**Distichopora robusta** sp. nov., the first shallow-water stylasterid (Cnidaria: Hydrozoa: Stylasteridae) from the tropical eastern Pacific

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Distichopora robusta, the first shallow-water stylasterid coral from the tropical eastern Pacific, is described from the west coast of Panama. The new species is distinguished from all species of Distichopora described thus far by having robust branches and poorly defined pore rows.

**INTRODUCTION**

Stylasterid corals comprise about 250 species, making them the second largest group of calcified cnidarians, only the Scleractinia having more species (i.e. 1500; Cairns, 1999; Cairns et al., 1999). They are distributed worldwide in both deep and shallow-water marine environments, but most species occur in water depths of 200–500 m (Cairns, 1984, 1992). Among the tropical shallow-water species, currently assigned to either Stylaster or Distichopora, most form branching, fan-like colonies 5 to 25 cm tall and are remarkable for their bright colours, including violet, red, yellow and orange. These shallow-water species are abundant mostly in the Indo-West Pacific, with only two species—Stylaster blatteus (Boschma, 1961) and Stylaster roseus (Greeff, 1886)—occurring in the eastern Atlantic and a single species—Stylaster roseus (Pallas, 1766)—found in the western Atlantic.

The first descriptions of shallow-water stylasterids were those of the western Atlantic Stylaster roseus and the Indo-Pacific Distichopora violacea (Pallas, 1766). Subsequently, about a dozen additional shallow-water species of Distichopora were described for the Indo-West Pacific. This number was greatly reduced by Boschma (1959), who recognized only four valid shallow, Indo-Pacific species of Distichopora (plus two doubtful species). The most widespread of these is D. violacea, ranging from the Red Sea, Seychelles, East Africa, through the Indian Ocean to the central Pacific. Thus far, only for the eastern Pacific have tropical shallow-water stylasterid corals not been described.

Here, we describe *Distichopora robusta* sp. nov., the first tropical shallow-water stylasterid coral from the eastern Pacific. Collected off the coast of Panama, this new species has robust branches and lacks well-developed pore rows, the latter feature traditionally considered as the most important diagnostic characteristic of Distichopora (Cairns, 1983).

**MATERIALS AND METHODS**

Colonies of *Distichopora robusta* sp. nov. were collected at depths of 5 to 25 m on the south side of Isla Jicarita, Gulf of Chiriqui, western coast of Panama. Colonies were preserved in 95% ethanol or kept dried, and were studied using methodology as described by Cairns (1983). The abbreviations used are: MZUSP (Museu de Zoologia da Universidade de Sã o Paulo, Sã o Paulo, Brazil); RMNH (Natuurlijk Historisch Museum, Leiden, the Netherlands); USNM (National Museum of Natural History, Smithsonian Institution, Washington, DC, USA).

**SYSTEMATICS**

Class HYDROZOA

Order FILIFERA

Superfamily HYDRACTINOIDEA

Family STYLASTERIDAE Gray, 1847

Genus Distichopora Lamarck, 1816

*Distichopora robusta* sp. nov. (Figures 1 & 2)

**Type material**

Holotype: female colony, 14 cm wide, dried, and scanning electron microscope (SEM) stubs 1066–1067 (south side of Isla Jicarita, Gulf of Chiriqui, Panama; water depth: ~12 m) [USNM 1020570]. Collected by Hector M. Guzman, 29 August 2002.

Paratypes: male colony, dried (south side of Isla Jicarita, Gulf of Chiriqui, Panama; water depth: 5–25 m) [RMNH Coel. 32150]. Collected by Carlos A. Guevara, 7 February 2003.

Female colony, dried (south side of Isla Jicarita, Gulf of Chiriqui, Panama; water depth: 5–25 m) [MZUSP 467]. Collected by Carlos A. Guevara, 7 February 2003.

