

## *TOPOMYIA (TOPOMYIA) YONGI*, A NEW SPECIES OF MOSQUITO FROM PENINSULAR MALAYSIA (DIPTERA: CULICIDAE)

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**ABSTRACT.** A new species of mosquito, *Topomyia (Topomyia) yongi* is described from peninsular Malaysia. The male, male genitalia, female, pupa and larva are described in detail and illustrations of the male genitalia, pupa and larva are provided. This species is a rain forest mosquito and breeds in the leaf axils of *Homalomena rostrata*.

### INTRODUCTION

While examining specimens collected by the Japan-Malaysia mosquito research team in peninsular Malaysia, we found a species belonging to the genus *Topomyia*, subgenus *Topomyia*, from the forest at Hulu Gombak which was distinct from all the described species of this subgenus (Knight and Stone 1977, Knight 1978, Ward 1984, Lu et al. 1986, Ramalingam 1987, Ramalingam and Banu 1987, Ramalingam and Ramakrishna 1988). Further studies revealed that this species is closely related to *To. tenuis* Edwards from the Malay Peninsula, differing only slightly but consistently in the male genitalia. The terminology used in the description of the species follows Harbach and Knight (1980, 1982).

*Topomyia (Topomyia) yongi*, n. sp.

**Male.** Small to medium in size. Wing about 2.54 mm. Proboscis about 1.72 mm. Dark brown mosquito with silver markings on head and thorax. **Head:** Vertex, occiput, side of head and postgena covered with broad, flat, silver decumbent scales; erect scales absent. Eyes touching each other above antennae; a pair of interocular and several ocular setae present. Clypeus small, elongate, brown, bare. Maxillary palpus small, covered with dark scales. Proboscis slender, covered by dark scales except for patch of silver-white scales on basal 0.2 and ventral line of white scales extending from the base to apex of prementum. Pedicel of antenna brown, with grayish tinge. **Thorax:** Integument of scutum, scutellum and pleura brown; scutum densely covered with narrow, curved, brown scales; 4-6 dorsocentral and several prescutellar, anterior promontory, median scutal fossal and supraalar setae present; a median line consisting of 2 rows of flat silvery scales on prescutellar area. Central and lateral lobes of scutellum black, sometimes silvery scales. Anteprenotum with con-

spicuous patch of silver-colored scales dorsally; a row of several setae on anterior side. Postpronotum covered with flat golden scales. Proepisternum covered with patch of silver-colored scales, with 1 seta. Paratergite with golden scales. Postspiracular area, prealar knob, mesokatepisternum and mesanepimeron with dense silver scales; prespiracular area with 3 fine setae. **Legs:** Coxae and trochanters covered with silver-colored scales; 2, 3 coxal setae present. Remaining parts of legs covered with small dark scales except for ventral pale scales extending from femora to tibiae. Ungues all small, simple and equal in length. **Wing:** Brown-scaled. Squame and plume scales covering veins. Cell R<sub>2</sub> about 3.1 times length of vein R<sub>2+3</sub>. Anal vein ending far beyond base of mediocubital crossvein. Alula with several fine piliform scales; upper calypter bare. **Halter:** Capitellum with dark scales. **Abdomen:** Terga I-VIII covered with dark brown scales; sterna II-VIII covered with flat golden scales. **Genitalia** (Fig. 1B-F): Tergum IX broad throughout with poorly defined lobes; a submedian strong flat spine arises from each lobe; with 2 elongate and pointed setae lateral to the spine. Gonocoxite narrow at base, broader distally; ventrally covered with scales and a few setae; lateral 0.67 highly sclerotized and bearing many long bent setae; center of dorsal surface with cluster of bent setae. Gonostylus (Gs) long, base broad with a patch of tiny setae on outer margin, middle narrow distal 0.25 broad; bearing a short terminal spine (gonostylar claw) and many fine setae. Dorsal lobe of claspette (Cl) composed of a broad rod-like stem and a narrower, elongate and pointed filament. Ventral lobe setaceous and bearing 2 large setae. Paraproct fairly long and pointed.

**Female.** Wing about 2.56 mm. Proboscis about 1.60 mm. Forefemur about 1.82 mm. Abdomen about 1.58 mm. Resembles male except ventral pale band on proboscis not prominent.

