

## New locality records of the sea slug Armina juliana from Puducherry coastal waters, India

The Arminidae constitutes a poorly known group of living nudibranchs occurring mainly in deep waters. Nearly 75 nominal species divided into six genera have been described (Kolb & Wagele 1998). It inhabits burrows in the sediment, mainly in deeper waters; and little is known of its biology (Marcus & Marcus 1960).

Characteristics shared by members of the family include an elongated, flattened body narrowing posteriorly, with longitudinal ridges or pustules on the notum, the latter bearing marginal sacs along its marginal edge; they have a distinct oral veil and retractile rhinophore with a caruncle in front; the radula typically having a broad denticulated rachidian tooth, and partly denticulated falciform laterals.



Dorsal view of Armina juliana from Puducherry coast, India.



Ventral view of Armina juliana from Puducherry coast, India.

All these characteristics, except for the caruncle and the subnotal lamellae, which probably have evolved within the Arminidae and are typical for some, but not all genera, are plesiomorphic and autapomorphies have yet been recognized for the Arminidae (Kolb 1998). The



genus *Armina* has more than 50 nominal species and includes the more derived forms of the group. Although *Armina* exhibits a worldwide distribution, more species have been reported in the western Atlantic waters (Marcus & Marcus 1967; Kolb & Wagele 1998). In India, recently Sethi & Rajapackiam (2012) reported the species from Chennai coastal waters. Although several investigations of sea slugs in Indian waters exist, the occurrence and reporting of *Armina* spp. appears to be rare (Ramya et al. 2014). This report is a record of *Armina juliana* at Puducherry coastal waters, 150 km south of Chennai.

In a recent Invertebrate survey along the Puducherry coast, we observed one specimen of *Armina juliana* in trawl catches during the month of May 2019 at a depth of 50–150 m. The fishing gear operated for the above catch was 34 m fish trawl. External features were examined directly when specimens were available, by photographs, or by literature review (Ardila & Diaz 2002). No vouchers were collected, but the photo vouchers (MUZSP-121) have been deposited at the zoological collections in Department of Zoology, Sir Theagaraya College, Chennai, India.

## **Systematics**

Class: Gastropoda Cuvier, 1797 Sub-class: Heterobranchia Brumeister, 1837 Order: Nudibranchia Cuvier, 1817 Family: Arminidae Rafinesque, 1814 Genus: *Armina* Rafinesque, 1814 *Armina juliana* Ardila & Diaz, 2002

The living animals are bright red in colour with contrasting white longitudinal notal ridges; the anterior margin of the oral veil and the apical portion of the rhinophores are also white. The body is elongated, flattened, narrowing posteriorly. The notum bears 34 longitudinal dorsal ridges, whose margins do not exhibit any black spots of pigment shimmer.

The oral veil is distinct. Two clubshaped rhinophores; each one with about 10 vertical lamellae. Eyes are visible through the epidermis at the outer base of each rhinophore. A caruncle is also distinguishable in front of the rhinophores. The genital opening is located on the right side, anterior to the branchial lamellae. The anal papilla is located slightly behind the midpoint (3/5 of total length, from anterior). There are 21 branchial lamella on each side of the body and 15 hyponotal lamellae.

A deep groove is present along the center of the foot sole. The pedal gland is white and located at the posterior end of the foot sole. Marginal sacs (each about 0.7 mm in diameter) are hardly distinguishable macroscopically on both sides just behind



the branchial lamellae. The rachidian tooth is broad (112  $\mu$ m) and bears 12 elongated denticles on either side of the median cusp. The first lateral tooth is short, bulky, and denticulated on the outer side of the cusp. The remaining lateral teeth are elongated and also bear denticles which become progressively smaller towards the marginal tooth rows.

Armina juliana can be distinguished from other species by one or more characters by the shape presence of radular teeth, branchial and hyponotal lamella, and distance between the rhinophores.

The species A. juliana looks similar to Armina babai but, some differential characters exist like pale yellow colour with a smooth body surface, and the notum have 35 longitudinal ridges; whereas, A. juliana have bright red body colour and white longitudinal notal ridges, having 34 longitudinal dorsal ridges; the number of branchial and hyponotal lamellae is smaller in Armina juliana compared with Armina babai. In addition, Armina juliana also differs from Armina *mulleri*, it has apparently a dark, opaque notum with light yellow or pale reddish ridges followed by the number of branchial and hyponotal lamellae. The species was originally described by Ardila & Diaz (2002), from the Caribbean coast of Columbia at a depth range of 310-460 m in the soft bottom

sediments. It has also been reported from the isolated localities from Atlantic to eastern Pacific Ocean. In Indian waters, the species was first reported by Sethi & Rajapackiam (2012) from Chennai coastal waters. After seven years this species is again reported from the southeastern coast of Puducherry. The nudibranchs of the particular area are not well studied and the present study is part of the biodiversity exploration of the area.

Sea slug is known to possess anticancer compounds which are very useful in pharmacological and pharmaceutical industries. Dolastatin-10, ILX651, Cemadotin and Kahalalide-F are marine natural anticancer compounds derived from sea slugs which are under various stages of clinical trials (Haefner 2003). However, in India the sea slugs are considered as a low value by catch and hence discarded or used for poultry and fish feed production companies.

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