

New record of brachyuran crabs from the Visakhapatnam coast, Andhra Pradesh

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Research Article

Keywords: Andhra Pradesh, Brachyuran, Eucrate, Euryplacidae, Liagore, Visakhapatnam, Xanthidae

Posted Date: July 15th, 2022

DOI: <https://doi.org/10.21203/rs.3.rs-1834186/v1>

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Abstract

Two species of brachyuran crabs from two families, *Eucrater indica* Castro & Ng, 2010 belonging to the family Euryplacidae and another one is *Liagore rubromaculata* (De Haan, 1983) belonging to the family Xanthidae are reported for the first time from the Visakhapatnam coast, Andhra Pradesh. The crabs were collected from the Visakhapatnam fishing harbour in the trawl bycatch during the reef and reef-associated faunal survey along Andhra coast. The morphological features, taxonomical systematic, colour and distribution of these crabs are discussed herein.

Introduction

Andhra Pradesh is situated between Orissa and Tamil Nadu, covering 973.4 km length of the India coast. The coast covered different types of ecosystems like reef patches, seaweed ecosystem with rocky bottom, rocky shore, mudflat ecosystems, mangrove ecosystem and sandy beaches (Chandra *et al.*, 2019). Visakhapatnam is a major fish landing centre and the capital of Andhra Pradesh. The crab's fishery is important crustacean resource in the Visakhapatnam coast. Mostly the family Portunidae is commercially valuable one and numerous brachyuran crab species from different families were caught accidentally in trawl net fishing along with fish and Portunids, but these are treated as trash or used in fish feed production (Pillai, & Thirumilu, 2008). The reason behind crustacean diversity being in study trends, is to understand macro-benthic faunal relations, which is represented by 67,000 species globally (Ahyong *et al.*, 2011; Martin, *et al.*, 2001). Among crustaceans, brachyuran crabs are the most diverse group. It represents nearly 7000 described species from 93 families distributed in marine, freshwater, and terrestrial habitats (Ng *et al.*, 2008; de Grave *et al.*, 2009). A total of 910 species belonging to 62 families and 361 genera have been reported from Indian waters and in Andhra Pradesh, a total of 121 species belonging 67 genera, and 27 families have been reported (Trivedi *et al.*, 2018, Valarmathi, 2020).

Brachyuran crabs belonging to the families Euryplacidae, and Xanthidae are smaller in size. The family Euryplacidae Stimpson, 1871, accommodates 31 species belonging to 13 genera, of which genus *Eucrater* represents only eight species around the world. In India three species, *E. alcocki*, *E. crenata* and *E. indica* have been reported. *E. indica* has been reported from, Tamil Nadu (Jeyabaskaran *et al.*, 2000; Castro and Ng, 2010; Silambarasan *et al.*, 2017; Trivedi *et al.*, 2018) and Gujarat coast (Trivedi *et al.*, 2018). The genus *Liagore* De Haan, 1833 belongs to the family Xanthidae, represents total three species worldwide, *L. erythematica* Guinot, 1971, *L. pulchella* Ng & Naruse, 2007; *L. rubromaculata* (De Haan, 1835), of which two species *L. rubromaculata* and *L. erythematica* have been reported from Indian waters (Krishnamoorthy 2007; Vaitheeswaran, 2019; Trivedi *et al.*, 2018). The present study reports the presence of *Eucrater indica* Castro & Ng, 2010 and *Liagore rubromaculata* (De Haan, 1983) for the first time from Andhra Pradesh coast.

Material And Method

The study was carried out as part of a research project entitled “Studies on the Coral and reef associated faunal community along the Andhra and Odisha coast of India”. During field survey, the samples have been collected from Visakhapatnam fishing harbour (N 17.696022, E 83.302603). The collected specimens were washed to remove sediment, photographed and then preserved in 10% formalin for further identification and preservation. The specimens were deposited in the National Zoological Collections of Zoological Survey of India, Sunderban Regional Centre, Canning, West Bengal. The specimens were identified following the descriptions and standard taxonomical key characters (Alcock 1898; Castro & Ng 2010; Ng & Chen 2004; Franse, 2014; Davie *et al.*, 2015; Naderloo, 2017).

Results

In the present study, brachyuran crab species *Eucrate indica* Castro & Ng, 2010 and *Liagore rubromaculata* (De Haan, 1983) are reported for the first time from the Andhra Pradesh coast.

