A new species of *Simulium* (*Simulium*) (Diptera: Simuliidae) from Genting Highlands, Malaysia

Zubaidah Ya'cobab,⁎, Hiroyuki Takaokac, Van Lun Lowa, Mohd Sofian-Azirunb

a Tropical Infectious Diseases Research and Education Centre (TIDREC), University of Malaya, Kuala Lumpur, 50603, Malaysia
b Institute of Biological Sciences, Faculty of Science, University of Malaya, Kuala Lumpur, 50603, Malaysia

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ABSTRACT

*Simulium* (*Simulium*) rasuli sp. nov. is described from two females collected by a Malaise trap in Genting Highlands, Peninsular Malaysia. This new species is placed in the *Simulium christophersi* species-group of the subgenus *Simulium*. The female of this new species is characterized by the scutum with three longitudinal vittae, dark legs, claw with a small subbasal tooth, and ovipositor valve triangular with its inner margin nearly straight. This new species is distinguished in the female from all the six named species of the species-group by the entirely brownish-black femora and tibiae.

1. Introduction

The black fly fauna of Peninsular Malaysia is composed of 61 species (58 named and 3 unnamed), all of which are classified in four subgenera of the genus *Simulium* Latreille: one sp. in *Daviesellum* Takaoka & Adler, 36 spp. in *Gomphostilbia* Enderlein, five spp. in *Nevermannia* Enderlein, and 19 spp. in *Simulium* Latreille (Adler and Crosskey, 2017).

The subgenus *Simulium* is the second largest and is rich in phylogenetic lineages, represented by nine species-groups: one sp. in the *S. argentipes* species-group, four spp. in the *S. griseifrons* species-group, three spp. in *S. multiserialum* species-group, one sp. in *S. melanocephalus* species-group, two spp. in *S. striatum* species-group, one sp. in *S. variegatum* species-group, two spp. in *S. christophersi* species-group, four spp. in *S. tuberosum* species-group and one sp. in *S. nobile* species-group (Adler and Crosskey, 2017). Human biting habits are known for two species, *S. (S.) digrammicum* Edwards of the *S. griseifrons* species-group and *S. (S.) fuscipilosum* Edwards of the *S. christophersi* species-group (Takaoka and Davies, 1995).

Recently, we collected two female adult black flies by a Malaise trap in Genting Highlands, Peninsular Malaysia. They are assigned to the *S. christophersi* species-group, redefined by Takaoka (2017), by having the scutum with three longitudinal vittae, claw with a small subbasal tooth, and ovipositor valve triangular with an inner margin nearly straight.

We describe a new species based on these females. Taxonomic notes are provided to separate this new species from six species of the *S. christophersi* species-group (Takaoka, 2017).

2. Material and methods

2.1. New species collection, description and illustration

The methods of collection, description and illustration, as well as terms for morphological features used here, follow those of Takaoka (2003). The type specimens are deposited at the Institute of Biological Sciences, Faculty of Science, University of Malaya, Kuala Lumpur, Malaysia.

3. Results

3.1. Morpho-taxonomic description

3.1.1. *Simulium* (*Simulium*) rasuli Takaoka, Ya’cob and Sofian-Azirun sp. nov.

