

FIRST REPORT OF *HASTULA ANOMALA* (GRAY, 1834) (GASTROPODA: TEREBRIDAE) FROM INDIAN WATERS

Members of the gastropod family Terebridae, commonly known as auger or pencil shells are distinctively narrow, slender and multiwhorled, inhabiting specialized sand and mud shallow marine habitats¹. Worldwide, this family is represented by about 400 species² with significant numbers from the tropical Indo Pacific region^{3,4}. In India, collections of terebrids were made in the latter half of the nineteenth century by G. H. Booley from Andamans and J. Henderson off Chennai waters and were subsequently studied by J.C. Melvill and others^{5,6}. The collections were deposited in the Manchester Museum, The University of Manchester, U.K. In all, 21 species were reported from Andamans and 17 from Tamil Nadu. Until now, studies with specific reference to terebrids^{3,7} were mostly from biodiversity-rich areas such as the Andaman Islands and Tamil Nadu. Although 69 species were reported from India, certain synonymies accorded to the species in the afore-cited publications are redundant, confusing, and not updated according to the latest nomenclature provided in the MolluscaBase². Recent examinations^{3,7} of the Terebridae collection present in the Zoological Survey of India, recorded 52 species, most of which (45 species) were from the Andamans, some (4 species) from Tamil Nadu and other coastal regions (14 species) of India. The majority of the terebrid species were assigned to the genera *Hastula* and *Terebra*. Currently, of the terebrids occurring in India, 13 species are ascribed to the former genus and 17 species to the latter. Of these, 5 species of *Hastula* and 6 species of *Terebra* were from Andhra Pradesh waters. Hitherto 13 species of terebrids were documented off Andhra Pradesh^{8,3,9} on the east coast of India, with most also distributed in the coasts of Tamil Nadu and Andamans. The earlier studies on Terebridae of Andhra Pradesh were based on museum or beach-washed specimens. Our recent exploratory benthic surveys (2008–2017) along India's east peninsular coast from 13°59.988'N, 80°11.599'E to 18°59.509'N, 84°42.934'E, revealed in all, 11 species of the family Terebridae in live condition, in the dredge hauls, the first exclusive report from the state. Five species, namely *Hastula anomala* (Gray,

1834), *H. raphanula* (Lamarck, 1822), *Terebra cumingii* Deshayes, 1857, *T. triseriata* Gray, 1834, and *T. quoygaimardi* Cernohorsky & Bratcher, 1976 are new additions to the Mollusca inventories from Andhra Pradesh. In addition, *H. strigilata* (Linnaeus, 1758) depicted a distribution range along the east coast of India from Odisha³, Andhra Pradesh⁸, and Tamil Nadu, while *H. raphanula* (Lamarck, 1822) was earlier recorded from Kerala and Karnataka on the west coast and observed in the Andaman Islands and Bay of Bengal³. Notably, the incidence of *H. anomala* is the first-time observation from India and reported here. The total number of terebrids from the state currently adds up to 18. The list of species reported from the state is given in Table 1.

Material examined 2 sp (live specimens), Reg No. MBLDZAU-103 (Fig. 1) (Deposited at Marine Biology Laboratory, Department of Zoology, Andhra University); dated 18.09.2014; Locality: Nakkapalli (17°20.608'N, 82°43.123'E) of Andhra Pradesh, India, depth of 15.7m.

Measurements Morphometric shell characteristics measurements (mm) of *Hastula anomala* (Gray, 1834), are tabulated (Table 2).

Description Shell shiny, moderate size. Whorls 10, plus 3 whorls of protoconch, sloping. Body whorl straight-sided, flattened, and elongate. Background color dark orange-brown and ornamented with a broad white band on the body whorl just above the margin of aperture and the suture for other whorls; indistinctly ribbed on either side of the suture, characterized by a distinct band and prominent sub sutural grooves. Spire bluish-colored, aperture broad and smooth, with straight outer lip, a white band within the aperture, the base of aperture straight, columella twisted and with strong fasciolar band.

