

Short Communication

New distribution record of Honeycomb *Sabellaria miryaensis* Parab & Gaikwad, 1990 (Polychaeta: Sabellariidae) from the Eastern coast of India, with the first-time report of the genus along the Odisha coast, Bay of Bengal

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Received 11 August 2024; revised 24 October 2024

In the paper, a taxonomic account of the honeycomb, *Sabellaria miryaensis* Parab & Gaikwad, 1990, is provided based on specimens collected during a daily routine local survey from the Gopalpur coast, Odisha, Bay of Bengal. The species of honeycomb worm was identified based on the morphological characters of the body and paleae structure. The species was formerly described from the Jakimiriya, Ratnagiri, West Coast, but this present study represents the distributional record to the east coast of India.

[Keywords: Bay of Bengal, East coast, Honeycomb, New record, Paleae morphology, *Sabellaria*]

Introduction

Sabellarids, commonly called honeycomb or sandcastle worms, can be identified by their well-constructed tubes of cemented sand grains forming reefs¹. They also have a well-developed operculum with rows of palea that seal the entrance tube. The family Sabellariidae Johnston, 1865 is divided into two subfamilies, *i.e.*, Lygdaminae Kirtley, 1994 and Sabellariinae Johnston, 1865^(ref. 2). The genus *Sabellaria* Lamarck, 1818 has a mid-ventral depression on the anterior end of the opercular stalk

and crown separated into symmetrical halves². Opercular paleae of this genus is organised into three concentric rows and separated into symmetrical halves, distinguishing them from its other genera^{2,3}. The sabellarids body is divided into four regions, *i.e.*, the operculum region, the thoracic and parathoracic region, the abdominal segments region, and the un-segmented posterior region. The posterior part of the body ends in a tubular and unsegmented region³. The genus *Sabellaria* includes 44 species, and it is considered cosmopolitan and usually inhabits shallow waters worldwide³⁻⁸. Of these, only seven were reported previously from the Indian waters, *i.e.*, *S. alcocki* Gravier, 1906; *S. alveolata* (Linnaeus, 1767); *S. floridensis* Hartman, 1944; *S. intoshi* Fauvel, 1914; *S. miryaensis* Parab & Gaikwad, 1990; *S. pectinata* Fauvel, 1932; and *S. spinulosa* (Leuckart, 1849)⁹⁻¹².

Materials and Methods

In this study, the coral reef-associated honeycomb worms were collected during a routine faunal biodiversity survey in the Gopalpur coast, Odisha, East coast of India, Bay of Bengal (19°15'55.0" N; 84°54'43.0" E), Odisha (Fig. 1). The examined specimens and their tubes were collected by hand picking from the sandy beach and transported to the Laboratory in plastic zip containers with seawater. The specimens were anaesthetised with magnesium chloride. After that, the specimens were fixed in 4 % formaldehyde and preserved in 70 % alcohol for further studies. Body measurements included total length from the apical end of the crown (including palea) to the last abdominal segments, width in the parathoracic regions, and lengths of the caudal peduncles, measured using a calliper (accuracy 0.1 mm). The specimens were observed and photographed with a stereoscopic microscope (Leica S9i). Opercular palea, chaetae, and uncini were dissected and mounted on glycerin slides, photographed with a digital camera, and observed under an optical microscope (Olympus CH20i). For future reference, the specimens were deposited in the NZC, MARC, ZSI, Digha, West Bengal, India. The specimen identification was carried out using literature by Kirtley².

Abbreviations used

AN: Andaman & Nicobar Islands, LD: Lakshadweep Islands, GA: Goa, MH: Maharashtra, TN: Tamil Nadu, WC: West Coast, KL: Kerala, KA: Karnataka, WB: West Bengal, MARC: Marine Aquarium and Regional Centre, ZSI: Zoological Survey of India, NZC: National Zoological Collection.



