Occurrence And Morphological Identification Of *Armina Juliana* (Nudibranchia: *Arminidae*) From Thoothukudi New Harbour (Puthiyathuraimugam) The Gulf Of Mannar, Thoothukudi Coast, Tamil Nadu, India

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ABSTRACT
Significantly, this is exploratory research on the marine biodiversity especially, the Nudibranch named *Armina juliana* (Bergh, 1861). It is a marine mollusk belonging to the family *Arminidae*. This study documents its occurrence and morphological characteristics from the Gulf of Mannar, Thoothukudi coast, Tamil Nadu, India. The specimen was collected at a depth range of 50 to 100 m (8° 47′ 39″ N and 078°09′ 36″ E) by using a drift gill net in a traditional fishing craft during a biodiversity survey. Moreover, the specimen identification was confirmed based on its external morphology, including body shape, coloration and radular structure. The literature review on the distribution of this species revealed that this is the first report of *Armina juliana* from the Gulf of Mannar, Tuticorin coast of India. Certainly, the presence of *A. juliana* in this region highlights the ecological significance of the Gulf of Mannar as a biodiversity hotspot and underscores the need for further research on sea slug diversity in Indian coastal waters.

Key words: (Nudibranchia, *Armina Juliana*, Thoothukudi, Gulf of Mannar, Sea slugs,)

Introduction

As a Gift of Mother Earth, the Gulf of Mannar serves as a biodiversity hotspot through its abundant molluscan fauna which exists in southeastern India. Nudibranchs or sea slugs are the lesser-known molluscan group and these are one of the most beautiful and diverse creature's displays attractive colours in the ocean (Sethi *et al*., 2014). There are more than 3,000 known species of nudibranch (National Geographic Animals). The Arminidae is one of the poorly known group of nudibranchs having six nominal genera; approximately 75 species (Ramya *et al.*, 2014). *Armina* is the most species-rich genus of the Arminidae family with over 50 nominal species. The monophyletic evidence for *Armina* is similar to those found in other Opisthobranchia groups (Báez *et al*., 2011). Arminids are characterized by having an elongated, flattened body and a narrow posterior end with longitudinal ridges or pustules on the notum. The notum bears marginal sacs along its marginal edge. Arminids have a distinct oral veil and rhinophores with longitudinal lamellae. In some genera a caruncle is present in front of the rhinophores. Typically, the radula has a broad, denticulated rachidian tooth and falciform lateral teeth (Kolb, 1998). Their feeding habits combined with the environmental sensitivity allow them to function as important indicators which reveal marine ecosystem health conditions. Notably, in the marine waters of India the *Armina babai* (Tchang, 1934) is the only species that has been reported from Tamil Nadu (Prasad et al., 2015 and Ramya *et al*., 2014). Similarly, the *Armina cygnea* (Bergh, 1876) and *Armina semperi* (Bergh, 1861) have been found in the Andaman and Nicobar Islands (Ramakrishna *et al*., 2010). Recently, during the biodiversity survey of gastropod in the selected study area Nudibranchs have also been collected and identified as *A. juliana* which was not yet reported from the region. Therefore, this article holds new information regarding the morphology of *Armina juliana* population at Thoothukudi coast, India.

Materials and method

Sample Collection

During a marine mollusc biodiversity survey in the Gulf of Mannar, an uncommon specimen of *Armina species* was collected from the Tuticorin coast (New Harbour, Puthiyathuraimugam: 8°47'39"N, 78°09'36"E) on 3rd March, 2023. In this study, the sampling was conducted at depths between 50–100 m using traditional fishing craft equipped with drift gill nets. This pioneering study has been represented as a notable record because, the particular species has not been previously documented in this study area through such fishing methods.

Sample Processing and Preservation

Carefully, the specimen was collected and rinsed with seawater to remove debris. Subsequently, it was preserved in 70% (v/v) ethanol for further taxonomic analysis. Morphometric measurements recorded a total length of 6.2 cm and a width

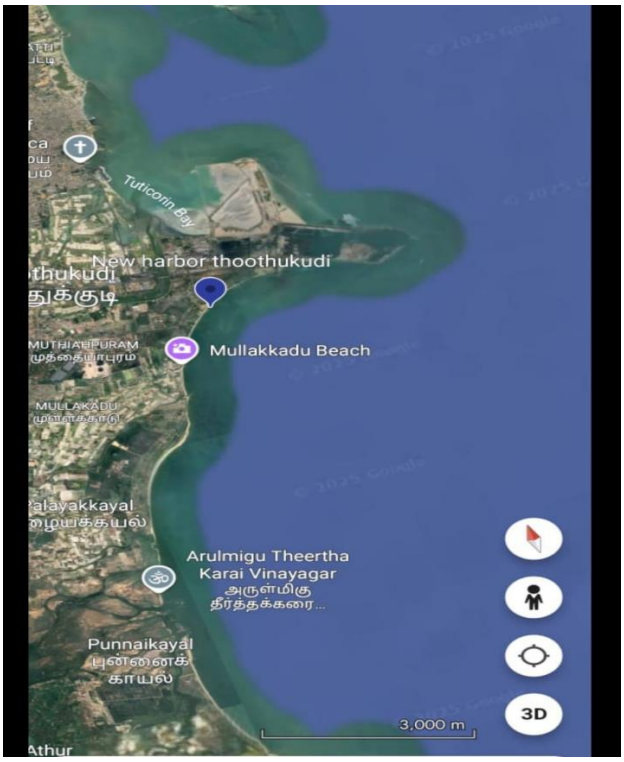
of 2.5 mm. Further specimen identification and classification follows the strategies of Kolb and Wägele (1998), Prasad *et al.*, (2015), Ramya *et al.*, (2014) and Bouchet (2015).

