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A new species of *Stenopsyche*, with descriptions of larvae and females of some species associated by gene sequences (Insecta: Trichoptera)

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Abstract

Twenty-seven individuals of *Stenopsyche* from An-hui, Shan-xi and Si-chuan provinces, China, were examined and their DNA (mtCOI) sequences were extracted and analyzed. The larva, male, and female of a new species, *S. huangshanensis* sp. nov., associated by mtCOI gene sequences, are described and illustrated. Larvae and adult females of 3 known species, *S. angustata* Martynov 1930, *S. navasi* Ulmer 1926, and *S. tienmushanensis* Hwang 1957, were successfully associated with their identifiable males; the larvae and females of *S. navasi* and *S. tienmushanensis* were described and illustrated for the first time, and the larva and female of *S. angustata* were re-described and re-illustrated. DNA from identifiable males of *Stenopsyche lotus* Weaver 1987 was also sequenced, but the larva and female of this species remain unknown. An unknown larva, not associated with an identifiable adult, was described and illustrated as *Stenopsyche* sp. 1. All the sequences were uploaded to GenBank. All specimens are deposited in the Insect Collection of Nanjing Agricultural University, Nanjing.

Key words: DNA, larval-adult association, Stenopsychidae, China

Introduction

Stenopsyche is the largest genus of Stenopsychidae, with 93 extant species and 1 fossil species. They are distributed mainly in the Oriental and East Palearctic Biogeographic Regions, with only 1 species occurring in the Afrotropical Region (Marlier 1950; Holzenthal *et al.* 2007, 2011; Morse 2015). Compared to the abundant known species described mainly from male genitalia, only a few females and larvae are distinguishable.

Stenopsyche maxima Martynov 1926, *S. cinerea* Navás 1930, *S. tibetana* Navás 1932, *S. chagyaba* Tian 1985, and *S. huangi* Tian 1985 were originally described based on females. The females of *S. apiguna* Schmid 1969 and *S. kodaikanalensis* Swegman & Coffman 1980 were figured and described in detail with their males in the original descriptions. Ismail *et al.* (1993) described the female of *S. siamensis* Martynov 1931. Hoang & Bae (2007) distinguished females of 4 *Stenopsyche* species that occurred in Vietnam: *S. angustata* Martynov 1930, *S. dakpri* Hoang & Bae 2007, *S. siamensis*, and *S. ulmeri* Navás 1932. Females of *S. griseipennis* McLachlan 1866, *S. pallidipennis* Martynov 1926, and *S. khasia* Kimmins 1958 were illustrated and described by Kimmins, (1958); those of *S. variabilis* Kimanski 1992, *S. marmorata* Navás 1920, and *S. coreana* (Kuwayama 1930) by Kumanski (1992); and those of *S. marmorata* and *S. pallens* Nozaki, Arefina & Hayashi 2008 by Nozaki *et al.* (2008). Many other authors listed females as allotypes when publishing new species, but they did not provide useful diagnostic characteristics for identifying females. In summary, to date, females of a total of 18 *Stenopsyche* species have been described.

Stenopsyche larvae also have been poorly studied. Larvae of only 9 species of *Stenopsyche* have been described, including *S. marmorata* (as *Stenopsyche griseipennis* McLachlan 1866) and *S. bergeri* Martynov 1926 by Lepneva (1964); *S. siamensis* by Ismail *et al.* (1996); *S. schmidi* Weaver 1987, *S. marmorata*, and *S. sauteri* (Ulmer 1907) by Kawai & Tanida (2005); *S. angustata*, *S. dakpri*, *S. ulmeri*, and 2 unknown species by Hoang & Bae (2007); *S. marmorata* (as *S. griseipennis*) and *S. sauteri* by Kawai (1950); *S. ochripennis* Albarda 1881 by Ulmer (1957); *S. angustata* by Dudgeon (1996); and *S. marmorata*, *S. sauteri*, and *S. schmidi* by Nozaki & Shimura (2015).