

A NEW GORGONACEAN OCTOCORAL
FROM JAMAICA¹

FREDERICK M. BAYER

Rosenstiel School of Marine and Atmospheric Science, University of Miami

ABSTRACT

A new species of the gorgonacean *Nicella* is described from deep-reef habitats along the coast of Jamaica and elsewhere in the Caribbean and is named *N. goreau* for its discoverer. It is compared with other known species of *Nicella* from the western Atlantic, and its spicular characters are illustrated by scanning electron micrographs as well as by drawings.

INTRODUCTION

Very early in his investigations on Jamaican reefs, Dr. T. F. Goreau began collecting gorgonians as a part of his inventory of the reef fauna. These collections obtained by diving provided an insight into the octocoral populations of the reef slope and wall from the drop-off down to about 100 meters, a habitat hitherto poorly sampled because it is virtually undredgable. Many unusual octocorals, previously taken only by dredging and trawling in considerably deeper water, proved to be abundant on the deeper, steeper parts of the reef that can be investigated only by the use of SCUBA. Among these were many specimens of the holaxonian genus *Nicella* (family Ellisellidae). This genus was considered by Deichmann (1936: 216) to include four western Atlantic species, two of which (*N. ramosa* Toeplitz and *N. americana* Toeplitz) she thought possibly to be variants of the common *N. guadalupensis* (Duchassaing & Michelotti). In attempting to identify the specimens collected by Dr. Goreau and his associates and to reconcile them with collections made both by diving and by trawling at many other Caribbean localities, I have found so many differences among them that it became impossible to allocate them with certainty to any of the four species mentioned by Deichmann. It has therefore become necessary to review the entire family Ellisellidae as a part of a general revision of the western Atlantic octocorals now in progress. As the first part of this revision, containing the family Ellisellidae, will not be published in the immediate future, and as the species collected by Dr. Goreau has proved to be new, it seems desirable to publish a description of it in advance of the detailed treatment in order to provide a name that can be used for it by those now conducting investigations on Caribbean reefs.

¹Contribution No. 1682 from the University of Miami, Rosenstiel School of Marine and Atmospheric Science.

In illustrating the spicules of this species, I have made extensive use of photographs made with the scanning electron microscope (SEM) while minimizing the number of traditional drawings. Scanning electron microscopy reveals details of spicular form with unprecedented clarity and records them photographically in a fraction of the time required for the production of drawings which, even at best, are far inferior. Preparation of a single detailed drawing, such as that of a double head in Figure 3,c, requires an hour or more, whereas an SEM photograph can be made in five minutes. Even when the preparation time is taken into consideration, SEM remains the most efficient and informative method of studying and recording spicular details that has yet become available.

In spite of its many advantages, SEM technique does not supplant the light microscope for routine study and identification. Preparations made in the traditional manner for either temporary or permanent mounts may be compared with SEM photographs without difficulty and, indeed, more accurately than with most published drawings of spicules. The comparison of drawings, even among themselves, can be misleading because of the variety of techniques that have been used to prepare them and because of the different degrees of accuracy with which they were prepared. Few illustrations of spicules have equalled in quality those published by Kölliker in 1864. In spite of the fact that they were the first illustrations to show the importance of spicules as taxonomic characters, they are among the very best because they were accurately drawn, skilfully engraved, and colored by hand. Illustrations published by most later authors have been less accurate and less useful taxonomically. Of the two revisions of the family Ellisellidae (=Gorgonellidae), that by Simpson (1910) is quite well illustrated whereas that by Toeplitz (1929) is inadequately so. Simpson's figures of spicules give a good impression of their form but show nothing about their structure, whether "loose" or "compact." The drawings given by Toeplitz are of little value in depicting the spicular differences of the kind that are significant in this family.

Further examples of the illustrations of ellisellid spicules available to the systematist are to be seen in works by Deichmann (1936: Pl. 24), Grasshoff (1972: 77, 83, 84), Tixier-Durivault (1966: 422-425), and Bayer (1959: 22; 1960: 179-180; 1961: 282, 286, 289). From these it can be seen that information now available about the spicules of most ellisellids is for the most part inadequate to permit evaluation of the nominal species on record. A redescription of all the type-specimens, preferably illustrated by scanning electron microscopy or, at the very least, by detailed drawings, will be necessary to put the species on a firm descriptive footing.

