

## ***Topomyia (Suaymyia) kelabitense* (Diptera: Culicidae), a new species from Sarawak, Malaysia**

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**Abstract:** A new species, *Topomyia (Suaymyia) kelabitense* is described from Bario and Ba'Kelalan highlands in Sarawak, Malaysia. The adult male and female, pupa and larva are described in detail and illustrations of the male genitalia, pupa and larva are provided. This species is easily distinguished from all known species of the subgenus *Suaymyia* by the male genitalia and larval characters. The larva is predacious with well developed maxillae apparently adapted for grasping prey. Larvae were collected from the leaf axils of Daun Itip (*Phrynium capitatum*), a common plant found in mountain forests.

Key words: *Topomyia kelabitense*, new species, Culicidae, Sarawak, Malaysia

### INTRODUCTION

Thurman (1959) proposed division of the genus *Topomyia* into two subgenera, *Topomyia* and *Suaymyia*. He placed 20 of the known species having claspettes with rod-like dorsal lobes, setaceous ventral lobes and lobes of the IXth tergite that are close together in the subgenus *Topomyia*. Eight species have claspettes with only setaceous ventral lobes and lobes of the IXth tergite that are widely separated in the subgenus *Suaymyia*. However, one species, *Topomyia argenteoventralis* Leicester, 1908 from Malaysia, was recognized as being atypical but was placed in *Suaymyia* because it has a IXth tergite typical of the subgenus even though it has a rod-like dorsal lobe for the claspette (Thurman, 1959; Miyagi and Toma, 2006). The genus *Topomyia* is still poorly known so many new species are being described. There are currently 58 recognized species of which 39 are in the subgenus *Suaymyia* including *Topomyia roslihashimi* Miyagi and Toma, 2005, *Topomyia nepenthicola* Miyagi and Toma, 2007 and *Topomyia lehcharlesi* Miyagi and Toma, 2008 from Malaysia that have somewhat atypical genital structures like *To. argenteoventralis*. The genus *Kimia* Vu Due Houng and Harbach was established based on *Topomyia (Suaymyia) decolabilis* Leicester, 1908 (Harbach et al., 2007; Miyagi and Toma, 2007b).

We also found an interesting species of *Topomyia* larvae collected from the leaf axils of *Phrynium capitatum* (Family Marantaceae) in the Bario and Ba'Kelalan Highlands (about 1,000 m elevation), Sarawak, Malaysia in 2008 and 2009. After careful comparison with the descriptions of the subgenus *Suaymyia* species (Edwards, 1922; Brug, 1939; Thurman, 1959; Miyagi and Toma, 2007a, 2008, 2010), although the specimens examined are somewhat atypical for the recognition of *Suaymyia* (Thurman, 1959), we have come to the conclusion that it is a new species of the subgenus with unique male genitalia and

larval chaetotaxy.

The terminology used follows previous descriptions for the adults and the male genitalia, pupa and larvae—Harbach and Knight (1980, 1981); for morphology of larval maxilla—Harbach and Peyton (1993); and for the chaetotaxy of the larva and pupa—Belkin (1962).

***Topomyia (Suaymyia) kelabitense* Miyagi and Toma, n. sp.**

(Figs. 1–3 and Tables 1, 2)

Male (Fig. 1A–D, F).

**Head:** Black with somewhat purple reflections in dorsal aspect; vertex covered closely with broad flat dark scales; apical part of vertex with a large transverse silver scale patch, the patch clear, as large as that on postpronotal area in dorsal aspect; erect scales and narrow decumbent scales absent on occiput; several black ocular setae present; postgena covered with a small silver scale patch. Clypeus small, dark brown without setae and scales. Maxillary palpus black, short, about 0.1 times length of proboscis covered with dark scales. Proboscis slender, 2.5 mm, as long as or a little longer than antenna, slightly swollen at the distal end; covered with dark scales dorsally and with a ventral line of white scales on basal 0.4 times of proboscis. Pedicel dark with a few white scales on dorsal margin.

