

TWO NEW SPECIES OF THE GORGONACEAN GENUS
CTENOCELLA (COELENTERATA: ANTHOZOA, OCTOCORALLIA)
FROM DEEP REEFS IN THE WESTERN ATLANTIC

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ABSTRACT

Many new records of the ellisellid gorgonian originally described as *Nicella schmitti* Bayer, 1961, are reported and provide the basis for an amplified description of the species, which is transferred to the genus *Ctenocella* on the basis of its sclerites and to the subgenus *Ellisella* because of its growth form with comparatively long, straight branches. Two closely related new species, one white from Jamaica, the other bicolored from the Bahamas, are described and illustrated with photographs of colonies and scanning electron micrographs of sclerites.

The family Ellisellidae (formerly Gorgonellidae) is one of the most distinctive and easily recognized families of holaxonian octocorals. The combination of axial structure, morphology of sclerites, and form of polyps is so characteristic and discontinuous from other families that recognition is easy. Within the family, however, discontinuities are all but nonexistent when an adequate array of specimens is available for study. *Ctenocella schmitti* (Bayer), one of the subjects of this contribution, originally was assigned to the genus *Nicella* Gray because its dichotomously branched, flabellate colonial form, with prominent, bluntly conical or cylindrical verrucae, is generally similar to the gross features of *N. dichotoma* (Gray), type species of the genus (see Gray, 1870: 40, as *N. mauritiana*). However, its spindles are only about twice as long as the double heads rather than four or five times as in *N. dichotoma* and, moreover, intergrade without any perceptible discontinuity. Consequently, the form of the sclerites of *N. schmitti* is more consistent with the genus *Ctenocella* than with *Nicella*. Consequently, the species is here transferred to *Ctenocella* because of the nature of its sclerites, and the subgenus *Ellisella* because of its growth form.

In the course of preparing his projected report on the Alcyonaria of the U.S. Coast Survey steamer BLAKE, A. E. Verrill intended to include no fewer than 15 species of the gorgonacean genus now called *Nicella*, of which all but one were new. Of these, Deichmann (1936: 216) recognized only two in the report as finally published: *Nicella guadalupensis* (Duchassaing and Michelotti, 1860: 309) and *N. obesa* Deichmann, 1936. Although Verrill's descriptive text is no longer extant, the unpublished captions of his illustrations show that most of his proposed new species almost certainly were variants of the widespread West Indian *Nicella guadalupensis*, which he referred to the genus *Verrucella* Milne Edwards and Haime, 1857, along with the new species. In the plate captions some of the species are referred to both *Verrucella* and *Gorgonella*, showing that Verrill changed his mind about generic assignment at some point in the preparation of his manuscript. In all probability this revolved around the fact that he suspected that *Gorgonella sarmentosa*, the type species of the genus, was a *Leptogorgia* in the family Gorgoniidae (Verrill, 1912: 401).

The species described as *Nicella goreau* Bayer (1973: 390), cannot be recognized among Verrill's unpublished illustrations, but it is probable that *Nicella schmitti* Bayer, 1961, is one of Verrill's proposed new species of *Verrucella*.

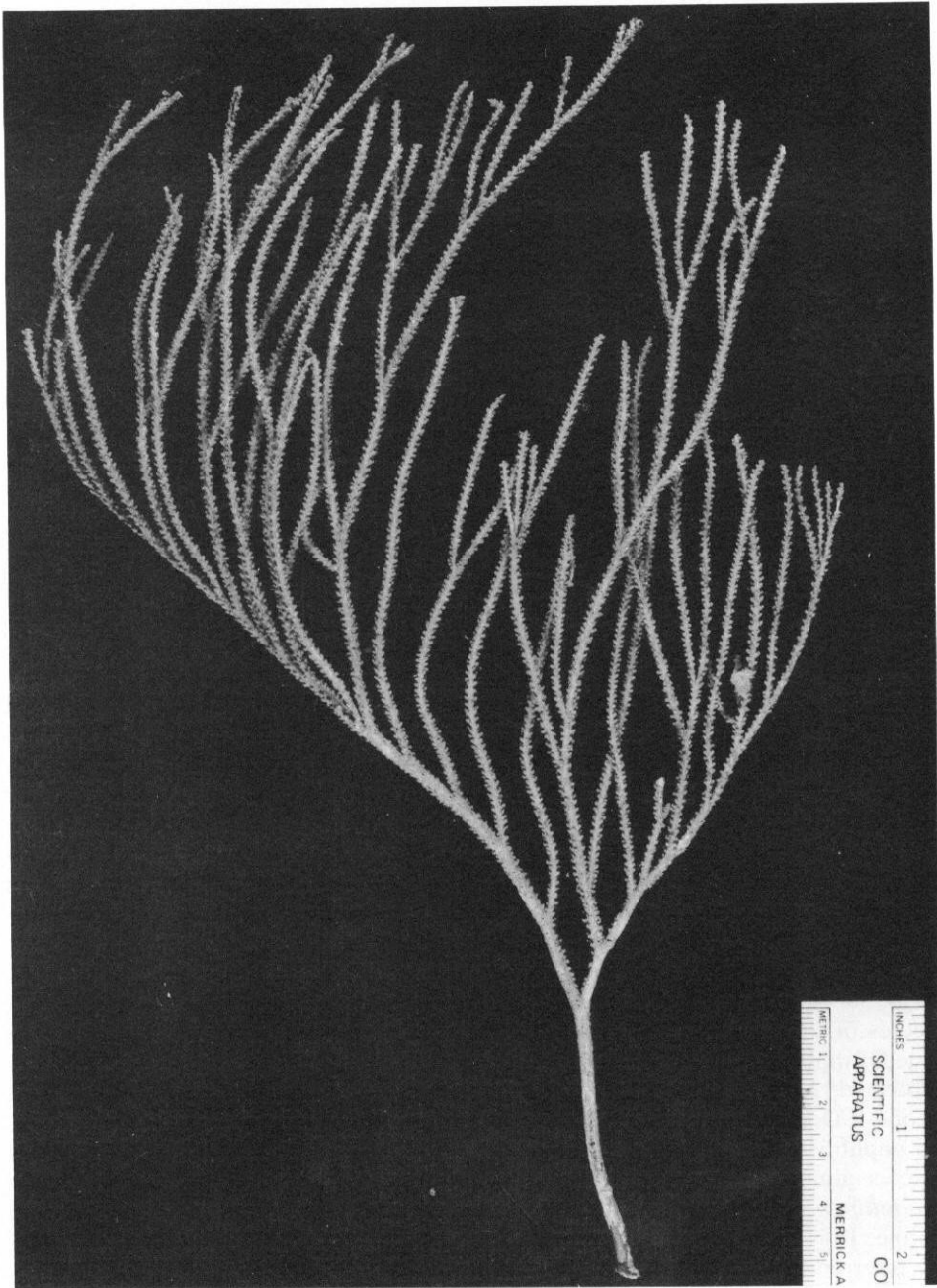


Figure 1. *Ctenocella (Ellisella) schmitti* (Bayer). Stout, lyrate colony from Boca Raton, Florida (USNM 53192).

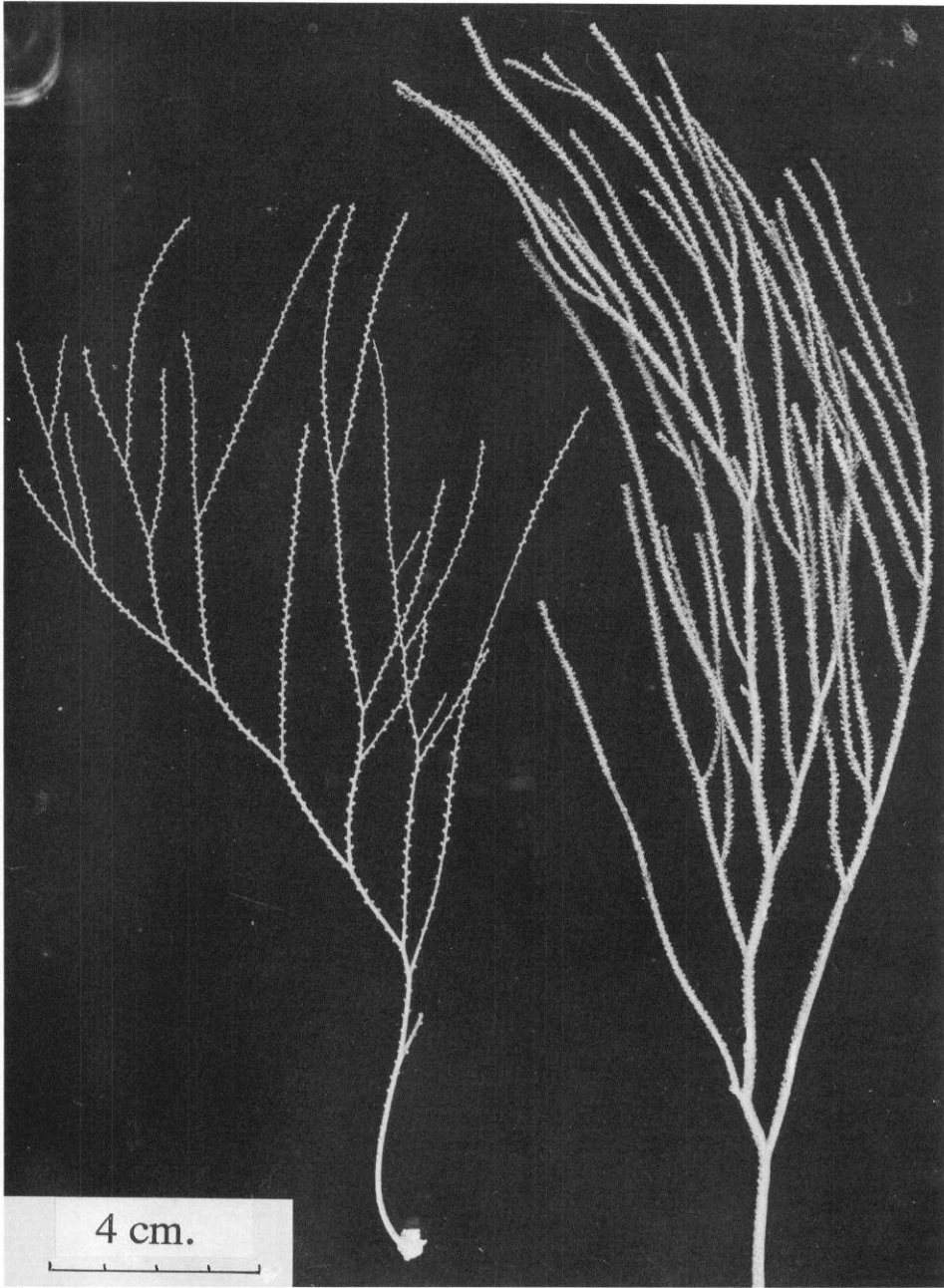


Figure 2. *Ctenocella (Ellisella) schmitti* (Bayer). Right, Intermediate lyrate colony from Dry Tortugas (USNM 87006); Left, Slender lyrate colony from Jamaica (USNM 53205).

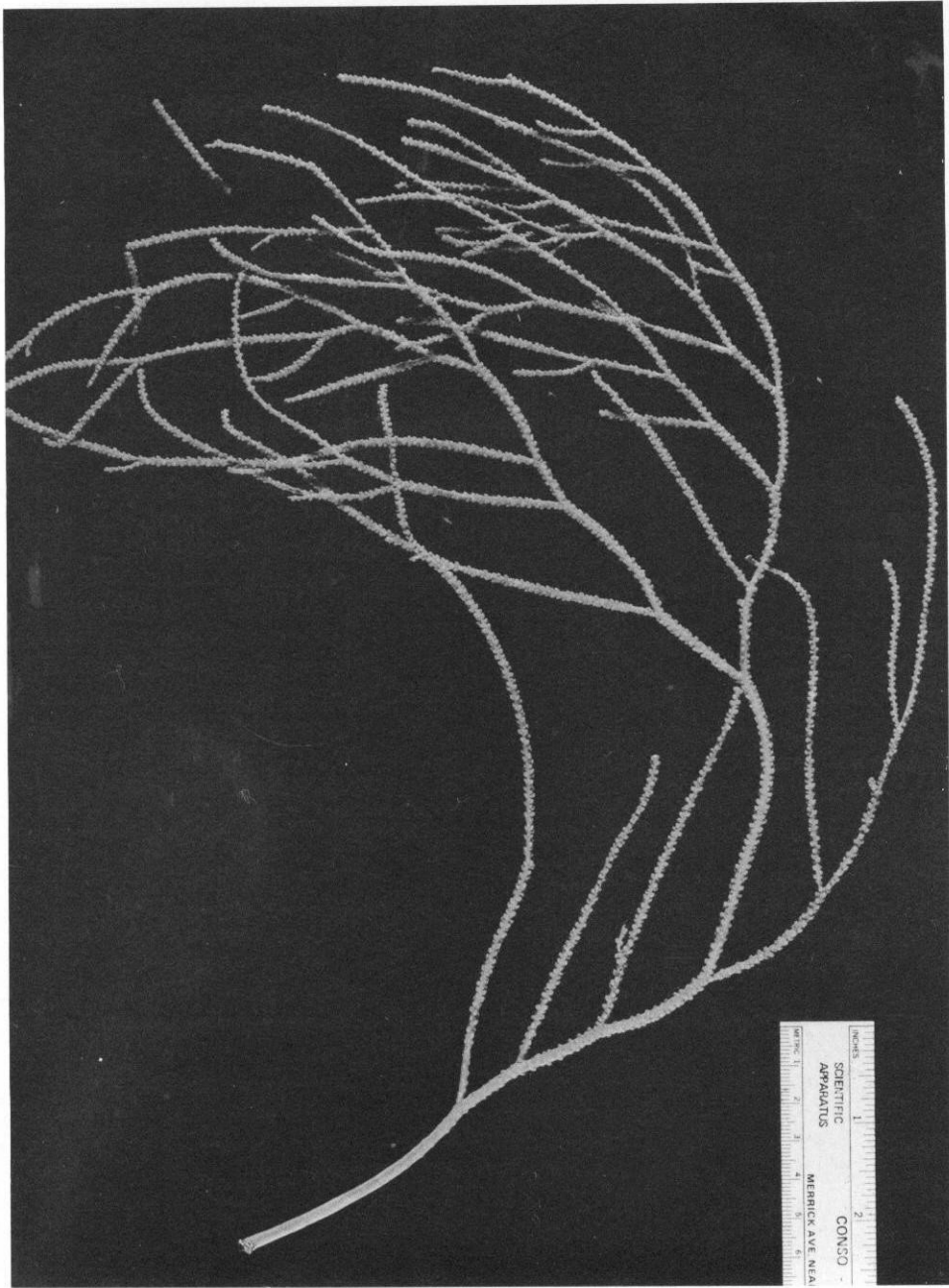


Figure 3. *Ctenocella (Ellisella) schmitti* (Bayer). "Subsecund" colony from Jamaica (USNM 53194).

