

Short Communication

First occurrence report of the hermit crab *Dardanus setifer* (H. Milne Edwards, 1836) (Crustacea: Decapoda: Anomura) from the Odisha coast, India

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The Hermit crabs belonging to the Diogenidae family are represented by 483 species under 22 genera and are mainly found in the Indo-Pacific region. Hermit crab species *Dardanus setifer* (H. Milne-Edwards, 1836) is documented for the first time from the Odisha coast based on specimens collected from Paradeep harbour and Bahuda estuary situated on the coast of Odisha state, India. The species has been documented across a range extending from South Africa to Australia. In India, it has been reported from Karnataka, Kerala, Tamil Nadu, Andhra Pradesh and Andamans. The current record claims the range extension of this species to the coastal water of Odisha, reporting northward extension in the distributional range of the species in the Bay of Bengal.

[Keywords: *Dardanus setifer*, Diogenidae, Hermit crab, New record, Odisha]

Introduction

Hermit crabs are omnivorous, mostly detritivore–scavengers feeding on a broad spectrum of resources, including fresh algae, detritus and a diverse array of invertebrates^{1,2}. Some can be active predators or filter feeders, but most of them depend on carrion or detritus as their primary source of nutrients¹⁻³. They perform an essential carrion scavenging role in the intertidal ecosystem³. They have a unique characteristic and behaviour of selecting mollusk shells, which has attracted significant attention from a wide array of biologists for interpretation of competition, resource partitioning, behavioural ecology, population dynamics, evolutionary processes, and prey–predator interactions⁴. Hermit crabs are also preyed upon by shell-crushing teleost fish and crabs, octopus, and birds, thus playing a crucial role in the coastal food chain^{2,5}. Due to their behavioural change, they can serve as indicator species for various types of marine pollution, including impacts of climate change, chemical pollutants, heavy metals, plastics, sound, and light⁶.

Hermit crabs belong to the infraorder Anomura Macleay, 1838, which represents one of the most diverse crustacean groups within the phylum Arthropoda consisting of six superfamilies⁷. Superfamily Paguroidea Latreille, 1802 comprises eight families *i.e.* Coenobitidae, Diogenidae, Lithodidae, Paguridae, Parapaguridae, Pylochelidae, Pylojacquesidae and Xylopaguridae⁸. The family Diogenidae can be distinguished from other families by the terminating tapered filament of the upper rami of flagella of antennules and the approximate base of both the maxilliped III^(refs. 9-11). Diogenidae is globally represented by 483 species under 22 genera⁸. Among them, the genus *Dardanus* Paulson, 1875 has 47 species worldwide⁸ and is characterized by broadly rounded rostrum, ocular acicles with sub–rectangular or subquadrate acicular projection, ring-like transverse striae on legs mostly absent and absence of brood pouch in females⁹⁻¹¹. In India, the genus *Dardanus* is represented by 12 species¹². *Dardanus hessii* Miers, 1884 is the sole species of this genus reported from Odisha¹²⁻¹⁵. In the present study, *Dardanus setifer* (H. Milne-Edwards, 1836) is documented for the first time from the coastal waters of Odisha, India.

Materials and Methods

The specimens analyzed in the present study were obtained from a fishing trawler at the fishing harbour of Paradeep (20°17'18" N, 86°42'24" E) and a fishing boat at Bahuda fish market (19°7'29" N, 84°45'14" E) situated in the coast of Odisha state, India. The specimens were collected as bycatch during offshore fishing operations with the help of a trawl net (trawlers) and purse seine net (fishing boats), respectively. The hermit crabs were retrieved, preserved in 4 % formalin, and subsequently transported to the laboratory for detailed analysis. After incubation in a refrigerator for a few minutes, the hermit crabs were carefully removed from the gastropod shells. The shield length and width (SL, SW) were recorded using a digital calliper of 0.1 mm accuracy. Later, the specimens were identified to the species level using standard identification manuals^{7,9-11,16-17}. The specimens are deposited in the Estuarine Biology Regional Centre, Zoological Survey of India.

Abbreviations used: SL – Shield length; SW – Shield width; OPL – Ocular peduncle length; ABC – Anterior border of carapace.