**Thorax:** Scutum covered densely with velvety black scales and with a median silvery line from anterior promontory to prescutellar area; consisting of double rows of overlapping flat silvery scales, the line slightly broad near prescutellar area. Prescutellar light brown reflection with 2 or 3 prescutellar, many antear and supraalar setae present. Thoracic pleura covered with silvery spatulate scales on antepronotal area and with golden spatulate scales on upper and lower postpronotal, upper proepisternal, postspiracular, subspiracular, prealar, upper and lower mesokatepisternal, upper mesepimeral and metepisternal areas. Conspicuous black setae absent on the pleuron. Scutellum dark without or at most few silvery scales on mid lobe and usually one pair of well developed setae on lateral lobes.

**Wing:** Length 3.75 mm. Cell  $R_2$  about 2.0 of stem  $R_{2+3}$ ; alula without scale on margin; upper calypter with 8–10 setae.

**Halter:** Scabellum pale, pedicel and capitellum with dark scales.

**Legs:** Coxae yellowish brown, with silvery-white scales; femora, tibiae and tarsi of all segments dark scaled dorsally and white scaled ventrally, the apical two segments of fore and mid tibiae, and all segments of hind tibia with white reflections in some aspects. Forefemur 3.0 mm, as long as midfemur and both apparently longer than hindfemur; first tarsal segment of fore legs longer than tibia; that of mid leg as long as tibia and that of hind leg apparently longer than tibia. Foreungues longer than mid and hindungues, each unguis equal in size, without lateral tooth.

**Abdomen:** Terga dark-scaled dorsally, without white dorsal and lateral patches on all segments. All sterna with white spatulate scales.

**Genitalia** (Fig. 1A–D, F): Lobes of tergum IX (IX-T) widely separated by narrow bridge, each lobe with stout apical seta directed outward and 1–3 (usually 2) small setae spaced on inner basal margin of each lobe (Fig. 1 F). Gonocoxite (Gc) elongate, length about 2.8 times breadth at middle, tapered distally and sternal and lateral surfaces with long setae and scales (Fig. 1A). Basal mesal lobe (BML) with 5–8 well developed lanceolate setae (Fig. 1C) and with fine setae. Claspette (CL) short stem with a very long simple seta, longer than length of gonocoxite. Gonostylus (Gs) (Fig. 1A, B, D) has latero-apical expansion with oval apex (Ap-Gs), with 10–12 setae curved apical margin

