

Research article

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First record of the genus *Alainites* Waltz & McCafferty, 1994 (Ephemeroptera, Baetidae) from India with the description of a new species from the North-western Himalayas

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Abstract. A new species *Alainites neeru* sp. nov. is described based on larvae collected from a hill stream in Jammu and Kashmir, India. It is the first report of the genus *Alainites* Waltz & McCafferty, 1994 from India. The new species is closely related to the Palearctic species *A. muticus* (Linnaeus, 1758), but can be distinguished from the latter by the length of the maxillary palp, the reduced number of spine-like setae on the margin between the prostheca and mola of the right mandible, the reduced tracheation in the tergalii, and by a reduced number of spines on the prolongation of the paraprot. With this record, the genus *Alainites* encompasses a total of twenty-two species.

Keywords. *Alainites muticus*, mayfly, new species, Palearctic realm.

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Introduction

The *Baetis muticus* group of species (Müller-Liebenau 1969) was elevated to generic rank as *Alainites* Waltz & McCafferty, 1994 based on laterally compressed body, glossae with dorsal setae, prostheca of right mandible reduced, femoral villopore absent, claws denticulate without any seta, hindwing pads present or absent, tergalia I present or absent, and paraproct with prolongation in the larvae (Waltz *et al.* 1994). After that, different opinions emerged regarding the systematic position of the genus *Alainites* along with the two related genera *Nigrobaetis* Novikova & Kluge, 1987 and *Takobia* Novikova & Kluge, 1987 (Müller-Liebenau 1969; Novikova & Kluge 1987, 1994; Waltz *et al.* 1994; Waltz & McCafferty 1997; Kluge & Novikova 2014). The riddle is mainly due to the lack of strong morphological support, some of the revisions were not based on the type material, and important characters were missing or wrongly interpreted in the original descriptions (Sroka *et al.* 2021; Yanai *et al.* 2022). *Alainites*, *Nigrobaetis*, and *Takobia* were recommended as valid genera based on the most recent investigations by Sroka *et al.* (2021) and Yanai *et al.* (2022) and it was strongly advised to wait until a worldwide phylogeny would be constructed based on genetic and morphological evidence before establishing a final classification.

Alainites is characterized in larvae by: i) prostheca of right mandible bifid; ii) femoral villopore absent; iii) posterior margin of the paraproct with a distinct prolongation; iv) body laterally compressed; v) with carina between antennal bases. In imagoes, i) segment III of the forceps is spherical to slightly elongated, and curved; ii) hindwings, when present, with three longitudinal veins, the second of which is bifurcated (Waltz *et al.* 1994; Zrelli *et al.* 2012; Yanai *et al.* 2022).

The genus *Alainites* presently includes 21 species: *Alainites acutulus* Tong & Dudgeon 2000, *A. albinatii* (Sartori & Tomas, 1989), *A. atagonis* (Imanishi, 1937), *A. bengunn* Yanai & Gattolliat, 2022 (in Yanai *et al.* 2022), *A. chocoratus* (Gose, 1980), *A. clivosus* (Chang & Yang, 1994) (in Kang *et al.* 1994), *A. florens* (Imanishi, 1937), *A. gasithi* Yanai & Gattolliat, 2022 (in Yanai *et al.* 2022), *A. kars* (Thomas & Kazanci, 1989) (in Kazanci & Thomas 1989), *A. laetificus* (Müller-Liebenau, 1984), *A. lingulatus* Tong & Dudgeon, 2000, *A. muticus* (Linnaeus, 1758), *A. navasi* (Müller-Liebenau, 1974), *A. oukaïmeden* (Thomas & Sartori, 1992) (in Thomas *et al.* 1992), *A. pascalae* Gattolliat, 2011, *A. sadati* Thomas, 1994 (in Thomas & Gagneur 1994), *A. siamensis* Phlai-ngam, Tungpaïrojwong & Gattolliat, 2022, *A. talasi* (Novikova & Kluge, 1994), *A. yehi* (Kang & Yang, 1994) (in Kang *et al.* 1994), *A. yixiani* (Gui & Lu, 1999), and *A. yoshinensis* (Gose, 1980).

