

A NEW BLACK CORAL (ANTHOZOA: ANTIPATHARIA) FROM A REEF WALL ENVIRONMENT IN JAMAICA

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ABSTRACT

A new species of antipatharian coral is described from Jamaica. *Antipathes rubusiformis* forms sprawling colonies, which spread sideways beneath overhangs on steep cliffs below 20 m depth. Colonies are attached by multiple holdfasts that develop at the tips of recurved branches where they contact the substratum. Branches are thin, often curved and set at wide angles; branching is irregular. Axial spines are triangular, compressed, and finely papillose on the upper third of their surface. The species resembles *Antipathes lenta*, Pourtalès (1871), from which it differs by having longer, papillose spines and less regular branching, and *Antipathes umbratica* Opresko (1996), which forms more robust colonies with a single holdfast and longer spines.

Vertical environments and overhangs on deep (> 20 m) coral reef escarpments are characterized by reduced light intensities and a rich encrusting biota of bryozoans, sponges, and crustose algae (Jackson and Winston, 1982). In the Caribbean, typical fan-shaped or tree-like antipatharian colonies of species such as *Antipathes atlantica* Gray and *Antipathes caribbeana* Opresko project outwards into the water column from such near-vertical substrata, presumably to maximize suspension feeding opportunities by exposure to mainstream currents (Warner, 1981). Their only connection with the substratum is at a single large holdfast. The unusual feature of the new species described here is that it has a much closer association with the encrusting biota. It grows sideways rather than growing out into the mainstream flow, and clings to the substratum by means of many small holdfasts instead of by one large one. In this respect it resembles a scrambling terrestrial plant, such as a blackberry or bramble, rather than a typical black coral.

RESULTS

Order Antipatharia

Family Antipathidae

Genus *Antipathes* Pallas

***Antipathes rubusiformis* new species**

(Figs. 1–5)

Material.—Holotype: BMNH 2000.1844, Jamaica, Rio Bueno. Paratypes: BMNH 2000.1845–6, Jamaica, Rio Bueno.

Other Material Examined.—Fifteen specimens from Rio Bueno, Jamaica; one specimen from Runaway Bay, Jamaica. Close-up underwater photographs from Rio Bueno, Jamaica. All collected by GFW at about 25 m.

Diagnosis.—Colony low and spreading, with many flattened, disc-shaped holdfasts developing at the tips of branches that come into contact with the substratum (Figs. 1,2). Found attached to under-surface of overhangs where it forms patches 3–7 cm high and up



Figure 1. Holotype of *Antipathes rubusiformis* (fixed specimen, photographed in air), showing several holdfasts facing upwards as they would do in life. The colony is 13 cm long and the large, central object is a piece of encrusting bryozoan.

to 50 cm across. Branching to fifth order or more, with only slight change in branch diameter. Stems and branches narrow, rarely more than 0.6 mm in diameter. Branches extending in all directions up to several cm apart, but occasionally uniserially arranged, with three or four branches in a row 5–15 mm apart and often curved upward towards the under-surface of the overhang. Branch angles usually close to 90°. Unbranched, terminal branches up to 15 cm in length, more commonly 3–7 cm from base to tip. Anastomosis between branches occurs but is not frequent.

Spines mostly in 5–7 longitudinal rows (as seen from one view), 0.3–0.4 mm apart, with ca. 29 spines per centimeter in each row (Fig. 3). Spines triangular, compressed, and finely papillose on the upper half of surface (Fig. 4), mean length 0.08 mm from middle of base to apex (range 0.05–0.11 mm); longer spines located on polypar side of axis (Fig. 3).

Polyps 0.5–1.0 mm in transverse diameter, typically near the upper end of this range with small polyps sometimes occurring between larger ones (Fig. 5). Polyps arranged in a single series, 0.3–0.8 mm apart, with seven or eight polyps per centimeter. In life, polyps and tissue yellowish, tentacles in fully expanded state, up to 3.5 mm long.

