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Short Communication: First Indian records and range expansion of three epitoniid gastropods in the Gulf of Mannar, India

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Abstract. *Kumar RR, Ardovini R, Venkatraman C, Pakchirajan P, Rajappa B. 2026. Short Communication: First Indian records and range expansion of three epitoniid gastropods in the Gulf of Mannar, India. Indo Pac J Ocean Life 10 (1): o100101. https://doi.org/10.13057/oceanlife/o100101.* The Gulf of Mannar, located along the southeast coast of India, is recognized as a global biodiversity hotspot, yet several molluscan groups remain poorly documented. By documenting their occurrence, this study provides evidence of range expansion and contributes to understanding the biogeographical patterns of the family in the Indo-Pacific region. This study reports the first confirmed Indian records of three epitoniid gastropods: *Epitonium angustum* and *Epitonium zatrephes*, and the first distributional record of *Epidendrium aureum* from the Gulf of Mannar thereby extending their known distributional ranges into the northern Indian Ocean. A key aspect of this study was the careful examination and comparison of morphological characters, including shell sculpture, coloration, and protoconch features, which were carefully examined and compared with authoritative taxonomic descriptions for accurate species identification. These new records provide essential baseline data for further investigations on taxonomy, systematics, and ecological interactions of Epitoniidae in Indian waters. Considering the ecological roles of epitoniids as specialized ectoparasites of sea anemones, their presence may also have implications for understanding trophic relationships in coral reef ecosystems.

Keywords: Distribution, *Epidendrium aureum, Epitonium angustum, Epitonium zatrephes,* marine biodiversity

INTRODUCTION

The family Epitoniidae, commonly known as wentletraps, represents a group of marine gastropods that are specialized predators or ectoparasites, primarily feeding on anthozoans such as soft corals and sea anemones (Morton 1967; Watson 1985). They are characterized by distinctively sculptured shells, with regularly spaced axial ribs and a high spired, turreted form. Owing to their highly specialized ecological relationships, epitoniids serve as important indicators of the structure and health of benthic communities, particularly in coral reef ecosystems. Despite their ecological significance, the family remains poorly studied in Indian waters, with only limited records reported from scattered localities. This knowledge gap stands in contrast to the relatively well-documented epitoniid fauna in other Indo-Pacific regions.

Globally, epitoniids are widely distributed across tropical and subtropical oceans. Numerous species have been documented in the Pacific and Indian Oceans, ranging from shallow reef flats to deeper continental slopes. Within the Indo-Pacific, the family demonstrates high diversity, with records spanning Southeast Asia, Australia, and the western Pacific archipelagos (Gittenberger and Hoeksema 2013). Their distribution is strongly associated with the availability of suitable anthozoan hosts, particularly alcyonacean soft corals. The reliance of epitoniids on host-specific prey highlights their role in marine biogeography, as shifts in coral distribution can directly influence their presence.

In Indian waters, however, epitoniids are still rarely documented in published research. Only a limited number of species have been reported (Rao and Sastry 2005; Narayana and Apte 2016a, b; Pati 2018), and large stretches of India's ecologically diverse coastline have not been systematically surveyed. While India has a variety of marine ecosystems, including coral reefs, seagrass beds, and mangroves, the systematic documentation of this family has lagged behind other gastropod groups. Earlier surveys mostly focus on more noticeable or economically important mollusks, leaving epitoniids largely ignored. This lack of information hampers the understanding of India's marine biodiversity and its biogeographical connections with nearby Indo-Pacific regions. The Gulf of Mannar especially harbors one of the most diverse collections of marine invertebrates in India, yet the epitoniid fauna of this biosphere reserve has never been fully studied.

The Gulf of Mannar Marine Biosphere Reserve, located along the southeastern coast of India, is a rich and diverse hotspot of marine biodiversity. It is home to a variety of habitats, including extensive coral reefs, seagrass meadows, and mangrove forests, which collectively sustain more than

3,600 species of flora and fauna. The discovery of previously undocumented epitoniid species within this ecosystem is not just about adding to the faunal catalog. These new records are crucial for understanding species turnover, connectivity, and range expansion across the Indo-Pacific.