Systematic details of the collected species:

Order: Decapoda Latreille, 1802

Family: Euryplacidae Stimpson, 1871

Genus: *Eucrate* De Haan, 1835

Eucrate indica Castro & Ng, 2010

Material Examined: One male specimen (Fig 2) collected by trawl catch, Visakhapatnam fishing harbour, Bay of Bengal, Andhra Pradesh, India, (N 17.696022, E 83.302603), on 22.01.2022, Coll. by: J. S. Yogesh Kumar, Accession No: ZSI/SbRC/KN5110 (Deposited in the National Zoological Collections of Zoological Survey of India, Sunderban Regional Centre).

Diagnostic Characters: Carapace is hexagonal shaped, surface of the carapace is smooth and without any granules. The anterolateral margin of the carapace possesses three anterolateral teeth excluding the outer orbital tooth. The first tooth is short, triangular; the second tooth is largest, sharp, pointed and slender; the third tooth is short, almost reduced, and not much noticeable. The male abdomen is narrow; almost looks like ‘T’. Propodus is swollen; cheliped is slightly broader than propodus. Cheliped fingers are stout moderately. Small red-brown dots are distributed on the dorsal portion of the cheliped and maxillipeds. The dorsal Carapace with numerous small red-brown dots. Dorsal portion of the carapace contains two large red-brown spots on the median region, each large blotch is flanked by two small red-brown vertically placed spots. Morphometric measurements are detailed in table 1.

Table 1. Morphometric measurements of *Eucrate indica* Castro & Ng, 2010 and *Liagore rubromaculata* (De Haan, 1983).

Morphometric Characters	<i>Eucrate indica</i>	<i>Liagore rubromaculata</i>
Carapace Data (mm)	24.1	30.1
Carapace Width	20	22
Carapace length	7.1	9
Frontal Width	19.5	18.5
Posterior width of carapace	15.1	16
Abdominal length		
Cheliped Data (in mm)		
Propodus length	23.2	22.9
Propodus width	12.8	10.7
Dactylus length	15.6	9.9
Merus Length	11.9	10.1

Distribution: World: Persian Gulf, India, Andaman Sea coasts of Thailand, and Peninsular Malaysia (Castro and Ng, 2010). India: Gujarat (Trivedi *et al.*, 2018), Tamil Nadu (Jeyabaskaran *et al.*, 2000; Castro and Ng, 2010; Silambarasan *et al.*, 2017; Trivedi *et al.*, 2018), Andhra Pradesh (Present study).

Remarks: The present, examined male specimen from the Andhra coast agrees with the original description by Castro and Ng (2010) and recently reported specimen by Silambarasan *et al.*, 2017. Carapace coloration pattern slightly different from the Silambarasan *et al.*, 2017; Habib *et al.*, 2021 but agreed with Castro and Ng, 2010.

The collected species *Eucrate indica* was confused earlier with *Eucrate alcocki*. *E. indica* is geographically distributed in the Persian Gulf, Indian Ocean, and the Andaman Sea while *E. alcocki* can be seen on the Gulf of Thailand and the western Pacific Ocean. Shape and colour pattern slightly differs in *E. indica* and *E. alcocki*. *E. alcocki* contains six large red or brown red spots on the middle portion of the carapace, whereas *E. indica* contains six red large spots arranged transversely on the median portion of the carapace. Numerous smaller spots are distributed on the anterior portion of the carapace in both of the species. In addition, the carapace in *E. India* is much wider than *E. alcocki*. *E. indica* has more prominent frontal margin, distinct median notch rather than *E. alcocki*.

Order: Decapoda Latreille, 1802

Family: Xanthidae Macleay, 1838

Genus: *Liagore* De Haan, 1833

Liagore rubromaculata (De Haan, 1983)

Material Examined: One male specimen (Fig 3) collected by trawl catch, Visakhapatnam Fishing Harbour, Bay of Bengal, Andhra Pradesh, India, (N 17.696022, E 83.302603), 22.01.2022, Coll. by: J. S. Yogesh Kumar, Accession No: ZSI/SbRC/KN 5111 (Deposited in the National Zoological Collections of Zoological Survey of India, Sunderban Regional Centre).

Diagnostic Characters: Carapace of *L. rubromaculata* is oval shaped, smooth, no granules present on the carapace. The anterolateral margin is smooth, it contains no teeth whereas posterior margin is slightly concave. Eye stock is stout and short. Front is broad and divided into two lobes; Fronto-orbital width is moderately wide. Eyes are small with short and steep eye-stalk. Chelipeds are symmetrical. Well-developed H-shaped groove is present on the middle of the carapace. The dorsal side of Chelipeds, pereopods, and carapace is covered with numerous brownish-red spots. First pleopod elongated with long hairs on the inner side of the distal part. Male abdomen is triangular in shape and third to fifth segments are fused with each other; terminal segment is with round margin. Red dots over the carapace is symmetrically distributed (Fig: C & D). Morphometric measurements are detailed in table 1.

