

TWO NEW PLEXAURID GORGONIANS FROM THE BAHAMA ISLANDS¹

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ABSTRACT

Two species of the reef dwelling gorgonacean family Plexauridae are described as new. Both were recovered from a habitat unusually deep for genera concerned (36 fathoms) and show modification toward the slender, delicate colonial form characteristic of deep-water genera. *Plexaura nina* bears a strong resemblance to *P. homomalla* (Esper), the generic type, but differs both in growth form and in spicular details. *Eunicea pinta* belongs to the group of species related to *Eunicea mammosa* Lamouroux, also the type of its genus, but lacks protruding calicles and has atypically strong anthocodial armature, as well as differing in growth form and details of spiculation.

INTRODUCTION

Amongst the shallow-water gorgonians of the West Indian region, perhaps none are more conspicuous and characteristic of the reef fauna than the plexaurids. It is accordingly of no little interest that a tangle haul made at a depth of 36 fathoms in the Tongue of the Ocean, Great Bahama Bank, by the U. S. Fish Commission steamer ALBATROSS during 1886 contains representatives of two typically reef dwelling plexaurid genera. Both demonstrate the effect that a deep, quiet habitat has upon a colonial form adapted for life in the turbulent waters of the reef. Instead of the densely arborescent, thick-branched growth form usually met with in shallow water on the reefs, these two species are sparingly branched, with exceptionally long, slender, and flexible terminal branches. In both, the anthocodial armature is unusually strong for plexaurids, which commonly have only a weak crown or merely a few tiny, tentacular rods, sometimes none at all. In consequence, the anthocodiae of both species tend to remain exsert in preservation to a much greater degree than is usual for reef dwelling plexaurids.

Similar modifications can be seen in the deeper-water representatives of the genus *Muricea*, as well as among those of several gorgoniid genera. The colonies assume a spindly and leggy aspect while retaining the customary pattern of ramification; the anthocodial armature becomes unusually strong; and the spicules of the rind tend to become

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more aculeate. Thus, the effects of the physical environment seem to elicit similar responses in members of various holaxonian genera in at least two families.

One of the species obtained by the ALBATROSS bears obvious resemblance to the shallow-water group of *Plexaura homomalla* (Esper) and therefore is referable to the genus *Plexaura*, and the other shares many features in common with the reef-dwelling group of *Eunicea mammosa* Lamouroux, but the generic distinction, unsatisfactory at best, is even more obscure in these two deeper water forms. The type species of the genus *Eunicea*, *E. mammosa*, has its surface spicules in the form of aculeate torches, and contains long, slender, bright purple, spinose spindles in the axial sheath layer, with capstans appearing only in the larger branches near the base of the colony. Contrastingly, the axial sheath of *Plexaura homomalla*, type species of *Plexaura*, contains abundant capstans or spheroidal bodies all the way to the branch tips, thus providing one of the few distinguishing features that seems to hold good for separation of these genera. Unfortunately, both of the species now under consideration have capstans in the axial sheath all the way up to the branch tips, although only one of them has torches of the *Eunicea* type. In the latter, the capstans are found to be rather acutely pointed and mostly sculptured with only conical spines rather than with complex tubercles and so correspond with those found in some species of *Eunicea*. Thus it still seems justifiable to retain the distinction between *Plexaura* and *Eunicea*, and to assign one of these new species to the former and the other to the latter.

Genus *Plexaura* Lamouroux

Plexaura Lamouroux, 1812, p. 187. (Type species, *Gorgonia homomalla* Esper, by subsequent designation: Verrill, 1912, p. 382.)

Plexaura Moser, 1921, p. 110.

Plexaura Kükenthal, 1924, p. 111.

Plexaura Stiasny, 1935, p. 44.

Diagnosis.—Plexaurids with cortical spiculation divided into three layers: outer layer clubs (chiefly leaf-clubs), often with some unilaterally foliate capstans or spindles; middle layer predominantly spindles of large (up to 2 mm) or moderate size; inner layer (=axial sheath) with capstans of deep reddish purple color predominating. Anthocodiae strongly armed with spindles forming a crown with 8 points, flattened rods in the backs of the tentacles, and sometimes a collaret.

