

A Checklist of Freshwater Prawn Species of the Palaemonidae Family in the Northwest Part of Bangladesh

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Abstract: To formulate information on the freshwater prawn species and to identify any species at a glance clearly and simply a checklist of freshwater prawn species (Palaemonidae) collected from Northwest part of Bangladesh was prepared. A total of Sixty samples of freshwater prawn from the waterbody of Dinajpur, Rangpur and Thakurgoan districts of Bangladesh were collected and used. Samples were observed through six morphological characters namely body color, the number of chela, rostrum shape, rostrum teeth, abdomen shape, segments size of walking leg and eight morphometric characters i.e. Total length (TL), Rostrum length (RL), Cephalothorax length (CL), Cephalothorax height (CH), Second pleon segment height (SSH), Sixth pleon segment length (SISL), TeL (Telson length), TeW (Telson width). After observing the morphological and morphometric characters a total of six species were found to be different and identified by checking with previous literature. The identified species were *Macrobrachium lanchesteri*, *M. palaemonides*, *M. lamarrei*, *M. idella*, *M. dolicoedactylus* and *M. latidactylus*. Although there was availability of *M. resenberghii* sometimes in the open water bodies of northwest Bangladesh but it was only during flooding season. This study synthesized a concise idea about the available freshwater prawn in Bangladesh. Several consecutive studies including DNA barcoding are needed to formulation exact information on the detail record of freshwater Palaemonid prawn in the waterbodies of Bangladesh.

Key words: Checklist • Prawn • *Macrobrachium* • Biodiversity

INTRODUCTION

Crustaceans are diverse in form and live around the world in a variety of habitats and they are the most important to humans- as crabs, lobsters and shrimps are widely fished and consumed around the world. Prawn is a common name for small aquatic crustaceans that contains an exoskeleton and ten legs [1]. They are very much important crustaceans having palatable taste which are the major export item of Bangladesh with great market demand at home and abroad.

Palaemonidae is a prawn family in the order Decapoda was noted by Rafinesque C. S. in 1815 [2] as Palaemonia [3]. It is one of the successfully diversified group of crustacean that are found in oceans, estuaries and rivers. But can be found mainly in fresh water habitats as they

are mostly freshwater species. Several studies on the biodiversity and taxonomy of palaemonid prawn had been conducted by De Man [4, 5], Chopra [6], Kunju [7], Kurian & Sebastian [8], Jayachandran [9]. The family contains more than 950 species under 137 genera and two subfamilies [10]. Jayachandran [9] recorded 75 species belonging to 8 genera of palaemonid prawns from India. Although different world wide survey, identification and classification of prawn and shrimp have been studied by many investigators, a little work has been done with this family in Bangladesh. A total of 62 prawn and shrimp were recorded from Bangladesh; of which 6 are fully freshwater species, 14 are both freshwater and brackish water species [11]. Cai and Ng [12] published a taxonomy on freshwater prawn. Moreover Cai and Shokita [13] has made a report on the collection of freshwater shrimp from Philippine.

Raghunathan and Valurmathi [14] have been documented a checklist of freshwater prawns in Tamil Nadu, India. Mariappan and Jasmin [15] also have been made studies on freshwater prawns of Family Palaemonidae in Tamil Nadu India. Arumugam [16] recorded 24 species of freshwater prawns in Tamil Nadu, India. In Myanmar which is our neighboring country there are 8 species of palaemonidae prawn are found [17].

A species checklist reflects a precision by providing clarity at a glance clearly and simply. To gather knowledge about freshwater prawns, researchers need the updated checklist of Palaemonidae family. But in Bangladesh the studies on freshwater prawn under Palaemonidae family is very little and most of the prawn cannot be identified due to lack of checklist. Therefore this study aimed to identify the available freshwater prawns of Northwest Bangladesh through morphological identification based on available literature.