The Indian Baetidae Leach, 1815 comprise about 15 genera and 60 species (Selvakumar *et al.* 2019; Kluge 2020; Kluge & Suttinun 2020; Kubendran *et al.* 2021; Sivaruban *et al.* 2022; Srinivasan *et al.* 2023). Jammu and Kashmir lie in the northwest part of the Himalayas at the intersection of the Palearctic and the Oriental realms, and harbour a rich biodiversity. Yet, the freshwater entomofauna remains poorly known for baetids and other mayflies. A new species of *Acentrella* (*A. isacki* Srinivasan *et al.*, 2023) was recently discovered from a hill stream in the north-western Himalayas and the same batch of samples yielded another new species of the genus *Alainites*, which is also the first record of this genus for the country.

Material and methods

The larvae of the species were hand-picked from the Neeru stream in Jammu and Kashmir. The specimens were preserved in 80% ethanol. Morphological characters of the new species were studied

using Magnus MSZ stereo zoom and LABOMED Lx400 microscopes, and photos were obtained using an AR 6 Pro digital camera and processed in Adobe Photoshop ver. 7.0. The taxonomical characters are depicted following Yanai *et al.* (2022) and Phlai-ngam *et al.* (2022). The type specimens of the new species are deposited in The American College Museum (AMC), Madurai, Tamil Nadu, India.

Results

Taxonomy

Class Insecta Linnaeus, 1758
Order Ephemeroptera Hyatt & Arms, 1891
Family Baetidae Leach, 1815
Genus *Alainites* Waltz & McCafferty, 1994

Alainites neeru sp. nov.

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Figs 1–36

Diagnosis

Larval diagnostic characters of *Alainites neeru* sp. nov. are as follows: (1) ventral surface of labrum with eight to ten small, pointed setae, increasing in size towards apex (Fig. 6); (2) right mandible with about four medium stout, pointed spine-like setae between prostheca and mola (Figs 12–13); (3) margin between prostheca and mola of left mandible slightly crenelate near the mola (Fig. 10); (4) labial palp segment III conical, apically slightly pointed (Fig. 16); (5) outer margin of fore tibia with a row of seven to nine stout, spine-like setae only on the distal half (Fig. 23); (6) hindwing pads well-developed (Fig. 28); (7) tergalii present on abdominal segments I–VII, with poorly visible tracheation (Fig. 32) and (8) distal margin of paraproct between prolongation and cercotractor with about 6–8 long, triangular spines (Fig. 36).

Etymology

The species is named after the type locality Neeru stream, Jammu and Kashmir.

Material examined

Holotype

INDIA • ♀, larva; Jammu and Kashmir, Doda District, Bhaderwah Town, Neeru Stream; 33°01.17' N, 75°39.46' E; 1400 m a.s.l.; 10 Oct. 2020; Asha Sohil leg.; AMC (AMC/ZN/271).

Paratypes

INDIA • 3 larvae; same collection data as for holotype; AMC (AMC/ZN/272).

