

## A new species of azooxanthellate Scleractinia from the western Atlantic, and a new name and record of *Desmophyllum striatum* sensu Cairns, 1979

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**Abstract.**—A new species of deep-water azooxanthellate scleractinian coral is described from the northwestern Atlantic, named *Trochocyathus circularis*. It is distinctive for its almost circular calice. A new name is proposed for the junior primary homonym *Desmophyllum striatum* Cairns, 1979, which was preoccupied by the senior homonym, a Miocene fossil from Italy, described in 1871 by Sismonda in Sismonda & Michelotti.

**Keywords:** azooxanthellate, *Desmophyllum*, new species, Scleractinia, *Trochocyathus*, western Atlantic

The rate of discovery of new scleractinian species in the western Atlantic has been modest over the last two decades. Since 2000 (Cairns 2000) only eleven new species have been described (Lattig & Cairns 2000, Kitahara & Cairns 2005, Neves & Johnsson 2009, Reyes et al. 2009, Cairns & Polonio 2013, Kitahara et al. 2020), and of those, eight were from the southwestern Atlantic. The reasons for this paucity of new species may be twofold: 1) this fauna has become well known and few species remain to be described, and/or 2) few collections have been made in the last 20 years to form the basis for study. Although the first reason is probably not the cause (Cairns 1999), it is true that, notwithstanding the expeditions of the *Okeanos Explorer* in northwestern Atlantic waters from 2011 to the present, there have not been many major collections of deep-water organisms in the western Atlantic. Even though the *Okeanos Explorer* expeditions were highly successful in documenting biodiversity, their aim was not to collect specimens but to photograph them, and furthermore most deep-water azooxanthellates are too small to be seen from a remotely operated vehicle. Docu-

mentation of the cruises of the *Okeanos Explorer* can be found at: <https://oceanexplorer.noaa.gov/explorations/location/explorations-by-location.html> (last accessed 24 November 2020).

There is, however, another untapped source of specimens to study. In the National Museum of Natural History, Smithsonian (NMNH), and probably in other museums, there are several dozen deep-water scleractinian specimens that have been put aside because they belonged to species represented by singletons or few specimens, or they were too poorly preserved to be identified to species or even genus. They have remained in this holding collecting for decades, hoping that additional specimens would be collected to justify the description of a new species. *Trochocyathus circularis* is one such species, and is described now because of the excellent preservation of the two available specimens and the distinctive nature of the species.

### Materials and Methods

The specimens studied in this paper are deposited in the collections of the NMNH.

The terminology used in the description is defined and illustrated in Cairns & Kitahara (2012).

Abbreviations used in the description include:

GCD:LCD Ratio of greater to lesser calicular diameter of a corallum

PD:GCD Ratio of pedicel diameter to greater calicular diameter of a corallum

PxCycle of pali designated by numerical subscript

SxCycle of septa designated by numerical subscript

USNM United States National Museum (now NMNH), Washington D.C.

Class Anthozoa  
Order Scleractinia

Family Caryophylliidae Dana, 1846

Genus *Trochocyathus* Milne Edwards & Haime, 1848

*Type species.*—*Turbinolia mitrata* Goldfuss, 1827, by subsequent designation (Milne Edwards & Haime 1850:xiv).

*Diagnosis.*—Corallum solitary; attached, free, or resulting from transverse division. Septotheca costate and usually granular; costal spines sometimes present. Discrete pali present before all but last septal cycle in two or three crowns; columella papillose. Vesicular dissepiments sometimes present.

*Distribution.*—Middle Jurassic to Recent, living species have been reported in all oceans but eastern Pacific at 20–1650 m (Hoeksema & Cairns 2018).

*Remarks.*—Thirty-one recent species are considered to exist (Hoeksema & Cairns 2018).

*Trochocyathus circularis*, new species

Fig. 1

*Material examined (types).*—Holotype: Gerda station 679, 20 Jul 1965, USNM 1421858. Paratype: Albatross station 2350, 23°10'39"N, 82°20'21"W (off Havana,

Cuba), 390 m, 20 Jan 1885, USNM 1421857.

*Type locality.*—25°56'N, 78°09'W (Northwest Providence Channel, Bahamas), 594–710 m.

*Description.*—Holotype (Fig. 1A–C): a straight ceratoid corallum 22.9 mm in height, broken from its attachment but having a monocyclic base and a pedicel diameter of 5.1 mm (PD:GCD = 0.37). Calice slightly elliptical, almost circular (Fig. 1B) (GCD:LCD = 1.05), measuring 13.8 × 13.1 mm, and thus conferring a bilateral orientation to calicular elements. Costae equal in width (about 0.65 mm wide), slightly rounded and covered with low, fine granules. Intercostal furrows narrow (0.3 mm in width) and shallow, except near calice, where they are deep.

