



Taxonomy of water fleas (Diplostraca: Branchiopoda: Arthropoda) from Mathura Beel, West Bengal, India

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Abstract

Three Diplostracan (= Cladocera) Branchiopods viz. *Ceriodaphnia cornuta* Sars, *C. reticulata* (Jurine) and *Daphnia lumholtzi* Sars have been recorded from Mathura Beel for the first time. Detailed systematic taxonomy of these water fleas including their photographs and distributions is discussed herewith.

Keywords: Water flea, diplostraca, branchiopods, mathura beel, systematics, distribution

Introduction

Most of the water fleas are bivalved diplostracan branchiopods. By taking micro-arthropods like water fleas as food (mainly protein), fish populations grow rapidly. Mathura beel, a small wetland has great significances like aquatic production, water purification, and control of micro climatic change in the district of north 24-parganas. Here I discussed the taxonomy of some water fleas that were collected from the beel.

From different parts of the world, the notable Diplostracan faunistics, biogeography, and ecological significances have been worked out as such of Birge (1918) [1], Ruttner (1952) [22], Clegg (1969) [3], Frey (1971) [6], Pennak (1978) [19], Fernando (1980) [5], DuMont (1994) [4], Liu (2008) [12], Olesen & Richter (2013) [17], Lee & Hansson (2024) [11].

From different parts of Indian the notable works on this field were of Michael (1973, 1980) [13, 14], Patil (1976) [18], Nasar (1977) [16], Khan *et al.* (1978) [10], Quadri & Yousuf (1978) [21], Sharma & Sharma, 2010) [26].

The remarkable faunistic studies on diplostracan branchiopods from West Bengal carried out by Gurney (1906, 1907) [8, 9], Sewell (1935) [23], Sharma (1978) [24], Venkataraman (1998) [29].

Materials and Methods

The water fleas were sampled from Mathura Beel on 11th June, 2024 by using 50 µm mesh sized plankton net. In the field, samples were fixed in 10% formalin. Then the samples were taxonomically analysed with the help of binocular microscope (Olympus, Model: CH20i). Images were taken by Canon EOS 1200D. Identification of the water fleas was made by the most notable literatures as Michael & Sharma (1988) [14], Sharma & Sharma (1990) [25] and Simões *et al.* (2009) [27]. Systematic nomenclature of the recorded species has been considered here suggested by Olesen & Richter (2013) [17] and Sinha (2023) [28].

Survey Area: Mathura Beel, an ox-bow lake located in between 88° 4' N and longitude 22° 6' E (North 24-Parganas and Nadia District) is lying on east of Barrackpore-Kalyani Expressway. For details please goes through https://www.barrackpore.gov.in/picnic_spot

Results

Systematics

Class: Branchiopoda

Superorder: Diplostraca Gerstaecker

Order: Anomopoda Sars

Family: Daphniidae Straus

Diagnosis: Bivalved branchiopods; trunk including thoracic limbs enclosed with carapace; thoracic limbs usually 5 or 6 pairs that is dissimilar; antenna with 2 branches, - one branch with 3 segments and other with 4; antennules and rostrum separated; in female antennules are short and immovable.

Type genus: *Daphnia* Müller, 1785

Biogeography: Afrotropical, Australia, Nearctic, Neotropical, Oriental, Palearctic (Simões *et al.* 2009; GBIF, 2024) [27, 7].

Key to the genera of the Family: Daphniidae Straus 1820

1. Body with a short spine or a sharp angle at posterior end; Eye large that filling almost entire front area of head.....

Ceriodaphnia Dana

▪ Body usually with a long spine at posterior end; Eye relatively small in compare to *Ceriodaphnia* Dana.....

Daphnia Müller

Genus 1: *Ceriodaphnia* Dana, 1853

Diagnosis: Body circular or ovate; head small and depressed; antennules small and immovable; valves usually ending in a sharp spine or angle posteriorly; post-abdomen large and rounded; venter pointed.

Type species: *Ceriodaphnia quadrangula* (Müller, 1776)

Key to the species of the Genus: *Ceriodaphnia* Dana, 1853

[Adopted from Petersen *et al.* 2020] [20]

1. Well-developed rostrum; rounded head with a small horn or pointed projection; venter pointed; shoulders with 1 or 2 spinules.....
cornuta Sars

- Rostrum absent; rounded head with no projection or horn; venter rounded; claw on middle pecten with long spines.....*reticulata* (Jurine)

Species 1: *Ceriodaphnia cornuta* Sars, 1885



Fig 1: *Ceriodaphnia cornuta* sars, 1885

1885. *Ceriodaphnia cornuta* Sars, Fur. i Vide. Sels. I.Christ. 8: 26-28, pl. - 5, figs. 1-3
 Syn. *Ceriodaphnia cornigera* Jiang Xiezhi, 1977
 Syn. *Ceriodaphnia rigaudi* Lopez et al., 2017

Diagnosis: ♀: Broadly ovate and posteriorly pointed; head small, depressed and prominently separated from trunk, with a short horn or spine over the eyes; valves reticulate; fornix of shell with 1-2 spinules; post-abdomen broad and with 5-6 anal spines; venter pointed; claws short and minutely setulate; size 482 µm.

