

STUDIES ON THE FAUNA OF SURINAME
AND OTHER GUYANAS: No. 6.

OCTOCORALS FROM SURINAM AND THE ADJACENT
COASTS OF SOUTH AMERICA

by

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Two small but interesting collections of octocorals from the northeastern coast of South America have recently come into my hands through the U.S. Fish and Wildlife Service, one of them from a survey conducted by the Government of Surinam, the other from exploratory work of the U.S. Fish and Wildlife Service. The first was obtained off the coast of Surinam by Mr. J. C. HIGMAN, U.S. Fish and Wildlife Service observer aboard the motor vessel "Coquette" during the course of exploratory shrimp investigations. The second was obtained between Trinidad and the Amazon River, Brazil, through the efforts of Dr. GILES W. MEAD during the course of cruise 47 of the exploratory vessel "Oregon."

Because there is so little information available dealing with the fauna of the northeastern coast of South America, it seems desirable to make known the records of Octocorallia taken by the "Coquette" and the "Oregon" along this extensive and little known coast, together with a list of the species already reported in the literature. The four new species contained in the present material are described and figured in full, and figures of the spicules of the known species are given in support of the identifications set forth.

All drawings were made by the author except 14a and b, 18a and b, and 19a and b, which were drawn by PATRICIA J. ISHAM, illustrator in the Department of Zoology of the U.S. National Museum. I am especially grateful to Dr. P. WAGENAAR HUMMELINCK for his assistance in preparing this paper for the press.

HISTORICAL SUMMARY

The Octocorallia of the Atlantic coast of South America are very poorly known. There are two papers by A. E. VERRILL (1868, 1912) that deal specifically with Brazilian octocorals, but other records of eastern South American species are found scattered through non-faunal works. A number of species, mostly from Brazil, are listed by DONOVAN (1825), VALENCIENNES (1855), MILNE EDWARDS & HAIME (1857), VERRILL (1864), WRIGHT & STUDER (1889), and STIASNY (1951). Octocorals from the adjacent coasts of South America and from Curaçao, Trinidad and other islands close by are reported by ESPER (1788-1830), DUCHASSAING & MICHELOTTI (1864), STUDER (1878), GORDON (1925), and STIASNY (1941).

The two collections reported upon herein contain sixteen species, of which four are previously undescribed, and the literature reveals another 28 species, bringing the total to 44. There must be many more.

LIST OF SPECIES TREATED IN THIS PAPER

Collected species with localities; "Coquette" stations 2-360, "Oregon" stations 2037-2289.

- 1 *Telesto riisei* (Duch. & Mich.) — SURINAM, FRENCH GUIANA, BRAZIL — 2, 15, 23, 27, 144, 302, 306, 2037, 2063, 2071, 2078, 2079
- 2 *Iciligorgia schrammi* Duchassaing — BRAZIL — 2063
- 3 *Diodogorgia nodulifera* (Hargitt) — SURINAM — 26
- 4 *Tripalea clavaria* (Studer)
- 5 *Acanthogorgia schrammi* (Duch. & Mich.) — BRAZIL — 2066
- 6 *Plexaurella dichotoma* (Esper)
- 7 *Plexaurella grandiflora* Verrill
- 8 *Plexaurella pumila* Verrill
- 9 *Muriceopsis sulphurea* (Donovan)
- 10 *Eunicea castelnaudi* Milne Edwards & Haime
- 11 *Muricea midas* spec. nov. — SURINAM, BRAZIL — 2066, 2289
- 12 *Thesea antiope* spec. nov. — BRAZIL — 2067, 2081
- 13 *Thesea bicolor* Deichmann
- 14 *Thesea gracilis* (Gray)
- 15 *Leptogorgia stheno* (Bayer) — SURINAM — 360
- 16 *Leptogorgia setacea* (Pallas)
- 17 *Leptogorgia virgulata* (Lamarck)
- 18 *Lophogorgia punicea* (Milne Edwards & Haime)
- 19 *Lophogorgia rathbunii* (Verrill)
- 20 *Lophogorgia rubropurpurea* (Verrill)

- 21 *Lophogorgia violacea* (Pallas)
- 22 *Pacifigorgia elegans* (Milne Edwards & Haime) — SURINAM — 23
- 23 *Pseudopterogorgia bipinnata* (Verrill)
- 24 *Phyllogorgia dilatata* (Esper)
- 25 *Ellisella barbadensis* (Duch. & Mich.) — SURINAM, BRAZIL — 2066, 2289
- 26 *Ellisella elongata* (Pallas) — SURINAM, FRENCH GUIANA, BRAZIL — 2037, 2038, 2049, 2066, 2289
- 27 *Junceella hystrix* Milne Edwards & Haime
- 28 *Chrysogorgia fewkesi* Verrill, forma *multiflora* Deichmann — BRAZIL — 2081
- 29 *Chrysogorgia affinis* Versluys
- 30 *Primnoella divaricata* (Studer)
- 31 *Primnoella magelhaenica* Studer
- 32 *Primnoella murrayi* Wright & Studer
- 33 *Primnoella flagellum* Studer
- 34 *Primnoella polita* Deichmann
- 35 *Primnoella delicatissima* Kükenthal
- 36 *Thouarella acanthina* (Wright & Studer)
- 37 *Primnoisis rigida* Wright & Studer
- 38 *Renilla reniformis* (Pallas), forma *americana* Lamarck
- 39 *Renilla mülleri* Kölliker — SURINAM — 2, 21, 33, 44, 157
- 40 *Sclerobelemnon theseus* spec. nov. — SURINAM, TRINIDAD — 226; "ALBATROSS" 2121, 2122
- 41 *Virgularia presbytes* Bayer — SURINAM — 223, 225, 226, 2016
- 42 *Virgularia kophameli* May
- 43 *Stylatula* sp. cf. *brasiliensis* (Gray) — SURINAM — 226
- 44 *Stylatula diadema* spec. nov. — SURINAM — 2, 144, 188, 191

DESCRIPTIVE LIST OF THE FAUNA

Order TELESTACEA Hickson, 1930

Family TELESTIDAE Milne Edwards & Haime, 1857

1. *Telesto riisei* (Duchassaing & Michelotti)

Fig. 1

Clavularia Rüsei DUCHASSAING & MICHELOTTI 1860, p. 34.

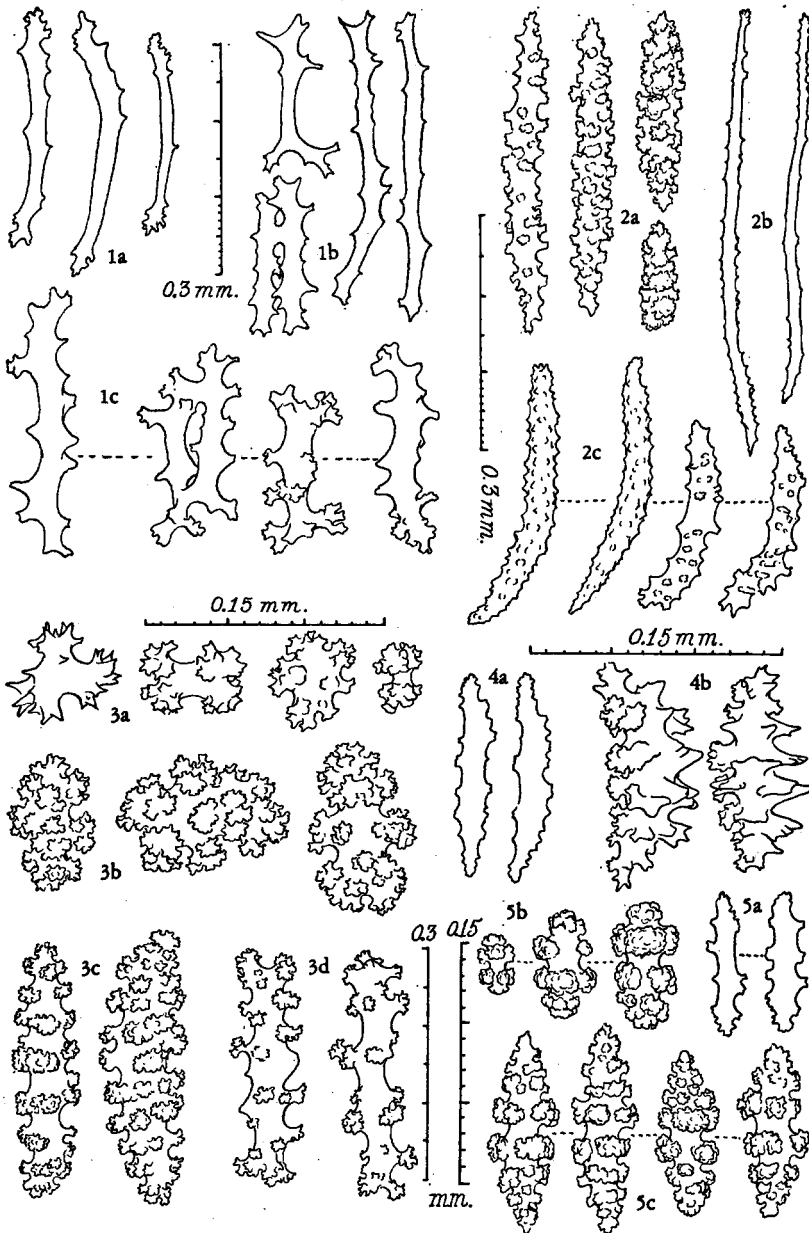
Clavularia Riisei DUCHASSAING & MICHELOTTI 1864, p. 23.

Carijoa rupicola F. MÜLLER 1867, p. 330, pl. 9 fig. 56–57.

Telesto riisei, LAACKMANN 1909, p. 78, fig. C, pl. 3 fig. 4.

Telesto rupicola, LAACKMANN 1909, p. 81, fig. D, pl. 2 fig. 1–2, pl. 3 fig. 3.

Off SURINAM, seven lots (USNM 50838–50844) from the following stations:
 "Coquette" sta. 2, 06° 23' N, 55° 05.5' W, 15 fms., mud, 11.V.1957; 15, 06° 24.5' N, 54° 59.5' W, 16 fms., mud & shell, 11.V.1957; 23, 06° 24' N, 54° 59.5' W, 15 fms., shell, 12.V.1957; 27, 06° 45' N, 54° 58' W, 23 fms., hard mud & shell, 12.V.1957; 144, 06° 22.5' N, 54° 58' W, 14 fms., mud, 30.V.1957; 302,



06° 49' N, 55° 25' W, 24 fms., mud & fine shell, 28.VI.1957; 306, 06° 54' N, 56° 14' W, 27 fms., shell & coral, 7.VII. 1957.
 Off FRENCH GUIANA, one lot (USNM 50912), from the following station: "Oregon" sta. 2037, 05° 51' N, 53° 00' W, 19 fms., 11.XI.1957.
 Off BRAZIL, four lots (USNM 50851-50854) from: "Oregon" sta. 2063, 02° 35' N, 48° 14' W, 53 fms., 15.XI.1957; 2071, 02° 14' N, 48° 10' W, 42 fms., 16.XI.1957; 2078, 01° 50' N, 47° 28' W, 40 fms., 17.XI.1957; 2079, 01° 50' N, 47° 31' W, 45 fms., 17.XI.1957.

The twelve lots of specimens mentioned above agree satisfactorily with the descriptions of *Telesto riisei* and *T. rupicola* given by LAACKMANN (1909) with the exception that the extensive cohesion of spicules noted in *T. riisei* does not occur. As a matter of fact, I have not found a cohesive skeleton in any of the dozens of specimens that I have examined from many localities, including St. Thomas (the type locality of *T. riisei*). South American specimens do not differ from West Indian material in the extent of spicular fusion in the body walls, and there appears to be no valid reason to maintain *T. riisei* and *T. rupicola* as separate species.

