



Short Communication

A note on occurrence of blanket octopus, *Tremoctopus gracilis* (Cephalopoda: Tremoctopodidae) from Northwestern coast of India

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This study reports the occurrence of the blanket octopus, *Tremoctopus gracilis* (Souleyet, 1852) from the Gujarat, northwest coast of India, indicating its range extension to the northern Arabian Sea. A single female specimen (535 mm *TL* and 148 mm *DML*) was collected from the multiday trawl by-catch landed at the Veraval fishing harbour in February 2024. Details on systematics and morphological description of this species are presented herein.

[**Keywords:** Blanket octopus, By-catch, India, Rare occurrence]

Introduction

Blanket octopus representing the family Tremoctopodidae Tryon, 1879 belongs to the order Octopoda Leach, 1818, which comprises only four species under a monotypic genus *Tremoctopus* Delle Chiaje, 1830. They are widely distributed in the tropical and subtropical oceans¹⁻⁴, but there are very few valid documentations in the Indian coastal waters⁵. Octopuses belonging to this family are commonly referred to as blanket octopuses due to the presence of elongated arms with dark-coloured connecting membranes, which are closely related to the two families: Argonautidae and Ocythoidae². Morphologically, adult males belonging to the genus *Tremoctopus* are comparatively smaller than females, and they possess a separable hectocotylied arm that is used for storage purposes and in transferring the spermatophores to females during copulation². They are epipelagic, free-swimming octopuses adapted to

live in deeper waters (up to 300 m) of the tropical seas²⁻⁴.

Recently, Mangold *et al.*⁴ reviewed the genus *Tremoctopus* by morphological characterisation and validated four species *viz.*, *T. gelatus* Thomas, 1977 (Hawaiian Island and Indian Ocean); *T. gracilis* (Souleyet, 1852; Pacific and Indian oceans); *T. robsoni* (Kirk, 1884; New Zealand); and *T. violaceus* delle Chiaje, 1830 (Atlantic waters, Gulf of Mexico, Caribbean Sea and Mediterranean Sea). Previously, *T. gracilis* occurrences were reported from the Western Pacific and Indian Ocean in the area ranging from Southern India to northeast Australia at a shallower to wide depth range (1 – 30 m and > 30 m)^{5,6}. In the Indian context, only *T. gracilis* has been recently recorded from the southwest coast of India⁵. This study presents the northernmost distributional record of the blanket octopus species, *T. gracilis*, from the northwestern coast of India, accompanied by a detailed analysis of its morphology, meristic features, and colour patterns.

Materials and Methods

Field surveys were conducted regularly at the Veraval multiday trawl fish landing centre in Gujarat, northwestern coast of India, during February 2024. A single female specimen of *Tremoctopus gracilis* (535 mm *TL*) was collected from the by-catch of multiday trawlers targeting commercial finfishes (mesh size of cod end ranged from 60 – 80 mm) at Veraval fishing harbour. Trawling was carried out offshore fishing grounds at depths ranging from 80 to 150 m, at a distance of 100 to 200 Nautical miles towards the west (SR, pers. comm., based on information from the fishing crew). However, the exact location of the species collection is not known. After collection, the specimen was brought to the laboratory, and fresh photographs were taken. The specimen was identified to species level by following Thomas² and Mangold *et al.*⁴. Measuring methods, percentage (indices) calculation and sex identification follow Thomas², Finn⁷, and Roper & Voss⁸. The measurements were made using Mitutoyo digital Vernier callipers to the nearest 0.1 mm. The specimens were then preserved in 10 % formalin solution and deposited in the Department of Fisheries

Resource Management museum (KU/COFS/MUS/010228), College of Fisheries Science, Kamdhenu University, Veraval, for future reference.

Abbreviations⁷: TL - Total Length; DML - Dorsal Mantle Length; TW - Total Weight; LA - Left Arm; and RA - Right Arm.

Results

Systematic account

Class: Cephalopoda Cuvier, 1795

Order: Octopoda Leach, 1818

Suborder: Incirrata Grimpe, 1916

Family: Tremoctopodidae Tryon, 1879

Genus: *Tremoctopus* delle Chiaje, 1830

Tremoctopus gracilis (Souleyet, 1852); Indo-Pacific violet blanket octopus (Figs. 1a – e, 2a – d)

Material examined

KU/COFS/MUS/010228, 1 female specimen, 535 mm TL, 148 mm DML, and 480 g TW (Fig. 1a – e), Veraval fishing harbour, northwest coast of India: Gujarat, 20°54'27" N; 70°23'02" E, leg. S. Ragul, 22 Feb. 2024.