**Pupa** (Fig. 2 A-C). Abdomen 2.78-3.11 mm. Trumpet 0.25-0.37 mm. Paddle 0.53-0.60 mm. Integument of cephalothorax (CT) and abdomen yellow. Chaetotaxy as in Fig. 2 and Table 1. **Trumpet:** Dark yellow in color, with fine sculpturing; index 2.2-2.5; pinna 0.11-0.24 trumpet length. Seta 1-CT long, conspicuous, double; setae 2-4, 8-12-CT inconspicuous, single or double. **Abdomen:** Minute spines anteriorly on sterna II-VIII. Seta 1-C dendritic,

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*Topomyia (Topomyia) yongi*

B

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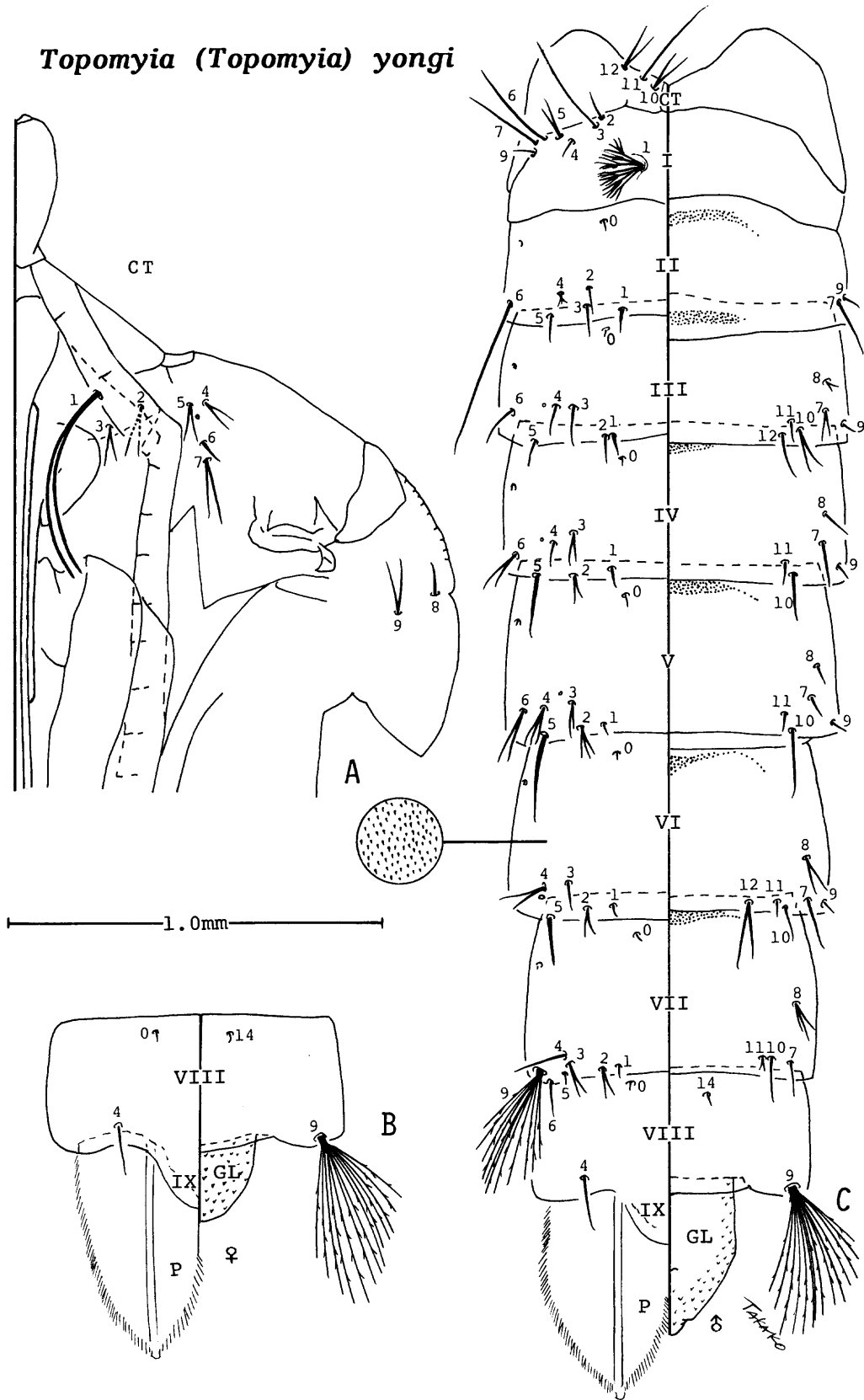


