

Reprinted from

PROCEEDINGS OF THE ENTOMOLOGICAL SOCIETY OF WASHINGTON

Vol. 70, No. 4, December 1968

pp. 361-375

Made in the United States of America

### THREE NEW SPECIES OF THE GENUS *TRIPTEROIDES*, SUBGENUS *TRIPTEROIDES* GILES<sup>1, 2</sup>

(DIPTERA: CULICIDAE)

MERCEDES D. DELFINADO<sup>3</sup> and ELAINE R. HODGES, *Southeast Asia Mosquito  
Project, Smithsonian Institution, Washington, D. C. 20560*

#### INTRODUCTION

The subgenus *Tripteroides* of the genus *Tripteroides* Giles is a complex group of about 50 species occurring from India and Ceylon, through Thailand and Viet-Nam, north to China, Taiwan and Japan, and south through the Philippines, Malaysia, Indonesia, New Guinea, the Solomon Islands, and Australia. Pending a revision of the subgenus we are describing three new species from Malaya and Thailand. We feel that these species draw attention to certain diagnostic characters in this subgenus.

We are following the classification proposed by Belkin (1962) who recognized three subgenera as follows: "*Tripteroides* for the ornamented species, *Rachisoura* for nonornamented species with predaceous larvae with incomplete, widely separated maxillary sutures, and *Rachionotomyia* for all the other nonornamented species." The larval and pupal chaetotaxy and terminology used is also that of Belkin (1962) for the most part. Following Knight (1968), we are labeling the larval basal maxillary hair "bmh," having found it to be of some taxonomic value.

Type specimens will be deposited in the U.S. National Museum, Washington, D.C., and the British Museum (Natural History), London.

Many of the *Tripteroides* (*Tripteroides*) species are difficult or impossible to separate using adult coloration and scaling alone. The species usually have brilliant blue scales on the vertex; silver patches on pleuron, abdomen, and femora; narrow dark scales on scutum; broad black scales on scutellum and anterior pronotum and narrow ones on scutum and posterior pronotum. Color of scutellar and pleural integument is somewhat variable, though in a few species it seems constant enough to be helpful. Differences between some species may be noted in the extent of silver pleural scaling, the shape and extent of silver abdominal patches, and differences from the norm described above; however, in some species these characters tend to be somewhat variable also. A good many of the members of this subgenus characteristically have rows of long scales and diagonally striated setae at the apex of the

---

<sup>1</sup> This work was supported by Research Contract No. DA-49-193-MD-2672 from the U.S. Army Medical Research and Development Command, Office of the Surgeon General.

<sup>2</sup> Immediate publication secured by full payment of page charges.—Editor.

<sup>3</sup> Present address: Department of Entomology, University of Hawaii, Honolulu, Hawaii 96822.

Report Documentation Page				Form Approved OMB No. 0704-0188	
Public reporting burden for the collection of information is estimated to average 1 hour per response, including the time for reviewing instructions, searching existing data sources, gathering and maintaining the data needed, and completing and reviewing the collection of information. Send comments regarding this burden estimate or any other aspect of this collection of information, including suggestions for reducing this burden, to Washington Headquarters Services, Directorate for Information Operations and Reports, 1215 Jefferson Davis Highway, Suite 1204, Arlington VA 22202-4302. Respondents should be aware that notwithstanding any other provision of law, no person shall be subject to a penalty for failing to comply with a collection of information if it does not display a currently valid OMB control number.					
1. REPORT DATE <b>DEC 1968</b>		2. REPORT TYPE		3. DATES COVERED <b>00-00-1968 to 00-00-1968</b>	
4. TITLE AND SUBTITLE <b>Three New Species of the Genus Tripteroides, Subgenus Tripteroides Giles (Diptera: Culicidae)</b>				5a. CONTRACT NUMBER	
				5b. GRANT NUMBER	
				5c. PROGRAM ELEMENT NUMBER	
6. AUTHOR(S)				5d. PROJECT NUMBER	
				5e. TASK NUMBER	
				5f. WORK UNIT NUMBER	
7. PERFORMING ORGANIZATION NAME(S) AND ADDRESS(ES) <b>Southeast Asia Mosquito Project, Smithsonian Institution, Washington, DC, 20560</b>				8. PERFORMING ORGANIZATION REPORT NUMBER	
9. SPONSORING/MONITORING AGENCY NAME(S) AND ADDRESS(ES)				10. SPONSOR/MONITOR'S ACRONYM(S)	
				11. SPONSOR/MONITOR'S REPORT NUMBER(S)	
12. DISTRIBUTION/AVAILABILITY STATEMENT <b>Approved for public release; distribution unlimited</b>					
13. SUPPLEMENTARY NOTES					
14. ABSTRACT					
15. SUBJECT TERMS					
16. SECURITY CLASSIFICATION OF:			17. LIMITATION OF ABSTRACT <b>Same as Report (SAR)</b>	18. NUMBER OF PAGES <b>16</b>	19a. NAME OF RESPONSIBLE PERSON
a. REPORT <b>unclassified</b>	b. ABSTRACT <b>unclassified</b>	c. THIS PAGE <b>unclassified</b>			

