

*Tripteroides (Rachionotomyia) ponmeki* (Diptera: Culicidae): A new species from Khammouane Province, Lao PDR

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**Abstract:** *Tripteroides ponmeki* sp. n. of the subgenus *Rachionotomyia* is described from specimens collected in Khammouane Province, Lao PDR. The larva of this species differs significantly from other species of the subgenus in having unique modifications in head seta 1-C which is stout with many hairs apically and thoracic setae 6-M and 7-T which are not stout and not spinose and without basal arm. The description includes illustrations and photographs of the adults, male and female genitalia, pupa and fourth-instar larva. The larva breeds mainly in bamboo internodes in rain forests.

This study is based on the specimens collected in 1999 and 2000 by the authors under a scientific research grant from the Japanese government for cooperative research with the Center of Malariology, Parasitology and Entomology in Vientiane, Lao, PDR entitled "Epidemiological studies on mosquito borne diseases in Lao PDR". In the course of sorting and classifying these specimens from Khammouane Province, Lao PDR, an interesting non-ornamented species of the genus *Tripteroides* was found. After careful comparison with descriptions of *Tripteroides* species from the Oriental region (Baisas and Ubaldo-Pagayon, 1952; Mattingly, 1981; Harrison et al., 1990; Lu Baolin, 1997), the authors have come to the conclusion that it is a new species. The terminology used for the descriptions of all stages of the species follows Harbach and Knight (1980, 1982).

***Tripteroides (Rachionotomyia) ponmeki***

Miyagi and Toma, sp. n.

(Figs. 1-4; Tables 1, 2)

Female. *Head:* Vertex and occiput cov-

ered densely with broad, flat and dark scales with red and green iridescence, particularly noticeable from the dorsoanterior angle. Snow-white scales present ventrolaterally around eye margins, extending well onto the dorsal surface at the sides; postgena with dark scales. One pair of pale inter ocular seta and 6 dark ocular setae well out to either side along the eye margin. Clypeus dark, round in shape, covered sparsely with fine grayish pollen. Pedicel with grayish pollen, with several small white scales and fine setae on inner surface. Antenna short, about 0.7 to 0.8 of proboscis. Flagellomer 1 with white scales on base. Proboscis (Fig. 1A) dark with faint dark bluish reflection and stout, slightly swollen and bent downward toward apex, relatively short ( $\bar{x}$ =2.5 mm), about 1.1 of the forefemur and about 0.92 of the abdomen. Maxillary palpus entirely dark, long (0.8 mm) about 0.32 of the proboscis and several labial basal setae present.

*Thorax:* Scutum with broad dark scales, subdued red, green iridescent reflection dorsally and with broad, flat, snow-white