Documenting new faunal records is particularly important in the present era of rapid environmental change. Coral reef habitats, which support epitoniids and their prey, are under increasing stress from climate change, ocean acidification, and anthropogenic pressures such as overfishing and coastal development. These stressors threaten both the persistence of host corals and the specialized mollusks dependent on them. Recording range extensions of epitoniids thus serves not only to expand taxonomic inventories but also to contribute to broader ecological monitoring and conservation strategies. Biogeographically, new records from Indian waters may indicate previously unrecognized dispersal pathways, possibly facilitated by ocean currents in the Bay of Bengal and Arabian Sea, or reflect broader Indo-Pacific connectivity.

Given this background, the present study addresses a clear gap in the knowledge of Indian molluscan diversity. It reports the first records of three epitoniid gastropods in the Gulf of Mannar, India, thereby extending the known geographical range of these species into the eastern Indian Ocean. By documenting their occurrence, this study provides evidence of range expansion and contributes to understanding the biogeographical patterns of the family in the Indo-Pacific region. The findings also underscore the importance of continued taxonomic surveys in India's marine ecosystems, which remain underexplored despite their global significance. Explicitly, this study aims to provide the first confirmed records of these three epitoniid species in India, to describe their diagnostic features, and to discuss the implications of their presence for biogeography and biodiversity conservation in the Gulf of Mannar.

MATERIALS AND METHODS

Study area and sampling

Field surveys were conducted on 25 December 2022 at Appa Island, located in the Gulf of Mannar, southeastern India (9°15′N, 79°10′E). Specimens were obtained during benthic surveys at depths of 10-15 m in reef-associated habitats The study site comprises shallow reef-associated habitats characterized by sandy-coral rubble substrates, seagrass beds, and scattered coral patches dominated by sea anemones (Figure 1). Four belt transects (50 m × 5 m each) were established and surveyed using snorkeling and wading techniques at depths ranging between 1 and 6 m, depending on tides and site topography (Figure 1). A total of six person-hours of active sampling ensured representative coverage of available microhabitats.

Environmental conditions

Water temperature (28-30°C) and salinity (34-35 PSU) were measured in situ using a digital thermometer (accuracy ± 0.1°C) and a handheld refractometer, respectively. Substrate composition was visually inspected along transects, confirming sandy–coral rubble as the dominant habitat with patchy seagrass distribution.

Specimen collection and processing

Sediment samples were sieved through 1.0 mm and 0.5 mm mesh sizes to extract micromollusks. Six epitoniid specimens were recovered, consisting of two *Epitonium angustum* (Dunker, 1861), two *Epitonium zatrephes* (Melvill, 1910), and two *Epidendrium aureum* (A. Gittenberger & E. Gittenberger, 2005). All specimens were preserved in 70% ethanol for further analysis.

