A NEW SPECIES OF THE OCTOCORALLIAN GENUS PARAGORGIA TRAWLED IN FLORIDA WATERS BY R.V. "GERDA"

by

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The genus *Paragorgia* was established by Milne Edwards & Haime in 1857 to receive the large, boreal scleraxonian octocoral from the "Norwegian Ocean", called *Alcyonium arboreum* by Linnaeus (1758). In subsequent years, that species was reported also from localities in the northern Pacific Ocean (Kinoshita, 1913; Hickson, 1915) and from high southern latitudes off the Falkland Islands (Broch, 1957). In 1883, Koren & Danielssen described two new species from Batalden, Norway, *Paragorgia nodosa* and *Briareum frielei,* which generally have been treated as synonyms of *P. arborea.* Nutting (1908, 1912), however, reported *P. nodosa* from deep waters off Hawaii and Japan and, furthermore, established a new Japanese species, *Paragorgia regalis.* Kinoshita (1913) also reported *P. nodosa* from Japan and proposed two more new species from that area, *P. granulosa* and *P. tenuis.*

The first record of the genus *Paragorgia* from tropical waters was established by Thomson & Henderson (1906) for specimens which they called *Paragorgia splendens,* collected in the Indian Ocean by the "Investigator". Nutting (1911) and Stiasny (1937) reported the same species, probably in error, from deep water off the Sulu Islands.

In 1956, I suggested that Nutting's (1908) record of *P. nodosa* from Hawaii was incorrect and established his material as a new species, *P. dendroides.* Although it is definitely not the same as *P. nodosa* from Norwegian waters, I now am inclined to believe that *P. dendroides* belongs to the species that Nutting called *P. regalis* from Japan.

Since *Paragorgia arborea* and related forms have been collected repeatedly in cold, northern waters, but only a few records of the genus are known from tropical localities, it appears that *Paragorgia* is primarily a boreal genus which becomes rather scarce as it descends into the deeper, cool waters towards the tropics. It therefore is of no little interest that trawling ope-

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rations conducted by the Institute of Marine Science, University of Miami, aboard the R. V. "Gerda" obtained a fine specimen of *Paragorgia* from the Straits of Florida, a general area that was explored rather extensively in years past by the well-known steamers "Blake", "Albatross" and others. This represents the first record of the genus from the tropical western Atlantic.

It gives me a great deal of pleasure to report this interesting discovery in this volume of scientific contributions honoring Dr. H. Boschma, Emeritus Director of the Rijksmuseum van Natuurlijke Historie, Leiden, and Professor of Leiden University.

The specimens described in these pages were obtained, along with many others, with the help of Grant G-20355 from the National Science Foundation (U.S.A.) in support of deep-water biological operations of R. V. "Gerda". I also acknowledge with gratitude the skilled seamanship of Cdr. William Dickinson and the crew of R. V. "Gerda", as well as the efforts of the scientific field parties, without whose help this paper could not be written.

PARAGORGIIDAE Kükenthal

Paragorgia Milne Edwards & Haime, 1857

Paragorgia boschmai sp. nov. (figs. 1-3)

Material examined. — Holotype. Straits of Florida between the coast of Florida and the Little Bahama Bank, 40 miles East of Hobe Sound, Palm Beach County, Florida, 27° 01′ North 79° 21.5′ West, 285-300 fathoms; otter trawl; R. V. "Gerda", haul G-169, 29 June 1963.

Also one complete small colony 50 mm high, with 3 branches; from the same haul.

Description. — The type-specimen is a colony 250 mm tall, without base of attachment. Although five small, lateral branchlets arise from the zigzag main stem within its first 80 mm, the first major bifurcation of the trunk occurs at a height of 115 mm. Branching proceeds thereafter in an irregularly dichotomous sequence, roughly in one plane although the entire colony is curved (fig. 1).