Description

The reported female octopus specimen (148 mm DML) weighed about 480 g TW. Thick muscular mantle, posterior slightly pointed end with a length of 27.6 % of TL (Fig. 1e); mantle width, 66.8 % of DML. Relatively, head narrower than the mantle portion, head width 51.3 % of DML. Pair of eyes present at both lateral sides with a diameter 10.8 % of DML. A pair of dorsal cephalic pores with a diameter 11.4 (Left), 12.1 (Right); width 6.4 (Left and Right) in % of DML located in between the eyes and a slightly small ventral pair with diameter 6.4 (Left and Right); width 6.0 left, 5.7 right in % of DML located below the free funnel opening (Fig. 1e). Funnel extends beyond eye mid-level with the length and free funnel length of 25.6 and 14.5 in % of DML.

Arms vary in size and shape with formula $2 > 1 > 4 > 3$. Comparably, dorsal arms are lengthier than the ventral arms. Dorsal four arms connected with a deep, thick web to the distal end. RA II (261.3 in % of DML) and LA II (214.1 in % of DML) are more elongated than the rest; RA I 192.5, RA III 140.9, RA IV 152.0, LA I 152.0, LA III 84.4, LA IV 156.7, all in % of DML (LA III distal end damaged). Detached hectocotylus was not found in the mantle cavity. Arrangement of bi-serial suckers, larger in proximal and decreasing in size to the distal portion of the arm

(Fig. 1c & d). Web deeply developed and was torn in the distal part (Fig. 1a & b). Gill lamellae, 13 (Fig. 2a), are located at the outer demi-branch of the gill.

Wide upper beak and curved in anterior outline; dark brown medium-sized hood with blunt rostrum part; smooth cutting edge; lateral walls deep with relatively prominent longitudinal axis (Fig. 2b); crest and lateral walls almost 35 % pigmented (Fig. 2b). Lateral profile of lower beak lunate; dark brown hood and curved rostrum; lateral wings almost 50 % pigmented; lateral walls broad and elongated like leaf (Fig. 2c & d).

Colouration

In fresh specimen (Fig. 1a), the dorsal profile of the mantle and head is darker, brownish purple, and the ventral profile is iridescent silvery with numerous orange pigmentation in various sizes. Colouration (preserved specimen), specimen loses the colouration and becomes paler.

Discussion

The morphological and morphometric characters of *Tremoctopus gracilis*, including a deep or broad dorsal web, a specific arrangement of arm suckers, the presence of cephalic water pores, distinct funnel morphology and free funnel length, and a characteristic number of gill filaments, serve to distinguish it from other blanket octopus species^{2,4,5}. *Tremoctopus gracilis* is closely related to *T. violaceus* by sharing a similar range of gill filaments or lamellae on the outer demibranch of the gill (13 – 16 in females). *Tremoctopus gracilis* differs from the other two species by having a muscular mantle vs. gelatinous and gill filaments 8 – 11 in females of *T. gelatus* and gill filaments 15 in females of *T. robsoni*.

Species identification is challenging for *Tremoctopus* species, particularly when it comes to differentiating between *T. gracilis* and *T. violaceus* using female/juvenile specimens¹⁰. The key character used in species identification is the number of proximal suckers in the hectocotylised arms of the male *Tremoctopus*. The specimen examined was a female, and since the hectocotylised arm used for species identification is a male-specific sexual characteristic, this diagnostic method was not applicable. The present female specimen shows similarities with *T. gracilis* of previous studies, especially in having the number of gill filaments (13 in the present study; 13 – 14 in Sajikumar *et al.*⁵; 13 – 16 in Nabhitabhata *et al.*⁹).