MATERIALS AND METHODS

Specimen collection and preservation

The study was conducted for a period of one year effected from July-2018 to June-2019. Prawn samples were collected bimonthly from the fishermen of the three districts (Dinajpur, Rangpur, Thakurgon) of northern region of Bangladesh. Two rivers from each district (the Punarbhaba river-latitude 25°36'34.9" North and longitude 88°37'32.6" East), (the Atrai river-latitude 25°36'46.4" North and longitude 88°41'58.0" East),

(the Teesta river-latitude 25°47'17.3" North and longitude 89°26'21.9" East), (the Jamuneswari river- latitude 25°40'34.2" North and longitude 89°03'43.0" East), (the Tangon river- latitude 25°49'32.8" North and longitude 88°23'07.5" East) and (the Kulic river- latitude 25°53'22.6" North and longitude 88°16'11.5" East) respectively from three districts (Figure 1). For study purpose collected samples were sorted out and photographs of the specimen were taken by using Nikon d3300 DSLR camera. Ten representative specimens of each individual were selected after and finally preserved in 70% Ethanol. Each specimens were then measured and then carefully preserved for further studies.

Morphometric and Morphological Observation: Six morphological characters viz. body color, number of chela, rostrum shape, rostrum teeth, abdomen shape and segments size of walking leg were observed and used to identifying species. eight morphometric characters i.e. Total length (TL), Rostrum length (RL), Cephalothorax length (CL), Cephalothorax height (CH), Second pleon segment height (SSH), Sixth pleon segment length (SISL), TeL (Telson length), TeW (Telson width) of the specimen were measured by using slide-calipers, normal centimeter scale, compus and forceps. The mophometric and morphological observation were conducted based on the Dineshababu *et al.* [18] (Figure 2). The observed taxonomic characters were then checked and identified according to Cai and Ng [12] and Mar and Myint [17].

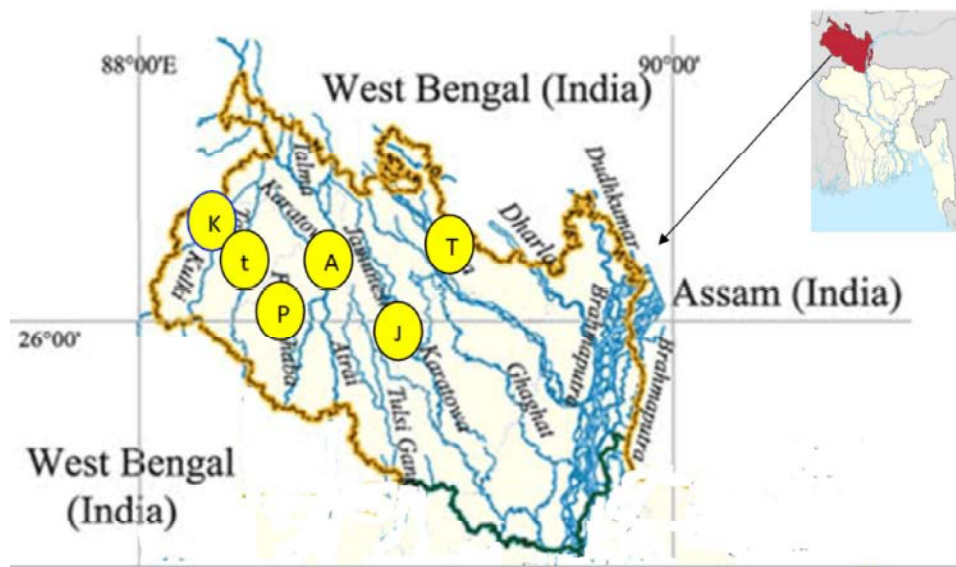


Fig. 1: Location of the sample collecting site in the northwestern Bangladesh

K- Kulik river; t- Tangon river; P- Punarbhaba river; A- Atrai river; J- Jamuneswari river and T- Teesta river

