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THREE NEW RECORDS OF ENTOMOBRYIDAE COLLEMBOLA (ARTHROPODA: HEXAPODA) SPECIES FROM BANGLADESH

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AUTHORS' CONTRIBUTIONS

This work was carried out in collaboration between both authors. Both authors read and approved the final manuscript.

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ABSTRACT

Three new recorded species, viz., *Lepidocyrtus ruber* (Schott, 1902), *Seira mendoncea* (Bellini & Zeppelini, 2008) and *Orchesella albosa* (Guthrie, 1903), from Rajshahi University Campus, Bangladesh are described and illustrated with a key to the genus and species. The following three Collembola species were identified, recorded, and reported for the first time from Bangladesh.

Keywords: Collembola; entomobryidae; Rajshahi University; new record; Bangladesh.

1. INTRODUCTION

Entomobryidae family is the most diversified [1,2] .and like other Entomobryomorpha, this family's members feature lengthy appendages such as antennae, legs, and furca [1,3]. Multiciliated setae on the body, the abdominal segment IV longer than III, crenulated dens, and a tiny mucro with one or two well-developed teeth distinguish Entomobryidae from other families [4,5]. The genus *Lepidocyrtus* [6] is the second biggest genus in the Lepidocyrtinae subfamily [7], and is distinguished by four-segmented antennae, 8+8 eyes, and a bidentate mucro with a basal spine, finely ciliate scales, and the lack of dental spines. The genus *Orchesella* has a holarctic distribution, with members found in North America, Europe, and Western Asia [8,9] with subdivided basal antennal segments. The presence of a falcate mucro, prominently striated scales covering the dorsal body and appendages, 8+8 (or fewer, typically 7+7) ocular lenses, and in most species, three trichobothria on the fourth abdominal segment separate *Seira* from these two genera [5,10].We reported here three species from diverse environments on the Rajshahi University Campus in Bangladesh *viz.*, *Lepidocyrtus ruber*, *Seira mendoncea*, and *Orchesella albosa*. The Collembola

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species of Entomobryidae family serve as scavengers on decaying vegetation and associated bacteria and fungi, and they are also known to eat nematodes and dead animal matter [11].

2. MATERIAL AND METHODS

Collembola specimens were collected from Rajshahi University Campus area located about 4.8km from Rajshahi City. It is located at 24°22′26″N and 88°36′04″E with an altitude 23m above sea level. Collembola were collected by using the Aspirator [12] and Berlese funnel [13]. In the field white plate and aspirator were used. Soil collembola was collected by using a Berlese funnel. Thereafter, they were picked up with fine brush and preserved in 70% alcohol. In the present study, a series of permanent slides were prepared for the taxonomic analysis. Hoyer's mounting medium was used for slide-mounting of the specimens. Fluorescent microscope was used for photographic documentation following methodology [3], and Camera Lucida was utilized to prepare line diagrams. Collembola were identified at the genera and species level following those keys [14, 15, 16, 17, 18]. Chaetotaxic description follows [19].

3. RESULTS AND OBSERVATION

Systematic Account

Family: Entomobryidae Schaffer, 1896
Genus: *Lepidocyrtus* (Bourlet, 1939)
Species: *Lepidocyrtus ruber* (Schott, 1902)

Diagnosis: The dorsal cephalic macrochaeta was missing (Fig 1.C), microchaeta present, the unguis inner border with one strange tooth (Fig 1.D), and the body color golden yellow (Fig 1.A). The mesothorax slightly protruded over the head (Fig 1.A). The eye patch irregularly formed with 8+8 eyeballs on each side (Fig 1.E), each corresponding to an ocellus. Body length: 532.83µm; other measurements are listed in Table 1.

Material examined: Rajshahi University Mulberry garden, soil surface, Bangladesh, 14.iii.2015, location coordinates: 24.370^0N, 88.637^0E. Collection: Nur Mohammad, Material deposited in the Department of Zoology, Insect Research Laboratory, University of Rajshahi, Rajshahi-6205, Bangladesh.

Distribution: Austria, Britain, Czech Republic, Germany, Hungary, Ireland, Italy, Netherlands, Norway, Poland, Russia Central, Slovakia, and Ukraine [20].

Family: Entomobryidae Schaffer, 1896
Genus: *Orchesella* (R.Templeton, 1939)
Species: *Orchesella albosa* (Guthrie, 1903)

Diagnosis: Antennae 5 segmented with a little purple tinge on the back (Fig 2.C). Yellow ground colour with purple tinge at the inter segments (Fig 2.D) and a light purple tinge posteriorly (Fig 2.E). Body length: 640.91 µm; other measurements are listed in Table 1.