Fig. 2. Pupa of *Topomyia (Topomyia) yongi*: A. Cephalothorax; B. Distal part of abdomen of female; C. Abdomen of male.

**Table 1.** Chaetotaxy of the pupa of *Topomyia (Topomyia) yongi*<sup>1</sup>.

Seta No.	Cephalo-thorax	Abdomen								
		I	II	III	IV	V	VI	VII	VIII	
0	-	-	1	1	1	1	1	1	1	1
1	2	m*	1	1	1	1	1	1	1	-
2	1,2 (2)	1,2 (1)	1,2 (1)	1-3	2-5	2-6	2-6	1-5	-	-
3	1,2 (2)	1,2 (1)	1	1-3	2,3	1-3	1-3	1,2	-	-
4	1,2 (2)	1-4 (1)	1-4	1-3	1-3	2-4	1-4	1,2 (1)	1,2 (1)	-
5	2-4	1-4	1	1,2	1,2	1	1	1	-	-
6	1,2 (1)	1,2 (1)	1	1,2	2-4	1-3	1**	1-3	-	-
7	1-3	1,2	1,2	1-4	1-3	1-4	1,2 (1)	1	-	-
8	1,2 (1)	-	-	1-3	1-3	1-4	1-3	2-4	-	-
9	1,2	1,2 (1)	1	1	1	1	1	10-20	13-22	-
10	1,2	-	-	1,2	1,2	1,2	1,2+	1,2	-	-
11	1	-	-	(1,2) 1	(1-3) 1	1-3	1,2	1,2	-	-
12	1,2	-	-	1**	-	-	1-3	-	-	-
14	-	-	-	-	-	-	-	-	-	1

<sup>1</sup>Branching counts from 7 specimens.

\*Multiple, \*\* usually absent, + present or absent.

with 5-8 main branches, each divided repeatedly and ending as fine hairlike branches. Seta 3-I long, single, sometimes double; 1-II always single, 3-II single, 6-II long, single; 1-III single, 12-III single when present, usually absent; 1-IV-VI single; 6-VI absent, 10-VI single or double, sometimes absent; 12-VI present, 1-3 branched; 9-VII 10-20 branched, aciculate; 9-VIII 13-22 branched, aciculate. Paddle uniformly and lightly pigmented, with distinct midrib and distinct marginal fringe; length about 2.7-3.1 times width. Male genital lobe as illustrated (Fig. 2B), extending to 0.69-0.86 of paddle, female genital lobe to 0.4 of paddle.

**Larva** (Fig. 3 A-G). **Head:** Length about 1.01 mm. Width about 1.38 length. Pigmentation yellow, integument smooth. Dorsomentum (Dm) with median tooth and 11-13 smaller teeth on either side. Maxilla without a well-developed maxillary horn. Chaetotaxy as in Fig. 3 and

Table 2. Seta 1-C pigmented, short, stout, not curved; 4, 5, 6-C single; 7-C single to 7 branched; 11-C long, 5-8 branched; 12-C 2-5 branched; 13-C 1-3 branched; 14-C long, 3-6 branched; 15-C small, single or double. **Antenna:** Length about 0.29 of head length. Seta 1-A inserted 0.7 from base, weak, single, extending to tip of antenna. **Thorax:** Seta 1-P 5-11 branched; 2-P single; 3-P 3 or 4 branched; 4-P 5-15 branched; 5-P with short and long branches, 6-14 branched; 6-P long, 5-8 branched, 1.2 length of 9-P; 7-P long, twice as long as 6-P; 5, 6-M long, single, 1.4 length of 9-P; 7-T long, 1-4 branched, 1.3 length of 9-P; 9-T long, 5 or 6 branched, 1.5 length of 9-P; 10-T long, single or double, 1.3 length of 9-P. **Abdomen:** Seta 1-IV-VII well developed, stellate; 6-I long, 4-8 branched; 6-II 4-7 branched; 6-III-VII single; 7-I long, double or triple and 7-11 long, double, both setae slightly shorter than 6-VI. Comb scales

