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Sayan Kumar Mukhopadhyay
Zoological Survey of India,
M-Block, New Alipore, Kolkata,
West Bengal, India

Sreeraj CR
Zoological Survey of India,
Sunderban Regional Centre,
Canning, West Bengal, India

C Raghunathan
Zoological Survey of India,
M-Block, New Alipore, Kolkata,
West Bengal, India

Arya Sen
Zoological Survey of India,
Sunderban Regional Centre,
Canning, West Bengal, India

Corresponding Author:
Sreeraj CR
Zoological Survey of India,
Sunderban Regional Centre,
Canning, West Bengal, India

First report of a hermit crab *Clibanarius longitarsus* (De Haan, 1849) (Crustacea: Anomura) from sunderbans, India

Sayan Kumar Mukhopadhyay, Sreeraj CR, C Raghunathan and Arya Sen

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Abstract

Hermit crabs play a crucial role in the mangrove ecosystem; being scavenger in nature, they help quickly remove dead materials from soil. Hermit crabs belong to the Decapoda and superfamily Paguridae of the subphylum Crustacea. In India a total of 114 species of hermit crabs have been recorded, of which 20 species are reported so far from West Bengal. During the recent survey at Sunderban Biosphere Reserve, a hermit crab *Clibanarius longitarsus* De Han, 1849 was recorded, which is not hitherto reported from West Bengal. Detailed characters of the species along with the list of hermit crabs reported from West Bengal are given in this work.

Keywords: Anomura, biosphere reserve, *Clibanarius*, diogenidae, Lothian, sunderban

Introduction

Hermit crabs belong to the order Decapoda and superfamily Paguridae of the subphylum Crustacea. Due to the soft, non-calcified abdomen of hermit crabs, they inhabit empty molluscan shells; mainly bivalve, scaphopod shells and hollowed wooden logs (Lemaitre, 1995; McLaughlin and Lemaitre, 1997; Forest, 1987)^[15, 10, 19], hollowed outer parts of stones (Pope, 1953; Mayo, 1973)^[12], hollowed tubes of vermitid gastropods (Markham, 1977; Gherardi and Cassidy, 1994; Gherardi, 1996; Rodrigues *et al.*, 2000)^[13, 18, 17], corals (McLaughlin and Lemaitre, 1993)^[11] and sponges (Forest, 1987)^[19]. But there are also exceptions, where the fully calcified body is observed in adult hermit crabs, for example *Birgus latro*, (Linnaeus, 1767), commonly known as Coconut Crab, lives without inhabiting any shells as they possess a fully calcified body. Worldwide there are about 1,106 species of hermit crabs reported, among which the greatest number of species are in the family Paguridae containing 75 genera and 542 species followed by Diogenidae containing 20 genera and 428 species; Parapaguridae containing 10 genera and 76 species; Pylochelidae containing 10 genera and 52 species; Coenobitidae containing 2 genera and 17 species (McLaughlin *et al.*, 2010)^[9]. Except for Arctic and Antarctic seas, hermit crabs have a wide range of distribution worldwide, from the freshwater region of the river mouth to mangrove intertidal swamps, corals, subtidal shores (Mostafa, 2015).

In India a total of 114 species of hermit crabs of 27 genera have been reported among which the highest number of species belong to the family Diogenidae containing 11 genera and 79 species, followed by Paguridae containing 7 genera and 19 species; Coenobitidae containing 2 genera and 7 species; Parapaguridae containing 3 genera and 4 species and Pylochelidae containing 3 genera and 3 species. Among the 114 species reported from India, the highest number of species are found in Tamil Nadu (50 species belonging to 13 genera and 4 families) and the lowest number of species are found in the state of Maharashtra (7 species belonging to 4 genera and 2 families). Amongst the 7,156 Km long Indian coastline, the east coast and Andaman and Nicobar island group is reported to be more diverse than the west coast and Lakshadweep island group (Trivedi *et al.*, 2017; Behera *et al.* 2021)^[2, 22].

