



Description of three new species of *Neoperla* (Plecoptera: Perlidae) and a historical review of tropical Southeast Asian Perlidae

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Abstract

The stonefly family Perlidae has successfully invaded tropical Southeast Asian streams. In this paper, three new species of *Neoperla* Needham, *N. sungi*, **sp. nov.**, *N. tamdao*, **sp. nov.**, and *N. yentu*, **sp. nov.**, are described from tropical Vietnam with line drawings of key characters. A brief historical review of investigations and trends in tropical Southeast Asian Perlidae diversity, including a species checklist, is provided.

Key words: *Neoperla sungi*, *Neoperla tamdao*, *Neoperla yentu*, Perlidae, Plecoptera, new species, description, historical review, Vietnam, tropical Southeast Asia

Introduction

Plecoptera are known as a cold adapted group of aquatic insects, and the majority of the members of this group are found in streams of temperate regions. The Perlidae is the only family of stoneflies that has been highly successful invading tropical regions of peninsular and insular Southeast Asia, although a small number of species of other families, including Nemouridae, Leuctridae, and Peltoperlidae, are also present in tropical regions (Dudgeon 1999, Hoang & Bae 2006).

The widespread genus *Neoperla* Needham is the most species-rich genus of the Perlidae in the streams of tropical Southeast Asia (Sivec *et al.* 1988). The *Neoperla* adult is characterized by a projected lobe or raised process located on the 7th abdominal tergum, by patches of conical spinules at the 7th to 9th abdominal terga in males, and by poor development of the subgenital plate in females (Sivec *et al.* 1988). The *Neoperla* nymph has a body of medium size and can be distinguished from other genera of the tribe Neoperlini by the incomplete lateral fringe in the pronotum and by the bare occipital ridge (Sivec *et al.* 1988, Stewart & Stark 2002). The species concept of *Neoperla* has been well-established since Zwick (1983) and Sivec *et al.* (1988) described the structure of the aedeagus, the chorionic sculpturing of the eggs, and the external setation of the nymphs.

In the present work, we describe three new species of *Neoperla* found in mountain areas in tropical Vietnam and also provide a historical review of Southeast Asian Perlidae.

Material and methods

Adult materials were collected using a light trap or sweep net from stream sides of mountain areas throughout Vietnam. Nymphs were collected using a Surber net or a dipnet in the mountain streams. Last instar nymphs