Spicules of the specimen from "Coquette" station 15 (USNM 50843) are shown in fig. 1. Tentacular rods, fig. 1a; fused and unfused spinose rods from walls of axial polyp, fig. 1b; spinose and branched rods, showing some fusion, from walls of anthosteles, fig. 1c.

- Fig. 1. *Telesto riisei* (Duch. & Mich.), "Coquette" sta. 15: 1a, spicules from the tentacles; 1b, spicules from the wall of the axial polyp; 1c, spicules from calices of secondary polyps. Uniform magnification, indicated by 0.3 mm. scale.
- Fig. 2. *Iciligorgia schrammi* Duchassaing, "Oregon" sta. 2063: 2a, spicules of cortex; 2b, needles from medulla; 2c, bent rods from anthocodiae, the two at left from the crown, the two at right from the tentacles. Uniform magnification, indicated by 0.3 mm. scale.
- Fig. 3. *Diodogorgia nodulifera* (Hargitt), "Coquette" sta. 26: 3a, spiny radiates from tentacles; 3b, tuberculate radiates from calices; 3c, tuberculate spindles from cortex; 3d, irregular rods from medulla. Figs. 3a and 3b drawn at high magnification indicated by 0.15 mm. scale; 3c and 3d at lower magnification indicated by 0.3 mm. scale.
- Fig. 4. *Leptogorgia stheno* (Bayer), "Coquette" sta. 360: 4a, flat anthocodial rods; 4b, asymmetrical spindles from rind. Both figures at high magnification indicated by 0.15 mm. scale above.
- Fig. 5. *Pacifigorgia elegans* (Milne Edwards & Haime), "Coquette" sta. 23: 5a, flat anthocodial rods; 5b, blunt capstans from outer rind; 5c, belted spindles from inner rind. All figures drawn at high magnification indicated by 0.15 mm. scale at left.

Previous South American Records: Brazil, Rio de Janeiro, F. MÜLLER 1867 [as *Carijoa rupicola*]. Bahia, WRIGHT & STUDER 1889 [as *Telesto (Carijoa) rupicola*].

Order GORGONACEA Lamouroux, 1816

Suborder Scleraxonia Studer, 1887

Family ANTHOTHELIDAE Broch, 1916

Subfamily *Semperininae* Aurivillius, 1931

2. *Iciligorgia schrammi* Duchassaing

Fig. 2

Iciligorgia schrammi DUCHASSAING 1870, p. 12.

Iciligorgia ballini KÜKENTHAL 1916, p. 479, fig. L-N, pl. 23 fig. 3.

Iciligorgia schrammi, DEICHMANN 1936, p. 82.

Off BRAZIL, "Oregon" sta. 2063, 02° 35' N, 48° 14' W, 53 fms., 15.XI.1957; a large but fragmentary dried specimen, trawled off the mouth of the Amazon River (USNM 50846).

The single specimen noted above, collected off the mouth of the Amazon River, extends the range of the species more than 1000 miles. The southernmost locality known previously was Dominica.

This specimen is a fully developed colony, the largest fragment of which – including base and main stem – measures about 60 cm. in height. The spicules are completely typical: the warted spindles of the cortex are shown in fig. 2a; the prickly needles of the medulla in fig. 2b; and the bent rods of the anthocodiae in 2c.

Many small ophiuroids are entwined about the branches.

Subfamily *Spongiodermatinae* Aurivillius, 1931

3. *Diodogorgia nodulifera* (Hargitt)

Fig. 3

Solanderia nodulifera Hargitt, in HARGITT & ROGERS 1901, p. 279, fig. C, 1, 3–5.

Solanderia crustata Hargitt, in HARGITT & ROGERS 1901, p. 280, fig. C, 2, 6–7.

Diodogorgia ceratosa KÜKENTHAL 1919, p. 97, fig. 44–52.

Diodogorgia cervicornis KÜKENTHAL 1919, p. 645.

Corallium vanderbilti BOONE 1933, p. 51, pl. 12–14.

Diodogorgia nodulifera, DEICHMANN 1936, p. 87, pl. 5 fig. 11-19.

Diodogorgia ceratosa, DEICHMANN 1936, p. 86.

Off SURINAM, "Coquette" sta. 26, 06° 40' N, 54° 58' W, 20 fms., shelly bottom, 12.V.1957; a small specimen (USNM 50791).

The recovery of a specimen of *Diodogorgia nodulifera* off the coast of Suriname by the "Coquette" serves to extend the range of the species about 600 miles to the southeast.

The colony is vinaceous pink (Ridgway), brighter pink at the summit of the calices and near the edges of the basal expansion; the spicules of the anthocodial walls are bright yellow. The spicules are in exact accord with specimens from Florida and the Antilles. Examples from the tentacles are shown in fig. 3a, from the calicular walls in 3b, from the cortex in 3c, and from the medulla in 3d.

Previous South American record: Venezuela, Cumaná, DEICHMANN [as *Diodogorgia ceratosa*].

4. *Tripalea clavaria* (Studer)

Suberia clavaria STUDER 1878, p. 667, pl. 5 fig. 38.

Suberia clavaria, DEICHMANN 1936, p. 85.

Tripalea clavaria, BAYER 1955, p. 208.

Not represented in the collections of the "Coquette" and the "Oregon."

Previous South American records: Brazil, vicinity of Rio de Janeiro, DEICHMANN 1936 [as *Suberia clavaria*]. Uruguay, off mouth of the Rio de la Plata, STUDER 1878 [as *Suberia clavaria*].

Suborder Holaxonia Studer, 1887

Family ACANTHOGORGIIDAE Gray, 1859

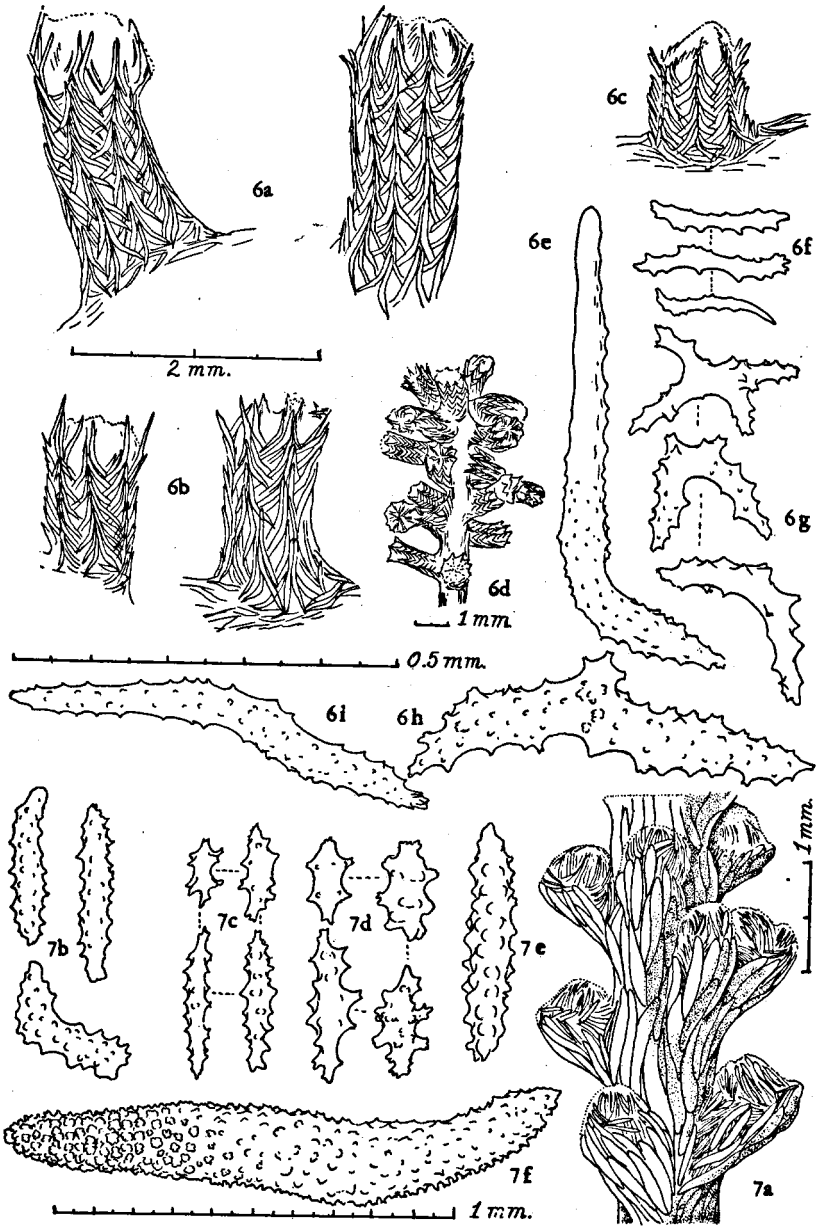
Acanthogorgiidae, BAYER 1956, p. 202.

This family is now taken to include the genera *Acanthogorgia* Gray, *Acalycigorgia* Kükenthal, and *Anthogorgia* Verrill.

5. *Acanthogorgia schrammi* (Duchassaing & Michelotti) Fig. 6

Blepharogorgia schrammi DUCHASSAING & MICHELOTTI 1864, p. 15, pl. 1 fig. 9.

?*Acanthogorgia goësi* AURIVILLIUS 1931, p. 83, fig. 18, pl. 2 fig. 3.



Acanthogorgia schrammi, DEICHMANN 1936, p. 151, pl. 16 fig. 5-13, pl. 31 fig. 1-1a.

Acanthogorgia muricata, STIASNY 1947, p. 43.

?*Paracanthogorgia goësi*, STIASNY 1947, p. 59.

Off BRAZIL, "Oregon" sta. 2066, 02° 40' N, 47° 55' W, 110 fms., 15.XI.1957; one much broken specimen trawled near the mouth of the Amazon River (USNM 50908).

A single badly broken colony trawled off the mouth of the Amazon River is referable to this species. It differs in some details from DEICHMANN's description and from other West Indian material available to me, but agrees in the following general characteristics: (1) branching irregular, tending to remain in one plane; (2) polyps about 2 mm. tall, and rather widely spaced - usually separated by more than their own diameter, although becoming crowded toward the ends of the twigs (fig. 6d); (3) spinous distal part of crown spicules irregular, not glassy smooth (fig. 6e); (4) rind spicules include spinose, irregular spindles (fig. 6n) and radiate forms many of which are developed into antler-like bodies (fig. 6g).

The discrepancies are: (1) branches not anastomosing, whereas the type was so described ("flabellata, reticulata, crebre ramosa"); (2) polyps as a rule not arranged strictly or even approximately along two sides of the branches, although in a few places they are so arranged; (3) the crown spicules project little or not at all (fig. 6a-c), but when they do so it is usual that only one spicule in each sector is enlarged and spine-like, as is the case in *A. schrammi*; (4) spicules of both rind and polyps are smaller than those described for *A. schrammi* by DEICHMANN.

Fig. 6. *Acanthogorgia schrammi* (Duch. & Mich.), "Oregon" sta. 2066: 6a-6c, five polyps in various stages of contraction; 6d, branch tip; 6e, marginal crown spicule; 6f, flat, serrated rodlets from tentacles; 6g, quadriradiates and antlers from rind; 6h, spindle from rind; 6i, bent spindle from body of polyp. Figs. 6a-6c uniformly enlarged according to 2 mm. scale; 6d enlarged as indicated by 1 mm. scale; 6e-6i uniformly enlarged according to 0.5 mm. scale.

Fig. 7. *Muricea midas* spec. nov., "Oregon" sta. 2066: 7a, part of a branch; 7b, spicules from tentacles; 7c, spicules from axial sheath near tip of branch; 7d, spicules from axial sheath of main stem; 7e, small spindle from rind; 7f, large spindle from rind. Magnification of 7a indicated by 1 mm. scale; 7b-7e uniformly enlarged according to 0.5 mm. scale; 7f enlarged according to 1 mm. scale.