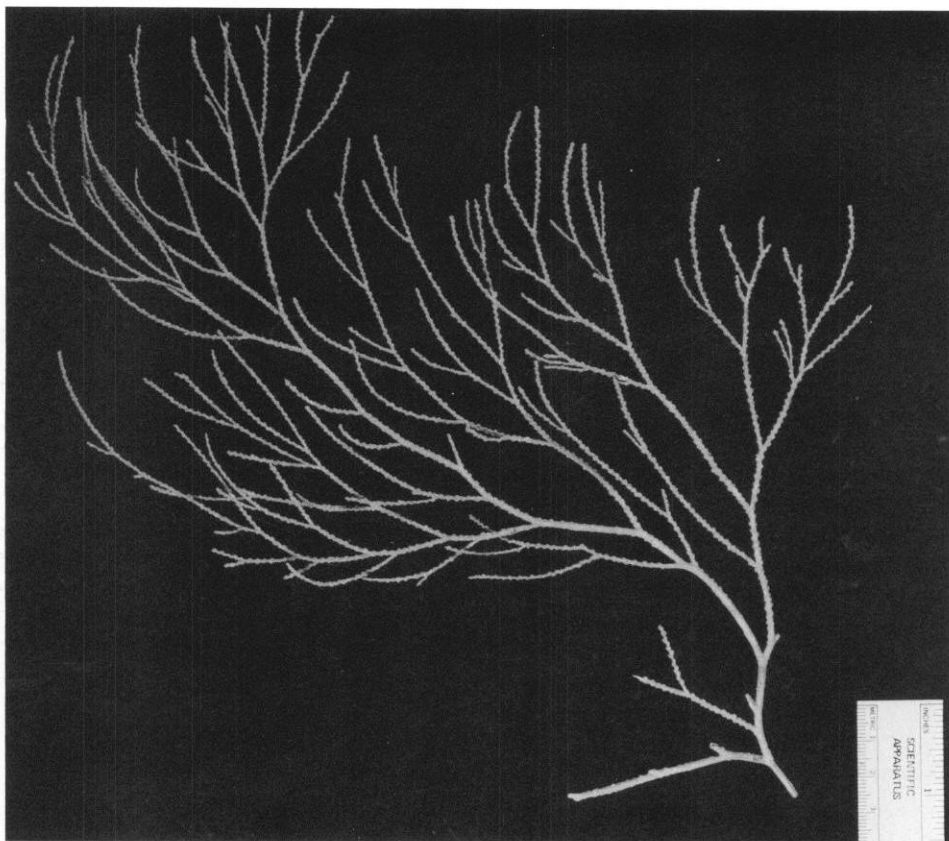


Figure 4. Colony from off Cuba with initially lyrate branching showing transition to dichotomous (USNM 53195).

Family Ellisellidae

Gorgonellacées Valenciennes, 1855: 14.—Milne Edwards and Haime, 1857: 182.

Gorgonellidae Kölliker, 1865: 139.—Toeplitz, 1929: 237.

Ellisellidae Gray, 1860: 489; 1870: 24.

Ellisellidae (nom. correct.).—Verrill, 1912: 401.—Bayer, 1955: 214; 1956: 214.—Bayer and Deichmann, 1960: 176.—Grasshoff, 1972: 73.—Carpine and Grasshoff, 1975: 97.—Grasshoff, 1992: 90.—Bayer and Grasshoff, 1994: 21.

Diagnosis.—Holaxonians with strongly calcified continuous scleroproteinous axis with solid central core. Sclerites consisting of heads or double heads of small size, less than 0.15 mm in length, sometimes modified as asymmetrical clubs, capstans or double-stars of similar size, and rods or spindles with median waist, more or less flattened, up to 0.25 mm long. Sclerites of polyps not arranged as crown and points, merging without interruption with those of coenenchyme so polyps lack introvert and can only contract, not retract.

To the extent that they can be defined today, the various genus-group taxa that have been based on different combinations of skeletal and colonial characters can be expressed in the following key. As the pervasive interspecific and intergeneric intergradation of skeletal and colonial characters essentially obliterate morpho-

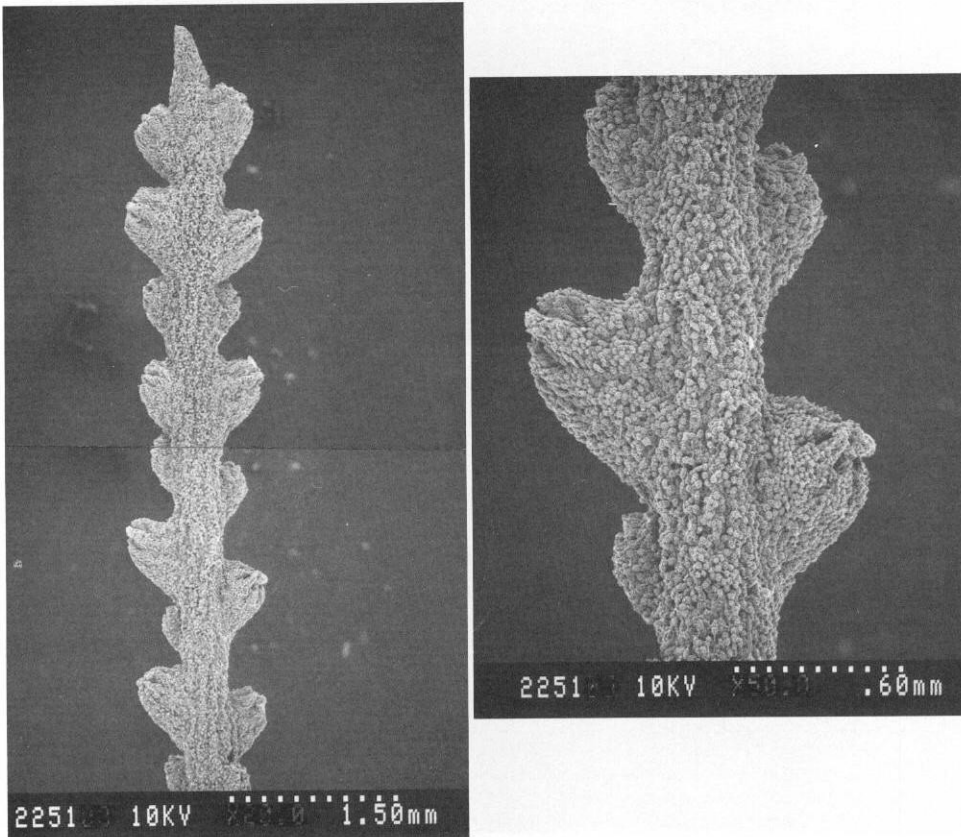


Figure 5. *Ctenocella (Ellisella) schmitti* (Bayer). Colony from off Grenada, Windward Islands (USNM 53178). Left, tip of branchlet; Right, Contracted verrucae at greater magnification (SEM 2251).

logical discontinuities of generic significance, only the genera *Ctenocella*, *Juncella*, *Nicella* and *Riisea* are here recognized at full generic rank, and even *Riisea* reasonably could be considered as a subgenus of *Nicella* because it differs only in its distinctive paniculate growth form (Bayer and Grasshoff, 1994).

KEY TO GENUS-GROUP TAXA OF ELLISELLIDAE

- 1(14). Predominant sclerites are double heads with distinct median waist, together with narrower blunt rods or spindles with or without distinct waist, but clubs not numerous or predominating.
- 2(11). Rods/spindles intergrade with double heads and are not conspicuously longer than the predominant double heads Genus *CTENOCELLA* Valenciennes
- 3(4). Colonies flagelliform, unbranched or rarely with one or two long, slender branches Subgenus *Viminella* Gray
- 4(5). Colonies repeatedly forked, with several or many long, whiplike branches Subgenus *Ellisella* Gray
- 5(6). Colonies bipectinate (i.e., lyrate), end branches long and straight, rather stiff, with thick cortex Subgenus *Ctenocella* Valenciennes
- 6(3). Colonies abundantly branched, planar, end branches short and usually bent.
- 7(10). Contracted polyps form prominent, wart-like or cylindrical verrucae, coenenchyme thin, branchlets slender.

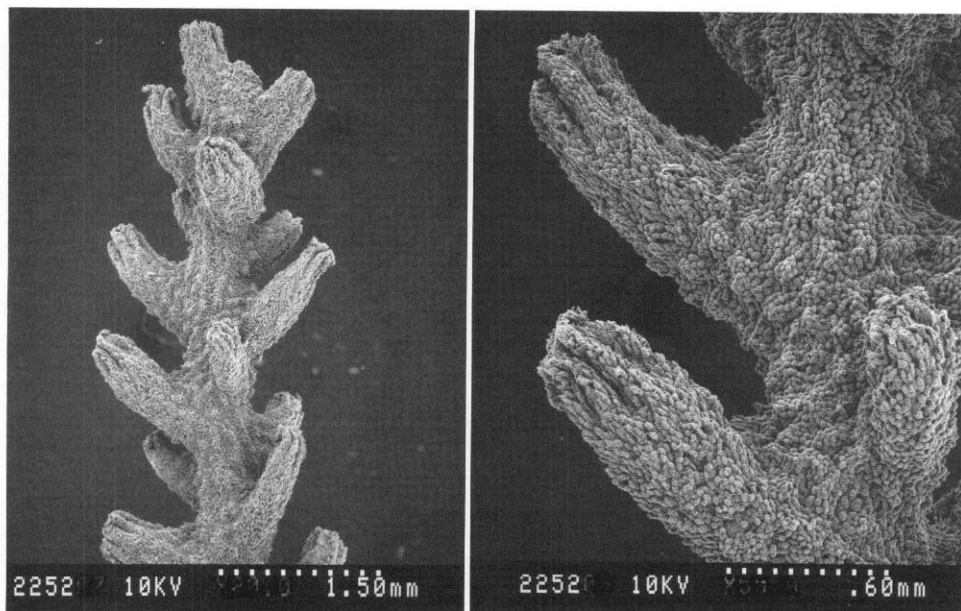


Figure 6. *Ctenocella (Ellisella) schmitti* (Bayer). Colony from off Panama (USNM 53172). Left, tip of branchlet; Right, Contracted verrucae at greater magnification (SEM 2252).

- 8(9). Flabellate colonies with little or no anastomosis, not net-like Subgenus *Verrucella* Milne Edwards and Haime
- 9(8). Flabellate colonies with short branchlets frequently anastomosing to form net-like colonies Subgenus *Umbracella* Gray
- 10(7). Contracted polyps project little or not at all, verrucae not prominent; polyps contract almost completely into thick coenenchyme, branchlets thick Subgenus *Phenilia* Gray
- 11(2). Rods/spindles clearly differentiated from double heads and conspicuously longer than (4× or more) the predominant double heads.
- 12(13). Colonies planar, branches usually completely free, anastomoses rare or absent. Rods more or less flattened, sometimes scale-like Genus *NICELLA* Gray
- 13(12). Colonies paniculate. Rods and spindles much longer than the double heads, more or less flattened, some almost scale-like, concentrated in the polyps Genus *RIISEA* Duchassaing and Michelotti
- 14(1). Predominating sclerites are clubs (mostly in outer layer) and double-stars or capstans (axial sheath) Genus *JUNCELLA* Valenciennes
- 15(16). Colonies unbranched (or rarely with one or two long, whiplike branches) Subgenus *Junceella* s.s.
- 16(17). Colonies bushy, repeatedly branched dichotomously Subgenus *Dichotella* Gray
- 17(14). Colonies uniplanar or flabellate with branching more or less distinctly unilateral (i.e., "secund" or "subsecund") and irregularly dichotomous, sometimes weakly anastomosing Subgenus *Heliania* Gray

Genus *Ctenocella* Valenciennes, 1855

Ctenocella Valenciennes, 1855: 8 (type species, *Gorgonia pectinata* Pallas, 1766, by monotypy).—Alderslade, 1993: 79.—Bayer and Grasshoff, 1994: 29.