**Table 2.** Chaetotaxy of the fourth stage larva of *Topomyia (Topomyia) yongi*.<sup>1</sup>

Seta No.	Head	Thorax			Abdomen									
		Pro-	Meso-	Meta-	I	II	III	IV	V	VI	VII	VIII	X	
0	1	3-9	-	-	-	-	1	1	1	1	1	1	-	
1	1	5-11	1-3	1-3	2-4	2,3	2-9	18-26	17-29	17-47	17-35	3-6	4-7	
2	-	1	1	1-4	2,3	2,3	1-3	1,2	1,2	1,2	2,3	2,3	4-7	
3	1	3,4	1	1-3	1-3	2-5	1	1	1-6	2-4	2,3	1-4	1,2	
4	1	5-15	1,2	2-4	3-5	1-3	1-3	1,2	1,2	2,3	2-5	1-3	2,3	
5	1	6-14	1	3-5	1,2	2-5	2-5	1-3	1-3	2,3	1,2	2-4	-	
6	1	5-8	1	1-4	4-8	4-7	1	1,2 (1)	1	1	1	-	-	
7	1-7	2	1-4	1-4	2,3	2	3-5	2,3	3-5	1-4	1-3	-	-	
8	1-3	5-9	2,3	4-6	-	1	1-3	1,2	1,2	3-5	2-7	-	-	
9	1-6	5,6	2,3	5,6	1,2	1,2	2	2	1,2	2,3	2-5	-	-	
10	1-5	1,2	1	1,2	1,2	2	1-3	2,3	2-4	2,3	1	-	-	
11	5-8	1	1	1	5-9	2-4	2-4	2,3	2,3	1-3	2-4	-	-	
12	2-5	1	1	1,2	-	2-5	1,2	1	1	2-4	2,3	-	-	
13	1-3	-	5-10	4-8	3,4	2,3	2,3	2,3	1-3	1,2	3-5	-	-	
14	3-6	-	3-5	-	-	-	-	-	-	-	-	1	-	
15	1,2	-	-	-	-	-	-	-	-	-	-	-	-	

<sup>1</sup>Branching counts from 4 fourth stage larvae and 7 larval exuviae.

(CS) in irregular row, 5-8 individual scales, these large, pointed and with fine fringe. *Siphon*: Length 0.62-0.72 mm; lightly pigmented; long, broad at base and with sides somewhat parallel in basal 0.67 and tapering towards apical 0.33; index 3.4-4.1; pecten extending from basal 0.12 to apical 0.24, with 2-6 large spines (PS), these characteristically with denticulate margins. Seta 1-S double or triple; 1a-S 9-11 in number, each 1-3 branched, apical 3 tufts shorter, always on a line, other tufts on irregular line; 2a-S 6-8 in number (3, 3.5 or 4 pairs) each seta with 2-4 branches. *Saddle*: About 0.32 mm. Stellate setae present, but spicules absent. Integument smooth.

**Type data.** Holotype male (no. 39), with slides of associated larval and pupal exuviae and male genitalia (G-25), Hulu Gombak Forest Reserve, Selangor, Darul Ehsan, peninsular Malaysia, 8 August, 1989, I. Miyagi and T.

Toma. Paratypes: 4 females (nos. 39, 44, 75, 120), with slides of associated larval and pupal exuviae and male genitalia and 3 females (nos. 13, 20, 73) with slides of larval and pupal exuviae. Three larvae (890808-1-1, 890808-1-2 and 890808-1-3), same data as holotype and 1 larva (900118-1), Hulu Gombak, 18 January, 1990, Miyagi and Hasegawa. Holotype and some paratypes will be deposited in the National Museum of Natural History, Smithsonian Institution, Washington, DC, 20560, USA.

