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The black flies (Diptera: Simuliidae) from Thua Thien Hue and Lam Dong Provinces, Vietnam

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Abstract

Surveys of pupae and larvae of black flies (Diptera: Simuliidae) were carried out in Thua Thien Hue Province of central Vietnam, and Lam Dong Province of southern Vietnam in 2014. A total of 26 species belonging to the genus *Simulium* were collected, consisting of eight known species, one newly recorded species, and 17 new species (of which three species of the subgenus *Nevermannia* were described in 2014). The remaining 14 new species (nine of the subgenus *Gomphostilbia* and five of the subgenus *Simulium*) are described here based on females, males, pupae and mature larvae. The total number of species of black flies in Vietnam is now 46. Keys to identify all 26 species recorded from the two provinces of Vietnam are given for females, males, pupae and mature larvae.

Key words: black fly, *Simulium*, Vietnam, new species

Introduction

Black flies (Diptera: Simuliidae) are biting dipteran insects of medical and veterinary importance. In Vietnam, the black fly fauna has been poorly studied until recently. Only 16 species were recorded (Crosskey and Howard 1997; Pham 1998, 1999). In 2013, we carried out surveys of black flies in Tam Dao National Park, Vinh Phuc Province, northern Vietnam, and added 12 more species including five new species (Takaoka *et al.* 2014b, c). Of the 28 species, all in the genus *Simulium* Latreille, eight species are placed in the subgenus *Gomphostilbia* Enderlein, 19 species are in the subgenus *Simulium* Latreille, and one is in the subgenus *Nevermannia* Enderlein (Adler and Crosskey 2014; Takaoka *et al.* 2014b, c). Biting habits and other biological aspects of these species remain to be studied except for five species that were reported to be attracted to humans (Takaoka *et al.* 2014b).

In February and April 2014, we conducted surveys of pupae and larvae of black flies in seven streams in Bach Ma National Park and eight streams in other areas in Thua Thien Hue Province, one of the central provinces of Vietnam, and in 12 streams in Lam Dong Province, one of the southern provinces of Vietnam. We collected 26 species consisting of eight known species, one newly recorded species, and 17 new species, of which three new species of the *Simulium feuerborni* species-group of the subgenus *Nevermannia* were described previously (Takaoka *et al.* 2014d). The remaining 14 new species (nine of the subgenus *Gomphostilbia* and five of the subgenus *Simulium*) are described here based on females, males, pupae and mature larvae, bringing the total number of species of black flies in Vietnam to 46.

Keys to identify all the 26 species recorded from two provinces in Vietnam are given for females, males, pupae and mature larvae.

The methods of collection, description and illustration, and terms for morphological features used here, follow those of Takaoka (2003) and partially those of Adler *et al.* (2004). Adult black flies examined in this study were reared from pupae, and preserved in 80% ethanol together with their associated pupal exuviae and cocoons, and mature larvae were preserved in Carnoy's solution (one part glacial acetic acid and three parts 95% ethanol).

Holotypes and paratypes of the new species are deposited in Institute of Biological Sciences, Faculty of Science, University of Malaya, Kuala Lumpur, Malaysia.

Systematics

Genus *Simulium* Latreille

All 26 species recorded from Thua Thien Hue and Lam Dong Provinces are classified into three subgenera (*Gomphostilbia*, *Nevermannia* and *Simulium*) of the genus *Simulium*, the only black fly genus in the Oriental Region. Definitions of the genus *Simulium* and three subgenera follow those given by Takaoka (2003).

Keys to three subgenera of the genus *Simulium*

Females

1. Katepisternum haired *Gomphostilbia*
Katepisternum bare 2