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Simulium (*Gomphostilbia*) *sofiani*, a new species of black fly (Diptera: Simuliidae) from peninsular Malaysia

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Abstract. *Simulium* (*Gomphostilbia*) *sofiani* sp. nov. is described on the basis of reared adult female, male, pupal and larval specimens collected from Cameron Highlands, Pahang state, Malaysia. This new species is placed in the *ceylonicum* species-group within the subgenus *Gomphostilbia* and is easily distinguished from all the related known species by the combination of the following characteristics: an elongate sensory vesicle and yellow hair tuft on the stem vein of the wing in the female, the greater number of large upper-eye facets (15 or 16 vertical columns and 15 or 16 horizontal rows) and almost entirely darkened hind basitarsus in the male, and the gill bearing a long common basal stalk and 8 filaments arranged as [(1+2)+ (1+2)] +2 filaments from dorsal to ventral in the pupa.

INTRODUCTION

Black flies (Diptera: Simuliidae) are one of the most important groups among the blood-sucking insects. The blood-sucking habits of female black flies are responsible for considerable deleterious effects on humans and their economic welfare. Reduction of tourism, death of domesticated birds and mammals and transmission of viral, protozoan and filarial diseases are medical and socioeconomic impacts associated with black flies (Adler *et al*., 2004). Until now, these effects of black flies to humans in peninsular Malaysia have remained unknown but are expected to be investigated in the near future on the basis of a reliable identification key for the adult females as well as accurate information of the fauna of black flies.

The fauna of black flies in peninsular Malaysia is represented by 36 named and 3 unnamed species, which are all classified in the genus *Simulium* Latreille s. l. and are further placed in four subgenera: 1species in *Daviesellum* Takaoka and Adler, 17 species (16 named and 1 unnamed) in *Gomphostilbia* Enderlein, 4 species in *Nevermannia* Enderlein and 17 species (15 named and 2 unnamed) in *Simulium* Latreille s. str. (Crosskey, 1973; Edwards, 1928; Takaoka, 2000, 2008; Takaoka & Adler, 1997; Takaoka & Davies, 1995, 1997; Takaoka *et al*., 2010).

In recent surveys of pupae and larvae of black flies in Cameron Highlands, Pahang Darul Makmur, Peninsular Malaysia, we collected a new species placed in the *ceylonicum* species-group of the subgenus *Gomphostilbia*, which includes one important vector species of a filarial parasite of animals in northern Thailand, i.e., *Simulium* (*Gomphostilbia*) *asakoae* Takaoka & Davies, 1995, originally described from peninsular Malaysia (Ishii *et al*., 2008). This new species is easily distinguished from all the known species of this species-group including four species described from peninsular Malaysia [i.e., *Simulium* (*Gomphostilbia*) *asakoae*, *Simulium* (*Gomphostilbia*) *hoiseni* Takaoka, 2008,

Simulium (*Gomphostilbia*) *longitruncum* Takaoka & Davies, 1995 and *S.* (*G.*) *sheilae* Takaoka & Davies, 1995] by several morphological characteristics, in particular, the greater number of the male upper-eye facets and the arrangement of the eight pupal gill filaments arising from a long common basal stalk.

This new species is described here on the basis of one female and three males which emerged from pupae, together with their pupal exuviae and cocoons, one male pupal exuviae and three mature larvae, all preserved in 80% ethanol.

The methods of collections, descriptions and illustrations as well as terms for morphological features used here follow those of Takaoka (2003).

The holotype and paratypes will be deposited at the Institute of Biological Sciences, Faculty of Science, University of Malaya, Kuala Lumpur, Malaysia.