I am able to justify the description of a new species in the genus *Nicella* at this time only by virtue of having studied by scanning electron microscopy the type-specimen of the type-species of the genus, *Nicella*

dichotoma (J. E. Gray), through the courtesy of Dr. P. F. S. Cornelius and the Trustees of the British Museum (N.H.); the type-specimen of *Nicella guadalupensis* (Duchassaing & Michelotti), through the kindness of Dr. Lucia Rossi of the Turin Museum; and the type-specimen of *Nicella obesa* Deichmann in the Museum of Comparative Zoology. Likewise, I have examined hundreds of colonies of various *Nicella* from the entire Caribbean area, many of them by SEM, including many specimens of the new species collected by diving in the vicinity of Discovery Bay, Jamaica. Therefore, I am reasonably confident that the new species is a good species, at least insofar as it occurs on the reef face on the north coast of Jamaica; that it is distinct from *Nicella guadalupensis*, the most widely reported species in the area, as well as from *N. obesa* Deichmann, 1936; that it is distinct from *N. atlantica* and *N. ramosa* as described and figured by Toeplitz (1929); and that it actually belongs in the genus *Nicella*.

ACKNOWLEDGMENTS

This research was supported by grant no. GB 030741 from the National Science Foundation, for which I wish here to express my thanks. Some of the comparative material used in the present report was collected by operations of R/V JOHN ELLIOT PILLSBURY supported by grant no. GB 3808 from the National Science Foundation.

I was assisted in the routine examination of a large number of these specimens of *Nicella* by Mr. Charles G. Messing, with the help of a grant from the Smithsonian Research Foundation (1971), for which I am most grateful. The scanning electron microscopy of spicules was done on a Cambridge Stereoscan instrument by Mr. Walter R. Brown, electron microscopist of the Smithsonian Institution, during my term of appointment as Visiting Curator, Department of Invertebrate Zoology, Smithsonian Institution.

I here extend special thanks to Dr. Lucia Rossi, who made it possible for me to examine the spicules of Duchassaing & Michelotti's type-specimen of *Verrucella guadalupensis*, which is preserved in the Museo Zoologico di Torino.

It is especially fitting that this species be dedicated to the late Dr. Thomas F. Goreau, who collected the type-specimen and many others, and bear his name in memory of the many advances in our knowledge of coral reefs that he made personally or by his boundless enthusiasm stimulated others to make.

Genus *Nicella* J. E. Gray, 1870

Nicella Gray, 1870: 40. (Type-species, *Nicella mauritiana* Gray, 1870, =*Scirpearia dichotoma* Gray, 1859, =*Nicella dichotoma* [Gray], by monotypy; type-specimen, British Museum.)—Kükenthal, 1924: 376.—

Toeplitz, 1929: 334 (synonymy).—Deichmann, 1936: 216.—Bayer, 1961: 287.

This genus of profusely branched ellisellids is distinguished from *Verucella*, whose species have a similar growth form, by the presence of long, more or less pointed, commonly flattened spindles or rods in the calyces and inner layer of the cortex.

A similar difference separates the whiplike or flagelliform species of *Ellisella* Gray (= *Scirpearia* Auct.) from *Viminella* Gray (= *Toeplitzella* Deichmann). Unfortunately, this character shows considerable variability and must be reassessed before the status of these two pairs of genera can be evaluated.

Nicella goreau, sp. nov.

Figs. 1-5

Material Examined.—HOLOTYPE: Discovery Bay, Jamaica, 200+ feet (61 m), coll. T. F. Goreau, by SCUBA, 25 October 1966 (USNM 53124).

PARATYPES: Discovery Bay, Jamaica, 36-55 m, coll. R. Kinzie, by SCUBA, 6 May 1969 (USNM 53122).—Gulf of Uraba, Panama, 8°48.7' N, 77°12.7' W, 96-98 m, R/V PILLSBURY Sta. P-403, otter trawl, 17 July 1966 (USNM 53100).