Ellisella Gray, 1858: 287 (type species, *Gorgonia elongata* Pallas, 1766, by subsequent designation: Nutting, 1910).—Nutting, 1910: 30.—Toeplitz, 1929: 273.—Bayer, 1956: 214.—Grasshoff, 1972: 75.—Carpine and Grasshoff, 1975: 97.—Bayer, 1981: 934 (in key only).—Grasshoff, 1992: 90.—Alderslade, 1993: 77.

Not "Scirpéaires" Cuvier, 1817: 85.

Scirpearia Nutting, 1910: 23.—Simpson, 1910: 307.—Kükenthal, 1924: 367.—Toeplitz, 1929: 289 (part).—Deichmann, 1936: 206 (part).

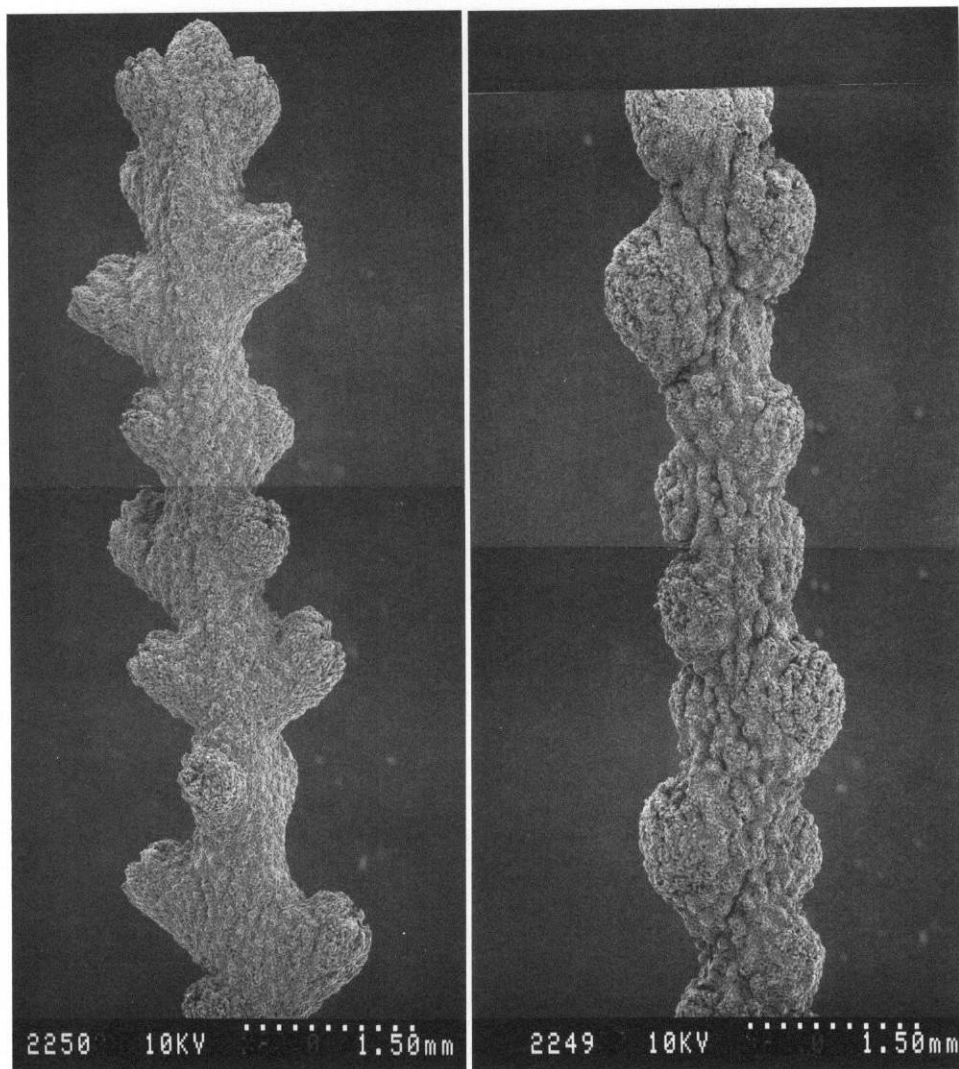


Figure 7. *Ctenocella (Ellisella) schmitti* (Bayer). Colony from Andros Island, Bahamas (USNM 53180). Parts of two branchlets showing variation in shape of contracted verrucae (SEM 2249, 2250).

Scirpearrella Wright and Studer, 1889: 154.—Nutting, 1910: 23.

Toeplitzella Deichmann, 1936: 205 (type species, *Juncella laevis* Verrill, by original designation).—Bayer, 1956: 214; 1981: 932 (in key only).

Viminella Gray, 1870: 29 (type species, *Juncella flagellum* Johnson, by subsequent designation, Verrill 1912: 402).

Diagnosis.—Ellisellidae with only double heads and rods or spindles somewhat longer than the double heads; no asymmetrical clubs. Colonial form variable, from simple and flagelliform, bipectinate, or repeatedly bifurcate to densely branched, pinnate or dichotomous, sometimes anastomosed and net-like. Color white, tan, brown, ferruginous, shades of yellow, orange or red.

Distribution.—Temperate and tropical seas, shallow water down to about 500 m.

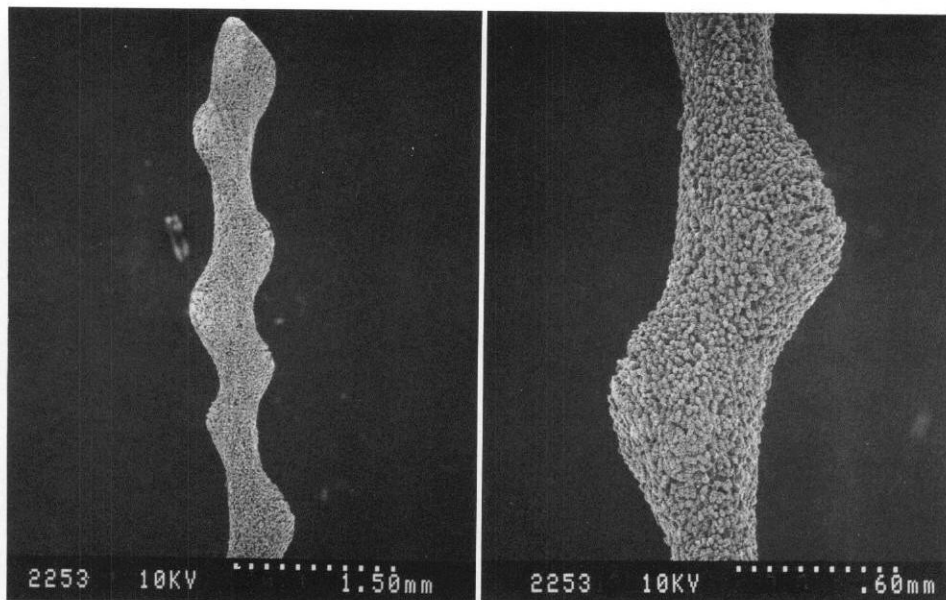


Figure 8. *Ctenocella (Ellisella) schmitti* (Bayer). Slender colony from off Discovery Bay, Jamaica (USNM 53184). Left, tip of branchlet; Right, Contracted verrucae at greater magnification (SEM 2253).

Subgenus *Ellisella* Gray, 1858

Ellisella Gray, 1858: 287 (type species, *Gorgonia elongata* Pallas, 1766, by subsequent designation: Nutting, 1910).—Bayer and Grasshoff, 1994: 30.

Diagnosis.—*Ctenocella* species with tall, bifurcating colonies with several or many long, often whiplike terminal branches; spindle- or rod-shaped sclerites only moderately, if at all, longer than the predominant double heads.

Ctenocella (Ellisella) schmitti (Bayer, 1961)

Figures 1–13

Nicella schmitti Bayer, 1961: 288, fig. 95 a–e.—Humann, 1993: 70–71, 3 figs.

Material Examined.—Specimens arranged according to growth form:

COARSE LYRATE (=typical *schmitti*)

BAHAMAS: Andros Island. Coll. Timothy Turnbull, date not recorded. Five branches, USNM 73927.

Andros Is., Small Hope Bay, off Birch's barge, at drop-off ledge, 280–300 feet (85–92 m). Coll. W. A. Starck, Jo D. Starck, Peter Hopper, NGS-MRF sta. 33, 20 April 1970. One small colony, dry, USNM 53199 (SEM 2247). Figure 10.

FLORIDA: off Boca Raton, 32 m. Coll. Walter Goldberg, 15 February 1970. One colony, dry, USNM 53192 (SEM 2246). Figures 1, 9.

Dry Tortugas: 24°36'10"N, 82°41'58"W, 27 m. R/V SUNCOASTER sta. 55, 25 March 1985. Two colonies without holdfast, dry, USNM 87118.

Dry Tortugas: 24°47'25"N, 83°51'09"W, 76 m. Continental Shelf Associates, sta. 30, 25 April 1981. Two incomplete colonies, USNM 73725.

Dry Tortugas: 24°36'10"N, 82°41'58"W, 27 m. R/V SUNCOASTER sta. 55, 25 March 1985. Two incomplete colonies without holdfast, dry; 2 in alcohol, both USNM 87006. Figure 2, right.

Dry Tortugas: 24°36'10"N, 82°41'58"W, 27 m. R/V SUNCOASTER sta. 55, 14 September 1985. One small incomplete colony without holdfast, dry, USNM 87007.

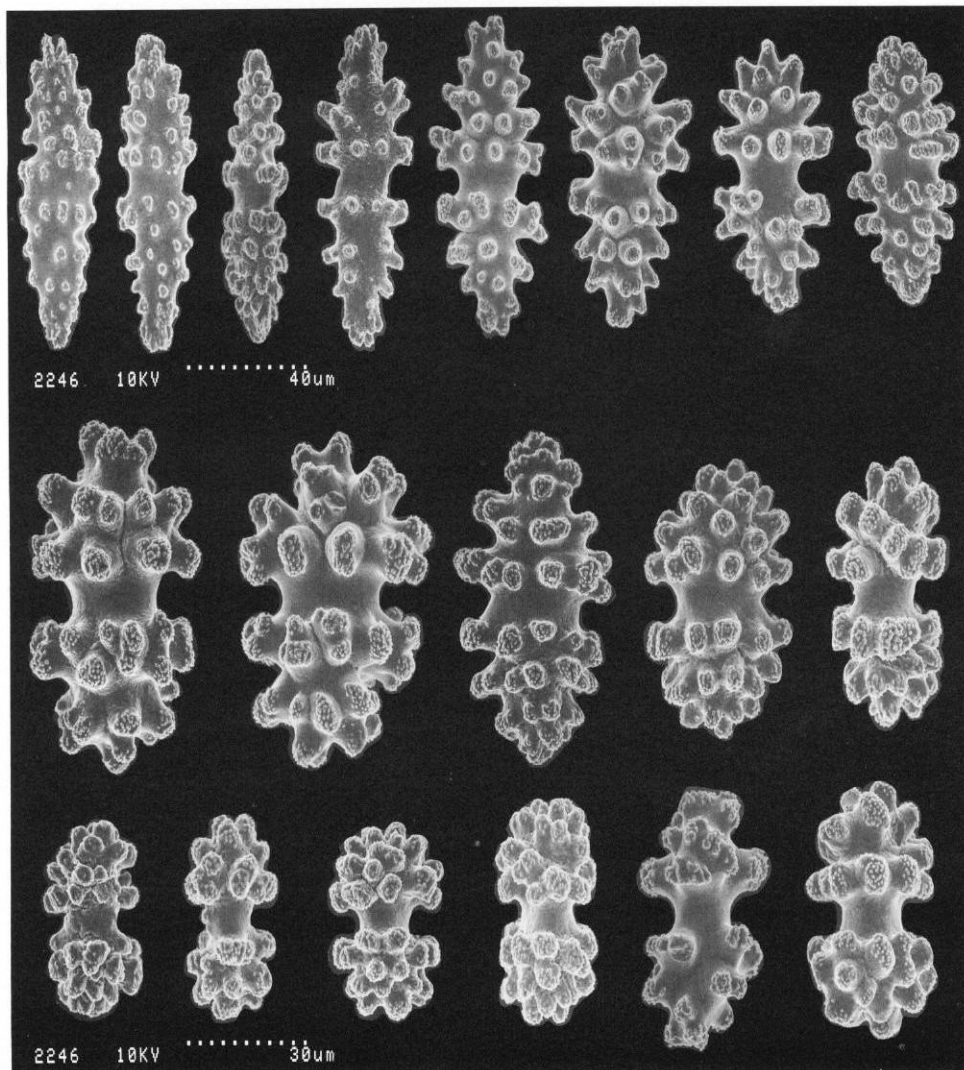


Figure 9. *Ctenocella (Ellisella) schmitti* (Bayer). Sclerites of colony from Boca Raton, Florida. Top row, spindles and intermediate forms; Middle row, intermediate forms and double heads at higher magnification; Bottom row, double heads (SEM 2246).

