

# Morphotaxonomic Review for Conserving *Liotelphusa laevis* (Wood-Mason, 1871) (Decapoda: Brachyura: Gecarcinucidae), A Near Threatened Freshwater Crab from North East India

Awarlin Chetia<sup>1</sup>, Santanu Mitra<sup>2</sup> and Debangshu Narayan Das<sup>1\*</sup>

<sup>1</sup>Department of Zoology, Rajiv Gandhi University, Doimukh-791112, Arunachal Pradesh.  
awarlinchetia26@gmail.com, dndas2011@gmail.com

<sup>2</sup>Crustacea Division, Zoological Survey of India, Fire Proof Spirit Building, 27 Jawaharlal Nehru Road, Kolkata-700016, West Bengal.  
santanuzsi@gmail.com

**Abstract:** *Liotelphusa laevis* is a small, bright red coloured endemic freshwater crab but was ambiguously described from Northeastern India. Now the species has been categorized as 'near threatened' due to lack of necessary attention from conservationists, despite its potential for ornamental market. The present review has explored its identity clues which are discrete from other congeners so that an endeavor towards its conservation could easily be undertaken.

**Index Terms:** Morphotaxonomy, freshwater crab, ornamental market, conservation, congener.

## I. INTRODUCTION

Most of the crabs are endemic to narrow geographical area, a very few numbers of crab are widely distributed and usually of very common occurrence. For example, *Sartoriana spinigera* is a very common crab in Northeastern parts of India and also found in Nepal, Bangladesh, Pakistan, Srilanka, and Myanmar (Mitra 2017). *Maydelliathelphusa lugubris* has continuous distribution throughout the Eastern Himalayan region including Bangladesh, Bhutan, and Nepal (Mitra 2017). Similarly, in southern parts of India *Barytelphusa cunicularis* is a common freshwater crab and its distribution extends from Himachal Pradesh in the North to Kerala in the South (Pati and Sharma 2014). In India, 120 species of freshwater crabs have been reported from different geographical regions and among these 38 species are reported from North East India (Pati and Thackeray, 2018). The IUCN red data list revealed that most of these crabs of North East India are in data deficient condition and some of them are 'least

concern' in the context of conservation scale (Cumberlidge et al. 2009) where reportedly *Liotelphusa quadratica* and *Phricotelphusa elegans* are in vulnerable condition and *Maydelliathelphusa falcidigitis*, *Liotelphusa gageii*, and *Liotelphusa laevis* are considered as near threatened (Mitra 2017).

The near threatened crab *Liotelphusa laevis* was originally described from Sivasagar district of Assam as *Telphusa laevis* (Wood-Mason 1871). Later it was redescribed as *Liotelphusa laevis* (Bott 1970). Thereafter species was also described by many taxonomists who collected them from the different geographical region of North Eastern India (Ghatak et al. 2008; Ghosh and Ghatak 1999; Mitra 2017; Wood-Mason 1871). In spite of that, there exists taxonomic obscurity of the species and species discrimination from other congeners is fairly difficult. Therefore, in the context of necessity of proper taxonomic identity, a review has been made here in weighing morphotaxonomic features of *L. laevis* along with information on their habitat, distribution, etc.

## II. METHODOLOGY

We have examined one male and one female specimen of *L. laevis*, which were preserved in 70% alcohol in crustacean section of Zoological Survey of India (ZSI). The male and female specimens were collected respectively from Shillong town and Umium Lake in Meghalaya. The terminology used is that provided by Ng & Tay and Pati & Singh (Ng and Tay 2001; Pati and Singh 2017). Abbreviations used here are CW, carapace

width; CL, carapace length; CH, carapace height; FL, Front length, First gonopod, G1 and Second gonopod, G2.

### III. TAXONOMY OF THE SPECIES

1871. *Telphusa laevis*, Wood-Mason, J. Soc. Bengal, 40: 201, pl. 14, figs. 1-6.

1887. *Telphusa laevis*, De Man, J. Linn. Soc. London, 22: 100.

1893. *Telphusa laevis*, Henderson, Trasinninn. Soc. London, (2) 5: 383.

1898. *Potamon laevis*, De Man, J. Ann. Mus. Civ. Sturgeon. Nat. Genova, 19: 437.

1905. *Potamon (Geothelphusa) laevis*, Rathbun, nov. Arch. Mus., (4) 7: 218.

1910. *Parathelphusa (Liotelphusa) laevis*, Alcock, Cat. Ind. Decapod Crust. Ind. Mus., 1 (2): 109, pl. 13, fig. 65.

1970. *Liotelphusa laevis laevis*, Bott, Abhandl. Sencken. Naturfors. Ges., 526: 49p, pl. 6, figs. 63-65; pl. 27, figs. 17-20.

