KEY 5

KEY TO THE WESTERN ATLANTIC SPECIES OF NIDALIA

1a. Spindles slender, length about six times the diameter. Proximal part of introvert or neck-zone of polyps containing numerous flat scales with scalloped edges, and in addition many granulated platelets which abound also in the pharyngeal walls: *Nidalia occidentalis* Gray

1b. Spindles stout, coarse and often blunt, length only about four times the diameter, occasionally even less. Proximal part of introvert containing abundant platelets but few larger scales: *Nidalia rigida* Deichmann

8 **Nidalia occidentalis** Gray, 1835

(Figs. 9 h, 10 a–c)

Nidalia occidentalis GRAY 1835, p. 60. (Montserrat.)
Nidalia occidentalis, DEICHMANN 1936, p. 56, pl. 1 fig. 5; pl. 4 figs. 1–3. (Tortugas to Barbados, 38–170 fms.)
Nidalia occidentalis, UTINOMI 1958, p. 102, figs. 1–3. (Cape Canaveral, Fla.; Montserrat.)

Diagnosis. *Nidalia* with spindles having a diameter about one-sixth the length.

Material. USNM specimens: SOUTH CAROLINA. off Charleston (49676); FLORIDA, off Cape Canaveral, 7 spec. (50398); off Palm Beach, 9 spec. (49697, 49698); off Miami Beach 2 spec. (50158); off Sombrero Light (50397); DRY TORTUGAS (50396); in 20–170 fms.

Distribution. From South Carolina to Barbados, in 20 to 170 fathoms.

Remarks. The characteristic yellowish brown, clavate colonies of this species are a common constituent of shallow-water dredgings in the West Indian region.

Family **NEPHTHEIDAE** Gray, 1862 (emend. Utinomi, 1954)

In the Nephtheidae, the polyps, which are never dimorphic, are placed in clusters at the ends of the slender branches of predominantly arborescent colonies. This family, profusely abundant in the shallow waters of the Indo-Pacific, is not represented in the reef

habitat of the West Indies, and only sparsely so in greater depths. The two genera of the western Atlantic are separated by DEICHMANN (1936, p. 58) according to the following key.

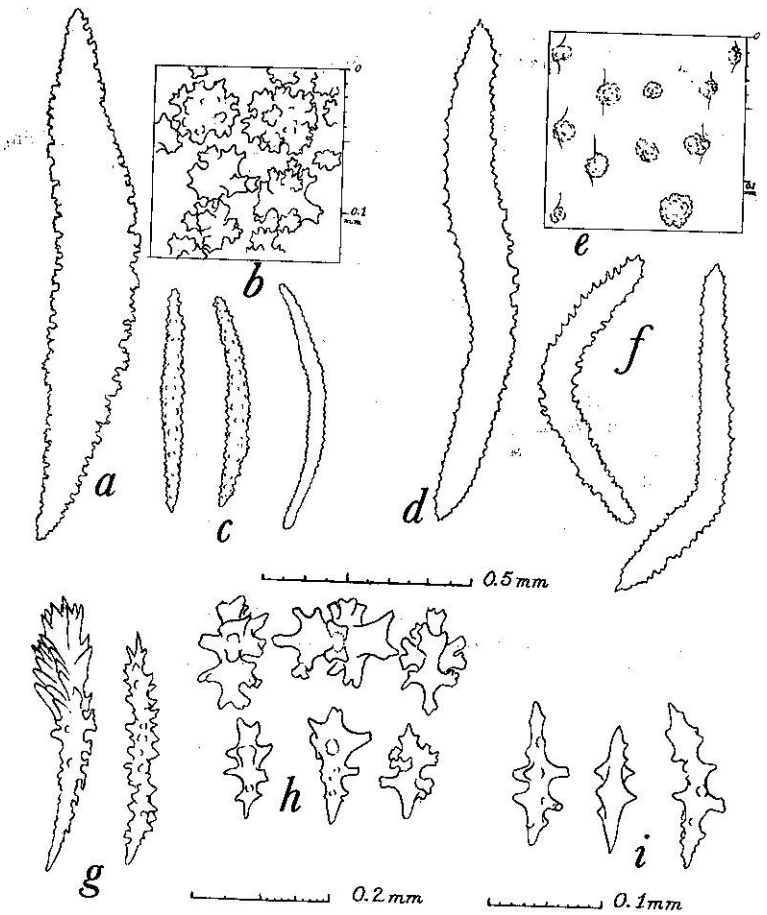


FIGURE 10. *Nidalia occidentalis* Gray, from Florida (USNM 50398): *a*, spindle of stalk; *b*, detail of ornamentation of spindle; *c*, anthocodial spindles. *Neospongodes portoricensis* (Hargitt), from Cuba (7184): *d*, spindle of stalk; *e*, detail of ornamentation of spindle; *f*, anthocodial spindles. *Eunephthya nigra* (Pourtalès), from Florida (15916): *g*, spicules from polyp walls; *h*, spicules from surface layer of stalk; *i*, spicules from interior of stalk. (Enlargement of *a*, *c*, *d*, and *f* indicated by 0.5 mm. scale between *c* and *d*; that of *b* and *e* by scales adjacent; that of *g* by 0.2 mm. scale adjacent; that of *h* and *i* by 0.1 mm. scale below *i*.)

KEY 6

KEY TO THE WESTERN ATLANTIC GENERA OF NEPHTHEIDAE

1a. Zooids in clusters or singly, without projecting bundles of spindles on their outer side: Genus *Eunephthya* Verrill.

1b. Zooids singly, with projecting bundles of spindles on their outer side: Genus *Neospongodes* Kükenthal

Genus **Eunephthya** Verrill, 1869

Eunephthya VERRILL 1869, p. 284. (Type species, *Nephthya thyrsoidea* Verrill 1865, by original designation.)
Eunephthya, DEICHMANN 1936, p. 59.

Diagnosis. Arborescent colonies with clusters of polyps at the branch ends; no bundles of supporting spicules on the outer side of the polyps.

Remarks. One species is fairly common at moderate depths in Florida waters, and may occur in the West Indies. Other species are found in the northern Pacific, the northern Atlantic, and South Africa.

9 **Eunephthya nigra** (Pourtalès), 1868

(Figs. 9 j, 10 g–i)

Nephthya nigra POURTALÈS 1868, p. 130. (Sand Key, Florida, 120 fms.)
Eunephthya nigra, DEICHMANN 1936, p. 60, pl. 1 fig. 7; pl. 4 figs. 5–13; pl. 27 figs. 1–2. (Florida Keys, 98–130 fms.)

Diagnosis. Colonies with a short stalk and compact, rounded clusters of polyps. Spicules of the polyps chiefly rods with simple projections, and bent clubs with foliate heads. Color, sepia brown or slaty gray, the polyps with eight pale bands where the longitudinally disposed spicules show through the epidermis.

Material. Off GEORGIA, 276–440 fms., 168 specimens (USNM 10506, 10543, 10813, 17045); FLORIDA, off Daytona, 438 fms., 20 spec. (USNM 14607, 15916); off Miami, 150 fms. (USNM 50157).

Distribution. Off southern Georgia to the Florida Keys, in 150 to 440 fathoms; not yet reported from the West Indies proper.

Genus **Neospongodes** Kükenthal, 1903

Neospongodes KÜKENTHAL 1903, p. 273. (Type species, *Neospongodes atlantica* Kükenthal, by subsequent designation: DEICHMANN, 1936.)
Neospongodes, DEICHMANN 1936, p. 66.

Diagnosis. Colonies arborescent; polyps in clusters or scattered on the terminal branches, supported by a group of stout spicules ('Stützbündel') on the abaxial side.

Remarks. Five species have been described in the western Atlantic, two of them off Brazil and three in the West Indies proper. Of these five, two, *Neospongodes agassizii* Deichmann and *N. caribaea* Deichmann, belong to the genus *Siphonogorgia*, not previously reported in the western Atlantic, and hence to the foregoing family. Only one true nephtheid seems to be at all common in the Caribbean area.

10 **Neospongodes portoricensis** (Hargitt), 1901

(Figs. 9 i, 10 d–f)

Spongodes portoricensis Hargitt 1901, in: Hargitt & Rogers, p. 279, fig. B. (Porto Rico, 75–76 fms.)

Neospongodes portoricensis, Deichmann 1936, p. 67, pl. 1 fig. 10; pl. 27 figs. 3–12. (St. Croix to Barbados, 56–264 fms.)

Diagnosis. A number of stubby branches arise from a stout stalk. Polyps tall and curved inward, supported by a group of stout, converging spindles that project little if at all. Operculum consisting of eight usually unequal pairs of bent spindles, and a few accessory rods. Color of colonies creamy white in alcohol; spicules colorless.

Material. Cuba, off Havana, 122 fms. (USNM 7184); off the north coast of Puerto Rico, 80–120 fms. (USNM 50399).

Distribution. Straits of Florida to Barbados (and possibly Brazil), in 38 to 278 fathoms.

Order **GORGONACEA** Lamouroux, 1816 (emend. Verrill, 1866)

Diagnosis. Polyps with uniformly short gastric cavities. An axial structure of some kind always present; either a dense, horny or calcareous central cylinder, or a medullar zone of spicules bound together more tightly than those of the cortex. Medullar spicules usually of different form, and sometimes different color, from those of cortex.

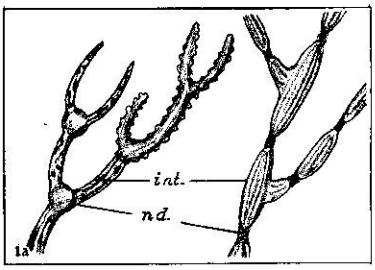
Distribution. Marine waters from Arctic to Antarctic; low tide line to the abyssal.

KEY 7

ILLUSTRATED KEY TO THE FAMILIES OF GORGONACEA

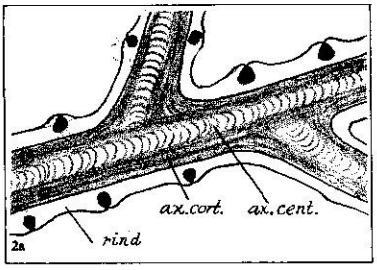
1a. The axis is composed of alternating horny and calcareous joints: 16

1b. The axis is not jointed: 2



2a. Axis with a soft, cross-chambered central core: 8

2b. Axis without a cross-chambered central core: 3

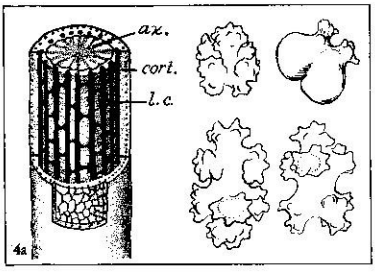


3a. The axis is a spicular medulla, in one family rigidly calcareous: 4

3b. The axis is a calcified but more or less flexible horny rod with a solid core: 12

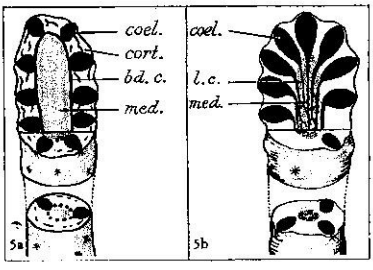
4a. The axis is solidly calcareous; cortical spicules chiefly capstans with 6, 7, or 8 rays, sometimes modified into double clubs: Family CORALLIIDAE

4b. The axis is a medulla containing separable spicules: 5



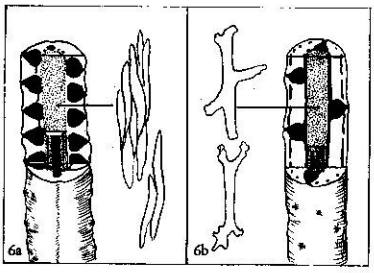
5a. The medulla is separated from the cortex by a ring of longitudinal boundary canals; no gastrodermal canals in medulla: 6

5b. No ring of boundary canals separating medulla from cortex; gastrodermal canals perforate the medulla: 7



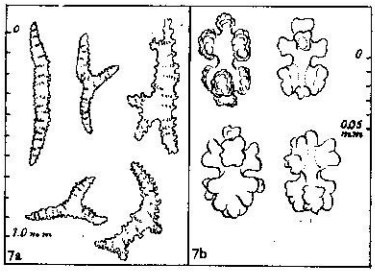
6a. Medullar spicules smooth and anastomosing. Two larger longitudinal canals on opposite sides of the branches: Family SUBERGORGIIDAE

6b. Medullar spicules ornamented with warts, spines or branching processes by which they may be joined together; longitudinal canals of about equal size: Family ANTHOTHELIDAE



7a. Polyps monomorphic. Cortical spicules fusiform, no capstans: Family BRIAREIDAE.

7b. Polyps dimorphic. Cortical spicules predominantly capstans: Family PARAGORGIIDAE

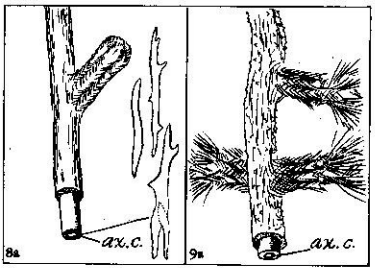


8a. The layer of axis surrounding the chambered core is composed of smooth flattened, fusiform spicules: Family KEROEIDIDAE

8b. The layer of axis surrounding the chambered core never contains calcareous material in spicular form: 9

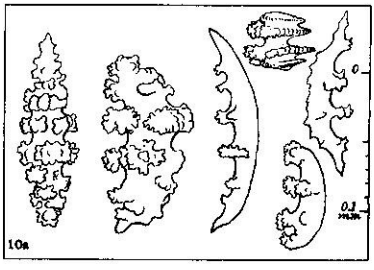
9a. The anthosteles project stiffly; polyps lack a neck-zone free of spicules, so that only the tentacles may be retracted: Family ACANTHOGORGIIDAE

9b. Anthocodiae retractile; if there are projecting anthosteles, a neck-zone with few or no spicules enables the anthocodiae to retract more or less completely: 10

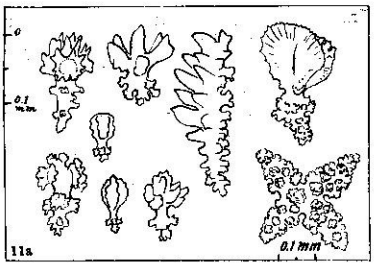


10a. Longest spicules rarely exceeding 0.2 mm., usually not over 0.15 mm.; tubercular sculpture in transverse belts, sometimes fused into disks; no clubs. Cortex of axis little loculated if at all: Family GORGONIIDAE.