Remarks.—Of the nineteen species attributed to this genus by Kükenthal

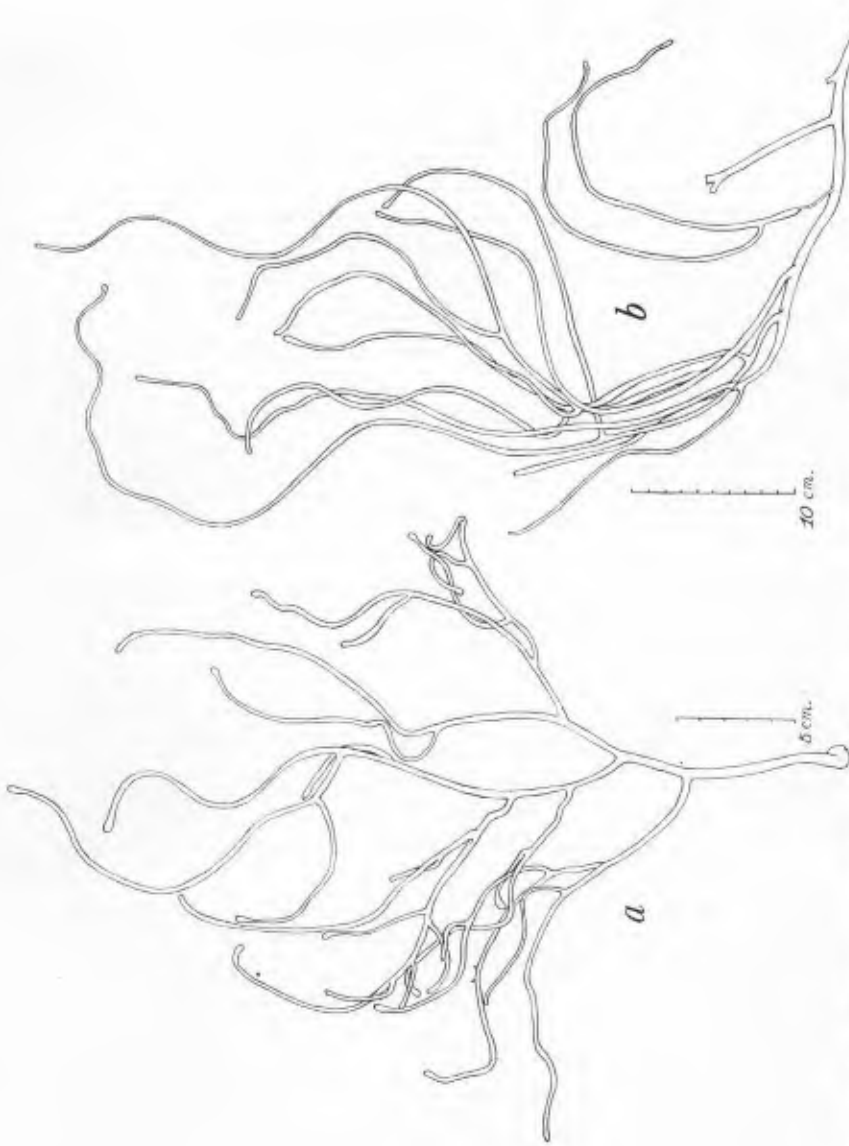


FIGURE 1. a, *Plexaura nina* sp. nov.; outline drawing of the type colony, reduced as indicated by 5 cm scale. b, *Eumicea pinta* sp. nov.; outline drawing of the type colony, reduced as indicated by 10 cm scale.

thal in 1924, only three, viz. *homomalla* Esper, its growth form *küken-thali* Moser, and *flexuosa* Lamouroux, remain in it as it is here defined; the remaining sixteen are redistributed among *Pseudoplexaura*, *Euni-cea*, and *Muriceopsis*. A new species, closely related to *homomalla*, is here described.

Plexaura nina sp. nov.

(Figs. 1, a; 2; 3)

Diagnosis.—Colonies branched sparsely, dichotomously and in one plane, axillary angles 40° - 90° . Terminal branches 1.5-2.0 mm in diameter and up to 25 cm long. Calicles verruciform, prominent everywhere except on the largest branches and the trunk. Anthocodiae with a crown of 4-6 bent rods *en chevron* beneath each tentacle and a collaret of curved rods in 2-3 transverse rows. Surface clubs small, foliate; tuberculate spindles of middle layer curved, up to 1.2 mm long; deep reddish purple capstans occur throughout the axial sheath, and bluntly spinose spindles in the terminal regions only. Color of rind grayish brown with white-bordered calicular orifices; anthocodiae white (in alcohol).

