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43/2 Varadarajulu Nagar, 5<sup>th</sup> Street West, Ganapathy, Coimbatore, Tamil Nadu 641006, India  
Registered Office: 3A2 Varadarajulu Nagar, FCI Road, Ganapathy, Coimbatore, Tamil Nadu 641006, India  
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Cover: The breathtakingly beautiful Silver Jubilee cover of JoTT is done in color pencils and ink by the 13-year old darling, Elakshi Mahika Molur.



## First report of *Macrochaetus sericus* Thorpe, 1893 and *Lecane tenuiseta* Harring, 1914 (Rotifera: Monogononta) from Jammu waters (J&K), India

Deepanjali Slathia<sup>1</sup> , Supreet Kour<sup>2</sup>  & Sarbjeet Kour<sup>3</sup> 

<sup>1,2,3</sup> Department of Zoology, University of Jammu, Baba Saheb Ambedkar Road, Jammu, Jammu & Kashmir 180006, India.

<sup>1</sup>deepanjalisathia96@gmail.com (corresponding author), <sup>2</sup>supreetkour1994@gmail.com, <sup>3</sup>drsarbjeetkour@gmail.com

**Abstract:** Water bodies, apart from having aesthetic value, harbor a great diversity of both macro and microorganisms. Rotifers or wheel animalcules are cosmopolitan aquatic invertebrates that play a key role in aquatic food chain. Presently, two species of rotifers (*Macrochaetus sericus* & *Lecane tenuiseta*) have been recorded for the first time from Jammu. *M. sericus* is first record from Union territory of J&K while *L. tenuiseta* has already been reported from Kashmir. During the one year study period, *M. sericus* was observed in the plankton sample during the monsoon season while *L. tenuiseta* was collected from the periphytic zone during the winter season. *M. sericus* differed from related congeneric species by absence of anal segment and anal spines. *L. tenuiseta* is distinguished by its long separated claws and long toes. The first report of these two species from Jammu has further expanded their distributional ranges in the Indian subcontinent.

**Keywords:** Diagnosis, distribution, first reports, habitat, invertebrates, Jammu & Kashmir, morphology, periphytic, plankton, seasonality, water, wheel animalcules.

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**Author details:** DEEPAJALI SLATHIA is a research scholar, pursuing her Ph.D. from the Department of Zoology, University of Jammu. She is working on diversity, taxonomy and ecology of freshwater zooplankton. SUPREET KOUR is also a Ph.D. research scholar in the Department of Zoology, University of Jammu, working on zooplankton ecology and epibiotic associations among them. DR. SARBJEET KOUR is currently working as associate professor in the Department of Zoology, University of Jammu. She has a research experience of 23 years and her area of specialization includes limnology, aquatic biology, water quality analysis and zooplankton ecology.

**Author contributions:** Deepanjali Slathia: field surveys, identification, data analysis, interpretation and preparation of manuscript. Supreet Kour: Data collection, review and editing. Sarbjeet Kour: study design, supervision, confirmation of species and final approval of manuscript.