The colony here discussed is not considered to be a new species because it conforms in the main with *A. schrammi* in respect to the size of polyps, form and arrangement of spicules, and characteristics of branching (except for anastomosis, which has not been observed in any material seen by me). At present it is impossible to exclude individual and ecological variation as possible causes of the observed discrepancies: more crowded polyps not strictly biserial, and generally smaller spicules, those around the tentacles not strongly projecting as a subtentacular crown.

A reëxamination of DUCHASSAING & MICHELOTTI's original description and figure (1864), and of DEICHMANN's (1936) interpretation of them, reveals little justification for STIASNY's (1947) view that *Acanthogorgia muricata* Verrill and *A. schrammi* (Duchassaing & Michelotti) are not the same species. DEICHMANN's interpretation of the case is therefore retained.

The small fragment of *A. goësi* Aurivillius, which the kindness of Prof. NILS ODHNER of the Naturhistoriska Riksmuseet in Stockholm has enabled me to examine, is insufficient to permit a reappraisal of its affinity.

Family PLEXAURIDAE Gray, 1859

The lines demarcating the families Plexauridae, Paramuriceidae (= Muriceidae of previous authors), and Gorgoniidae are very indefinitely drawn. It is my opinion at the present time that the family Plexauridae includes the genera *Plexaura*, *Pseudoplexaura*, *Eunicea*, *Muricea*, *Muriceopsis*, *Plexaurella*, *Euplexaura*, *Anthoplexaura*, *Psammogorgia*, *Echinogorgia* (including *Paraplexaura* and at least part of *Plexauroides*), *Thesea*, *Adelogorgia*, *Rumphella*, and *Eunicella*. *Echinogorgia* lies on the boundary between Plexauridae and Paramuriceidae, leaning toward the former; *Swiftia* is on the boundary between Plexauridae and Gorgoniidae, but leaning toward the latter. The taxonomic characters of these genera, as well as of *Thesea*, *Rumphella*, *Eunicella* and others, merit critical reappraisal which may well result in changes in familial alignment.

The family Plexauridae is in need of redefinition. The presence of loculation in the axial cortex is by no means as prevalent as sup-

posed (e.g., DEICHMANN 1936, p. 91), and the polyps do not always (or even very often) lack an operculum as stated by KÜKENTHAL (1919, 1924) and followed by DEICHMANN (1936, p. 73).

For the present, the following characteristics may be considered typical of the family:

1. Rind usually thick;
2. Polyps fully retractile into the rind or into calicles;
3. More than two longitudinal stem canals surrounding the axis and dividing the rind into an inner and an outer layer differing in spiculation;
4. Spicules of outer layer asymmetrically sculptured and commonly modified into clubs;
5. Spicules usually including spindles of large size, 0.3 mm. to 3.0 mm. in length;
6. Sculpture of spindles usually not arranged in transverse belts.

6. *Plexaurella dichotoma* (Esper)

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

Plexaurella dichotoma, KUNZE 1916, p. 569, fig. N, O, P, pl. 28 fig. 5.

Not represented in the collections of the "Coquette" and the "Oregon."

Previous South American records: Brazil, Fernando Noronha, VERRILL 1912 [as *Plexaurella obesa* Verrill]. Abrolhos Reefs, VERRILL 1912 [as *Plexaurella cylindrica* Verrill and probably *P. braziliana* Verrill].

7. *Plexaurella grandiflora* Verrill

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

Not represented in the collections of the "Coquette" and the "Oregon."

Previous South American records: Brazil, Mar Grande, VERRILL 1912. Candeias, Pernambuco, VERRILL 1912 [as *Plexaurella verrucosa* Verrill].

8. *Plexaurella pumila* Verrill

Plexaurella pumila VERRILL 1912, p. 386, pl. 31 fig. 5, pl. 32 fig. 8, pl. 34 fig. 2.

Not represented in the collections of the "Coquette" and the "Oregon."

Previous South American record: Brazil, Periperi Point, Bahia, VERRILL 1912.

9. *Muriceopsis sulphurea* (Donovan)

Gorgonia sulphurea DONOVAN 1825, no. 126.

Eunicea humilis MILNE EDWARDS & HAIME 1857, p. 149, pl. B² fig. 1.

Muricea humilis, VERRILL 1912, p. 377, fig. 1, pl. 29 fig. 1-1a, pl. 32 fig. 4-5, pl. 35 fig. 2.

Muriceopsis humilis, AURIVILLIUS 1931, p. 115 (in key).

Not represented in the collections of the "Coquette" and the "Oregon."

Previous South American records: "The Brazilian Sea", DONOVAN 1825. Brazil, Bahia, MILNE EDWARDS & HAIME 1857 [as *Eunicea humilis*]. Abrolhos; Porto Seguro; Bahia, VERRILL 1868 [as *Eunicea humilis*]. Bahia, WRIGHT & STUDER 1889 [as *Muricea bicolor* Wright & Studer]. Abrolhos Reefs; Bahia; Porto Seguro; Parahyba do Norte; as far south as Guarapary, VERRILL 1912 [as *Muricea humilis* var. *humilis*]. Mar Grande, VERRILL 1912 [as *Muricea acropora* Verrill].

10. *Eunicea castelnaudi* Milne Edwards & Haime

Eunica Castelnaudi MILNE EDWARDS & HAIME 1857, p. 148.

Not represented in the collections of the "Coquette" and the "Oregon."

Previous South American record: Brazil, Bahia, MILNE EDWARDS & HAIME 1857. Not subsequently reported; perhaps this is *Plexaurella grandiflora* Verrill.

Genus *Muricea* Lamouroux

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

Muricea, AURIVILLIUS 1931, p. 102.

Muricea, DEICHMANN 1936, p. 99.

Muricea, BAYER 1956, p. F210.

This endemic amphi-American genus contains five species in the western Atlantic, ranging in shallow water from North Carolina to Curaçao. A sixth species, described here as new to science, is both the southernmost and the deepest record for the genus. The Brazilian species attributed to *Muricea* by VERRILL (1912) actually belong to *Muriceopsis*.

11. *Muricea midas* spec. nov.

Fig. 7

SURINAM, "Oregon" sta. 2289, 07°24' N, 54°35' W, east of Paramaribo, 75-80 fms., 8.XI.1958; one almost complete colony (USNM 51259).

BRAZIL, "Oregon" sta. 2066, 02°40' N, 47°55' W, off the mouth of the Amazon River, 110 fms., 15.XI.1957; one specimen (holotype, USNM 50905).

The type is a much broken colony branched mainly in one plane. Ramification is lateral, with the twigs biserially arranged to produce a lax, pinnate appearance. The unbranched lateral twigs are mostly 15–30 mm. long, commonly 5–15 mm. apart but commonly more distant. The diameter of the twigs (excluding calices) is 1 mm. or a little less, and of the trunk just above the base, about 4 mm. The calices are of typical *Muricea* form, 0.6–0.8 mm. tall (measured at a right angle with the branch axis), shelf-like, inclined upward, and supported below by several large spindles. The calices are arranged in diagonal rows across the front of the branches, leaving the opposite face of the colony more or less free of polyps i.e., the polyps occur around the branches in spirals interrupted by a naked streak along one side, the "back." The spicules of the outer rind and calices are spindles (fig. 7f) reaching a length of about 1 mm.; they are tuberculate on the inner surface and prickly on the outer, but there are no strong external processes and those of the calices are not produced into projecting terminal spines. The smaller spicules of the outer cortex are ordinary spindles with low, blunt processes (fig. 7e). The anthocodiae and tentacles contain simple, spinose spindles, sometimes bent (fig. 7b), arranged as an irregular crown. The axial sheath contains small, spinose spindles and stellate bodies arranged in rows between the longitudinal canals; near the branch tips the spindles are slender and acutely thorny and the stellate bodies are acute (fig. 7c); toward the base of the colony, the spindles become coarser and the stellate bodies develop into stubby capstans with low processes (fig. 7d). The axis is longitudinally striated, brittle and woody, not loculated, with a strongly eccentric chambered core about 0.3 mm. in diameter. The axial core lies toward that side of the branch that bears the polyps; the axis increases in diameter most rapidly on that side lacking polyps.

The spicules by reflected light are a clear, golden yellow color; those of the anthocodiae colorless, causing the contracted polyps to appear white.

Because of its spindles without strong spines and its yellow color, *Muricea midas* falls close to *M. pendula* Verrill. It differs from that species in its more delicate growth form with less regularly pinnate branching, smaller and slimmer spindles, and distinctly bicolored appearance resulting from the pale anthocodiae contrasted against the golden yellow color of the cortex. From all other Atlantic species of *Muricea* it differs in having neither strong thorns on the outer surface of the cortical and calicular spindles, nor a terminal spike on those of the calices.

Genus *Thesea* Duchassaing & Michelotti

Thesea DUCHASSAING & MICHELOTTI 1860, p. 18. (Type species *Thesea exserta* Duch. & Mich. [non *Gorgonia exserta* Ellis & Solander] = *Thesea guadalupensis* Duch. & Mich. 1864 [specific name given to specimens previously misidentified as *G. exserta* Ellis & Sol.].)

Thesea, DUCHASSAING & MICHELOTTI 1864, p. 12.

Thesea, DEICHMANN 1936, p. 110.

Thesea, BAYER 1958, p. 50, 53.

Although I placed this genus in the newly established family Paramuriceidae in the classification drawn up for the "Treatise on Invertebrate Paleontology" (BAYER 1956), its affinities lie more closely with the Plexauridae and it was transferred to that family in a recent paper on West American plexaurids (BAYER 1958, p. 53).

12. *Thesea antiope* spec. nov.

Fig. 8

BRAZIL, "Oregon" sta. 2067, 02°41' N, 47°48' W, off the mouth of the Amazon River, 180 fms., 15.XI.1957; one specimen (holotype, USNM 50848). — 2081, 01°52' N, 46°54' W, off the mouth of the Amazon River, 175 fms., 17.XI.1957; one specimen (paratype, USNM 50906).