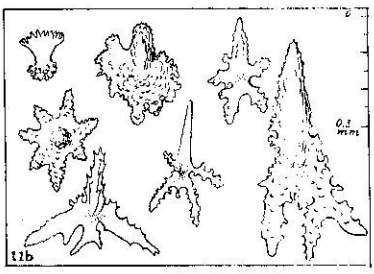
10b. Longest spicules exceeding 0.2 mm., often many times that size, with sculpture usually irregular and not arranged in transverse belts. Cortex of axis loculated: 11



11a. Spicules almost always including clubs of various kind; if clubs absent, the typical sclerites are 4-rayed 'butterflies', or large spindles often with spines on the outer surface. Crown usually weak and irregular. Branches usually stout: Family PLEXAURIDAE

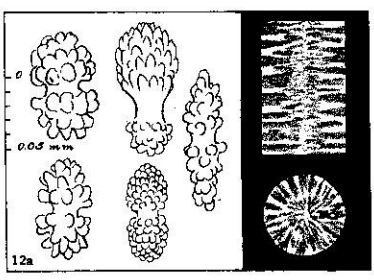


11b. Spicules including thornscales, stars, rosettes, foliate spindles, large plates or spindles, but no clubs. Crown strong, forming 8 regular points over a distinct transverse collaret. Branches usually slender: Family PARAMURICEIDAE



12a. Spicules as characteristic double heads or clubs. Axis calcification radially oriented: Family ELLISELLIDAE

12b. Spicules as minute corpuscles, large scales, or spindles. Axis calcification not radially oriented: 13

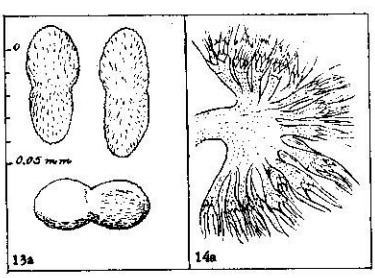


13a. Spicules as minute, discoidal or bidiscoidal corpuscles 0.025 to 0.07 mm. in greatest diameter: Family IFALUKELLIDAE

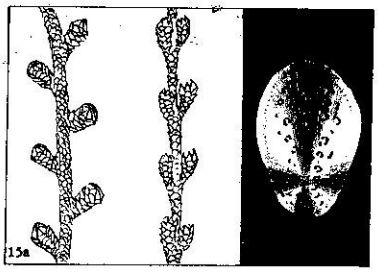
13b. Spicules as large scales or spindles: 14

14a. Polyps united by their bases to form polyp-leaves disposed biserially along unbranched stems. Spicules as scales: Family AINIGMAPTILIDAE

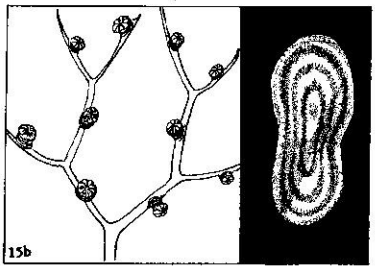
14b. Polyps isolated or in whorls, never united to form polyp-leaves: 15



15a. Branching pinnate, dichotomous or bushy, rarely simple. Axis with concentric layers strongly undulated. Polyps in pairs or whorls, sometimes scattered. Polyp spicules scale-like; branches with thick scales that may be irregular or elongate; scales showing a cruciform pattern in polarized light: Family PRIMNOIDAE

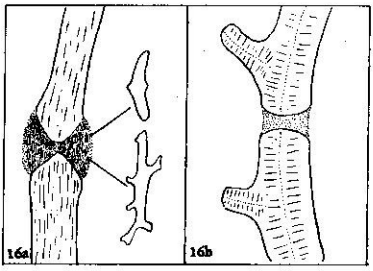


15b. Branches simple or dichotomously divided, arising from the mainstem spirally, rarely irregularly or unilaterally. Polyps scattered, sometimes biserial, not in pairs or whorls. Spicules scale-like, fusiform, or rod-like; scales showing a concentric pattern in polarized light: Family CHRYSOGORGIIDAE



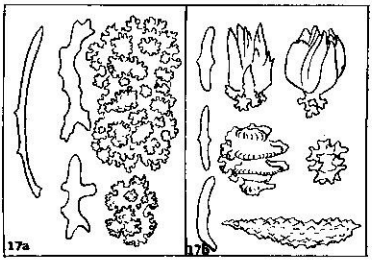
16a. The horny nodes contain spicules: 17

16b. The horny nodes contain no spicules whatever: Family ISIDIDAE



17a. Cortical spicules are thick plates (stellate in their young stages) closely fitted as in mosaic: Family PARISIDIDAE

17b. Cortical spicules are spindles, disk-spindles or clubs, not flat plates: Family MELITHAEIDAE



Suborder *SCLERAXONIA* Studer, 1887

Diagnosis. Gorgonaceans with axial structure composed of spicules, either free or inseparably fused.

Remarks. The waters of the West Indian region are not rich in scleraxonians, of which only three species are commonly encountered in reef habitats; they are readily recognized by their encrusting or lobate colonial form. The arborescent species of somewhat deeper water have a central axis of closely packed spicules that affords the colonies a considerable degree of rigidity.

Distribution. Except for a few boreal species, the suborder is limited to warm waters. The greatest number of species occurs in the East Indies and Philippines, but there is moderate representation in the West Indies. They inhabit depths from low tide to the abyssal.

Family **BRIAREIDAE** Gray, 1859

Diagnosis. Monomorphic Scleraxonia with a continuous medulla containing separable spicules, which is perforated by gastrodermal canals all the way to the branch tips, and which is not separated from the cortex by a ring of boundary canals.

Distribution. Tropical western Atlantic; Indo-Pacific.

Genus **Briareum** Blainville, 1830

Briareum Blainville 1830, *6o*, p. 484. (Type species, *Briareum gorgonoideum* Blainville = *Briareum asbestinum* (Pallas), by monotypy.)

Asbestia Nardo 1845, p. 106. (Type species, *Asbestia asbestina* (Pallas), by monotypy.)

Solenopodium Kükenthal 1916a, p. 174. (Type species, *Solenopodium stechei* (Kükenthal), by subsequent designation: Kükenthal 1916b, p. 468).

Briareum, Kükenthal 1919, p. 45.

Briareum, Deichmann 1936, p. 79.

Diagnosis. Briareids with large, tuberculate spindles and three-armed bodies.

Remarks. The phylogenetic position of this genus has long been the subject of debate. The most recent, as well as the most thorough, investigation of the matter is that of VERSEVELDT (1940, p. 9), but I believe that his conclusion regarding the relationship of *Briareum* remains open to question because of certain points of interpretation. Consequently, the usual arrangement of the genus among the Gorgonacea is retained, at least for the present.

I can find no reason for retaining the Pacific species of *Solenopodium* in a separate genus. Moreover, KÜKENTHAL's *Erythropodium marquesarum* undoubtedly came from the Atlantic rather than the Pacific Marquesas and therefore belongs also to *Briareum*. This view is borne out by the fact that KÜKENTHAL described from the same collection (KÖLLIKER's, in Munich) a *Eunicella marquesarum*, which is nothing more than the common West Indian *Plexaura flexuosa*.

11 **Briareum asbestinum** (Pallas), 1766

(Fig. 11)

Alcyonium asbestinum PALLAS 1766, p. 344. (Mare Americanum.)
Briareum gorgonoideum BLAINVILLE 1830, 60, p. 484.
not *Alcyonium gorgonoides* ELLIS & SOLANDER 1786, p. 181, p. 9 figs. 1–2. [A zoanthid.]
Ammothea polyanthes DUCHASSAING & MICHELOTTI 1860, p. 15, pl. 1 fig. 6 (St. Thomas.)
Erythropodium marquesarum KÜKENTHAL 1916a, p. 173. [Nomen nudum.]
Briareum asbestinum, KÜKENTHAL 1916b, p. 469, figs. F–H, pl. 23 fig. 2. (Florida; Tortugas; Haiti; St. Thomas.)
Erythropodium marquesarum KÜKENTHAL 1919, p. 34, figs. 1–7. (Marquesas-Inseln in 22–37 m Tiefe.)
Erythropodium polyanthes, DEICHMANN 1936, p. 77, pl. 5 fig. 23. (St. Thomas; type material.)
Briareum asbestinum, DEICHMANN 1936, p. 79, pl. 5 figs. 1–2. (Carysfort Reef, Florida.)
Briareum asbestinum, VERSEVELDT 1940, p. 9, figs. 2–4.

Diagnosis. As for the genus.

Material. In Dr. Hummelinck's collection the species is represented from ST. BARTHÉLEMY, island of La Fourche, on rock debris at 2 m., sta. 1124, 2. VI. 1949, 2 dry colonies, 1 in alcohol (USNM 50400, 51314). Found by Dr. J. H. Stock at ST. EUSTATIUS, Gallows Bay, 11. II. 1959, dried piece (Amsterdam).

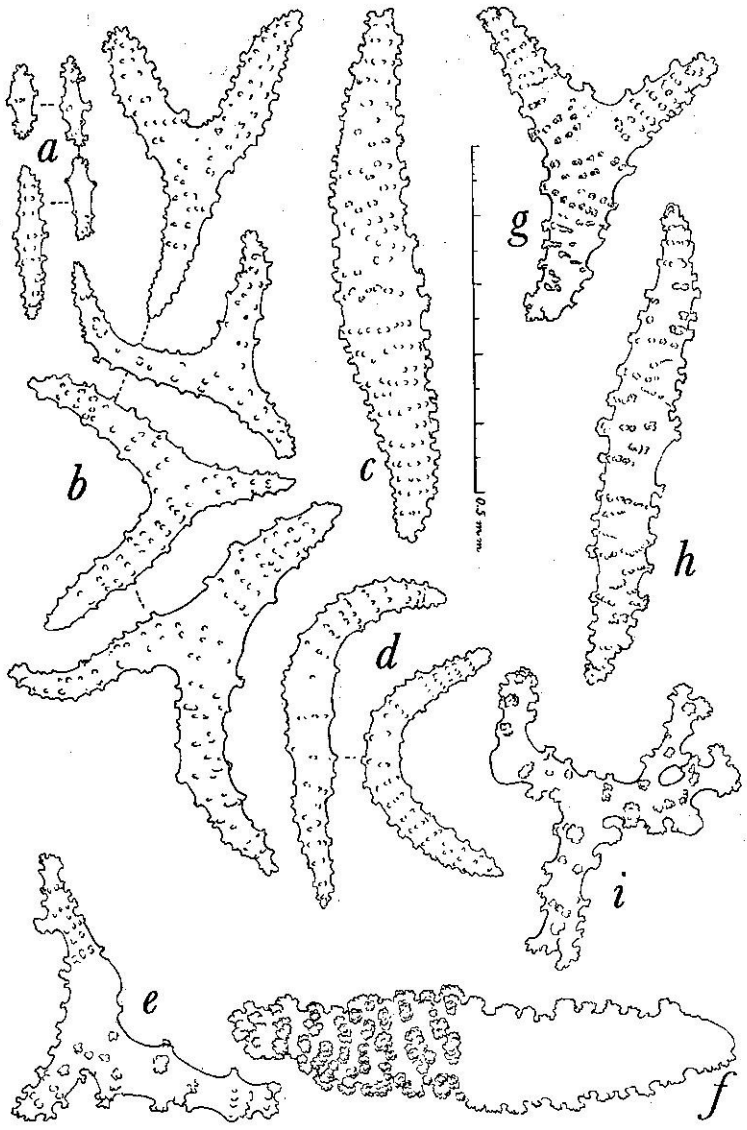


FIGURE 11. *Briareum asbestinum* (Pallas). *a–f*, spicules of a specimen from St. Barts (USNM 50400): *a*, stubby rods of outer layer; *b*, colorless tripods of outer layer; *c*, white spindles of outer layer; *d*, curved white spindles of outer layer; *e*, purple tripod of inner layer; *f*, purple spindle of inner layer (sculpture partially shown). *g–i*, spicules of one of the original specimens of *Ammothea polyanthes* from St. Thomas (Leiden Museum): *g*, colorless tripod of outer layer; *h*, colorless spindle of outer layer; *i*, purple tripod of inner layer. (All figures drawn to the same scale.)

From the collections of the U.S. National Museum, the following were also examined: southern FLORIDA, including the Keys (43228, 49668); the BAHAMAS (33034, 43220, 43257, 50401); CUBA (49476); OLD PROVIDENCE, 3 lots (44110–44112); ANTIGUA (43069); BARBADOS (43413); TOBAGO, Milford Bay (51413); MEXICO, Arrecife Alacranes, Yucatan (51428, 51452, 51460), Cozumel Isl., Quintana Roo (51453).

Distribution. Southern Florida, the Bahamas, Caribbean Sea, and the West Indian Islands south to Barbados.

Remarks. This exceedingly variable species is common from southern Florida through most of the West Indies. Colonies may be erect and lobate or digitate, or merely encrusting (sometimes upon the dead axes of other gorgonians). The polyps are very large in the expanded state (STIASNY 1935b, p. 182, fig. 1), purplish gray in color; they are packed with zooxanthellae and lack spicules. Protruding, false calyces appear in varying degrees of prominence, due largely to conditions of preservation; in some specimens, they are tall, flexible tubes, in others only low verrucae, and in many they do not project at all. There are usually some fully retracted polyps on specimens that show very prominent calyces, indicating that the character is not of a morphological nature. The coenenchyme contains a cortical zone of predominantly colorless spicules, straight or curved spindles of large size and many tripods (Fig. 11 b–d); and a medullar zone with mostly purple spicules shaped like those of the cortex but larger and coarser (Fig. 11 e–f), and a number of branching bodies among which some coalescence may occur. In erect colonies, the medulla is perforated by coelenteric canals that connect directly with the gastric cavities of the polyps.

On figure 11 are also shown examples of spicules from one of DUCHASSAING & MICHELOTTI's original specimens of *Ammothea polyanthes* from St. Thomas (g–i), which has generously been made available by Dr. L. B. HOLTHUIS of the Leiden Museum. It is entirely possible that studies in the field will reveal characters permitting the recognition of *Erythropodium polyanthes* as a valid species, but preserved material does not justify such a separation at the present time.

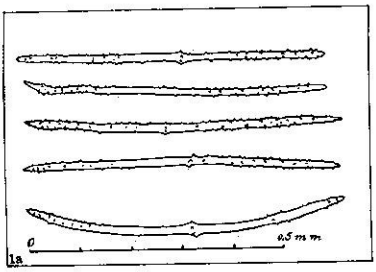
Family **ANTHOTHELIDAE** Broch, 1916

Diagnosis. Monomorphic Scleraxonia with a circle of longitudinal boundary canals separating medulla from cortex. Solenia perforating the medulla in larger branches. Spicules fusiform, sometimes clavate or bent, occasionally with radiate bodies and capstans.

KEY 8

ILLUSTRATED KEY TO THE WEST INDIAN SUBFAMILIES AND GENERA OF ANTHOTHELIDAE

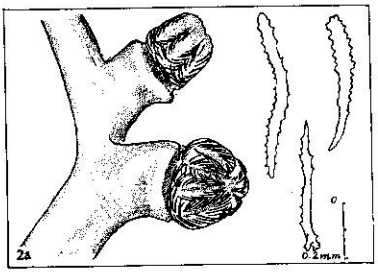
1a. The medullar spicules are long, prickly needles (subfamily Semperininae): Genus *Iciligorgia*



1b. The medullar spicules are stouter and not needle-like: 2

2a. Branches slender, polyps with prominent, cylindrical calyces; anthocodiae usually exsert, their spicules often clavate. Cortical spicules not capstans (subfamily Anthothelinae): Genus *Anthothela*

2b. Branches stouter, calyces conical or hemispherical; anthocodiae retractile, without clavate spicules. Cortex with capstans or radiate forms, at least in calyces and outer layer (subfamily Spongiodermatinae): 3

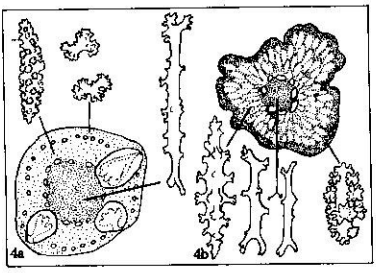


3a. The cortical spicules include many elongate spindles: 4

3b. The cortical spicules are predominantly radiate forms: 5

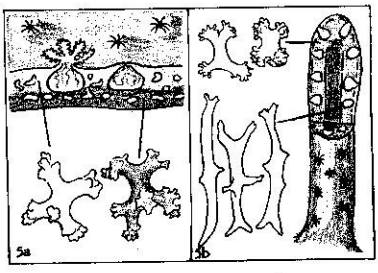
4a. Colonies arborescent, red or yellow. Outer cortex with many small radiates as well as large spindles; inner cortex not vesicular, with spindles only. Medullar rods with branching processes: Genus *Diodogorgia*

4b. Colonies clavate, unbranched, white. Outer cortex thin, filled with belted spindles and capstans; inner zone thick, vesicular with long, warted spindles. Medullar rods forked at one or both ends: Genus *Tripalea*



5a. Colonies are encrusting sheets. Spicules chiefly 6-radiates, those of medulla red, partially fusing: Genus *Erythropodium*

5b. Colonies with erect, digitate branches. Medullar spicules are elongate, branching rods unlike the cortical radiates: Genus *Titanideum*



Genus **Iciligorgia** Duchassaing, 1870

Iciligorgia DUCHASSAING 1870, p. 12. (Type species, *Iciligorgia schrammi* Duchassaing, by monotypy.)
Iciligorgia, DEICHMANN 1936, p. 82.

Diagnosis. Anthothelidae with long, slim needles in the medulla; polyps biserial, forming low calyces.

Remarks. This genus appears to be strictly West Indian, with a single species. Its nearest relatives are *Solenocaulon*, which forms colonies with a peculiar, tubular main stem, and *Semperina*, which differs in having the polyps scattered on one face of the branches rather than biserially disposed.