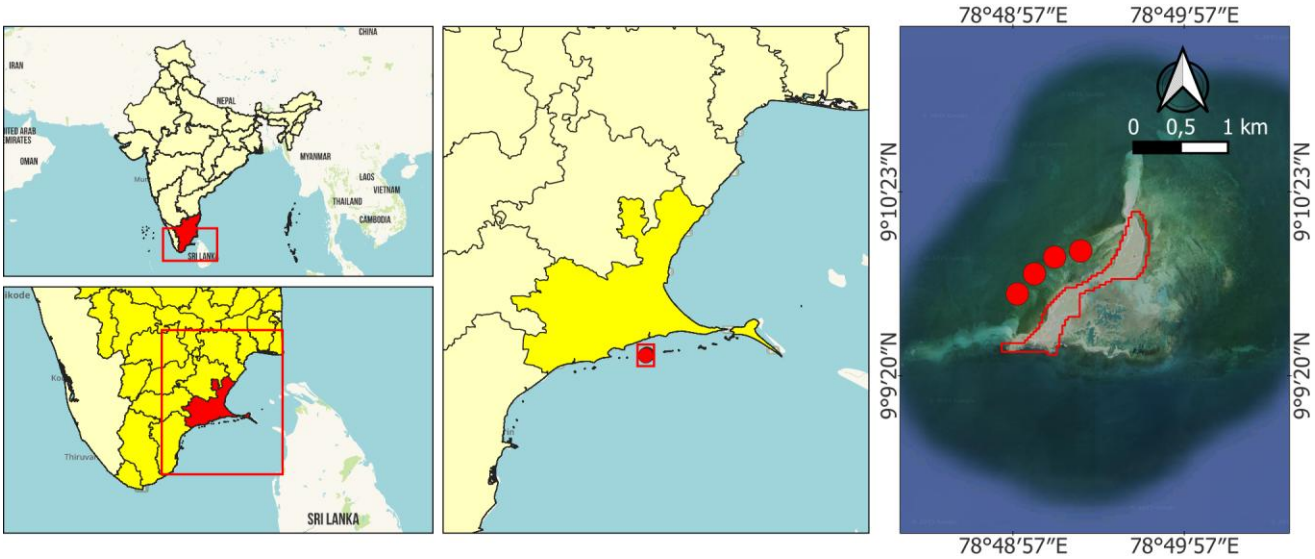

Figure 1. Geographical position of sampling stations (9°15′N, 79°10′E) in Appa Island, Gulf of Mannar, southeastern India and survey transects (T1-T4, each 50 m × 5 m), representing replicate sampling stations

Morphological identification

Specimens were examined under a Carl Zeiss Discovery V25 stereomicroscope. Diagnostic characters, including shell height, aperture structure, whorl count, and rib orientation, were measured and compared. Species-level identification followed established taxonomic references: Gray and Reeve (1848-1850), Dunker (1861a, b), Melvill (1910), Okutani (2000), Poppe (2008). Morphological criteria used were consistent with standard descriptions for epitoniid gastropods, ensuring reliable determination.

Specimen deposition

All identified specimens were deposited in the National Zoological Collections at the Marine Biology Regional Centre (MBRC), Zoological Survey of India (ZSI), Chennai, India. Voucher numbers are as follows: *E. angustum* (MBRC/ZSI/M.3104), *E. zatrephes* (MBRC/ZSI/M.3105,) and *E. aureum* (MBRC/ZSI/M.3105).

Ethical statement

The sampled species are not listed under any protected category, and no ethical clearance was required. Specimen collection was carried out under permits issued by the Chief Wildlife Warden, Gulf of Mannar Marine Biosphere Reserve, Department of Forests, Government of Tamil Nadu.

RESULTS AND DISCUSSION

Taxonomic placement

All specimens collected from the Gulf of Mannar belong to the subclass Caenogastropoda, superfamily Epitonoidea, family Epitoniidae. Two genera were represented: *Epitonium* (Röding, 1798), and *Epidendrium* (Gittenberger & Gittenberger, 2005).

***Epitonium angustum* (Dunker, 1861)**

Material examined: Two specimens (shell height 6.7 mm) deposited at ZSI/MBRC, collected from Appa Island, Gulf of Mannar, India (9°10′03.5″N, 78°49′31.1″E), at depths of 4-6 m on 23 February 2022. Description: Shell slender and elongate with 9-10 moderately convex whorls. Teleoconch sculptured with strong, orthocline, contiguous axial ribs; interspaces smooth. Sutures deep and distinctly impressed. Aperture circular, with a continuous peristome thickened externally and on the columella. Umbilicus closed; spire high and tapering evenly. Protoconch smooth. Shell is white and semitranslucent.

***Epitonium zatrephes* (Melvill, 1910)**

Material examined: Two specimens (shell height 15.2 mm) deposited at ZSI/MBRC, collected from Appa Island, Gulf of Mannar (same coordinates), at depths of 2-4 m on 23 February 2022. Description: Shell slender, dirty white to cream, consisting of 9-10 whorls including a smooth 3-whorled protoconch. Teleoconch with 18-20 fine, prosocline axial ribs and dense spiral striae. Sutures oblique and well defined; umbilicus closed, aperture circular with reinforced columella and thin outer lip. Spire moderately high and evenly tapering.

***Epidendrium aureum* (A. Gittenberger & E. Gittenberger, 2005)**

Material examined: Two specimens (shell height 6.5 mm) deposited at ZSI/MBRC, collected from Appa Island, Gulf of Mannar (same coordinates), at depths of 1-3 m on 23 February 2022. Description: Shell minute, translucent white, with 3 smooth protoconch whorls and 4-7 convex teleoconch whorls. Teleoconch sculptured with fine, oblique, regularly aligned axial ribs (16-22 per whorl, increasing with growth) and numerous spiral lines (20-30 on last whorl). Sutures deeply impressed. Aperture circular with a thin peristome. Umbilicus moderately wide and deep.

Comparative morphology

The three species are clearly distinguished by shell size, rib orientation, sculpture, and aperture structure. *Epitonium angustum* is small with strong orthocline ribs and smooth interspaces, *E. zatrephes* is larger with prosocline ribs and dense spiral striae, while *E. aureum* is minute with high rib density and regular spiral sculpture. These characters are summarized in Table 1. Diagnostic shell morphology of all three taxa is illustrated in Figure 2.