The type is a colony about 43 cm. tall, of which the proximal 25 cm. of the main stem and all lateral branches springing therefrom are devoid of rind (fig. 8e). The diameter of the main axis just above the base, where it is round, is 4 mm. Toward the middle of the colony, the main trunk becomes distinctly flattened normal to the plane of branching but, higher still, it reverts to a nearly round cross section. In the terminal branches, the axis has a very wide, chambered core and a thin but dense cortical zone. The axial cortex

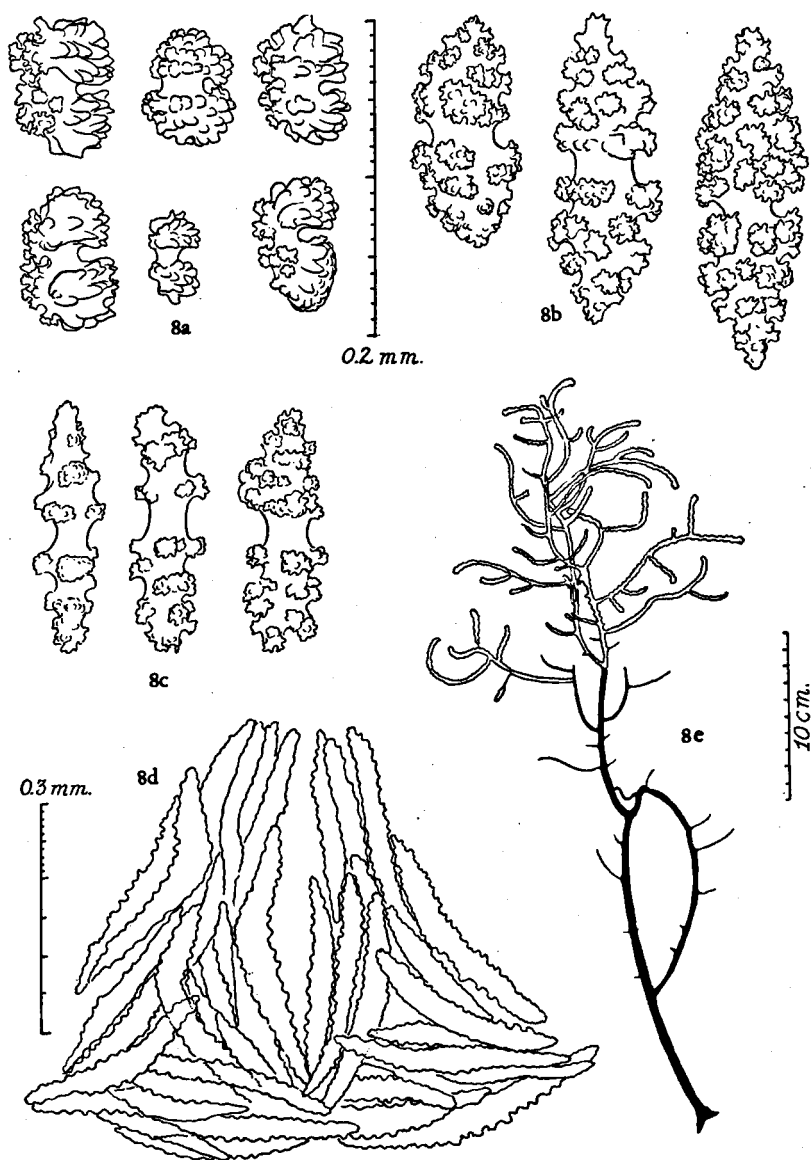


Fig. 8. *Thesea antiope* spec. nov., "Oregon" sta. 2067: 8a, asymmetrical double heads from outer rind; 8b, double spindles from middle layer; 8c, blunt, belted rods from inner layer; 8d, two segments of crown; 8e, habit of entire colony. Magnification of 8a-8c shown by 0.2 mm. scale; 8d enlarged as indicated by 0.3 mm. scale; 8e reduced as shown by 10 cm. scale.

increases in thickness asymmetrically, for the core is strongly eccentric. The axial cortex is loculated only in the innermost layer immediately surrounding the core. It is dark brown in color in the spirit specimen, but on drying becomes golden brown; in the proximal regions of the colony it is inconspicuously striated.

Ramification is chiefly in one plane, openly and irregularly pinnate or lateral; anastomosis occurs in several places but is irregular. The larger branches are as much as 100 mm. in length, and the unbranched twigs up to 40 mm., although most of them measure 20–30 mm. The twigs are 1.5–2.0 mm. in diameter between the calicles, and at the slightly clavate tips, about 3 mm. The polyps form low, rounded calicles, which are arranged on the branches and twigs in bilateral rows, the individuals alternately inclining toward front and back of the colony. The calicular apertures have a distinctly 8-lobed margin, with the spicules converging in the lobes. The anthocodiae are armed with curved spindles forming a crown with collaret; the latter is about four spicules in width, and the points each contain about six pairs of spindles *en chevron* (fig. 8d). In many cases the anthocodiae are preserved exsert.

The cortex has a comparatively thick outer layer and a thin axial sheath, which surrounds the axis and extends between the longitudinal canals. The outer layer of cortex contains a superficial zone consisting almost exclusively of small double heads with their sculpture asymmetrically developed (fig. 8a); in the deeper zone there are, in addition, many double cones of larger size (fig. 8b), but none of the sclerites of the outer cortex develop into the large grains or plates typical of several West Indian species of *Thesea*. The axial sheath, including the partitions separating the longitudinal canals, contains belted rods with weaker sculpture (fig. 8c). The largest double heads of the superficial cortex measure about 0.1 mm. but most are smaller, and many reach only 0.05 mm. in length. The double cones attain a length of about 0.22 mm., and the belted rods of the axial sheath about 0.15 mm. The anthocodial rods may be more than 0.3 mm. long. All sclerites are colorless; consequently the cortex is white.

Thesea antiope is unlike the other western Atlantic members of the genus in the superficial layer of peculiar, asymmetrical double heads.

Similar sclerites are found in *Thesea hebes* Deichmann, but that species contains rounded, granular sclerites nearly twice as large (0.4 mm.) as the largest double cones of *T. antiope*. The new species also bears some resemblance to *T. nivea* Deichmann, but in that species the double heads are larger (0.15–0.2 mm.) and not asymmetrical, the double cones are larger (0.35 mm.) and the spindles of the collaret much larger (0.7 mm).

13. *Thesea bicolor* Deichmann

Thesea bicolor DEICHMANN 1936, p. 114, pl. 11 figs. 11–13.

Not represented in the collections of the "Coquette" and the "Oregon."

Previous South American record: Brazil, off Bahia, 200 fms., VERRILL 1912 [as *Evacis* sp.]; DEICHMANN 1936.

14. *Thesea gracilis* (Gray)

Filigella gracilis GRAY 1868, p. 443, fig. 2.

Not represented in the collections of the "Coquette" and the "Oregon."

Previous South American record: Brazil, off Cape Frio, GRAY 1868; WRIGHT & STUDER 1889; AURIVILLIUS 1931; DEICHMANN 1936 [all as *Filigella gracilis*].

Family GORGONIIDAE Lamouroux, 1812

15. *Leptogorgia stheno* (Bayer)

Fig. 4

Eugorgia stheno BAYER 1952, p. 186, fig. 1 j-n.

Off SURINAM, "Coquette" sta. 360, 06°19' N to 06°20' N, 55°15' W to 55°14' W, 14 fms., mud & shell, 22.VII.1957; one incomplete specimen (USNM 50845).

A fragment of an extremely slender colony is referable to this species. Its anthocodial rods (fig. 4a) measure as much as 0.135 mm. in length. The disk-spindles (fig. 4b) are more sharply sculptured than in typical material from various localities in the Gulf of Mexico.

16. *Leptogorgia setacea* (Pallas)

Leptogorgia setacea, DEICHMANN 1936, p. 178, pl. 19 fig. 35–38.

Not represented in the collections of the "Coquette" and the "Oregon."

Previous South American records: Brazil, Abrolhos Reefs, VERRILL 1868 [as *Pterogorgia gracilis* Verrill]; VERRILL 1869 and 1912 [as *Gorgonia gracilis*].

All of the specimens of this species that I have seen have a very weak anthocodial crown composed of rods much smaller than those of *L. stheno* – usually about half as long as the longest cortical spindles.

17. *Leptogorgia virgulata* (Lamarck)

Leptogorgia virgulata, BIELSCHOWSKY 1929, p. 127, fig. 21, pl. 3 fig. 12.

Leptogorgia virgulata, DEICHMANN 1936, p. 177, pl. 19 fig. 24–34.

Not represented in the collections of the "Coquette" and the "Oregon."

Previous South American record: Brazil, Mapelle, Bahia, VERRILL 1912 [as *Gorgonia braziliensis* Verrill].

18. *Lophogorgia punicea* (Milne Edwards & Haime)

Gorgonia punicea VALENCIENNES 1855, p. 12. (Nom. nud.)

Leptogorgia punicea, VERRILL 1912, p. 399, pl. 33 fig. 9–10, pl. 35 fig. 11.

Not represented in the collections of the "Coquette" and the "Oregon."

Previous South American records: Brazil, Rio de Janeiro, VALENCIENNES 1855 [as *Gorgonia punicea*]; MILNE EDWARDS & HAIME 1857 [as *Gorgonia punicea* Val., *err. transcr.*]. Rio de Janeiro, VERRILL 1912 [as *Leptogorgia punicea*]. Brazil, STIASNY 1941 [as *Leptogorgia punicea* (Val.) and *L. purpurea* (Esp.)]; STIASNY 1951 [as *Leptogorgia punicea* (Val.)].

19. *Lophogorgia rathbunii* (Verrill)

Leptogorgia rathbunii VERRILL 1912, p. 397, pl. 29 fig. 4–4a, pl. 33 fig. 11, pl. 35 fig. 9–9a.

Leptogorgia diffusa, STIASNY 1951, p. 71, pl. 20 fig. B, pl. 21 fig. 2–3. Not *Leptogorgia diffusa* Verrill 1868.

Not represented in the collections of the "Coquette" and the "Oregon."

Previous South American records: French Guiana, Ile Royale, STIASNY 1951 [as *Leptogorgia diffusa* Verrill]. Brazil, Parannao, VERRILL 1912 [as *Leptogorgia rathbunii*].

20. *Lophogorgia rubropurpurea* (Verrill)

?*Gorgonia violacea* PALLAS 1766, p. 176.

?*Gorgonia purpurea* ESPER 1796, p. 159, pl. 43.

Leptogorgia rubropurpurea VERRILL 1912, p. 398, pl. 29 fig. 5-5a, pl. 30 fig. 1, pl. 35 fig. 10-10a, pl. 33 fig. 8.

Not represented in the collections of the "Coquette" and the "Oregon."

Previous South American records: Brazil, Rio de Janeiro, VERRILL 1912 [as *Leptogorgia rubropurpurea*].

This species may prove to be identical with the following.

21. *Lophogorgia violacea* (Pallas)

Gorgonia violacea PALLAS 1766, p. 176.

Gorgonia purpurea ESPER 1796, p. 159, pl. 43.

BRAZIL, two specimens from Paqueta, and one from Rio de Janeiro (USNM 17329, 50225).

Not represented in the collections of the "Coquette" and the "Oregon".

22. *Pacifigorgia elegans* (Milne Edwards & Haime)

Fig. 5

Rhipidigorgia elegans MILNE EDWARDS & HAIME 1857, p. 177.

Rhipidogorgia elegans DUCHASSAING & MICHELOTTI 1864, p. 20, pl. 4 fig. 4.

Gorgonia hartii VERRILL 1912, p. 391, pl. 29 fig. 6-6a, pl. 30 fig. 2, pl. 33 fig. 6, pl. 35 fig. 6.

Gorgonaria [sic] *Crevauxi* STIASNY 1951, p. 72, pl. 20 fig. C, pl. 22 fig. 4-5.

Rhipidogorgia elegans, STIASNY 1951, p. 70, pl. 20 fig. A.

Off SURINAM, "Coquette" sta. 23, 06°24' N, 54°59.5' W, 15 fms., shelly bottom, 12.V.1957; several complete specimens (USNM 50953).

In spite of the fact that several names have been applied to the bright purple sea-fans from Trinidad and the Atlantic coast of South America, only one species appears actually to be involved. I have examined numerous specimens from Trinidad, the source of both MILNE EDWARDS & HAIME's and DUCHASSAING & MICHELOTTI's material, and some of VERRILL's specimens from Brazil, and can

find no essential differences. The present material, from Surinam, likewise agrees in all significant respects, as does STIASNY's description (1951) of his specimens from Trinidad and of "*Gorgonaria*" *Crevauxi* from French Guiana. Furthermore, it is quite possible that Esper's *Gorgonia ventalina* (1791, p. 20, pl. 1; not Linnaeus) is also identical.

The spicules are typical; the flat rods from the anthocodiae are shown in fig. 5a, the blunt capstans of the outer layer of rind in 5b, and the longer double spindles from the deeper layer in 5c. All are purple except the anthocodial rods, which are colorless.

23. *Pseudopterogorgia bipinnata* (Verrill)

Pterogorgia bipinnata VERRILL 1864, p. 31.

Pterogorgia bipinnata, DEICHMANN 1936, p. 195, pl. 21 fig. 1-16.

Pseudopterogorgia bipinnata, BAYER 1959, p. 394.