Also 46 additional lots from the Straits of Florida, Bahamas, Jamaica, and Caribbean Sea: USNM nos. 44122, 44134, 49424, 49514, 50896-50898, 51584, 53084-53099, 53101-53121, 53123, all of which have the status of paratypes.

Description.—*Nicella* closely branched in one plane (Fig. 1), varying from rather coarse, with prominent hemispherical calyces, to rather fine, with low and inconspicuous calyces; color predominantly copper, terra cotta, or brick red, occasionally ochre, sometimes with paler calyces, sometimes uniformly colored; colonies marginally white occur, but appear to be rare (USNM 50896). Calyces distributed on three sides of branches and twigs, so that one side of the flabellate colony is devoid of zooids. Characteristic of all colonies is the loose structure of the spicules, all of which show to some degree a distinctly "porous" texture, in which the calcareous elements of the spicules are incompletely united, leaving conspicuous interstices. The significance of this loose structure is not known, but the most obvious interpretation is an unusually strong development of the organic matrix upon which the calcium of the spicule is deposited; this is dissolved by the NaClO solution used to clean the spicules for scanning and for light microscopy, leaving the surface pitted.

The outer cortical layer contains double heads (Fig. 2,f-h) of ovate outline (ratio of width to length from 0.45 to 0.6); the heads are more or less flattened, sometimes nearly discoidal (Fig. 5,f-o), and joined by a