Description.—Colonies branched sparingly, in one plane; ramification mostly dichotomous, with axillary angles from 45° to 90° . The type is a colony 40 cm high including the base, with flexible, slender end branches up to 2 mm in diameter and 15 cm long. The branch tips are slightly clavate. Calicles are conspicuous over most of the colony, becoming low or quite flush with the surface of the rind on the trunk and major branches. Many of the anthocodiae are exsert in preservation (Fig. 2, a), being armed with a strong crown of 4-6 rods *en chevron* beneath each tentacle and a collaret of 2-3 rows of transverse rods; tentacles filled with smaller rods (Fig. 3, a). The outer layer of rind contains small leaf-clubs and asymmetrically foliate capstans 0.1-0.13 mm long (Fig. 2, h-m), which become stouter and coarser toward the base of the colony (Fig. 2, n-p). The middle layer of rind contains tuberculate spindles about 0.7 mm long near the tips of the branches (Fig. 3, d), 0.8-1.0 mm long toward the middle of the colony (Fig. 3, c), and up to 1.2 mm long in the main trunk (Fig. 3, b); most are white but a few of those nearest the axial sheath may be lavender. Some of the smaller spindles, especially those near the calicular margins, have one end enlarged and asymmetrically spinose (Fig. 3, e). The axial sheath contains dark purple capstans basically