Additional paratypes: 3 male and 3 female colonies, dried, SEM stubs 1068–1070, and 33 fragments in ethanol (south side of Isla Jicarita, Gulf of Chiriqui, Panama;...
water depth: 5–25 m) [USNM 1020571]. Collected by Carlos A. Guevara, 7 February 2003.

**Etymology**

The specific name *robusta* refers to the thick, robust branches of the species.

**Diagnosis**

*Distichopora robusta* is distinguished from its congeners by the combination of two characters: (1) having thick, robust branches (up to 2 cm wide) with blunt to slightly clavate tips; and (2) having poorly defined pore rows.

**Description**

Corallum bushy, attached through a broad encrusting base from which 3–5 contiguous, large-diameter (up to 2 cm) branches originate, each main branch bifurcating repeatedly, terminating in blunt to slightly clavate branch tips 4–5 mm in diameter. Largest colony (holotype) 4 cm in basal diameter, 10 cm in height, and 14 cm in width, producing a roughly spherical colony of closely spaced branches (Figure 1). Branches circular to slightly elliptical in cross-section, but not flattened, as in most species of *Distichopora*. Branch anastomosis rare. All branches somewhat knobby, each knob a small prominence with a short pore row consisting of several gastropores flanked by dactylopore spines (Figure 2E). Coenosteum reticulate–granular in texture, the coenosteal strips 75–110 μm in width and flanked by slits 40–50 μm in width, the slits often reduced to elongate pores. Strips covered by tall (up to 28 μm) slender spines, not rounded granules (Figure 2H, I). Coenosteum a dark purple to lavender in colour, the branch tips and central branch core white, and the branch knobs a more intense lavender (Figure 1).

Pore rows poorly defined (Figure 2), short rows of gastropores rarely more than 15 μm in length occur randomly over the branch surfaces; isolated gastropores surrounded by 4–6 dactylopore spines, and short rows of two or three gastropores also quite common. Small clusters of gastropores also occur. Pore rows about 0.8 mm wide. Gastropores flush, circular, 0.17–0.22 mm in

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**Figure 1.** *Distichopora robusta* sp. nov.: (A) holotype colony, 14 cm wide, lateral view; (B) holotype colony, upper view; (C) paratype colony (USNM 1020571), 10 cm wide, lateral view.

**Figure 2.** (Opposite) *Distichopora robusta* sp. nov.: (A) branch cross section showing branch core, ampullae (upper and lower parts) and gastropore tubes with gastrostyles (right); (B) branch cross section showing a pair of U-shaped holes created by *Polydora* sp. and a long gastropore with gastrostyle and several tabulae (upper part); (C) stereo pair showing short pore row and surface of two female ampullae (notice efferent pore on right upper part of upper ampulla); (D) short pore row; (E) pore row forming a knob; (F) pore row flanked by female ampullae; (G) detail of short pore row; (H) reticulate–granular coenosteal texture; (I) reticulate–granular coenosteal texture; (J) dactylopore spine and adjacent gastropore; (K) stereo pair showing two gastrostyles, with tabulae and elements of diffuse ring palisade (near tip of style); (L) gastrostyle, tabula (bottom) and rounded elements of diffuse ring palisade (on gastropore tube near tip of style); (M) detail of gastrostyle. (A, H, I & K–M: Holotype, USNM 1020570; B–G & J: Paratypes, USNM 1020571). Scale bars: A–F, 1 mm; G, H & K, 200 μm; I, J & L, 100 μm; M, 50 μm.
diameter, and widely spaced, separated from one another by 0.13–0.21 mm. Dactylopore spines typical teardrop shaped, about 0.18 wide and 0.20 mm in length, 0.12 mm in greatest height, and with a dactylotome 0.09 mm in width (Figure 2J). Like the gastropores, the dactylopore spines are also widely spaced. Dactylostyles absent.

