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Occurrence of two cuttlefish species, *Aurosepina arabica* and *Erythalassa trygonina*, in the northwestern coast of India

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Short Communication

Abstract

The paper reports the occurrence of the Arabian cuttlefish, *Aurosepina arabica* (Massy, 1916), and trident cuttlefish, *Erythalassa trygonina* (Rochebrune, 1884), in the coastal waters off Veraval, in the northern Arabian Sea, India. Cuttlefish species of the family Sepiidae can be easily differentiated by the cuttlebone morphology. Among them, the unique genus *Aurosepina* has the anteriorly widest, posteriorly very narrow, and spine absent. In contrast, the genus *Erythalassa* has a narrow bone, outer limbs expanded, forming two wing-like expansions, and spine present. The present study provides detailed taxonomic information on morphological characteristics and fresh images.

Keywords: *Arabian Sea, distribution, Gujarat, range expansion*

Introduction

Cuttlefishes of the family Sepiidae Leach, 1817 (Cephalopoda) are mostly found in tropical and subtropical waters worldwide, comprising 121 valid species under thirteen valid genera till date namely (MolluscaBase, 2024) *Acanthosepion* Rochebrune, 1884 (10 species); *Ascarosepion* Rochebrune, 1884 (13 species); *Aurosepina* Jothinayagam, 1987 (1 species); *Decorisepia* Iredale, 1926 (3 species); *Digitosepia* Lipinski, 2020 (6 species); *Doratosepion* Rochebrune, 1884 (12 species); *Erythalassa* Reid, 2023 (1 species); *Hemisepius* Steenstrup, 1875 (1 species); *Lusepia* Reid, 2023 (1 species); *Rhombosepion* Rochebrune, 1884 (4 species); *Sepia* Linnaeus, 1758 (59 species); *Sepiella* Gray, 1849 (8 species); *Spathidosepion* Rochebrune, 1884 (2 species). Genus *Aurosepina* Jothinayagam, 1987 is a monotypic genus which is erected as a single species *Aurosepina arabica* (Massy, 1916). This species inhabits various aquatic environments, from purely marine to brackish waters. Such habitat versatility underscores its ecological importance within regional marine biodiversity. It is known to be sparsely distributed in the various regions of the Indian Ocean: the Red Sea, Gulf of Aden, and the Persian Gulf; from India, it is reported from the south-eastern coast and the Lakshadweep Islands (Jothinayagam, 1987). Even after the revision by Lupše *et al.* (2023), *A. arabica* maintains its unique morphological traits that distinguish it from other Sepiidae cephalopods, enhancing its recognition as a significant component of cephalopod diversity in the Indian Ocean and Gulf region. Recently erected genus *Erythalassa* Reid, 2023 is also a monotypic genus that contains a single species, *Erythalassa trygonina* (Rochebrune, 1884), which is known to be distributed in the Southern Indian Ocean: Saya-de-Malha Bank and Zanzibar to South India and from the Northwestern Indian Ocean: Red Sea, Persian Gulf; in India, the species has been reported from the Gulf of Mannar, Southeastern coast (Sarvesan, 1976). During our regular fishing surveys (Ragul *et al.,* 2024a, b, c; 2025), we collected a single specimen of *A. arabica* and three specimens of *E. trygonina* at Veraval Fishing Harbour, Gujarat, northwestern coast of India.

Material and methods

In October 2024, a routine fishing diversity monitoring survey was carried out at Veraval Fishing Harbour to document the cephalopod species assemblage. During this survey, cuttlefishes of the family Sepiidae were collected from multiday trawlers that landed at Veraval, located off the northwest coast of India, Gujarat. The specimens were taken to the laboratory, photographed, and identified, which was done using previously published literature (Lupše *et al.*, 2023). The specimens were then preserved in 10 % formalin and were deposited in the fish collection of the Department of Fisheries Resource Management at the College of Fisheries Science,

Kamdhenu University, Veraval (KU/COFS/MUS/010257–59) for future reference.

Abbreviations: TL, total length; DML, dorsal mantle length; TW, total weight.