***Simulium* (*Gomphostilbia*) *sofiani* Takaoka & Hashim sp. nov.**

DESCRIPTION. **Female**. Body length 1.9 mm. ***Head***. Slightly narrower than width of thorax. Frons dark brown, slightly shiny when illuminated at certain angle of light, densely covered with whitish-yellow scale-like recumbent short hairs interspersed with few dark simple longer hairs along each lateral margin; frontal ratio 1.76:1.00:2.27; frons-head ratio 1.00: 4.36. Fronto-ocular area well developed, narrow, directed dorsolaterally. Clypeus medium to dark brown, slightly shiny when illuminated at certain angle of light, densely covered with yellow hairs interspersed with several dark longer hairs on each side. Labrum 0.60 times as long as clypeus. Antenna composed of scape, pedicel and 9 flagellomeres, dark brown except scape, pedicel, and base of 1st flagellomere whitish-yellow. Maxillary palp composed of 5 segments, light to medium brown, proportional lengths of 3rd, 4th, and 5th segments 1.00: 1.00: 2.05; 3rd segment (Fig. 1A) somewhat swollen; sensory vesicle (Fig. 1A) elongate (0.62 times as long as 3rd segment), with medium-sized opening. Maxillary lacinia with 15 inner and 15 outer teeth. Mandible with 26 inner teeth and 4 outer teeth at some distance from apex. Cibarium (Fig. 1B) medially forming sclerotized plate folded forward from posterior margin, with moderately sclerotized medial longitudinal ridge. ***Thorax***. Scutum dark brown to brownish-black, shiny when illuminated at certain angle of light, densely covered with yellow scale-like recumbent hairs. Scutellum medium brown, shiny when illuminated at certain angle of light, covered with yellow short hairs and dark brown long upright hairs along posterior margin. Postnotum dark brown, shiny when illuminated at certain angle of light, and bare. Pleural membrane bare. Katepisternum dark brown, longer than deep, shiny when illuminated at certain angle of light, moderately covered with fine short hairs. ***Legs***. Foreleg: coxa yellow though anterior surface somewhat darkened; trochanter light brown except base whitish-yellow; femur light brown (though somewhat darkened toward apex, with apical cap dark brown; tibia white except apical 1/4 dark brown, with whitish sheen on outer surface of basal 3/4; tarsus brownish-black, with moderate dorsal hair crest; basitarsus moderately dilated, 5.85 times as long as its greatest width. Midleg: coxa medium brown except posterior surface brownish-black; trochanter light brown except base yellow; femur light to medium brown with base somewhat yellowish; tibia medium to dark brown with basal 1/3 whitish-yellow, covered with whitish fine hairs on little more than basal 1/2 and white sheen on posterior surface of basal 3/4 when illuminated at certain angle of light; tarsus medium to dark brown except basal 1/2 of basitarsus light brown. Hind leg: coxa light to medium brown; trochanter yellow; femur medium brown with base yellow and apical cap dark brown; tibia (Fig. 1C) light to dark brown with basal 1/2 yellowish-white, covered with whitish fine hairs on outer and posterior surface of basal 3/4 and white sheen on posterior surface of basal 3/4 when illuminated at certain angle of light; tarsus medium brown except basal 2/3 of basitarsus (though base medium brown) and basal 1/2 of 2nd tarsomere white; basitarsus (Fig. 1D) narrow, nearly parallel-sided, 6.75 times as long as wide, and 0.59