**Etymology.** This species is dedicated to Dr. Yong Hoi Sen, Professor of Zoology, Department of Zoology, Faculty of Science, University of Malaya, Kuala Lumpur, Malaysia, for his contributions to mosquito biology in Malaysia and for his cooperation and encouragement during mosquito surveys in Malaysia, 1988 to 1990.

**Biology.** *Topomyia yongi* was collected in the Hulu

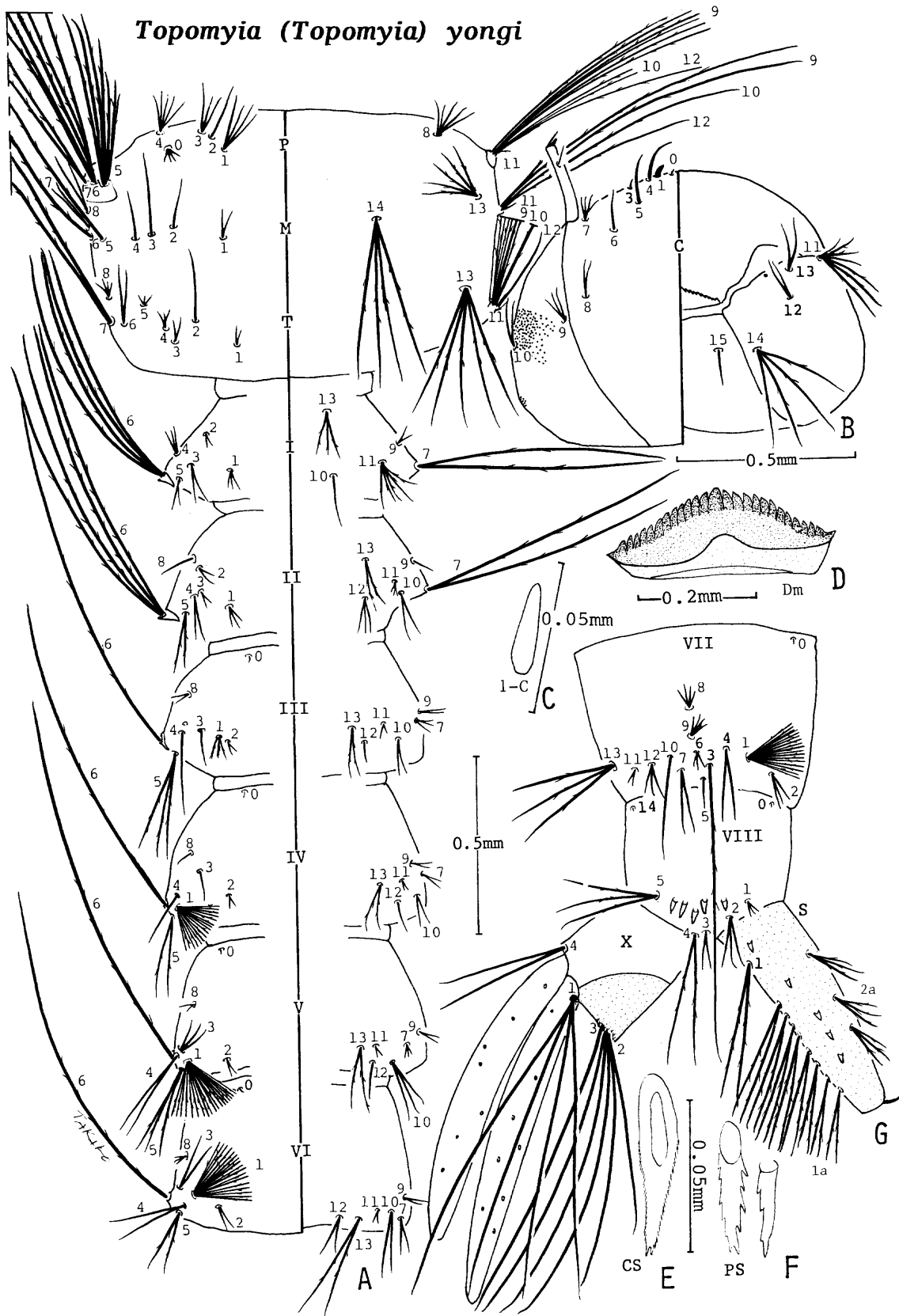


Fig. 3. Larva of *Topomyia (Topomyia) yongi*: A. Thorax and abdominal segments I-VI; B. Head; C. Seta 1-C; D. Dorsontum; E. Comb scale; F. Pecten spines; G. Distal part of abdomen, segments VII-X.