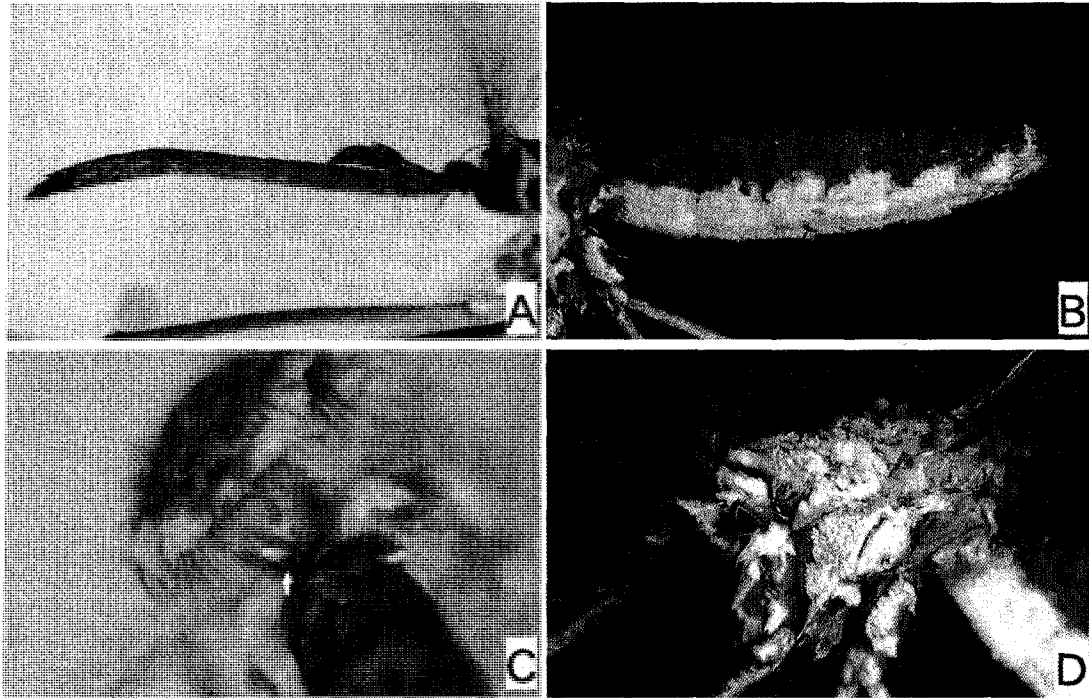


Fig. 1. *Tripteroides (Rachionotomyia) ponmeki* sp. nov., (female).

A, head, palpi and proboscis (left side); B, abdomen, lateral view (left side); C, white scales on mesopostnotum (arrow); lateral aspect of thorax.

scales on either side of anterior promontory and supraalar areas. One or two rows of about 30 strong supraalar setae present. Acrostichal, dorsocentral and prescutellar setae absent. Mid lobe of scutellum with 2 strong setae and many broad white scales; each lateral lobe with many broad snow-white and a few black scales, and 5 to 7 marginal setae. Ante and postpronotum covered densely with broad white scales and several strong anteprenotal setae; propisternum with white scales and 2 pale setae; 3 fine white prespiracular setae buried under white scales; postspiracular, mesanepimeral, prealar, paratergal and subspiracular areas covered densely with broad snow-white scales (Fig. 1D). Conspicuous setae absent on all these pleural areas, except 6-8 fine upper mesepimeral setae. Mesokatepisternal covered with snow-white scales except for anteroventral portion; a row of several lower mesokatepisternal pale setae present; mesopostnotum with 3-4 broad decumbent white

scales (Fig. 1C) and 2 dark curved setae.

*Wing:* Length 3.3-3.4 mm. Dark-scaled. Outstanding scales on the surface vein narrow, those on veins  $R_1$ ,  $R_2$  and  $R_3$  broader than others; alula with about 7 setae and upper calipter with about 12 setae; upper fork vein ( $R_2$ ) 1.4 length of its stem ( $R_{2+3}$ ). Halter: Capitellum with white and dark scales.

*Legs:* Coxae and trochanters largely covered with pale spatulate scales like those of pleura. Many coxal setae present especially on forecoxae. Forefemur about 1.2 and 1.3 longer, respectively, than the mid- and hindfemora. Anterior surface of all legs dark; posterior surface of all femora, tibiae and 1st tarsal segment pale from base to tip, without discrete pale markings. All unguis (Fig. 2G, H, J) paired, without small lateral tooth; U-III somewhat smaller than U-I and -II.

*Abdomen:* Terga entirely dark with blue and green reflections from the dorsoanterior angle, with broad white-scale patch