Key Largo, ½ mile south of Alligator Reef Light, off deep edge of reef, 90–100 feet (27–30 m). Coll. W. A. Starck, 19 April [1969]. Three colonies without holdfast, USNM 53185.

Dry Tortugas: 24°36'10"N, 82°41'58"W, 27 m. R/V SUNCOASTER sta. 55, 26 June 1985. One colony with holdfast, USNM 87005.

JAMAICA: West of Salt Coppers, 33 m. Coll. T. F. Goreau, 4 November 1962. One large colony ("orange") almost complete, with holdfast, dry, USNM 53197.

PANAMA, off Colon: 9°32'20"N, 79°54'45"W, 34 fath. (=62 m), USFC str. ALBATROSS sta. 2147, 2 April 1884. Two branches, USNM 7587 (holotype) and 7611 (paratype).

INTERMEDIATE LYRATE

(Ambiguous colonies intermediate between typical coarse specimens and delicate, slender specimens, sometimes partly lyrate and partly dichotomous.)

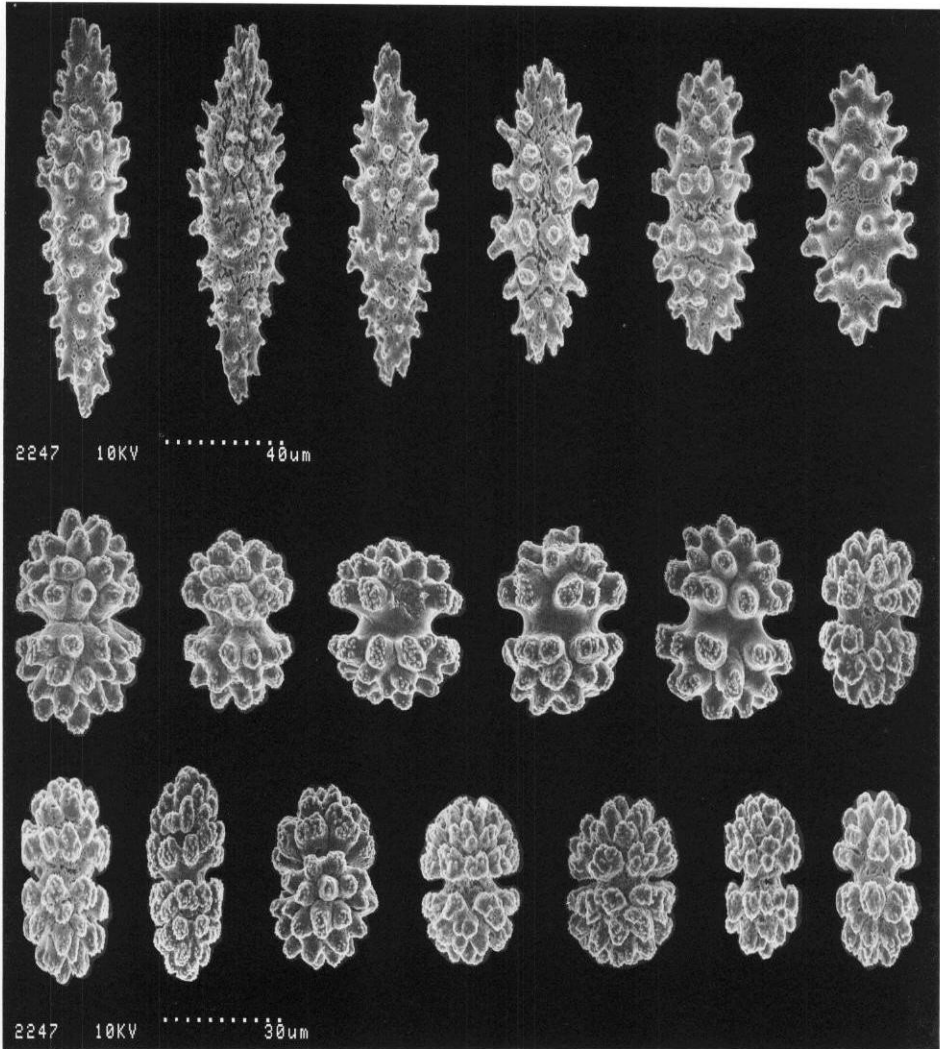


Figure 10. *Ctenocella (Ellisella) schmitti* (Bayer). Sclerites of colony from Andros Island, Bahamas, USNM 53199. Top row, spindles and intermediate forms; Middle row and bottom row, double heads at greater magnification (SEM 2247).

BAHAMAS: Andros I., ¼ mile NE off Goat Cay, Fresh Creek, 85–150 feet (26–46 m). NGS-MRF sta. 19, coll. W. A. Starck, Jo D. Starck and Peter Hopper, 17 December 1969. One large colony broken off at holdfast, USNM 53181.

Andros I., ¼ mile NE off Goat Cay, Fresh Creek, 125–150 feet (38–46 m). NGS-MRF sta. 21, coll. Jo D. Starck and Peter Hopper, 19 December 1969. One colony with holdfast, USNM 53177.

Andros I., ¼ mile NE off Goat Cay, Fresh Creek, 175–180 feet (53–55 m). NGS-MRF sta. 23, coll. Jo D. Starck and Peter Hopper, 21 December 1969. One colony broken off at holdfast, USNM 53170.

Andros I., ½ mile east of Goat Cay, Fresh Creek, 85–110 feet (26–33 m). NGS-MRF sta. 26, coll. W. A. Starck, Jo D. Starck and Peter Hopper, 27 December 1969. Two colonies with holdfast, USNM 53180 (SEM 2249, 2250). Figure 7.

FLORIDA: Dry Tortugas: 24°47'25"N, 83°51'09"W, 76 m. Continental Shelf Associates, sta. 30, 21 November 1980. Fragments, USNM 74845.

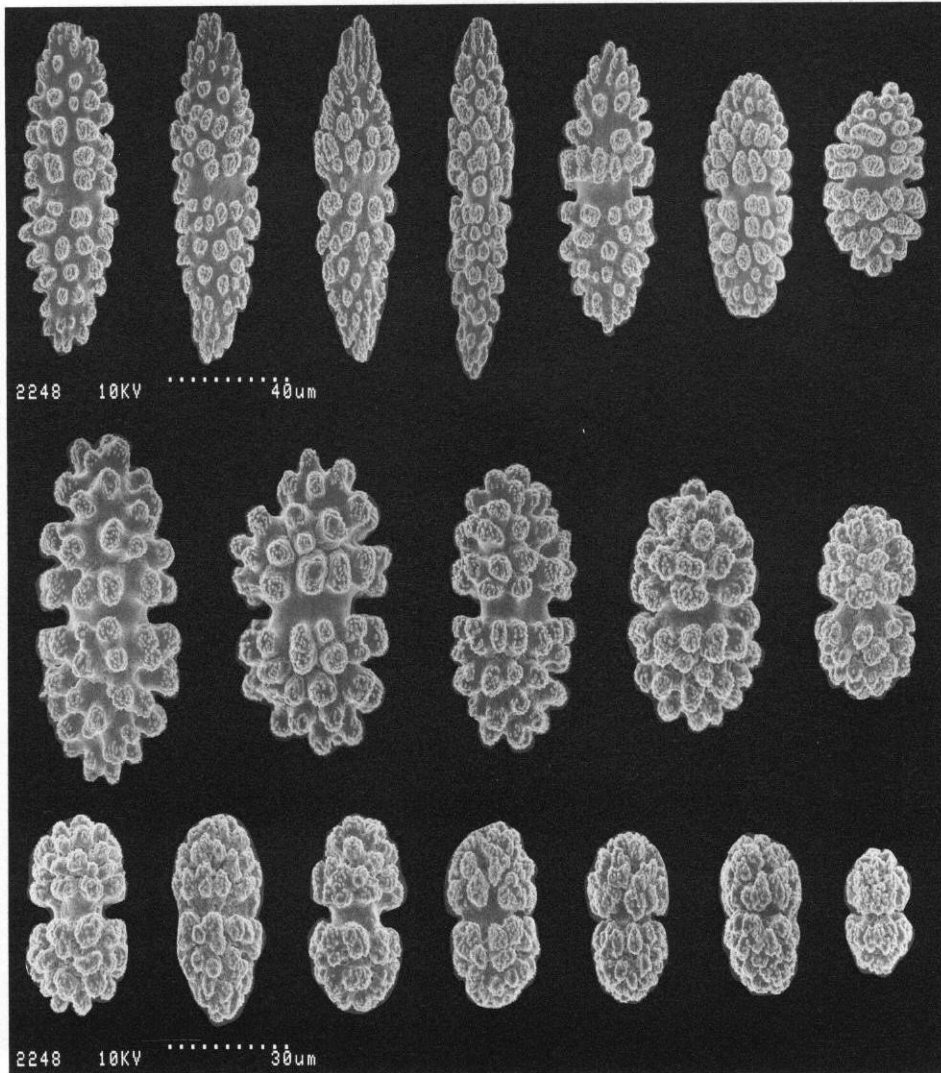


Figure 11. *Ctenocella (Ellisella) schmitti* (Bayer). Sclerites of colony from off Cuba, USNM 53195. Top row, spindles and intermediate forms; Middle and bottom rows, intermediate forms and double heads at greater magnification (SEM 2248).

JAMAICA: Cardiff Hall, 42–27 m. Coll. T. F. Goreau, June 1964. Five colonies with holdfast, USNM 53175.

Discovery Bay, 91.5 m. Coll. Roma Chapman, 24 August 1965. Two small colonies without holdfast, dry, USNM 53189.

Discovery Bay, 90 m. Coll. Paul and Roma Chapman, 29 August 1965. Two colonies without holdfast, dry, USNM 53207.

Discovery Bay, no other data. Coll. R. A. Kinzie, date not recorded. One colony with holdfast, dry, USNM 53200.

Discovery Bay, no other data. Coll. R. A. Kinzie. One colony with holdfast, dry, USNM 53206.
COLOMBIA: Caribbean Sea off Golfo de Morrosquillo; 9°53.8'N, 75°50.9'W, 70–51 m, R/V PILLSBURY sta. P-389, 15/16 July 1966. One colony (now broken in two) on fragment of substrate, USNM 53171.

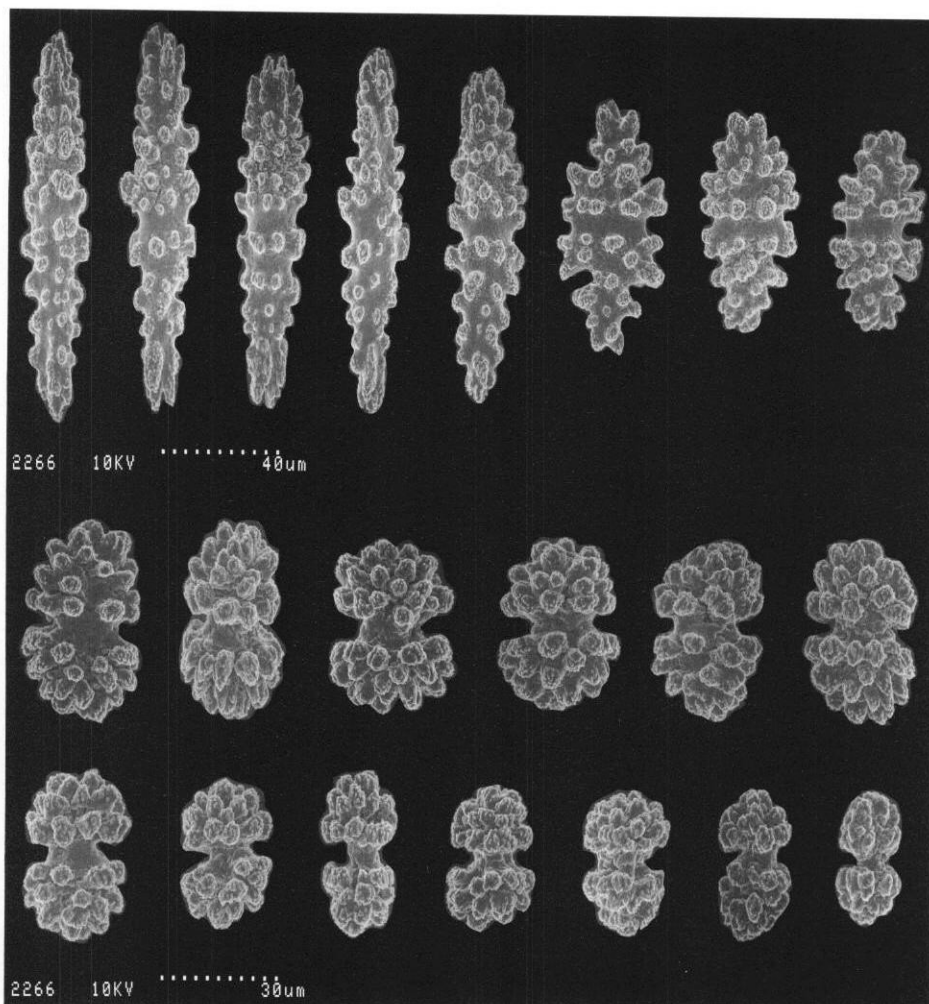


Figure 12. *Ctenocella (Ellisella) schmitti* (Bayer). Sclerites of colony from Discovery Bay, Jamaica, USNM 53205. Top row, spindles and intermediate forms; Middle and bottom rows, double heads at greater magnification (SEM 2266).