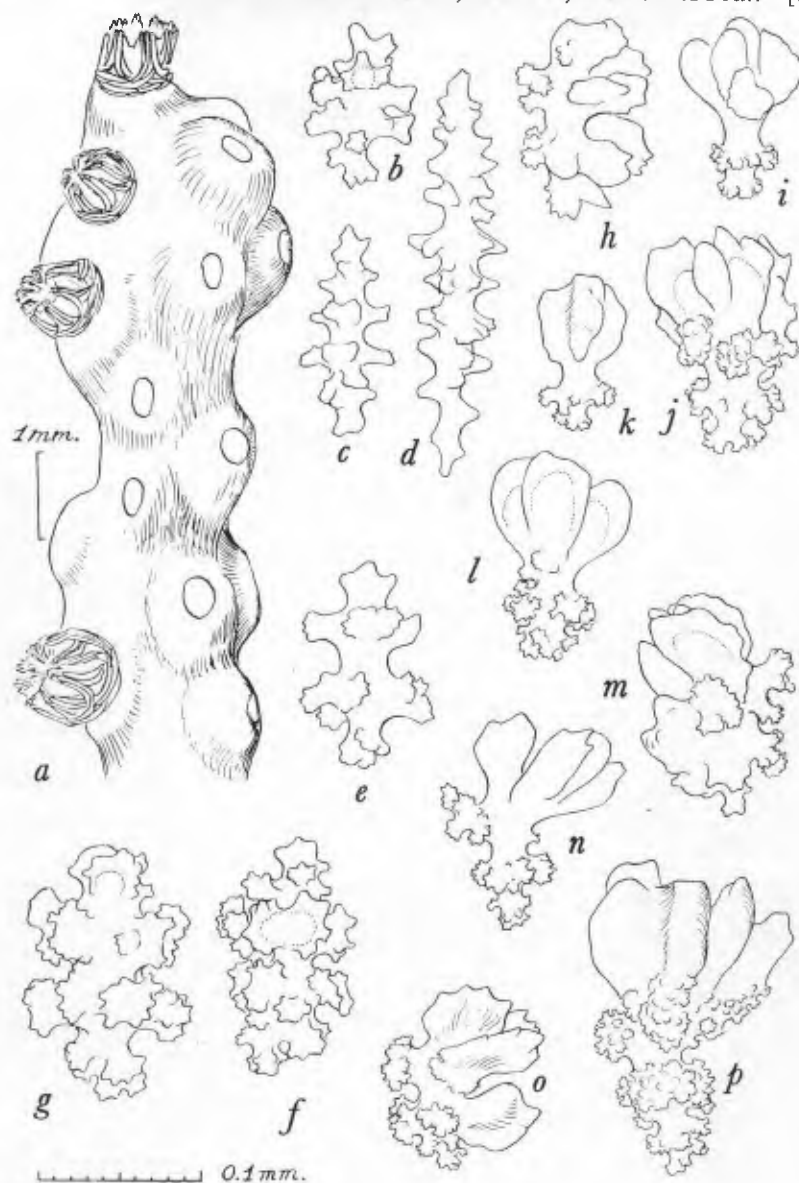


FIGURE 2. *Plexaura nina* sp. nov. a, branch tip drawn at low magnification, as indicated by 1 mm scale. b-d, deep purple spicules from the axial sheath layer of a terminal branch. e-g, deep purple spicules from the axial sheath layer of main trunk. h-m, colorless clubs and foliate bodies from the surface layer of rind of a terminal branch. n-p, colorless clubs and foliate body from the surface layer of rind of the main trunk. (All spicules, b-p, drawn at high magnification as shown by 0.1 mm scale.)

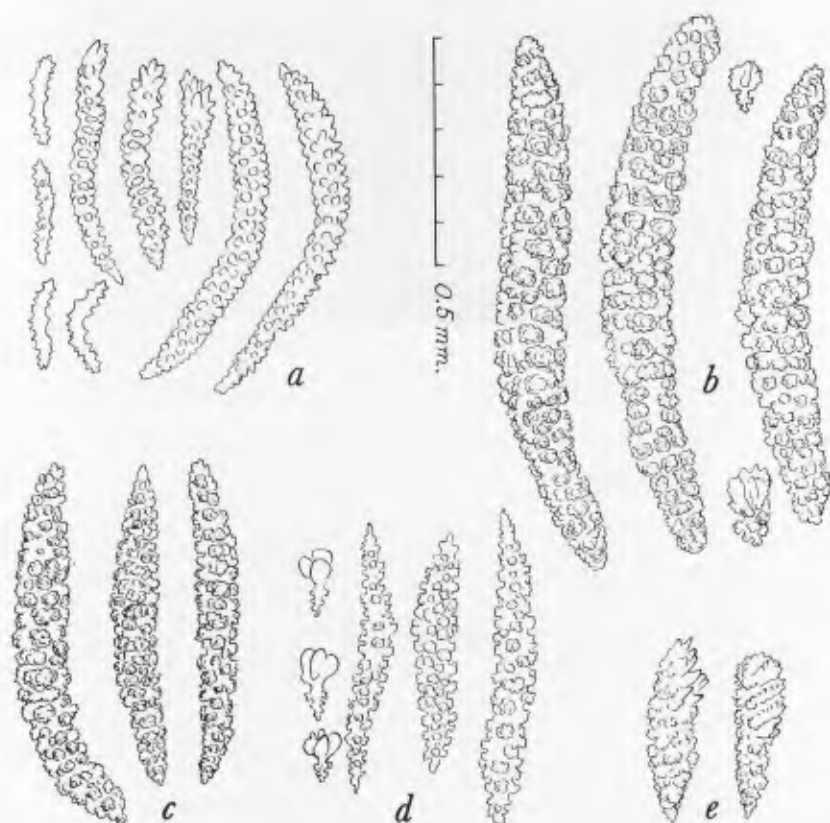


FIGURE 3. *Plexaura nina* sp. nov. a, spicules of the crown: large, curved spindles of the collarlet (right); terminally thorny spindles of the points (middle); small, flattened rods of the tentacle backs (left); all colorless. b, spindles from the middle layer of rind of the main trunk; white, white with purple core, or all purple; two clubs from surface layer drawn to same scale. c, spindles from the middle layer of rind near middle of colony; mostly white, a few pale purple. d, spindles from the middle layer of rind of a terminal branch; colorless; three clubs from surface layer drawn to same scale. e, asymmetrically spinose spindles from calicular margins. (All figures drawn at intermediate magnification as shown by 0.5 mm scale.)

of 8-radiate type, with blunt, complicated rays. They are rather small (length about 0.1 mm) in the terminal branches, where bluntly spinose spindles also occur (Fig. 2, b-e), but they increase in size and complexity basad, where there are no spindles (Fig. 2, f-g).

