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First record of the synaptid holothurian *Protankyra bidentata* (Woodward & Barrett, 1858) from the Indian Ocean

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ABSTRACT

Sea cucumbers (holothurians) are marine invertebrates that are harvested worldwide, mostly for human consumption in Asian countries. To date, only eight species of synaptid holothurians of the genus *Protankyra* have been reported from the Indian Ocean. The present report forms the first record of *Protankyra bidentata* (Woodward & Barrett, 1858) from Indian waters. The specimen recorded was small measuring 42 mm in length, cylindrical in shape with microscopic ossicles scattered throughout the skin. The size and shape of calcareous ossicles are very specific and found similar to previous reports of *P. bidentata*

Keywords: Goa, Holothurian, Indian Ocean, *Protankyra bidentata*, Synaptidae, Zuari Estuary

Over the past few decades, there has been considerable increase in the harvesting of sea cucumbers due the importance as a source of livelihood for many artisanal fishers from developing countries and as a globally traded product. Overexploitation has resulted in decline of sea cucumber population in many countries which led to considerable interest on their biology, ecology and management of the fishery.

The phylum Echinodermata consists of approximately 7000 species, of which around 1400 species are sea cucumbers (class Holothuroidea) (Lane and Vandenspiegel, 2003; Pawson, 2007). Holothuroids are the most poorly studied echinoderms, distributed in all marine habitats and having wide morphological variations (Kerr and Kim, 1999; Teo and Ng, 2009). Nearly 200 species of sea cucumbers are known to occur in the seas around India, of which about 75 species were reported from shallow waters while nearly 50 species from the intertidal region and 12 species are commercially important (James, 2004). Very little is known about the apodous holothurians of Indian Seas (James, 1982). This paper reports the holothuroid species *Protankyra bidentata* (Woodward & Barrett, 1858) (Order: Apodida; Family: Synaptidae) for the first time from the Indian coast.

In February 2009, a single specimen of sea cucumber was incidentally collected along with sediment samples from about 6 m depth during regular sampling from the mouth of Zuari Estuary (lat.15°25' N; long. 73° 47'E; Fig. 1) Goa, along the west coast of India. The live specimen collected was kept for observation in a glass aquarium and photographs were taken. After few days

of observation, it was preserved in 5% buffered formalin and later stored in 75% alcohol. For species confirmation, ossicles were extracted as per the method suggested by Toral-Granda (2005). The ossicles collected were examined, photographed and measured under a phase contrast microscope. The specimen was identified as *Protankyra bidentata* (Woodward & Barrett, 1858), which was further confirmed by Dr. Alexei Smirnov, Zoological Institute, Russian Academy of Science, Saint Petersburg University, Russia (per. comm.).

The environmental parameters recorded at the collection site were: salinity-33.8 ppt; dissolved oxygen - 3.7 ml l⁻¹ and sedimentary chlorophyll - 0.4 µg g⁻¹. Bottom sediment was dominated by sand (98%) followed by silt (1.5%) and clay (0.5%). *Protankyra bidentata* has been reported earlier from the intertidal, estuarine and bay regions dominated by silt and fine sand with salinity ranging from 29.2 - 32.8ppt (Shin and Thompson, 1982; Yokoyama *et al.*, 2005; Paik *et al.*, 2008)

At rest, the specimen was small, elongated, measured around 42 mm in length, with thin-walled, white translucent body which was crammed with silty sand. The mouth lies downward, surrounded by ten pinnately branched oral tentacles (Fig. 2).

