

TRUNCATOFLABELLUM MADRASENSIS SP. NOV. – A NEW AHERMATYPIC CORAL SPECIES FROM INDIA AND A CHECKLIST OF SPECIES OF THE GENUS TRUNCATOFLABELLUM FROM THE INDIAN OCEAN

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ABSTRACT. – A new species of scleractinian coral of the genus *Truncatoflabellum* Cairns, 1989 (Family Flabellidae), *Truncatoflabellum madrasensis* sp. nov. was described based on specimens collected from Chennai (east coast of India). The species contains 64 septa and the septal symmetry is in the ratio of 16:16:32. Including this new species, a total of 19 species under the genus *Truncatoflabellum* were recorded from the Indian Ocean region.

INTRODUCTION

Among the South Asian countries, coral reefs are found in India, Bangladesh, Pakistan, Maldives and Sri Lanka, as well as overseas territory of Chagos (British Indian Ocean Territory, BIOT) (Tamelander & Rajasuriya 2004). Currently, there are four major reefs in India that include the Gulf of Mannar, the Gulf of Kachchh, the Lakshadweep Atolls, and the Andaman and Nicobar Islands, and minor reefs are distributed along the intertidal regions of Malvan, Ratnagiri, and Redi, south of Bombay, west of Mangalore. From Quilon, located along the Kerala coast, to Enayem, along Tamil Nadu coast, hermatypic corals along the shore were reported.

Pillai (1983a) recorded a total of 199 species divided among 71 genera, from India, which include 31 genera – 78 species from Lakshadweep, 24 genera – 37 species from the Gulf of Kachchh, 37 genera – 94 species from Palk Bay and the Gulf of Mannar; and 59 genera – 135 species from Andaman and Nicobar Islands. This account includes both ahermatypic and hermatypic corals recorded from the above major regions of India. More recently, Venkataraman *et al.* (2003) reported two species of corals, *Flabellum pavoninum* Lesson, 1831 and *Placotrochus laevis* Milne-Edwards & Haime, 1848 under family Flabellidae. Later, Venkataraman (2006) found four additional species under this family, namely, *F. deludens* Marenzeller, 1904, *Rhizotrochus typus* Milne-Edwards & Haime, 1848; *Truncatoflabellum paripavonium* (Alcock, 1894) and *T. stokesii* (Milne-Edwards & Haime, 1848) from the Indian waters. In the study of Venkataraman *et al.* (2003), 15 families, 60 genera and 208 species of Scleractinia (reef building and hermatypic corals) were reported from four major reefs of India such as the Gulf of Kachchh (36 species, 20 genera), Lakshadweep Island (91 species, 34 genera), the Gulf of Mannar and the Palk

Bay (82 species, 27 genera), and Andaman and Nicobar islands (177 species, 57 genera). They concluded that, probably during the coming years, many more new species on the scleractinian fauna of the coral reefs of India are expected to be identified. *Truncatoflabellum* Cairns, 1989 is a genus comprising solitary ahermatypic corals belonging to the Holocene epoch, the seventh largest genus consisting of about 240 species with 38 known species (Latypov 2014, Cairns 2016). From the Indian subcontinent, this genus is reported from the Lakshadweep, and the Andaman and Nicobar islands by Venkataraman (2007). There is an indication of a submerged reef near-shore Chennai (Gopala Aiyar 1938), which is supported by a scleractinian specimen incidentally obtained on a trawl net at 2.5 km off Kovalam, Chennai coast. The present study deals with the description of a new species of *Truncatoflabellum* based on specimens collected from Marina Beach, Chennai, east coast of India.

MATERIALS AND METHODS

During the study period (June 2015-May 2016), a total of 6 type materials from bottom gill nets was sampled. These 6 azooxanthellate corals were collected from Marina Beach (13°02'21.52"N, 80°16'52.90"E), Chennai. Collected specimens were washed with freshwater, sun-dried and labelled. From the type locality, only one holotype and one paratype were studied based on the dead corals. *Truncatoflabellum* corals had occasionally washed ashore on Chennai Beach during the study period. All specimens (holotype: ZSI/MBRC/C-0096; paratype: ZSI/MBRC/C-0097) were deposited at the Zoological Survey of India, Chennai. All specimens were examined with the help of stereo-microscope (Nikon SMZ 25), and identified following Cairns (1999a, 2012, 2016) and Venkataraman & Satyanarayana (2012).

RESULTS AND DISCUSSION

Systematics

Phylum: Cnidaria
 Class: Anthozoa
 Order: Scleractinia
 Family: Flabellidae
 Genus: *Truncatoflabellum* Cairns, 1989
 Species: *Truncatoflabellum madrasensis* sp. nov.