Description of the Holotype.—The holotype is a relatively small colony, approximately 13 cm long and 7 × 7 cm wide (Fig. 1). There is no clearly defined stem; the thickest branch is 0.45 mm in diameter, and there are six holdfasts present. Sub-branches develop on all sides of the lower order branches, although in places several adjacent ones develop on the same side. They are spaced varied distances apart, from opposite to as much as 2.4 cm, but most are 9–15 mm apart. The branch angles are generally close to 90°, with a range from about 75–105°. Several unbranched branches are ≥ 2 cm long. The spines are

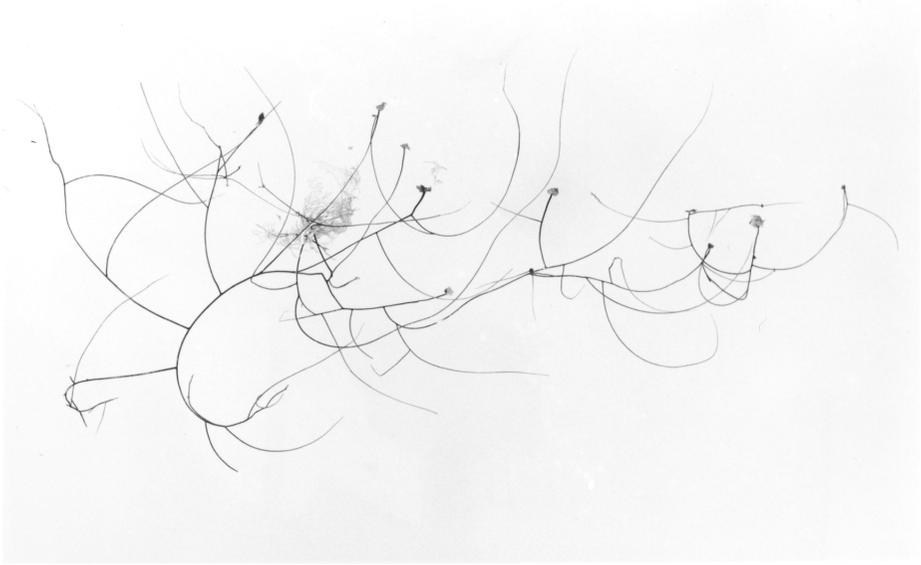


Figure 2. A relatively large (23 cm long) dried corallum of *Antipathes rubusiformis*, showing continued, irregular, wide-angled branching, curving branches and numerous holdfasts facing upwards as they would do in life.

triangular, laterally compressed, papillose, and unequally developed around the circumference of the axis. They are 0.07–0.10 mm tall on the polypar side of the axis and 0.05–0.06 mm on the abpolypar side. They are arranged in 5–7 longitudinal rows (seen in one lateral view) on axes of 0.1–0.4 mm in diameter. The distance between adjacent spines in one row ranges from about 0.2–0.4 mm. The small papillae that are found on the surface of the spines tend to be confined to the upper half. Spines on younger and narrower branches tend to have fewer and more widely spaced papillae than those on the larger branches where the papillae are larger and more crowded.

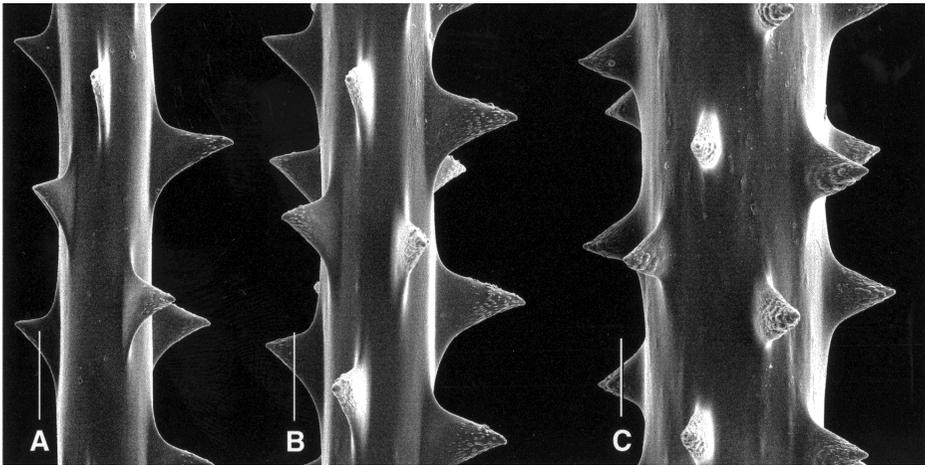


Figure 3. A–C, scanning electron micrographs of representative branches of *Antipathes rubusiformis*, showing the arrangement of spines. In A and B, the larger, polypar spines are to the right. Scale bar = 100 μm .