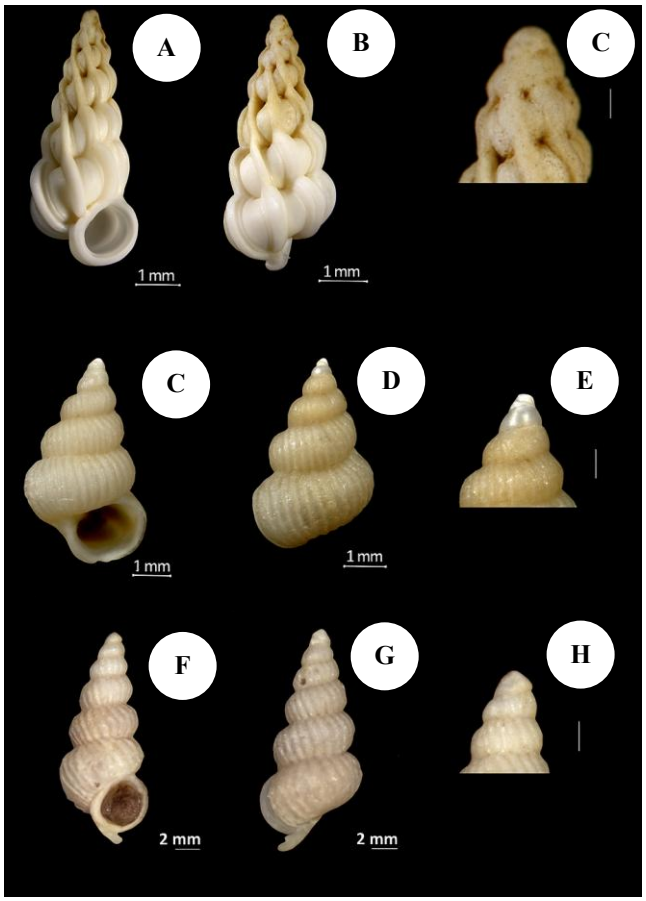

Figure 2. Shell morphology of three Epitoniidae gastropods from the Gulf of Mannar, India. A-C. *Epitonium angustum* apertural view, lateral view, protoconch close-up. D-F. *Epidendrium aureum* apertural view, lateral view, protoconch close-up. G-H. *Epitonium zatrephes* apertural view, lateral view, protoconch close-up. Scale bars: 1 mm (A-E), 2 mm (F-H)

Table 1. Comparative shell morphology of the three species

Species	Shell height (mm)	Whorls (protoconch + teleoconch)	Axial ribs (per whorl)	Spiral sculpture	Aperture	Umbilicus	Color
Epitonium angustum (Dunker, 1861)	6.7	0 + 9-10	Strong, orthocline, contiguous (18-20)	Smooth, interspaces unornamented	Circular, thickened peristome	Closed	White, semi-translucent
Epitonium zatrephes (Melvill, 1910)	15.2	3 + 6-7	Fine, prosocline (18-20)	Dense, minute spiral striae	Circular, thin outer lip	Closed	Dirty white to cream
Epidendrium aureum (A. Gittenberger & E. Gittenberger, 2005)	6.5.	3 + 4-7	Fine, oblique (22-16; increases with growth)	Numerous, regular (20-30 on last whorl)	Circular, thin peristome	Moderately wide, deep	Translucent white

Table 2. Distribution of the three Epitoniid species

Species	Previously known distribution	Primary sources	New record (this study)
Epitonium angustum (Dunker, 1861)	Indo-Pacific: Philippines, Indonesia, Papua New Guinea, Solomon Islands, Australia, Japan, South China Sea	Dunker (1861a,b), Kilburn (1985), García (2003) and Mollusca Base (2025)	Gulf of Mannar, India
Epitonium zatrephes (Melvill, 1910)	Western Indian Ocean: Oman, Madagascar, Mozambique; Eastern Indian Ocean: Sri Lanka; Western Pacific: Philippines	Melvill (1910), Kilburn (1985), García (2003), and Mollusca Base (2025)	Gulf of Mannar, India
Epidendrium aureum (Gittenberger & E. Gittenberger, 2005)	Indo-West Pacific: Red Sea, East Africa, Maldives, Andaman Sea, Philippines, Japan	Bouchet and Waren (1986), Kilburn (1985) and Mollusca Base (2025)	Gulf of Mannar, India