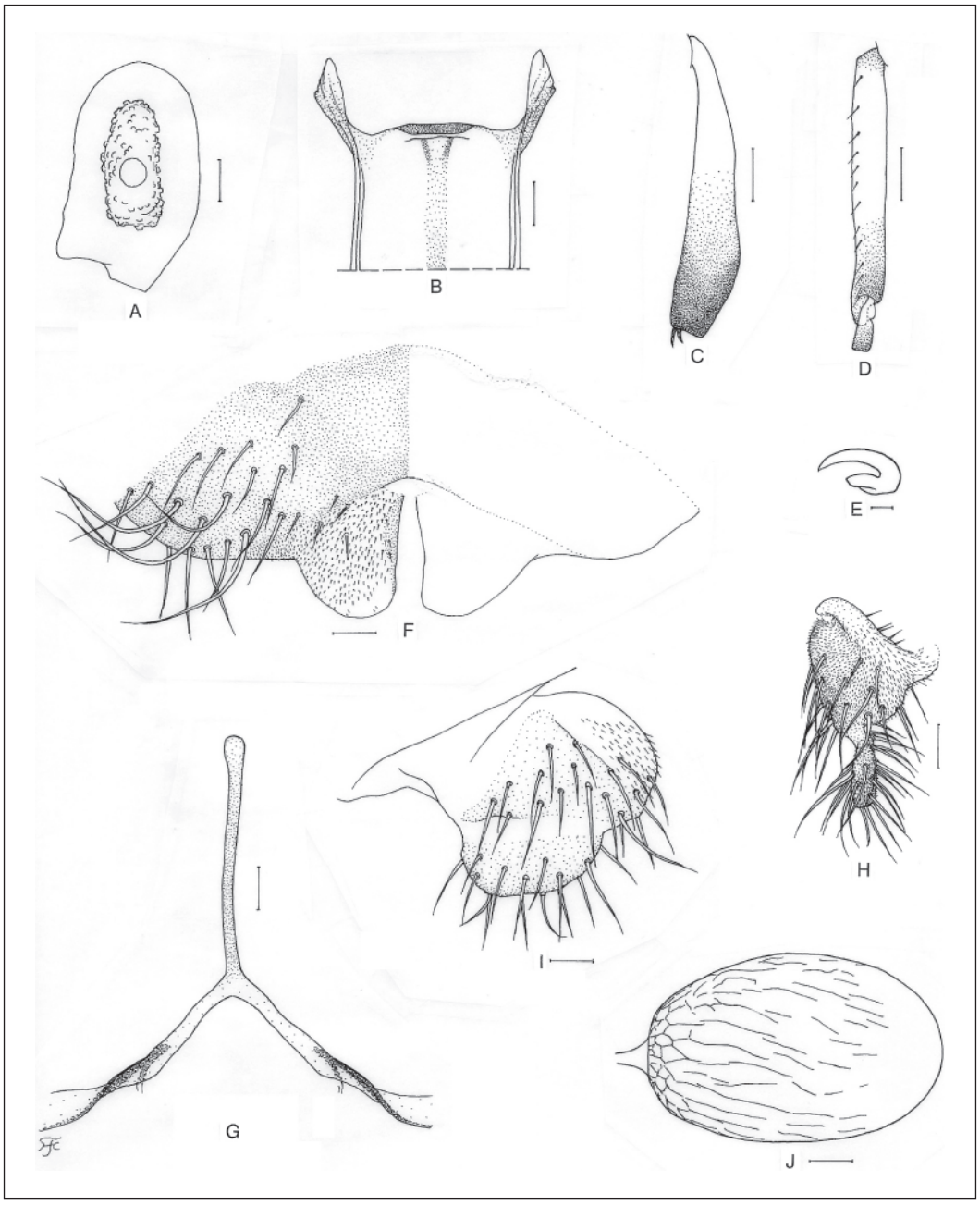

Figure 1. Female of *Simulium* (*Gomphostilbia*) *sofiani* sp. nov. A, 3rd segment of left maxillary palp with sensory vesicle (front view); B, cibarium (front view); C, left hind tibia (outer view); D, basitarsus and 2nd tarsomere of left hind leg showing calcipala and pedisulcus (outer view); E, claw (lateral view); F, sternite 8 and ovipositor valves (ventral view); G, genital fork (ventral view); H & I, right paraprocts and cerci (H, ventral view; I, lateral view); J, spermatheca (lateral view). Scale bars. 0.1 mm for C and D; 0.02 mm for A, B and F–J; 0.01 mm for E

and 0.55 times as wide as greatest width of tibia and femur, respectively; calcipala (Fig. 1D) nearly as long as wide, and 0.60 times as wide as greatest width of basitarsus. Pedisulcus (Fig. 1D) well defined. Claw (Fig. 1E) with large basal tooth 0.53 times as long as claw. ***Wing***. Length 1.9 mm. Costa with dark spinules and hairs except hairs on basal

portion yellow. Subcosta with dark hairs except little less than apical 1/2 bare or with 1 hair. Hair tuft on stem vein whitish-yellow. Basal portion of radius fully haired; R_1 with dark spinules and hairs; R_2 with hairs only. Basal cell absent. ***Halter***. White except basal stem darkened. ***Abdomen***. Basal scale light brown, with fringe of whitish-yellow hairs. Dorsal surface of abdomen dark brown except segment 2 grayish-yellow though tergal plate light brown and narrow area along posterior margin somewhat darkened, moderately covered with dark short to long hairs; tergites of segments 6–9 shiny when illuminated at certain angle of light. Ventral surface of segment 2 entirely whitish-yellow, and those of other segments light to medium brown; sternal plate on segment 7 undeveloped. ***Genitalia***. Sternite 8 (Fig. 1F) bare medially, with 20 or 21 medium-long to very long hairs together with few slender short hairs on each side. Ovipositor valves (Fig. 1F) tongue-like, thin, membranous, moderately covered with microsetae interspersed with 1–3 short hairs; inner margins straight or very slightly concave, somewhat sclerotized, and moderately separated from each other. Genital fork (Fig. 1G) of usual inverted-Y form, with slender stem; arms of moderate width and moderately folded medially. Paraproct in ventral view (Fig. 1H) nearly triangular, with 6 or 7 sensilla on anteromedial surface; paraproct in lateral view (Fig. 1I) somewhat produced ventrally, 0.67 times as long as wide, with 18–20 medium-long to long hairs on ventral and lateral surfaces. Cercus in lateral view (Fig. 1I) short, rounded posteriorly, 0.57 times as long as wide. Spermatheca (Fig. 1J) ellipsoidal, 1.56 times as long as its greatest width, well sclerotized except duct and small area near juncture with duct unsclerotized, and with many fissures on surface; internal setae absent; both accessory ducts slender, subequal in diameter to major one.

Male. Body length 2.0 mm. ***Head***. Wider than thorax. Upper eye dark brown, consisting of 15 or 16 vertical columns and 15 or 16 horizontal rows of large facets. Face dark brown, grayish-white pruinose. Clypeus dark brown, whitish pruinose, densely covered with golden yellow scale-like medium-long hairs (mostly directed upward) interspersed with several dark brown simple longer hairs. Antenna composed of scape, pedicel and 9 flagellomeres, dark brown except scape and pedicel light brown and base of 1st flagellomere yellow; 1st flagellomere elongate, 1.70 times as long as 2nd one. Maxillary palp light to medium brown, with 5 segments, proportional lengths of 3rd, 4th, and 5th segments 1.00: 1.29:3.00; 3rd segment (Fig. 2A) widened apically; sensory vesicle (Fig. 2A) globular, small (0.15 times as long as 3rd segment), and with very small opening. ***Thorax***. Scutum dark brown to black, shiny and thinly grayish-white pruinose on each shoulder, broadly along each lateral margin and on prescutellar area when illuminated at certain angle of light; scutum densely covered with golden-yellow recumbent short hairs. Scutellum dark brown, with golden-yellow short hairs and dark brown long upright hairs along posterior margin. Postnotum dark brown and bare. Pleural membrane bare. Katepisternum dark brown, moderately covered with fine hairs. ***Legs***. Foreleg: coxa dark yellow except apex light yellow; trochanter light brown except base yellow; femur light brown with apical cap medium brown; tibia light brown with apical 1/4 medium brown and basal 3/4 of outer surface widely whitish; tarsus brownish-black; basitarsus moderately dilated, 6.96 times as long as its greatest width. Midleg: coxa medium brown except posterior surface brownish-black; trochanter light brown except basal 1/2 yellow; femur light brown; tibia medium brown except basal 1/4 whitish to yellowish-white; tarsus medium to dark brown except basal 1/3 of basitarsus light brown (though border not well defined). Hind leg: coxa medium brown; trochanter yellow; femur medium brown with base yellow and apical cap dark brown; tibia (Fig. 2B) dark brown to brownish-black except little less than basal 1/2 yellow; tarsus (Fig. 2C) medium to dark brown except basal 1/2 of basitarsus and little less than basal 1/2 of 2nd tarsomere grayish-white; basitarsus (Fig. 2C) enlarged, spindle-shaped, 4.29 times as long as wide, and 0.81 and 0.87 times as wide as greatest width of tibia and femur, respectively; calcipala (Fig. 2C) nearly as