The Pacific species described by AURIVILLIUS (1931, p. 11) as *Iciligorgia boninensis* belongs to the genus *Anthothela*. The Indo-Pacific *Alertigorgia* (= *Machaerigorgia*) *orientalis* (Ridley), which was originally, and has been subsequently, referred to *Iciligorgia*, actually belongs in a distinct genus.

12 **Iciligorgia schrammi** Duchassaing, 1870

(Fig. 12; Frontispice)

Iciligorgia schrammi DUCHASSAING 1870, p. 12. (Guadeloupe.)
Iciligorgia ballini KÜKENTHAL 1908, p. 17. (St. Thomas.)
Iciligorgia schrammi, DEICHMANN 1936, p. 82, p. 5 figs. 3–5. (Dry Tortugas; Dominica; Montserrat.)
Iciligorgia schrammi, BAYER 1959, p. 6, fig. 2. (Brazil.)

Diagnosis. Colonies dichotomously branched, mostly in one plane; twig ends fistulose (Fig. 12a); polyps biserial, forming low calyces that may be undetectable in dry material; anthocodiae strongly armed with spindles 'en chevron'; cortex with tuberculate rods (Fig. 12 b); medulla with long, slender needles (Fig. 12 c). Color, brown.

Material. From the U. S. National Museum: FLORIDA, off Palm Beach (49709, 49710, 49941); off Elliott Key (49609); off CAT CAY, Bahamas (50161); CUBA, off Havana (7208, 10134, 17053, 44092, 44093); north of PUERTO RICO (43796); BRAZIL, off mouth of Amazon River (50846).

Distribution. East coast of Florida, the Bahamas and West Indies, south to the mouth of the Amazon River; 6–196 fathoms.

Remarks. This very distinct species could hardly be mistaken for any other in the West Indies. Near the end of the twigs, the edges of the branches are rolled back and joined medially to produce a distinctly fistulose condition (Fig. 12 a). In this regard, *Iciligorgia schrammi* is very close to the genus *Semperina*, differing chiefly in the biserial arrangement of the polyps. The tendency to produce tubular branches reaches its highest development in the East Indian *Solenocaulon*, in which the edges of the main stem recurve and meet to form a wide, hollow tube, while the small twigs exactly resemble those of *Iciligorgia*. The spiculation, especially that of the medulla, is very similar in all three genera.

Genus **Anthothela** Verrill, 1879

Anthothela Verrill 1879a, 32. (Type species, *Anthothela grandiflora* (Sars), by monotypy.)
Anthothela, Verrill 1879, p. 199
Anthothela, Verrill 1922, p. 18.

Diagnosis. Anthothelidae forming colonies of slender, crooked branches without large main stems. Calyces prominent, cylindrical; anthocodial armature strong. Spicules of medulla as strongly

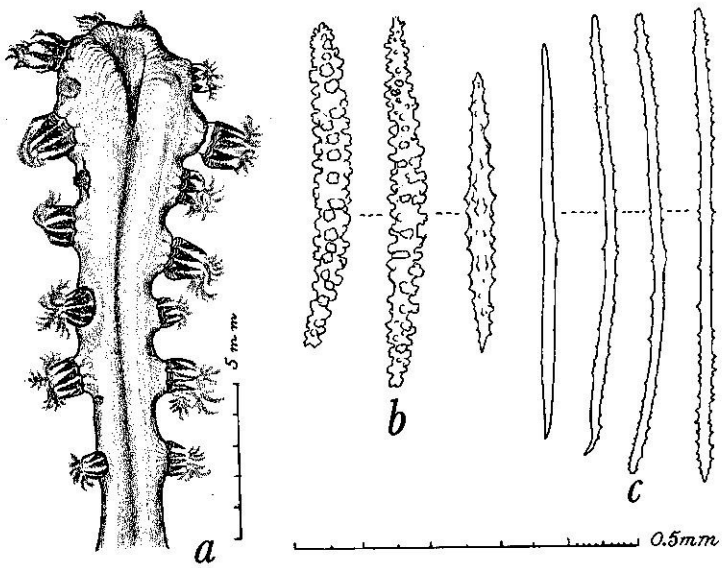


Figure 12. *Iciligorgia schrammi* Duchassaing, from Florida (USNM 49609): *a*, twig end with exsert anthocodiae; *b*, cortical spindles; *c*, medullar needles. (Enlargement of *a* indicated by adjacent 5 mm. scale; that of *b–c* by 0.5 mm. scale.)

thorny spindles; stem cortex and calyx walls containing many bent or clavate spindles; no radiate bodies.

Remarks. In the western Atlantic, the genus *Anthothela* is represented by the type species, *A. grandiflora*, which is common on the Grand Banks and extends south, in deep water, to Fernandina, Florida. A new species is here described, the first record for the genus in the Gulf of Mexico.

13 **Anthothela tropicalis** spec. nov.

(Fig. 13)

Diagnosis. *Anthothela* with surface of calyces and cortex roughened by the projecting ends of angularly bent spindles. Crown with eight points composed of spinose spindles 'en chevron', resting upon a wide and diffuse collaret of many transverse rows of spindles.

Description. The type consists of several crooked branches that seem to have been part of a tangled mass. The branches are cylindrical, about 2.0 mm. in diameter, bearing polyps widely separated on all sides. The polyps are fully retractile within cylindrical calyces about 1.5 mm. tall, but most are exsert in preservation (Fig. 13 g). The anthocodiae have a strong crown consisting of eight points of crowded, curved, spinose spindles 0.3–0.4 mm. long (Fig. 13 b) arranged 'en chevron', merging into a broad zone of transversely placed spindles that form a diffuse collaret. The tentacles contain smaller, spinose spindles with the spines larger at one end than elsewhere (Fig. 13 a), longitudinally arranged. In the pharynx are found numerous slender, spinose spindles about 0.1 mm. long (Fig. 13 f). The surface of calyces and cortex is thorny in appearance due to the projecting ends of bent 'hockey-stick' spindles. In the calyces, where they are best developed, these spicules are mostly 0.4–0.8 mm. long (fig. 13 e); in the cortex they are smaller and many ordinary spindles are mixed with them (Fig. 13 d). The medulla contains slender, sharply thorny spindles of diverse size (Fig. 13 c), often exceeding a length of 0.5 mm. The cortex is separated from the medulla by a ring of longitudinal boundary canals (Fig. 13 h), but the material is not sufficiently well-preserved to determine the extent to which the medulla is perforated by solenia. The colonies are ivory white in alcohol.

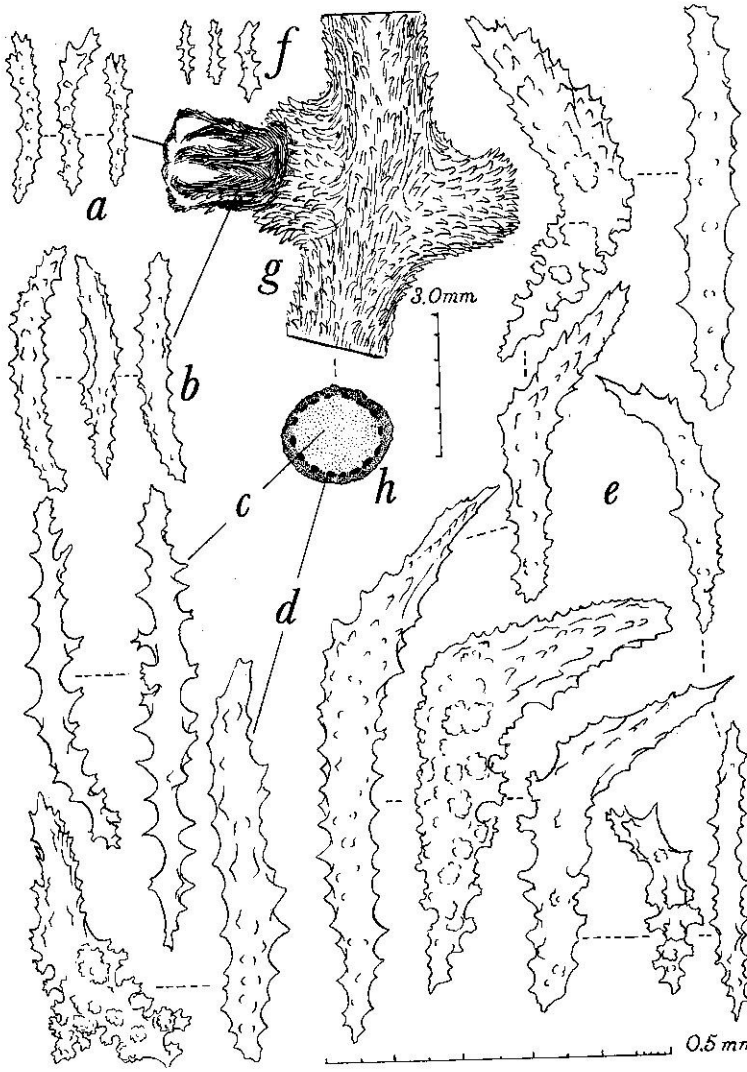


FIGURE 13. *Anthothela tropicalis* spec. nov.; the holotype from Texas (USNM 50650): *a*, tentacular spicules; *b*, crown spicules; *c*, medullar spindles; *d*, cortical spindles; *e*, calycular spicules; *f*, spinose rods of pharynx; *g*, part of branch with exsert polyp; *h*, cross section of stem. (Enlargement of *g–h* shown by 3.0 mm. scale adjacent; that of all spicules by 0.5 mm. scale at *e*, lower right.)

Material. Holotype: southeast of Galveston, TEXAS, 27°32′ North, 93°01.6′ West, 400–450 fms., *Oregon* sta. 534, 11.IV.1952 (USNM 50650).

Remarks. This deep-water species is described here because of its unusual interest. It is the first find of the genus *Anthothela* in the Gulf of Mexico, and is closely related to *Anthothela pacifica* (Kükenthal) of the Pacific coast, with which it forms a twin pair.

Anthothela tropicalis differs from *A. grandiflora* and resembles *A. pacifica* in the rough surface resulting from the projecting spicules. It differs from *A. pacifica* in having smaller and more numerous spicules in the crown, and a broader collaret.

Genus **Tripalea** Bayer, 1955

Tripalea BAYER 1955a, p. 208. (Type species, *Suberia clavaria* Studer 1878, by original designation.)

Diagnosis. Monomorphic Scleraxonia producing erect colonies with the medulla lacking solenia and separated from the cortex by a ring of boundary canals. Cortex consisting of two layers: a thick inner layer with many wide lacunae whose walls contain relatively few spicules (Fig. 14 a–b); and an outer dense layer packed with spicules (Fig. 14 a, c), which extends into the inner cortex as an investement of the gastric cavities of the polyps. Outer layer with capstans and short, belted spindles; spongy layer with elongate, belted spindles; medulla with forked rods.

Remarks. This genus was erected to receive *Suberia clavaria* because the type species of *Suberia* (*S. höllikeri*) was removed to the genus *Semperina*, making the genera synonymous. The structure of *S. clavaria* is unique among scleraxonians and fully warrants a separate genus.

My statement (BAYER 1955, p. 208) that there are solenia in the medulla is incorrect. The longitudinal canals, which are coelenteric, originate at the periphery of the medulla and, as growth proceeds, appear to be pushed apart by the enlarging medulla and somewhat imbedded in its outermost region. I have examined several more specimens and have been able to observe the tip of the medulla; nowhere is it perforated by coelenteric canals.

The extension of the polyps as long coelenteric canals is strongly suggestive of *Briareum*, but in *Tripalea* the medulla takes form between the uppermost polyps and the canals lie in a ring around it, becoming farther and farther apart as the medulla increases in diameter proximad. The circular canal system is not continuous since it consists of coelenteric extensions of polyps that arose at different levels in the colony; it is, however, a boundary system in the broad sense and *Tripalea* must, for the time, be reckoned among the Anthothelidae. Its long coelenteric canals, arranged in a ring between cortex and medulla, give it a position intermediate between *Briareum* and the anthothelid genera.

The intercommunicating lacunae of the deeper, spongy cortex probably represent a highly aberrant solenial system. The mesogloea separating them is much reduced and contains but few spicules.

Further studies upon the anatomy of this genus are badly needed; unfortunately, the limited material at my disposal is neither sufficient in quantity nor well enough preserved to make this possible.

14 **Tripalea clavaria** (Studer), 1878

(Fig. 14)

Suberia clavaria STUDER 1878, p. 667, p. 5 fig. 38 a–b. (35°0.1′ South, 54°24.9′ West; 36°48′ South, 55°35′ West.)
Suberia clavaria, KÜKENTHAL 1919, p. 85, figs. 32–38, p. 35 fig. 25. (Punta Medanos, Ost-Patagonien; Montevideo.)

Diagnosis. As for the genus.

Material. Three lots from URUGUAY, vicinity of Montevideo (USNM 43421, 50403, 50404).

Distribution. Off the eastern coast of South America.

Remarks. The spiculation and character of the cortex make *Tripalea clavaria* readily distinguishable from white colonies of *Titanideum* (which are very uncommon). The spicules of the outer layer are capstans and short, blunt, belted spindles (Fig. 14 b); those of the inner, spongy layer are longer spindles with less crowded sculpture (Fig. 14 c). KÜKENTHAL (1919) incorrectly figures the latter for medullar sclerites, which in reality are forked rods (Fig. 14 d).

Tripalea clavaria is apparently a cool-water species. The surface temperature at the point of collection of one of the above lots (43421) was 68°F. The northern limit of its range, so far as known, is Rio de Janeiro, and it probably does not enter West Indian waters.

Genus **Diodogorgia** Kükenthal, 1919

Diodogorgia KÜKENTHAL 1919, p. 96. (Type species, *Diodogorgia ceratosa* Kükenthal = *Solanderia nodulifera* Hargitt, by monotypy.)
Diodogorgia, DEICHMANN 1936, p. 85.

Diagnosis. A ring of boundary canals separates medulla from cortex; a plexus of solenia divides cortex into a thin outer and a

thick inner layer. Cortex with long spindles having tubercular sculpture and, in the surface layer, many small, radiate sclerites which continue into the lower part of the polyp walls; medulla with branched rods.

Remarks. The various described forms seem referable to a single variable species, which takes the oldest available name.

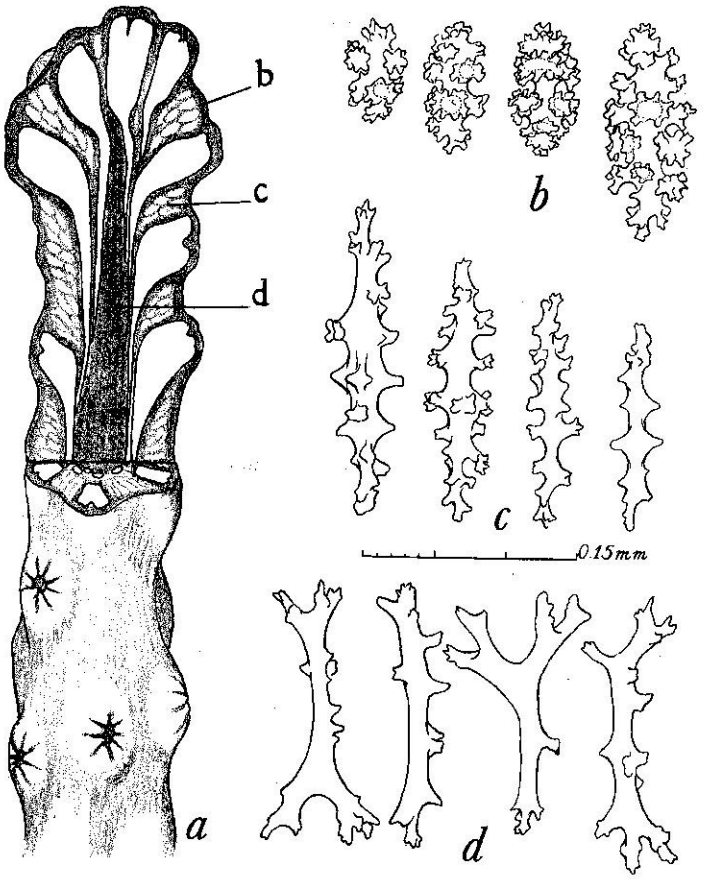


FIGURE 14. *Tripalea clavaria* (Studer); a specimen from Uruguay (USNM 43421): *a*, part of a branch with the tip in cross section, showing dense outer cortex (b), spongy inner cortex (c), and medulla (d); *b*, spicules of outer cortex; *c*, spicules of inner cortex; *d*, spicules of medulla. (All spicules drawn to the same scale, as indicated at *c*.)