Color.—In alcohol, rind grayish brown, the calicular apertures with white borders; anthocodiae white.

Type.—U. S. National Museum, Cat. No. 50562: South tip of the Tongue of the Ocean, Great Bahama Bank, 23° 24' 00" North, 76° 33' 00" West, 36 fathoms, ALBATROSS Station 2649, April 12, 1886. Fragments in the Museum of Comparative Zoölogy, Cat. No. 2537.

Range.—Known at present only from the type locality.

Remarks.—Many features of *Plexaura nina* recall *Plexaura homomalla*, notably the strong anthocodial crown, the clubs of the surface layer, the spindles of the middle layer, and the capstans of the axial sheath. The outer clubs are smaller and less ornate than those of *homomalla*, but the coarser examples from low in the colony approach the *homomalla*-type in all features except size. The spindles of the middle layer of rind are like those of *homomalla* but are longer and more slender than usual in that species. The purple spicules of the axial sheath are similar in *P. nina* and *homomalla*, but spindles seem not to occur in the terminal branches of the latter. As usual, the spicules of all layers become larger and coarser toward the base of the colony, indicating that the secretory activity of the scleroblasts continues long after the spicules are fully formed. The colonial form of *P. nina* is more delicate than that of *homomalla*, the branching is less profuse and the branches are much more slender and flexible.

Genus *Eunicea* Lamouroux

Eunicea Lamouroux, 1816, p. 431. (Type species, *Eunicea mammosa* Lamouroux 1816, by subsequent designation: Bayer, 1955, p. 212.)

Eunicea Kunze, 1916, p. 505.

Eunicea Kükenthal, 1924, p. 118.

Eunicea Stiasny, 1935, p. 73.

Diagnosis.—Plexaurids with cortical spiculation divided into three layers: outer layer clubs (wart-clubs, thorn-clubs, leaf-clubs, or torches); middle layer predominantly spindles, often large and coarse (up to 3 mm long); inner layer (=axial sheath) with spindles or rods, some of which may develop into rudely sculptured ovoids toward base of colony. Invariably some spicules of the axial sheath are some shade of purple (deep red-purple, lavender, or violet), at least in young colonies and near the base of fully developed examples. Anthocodiae armed with spindles, rods, and flat rodlets, sometimes restricted to the tentacles, sometimes forming also a crown.

Remarks.—Kükenthal's account of this genus (1924), based largely on the work of Kunze (1916), is of little value today since it recognizes many species based upon differences in growth form and un-

reliable variations in spiculation. Stiasny's treatment (1935) is not much better from a systematic standpoint but contains more detailed and better illustrated descriptions.

The type species recognized by earlier workers, viz. *Eunicea succinea* (Pallas), is ineligible for designation as genoelectotype because it was a doubtful species from the standpoint of the author of the genus (Int. Rules of Zool. Nomenclature, Art. 30 (e) β). A new selection was accordingly made by Bayer (1955) as noted in the synonymy above.

In our opinion, the genus *Eunicea* is not homogeneous, but divides naturally into two groups of species, the first including those related to *Eunicea mammosa* Lamouroux (*Eunicea* s.s.), the second those related to *E. tourneforti* Milne Edwards and Haime. The latter group was called *Euniceopsis* by Verrill (1907), a name that we propose to recognize in a subgeneric sense.

The species of the subgenus *Eunicea* s.s. are characterized by weak anthocodial spiculation concentrated in the tentacles (excluding the pinnules) and extending little if at all onto the body wall below the tentacles (except for the new species described below, which has a weak crown of one or two pairs of rods *en chevron* in each sector); the outer clubs have long handles and ornately lacinated heads, producing the type we call "torches;" and most or all of the spicules of the axial sheath are invariably deep reddish purple throughout the colonies.

The species of the subgenus *Euniceopsis* Verrill are characterized by strong anthocodial spiculation consisting of small, flat rods in the pinnules, larger rods in the tentacle backs, and large, bent spindles forming a crown in the body wall below the tentacles; the outer clubs have short handles and take the form of leaf-clubs or wart-clubs, rarely thorn-clubs; and the spicules of the axial sheath are colorless and either lavender or pale violet but never dark purple.