Septa hexamerally arranged in four full cycles according to formula: S1>S2>S3>S4, resulting in 48 septa (Fig. 1B, C). S1 (Fig. 1B) about 2.5 mm exsert, extend about half distance to center of calice, and have slightly sinuous vertical axial edges, each of which is bordered by a tall, slender (0.6 mm wide) palus (P1). S2 equally exsert and also sinuous but only slightly less wide, each also bordered by a somewhat wider (0.12 mm wide) palus (P2) that is slightly taller than a P1. Axial edges of P1–2 extend same distance into fossa, and although differing in width and height, form an inner crown of 12 palar elements. S3 slightly less exsert (2.1 mm) than S1–2 and are less wide than S2, but also have sinuous axial edges, each S3 bordered by a slender P3 of similar size to P1, but recessed from columella and thus forming a second outer crown of 12 palar elements (Fig. 1B). Septal faces bear low granules, whereas granules on palar faces are twice that size. Fossa of moderate depth, containing two palar crowns and a papillose columella consisting of 6 vertical rods that are roughly aligned with axis of GCD.

Single paratype (Fig. 1D, E), which was dead when collected, quite similar to holotype but smaller (10.5 × 10.4 mm in

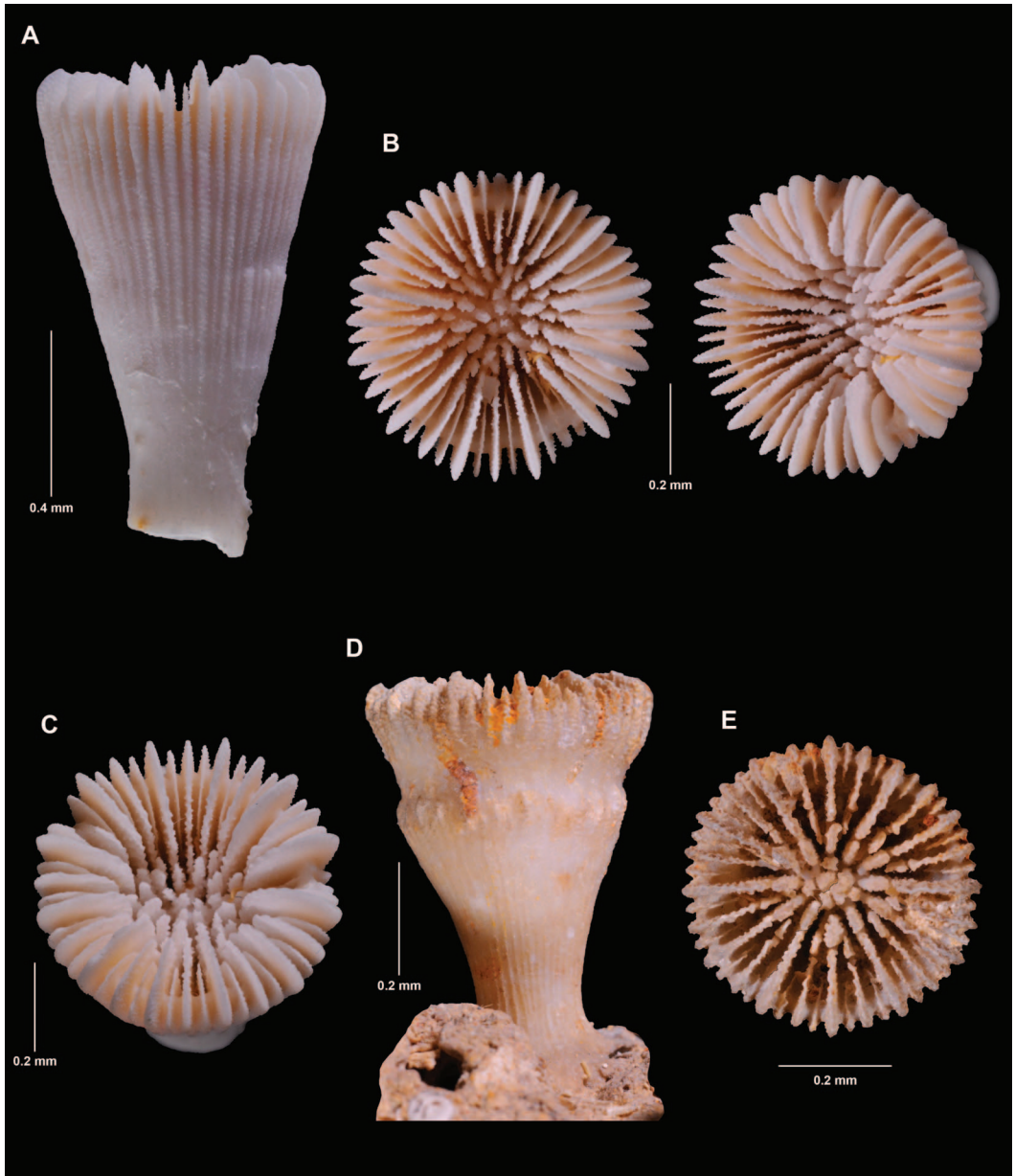


Fig. 1. *Trochocyathus circularis* (A–C, holotype; D–E, paratype): A, lateral view of corallum; B, stereo view of calice; C, oblique view of calice; D, E, lateral and calicular views of paratype, respectively.

calicular diameter,  $GCD:LCD = 1.01$ , and 13.9 mm in height) and firmly attached to substrate, having an identical  $PD:GCD$  ratio. It also has the same number of septa.

*Comparisons.*—Among the 30 other Recent species in the genus, *T. circularis* is

most similar to *T. laboreli* Cairns, 2000, a species known only from off southern Brazil at 130–240 m depth. Whereas its septal and palmar arrangements are quite similar to that of *T. circularis*, *T. laboreli* has a somewhat cornute or curved corallum

and a more slender pedicel (PD:GCD = 0.09–0.20), so narrow that several specimens have been observed to be free of attachment. Also, its septa are less exert than those of *T. circularis*.

Sixty-four fossil species of *Trochocyathus* are known according to Fossilworks; however, only two species are known from the Atlantic region from the Late Miocene to Pleistocene, both described from the Early Pliocene of the Dominican Republic (Cairns & Wells 1987). Indeed, *T. circularis* is quite similar to *T. duncani* Cairns & Wells, 1987 in having a circular calice and 48 septa at a corresponding calicular diameter but differs in having a much narrower pedicel (PD:GCD = 0.11–0.23) and in having a fuller corallum, the thecal walls of *T. circularis* being straight, forming a perfect cone.