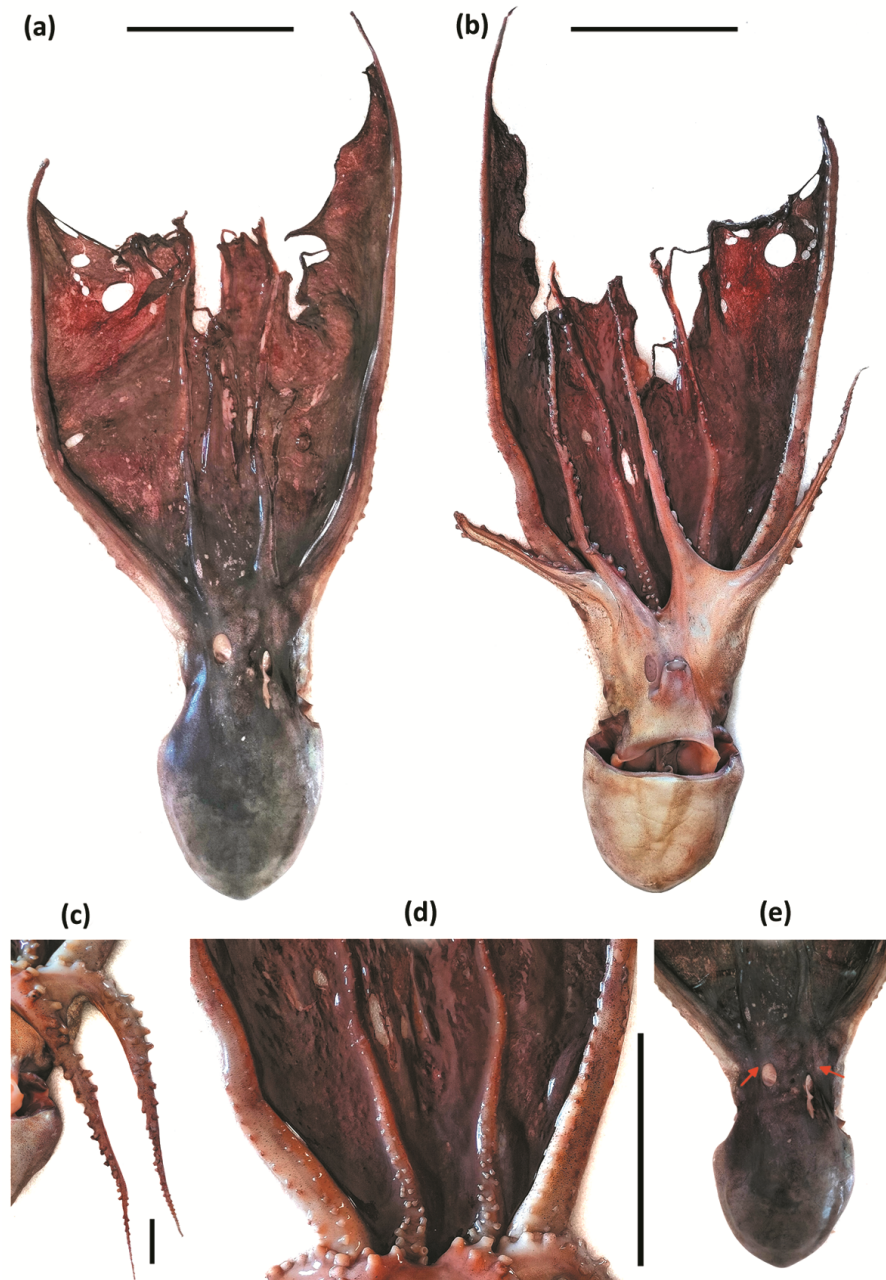


Fig. 1 — *Tremoctopus gracilis*, female: (a & e) dorsal, (b – d) ventral; (a & b) Overall view with deep web; (c) prominent suckers, RA III & IV; (d) proximal view of rudiment suckers in RA I & II and LA I & II; (e) mantle tip slightly pointed and arrows on head indicate two cephalic pores; Scale bars — a, b, d, e = 100 mm; c = 25 mm

This study highlights the occurrence of a blanket octopus *T. gracilis*, which to date has been sporadically reported from the Indian Ocean. The most important reason for the low sighting of this species is due to its low commercial value and therefore being discarded as trash during commercial fishing⁹. *Tremoctopus gracilis* has been known from tropical and subtropical regions, which include the

Indo-West Pacific and Indian Ocean (Fig. 3). The type specimen was originally recorded from the Pacific Ocean as *Octopus gracilis*¹⁰. Further, Zeidler¹¹ from southern and eastern Australia; Nabhitabhata *et al.*⁹ from Thailand, Andaman Sea, and recently this species has been reported from the southwest coast of India by Sajikumar *et al.*⁵. This report indicates widespread distribution of this species, which was not