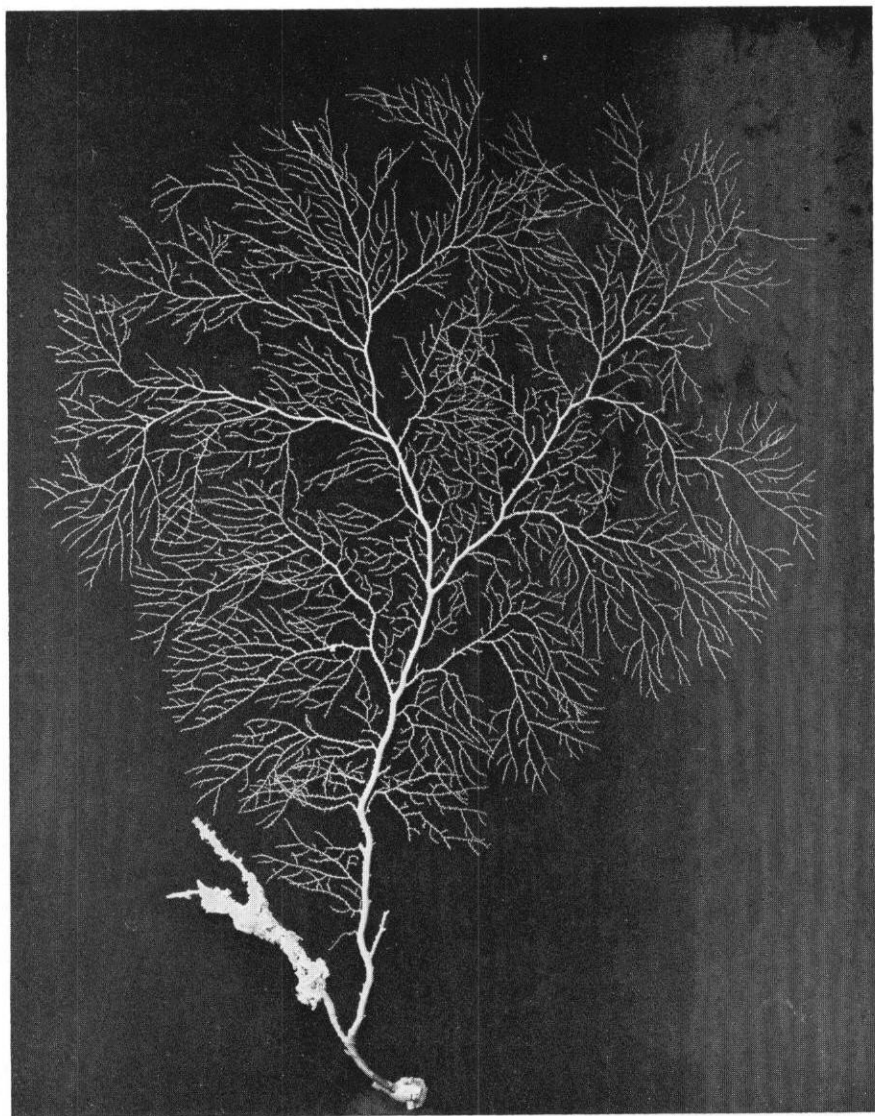


FIGURE 1. *Nicella goreau*, sp. nov., holotype colony (USNM 53124), height 60 cm, from Discovery Bay, Jamaica.

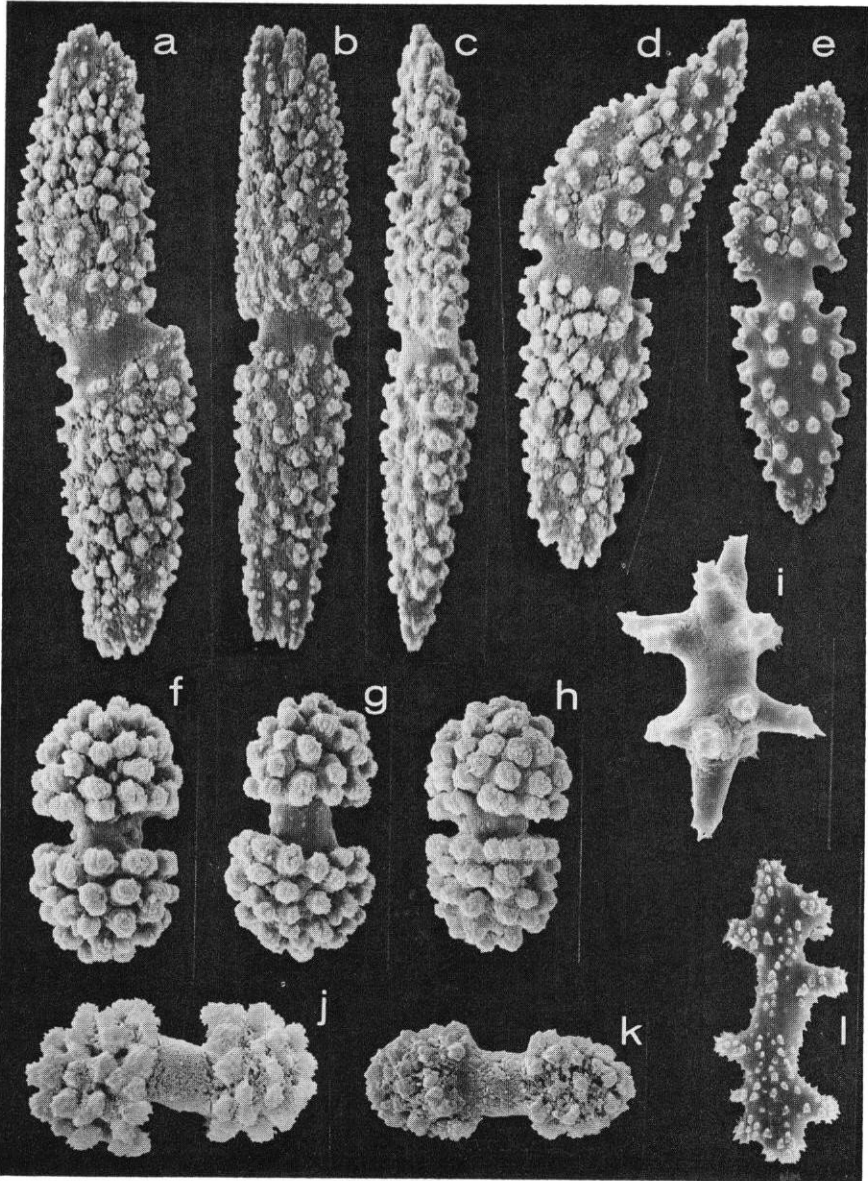


FIGURE 2. Spicules of *Nicella goreau*, sp. nov., holotype (USNM 53124). Magnifications: a-e, $\times 500$; f-h, $\times 750$; i-l, $\times 1000$. SEM photographs by W. R. Brown, Smithsonian Institution.