15 **Diodogorgia nodulifera** (Hargitt), 1901

(Fig. 15)

Solanderia nodulifera Hargitt 1901, in: Hargitt & Rogers, p. 279, fig. C 1, 3–5. (St. Thomas.)
Solanderia crustata Hargitt 1901, in: Hargitt & Rogers, p. 280, fig. C 2, 6–7. (Mayaguez Harbor.)
Diodogorgia ceratosa Kükenthal 1919, p. 97, figs. 44–52. (Golf von Mexico.)
Diodogorgia cervicornis Kükenthal 1919, p. 645. (St. Thomas.)
Corallium vanderbilti Boone 1933, p. 51, pls. 12–14. (Casilda, south coast of Cuba, in 100+ fathoms.)
Diodogorgia ceratosa, Deichmann 1936, p. 86. (Cumaná, Venezuela.)
Diodogorgia nodulifera, Deichmann 1936, p. 87, pl. 5 figs. 11–19. (Florida; Tortugas; Great Bahamas Bank; St. Croix; Montserrat.)
Diodogorgia nodulifera, Bayer 1959, p. 6, fig. 3 (Surinam.)

Diagnosis. Surface layer of cortex with many small 4-, 5-, and 6-radiate sclerites (Fig. 15 b, f, j), which are numerous also in the calyx walls; deeper layer with tuberculate spindles and rods (Fig. 15 a, d, h); medulla with branched rods (Fig. 15 c, e, i).

Material. Hargitt's type of *Solanderia nodulifera:* off St. Thomas, Sail Rock W. by N. 1/2 N., 6 miles, 20–23 fms., coral, *Fish Hawk* sta. 6079, 6.II.1899 (USNM 42607). Hargitt's type of *Solanderia crustata:* Mayaguez Harbor, Puerto Rico, tangent of land about Pt. Melomas S. 13-1/2 miles, Custom House E. 1/4 N., 4–3/8 miles, 33–1/2 fms., sand and mud, *Fish Hawk* sta 6064, 20.I.1899 (USNM 42609). Also examined were several stout, red colonies all from Florida vicinity of Palm Beach (USNM 49702, 49703, 49704, 49929); 1 specimen yellow with red calyces, from Palm Beach (USNM 49705); and some uniformly yellow or orange colonies, often with very tall calyces, from Puerto Rico (USNM 50424), and from Panama and the Gulf of Darien (USNM 7612, 16547); and one small pink colony from Surinam (USNM 50791).

Distribution. Southern Florida, Greater and Lesser Antilles, and the shores of South America as far as Surinam, in 20–100 fathoms.

Remarks. I have before me typical specimens of *Diodogorgia ceratosa* as originally described by Kükenthal, Hargitt's types of *Solanderia nodulifera* and *S. crustata*, robust material like that called *D. ceratosa* by Deichmann, slim specimens with extremely prominent calyces even taller than those described for *D. cervicornis*, and several additional specimens more or less closely resembling the type of *S. nodulifera*. The spicules are of the same kind in all, though varying somewhat in size, and I can find no consistent correlation between spicular variation and colonial variation. The commonest form seems to be the yellow sort with red patches around the calycular apertures.

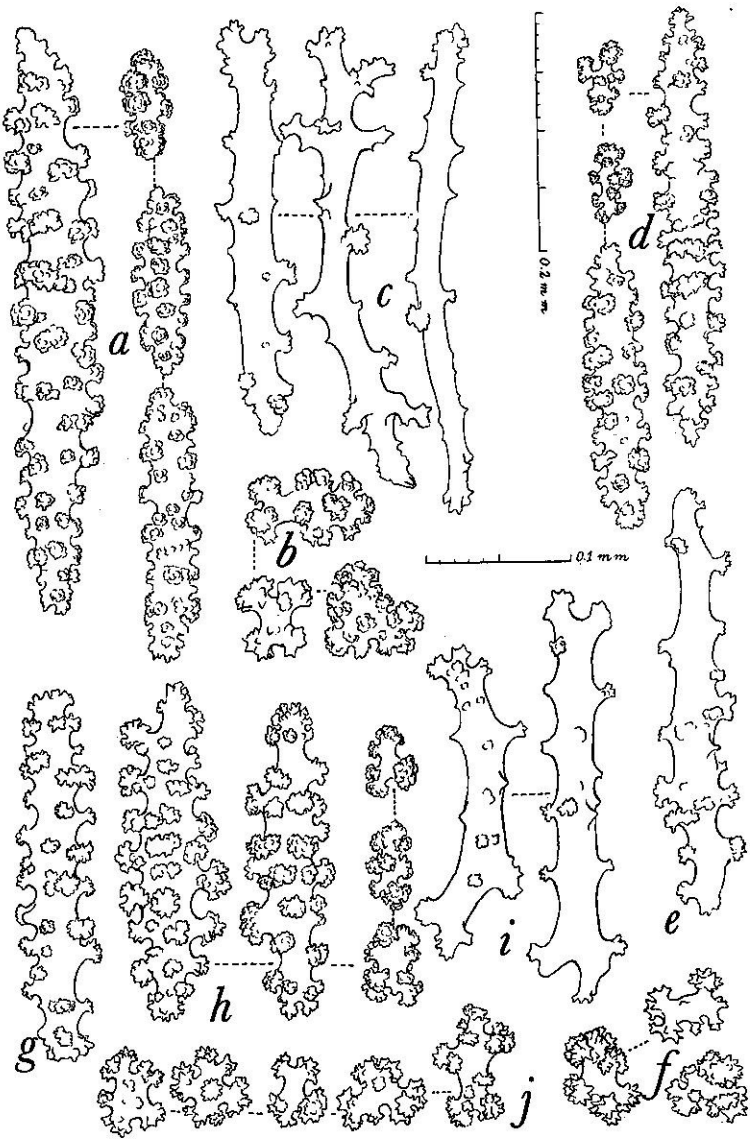


FIGURE 15. *Diodogorgia nodulifera* (Hargitt), from Panama, spicules. *a–c*, of a slender specimen like *D. cervicornis* (USNM 16547): *a*, cortical spindles; *b*, radiates from lower part of anthocodiae; *c*, medullar rods. *d–f*, of Hargitt's type of *S. nodulifera* from St. Thomas (42607): *d*, cortical spicules; *e*, medullar rod; *f*, radiates from lower part of anthocodiae. *g–j*, of a stout specimen with inconspicuous calyces from Florida (49703): *g*, spindle from deeper cortex; *h*, spicules of outer cortex; *i*, medullar rods; *j*, radiates from lower part of anthocodiae. (Enlargement of *b*, *f*, and *j* indicated by 0.1 mm. scale at right of *b*; that of all other spicules by 0.2 mm. scale left of *d*.)

In the accompanying figure are illustrated spicules from the type specimen of *S. nodulifera* (Fig. 15 d–f); from a stout, red specimen from Florida (Fig. 15 g–i); and from a slender, '*ceratosa*-type' colony from the Gulf of Darien (Fig. 15 a–c).

Genus **Erythropodium** Kölliker, 1865

Erythropodium KÖLLIKER 1865, p. 141. (Type species, *Xenia carybaeorum* [*sic*] Duchassaing & Michelotti, by monotypy.)

Diagnosis. Colonies membranous. Spicules all 6-radiates, colorless in the outer cortex, red in the inner.

Remarks. In my opinion, the species subsequently referred to this genus belong elsewhere. *Erythropodium polyanthes* and *E. marquesarum* are considered synonymous with *Briareum asbestinum*, and the genus *Erythropodium* thus reverts to its monotypic status. Its closest relative appears to be VERRILL's genus *Callipodium* from the Panamic province, but the colonies of that genus have a different form as well as a somewhat different spiculation.

16 **Erythropodium caribaeorum** (Duchassaing & Michelotti), 1860

(Fig. 16 e–h)

Xaenia caribaeorum DUCHASSAING & MICHELOTTI 1860, p. 16, pl. 1 figs 8–11 (St. Thomas.)

Erythropodium carybaeorum, KÖLLIKER 1865, p. 141, p.l 12 figs. 10–11.

Erythropodium caribaeorum, KÜKENTHAL 1916b, p. 445, figs. A–E (Ostküste von St. Thomas; Golf von Kingston auf Jamaika: Drunken-Man Key bei Port Henderson.)

Diagnosis. As for the genus.

Material. ST. EUSTATIUS, Gallows Bay, rocky beach at 1–2 m, sta. 1116B, Hummelinck coll., 15.VII.1949, 2 dry spec., one growing on *Coralliophila* (USNM 52049).

Also single USNM specimens from FLORIDA, Biscayne Key (44143); ST. JOHN (44142); and OLD PROVIDENCE (44147).

Distribution. From southern Florida to the Virgin Islands; Caribbean Sea. Apparently uncommon.

Remarks. KÖLLIKER's figures establish the identity of this species beyond a doubt, and KÜKENTHAL's description considerably elaborates our knowledge of it.

The colonies form thin, firm, purplish-gray expansions on rocks; when the polyps

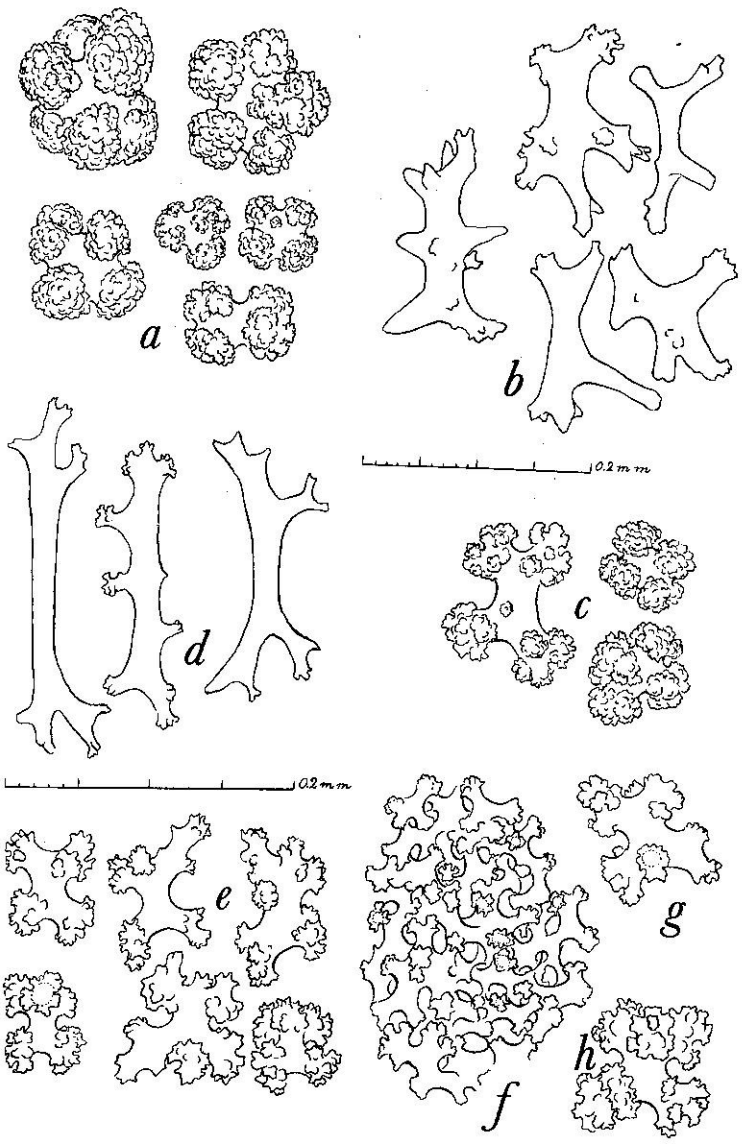


FIGURE 16. *Titanideum frauenfeldii* (Kölliker), spicules. *a–b*, of a specimen from Florida (USNM 50425): *a*, radiates from cortex; *b*, branched bodies from medulla. *c–d*, of a specimen from off Cape Fear (16842): *c*, radiates from cortex; *d*, branched bodies from medulla. *Erythropodium caribaeorum* (Duchassaing & Michelotti), spicules of a specimen from Florida (44143): *e*, colorless radiates from outer layer; *f*, cluster of fused red radiates of innermost layer; *g–h*, red radiates of inner layer. (Enlargement of *a–d* indicated by 0.2 mm. scale below *b*; that of *e–h* by 0.2 mm. scale above *e*.)

are retracted, slightly projecting calyces may be visible, but more often only star-shaped apertures. The spicules are all derivatives of 6-radiates; those of the inner layer (Fig. 16 g–h), red in color, do not differ materially from the colorless spicules of the cortex (Fig. 16 e) except that they may be a little larger and more ornately sculptured, and may fuse into a solid basement layer (Fig. 16 f).

Genus **Titanideum** Verrill, 1864

Titanideum Verrill 1864, p. 39. (Type species, *Gorgonia suberosa* Ellis & Solander 1786 (not Pallas 1766) = *Solanderia Frauenfeldii* Kölliker 1865, by monotypy.)
Titanideum, Deichmann 1936, p. 83.

Diagnosis. Branches erect, cylindrical; medulla separated from cortex by a ring of longitudinal boundary canals; cortex divided into two layers by a plexus of solenia. Cortical sclerites in the form of short radiate bodies with three to six rays; no spindles; medulla with elongate, branched bodies.

Remarks. This genus is distinguished from *Diodogorgia* by the absence of elongate spindles in the cortex. The evidence afforded by the literature indicates that the South African genus *Spongioderma* differs in no important regard.

17 **Titanideum frauenfeldii** (Kölliker), 1865

(Fig. 16 a–d)

Gorgonia suberosa Ellis & Solander 1786, p. 193. (Coast of South Carolina.)
not *Gorgonia suberosa* Pallas 1766, p. 191. [= *Subergorgia suberosa*.]
Titanideum suberosum, Verrill 1864b, p. 39. (Charleston, S.C.; Beaufort, N.C.; Stono Inlet.)
Solanderia Frauenfeldii Kölliker 1865, p. 141, pl. 19 figs 19–20, 22.
Titanideum suberosum, Deichmann 1936, p. 83, pl. 5, figs. 6–10 (Charleston, S.C.; Beaufort, N.C.; Garden Key, Dry Tortugas.)

Diagnosis. As for the genus.

Material. From the U.S. National Museum: North Carolina, vicinity of Cape Hatteras, 15–68 fms. (8348, 8349, 8352, 8356, 16814, 16815, 17308, 17309, 17313, 43032, 43034); off Cape Lookout, 18 fms. (43033); off Cape Fear, 15 fms. (16604, 16818, 16842, 43031); South Carolina, off Little River and Port Royal, 8–18 fms. (16832, 16845, 49587, 49588, 49678, 49683); Florida, off Jacksonville, 40 fms. (50425); off Palm Beach, 20–75 fms. (49699, 49700, 49701); Cuba, off Havana, 115–130 fms. (10096, 10859).

Remarks. Individuals of this species reach a considerable size with several stout, cylindrical branches about 8 mm. in diameter, but they commonly are small,

digitate colonies with no branches. The stems are perforated by a ring of longitudinal canals between the cortex and medulla, and by a network of solenia that divides the cortex into a thin outer and a thick inner layer. Both layers of the cortex contain radiate sclerites with three to six rays (Fig. 16 c); the medullar spicules are elongate, branched rods (Fig. 16 d). In specimens from southerly localities, the spicules are larger and coarser (Fig. 16 a–b). The color ordinarily is bright pinkish red, sometimes yellowish orange; rarely, specimens are white, in which case they resemble *Tripalea clavaria* from which they may readily be distinguished by spiculation.

Genus **Anthopodium** Verrill, 1872

Anthopodium Verrill 1872, p. 434. (Type species, *Anthopodium rubens* Verrill, by monotypy.)