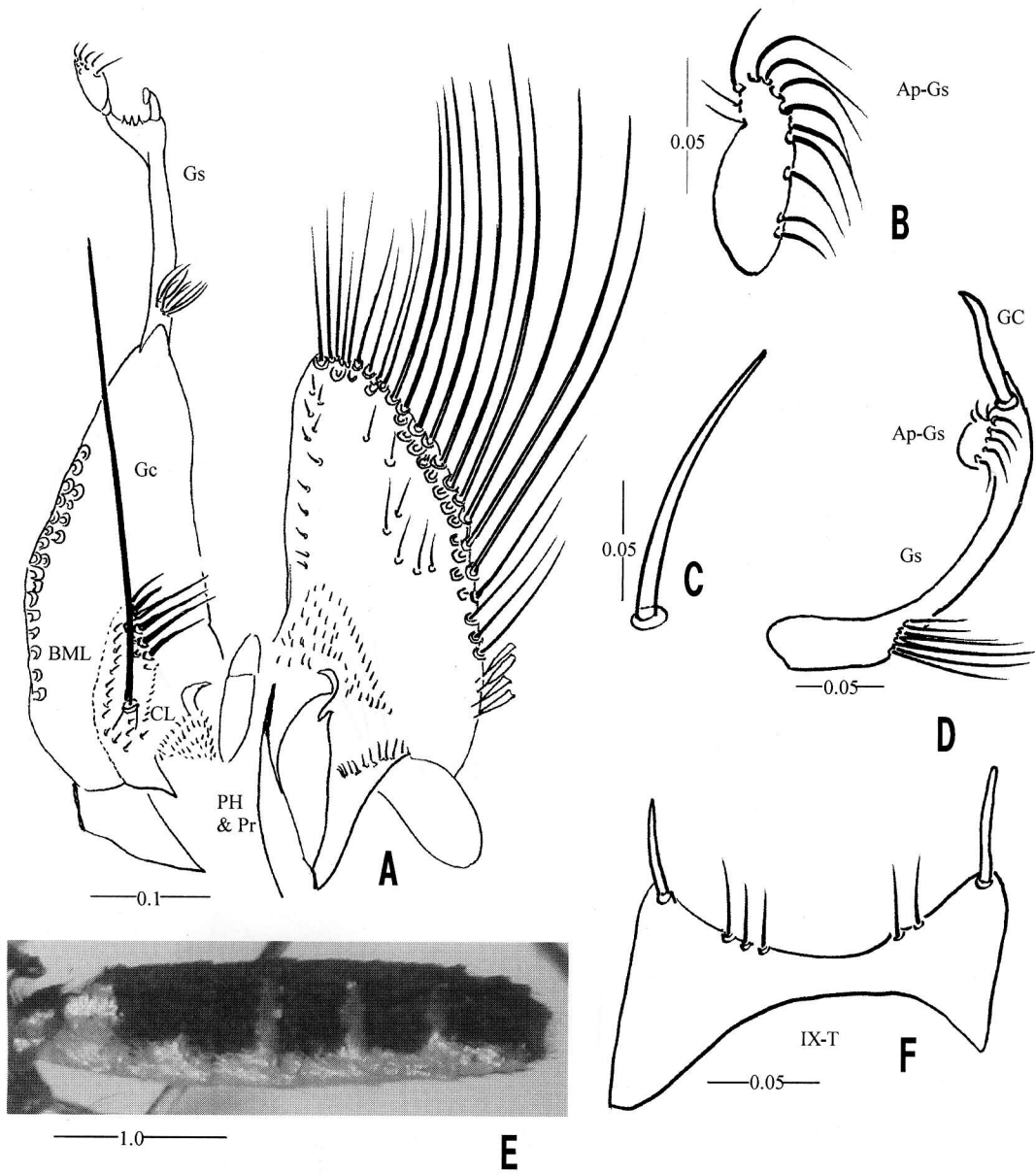


Fig. 1. Male genitalia (A-D, F) and female abdomen (E) of *Topomyia (Suaymyia) kelabitense*, n. sp. A, genitalia (paratype G87, ventral aspect); B, apical part of gonostylus; C, lanceolate seta on BML; D, gonostylus (paratype G83); E, abdominal segments (specimen 090907-11, lateral aspect); F, tergum IX (paratype G26); Ap-Gs, apical part of gonostylus; CL, Claspette; BML, basal mesal lobe; Gc, gonocoxite; GC, gonostylar claw; Gs, gonostylus; PH & Pr, phallosome and paraproct; IX-T, tergum IX. Scales in mm.

and 3 or 4 spines and fine setae. Gonostylar claw (GC) blunt, curved apically (Fig. 1D).

Female (Fig. 1E).

Wing about 4.40 mm. Proboscis about 2.40 mm. Forefemur about 3.10 mm. Cell  $R_2$  about 2.7 of stem  $R_{2+3}$ . Resembles male except as follows. Pedicel dark with many white scales on dorsal margin. Thoracic pleura covered uniformly with silvery spatulate scales; white spots on mid lobe of scutellum; terga covered with dark purple-brown scales