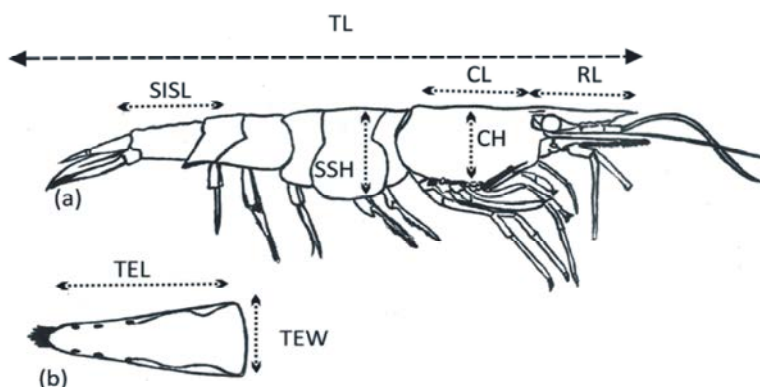


Fig. 2: Morphometric characters of Prawn

Total length (TL), Rostrum length (RL), Cephalothorax length (CL), Cephalothorax height (CH), Second pleon segment height (SSH), Sixth pleon segment length (SISL), TeL (Telson length), TeW (Telson width).

The scientific naming of each species was based on current valid names with the WoRMS (World Register of Marine Species) [19], GBIF (Global Biodiversity Information Facility) [20] and IRMNG (Interim Register of Marine and Nonmarine Genera) [21] database for taxonomic status (accepted/status unknown, synonyms, alternate representations etc.). Taxonomic hierarchy drawing was according to ITIS (Integrated Taxonomic Information System) [22].

Checklist Preparation: Preparation of the checklist was based on the information from available literature such

as research articles [7, 9, 10, 12,15, 23, 24], monographs [16, 17, 25], manuals [3], books [1, 5, 10, 17], species checklists [3, 14, 16, 27, 28] and technical reports [11].

RESULTS

Based on morphometric and morphological observation and cross reviewing with available literature a total of six freshwater prawn species under genus *Macrobrachium* were recorded in this study (Table 1 and Figure 3-7). Details of all the recorded species are shown in Table 2.

Table 1: Recorded freshwater prawn species in the northwestern Bangladesh

| SL No. | Species recorded |
|--------|--|
| 1. | <i>Macrobrachium lanchesteri</i> (De Man, 1911) |
| 2. | <i>Macrobrachium palaemonoides</i> (Holthuis, 1950) |
| 3. | <i>Macrobrachium lamarrei</i> (H. Miline -Edwards, 1837) |
| 4. | <i>Macrobrachium idella</i> (Hilgendorf, 1898) |
| 5. | <i>Macrobrachium dolichodactylus</i> (Hilgendorf, 1879) |
| 6. | <i>Macrobrachium latidactylus</i> (Thallwitz, 1891) |

Systematic Position:

Kingdom: Animalia

Sub-kingdom: Bilateria

Infra-kingdom: Protostomia

Super-phylum: Ecdysozoa

Phylum : Arthropoda

Sub-Phylum : Crustacea Brünnich, 1772

Class: Malacostraca Latreille, 1802

Sub-class: Eumalacostraca Grobben, 1892

Super-order: Eucarida Calman, 1904

Order: Decapoda Latreille, 1803

Sub-order: Pleocyemata Burkenroad, 1963

Infra-order: Caridea Dana, 1852

Super-family: Palaemonoidea Rafinesque, 1815
Family: Palaemonidae Rafinesque, 1815
Sub-family: Palaemoninae Rafinesque, 1815
Genus: Macrobrachium Bate, 1868
Species: *M. lanchesteri* (De Man, 1911)
M. palaemonoides (Holthuis, 1950)
M. lamarrei (H. Milne -Edwards, 1837)
M. idella (Hilgendorf, 1898)
M. dolichodactylus (Hilgendorf, 1879)
M. latidactylus (Thallwitz, 1891)

The result indicates the availability of only six fully freshwater prawn of Palaemonidae family. It was also found that *M. rosenbergii* was available sometimes in the study area but this was during the period of flooding. Among the six species only *M. lanchesteri* and *M. lamarrei* were most available species from all the locations. *M. palaemonoides* was available from almost all of the locations except the Teesta river. *M. idella* was unavailable in the Jamuneswari and Kulic river in contrast to *M. dolichodactylus* which was not found in Tangan and Kulic river. The *M. latidactylus* was the only species that available in the Punarbhaba river, Dinajpur.

