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Short Communication

First record of *Pandarus cranchii* Leach, 1819 (Siphonostomatoida: Pandaridae) from the North-Eastern Arabian Sea

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Parasites play an important ecological role in reflecting host health and marine ecosystem dynamics. This study documents the first record of the ectoparasitic copepod *Pandarus cranchii* Leach, 1819, from the north-eastern Arabian Sea. A total of 11 specimens of *P. cranchii* were recovered from the ventral region of two female silky sharks, *Carcharhinus falciformis* (Müller & Henle, 1839), representing a prevalence of 25 %. The hosts were incidentally captured as bycatch during oceanic monofilament tuna longline operations conducted by the MFV Matsya Vrushti in January and April 2023. All collected parasites were adult females, with body lengths ranging from 8.02 to 11.24 mm.

[**Keywords**: Arabian Sea, Ectoparasite, *Pandarus*, Silky shark, Siphonostomatoida]

Introduction

Sharks typically have a wide distribution and occupy the top of the food chain as apex predators. Their diverse feeding habits make them an ideal and favourable habitat for a variety of parasitic fauna[1-3]. The longline fishery of India, particularly targeting tuna and other large pelagic species, often results in the incidental capture of a diverse range of shark species. The silky shark, *Carcharhinus falciformis* Müller & Henle, 1839, is one of the most commonly caught species and is widely distributed throughout Indian waters[4]. Silky sharks possess notably softer skin compared to other members of the family Carcharhinidae, owing to the presence of tiny dermal denticles. This unique skin texture makes them more vulnerable to ectoparasitic infestations[5].

The parasites reported from silky sharks include cestodes[6], trematodes[7-8], copepods[9-10], isopods[11] and marine leeches[12]. Members of the copepod family Pandaridae (Milne Edwards, 1840) are well documented as ectoparasites of elasmobranchs[14], occurring predominantly on species of the family Carcharhinidae within the order Carcharhiniformes[15-17]. To date, three species of the genus *Pandarus*, *viz*. *Pandarus cranchii* Leach, 1819, *Pandarus katoi* Cressey, 1967 and *Pandarus smithii* Rathbun, 1886, have been reported from *C. falciformis*[9-10,13].

Pandarus cranchii has a wide global distribution and has been recorded from all major oceans, including the Pacific Ocean[17-18], Atlantic Ocean[19-22], and Indian Ocean[10,13,23-27]. However, comprehensive studies on pandarid parasitic copepods from Indian waters remain scarce and are largely limited to opportunistic records[26,28]. The present study documents the occurrence of *P. cranchii* in the north-eastern Arabian Sea and extends its known geographic range.

Materials and Methods

A total of eight silky sharks, *Carcharhinus falciformis* were incidentally caught as bycatch in the monofilament oceanic tuna longlining operations conducted by the MFV Matsya Vrushti in January and April 2023 from the north-eastern Arabian Sea (Lat. 13°30′00″ N; Long. 71°25′16″ E and Lat. 20°13′40″ N; Long. 68°15′51″ E; Fig. 1). The total length of the sampled sharks ranged from 1230 to 1720 mm, with an average total length of 1482 mm, and body weights ranged between 7 and 29 kg (mean: 17 kg). Of the eight sharks examined, two females were infested with the ectoparasitic copepod *P. cranchii*, yielding a prevalence of 25 %. A total of 11 copepod specimens were recovered from the belly region of infested hosts. The parasites were gently washed on board in freshwater to remove mucus and debris, and subsequently fixed in 70 % ethanol for further examination in the shore laboratory. Specimens were photographed using a stereo zoom microscope (Leica S9i HD Digital) and later cleared by immersion in 85 % lactic acid for 2 h before dissection, following the method of Humes & Gooding[29]. Parasitic identity was confirmed based on morphological features[14,18,27,28]. The parasite specimens were deposited in the museum of Zonal Base of Fishery Survey of India, Mumbai, Maharashtra (Ref. No. MUS.FSI.MU/EBP/2024/11).