*Distribution*.—Known only from Northwest Providence Channel, Bahamas and off Havana, Cuba at 390–594 m depth, a pattern of distribution characterized by Cairns (1979:198) as insular Straits of Florida, and shared with three other azooxanthellate species: *Rhizosmilia gerdæ* Cairns, 1978, *Deltocyathus pourtalesi* Cairns, 1979, and *Flabellum atlanticum* Cairns, 1979.

*Etymology*.—From *circularis* (Latin for circular), in allusion to the almost circular (GCD:LCD almost 1.0) shape of the calice.

***Desmophyllum hourigani*, nom. nov.**

Not *Desmophyllum striatum* Sismonda in Sismonda & Michelotti, 1871:342, pl. 7, fig. 10.

Not *Desmophyllum* cf. *striatum*: Chevalier, 1961:376, pl. 16, figs. 6, 7.

*Desmophyllum striatum* Cairns, 1979:120–121, pl. 22, fig. 9, pl. 23, figs. 2, 3 (junior primary homonym).

*Material examined*.—Pillsbury station 969, 17°27'48"N, 61°41'06"W (north of Antigua and Barbuda, Caribbean), 70–220 m, 20 Jul 1969.

*Discussion*.—I recently became aware that I had established a junior primary homonym when naming *Desmophyllum striatum* Cairns, 1979. That name was preoccupied by a Middle Miocene fossil species collected near Turin, Italy by the same name: *Desmophyllum striatum* Sismonda in Sismonda & Michelotti, 1871. My species thus requires a new name as it is a junior homonym, which I name herein *D. hourigani*. I also take the opportunity to report an additional specimen for this rarely collected species.

According to Chevalier (1961), the holotype of the fossil *D. striatum* is lost, although he reported a possible specimen from the type locality, which is now deposited in the Museum national d'histoire naturelle, Paris. Another topotypic specimen is deposited at the NMNH (USNM M156356).

*Etymology*.—Named in honor of Thomas F. Hourigan, National Oceanic and Atmospheric Administration, Washington, DC, Deep Sea Coral Research and Technology Program.

Remarks

One of my first papers (Cairns 1977) and one of my last papers (herein), spanning a 45-year career, were published in the *Proceedings of the Biological Society of Washington*. During the years between, there were an additional 28. I am sure that this is not a record, but the *Proceedings* provided me with an outlet for many of my shorter taxonomic papers, which was once the domain of the *Proceedings of the United States National Museum* for those that worked at the Smithsonian. It also allowed me to serve the taxonomic community as President, Councilor, review editor (Invertebrates), Acting Editor, and Secretary of its Society. I am grateful for this journal and what it has meant to my career at the Smithsonian.