The autozooids are clustered in distinct nodes distributed over the convex face of the colony; the siphonozooids are closely grouped around the autozooid clusters and openly scattered over the general surface of the coenenchyme. The autozooid clusters are usually rounded and about 5 mm in diameter, but some of those on the larger branches are transversely elongated and may be 10 mm or more in greater diameter. The terminal twigs are more or less crooked and always conspicuously clavate. The shortest are about 10 mm long and consist of a single terminal cluster of autozooids borne on a narrow stalk 2.5 to 3.0 mm in diameter; the longer ones may

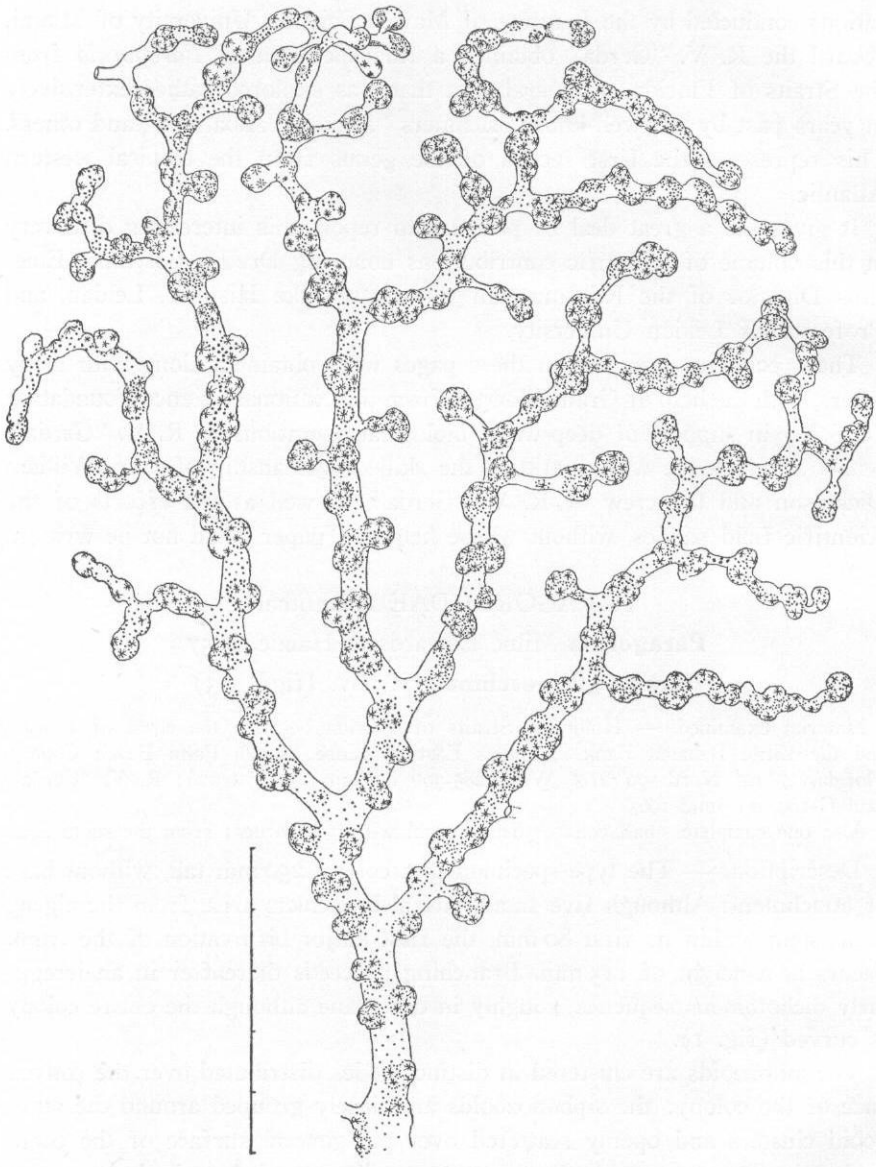

Fig. 1. *Paragorgia boschmai* sp. nov., the type specimen, showing manner of branching and distribution of autozooid clusters. The unbranched, proximal portion of the main trunk is not shown. The scale represents 50 mm.

reach a length of 55 mm and bear 8 or 10 larger and smaller autozooid clusters. The main stem is oval, 7.5 × 9.5 mm in diameter.

The thin, red, outer layer of cortex is separated from the underlying medulla by a network of small solenia. The major longitudinal stem canals, which originate from the gastrovascular cavities of the autozooids, lie near the center of the branches and pierce the medulla all the way to the base. Each of the canals is surrounded by a transparent layer of mesogloea lacking spicules, and then by a zone of colorless medullar spicules which grows thicker in the lower parts of the colony until, in the main stem, virtually the whole medulla is white; only a few strands of reddish spicules extend here and there, especially in the vicinity of the largest canals clustered somewhat off center toward the middle of the medulla.