male hind tibia and base of hind first tarsomere; additional specialized scaling of the male legs as well as claw structures present valuable specific characters. The female terminalia have not provided useful characters for other workers and have not been used here. Male terminalia in some cases look similar superficially but on closer examination show good characters. The ninth tergum, distimere, and paraproct have traditionally been used, but we found Baisas and Ubaldo-Pagayon's method (1953) of dissecting the aedeagus and studying it from lateral as well as dorsal views especially productive. The ventral projection of the aedeagus (Baisas calls it the ventral arm) can be seen clearly only in lateral aspect. Lien (1958, p. 15) illustrates his new *Tripteroides* (*T.*) *cheni* in lateral view to differentiate it from *bambusa* (Yamada), but few other authors have given illustrated descriptions of this structure.

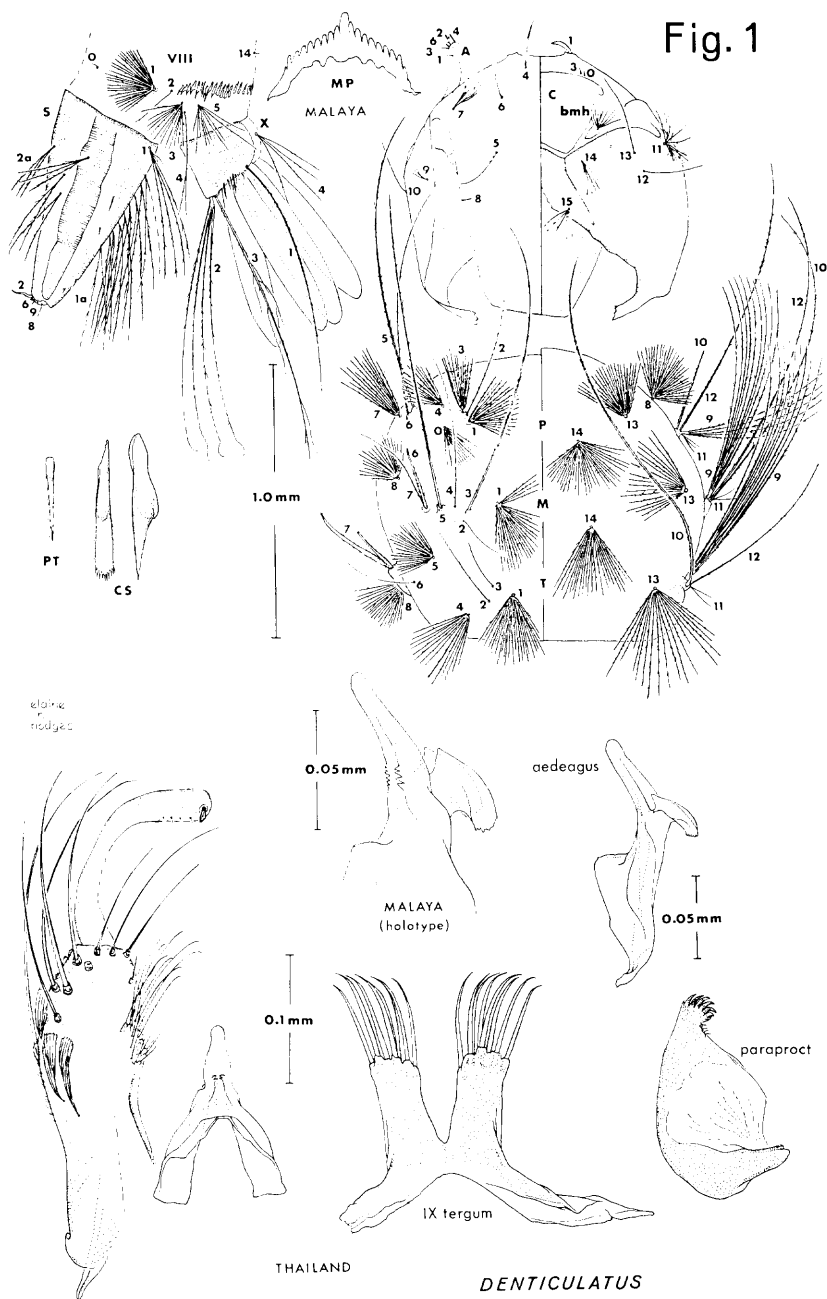
In the immatures there are many similarities among species and much specific variation. In pupae the length and character of abdominal hairs 3-VII and 5-II-VI are sometimes useful. Paddle shape and size and the location of paddle spicules, when present, may prove to be valuable characters. Because there are no striking differences among the pupae of the present species, they are not described in detail, and only *tarsalis*, n. sp. as a whole and paddles of *malayi*, n. sp. and *denticulatus*, n. sp. are figured. Larval differences may be found in the basal maxillary hair (bmh), 14-C, possibly other head hairs, and, most useful, segment VIII, siphon, and anal segment. Larvae of the Southeast Asian species have mesothoracic tubercles protruding to a small point but never with a long pointed lobe which is present in some species from New Guinea, Solomon Islands, and Fiji [*bimaculipes* (Theobald), *binotatus* Belkin, *brevipalpus* Brug, *distigma* (Edwards), *lipovski* Belkin, *purpuratus* (Edwards), and *quasiornatus* (Taylor)].

