

## New records of two species of water bugs (Insecta: Hemiptera: Heteroptera) from Kerala, India

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### Abstract

Water bugs are the major group of insects successfully utilize enormous array of aquatic habitats. The present study reports new records of two species of water bugs viz., *Tiphotrephes indicus* (Distant, 1910) [6] and *Microvelia albomaculata* Distant, 1909 [6] belonging to the families of Helotrephidae and Veliidae respectively from Kerala. The current study shall contribute two species of water bugs to the checklist of aquatic Heteropterans of the State, thereby strengthening information on the geographic distribution. Concise comments on their general characteristics and bionomics have been integrated.

**Keywords:** Heteroptera, Kerala, new record, systematics, water bugs

### Introduction

Water bugs inhabit broad spectrum of aquatic habitats and they have numerous adaptations and distinctive behavioral patterns for colonizing in wide variety of niches (Spencer and Andersen, 1994) [1]. As they perform various ecological roles in aquatic ecosystems, studies on water bugs have immense importance. Around 4656 species of aquatic and semi-aquatic bugs under 326 genera and 20 families have been reported globally (Polhemus and Polhemus, 2008) [2]. Approximately 350 species of aquatic and semi-aquatic Heteropterans have been reported so far from India (Chandra *et al.*, 2017; Jehamalar and Chandra, 2020) [3, 4]. Contrasting other states of India, studies on water bugs in Kerala have been seldom. An attempt was made to document aquatic and semi-aquatic bugs from Sasthamkotta lake, the largest freshwater lake of Kerala. As a part of the investigation, two species of water bugs namely *Tiphotrephes indicus* (Distant, 1910) [5] and *Microvelia albomaculata* Distant, 1909 [6] belonging to the families of Helotrephidae and Veliidae respectively have been reported for the first time from Kerala. Even though these species have been reported from many other states of India, the current record deserves much attention since it is the pioneer report from the state of Kerala. Distribution records are highly necessary for understanding zoogeography and it is vital for implementing conservation actions.

### Materials and Methods

The studied materials were collected from Sasthamkotta lake, the largest freshwater lake of Kerala, by using a hand operated D-frame aquatic net with a mesh size of 500µm. Collected materials were preserved in 70% ethanol in the field and transported to the laboratory for further taxonomic analysis. Male genital segment and related structures of the collected specimens were dissected and kept in 10% potassium hydroxide (KOH) for a period of 30 minutes for in-depth examination. The specimens were studied under Olympus SZ51 stereomicroscope and photographs were taken using Olympus TG- 6 digital camera. Identification was done using published taxonomic literatures (Chandra *et al.*, 2012; Basu *et al.*, 2018) [7, 8].

### Results

#### 1. *Tiphotrephes indicus* (Distant, 1910) [5] (Fig. 1A-D)

**Order:** Hemiptera Linnaeus, 1758

**Suborder:** Heteroptera Latreille, 1810

**Infraorder:** Nepomorpha Popov, 1968

**Superfamily:** Pleoidea Fieber, 1851

**Family:** Helotrephidae Esaki and China, 1927

**Genus:** *Tiphotrephes* Esaki and China, 1928

#### *Tiphotrephes indicus* (Distant, 1910) [5]

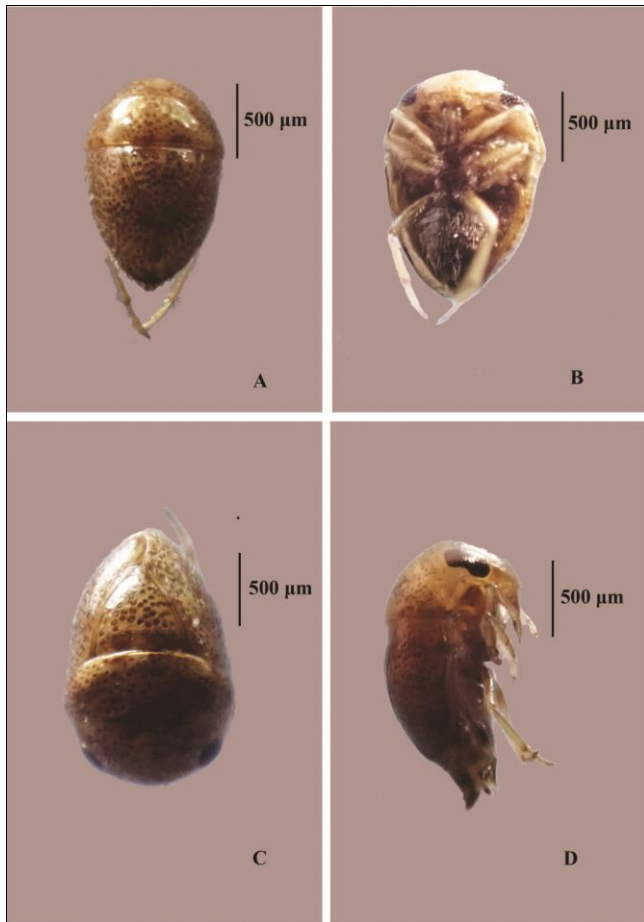
**Materials examined:** 6 ♂, 4 ♀, Sasthamkotta Lake; S1; Ambalakkadavu (9°2'17.58" N and 76° 38'0.87" E), 5 ♂, 1 ♀, S2; Near pump house (9°2'30.09" N and 76°37'22.72" E), 4 ♂, 7 ♀, S3; Adikkadu Kadavu (9°2'4.01" N and 76°36' 49.36" E), 2♂, 2 ♀, S4; Vettolikadavu (9°1'56.93" N and 76° 37' 29.72" E), 3♂, 1 ♀, S5; Near to bund (9°2'4.45" N and 76°38' 5.15" E), 3 ♂, 6 ♀, S6; Punnakkadu Kadavu (9°2'41.27"N and 76°37' 44.17" E), 7♂, 5♀, S7; Pulikuzhi (9°2'58.4" N and 76°38'24.79"E), 22.vi.2022, Coll. Jyothylakshmi K and S. Nandakumar.

