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## ***Simulium ledangense*, a new species of the *Simulium feuerborni* species-group of the subgenus *Nevermannia* (Diptera: Simuliidae) from Mount Ledang, Peninsular Malaysia**

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### **Abstract**

*Simulium* (*Nevermannia*) *ledangense* sp. nov. is described from females, males, pupae and mature larvae from Peninsular Malaysia. This new species is assigned to the *Simulium feuerborni* species-group of the subgenus *Nevermannia*, and is characterized by the pupa having a very long stalk of the ventral paired gill filaments, which is almost five times longer than the interspiracular trunk and female tergites of segments 2 and 5 to 7 shiny. Taxonomic notes are given to distinguish this new species from three known species of the *S. feuerborni* species-group from Malaysia.

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

### **Introduction**

The *Simulium feuerborni* species-group within the subgenus *Nevermannia* Enderlain, redefined by Takaoka (2003), is a small homogenous group consisting of 29 described species (Adler & Crosskey 2014). The majority of species of this group are distributed in the Oriental Region and only 8 are known in eastern parts (China, Korea and Japan) of the Palearctic Region. In Peninsular Malaysia, this species-group is represented by only one species, *S. (N.) feuerborni* Edwards, 1934, which was originally described from Java (Edwards 1934) and later recorded from Peninsular Malaysia (Takaoka & Davies 1995), Thailand (Kuvangkadilok et al. 1999) and Sumatra (Takaoka et al. 2000).

Biting habits of the *S. feuerborni* species-group as well as other ecological aspects remain unstudied in Malaysia as in most parts of the Oriental Region.

Recently, we collected another species of the *S. feuerborni* species-group in Peninsular Malaysia, which is easily distinguished from all known species by the arrangement of the pupal gill filaments. In this paper, we describe this species as new to science based on females, males, pupae and mature larvae.

The terms and identification for morphological features used here follow those of Takaoka (2003). Holotype and paratype specimens of the new species will be deposited in the Institute of Biological Sciences, Faculty of Science, University of Malaya, Kuala Lumpur, Malaysia

### ***Simulium* (*Nevermannia*) *ledangense* Ya'cob, Takaoka & Sofian-Azirun sp. nov.**

**Female (n = 3).** Body length 2.1 to 2.5 mm. **Head.** Slightly narrower than thorax. Frons dark brown, thinly grey pruinose, densely covered with yellow hairs and several dark longer hairs along each lateral margin. Frontal ratio 1.81–1.90:1.00:2.75–2.96. Frons:head ratio 1.00:4.76–4.79. Clypeus dark brown, whitish-grey pruinose and covered with whitish-yellow hairs and several dark longer hairs on lower half and bare in middle. Labrum 0.84–1.00 times length of clypeus. Antenna composed of scape, pedicel and 9 flagellomeres, dark brown except scape, pedicel and base of first flagellomere yellow; first flagellomere 2.50–2.62 times length of second

*Simulium (N.) feuerborni*, the only known species of the *S. feuerborni* species-group in Peninsular Malaysia, is distinguished from *S. (N.) ledangense* by having the cocoon with an anterodorsal projection and the ventral paired gill filaments with a short stalk. In Sabah, *S. (N.) fuscineris* Edwards, 1933, which was described from a male (Edwards 1933), differs from the new species by having the reduced number of large eye facets, i.e., ca 12 vertical columns and 12–14 horizontal rows, and paramere with 10 hooks; another Sabah species, *S. (N.) borneoense* Takaoka, 2001, differs by having four pupal gill filaments in place of six gill filaments.

The simple cocoon and the long stalk of the ventral pair of filaments separate *S. (N.) ledangense* **sp. nov.** from all other known species of the *feuerborni* species-group, of which the pupa is known.

## Keys to separate four Malaysian species of the *Simulium feuerborni* species-group

### Female\*

1. Number of minute spines on middle of cibarium 42–44. . . . . *S. ledangense*
- Number of minute spines on middle of cibarium 22. . . . . *S. feuerborni*

\*Female of *S. borneoense* and *S. fuscineris* are unknown.

### Male

1. Upper-eye large facets in 15 vertical columns and 17 horizontal rows . . . . . *S. borneoense*
- Upper-eye large facets in 12–14 vertical columns and 12–15 horizontal rows . . . . . 2
2. Paramere with 10 hooks . . . . . *S. fuscineris*
- Paramere with 4–6 hooks . . . . . 3
3. Paramere with 4 hooks . . . . . *S. feuerborni*
- Paramere with 5 or 6 hooks. . . . . *S. ledangense*

### Pupa\*

1. Gill with 4 filaments . . . . . *S. borneoense*
- Gill with 6 filaments . . . . . 2
2. Cocoon with anterodorsal projection . . . . . *S. feuerborni*
- Cocoon without anterodorsal projection . . . . . *S. ledangense*

\*Pupa of *S. fuscineris* is unknown.

### Mature larva\*

1. Pharate gill with 5 filaments . . . . . *S. borneoense*
- Pharate gill with 6 filaments . . . . . 2
2. Stalk of ventral paired of pharate gill filaments very long, about half of total length of filaments . . . . . *S. ledangense*
- Stalk of ventral paired of pharate gill filaments short, as long as or shorter than common basal stalk . . . . . *S. feuerborni*

\*Larva of *S. fuscineris* is unknown.

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