Habitat Sandy substrate (sand 92.62%, silt & clay 7.38%, organic matter 1.37%), salinity 21.52 PSU.

Geographic range Madagascar, India (Andhra Pradesh), Philippines.

Table 1 List of Terebrid species recorded from Andhra Pradesh

Sl. No.	Species	References
1	<i>Duplicaria duplicata</i> (Linnaeus, 1758)	Ramakrishna <i>et al.</i> , 2007
2	<i>Gradaterebra capensis</i> (E. A. Smith, 1873)	Monolisa & Edward, 2015
3	<i>Hastula anomala</i> (Gray, 1834)	Present collection
4	<i>H. bacillus</i> Deshayes 1859	Ramakrishna <i>et al.</i> , 2007; Venkitesan <i>et al.</i> , 2012
5	<i>H. raphanula</i> (Lamarck, 1822)	Present collection
6	<i>H. strigilata</i> (Linnaeus, 1758)	Ramakrishna <i>et al.</i> , 2007
7	<i>H. traillii</i> (Deshayes, 1859)	Ramakrishna <i>et al.</i> , 2007; Venkitesan <i>et al.</i> , 2012
8	<i>Impages hectica</i> (Linnaeus, 1758)	Ramakrishna <i>et al.</i> , 2007
9	<i>Myurella affinis</i> (Gray, 1834)	Monolisa & Edward, 2015
10	<i>Oxymeris crenulata</i> (Linnaeus, 1758)	Venkitesan <i>et al.</i> , 2012; Monolisa & Edward, 2015
11	<i>O. maculata</i> (Linnaeus, 1758)	Ramakrishna <i>et al.</i> , 2007; Venkitesan <i>et al.</i> , 2012
12	<i>Punctoterebra succincta</i> (Gmelin, 1791)	Ramakrishna <i>et al.</i> , 2007; Venkitesan <i>et al.</i> , 2012
13	<i>Terebra commaculata</i> (Gmelin, 1791)	Ramakrishna <i>et al.</i> , 2007; Venkitesan <i>et al.</i> , 2012
14	<i>T. cumingii</i> Deshayes, 1857	Present collection
15	<i>T. guttata</i> (Röding, 1798)	Ramakrishna <i>et al.</i> , 2007; Venkitesan <i>et al.</i> , 2012
16	<i>T. quoygaimardi</i> Cernohorsky & Bratcher, 1976	Present collection
17	<i>T. subulata</i> (Linnaeus, 1758)	Monolisa & Edward, 2015
18	<i>T. triseriata</i> Gray, 1834	Present collection