Spicules. — Anthocodial spicules. The proximal part of the anthocodia is free of spicules, forming a flexible neck-zone. Above this, on the bases of the tentacles, spicules are aranged in eight interseptal tracts which continue upward along the backs of the tentacles as tapering bands; no spicules extend from these bands into the pinnules. The proximal spicules in the interseptal tracts are blunt rods 0.06 to 0.07 mm long, with two whorls of three short processes, and are thus derived from the octoradiate type of sclerite; distad along the tentacles the spicules become more slender and irregularly sculptured (fig. 2a). In the pharyngeal walls there are slender, spiny rods 0.06 to 0.08 mm in length (fig. 2b).

Cortical spicules. The thin layer of dermal cortex lying outside the superficial solenial network contains radiate sclerites with 6, 7, and 8 rays. Octoradiates predominate, and commonly measure 0.065 mm in length by 0.035 to 0.04 mm in width, although a few attain a length of 0.10 to 0.11 mm and a width of 0.045 mm. These spicules consist of a rod-like main axis, blunt at each end, girdled by two whorls of three blunt processes set with the rays alternating (fig. 2e). Septemradiates, in which one terminal process of the long axis is missing (fig. 2d), are much less abundant than the octoradiates. They have a length of 0.055 to 0.07 mm. Sexradiates, lacking both terminal processes of the main axis (fig. 2c), are quite scarce. They may measure as much as 0.06 mm in length but usually are 0.05 mm or less.

The radiate sclerites of the outermost cortex continue onto the autozooid calyces where, however, their rays are more conspicuously expanded terminally. As in the cortex proper, the 8-radiates predominate (fig. 2h), the 7's are less common (fig. 2g) and the 6's are scarce (fig. 2f). In the calyces there is an intermediate layer of red spicules lying beneath the superficial layer and separating it from the deeper medulla. In this layer the 8-radiates become rather large, up to 0.1 to 0.12 mm in length (fig. 2i), and spicules like those of the medulla make their appearance (fig. 3a).