Fig. 1 — Map showing the distribution of *Sabellaria miryaensis* from India: Gopalpur, Odisha (green dot indicates new record); and Ratnagiri, Maharashtra (red dot indicates earlier record of the species)

Results

Class: Polychaeta Grube, 1850

Family: Sabellariidae Johnston, 1865

Genus: *Sabellaria* Lamarck, 1818

Sabellaria miryaensis Parab & Gaikwad, 1990

Common name: Honeycomb worms

Material examined

52 specimens (31.78 – 67.86 mm); Gopalpur, Odisha, 19°15'55.0" N, 84°54'43.0" E; February 26, 2024; ZSI/MARC/P1529; collector – Rajesh Kumar Behera. 35 specimens (29.71 – 50.53 mm); Gopalpur, Odisha; 19°15'55.0" N, 84°54'43.0" E; March 28,

2024; ZSI/MARC/P11530; collector – Sandeep Kumar Mohapatra.

Diagnosis

Body length 29.89 – 67.86 mm, 3.19 – 5.69 mm in width, crown length 3.32 – 7.71 mm, pygidium length 3.33 – 13.22 mm. Anterior end of the opercular stalk entirely separated into symmetrical halves along the anterior midline. Operculum fused with dorsal margin with paleae. Three parathoracic segments. An operculum consists of numerous golden paleae almost close to the tube. Opercular crown and stalk divided into two symmetrical lobes at the anterior midline.