The anchors with anchor plates and rods were very typical and similar to all previous descriptions of *P. bidentata* (Fig. 3 a-e). Anchors measured around 400 µm with finely toothed stalk, arms serrate and vertex without knob. Anchor plates were ovate, without a 'handle' and measured 200-300 µm in length, with irregular margins, bearing numerous small smooth or toothed holes. Size

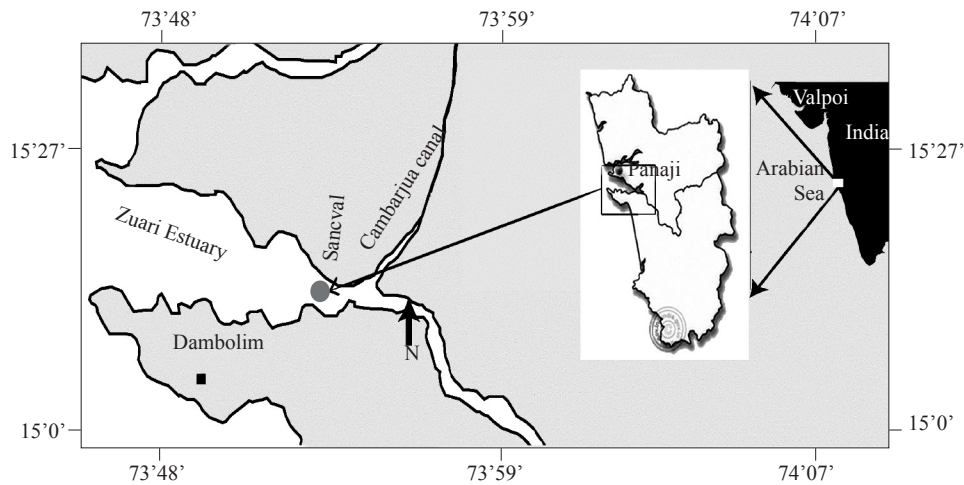


Fig. 1. Map showing the sampling location in Zuari Estuary on the west coast of India

of the anchor plates generally depends on the growth of the animal and larger plates develop as the animal grows (Pawson *et al.*, 2003). The rod shaped ossicles were around 100 μm in length from the body wall.

The anchors with smooth arms, vertex without knobs and anchor plates with numerous holes, which are not narrowed into a handle identifies this specimen as *Protankyra*. Further characteristics were also noted such as anchor arms without serrations, less branched and denticulated anchor stalk. Anchor plates as long as anchors, much longer and wider, with larger holes at the centre with dentate margin differentiates this specimen

from other *Protankyra* species (Thandar, 2007) such as *P. errata* (Koehler & Vaney, 1905), *P. buitendijki* (Rowe, 1983), *P. dubia* (Cherbonnier, 1964), *P. similis* (Semper, 1867) and the specimen was identified as *Protankyra bidentata* (Woodward & Barrett, 1858) according to the key developed by Clark (1907).

Records of the genus *Protankyra* are mainly from Pacific Ocean and from the North-east Atlantic (data from GBIF Open Geospatial Consortium Services). In Indian Ocean, occurrence of *Protankyra* was reported mainly from Bay of Bengal, along the east coast of India. The first report of *Protankyra* from Indian region was that of *P. errata* by Koehler and Vaney (1905). James (1982) described *P. tucicorenensis* from Tuticorin and later Singh and Choudhari (1992) reported *P. similis*. According to the information provided by the CSIR-National Institute of Oceanography (CSIR-NIO), India, altogether eight species of the genus *Protankyra* were reported from Indian region (NIO bio Search, 2015) viz., *P. errata*, *P. timida*, *P. conferta*, *P. tristis*, *P. innominata*, *P. tucicorenensis*, *P. similis* and *P. pseudodigitata*. *Protankyra bidentata* (Woodward & Barrett 1858) is reported here for the first time from Indian Ocean. *P. bidentata* has so far been reported from China and Japan (Clark and Rowe, 1971; Yokoyama *et al.*, 2009), from Bohol in Philippines as junior synonym *Synapta molesta* (Semper, 1868) and also from Korea (Paik *et al.*, 2008).