Not represented in the collections of the "Coquette" and the "Oregon."

Previous South American record: Venezuela, Cumaná, VERRILL 1864; DEICHMANN 1936 [both as *Pterogorgia bipinnata*]. DEICHMANN's record from Abrolhos Reefs, Brazil, is based upon VERRILL's *Pterogorgia gracilis*, which I consider to be *Leptogorgia setacea* (Pallas).

24. *Phyllogorgia dilatata* (Esper)

Gorgonia dilatata ESPER 1806, p. 25, pl. 51.

Phyllogorgia foliata VERRILL 1912, p. 397, pl. 33 fig. 5.

Phyllogorgia frondosa VERRILL 1912, p. 395, pl. 31 fig. 2, pl. 33 fig. 4, pl. 35 fig. 8.

Phyllogorgia quercifolia + vars. *quercifolia* and *lacerata* VERRILL 1912, p. 394, pl. 30 fig. 3, pl. 32 fig. 1, pl. 33 fig. 1-1a; p. 395, pl. 30 fig. 4, pl. 32 fig. 2, pl. 33 fig. 2.

Not represented in the collections of the "Coquette" and the "Oregon."

Previous South American records: Brazil, VALENCIENNES 1855; MILNE EDWARDS & HAIME 1857. Cape Frio north to Pernambuco; abundant at Bay of Victoria, Abrolhos, Porto Seguro, and Bahia, VERRILL 1868 [as *Hymenogorgia quercifolia* Milne Edwards & Haime]; VERRILL 1912 [as *Phyllogorgia quercifolia* var. *quercifolia*]. Periperí, Bahia, VERRILL 1912 [as *Phyllogorgia quercifolia* var. *lacerata*]. Abrolhos Reefs, VERRILL 1912 [as *Phyllogorgia frondosa*]. Bahia, STIASNY 1951 [as *Hymenogorgia quercus-folium* (Ehrenberg)].

Family ELLISELLIDAE Gray, 1859

25. *Ellisella barbadensis* (Duchassaing & Michelotti)

Fig. 9

Juncella barbadensis DUCHASSAING & MICHELOTTI 1864, p. 22, pl. 5 fig. 5-6. Not WRIGHT & STUDER 1889, p. 159.

Scirpearia rigida typica Toeplitz in KÜKENTHAL 1919, p. 859.

Scirpearia rigida var. *tenuis* Toeplitz in KÜKENTHAL 1919, p. 859.

Scirpearia rigida TOEPLITZ 1929, p. 297, fig. 11, pl. 6 fig. 5.

Scirpearia rigida var. *tenuis* TOEPLITZ 1929, p. 299, fig. 12, pl. 6 fig. 5a.

?*Scirpearia flagellum* TOEPLITZ 1929, p. 308, fig. 16. Not JOHNSON 1863, p. 565.

Scirpearia barbadensis DEICHMANN 1936, p. 208, pl. 24 fig. 1-19.

Ellisella barbadensis BAYER 1958, p. 386, fig. 4b.

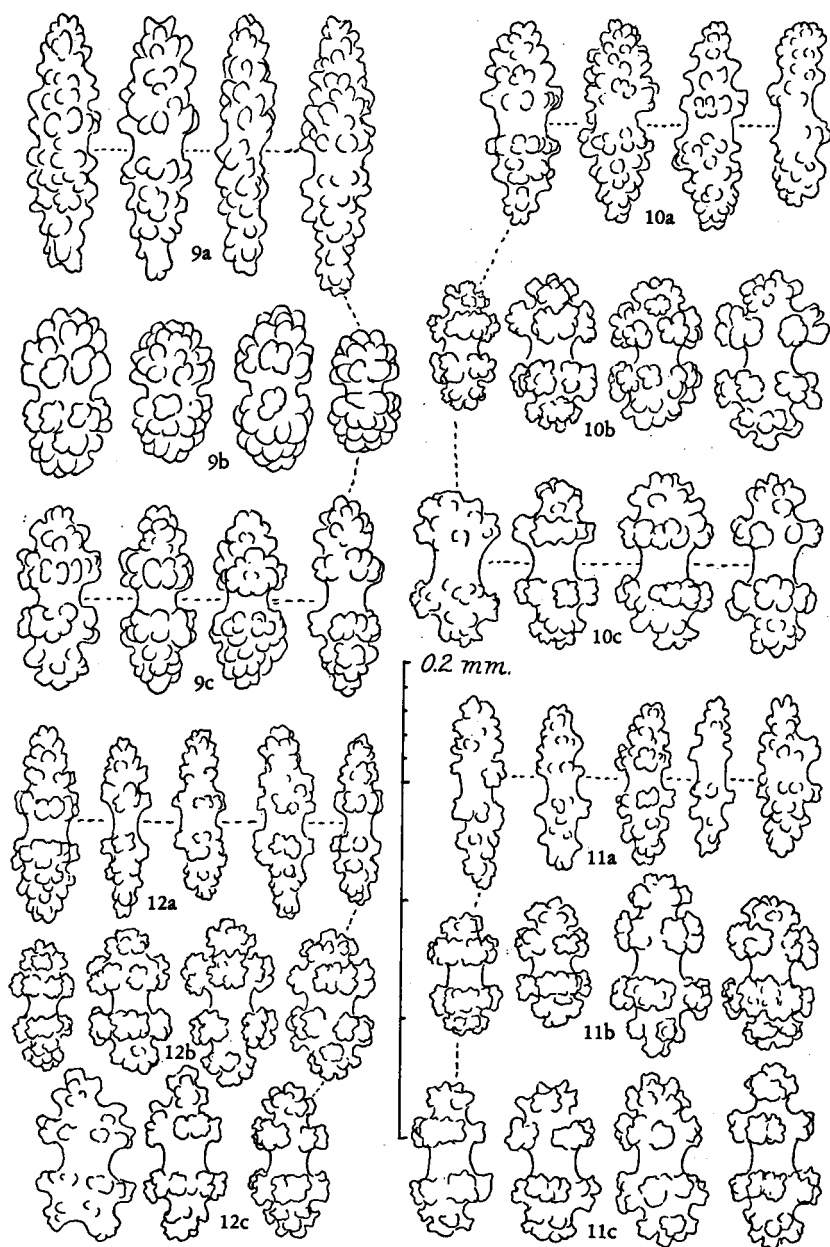
SURINAM, "Oregon" sta. 2289, 07°25' N, 54°35' W, east of Paramaribo, 75-80 fms., 8.XI.1958; 3 fragments, probably parts of one colony (USNM 51294).

BRAZIL, "Oregon" sta. 2066, 02°40' N, 47°55' W, off the mouth of the Amazon River, 110 fms, 15.XI.1957; several fragments (USNM 50904).

"Oregon" station 2066 produced a number of fragments that appear to belong to a single colony. The calicles are hemispherical, in a single or alternating double row along each side of the unbranched stem. Color dull orange, calicles white or yellowish. The outer layer of rind contains double heads 0.05-0.07 mm. long, ornamented with closely crowded, rather smooth warts (fig. 9b); the calicles contain blunt rods up to 0.11 or 0.12 mm. long (fig. 9a); and the axial sheath contains narrower double heads approaching the capstan type, with terminal clusters of warts (fig. 9c).

This species shows great variability in external appearance and uniformity in spiculation, as pointed out by DEICHMANN (1936), who concludes that it is the same as the *Juncella barbadensis* described by DUCHASSAING & MICHELOTTI. The material here reported agrees well with some of the specimens studied by Miss DEICHMANN, especially Mus. Comp. Zool. no. 4720, which I had an opportunity to examine at the Museum of Comparative Zoölogy, as well as with TOEPLITZ' description of *Scirpearia rigida* and *S. rigida* var. *tenuis*.

Ellisella barbadensis was originally recorded from Barbados and Guadelupe by DUCHASSAING & MICHELOTTI, and later from Barbados by TOEPLITZ. DEICHMANN reports it from Havana, St. Croix,



Grenada and Barbados in 92–262 fathoms, and I have reported it in the Gulf of Mexico off Mobile, Alabama in 41–42 fathoms.

26. *Ellisella elongata* (Pallas)

Figs. 10–12

Gorgonia elongata PALLAS 1766, p. 179.

Gorgonia elongata, ESPER 1806, p. 35, pl. 55.

Ellisella elongata, GRAY 1857, p. 287.

Ellisella elongata, TOEPLITZ 1929, p. 285.

Scirpearia cylindrica TOEPLITZ 1929, p. 306, fig. 15, pl. 7 fig. 7.

Scirpearia elongata, DEICHMANN 1936, p. 212, pl. 24 fig. 46–48.

Ellisella elongata, BAYER 1958, p. 386, fig. 4e–f.

SURINAM, "*Oregon*" sta. 2289, 07°25' N, 54°35' W, east of Paramaribo, 75–80 fms., 8.XI.1958; 4 fragments, probably parts of one colony (USNM).

Off FRENCH GUIANA, "*Oregon*" sta. 2037, 05°51' N, 53°00' W, 19 fms., 11.XI.1957; one imperfect specimen (USNM 50903). 2038, 05°46' N, 53°00' W, 15 fms., 11.XI.1957; one imperfect specimen (USNM 50901).

BRAZIL, "*Oregon*" sta. 2049, 04°02' N, 50°33' W, off Cabo Caciporé, 38 fms., 13.XI.1957; two branches (USNM 50899). 2066, 02°40' N, 47°55' W, off the mouth of the Amazon River, 110 fms., 15.XI.1957; a small but complete colony (USNM 50902).

Most of the ellisellid material obtained by the "*Oregon*" along the Atlantic coast of South America has proved to be this species. Except for one small specimen, the colonies are incomplete, being long terminal branches; two of these are branched, perhaps abnormally. Color is uniform, either putty-grey or dull yellow, not pale red, or red with white calicles as in specimens from the Gulf of Mexico. The spicules demonstrate only a small amount of variation, chiefly in the size of the calicular rods. The double heads, particularly the larger ones, are of the capstan type, i.e., they have two whorls of tubercles and terminal clusters, instead of the closely crowded tubercles characteristic of the dumb-bell type. The largest of the calicular rods are only slightly longer than the largest of the double

Fig. 9. *Ellisella barbadensis* (Duch. & Mich.), "*Oregon*" sta. 2066.

Fig. 10. *Ellisella elongata* (Pallas), "*Oregon*" sta. 2049. (White colony.)

Fig. 11. *Ellisella elongata* (Pallas), "*Oregon*" sta. 2049. (Yellow colony.)

Fig. 12. *Ellisella elongata* (Pallas), "*Oregon*" sta. 2066.

In figs. 9–12, spicules marked a are calicular rods; b, double heads of outer rind; c, capstans of axial sheath. All figures are enlarged according to the 0.2 mm. scale.

heads. In the accompanying figures I have illustrated a few spicules from three of the colonies in order to demonstrate the degree of variation to be expected.

The specimen from station 2037 is a damaged branch, injured at the upper end, broken off, decorticated and encrusted with barnacles at the lower. It gives off a long lateral branch at right angles, apparently as the result of an injury. It has putty-grey rind and closely crowded calicles of the same color. The calicles are crowded, prominent, often appressed and scale-like and directed either upward or downward; they occur in four rows on each side of the stem, separated by two inconspicuous grooves that ascend the stem in a weak spiral. The largest capstans of the outer rind measure about 0.08 mm. in length; the spicules of the axial sheath are of similar size but are more slender and not so prominently sculptured. The rods in the calicles reach a length of 0.09 mm. and may be slightly claviform.