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## Literature Cited

- Cairns, S. D. 1977. A review of the Recent species of *Balanophyllia* (Anthozoa: Scleractinia) in the western Atlantic, with descriptions of four new species. *Proceedings of the Biological Society of Washington* 90:132–148, 4 pls.
- Cairns, S. D. 1978. New genus and species of ahermatypic coral (Anthozoa: Scleractinia) from the western Atlantic. *Proceedings of the Biological Society of Washington* 91:216–221.
- Cairns, S. D. 1979. The deep-water Scleractinia of the Caribbean Sea and adjacent waters. *Studies on the Fauna of Curaçao and Other Caribbean Islands* 57(180):1–341.
- Cairns, S. D. 1999. Species richness of Recent Scleractinia. *Atoll Research Bulletin* 459:1–12.
- Cairns, S. D. 2000. A revision of the shallow-water azooxanthellate Scleractinia of the western Atlantic. *Studies on the Natural History of the Caribbean Region* 75:1–231.
- Cairns, S. D., & M. V. Kitahara. 2012. An illustrated key to the genera and subgenera of the Recent azooxanthellate Scleractinia (Cnidaria, Anthozoa), with an attached glossary. *ZooKeys* 227:1–47.
- Cairns, S. D., & V. Polonio. 2013. New records of deep-water Scleractinia off Argentina and the Falkland Islands. *Zootaxa* 3691(1):58–86.
- Cairns, S. D., & J. W. Wells. 1987. Neogene paleontology in the northern Dominican Republic, 5. The suborders Caryophylliina and Dendrophylliina (Anthozoa, Scleractinia). *Bulletins of American Paleontology* 93(328):23–43.
- Chevalier, J.-P. 1961. Recherches sur les Madréporaires et les Formations Récifales Miocènes de la Méditerranée Occidentale. *Mémoires de la Société Géologique de France (new series)* 40(93):1–562.
- Dana, J. D. 1846. (1846–1849). Zoophytes. United States Exploring Expedition during the Years 1838, 1839, 1840, 1841, 1842 under the Command of Charles Wilkes, U.S.N. Lea & Blanchard, Philadelphia, Volume 7, 740 pp.
- Goldfuss, G. A. 1826–1833. *Petrefacta Germaniae tam ea : quae in Museo Universitatis Regiae Borussicae Fridericiae Wilhelmae Rhenanae servantur quam alia quaecunque in Museis Hoeninghusiano Muensteriano aliisque extant, iconibus et descriptionibus illustrata*. Düsseldorf. Volume 1, 252 pp + 71 pl.
- Hoeksema, B. W., & S. D. Cairns. 2018. World List of Scleractinia. Accessed at: <http://www.marinespecies.org/scleractinia>. (Last accessed 11 November 2020.)
- Kitahara, M. V., & S. D. Cairns. 2005. *Monohedrotrochus capitollii*, a new genus and species of solitary azooxanthellate coral (Scleractinia, Caryophylliidae) from southern Brazil. *Zoologische Mededelingen Leiden* 79(3):117–123.
- Kitahara, M. V., K. C. C. Capel, & A. E. Migotto. 2020. *Coenocyathus sebroecki* sp. nov.: a new azooxanthellate coral (Scleractinia, Caryophylliidae) from southeastern Brazil. *Marine Biodiversity* 50(4):59.
- Lattig, P., & S. D. Cairns. 2000. A new species of *Tethocyathus* (Cnidaria: Anthozoa: Scleractinia: Caryophylliidae), a trans-isthmian azooxanthellate species. *Proceedings of the Biological Society of Washington* 113:590–595.
- Milne Edwards, H., & J. Haime. 1848. Recherches sur les polypiers. Deuxième mémoire: Monographie des Turbinolides. *Annales des Sciences Naturelles, Zoologie (serie 3)* 9:211–344.
- Milne Edwards, H., & J. Haime. 1850. A Monograph of the British Fossil Corals. First Part. Introduction: Corals from the Tertiary and Cretaceous Formations. Palaeontological Society, London, lxxxv + 71 pp.
- Neves, E., & R. Johnsson. 2009. Taxonomic revision of the southwestern Atlantic *Madracis* and the description of *Madracis fragilis* n. sp. (Scleractinia: Pocilloporidae), a new coral species from Brazil. *Scientia Marina* 73:739–746.
- Reyes, J., N. Santodomingo, & S. Cairns. 2009. Caryophylliidae (Scleractinia) from the Colombian Caribbean. *Zootaxa* 2262:1–39.
- Sismonda, E., & G. Michelotti. 1871. Matériaux pour servir à la Paléontologie du terrain tertiaire du Piémont. *Memorie della Reale accademia delle Scienze di Torino, Serie 2*, 25:257–361.