Two new species of the *Simulium batoense* species-group of *Simulium* (*Gomphostilbia*) (Diptera: Simuliidae) from Peninsular Malaysia

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Abstract

Two new black fly species, *Simulium* (*Gomphostilbia*) *tekamense* and *Simulium* (*Gomphostilbia*) *jerantutense*, are described based on adult females emerged from pupae in Peninsular Malaysia, and assigned to the *binuanense* subgroup of the *batoense* species-group in the subgenus *Gomphostilbia*. *Simulium* (*G.*) *tekamense* sp. nov. is characterized in the female by the subcosta with 0–2 hairs, and presence of a deep notch on the apex of the mediolongitudinal ridge of the cibarium, and in the pupa by one of two paired gill filaments of the middle triplet much thicker than the counter filament. *Simulium* (*G.*) *jerantutense* sp. nov. is characterized in the female by the short claw tooth 0.46 times the length of the claw, and in the pupa by the gill filaments arranged as [2+1+(1+2)]+2 filaments from dorsal to ventral. Taxonomic notes are given to distinguish these new species from related species.

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

Introduction

*Gomphostilbia* Enderlein is, as in other Southeast Asian countries, the most dominant and varied black fly subgenus of the genus *Simulium* Latreille in Peninsular Malaysia, consisting of 24 species (51.1%) of the total 47 species (Adler and Crosskey, 2013). This subgenus includes several human-biting species, of which one species, *S.* (*G.*) *asakoe* Takaoka and Davies, is a vector of an unnamed filarial parasite, possibly of animal association in Thailand, which is a potential agent of zoonotic filariasis (Fukuda et al., 2003; Ishii et al., 2008). However, the biting habits and other biological aspects of these Peninsular Malaysian species remain to be studied.

In recent surveys of pupae and larvae of black flies in Pahang of the mainland of Peninsular Malaysia, we collected two new species belonging to the subgenus *Gomphostilbia*, which are described here based on adult females reared from pupae. These new species are assigned to the *batoense* species-group recently redefined by Takaoka (2012). Taxonomic notes are given to distinguish these new species from related species.

The methods of collection, description and illustration, and terms for morphological features, follow those of Takaoka (2003) and partially those of Adler et al. (2004). The holotypes and paratypes are deposited in the Institute of Biological Sciences, Faculty of Science, University of Malaya, Kuala Lumpur, Malaysia.