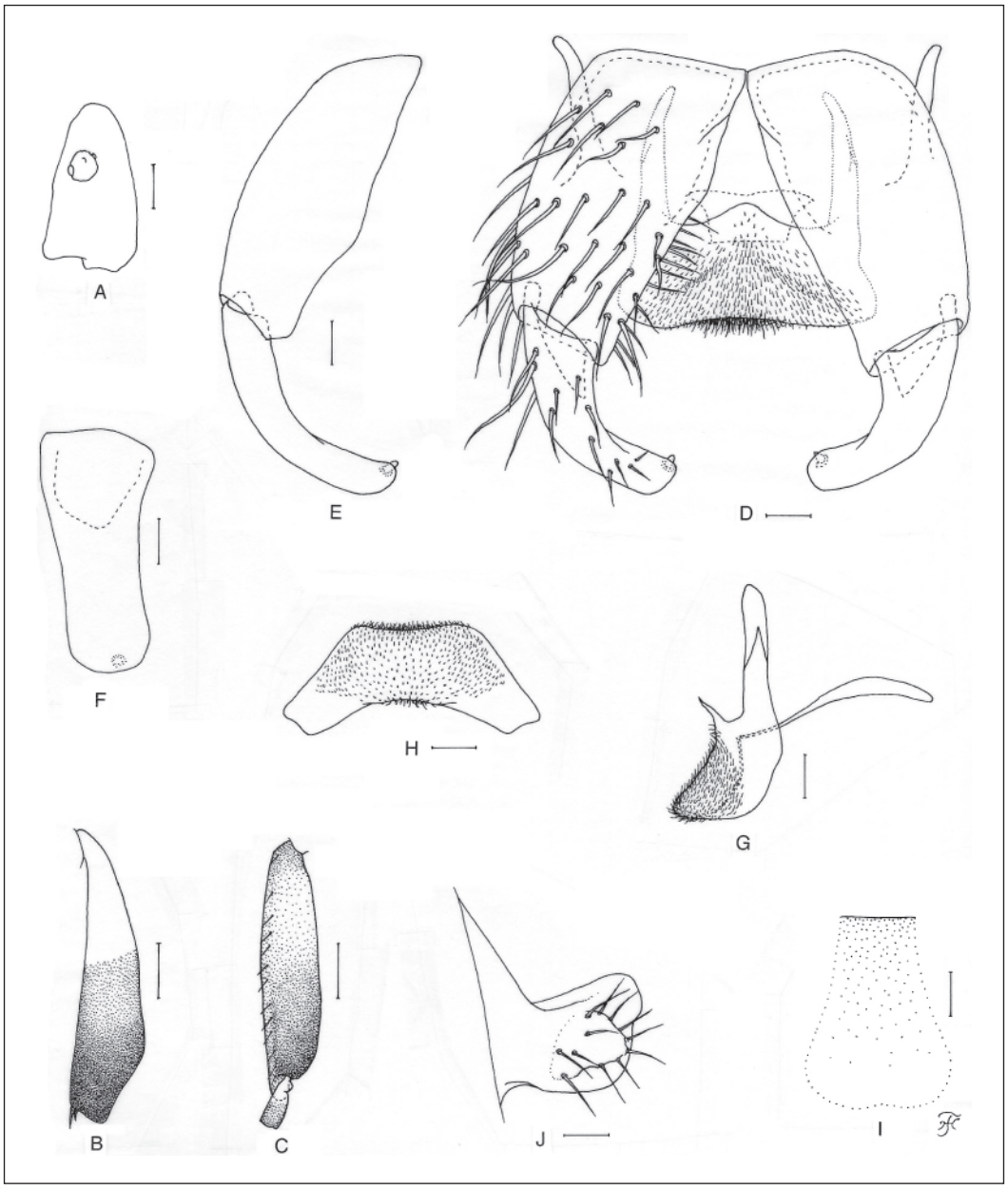

Figure 2. Male of *Simulium* (*Gomphostilbia*) *sofiani* sp. nov. A, 3rd segment of left maxillary palp with sensory vesicle (front view); B, left hind tibia (outer view); C, basitarsus and 2nd tarsomere of left hind leg showing calcipala and pedisulcus (outer view); D, coxites, styles, ventral plate and median sclerite (ventral view); E, right coxite and style (medial view); F, right style (ventrolateral view); G, ventral plate and median sclerite (lateral view); H, ventral plate (caudal view); I, median sclerite (caudal view); J, 10th abdominal segment and right cercus (lateral view). Scale bars. 0.1 mm for B and C; 0.02 mm for A and D–J

long as wide, and 0.37 times as wide as greatest width of basitarsus. Pedisulcus (Fig. 2C) well defined. ***Wing***. Length 1.6 mm. Costa with dark brown spinules as well as dark brown hairs except basal portion with patch of yellowish hairs. Subcosta bare. Hair tuft on stem vein yellow. Basal portion of radius fully haired; R_1 with dark spinules and hairs; R_2 with hairs only. Basal cell absent. ***Halter***. Grayish-white except basal stem darkened.