**Diagnostic characters:** Body length: 1-1.5mm; they are tiny and oval shaped species; colour: golden yellow to light brown; head is round and the eyes are not visible from the above. Dorsal surface of the body with numerous punctures; pronotum is less punctuate than the scutellum; lateral side of the scutellum without clavus.

**Distribution:** India: Maharashtra, Meghalaya, Uttar Pradesh and West Bengal.

**Bionomics:** These bugs look similar to pleids. The species is most commonly encountered in the littoral zones of the lake, sometimes found crawling on floating macrophytes. They are active swimmers but tend to crawl and hide amongst the aquatic macrophytes. It is very difficult to spot them quickly due to their tiny size and dark colour. They are predatory bugs; possess specialized mouthparts adapted for piercing and sucking. Sometimes 20-25 species occurring together, but they may separate themselves by microhabitat within the lake.

**Remarks:** Coarse punctures on the dorsal surface of the body are a typical characteristic of this species.



**Fig 1:** A-D. *Tiphotrephes indicus* (Distant, 1910) <sup>[5]</sup>. A. Dorsal view; B. Ventral view; C. Head and pronotum; D. Lateral view

## 2. *Microvelia albomaculata* Distant, 1909 <sup>[6]</sup> (Fig. 2A-F)

**Order:** Hemiptera Linnaeus, 1758

**Suborder:** Heteroptera Latreille, 1810

**Infraorder:** Gerromorpha Popov, 1971

**Superfamily:** Gerroidea Reuter, 1910

**Family:** Veliidae Amyot and Serville, 1843

**Subfamily:** Microveliinae China and Usinger, 1949

**Genus:** *Microvelia* Westwood, 1834

### *Microvelia albomaculata* Distant, 1909 <sup>[6]</sup>

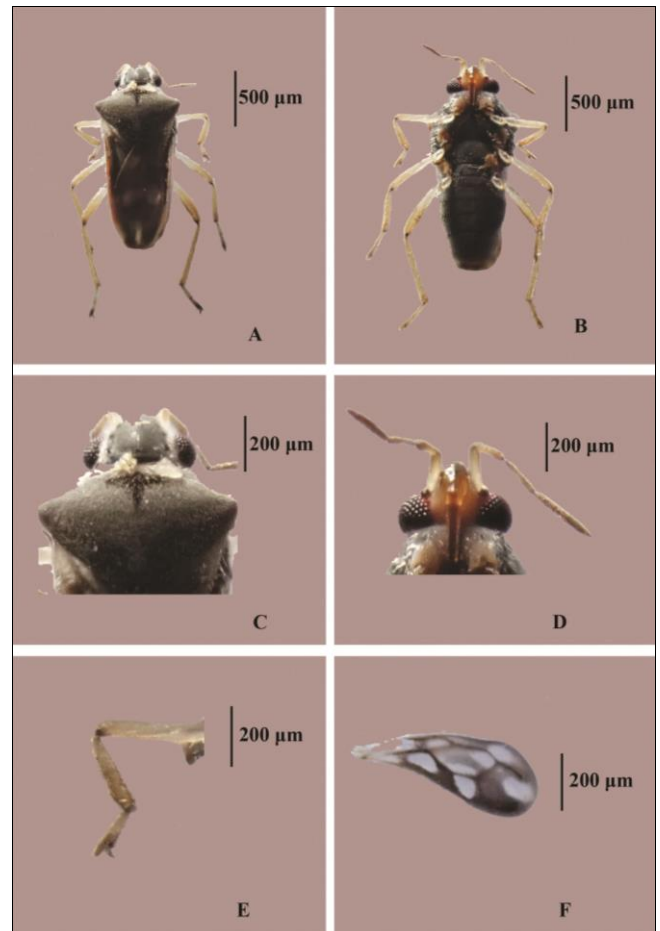
**Materials examined:** 9 ♂, 8 ♀, Sasthamkotta Lake; S1; Ambaladakavu (9°2'17.58" N and 76° 38'0.87" E), 7 ♂, 7 ♀., S2; Near pump house (9°2'30.09" N and 76°37'22.72" E), 4 ♂, 6 ♀., S3; Adikkadu Kadavu (9°2'4.01" N and 76°36' 49.36" E), 5♂, 8 ♀., S4; Vettolikadavu (9°1'56.93" N and 76° 37' 29.72" E), 4♂, 4 ♀., S5; Near to bund (9°2'4.45" N and 76°38' 5.15" E), 5♂, 4 ♀., S6; Punnakkadu Kadavu (9°2'41.27"N and 76°37' 44.17" E), 3♂, 3♀., S7; Pulikuzhi (9°2'58.4" N and 76°38'24.79"E), 17.viii. 2022, Coll. Jyothylakshmi K and S. Nandakumar.