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

**Female.** Body length 2.5 mm. **Head.** Nearly as wide as thorax. Frons black, shiny, moderately covered with yellowish-white scale-like recurved short hairs interspersed with several dark simple longer hairs along each lateral margin; frontal ratio 1.54:1.00:1.92; frons:head ratio 1.00:4.54. Fronto-ocular area well developed, narrow, directed dorsolaterally. Clypeus black, shiny, gray pruinose, densely covered with yellowish-white hairs interspersed with several dark longer hairs on each labrum. 0.58 times length of clypeus. Antenna composed of scape, pedicel and nine flagellomeres, medium to dark brown except scape, pedicel and base of first flagellomere yellow. Maxillary palp composed of five segments, light to medium brown, proportional lengths of...
third, fourth, and fifth segments 1.00:1.22:2.77; third segment (Fig. 1A) ellipsoidal, medium-long, 0.46 times length of third segment and with medium-sized opening. Maxillary lacinia with 7 or 8 inner and 11 or 12 outer teeth. Mandible with 20 inner and 8 or 9 outer teeth. Cibarium (Fig. 1B) medially forming sclerotized plate folded forward from posterior margin, with strongly sclerotized medial longitudinal ridge bearing deep notch apically. Thorax. Scutum black, shiny when illuminated at certain angles, thinly gray pruinose, appearing to have three (median and submedian) broad longitudinal vittae, densely covered with whitish scale-like recumbent hairs except three longitudinal vittae with dark recumbent hairs and prescutellar area with few dark upright hairs. Scutellum brownish-black, slightly shiny when illuminated at certain angles, covered with dark short hairs and dark brown long upright hairs along posterior margin. Postnotum brownish-black, shiny when illuminated at certain angles and bare. Pleural membrane bare. Katepisternum brownish-black to black, longer than deep, shiny when illuminated at certain angles, moderately covered with short hairs. Legs. Foreleg: coxa yellow; trochanter light brown except base yellow; femur light to medium brown with apical cap dark brown; tibia medium brown with extreme base yellow and apical cap brown dark, and median portion largely light brown, moderately covered with white (shiny in light) short hairs on outer surface; tarsus black, with moderate dorsal hair crest; basitarsus somewhat dilated, 5.18 times as long as its greatest width. Midleg: coxa dark brown except posterolateral surface brownish-black; trochanter light brown except base yellow; femur medium brown except apical cap dark brown; tibia medium brown except basal tip yellow and apical cap dark brown, and with white (shiny in light) short hairs on outer and posterior surfaces of basal two-thirds; tarsus dark brown except basal half of basitarsus dark yellow. Hind leg: coxa medium brown; trochanter yellow; femur medium to dark brown except extreme base dark yellow and apical cap brownish-black; tibia (Fig. 1C) medium to dark brown except base yellow and apical cap brownish-black, moderately covered with white (shiny in light) short hairs on outer and posterior surfaces of basal two-thirds; tarsus (Fig. 1D) dark brown to brownish-black except basal two-thirds of basitarsus (though base light brown) and basal half of second tarsomere yellowish-white; basitarsus (Fig. 1D) narrow, nearly parallel-sided, 6.82 times as long as wide, and 0.61 and 0.50 times as wide as greatest width of tibia and femur, respectively; calcipala (Fig. 1D) well developed, as long as wide, and 0.53 times as wide as greatest width of basitarsus; pedisculus (Fig. 1D) well developed; claw (Fig. 1E) with large basal tooth 0.50 times length of claw. Wing. Length 1.6–1.8 mm. Costa with dark brown spinules and light brown hairs. Subcosta bare in one female and with two hairs on each side in other female. Hair tuft on base of radial vein dark brown. Basal portion of radius fully haired. Basal cell absent. Halter. Clear white except basal stem partially darkened. Abdomen. Basal scale medium brown, with fringe of yellowish-white hairs. Dorsal surface of abdomen medium to dark brown except base of segment 2 yellow, moderately covered with dark short to long hairs; tergites of segments 2 and 6–9 shiny when illuminated at certain angles. Ventral surface of abdomen light to medium brown except base of segment 2 yellow; sternal plate on segment 7 undeveloped. Genitalia. Sternite 8 (Fig. 1F) bare medially, with 13 or 14 medium-long to long hairs together with three or four slender short hairs on each side. Ovispositor valves (Fig. 1F) triangular (though medioposterior corners rounded), tapered laterally, thin, membranous, moderately covered with microsetae interspersed with two short hairs; inner margins slightly sinuous, moderately sclerotized, and somewhat separated from each other. Genital fork (Fig. 1G) of usual inverted-Y form, with slender stem; arms of moderate width, moderately folded medially, with short posteromedial lobe. Paraproct in ventral view (Fig. 1H) with anterolateral tip unsclerotized and anteromedian margin darkened, with four or five sensilla on anteromedial surface; paraproct in lateral view (Fig. 1I) somewhat produced ventrally, 0.75 times as long as wide, with 22 medium-long to long hairs on ventral and lateral surfaces. Cercus in lateral view (Fig. 1I) short, rounded posteriorly, 0.48 times as long as wide. Spermathec (Fig. 1J) oblong, 1.5 times as long as 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. Pupa. Body length 2.6 mm. Head. Integument yellow, moderately covered with small round tubercles; antennal sheath without any protuberances; frons with three pairs of unbranched long trichomes with coiled or uncoiled apices; face with pair of unbranched long trichomes with uncoiled apices; three frontal trichomes on each side arising close together, subequal in length to one another and somewhat longer than facial one. Thorax. Integument yellow, moderately covered with small round tubercles, with three unbranched long mediodorsal trichomes with coiled apices, two unbranched anterolateral trichomes (one long with coiled apex, one medium-long with uncoiled apex), one unbranched short to medium-long mediolateral trichome with uncoiled apex, and three unbranched ventrolateral trichomes with uncoiled apices (one medium-long, two short) on each side. Gill (Fig. 1K) composed of eight slender thread-like filaments, arranged as \((2+1)+(1+2)\)+2 filaments from dorsal to...
ventral, with short common basal stalk having somewhat swollen basal fenestra at base; common basal stalk short, 0.41–0.63 times length of interspiracular trunk; dorsal and middle triplets sharing short stalk; primary stalk of dorsal triplet short, but secondary stalk so short that all three filaments appearing to arise from same level; both primary and secondary stalks of middle triplet medium-long; length of primary and secondary stalks of middle triplet combined somewhat longer than stalk of ventral pair; stalk of ventral pair long, 2.00–2.10 times length of common basal stalk and 1.14–1.33 times length of interspiracular trunk; stalk of ventral pair 1.07–1.20 times as thick as primary stalk of middle triplet, and 1.20–1.25 times as thick as primary stalk of dorsal triplet; primary stalk of dorsal triplet lying against stalk of lower pair at angle of 90 degrees or little more when viewed laterally; all filaments dark brown, gradually tapered toward apex; entire length of filaments (measured from base of gill to tips of filaments) based on one pupa as follows: 2.3–2.5 mm for dorsal triplet, 2.9–3.1 mm for middle triplet and 3.5–4.0 mm for ventral paired filaments; cuticle of all filaments with well-defined annular ridges and furrows though gradually becoming indistinct from middle to apex, densely covered with minute tubercles. **Abdomen.** Dorsally, all segments nearly transparent except segments 1 and 2 yellowish; segments 1 and 2 without tubercles; segment 1 with one unbranched slender short hair-like seta on each side; segment 2 with one unbranched slender short hair-like seta and five short somewhat submedially near posterior margin on each side; segments 3 and 4 each with four hooked spines and one short somewhat spinous seta near posterior margin on each side; segments 6–9 each with spine-combs in transverse row, comb-like groups of minute spines near anterior margin and two unbranched short setae near posterior margin on each side; segment 9 with pair of cone-like terminal hooks (Fig. 1L). Ventrally, segment 4 with one unbranched hook and few unbranched short setae on each side; segment 5 with pair of bifid hooks submedially and few unbranched short slender setae on each side; segments 6 and 7 each with pair of bifid inner and unbranched outer hooks somewhat spaced from each other and few unbranched short slender setae on each side; segments 4–8 with comb-like groups of minute spines. Each side of segment 9 with three grapnel-shaped hooklets. **Cocoon.** Wall pocket-shaped, moderately woven, somewhat extended ventrolaterally; anterior margin somewhat thickly woven, with dorsal portion not produced anteriorly when viewed dorsally; posterior half with floor roughly or moderately woven; individual threads visible; 3.1 mm long by 2.0 mm wide. 