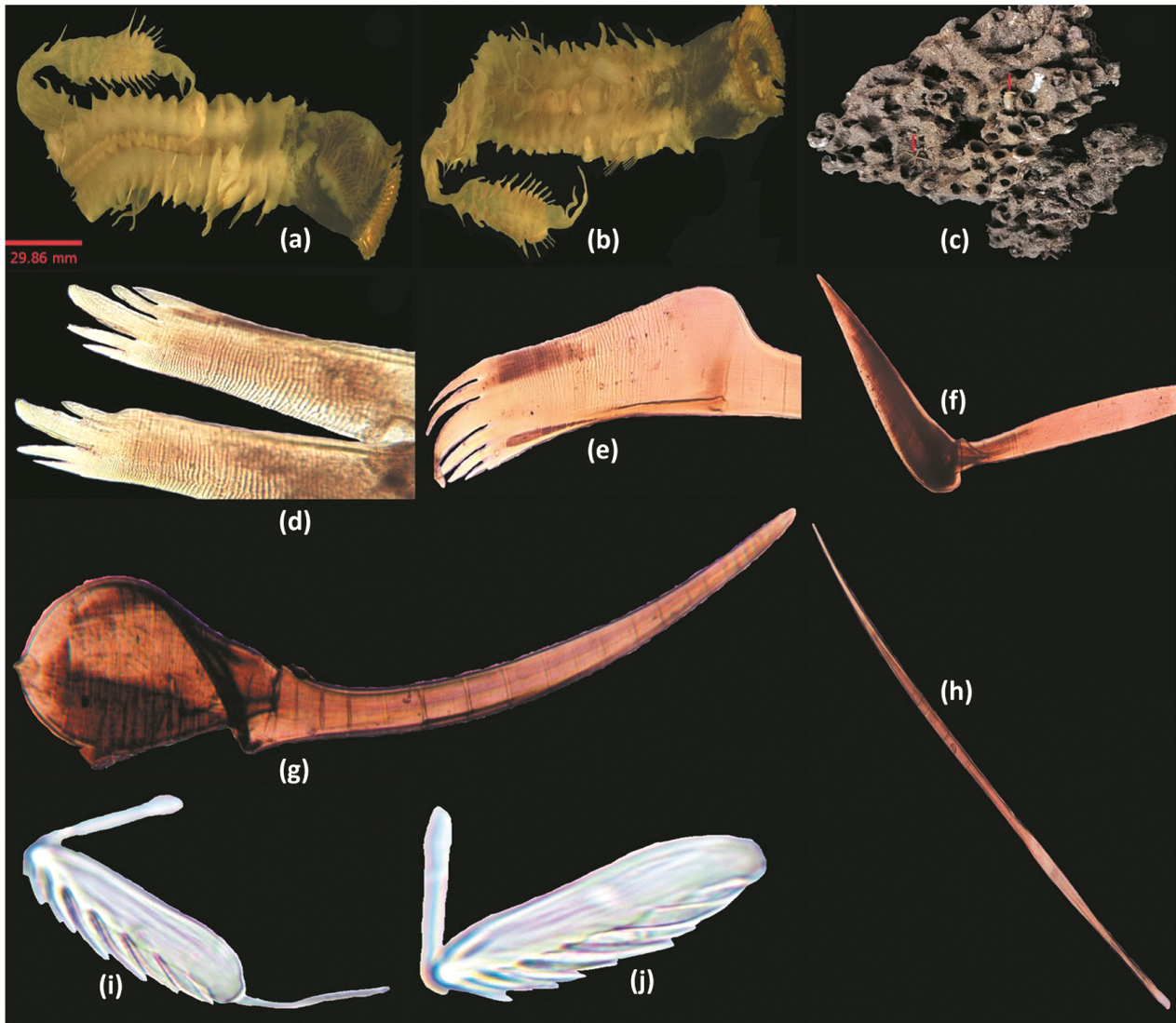


Fig. 2 — *Sabellaria miryaensis*: (a) Dorsal portion of the specimen, (b) Ventral portion of the specimen, (c) Portion of the reef showing the first segments of the worms out of the tubes, (d – e) Outer palea, (f) Middle palea, (g) Inner palea, (h) Distal tip of abdominal neurosetae, and (i – j) Abdominal uncini

Opercular paleae on each lobe arranged in 3 rows of three to four kinds of paleae. Paleae bright yellow or light brown with resinous luster. Paleae divided into three types: outer paleae rectangular in outline, a distal end with a large median tooth with tip laterally and narrowing to a harping point, with three smaller straight teeth on either side (Fig. 2d – e). Middle paleae subovate in outline with small distal tip (Fig. 2f). Inner paleae - geniculate blade slightly excavate on the upper surface, with a narrow blade tapering to a sharp distal tip (Fig. 2g); distal tip of abdominal neurosetae (Fig. 2h), and abdominal uncini (Figs. 2i – j). Dorsal branchiae present in parathoracic and abdominal segments. Blades bent slightly

outwards from the longitudinal axis of the shaft, distal lateral margins.

Distribution

The type locality of this species is on the Jakimirya, Ratnagiri, West Coast of India¹¹, and this report extends its distribution to the Bay of Bengal in the Indian Ocean.

Discussion

Kirtley² identification key defines the *Sabellaria* species by the configuration of the opercular stalk and crown structure, the number and types of paleae present in the crown, the geometry and superficial

Table 1 — List of the species of family Sabellariidae from India

Sl. No.	Name of the species	Distribution and references
1.	<i>Idanthysrus pennatus</i> (Peters, 1854)	Andaman & Nicobar Islands ¹⁵
2.	<i>Lygdamis indicus</i> Kinberg, 1866	Andaman & Nicobar Islands, Lakshadweep ¹⁶
3.	<i>Neosabellaria cementarium</i> (Moore, 1906)	Goa, Maharashtra, Tamil Nadu ¹⁴
4.	<i>N. rupicaproides</i> (Augener, 1926)	Kerala ¹⁰
5.	<i>N. clandestinus</i> (Menon & Sareen, 1966)	Karnataka ¹⁹
6.	<i>Sabellaria chandrae</i> Silva, 1961	Maharashtra ¹⁹
7.	<i>S. alococki</i> Gravier, 1906	West Bengal ¹⁴
8.	<i>S. alveolata</i> (Linnaeus, 1967)	Kerala ⁹
9.	<i>S. floridensis</i> Hartman, 1944	Tamil Nadu ⁹
10.	<i>S. intoshi</i> Fauvel, 1914	Tamil Nadu ¹⁶
11.	<i>S. miryaensis</i> Parab & Gaikwad, 1990	Maharashtra ¹¹
12.	<i>S. pectinata</i> Fauvel, 1932	West Bengal ¹⁷
13.	<i>S. spinulosa</i> (Leuckart, 1849)	Kerala, Tamil Nadu, West Bengal ¹⁷