distinct, usually oblique, neck. The inner cortex and the calyces contain compressed double spindles, sometimes blunt (Fig. 4,a), sometimes acute (Fig. 5,a); in some colonies, they are only about twice as long as the double heads, but more commonly they are 2.5 to 3.5 times as long, strongly compressed, straight-sided and blunt. Not infrequently, however, they are strongly flattened, almost scalelike, with a distinct median waist and the two ends somewhat unequal in size so that the outline is almost slipper-shaped (Fig. 4,a). Double heads from 0.04 to 0.05 mm in length and 0.018 to 0.025 mm in width predominate in the outer cortex, but more elongated forms grading into the double spindles are common. Fully developed double spindles and double rods range in length from 0.14 to 0.20 mm and in width from 0.02 to 0.04 mm.

The many specimens in the present collection show much variation as to color, external form, and development of the compressed double spindles and double rods of the calyces and inner cortex, and I have so far not been able to correlate any of these differences in a way that would permit the recognition of more than one species. It is possible that a more intensive study will reveal groupings that merit taxonomic recognition. The one feature that is shared by all specimens is the loose texture of the calcium of the spicules, but even this character varies, and it is found also in *Nicella dichotoma* (Gray), the type-species of the genus, and in *Nicella coralloides* Nutting, both from the Indo-Pacific.

The holotype is a flabellate colony 60 cm tall and 45 cm wide (Fig. 1); it is a fully developed lateral branch from a mainstem that had earlier died and become encrusted with fouling organisms. Branching, although it superficially appears to be dichotomous, is actually lateral, with rather short end twigs curving upward. The ultimate branchlets are rather fine, about 0.5 mm in diameter or somewhat less and mostly about 1 cm in length. Calyces are bluntly conical, 0.6-0.8 mm tall and about 1.5 mm apart (Fig. 3,a), placed on three sides of the branches so that one side of the colony is essentially without zooids. The bases of the tentacles form eight rather pointed lobes that close the calycular orifices. The spicules in the marginal lobes are longitudinally arranged and are clearly of the double-spindle and double-rod types; the basal parts of the calyces and the general coenenchyme show a superficial layer of double heads, and the colonial surface is finely granular but not thrown into wrinkles and corrugations as is the case in other species. The color of the colony is uniformly brownish orange of the hue called copper (red) by Kornerup & Wanscher (1961); the calyces are not colored differently from the coenenchyme.

The spicules of the three specimens here selected for illustration show the range of variation found among specimens of *N. goreau*. In the specimen from the Gulf of Uraba (USNM 53100), they have the loose