**Male and larva.** Unknown.

**Type Materials.** HOLOTYPE: Female (with associated pupal exuviae and cocoon) (preserved in 80% ethanol) reared from pupa, MALAYSIA: Pahang, Jerantut, Lepar, Tekam, 17-VI-2011, by M. Sofian-Azirun and Z. Ya’cob. Paratypes: One female emerged from pupa, and one pupa, preserved in 80% ethanol, same data as those of holotype. 

**Etymology.** The species name *tekamense* represents the locality name, Tekam, where this new species was collected.

**Biology.** The pupae of this new species were collected from dead tree leaves in a small stream (width 0.5–1.0 m, water temperature 27.0°C, shaded, altitude 280 m) (03°18′22.9″N, 101°52′50.0″E) flowing slowly in an oil palm plantation. The associated species were *Simulium* (Gomphostilbia) gombakense Takaoka and Davies, 1995, *S. (G.) jerantutense* sp. nov. and *S. (G.) sp. (ceylionicum species-group).**

**Discussion.** *Simulium (G.) tekamense* sp. nov. is assigned to the *batoense* species-group in the subgenus *Gomphostilbia* as defined by Takaoka (2012), by having the antenna with 11 articles, pleural membrane bare, katepisternum haired, base of the radial vein with dark tuft hairs, mid and hind tibiae darkened except the base yellowish (Fig. 1C), claw with a large basal tooth (Fig. 1E) and spermatheca without a sclerotized neck (Fig. 1J) in the female, and the gill with eight long filaments (Fig. 1K) and cone-like terminal hooks (Fig. 1L) in the pupa. This new species is tentatively assigned to the *binuanense* subgroup by having eight filaments, of which two filaments of the ventral pair are longer than the pupal body, and at least two filaments of the middle triplet are more than half of the length of the ventral paired filaments (Fig. 1K), although the two ventral paired filaments appear to be subequal in thickness, which departs from the definition given by Takaoka (2012).