The specimen from station 2038 is a main stem, terminally decorticated and broken off at the base, which gives off a single lateral branch at right angles. The rind is white. The calicles are crowded and arranged in four rows on each side of the stem, separated by two inconspicuous longitudinal grooves. Distally the calicles are cylindrical and bent inward, usually facing upward; proximally they become shorter and shorter until, near the base, they are indicated as shallow pits in the rind. The largest cortical capstans measure 0.08 mm., the longest calicular rods 0.09 mm. The capstans of the axial sheath are like those of the outer layer, but are more slender and not so profusely sculptured.

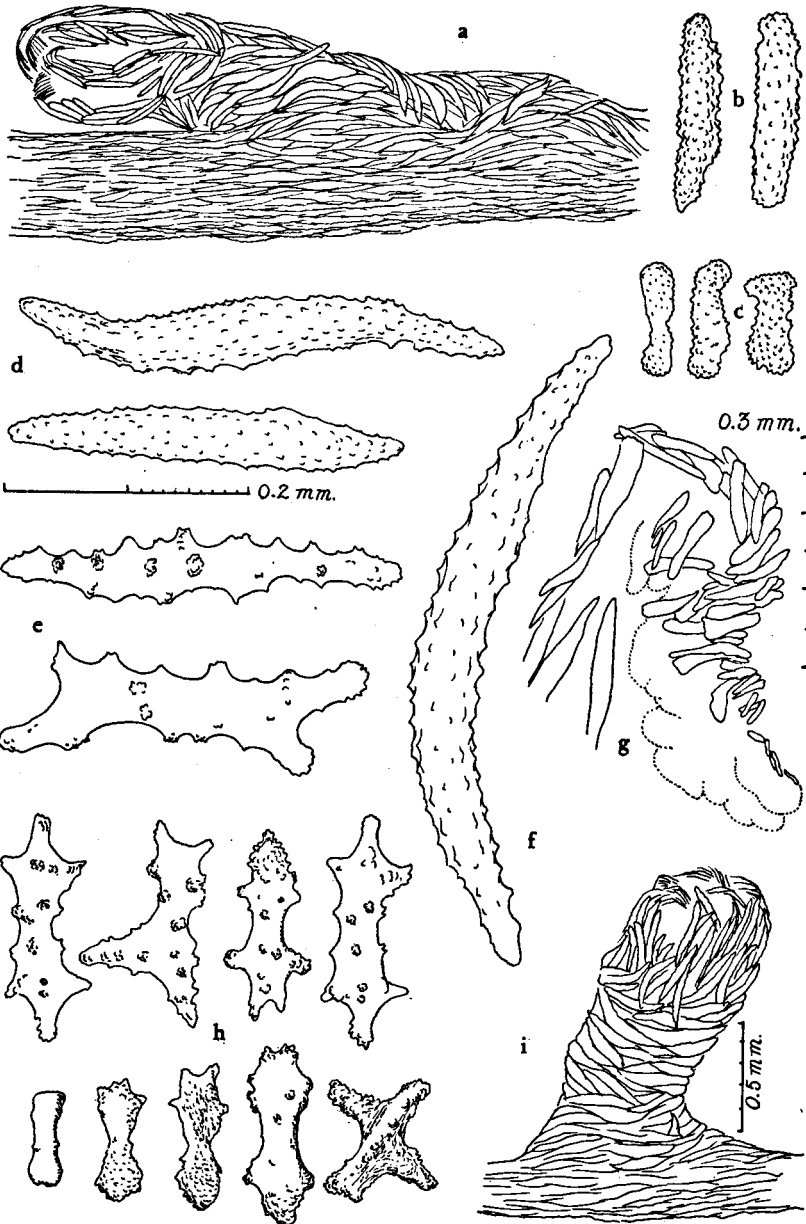
Station 2049 yielded two specimens, one yellowish, the other white. The white colony is an undivided terminal branch broken at both ends and in the middle. The calicles are crowded, upturned, and set in two biserial bands of four rows, separated by two distinct longitudinal tracts. The largest capstans of the outer rind (fig. 10b) are 0.08 mm. long and the longest calicular rods (fig. 10a) are about 0.09 mm.; the axial sheath contains capstans up to 0.075 mm. in length, narrower and less profusely sculptured than those of the outer rind (fig. 10c).

The yellow specimen is also a long, unbranched terminal with

crowded calicles. The polyps are arranged in bilateral tracts of five rows (three rows near the tip) on each side of the stem, separated by two longitudinal naked streaks. The calicles are narrow, up-turned, and scale-like. The largest capstans of the outer layer (fig. 11b) measure 0.08 mm. but are not quite so stout as those of the white colony; the capstans of the axial sheath (fig. 11c) are of the same length and are only slightly less ornate than those of the outer layer. The longest calicular rods (fig. 11a) measure only 0.08 mm. and are narrower than those of the pale specimen.

From station 2066 comes a small, slender colony, complete with base, which measures 68 cm. in height and is apparently young, being slender (3 mm. in diameter near the base) and unbranched. The color of the rind is light yellow. The proximal 4 cm. is devoid of calicles, above which the polyps occur in three rows along each side of the stem. Proximally they are completely retracted but distally they are narrow, upturned and scale-like. The spicules are almost identical with those of the other colonies in the collection: the largest cortical capstans (fig. 12b) measure 0.07 mm. in length, the largest calicular rods 0.08 mm. (fig. 12a); the capstans of the axial sheath (fig. 12c) are the same size as those of the outer rind but are more delicate.

In DEICHMANN's arrangement there are four species of *Ellisella* (*Scirpearia*) with double heads in the form of capstans — i.e., with tubercles arranged in two median belts and two terminal clusters — viz., *funiculina* (Duch. & Mich.), *grandiflora* (Deichmann), *elongata* (Pallas), and *grandis* (Verrill). Of these, *funiculina* has elongate, almost rod-like capstans 0.1 mm. long and calicular rods up to 0.14 mm., and its colonies are unbranched, with small, scale-like calicles; *grandiflora* has huge, projecting calicles 2–3 mm. tall, capstans 0.08 mm. long, with narrow waists, and calicular rods 0.13 mm. long; both *elongata* and *grandis* produce branched colonies, but in the latter the calicular rods measure 0.12 mm. whereas in *elongata* they are at most about 0.09 mm. and usually only 0.08 mm. When the variation in size of spicules has been more thoroughly investigated it may prove necessary to unite *grandis* with *elongata* — as DEICHMANN (1936) has already suggested — but the scattered



material available to date seems to indicate that *elongata* always has smaller calicular rods.

27. *Junceella hystrix* Milne Edwards & Haime

Junceella [sic] *hystrix* MILNE EDWARDS & HAIME 1857, p. 186.

Not represented in the collections of the "Coquette" and the "Oregon."

Previous South American record: Brazil, Bahia, VALENCIENNES 1855; MILNE EDWARDS & HAIME 1857.

Identity of this species remains to be established; it is probably an *Ellisella*.

Family CHRYSOGORGIIDAE Verrill, 1883

28. *Chrysogorgia fewkesi* Verrill, forma *multiflora* Deichmann Fig. 13

Chrysogorgia fewkesi var. *multiflora* DEICHMANN 1936, p. 231, pl. 22 fig. 6, pl. 23 fig. 51-52.

BRAZIL, "Oregon" sta. 2081, 01°52' N, 46°54' W, off the mouth of the Amazon River, 175 fms., 17.XI.1957; six specimens (USNM 50907).

The six colonies from station 2081 are of uniform appearance and were apparently of similar size when complete, although they are now more or less damaged. The most nearly perfect specimen, which is broken off from its holdfast at the point of articulation, is about 11 cm. tall. The branching sequence is $\frac{2}{5}$, twisted to the right, i.e., the regularly dichotomizing branches arise from the main stem in a right-handed spiral, every sixth branch standing directly above the first and separated from it by two turns around the axis

Fig. 13. *Chrysogorgia fewkesi* Verrill, forma *multiflora* Deichmann, "Oregon" sta. 2081: a, polyp distended with eggs; b, spicules from proximal part of tentacle; c, flat rods from tip of tentacle; d, thorny spindles from upper part of polyp body; e, coarsely spinose spindle and flattened sclerite from twig rind; f, curved thorny spindle from lower part of polyp; g, tentacular spiculation; h, flattened sclerites from rind of main stem; i, polyp.

Figs. a and i are drawn at magnification indicated by 0.5 mm. scale at i; g, enlarged according to 0.3 mm. scale adjacent; b-f, and h, enlarged according to 0.2 mm. scale between d and e.

(for a discussion of the branching sequence or 'Aststand' see VERSLUYS 1902, p. 21-22); they are inclined slightly upward, forming an angle of about 80° with the vertical axis of the colony. The internodes of the main stem are 2-3 mm. long, the shortest being basal. The branches dichotomously subdivide as many as 10 times, although 3-4 dichotomies is usual, the internodes usually measuring about 6 mm. in length. The branch internodes carry one polyp each, near the distal end, except for the proximal internodes which may have two, one near the middle and the other at the distal end just below the first bifurcation of the branch. The polyps are about 1.4 mm. tall, erect, and usually directed distad (fig. 13i); individuals with the lower part of the body distended with ova may be directed basad (fig. 13a). The spiculation of the polyps consists mainly of prickly spindles, those of the lower part of the body large, curved (fig. 13f), and transversely arranged (fig. 13i); below the tentacles, the spicules are smaller (fig. 13d) and longitudinally arranged in converging rows. On the tentacles (fig. 13g) the spicules of the proximal half are blunt, prickly rods (fig. 13b) longitudinally arranged, and on the distal half they are flattened rodlets (fig. 13c) set transversely. The large, bent spindles of the anthosteles measure approximately 0.5 mm. in length, and the shorter, longitudinal rods below the tentacles about 0.4 mm. In the rind of the twigs there are elongate, rudely spinose rods, sometimes flattened (fig. 13e), about 0.3 mm. long; on the main stem the rind spicules are shorter (about 0.2 mm.), mostly flattened, irregularly granular, and have coarsely dentate margins (fig. 13h). Nematozooids lacking. Axis of main stem brown with brassy luster, twigs straw colored or honey yellow with faint metallic iridescence.

On the basis of the information given by DEICHMANN (1936) and the available specimens identified by VERRILL, the present material seems definitely to belong to the form *multiflora* of VERRILL's *Chrysogorgia fewkesi*. The colonies are in general not so robust as reported by DEICHMANN, but the transverse arrangement of the spindles in the anthosteles and the prominent sculpture of the rind spicules indicate that they are the same species and form.

Tunicates, ophiuroids, and two specimens of the anomuran *Uroptychus uncifer* (A. Milne Edwards) were found attached to or clinging among the branches of these delicate gorgonians.

29. *Chrysogorgia affinis* Versluys

Chrysogorgia affinis VERSLUYS 1902, p. 47, fig. 64-65.

Not represented in the collections of the "Coquette" and the "Oregon."

Previous South American record: Brazil, off Pernambuco, 630 m., WRIGHT & STUDER 1889 [as *Dasygorgia spiculosa* Verrill].

This is probably *Crysogorgia elegans* Verrill = *C. spiculosa* (Verrill) as WRIGHT & STUDER originally thought; see DEICHMANN 1936, p. 222.

Family PRIMNOIDAE Gray, 1857

30. *Primnoella divaricata* (Studer)

Narella divaricata STUDER 1878, p. 643, pl. 1 fig. 8a-c.

Not represented in the collections of the "Coquette" and the "Oregon."

Previous South American records: East coast of Argentina, 38°10.1' S, 56°26.2' W, 30 fms., STUDER 1878. — In the collections of the U.S. National Museum there are specimens from off Peninsula Valdés, Argentina (42°24' S, 61°38' 30" W), and Cabo de Santa Maria, Uruguay.

31. *Primnoella magelhaenica* Studer

Primnoella magelhaenica STUDER 1878, p. 644, pl. 2 fig. 10 a-c.

Not represented in the collections of the "Coquette" and the "Oregon."