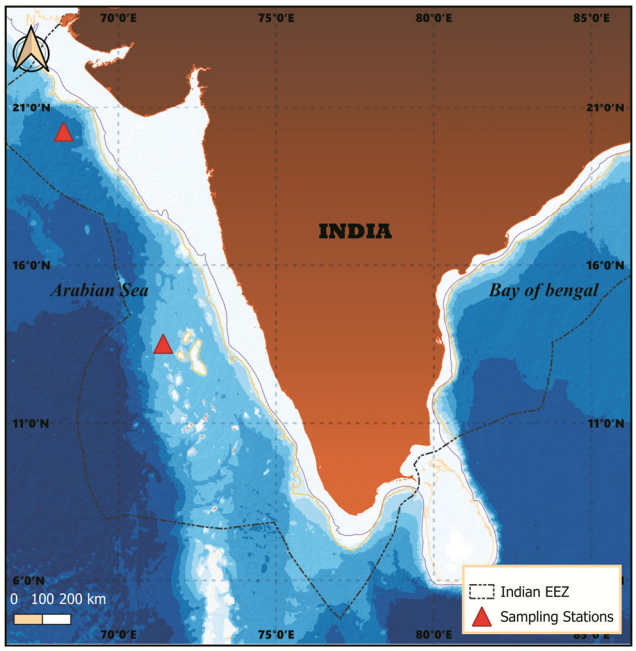


Fig. 1 — Map showing the collection locality of *Pandarus cranchii* in the Northeastern Arabian Sea



Fig. 2 — *Pandarus cranchii* clings to the belly region of *C. falciformis*

Results

A total of 11 specimens of *P. cranchii* were recovered from the ventral surface near the cloacal aperture of the silky shark *C. falciformis* (Fig. 2), corresponding to a prevalence of 25 %. All recovered specimens were identified as adult females. The total length of *P. cranchii* ranged from 8.02 to 11.24 mm, with a mean length of 10.51 mm. No visible external lesions, pigmentation, or tissue damage were observed at the attachment sites, suggesting a limited pathological impact on the host in the present observations.

Taxonomy

Class: Copepoda Milne Edwards, 1840
Order: Siphonostomatoida Burmeister, 1835
Family: Pandaridae Milne Edwards, 1840
Genus: *Pandarus* Leach, 1816
Pandarus cranchii Leach, 1819

Diagnosis

Female (Figs. 2, 3): Body robust with rich pigmentation, cephalothorax broad (4.6–6.1 mm; mean 5.2 mm). Posterior margin of cephalothorax bearing four pairs of tubercles, each with a spinule. Frontal plates well developed; antennae, mouth tube, maxillule, maxilla, and maxilliped prominent[14,18,28]. Dorsal plates of the second thoracic somite extending beyond the posterior margin of the third somite; hind margin bears five spines (Fig. 3d). Plates of the third somite smaller, medially fused, with a narrow median sinus flanked by paired spines. Fourth thoracic dorsal plates larger, fused, with a broader median sinus and paired spines. The fourth thoracic somite laterally expanded, forming large, wing-like adhesive plates, broader and more rounded than those of congeners such as *Pandarus carcharhini* and *P. smithii*[9,14] (Table 1). First to fourth legs distinct, with clawed exopods; fifth leg broader than the others, terminating in a distal spine. Genital complex short, with paired large spines on the postero-lateral lobes. Abdomen flattened (1.5–1.79 mm long); caudal rami short and broad (mean length 2.1 mm), extending beyond the abdominal plate; distally pointed and spinose.

Discussion

Previous studies have documented several species of the genus *Pandarus* from Indian waters, indicating a broad distribution of pandarid copepods in the region. Pillai[28] documented five species, *viz*. *Pandarus niger* Kirtisinghe, 1950, *Pandarus carcharhini* Ho, 1963, *Pandarus satyrus* Dana, 1849, *Pandarus cranchii* Leach, 1819, and *Pandarus smithii* Rathbun, 1886 from Indian waters. Subsequently, Cressey[9] recorded *P. cranchii* from the western Indian Ocean parasitising the silky shark *C. falciformis*; however, these records were from locations outside the Indian Exclusive Economic Zone (EEZ).

Within Indian coastal waters, Asok Kumar[23] documented pandarid copepods infecting elasmobranchs along the Kerala coast and reported *Pandarus cranchii* from multiple shark hosts, including *Sphyrna zygaena* (Linnaeus, 1758), *Carcharhinus dussumieri* (Valenciennes, 1839),