Material examined: 1♀; 88° 47' N, 22° 92' E; 11.vi.2024. Coll. 2nd Sem. Students.

Distribution: In India – Andaman and Nicobar, Andhra Pradesh; Assam, Bihar, Gujarat, Haryana, Himachal Pradesh, Karnataka, Kerala, Madhya Pradesh, Meghalaya, Punjab, Rajasthan, Tamil Nadu, Tripura, West Bengal; elsewhere - Australia, Bangladesh, Brazil, China, Columbia, Côte d'Ivoire, El Salvador, French Guiana, Japan, Mexico, Nepal, Sri Lanka, Uganda, United Arab Emirates, United States of America (Biswas, 1971; Sharma, 1978; Michael & Sharma, 1988; Venkataraman, 1998; GBIF, 2024)^[2, 24, 15, 29, 7].

Species 2: *Ceriodaphnia reticulata* (Jurine, 1820)



Fig 2: *Ceriodaphnia reticulata* (Jurine, 1820)

1820. *Monoculus reticulata* Jurine, p. 139, pl. 14, figs. 3 & 4
 1901. *Ceriodaphnia reticulata* (Jurine) Sars Fur. i Vide. Sels. I.Christ.: 21
 Syn. *Ceriodaphnia fisheri* Leydig, 1860
 Syn. *Ceriodaphnia serrata* Sars, 1890
 Syn. *Ceriodaphnia kuerzi* Stingelin, 1895
 Syn. *Ceriodaphnia occulata* Werestchagin, 1911

Diagnosis: ♀: Body almost rounded, posteriorly with a small protuberance; head rounded and neither with rostrum nor with horn; eyes large that almost filling the head; margin of post-abdomen with 7 spines; with single row of anal spine; claw with 6 toothed pecten; size 587 µm.

Material examined: 1♀; 88° 47' N, 22° 92' E; 11.vi.2024. Coll. 2nd Sem. Students.

Distribution: In India – Bihar, Madhya Pradesh, Rajasthan, West Bengal; elsewhere - Austria, Bangladesh, Belgium, Columbia, Estonia, France, Germany, Korea, Mexico, Nepal, Netherlands, Norway, Russia, Spain, United Kingdom (Biswas, 1971; Michael & Sharma, 1988; Venkataraman, 1998; GBIF, 2024)^[2, 15, 29, 7].

Genus 2: *Daphnia* Müller, 1785

Diagnosis: Body oval or elliptical, compressed, head with long crest or horn, valves reticulate; dorsal and ventral margins rounded and spinous; in male rostrum absent and antennules large and movable; in female rostrum present and antennules rudimentary and immovable.

Type species: *Daphnia longispina* Müller, 1785
Daphnia lumholtzi Sars, 1885



Fig 3: *Daphnia lumholtzi* Sars, 1885

1885. *Daphnia lumholtzi* Sars, Fur. i Vide. – Sels. I. Christ. 8: 18, pl. 1, fig. 1-10

Diagnosis: ♂: Head with an elongated and pointed horn at top, fornix projected laterally; ventral margin and mid to distal region of dorsal margin strongly spinous, elongated tail covered with spinules; first leg with hook and flagellum; claws with 3 strong pectens; body size 1.53 mm.

Material examined: 1♂; 88° 48' N, 22° 91' E; 11.vi.2024. Coll. 2nd Sem. Students.

Distribution: In India – Andhra Pradesh, Assam, Himachal Pradesh, Orissa, Punjab, Rajasthan, Tamil Nadu, Telengana, Uttar Pradesh, West Bengal; elsewhere – Africa, Australia,

Bangladesh, Brazil, Canada, Egypt, Mexico, Nepal, Pakistan, Sri Lanka, Tanzania, Thailand, Uganda, United State of America, Zimbabwe (Biswas, 1971; Sharma, 1978; Michael & Sharma, 1988; Sharma & Sharma, 1990; Venkataraman, 1998; Simões *et al.* 2009; GBIF, 2024) [2, 24, 15, 25, 29, 27, 7].

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Discussion: Global fauna of the Diplostraca comprises approximately 620 species under 95 genera belonging to 17 families whereas India represents 139 species and 55 genera under 12 families and more than half of Indian species (approximately 77 species) harbours in West Bengal (Sinha, 2023) [28]. Water fleas diversity in West Bengal is very low in compare to other temperate zone (Venkataraman 1998) [29]. As the study area is located in the temperate region and is used for fish production, the diplostracan diversity might be less. Another reason for getting small amount of species was due to survey period. Although *Ceriodaphnia reticulata* (Jurine, 1820), an uncommon species was recorded. So, this wetland needs much more attention for revealing the actual species composition of diplostracan branchiopods.

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