Previous South American records: Chile, Straits of Magellan, 42 fms., STUDER 1878. Uruguay, off Montevideo, 600 fms., WRIGHT & STUDER 1889 [as *Primnoella magellanicus* Studer].

32. *Primnoella murrayi* Wright & Studer

Primnoella murrayi WRIGHT & STUDER 1889, p. 84, pl. 18 fig. 3-3a, pl. 21 fig. 11.

Not represented in the collections of the "Coquette" and the "Oregon."

Previous South American record: *Uruguay*, off Montevideo, 600 fms., WRIGHT & STUDER 1889.

33. *Primnoella flagellum* Studer

Primnoella flagellum STUDER 1878, p. 645, pl. 2 fig. 11 a-c.

Not represented in the collections of the "Coquette" and the "Oregon."

Previous South American records: *Argentina*, SE of Peninsula Valdés, 43°56.2' S, 60°25.2' W, 60 fms., STUDER 1878.

34. *Primnoella polita* Deichmann

Primnoella polita DEICHMANN 1936, p. 162, pl. 26 fig. 12.

Not represented in the collections of the "Coquette" and the "Oregon."

Previous South American record: *Brazil*, off Pernambuco, WRIGHT & STUDER 1889 [as *Primnoella distans* Studer (part)].

35. *Primnoella delicatissima* Kükenthal

Primnoella delicatissima KÜKENTHAL 1909, p. 47.

Not represented in the collections of the "Coquette" and the "Oregon."

Previous South American records: *Brazil*: Cape Frio, KÜKENTHAL 1909. Rio de Janeiro, 30-40 fms., AURIVILLIUS 1931.

36. *Thouarella acanthina* (Wright & Studer)

Stenella acanthina WRIGHT & STUDER 1889, p. 59, pl. 14 fig. 3, pl. 20 fig. 10.

Not represented in the collections of the "Coquette" and the "Oregon."

Previous South American record: *Argentina*, off the Rio de la Plata, 600 fms., WRIGHT & STUDER 1889.

Family ISIDIDAE Lamouroux, 1812

37. *Primnoisis rigida* Wright & Studer

Primnoisis rigida WRIGHT & STUDER 1889, p. 37, pl. 8 fig. 3-3a, pl. 9 fig. 8.

Not represented in the collections of the "Coquette" and the "Oregon."

Previous South American record: *Argentina*, off the Rio de la Plata, 600 fms.
WRIGHT & STUDER 1889.

Order PENNATULACEA Verrill, 1865

Suborder Sessiliflorae Kükenthal, 1915

* Family RENILLIDAE Gray, 1860

38. *Renilla reniformis* (Pall.), forma *americana* Lamarck

Pennatula reniformis PALLAS 1766, p. 374.

Renilla Americana LAMARCK 1816, p. 429.

Renilla reniformis (Pallas) forma *americana* DEICHMANN 1936, p. 259.

Not represented in the collections of the "Coquette" and the "Oregon."

Previous South American records: *Brazil*, Continguiba and Desterro, KÖLLIKER 1872.

39. *Renilla mülleri* Kölliker

Fig. 14

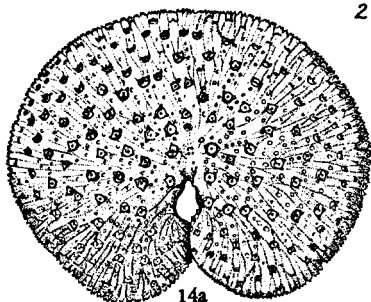
Renilla Mülleri KÖLLIKER 1872, p. 106, pl. 20 fig. 172, 176.

Renilla mülleri, DEICHMANN 1936, p. 258.

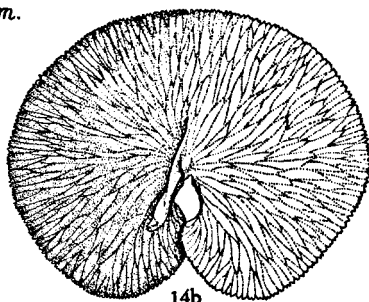
Off *SURINAM*, five lots (USNM 50826-50830) from the following localities:
"Coquette" sta. 2, 06°23' N, 55°05.5' W, 15 fms., mud, 11.V.1957. 21, 06°21' N, 55°00' W, 14 fms., 12.V.1957. 33, 06°52' N, 54°53' W, 28 fms., mud & shells, 12.V.1957. 44, 06°18.5' N, 54°51' W, 10 fms., mud, 13.V.1957. 157, 06°22' N, 55°03.5' W, 13 fms., mud, 4.VI.1957.

The specimens of *Renilla mülleri* collected at the above-mentioned stations are entirely typical. This species ranges from the northern shore of the Gulf of Mexico along the continental coast south to Brazil, whereas *R. reniformis*, the long-stemmed sea-pansy, extends from the Carolina coast to Brazil by way of the Antillean islands, apparently avoiding the continental shore of the Gulf of Mexico and Caribbean Sea.

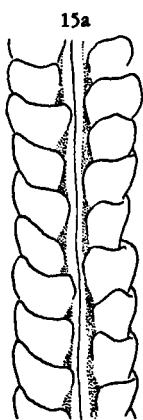
2 cm.



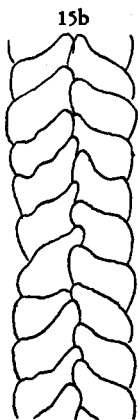
14a



14b



15a

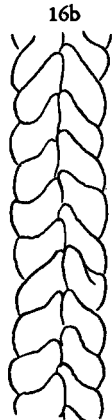


15b

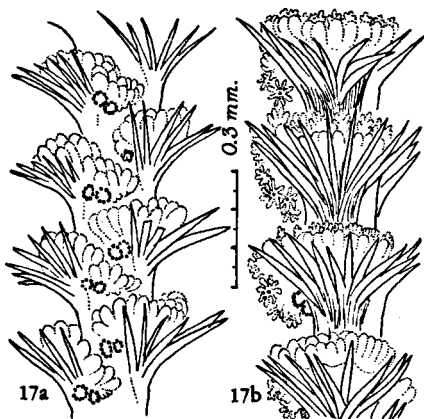
10 mm.



16a

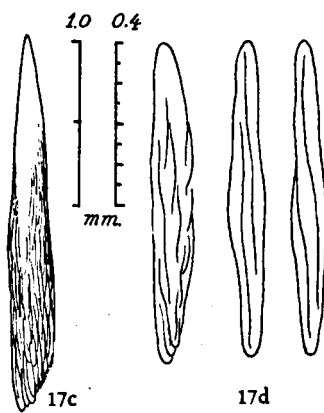


16b



17a

17b



17c

17d

One of the specimens from station 157 is illustrated in fig. 14 (USNM 50826).

Family KOPHOBELEMNIDAE Gray, 1860

Genus *Sclerobelemnon* K  lliker

Sclerobelemnon K  LLIKER 1872, p. 117, 131. (Type species, *Sclerobelemnon Schmeltzii* K  lliker, by monotypy.)

Mesobelemnon GRAVIER 1907, p. 159.

Sclerobelemnon, HICKSON 1916, p. 77.

HICKSON's discussion of this genus clarifies its relationship with *Kophobelemnon* Asbj  rnsen. The material described below represents the first notice of *Sclerobelemnon* in the Atlantic Ocean. Previous distribution: Formosa; Australia (*S. schmeltzii* K  lliker); Japan; Philippines; Coromandel coast (*S. burgeri* Herklots); Red Sea (*Mesobelemnon gracile* Gravier).

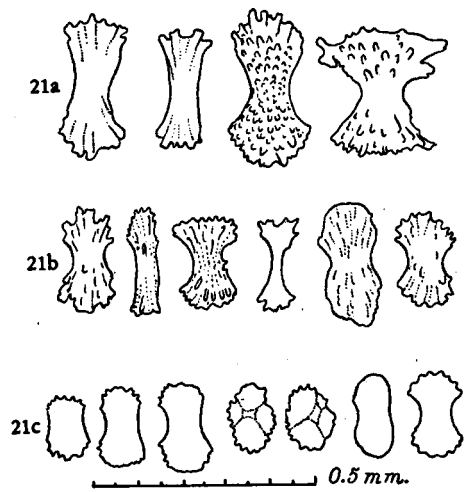
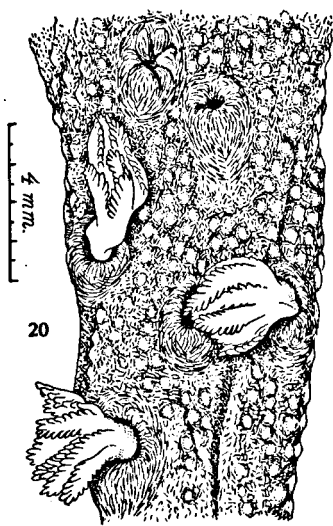
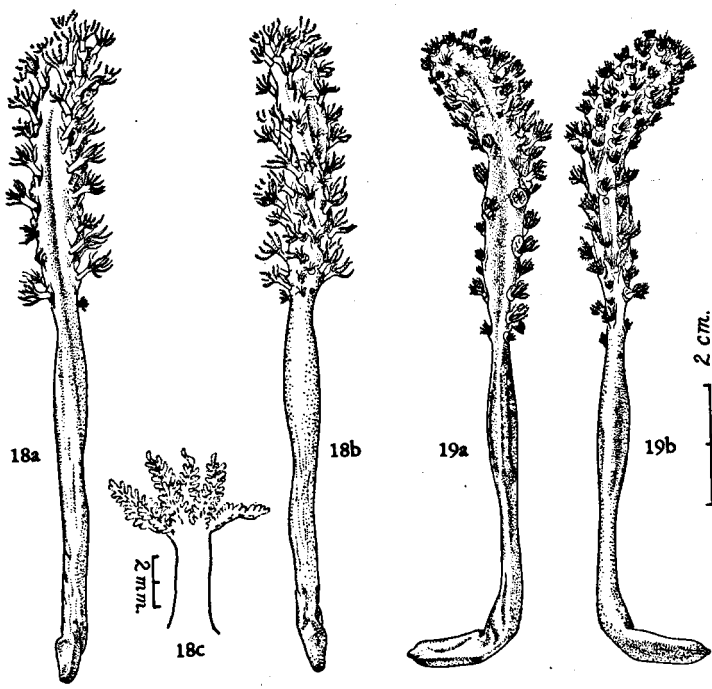
40. *Sclerobelemnon theseus* spec. nov.

Figs. 18-21

TRINIDAD, "Albatross" sta. 2121-2122, 10°37'00" - 10°37'40" N, 61°42'40" - 61°44'22" W, Gulf of Paria, south of Entrada Point, 31-34 fms., dark slate-colored mud, 3.II.1884; twenty specimens (holotype, USNM 50954, and 19 paratypes, 7072).

Off SURINAM, "Coquette" sta. 226, 06°55' N, 54°10' W, 30 fms., mud, 15.VI. 1957; one specimen (paratype USNM 50955). One specimen from the "Coquette" collection, trawled off Surinam, received without label (USNM 50956).

- Fig. 14. *Renilla m  lleri* K  lliker, "Coquette" sta. 157: 14a, dorsal view; 14b, ventral view. Drawing by Patricia Isham.
- Fig. 15. *Virgularia presbytes* Bayer, "Coquette" sta. off Surinam: 15a, dorsal view; 15b, ventral view.
- Fig. 16. *Virgularia presbytes* Bayer, "Coquette" sta. off Surinam: 16a, dorsal view; 16b, ventral view.
- Fig. 17. *Stylatula diadema* spec. nov., "Coquette" sta. 144: 17a, ventral view, and 17b, lateral view of part of rachis of type; 17c, large needle from the supporting fan; 17d, smaller, 3-flanged rods from supporting fan. Enlargement of 17c shown by 1.0 mm. scale; of 17d, by 0.4 mm. scale; other figures as indicated.