Gastropore tubes quite elongate (up to at least 4 mm), oriented perpendicular to branch surface near the exterior, but gently curving 90° to parallel the branch axis, together producing a very porous branch core (‘axial’ sensu Cairns, 1991a; Figure 2A). A very diffuse ring palisade is present in each gastropore at about the level of the gastrostyle tip, consisting of 15–20 small (20–25 μm in diameter) rounded elements. Gastroyostyles slender (0.08–0.09 mm wide), needle-shaped, but not ridged, covered with rather elongate (up to 30 μm), slender spines (Figure 2K–M).

The base of most colonies are bored by a lithophagid bivalve. Additionally, many of the branches of most colonies contain a pair of circular, closely-placed, parallel, excavated holes, each about 1.3 mm in diameter that run along the centre of the branch core (Figure 2B) and excavated holes, each about 1.3 mm in diameter that run along the centre of the branch core (Figure 2B) and sometimes to parallel the branch axis, together producing a very porous branch core (‘axial’ sensu Cairns, 1991a; Figure 2A). A very diffuse ring palisade is present in each gastropore at about the level of the gastrostyle tip, consisting of 15–20 small (20–25 μm in diameter) rounded elements. Gastroyostyles slender (0.08–0.09 mm wide), needle-shaped, but not ridged, covered with rather elongate (up to 30 μm), slender spines (Figure 2K–M). Tip of gastrostyle terminates about 0.4 mm below coenoskeletal surface; lower sections of style, below the uppermost tabulae, smooth, somewhat, the spines being worn or missing. Height:width of a gastrostyle as high as 50. Delicate, elongate gastrostyles held in place by multiple horizontal tabulae. Tabulae about 10 μm in thickness and occur every 0.20–0.45 mm along gastrostyle, some elongate styles having over ten tabulae.

The base of most colonies are bored by a lithophagid bivalve. Additionally, many of the branches of most colonies contain a pair of circular, closely-placed, parallel, excavated holes, each about 1.3 mm in diameter that run along the centre of the branch core (Figure 2B) and occasionally to parallel the surface of the coenoskeleton. Each of these U-shaped cavities contains a polychaete of the family Chondrosteidae. A typical polychaete is about 1 mm long, 0.2 mm wide, and with a set of bristles at each end (Figure 2K–M). The polychaetes are typically found in the gastrostyles of the stylasterids, where they are able to feed on the tentacles of the jellyfish that are present in the gastrostyles. The polychaetes are also able to use their bristles to push down the gastrostyles, preventing the jellyfish from escaping.

The only other Distichopora from the eastern Pacific is D. laevisgranulosa (Cairns, 1986, 1991b) from deep-water (166–806 m) off the Galápagos Islands. This species, however, has laterally-flattened branches and well-developed pore rows on branch edges, characters shared by most species of Distichopora but not Distichopora robusta.

Among the 23 species of stylasterids known from the eastern Pacific (Cairns et al., 1999; this study), D. robusta is the first reported south of the United States and north of the Cocos and Galápagos Islands (the latter localities having only deep-water species; see Cairns, 1986, 1991b). In addition to the south side of Isla Jicarita (type locality), D. robusta was also observed in Bajo Catedral, ~3 km north-west of the type locality. Both localities are of difficult access, being exposed to large swells and strong currents, and the species has probably only rarely been observed. The only record probably referring to D. robusta is that of Maté (2003), who reports that on the south side of Isla Jicarita ‘large and thick branching stylasterinid corals are very common in the basaltic walls below 15 m’. Although corals and coral reefs from the Pacific coast of Panama have been studied for over three decades (see Maté, 2003), recent studies in the Gulfs of Chiriqui and Panama have resulted in the description of several new shallow-water species, including scleractinians (Budd & Guzman, 1994; Glynn, 1999; Glynn, Maté & Stemmann, 2001), octocorals (Breedy & Guzman, 2003a,b, 2004) and a milleporid (de Weerdt & Glynn, 1991). The description of D. robusta, a conspicuous stylasterid coral, and the lack of comprehensive taxonomic studies on more diverse groups of corals in the region (e.g. the scleractinian genus Pocillopora Lamarck, 1816) indicate that additional new species of corals from the tropical eastern Pacific may be uncovered in the future.

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