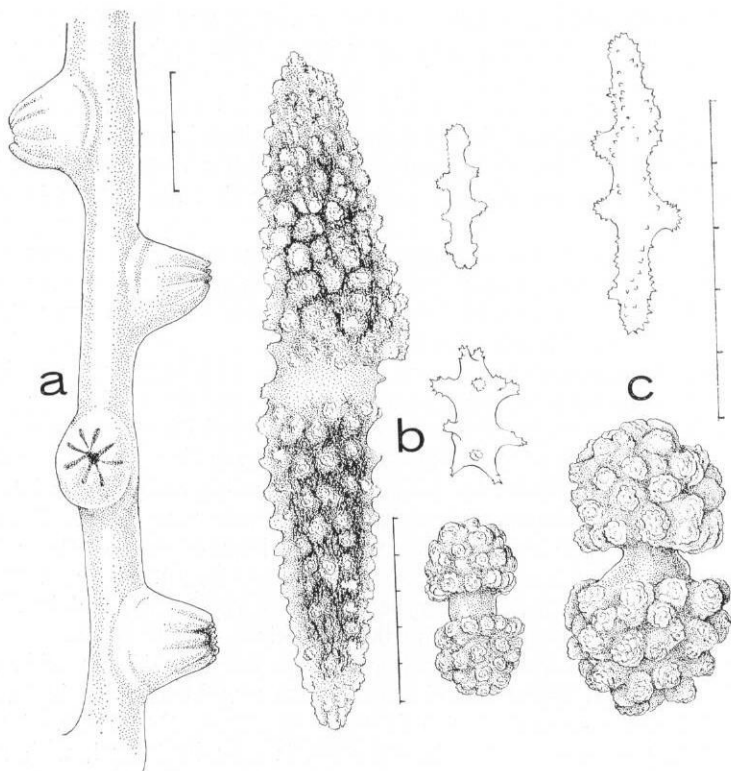


FIGURE 3. *Nicella goreau*, sp. nov., holotype (USNM 53124): a, part of terminal branch (scale represents 1 mm); b, calycular double rod, cortical double head, and pharyngeal spicules (scale represents 0.05 mm); c, cortical double head and pharyngeal rod at higher magnification (scale represents 0.05 mm). Original drawings by the author.

calcareous structure and the flattening of the double heads to a marked degree (Fig. 5), and most of the calycular double rods are compressed and strongly tapered (Fig. 5,a), but a few are broad and flat (Fig. 5,b).

In the holotype (USNM 53124), the loose structure is most evident in the calycular double rods and in the smaller cortical double heads (Fig. 2,j), whereas it is only moderately expressed in the larger double heads (Fig. 2,f-h). The latter are only weakly compressed, and this can be observed only by carefully observing them as they roll around in a wet preparation. The calycular double rods are compressed, moderately tapered (Fig. 2,b,c), commonly oblique (Fig. 2,a), sometimes with one end asymmetrically pointed (Fig. 2,d).