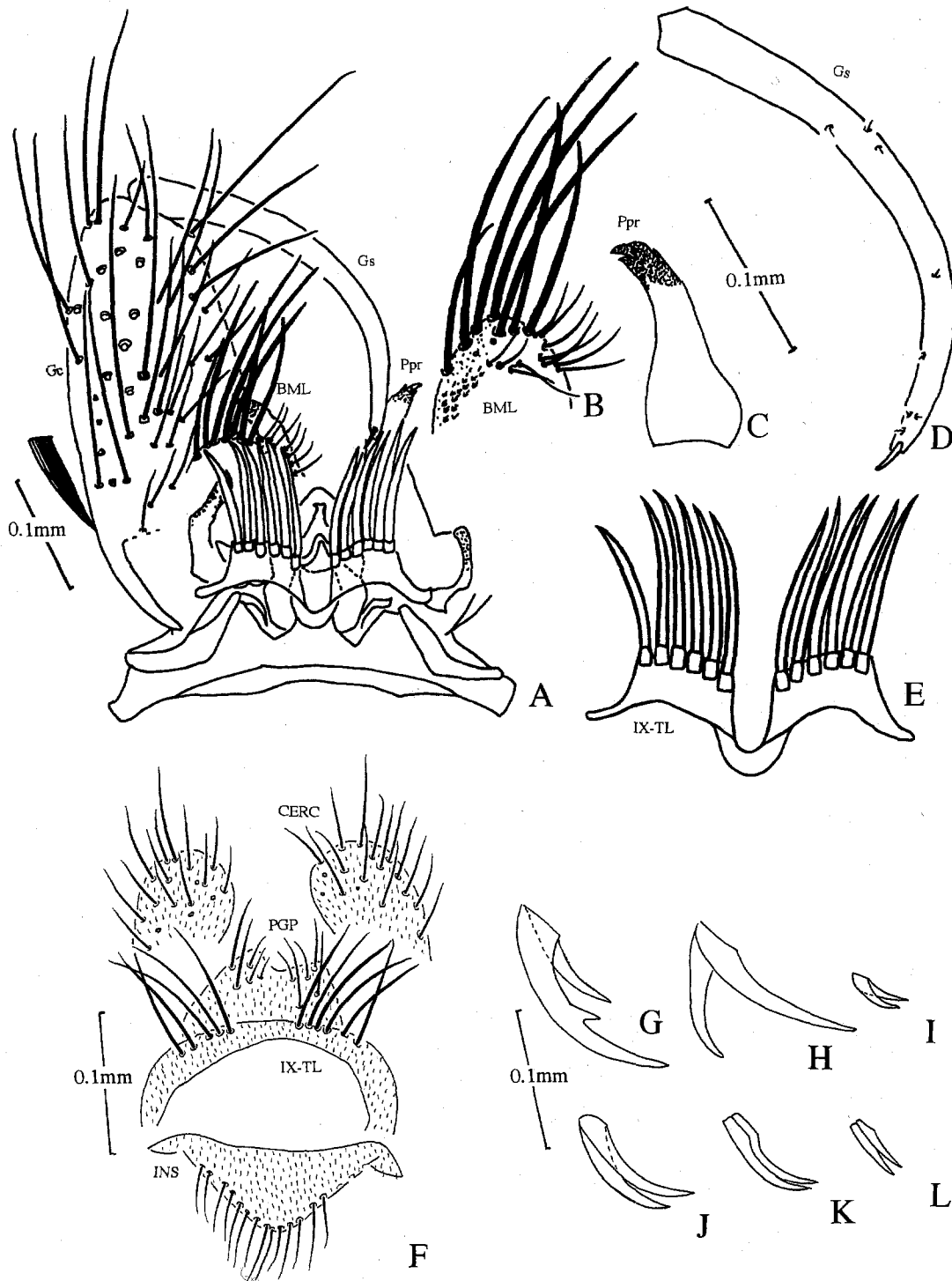


Fig. 2. Male and female genitalia, and unguis of *Tripteroides (Rachionotomyia) ponmeki* sp. nov. A, male genitalia (dorsal view); B, basal mesal lobe (BML); C, paraproct (Ppr); D, gonostylus (Gs); E, tergum IX lobe (IX-TL); F, female genitalia (dorsal view), cerci (CERC), postgenital lobe (PGL), insula (INS); G, H, I, male fore-, mid-, hindunguis; J, K, L, female fore-, mid-, hindunguis.

