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A PRELIMINARY NOTE ON THE SPECIES OF BLACK FLIES (DIPTERA: SIMULIIDAE) IN SARAWAK, MALAYSIA

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ABSTRACT

A total of 16 species of black flies (Diptera; Simuliidae) from Sarawak, Malaysia, including eight species recently found during the surveys in 2007 and 2008 are placed in three sub-genera of the genus *Simulium*. Brief notes for each species are providedon morphological characteristics, ecology and geographical distribution.

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Abstract

A total of 16 species of black flies (Diptera: Simuliidae) from Sarawak, Malaysia, including eight species recently found during the surveys in 2007 and 2008 are placed in three subgenera of the genus *Simulium*. Brief notes for each species are provided on morphological characteristics, ecology and geographical distribution.

INTRODUCTION

Black flies (Diptera: Simuliidae) are well known as one of the biting insects of medical and veterinary importance because females of certain species not only cause dermatoses like itching, rash and edema to men and cattle when they bite and take a blood meal but also play a role as vector of human and zoonotic onchocerciases. On the other hand, black flies also attract environmental ecologists as an ideal bio-indicator because their immature stages can breed only in clean running fresh waters (not in polluted or stagnant waters). It is also a research target for studies on biodiversity and phylogeny through analyses of larval salivary gland chromosomes and DNA sequences of certain genes.

The fauna of black flies is important as basic information to solve the problems or to promote the research mentioned above but it is poorly known in Sarawak, Malaysia. Only one species, *Simulium* (*Simulium*) *sabahense* Smart and Clifford, was recorded by Smart and Clifford (1969) before Takaoka (2001b) described two new species, *S.* (*Gomphostilbia*) *lehi* Takaoka and *S.* (*G.*) *sarawakense* Takaoka and recorded three known species, *S.* (*G.*) *sheilae* Takaoka and Davies, *S.* (*Nevermannia*) *aureohirtum* Brunetti and S. (*S.*) *laterale* Edwards. Recently, two more new species, *S.* (*S.*) *keningauense* Takaoka and *S.* (*S.*) *lunduense* Takaoka, were described (Takaoka, 2008a).

In 2007 and 2008 we carried out the faunistic surveys on larvae and pupae of black flies in many streams and rivers of four areas, Pueh, Borneo Highland, Bario and Ba Kelalan, in Sarawak in the framework of the Research Project "Study on taxonomy and bionomics of two winged flies, Diptera, in Sarawak, East Malaysia" by the Japanese team (Representative: Prof. I. Miyagi) in collaboration with Sarawak Museum (Representative: Dr. M.U. Leh), under the permission of Sarawak Forest Department. The pupae and larvae of black flies, which were attached to various substrates such as stones, dead leaves and trailing grasses in water, were collected from various types of clean running streams or rivers and the pupae were kept alive individually in plastic tubes until adults emerged. The emerged adults, their associated pupal exuviae and cocoons were preserved in small vials with 70% ethanol for later examination. The mature larvae collected were also preserved in vials with 70% ethanol.

In this preliminary note, all the 16 species so far recorded from Sarawak including four new species and one new record obtained from the survey in Bario (Takaoka, 2008b) and three new species found from Ba Kelalan and Pueh (Takaoka, 2009) are treated, and brief notes for each species are given on morphological characteristics, ecology and geographical distribution. The classification and definition of subgenera and species-groups follow Takaoka (2003).

Accounts of species of Simuliidae in Sarawak

Genus *Simulium* Latreille

Simulium is the largest genus of the family Simuliidae and is widely distributed throughout the world where running fresh waters are available. This is the only genus known from the Oriental Region. The adults are characterised by having the distinct calcipala and pedisulcus coupled with spinules and hairs on the costal vein.

Subgenus *Gomphostilbia* Enderlein

Gomphostilbia is one of the predominant subgenera in the Oriental Region. This subgenus is characterised in the adult female and male by the haired katepisternum, bare pleural membrane (except the *banauense* species-group), haired basal portion of the radial vein, in the pupa by the gill with eight filaments arranged in groups of 3+3+2 filaments from dorsal