Diagnosis

Asexual reproduction by apical transverse division of corallum, resulting in basal anthocaulus and distal anthocyathus. Corallum usually laterally compressed and fan shaped, having one or more pairs of thecal edge spines or crests; some species compressed-cylindrical in shape, but these are always laterally spinose. However, some fan-shaped coralla lack spines and crests. Columella absent or represented by a fusion of the lower, axial edges of larger septa. Anthocaulus not stereome-reinforced (Cairns & Kitahara 2012, Cairns 2016).

Material examined

Types: Holotype and paratype. – 1 holotype (Fig. 1) and 1 paratype (Fig. 2), Marina Beach, Chennai, east coast of India (actual habitat not known, hand picked from the beach, washed ashore), collected by S.Y. Tenjing, 05.12.2015 (Registration ID: Holotype: ZSI/MBRC/C-0096; paratype: ZSI/MBRC/C-0097).

Description

Corallum compressed. Calicular diameter (11.81 mm, longest; 7.01 mm shortest), height 14.89 mm, having a basal scar of 4.95 mm (longest) and 2.73 mm (shortest). Thecal edge non-spinose and non-ridged (rounded) and having an angle of about 25 degrees. Theca yellowish, consisting of epithecal corrugations. Calicular margin broken, rugged when touched. Number of septa 64 with a solid septal symmetry of 16:16:32. Septa divided into three size categories, i.e., primary, secondary and tertiary. Septa non exsert and primary septal series increases in thickness towards edge meeting thecal wall. Secondary and tertiary septal series smaller than primary series.

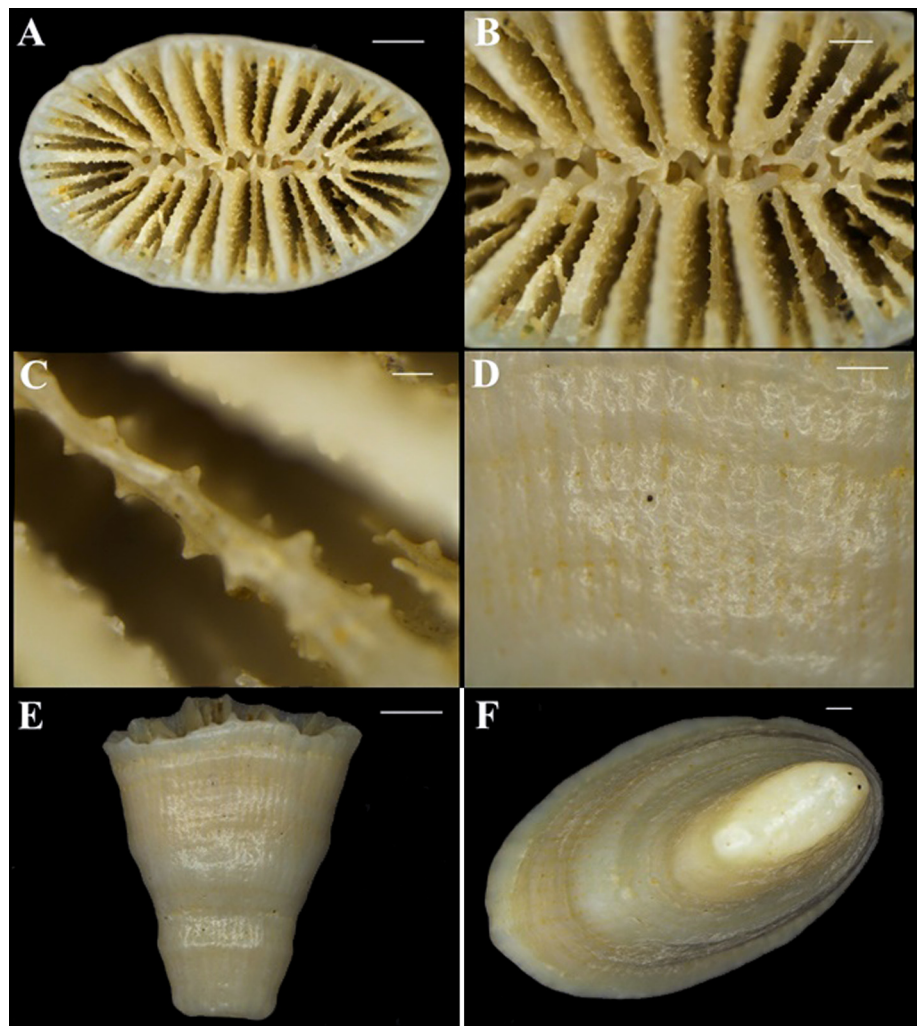


Fig. 1. – A: Holotype: *Truncatoflabellum madrasensis* sp. nov. (1 mm); B: Close up columella fused with axial edges of primary septa (0.5 mm); C: Minute outgrowths in the septal wall (0.1 mm); D: Epithecal corrugations (0.5 mm); E: Corallite (2 mm); F: Base (0.5 mm)