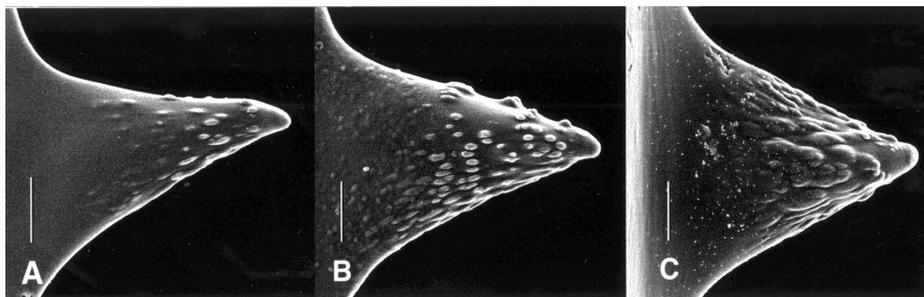


Figure 4. A–C, scanning electron micrographs of spines of *Antipathes rubusiformis*, from the branches shown in Figure 3. Scale bar = 20 μ m.

The polyps are slightly elongated in a transverse direction. When preserved they measure 0.5–0.9 mm in transverse diameter (from the distal side of the base of the distal lateral tentacles to the proximal side of the base of the proximal lateral tentacles). The interpolyar space is quite variable in length, 0.3–0.8 mm, depending on the state of contraction of the neighboring polyps. Polyps are arranged in a single series, usually with seven (rarely eight) polyps per centimeter. Tentacles are about 0.35 mm long.

Intraspecific Variation.—All of the colonies referred to as this species have a similar growth form and all were collected from the undersides of overhangs. An individual colony, as described here, refers to that portion that could be detached from the substratum as a single interconnected unit. Since the branches are thin and easily broken, it is likely that many (perhaps all) of the collected colonies are not entire and that some parts were left behind on the substratum. A relatively large specimen is shown in Figure 2. Apart from the holotype, 17 other colonies were examined. As a consequence of variable colony size, holdfast number also varied from 1–15 per colony, with a mean of six per colony. Holdfasts were irregularly disc-shaped and varied in maximum diameter from 1.05–4.47 mm with a mean of 2.65 mm ($n = 36$). Maximum branch diameters varied from 0.23–0.66 mm with a mean of 0.42 mm and maximum spine length varied from 0.082–0.118 mm with a mean of 0.10 mm. Distances between adjacent spines were rather variable from 0.18–0.47 mm, but often about 0.30 mm. There were no clear differences in spine dimensions when comparing thicker and thinner branches except that spines were smaller with fewer papillae at the very tips of thin, apparently actively growing branches. The number of polyps per centimeter was found to be fairly consistent at 7.5.

Remarks.—*Antipathes rubusiformis*, n. sp. resembles two other West Indian species, *Antipathes lenta* Pourtalès, 1871 and *Antipathes umbratica* Opresko, 1996. Both *A. rubusiformis* and *A. lenta* species have thin and irregularly branched colonies, with relatively widely spaced branches. The type of *A. lenta* was redescribed by Opresko (1972). It consists of only a few small branches, consequently, the overall growth form of the corallum could not be identified; however, there are several features by which the species can be distinguished from *A. rubusiformis*. In the type material of *A. lenta* the branches tend to lie in one plane, and the branch angles are usually around 45°; the spines are 0.06–0.07 mm tall, approximately equal around the circumference of the axis, and have a smooth surface. In *A. rubusiformis*, the spines are 0.05–0.10 mm tall, unequal around the circumference, and have a distinctly papillose surface. The differences between *A. rubusiformis* and *A. umbratica* lie primarily in the thickness of the branches and the size of the spines.