Abdomen. Basal scale dark brown, with fringe of light to medium brown hairs. Dorsal surface of abdomen medium brown to brownish-black except segment 2 light brown, covered with dark brown short to long hairs; segments 2 and 5–8 each with pair of shiny dorsolateral or lateral patches, of which those on segments 6 and 7 are most distinctive and those on other segments not so distinctive; ventral surface of segment 2 white, those of other segments medium to dark brown. ***Genitalia***. Coxite in ventral view (Fig. 2D) nearly rectangular, 1.94 times as long as its greatest width; coxite in medial view (Fig. 2E) 2.57 times as long as its greatest width. Style in ventral view (Fig. 1D) bent inward, slightly tapered from base toward middle, then nearly parallel-sided, rounded apically and with apical spine; style in medial view (Fig. 2E) shorter than coxite (0.75 times as long as coxite), gently bent inward, nearly parallel-sided, with apical spine; style in ventrolateral view (Fig. 2F) moderately tapered toward middle, then nearly parallel-sided, with rounded apex. Ventral plate in ventral view (Fig. 2D) with body transverse, 0.46 times as long as wide, widened posteriorly, with anterior margin produced anteromedially, and posterior margin slightly concave medially, densely covered with microsetae on ventral surface; basal arms of moderate length, directed forward, then slightly convergent apically; ventral plate in lateral view (Fig. 2G) moderately produced ventrally; ventral plate in end view (Fig. 2H) trapezoidal, densely covered with microsetae on posterior surface except portion near each lateral tip somewhat widely bare. Median sclerite (Fig. 2G,I) thin, plate-like, wide. Paramere of moderate size, each with 3 distinct long and stout hooks and several smaller ones. Aedeagal membrane moderately setose, slightly sclerotized at base but dorsal plate not well defined. Ventral surface of abdominal segment 10 without distinct hairs near posterior margin. Cercus in lateral view (Fig. 2J) small, rounded, with 12–15 hairs.

Pupa. Body length 2.2–2.4 mm. ***Head***. Integument light yellow, very sparsely covered with small round tubercles on frons but almost bare on rest of head (though sparsely to moderately covered with tubercles on frons and each lateral surface in male pupal exuviae); antennal sheath without any protuberances; face with pair of simple very long trichomes with coiled or uncoiled apices, and frons with 3 pairs of simple very long trichomes with coiled or uncoiled apices; 3 frontal trichomes on each side arising close together, subequal in length to one another and slightly longer than facial one. ***Thorax***. Integument yellow, very sparsely (sparsely to moderately in 4 male pupal exuviae) covered with round tubercles, with 3 simple very long dorsomedial trichomes with coiled or uncoiled apices, 2 simple anterolateral trichomes (1 very long with coiled apex, 1 long with uncoiled apex), 1 simple medium-long posterolateral trichome with uncoiled apex, and 3 simple ventrolateral trichomes with uncoiled apices (1 medium-long and 2 short) on each side. Gill (Fig. 3A–C) composed of 8 slender thread-like filaments, longer than pupal body, arranged in [(1+2)+(1+2)]+2 filaments from dorsal to ventral, with long common basal stalk having somewhat swollen transparent organ ventrally (partially broken) at base; common basal stalk as long as or longer than interspiracular trunk; dorsal and middle triplets share stalk of short to medium length and each composed of 1 individual and 2 paired filaments; dorsal triplet bearing short to medium-long primary stalk and short secondary stalk (in 1 female and 1 male pupal exuviae) or very long secondary stalk (in 3 male pupal exuviae); middle triplet bearing short to medium-long primary stalk and short secondary stalk (in 1 female and 1 male pupal exuviae) or very long secondary stalk (in 3 male pupal exuviae); ventral paired filaments with medium-long to long stalk which is shorter than common basal stalk (though slightly longer than common basal stalk in left gill of 1 male pupal exuviae); primary stalk of dorsal triplet lying against that of lower pair at angle of 50–80 degrees when viewed laterally; all filaments light to medium brown, gradually tapered toward apex; 6 filaments of dorsal and middle triplets subequal in length (2.5–2.8 mm long including their own stalks and common basal stalk) and thickness to one another, and 2 filaments of