According to IUCN Red List [29] five of the recorded species namely *M. lanchesteri*, *M. lamarrei*, *M. idella*, *M. dolichodactylus* and *M. latidactylus* are categorized as least concern (LC). The status of *M. palaemonoides* falls into not evaluated (NE) category according to Global Biodiversity Information Facility (GBIF) [30].

1. *Macrobrachium lanchesteri* (De Man, 1911) (Figure 3)

Synonyms: *Cryphiops lanchesteri* (De Man, 1911)

Palaemon lanchesteri De Man, 1911

Palaemon paucidens Lanchester, 1901

Body Color: Body color is whitish-grey.

Rostrum: Straight, long and anteriorly slight upturned; 5.8 times shorter than total length. Upper margin with 7 to 8 teeth; lower margin with 3 teeth; 2 teeth of the upper margin of rostrum behind the orbit.

Rostral Formula: 4-6(5) +2/3-4(3)

Cephalothorax: 1.6 times longer than its height.

Second Periopods: Chela is shorter than carpus but longer than merus; carpus is 1.4 times longer than merus.

Abdominal Pleon Segments: Second abdominal Segments Height (SSH) was around 1.25 times higher than the Sixth abdominal Segments Length (SISL).

Telson: Telson slender, 3 times longer than wide.

2. *Macrobrachium palaemonoides* (Holthuis, 1950) (Figure 4)

Synonyms: *Tenuipedium palaemonoides* (Holthuis, 1950)

Body Color: Body color is deep blackish

Rostrum: Elongated and curved upward; 4.2 times shorter than total length. Upper margin with 7 teeth, lower margin with 6 teeth; 2 to 3 teeth of the upper margin of rostrum behind the orbit.

Rostral Formula: 2-3(3) +7-8(7)/5-7(6)

Cephalothorax: 1.6 times longer than its height.

Second Periopods: Second pair is much larger and thicker than first pair; carpus is longer than chela and 1.5 times longer than merus. Chela slightly longer than merus.

Abdominal Pleon segments: Second abdominal Segments Height (SSH) was 1.3 times higher than the Sixth abdominal Segments Length (SISL).

Telson: Telson slender and 3.6 times longer than wide.

3. *Macrobrachium lamarrei* (H. Milne Edwards, 1837) (Figure 5)

Synonyms: *Palaemon lamarrei* H. Milne-Edwards, 1837

Sub Species: *Macrobrachium lamarrei lamarroides* (Tiwari, 1952)

Macrobrachium lamarrei lamarrei (H. Milne-Edwards, 1837)

Body Color: Body color is Whitish-Grey with black spot throughout the body.

Rostrum: Elongated and slightly curved upward; 4.7 times shorter than total length. Upper margin with 7 to 8 teeth; lower margin with 6 to 8 teeth; 3 teeth of the upper margin of rostrum behind the orbit.

Rostral Formula: 4-5(4) +3-4(3)/6-8(7)

Cephalothorax: 1.6 times longer than its height.

Second Periopods: chela 1.35 times longer than carpus and 1.7 times than merus; carpus is 1.2 times longer than merus.

Abdominal Pleon segments: Second abdominal Segments Height (SSH) was around 1.5 times higher than the Sixth abdominal Segments Length (SISL).

Telson Structure: Slightly broader and 3.3 times longer than wide.

4. *Macrobrachium idella* (Hilgendorf, 1898) (Figure 6)

Sub Species: *Macrobrachium idella georgii* (Jayachandran & Joseph 1985)

Macrobrachium idella idella (Hilgendorf 1898)

Body Color: Body color is blackish with black spot at anterior and posterior portion

Rostrum: Elongated and curved upward; 4.3 times shorter than total length. Upper margin with 7 to 9 teeth; lower margin with 5-8 teeth; 2 to 4 teeth of the upper margin of rostrum behind the orbit.