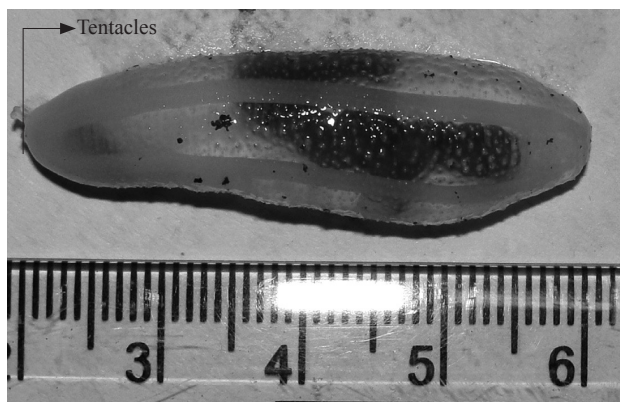


Fig. 2. Photograph of *Protankyra bidentata* at its dorsal position

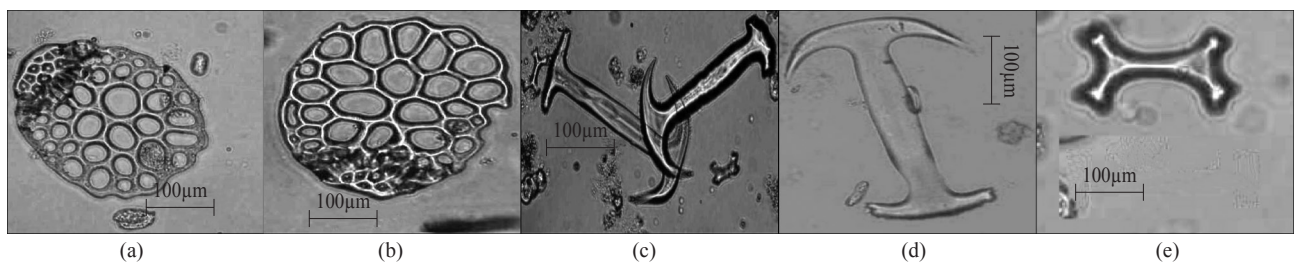


Fig. 3. Spicules of *Protankyra bidentata*. a and b : Anchor plates, c and d : Anchors, e : Rod

James (2004; 2008) reviewed echinoderms from India and concluded that there are nearly 200 species of holothurians in the seas around India. The present report of a non-native holothurian *P. bidentata* in Indian Ocean might be incidental, possibly introduced through ballast water, explained by the proximity of the sampling location to Goa Port (Cordell *et al.*, 1992; Buttermore *et al.*, 1994; Gosliner, 1995).