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## INTRODUCTION

Phylum Rotifera includes a group of microscopic, primarily freshwater pseudocoelomate animals, commonly called wheel animalcules because of the presence of corona or wheel organ which resembles rotating wheels. Being cosmopolitan, they occur in a variety of habitats (aquatic and semi-aquatic) ranging from lakes to small puddles and about 75% of all known species of rotifers inhabit littoral zones of water bodies (Pennak 1989; Smith 2001; Wei & Xu 2014). Forming an important part of the aquatic food chain, they are the most preferred food organisms for small fish larvae because of their small size and slow movement (Loveson et al. 2020). They are regarded as the most suitable water quality indicators as they are more sensitive and respond more rapidly to environmental alterations in comparison to crustaceans (Gannon & Stemberger 1978). The highest rotifer diversity has been observed in the tropics (Segers 2008). The work of Anderson (1889) represents the very first study on Indian rotifers. Since then, the appreciable amount of work on rotifer fauna of India has been done by many workers (Edmondson & Hutchinson 1934; Arora 1963; Nayar 1968; Sharma 1976; Sharma 1980; Sharma & Michael 1980; Battish 1992; Dhuru et al. 2003; Sharma & Sharma 2009; Vanjare et al. 2017). A total of 434 valid species of rotifers (belonging to 68 genera, 25 families) are known from India, making Indian Rotifer fauna the most diverse compared to southern Asia and southeastern Asia (Sharma & Sharma 2021). The Union Territory of Jammu & Kashmir, an important component of biodiversity hotspot (The Himalaya), is bestowed with unique physiography, diverse climate, and a variety of water bodies ranging from high mountain lakes, wetlands, hot water springs to small rivers, streams, and ponds (Sharma & Sharma 2018). Presently, 173 valid rotifer species are known from J&K (Sharma & Sharma 2018). Much work on the rotifer fauna of J&K has been concentrated in Kashmir (Pandit 1999; Wanganeo & Wanganeo 2006; Shah et al. 2015; Sharma & Sharma 2018). From Jammu, limited valid information is available (Sharma & Shrivastava 1986; Dalpatia 1998; Baba 2002; Kour 2006). There are still many unexplored small lentic water bodies in Jammu which if explored will add to the faunal biodiversity of the region. Present study was conducted on a completely unexplored pond of Jammu. In total we observed 31 rotifer species from the pond, of which two species were first reports from Jammu. This short communication briefly describes their diagnostic features, distribution, and comparison

with related congeneric species.

## MATERIAL AND METHODS

In the present study the area selected was a sacred perennial pond (32.701321°N & 74.747988°E) located in the Sohanjana region of Jammu (Figure 1, Image 1). The pond holds great religious significance. Many devotees make holy dips into the pond believing that it can wash their sins and will help them in getting rid of diseases. The pond is roughly rectangular-shaped and has an area of 2,295.45 m<sup>2</sup> and concrete embankments. The sampling was done and both the presently discussed species were observed during our preliminary seasonal study conducted on Sohanjana pond (from January 2020 to December 2020). *Macrochaetus sericus* Thorpe, 1893 was observed in the plankton sample while *Lecane tenuiseta* Harring, 1914 was recorded in the sample collected from the periphytic zone. Plankton samples were collected by filtering 50 litres of pond water through a plankton net made of bolting silk (mesh size 40 µm). About 20 ml of planktonic concentrate was then stored in 4% formalin in polyethylene vials for further observation. For periphytic sampling, periphyton was scrapped from stones and twigs with the help of a fine scalpel blade, washed with water, and then filtered through a plankton net. The periphytic sample was also transferred to vials and stored in 4% formalin for further observation. In the laboratory, preserved samples were observed under an Olympus compound light microscope. Identification was done by following standard identification keys (Koste & Shiel 1990; Segers 1995; Sharma 1998; Sharma & Sharma 2013). The taxonomical terminology was adopted from Segers (2002). The reference materials were deposited in the Museum of Department of Zoology, University of Jammu. An ocular micrometer was used for taking measurements. Glass camera lucida and Rotring Germany 1928 pens were used for making drawings of preserved specimens. For measuring abiotic parameters, water samples from the study area were collected in sterilized bottles. Water temperature was recorded using a glass mercury thermometer. pH was determined using a digital pH meter (Hanna instruments-HI 96107). Water transparency was measured with the help of a Secchi disc. Free carbon dioxide (FCO<sub>2</sub>), dissolved oxygen (DO), and biological oxygen demand (BOD) were analyzed by using standard methods given in APHA (2017).