Sunderban is considered the largest single mangrove belt globally, which constitutes about 9,827 Km² among which 4,264 Km² is part of the Indian subcontinent. A total of 548 species of Subphylum crustacea are reported from West Bengal, among which 334 species are found in the Sunderban region (Chandra, *et al.*, 2017)^[20]. A total of 16 species have been reported so far from West Bengal, belonging to 5 genera and 3 families (Trivedi *et al.*, 2017)^[2]

Among which 14 species belonging to 5 genera and 3 families have been reported from the Sunderban region of India (Chandra *et al.*, 2017) [20].

Material and Methods

The specimens were collected from the northern part of Lothian Island Wildlife Sanctuary (88°18.696'E, 21° 42.340'N), situated at the confluence of river Saptamukhi and the Bay of Bengal on 12.10.2019 (Figure 1). The specimens were obtained from the vacant shells of *Telescopium* Montfort, 1810. Specimens and the molluscan shells were collected by handpicking and the hermit crab samples were separated, photographed and preserved in 10% Formalin –freshwater solution. The specimens were measured using a slide calliper with a minimum measurement capacity of 0.1mm in the laboratory. Specimens and the host molluscan shells were identified in the lab. Identification keys used for identification of the hermit crabs were as per Thomas, 1989 [3]. Voucher specimens are deposited in the National Zoological Collections of ZSI-Sunderban Regional Centre.



Fig 1: Map of the Sunderban Biosphere Reserve and the collection site

Results

During the survey, a total of 10 specimens were collected and they were identified as three species belonging to two genera such as *Clibanarius longitarsus* De Han, 1849; *Clibanarius infraspinus* Hilgendorf, 1869 and *Coenobita cavipes* Stimpson, 1858. Among this, *C. longitarsus* was not hitherto reported from the Sunderban Biosphere Reserve. Details of the newly recorded species *C. longitarsus* are given below:

Systematic account

Phylum: Arthropoda von Siebold, 1848

Subphylum: Crustacea Brunnich, 1772

Class: Malacostraca Latreille, 1802

Order: Decapoda Latreille, 1802

Infraorder: Anomura MacLeay, 1838

Superfamily: Paguroidea Latreille, 1802

Family: Diogenidae Ortmann, 1892

Genus: *Clibanarius* Dana, 1852

Clibanarius longitarsus (De Haan, 1849)

Figure 2 (A, B)

Pagurus longitarsus de Haan 1950, p. 211, pi. 50, fig. 3.

Clibanarius longitarsis Dana 1852, p. 464; Fize and Serene

1955, pp. 83-90, fig. 1 A, B, C, pi. 3, 1, 7, 10, 13 (Synonymy).

Clibanarius longitarsus de Man 1902, p. 741; Sundara Raj 1927, p. 130; Sewell and Anandale 1928 p. 695; Reddi 1935, p. 562; Gravely 1941, p. 77; Lewinsohn 1969, 18-19.