There is evidence suggesting that *Euniceopsis* may eventually require subdivision to form a third subgenus within *Eunicea* s.l. Several of its species have a well-developed collaret formed by the transverse or oblique orientation of the proximal crown spicules, whereas others have no collaret but only eight well-separated points with the proximal spicules nearly or quite longitudinal. In the latter group, of which *E. tourneforti* is typical, the pale violet spicules of the axial sheath seem to be formed only during the early development of the colonies, all spicules formed after a certain age being colorless, since they (1)

appear throughout small colonies, (2) are concentrated in the basal region of larger specimens, and (3) are proportionally fewer in larger colonies. In the former group, however, numerous lavender spicules occur in the axial sheath at all levels, regardless of the size of the colonies.

Eunicea (Eunicea) pinta sp. nov.

(Figs. 1, b; 4; 5)

Diagnosis.—Colonies with long, slender branches (diameter 2.0-2.5 mm, length 50 cm) arising both laterally and dichotomously. Anthocodiae with a crown of at least one pair of bent rods beneath each tentacle, and rodlets transverse in tentacle backs but not extending into pinnules. Calicles not projecting, margins 8-lobed. Surface clubs as torches 0.13-0.16 mm long, with large, spiny heads and slender handles; middle layer of rind with spinose needles and slender tuberculate spindles 1.0-1.8 mm long; axial sheath with bright purple spindles and capstans sculptured with conical processes.

Description.—The growth form is tall and straggling, with slender, flexible branches arising laterally and dichotomously, usually at quite a wide angle, from 45° to 90°, with a tendency to remain in one plane (Fig. 1, b). The tallest colony measures 80 cm in height and has unbranched terminals as long as 50 cm. The main trunk is 7-10 mm in diameter, and the terminal branches, which are more or less clavate, measure 2.0-2.5 mm in diameter. They are cylindrical, smooth, and have only the slightest hint of elevation around the calicular orifices, which have eight marginal lobes but never a projecting calicle or lower lip. The anthocodiae, many of which are preserved exsert, have a crown of slender, curved rods about 0.45 mm long, at least one pair and sometimes two or three pairs below each tentacle, and numerous small flat rodlets 0.15-0.2 mm long placed transversely in the tentacle backs (Fig. 5, d). The outer layer of rind contains a dense layer of very spinose torches with large heads and slender handles, about 0.15 mm in length (Fig. 4, d-e), unlike those of any other known species. Presumably the oldest torches, near the base, are the largest, their size decreasing toward the branch tips. The middle layer of rind contains a great abundance of extremely slender, spinose needles 0.4-0.5 mm long, and some slim, curved spindles with compound tubercles (Fig. 5, a). In the main trunk, the largest spindles measure about 1.8 x 0.2 mm (Fig. 5, c); they decrease in length and stoutness toward the