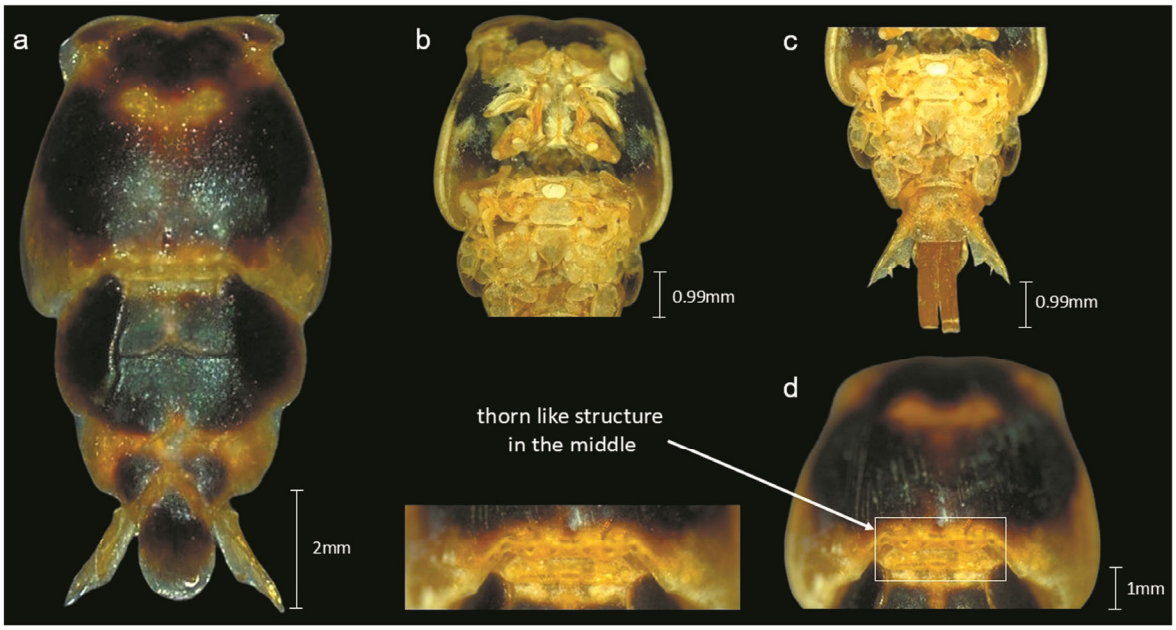


Fig. 3 — *Pandarus cranchii* Leach, 1819, adult female: a) Dorsal view; b) Ventral view – with cephalothorax; c) Ventral view with genital complex and egg sac; and d) Spines in thoracic somite

Table 1 — Comparative diagnostic characters of *Pandarus* species reported from Indian waters

Species	Body shape	Dorsal shield	Adhesive plates (4th somite)	Key diagnostic character
Pandarus cranchii	Broad, oval	Smooth	Very broad, wing-like	Wide adhesive plates
Pandarus niger	Compact	Thick, dark	Narrow	Dark pigmentation
Pandarus carcharhini	Elongate	Shallow indentations	Moderate	Streamlined body
Pandarus satyrus	Broad	Strongly sculptured	Irregular	Prominent dorsal ridges
Pandarus smithii	Slender	Smooth	Narrow	Long, narrow body

Carcharhinus sorrah (Müller & Henle, 1839), and *Carcharhinus melanopterus* (Quoy & Gaimard, 1824). In the same study, *Pandarus niger* was recorded from *Rhizoprion odonacutus* (Rüppell, 1837), while *Pandarus bicolor* was reported from *Sphyrna tudes* (Valenciennes, 1822). Additional records of *P. cranchii* include its occurrence on the pelagic thresher shark *Alopias pelagicus* from the Andaman Sea[26]. Despite these reports, documented occurrences of *P. cranchii* from offshore oceanic waters within the Indian EEZ remain limited.

Conclusion

This study documents the first confirmed record of the ectoparasitic copepod *Pandarus cranchii* from the north-eastern Arabian Sea within the Indian Exclusive Economic Zone, based on its occurrence on the silky shark *Carcharhinus falciformis*. The finding extends the known geographic distribution of the species and fills an important gap in its biogeographic record. Although the observed prevalence was low, this may reflect limited sampling effort and host-specific or ecological factors. The results emphasise the need for systematic parasitological surveys of oceanic sharks to improve understanding of parasite diversity, host associations, and distribution patterns in Indian waters.

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Conflict of Interest

The authors declare no conflict of interest.

Ethical Statement

The silky sharks investigated in this study were caught as bycatch during authorised oceanic tuna longlining operations onboard the MFV Matsya Vrushti. The parasite specimens were collected opportunistically from the hosts.

Author Contributions

AM: Collection, preservation, identification, registration, and preparation of draft manuscript; MN: Identification and manuscript review and editing; SS: Editing and critical analysis of the manuscript; and KRS: Editing and critical analysis of the manuscript.

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