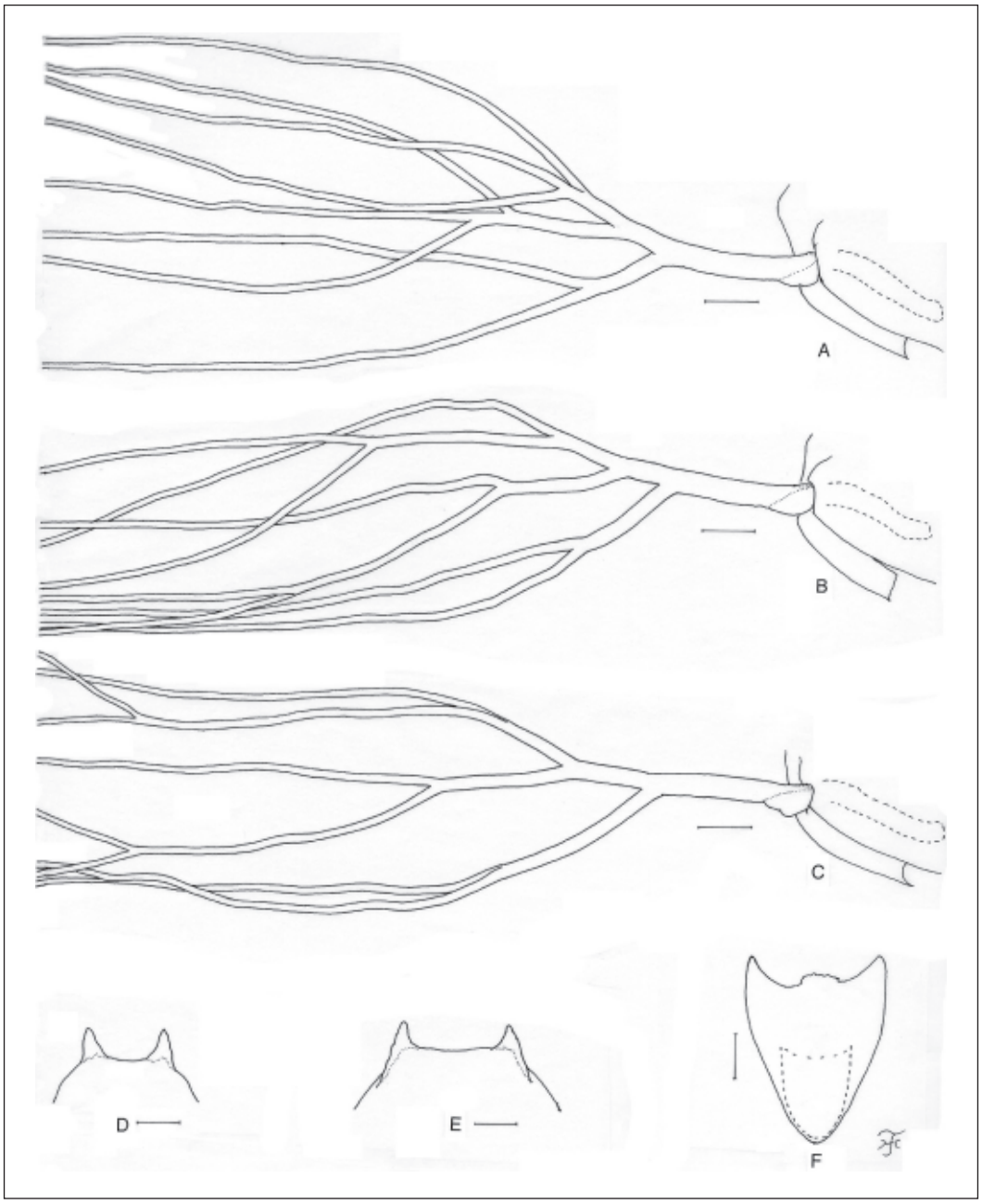

Figure 3. Pupa of *Simulium* (*Gomphostilbia*) *sofiani* sp. nov. A–C, left gill filaments (apical portions omitted) showing different lengths of the secondary stalks of dorsal and middle triplet groups among individual pupal exuviae (outer view; A, female pupal exuviae; B & C, male pupal exuviae); D & E, terminal hooks showing two slightly different types (caudal view; D, outer and inner margins subequal in length; E, outer margin much longer than inner margin); F, cocoon (dorsal view). Scale bars. 0.5 mm for F; 0.1 mm for A–C; 0.02 mm for D and E

ventral pair subequal in length (2.8–3.2 mm long including their own stalk and common basal stalk) and thickness to each other; cuticle of all filaments with well-defined annular ridges and furrows though becoming less marked apically, densely covered with minute tubercles. ***Abdomen***. Dorsally, segments 1 and 2 not pigmented and without

tubercles; segment 1 with 1 simple slender medium-long hair-like seta on each side; segment 2 with 1 simple slender medium-long hair-like seta and 5 very short somewhat spinous setae submedially on each side; segments 3 and 4 each with 4 hooked spines and 1 very short somewhat spinous seta on each side; segment 5 lacking spine-combs; segments 6–8 each with spine-combs in transverse row and comb-like groups of minute spines on each side; segment 9 with spine-combs (slightly smaller than those on segment 8) on each side (in 2 male pupal exuviae) or on left side only (in holotype female pupal exuviae and 1 male pupal exuviae) or without spine-combs (in 1 male pupal exuviae); segment 9 with comb-like groups of minute spines on each side, and pair of triangular flat terminal hooks of which outer margin is subequal in length to inner margin (Fig. 3D) (though in 2 male pupal exuviae outer margin is much longer than inner margin as shown in Fig. 3E); outer margin undulate but not serrate. Ventrally, segment 4 with 1 simple hook and few simple slender very short setae on each side; segment 5 with pair of bifid hooks submedially and few very short simple slender setae on each side; segments 6 and 7 each with pair of bifid inner and simple outer hooks somewhat spaced from each other and few very short simple slender setae on each side; segments 4–8 each with comb-like groups of minute spines on each side. Each side of segment 9 with 3 grapnel-shaped hooklets. ***Cocoon*** (Fig. 3F). Wall-pocket-shaped, thinly and moderately woven, slightly extended ventrolaterally; anterior margin not thickly woven, with or without short bulge; posterior 1/2 with floor roughly or moderately woven; individual threads visible; 2.0–2.2 mm long by 1.2–1.6 mm wide.