The female of this new species is most remarkable in that it has the subcosta which bears no or two hairs, a character rarely found in the *batoense* species-group, e.g., *S. (G.) binuanense* Takaoka and Tenedero, described from Palawan, the Philippines (Takaoka and Tenedero, 2008) (and placed in the *binuanense* subgroup), *S. (G.) chuzargangense* Takaoka and Somboon, described from Bhutan (Takaoka and Somboon, 2008) (and tentatively placed in the *parahiyangum* subgroup, due to lack of the pupal stage), *S. (G.) kolakaense* Takaoka, and *S. (G.) singgihi* Takaoka both described from Sulawesi, Indonesia (Takaoka, 2003) (both placed in the *duolongum* subgroup–Takaoka, 2012). However, the apex of the mediolongitudinal ridge on the cibarium bearing a deep notch (Fig. 1B) separates this new species from all four of these species. The pupa of *S. (G.) tekamense* sp. nov. is distinguished from those of *S. (G.) binuanense*, *S. (G.) kolakaense* and *S. (G.) singgihi* by the arrangement of eight
gill filaments (i.e., the stalk of the ventral pair and the secondary stalk of the middle triplet are long in *S. (G.) binuanense*, and the two ventral paired filaments are more than twice the length of the other six filaments of the dorsal and middle triplets in the other two species). The pupa of *S. (G.) chuzargangense* is unknown.

**FIGURE 1.** Female and pupa of *S. (G.) tekamense* sp. nov. (A)–(J) Female and (K) and (L) Pupa. (A) Third segment of right maxillary palp with sensory vesicle (front view). (B) Cibarium. (C) Tibia of left hind leg (outer view). (D) Basitarsus and second tarsomere of left hind leg showing calcipala and pedisulcus (outer view). (E) Claw. (F) Sternite 8 and ovipositor valve (only right half shown; ventral view). (G) Genital fork (ventral view). (H) Right paraproct and cercus (ventral view). (I) Right paraproct and cercus (lateral view). (J) Spermatheca. (K) Left gill (outer view). (L) Terminal hooks (caudal view). Scale bars = 0.1 mm (C, D, K), 0.02 mm (A, B, F–J) and 0.01 mm (E, L).
**Simulium (Gomphostilbia) jerantutense** Takaoka, Sofian-Azirun and Ya'cob, sp. nov.