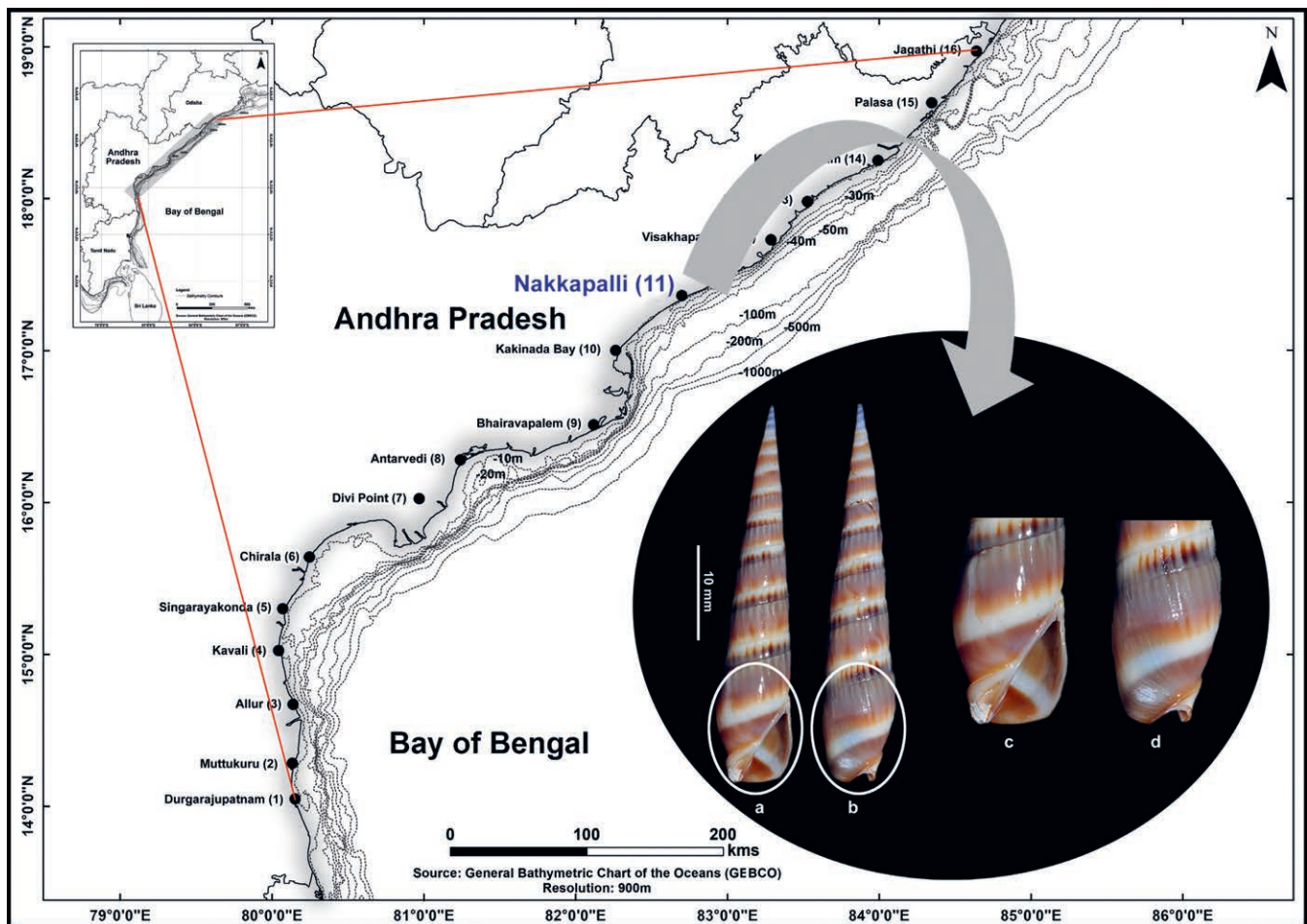


Figure 1 Location map showing the site of collection, along the coast of Andhra Pradesh, east coast of India; a-d *Hastula anomala* (Gray, 1834) a Ventral view b Dorsal view c and d enlarged anterior part.

Table 2 Morphometric measurements (mm) of *Hastula anomala* (Gray, 1834)

Characteristics	Specimen 1	Specimen 2
Shell Length	36.36	45.02
Shell Width	7.58	8.62
Thickness of shell	7.1	8.22
Aperture length	10.74	11.2
Aperture Width	4.64	4.64
No. of whorls	13	13

Comparisons Specimens of *H. anomala* examined are similar to the type specimen rechecked and reported¹⁰. Of the 15 species of *Hastula* reported from India³, the specimens obtained in the present study resemble *H. stylata* in certain characters. The species is morphologically dissimilar to *H. stylata*. The shell color in the latter is apparently deep brown in contrast to the dark orange hue observed in *H. anomala*. Furthermore, the suture in *H. anomala* has a broad white band with distinct narrow axial ribs and clearly visible subsuture in comparison to a mere narrow band in *H. stylata*. The difference observed between *H. anomala* and *H. strigilata*, is distinct. The shell in the latter is characterized by manifestation of a white streak with small blackish-brown blocks of near rhomboidal patterns, below the suture on the subsutural bands, the presence of prominent axial sculptures and a narrow siphonal canal without the columellar fold. *H. raphanula* (Lamarck, 1822) in our collection showed a faded brownish-purple blended coloration, the shell encircled by markedly defined flattened subsutural bands without patterns, no axial sculptures, and absence of a columellar fold.