Caribbean Sea, off Pta. Manzanillo: 9°44'N, 79°31'W, 64–55 m, R/V PILLSBURY sta. P-324, 7 July 1966. One colony broken off at holdfast, USNM 53172 (SEM 2252). Figure 6.

VENEZUELA: Caribbean Sea, off Testigos Is.: 11°08'N, 62°46'W, 46 m. R/V PILLSBURY sta. P-709, 19 July 1968. Two small colonies, USNM 53174.

WINDWARD ISLANDS: East of Trinidad: 10°40.5'N, 60°37.5'W, 33 m. R/V PILLSBURY sta. P-840, 1 July 1969. One small colony with holdfast, USNM 53179. Colony insufficiently developed to show definitive growth form.

SLENDER LYRATE

JAMAICA: Discovery Bay, 82–85 m. Coll. Paul and Roma Chapman, 27 July 1965. One colony without holdfast, dry, USNM 53193.

Discovery Bay, 70 m. Coll. Roma Chapman, 30 October 1964. One colony with holdfast, USNM 53182.

Discovery Bay, 65 m. Coll. Eileen A Graham, 25 October 1964. One "orange red" colony broken off above holdfast; one "dark red" colony with holdfast, USNM 53176.

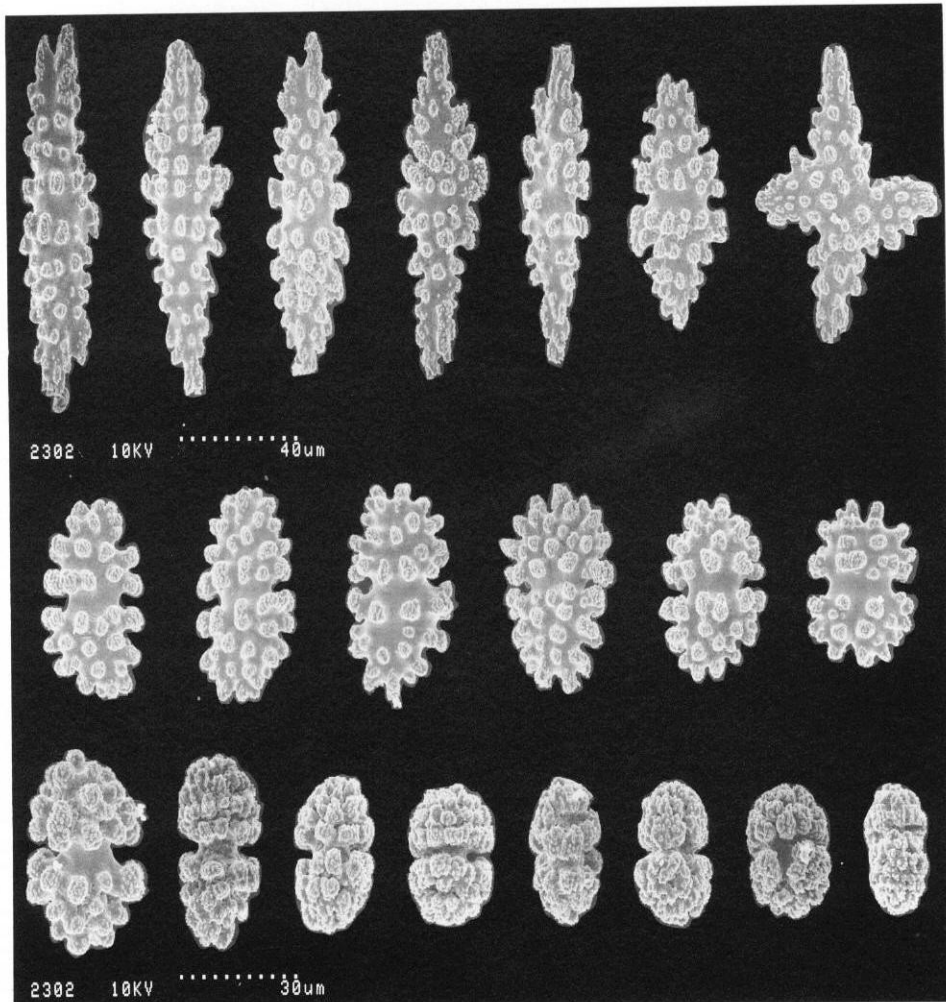


Figure 13. *Ctenocella (Ellisella) schmitti* (Bayer). Sclerites of large dichotomous colony from Discovery Bay, Jamaica, USNM 53190. Top row, spindles and crossed form; Middle row, intermediate forms; bottom row, double heads at greater magnification (SEM 2302).

Discovery Bay, 75–85 m. Coll. Paul and Roma Chapman, 25 October 1964. One small colony (“Brt red”) on piece of coral rubble, USNM 53173.

Discovery Bay, date not recorded. Coll. T. F. Goreau and E. A. Graham. One “brick red” colony, from 61 m; one “red” colony from 70 m, both with holdfast, dry, USNM 53208.

Runaway Bay, 70 m. Coll. Paul and Roma Chapman, 28 January 1965. One dry colony with holdfast, USNM 53205. Figures 2, left; 12.

East Palisadoes, 36 m. Coll. T. F. Goreau, October 1961. One colony without holdfast, dry, USNM 53196.

Discovery Bay, the Pinnacle, 55 m. Coll. R. A. Kinzie, J-132. Date not recorded. One colony with holdfast, dry, USNM 53204.

Discovery Bay, 90 m. Coll. Paul and Roma Chapman, August 1965. One colony without holdfast, dry, USNM 53201.

Discovery Bay, 87 m. Coll. Paul Chapman, 21 May 1966. One small colony with holdfast, dry, USNM 53203.

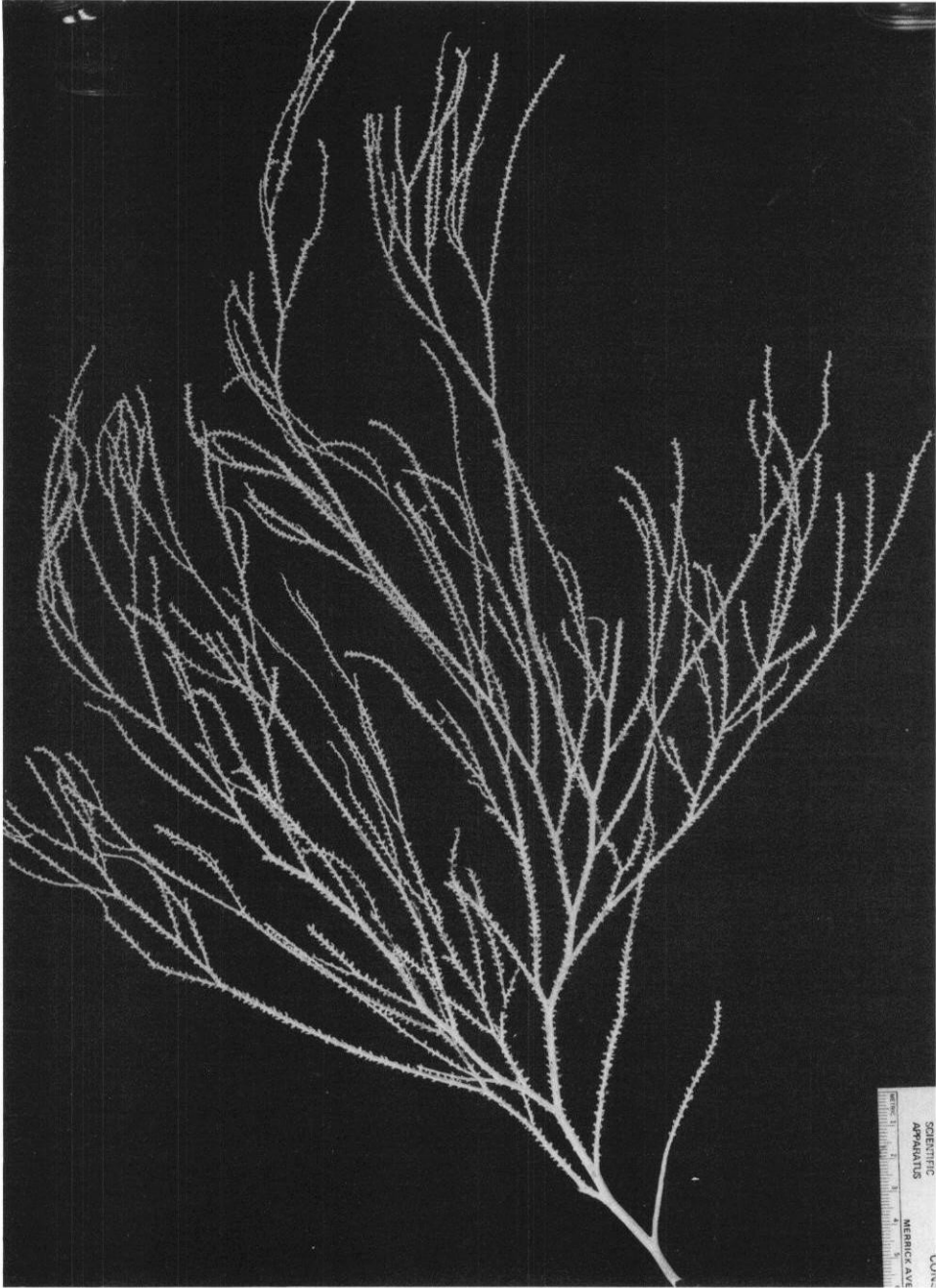


Figure 14. *Ctenocella (Ellisella) nivea* new sp. Colony, holotype, USNM 93366.

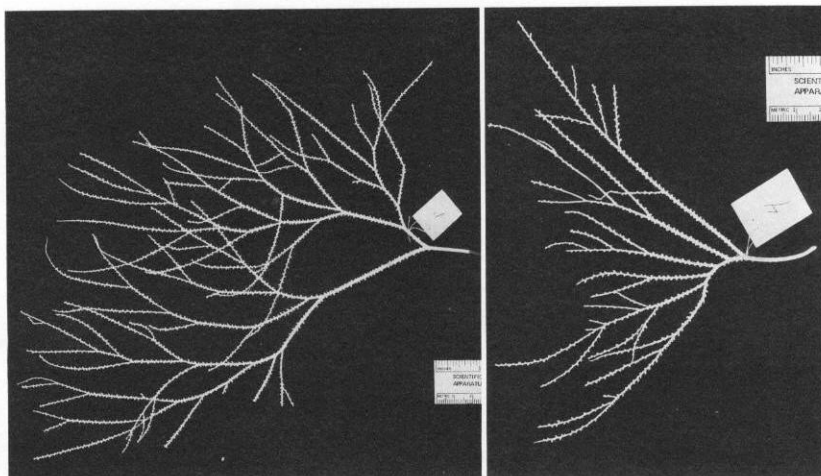


Figure 15. *Ctenocella (Ellisella) nivea* new sp. Large and small colony, paratypes, USNM 93367.

Discovery Bay, 61 m. Coll. T. F. Goreau, E. A. Graham and Roma Chapman, 24 December 1964. One damaged colony, USNM 53183.

LESSER ANTILLES: Windward Islands, east of Grenada: 12°17.5'N, 61°29'W, 35 m. R/V PILLSBURY sta. P-856, 3 July 1969. One incomplete colony without holdfast, USNM 53178 (SEM 2251). Figure 5.

Barbados, 1.5 mi east of Needham Point. University of Iowa Barbados-Antigua Expedition, sta. 11, 17 May 1918. One small colony, USNM 49516.

DICHOTOMOUS

CUBA, off Punta Maisi: 21°40.7'N, 73°50.8'W, 110 m, R/V PILLSBURY sta. P-1433, 22 July 1971. One colony, dry, USNM 53195 (SEM 2248). Figures 4, 11.

JAMAICA: Cardiff Hall, 33 m. Coll. T. F. Goreau, 1 June 1961. One large colony with holdfast, dry, USNM 53191.

Stairway Point, 28 m. Coll. T. F. Goreau, 11 January 1966. One large "subsecund" colony broken off at holdfast, dry, USNM 53194 (Fig. 3); one colony with holdfast, dry, USNM 53202.

Discovery Bay, 67 m. Coll. T. F. Goreau, date not recorded. One large colony with holdfast, dry, USNM 53190 (SEM 2302, 2303).

Runaway Bay, 68 m. Coll. Paul and Roma Chapman, 28 January 1965. Two large colonies now much broken, one with holdfast, dry, USNM 53188.

Discovery Bay, 48–60 m. Coll. T. F. Goreau, 23 December 1964. Three colonies, one without holdfast, one with part of holdfast, and one with holdfast on piece of substrate, USNM 53187.

Discovery Bay, 70 m. Coll. Paul and Roma Chapman, 25 December 1964. Two large colonies without holdfast, and five incomplete colonies, two with holdfast, contained in two jars, USNM 53184 (SEM 2253). Figure 8.

Discovery Bay, 60–69 m. Coll. Paul and Roma Chapman, 23 December 1964. Six colonies, somewhat broken, three with holdfast, USNM 53186.