Results

Systematic position

Phylum: Arthropoda von Siebold, 1848

Sub-phylum: Crustacea Brünnich, 1772

Class: Malacostraca Latreille, 1802

Order: Decapoda Latreille, 1802

Infraorder: Anomura MacLeay, 1838

Superfamily: Paguroidea Latreille, 1802

Family: Diogenidae Ortmann, 1892

Genus: *Dardanus* Paulson, 1875

Dardanus setifer (H. Milne Edwards, 1836)

Materials examined: 1 Female (Fig. 1), SL: 10.32 mm, SW: 9.56 mm, OPL: 9.00 mm, ABC: 9.32 mm, Paradeep, Odisha (ZSI/EBRC/Cr-16373); 1 Female, SL: 15.04 mm, SW: 14.40 mm, OPL: 12.47 mm, ABC: 12.54 mm, Bahuda estuary, Odisha (ZSI/EBRC/Cr-16374).

Diagnosis: Eyestalks approximately equal in length to the anterior border of the carapace and slightly exceed the length of the antennal peduncle. Antennular peduncles longer than both eyestalks and antennal peduncles. Ocular acicles widely spaced, each bearing a sub-rectangular acicular projection. Antennal acicle extends beyond the base of the terminal segment of the antennal peduncle. On the distal half of the antennal flagella, the anterio-lateral angles of the joints prominently produced. Rostrum obsolete.

Left cheliped substantially larger than right; with both exhibiting tuberculation and black-tipped, thorn-like spines. A longitudinal ridge along the lower margin of the left chela with spines arranged in palisade formation and a row of robust spines along the inner upper margin. Additionally, a prominent spine present on the outer upper border. Spines on cheliped surrounded by wreath-like arrangement of short, stiff setae around their bases. Fixed finger of left cheliped has curves along the lower margin. Pereopods 2 – 5 densely setose. Lateral surface of the propodus and dactylus of left third Pereopod with a broad, longitudinal, spinose median carina, tessellated with a series of deep-cut and extremely regular transverse grooves. These grooves are observed on both the upper and lower surfaces of the concavities, with more prominence on the upper surface. Dorsal and ventral margins lined with rows of elongated setae.

Telson exhibit asymmetry, characterized by a deep median cleft. The left lobe significantly larger than the right and possesses a few spines along the terminal margin.

Coloration: Maroon in colour when live. Chelipeds darker maroon. Ocular peduncle greyish purple on the upper side and orange on the lower. Antennules and antennae bright yellow or greyish yellow. Carpus and merus of each leg with dark brownish red band. Carpus with purple band on proximal dorsal region. Ambulatory legs with red and white patches. Setae dark red with white tips.

Discussion

The specimens examined in the present study correspond with the original description provided by, H. Milne Edwards¹⁸, and are also consistent with the descriptions provided by Bijukumar & Reshmi⁷, Kazmi & Siddiqui¹⁰, McLaughlin *et al.*¹¹, McLaughlin¹⁶ and Thomas¹⁷.