Taxonomic Identification

Species identification was conducted through morphological examination following established taxonomic keys and descriptions from:

1. Kolb & Wägele (1998) – Nudibranch systematics
2. Prasad et al. (2015) – Indian marine mollusc diversity
3. Ramya et al. (2014) – Gulf of Mannar nudibranch records
4. Bouchet (2015) – Global molluscan taxonomy

Photographic documentation was performed to record key diagnostic features, including body coloration, notal margin structure and oral tentacle morphology.



Results and Discussion

The present study documents the first recorded capture of *Armina juliana* in drift gillnet operations from the Gulf of Mannar, representing an important addition to the known Nudibranch fauna of this biologically diversified region. The specimen *Armina juliana* (Gray, 1850) was obtained on 3 March 2023 from New Harbour (Puthiyathuraimugam) at depths of 50-100 m (8°47'39"N, 78°09'36"E), with morphological measurements and characteristics detailed in Table 1 and then deposited at the Zoological Survey of India (ZSI), Sunderban Regional Centre, Canning, West Bengal, India. The specimen was given the accession/catalogue number KN-7988.

The specimen exhibited typical diagnostic features of *A. juliana*, including an elongated, dorsoventrally flattened body (6.2 cm length and 2.5 cm width) with distinctive coloration patterns. As shown in Table 1, key identifying characteristics included a black notum with light ridges, bright pink sole and two prominent purple dorsal spots. The asymmetric branchial lamellae (19 at the right and 16 at left) and presence of 15 hypobranchial lamellae bilaterally serves as the important taxonomic markers for species identification (Kolb & Wägele, 1998).

The presence of *Armina juliana* in the Gulf of Mannar provides essential insights into the health and functioning of the region's benthic ecosystems. As a specialized predator that primarily consumes soft corals (Octocorallia) and sea pens (Pennatulacea) (Gosliner *et al.*, 2018), its occurrence serves as a valuable bioindicator, suggesting three critical ecological conditions:

- The availability of its preferred cnidarian prey within the sampling area,
- The existence of relatively undisturbed benthic habitats capable of supporting sensitive nudibranch populations and
- The maintenance of complex trophic interactions within coral-associated ecosystems.

Table 1. Morphological characteristics of *Armina juliana* specimen

CHARACTERISTIC FEATURES	DESCRIPTION
Collection date	3 March 2023
Location	New Harbour, Gulf of Mannar (8°47'39"N, 78°09'36"E)
Depth range	50-100 m
Total length	6.2 cm
Total width	2.5 cm
Weight	150-180 g
Notum colour	Black with light ridges
Sole colour	Bright pink
Distinctive marks	Two large purple dorsal spots
Branchial lamellae	19 (right), 16 (left)
Hypobranchial lamellae	15 (bilateral)

The species demonstrated ability to sequester and potentially utilize secondary metabolites from its cnidarian prey (Bhavanarayani & Ravichandran, 2021) further underscores the intricate chemical ecology of marine invertebrates in this biodiversity hotspot, revealing important predator-prey co-evolutionary relationships. From a conservation perspective, this finding carries significant implications for both ecosystem protection and bioprospecting potential. The species' ecological requirements highlight the urgent need for:

(i) targeted protection of soft coral and sea pen habitats,
(ii) enhanced monitoring of anthropogenic impacts including bottom trawling and coastal pollution, and
(iii) Systematic inclusion of nudibranchs in biodiversity assessment programs (Ramesh *et al.*, 2020).

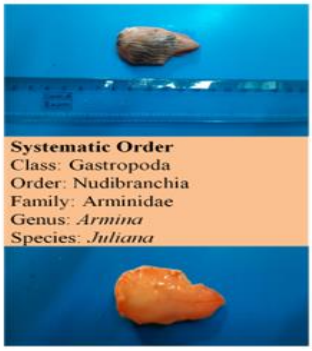


Fig. 1: Systematic order of *Armina juliana*

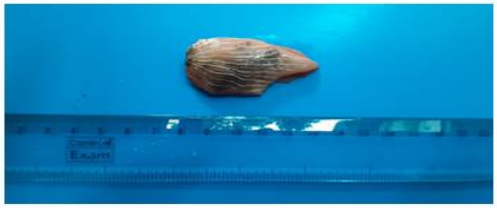


Fig. 2:Ventral morphology of *Armina juliana*

Fig. 3: Dorsal morphology of *Armina Juliana*

Simultaneously, A. juliana represents a promising yet underexplored resource for marine bioprospecting, with its secondary metabolites potentially yielding novel bioactive compounds exhibiting anti-cancer and anti-inflammatory properties (Puglisi *et al.,* 2020). The incidental capture of *A. juliana* in drift gillnet operations, while providing this valuable scientific record, simultaneously emphasizes the importance of considering non-target species in fisheries management strategies. Future research priorities should include comprehensive population assessments across the Gulf of Mannar, detailed chemical characterization of its secondary metabolites and rigorous studies of its microhabitat requirements. Such investigations will not only enhance our understanding of this ecologically significant species but also contribute to more effective conservation strategies for the Gulf of Mannar's fragile marine ecosystems in the face of increasing anthropogenic pressures and climate change impacts (Turner *et al.,* 2022).

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