1999. *Liotelphusa laevis laevis*, Ghosh and Ghatak, Zool. Surv. Ind., Fauna of Meghalaya, State Fauna Series, 4 (part 9): 570.

2008. *Liotelphusa laevis laevis*, Ghatak, Ghosh and Roy, Zool. Surv. Ind., Fauna of Kopili Hydro Electric Project Site, Wetland Ecosystem Series, 8: 36-37.

Family Gecarcinucidae Rathbun, 1904

*Liotelphusa* Alcock, 1909

*Liotelphusa laevis* (Wood-Mason, 1871) (Fig. 1, Fig.2 and fig.3)

### IV. MATERIALS EXAMINED

INDIA: 1 male, (CW 20 mm, CL 17 mm, CH 9 mm, FL 7 mm), a stream, Shillong town, Meghalaya (25.5788° N and 91.8933° E) 21/08/1989 coll, H.C. Ghosh (ZSI C8002/2). 1 female, (CW 24 mm, CL 19 mm, CH 11mm, FL 8 mm) Umium lake, Shillong, Meghalaya (25.6698° N and 91.9010° E), 21/08/1989, coll, H.C. Ghosh (ZSI C8003/2).

### V. DIAGNOSIS

Carapace broader than long, 1.2 times carapace length, longitudinally oval (CH/CW = 0.5) surface smooth, except some fine slanting striate towards posterolateral margin; cervical groove superficial, slightly visible posteriorly after gastric region, 'H' groove distinct, anterolateral margin fairly arched, greatly shorter than posterolateral margin, anterolateral tooth very small, sharp, situated near orbital tooth; epigastric cristae lobe like, poorly visible, slightly advance than post orbital cristae; epigastric groove mildly visible; post orbital cristae slightly visible, blunt; almost symmetrical gastric region, branchial region; cardiac region mildly noticeable; front square-cut shaped, greatly deflexed, 0.4 times carapace width, almost straight with smooth edge, frontal lobe weakly visible; orbital

tooth broad, distinct with blunt edge (Fig. 1a); infra orbital margin mildly crenulated (Fig. 1b).

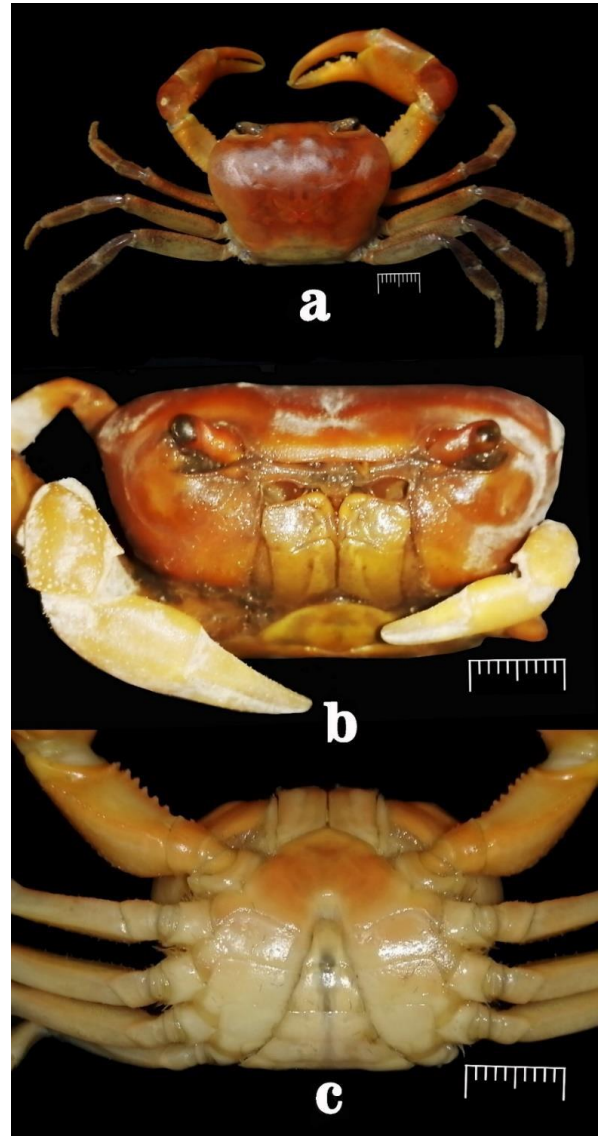


Fig. 1 *Liotelphusa laevis*, (ZSI C8002/2). a carapace of male, dorsal view; b frontal view; c thoracic sternite with abdomen of male, ventral view. Scale bar: 5mm