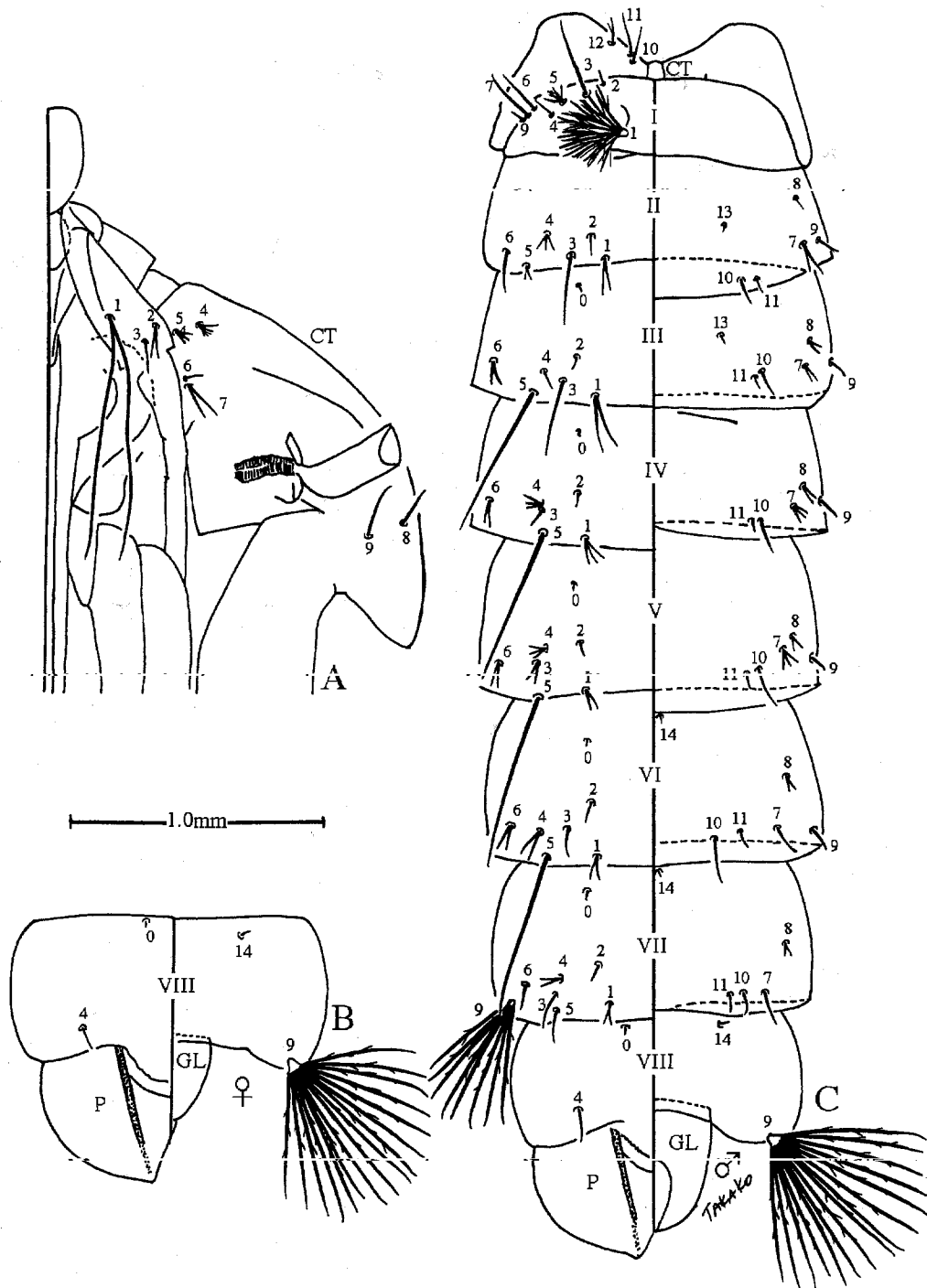


Fig. 3. Pupa of *Tripteroides (Rachionotomyia) ponmeki* sp. nov.

A, cephalothorax of male; B, terminal part of abdomen of female; C, metanotum and abdomen of male.

Table 1. Chaetotaxy of the pupa of *Tripteroides (Rachionotomyia) ponmeki* sp. nov.