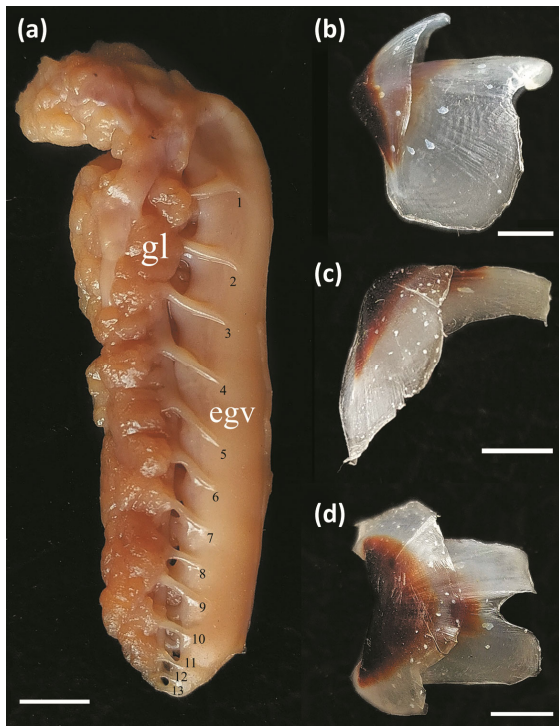


Fig. 2 — *Tremoctopus gracilis*: (a) left gill, showing 13 gill lamellae; (b – d) beak: (b) lateral view of upper beak; lower beak, (c) lateral and (d) dorsal view. Abbreviations: gl - gill lamellae; egv - efferent gill vessel. Scale bars = 5 mm

documented from this region earlier. Additionally, an extensive survey is warranted in the nearby territories to assess the full distribution range of *T. gracilis*.

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Conflict of Interest

Authors declare no competing or conflict of interest.

Author Contributions

All authors contributed to the study's conception and design. Material preparation, data collection, and analysis were performed by SR & MK. The first draft of the manuscript was written by SR, and all authors commented on previous versions of the manuscript. All authors have read and approved the final version of the manuscript.

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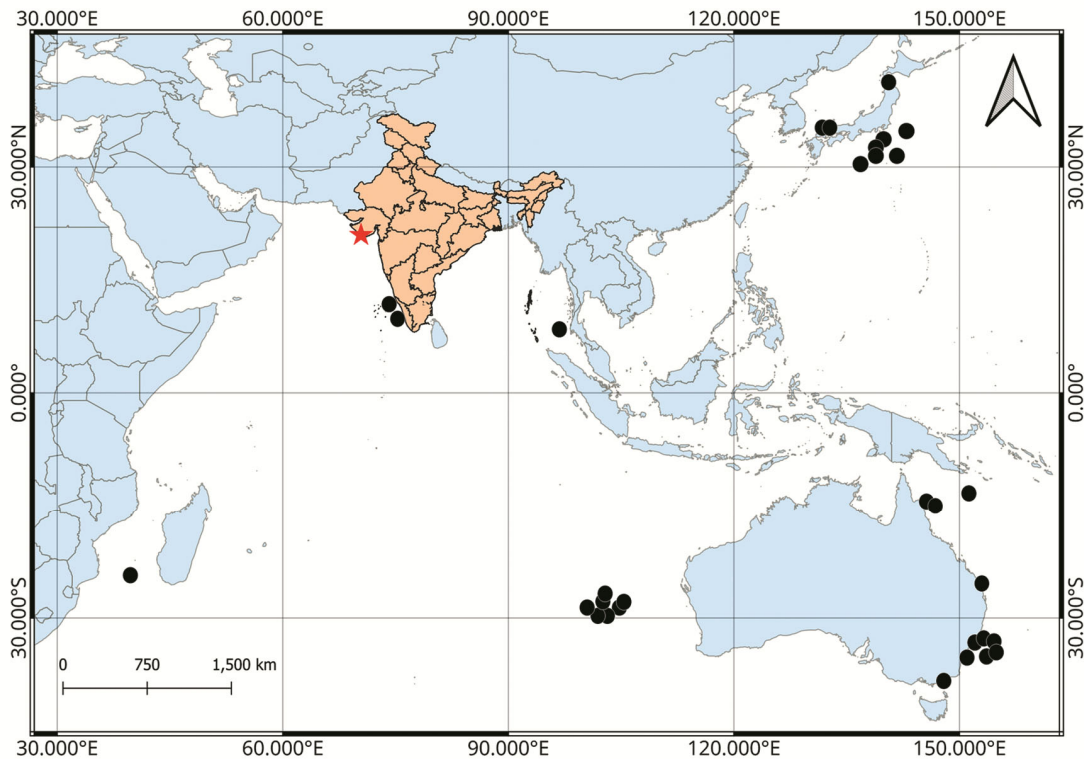


Fig. 3 — Geographical distribution of *Tremoctopus gracilis* in the Indo-West Pacific: Present collection site Gujarat (red star), and previous records (black circles)

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