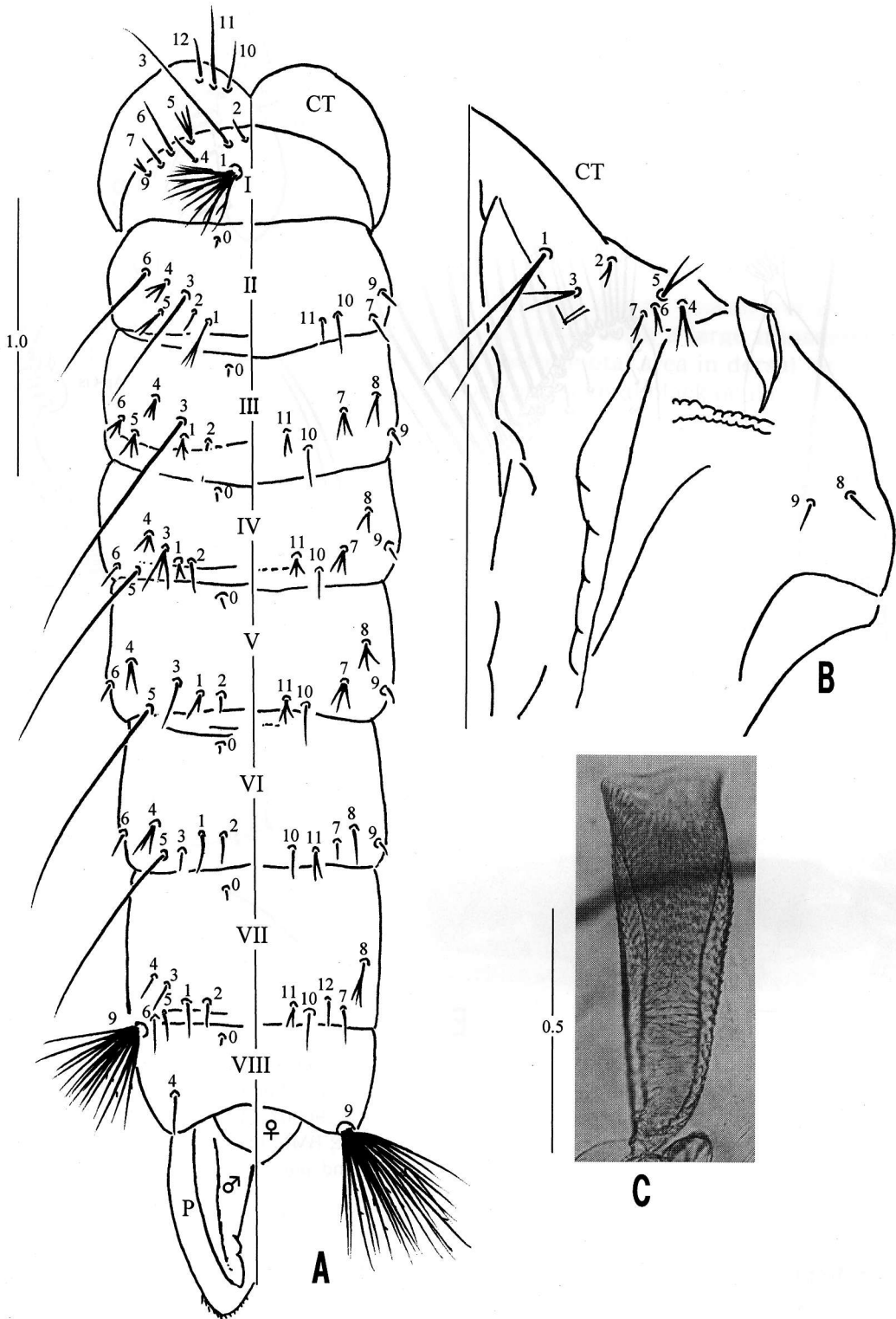


Fig. 2. Pupa of *Topomyia (Suaymyia) kelabitense*. A, cephalothorax (CT) and abdomen (dorsal and ventral aspects); B, cephalothorax (dorsal aspect); C, trumpet. Scales in mm.

Table 1. Chaetotaxy of the pupae of *Topomyia kalabitense* n. sp.