The type (fig. 19) is a colony 122 mm. tall. The stalk occupies 64 mm. of the total length, and has a spindle-like swelling in its upper portion; the proximal end is slightly dilated. At its narrowest part, between the terminal and distal swellings, the stalk has a diameter of 3 mm. It has a dense superficial layer of small, oval platelets often constricted in the middle and with serrated ends (fig. 21c); they are practically devoid of sculpture. The rachis is 58 mm. in length and, in its collapsed condition, about 8 mm. in diameter. There is a dorsal streak free of autozooids but thickly covered with siphonozooids. The autozooids are large (fig. 18c) and weakly spiculated, having a few tiny, longitudinally oriented rodlets scattered in the backs of the tentacles, and numerous scales in the proximal part of the body where they produce a pseudocalyx (fig. 20); these spicules are the largest in the colony, reaching a length of about 0.37 mm. and a breadth of 0.17 mm. or more. Many are constricted in the middle and expanded at the ends, somewhat like a double-bitted axe head, while others are nearly rectangular; the ends conspicuously notched (fig. 21a). The autozooids occur in 8 or 9 longitudinal rows and, at the same time, in oblique transverse rows. The siphonozooids form small verrucae arranged in irregular longitudinal lines (fig. 20) on all sides of the rachis including the dorsal streak. The spicules of the rachidial surface (fig. 21b) are like those of the pseudocalyces but smaller, usually not longer than 0.3 mm. The color of the colony is cream white.

The stout axis is proximally square, becoming more and more rounded distally until near the apex it is practically cylindrical. It

Fig. 18. *Sclerobelemnon theseus* spec. nov., paratype from "Coquette" sta. 226: 18a, dorsal, and 18b, ventral view; 18c, autozooid. Figs. 18a and 18b drawn by Patricia Isham.

Fig. 19. *Sclerobelemnon theseus* spec. nov., holotype, from "Albatross" sta. 2121-2122: 19a, dorsal and 19b, ventral view, drawn by Patricia Isham.

Fig. 20. *Sclerobelemnon theseus* spec. nov., paratype from "Albatross" sta. 2121-2122: detail view of part of rachis showing expanded autozooids and pseudocalyces of retracted individuals.

Fig. 21. *Sclerobelemnon theseus* spec. nov., spicules of holotype: 21a, scales from pseudocalyces; 21b, scales from surface of rachis; 21c, platelets from stalk.

Figs. 18a-b and 19a-b drawn to the same scale, as indicated at 19; Figs. 18c, 20, and 21 as indicated.

extends from the proximal flexure of the stalk, where it is bent into a slender, twisted hook, to about 1 cm. from the apex of the rachis, where its tip is blunt. Almost all of the colonies observed are bent proximally and distally as shown in fig. 19; few are as straight as that shown in fig. 18.

Measurements of the twenty specimens from the type lot show the average overall length to be 112 mm., rachis 53 mm., stalk 59 mm., diameter of rachis (collapsed) 7.3 mm., and diameter of stalk below the upper swelling, 3.8 mm. The extremes are: length, 90 to 145 mm.; length of rachis, 35 to 68 mm.; length of stalk, 48 to 77 mm.; diameter of rachis, 5 to 10 mm.; diameter of stalk below upper swelling, 3 to 5 mm.

The specific characters of *Sclerobelemnon theseus* may be summarized as follows: Slender, elongate, slightly clavate *Sclerobelemnon* with stalk slightly more than half the total length. End-swelling of stalk inconspicuous or absent in most specimens. Autozooids in about 9 irregular longitudinal rows, leaving a dorsal streak naked, with indication of pseudocalyces dependent upon degree of contraction. Siphonozooids numerous, in irregular longitudinal rows on all sides of the rachis including the dorsal streak. Autozooids with proximal portion of body wall filled with flat scales somewhat resembling a double-bitted axe head, tentacles with tiny needles longitudinally arranged; surface of rachis with scales like those of pseudocalyces but smaller; stalk with small, oval platelets usually with median constriction and serrated ends.

Colonies of *Sclerobelemnon theseus* bear a close resemblance to specimens of *Kophobelemnon* but completely lack the 3-flanged rods and needles so characteristic of that genus; their axe-head shaped scales are very distinctive.

Distribution: Trinidad to Surinam; probably occurs along most of the tropical east coast of South America, at moderate depths.

Suborder Subselliflorae Kükenthal, 1915

Family VIRGULARIIDAE Verrill, 1868

41. *Virgularia presbytes* Bayer

Figs. 15-16

Virgularia presbytes BAYER 1955, p. 295.*Virgularia presbytes*, BAYER 1958a, p. 379.

Off SURINAM, "Coquette" sta. 223, 06°49' N, 53°59' W, 26 fms., mud & shell, 15.VI.1957. 225, 06°55' N, 54°01' W, 30 fms., mud, 15.VI.1957. 226, 06°55' N, 54°10' W, 30 fms., mud, 15.VI.1957. "Coquette", off Surinam (no label), 1957. — "Oregon" sta. 2016, 07°18' N, 54°08' W, 50 fms., 8.XI.1957 (USNM 50821-50824, 50910).

Since this species has now been found living off Surinam, it undoubtedly occurs also in the vicinity of Trinidad, where it is known in the fossil state. The present specimens are in complete agreement with the material heretofore described.

42. *Virgularia kophameli* May*Virgularia Kophameli* MAY 1899, p. 10.

Not represented in the collections of the "Coquette" and the "Oregon."

Previous record: East coast of South America, 100 m.

Genus *Stylatula* Verrill*Stylatula* VERRILL 1864, p. 30. (Type species, *Stylatula elongata* Verrill 1864, non Gabb, by subsequent designation: Kükenthal 1915.)*Stylatula*, KÜKENTHAL 1915, p. 67.*Stylatula*, DEICHMANN 1936, p. 269.

The fan of large, spine-like, prismatic spicules supporting each polyp-leaf serves to distinguish the members of this genus from all other slender sea-pens of the tropical western Atlantic. Two species are represented in the present collections from the northeast coast of South America, one of them new, the other only provisionally identifiable.

43. *Stylatula* sp. cf. *S. brasiliensis* (Gray)

?*Lygus brasiliensis* GRAY 1870, p. 18.

?*Stylatula brasiliensis*, KÖLLIKER 1871, p. 567, pl. 16 fig. 139.

Off SURINAM, "Coquette" sta. 226, 06°55' N, 54°10' W, 30 fms., mud, 15.VI. 1957; one broken specimen (USNM 50831).

A fragmentary colony 13 cm. long is questionably referred to this species. The polyp-leaves vary from opposite to alternate, and 9 or 10 occur in 3 cm. (on one side of the rachis). The leaves consist of 12 autozooids in a single row, fused for most of their length but having short, distinct, free calicles; the autozooids are devoid of spicules. The supporting fan contains 8–10 large needles. The siphonozooids occur in a band of 2–4 rows in the leaf axils, widest at the dorsal side of the rachis.

The principal points of difference between KÖLLIKER's description of *S. brasiliensis* and the specimen here reported are the fewer needles (7–8) in the supporting fan and the more numerous autozooids (15) in each leaf. It is possible that these differences could be within the range of variation for the species, but in view of the lack of information regarding the distribution of siphonozooids in *S. brasiliensis*, it seems best to refer the present specimen to that species only tentatively.

44. *Stylatula diadema* spec. nov.

Fig. 17

Off SURINAM, "Coquette" sta. 2, 06°23' N, 55°05.5' W, 15 fms., mud, 11.V.1957. 144, 06°22.5' N, 54°58' W, 14 fms., mud, 30.V.1957. 188, 06°24' N, 54°55' W, 15 fms., mud, 10.VI.1957. 191, 06°24' N, 54°58' W, 14 fms., mud, 10.VI.1957. Four fragmentary specimens (holotype USNM 50834, paratypes 50833 and 50835).

The colonies, all fragmentary, are slender and rigid, resembling *Stylatula brasiliensis* and *S. antillarum* in general appearance. The type is a fragment 75 mm. long, with 8 pairs of polyp-leaves in 2 cm.; the spacing of leaves in the other specimens varies up to 12 in 2 cm. The number of autozooids per leaf varies from 25 to more than 30; they are in a single row dorsally, becoming an alternating double row toward the middle of the leaf, sometimes

reverting to a single row ventrally but usually preserving a suggestion of zigzag alternate arrangement. In no case are there spicules in the body walls of the polyps or in the tentacles. In the rachis, spicules are restricted to two lateral bands, which pass beneath the polyp-leaves and from which the supporting fans extend. The spicular fans (fig. 17b) are composed of 8-12 large, prismatic needles (fig. 17c) which extend beyond the autozoid calicles (fig. 17a), and numerous smaller needles (fig. 17d). The siphonozooids are peculiarly situated on the under (abaxial) surface of the leaves, in one or two circles or circular patches at their ventral end (fig. 17a).

The hard, calcified axis consists of a crystalline core surrounded by radiating prismatic columns as is the case with all species of *Stylatula* that have been examined with regard to this character (BAYER 1955, p. 217, pl. 7 figs. a-c, e, pl. 8 fig. a).

The specific characteristics of *Stylatula diadema* may be summarized as follows: Leaves 8-12 pairs in 2 cm., composed of 25-30 autozoids with distal portion forming short, free calicles, in alternating double row at middle of leaf becoming a single row dorsally and sometimes ventrally, supported by a fan of 8-12 large needles 2.2-2.7 mm. long and many smaller needles; no spicules in body walls or tentacles; needles in rachis only in two lateral bands, from which the supporting fans extend. Siphonozooids on lower surface of polyp-leaves, arranged in one or two circles or rounded patches at the ventral end of the leaves. Axis stiff, rounded-quadrangular, with a shallow groove along each side.

The unusual location of the siphonozooids serves to separate *S. diadema* from all other species of *Stylatula* known at present.

CONCLUSION

The sixteen species of Octocorallia obtained along the South American coast between Trinidad and the mouth of the Amazon River, which are contained in the collections of the exploratory

vessels "Coquette" and "Oregon," demonstrate clearly that this region is populated by a southerly extension of the West Indian fauna. *Iciligorgia schrammi*, *Diodogorgia nodulifera*, *Acanthogorgia schrammi*, *Ellisella barbadensis* and *E. elongata*, and *Chrysogorgia fewkesi* are species found widely through the West Indies, as far north as the lower east coast of Florida. *Muricea midas* and *Thesaea antiope* are new species of genera that are abundantly represented in the Antilles and southern Florida. *Virgularia presbytes* and *Renilla mülleri* are known also from many localities in the northern Gulf of Mexico, and, since the latter is found also on the Pacific coast of Central and South America (indicating that the species has remained essentially unchanged since the time of interoceanic seaways and faunal continuity) it is not surprising that the former — or its precursor — is found also in the Tertiary rocks of Trinidad. Another relict of an old, continuous amphi-American fauna is found in *Pacifigorgia elegans*, which belongs to a genus found otherwise only on the Pacific coast of Mexico, Central and South America. Moreover, the genus *Muricea*, represented here by a new species, has a number of species extending from Panama to southern California.

The Brazilian reef fauna, which was not investigated during the cruises here reported, consists largely of genera present in the West Indies, such as *Plexaurella*, *Muriceopsis*, *Leptogorgia* and *Lophogorgia*, which contain a number of endemic species. The gorgoniid genus *Phyllogorgia* seems to be restricted to the reefs of Brazil.

The more southerly South American coasts, those of Uruguay and Argentina, have a cold-water fauna with a predominance of primnoids, but the material reported up to now has been collected mostly by dredge in considerable depths so it is impossible to draw any valid conclusions about the composition and relationship of the shallow-water fauna.

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