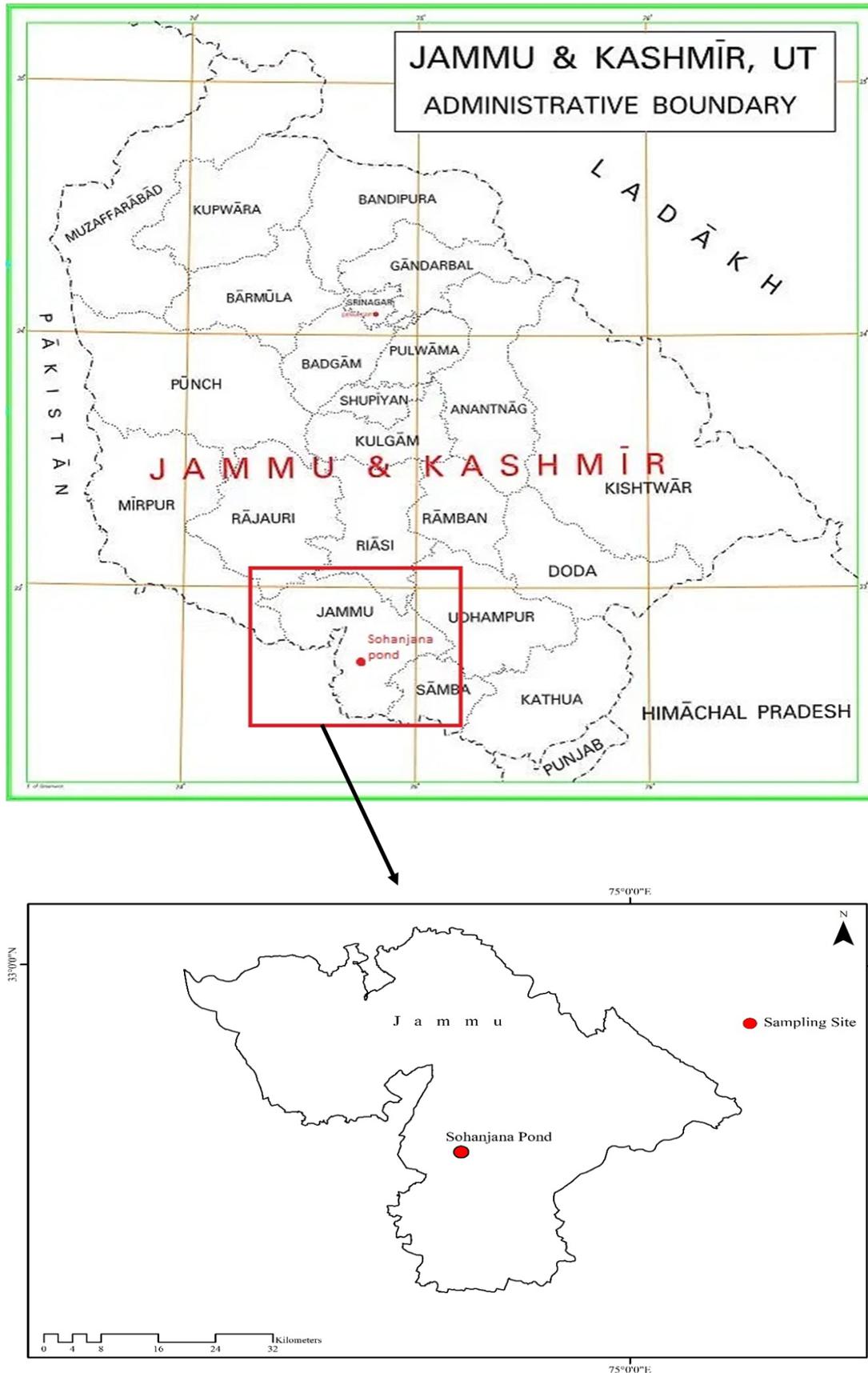


Figure 1. a—Map of Union Territory of J&K indicating sampling site | b—Map of Jammu indicating sampling site