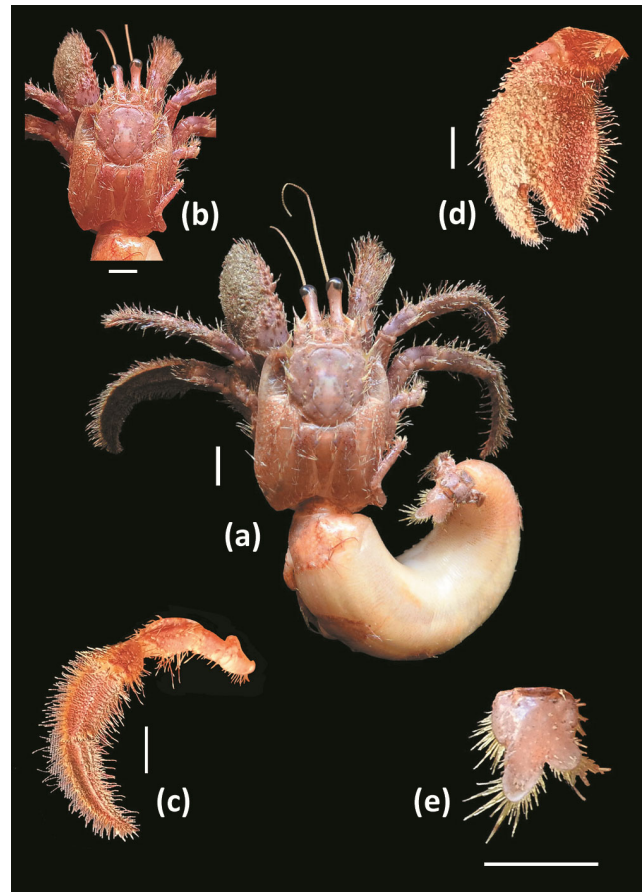


Fig. 1 — *Dardanus setifer* H. Milne-Edwards, 1836, Female (ZSI/EBRC/Cr-16373), SL: 15.04 mm, SW: 14.40 mm: a) entire, dorsal view; b) shield and cephalic appendages; c) dactylus and propodus of left third pereopod, lateral view; d) left cheliped; and e) telson. Scales equal 5 mm

Dardanus setifer is distinguished from other species of the genus by the presence of distinct curvatures along the lower margin of the left cheliped. Additionally, the lateral face of the propodus and dactylus of the left third pereopod exhibits a broad, longitudinal, spinose median carina, tessellated with a series of deep-cut and extremely regular transverse grooves. These grooves are observed on both the upper and lower surfaces of the concavities, though more pronounced on the upper surface.

It exhibits morphological similarity to *D. crassimanus* and *D. scutellatus* in the shape and proportion of cephalic appendages. However, these species can be differentiated based on distinct traits such as *D. crassimanus* having a heavily setose left third pereopod and left cheliped; *D. scutellatus* possessing an elongated palm on the left cheliped covered with short, stiff setae; whereas, *D. setifer* displays a short

palm, covered with thorn-like spines and accompanied by short, stiff setae¹⁹.

The occurrence of *Dardanus setifer* has been documented from South Africa^{11,17,20}, east coast of Africa^{13,20}, Mozambique¹⁵, Madagascar¹¹, Mauritius^{11,16,20}, Gulf of Oman^{15,21}, Pakistan^{11,16,22}, Indian Ocean¹⁵, Maldives¹⁵, Sri Lanka^{11,13,16,17}, Gulf of Martaban^{17,23}, Cheduba island¹³, Andaman Sea^{15,16}, Thailand^{11,16}, Vietnam^{11,15,16,17}, Indonesia¹⁵, Philippines^{15,19}, Hong Kong^{11,13,16,17,20}, Taiwan^{11,15}, Japan^{13,20}, Arafura Sea¹⁵, Torres Strait¹⁶, Australia^{11,16,20}, Fiji¹⁵, Funafuti¹⁵, and Tongatapu¹⁵. A map describing the Indian distribution of *Dardanus setifer* is provided in Figure 2. From India, it was first reported by Alcock in 1905 from the east coast.

Later, it was reported from Malabar coast^{13,17}, Karnataka^{13,24}, Kerala¹⁵, Tamil Nadu^{13,17,23,25-31}, Gulf of Mannar^{13,17,25,26}, Andhra Pradesh¹⁷, and Andaman