Seta no.	Cephalo-thorax	Abdominal segments							
		I	II	III	IV	V	VI	VII	VIII
0	—	—	1	1	1	1	1	1	1
1	2	m*	3-5	2-6	1-4	2, 3	1-3	1, 2	—
2	1, 2	1	1	1	1	1	1	1	—
3	1-3	1	1	1	1-5	1, 2	1, 2	1 (1, 2)	—
4	1-4	1	2-4	2-4	1-5	1-4	1-3	1 (1, 2)	1, 2
5	1-3	2-5	1-3	2, 3	1	1	1	1 (1, 2)	—
6	1-3	1	1	2, 3	1-4	1, 2	1	1 (1, 2)	—
7	1-3	1, 2	1-3	1-4	2-5	2, 3	1	1	—
8	1	—	—	1-3	1-3	1-3	1-3	2-4	—
9	1, 2	1, 2	1	1	1	1	1 (1, 2)	14-24**	21-24**
10	1, 2	—	1, 2***	1-4	1-3	1, 2	1, 2	1, 2	—
11	1, 2	—	1, 2	2-4	1-4	1-3	1, 2	1, 2	—
12	1, 2	—	—	—	—	—	—	1***	—

\*Fanlike setae with 7-12 main branches. \*\*Aciculated. \*\*\*Often obsolete.

Obsolete and missing setae are shown with a hyphen (—).

Specimens examined: 5 pupal exuviae from Bario, Sarawak.

dorsally. Segment II with dorsal white patch; I and III with a lateral patch of white scales; IV-VI with latero-apical patch which extends dorsally; VII without lateral white patch (Fig. 1E). All ungues small equal in size, without lateral tooth.

Pupa (Fig. 2A-C, Table 1).

*Cephalothorax* (Fig. 2A, B): Trumpet 0.45 mm in length; yellowish brown in color, with fine sculpturing, not strongly broadened towards pinna; index (length/width) 5.75 (Fig. 2C). Seta 1-CT strongly developed, usually bifid, setae 10-12-CT small, usually single sometimes double.

*Abdomen* (from segments I to VIII): About 3.70 mm long, with microtrichia on all segments uniform; abdominal seta 1-I well developed, moderately long, dendritic; 1-II 3-5 branched with stout basal stem; 3, 6-II well developed, single; 5-IV-VI long, single; 9-VII, VIII strongly developed, fanlike with aciculate branches. Paddle long, 1.61 mm, with distinct midrib reach to basal 0.6 of paddle length in male and 0.9 in female, with microtrichia uniform, ending in a blunt point with minute spicules along apical margin; index (length/width) 2.30. Setae 1-Pa indistinct. Genital lobe extending to about 0.92 of paddle in male and 0.36 in female.

Fourth-instar Larva (Fig. 3A-G, Table 2).

*Head* (Fig. 3D): Moderately tanned. Length 0.93-1.08 (mean=1.02) mm, width 1.12-1.29 (mean=1.21) mm; seta 1-C stout, simple; setae 4, 6 and 11 well developed, single; seta 15 usually obsolete, rarely single. Dorsocentral plate heavily tanned with median tooth and 5-8 (mean=7) smaller teeth on either side. Mouth parts modified for predation. Mouth brushes pectinate. Mandible black with a large dorsal tooth and 3 ventral teeth, seta 2 well developed. Maxilla (Fig. 3C) developed. Maxillary body (MxB) with developed apical tooth (AT). Maxillary bundle (MxBn) fused into MxB, with a row of usually 4 laciniarastrium (LR) which are stout blunt apically. Seta 1 minute, 2 spines close together; seta 2 small, 1-3 branched; seta 3 single, seta 4 small, 3-5 branched. Antenna 0.25-0.27 (mean=0.26) mm length, about 0.28 length of head. Seta 1-A weak, single, arising 0.74 from base, extending over tip of antenna.