Material examined: Rajshahi University Mulberry garden, leaf litter, Bangladesh, 19.iv.2015, location coordinates: 24.370^0N, 88.637^0E. Collection: Nur Mohammad, Material deposited in the Department of Zoology, Insect Research Laboratory, University of Rajshahi, Rajshahi-6205, Bangladesh.

Distribution: North America including Greenland, Central Florida, Michigan, and the highlands of Mexico [18].

Family: Entomobryidae Schaffer, 1896
Genus: *Seira* (Lubbock, 1869)
Species: *Seira mendoncea* (Bellini & Zeppelini, 2008)

Diagnosis: Typical entomobryid habitat. The fixed specimens have a pale yellow body color. Seira's trademark spot on the forehead (Fig 3.A). Ant. I, II, and III, as well as the head, meso and metathorax, abdomen, coxae, trochanters, femurs and tibiotarsus, manubrium, and dens are covered in brownish spherical scales. Ant. IV has an apical bulb (Fig 3.C) but no pin setae and not annulated. Eye patches oval with four inter-ocular feathery setae (Fig 3.B). Four inner teeth, one pair at the base, and two unpaired teeth at the apex of the ungues (Fig 3.D). Manubrium venter with five subapical setae (Fig. 3.E). On the manubrium, there are no spine-like setae Mucro typically falcate (Fig 3.F). Dorsal macrochaetae distribution of head and body as in (Fig 3.G). Body length: 631.83 µm other measurements are listed in Table 1.

Material examined: Rajshahi University Mulberry garden, Soil, leaf litter, Bangladesh, 19.iv.2015, location coordinates: 24.370^0N, 88.637^0E. Collection: Nur Mohammad, Material deposited in the Department of Zoology, Insect Research Laboratory, University of Rajshahi, Rajshahi-6205, Bangladesh.

Distribution: Cacimba de Dentro, state of Paraíba northeastern Brazil [21].

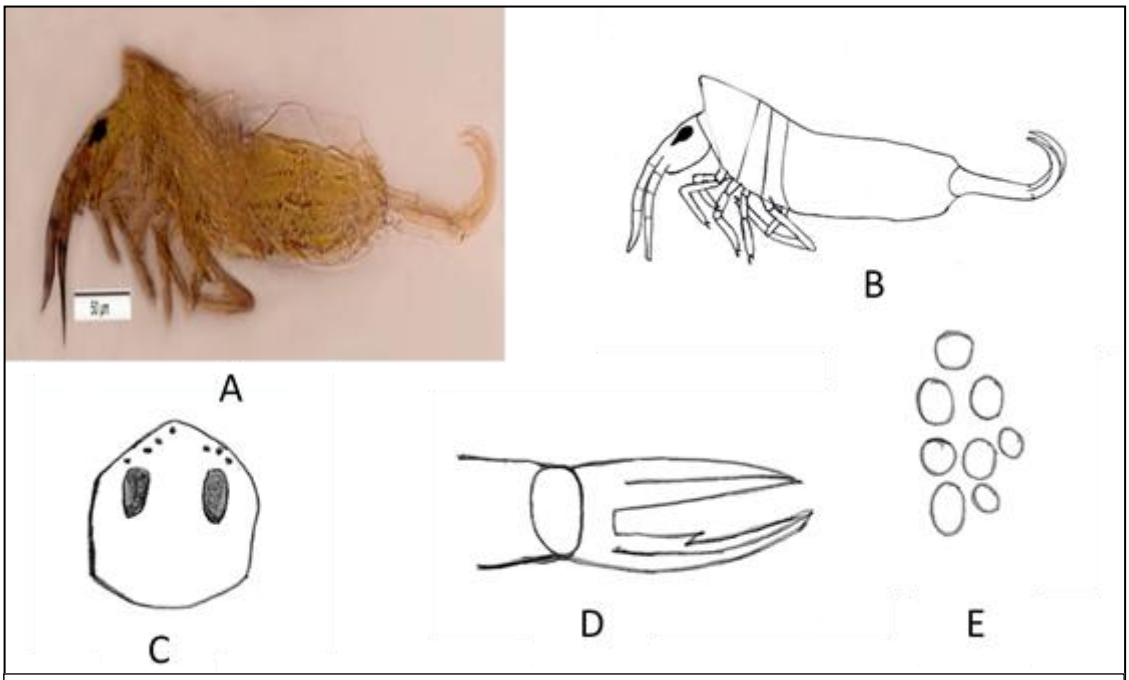

Fig. 1. A-B. *Lepidocyrtus ruber*, C. Dorsal cephalic with microchaeta, D. unguis with one odd tooth, E. Eye patch with 8+8 eyes each side