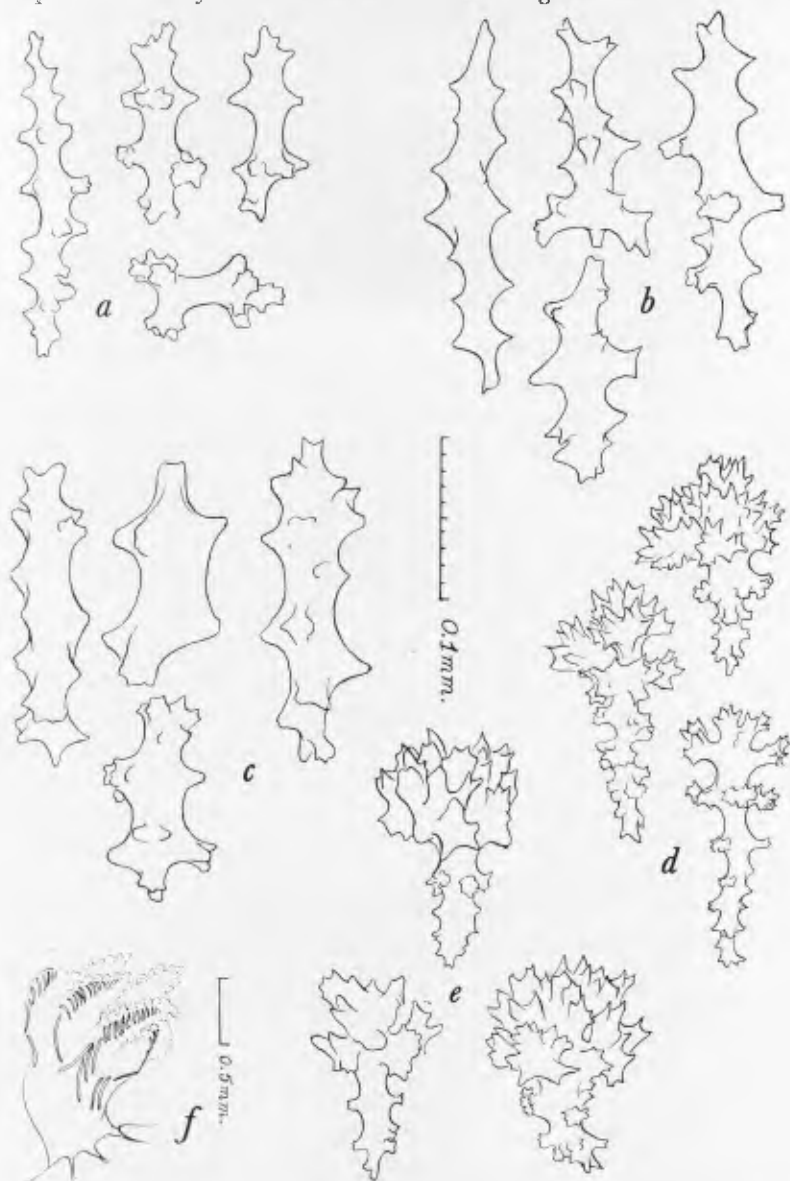


FIGURE 4. *Eunicea (Eunicea) pinta* sp. nov. a, purple spicules from the axial sheath of a terminal branch. b, purple spicules from the axial sheath near middle of colony. c, purple spicules from the axial sheath of the main trunk. d, colorless torches from the outer layer of rind of a terminal branch. e, colorless torches from the outer layer of rind of the main trunk. f, expanded polyp showing arrangement of spicules in the crown. (All spicules, a-e, drawn at high magnification as shown by 0.1 mm scale; polyp drawn at low magnification as shown by 0.5 mm scale.)