**Female.** Body length 2.3 mm. **Head.** Slightly narrower than width of thorax. Frons brownish-black, shiny, moderately covered with yellowish-white scale-like recumbent short hairs (appearing to lack dark longer hairs along each lateral margin); frontal ratio 1.63:1.00:2.21; frons:head ratio 1.00:4.75. Fronto-ocular area well developed, narrow, directed dorsolaterally. Clypeus dark brown, shiny, gray pruinose, densely covered with yellowish-white hairs interspersed with few dark longer hairs near each ventrolateral corner. Labrum 0.66 times length of clypeus. Antenna composed of scape, pedicel and nine flagellomeres, light to medium brown except scape, pedicel and base of first flagellomere yellow. Maxillary palp composed of five segments, light to medium brown except segments 1 and 2 pale, proportional lengths of third, fourth, and fifth segments 1.00:1.13–1.19:2.51–2.62; third segment (Fig. 2A) of moderate size; sensory vesicle (Fig. 2A) ellipsoidal, medium-long, 0.38–0.41 times length of third segment and with medium-sized opening. Maxillary lacinia with 8 or10 inner and 11 or 12 outer teeth. Mandible with 18 inner and 9 outer teeth. Cibarium (Fig. 2B) medially forming sclerotized plate folded forward from posterior margin, with strongly sclerotized medial longitudinal ridge. **Thorax.** Scutum dark brown, shiny when illuminated at certain angles, thinly gray pruinose, with three (median and submedian) brownish-black broad longitudinal vittae, densely covered with whitish-scale-like recumbent hairs except three longitudinal vittae with dark recumbent hairs (no dark longer hairs on prescutellar area). Scutellum ochreous, covered with dark short hairs and dark brown long upright hairs along posterior margin. Postnotum dark brown, shiny when illuminated at certain angles and bare. Pleural membrane bare. Katepisternum medium brown, longer than deep, shiny when illuminated at certain angles, moderately covered with short hairs. **Legs.** Foreleg: coxa yellow; trochanter grayish-yellow; femur grayish to light brown with apical cap medium brown; tibia (Fig. 2C) medium brown with extreme base yellow and median portion largely grayish, moderately covered with white (shiny in light) short hairs on outer surface; tarsus dark brown, with moderate dorsal hair crest; basitarsus somewhat dilated, 5.25 times as long as its greatest width. Midleg: coxa dark brown except posteralateral surface brownish-black; trochanter grayish except posterior surface light brown; femur grayish except apical cap medium brown; tibia (Fig. 2D) grayish except basal tip yellow, subbasal spot light brown, apical cap and narrow portion along posterior margin of apical half medium brown, and with yellow (shiny in light) short hairs on outer and posterior surfaces of basal two-thirds; tarsus medium brown except basal two-thirds of basitarsus grayish. Hind leg: coxa medium brown; trochanter yellow; femur grayish to light brown except extreme base yellow and apical cap medium to dark brown; tibia (Fig. 2E) grayish except base yellow and apical one-third medium to dark brown, moderately covered with white (shiny in light) short hairs on outer and posterior surfaces of basal two-thirds; tarsus (Fig. 2F) dark brown except little more than basal two-thirds of basitarsus (though base light brown) and basal half of second tarsomere yellowish-white; basitarsus (Fig. 2F) narrow, nearly parallel-sided, 6.59 times as long as wide, and 0.57 and 0.53 times as wide as greatest width of tibia and femur, respectively; calcipala (Fig. 2F) well developed, as long as wide, and 0.59 times as wide as greatest width of basitarsus; pedisculus (Fig. 2F) well developed; claw (Fig. 2G) with large basal tooth 0.46 times length of claw. **Wing.** Length 1.7 mm. Costa with dark brown spinules and dark brown hairs except basal patch of hairs mixed with pale hairs. Subcosta haired except apical one-third bare. Hair tuft on base of radial vein dark brown. Basal portion of radius fully haired. Basal cell absent. **Halter.** Clear white except basal stem partially darkened. **Abdomen.** Basal scale light brown, with fringe of yellowish-white hairs. Dorsal surface of abdomen medium brown except basal two-thirds of segment 2 yellowish-white, moderately covered with dark short to long hairs; tergites of segments 2 and 6–9 shiny when illuminated at certain angles. Ventral surface of abdomen light to medium brown except segment 2 yellowish-white; sternal plate on segment 7 undeveloped. **Genitalia.** Sternite 8 (Fig. 2H) bare medially, with 12 or 13 medium-long to long hairs together with few slender short hairs on each side. Ovipositor valves (Fig. 2H) triangular (though medioposterior corners rounded), tapered laterally, thin, membranous, moderately covered with microsetae interspersed with two or three short hairs; inner margins sinuous, moderately sclerotized, and close to each other. Genital fork (Fig. 2I) of usual inverted-Y form, with slender stem; arms of moderate width, moderately folded medially, with short posteromedial lobe. Paraproct in ventral view (Fig. 2J) with anterolateral tip unsclerotized and anteromedian margin darkened, with five sensilla on anteromedial surface; paraproct in lateral view (Fig. 2K) somewhat produced ventrally, 0.61 times as long as wide, with 18–21 medium-long to long hairs on ventral and lateral surfaces. Cercus in lateral view (Fig. 2K) short (0.58 times as long as wide), trapezoidal. Spermatheca (Fig. 2L) oblong, 1.5 times as long as 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.
FIGURE 2. Female and pupa of S. (G) jerantutense sp. nov. (A)–(L) Female, and (M) and (N) Pupa. (A) Third segment of right maxillary palp with sensory vesicle (front view). (B) Cibarium. (C) Tibia of left foreleg (outer view). (D) Tibia of left midleg (outer view). (E) Tibia of left hind leg (outer view). (F) Basitarsus and second tarsomere of left hind leg showing calcipala and pedisulcus (outer view). (G) Claw. (H) Sternite 8 and ovipositor valve (only right half shown; ventral view). (I) Genital fork (ventral view). (J) Right paraproct and cercus (ventral view). (K) Right paraproct and cercus (lateral view). (L) Spermatheca. (M) Right gill (outer view). (N) Terminal hooks (caudal view). Scale bars = 0.1 mm (C, D, E, F, M), 0.02 mm (A, B, H–L) and 0.01 mm (G, N).
Pupa. Body length 2.5 mm. Nearly as in pupa of *S. (G.) tekamense* sp. nov. except for the following characters. 