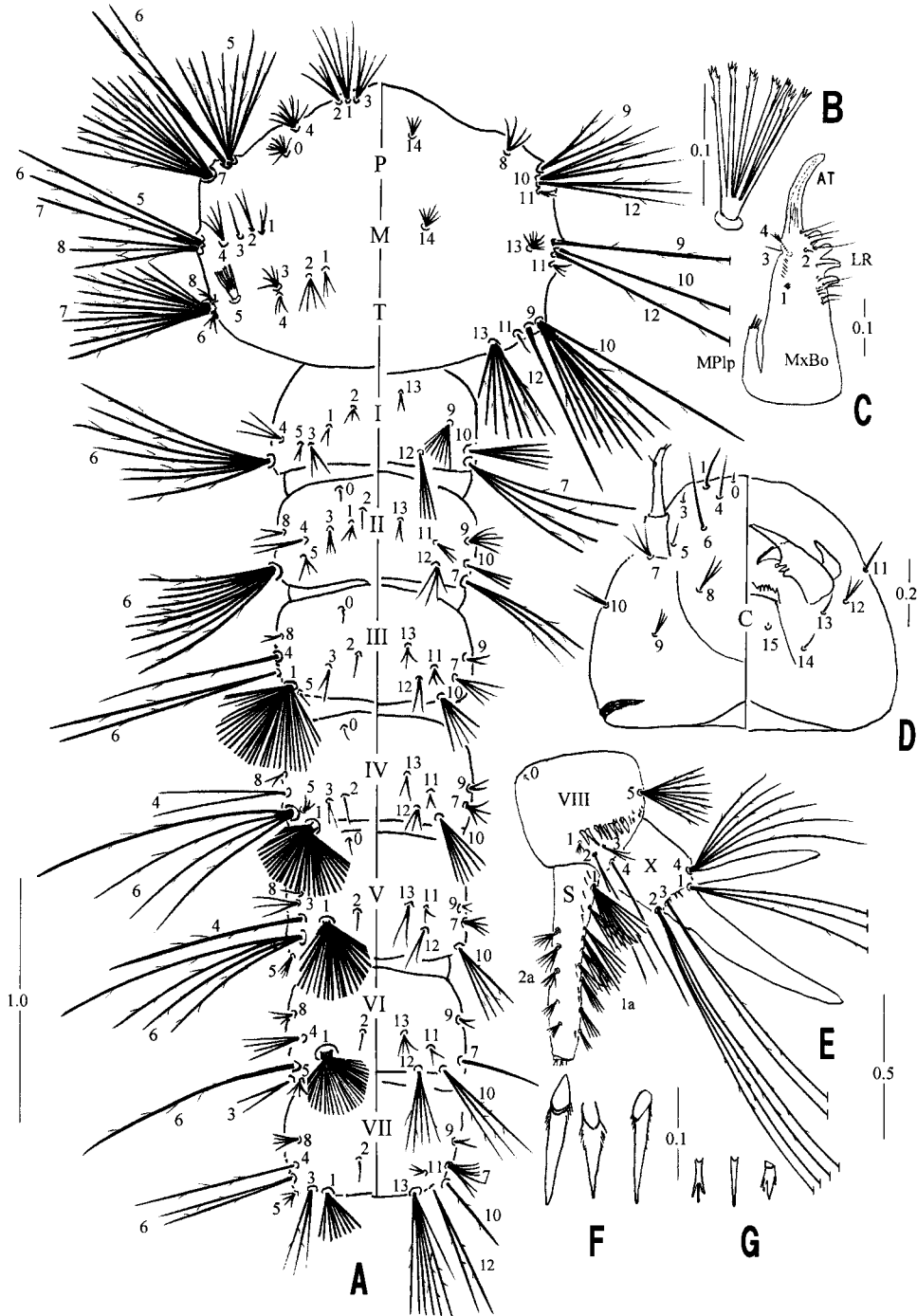


Fig. 3. Fourth-instar larva of *Topomyia (Suaymyia) kelabitense*. A, thorax and abdominal segments I-VII (dorsal and ventral aspects); B, thoracic seta 5-T; C, maxilla; D, head (dorsal and ventral aspects); E, abdominal segments VIII, X (ventral aspect); F, comb teeth; G, pecten teeth; AT, apical teeth; LR, laciniarastrum; MP1p, maxillary palpus; MxBo, maxillary body. Scales in mm.