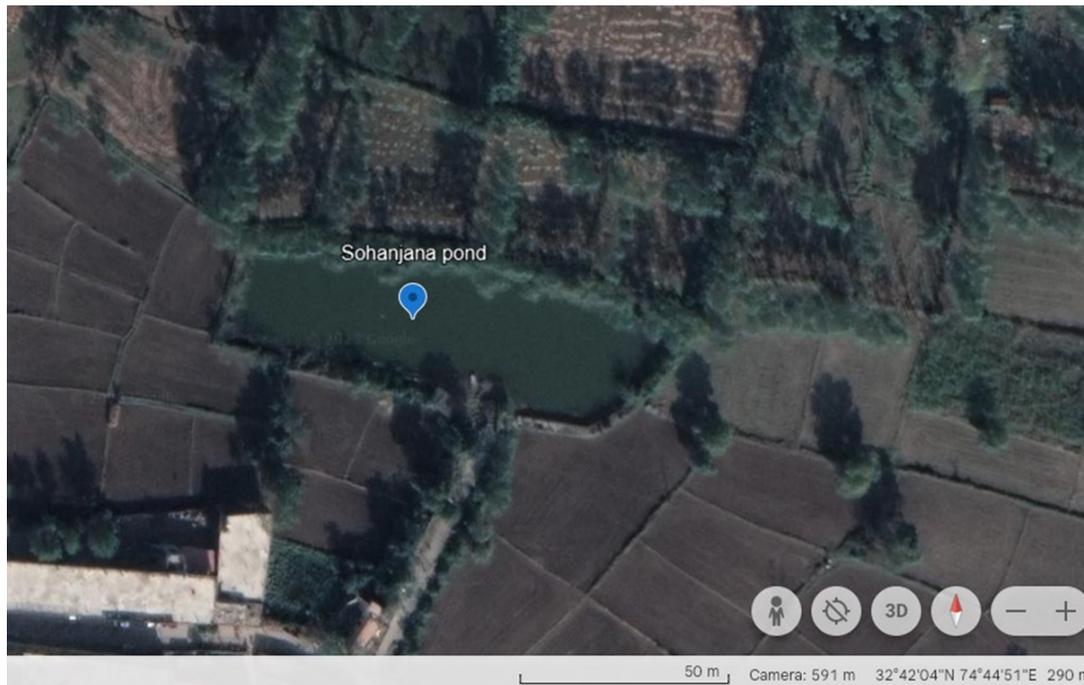


Image 1. Satellite view of sampling station (Sohanjana pond)

## RESULTS AND DISCUSSIONS

### a). *Macrochaetus sericus* (Thorpe 1893) (Image 2a–c, Figure 2)

Phylum: Rotifera Cuvier, 1817  
 Class: Eurotatoria De Ridder, 1957  
 Subclass: Monogononta Plate, 1889  
 Order: Ploima Hudson & Gosse, 1886  
 Family: Trichotriidae, Haring 1913

**Synonym:** *Dinocharis serica* Thorpe, 1893

**Material examined:** Four contracted specimens were studied for morphological features.

**Environmental data:** Water temperature: 31°C, pH: 6.9, Free carbon dioxide: 24.64 mg/l, Dissolved Oxygen: 4.82 mg/l, Transparency: 31.5 cm, and BOD: 1.32 mg/l.

**Diagnosis:** Lorica is broad than long, shaped like a horse-shoe and covered with minute spines or tubercles at outer angles. Its dorsal surface is characterized by the presence of eight spines (four anterior and four posterior) which are symmetrically placed with reference to mid-line. Anal segment and anal spines are absent. Mastax is malleate type. Toes are small and spindle-shaped.

**Distribution:** It is a warm stenothermal, pantropical species (Sharma & Sharma 2018). In India, it has been reported from Maharashtra (Vanjare et al. 2017), Andhra Pradesh, Madhya Pradesh, Tamil Nadu, Orissa,

Meghalaya, West Bengal, and Assam (Sharma & Sharma 2013). No previous record of this species is known from J&K.

**Remarks:** Species was observed during the monsoon season when temperature was high and water was less transparent. This seasonal appearance might be attributed to the preference of this genus for specific environmental conditions like warm temperature, low pH and low water transparency (de Paggi et al. 2000). The numerical count of this species was very low in the plankton sample (0.102 No./ litre) as the appearance of members of this genus in open waters is quite rare due to their affinity for epiphytic or benthic habitat and they appear in open water of reservoirs at the time of seasonal flushing (Koste & Shiel 1989). *Macrochaetus sericus* Thorpe, 1893 can be confused with congener *Macrochaetus collinsi* Goose, 1867. But absence of anal segment and anal spines easily distinguish *Macrochaetus sericus* from *Macrochaetus collinsi*.