Rostral Formula: 4-5(4) +3-4(3)/6-8(6)

Cephalothorax: 1.7 times longer than its height.

Second Periopods: Carpus is longer than chela and merus; chela is slightly longer than merus.

Abdominal Pleon segments: Second abdominal Segments Height (SSH) was around 1.3 times higher than the Sixth abdominal Segments Length (SISL).

Telson Structure: Slender and 3.3 times longer than wide.

5. *Macrobrachium dolichodactylus* (Hilgendorf, 1879) (Figure 7)

Synonym: *Macrobrachium scabriculum* (Heller, 1862)

Body Color: Body color is blackish with black spot on the body.

Rostrum: Elongated and curved upward; 4.8 times shorter than total length; upper margin with 6 to 9 teeth, lower margin with 5 to 8 teeth; 2-3 teeth of the upper margin of rostrum behind the orbit.

Rostral Formula: 4-6(4) +2-4(3)/6-8(6)

Cephalothorax: 1.6 times longer than its height.

Second Periopods: Chela is longer than carpus and merus; carpus is longer than merus.

Abdominal Pleon segments: Second abdominal Segments Height (SSH) was around 1.8 times higher than the Sixth abdominal Segments Length (SISL).

Telson Structure: Slender and 2.7 times longer than wide.

6. *Macrobrachium latidactylus* (Thallwitz, 1891) (Figure 8)

Synonym: *Palaemon endehensis* De Man, 1892

Palaemon lampropus De Man, 1892

Palaemon latidactylus Thallwitz, 1891

Body Color: Body color is greyish-green

Rostrum: Long and curved upward at anterior portion; 4 times shorter than total length; upper margin with 10 to 11 teeth, lower margin with 4-5 teeth; 2 to 3 teeth of the upper margin of rostrum behind the orbit.

Rostral Formula: 8-9(8) +2-3(3)/4-5(5)

Cephalothorax: 1.6 times longer than its height.

Periopods: Chela is longer than carpus, carpus is longer than merus.

Abdominal Pleon segments: Second abdominal Segments Height (SSH) was around 1.45 times higher than the Sixth abdominal Segments Length (SISL).

Telson Structure: Slender and 2.7 times longer than wide.



Fig. 2: Left view of *M. lanchesteri*



Fig. 3: Left view of *M. palaemonoides*



Fig. 4: Left view of *M. lamarrei*



Fig. 5: Left view of *M. idella*



Fig. 6: Left view of *M. dolichodactylus*



Fig. 7: Left view of *M. latidactylus*

Table 2: The available prawn species at different locations ('+' indicates presence and '-' indicates absence of species)

| Species | Common Name | Local Name | Threatened Status | Presence and absence of species at different river | | | | | |
|---------------------------|---------------------------------|----------------|-------------------|--|-------|--------|--------------|--------|-------|
| | | | | Punarbhaba | Atrai | Teesta | Jamuneshwari | Tangon | Kulic |
| <i>M. lanchesteri</i> | Riceland prawn/ Glass Shrimp | Dhonua Chingri | *LC | + | + | + | + | + | + |
| <i>M. palaemonoides</i> | - | - | **NE | + | + | - | + | + | + |
| <i>M. lamarrei</i> | Kuncho river prawn | Gura Chingri | LC | + | + | + | + | + | + |
| <i>M. idella</i> | Slender river prawn | Chikna Chingri | *LC | + | + | + | - | + | - |
| <i>M. dolichodactylus</i> | Goda river prawn | - | *LC | + | + | + | + | - | - |
| <i>M. latidactylus</i> | Sissor river prawn | - | *LC | + | - | - | - | - | - |

*Source IUCN Red List, 2020 ** Source GBIF

DISCUSSION

Prawn constitutes a much important export commodity in Bangladesh with a total production of 4.381 million MT in Fiscal year 2018-19 [31]. But investigations

on the fauna of shrimps and prawns have been intermittent and literature on the freshwater crustaceans of Bangladesh is rather scanty which makes it difficult to assess the exact number and types of the prawn. Although our neighboring countries have quite enough

information on the shrimps and prawns fauna of fresh and brackish water, there is little information about the palaemonid prawn of Bangladesh.