Table 2. Chaetotaxy of the fourth-instar larvae of *Topomyia kelabitense* n. sp.

Seta no.	Head	Thorax			Abdominal segments								
		P	M	T	I	II	III	IV	V	VI	VII	VIII	
0	1	10-16*	—	—	—	1	1	1	1	1	1	1	1
1	1	5-7	1-3	2-4	1-4	3-5	35-43**	21-37**	36-47**	38-46**	9-13*	5-13	
2	—	4-6	2, 3	4-6	1-3	1 (1, 2)	1	1	1 (1, 2)	1	1, 2	2 (1, 2)*	
3	1	1-5	1, 2	5-7	1-4	3-7	2, 3	2, 3	3-6*	2, 3*	2-4*	3-6	
4	1	9-13*	3-5	3-6	3-8*	2, 3	1, 2*	2, 3*	1*	2-5*	1 (1, 2)*	1(1, 2)*	
5	1-4	8-19*	1 (1, 2)*	4-9*	2-5	3-5	1-5	3-5	4-6	4-6*	3-5	9-12*	
6	1	2, 3*	1 (1, 2)*	3-6	6-9*	8-10*	2, 3*	4-7*	4-6*	1 (1, 2)*	1, 2*	—	
7	1-6	11-17*	1-3*	11-15*	3-10*	3-6*	4-8	4-8	3-7*	1, 2*	7-12*	1-X=3-5*	
8	3-5	3-7	3-6*	3-6	—	1-4	1, 2	2 (1, 2)	1-3	2-6	4-10	2-X=3, 4*	
9	2-5	2-6*	1*	8-15*	8-12*	5-9	2-4	2-4	2-4	1-5	2-6	3-X=2, 3*	
10	2-4	4-6*	1*	1*	5-11*	3-7	4-6	6-9	4-8*	3-6*	1 (1, 2)*	4-X=5-9*	
11	1, 2	2-6*	2-5	1, 2	—	3-5	3-5	2, 3	2-4	2-7	2-5	—	
12	3-6	2-4*	1*	1*	3, 4	3-7	2-5	2-4	2-4	4-6*	1-4*	—	
13	1-6	—	12-19	8-20*	1-5	1, 2	1-3	1, 2	1-3	4-16	7-12*	—	
14	1-3	2-4	6, 7	—	—	—	—	—	—	—	—	—	
15	1***	—	—	—	—	—	—	—	—	—	—	—	

\*Aciculated. \*\*Stellate. \*\*\*Often obsolete.

Obsolete and missing setae are shown with a hyphen (—).

Specimens examined: 5 fourth-stage larvae from Bario, Sarawak.

*Thorax* and *abdomen* (Fig. 3A, E): Setae 5-7-P large with many aciculate branches; setae 0, 4-P small with many aciculate branches; 5- 7-M large usually single aciculated; 9, 10, 12-M large single aciculated; 7, 9, 13-T large with many aciculate branches; 5-T stout, 4-7 branched, each with comb-tipped branches (Fig. 3B); 10, 12-T large single. Stellate setae with many aciculate branches, present in setae I-III-VII; setae 6-I, II 5-9 branched; 6-III 2, 3 branched; 6-IV, V 4-7 branched; 6-VI, VII usually single. All these setae long with aciculate branches.

*Siphon* (Fig. 3E): Length 0.67-0.78 (mean=0.73) mm; variable in length, broad at base, tapering, lightly pigmented; index (length/width) 4.7-6.0 (mean=5.6). Comb scales 9-21 in an irregular row, individual scales usually pointed and with fine fringes towards base (Fig. 3 F). About 5-24 fine pecten teeth (Fig. 3 G) scattered from base to apical part. One pair of basal seta (1-S) of ventral siphon long, 4-8 branched; other ventral setae (1a-S) 7 or 8 unpaired, each with 3-7 branches. Dorsal seta (2a-S) 4 or 5 pairs with 4-15 branches. Saddle incomplete, with fine spines on posterior margin. Segment X (Fig. 3E), 1-X 3 branched; 2-X 3, 4 branched; 3-X 2, 3 branched; 4-X 5-9 branched; all these setae long with aciculate branches. Gill elongate, tapering.