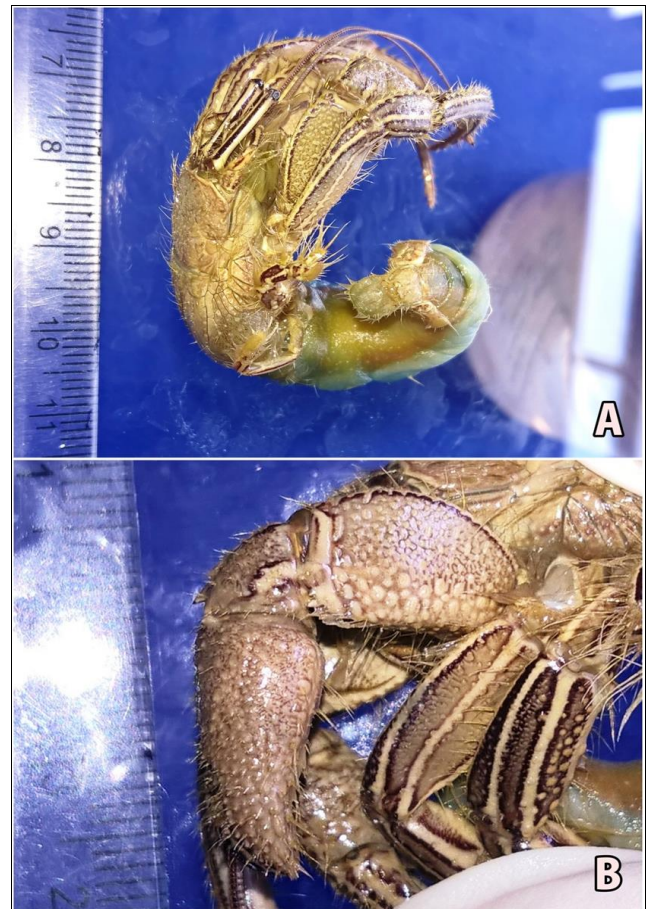


Fig 2: A. *Clibanarius longitarsus* De Haan, 1849 Adult Female B. Outer view of left chela of *C. longitarsus*



Fig 3: Natural habitat of *Clibanarius longitarsus* De Haan, 1849 in Sunderban Biosphere Reserve

Diagnostic characters: Well developed carapace with spines projecting outwards and the carapace is broader at the proximal end of the body. Eye stalk is as long as the antennular peduncle. Chelipeds are equal in length; left cheliped is slightly larger than the left. Both chelipeds are with dark corneous tips. One or two rows of spines are present on chelipeds and irregularly placed spines are present on palm. Dactylus of the third walking leg is longer than the

propodus. Ambulatory legs with two stripes; stripes are olive green or brown in colour. Antennae dull brown on olive green in colour.

Material examined: 2 ♀ and 2 juveniles, Lothian Island, Sunderban Biosphere Reserve (21°42.266'N, 88°18.703'E), 12.10.2019, Collector: Sayan Kr. Mukhopadhyay, Accession Number: ZSI/SbRC/KN 2695 (Deposited in the National Zoological Collections of ZSI-Sunderban Regional Centre).

Distribution India: Kerala, Andhra Pradesh, Odisha, Andaman and Nicobar, West Bengal (Current Study).

Elsewhere: Red Sea, Singapore, Vietnam, China, Japan, East coast of Africa.

Remarks: *C. longitarsus* is described here, on the basis of 2 female examples collected from Sunderban. In the present study the specimen described agrees with all the descriptive characteristics described by Thomas (1989)^[3]. *C. longitarsus* was earlier reported from the east coast of India except the coast of West Bengal. This is the first report of from Sunderban Biosphere Reserve as well as from West Bengal (India). In this study *C. longitarsus* specimens were collected from their natural habitat (Figure 3) and observed that they inhabit vacant shells of *Telescopium* spp.

Discussions and Conclusion

In India a total 114 species of hermit crabs were reported

among which 20 species have been reported from West Bengal (Trivedi *et al.*, 2017; Behera *et al.* 2021)^[2, 22] [Table 1]. With this report, a total 15 species of hermit crabs are now reported from Sunderban as well as West Bengal.

Hermit crabs ecologically play a crucial role in mangrove ecosystem. They are scavenger in nature and help in quick removal of dead materials in soil in their natural habitat. Some of the hermit crab species like *Clibanarius longitarsus* (De Haan, 1849) also have a propensity to accumulate heavy metals (Lyla and Khan, 2011)^[14] which makes them a prospective agent for ecotoxicological survey for heavy metal toxicity. All these data thus suggest the ecological importance of hermit crabs. In India, Crustacean fauna is one of the least studied major phyla. Sunderban Mangrove is the largest single mangrove belt in the world. Mangroves are well known for their rich biodiversity. The Indian part of Sunderban is the largest mangrove ecosystem in India also. But due to lack of study of crustacean biodiversity nationwide as well as in Sunderban, a little is only known about the species present here. Worldwide 1,106 hermit crabs are reported but in India only 112 species are reported as of now, which is about 10 percent of the worldwide population of hermit crabs. This shows the lack of exploration in this group and also throws light onto the prospect of future research. Hence in future more detailed research regarding the biodiversity, distribution and behaviour of hermit crabs need to be undertaken to glean the knowledge of these conspicuous organisms and their distribution pattern in Sunderban Biosphere Reserve as well as Indian subcontinent.