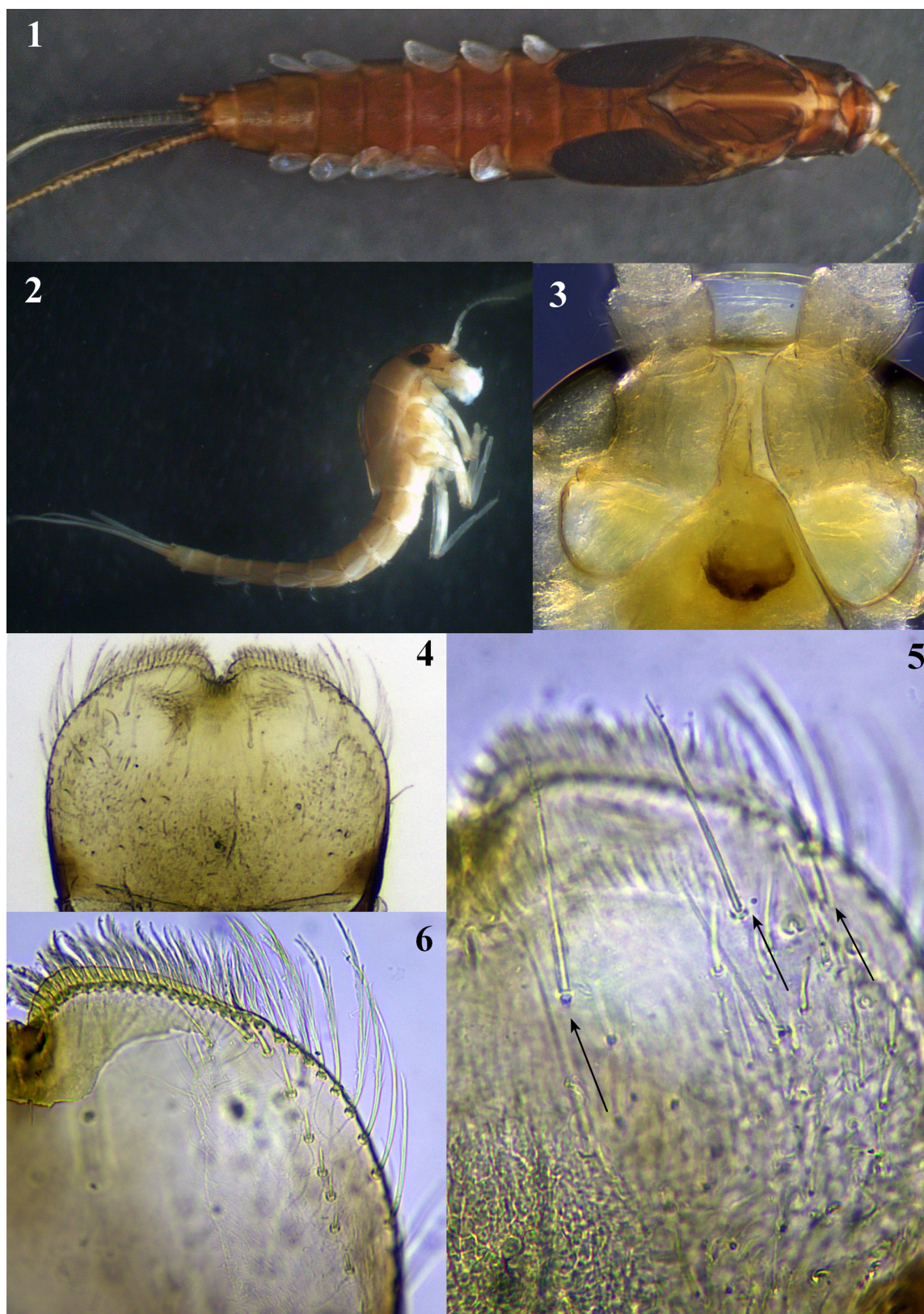
Description

Larva

MEASUREMENTS. Body length 4.1–4.3 mm; paracercus length 1.2–1.4 mm; cerci length 1.6–1.7 mm.

COLOURATION. General colouration reddish brown in mature larva and light brown in immature larva (Figs 1–2). Head dark brown. Prothorax and mesothorax dark brown laterally, and pale medially. Legs pale with brownish stripe at distal $\frac{2}{3}$ area of femora. Abdominal terga unicolor and light brown (Fig. 2). Abdominal sterna light brown. Cerci and paracercus light brown (Fig. 2).

HEAD. Antennae close to each other (Fig. 3). Labrum (Fig. 4): dorsal surface with submarginal arc consisting of central seta, and two lateral setae (Fig. 5). Ventral surface with eight to ten small, pointed



Figs 1–5. *Alainites neeru* sp. nov. 1. Holotype, ♀ (AMC), mature larva. 2–6. Paratype (AMC). 2. Immature larva. 3. Antenna. 4. Labrum. 5. Labrum, sub-marginal setae (arrows indicate 1+2 long, simple setae). 6. Setae of the ventral surface of the labrum.