Seta No.	Cephalothorax	Abdomen							
		I	II	III	IV	V	VI	VII	VIII
0	—	—	—	1	1	1	1	1	1
1	2*	M*	1-8	1-6	3-6	1-6	1-4	1-3	—
2	1, 2	1	1	1	1	1	1	1	—
3	1, 2	1	1	1	1-4	1-5	1, 2	1, 2	—
4	1-4	1, 2	2-5	1-4	1-4	2-7	2-6	1, 2	1, 2 (1)
5	2-5	3-8	1-5	1*	1*	1*	1*	1	—
6	1	1-3 (1)	1, 2 (1)	1, 2	1-4	1-4	1-3	1-3	—
7	1-3	1, 2 (1)	1-3	1-4	1-5	2-5	1-3	1-3	—
8	1	—	1**	1-3	1-3	1-5	1-7	2-5	—
9	1-3	1	1	1	1	1	1	8-12*	15-19*
10	1-3	—	—	1, 2	1, 2 (1)	1, 2 (1)	1, 2 (1)	1-3	—
11	1, 2	—	1	1	1	1	1	1	—
12	1-3	—	—	—	—	—	—	—	—
13	—	—	1,2**	1**	—	—	—	—	—
14	—	—	—	—	—	—	1	1	1

M, multiple branched; \* prominent seta; \*\* present or absent

lateroventrally (irregular lateral white patches of terga I-VII incomplete as figured in Fig. 1B). Tergum VIII with white scales dorsobasally. All sterna entirely white including sternum VIII. Genitalia (Fig. 2F): Tergum IX narrow, posterior margin emarginate with a regular line of 4-6 ( $\bar{x}=5$ ) submarginal setae on either side of midline. Distal margin of post-genital lobe emarginate in middle with 3 setae. Cerci short, with 2 setae on apical margin and with many fine setae. Insula with many marginal setae. Three spermathecal capsules, one larger than the others.

**Male.** Similar to female except for sexual characters. Head: Antenna short (0.62 of proboscis), more verticillate. Maxillary palpus 1.9 mm length, about 1.35 length of the proboscis with 2 apical setae.

**Abdomen:** Terga dark above and white laterally; terga VI and VII with lateral white scale patch on dorsal view; tergum VIII with white-scales dorsally. Mesopostnotum with 5 black curved setae and scales. Sterna white-scaled.

**Legs:** U-I large, unequal, the larger one toothed (Fig. 2G); U-II large, unequal, simple (Fig. 2H); U-III minute, equal and simple (Fig. 2I).

**Genitalia** (Fig. 2A): Tergum IX (Fig. 2E) with lateral lobes relatively broad and closely approximated with 5-6 long stout lanceolate setae. Gonostylus (Fig. 2D) slender, moderately long and curved with minute setae and gonostylar claw. Gonocoxite elongate, broadest at basal 2/3, with many conspicuous setae and scales. Basal mesal lobe (Fig. 2B) with 5-7 long lanceolate setae and many fine setae. Paraproct (Fig. 2C) elongate with 3 sclerotized apical teeth.

**Pupa** (Fig. 3). Character and positions of setae as Fig. 3 and numbers of branches in Table 1. Cephalothorax (Fig. 3A): Lightly tanned. Seta 1-CT very long, double. Trumpet: Dark, short and cylindrical, with little or no apical expansion; index about 2.4. Abdomen (Fig. 3C): Moderately tanned; dorsocentral terga I-IV noticeably darker. Seta 1-I strongly palumate; seta 5-III-V single, dark, distinctly longer