**Head.** Integument ochreous. **Thorax.** Integument ochreous. Gill (Fig. 2M) composed of eight slender thread-like filaments, arranged as \([2+1+(1+2)]+2\) filaments from dorsal to ventral, with short common basal stalk having somewhat swollen basal fenestra; common basal stalk short, 0.61–0.63 times as long as interspiracular trunk; dorsal pair, middle triplets and individual filament in-between arising at same level, sharing short stalk; stalk of dorsal pair short, and primary and secondary stalks of middle triplet short and medium-long, respectively; stalk of ventral pair medium-long, 1.61–2.12 times length of common basal stalk and 1.02–1.29 times length of interspiracular trunk; stalk of ventral pair at level of primary stalk of middle triplet; stalk of dorsal pair lying against stalk of lower pair at angle of 90 degrees or little more when viewed laterally; all filaments light brown, gradually tapered toward apex; dorsal paired filaments and individual filament subequal in length to one another (2.0 mm), three filaments of middle triplet slightly varying in length (2.4–2.7 mm), and ventral paired filaments subequal in length to each other (3.5 mm).

**Abdomen.** Ventrally, segment 4 with one unbranched or bifid hook and few unbranched short setae on each side.

**Male and larva.** Unknown.

**Type Materials.** HOLOTYPE: Female (with associated pupal exuviae and cocoon) (preserved in 80% ethanol) reared from pupa, MALAYSIA: Pahang, Jerantut, Lepar, Tekam, 17-VI-2011, by M. Sofian-Azirun and Z. Ya’cob. Paratypes: One female emerged from pupa, preserved in 80% ethanol, same data as those of holotype.

**Etymology.** The species name *jerantutense* represents the district name, Jerantut, where this new species was collected.

**Biology.** The pupae of this new species were collected from the same stream as pupae of *S. (G.) tekamense* sp. nov. Collection data and associated species are the same as noted in the biology of *S. (G.) tekamense* sp. nov.

**Discussion.** *Simulium* (*G.*) *jerantutense* sp. nov. is assigned to the *batoense* species-group of the subgenus *Gomphostilbia* as defined by Takaoka (2012), by having the antenna with 11 articles, pleural membrane bare, katepisternum haired, base of the radial vein with dark tuft hairs, mid and hind tibiae darkened except the base yellowish (Fig. 2E), claw with a large basal tooth (Fig. 2G) and spermatheca without a sclerotized neck (Fig. 2L) in the female, and the gill with eight long filaments (Fig. 2M) and cone-like terminal hooks (Fig. 2N) in the pupa. This new species is tentatively assigned to the *binuanense* subgroup although the relative length and thickness of the two filaments of the ventral pair are subequal to each other (Fig. 2M).

The female of this new species is similar to that of *S. (G.) chuzargangense* from Bhutan in many characters including the size of the sensory vesicle, shape of the cibarium, and color of the legs (Takaoka and Somboon, 2008). However, this new species is distinguished from the latter by the smaller tooth of the tarsal claw (0.46 times the length of the claw) (Fig. 2G) and presence of hairs on the subcosta (cf., the tooth of the tarsal claw is 0.52 times the length of the claw and subcosta with no hairs or only one hair in *S. (G.) chuzargangense*–Takaoka and Somboon, 2008). The pupa of this new species is characterized by the pupal gill filaments arranged as \([2+1+(2+1)]+2\) filaments from dorsal to ventral (Fig. 2M), i.e., three dorsal filaments not forming a triplet but arising as two paired filaments on the outer side and one individual filament on the inner side, leaving no shared stalk between them. A similar arrangement of the pupal gill filaments is recorded in *S. (G.) butwalense* Takaoka and Shrestha from Nepal (Takaoka and Shrestha, 2010) (and placed in the *binuanense* subgroup). However, the inner filament of the ventral pair is much thicker than the outer counter filament in *S. (G.) butwalense*, as for other species of the *binuanense* subgroup (Takaoka and Shrestha, 2010).

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