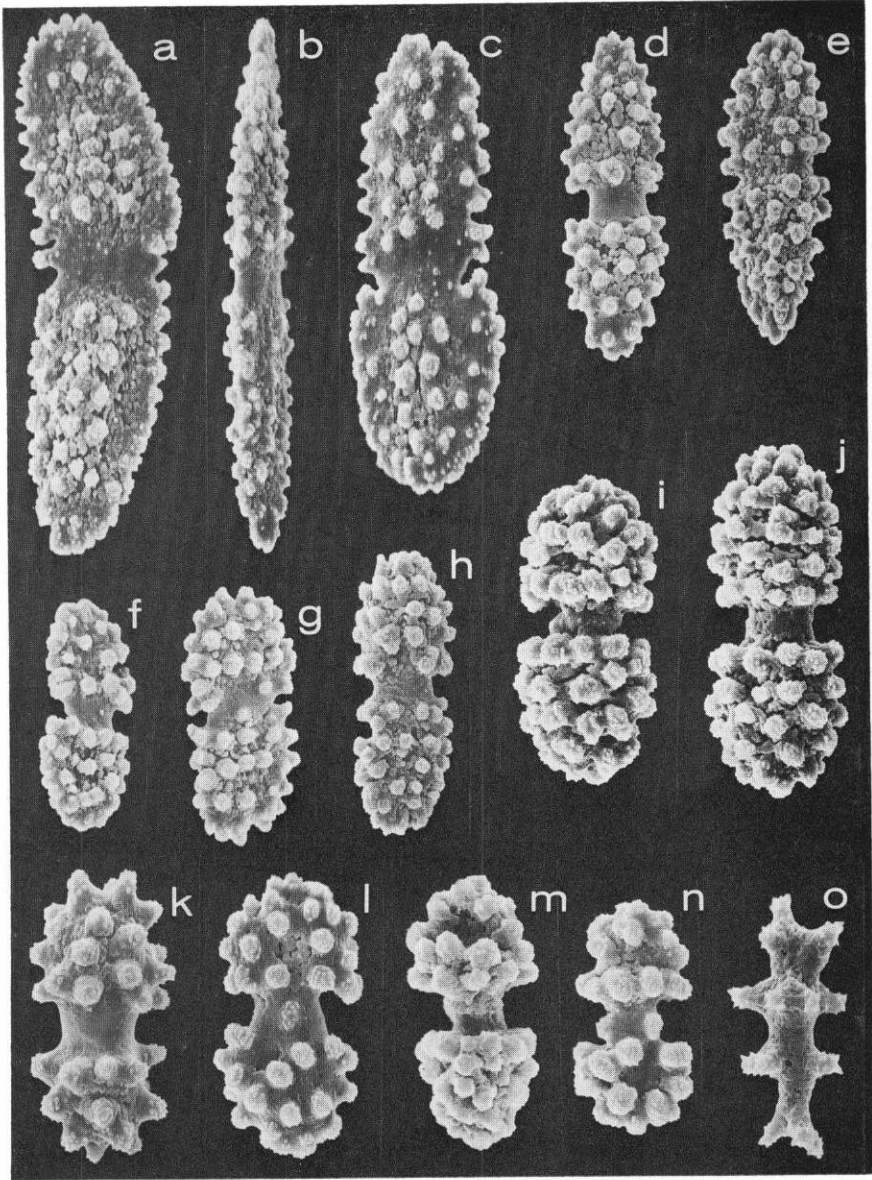


FIGURE 4. *Nicella goreai*, sp. nov., paratype (USNM 53122) from Discovery Bay, Jamaica. Magnifications: a-h, $\times 500$; i, m, $\times 1000$; j-l, n, o, $\times 750$. SEM photographs by W. R. Brown, Smithsonian Institution.