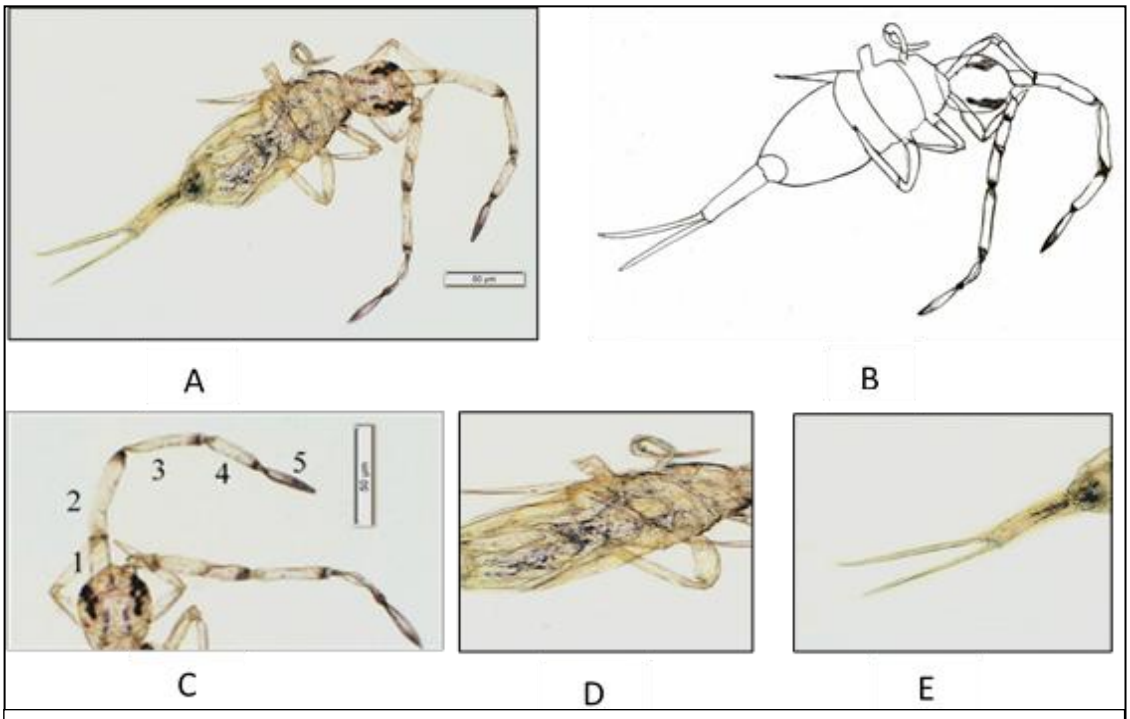

Fig. 2. A-B. *Orchesella albosa*, C. Antennae with dusting of light purple posteriorly, D. Body with variable amount of purple pigment, E. last body segment and furcula with dusting of light purple pigment