Mature larva. Body length 4.2–4.6 mm. Body color creamy to light ocherous except abdominal segments 1–4 entirely light greenish, other posterior abdominal segments (in particular segments 7 and 8) also faintly greenish on dorsal surface, and abdominal segment 7 with faint light ocherous transverse band on ventral surface. Cephalic apotome pale yellow; head spots indistinct. Lateral surface of head capsule pale yellow except eye-spot region whitish; spots indistinct. Ventral surface of head capsule pale yellow except somewhat darkened area near posterior margin on each side of postgenal cleft. Antenna composed of 3 segments and apical sensillum, somewhat longer than stem of labral fan; proportional lengths of 1st, 2nd, and 3rd segments 1.00:0.76:0.81. Labral fan with 33 main rays. Mandible (Fig. 4A) with 3 comb-teeth decreasing in length from 1st to 3rd; mandibular serration composed of 2 teeth (1 medium-sized and 1 small); major tooth at acute angle against mandible on apical side; supernumerary serrations absent. Hypostoma (Fig. 4B) with row of 9 apical teeth; median and each corner tooth prominent (though median tooth slightly longer than corner teeth) and much longer than 3 intermediate teeth on each side; lateral margin smooth; 4 hypostomal bristles per side lying parallel to lateral margin. Postgenal cleft (Fig. 4C) lanceolate, 2.3 times as long as postgenal bridge. Cervical sclerite composed of 2 pale small pieces, not fused to occiput, widely separated medially from each other. Histoblast of pupal gill filaments (Fig. 4D) with long common basal stalk. Thoracic cuticle bare. Abdominal cuticle almost bare except few posterior segments sparsely covered with simple minute setae dorsally and last segment moderately covered with similar setae on each side of anal sclerite. Rectal scales absent. Rectal papilla compound, each of 3 lobes with 5–7 finger-like secondary lobules. Anal sclerite of usual X-form, with anterior arms subequal in length to posterior ones, broadly sclerotized at base; accessory sclerite absent. Last abdominal segment expanded ventrolaterally forming double bulges on each side, visible as large conical ventral papillae when viewed from side. Posterior circlet with 80 rows of up to 12 hooklets per row.

TYPE SPECIMENS. Holotype female (with associated pupal exuviae and cocoon) (preserved in 80% ethanol) reared from pupa, collected from a stream (width 3–5 m, water temperature 16.0°C, exposed to the sun, altitude 1,470 m) moderately flowing in front of the gate of Forest Department, Tanah Rata, Cameron Highlands, Pahang, Malaysia,