### b). *Lecane tenuiseta* (Haring 1914) (Image 2d) (Figure 3)

Phylum: Rotifera Cuvier, 1817  
 Class: Eurotatoria De Ridder, 1957  
 Subclass: Monogononta Plate, 1889  
 Order: Ploima Hudson & Gosse, 1886  
 Family: Lecanidae Remane, 1933

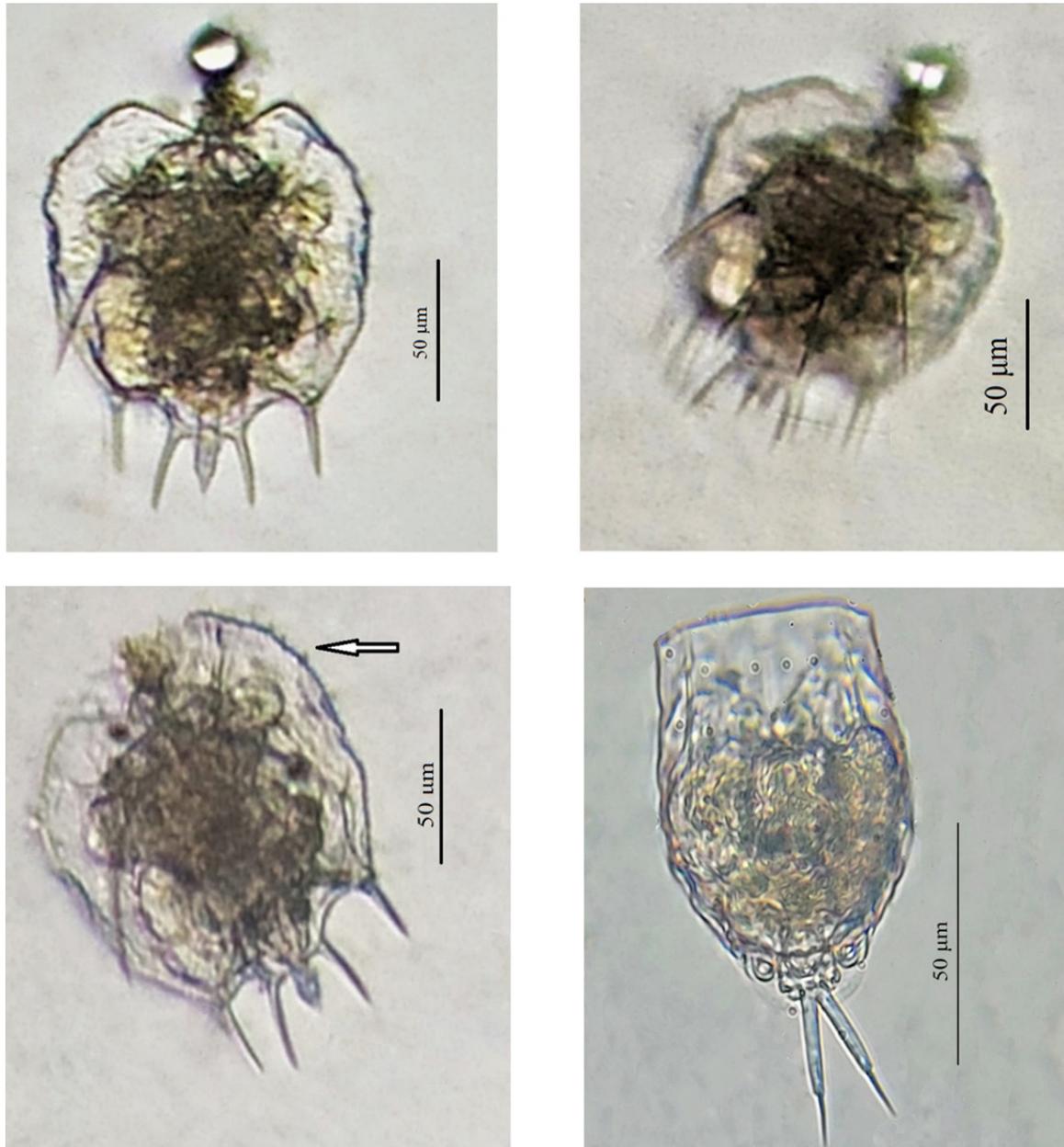


Image 2. a—*Macrochaetus sericus* (Thorpe, 1893) showing 4 posterior spines | b—*Macrochaetus sericus* (Thorpe, 1893) showing 4 anterior spines | c—*Macrochaetus sericus* (Thorpe, 1893) showing minute spines at outer angles | d—*Lecane tenuiseta* (Harring, 1914)