Table 1: Checklist of Hermit crab Species reported from West Bengal

Sl. No.	Family	Species	Reference
1	Coenobitidae	<i>Coenobita cavipes</i> , Stimpson, 1858	Reddy 1995b; Ramakrishna <i>et al</i> 2003 ^[5, 6]
2	Diogenidae	<i>Clibanarius clibanarius</i> , Herbst, 1791	Alcock 1905; Reddy 1995b; Ramakrishna <i>et al</i> 2003 ^[2, 5, 6]
3		<i>Clibanarius infraspinus</i> , Hilgendorf, 1869	Reddy 1995b; Ramakrishna <i>et al</i> 2003 ^[5, 6]
4		<i>Clibanarius olivaceus</i> , Henderson, 1915	Reddy 1995b; Ramakrishna <i>et al</i> 2003 ^[5, 6]
5		<i>Clibanarius padavensis</i> , De Man, 1888	Alcock 1905; Reddy 1995b; Ramakrishna <i>et al</i> 2003 ^[2, 5, 6]
6		<i>Dardanus hessi</i> , Miers, 1884	Reddy 1995b; Ramakrishna <i>et al</i> 2003 ^[5, 6]
7		<i>Diogenes alias</i> , McLaughlin & Holthuis, 2001	Alcock 1905; Reddy 1995b ^[2, 5]
8		<i>Diogenes avarus</i> , Heller 1865	Reddy 1995b; Ramakrishna <i>et al</i> 2003 ^[5, 6]
9		<i>Diogenes costatus</i> , Henderson, 1893	Alcock 1905; Reddy 1995b; Ramakrishna <i>et al</i> 2003 ^[2, 5, 6]
10		<i>Diogenes custos</i> , Fabricius, 1798	Reddy 1995b; Ramakrishna <i>et al</i> 2003 ^[5, 6]
11		<i>Diogenes dubius</i> , Herbst, 1804	Alcock 1905 ^[2]
12		<i>Diogenes investigatoris</i> , Alcock, 1905	Reddy 1995b; Ramakrishna <i>et al</i> 2003 ^[5, 6]
13		<i>Diogenes miles</i> , Herbst, 1791	Ramakrishna <i>et al</i> 2003 ^[6]
14		<i>Diogenes planimanus</i> , Henderson, 1893	Reddy 1995b; Ramakrishna <i>et al</i> 2003 ^[5, 6]
15		<i>Diogenes rectimanus</i> , Miers, 1884	Ramakrishna <i>et al</i> 2003 ^[6]
16		<i>Paguristes balanophilus</i> Alcock, 1905	Behera <i>et al.</i> 2021 ^[22]
17		<i>Paguristes calvus</i> Alcock, 1905	Behera <i>et al.</i> 2021 ^[22]
18	Paguridae	<i>Spiropagurus spiriger</i> , De Haan, 1849	Reddy 1995b ^[5]
19	Parapaguridae	<i>Parapagurus pilosimanus</i> Smith, 1879	Behera <i>et al.</i> 2021 ^[22]
20	Pylochelidae	<i>Bathycheltes macgilchristi</i> (Alcock, 1905)	Behera <i>et al.</i> 2021 ^[22]

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Authors Contribution

Author SKM collected, preserved and identified the specimen & prepared the draft manuscript, Author AS assisted during survey and manuscript preparation, Author SCR confirmed the identification and finalized the manuscript, Author CR overall coordination the research.

Competing Interest

All the authors declare that they do not have any competing interest.

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