Distribution: Northern Indian Ocean; Persian Gulf, Bay of Bengal (Naderloo, 2017), Taiwan, South China, Java, Indonesia, Gulf of Carpentaria, north-western Queensland, Australia (Ng and Chen 2004). In India: Tamil Nadu (Krishnamoorthy, 2007; Vaitheeswaran, 2019), West Bengal (Vaitheeswaran, 2019), Andhra Pradesh (Present Study).

Remarks: The present, examined male specimen from the Andhra coast completely agrees with the description by Ng and Chen 2010. *L. rubromaculata* can be differentiated from *L. erythematica* mainly in the anterolateral margin. *L. erythematica* has lobes on the anterolateral margin. Whereas the anterolateral margin of *L. rubromaculata* is completely smooth and unarmed (Guinot, 1971). In *L. rubromaculata*, no trace of lobes can be found regardless of the Specimen size (Ng, & Chen, 2004).

Discussion

Andhra Pradesh is a state of long coastline and the costal ecosystem has been crowned with versatile habitats, sandy, rocky, patchy coral, mangrove habitats. These habitats are preferred by various brachyurans and inventorying of brachyurans from the Andhra Pradesh coast recorded 121 species from 27 families (Roy & Nandi, 2007; Trivedi et al., 2018). Euryplacidae & Xanthidae, both the families are quite diverse and prefers muddy to rocky substratum habitats. *E. indica* under the family Euryplacidae was first described by Castro and Ng (2010) from Thailand with a single male holotype along with three female and two male paratypes. This species is distributed in the Persian Gulf, India, Thailand and Peninsular Malaysia (Naderloo, 2017). *L. rubromaculata* under the family Xanthidae was first reported by De Haan in 1983. It is distributed in Northern Indian Ocean; Persian Gulf, Bay of Bengal (Naderloo 2017), Taiwan, South China, Java, Indonesia, Gulf of Carpentaria, north-western Queensland, Australia (Ng and Chen 2004). When reviewing the distribution of these two species, it can be observed that they have a restricted distribution mostly concentrated in the tropical region in, Indian Ocean, Bay of Bengal, Phillipine Sea,

South Pacific Ocean. The temperature and habitat choice of these two species can be reason behind the restricted distribution pattern.

Importance of general biodiversity study for habitat analysis and conservation of a whole ecosystem is undeniable. In this point of respect, finding these two brachyuran species from Visakhapatnam extends the range of distribution from West Bengal and Tamil Nadu Coast, which is almost 350 km away – can be a crucial factor for understanding the brachyuran diversity for Andhra coast. However, the problem is unknowingly the fishermen collect juvenile and large brachyuran, which don't have an economical value and mostly treated as trash becoming a great barrier for conservation of natural biodiversity resources. It is quite interesting that five new type taxa have been described from Andhra Pradesh (Roy & Nandi, 2007). Therefore the present study is stepping stone for cataloguing the brachyuran diversity of Andhra coast for growing awareness to preserve this wild diversity for better ecological implications. The availability of these two species in this region predicts the abundance of brachyuran crab in this region creates an array of hope for finding new species.

Declarations

Ethics approval and Consent to participate

Consent and approval was obtained from the Zoological Survey of India, Sunderban Regional Centre, Canning, WB, India for conducting a survey to collect, preserve & identify faunal specimens for better knowledge of the diversity, as well as preparation of the brachiurian catalogue of the state of Andhra Pradesh following the mandate of Zoological Survey of India.

Human and Animal Ethics

All procedures involving animals were in compliance with the Zoological Survey of India animal ethical standards, and approval was granted by the Zoological Survey of India, Sunderban Regional Centre, Canning, WB, India.

Consent for publication

Informed consent was obtained from all individual participants included in the study for publication of the data.

Availability of supporting data

The identified specimen mentioned in the publication is deposited at the National Zoological Collection of Sunderban Regional Center, Zoological Survey of India (Reg No -ZSI/SbRC/KN5110, ZSI/SbRC/KN 5111) and is available on request.

Competing interests

The authors declare that they have no competing interests.