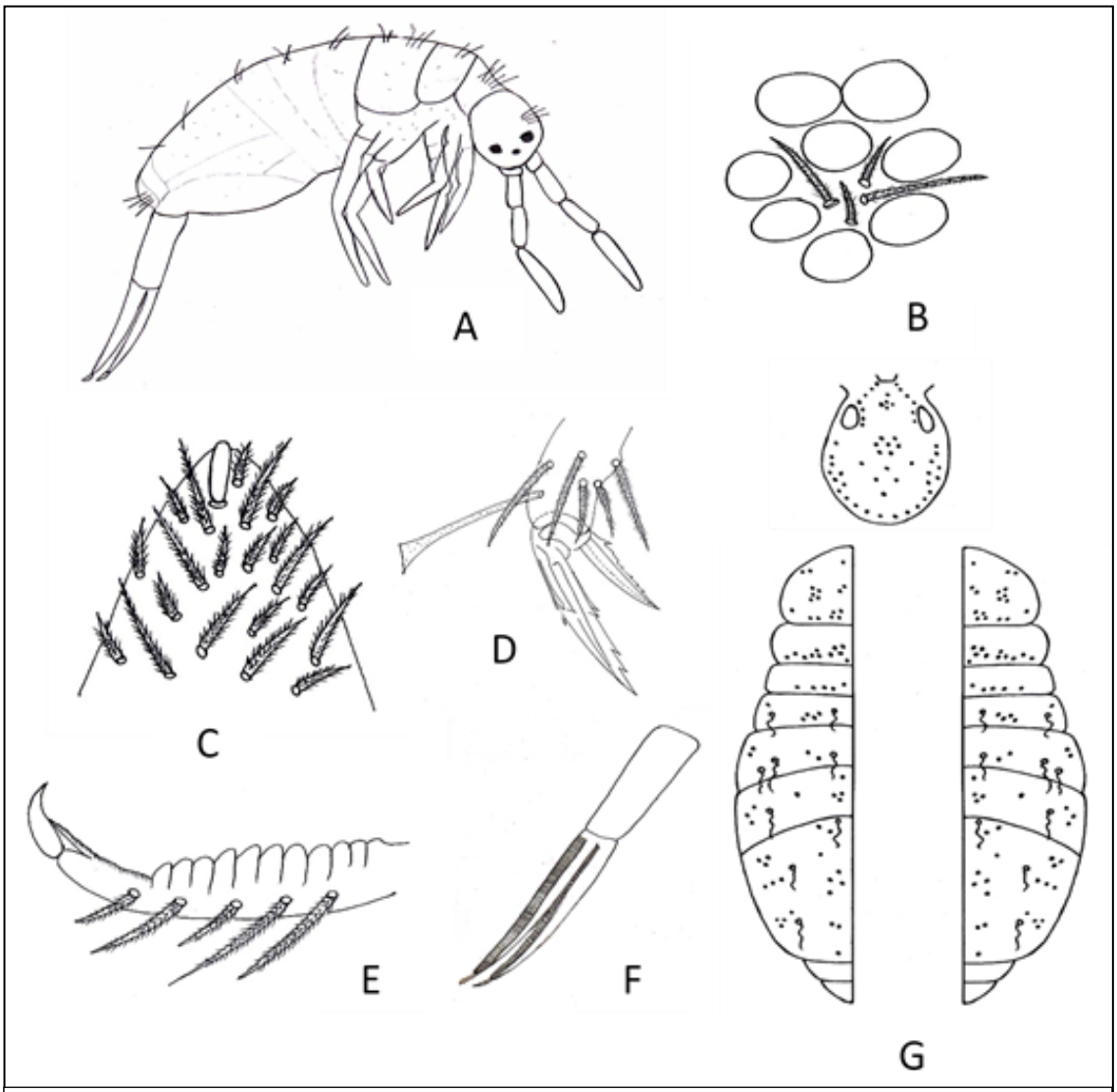

Fig. 3. A. *Seira Mendoncea*, B. Eyepatch, C. Antenna with apical bulb, D. Third foot complex, E. Dens and Mucro, F. Falcate Mucro, G. Dorsal macrochaeta distribution

Table 1. Morphometric measurements of recorded Collembola species

Parameters: Length (µm)		***Lepidocyrtus ruber***	***Seira Mendoncea***	***Orchesella albosa***
Antenna	1st segment	11.36	9.13	37.67
	2nd segment	14.36	29.72	63.04
	3rd segment	23.55	37.92	58.13
	4th segment	44.05	61.20	41.06
	5th segment			42.81
Total antennal length		93.31	137.97	242.73
Head		58.53	71.85	66.81
Thorax		102.54	92.17	80.37
abdomen		135.46	173.31	93.47
Furcula	Manubrium	69.82	67.57	64.07
	Dentes	73.17	88.96	93.64
Total Furcula length		142.99	156.53	157.5
Total body length		532.83	631.83	640.91

Key to the genera of *Lepidocyrtus*

1. Dentes crenulate ……..…….2
2. Body with scales…….……..3
3. Mucro bidentate……4
4. Dentes with scales on ventral surface……...5
5. Forth abdominal segment at midline more than twice as long as third…….……...6
6. Eyes 8 + 8..... ***Lepidocyrtus***

Key to the species of *Lepidocyrtus ruber*

1. Unguiculus truncate… ……..….2
2. Dorsal cephalic macrochaeta absent, inner margin of the unguis with one odd tooth, body color variable from yellow to dark violet…… ***Lepidocyrtus ruber***

Key to the genera of *Orchesella*

1. Abdominal segment IV shorter than 111; post antennal organ present or absent ……..…2
2. Scales absent from body. ……..3
3. Antennae appear 5 or 6 segmented ….. ***Orchesella***

Key to the species of *Orchesella albosa*

1. Antennae apparently 5 segmented, the segments, sometimes with dusting of light purple Posteriorly..... 2
2. Color basically yellow, with variable amounts of purple between the segments, sometimes

With dusting of light purple posteriorly……..…***Orchesella albosa***

Key to the genera of *Seira*

1. Dentes crenulate ……....…….…….2
2. Body with scales……..…….……..3
3. Mucro falcate…….……***Seira***

Key to the species of *Seira mendoncea*

1. Eye is oval shaped with four interocular feathery setae.....2
2. Antenna IV segment has an apical bulb but no pin setae and is not annulated. ……..... 3
3. Manubrium venter with five sub apical setae. .....***Seira mendoncea***

4. CONCLUSION

Further studies are to be undertaken to strengthen the Collembolan fauna of Bangladesh.

ETHICAL APPROVAL

As per international standard or university standard ethical approval has been collected and preserved by the authors.

COMPETING INTERESTS

Authors have declared that no competing interests exist.

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