After the major part of this manuscript was completed, Dr. Willis Hewatt and Mr. Robert Parker submitted some specimens collected on the coast of Texas that proved to be the long-lost *Anthopodium rubens* Verrill. Since Verrill gave no figures of his type, which is lost, and there has been some doubt as to its proper position in the Octocorallia, the accompanying figures and description have been added to the manuscript. The key to the family Anthothelidae has not been revised to include it, because the species is so distinctive that it should be easily recognizable from the figures.

Because of the scarcity of Verrill's older papers, the original description of *Anthopodium* (1872, p. 434) is quoted in full:

> Corallum with an encrusting, firm coenenchyma, from which arise prominent, tubular verrucae, with rather large polyps at the summit. The surface of the coenenchyma and verrucae is minutely granulous with rough irregular spicula, closely united together. The spicula are of many forms and sizes, and are remarkable for their irregularity and roughness; the most prominent kinds are very roughly warted and spinulose oblong forms, and rougher lacerate club-shaped ones, many of which are flattened at the large end. Besides these are numerous rudely spinulose spindles, and an abundance of the small, short glomerate kinds.
>
> This genus is allied to *Telesto* on one side and *Callipodium* V. on the other. It resembles the latter somewhat in general appearance and mode of growth, but has very different spicula; to the former it is somewhat allied in the structure of the coenenchyma and polyp-tubes, and especially in the interlocking of the rough spicula, but the spicula are very different in structure; the walls are thicker and more rigid; and the mode of growth quite different.
>
> *Anthopodium rubens* V., sp. nov.
>
> Corallum encrusting, creeping over the dead axis of *Leptogorgia* and forming a continuous, thin, firm, finely granulous crust, from which the elongated verrucae arise nearly at right angles, though usually inclined upward. The polyp-cells are large, at the summit of the tubular and nearly cylindrical verrucae, which are variable in height and are much crowded in some parts and irregularly scattered in others; their surface is finely granulous, with minute

rough spicula. Height of the longest verrucae .28 of an inch; diameter .06. Color, uniform light red.

The spicula of the coenenchyma and verrucae are light but bright red; the larger ones are irregularly oblong, blunt at the ends, and covered throughout with rough, often lacerate, spinulose warts; some of these were .238 mm by .084, .264 by .072, .228 by .096, .216 by .084. With these there are many irregular, rudely spinulose, acute spindles of about the same length, but more slender, measuring .204 by .048, .192 by .060. There are many smaller obtuse, fusiform, oblong and glomerate spicula, of various sizes, covered with rough spinulose warts, like the larger ones. The club-shaped spicula are less numerous, and usually smaller than the largest oblong ones, but are similarly covered with rude spinules. There are also many small oblong spicula, with a smooth naked median zone, and bearing a few small acute spinules on each end, and other similar ones with small distant spinules on all parts; some of these are irregularly branched, either with three, four, five, or more points, but regular crosses are rare. The polyp-spicula are deep red, simple, fusiform or club-shaped spicula, with a few irregular minute spinules, or with the surface merely uneven; they are about .156 long and .036 in diameter.

Fort Macon, N.C., – Prof. E. S. Morse.

The specimens recently collected on the coast of Texas are described as follows:

18 **Anthopodium rubens** Verrill, 1872

(Fig. 17)

Anthopodium rubens Verrill 1872, p. 434. (Fort Macon, North Carolina; on dead *Leptogorgia* stems.)
Anthopodium rubens, Deichmann 1936, p. 37.

Diagnosis. Small, membranous colonies with strongly projecting calyces. Polyp walls with small radiates; outer cortex with tuberculate rods and oval bodies; medulla with large radiates. Color, dull red.

Description. Colonies small, encrusting, rounded, about 10 mm. in diameter (Fig. 17 d); monomorphic. Polyps forming tubular calyces about 3.0 mm. in height and 2.0–2.5 mm. in diameter. Anthocodiae fully retractile, with numerous spicules in the body wall but none in the tentacles. Lower half of the gastric cavities imbedded in the colonial coenenchyme; a basal layer about 2.0 mm. thick, containing spicules and solenia but not penetrated by the polyp cavities, represents a medullar zone. The anthocodial

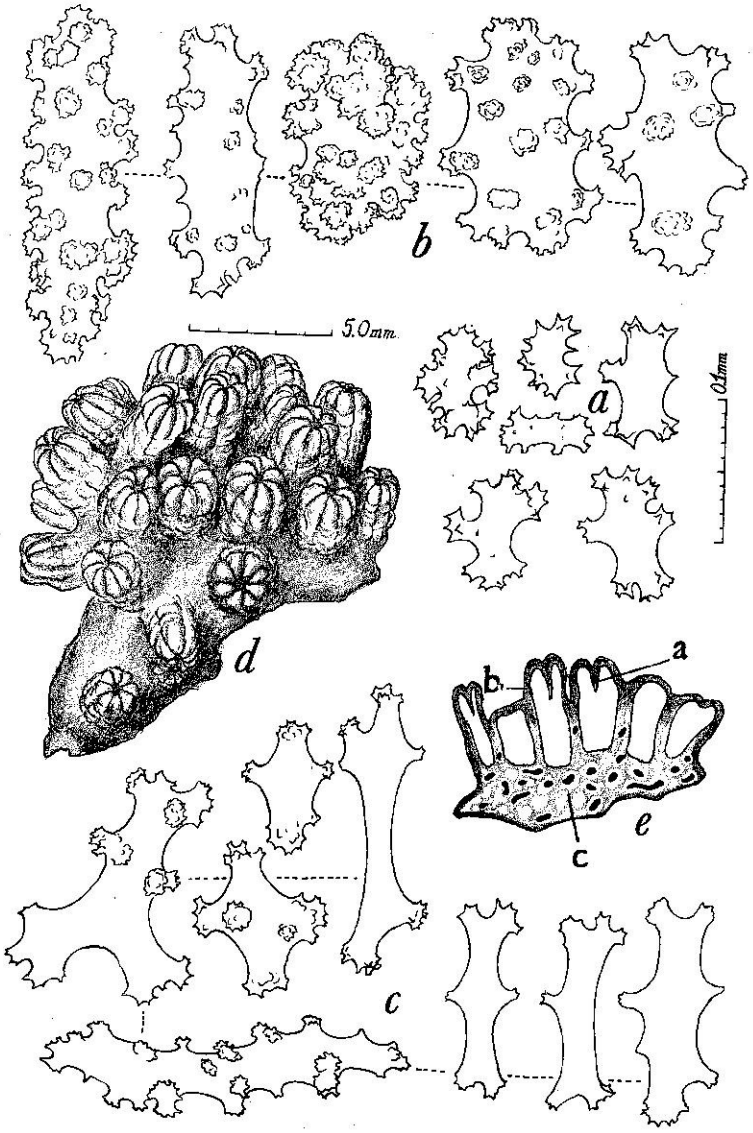


FIGURE 17. *Anthopodium rubens* Verrill; *a* specimen from Texas (USNM 50523); *a*, spicules of anthocodial walls; *b*, spicules from surface of cortex; *c*, from inner (medullar) layer; *d*, entire colony; *e*, semi-diagrammatic cross section of colony showing position of solenia (in black) and localization of spicules illustrated in *a–c*. (Enlargement of all spicules indicated by 0.1 mm. scale to right of *a*; that of *d–e* by 5.0 mm. scale above *d*.)

walls contain numerous small, flattened rods or oval sclerites with short, radiating, spinose marginal processes, which are mostly 0.05–0.10 mm. long (Fig. 17 a). The calycular walls and outer layer of coenenchyme are filled with flattened, coarsely tuberculate rods and oval bodies (Fig. 17 b); length of rods about 0.26 mm; of ovals, about 0.17 mm. Inner coenenchyme with numerous flattened, blunt rods, triradiates and quadriradiates with blunt, spinose processes (Fig. 17 c), along with a few coarsely tuberculate rods similar to those of the outer layer; the radiates measure from 0.08 to 0.2 mm. in major diameter; the blunt rods are commonly about 0.15 mm., occasionally 0.2 mm., in length. All of the spicules range in color from almost colorless to clear reddish pink, those of the outer layer the darkest. The spicules of the basement layer are more or less fused together and somewhat more coarsely sculptured than those in the layers above, as is the case also in *Erythropodium* and *Callipodium*.

Material. East Bank, 20 miles off Freeport, TEXAS, 5–8 fms., growing on rocks, shells, and hydroid stems, collected by divers, 4.VI.1956, 2 lots (USNM 50523, 50524).

Remarks. As VERRILL pointed out, the colonial form of *Anthopodium* resembles that of *Callipodium* Verrill from the Pacific coast. However, the spicules of *Anthopodium* bear a closer resemblance to those of *Callipodium* than VERRILL indicated, although they are not identical. They are also strongly reminiscent of those to be seen in *Diodogorgia*, especially the rods of the inner coenenchyme.

There is no doubt that *Anthopodium* belongs close to the gorgonacean genera mentioned above, and therefore in the scleraxonian family Anthothelidae.

Suborder ***HOLAXONIA*** Studer, 1887

Diagnosis. Gorgonaceans with axial structures not composed of spicules, or if so with a distinct chambered core.

Remarks. The great majority of the West Indian shallow-water octocorals belong to this suborder. They have a distinct supporting axis composed of a horny outer part and a chambered central core. In some shallow-water genera, notably in the family Plexauridae, the

horny part of the axis may be permeated with calcareous material that is not in spicular form; in one deep-water family, Keroeididae, the outer part of the axis cylinder contains smooth, fusiform spicules but they surround a distinct chambered core.

It should be clear from the remarks above that the Holaxonia is not an entirely homogeneous group. Various classifications have been proposed, none of them completely satisfactory. Iam following herein the arrangement used in the *Treatise on Invertebrate Paleontology* (BAYER 1956), which combines the views of KÜKENTHAL and his students, HICKSON, STIASNY, and DEICHMANN.

Family **KEROEIDIDAE** K. Kinoshita, 1910

Diagnosis. Holaxonia with a chambered central core in the axis, but with the calcareous matter of the axial cortex taking the form of smooth, slender, fusiform spicules.

Distribution. Indo-Pacific as far east as Hawaii; one species in the West Indies. Moderate to considerable depths.

Genus **Lignella** Gray, 1870

Lignella GRAY 1870b, p. 407. (Type species, *Lignella richardi* = *Gorgonia richardii* Lamouroux, by monotypy.)
Keroeides (pars), DEICHMANN 1936, p. 88

Diagnosis. Keroeididae with tall, cylindrical polyps having spicules arranged 'en chevron' in eight longitudinal tracts.

Distribution. West Indies, in moderate depths.

Remarks. The tall, cylindrical polyps with their spicules in chevrons serve to distinguish the single West Indian keroeidid from those of the Indo-Pacific region, and it seems amply justifiable to recognize GRAY's genus *Lignella*, established for *Gorgonia richardii* Lamouroux.

19 **Lignella richardii** (Lamouroux), 1816

(Fig. 18)

Gorgonia Richardii LAMOUROUX 1816, p. 407. (Antilles.)
Lignella Richardi, GRAY 1870b, p. 408. (West Indies.)
Keroeides richardii, DEICHMANN 1936, p. 89. (St. Vincent; Guadeloupe; Barbados; in 73–150 fms.)

Miss DEICHMANN has described this curious species, but no figures have ever been given of the spicules. The accompanying illustrations show the characteristic spiculation of the axial cortex (Fig. 18 c) and of the rind (Fig. 18 b), and the arrangement of spicules on the calyces (Fig. 18 a).

Material. Off Pelican Island, BARBADOS, 100 fms., fragments (USNM 49436).

Remarks. The cylindrical calyces strongly projecting from slender branches impart to *Lignella richardii* the appearance of an acanthogorgiid. Its spicules are

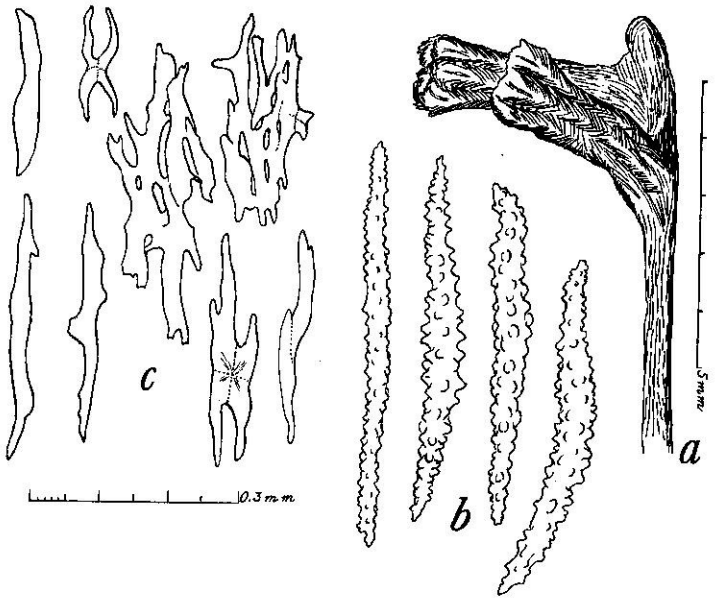


FIGURE 18. *Lignella richardii* (Lamouroux); a specimen from Barbados (USNM 49436): *a*, branch tip with two polyps; *b*, rind sclerites; *c*, anastomosing sclerites of axial cortex. (Enlargement of *a* indicated by 5 mm. scale adjacent; that of *b–c* by 0.3 mm. scale.)

similar to those of the Acanthogorgiidae, and its axis has a wide, chambered core that is lined with a fairly thick layer of horny matter setting it off sharply from the surrounding spicular zone, which is thinner than in the Indo-Pacific species of *Keroeides*. Thus, *L. richardii* assumes even closer resemblance to typical Holaxonia than do *K. koreni* and the other Pacific species.

The horny wall of the chambered central core in *Keroeides* and *Lignella* suggests that the axis of holaxonians developed from the central core, and that the so-called axial sheath is a vestige of the spicular axial cortex. Furthermore, the spicules of the axial sheath of holaxonians are usually different from those of the rind, just as the axial sclerites of *Keroeides* and the outer medullar spicules of scleraxonians differ from those of the surrounding layers of rind.

Family **ACANTHOGORGIIDAE** Gray, 1859

Diagnosis. Holaxonians having a purely horny axis with a wide, chambered central core. Rind thin. Nonretractile polyps form prominent, cylindrical calyces with spicules arranged 'en chevron' in eight longitudinal fields; calycular spicules continuous with those of the tentacular crown, without any intervening spicule-free neck-zone or transverse collaret; consequently, there is no clear demarcation between anthocodia and anthostele. Spicules fusiform, often bent; radiate forms in the inner layer of some species.

Remarks. Only one genus of this family occurs in the western Atlantic, namely, *Acanthogorgia*. It is characterized by long, spinous spindles in the tentacle bases, which project and form a thorny crown around the tentacles. Two species are found in the West Indies: *A. aspera* Pourtalès, which has crowded polyps with smooth projecting spines; and *A. schrammi* (Duchassaing & Michelotti), which has scattered polyps with rough spines. Both have been taken exclusively in deep water, those in the West Indies usually deeper than 100 fathoms.

A brief description and illustration of *A. aspera* are given below as an example of the genus.

20 **Acanthogorgia aspera** Pourtalès, 1867

(Fig. 19)

Acanthogorgia aspera POURTALÈS 1867, p. 113. (Off Havana, Cuba.)
Acanthogorgia aspera, DEICHMANN 1936, p. 150, pl. 16 figs 14–27; pl. 31 figs 2–2a. (Havana; Porto Rico; St. Vincent; Dominica; Barbados.)

Description. The colonies are rather openly branched, laterally and in one plane. The polyps are closely placed around the branches, and measure 1–3 mm. in height and 1 mm. in diameter; they have a bristling armature of projecting spines around the tentacles (Fig. 19 a). The spines of the projecting spicules are entirely smooth and glassy (Fig. 19 b); the spindles set 'en chevron' in the body walls are distantly spinose (Fig. 19 c).