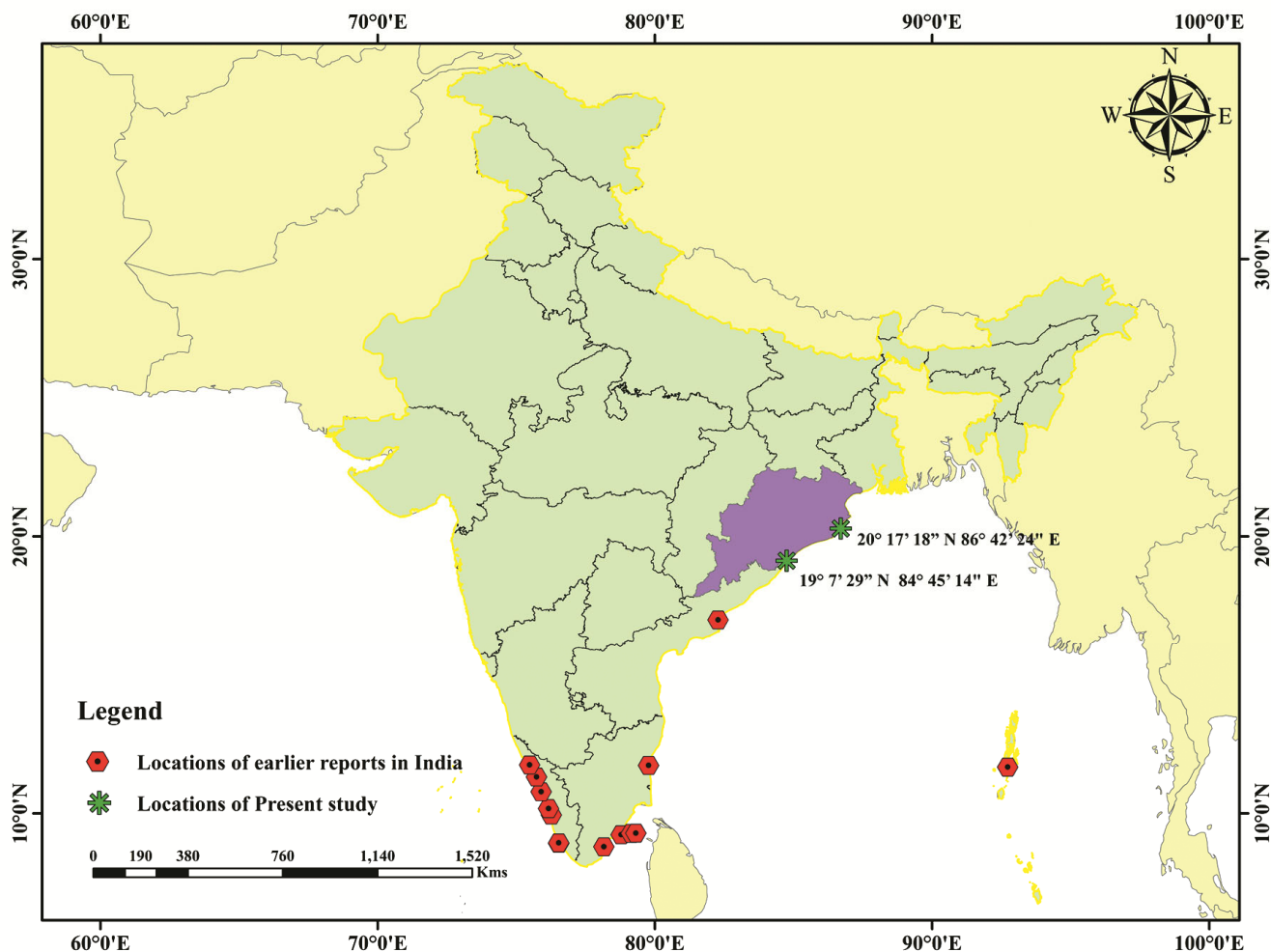


Fig. 2 — Occurrences of *Dardanus setifer* H. Milne-Edwards, 1836 reported in different coastal states and union territories of India along with the present report from Odisha

and Nicobar Islands^{31,32}. The current report from the coastal region of Odisha documents the extended distribution of *Dardanus setifer* and provides evidence of its continuous distribution from the west coast to the East coast of India. It also extends the distribution of this species northward in the Bay of Bengal. Previously, the genus was represented by only one species, *Dardanus hessii*, along the Odisha coast. With the present documentation of the species from Paradeep and Bahuda estuary, the total number of species within this genus recorded from the state has increased to two, while the overall hermit crab species count has increased to 24.

Conclusion

Despite their ecological significance in marine benthic and intertidal ecosystems, hermit crabs remain one of the least studied taxa within the animal kingdom. As the increasing pressure on the coastal environments caused by human activities is having detrimental effects on the coastal biodiversity, many species are going extinct at a very rapid pace. Hence, extensive study is required to assess all the different species of hermit crabs, their biology, ecological role and population attributes to develop a holistic management and conservation plan.

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Conflict of Interest

The authors declare no competing or conflict of interest.

Author Contributions

APS & SK: Field survey, analysis and identification of the samples; and SP: Study design, critical analysis and article writing.

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