Results and discussion

Systematics

Family Sepiidae Leach, 1817
Genus *Aurosepina* Jothinayagam, 1987
Aurosepina arabica (Massy, 1916)
Arabian cuttlefish (Fig. 1A–D)
Type locality: based on syntypes, Lacadive Sea and the Persian Gulf

Material examined

KU/COFS/MUS/010256, female (Fig. 1A–D), 15/10/2024, 21° 38′ 49″ N; 67° 32′ 42″ E (personal communication with fishing crew), northwest coast of India, off Gujarat, landed at the Veraval Fishing Harbour; leg. Ragul S

Description

The present female cuttlefish specimen: 92mm TL, 55mm DML and weighed approximately 16.53g TW. The anterior origin is positioned behind the mantle margin, with a broad gap separating it at the posterior end, with a length of 59.7 % of TL; mantle width of 42.3 % of TL. Relatively slender head, narrower than the mantle, head width of 23.9 % of TL. A pair of eyes present at both lateral sides with a diameter of 0.8 % of TL and bears a pair of large, fleshy, ear-shaped lobes located immediately behind the eyes (Fig. 1A&B). The specimen lacks a posterior gland and gland pore. The mantle-locking cartilage is curved with a semicircular ridge, while the funnel-locking cartilage with the same depression. Arm suckers are small, spaced widely, and arranged in four rows. Arms II and III with a row of tubercles along the dorsal margins. The dorsal mantle, dotted with pale circular tubercles between 10–12 dark chromatophore patches near the fin bases, and the dorsal sides of arms 3 display rectangular brown patches.

Lanceolate and narrow cuttlebone, widest anteriorly and tapering to a narrow posterior end that curves ventrally; granulose dorsal surface with chitin bands along the lateral margins, spine absent, and a short, central keel at the dorso-posterior end. The loculus and striated area are highly convex, with a shallow, broad sulcus limited to the last loculus (Fig. 1C). Anterior striations form a V-shape, while the inner cone narrows posteriorly with a slightly raised, rounded ridge. The outer cone is paddle-shaped, expanding and rounding at the posterior end, with irregular calcareous ribs extending into the outer cone (Fig. 1D).

Colouration

Reddish to purple. Chromatophores are densely clustered around the eye orbits on the head. Dorsal mantle chromatophores are in uneven patches, with the base of fins on the posterior half displaying 10 to 12 clusters of concentrated reddish-purple chromatophores.

Distribution

Arabian cuttlefish, *Aurosepina arabica* (Massy, 1916), is sparingly distributed in the Indian Ocean, the Red Sea, the Gulf of Aden, and the Persian Gulf; from India, it reported from the Lakshadweep Islands (Massy, 1916) and the south-eastern coast (Jothinayagam, 1987).

Remarks

Aurosepina arabica, cuttlebone broader at the anterior end than at the posterior, distinguishing it from *Doratosepion*. Notably, the fleshy lobes behind the eyes are unique. Jothinayagam (1987) erected the genus *Aurosepina* based on its ear-shaped skin flaps, unique cuttlebone morphology, specifically the radiating inner cone ribs, and absence of a spine and the presence of tubercles in Arms II and III. Nateewathana (1996) questioned the validity of the genus, suggesting that these features may only warrant subgeneric recognition. However, Lupše *et al.* (2023) molecular analysis supports Jothinayagam's classification of *Aurosepina* as valid because of their significant distinguishing traits.

Systematics

Genus *Erythalassa* Reid, 2023
Erythalassa trygonina (Rochebrune, 1884)
The trident cuttlefish (Fig. 1E–H)
Type locality. Red Sea

Material examined

KU/COFS/MUS/010257, male (Fig. 1E–H), 11/10/2024, leg. D. J. Solanki; KU/COFS/MUS/010258 & 59, female and male, 15/10/2024, leg. S. Ragul, 20°54′27″N 70°23′02″ E, northwest coast of India, off Gujarat, landed at Veraval Fishing Harbour.