**Diagnostic characters:** Body length: 1.2- 1.8 mm; colour: black colour with gray coating dorsally; reddish or yellowish stripes present on the anterior region of the pronotum; wings having grayish white spots; lateral margin of wings have wavy appearance; legs are yellowish in colour; black colouration is present on the tip of each femur, tibia and tarsus of forelegs, mid legs and hind legs; last antennal segment is longer than the rest.

**Distribution:** India: Madhya Pradesh and West Bengal

**Bionomics:** They are one of the smallest species among semi aquatic bugs. The species is not adapted to wide variety of microhabitat in the lake. They are found associated with hydrophytes rich zones of the lake. Wingless forms of *Microvelia albomaculata* are brown colour and winged forms are black coloured. Sexual dimorphism is apparent; males are comparatively small with pointed abdomen. Nymphs of the species closely resemble apterous adult. They are predators feeding on tiny invertebrates.

**Remarks:** This species can be easily distinguished by the wing pattern.



**Fig 2:** A-F. *Microvelia albomaculata* Distant, 1909 <sup>[6]</sup>. A. Dorsal view; B. Ventral view; C. Head and pronotum; D. Head ventral view; E. Foreleg; F. Wing pattern

### Discussion

Several works on the systematics and faunistics of aquatic bugs have been conducted at different regions of Western Ghats. However, very little attention has been paid to the faunal documentation of aquatic bugs of Kerala. The present discovery of *Tiphotrephes indicus* (Distant, 1910) <sup>[5]</sup> and *Microvelia albomaculata* Distant, 1909 <sup>[6]</sup> are from Sasthamkotta lake, the largest freshwater lake of Kerala, shall contribute two species to the checklist of water bug fauna of the state. *Tiphotrephes indicus* (Distant, 1910) <sup>[5]</sup> was previously reported from West Bengal by Basu *et al.* (2018) <sup>[8]</sup> and the same was reported from Meghalaya by Jehamalar *et al.* (2018) <sup>[9]</sup>. These reports provide evidence that this species could occur in stagnant ecosystems such as pond or lake. This is the only species of *Tiphotrephes* so far

reported from India (Thirumalai, 2007; Praveen *et al.*, 2024)<sup>[10, 11]</sup>. *Microvelia albomaculata* Distant, 1909<sup>[6]</sup> was earlier reported from Madhya Pradesh by Chandra *et al.* (2012)<sup>[7]</sup> and the same was reported from West Bengal by Basu *et al.* (2018)<sup>[8]</sup>. A total of 8 species of *Microvelia* have been so far reported from India (Basu *et al.*, 2018; Praveen *et al.*, 2024)<sup>[8, 10]</sup>. The current records are extremely crucial and are of zoogeographical importance, since Kerala region is not well explored for water bug documentation. The present contribution highlights the necessity of studying local diversity profiles of water bugs for implementing effective conservation strategies. Many districts of the state are not sufficiently surveyed for aquatic and semi aquatic bugs and several new records and new species of water bugs from Kerala are yet to be discovered. Along with the systematics and faunistics, understanding the bionomics of water bugs by assessing their ecological and behavioral processes will be helpful to implement better conservation actions. Although our current knowledge on the bioecology of water bugs has been progressing, there is an open field of possibilities and gaps that need to be addressed in future research.

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