Medullar spicules. The axial cylinder lying within the solenial network

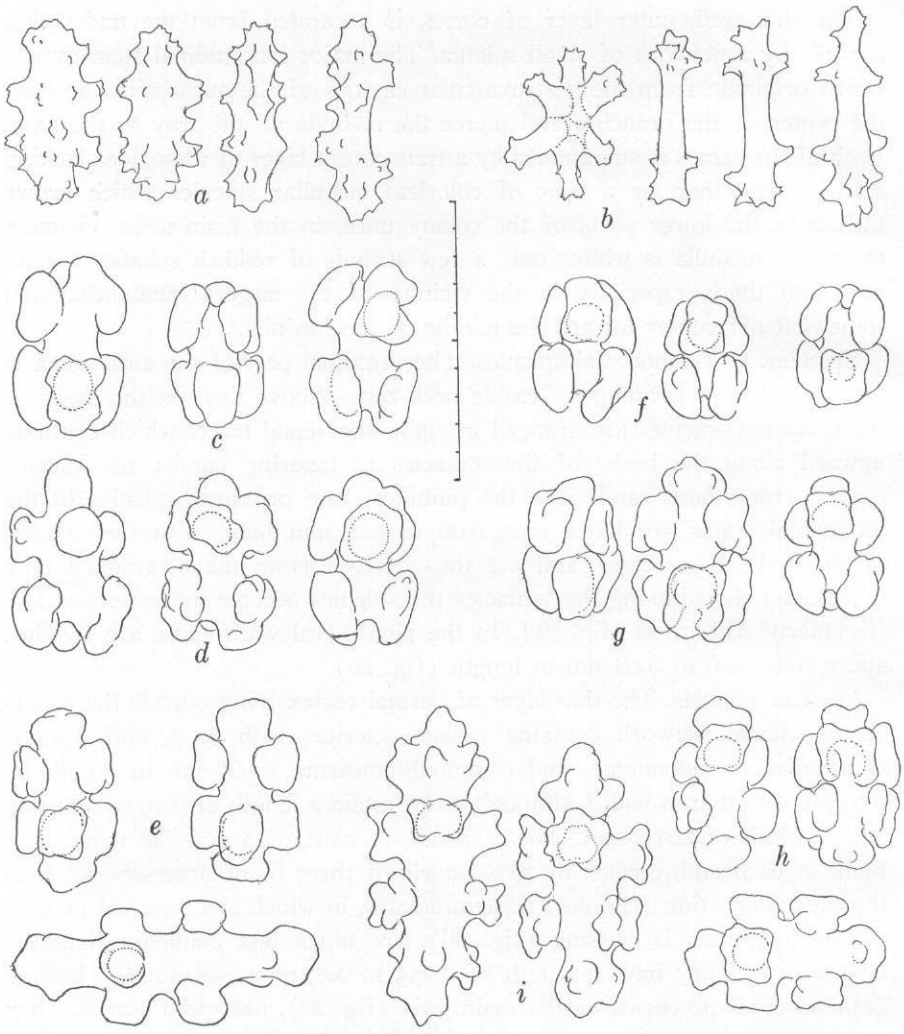

Fig. 2. *Paragorgia boschmai* sp. nov., spicules. a, from the interseptal tracts of the anthocodiae; b, from the pharyngeal region of the autozooid; c, 6-radiates of outermost cortex; d, 7-radiates of outermost cortex; e, 8-radiates of outermost cortex; f, 6-radiates of calyx wall; g, 7-radiates of calyx wall; h, 8-radiates from calyx wall; i, long 8-radiates of calyx wall. Scale represents 0.1 mm.

contains both pink and colorless sclerites. Toward the branch tips, the stem canals are surrounded by a zone of colorless spicules embedded in pink medulla. In the thicker parts of the branches and in the main stem, the medulla contains predominantly colorless spicules, the pink ones forming

only scattered strands here and there. The colorless forms are irregularly branched rods, sometimes with 3 branches at each end (fig. 3c). These spicules reach a length of 0.38 mm but usually are much broken in preparations. The pink medullar sclerites (fig. 3b) are like those of the inner walls of the calyces, and there also are a number of cortical radiates.

Comparisons. — *Paragorgia boschmai* sp. nov. is not unlike the Pacific *Paragorgia regalis* Nutting in general appearance. However, the autozooid clusters in that species are rather diffuse and calyces appear along the branches between them, which accordingly are considerably thicker than in

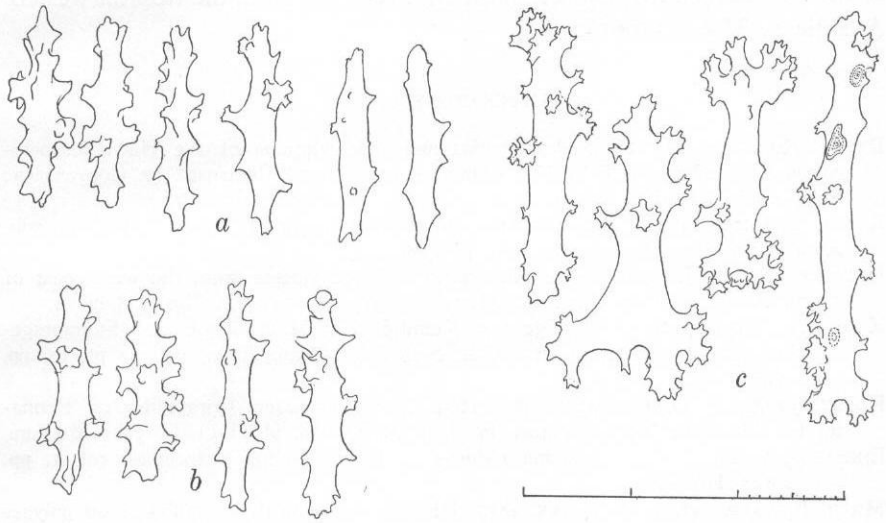

Fig. 3. *Paragorgia boschmai* sp. nov., spicules. a, from inner layer of calyx wall; b, from pink areas of medulla; c, from white areas of medulla. Scale represents 0.3 mm.

the present case. The spicules of the two species are quite similar, but the anthocodial rods in *P. regalis* are much larger and the medullar rods are rather uniformly spinose instead of irregularly branched.