Eggs. Unknown.

*Type specimens.* Holotype ♂ (090907-11) on pin with L (larva) and P (pupa) exuviae mounted on a slide (157) and G (genitalia) on another slide (G52) with following collection data: Arur Dalan (elevation 1,000-1,200 m above sea level), Bario, Sarawak, Malaysia, collected as larva from leaf axil of *Phrynium capitatum*, Sept. 7, 2009 and reared to adult in the laboratory.

Paratypes. 4♂♂ (090907-11), L and P exuviae on slide (73, 205, 216 and 217) with genitalia on slide (G26, G83, G87 and G86); 1♀ (090907-11) with P (88), 6 whole larvae

(090907-11) collection data same as holotype; 1♂ (080826-5), L and P exuviae on slide (319) and on slide (G106); 1♂ (080824-35) with (G22) collected in *P. capitatum* leaf axils, Ba' Kelalan (elevation 1,000 m), Sarawak, Malaysia, Aug. 25 and 26, 2008. All specimens were collected and mounted by I. Miyagi and T. Toma. Holotype and some paratypes will be deposited in the US National Museum, Washington DC, U.S.A. and some paratypes will be deposited in the Sarawak Museum, Kuching, Malaysia.

*Taxonomic Discussion.* This species can be easily distinguished from all other species of the subgenus by the following distinctive characters of male genitalia: Basal dorsomesal lobe with 5–8 conspicuous long and short lanceolate setae and claspette short stem with a very long simple seta which is apparently longer than the length of the gonocoxite. Gonostylus long, straight, bifurcated apically, with prominent curved blunt terminal gonostylar claw. An accessory oval lobe (Ap-Gs) directed posteriorly beyond apex with 6–9 sinuous setae marginally. A row of 3 or 4 fine spines between gonostylar claw and accessory oval lobe. Tergum IX with widely separated lobe by narrow bridge, each lobe short with a long stout seta that is curved outwards, usually two, rarely one or three pairs of setae somewhat spaced in the middle. The larva of *To. kelabitense* can be distinguished by the maxillary body with developed apical tooth with a row of 4 laciniarstrum, seta 5-T with 4–7 comb-tipped branches and well developed siphonal setae. On the basis of the male genitalia, *To. kelabitense* somewhat resembles *To. roslihashimi* from Gombak, Peninsular Malaysia (Miyagi and Toma, 2005). Both species have short claspette with a single very long seta and gonostylus curved with accessory basal lobe with many fine setae, bifurcated into two lobes apically and with a gonostylar claw large dark brown but gonocoxite is quite different, bearing a ventrosabapical tuft of many long filamentous setae in *To. roslihashimi*, without such tuft of seta in *To. kelabitense*.

*Biological Notes.* The larvae and pupae of *To. kelabitense*, n. sp. were found mainly in the leaf axils of *Phrynium capitatum*. The Kelabit cook rice and wrap it in the leaf of this plant as a lunch box. The plants are called Daun Itip by the Kelabit and found abundantly around wooden huts in the rice fields. Usually, the mature larvae of *To. kelabitense* were collected singly from the leaf axil. The larva has a well developed maxilla and preys readily on the larvae of other mosquitoes in a small rearing container. None of the members of the genus are capable of sucking blood and some of the species feed predominantly on nectar or other plant exudates (Thurman, 1959, Mogi and Miyagi, 1989).

*Etymology.* The species name *kelabitense* refers to the name of the Kelabit, one of the smallest tribes in Sarawak, Malaysia. The Bario Highland at about 1,000 m above sea level, is home for the Kelabit people.

*Distribution.* Known from Bario and Ba'Kelalan, Sarawak, Malaysia.

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