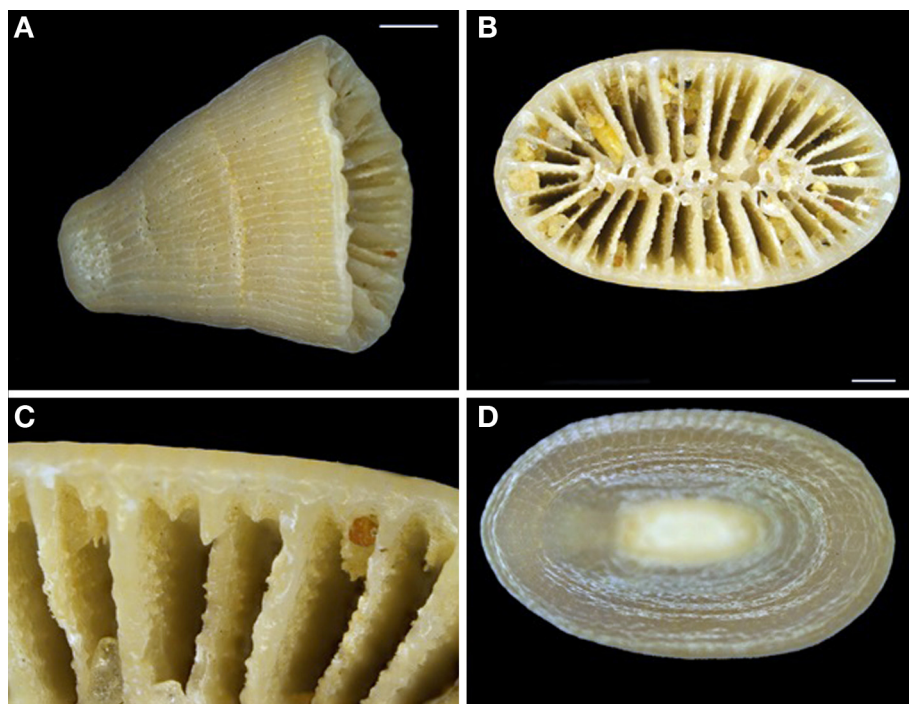


Fig. 2. – A: Paratype: *Truncatoflabellum madrasensis* sp. nov. (1.73 mm); B: Close up columella fused with axial edges of primary septa; C: Minute outgrowths in the septal wall; D: Base (0.96 mm)

Each septum in the secondary series is almost half the size of those in primary series. Tertiary septa are equivalent to one-third length to the primary septa. Lower axial edges of primary septa fused with the columella giving a lamellar appearance and inner edges are slightly sinuous. Fossa deep, narrow containing an elongated columella. Basal scar relatively large and costae non-ribbed.

Etymology

The species name is coined after the name of the holotype collection locality.

Remarks

The specimen is placed under the genus *Truncatoflabellum* Cairns, 1989 because it conforms to all the generic characters. The specimen is closely related to *Truncatoflabellum formosum* Cairns, 1989, but differs in the number of septa (64) and septal symmetry (16:16:32) compared to *T. formosum* (total septa: 80, septal symmetry: 20:20:40).

Bernard (1897) mentioned the occurrence of *Montipora divaricata* (*M. digitata*) and *M. foliosa* in Rameswaram region. Later, Bernard (1905) also described 14 specimens of *Porites* collected by Thurston from the living and sub-fossilised reefs of Rameswaram. Gardiner (1904, 1905) recorded 27 species of corals assignable to 17 genera from Minicoy region of Lakshadweep Island. Matthai's (1924a) study on the coral collections of Indian Museum, Calcutta (currently known as Kolkata) has already been alluded to. Matthai (1924b) reported a species of *Culicia*

from Chilka Lake, Orissia (currently known as Odisha). In his catalogue of the "Meandroid Asteroidea", Matthai (1928) reported the occurrence of *Synlphzylia radians*, *S. recta* and *Piatygyra lamellina* around Mandapam. From the south east coast of India, Gravely (1927) reported on the Scleractinia of the littoral waters of Krusadai Island and nearby places. This work included 22 genera and 30 species. He only mentioned the occurrence of the genera *Porites* and *Goniopora*. During his geographic and oceanographic researches in the Indian waters, Sewell (1935) collected 13 coral species belonging to 8 genera from the raised reefs of Mandapam and Rameswaram. Gravely (1941) noted the presence of the remnants of *Pocillopora damicornis* at Madras Beach (currently known as Chennai coast). Similarly, *Truncatoflabellum madrasensis* sp. nov. was found from Chennai beach.