Diagnosis.—See Bayer, 1961: 288. Repeatedly branched *Ctenocella* forming uniplanar or compressed colonies with unilateral ("secund") or dichotomous branching, often distinctly or indistinctly lyrate; polyps forming bluntly conical, cylindrical, or hemispherical verrucae biserially placed along branches in single or multiple rows; surface of coenenchyme more or less distinctly wrinkled. Sclerites including spindles or rods up to about twice the length of predominant double heads, only indistinctly flattened and never scale-like. Colonies brick-red or reddish orange, sclerites amber colored.

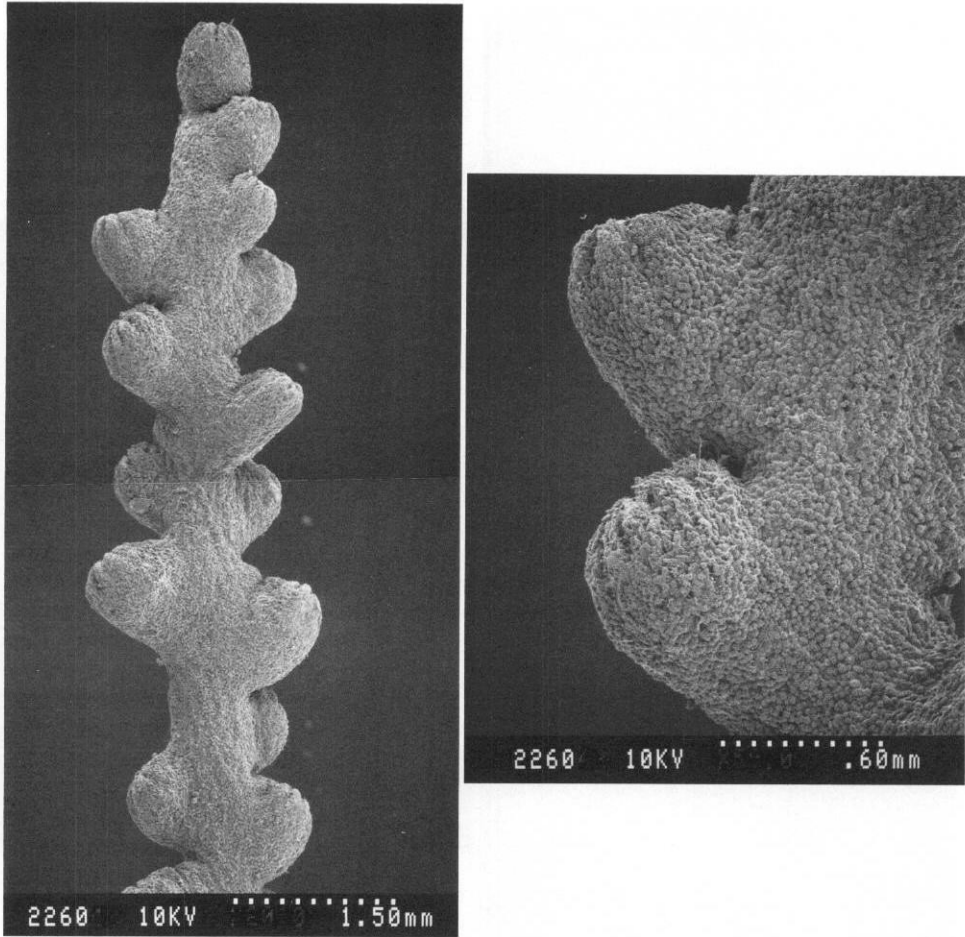


Figure 16. *Ctenocella (Ellisella) nivea* new sp. Holotype, USNM 93366. Left, Tip of stout terminal branchlet; Right, Verrucae of same at higher magnification (SEM 2260).

Discussion.—Since the original description was published, many additional specimens have been obtained, partly by dredging operations in the Caribbean region, but mostly by divers using SCUBA gear in parts of the reef community inaccessible to dredging and trawling. This new material provides information about variation of colonial form that requires a modification of the species diagnosis as originally presented. Description of the species is amplified as follows.

The largest colonies are 54 cm tall and 60 cm wide (USNM 53191) and 60 cm tall and 40 cm wide (USNM 53190). The smallest, only 3.5 cm tall, with four end twigs, attached to a bit of broken shell (USNM 53179), probably would not have survived to reach full size as its support could hardly have maintained the colony in an upright position. All colonies are a uniform red, with only minor variations in hue, ranging in dried material from reddish orange to brownish orange, and occasionally burnt sienna (Reinhold Color Atlas plate 7, B8, C8 and D8). The color of colonies in alcohol appears more intense and darker. The verrucae of the contracted polyps are not noticeably paler than the adjacent cortex.

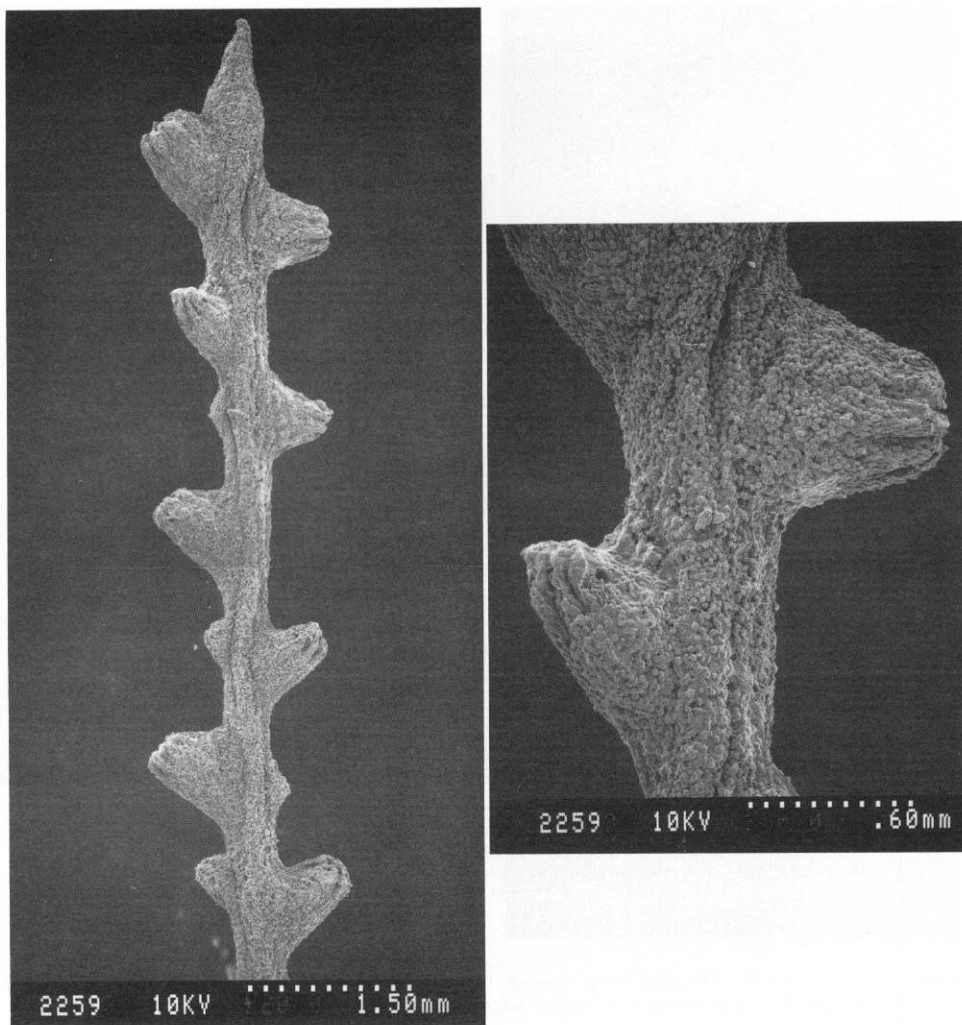


Figure 17. *Ctenocella (Ellisella) nivea* new sp. Holotype, USNM 93366. Left, Tip of slender terminal branchlet; Right, Verrucae of same at higher magnification (SEM 2259).

Colonies included in the 44 lots in the present collection show so much variation that three or more species might be recognized on morphological grounds were they not inseparably connected by intermediate forms. The branching of the original fragmentary material (USNM 7587 and 7611) were "second," with straight secondary branches arising along one side of primary branches as illustrated in the sketch that accompanied the original description (Bayer, 1961: 289, fig. 95a). Complete specimens obtained subsequently demonstrate that the colonial form is lyrate, usually one-sided (Fig. 2) but occasionally more or less symmetrical (Fig. 1), similar to the growth form of the Indo-Pacific *Ctenocella*. Such second or lyrate colonies vary from stout and robust (Fig. 1), with terminal branchlets 0.7–0.9 mm in diameter (exclusive of verrucae) and prominent, cylindrical verrucae (Fig. 6), to slender and delicate (Fig. 2, left), with terminal

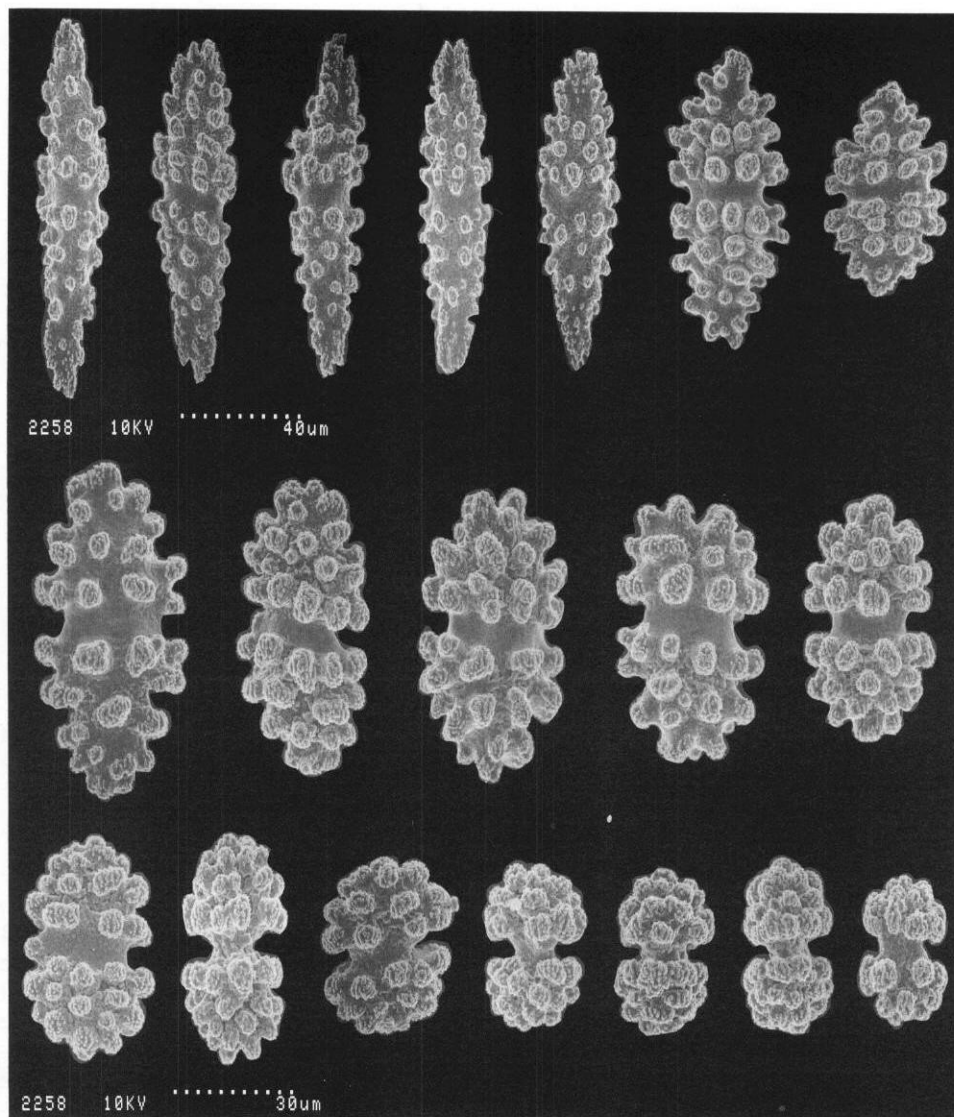


Figure 18. *Ctenocella (Ellisella) nivea* new sp. Sclerites of holotype, USNM 93366. Top row, spindles and intermediate forms; Middle row, intermediate forms and double heads at higher magnification; Bottom row, double heads (SEM 2258).

branchlets only 0.3–0.35 mm in diameter (exclusive of verrucae), and low, hemispherical verrucae (Fig. 8).

The largest colonies are dichotomously branched approximately in one plane and flabellate in shape. They differ so much from the lyrate colonies in general appearance that they could be considered specifically distinct were it not for the fact that branching in some colonies is originally lyrate or unilateral and secund, but changes to dichotomous with increasing size (Figs. 3, 4). As no consistent differences in the sclerites have been observed among the various growth forms, there is as yet no objective basis for subdividing them into more than one species.