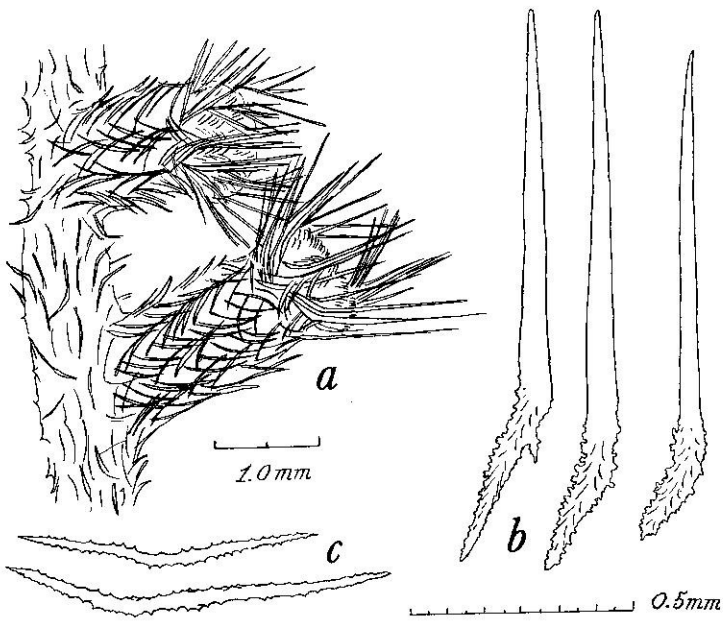


FIGURE 19. *Acanthogorgia aspera* Pourtalès; a specimen from the Bahamas (USNM 49427): *a*, part of branch with two polyps; *b*, spinous spicules of calyx margin; *c*, spindles of stem rind. (Enlargement of *a* indicated by 1.0 mm. scale adjacent; that of *b–c* by 0.5 mm. scale.)

Family **PARAMURICEIDAE** Bayer, 1956

Diagnosis. Holaxonia with branching mostly in one plane, free or anastomosing; rarely bushy or unbranched. Calyces usually prominent, crown well developed, usually with collaret. Coenenchyme usually thin, axial sheath with a thin layer of spicules sometimes limited to bands between the stem canals, or missing entirely. Spiculation extremely diverse, outer cortex often containing large spindles or plates up to 5 mm. long, or other characteristic forms but not clubs; calyces often with thorn-scales. Axis horny, the cortex loculated, the medulla chambered.

Remarks. The removal of the type genus *Muricea* from the family Muriceidae required the renaming of the family in its present form (BAYER 1956, p. *F*203). It may yet require further subdivision into a restricted Paramuriceidae including only the genera with thorn-scales or comparable sclerites, and a new family including those genera with generalized spicules in the form of spindles or plates but no thorn-scales.

The Paramuriceidae do not invade the reef habitat and therefore have not been extensively treated in this paper. Moreover, the splendid monograph of the western Atlantic Alcyonaria by DEICHMANN (1936), which deals with the deep-water fauna, covers the family (as Muriceidae) in detail. I offer as new only an illustrated key to the genera, to aid in the generic determination of any specimens that may be encountered.

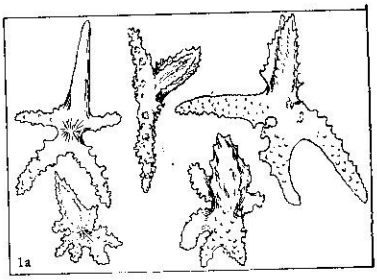
The family Paramuriceidae attains its richest development in the Indo-West-Pacific, and chiefly in the vicinity of the Malay Archipelago, where a large number of species are to be found in depths of less than 100 fathoms. A few species venture into cold, northern waters and into depths as great as 500 fathoms.

KEY 9

ILLUSTRATED KEY TO THE WESTERN ATLANTIC GENERA OF PARAMURICEIDAE

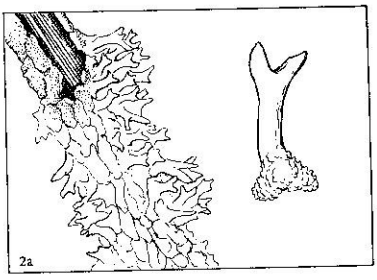
1a. Sclerites of the calyx wall and margin are thorn-scales, with a root-like base and a projecting distal part: 2

1b. None of the sclerites are thorn-scales: 7



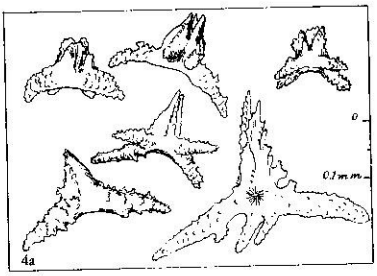
2a. Spicules of cortex in one layer, no axial sheath layer with special spiculation. Thorn-scales stout, with a simple, bifurcate, or antler-like process: Genus *Acanthacis*

2b. Spicules of cortex in two layers, special spiculation in axial sheath well-developed. Thorn-scales more delicate, with a single spine, a foliate process, or several projections: 3



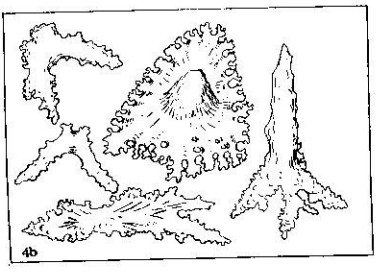
3a. The cortical sclerites are fusiforms: 5

3b. The cortical sclerites are scales, plates, or multiradiate bodies: 4



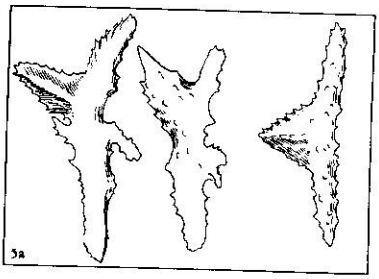
4a. The cortical sclerites are fourarmed bodies with a pyramidial, more or less serrated central projection; calycular thorn-scales with a broad, branched base and a laciniate, foliate, or digitate outer process: Genus *Villogorgia*

4b. The cortical sclerites are knee-bent rods and/or large plates with serrate edges and sometimes a projecting central process; calycular thorn-scales usually with a single stout spine: Genus *Paramuricea*.

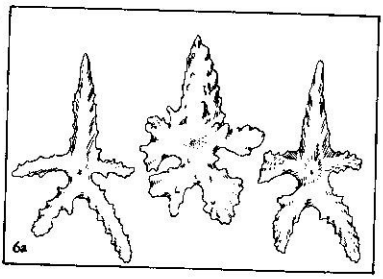


5a. The calycular thorn-scales have a narrow basal part with a slanting, serrated spine arising near the distal end. The fusiform cortical spicules have a stout, more or less thorny central process, which is large in proportion to the rest of the spicule: Genus *Trachymuricea*

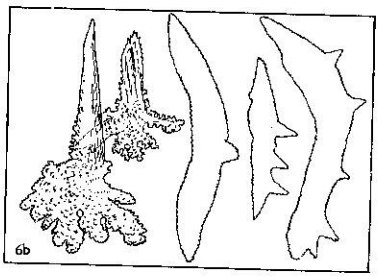
5b. The calycular thorn-scales have a broad, lobate base: 6



6a. The calycular thorn-scales have a sharp, nearly smooth projecting point. Spicules of cortex without conspicuous projecting spines: Genus *Echinomuricea*

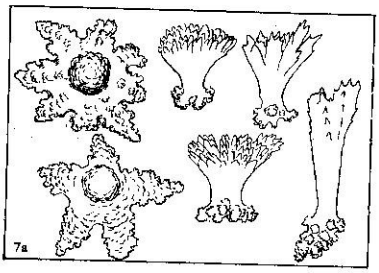


6b. The calycular thorn-scales have a serrated process which in some species is stubby and blunt. Most of the cortical spindles with one or several projecting spines: Genus *Placogorgia*

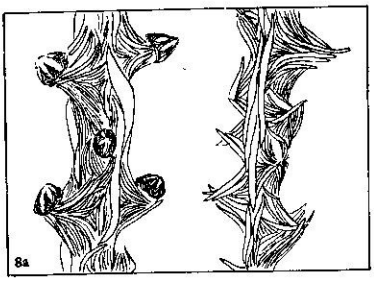


7a. Cortex with an outer layer of double-rosettes, which become lopsided around the calycular apertures; and an inner layer of large, stellate plates with a central boss: Genus *Bebryce*

7b. Cortex with spindles, or plates that are not stellate: 8

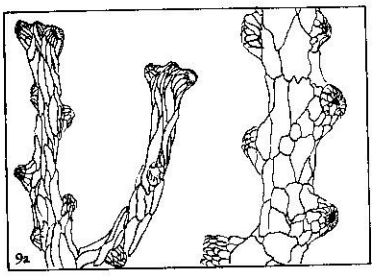


8a. Cortical spicules in the form of long, slender, sinuous spindles, not conspicuously flattened. Calyces formed by tracts of spindles converging from both sides, sometimes forming prominent, shelf-like receptacles for the anthocodiae: Genus *Hypnogorgia*



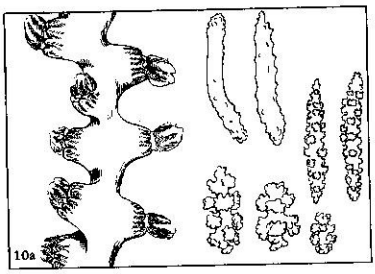
8b. Cortical sclerites as large, coarse plates thick, flattened spindles; or double cones, short spindles, or capstans. Calyces wart-like or subcylindrical, not shelf-like: 9

9a. Cortical sclerites as large, flattened spindles or broad plates, translucent and glassy in appearance, with fine, tuberculate sculpture: Genus *Scleracis*

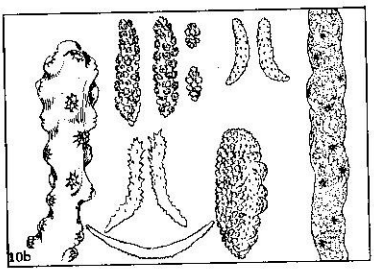


9b. Spicules not as flattened spindles; if plates, they are coarsely rugose and opaque: 10

10a. Cortical spicules in the form of capstans and spindles, the latter concentrated in the calyces, which are usually biserial. Anthocodiae with a strong crown of bar-like rods, straight or curved: Genus *Swiftia*



10b. Cortical sclerites mostly coarse, rugose plates, sometimes tuberculate spindles and double heads. Calyces usually placed all around branches. Crown without the stout bar-like rods: Genus: *Thesea*



Genus **Acanthacis** Deichmann, 1936

Acanthacis Deichmann 1936, p. 130 (Type species, *Acanthacis scabra* Deichmann, by original designation.)

Genus **Villogorgia** Duchassaing & Michelotti, 1860

Villogorgia Duchassaing & Michelotti 1860, p. 32. (Type species, *Villogorgia nigrescens* Duch. & Mich., by monotypy.)

Genus **Paramuricea** Kölliker, 1865

Paramuricea Kölliker 1865, p. 136. Type species, *Gorgonia placomus* Linnaeus 1758, by subsequent designation: E.P. Wright, Zool. Record *1866*, p. 628.)
Paramuricea, Deichmann 1936, p. 134.

Genus **Trachymuricea** Deichmann, 1936

Trachymuricea Deichmann 1936, p. 132. (Type species, *Trachymuricea hirta* (Pourtalès), by original designation.)

Genus **Echinomuricea** Verrill, 1869

Echinomuricea Verrill 1869a, p. 285. (Type species, *Echinomuricea coccinea* = *Acanthogorgia coccinea* = *?Nephthya coccinea* Stimpson 1855, by original designation and monotypy.)

Genus **Placogorgia** Studer, 1887

Placogorgia Studer 1887, p. 56. (Type species, *Placogorgia atlantica* Wright & Studer 1889, by subsequent monotypy: Wright & Studer 1889, p. 114.)

Genus **Bebryce** Phillippi, 1842

Bebryce Philippi 1842, p. 35. (Type species, *Bebryce mollis* Philippi, by monotypy.)
Bebryce, Deichmann 1936, p. 124

Genus **Hypnogorgia** Duchassaing & Michelotti, 1864

Hypnogorgia Duchassaing & Michelotti 1864, p. 21. (Type species, *Hypnogorgia pendula* Duch. & Mich., by monotypy.)
?Caliacis Deichmann 1936, p. 106. (Type species, *Caliacis nutans* = *Thesea nutans* Duch. & Mich. 1864, by original designation and monotypy.)

Genus **Scleracis** Kükenthal, 1919

Scleracis Kükenthal 1919, p. 837, 908. (Type species, *Scleracis pumila* Kükenthal 1919 = *Acis guadalupensis* Duchassaing & Michelotti 1869, by monotypy).

Genus **Swiftia** Duchassaing & Michelotti, 1864

Swiftia Duchassaing & Michelotti 1864, p. 13. (Type species, *Swiftia exserta* = *Gorgonia exserta* Ellis & Solander 1786, by monotypy.)

This genus is usually assigned to the family Gorgoniidae (Deichmann 1936, p. 185), but it seems to have more in common with the paramuriceids and plexaurids than with the gorgoniids.

Genus **Thesea** Duchassaing & Michelotti, 1860

Thesea Duchassaing & Michelotti 1860, p. 18. (Type species, *Thesea exerta* Duch. & Mich. 1860, not *Gorgonia exserta* Ellis & Solander 1786, = *Thesea guadalupensis* Duch. & Mich. 1864, by monotypy.)

This genus has features suggesting relationship with the Plexauridae, to which family it may eventually be removed.

Family **PLEXAURIDAE** Gray, 1859

Diagnosis. Holaxonians having an axis with cross-chambered central core and a cortex commonly (but not always) loculated. Coenenchyme usually thick, with a circle of longitudinal canals surrounding the axis. Spicules large, often reaching a length of several millimeters. Polyps with or without anthocodial armature; when present, it forms a strong operculum in only a few species.

Distribution. All warm, shallow, marine waters; especially well-represented in the American tropics.

Remarks. The thick-branched holaxonians of tropical Atlantic reefs are invariably plexaurids; some of the slimmer colonies also may belong to this family, but they must be recognized by means of the spicules, which are always much larger and more irregularly sculptured than those of the Gorgoniidae. Moreover, plexaurid spicules commonly take the form of clubs, a type never found in gorgoniid genera.

A great many names have been proposed for various plexaurid species, often several for a single one. This was the natural result

when the specific criteria used were limited to the variable external characteristics of the colonies. Characters of spiculation afforded a better basis for the establishment of species after the appearance of KÖLLIKER's paper of 1865, but even then the variability of the spicules was not always apparent when only a few specimens were available. Thus it often came to pass that specimens were named rather than species, and a considerable number of nominal genera and species appeared in the literature. When suites of specimens are available for study, the tremendous capacity for variation within species becomes apparent.

The protean disguises of many Caribbean plexaurids have been penetrated by the keen systematic eye of my esteemed colleague, Miss ELISABETH DEICHMANN of the Museum of Comparative Zoölogy at Harvard University. The treatment of the species given below grew out of many discussions with her and is a broad adaptation of her manuscript classification of Bermudian plexaurids, which she has generously put at my disposal. Miss DEICHMANN's examination of type material in European museums, especially DUCHASSAING & MICHELOTTI's types in Turin, has made possible the reduction of many synonyms, and her familiarity with the collections and works of A. E. VERRILL has disposed of others.

The generic arrangement employed here differs somewhat from that proposed by Miss DEICHMANN. In my opinion, the distinctive western Atlantic genera are: (1) *Muricea*, (2) *Muriceopsis*, (3) *Eunicella*, and (4) *Plexaurella*. The remainder fall into ill-defined groups that have taken the names *Plexaura*, *Pseudoplexaura*, *Plexauropsis*, *Eunicea*, and *Euniceopsis*. Miss DEICHMANN has shown that *Plexauropsis bicolor* Verrill is nothing more than *Pseudoplexaura crassa*, so *Plexauropsis* must yield to *Pseudoplexaura*. However, it is very difficult to defend the latter genus, which differs from *Plexaura* chiefly in its paucity of anthocodial spicules. According to VERRILL, *Euniceopsis* differs from *Eunicea* in the presence of a good anthocodial armature, and although this is a difference of degree, it proves to be consistent and is useful in dividing *Eunicea* sensu lato into two subgenera. We also find no little difficulty in distinguishing *Eunicea* from *Plexaura*. The accepted difference – projecting calyces in *Eunicea*, none in *Plexaura* – is so variable that

it holds good only in extreme cases. When we refer to the spicules, we find that the species with prominent calyces have elongate spindles in the axial sheath, whereas those without have predominantly oval capstans. If this criterion is accepted, the species segregate in the two genera approximately as they have in the past, and the position of most questionable species can be decided. Unfortunately, there is variation in this character also, and some species with long spindles in the axial sheath have some capstans as well, and some predominantly with capstans may have spindles, especially near the tips of the branches, thus making practical application of the character rather difficult.