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References

- Buttermore, R. E., Turner, E. and Morrice, M. G. 1994. The introduced northern Pacific seastar *Asterias amurensis* in Tasmania. *Mem. Queensl. Mus.*, 36: 21-25.
- Cherbonnier, G. 1964. Holothurians recoltées par A. Crosnier dans le Golfe de Guinée. *Bull. Mus. Nat. Hist. Nat. 2 Ser.*, 36: 647-676.
- Clark, H. L. 1907. The apodous holothurians. *Smithson. Contrib. Knowledge*, 35: 1-231, pls. 1-13.
- Clark, A. M. and Rowe, F. E. W. 1971. Monograph of shallow-water Indo-West Pacific echinoderms. *British Museum Natural History Publications*, London, 690: 1-238.
- Cordell, J. R., Morgan, C. A. and Simenstad, C. A. 1992. Occurrence of the Asian calanoid copepod *Pseudodiaptomus inopinus* in the zooplankton of the Columbia River valley. *J. Crust. Biol.*, 12: 260-269.
- Gosliner, T. M. 1995. Introduction and spread of *Philine auriformis* (Gastropoda: Opisthobranchia) from New Zealand to San Francisco Bay and Bodega Harbour. *Mar. Biol.*, 122: 249-255.
- James, D. B. 1982. Studies on Indian echinoderms-11 On *Protankyra tuticorenensis* sp. nov. and other apodous holothurians from the Indian Seas. *J. Mar. Biol. Assoc. India*, 24(1-2): 92-105.
- James, D. B. 2004. A bibliography of Indian sea cucumbers. *Tech. Bull. 2. Fisheries Technocrats Forum Chennai*, p. 1-26.
- James, D. B. 2008. Indian echinoderms, their resources, biodiversity, zoogeography and conservation. In: Natarajan, P., Jayachandran, K. V., Kannaiyan, S., Ambat Babu and Arun Augustine (Eds.), *Glimpses of aquatic biodiversity-Rajiv Gandhi Chair Special Publication*, Cochin University of Science and Technology, Kochi, p. 120-132.
- Kerr, A. M. and Kim, J. 1999. Bi-penta-bi-decaradial symmetry: a review of evolutionary and developmental trends in Holothuroidea (Echinodermata). *J. Exp. Zool., B: Mol. Dev. Evol.*, 285: 93-103.
- Koehler, R. and Vaney, C. 1905. An account of the deep-sea Holothuroidea collected by the Royal Indian Marine Survey Ship Investigator. In: *Echinoderms of the Indian Museum 3*. Indian Museum, Calcutta, p. 1-15.
- Lane, D. J. W. and Vandenspiegel, D. 2003. *A guide to sea stars and other echinoderms of Singapore*. Singapore Science Centre, Singapore, 187 pp.
- NIO-bio Search, 2015. <http://www.biosearch.in/publicSearchIndex.php?key1=P>.
- Paik, S. G., Yun, S. G., Park, H. S., Lee, J. H. and Ma C. W. 2008. Effects of sediment disturbance caused by bridge construction on macrobenthic communities in Asan Bay. *Korean J. Environ. Biol.*, 29: 559-566.
- Pawson, D. L., Gage, J. D., Belyaev, G. M., Mironov A. N. and Smirnov, A.V. 2003. The deep sea synaptid *Protankyra brychia* (Echinodermata: Holothuroidea). *Sarsia*, 88: 59-174.
- Pawson, D. L. 2007. Phylum Echinodermata. *Zootaxa*, 1668: 749-764.
- Rowe, F. W. E. 1983. Collection of Holothurians in the Leiden Museum from the East Indies and New Guinea, with the description of a new species of *Protankyra* (Holothuroidea: Synaptidae) from Java. *Zool. Med. Leiden*, 57(17):149-164.
- Semper, C. 1868. Holothurien. Reisen im Archipel der Philippen. Holothurien. 2. *Wissenschaftliche Resultate. Wiesbaden, Leipzig*.
- Shin, P. K. S. and Thompson, G. B. 1982. Spatial distribution of the in faunal benthos of Hong Kong. *Mar. Ecol. Prog. Ser.*, 10: 37-47.
- Singh, B. N. and Choudhary, A. 1992. A new record of *Protankyra similis* (Semper) (Holothuroidea: Apoidida) from Indian brackishwater environment. *Obelia*, 18: 109-119.
- Teo, S. and Ng, C. S. L. 2009. New record of a sea cucumber, *Holothuria ocellata* (Jaeger, 1833) (Holothuroidea: Aspidochirotida: Holothuriidae) in Singapore. *Nature in Singapore*, 2: 411-414.
- Thandar, A. S. 2007. Additions to the aspidochirotid, molpadid and apodid holothuroids (Echinodermata: Holothuroidea) from the east coast of southern Africa, with descriptions of new species. *Zootaxa*, 1414: 1-62.
- Toral-Granda, M. V. 2005. The use of calcareous spicules for the identification of the Galápagos sea cucumber *Isostichopus fuscus* on the international market SPC. *Beche-de-mer Info. Bull.*, 22: 3-5.

Woodward, S. P. and Barrett, L. 1858. On the genus *Synapta*.
Proc. Zool. Soc. Lond., 26: 350-367.

Yokoyama, H., Tamaki, A., Koyama, K., Ishihi, Y., Shimoda, K.
and Harada, K. 2005. Isotopic evidence for phytoplankton
as a major food source for macrobenthos on an intertidal

sandflat in Ariake Sound, Japan Hisashi. *Mar. Ecol. Prog.
Ser.*, 304: 101-116.

Yokoyama, H., Sakami, T. and Ishihi, Y. 2009. Food sources
of benthic animals on intertidal and subtidal bottoms in
inner Ariake Sound, southern Japan, determined by stable
isotopes. *Estuar. Coast. Shelf Sci.*, 82: 243-253.