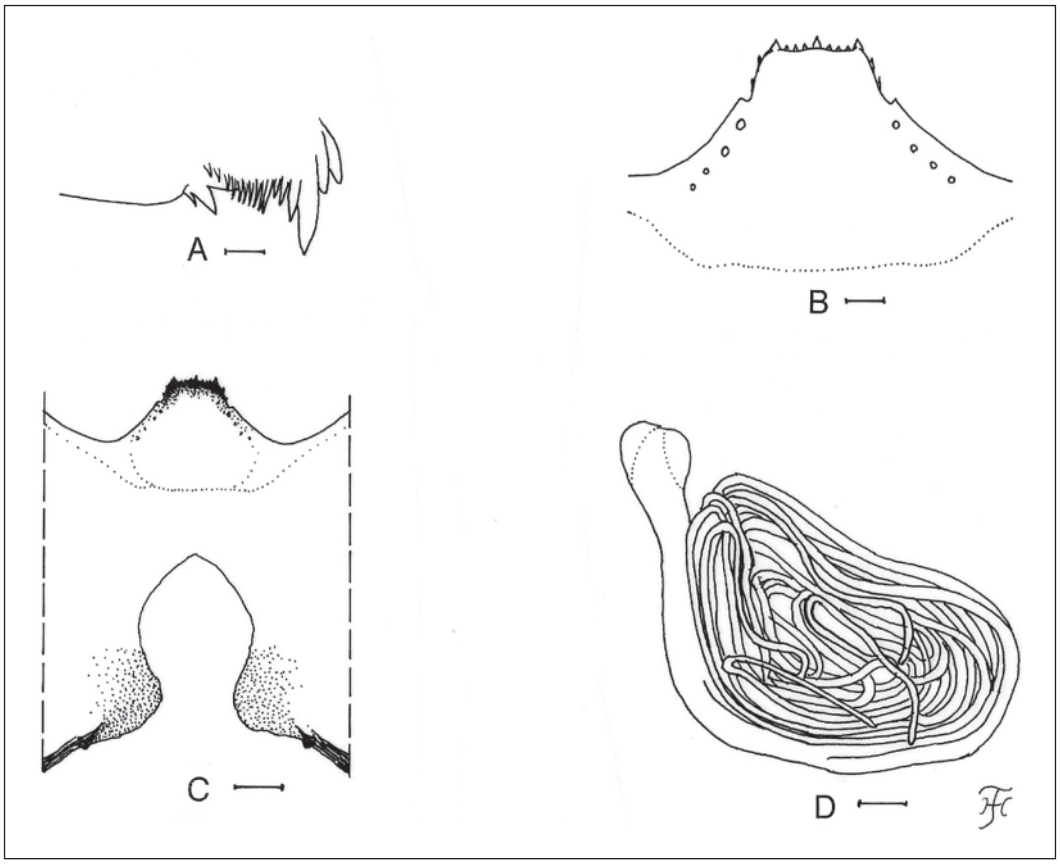

Figure 4. Mature larva of *Simulium* (*Gomphostilbia*) *sofiani* sp. nov. A, apex of right mandible (lateral view); B, hypostoma (ventral view); C, median portion of head capsule showing hypostoma and postgenal cleft (ventral view); D, histoblast of left pupal gill filaments (outer view). Scale bars. 0.05 mm for C and D; 0.02 mm for B; 0.01 mm for A

28.I.2011, by H. Takaoka and A. Takaoka. Paratypes: 3 males with associated pupal exuviae and cocoons, 1 pupal exuviae and cocoon, and 3 mature larvae, all preserved in 80% ethanol, same data as those of the holotype.

ECOLOGICAL NOTES. The pupae of this new species were collected from grass leaves trailing in the water. Associated species were *S.* (*G.*) sp. (*ceylonicum* species-group), *S.* (*N.*) *feuerborni* Edwards, 1934 and *S.* (*S.*) *tani* Takaoka & Davies, 1995.

ETYMOLOGY. The species name *sofiani* is in honor of Prof. Dr. Mohd Sofian-Azirun, Dean of Faculty of Science, University of Malaya, who has greatly contributed to the research of insects of medical importance and aquatic invertebrates.

REMARKS. According to the keys (Takaoka, 2003), S. (*G.*) *sofiani* sp. nov. is readily assigned to the *ceylonicum* species-group within the subgenus *Gomphostilbia* by having the adult antenna with 11 segments, pleural membrane bare, katepisternum haired, female claw with a large basal tooth (Fig. 1E), male hind basitarsus enlarged (Fig. 2C), and eight pupal gill filaments (Fig. 3A).

This new species is most striking in having the pupal gill with a long common basal stalk which is as long as or longer than the interspiracular trunk (Fig. 3A–C). None of the known species of the *ceylonicum* species-group (of which the pupal stage is known) listed in Adler & Crosskey (2010) has such a long common basal stalk, except *S.* (*G.*) *atratoides* Takaoka & Davies, 1996,

described from Java (Takaoka & Davies, 1996), *S.* (*G.*) *hoiseni* and *S.* (*G.*) *longitruncum*, both described from peninsular Malaysia (Takaoka, 2008; Takaoka & Davies, 1995). However, *S.* (*G.*) *sofiani* sp. nov. is easily distinguished from *S.* (*G.*) *atratoides* and *S.* (*G.*) *hoiseni* by the pupal gill with eight filaments (cf., ten filaments in *S.* (*G.*) *atratoides* and six filaments in *S.* (*G.*) *hoiseni*) and from *S.* (*G.*) *longitruncum* by the eight gill filaments arranged as [(1+2) + (1+2)] +2 filaments from dorsal to ventral (cf., (1+2)+[(3+1)+1] or 3+[(1+2) +2] filaments from dorsal to ventral in *S.* (*G.*) *longitruncum*).

The male of *S.* (*G.*) *sofiani* sp. nov. is easily distinguished from those of all the four known species, i.e., *S.* (*G.*) *asakoae*, *S.* (*G.*) *hoiseni*, *S.* (*G.*) *longitruncum* and *S.* (*G.*) *sheilae*, described from peninsular Malaysia by the greater number of large upper-eye facets in 15 or 16 vertical columns and 15 or 16 horizontal rows (cf., 11 vertical columns and 13 horizontal rows in the four known species). On the other hand, the female of *S.* (*G.*) *sofiani* sp. nov. is very similar to that of *S.* (*G.*) *sheilae* in many characteristics including the elongate sensory vesicle and the hind tibia with the apical half darkened but is barely distinguished by the yellow tuft hairs of the stem vein. The females of *S.* (*G.*) *asakoae* and *S.* (*G.*) *longitruncum* bear the medium-long sensory vesicle differing from the elongate sensory vesicle of *S.* (*G.*) *sofiani* sp. nov. The female of *S.* (*G.*) *hoiseni* is not known.

Simulium (*G.*) *dudgeoni* Takaoka & Davies, 1995, described from female and male specimens collected from Hong Kong appears to be somewhat related to *S.* (*G.*) *sofiani* sp. nov. in having the similar spindle-shaped male hind basitarsus, a nearly similar number of enlarged male upper-eye facets (i.e., 13 or 14 vertical columns and 15 or 16 horizontal rows) and the ventral plate which is widened posteriorly when viewed ventrally, but is distinguished by the entirely darkened male hind tibia (Takaoka *et al.*, 1995). In addition, *S.* (*G.*) *namense* Takaoka, 1989, described from adult specimens collected from Myanmar shows a nearly similar number of enlarged male upper-eye facets (i.e., 14 vertical columns and 15 horizontal rows) but differs by having the male hind basitarsus wedge-shaped (Takaoka, 1989).

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