The last word remains to be said regarding the plexaurids. So many species have been described without figures that a re-examination of all pertinent types is necessary before the synonymies can be clarified in full. While studying plexaurids I have often fallen prey to perplexity, just as the user of these pages is certain to do. Species that could not be reconciled with any existing description or figure have been described as new even though it may develop that some or all of them have previously been described in an unrecognizable manner. Such a course seems preferable either to treating them as 'species indeterminatae' or to applying doubtful names to them.

Special methods of study. In studying specimens of plexaurids it is necessary to isolate with care the spicules from the various strata of coenenchyme. To obtain an uncontaminated sample of axial sheath spicules, take only the tissue between the longitudinal canals and the axis; this may adhere to the axis when the outer rind of dry specimens is broken away, or may be seen as a thin, purple layer lining the axis cavity when an alcoholic specimen is split open longitudinally. Because of the variation of spicules from tip to base of the colonies, samples should be examined from the terminal branches, from the middle region, and from the base of the specimen. The spicules of the terminal branches are more nearly constant in form than those of other regions and have be used in drawing up the keys herein, with qualifications regarding variation in cases that seemed especially misleading.

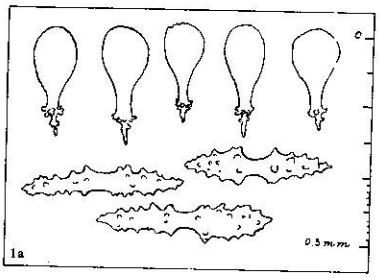
The anthocodial armature is best observed in alcoholic specimens, preferably expanded, but it can be studied satisfactorily in dry material as well. The retracted polyp should be dissected out under the stereoscopic microscope, then soaked for a few moments in a drop of dilute potassium hydroxide. After this, rinse in a drop of water, teasing away any adhering cortical tissue that may remain, and transfer to glycerin. Observation under moderate powers of the compound microscope may be facilitated by the use of crossed polaroid filters, one in the substage, the other in the ocular.

KEY 10

ILLUSTRATED KEY TO THE WEST INDIAN GENERA OF THE PLEXAURIDAE

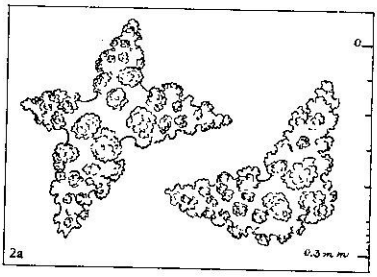
1a. Surface of rind with a dense layer of flask-shaped balloon-clubs; inner layer with double spindles: Genus *Eunicella*

1b. No superficial layer of balloon-clubs: 2



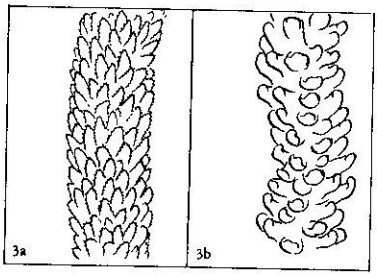
2a. Characteristic spicules of the cortex are large, 4-rayed 'butterfly' spicules; no purple spicules in the axial sheath: Genus *Plexaurella*

2b. Four-rayed spicules do not predominate in the rind: 3



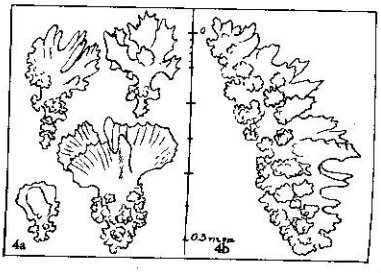
3a. Polyps always forming tall, pointed, shelf like calyces made rough by large, projecting spicules. Axial sheath without purple spicules: Genus *Muricea*

3b. Polyps often forming no calyces at all; when tall, they are not prickly because of projecting spicules. Some or all of the axial sheath spicules purple: 4



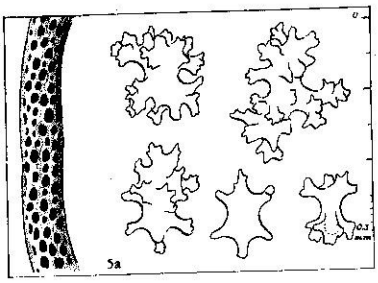
4a. Spicules of cortex in three layers: outer rind containing clubs of various form (never balloon-clubs); middle layer with spindles that often are much larger than the clubs; axial sheath with purple spindles and/or capstans: 5

4b. Spicules of cortex in two layers: outer rind containing large, unilaterally spinose spindles, but no layer of clubs at surface; axial sheath with symmetrical spindles, usually purple: Genus *Muriceopsis*



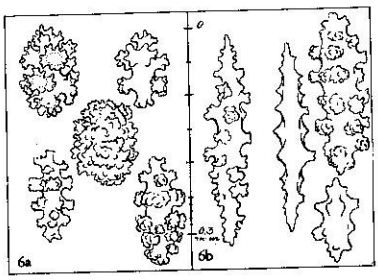
5a. Axial sheath with deep reddish purple capstans, irregular bodies, branched forms, and simple spindles. Polyps fully retractile, anthocodiae unarmed or with a few small rods; openings porelike, no projecting calyces: Genus *Pseudoplexaura*

5b. Axial sheath with capstans, spindles, or both, at least some of them purple or lavender, but no branched forms. Polyps with or without calyces; anthocodial armature moderate or strong: 6



6a. Axial sheath containing stubby capstans and/or stellate forms, always deep reddish purple: Genus *Plexaura*

6b. Axial sheath containing mostly spindles, or blunt spindles and capstans, the latter especially in the trunk and large branches, sometimes purple, sometimes partly violet, partly colorless: Genus *Eunicea*



Genus **Plexaura** Lamouroux, 1812

Plexaura Lamouroux 1812, p. 187. (Type species, *Gorgonia homomalla* Esper, by subsequent designation: Verrill 1912, p. 382.)
Plexaura, Moser 1921, p. 110.
Plexaura, Kükenthal 1924, p. 111.
Plexaura, Stiasny 1935d, p. 44.

Diagnosis. Plexaurids with the axial sheath spicules in the form of short capstans with six or eight rays, or belted rods that may develop into multiradiate spheroidal bodies, deep reddish purple in color. The spicules of the outer rind are chiefly clubs, foliate or thorny and, in some species, unilaterally foliate spindles. The middle layer contains ordinary warty spindles. The anthocodiae are armed with straight or curved rods that are more or less flattened, forming a crown with or without a collaret. Calyces not well developed, apertures pore-like or pit-like, sometimes with a raised rim, sometimes with a slight lower lip.

Distribution. Bermuda, southern Florida and the Gulf of Mexico south to Curaçao. The Indo-Pacific species attributed to the genus by various authors appear not to be congeneric with the West Indian species.

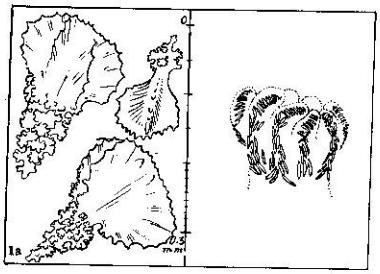
Remarks. The genus *Plexaura* is restricted to those species with predominantly short, reddish purple capstans in the inner rind, spindles and clubs of various kinds in the outer layers, and armature of more or less bent and flattened rods in the anthocodiae. *Pseudoplexaura* differs mainly in having the polyps completely unarmed or with at most a few tiny, flat rods.

I am able to distinguish only three species in the West Indian region: *Plexaura homomalla* (Esper), *P. nina* Bayer & Deichmann, and *P. flexuosa* Lamouroux.

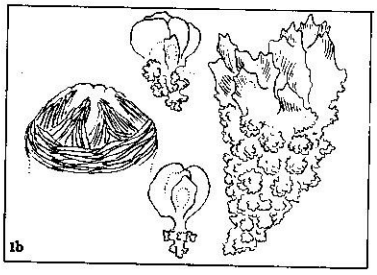
Key 11

Illustrated key to the species of *Plexaura*

1a. Surface of rind with a dense layer of large leaf-clubs with 3 or 4 broad, serrate folia. Spindles of middle layer large and stout, 2 mm. or more in length. Anthocodiae with a crown consisting of 8 points but no collaret. Colonies brown, purple or yellow: *Plexaura flexuosa* Lamouroux

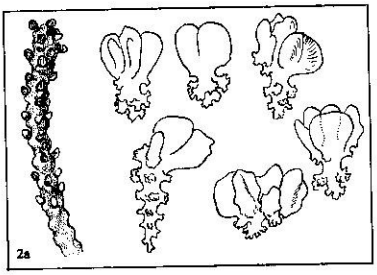


1b. Leaf-clubs of surface layer with several small, serrate blades or 2–4 smoothly rounded folia. Spindles of middle layer at most about 1 mm. long. Anthocodiae having a strong crown with collaret: 2



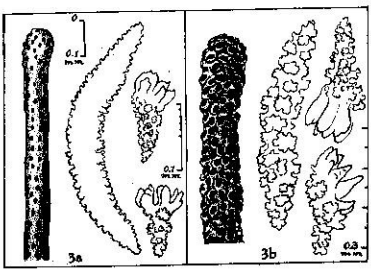
2a. Colonies sparsely branched, dichotomous, in one plane; end branches up to 25 cm. long and 1.5 mm. in diameter Anthocodiae commonly preserved exsert. Surface of rind containing clubs of moderate size with several smooth, rounded leaves: *Plexaura nina* Bayer & Deichmann

2b. Colonies profusely branched, end branches up to 10 cm. long and 2.5–5.0 mm. in diameter. Anthocodiae usually not preserved exsert. Surface of rind containing large clubs with laciniate folia: *Plexaura homomalla* (Esper)



3a. Colonies tall, end branches about 2.5 mm. in diameter: *Plexaura homomalla* forma *kükenthali* Moser

3b. Colonies broad, end branches 4–5 mm. in diameter: *Plexaura homomalla*, typical form



21 **Plexaura homomalla** (Esper), 1792 forma **homomalla**

(Fig. 20; Pl. I fig. 6, XVI)

?*Gorgonia humosa* ESPER 1791, *2*, p. 36, pl. 6. („Der Wohnplaz dieser Coralle ist mir unbekannt, wahrscheinlich aber ist es die Insel Curassao.")
Gorgonia homomalla ESPER 1792, *2*, p. 104, pl. 29. („Aus dem mittelländischen Meer.")
Plexaura homomalla, VERRILL 1907, p. 304, fig. 147, pl. 35A fig. 3. (Bermuda.)
Plexaura homomalla, KÜKENTHAL 1924, p. 117.
Plexauropsis tricolor STIASNY 1935a, p. 241. (Bermuda.)
?*Plexaura homomalla*, STIASNY 1935d, p. 66. (Mer amérique; Portorico.)
Plexauropsis tricolor, STIASNY 1935 d, p. 69, fig. R, pl. 3 fig. 12. (Bermuda.)
Plexaura flexuosa, STIASNY 1941d, p. 105. (Blanquilla, Venezuela.)

Diagnosis. Colonies bushy, flattened, branched laterally and dichotomously (Pl. I fig. 6). Polyps strongly armed with a crown resting upon a distinct transverse collaret. Axial sheath containing deep reddish purple capstans (Fig. 20 d, h, l); middle layer with white (rarely violet) spindles up to 0.8 mm. long (Fig. 20 a, e, j); outer layer with large, asymmetrical leaf-clubs with numerous

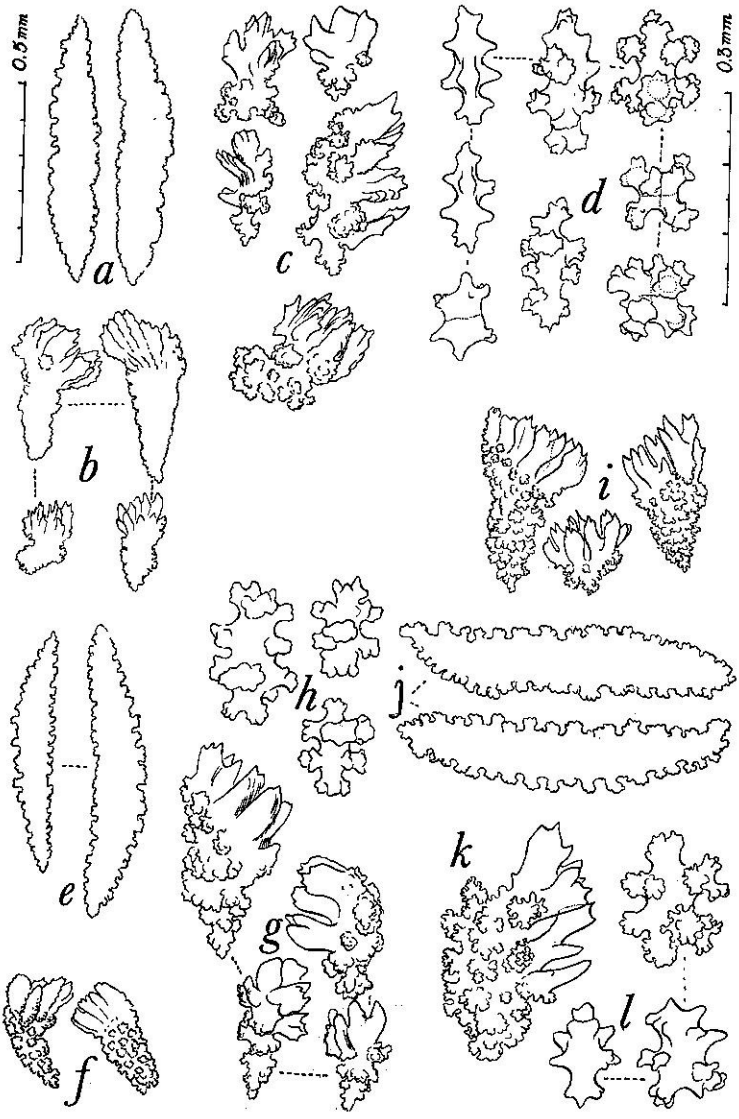


FIGURE 20. *Plexaura homomalla* (Esper) typical form, spicules. *a–d*, of a specimen from Curaçao (USNM 50268): *a*, spindles of middle rind; *b*, foliate clubs of middle rind; *c*, clubs and unilateral spindles of outer rind; *d*, spicules of axial sheath. *e–h*, of a specimen from Florida (50302): *e*, spindles of middle rind; *f*, foliate clubs of middle rind; *g*, clubs of outer cortex; *h*, spicules of axial sheath. *i–l*, of a specimen from Bermuda (Stiasny's type of *Plexauropsis tricolor*): *i*, foliate clubs of middle rind; *j*, spindles of middle rind; *k*, unilaterally foliate body from outer rind; *l*, spicules of axial sheath. (Enlargement of *a–b*, *e–f*, *i–j*, indicated by 0.5 mm. scale at *a*; that of *c–d*, *g–h*, *k–l* by 0.3 mm. scale at *d*.)

serrate leaves, up to about 0.5 mm. in length (Fig. 20 b, f, i). Cortex friable when dry, with granular surface and gaping calycular orifices, often with a raised rim. Colonies drying to a deep brown, blackish brown, or nearly black; purplish brown in alcohol.