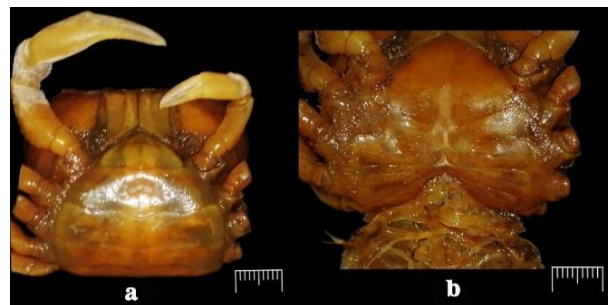


Fig. 2 *Liotelphusa laevis*, (ZSI C8003/2). a abdomen of female, ventral view; b thoracic sternite with valva of female, ventral view. Scale bar: 5mm

Eyes are medium in size, cornea large; third median triangle almost complete; epistome medium in size, epistomal median lobe widely triangular, lateral line sinuous, mildly established; antenular cavity comma shaped; mild granules on suborbital region, pterostomial region; mildly developed furrow on third ischium of third maxilliped, ischium rectangular shaped, merus sub-rectangular, width more than length, exopod with long flagellum (Fig 1a-b).

Cheliped unequal, pollex of chela more or less equal to dactylus, small gap between pollex and propodite, one molar tooth on upper dentary edge and three molar teeth on lower dentary edge with numerous minute truncate shaped teeth on both sides; upper margin of carpus serrated, carpal tooth acute; upper margin, lower margin, inner margin of merus strongly serrated, surface of merus mildly serrated, no merus tooth; ambulatory legs elongated, longer than cheliped, short serration on the surface of legs, covers by thin, minute fur, dactylus slightly curved, small sharp bristle on it (Fig. 1a-b & Fig. 2b).

Thoracic sternite smooth, prominent transverse suture in between 2nd and 3rd sternite, an incomplete but remarkable suture on lateral line of 3rd and 4th sternite, no suture between 1st and 2nd sternite; male abdomen 'T' shaped with more or less smooth concave lateral edges, length of 6th somite almost equal to greatest width; rest of the somite broader than length; lateral line of telson slightly concave with round tip, width almost equal to greatest width; sternoabdominal cavity deep in male, medium depth in female; female abdomen broad, ovate, surface smooth, completely conceal the sternum (Fig. 1c & Fig. 2a-b).



Fig. 3 *Liotelphusa laevis*, (ZSI C8002/2). a first left gonopod of male, dorsal view; b first left gonopod of male, ventral view; c second gonopod of male. Scale bar: 0.5mm

First gonopod (G1) sinuous, robust; terminal segment short, rigid, conical in shape, ca. 0.2 times combined length of subterminal segment and flexible zone, tip mildly rounded, flexible zone visible and almost symmetrical; subterminal segment elongated, inner margin and outer more sinuous, stouter than terminal segment; second gonopod (G2) thin, elongated,

shorter than G1 with distinctly remarkable flexible zone, followed by long thin distal segment ca. 0.3 times basal segment (Fig. 3a-c). Female gonopore round, transparent colour, located at 6th segment, distally nearer to transverse margin of fifth sternite (Fig. 2b).

## VI. HABITAT

Specimens were found in a small stream. They usually construct small size burrow in soft soil nearer to stream or any kind of wetland within a shallow hole. After the light shower, they come out from the hole and stay superficially on the mud or clean area situated near the water.

## VII. DISTRIBUTION

Till date, this species has been reported from Assam, Nagaland, Arunachal Pradesh, Meghalaya, Mizoram, and West Bengal (Mitra 2017; Pati and Thackeray 2018) (Fig. 4).

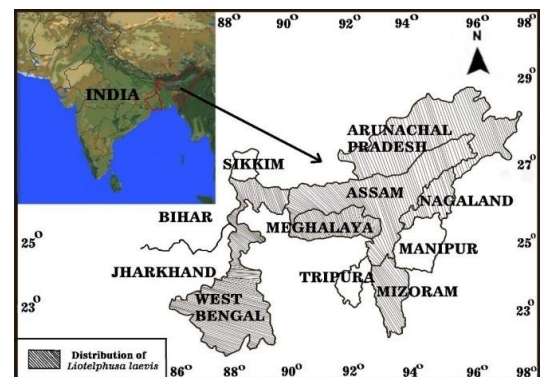


Fig. 4: Distribution of *Liotelphusa laevis*.