**Synonym:** *Lecane punctata* Carlin- Nilsson, 1934

**Material examined:** Six specimens were examined for studying morphological features.

**Environmental data:** Water temperature: 14°C, pH: 7.8, Free carbon dioxide: 14.08 mg/l, Dissolved Oxygen: 6.24 mg/l, Transparency: 58 cm, and BOD: 0.64 mg/l.

**Diagnosis:** Lorica is elongated and distinct. Anterior head aperture with nearly parallel margins. The anterio-lateral corners of lorica are angulated. Ventral plate is more longer than broad, along with incomplete

longitudinal and transverse folds. Foot pseudo segment is either slightly or completely not projecting. Mastax is malleate type. Toes with claws that are long and completely separated from each other with claw to toe length ratio of approximately 0.5.

**Distribution:** It is a cosmopolitan species. In India, *Lecane tenuiseta* currently shows a discontinuous distribution pattern (Sharma & Sharma 2014) and has been recorded from Delhi (Sharma & Sharma 2013), Kerala (Kakkassery 2003) and Northeastern states like

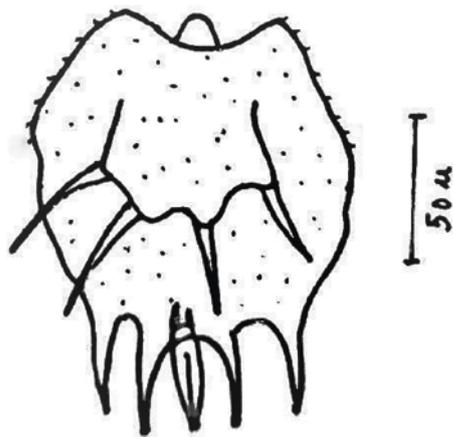


Figure 2. Camera lucida drawing of *Macrochaetus sericus* (Thorpe, 1893).

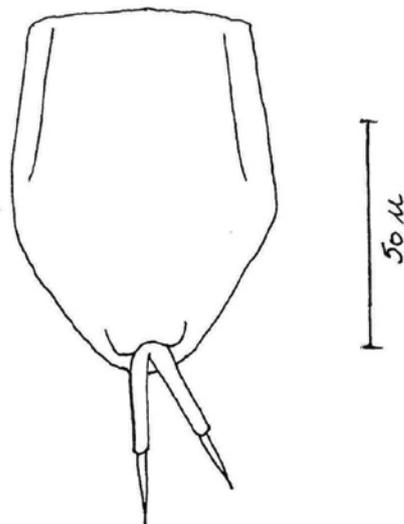


Figure 3. Camera lucida drawing of *Lecane tenuiseta* (Harring, 1914)

Assam (Sharma 2014) and Manipur (Sharma 2007).

**Remarks:** Although cosmopolitan, it is a rare species due to its restricted habitat preference (typically littoral) (Glime 2017). Presently it was observed only during the winter season as this species best proliferates at colder temperatures (Fialkowska et al. 2016) and represented only 6% of the total periphytic rotifer fauna. Some other lecanidae species which were exclusively observed from the periphytic zone of the pond were *Lecane luna* (O.F. Muller, 1776), *Lecane hamata* (Stokes, 1896) and *Lecane clostercerca* (Schmarda, 1859). *Lecane tenuiseta* can be confused with *L. aeganea* (Harring, 1914), *L. doryssa* (Harring, 1914) or *L. inermis* (Bryce, 1892). But *L. inermis* has comparatively soft lorica. Both *L. aeganea* and *L. doryssa* differs from *L. tenuiseta* by their stiffer lorica.

But *L. aeganea* has shorter claws and *L. doryssa* has typically projecting foot pseudo segment.

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