ornamentation of the thecae; small structure of the opercular region and the morphology of the opercular palea and chaetae; the presence of nuchal hooks or spines; the presence or absence of a median organ or aboral cirrus; and the form of the oral feeding tentacles. Both species *Sabellaria pectinata* and *S. miryaensis* share similarities in outer paleae with distal median tooth not sigmoidal. The outer palea of *S. miryaensis* distal median tooth bent abruptly at the tip, whereas, *S. pectinata* exhibits a median tooth not bent. In *S. alveolata*, the blades of the middle paleae obovate, upper surface slightly concave, narrowing abruptly to a small tip, slightly twisted from the axial plane of shafts; while in *S. miryaensis*, middle paleae ovate in outline, inner paleae with geniculation blades slightly excavate on the upper surface, with narrow blades tapering to sharp distal tips. The species *S. miryaensis* may be affected by natural calamities, cyclones, and shore currents. An extensive study can be done to explore more species along the Indian coast. In Indian waters, a total of 13 species of the family Sabellariidae are reported^{9-11,14-17,19} (Table 1). Thus, the morphology of the operculum and configuration of the paleae and other features such as thoracic chaetae and abdominal uncini are crucial for the taxonomic classification of the family Sabellariidae¹³. Significant abundance and diversity of the species were found around the depth of 3 – 4 meters. At this depth, more than 100 specimens were associated with starfish, sea urchins, isopods, crabs, and other lower invertebrates¹⁴. The present study provides information about the species *S. miryaensis*, which occupies a great extension of the bay.

Conclusion

The present study on the honeycomb worm *Sabellaria miryaensis* reports a new distributional record for the eastern coast of India, the Bay of Bengal. This also indicates the presence of the coral reefs on the southern coast of Odisha. The species is found associated with crabs, starfish, isopods, and other lower invertebrates. Therefore, it is highly recommended that more comprehensive research be conducted to assess the polychaete faunal distribution of the Odisha coast to improve conservation efforts.

Acknowledgments

Our sincere thanks to Dr Dhriti Banerjee, Director, ZSI, Kolkata, for her support and encouragement. The corresponding author thanks Yessica Chávez López, El Colegio de la Frontera Sur Chetumal, Mexico, for providing the old literature and confirmation on species. The corresponding author (SB) gratefully acknowledges the Ministry of Earth Science, under the Deep Ocean Mission, Govt. of India (MoES/PAMC/DOM/310/2023 (E-16389), dated 05.11.2024), New Delhi, for their financial support. We also like to thank the two anonymous reviewers for their valuable comments, which greatly improved the manuscript.

Conflicts of Interest

There are no conflicts of interest among authors.

Ethics Statement

The organisms under study are neither in the schedule list nor in any other protection categories; hence, an ethical clearance certificate is not necessary.

Author Contributions

JP: Examination of specimens and manuscript preparation; RKB & SKM: Specimen collection and preservation; and SB: Manuscript reviewing (draft copy). All authors verified the final manuscript.