Material. The collection of Dr. Hummelinck, deposited in the U.S. National Museum, includes the following: ARUBA, east coast at Rincón, on sandy reef debris, about 1 m. deep, sta. 1310A, 7.V.1955, dry branch of large colony (51312). CURAÇAO, Knip Bay, on rock, 1 m., sta. 1017, 8.I.1949, 2 dry specimens (50268). Plaja Djerimi, rock, 2.5–4 m., sta. 1019A, 29.I.1949, 2 dry spec. (50312). Boca Lagoen, 23.X.1948, 3 dry spec. (50311); north side, rock, 2 m., sta. 1020, 13.XI.1948, 8 dry spec. (50308). Boca Santoe Pretoe, sandy rock, 2 m., sta. 1022, 28.X.1948, 2 dry spec. (50309). Santa Marta Bay, Acropora-reef, 3 m., Dr. J. H. Stock, 8.X.1958 (51301; Amsterdam). KLEIN BONAIRE, east coast, reef debris on sandy beach, 1–1.5 m, sta. 1049B, 13.IX.1948, fragments in alcohol (50502); sandy reef, 3 m., sta. 1049C, 13.IX.1948, fragments in alc. (50683). BONAIRE, north of Punt Vierkant, sandy reef, 2 m., sta. 1059B, 9.IX.1948, dry spec. (50307). BLANQUILLA, Playa Valuchu, sandy bottom, 3 m., 21.VII.1936, 2 dry spec. described by Stiasny 1941, p. 105. ST. BARTHÉLEMY, La Fourche, rock debris, 2 m., sta. 1124, 2.VI.1949, dry spec. (50310).

USNM specimens from BERMUDA, FLORIDA, and the BAHAMAS were used for comparison, and, in addition: JAMAICA, Lime Cay, Port Royal Cays (51353, 51371, 51373); Pigeon Island (51370); Don Christopher's Cove near St. Ann's Bay (51369); GRAND CAYMAN (51372); MEXICO, Arrecife Alacranes, Yucatan (51430, 51450, 51451, 51462), Mujeres Harbor, Quintana Roo (51753–51755). Fragments of the types of *Plexauropsis tricolor* Stiasny, from Bermuda, were made available by the Leiden Museum.

Distribution. Bermuda, southern Florida, Caribbean islands.

Remarks. In its typical form, *Plexaura homomalla* is a highly characteristic species recognized as easily by its outward appearance as by its spicules. A large number of specimens examined resemble exactly the original figure given by ESPER, and their spicules are in agreement with those of ESPER's material figured by KÖLLIKER.

STIASNY's figure of *Plexauropsis tricolor* shows a small but typical specimen of *Plexaura homomalla*, and the spicules agree satisfactorily in form and size. The yellow-brown spicules of the middle layer reported by Stiasny are nonexistent; spicules of *P. homomalla* are very difficult to clean, and the organic matter remaining on them – especially on the ornately sculptured forms of the middle layer – may impart to them a brownish or yellowish color. When thoroughly clean, all spicules are purple or white.

Several specimens from southern Florida, the Bahamas, and Old Providence have an atypical form of growth which tends to be quite bushy when well developed with slender, flexible branchlets about 2.5 mm. in diameter. Colonies of this type were described by MOSER in 1921 under the name *Plexaura kükenthali*, which may be retained to designate this particular form.

21 **Plexaura homomalla** (Esper), 1792 forma **kükenthali** Moser, 1921

(Fig. 21; Pl. I fig. 5)

Plexaura kükenthali Moser 1921, p. 117. (Kingston.)

Diagnosis. Colonies with branches more slender than in the typical form, the terminals about 15 cm. long and 2.5 mm. in diameter (Pl. I fig. 5). The large, laciniate clubs and asymmetrically foliate bodies characteristic of the typical form are reduced in size but still recognizable (Fig. 21 b, e); spindles of cortex (Fig. 21 a, d) and radiates of the axial sheath (Fig. 21 c, g) like those of the typical form.

Material. Single dry USNM specimens from: Florida, Biscayne Key, 6–7 fms., F. M. Bayer coll., 26.VI.1950 (50611); upper Florida Keys, Caesar's Creek, James E. Benedict, 1901 (50477); New Providence, Conrad Limbaugh, 1956 (50554); Puerto Rico, *Fish Hawk* (42140); Old Providence, *Albatross*, 4–9.IV.1884 (50476).

Remarks. The specimen from Old Providence is a small colony, about 16 cm. tall, with rich lateral branching. The terminal branchlets are about 2.5 mm. in diameter, 3 cm. long, and distinctly clavate. The cortex is friable, without projecting calyces. Nearly all of the middle spindles are curved (Fig. 21 a).

The specimen from Caesar's Creek, Florida, is a larger colony, about 39 cm. tall, with longer terminal branches. It is densely bushy and the branches ascend nearly parallel with one another. The cortex is friable, and only part of the spindles are curved.

Plexaura homomalla forma *kükenthali* differs from the typical form in the slender branchlets and the dense ramification, which produce colonies proportionately taller and bushier, and in the suppression of the large, laciniate clubs characteristic of the typical form.

22 **Plexaura nina** Bayer & Deichmann, 1958

(Figs. 22, 28 b)

Plexaura nina Bayer & Deichmann 1958, p. 227, figs. 1–3. (Tongue of the Ocean, Great Bahama Bank.)

Diagnosis. Slender, sparsely branched, dichotomous colonies with terminal branches 1.5–2.0 mm. in diameter. Calyces low. Crown strong: 4–6 bent rods 'en chevron' beneath each tentacle

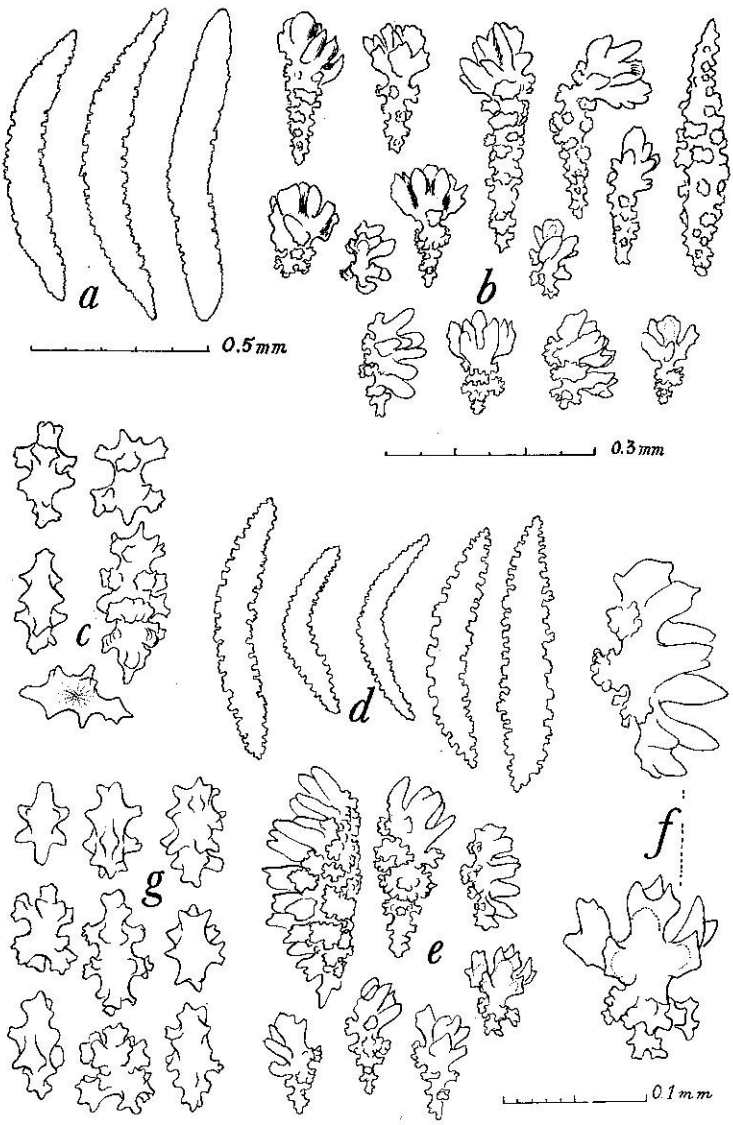


FIGURE 21. *Plexaura homomalla* forma *kükenthali* Moser, spicules. *a–c*, of a specimen from Old Providence (USNM 50476): *a*, spindles from middle rind; *b*, clubs and unilateral bodies from outer rind; *c*, spicules of axial sheath. *d–g*, of a specimen from Florida (50477): *d*, spindles from middle rind; *e*, clubs and unilateral bodies from outer rind; *f*, spicules from outer rind at greater magnification; *g*, spicules of axial sheath. (Enlargement of *a* and *d* indicated by 0.5 mm. scale at *a*; that of *b*, *c*, *e*, and *g* by 0.3 mm. scale at *b*; that of *f* by 0.1 mm. scale at *f*.)

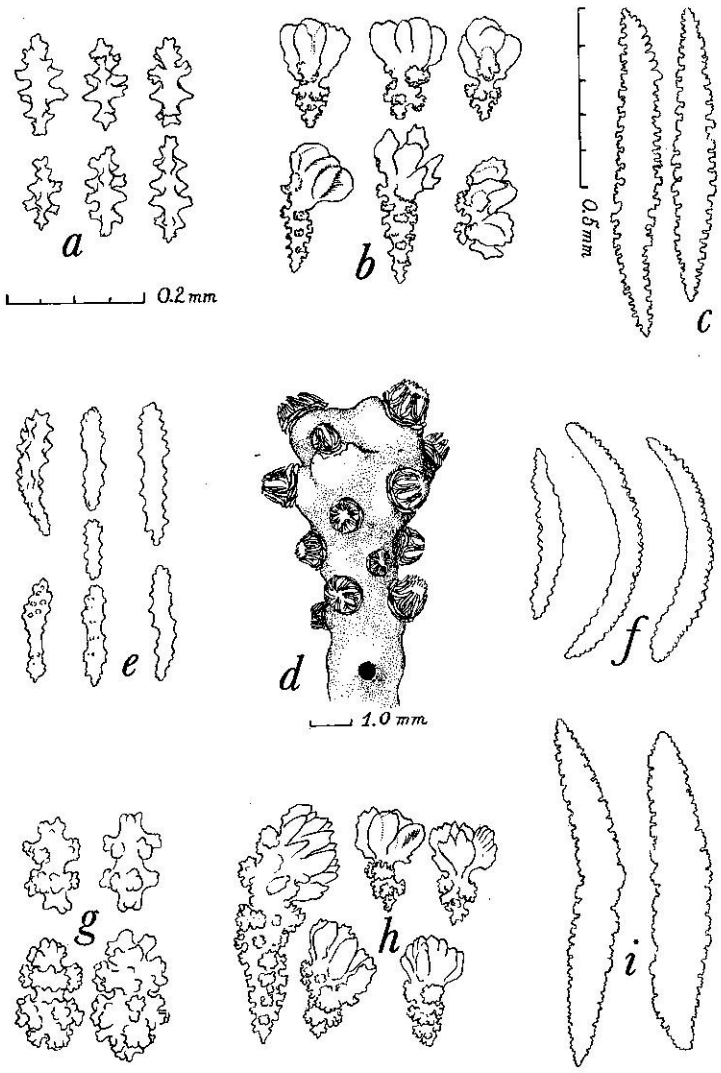


FIGURE 22. *Plexaura nina* Bayer & Deichmann; the holotype from the Great Bahama Bank (USNM 50562): *a*, spicules of the axial sheath from the end branch; *b*, clubs of the outer rind from an end branch; *c*, spindles of the middle rind from an end branch; *d*, branch tip; *e*, tentacular rods; *f*, bent spindles from the crown; *g*, spicules of the axial sheath from the main stem; *h*, clubs of the outer rind from the main stem; *i*, spindles of the middle rind from the main stem. (Enlargement of *a–b*, *e–h* indicated by 0.2 mm. scale at *a*; that of *c* and *i* by 0.5 mm. scale at *c*; that of *d* by adjacent 1.0 mm. scale.)

resting on a collaret of 2–3 transverse rows of curved rods. Outer cortex with leaf-clubs up to 0.15 mm. in length; middle layer with warted spindles up to 0.7 mm. in length, mostly white, some lavender; inner layer with bright purple capstans measuring 0.1 mm. in length, and spindles with simple warts, about 0.25 mm.; toward the base, the capstans increase in size and become the predominant form of sclerite.

Description. The complete type colony measures 40 cm. in height, with unbranched terminal twigs up to 15 cm. in length. Ramification is sparse, in one plane, and dichotomous; the branches arise at wide angles, between 45° and 90° (Fig. 27 b). The terminal branches are very flexible and slender, only 1.5–2.0 mm. in diameter. The branches increase in girth proximad only slightly, and the main trunk has a maximum diameter of about 5 mm. The polyps retract into low, mound-like calyces, but the anthocodial armature is so strong that many of them have been preserved exsert (Fig. 22 d). There are eight points of 4–6 bent rods 'en chevron' below the tentacles, over a collaret of about 2–3 rows of curved rods; these major spicules of the crown are large, as much as 0.7 mm. in length (Fig. 22 f). In the tentacles there are numerous flat rods, straight or curved, with serrate edges; these measure about 0.2 mm. (Fig. 22 e). At the apex of each point, where the tentacles bend sharply, the protruding end of the rods may be enlarged and spinose. The outer layer of cortex contains numerous leaf clubs of rather small size and some unilaterally foliate capstans. Near the branch tips the clubs are mostly 0.1–0.15 mm. in length (Fig. 22 b), but toward the base of the colony they become larger and coarser, attaining a length of 0.2 mm. (Fig. 22 h). Spindles with one end enlarged and asymmetrically foliate occur near the calycular margins. The middle layer of rind contains coarsely tuberculate spindles ranging in length from 0.6 mm. at the branch tips (Fig. 22 c) to 1.2 mm. at the base (Fig. 22 i). In the branches most of the spindles are white, but toward the base some of them are purple. The axial sheath contains bright purple capstans and, near the branch ends, some spindles with prominent, simple processes (Fig. 22 a). In the distal parts of the colonies the capstans measure about 0.1 mm. and the spindles 0.25 mm.; toward the base the capstans may be as long as 0.15

mm., and the spindles disappear (Fig. 22 g). In alcohol the rind is purplish brown and the calycular margins are nearly white; the exsert anthocodiae are white.

Material. The type colony and a fragment, 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.1866 (USNM 50562).

Distribution. Known only from the type locality.

Remarks. *Plexaura nina* is similar to *P. homomalla* in many respects. It differs in its lax and straggly growth form with very slender twigs, its small leaf-clubs, and its unusually strong crown. The clubs are similar in form to those of *P. homomalla* but are much smaller, and the spindles are more slender.

It is interesting that deep-water representatives of the commonest reef-dwelling genera, *Plexaura*, *Eunicea*, and *Pseudopterogorgia*, should appear in a single haul. They are indicative of a quiet-water facies of the reef habitat. It would be very instructive to observe the changes in the gorgonian fauna at this locality, beginning with the typical reef habitat and descending to the level of the present specimens, or deeper. Such a study would certainly be possible with modern diving apparatus.

23 **Plexaura flexuosa** Lamouroux, 1821

(Fig. 23; Pl. IV fig. 4, XVI, XVII)

Plexaura flexuosa LAMOUROUX 1821, p. 135, p. 70 figs. 1–2. (Havana.)
Plexaura salicornoides MILNE EDWARDS & HAIME 1857, *1* p. 153, pl. B2 fig. 2. (Martinique.)
Plexaura mutica DUCHASSAING & MICHELOTTI 1860, p. 28, p. 3 figs. 9–10. (St. Thomas.)
Eunicella marquesarum KÜKENTHAL 1919, p. 906. (Marquesas Inseln.)
Plexaura flexuosula KÜKENTHAL 1924, p. 118.
Plexaura flexuosa, GORDON 1925, p. 19, pl. 4 fig. 4 a–c. (Curaçao.)
Plexaura mutica, GORDON 1925, p. 17, pl. 3 figs. 1, 8; pl. 4 fig. 1. (Curaçao.)
Plexaura flexuosa, STIASNY 1935d, p. 57, pl. 4 fig. 18, pl. 7 figs. 35–36. (Haiti; Martinique; Curaçao; Tortugas.)
Plexaura edwardsi, STIASNY 1935d, p. 51, fig. 0, pl. 4 figs. 19–20, pl. 7 fig. 34. (Bermuda; Dry Tortugas.)
Eunicea humilis, STIASNY 1935d, p. 74, fig. T, pl. 3 fig. 14, pl. 7 fig. 32. (Curaçao.)
Eunicea hicksoni STIASNY 1935c, p. 115. (Curaçao.)
Eunicella marquesarum, STIASNY 1938, p. 27, pl. 3 figs. 9–10, pl. 8 figs. 30, 33. [KÜKENTHAL's type redescribed and figured.]
not *Plexaura flexuosa*, STIASNY 1941d, p. 105. [= *Pl. homomalla*.]