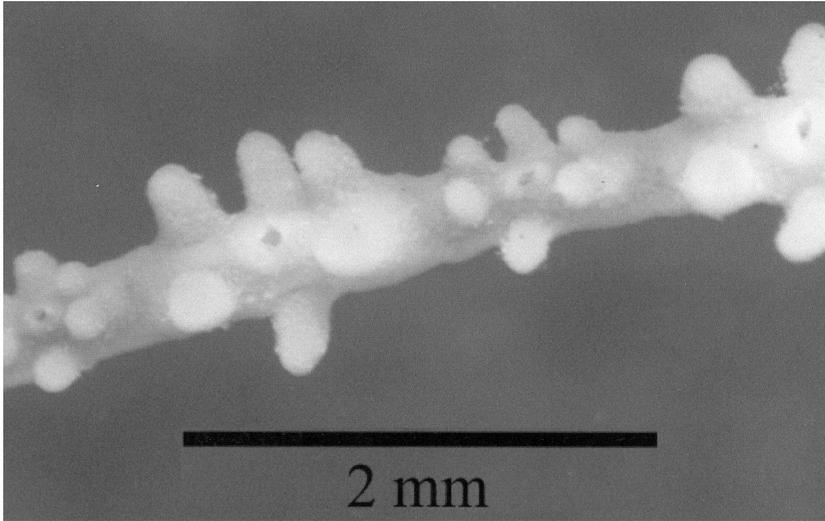


Figure 5. Fixed specimen of a branch of *Antipathes rubusiformis*, showing the polyps in a single line, on one side of the branch only.

In *A. umbratica* the lower order branches have a diameter of ≥ 1 mm (Opresko, 1996), whereas in *A. rubusiformis* the largest branches are generally not more than 0.6 mm. In *A. umbratica* the polypar spines usually exceed 0.14 mm and may be up to 0.24 mm; whereas, in *A. rubusiformis* the spines are only rarely longer than 0.1 mm. In addition, *A. umbratica* has one holdfast per colony while *A. rubusiformis* has several.

Etymology.—From *rubus*, blackberry, and *formis*, in the form of, in reference to the bramble-like growth form of the corallum.

Distribution.—Known only from Jamaica, where it is restricted to the reef wall habitat at 20+ m deep. Like other Caribbean antipatharians it may be widespread in the region within this habitat.

Ecological Observations.—Colonies were common on steep cliffs (reef walls) below about 20 m deep and were usually found beneath overhangs that faced open water, i.e., not in caves, clefts, or confined spaces. The angle which these overhangs made with the vertical was measured (using a plumb line and a slate) on nine overhangs at Rio Bueno on which *A. rubusiformis* was growing. This angle varied from 45° (a slight overhang) to 125° (the undersurface was angled towards the cliff) with a mean of 76°. In living colonies, the polyps all faced away from the undersurface of the overhang. Such polyps normally showed extended tentacles typically about 1.5 mm long, but occasionally up to 3.5 mm long.

Thirty-six holdfasts were detached from freshly collected colonies, preserved, and later examined for interactions with the substrate biota. Identifiable traces of the substrate to which the holdfast had been attached were present on the (proximal) under sides of the holdfasts on 14 occasions. Serpulid tubes were present beneath eight holdfasts, once in combination with crustose coralline algae and once with sponge. Crustose coralline algae were present under six holdfasts and scleractinian coral was present beneath one. Twenty-one of the holdfasts had antipatharian tissue, often including polyps, on the distal (upper) side of the holdfast, sometimes completely covering it. On nine occasions, this tissue

extended onto the proximal surface and in three cases it was clear that the holdfast had become detached prior to collection since antipatharian tissue covered all of it. Several holdfasts showed recent growth of a secondary stem or branch, sometimes leading to another holdfast. Many of the holdfasts showed overgrowth by other biota, which occasionally extended up the stem, replacing the antipatharian tissue. Crustose coralline algae were the most frequent overgrowers, but sponges, bryozoans, filamentous algae, and mud tubes were also occasionally present. Clearly the process of attachment by adventitious holdfasts is not always successful, and if achieved, may sometimes result in invasion from the substratum by other sessile biota.

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LITERATURE CITED

- Jackson, J. B. C. and J. E. Winston. 1982. Ecology of cryptic coral reef communities. I. Distribution and abundance of major groups of organisms. *J. Exp. Mar. Biol. Ecol.* 57: 135–147.
- Opresko, D. M. 1972. Redescriptions and reevaluations of the antipatharians described by L.F. de Pourtalès. *Bull. Mar. Sci.* 22: 950–1017.
- _____. 1996. New species of black coral (Cnidaria: Anthozoa: Antipatharia) from the Caribbean. *Bull. Mar. Sci.* 58: 289–300.
- Portalès, L. F. de 1871. Deep-sea corals. III. *Cat. Mus. comp. Zool.* 4: 93 p.
- Warner, G. F. 1981. Species descriptions and ecological observations of black corals (Antipatharia) from Trinidad. *Bull. Mar. Sci.* 31: 147–163.

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