References

- Sabfilippo R, Rosso A, Mastandrea A, Viola A & Deias C, *Sabellaria alveolata* sandcastle worm from the Mediterranean Sea: New insights on tube architecture and biocement, *J Morphol*, 280 (2019) 1839–1849. <https://doi.org/10.1002/jmor.21069>
- Santos A S D, Brasil A C D S & Christoffersen M L, *Sabellaria* and *Lygdamis* (Polychaeta: Sabellariidae) from reefs off northeastern Brazil including a new species of *Sabellaria*, *Zootaxa*, 3881 (1) (2014) 125–144. <https://doi.org/10.11646/zootaxa.3881.2.2>
- Kirtley D W, *A review and taxonomic revision of the family Sabellariidae Johnston, 1865 (Annelida: Polychaeta) Sabecon*, (Press Science Series Vero Beach, Florida), 1994, pp. 223.
- Nishi E, Bailey-Brock J H, Santos A S D & Kupriyanova E K, *Sabellaria isumiensis* n. sp. (Annelida: Polychaeta: Sabellariidae) from shallow waters off Onjuku, Boso Peninsula, Japan, and re-descriptions of three Indo-West Pacific sabellariid species, *Zootaxa*, 2680 (2010) 1–25. <https://doi.org/10.11646/zootaxa.2680.1.1>
- Nishi E, Matsuo K, Capa M, Tomioka S, Kajihara H, *et al.*, *Sabellaria jeramae*, a new species (Annelida: Polychaeta: Sabellariidae) from the shallow waters of Malaysia, with a note on the ecological traits of reefs, *Zootaxa*, 4052 (5) (2015) 555–568. <https://doi.org/10.11646/zootaxa.4052.5.3>
- Hutchings P, Capa M & Peart R, Revision of the Australian Sabellaridae (Polychaeta) and description of eight new species, *Zootaxa*, 3306 (2012) 1–60. <https://doi.org/10.11646/zootaxa.3306.1.1>
- Lezzi M, Cardone F, Mikac B & Giangrande A, Variation and ontogenetic changes of opercular paleae in a population of *Sabellaria spinulosa* (Polychaeta: Sabellaridae) from the South Adriatic Sea, with remark, on larval development, *Sci Mar*, 79 (1) (2015) 1–15. <https://doi.org/10.3989/scimar.04127.19A>
- Chávez-López Y, New species and new records of *Phragmatopoma* (Polychaeta: Sabellariidae) from Tropical America, *Zootaxa*, 4845 (3) (2020) 301–330. <https://doi.org/10.11646/zootaxa.4845.3.1>
- Day J H, Polychaeta collected by U.D. Gaikwad at Ratnagiri, south of Bombay, *Zool J Linn Soc London*, 52 (4) (1974) 337–361. <https://doi.org/10.1111/j.1096-3642.1973.tb01888.x>
- Achary G P K, Sabellariids as associates of other invertebrates and their role in the formation of benthic animal communities, *J Mar Biol Assoc India*, 11 (172) (1969) 198–202.
- Achary G P K, Polychaetes of the family Sabellariidae with special reference to their intertidal habitat, *Proc Nat Acad Sci, India Sec B: Biol Sci*, 38 (1974) 442–455.
- Parab P P & Gaikwad U D, Morphological description and ecology of *Sabellaria miryaensis* sp. nov. (Polychaeta: Sabellariidae) from the west coast of India, *J Eco-Biol*, 2 (4) (1990) 298–305.
- Chávez-López Y & Cruz-Gómez C, New records of polychaetes (Annelida: Polychaeta) from three locations of Oaxaca, Mexico, *Rev Biol Trop Int J Trop Biol*, 67 (S5) (2019) 157–168. <https://doi.org/10.15517/RBT.V67Is5.38941>
- Fauvel P, *The fauna of India including Pakistan, Ceylon, Burma and Malaysia-Annelida Polychaeta, Part I (Errantia) and Part II (Sedentaria)*, (The Indian Press Ltd, India), 1953, pp. 393.
- Sekar V, Rajasekaran R, Balakrishnan S & Raghuraman R, Taxonomical Keys for Morphological Identification of Coral-Associated from Great Nicobar Islands, In: *Natural Resources Management and Biological Sciences*, edited by Rhodes E R & Naser H, (IntechOpen), 2019, pp. 1–33. <https://doi.org/10.5772/intechopen.88668>
- Sivadas S K & Carvalho R, Marine Annelida of India: taxonomy and status evaluation and an updated checklist, *J Threat Taxa*, 12 (12) (2020) 16647–16714. <https://doi.org/10.11609/jott.5357.12.12.16647-16714>
- Fauvel P, Annelida Polychaeta of the Indian Museum, Calcutta, *Mem Indian Mus*, 12 (1) (1932) 1–262, plates I–IX. Available online at <http://faunaofindia.nic.in/PDFVolumes/memoirs/012/01/index.pdf>; pages(s): 210–211, text-figs. 35a–h
- Achary G P K, Catalogue of polychaetes in the references collections of the Central Marine Fisheries Research Institute, In: Catalogue of types and of sponges, corals, polychaetes, crabs and echinoderms in the references collections of the Central Marine Fisheries Institute, edited by James P S B R, Thomas P A, Pillai C S G & Achari G P K, *Bulletin of CMFRI*, 7 (1969) 31–40.
- Menon P K B & Sareen M L, A new species of Sabellariidae (Polychaeta) from India, *Zool Anz*, 177 (5–6) (1966) 435–438.