Description

The present three specimens range from 103–148 mm TL,

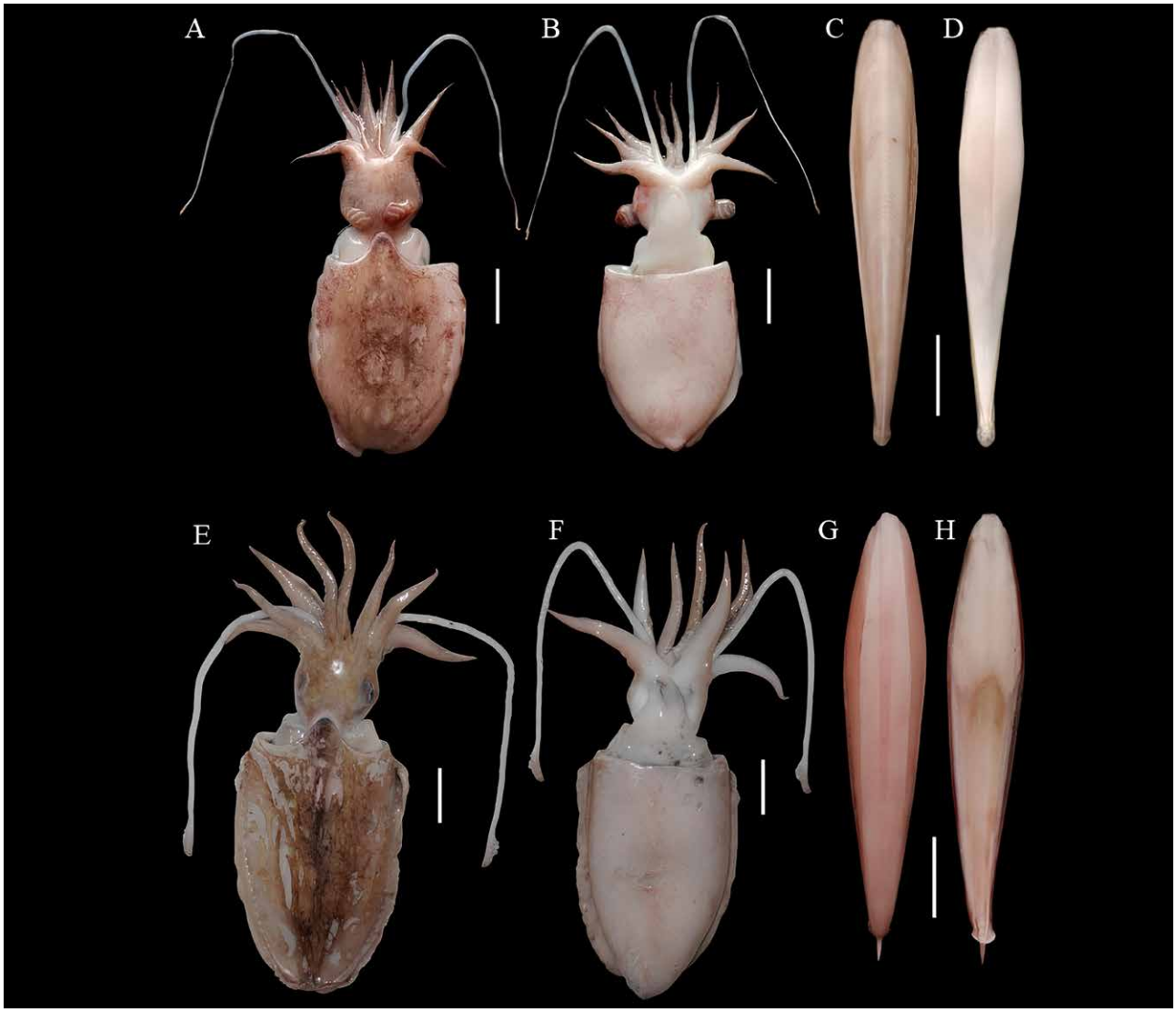

Fig. 1. (A–D) *Aurosepina arabica* and (E–H) *Erythalassa trygonina* from Gujarat, northwestern India: (A&E) dorsal and (B&F) ventral view of fresh specimen; (C&G) dorsal and (D&H) ventral view of cuttlebone (Scale A, B, E, F =20mm; C, D, G, H =15mm)