Different species of *Truncatoflabellum* reported from the Indian Ocean are provided in Table I. None of the species with established descriptions matched with the current collected specimen and thus, species is recognized as a new species under the genus *Truncatoflabellum*. Significant characters of the species include rounded thecal edges, non-spinose and non-ribbed with an angle of about 25 degrees; relatively large basal scar; non-ribbed costae and a solid septal symmetry of 16:16:32 (64 septa). Knowledge of the distribution and occurrence of deep-water coral reefs from India is very poor, being largely based on few surveys. Wood-Mason & Alcock (1891a, b) reported deep-water corals of the Indian Ocean collected during the expeditions of the Royal Indian Marine Survey Ships, Investigator I and II from the Indian Ocean. Other reports, that include information on deep-water corals

Table I. – The different species of *Truncatoflabellum* distributed in the Indian Ocean.

Sl. No.	Species	Indian Ocean	Indian coast
1	<i>Truncatoflabellum stabile</i> (Marenzeller, 1904)	Cairns, 1999a	–
2	<i>T. pusillum</i> Cairns, 1989	Cairns, 1999a	–
3	<i>T. aculeatum</i> (H. Milne Edwards & Haime, 1848)	Cairns, 1999a	–
4	<i>T. paripavonium</i> (Alcock, 1894)	Cairns, 1999b	Venkataraman, 2007
5	<i>T. stokesii</i> (Milne-Edwards & Haime, 1848)	Cairns, 1999b	Venkataraman, 2007
6	<i>T. angiosomum</i> (Folkeson, 1919)	Cairns, 1999b	–
7	<i>T. australiensis</i> Cairns, 1998	Cairns, 1999b	–
8	<i>T. formosum</i> Cairns, 1989	Cairns, 1999b	–
9	<i>T. gardineri</i> Cairns in Cairns & Keller, 1993	Cairns, 1999b	–
10	<i>T. inconstans</i> (Marenzeller, 1904)	Cairns, 1999b	–
11	<i>T. macroeschara</i> Cairns, 1998	Cairns, 1999b	–
12	<i>T. multispinosum</i> Cairns in Cairns & Keller, 1993	Cairns, 1999b	–
13	<i>T. paripavonium</i> (Alcock, 1894)	Cairns, 1999b	–
14	<i>T. pusillum</i> Cairns, 1989	Cairns, 1999b	–
15	<i>T. spheniscus</i> (Dana, 1846)	Cairns, 1999b	–
16	<i>T. stable</i> (Marenzeller, 1904)	Cairns, 1999b	–
17	<i>T. veroni</i> Cairns, 1999	Cairns, 1999b	–
18	<i>T. zuluense</i> Cairns in Cairns & Keller, 1993	Cairns, 1999b	–
19	<i>T. madrasensis</i> sp. nov.	–	Present report

from India and the Indian Ocean, were those of Alcock (1894, 1898, 1902), Bourne (1905), Gardiner (1929) and Wells (1956). Some of the studies on the Indian deep-water corals are those of Scheer & Pillai (1974, 1983), Pillai and Scheer (1976), Zibrowius (1980), Fricke and Schuhmacher (1983), Zibrowius & Gili (1990), Sheppard & Sheppard (1991) and Venkataraman (2007). In the Indian coast, 18 species under the genus *Truncatoflabellum* have been reported and along the Chennai coast, only one species in the same genus has been reported.

The seas and the deep shelf regions adjacent to India had few surveys and limited records on the occurrence of deep-water corals except the studies of Pillai & Scheer (1976) from Nicobar Island, Pillai (1967a, b, 1983b, 1986, 1988) from the Gulf of Kachchh, the Gulf of Mannar, Lakshadweep, and Andaman and Nicobar islands. Venkataraman (2007) also collected from the Chennai coast (from 10-30 m depth) by R/V *Sagara Sampatha* (trawl) in 2003, reporting the occurrence of eight species of scleractinia. Perhaps the new species reported from the same coast is due to trawling activities. Venkataraman (2007) stated that the major human impact on azooxanthellate scleractinian coral reefs is due to fishing activities throughout the continental shelf and deep-sea regions on the Chennai coast as well as other coasts of India. Since modern deep sea trawlers are designed to fish in different seascapes, they are able to trawl over coral habitats. Trawl fishing destroys the corals, eliminating or reducing the reef habitat. Exploitation of fisheries, associated with deep-sea habitats in the Indian Ocean, is continuing in an unmanaged and uncontrolled trend. The government of

India, scientists, and even the fishing industry itself are unaware of the environmental damage caused by these activities. It is probable that many deep-water coral and associated fauna are being trawled before they are fully studied and their species diversity is assessed. Human activity related to the gathering of mineral or biological resources in the Indian Ocean has impacts on the environment which are poorly understood or managed. Hence, it is very important to protect the deep-sea corals found in the seas around India and their associated fauna for the future.

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