Associated fauna. — The haul from which these specimens came was one of several made in the northern Straits of Florida which contained chiefly sessile organisms, such as sponges, hydroids, gorgonians and crinoids, but very few mollusks, crustaceans, fishes and other active animals. This sort of community is typical of rough ground, and the absence of the actively swimming and crawling types probably indicates that they were able to elude the net by retreating into crevices and irregularities of the bottom rather than that they do not inhabit a dense sponge-gorgonian-crinoid community.

The other gorgonians obtained along with *Paragorgia boschmai* in haul G-169 included the common *Swiftia casta* (Verrill) [many colonies], *Acanthogorgia schrammi* (Duchassaing & Michelotti) [4 colonies], *Acanthogorgia aspera* Pourtalès [2 colonies], *Plumarella pourtalesii* (Verrill) [many], *Stenella imbricata* (Johnson) [2 colonies much broken in the trawl], an undescribed species of *Calyptrophora* of the *japonica* group, hitherto unreported from the Atlantic [1 colony], and a new species of *Corallium,* the first authentic discovery of the genus in the western Atlantic.

Attached to the base of one of the colonies of *Stenella* are three specimens of the Scyphozoan *Stephanoscyphus,* first reported from the tropical western Atlantic by Moore (1961).

Literature cited

Bayer, Frederick M., 1956. Descriptions and redescriptions of the Hawaiian octocorals collected by the U.S. Fish Commission steamer "Albatross". (2. Gorgonacea: Scleraxonia). Pacific Science, vol. 10 pt. 1, pp. 67-95, figs. 1-11.

Broch, Hjalmar, 1957. The northern octocoral, Paragorgia arborea (L.), in sub-Antarctic waters. Nature, vol. 179, p. 1356.

Hickson, Sydney J., 1915. Some Alcyonaria and a Stylaster from the west coast of North America. Proc. Zool. Soc. London, 1915, pp. 541-557, figs. 1-5, pl. 1.

Kinoshita, Kumao, 1913. Beiträge zur Kenntnis der Morphologie und Stammesgeschichte der Gorgoniden. Journ. Coll. Sci. Tokyo Imp. Univ., vol. 32 pt. 10, pp. 1-50, figs. 1-13.

Koren, Johan & D. C. Danielssen, 1883. Nye Alcyonider, Gorgonider og Pennatulider tilhørende Norges Fauna, pp. i, ii, i-xvi, 1-38, pls. 1-13. Bergens Museum.

Linnaeus, Carolus, 1758. Systema naturae ... Editio decima, reformata, vol. 1, pp. i-iv, 1-824. Holmiae.

Milne Edwards, H. & J. Haime, 1857. Histoire naturelle des coralliaires ou polypes proprement dits, vol. 1, pp. i-xxxiv, 1-326. Atlas of 42 pls. Paris.

Moore, Donald R., 1961. The occurrence of Stephanoscyphus corniformis Komai (Scyphozoa) in the western Atlantic. Bull. Mar. Sci. Gulf & Carib., vol. 11 pt. 2, pp. 319-320.

Nutting, Charles Cleveland, 1908. Descriptions of the Alcyonaria collected by the U.S. Bureau of Fisheries steamer Albatross in the vicinity of the Hawaiian Islands in 1902. Proc. U.S. Nat. Mus., vol. 34, pp. 543-601, pls. 41-51.

——, 1911, The Gorgonacea of the Siboga Expedition. VIII. The Scleraxonia. Siboga-Exped. Monogr. 13b^5, pp. 1-62, pls. 1-12.

——, 1912. Descriptions of the Alcyonaria collected by the U.S. Fisheries steamer Albatross, mainly in Japanese waters, during 1906. Proc. U.S. Nat. Mus., vol. 43, pp. 1-104, pls. 1-21.

Stiasny, Gustav, 1937. Die Gorgonacea der Siboga-Expedition. Suppl. II. Revision der Scleraxonia mit Ausschluss der Melitodidae und Coralliidae. Siboga-Exped. Monogr. 13b^8, pp. i-vi, 1-138, text figs. 1-38, pls. 1-8.

Thomson, J. Arthur & W. D. Henderson, 1906. An account of the Alcyonarians collected by the Royal Indian Marine Survey Ship Investigator in the Indian Ocean. Part I. The alcyonarians of the deep sea, pp. i-xvi, 1-132, pls. 1-10. Indian Museum, Calcutta.