Remarks Notably, *Diplomeriza anomala* (p.75 Pl.1, fig1)³, is a clear misidentification as evident from the figure. The columella is described as straight and little calloused in the specimen. Besides, the absence of a bluish aperture distinctive of the species lacks mention in the above cited publication. Our attempts to locate the specimen in the Zoological Survey of India were futile. Reexamination of the existing image (p.75 Pl.1, fig. 1, op. cit), indicated morphological similarity to *Hastula* sp. possibly suggestive of an additional new record from India. The species certainly does not belong to the genus *Diplomeriza*, as the latter is characterized by small and ovate aperture, prominent axial ribs, deep spiral grooves

at the suture, besides the presence of a siphonal canal with a deep notch. In contrast, the genus *Hastula* is differentiated by wide aperture, short anterior canal with a wide deep notch, indistinct spiral groove with fine close-set axial ribs, mostly without a well-defined sub sutural band, folded columella, exceedingly short, stout siphonal canal and well-developed fasciole. Notably, the presence of a twisted columella with strong fasciolar band is characteristic of *H. anomala*, a feature observed in the live specimens obtained in our collections.

Distribution data indicated a single listing of *H. anomala* from Madagascar in the Indian Ocean, and the Philippines (www.obis.org 22.08.2020) with none recorded from the Indian subcontinent. The occurrence of the specimens examined in this study is the first documentation of *H. anomala* from the Indian coastal waters.

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¹ FEDOSOV AE, MALCOM G, TERRY Y, GORSON J, MODICA MV, HOLFORD M & PULIANDRE N 2019 Phylogenetic classification of the family Terebridae (Neogastropoda: Conoidea) *Journal of Molluscan Studies* **85** (4)359–388. doi:10.1093/mollus/eyz004.

² MOLLUSCABASE Eds. 2020 MolluscaBase. *Terebra Bruguière, 1789* Accessed through: World Register of Marine Species at: <http://www.marinespecies.org/aphia.php?p=taxdetails&id=160427> on 2020-09-03.

³ VENKITESAN R & MUKHERJEE AK 2012 Contribution to the knowledge on Indian marine molluscs: Family Terebridae. *Records of the Zoological Survey of India* **111** (Part-3) 49–77.

⁴ KANTOR YI, FEDOSOV AE & MARIN IN 2012 An unusually high abundance and diversity of the Terebridae (Gastropoda: Conoidea) in Nha Trang Bay, Vietnam *Zoological Studies* **51** 663–670.

- ⁵ MELVILL JC & SYKES ER 1898 Notes on a second collection of marine shells from the Andaman Islands with the description of new species of *Terebra* *Proceedings of the Malacological Society of London* (for 1898–1899) **3** 35–48.
- ⁶ MELVILL JC & STANDEN R 1898 The marine Mollusca of Madras and the immediate neighbourhood *Journal of Conchology* **9** 30–45.
- ⁷ DEY A 2016 *Catalogue of Marine Molluscs* (Polyplacophora and Gastropoda) 1–687, 192 plates, Zoological Survey of India.
- ⁸ RAMAKRISHNA DEY A, BARUA S & MUKHOPADHYA A 2007 Marine molluscs: Polyplacophora and Gastropoda *Fauna of Andhra Pradesh, State Fauna' Series 5* (Part-7): 1–148. *Zoological Survey of India*.
- ⁹ MONOLISHA S & EDWARD JKP 2015 Biodiversity of marine mollusc from selected locations of Andhra Pradesh coast, South eastern India *Indian Journal of Geo-Marine Sciences* **44** (6) 842–855.
- ¹⁰ CERNOHORSKY WO 1969 List of type specimens of Terebridae in the British museum (Natural History) *The Veliger* **11** 210.

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