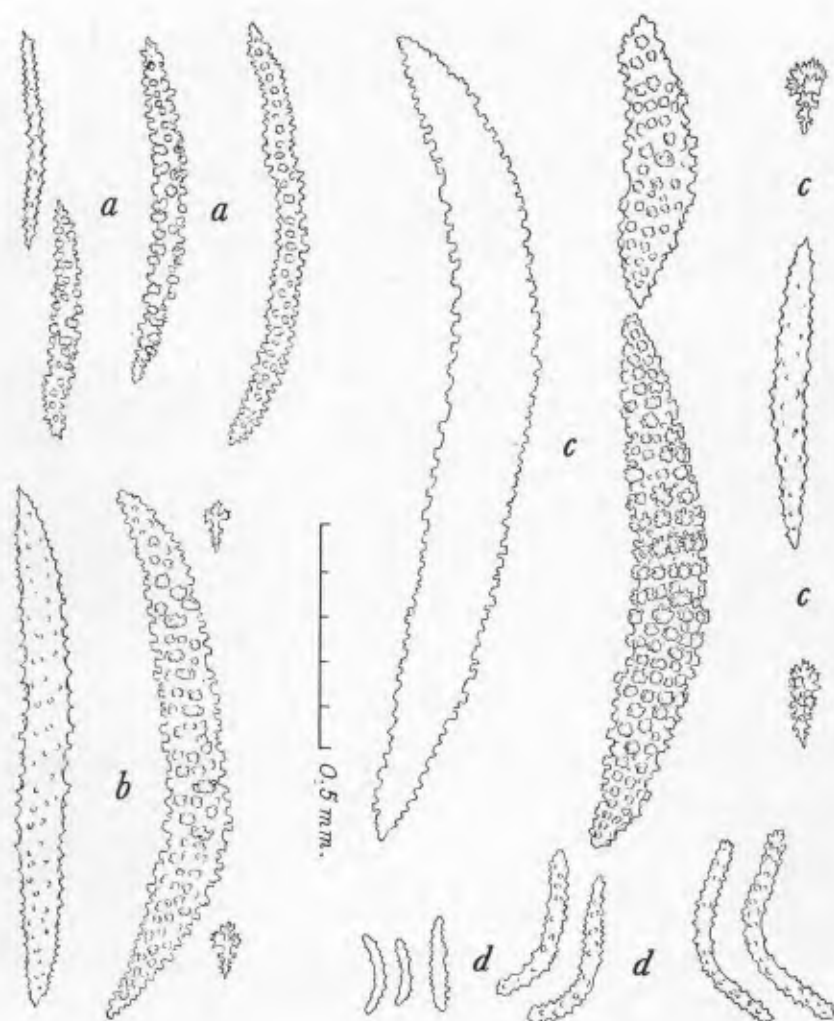


FIGURE 5. *Eunicea pinta* sp. nov. a, colorless needles and spindles from the middle layer of rind of a terminal branch. b, white spindles from the middle layer of rind from middle of colony; two torches of surface layer drawn to the same scale. c, white spindles from the middle layer of rind of the main trunk (sculptural detail omitted from largest); two torches drawn to the same scale. d, spicules of the crown. (All spicules drawn at intermediate magnification as shown by 0.5 mm scale.)

upper part of the colonies, in the middle region reaching 1.2 x 0.15 mm (Fig. 5, b), and at the branch tips about 1.0 x 0.05 mm. The slender needles are abundant throughout. The torches, spindles and needles are entirely colorless. The innermost layer of rind (the axial sheath) contains exclusively purple spicules: at the branch tips they are spinose spindles about 0.2 mm long, and slender capstans with two whorls of spines, mostly about 0.13 mm in length (Fig. 4, a); toward the middle of the colony, the spindles attain a length of about 0.22 mm and the capstans about 0.15 mm (Fig. 4, b); near the base, there are blunt rods about 0.18 mm in length, and stubby capstans about 0.12 mm (Fig. 4, c), but no acute spindles.

Color.—In alcohol, white; axis dark brown.

Type.—U. S. National Museum, Cat. No. 50563: South tip of the Tongue of the Ocean, Great Bahama Bank, 23° 24' 00" North, 76° 33' 00" West, 36 fathoms, ALBATROSS station 2649, April 12, 1886. Fragments in the Museum of Comparative Zoölogy, Cat. No. 2536.

Range.—Known at present only from the type locality.

Remarks.—The spicular characters of *Eunicea pinta* definitely point to an affinity with the *mammosa* group of species. The straggling, flexible growth form indicates an adaptation to conditions less turbulent than those that obtain in shallow water on the reefs.

REFERENCES

- BAYER, FREDERICK M.
1955. Contributions to the nomenclature, systematics, and morphology of the Octocorallia. Proc. U. S. nat. Mus., 105: 207-220, 8 pls.
- KÜKENTHAL, WILLY
1924. Gorgonaria. Das Tierreich, 47. xxviii+478, 209 figs. Berlin.
- KUNZE, G.
1916. Die Gorgonarien Westindiens: Kap. 4, Die Gattung *Eunicea* Lamouroux. Zool. Jb., Suppl., 11: 505-552, 25 figs., pls. 24-26.
- LAMOUREUX, J. V. F.
1812. Sur la classification des polypiers coralligènes non entièrement pierreux. Nouv. Bull. Sci. Soc. Philom., 3: 181-188.
1816. Histoire des polypiers coralligènes flexibles, vulgairement nommés zoophytes. lxxxiv+560, 19 pls. Cacn.
- MOSER, JOHANNES
1921. Ergebnisse einer Revision der Gattung *Plexaura* Lamouroux. Zool. Anz., 53: 110-118.
- STIASNY, GUSTAV
1935. Die Gorgonacea der Siboga-Expedition. Supplement I, Revision der Plexauridae. Siboga Exped., Monogr. 13b7. vi+106, 27 figs. 7 pls.
- VERRILL, ADDISON EMERY
1912. The gorgonians of the Brazilian coast. J. Acad. nat. Sci. Philad., 15 (2): 373-404, 1 fig., pls. 29-35.