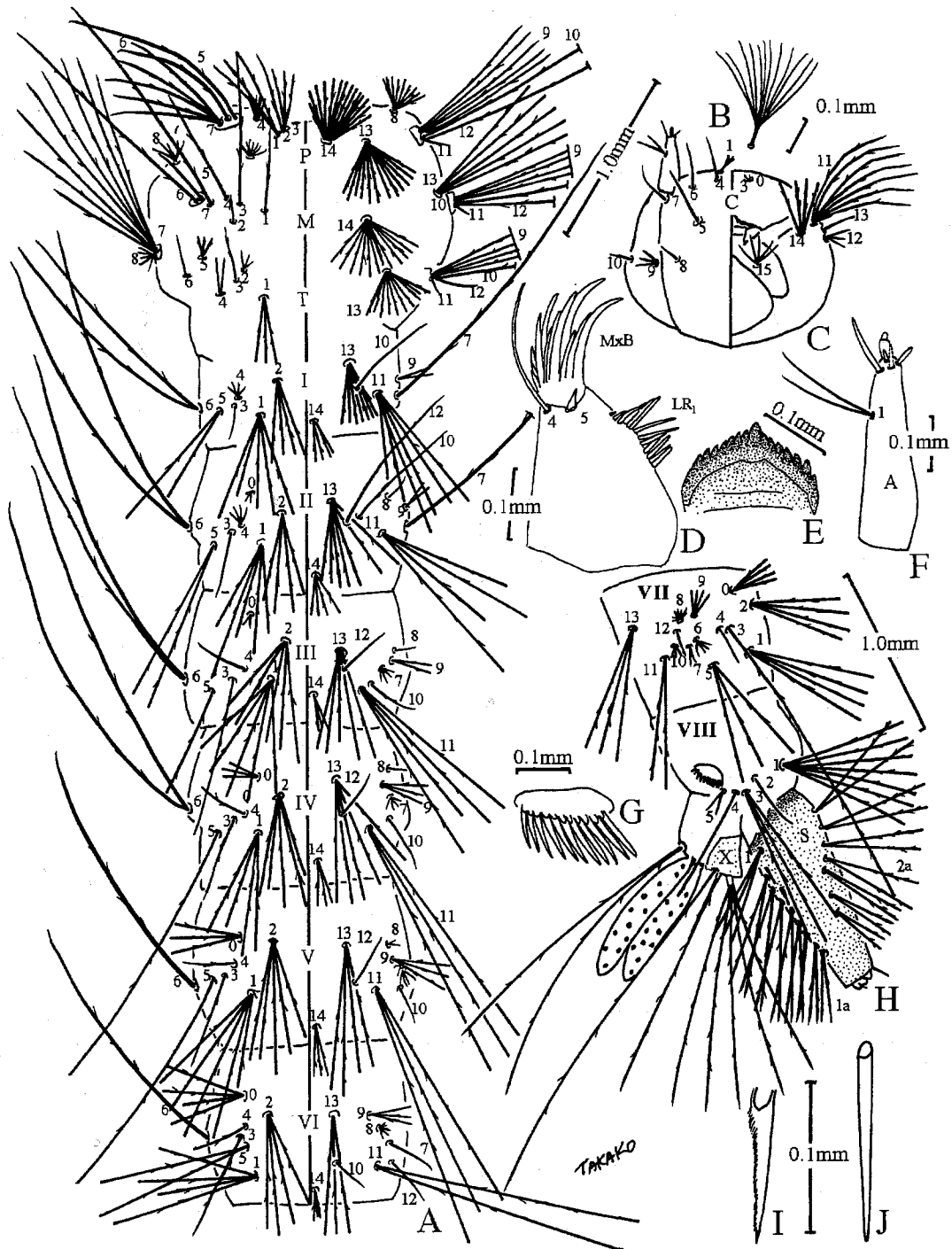


Fig. 4. Larva of *Tripteroides (Rachionotomyia) ponmeki* sp. nov.

A, thorax and abdominal segments I-VI; B, head setae C-1; C, head; D, maxillary body; E, dorsomentum; F, antenna; G, I, comb teeth; H, abdominal segments VII, VIII and X; J, pecten; MxB: maxillary brush. LR<sub>1</sub>: laciniarastrium 1.

Table 2. Chaetotaxy of the fourth-instar larva of *Tripteroides (Rachionotomyia) ponmeki* sp. nov.