## VIII. REMARKS

After Wood-Mason, Alcock's description was remarkable (Alcock 1910). He had described this species as *Paratelphusa laevis* under subgenus of *Liotelphusa* from Cherapunji (now Meghalaya), Cachar (Assam) and Shillong (now Meghalaya). The description included several morphological characters but he never described the structure of male gonopod and female abdomen with gonopore (Alcock 1910). Bott (1970) had described the specimen on the basis of male gonopod with the specimen collected from Cherapunji (Meghalaya) and Darjeeling (West Bengal). However, his information about first and second gonopods was very scanty and there was no report regarding the structure of female abdomen and gonopore. According to him, G1, the first gonopod was slender and balanced from the broadened subterminal segment, terminal segment depressed and short. Subterminal segment widened inside proximally. The distal segment of the second gonopod (G2) was long, thread-like. Whereas present observation revealed that G1 highly sinuous, subterminal segment broad, stouter than terminal segment. Terminal segment comparatively short, ca. 0.2 times of combined length of flexible zone and subterminal segment. The

shape of the terminal segment, though conical in appearance but suddenly tapered distal portion and then possess mild round tip. The flexible zone of G1, situated at the distal portion of the subterminal segment is faintly visible, transparent and appear 'V' shape. The G2 thin, elongated, slightly shorter than G1. Length of the distal segment of G2 is 0.3 times of basal segment and its flexible zone swell out and distinct under a microscope. Female gonopore round, transparent in colour and situated at just distal region of 6th sternite (Fig. 2b & 3a-c). Moreover Bott's descriptions related to the structure of carapace, median triangle, epibranchial tooth of were very confusing, as stated the carapace was smooth and slightly arched, epibranchial region did not possess any epibranchial tooth, forehead slightly arched, without frontal triangle (Bott 1970). However present observation unfolds that the surface of carapace smooth but some oblique striate are present toward posterolateral margin and dorsally it is oval in shape with fairly convex anterolateral margin. Epibranchial region possesses a small minute tooth which is difficult to observe properly by naked eyes but can feel the sharpness of tooth while touching the epibranchial margin. The frontal triangle is not visible superficially but appears complete when observing under the microscope (Fig. 1a-b). Ghosh & Ghatak (1999) reported a good number of this species from different parts of Meghalaya without describing any morphological characters. Ghatak et. al. (2008) reported this species from the Kopili river of Meghalaya. He had indeed described limited morphological characters excluding male gonopod and female gonopore. Recently Mitra (2017) reported this species from Mizoram and provided few common descriptions including male first gonopod. Now a day people have developed an interest to rear freshwater crab, crayfish (Patoka et al. 2014) in their aquarium as these organisms need very little care in aquarium condition. Moreover, the burrowing habit with detritivory nature of these organisms help in cleaning the substrates of aquaria. Small colourful crab as pet organism in aquaria has already gained importance in many countries, for example, *Cardisoma armatum* (origin: Africa), *Gecarcinus quadratus* (origin: Central America), *Geosesarma bicolor* (origin: South Asia), *Perisesarma bidens* (origin: Indo-Pacific) and thus created lucrative ornamental crustacean market (Turkmen and Karadal, 2012). *Potamonautes lirrangensis* ('Malawi blue crab') another freshwater crab of Lake Malwa, is being used as aquaria candidate in Africa (Dobson 2010). Some Indochinese potimid crabs *Demanietta khirikhan*, *Pudaengon arnamicai*, *Terrapotamon abbotti*, and parathelphusids like *Heterothelphusa fatum* have ornamental value and sold as item for aquarium trade (Yeo et al. 2008). Similarly, *L. laevis* of Northeast India also shows potential as an ornamental candidate for the aquarium trade as because they are also colorful, hardy and easily adoptable in glass aquaria like other crustaceans. However, due to lack of distinguishing clues the species are

being gradually declined in its natural habitat as well as failed to draw the attention of the hobbyist.

#### CONCLUSION

It has been observed that *L. laevis* is exclusively endemic to the Eastern Himalayan region and especially found in Northeastern India. However, Mitra (2017) mistakenly reported its distribution from Bhutan despite the dearth of published literature. Similarly, present review has been failed to obtain any supporting materials regarding the distribution of *L. laevis* in Uttarakhand, which was reported by Pati and Thackeray (2018) in their recent publication. Recently the IUCN red data book listed this endemic crab as near threatened. Due to its small body size generally, people hardly consider it as consumable item and also has been remained under attended for conservation. This study has removed all morphotaxonomic obscurity of *L. laevis* and thereby has made the species easily recognizable from all its congeners and may facilitate future endeavor towards its conservation.

#### AUTHOR'S CONTRIBUTION

Providing idea for this review article and searching literature were done by second author, Sri Santanu Mitra. Diagnosis of specimen, analysis and preparation of first draft of manuscript were done by first author, Ms Awarlin Chetia. Finalization of manuscript by proof reading was done by third author, Prof. Debangshu Narayan Das.

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