Funding

Not Applicable

Authors' contributions

Authors JSYK, PM, AS, PP: Sample collections, Preservation, Photography and identification. Author JSYK confirmed identification, prepared final manuscript for submission, author PM supported for identification and drafting the manuscript. Author AS assisted during survey, formatted the manuscript, author PP assisted in survey, preserved and photographed the specimen. All authors read and approved the manuscript.

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ACKNOWLEDGMENTS

The work was carried out as part of the In-house project entitled “*Studies on the Coral and reef associated faunal community along the Andhra and Odisha coast of India*”. The authors would like to thank Dr. Dhriti Banerjee, Director, Zoological Survey of India for the support and encouragement for undertaking the work. The authors are also thankful to Andhra Pradesh Forest Department, India for the necessary permissions and support provided for the survey.

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Figures

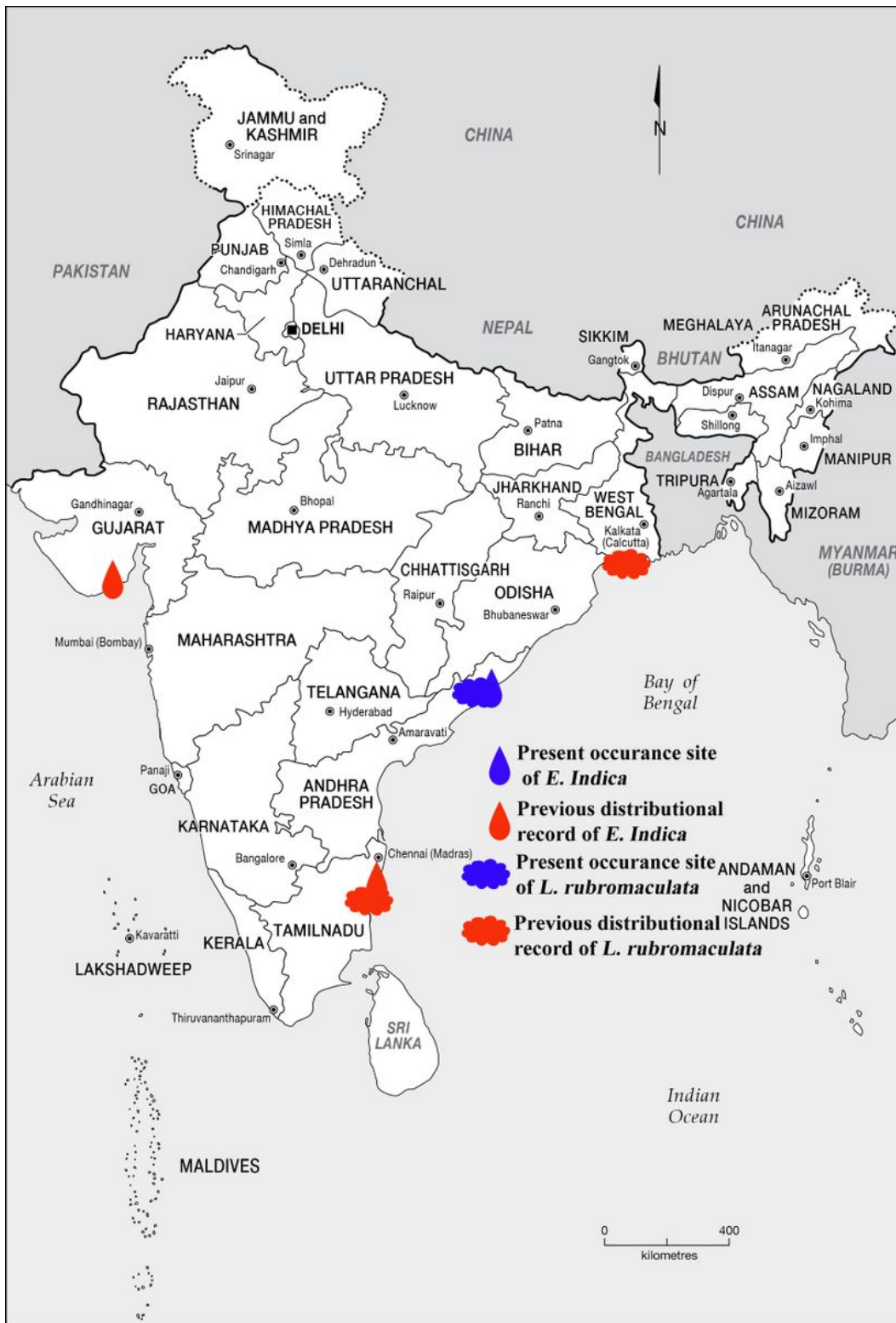


Figure 1

Collection site and distribution of *E. Indica* & *L. rubromaculata* from India

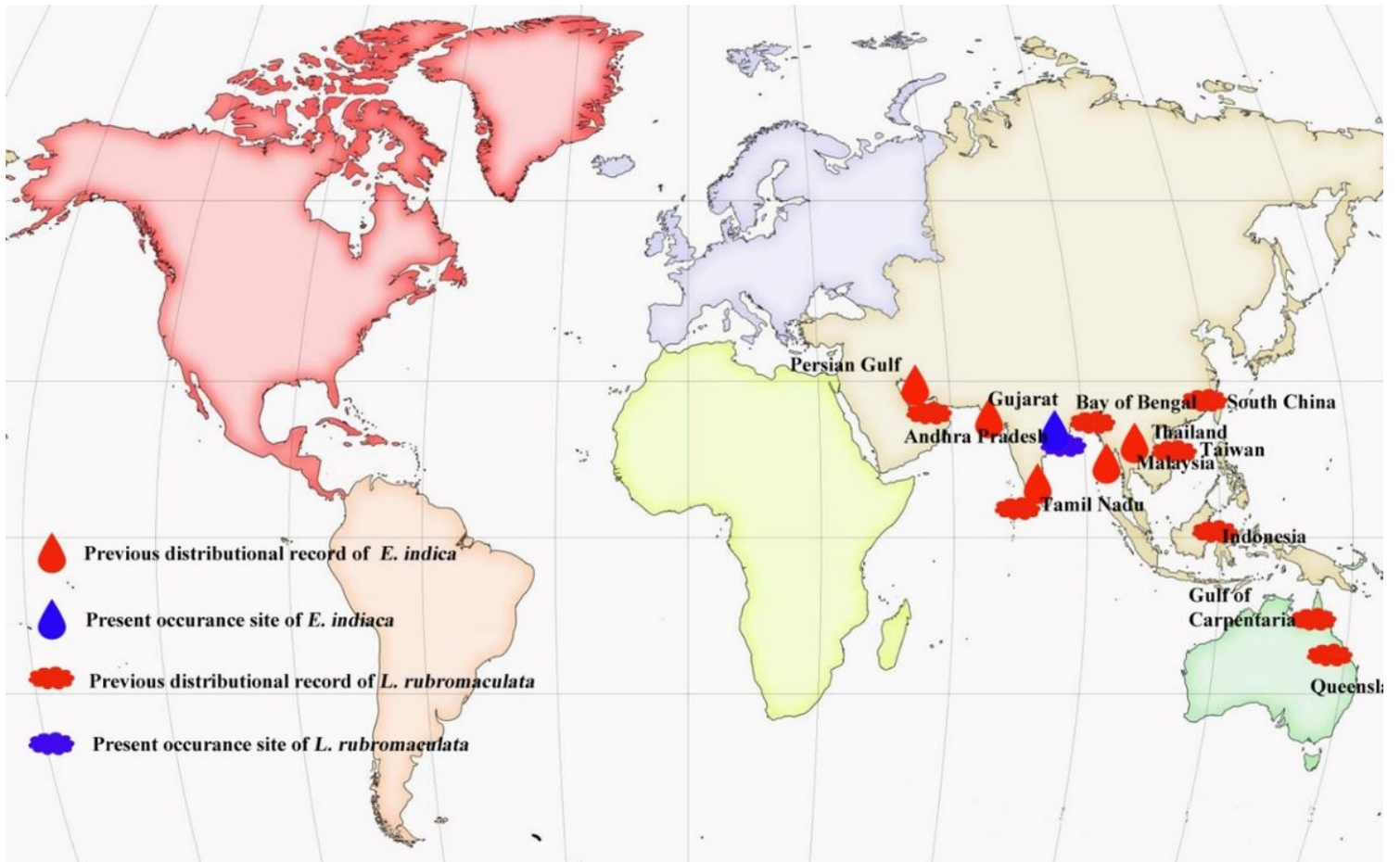


Figure 2

Distribution of *E. Indica* & *L. rubromaculata* in world



Figure 3

A & B Dorsal and Ventral view of the male specimen of *Eucrateindica* Castro & P.K.L. Ng, 2010. Male (24.1× 20 mm), Visakhapatnam, Andhra Pradesh. C&D dorsal and ventral view of the male specimen of *Liagorerubromaculata* (De Haan, 1983). Male Specimen (30.1 × 22 mm), Visakhapatnam, Andhra Pradesh.