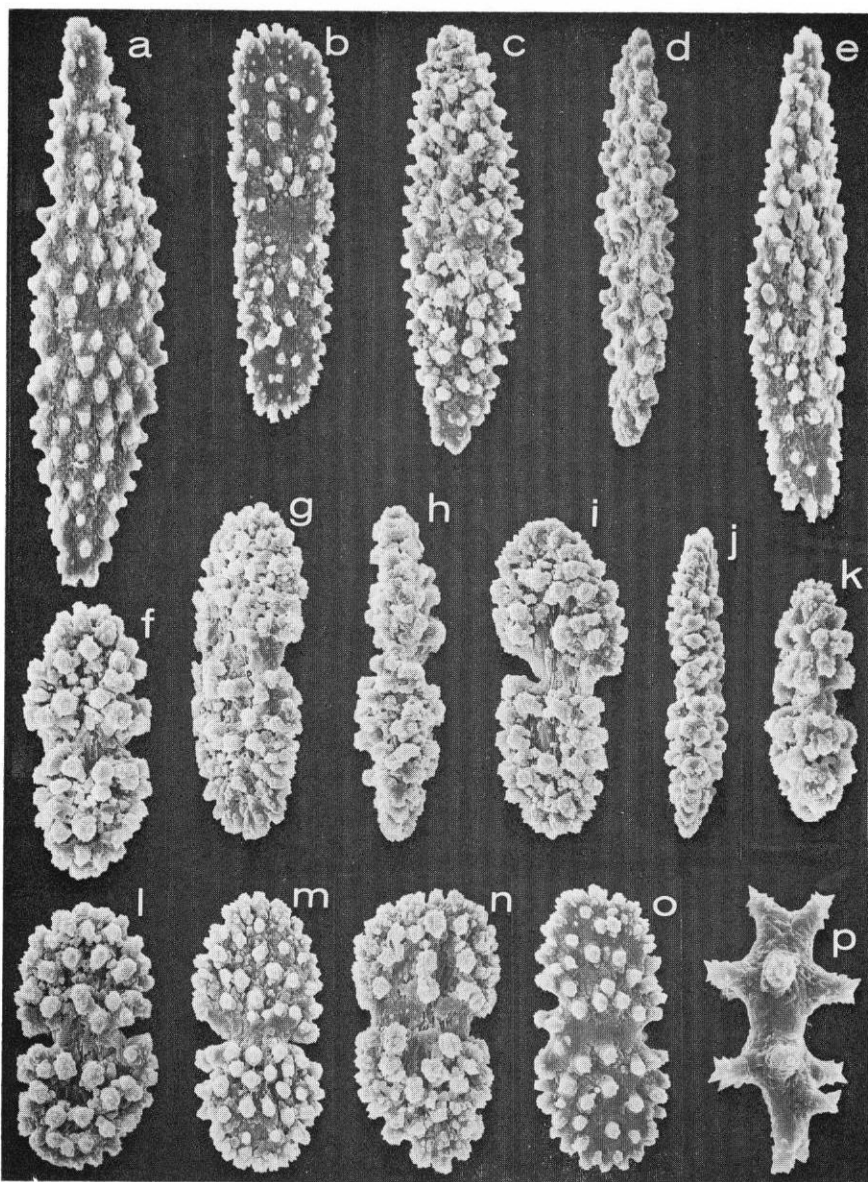


FIGURE 5. *Nicella goreau*, sp. nov., paratype (USNM 53100) from Gulf of Uraba. Magnifications: a-e, m, o, $\times 500$; f-l, n, $\times 750$; p, $\times 1000$. SEM photographs by W. R. Brown, Smithsonian Institution.

In USNM 53122 from Jamaica, the loose calcareous structure is distinct but not so pronounced as in USNM 53100, the calycular double rods are blunt, strongly flattened and commonly slipper-shaped (Fig. 4,a-c), and the cortical double heads (Fig. 4,f-n) are moderately compressed.

Toward the one extreme in variation, some colonies have calycular rods even larger and flatter than in USNM 53122, actually scalelike, and, toward the other extreme, some have only weakly compressed rods that are even less clearly differentiated from the cortical double heads than in USNM 53100. At present, it is impossible to distinguish any clear lines of separation among the numerous variations included in this collection, all of which seem to represent a single variable species inhabiting depths between 45 and 200 m, mostly shallower than 150 m.

SUMARIO

UN NUEVO GORGONÁCEO OCTOCORALINO DE JAMAICA

Se describe una nueva especie del gorgonáceo *Nicella* procedente de habitats de corales profundos a lo largo de la costa de Jamaica y otras áreas del Caribe y se le llama *N. goreaui* por su descubridor. Se compara con otras especies conocidas de *Nicella* del Atlántico Occidental y los caracteres de las espículas son ilustrados mediante micrográficos electrónicos ("scanning") así como con dibujos.

LITERATURE CITED

- BAYER, FREDERICK M.
 1959. Octocorals from Surinam and the adjacent coasts of South America. *Stud. Fauna Suriname*, 3(6): 1-43, figs. 1-21.
 1960. The Ellisellidae (Octocorallia) and their bearing on the zoogeography of the eastern Pacific. *Proc. biol. Soc. Wash.*, 73: 175-182, figs. 1-2.
 1961. The shallow-water Octocorallia of the West Indian region. *Stud. Fauna Curaçao*, 12(55): 1-373, figs. 1-101, pls. 1-27.
- DEICHMANN, ELISABETH
 1936. The Alcyonaria of the western part of the Atlantic Ocean. *Mem. Mus. comp. Zool. Harv.*, 53: 1-317, pls. 1-37.
- GRASSHOFF, MANFRED
 1972. Die Gorgonaria des östlichen Nordatlantik und des Mittelmeeres. I. Die Familie Ellisellidae (Cnidaria: Anthozoa). "Meteor" *Forsch.-Ergebnisse (D)*, No. 10: 73-87, figs. 1-9.
- GRAY, JOHN EDWARD
 1870. Catalogue of lithophytes or stony corals in the collection of the British Museum. *British Museum, London*, pp. 1-51, ill.
- KORNERUP, A. AND J. H. WANSCHER
 1961. *Reinhold Color Atlas*. Reinhold Publishing Co., New York, pp. 1-224, 30 pls.
- KÜKENTHAL, WILLY
 1924. Gorgonaria. *Das Tierreich*, 47: i-xxviii + 1-478, figs. 1-209.
- SIMPSON, JAMES J.
 1910. A revision of the Gorgonellidae. I. The Juncellid Group. *Proc. R. Ir. Acad., Ser. B*, 28(7): 247-386, pls. 1-19.

TIXIER-DURIVALT, ANDRÉE

1966. Octocoralliaires de Madagascar et des îles avoisinantes. Faune Madagascar, 21: 1-456, figs. 1-399.

TOEPLITZ, CHARLOTTE MATTHES

1929. Die Gorgonarien Westindiens. 7. Die Familie Gorgonellidae, zugleich eine Revision. Zool. Jb. (Suppl.), 16(2): 235-376, figs. 1-26, pls. 6-7.