Distributional records

The three epitoniid species recorded represent new range extensions into Indian waters. *Epitonium angustum* was previously known from the Philippines, Indonesia, Papua New Guinea, Solomon Islands, Australia, Japan, and the South China Sea. *Epitonium zatrephes* was documented in Oman, Madagascar, Mozambique, Sri Lanka, and the Philippines. *Epidendrium aureum* occurred in the Red Sea, East Africa, Maldives, Andaman Sea, Philippines, and Japan. Their occurrence in the Gulf of Mannar represents notable westward extensions within the Indo-Pacific region (Table 2).

Discussion

This study provides preliminary yet significant evidence for the westward range extension of three epitoniid gastropods: *E. angustum*, *E. zatrephes*, and *E. aureum* into Indian waters. Although the sample size is limited, the confirmed presence of these taxa in the Gulf of Mannar highlights that the species richness of Epitoniidae in the region is underestimated. All three species are morphologically distinct from sympatric congeners and can be reliably diagnosed by combinations of shell form, rib orientation, sculpture, and protoconch characters. For example, *E. angustum* differs from *Epitonium scalare* (Linnaeus, 1758) by its narrower shell, high spire, and orthocline axial ribs lacking spiral sculpture. Similarly, *E. zatrephes* and *E. aureum* can be distinguished from other Indian Ocean epitoniids by rib morphology, protoconch features, and aperture structure. Such diagnostic traits underscore the importance of detailed morphological analyses for documenting faunal extensions.

When placed in a broader Indo-Pacific context, these findings align with recent discoveries of hidden epitoniid diversity. García (2003) described 19 new species from the western Atlantic, while Huang and Lee (2016) added a new species and several records from Taiwan. Gittenberger et al. (2000) reported four new species associated with mushroom corals in Sulawesi. In India, about 27 species have been reported previously (Rao et al. 2004; Rao and Sastry 2005; Narayana and Apte 2016a, b; Pati et al. 2018), while Dey (2016) provided distributions for 20 taxa. However, given the ecological diversity of Indian coastal waters and the near absence of deep-sea exploration, true epitoniid diversity is likely much higher.

The distributional expansion of *E. angustum*, *E. zatrephes*, and *E. aureum* into Indian waters suggests possible dispersal pathways across the Indo-Pacific. Natural larval dispersal mediated by prevailing currents in the Bay of Bengal and Andaman Sea may facilitate westward expansion, while anthropogenic transport via ballast water and hull fouling cannot be excluded (Carlton 2009). Environmental drivers such as ocean warming and altered current systems (Poloczanska et al. 2016) may further enhance larval connectivity. Importantly, epitoniids' close associations with anthozoan hosts suggest that shifts in host distribution, particularly of sea anemones and corals, could also explain their current appearance in the Gulf of Mannar.

The ecological role of epitoniids as specialized ectoparasites highlights their significance beyond taxonomy. By feeding selectively on anthozoans, they may influence host reproduction and local reef dynamics. The occurrence of three epitoniid species in sea anemone-rich coral patches of the Gulf of Mannar suggests that these habitats provide both refuge and prey, linking gastropod diversity to reef health. Changes in anemone abundance due to climate stress or anthropogenic impacts could thus directly affect epitoniid populations.

From a biogeographic standpoint, the detection of these taxa extends the known range of Indo-Pacific epitoniids into the Indian subcontinent, reinforcing the Gulf of Mannar's role as a transition zone between the Bay of Bengal and Arabian Sea provinces. Such range extensions mirror broader patterns of faunal connectivity and underscore the region's significance for studying dispersal and biogeographic boundaries within the Indo-West Pacific.

Finally, beyond documenting new distributional records, this study highlights the importance of integrating morphological and molecular approaches. Applying such methods to Indian specimens would resolve species boundaries, detect hidden diversity, and clarify population connectivity. Detailed host association studies are also required, as epitoniid–anthozoan interactions may provide valuable insights into reef ecosystem function (Gittenberger and Hoeksema 2013).

In conclusion, the present study provides baseline data on epitoniid diversity in Indian waters and emphasizes the Gulf of Mannar as a biogeographically important but underexplored region. Future surveys, especially in deep-water habitats, combined with molecular tools and collaborative research, will be essential for improving faunal inventories and understanding ecological interactions.

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