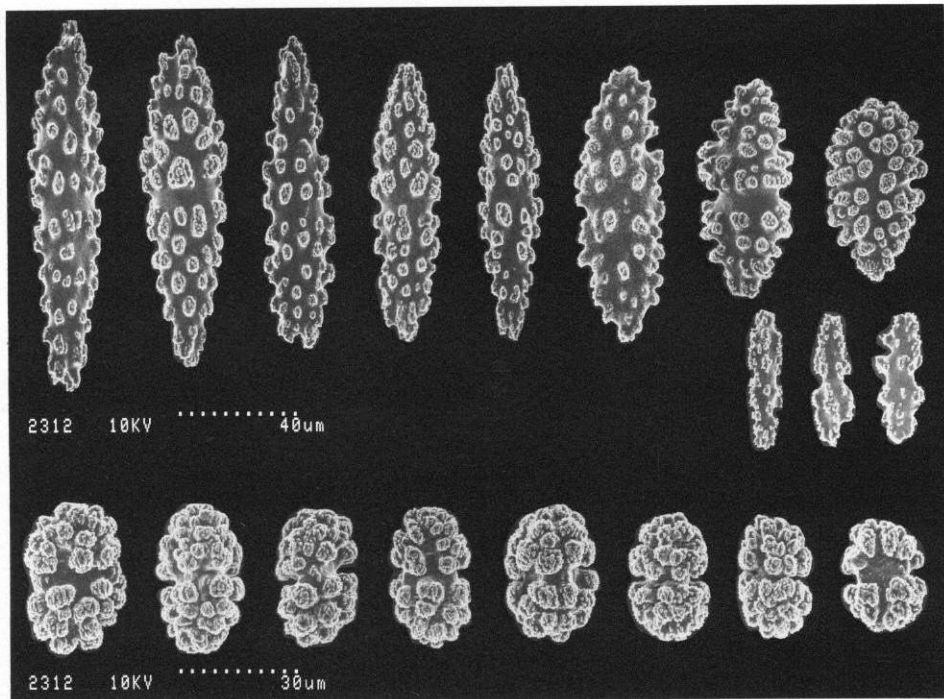


Figure 19. *Ctenocella (Ellisella) nivea* new sp. Sclerites of colony from Andros I., Bahamas, USNM 93963. Top row, spindles, intermediate forms and pharyngeal rods; Bottom row, double heads at higher magnification (SEM 2312).

The sclerites (Figs. 9–13) show some variation in size, especially the double spindles, which in different colonies range in greatest length from 0.1 mm to 0.135 mm. The cortex contains double heads that range in length from about 0.04 mm to 0.06 mm within a colony, but intermediate forms between these and the double spindles produce a virtual continuum although individuals between about 0.07 mm and 0.1 mm seem to be less common. All sclerites are flat, the double spindles more so than the double heads, but this is not apparent in bulk preparations viewed in transmitted light unless the sclerites are rolled around on the slide before mounting, or before the mounting medium has begun to set; manipulating individual sclerites for examination by SEM provides a more realistic impression of their shapes. Colonies are uniform brick red in color, and in transmitted light all sclerites are clear amber except those of the tentacles and the axial sheath, which are somewhat paler.

Remarks.—Unequivocal discontinuities between the variations of growth form and of sclerites present in this nominal species have not been documented. Without evidence to the contrary, the observed differences in growth form can be interpreted as responses to local environmental conditions. Variations in the sclerites, however, especially with respect to the length of the spindle-shaped forms, may be less influenced by environmental conditions and therefore indicative of genetic differences not yet recognized and documented. It is possible that more sophisticated analytical techniques including biochemistry, molecular and genetic methods, will demonstrate that the red colonies here accepted as a single variable

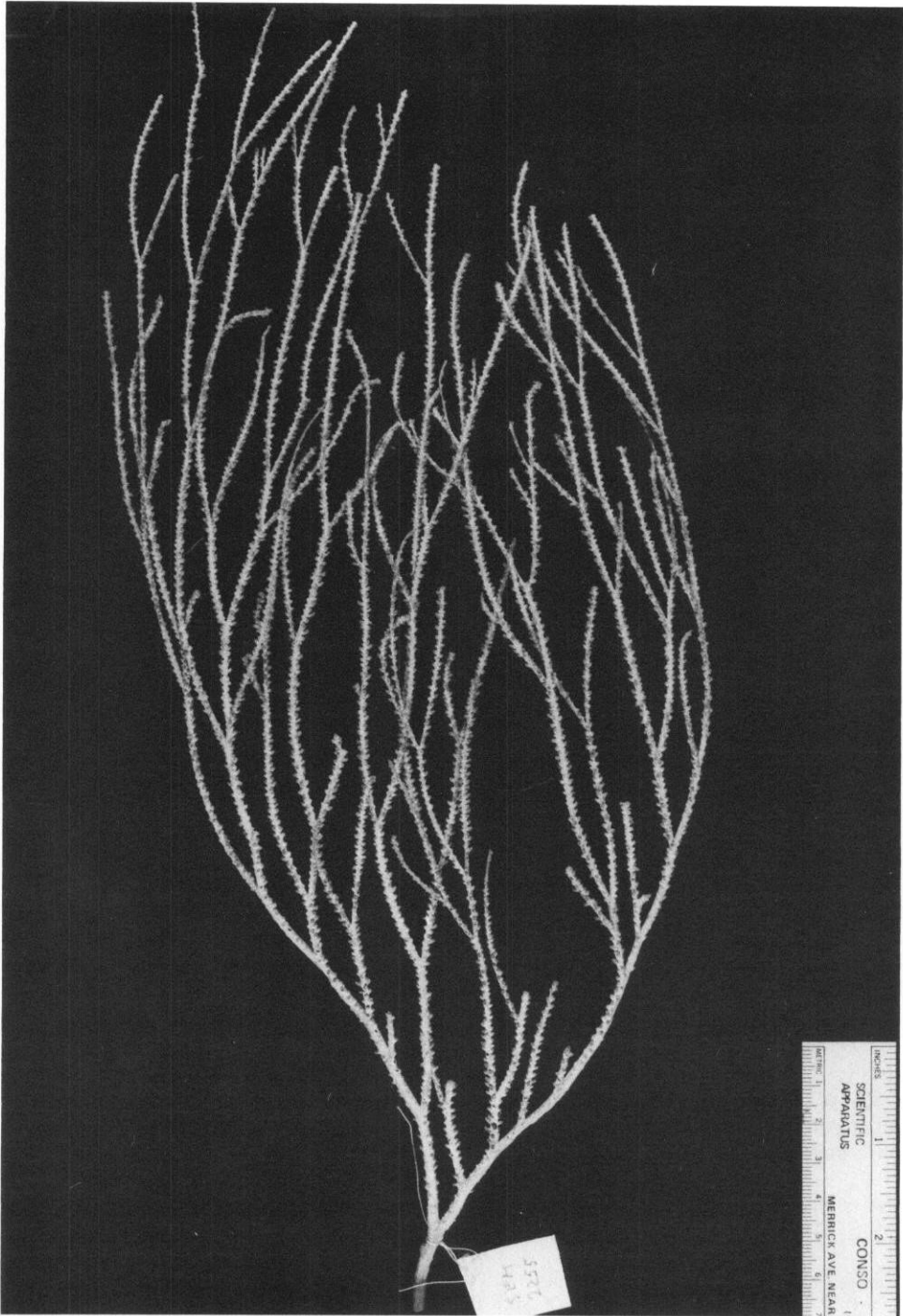


Figure 20. *Ctenocella (Ellisella) rosea* new sp. Holotype colony, USNM 59126.

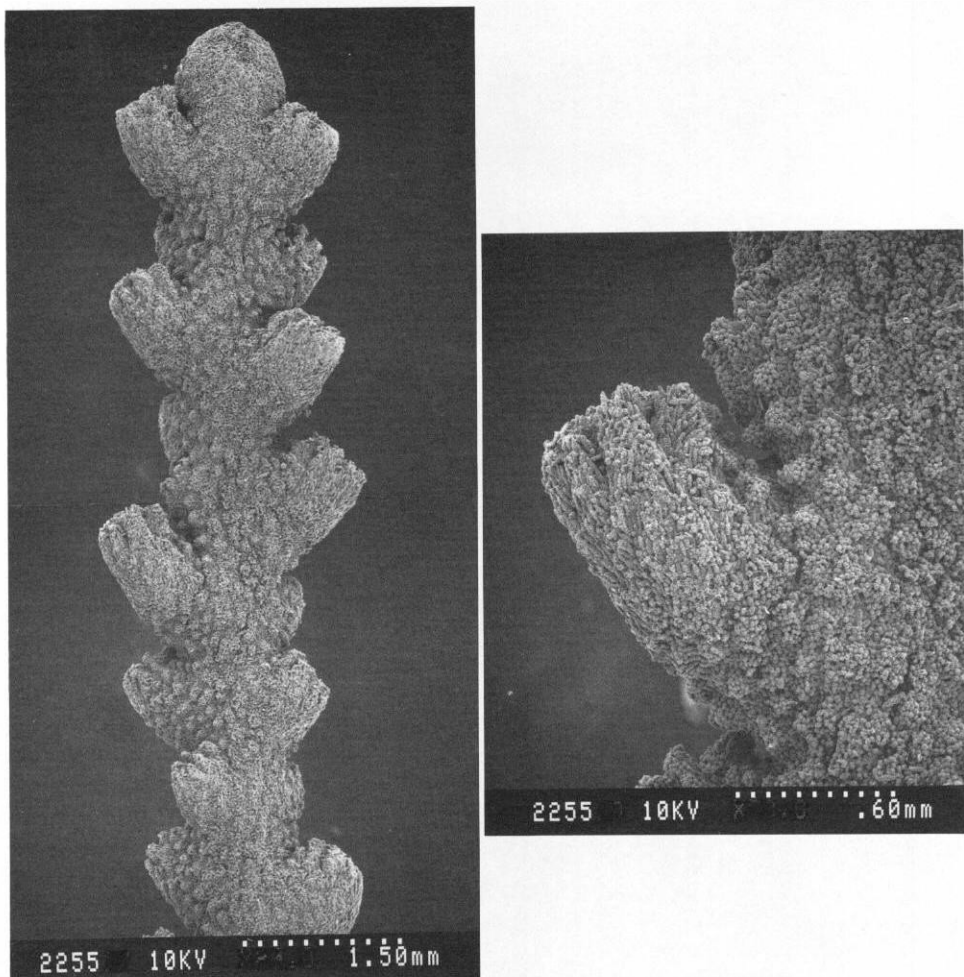


Figure 21. *Ctenocella (Ellisella) rosea* new sp. Holotype, USNM 59126. Left, Tip of stout terminal branchlet; Right, Verrucae of same at higher magnification (SEM 2255).

species are actually a complex of related species. However, until a representative array of adequately prepared samples can be investigated in detail, the question must remain open, and the complex or red colonies treated as a single polymorphic species.

***Ctenocella (Ellisella) nivea* new species**
 Figures 14–19

Material Examined.—BAHAMAS: Andros I., Fresh Creek, 200–300 feet (61–92 m) at reef drop-off near Birch's Barge, coll. Jo D. Starck, 25 April 1970. One colony with part of holdfast, USNM 93963. Figure 19.

JAMAICA: Discovery Bay, 200 feet (61 m), from cave. Coll. Paul and Roma Chapman, 25 October 1964. One colony with holdfast and bit of substrate, paratype, USNM 74893.

Discovery Bay, 230–250 feet (70–76 m). Coll. T. F. Goreau, E. A. Graham, and Paul and Roma Chapman, 1 November 1964. Four colonies broken off at holdfast, USNM 74894.

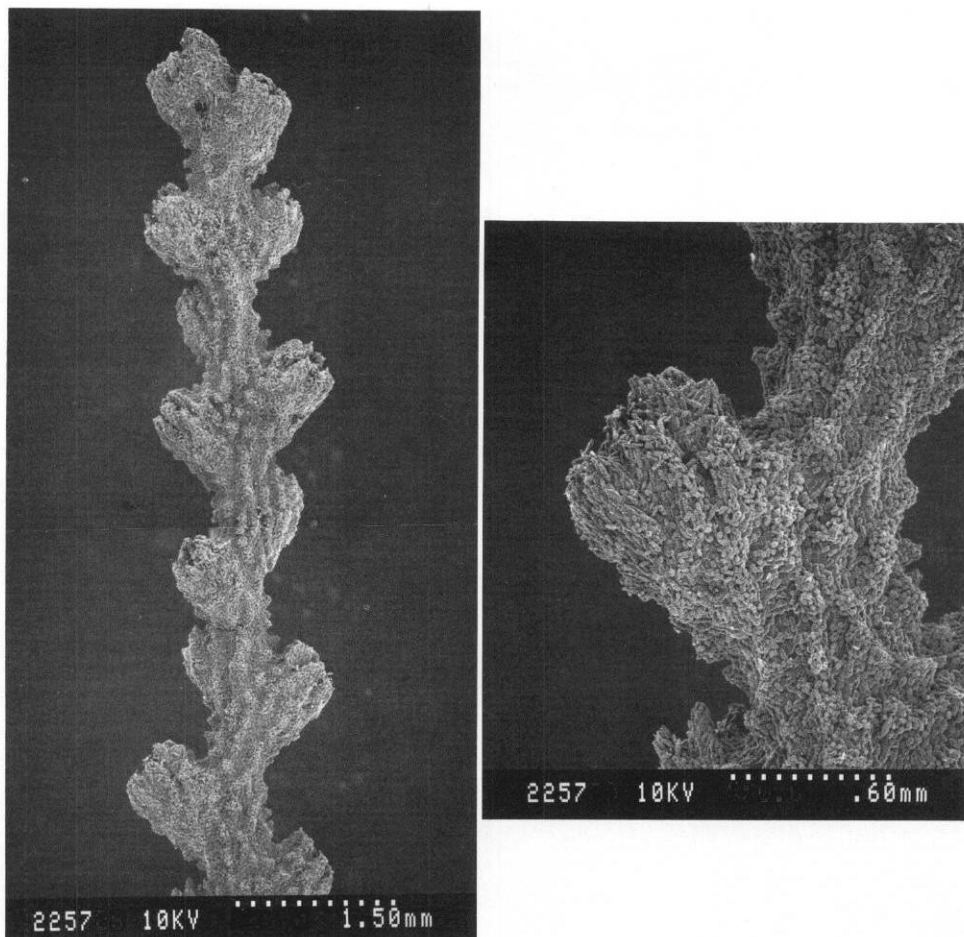


Figure 22. *Ctenocella (Ellisella) rosea* new sp. Paratype, USNM 93368. Left, Tip of slender terminal branchlet; Right, Verrucae of same at higher magnification (SEM 2257).

