

A new species of *Clypeocaenis* Soldán 1978 (Ephemeroptera: Caenidae) from Tamil Nadu, India

PANDIARAJAN SRINIVASAN^{1,4}, T. SIVARUBAN^{1*}, S. BARATHY², RAJASEKARAN ISACK^{1,5} & LUKE M. JACOBUS³

¹PG& Research department of Zoology, The American College, Madurai-625002, India.

²Department of Zoology, Fatima College, Madurai-625018, India.

³barathyurban@gmail.com; <https://orcid.org/0000-0002-9464-6464>

³Division of Science, Indiana University Purdue University Columbus, Columbus, Indiana, 47203, USA.

³lukemjacobus@alumni.purdue.edu; <https://orcid.org/0000-0002-7201-3922>

⁴srini15.05.1996@gmail.com; <https://orcid.org/0000-0001-8118-3256>

⁵iceisack143@gmail.com; <https://orcid.org/0000-0002-9952-4335>

*Corresponding author. sivaruban270@gmail.com; <https://orcid.org/0000-0001-8997-9355>

Abstract

Clypeocaenis malzacheri sp. nov. is described from the Kottakudi River in southern India, based on larvae and eggs. *Clypeocaenis malzacheri* sp. nov. appears to be closely related to *C. bisetosa* Soldán. The new species is distinguished from this species and other congeners based on the structure of the frons; the structure, setation, and maculation of legs; the shape and orientation of the abdominal tergum II projection; and by the shape and denticulation of abdominal sternum IX. Updated couplets for an identification key to *Clypeocaenis* larvae in the Indomalayan region are provided. The total number of *Clypeocaenis* species is thereby increased to twelve in the world and seven in India.

Key words: Clypeocaenini, new species, Western Ghats, Pannota, *Clypeocaenis malzacheri*

Introduction

The tribe Clypeocaenini (Ephemeroptera: Caenidae: Caeninae) currently is comprised of 10 genera (*Clypeocaenis* Soldán 1978; *Amercaenis* Provonsha & McCafferty 1985; *Barnardara* McCafferty & Provonsha 1995 (in Provonsha & McCafferty 1995); *Callistellina* Sun & McCafferty 2004 (= *Mccaffertya* Ozdikmen 2008 [see Jacobus & McCafferty 2009]); *Trichocaenis* Malzacher 2009; *Kalimaenis* Malzacher 2013; *Provonshara* Malzacher 2014; *Mandelara* Malzacher & Staniczek 2016; *Papuaenis* Malzacher & Staniczek 2016; and *Elatosara* Malzacher 2021). Three of these ten genera are found in the Indomalayan region: *Clypeocaenis*, *Elatosara*, and *Kalimaenis* (Malzacher 2021, Malzacher & Sangpradub 2021 (in Malzacher & Sangpradub 2021)). The genus *Clypeocaenis* and *Caenis*, in particular, has received considerable attention recently in India due to their biomonitoring potential (Muthukatturaja *et al.* 2020; Srinivasan *et al.* 2021; Balasubramanian & Muthukatturaja 2021). *Clypeocaenis* is recognizable by having distinct regular rows of setae on the foretibiae and tarsi, and a frons that is strongly protruded anteriorly and bears long setae (Kluge 2004; Malzacher & Staniczek 2016).

Eleven species have been documented from the Afrotropical, Indomalayan and Palearctic regions, combined (Balasubramanian & Muthukatturaja 2021), and six of these species have been previously known from the Indian subcontinent: *Clypeocaenis bisetosa* Soldán 1978; *C. multisetosa* Soldán 1978; *C. gayathri* Balasubramanian & Muthukatturaja 2020 (in Muthukatturaja *et al.* 2020); *C. sharadhae* Balasubramanian & Muthukatturaja 2020 (in Muthukatturaja *et al.* 2020); *C. kaveri* Balasubramanian & Muthukatturaja 2021; and *C. napoklu* Balasubramanian & Muthukatturaja 2021. From the 11 species, 4 species have larval and imaginal characters described (*C. oligosetosa*, *C. kaveri*, *C. napoklu*, and *C. sharadhae*), 2 species have larval and subimaginal characters from male mature larva (*C. bisetosa* and *C. soldani*), and 5 other species have only larval characters known (*C. multisetosa*, *C. afrosetosa*, *C. femorisetosa*, *C. umgeni*, and *C. gayathri*). Here, we describe an additional species of *Clypeocaenis* from the Western Ghats of southern India based on larvae and eggs.

Contribution to the knowledge of Teloganodidae (Ephemeroptera, Ephemerelloidea) of India

Alexander V. Martynov¹, T. Sivaruban², Dmitry M. Palatov³,
Pandiarajan Srinivasan², **S. Barathy⁴**, Rajasekaran Isack², Michel Sartori^{5,6}

1 National Museum of Natural History, National Academy of Sciences of Ukraine, Bohdan Khmelnytsky str., 15, 01030, Kyiv, Ukraine **2** PG & Research Department of Zoology, The American College, Madurai-625002, India **3** Independent researcher, Lviv, Ukraine **4** Department of Zoology, Fatima College, Madurai-625018, India **5** Musée cantonal de zoologie, Palais de Rumine, Place de la Riponne 6, 1014 Lausanne, Switzerland **6** Department of Ecology and Evolution, Biophore, University of Lausanne, 1015 Lausanne, Switzerland

Corresponding author: Alexander V. Martynov (centroptilum@gmail.com)

Academic editor: Ben Price | Received 17 April 2022 | Accepted 17 June 2022 | Published 18 July 2022

<https://zoobank.org/AF6603AD-BD03-47EE-AFD0-05459C3CCC9E>

Citation: Martynov AV, Sivaruban T, Palatov DM, Srinivasan P, Barathy S, Isack R, Sartori M (2022) Contribution to the knowledge of Teloganodidae (Ephemeroptera, Ephemerelloidea) of India. ZooKeys 1113: 167–197. <https://doi.org/10.3897/zookeys.1113.85448>

Abstract

Two new species of *Dudgeodes* Sartori, 2008 and a new species of *Teloganodes* Eaton, 1882 are described from India; they are *Dudgeodes selvakumari* Martynov & Palatov, **sp. nov.** from Himalayan region (Uttarakhand), *Dudgeodes molinerii* Sivaruban, Martynov, Srinivasan, Barathy & Isack, **sp. nov.**, and *Teloganodes barathyae* Sivaruban, Martynov, Srinivasan & Isack, **sp. nov.** from the Tamil Nadu part of the Western Ghats. Thus, for now, the Teloganodidae fauna of India includes 11 species. *Dudgeodes selvakumari* **sp. nov.** appears to be significantly extend northward the known distribution of *Dudgeodes*. Partial COI sequences were used as an initial clustering method to show the relationships of *D. selvakumari* **sp. nov.** with other sequenced operational taxonomic units (OTU) of the genus.

Keywords

COI, distribution, imago, larva, morphology, Pannota, Tamil Nadu, Uttarakhand