Seta No.	Head	Thorax			Abdomen							
		Pro	Meso-	Meta-	I	II	III	IV	V	VI	VII	VIII
0	1	9-18	—	—	—	1-5**	1-5	2-5*	2-5*	2-6*	2-5*	—
1	M	2-4*	1-3*	2-6*	4-8*	3-6*	3-6	3-8*	3-7*	4-6*	3-6*	5-9*
2	—	1, 2* (1)	1	3-5	5-7*	3-6*	4-8*	4-7*	4-8*	3-6*	4-6*	1
3	1	3-6*	1*	1-3 (1)	1	1	1*	1	1	1	1*	3-5*
4	1, 2 (1)	2-9	1* (1)	1-3	3-8	3-6	1	1-3 (1)	1-4	1	1	1
5	1	1*	1*	1-11	2-4*	1-3*	1, 2*	1-3*	1-3*	1-3*	2-4*	2-4
6	1	1, 2* (1)	1*	1	2, 3* (2)	2*	2*	2*	1, 2*	1*	2-6	1-A 1, 2
7	1, 2* (1)	5-9*	1	4-10*	1*	1*	3-8	3-7	2-9	1	1-3	1-S 2-5
8	1	9-16*	2-8	4-9	—	1, 2	1	1, 2	1-3	5-9	4-10	1-X 1, 2* (1)
9	2-5	5-10*	4-8*	3-7*	1-3	1-3	1-3	1-4*	2-5*	2-4*	2-5*	2-X 4-7*
10	1	1*	1*	1*	1	1	1	1	1	1	1-6	
11	5-9*	1	1, 2 (1)	1	4-8*	3-7*	3-6*	2-4*	2, 3*	2, 3*	2-4*	3-X 1*
12	3-6	1*	1*	1, 2 (1)	—	1	1-3	1	1	1-3	1	4-X 1-4*
13	1	10-18*	4-9*	7-16*	6-16*	7-12*	5-9*	5-11*	4-8*	3-6*	2-5*	
14	4-6*	14-23*	11-18*	—	1-9*	3-8*	3-9*	2-7*	2-6*	2-5*	—	—
15	3-7	—	—	—	—	—	—	—	—	—	—	—

M, multiple branched; \* prominent seta; \*\* present or absent

than others; 9-VIII strongly palumate, longer than 9-VII. Median caudal lobe, genital lobe and midrib moderately tanned. Paddle (Fig. 3B): Lightly tanned; short, flattened or bluntly rounded at tip without conspicuous spicules, about 1.3 of genital lobe (GL).

Larva (4th instar larva). Chaetotaxy in Fig. 4A, C, H and Table 2. Head (Fig. 4C) as long as or a little longer than width. Mouth brushes with inner setae, pectinate. Maxilla (Fig. 4D) with well-developed maxillary brush (MxB) and 4-Mx well-developed; laciniarastrium 1 (LR<sub>1</sub>) present. Mandible large with a strong dorsal tooth; dorsomentum (Fig. 4E) with a large central tooth and 7 lateral teeth. Seta 1-A (Fig. 4F) single or double, situated on apical 1/3. Seta 1-C (Fig. 4B) stout with many setae apically. Comb (Fig 4G) with 9-14 large

teeth in a straight line, arising from weakly developed sclerotized plate; individual teeth spines with fine fringes on one side (Fig. 4I), the largest one at least 2/3 of the length of the saddle. Siphon (Fig. 4H) stout, siphonal index 2.4-3.0. Pecten (Fig. 4J) with 1-4 teeth on either side of the midline, confined to the basal 1/3. Seta 1-S with 2-5 branches; 1a-S pectinate, 8-11 in number on single line with 2-3 branches; 2a-S pectinate, 4-7 in number, both sides of midline with 1-3 branches.

Holotype. Female, no. 386, 990824-2 with associated larval and pupal exuviae mounted on slide, Hinboon, Khammouane Province (105°46'E, 17°17'N), Lao PDR, from bamboo internodes, 24 Aug. 1999, T. Toma. Paratypes. 4 females, nos. 387, 389 and 406 (with genitalia G-4), 990824-2,

no. 426, 990731-2 with larval and pupal exuviae mounted on slides; 2 females, nos. 323 and 324, 990824-2 with pupal exuviae on slides; 3 females, 000923-1; 2 males, no. 361 (with G-1), 990824-2, no. 397 (with G-2), 990820-2 with larval and pupal exuviae on slides; 2 males, no. 8 (with G-3) and 326, 990820-2 with pupal exuviae on slides; 13 larvae (4th-instar), 990824-2 mounted on slides. All paratypes collected from the same place as holotype by I. Miyagi and T. Toma. Holotype and some paratypes will be deposited in the U. S. National Museum, Washington DC, USA.

*Etymology.* The authors are pleased to dedicate this new species to Dr. Ponmek Dalaloy, Ministry of Health, Lao PDR in appreciation his approval and encouragement of this study.