Discovery Bay, 230 feet (70 m). Coll. Roma Chapman, 30 October 1964. One colony broken off at holdfast, USNM 74895.

Discovery Bay, 270–280 feet (82–85 m). Coll. Paul and Roma Chapman, 27 December 1965. Three colonies broken off at holdfast, dry, USNM 93169.

Discovery Bay, 210 feet (64 m). Coll. T. F. Goreau, date not recorded. Seven colonies, four with all or part of holdfast, paratypes, dry, USNM 93367.

Discovery Bay, depth not recorded. Coll. R. A. Kinzie, date not recorded. One colony broken off at holdfast, dry, USNM 93170.

Stairway Point (Locality K), 170 feet (52 m), Coll. T. F. Goreau, date not recorded. Three colonies, one with holdfast, one partly overgrown by bryozoan, dry, USNM 93365.

Discovery Bay, 300 feet (92 m). Coll. Paul and Roma Chapman, 29 August 1965. Two colonies with holdfasts, dry, USNM95410.

Reading, Montego Bay, 200 feet (61 m). Coll. Roma Chapman, 30 January 1966. One colony broken off at holdfast, holotype (Fig. 14), dry, USNM 93366 (SEM 2245, 2258–2260); eight colonies, paratypes (Fig. 15), USNM 93367.

Diagnosis.—Dichotomously branched flabellate colonies grossly similar to *C. schmitti* but completely white, with cortex always smooth or nearly so, never strongly corrugated or papillose; prominent biserial verrucae widely separated on

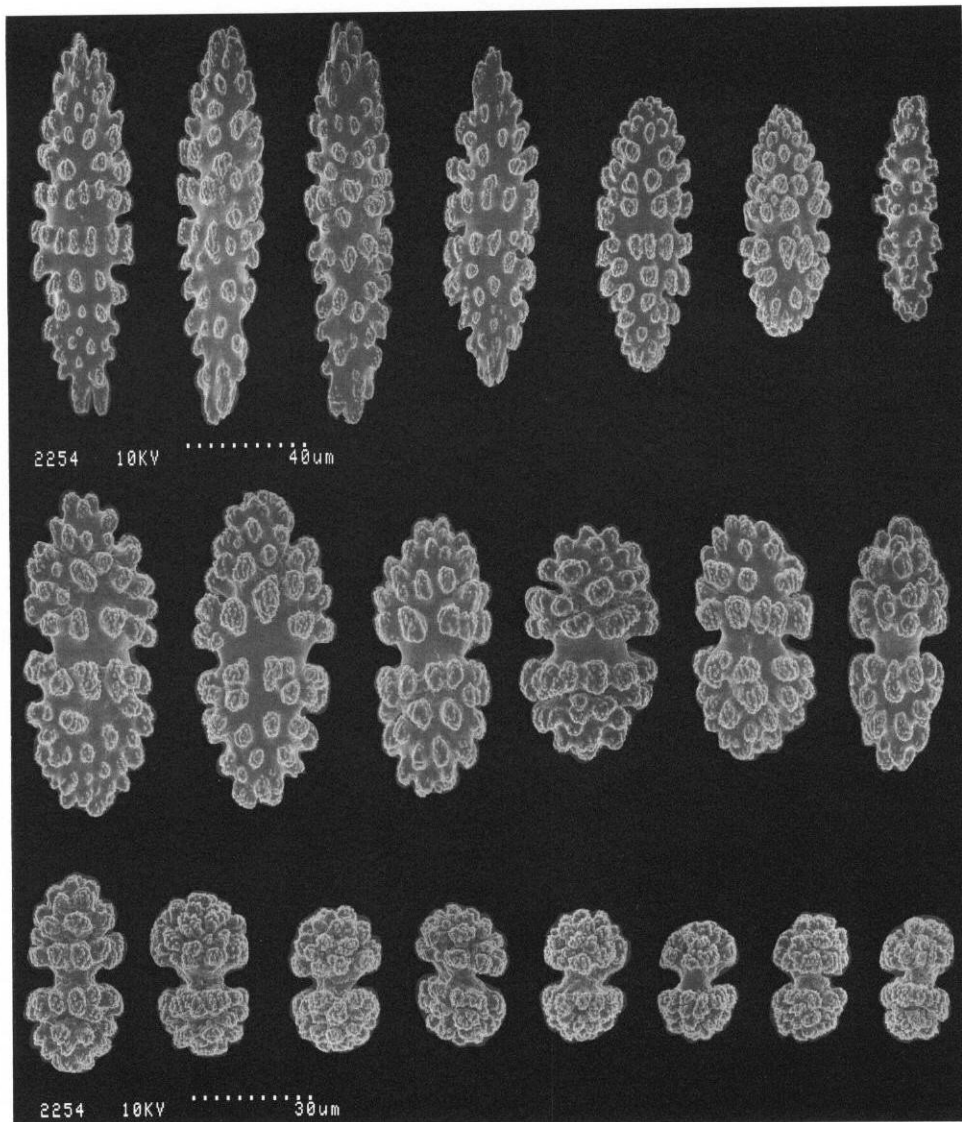


Figure 23. *Ctenocella (Ellisella) rosea* new sp. Sclerites of holotype, USNM 59126. Top row, spindles and intermediate forms; Middle row, intermediate forms and double heads at higher magnification; Bottom row, double heads (SEM 2254).

slender terminal branchlets or closely placed on stouter terminal branchlets, even in a single colony. Sclerites as in *C. schmitti* but colorless.

Description.—Colonies uniplanar, dichotomously branched, more or less “subsecund” with branchlets tending to originate along the upper side of branches (Figs. 14, 15), and prominent, cylindrical verrucae biserially arranged on the distal branches and terminal branchlets (Figs. 16, 17), becoming multiserial on the largest branches and main stem, directed upward at about 45°; on the distal branches the verrucae of each biserial row alternate more or less distinctly toward front

and back of the colony. The largest colony (USNM 93366) here designated as holotype (Fig. 14) is 39 cm tall, broken off at the holdfast where the trunk is 2.6 mm in diameter, and 28 cm wide, flabellate, with branches commonly 1.0–3.5 cm apart but as much as 12 cm, arising at angles of 25°–40°; unbranched terminal branchlets reach 7.5 cm in length but usually are shorter, commonly between 2 and 4 cm, and 0.5–0.75 mm in diameter excluding the verrucae. The polyps on the distal branches are either alternate or opposite, and a few occur on the “front” side of the branches. Polyps are absent from the proximal 4 cm of trunk (i.e., below the origin of the third lateral branch). Fully developed individuals form short, stout, cylindrical verrucae about 1 mm tall and 1.25 mm wide at the base, directed distad at 45°–50°; the proximal side is about 1.25 mm long, the distal side 0.5 mm. The verrucae are marked by eight weak longitudinal grooves that correspond to the mesenteries and distally separate eight marginal lobes that are more or less distinct depending upon degree of contraction. The surface of the cortex is smooth, but a median longitudinal furrow on “front” side of the large branches indicates the course of a major coenenchymal canal, and several narrow longitudinal furrows extend along the smaller branches.

Terminal branches of the holotype vary in stoutness, the slenderest (Fig. 17) about 0.5 mm in diameter exclusive of the verrucae, the thickest about 0.75 mm (Fig. 16); the polyps of the slender branchlets are well separated, cylindrical, truncate and weakly tapered (Fig. 17), but those of the thicker branchlets are hemispherical (Fig. 16), more crowded along the two sides and more clearly alternating toward front and back of the colony.

Apart from being colorless, the sclerites (Fig. 18) agree closely with those of *C. schmitti*. The spindles are 0.12–0.14 mm long, and the double heads 0.04–0.06 mm; intermediate forms 0.08–0.1 mm long connect the two extremes and form a virtual continuum.

Remarks.—Although most of the specimens of *C. nivea* were collected along the north coast of Jamaica, a single colony obtained in 61 m at Andros Island in the Bahamas agreeing with them in colonial form and sclerites (Fig. 19) indicates that the species is more widely distributed on deep reef situations in the West Indian region. It is remarkable that many trawling stations in appropriate depths throughout the Caribbean have failed to obtain additional examples. This probably can be accounted for by the steep and rugged deep-reef slopes from which all known specimens have been taken, a habitat inaccessible to dredges and trawls.

***Ctenocella (Ellisella) rosea* new species**
Figures 20–23

Material Examined.—Bahamas: Eleuthera Island, 170 feet (=52 m) Coll. Walter Goldberg, 11 September 1972. Five colonies and one detached branch, dry, holotype (Figs. 20, 21, 23) USNM 59126 (SEM 2254, 2255) and paratypes (Fig. 22), USNM 93368 (SEM 2256, 2257).

Diagnosis.—Dichotomously branched flabellate colonies grossly similar to *C. schmitti* but with red verrucae and white cortex together giving colonies an overall pinkish color. A thin superficial layer of small, white double heads overlies the amber sclerites of the burnt orange or rusty red deeper cortex, but extends little if at all onto the red verrucae; cortex strongly corrugose or papillose; prominent cylindrical or blunt-conical verrucae biserial on terminal branchlets but becoming multiserial in two lateral rows on stouter branchlets and main stem. Sclerites as in *C. schmitti* but colorless.

Description.—The colonies are flabellate, dichotomously branched in one plane but not anastomosing, more or less “subsecund” with branchlets tending to originate along the upper side of branches (Fig. 20), resulting in a somewhat lyrate form as in some colonies of *C. schmitti*. The polyps form cylindrical or slightly tapered verrucae (Figs. 21, 22) arranged biserially in double rows on the distal parts of the end branchlets, the individual verrucae alternating toward front and back of the corallum; on the proximal parts of the terminal twigs and on the major branches, the biserial rows become multiple, so the polyps occur in two broad bands along the two sides of the branches in the plane of branching. Vestiges of verrucae persist even on the large main branches and main trunk. The verrucae are dull red but the surrounding cortex is white owing to a thin superficial layer of small, white double heads overlying the amber sclerites of the deeper cortex, giving the colonies an overall pink color.

The largest colony (Fig. 20), 32 cm tall lacking the holdfast, here designated as holotype (USNM 59126), bifurcates 2.5 cm above the broken base, but a scar 1.5 cm above the broken end indicates that a bifurcation had occurred lower on the main stem. After the first bifurcation, the dichotomy tends to be unilateral and is somewhat irregular. The longest undivided terminal branchlets are about 6.5 cm long and from 0.75 mm to 1 mm wide exclusive of verrucae and 2–2.5 mm wide overall, depending upon prominence of the verrucae. The slenderest of the paratypes, which may be a small colony nearly complete save for the holdfast, is only 15 cm tall and has the narrowest branchlets.

Verrucae (Figs. 21, 22) are prominent, mostly directed upward at about 45°, about 1 mm tall and 0.75 mm in diameter, but some are contracted to low hemispheres (Fig. 21); developing individuals are correspondingly smaller. The verrucal walls are marked by eight distinct grooves separated by conspicuous ridges that form eight blunt marginal teeth (Fig. 22).

In the smallest as well as the largest colony, the surface of the cortex is thrown into conspicuous papillae and short ridges formed by clusters of sclerites (Figs. 21, 22).

The sclerites (Fig. 23) consist of tuberculate spindles, double heads and intermediate forms similar to those of *C. schmitti*. The spindles reach a length of about 0.14 mm, and the largest double heads are about 0.66 mm long; intermediate forms more elongate than double heads but not as slender as spindles range from about 0.08 to 0.1 mm in length forming a virtual continuum as in *C. schmitti*. The white superficial layer of sclerites covering the cortex is composed of small, colorless double heads 0.03–0.05 mm long. Most spindles and intermediate forms are reddish amber in color, but colorless examples are present but very uncommon.

Etymology.—Latin *roseus*, rose-colored, in allusion to the pinkish general aspect produced by the superficial layer of white sclerites.

Remarks.—This species has been collected only at the type locality in the Bahamas, and at Bonaire. As in *C. schmitti* and *C. nivea*, branchlets vary in stoutness, but no colonies with completely smooth, non-papillate coenenchyme have been found.

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Most of the specimens reported in this paper were obtained by skilled SCUBA divers who diligently collected gorgonians from parts of the reef never before sampled for these organisms. The late Dr. T. F. Goreau of the Discovery Bay Marine Laboratory and his colleagues E. Graham, P. and R. Chapman, and R. F. Kinzie collected the specimens from Jamaica. Dr. W. A. Starck, Dr. W. F. Goldberg, J. D.

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