Gombak forest, at an elevation of about 200 m. This species is a rain forest mosquito and breeds exclusively in leaf axils of *Homalomena rostrata* Griff (Fig. 1A). The larvae of *To. yongi* were collected in the central (and youngest) leaf axils of this plant, as only these axils hold water. Species collected from these axils with *To. yongi* included *To. tipuliformis* Leicester and *Malaya genurostris* Leicester. Nothing is known of the biology of the adults.

### TAXONOMIC DISCUSSION

*Topomyia yongi* has similarities in the male genitalia with *Topomyia tenuis* Edwards (Edwards 1922a, 1922b) and *Topomyia svastii* Thurman (1959). However, it can be separated from the latter two species by the following points: (1) gonocoxite with a dense tuft of long black setae at the external apical margin and with a cluster of many bent setae above the center; (2) ventral lobe of claspette bearing conspicuous spines of 2 sizes; (3) gonostylus somewhat expanded apically, with terminal spine and many fine setae; and (4) tergum IX lobes weakly developed, each with a submedian strong spine and 2 pointed setae.

As the larval and pupal stages of most species of the genus *Topomyia* are as yet unknown, it is difficult to discuss the characteristic features of *To. yongi*. However, the short and stout pigmented seta 1-C, 3-6 long-branched seta 14-C, the irregular row of 5-8 comb scales and the pecten with 2 to 6 spines extending from the basal 0.12 to apical 0.24 of the siphon may be characteristic of this species. In pupa, the presence of setae of 12-III and 12-VI, and absence of seta 6-VI are unique.

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### REFERENCES CITED

- Edwards, F.W. 1922a. A synopsis of adult Oriental culicidae (including megarhinine and sabethine) mosquitoes. Part I. Indian J. Med. Res. 10:249-293.
- Edwards, F.W. 1922b. A synopsis of adult Oriental culicine (including megarhinine and sabethine) mosquitoes. Part II. Indian J. Med. Res. 10:430-475.
- Harbach, R.E. and K.L. Knight. 1980. Taxonomists' glossary of mosquito anatomy. Plexus Publishing, Inc. Marlton, New Jersey, 415 pp.
- Harbach, R.E. and K.L. Knight. 1982. Corrections and additions to *Taxonomists' glossary of mosquito anatomy*. Mosq. Syst. (1981) 13:201-217.
- Knight, K.L. 1978. Supplement to "a catalog of the mosquitoes of the world (Diptera: Culicidae)." Thomas Say Found., Entomol. Soc. Am. Vol. 6 (suppl.), 107 pp.
- Knight, K.L. and A. Stone. 1977. A catalog of the mosquitoes of the world (Diptera: Culicidae). 2nd edition. Thomas Say Found., Entomol. Soc. Am., Vol. 6, xi + 611 pp.
- Lu, B.L., X.S. Dong and X.Z. Wang. 1986. A new species subgenus *Topomyia* of genus *Topomyia* (Diptera: Culicidae). Acta Zootax. Sinica 11:406-408 (in Chinese with English summary).
- Ramalingam, S. 1987. Description of a new species of *Topomyia* from peninsular Malaysia (Diptera: Culicidae). Mosq. Syst. 19:245-250.
- Ramalingam, S. and Q. Banu. 1987. Studies on the genus *Topomyia*: 2. Description of a new species from Sabah, Malaysia (Diptera: Culicidae). Trop. Biomed. 4:119-124.
- Ramalingam, S. and K. Ramakrishna. 1988. Studies on the genus *Topomyia*: 1. A new species from Sabah, Malaysia. Mosq. Syst. 20:33-40.
- Thurman, E.B. 1959. A contribution to a revision of the Culicidae of northern Thailand. Univ. Maryland Agr. Exp. Sta. Bull. A-100, 182 pp.
- Ward, R.A. 1984. Second supplement to "A catalog of the mosquitoes of the world (Diptera: Culicidae)". Mosq. Syst. 16:227-270.