*Taxonomic Discussion.* *Tripteroides ponmeki* is characterized by the following features: In the adult female, maxillary palpus long (0.8 mm); proboscis (2.5 mm) stout, swollen and bent downward apically; mid and lateral lobes of scutellum with white and black scales; mesopostnotum with 3-4 broad white scales and setae; abdominal terga dark above with irregular incomplete lateral white patches, and sterna entirely white including sternum VIII. In the larva, head hair 1-C stout with many fine setae apically; siphon tapering, widest on basal 1/4, siphonal index 3.0; comb teeth large, with apical fringes. A row of 11 comb teeth situated on a weakly citinized plate; thoracic seta 6-M long, single, not spiniform and 7-T well developed, 9-10 branches, without dark stout spines. In the pupa, seta 1-CT very long and double; trumpet short without apical expansion; seta 1-I strongly palumate; setae 9-VII and -VIII strongly palumate, the latter longer than paddle which is short, bluntly rounded at tip without conspicuous spicules.

*Tripteroides ponmeki* is placed in the subgenus *Rachionotomyia*, having occiput with broad, flat, dark scales with subdued

bronze reflection, and white or whitish border to eyes. Pleuron covered densely with white scales. Lateral pale scales on abdominal tergites and sternites white or whitish. Subspiracular scales present. Femora pale below, anterior surface dark or at most narrowly pale below at base, never with discrete pale markings. All claws paired in the female. Wing on upper surface with outstanding scales narrower over most of the field, broader toward the tip especially on  $R_2$  and  $R_3$ .

According to the revisional study of Mattingly (1981), *Tr. ponmeki* may be recognized as a member of the *edwardsi* group. It includes two species from the Oriental region, *-Tr. edwardsi* (Barraud), 1929, is known only with adult female from India, and *Tr. rozeboomi* Baisas and Ubaldo-Pagayon, 1953, only adult male from Mindanao, Philippines. *Tr. ponmeki* is similar to *Tr. edwardsi*, being characterized by the proboscis relatively short and stout, slightly swollen and bent downward toward apex. The palpus is unusually long, about 1/3 length of proboscis. However, it differs from *Tr. edwardsi* by mesopostnotum with a tuft of white scales as well as black setae, terga I-VII with pale lateral borders extended to form conspicuous pale apicolateral triangles which are invisible from the dorsal view and tergite VIII white dorsally and ventrally. Female genital structure is quite similar, but tergite IX has 4-6 submarginal setae. As immatures of the other species of the group are as yet unknown, it is difficult to discuss the characteristics of *Tr. ponmeki*. However, the absence of spiniform setae in meso- and metathorax, the presence of about 11 large comb teeth on a weakly sclerotized comb plate and head hair 1-C having minute hairs apically may be characteristic of the larvae of this species. Due to the marked differences from all described species of the subgenus (Belkin, 1962; Mattingly, 1981), it may be necessary to separate *edwardsi* and *ponmeki* as distinct groups, after the larva and adult male of *edwardsi* are described. The



larvae of *Tr. ponmeki* show remarkable variation in almost all setae, particularly the head hairs (11, 12, 14, 15-C). The development of stellate setae on the thorax (13, 14-P, M, T) and abdomen (13, 14-I-VII) is quite variable: some specimens from the type locality show very slender, lightly pigmented spines, while others from Thapathon have stout and black ones. No correlation between any of the above variations has been found either in the larvae or adults.

*Bionomical Notes.* About 20–30 immature stages of *Tr. ponmeki* are often found in a bamboo internode in the rainy season. They are not predacious. The general appearance, locomotion in a crowd and feeding habits of the larvae somewhat resemble those of the genus *Armigeres*. The immatures of *Tr. (Rachionotomyia) aranoioides* (Theobald) and *Topomyia (Suaymyia)* spp. bred in different bamboo internodes in this forest. All adults of *Tr. ponmeki* in the collections were reared and nothing is known of their bionomics or disease relations. Due to the well-developed ovarian follicles in the newly emerged adults without blood meals, this species may be autogenous in the field.

*Distribution.* At present, known only from Khammouane Province, Lao PDR.

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