66–81 mm DML, and weighed approximately 18-30 g TW. The elongated oval-shaped mantle, broadening at its opening, slightly flattened from top to bottom, appeared compressed. The mantle oblong, acuminate posteriorly, ends with a length of 54.7–66.9 % of TL (Fig. 1E-F); the mantle width is 30.4–38.8% of TL. Relatively, narrower head than the mantle portion, head width of 15.4–24.2 % of TL. The mantle's mid-dorsal projection extends to align with the space directly between the eyes. A pair of eyes present at both lateral sides with a diameter, 4.7–6.7 % of TL. Notably, the buccal lappets lack suckers, and the funnel is relatively short, falling short of the interbrachial space between the ventral arms. Arm length is largely consistent, arranged in the sequence 1, 2 = 3, and 4 for females, and 1, 4 = 3, and 2 for males. Arms robust and thick at the base, tapering to slender tips, with dorsal and dorsolateral arms rounded at the base and slightly keeled. In both sexes, the ventrolateral and ventral arms were compressed laterally and keeled throughout their length. Webbing between the arms is shallow, and absent between the ventral arms. In males, most arms have quadriserial suckers, while dorsal arms show quadriserial suckers proximally and switch to widely spaced biserial suckers distally. For females, all arms possess quadriserial suckers along the proximal two-thirds, transitioning to biserial arrangements toward the tips. Distal biserial suckers are tiny and moderately spaced. This structure suggests adaptations for grasping and holding with specific sexual dimorphism in sucker patterns across the arms.

Lanceolate cuttlebone, with a strongly recurved ventral side. The dorsal surface is pinkish and calcified medially, being thickest at the posterior end; the surface is slightly granular, featuring irregular longitudinal ridges. A dorsal median rib is

present but indistinct. Chitin was observed as wide bands bordering the lateral margins. Spine curves dorsally, with no keel present. The inner cone limbs are uniform in width, narrow, and U-shaped at the posterior, slightly raised to form a rounded posterior ridge. The outer cone is present, with its limbs expanding into two long, ventrally directed "wings" that form a recurved, cup-like structure.

Colouration (fresh specimen)

Pale brownish hue. Males are characterized by small, circular dark brown blotches on the dorsal surface of the mantle and fins, accompanied by a dark purple band at the base of the fins and cream-colored patches. Females have a more uniform colouration, lacking significant markings. These distinctive colour patterns not only enhance camouflage but also aid in the identification of the two sexes.

Distribution

Trident cuttlefish, *Erythalassa trygonina* (Rochebrune, 1884) is known to be distributed in the Southern Indian Ocean: Saya-de-Malha Bank and Zanzibar to South India, Mozambique, Tanzania and from the Northwestern Indian Ocean: Red Sea, Persian Gulf; In India, it is reported from the Gulf of Mannar, Southeastern coast (Sarvesan, 1976; Lupše *et al*., 2023).

Remarks

Female *Erythalassa trygonina* closely resembles *Sepia sokotriensis* (Khromov, 1988) and cuttlebone similar to that of *S. burnupi* (Hoyle, 1904), but features a less distinct dorsomedial rib. This species shows sexual dimorphism in the lengths of the arms and the arrangement of suckers; males possess less modified arms than those of *S. burnupi*, while females have widely spaced suckers at the distal ends of their lateral arms. Moreover, the club and hectocotylus are similar to those of *S. elongata* (d'Orbigny, 1842), although *S. elongata* has a thicker cuttlebone with a different inner cone structure and striae.

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Author contributions

Conceptualization: DJS, SR; Methodology: DJS, SR; Data Collection: DJS, SR; Data Analysis: DJS, SR; Writing Original Draft: DJS, SR; Writing Review and Editing: DJS, SR, VMC, JBS; Supervision: VMC. All authors commented on previous versions of the manuscript. All authors read and approved the final manuscript.

Data availability

All relevant datasets supporting the conclusions of this article are included within the article.

Conflict of interests

The authors declare that they have no conflict of financial or non-financial interests that could have influenced the outcome or interpretation of the results.

Ethical statement

No ethical approval is required as the study does not include activities that require ethical approval or involve protected organisms/ human subjects/ collection of samples/ protected environments.

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