**Female** Body length 2.8–3.0 mm. **Head** Slightly narrower than thorax. Frons brownish black, shiny, with several dark stout hairs along lateral margins; frontal ratio 1.3:1.0:1.2; frons/head ratio 1.0:3.4:4.2. Pronto-ocular area well developed, short, directed laterally, and round or pointed apically. Clypeus brownish black, thinly white pruinose, shiny, moderately covered with dark brown medium-long hairs except mediolongitudinal portion widely bare. Labrum 0.83 times length of clypeus. Antenna composed of scape, pedicel and nine flagellomeres, dark brown except scape light to medium brown and base of first flagellomere yellow (though base of first flagellomere light brown in a paratype female). Maxillary palp with five segments, medium brown except third segment dark brown; proportional lengths of third, fourth,
and fifth segments 1.0:1.0:1.9; third segment (Fig. 1A) of normal size, with small ellipsoidal sensory vesicle (0.20–0.24 times length of third segment) having medium-sized opening. Maxillary lacinia with 12–14 inner and 15 outer teeth. Mandible with 31 inner and 14 outer teeth. Cibarium (Fig. 1B) with 92–96 minute processes near posterodorsal margin. Thorax. Scutum brownish black to black, shiny, densely covered with brassy recumbent short hairs interspersed with several dark-brown long upright hairs on prescutellar area; when illuminated in front and viewed dorsally, scutum white pruinose, faintly with three longitudinal nonpruinose vittae (one narrow median vitta, two somewhat wider submedian vittae). Scutellum brownish black, covered with dark-brown upright long hairs and dark short hairs. Postnotum brownish black, bare. Pleural membrane bare. Katepisternum brownish black, longer than height (when viewed laterally), bare. Legs. Foreleg:
coxa light brown except inner surface yellow; trochanter and femur brownish black; tibia dark brown with outer surface widely yellow mediially; tarsus brownish black, with moderate dorsal hair crest; basitarsus greatly dilated, 5.9–6.5 times as long as its greatest width. Midleg: brownish black except basal tip of tibia yellow, subbasal area of tibia light brown and basal one-fourth of basitarsus dark yellow. Hind leg: coxa brownish black; trochanter dark yellow; femur brownish black; tibia dark brown to brownish black except basal tip yellow and subbasal area dark yellow to light brown (subbasal area dark brown in a paratype female); tarsus dark brown except basal half or little more of basitarsus, and basal half of second tarsomere yellowish white; basitarsus (Fig. 1C) nearly parallel-sided, 5.4–6.0 times as long as wide, and 0.8 and 0.6–0.7 times as wide as greatest widths of hind tibia and femur, respectively; calcipala (Fig. 1C) moderately developed, nearly as long as wide, and 0.4 times as wide as greatest width of basitarsus; pedisculus (Fig. 1C) well developed at basal one-third of second tarsomere. Tarsal claw (Fig. 1D) with subbasal tooth and several minute setae on its base. Wing. Length 2.4–2.6 mm. Costa with dark spinules and hairs; subcosta haired except near apex bare; basal section of radial vein bare; R₁ with dark-brown spinules and hairs; R₂ with dark-brown hairs; hair tuft on stem vein dark-brown; basal cell absent. Abdomen. Basal scale dark brown, with fringe of light-brown hairs. Dorsal surface of abdomen medium to dark brown, with light to dark-brown short hairs; ventral surface not pigmented narrowly along medial margins nearly straight or slightly sinuous, somewhat separated from each other. Genital fork (Fig. 1F) of inverted-Y form, with narrow well sclerotized stem; arms of moderate width, each with distinct projection directed anterodorsally. Paraproct in ventral view (Fig. 1G) nearly triangular, with ventral surface not pigmented narrowly along medial margin and bare on its anterior half, with 34–37 pale and dark short to medium-long hairs on lateral and ventral surfaces, and with 7–11 short sensilla on anteromedial surface; paraproct in lateral view (Fig. 1H) 0.74 times as long as wide, and much protruding ventrally beyond ventral margin of cercus. Cercus in lateral view (Fig. 1H) short, 0.48 times as long as wide, with numerous medium-long hairs, and rounded posteriorly. Spermatheca (Fig. 1I) nearly ovoid or ellipsoidal, 1.2 times as long as greatest width, well sclerotized except portion of junction with duct un sclerotized, with many fissures irregularly on its outer surface; internal setae present; accessory ducts subequal in thickness to each other, and slightly thicker than major duct. 

3.1.2. Male, pupa and mature larva

The status is unknown.

3.1.3. Type materials

HOLOTYPE: Female (preserved in 80% ethanol), collected by Malaise trap from Ulu Kali (altitude 1720 m, 3°25′54.9″N 101°47′05.4″E), Genting Highlands, Bentong Province, Peninsular Malaysia, 20-IV-2017, by Z. Ya’cob. PARATYPE: One female, same as those of the holotype except the date 22-VII-2017.

3.1.4. Etymology

The species name rasuli is in honor of Muhammad Rasul Abdullah Halim, a PhD candidate in University of Science Malaysia (USM), Malaysia, who helped our field surveys.

4. Discussion

Simulium (S.) rasuli sp. nov. is assigned to the S. christophersi species-group, defined by Takaoka et al. (2014) and redefined by Takaoka (2017), by having the scutum with three longitudinal vittae, claw with a small subbasal tooth (Fig. 1D), ovipositor valve triangular with its inner margin nearly straight, covered with many short to medium-long hairs (Fig. 1E). Among the six member species of this group, this new species is similar to S. (S.) fusciplumosum from Peninsular Malaysia (Edwards, 1928; Takaoka and Davies, 1995) by having the female femora almost entirely darkened, but is distinguished from the latter by the color of the mid and hind tibiae (entirely darkened except the basal tip of the hind tibia yellow in this new species but basal half of the mid and hind tibiae yellow in S. (S.) fusciplumosum). The darkened fore coxa of the female of this new species separates it from all five other species of the group: S. (S.) acontum Chen, Zhang & Huang, from Sichuan, China (Chen et al., 2005), S. (S.) atiporna Sakaoka, Srisuks & Choochoo from Thailand (Takaoka et al., 2014), S. (S.) christophersi Puri and S. (S.) howletti Puri, both from India (Puri, 1932a,b), and S. (S.) triangustum An, Guo & Xu from Tibet (An et al., 1995), all of which have yellow fore coxae.

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References