Of the 62 numbers of prawn and shrimp species in Bangladesh 6 are fully fresh water species, 14 are both freshwater and brackish water species [11]. Mar and Myint [17] described eight species of palemonid prawns from Magway Environs of neighboring country Myanmar namely *M. aemulum*, *M. cavernicola*, *M. clymene*, *M. lamarrei*, *M. lanchesteri*, *M. latidactylus*, *M. palaemonoides*, *M. rosenbergii*.

In this study, six species of freshwater prawn under palemonidae family namely *M. lanchesteri*, *M. palaemonoides*, *M. lamarrei*, *M. idella*, *M. dolichodactylus* and *M. latidactylus* were recorded from the Northern region of Bangladesh.

Jayachandran *et al.* [32] divided the genus *Macrobrachium* into two subgenera; the subgenus *Macrobrachium* are those species which have equal or subequal chelae in second pair of pereopods and the subgenus *Allobrachium* have unequal chelae. In the present work, In *M. latidactylus* the second pairs of pereopods are distinctly unequal while in other species are found to be equal in shaped and their length in this study.

The most important characters to identify the freshwater prawn species are armature of rostrum, number of dorsal and ventral rostral teeth, proportion of rostrum, size and proportion of the carpus, merus and dactylus of second pereopod and proportion of the length of telson and inner spine of telson [25].

In all the six species, there are differences not only in the shape of the rostrum but also in the proportion of carpus and merus; carpus of the second pereopod is generally longer than chela and merus in *M. lanchesteri*, *M. palaemonoides*, *M. idella*, but in *M. dolichodactylus*, *M. latidactylus* and *M. lamarrei* chela of the second pereopod is generally longer than carpus and merus. And there are also significant differences in rostrum size, rostrum teeth.

Cai and Ng [12] recorded *M. Lenchesteri* with straight and slightly upturned Rostrum and having 6-7 upper and 3-4 lower teeth with carpus of second pereopod usually longer than chela and very slender telson which are much similar to present findings.

Mar and Myint [17] found freshwater Palaemonid prawns from Magway Environs, Myanmar with very much similar findings.

Collection of prawn is quiet difficult task as the availability of prawn depends on certain season. Furthermore different species is available at different

time that makes the task rather tedious and laborious. *M. lamarrei* the more common species among the six species found in the present study.

Raghunathan and Valarmathi [24] reported five species of *Macrobrachium* along with *M. lamarrei* others were *M. malcolmsonii* (H. Milne Edwards, 1844), *M. peguense* (Tiwari, 1952) *M. scabriculum* (Heller, 1952) *M. unikarnatakae* Lalihal *et al.*, 1988. Cai & Ng [12] described freshwater palaemonid prawns of Myanmar having *M. lamarrei* in common.

The availability of *M. latidactylus* among the six palaemonid species found in this study was scanty although the IUCN status of the species is Least Concern and was only available in the Punarbhaba river of Dinajpur district. The possible cause of the availability was the Punarbhaba is a tributaries of the river Ganges.

For the maintenance and management of fisheries biodiversity of Bangladesh accurate and continuous updating of data on the fish as well as prawn species is a time demand. The checklist of these obtained species was prepared on the basis of applying the idea developed from literature. According to our result, it can be easily said that the number of species of palemonid prawns in whole Bangladesh would be above six. Although identification of the freshwater prawn under palemonidae family is quite difficult due to great morphological variations, further studies on freshwater prawn is needed in whole country. Molecular studies can be a sophisticated tool to identify ambiguous species properly in order to append the list of palaemonid species in Bangladesh more authentically.

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