The three species that we are describing have an aedeagal type which generally resembles that of *bambusa* from Japan, Taiwan, China, Ryukyu-Retto and *vicinus* (Edwards) from Borneo, Malaya, China, Sumatra in having dorsal teeth and twin ventral projections, each of which has an anterior hump, sometimes faintly sclerotized, immediately sternad of the main aedeagal tube. The descriptions are mainly based on the holotypes, but the extent of variation in all the specimens which were available for examination is noted.

***Tripteroides* (*Tripteroides*) *denticulatus*, n. sp.**

(Figs. 1, 4, 5)

**MALE. Head.** Vertex with bright blue decumbent scales; lateral surface with silvery scales; occiput with erect dark brown scales; torus bare, yellowish or whitish-brown; clypeus bare, pale brown; proboscis about 1.5 longer than fore femur, underside of base of proboscis with a number of dark bristles; palpi uniformly dark, about 0.1 length of proboscis. **Thorax.** Scutal integument brown, darker at dorso-

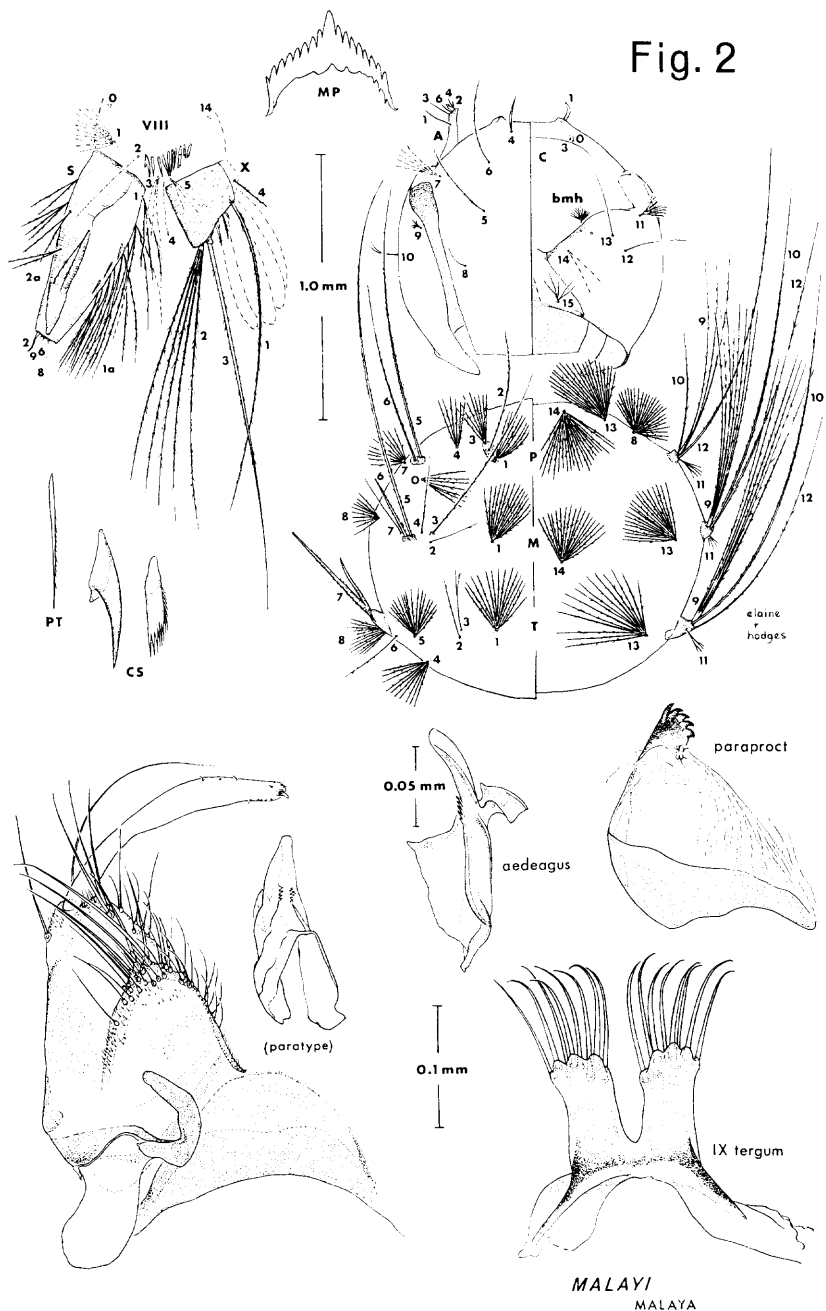


central portion, yellowish around anterior promontory, humeral and supraalar areas, with dark brown narrow scales and bristles; yellowish or beige prescutellar space and scutellum, the latter with broad dark brown or black scales; anterior pronotum yellowish with broad dark brown scales and a number of strong bristles, posterior pronotum yellowish with narrow dark brown scales interspersed with a few broader ones, with 1 dark bristle; propleuron yellowish with 2 bristles; pleuron medium brown on postspiracular and spiracular areas, sternopleuron, paratergite and mesepimeron; meron and sometimes paratergite pale brown; sternopleuron with silvery broad appressed scales from below prealar to above mid coxa; a patch of translucent silvery scales on mesepimeron. *Legs*. Silvery scales on coxae; anterior surface of each femur with a silver line extending from base to one-third and 2 silver spots, 1 median and 1 subapical (not well defined on the fore femur of the holotype); legs otherwise dark anteriorly; dorsal edge of fore tibia with an inwardly inclined row of 14–18 more or less regularly spaced stiff, long semi-erect spines, each of these spines, on the whole, longer than the diameter of the tibia. Fore tarsomere V modified; a paratype slide preparation shows the plantar surface with 2 stout, sharply pointed basal spines mounted on tubercles plus 4 other tubercles each bearing a small seta (as in *malayi*, fig. 4). Mid tarsomere V unmodified. Hind leg with a group of long semi-erect setae and scales at apex of tibia and base of tarsomere I (fig. 4); these scales and setae are shown enlarged, setae with diagonal striations and scales with a central rib resembling a long narrow feather; tarsomere V unmodified. *Claws*. (Fig. 4, drawn from paratype). Fore tarsal claws unequal, the larger claw with a strong median tooth projecting at about right angles to it; mid claws small, simple and equal; hind claws very small, simple and equal. *Abdomen*. Terga dark dorsally, with distinct postero-lateral patches of silvery-white scales on II–VII (patches larger on II and VII); I and VIII entirely dark. Abdominal maculation is generally similar to *tarsalis* (fig. 4) though lateral patches tend to be smaller in *denticulatus*; sterna pale gold. *Terminalia*. (Fig. 1, drawn from holotype and 2 Thailand paratypes). Basimere with long bristles on lateral distal margin; basal lobe with about 10 long and some short bristles; distimere incurved, attenuated at middle, with a few fine setae distally and an apical flattened spiniform appendage; aedeagus tapered distally with a variable number of strong middorsal teeth (4–10) and a ventral projection serrated finely on distal margin; paramere outwardly curved; paraproct with 6–8 teeth and 4–8 cercal setae; tergum IX with 6–9 apical bristles of equal length on each lobe. The aedeagus of the paratype shown in lateral view appears to differ slightly from that of the holotype. At this stage we feel that these differences are not of specific value, though this might prove to be so when more material is available for examination.

**PUPA.** (Fig. 5, paddle drawn from holotype, 4 specimens examined.) Hair 3–VII reaching to or beyond posterior margin of VIII; paddles 1.5–2.0 times as long as wide, smooth and rounded apically, without spicules. Except for paddles, pupa resembles *tarsalis* as illustrated.

**LARVA.** (Fig. 1, drawn from paratype, 4 specimens examined.) *Head*. 4-C single, long, flattened and expanded at middle, tapering to a fine point; 7-C about as long as 4-C, 5–7 branched; 8-C normally with 2 weak branches (1–3); 9-C with 2–6 short, weak branches; mental plate (MP) with 17–19 teeth; strong basal maxillary hair (bmh) varying in size from much smaller to as large or larger than 14-C, usually with 3–11 branches; 14-C usually with 5 or fewer branches, about  $\frac{2}{3}$  length

Fig. 2



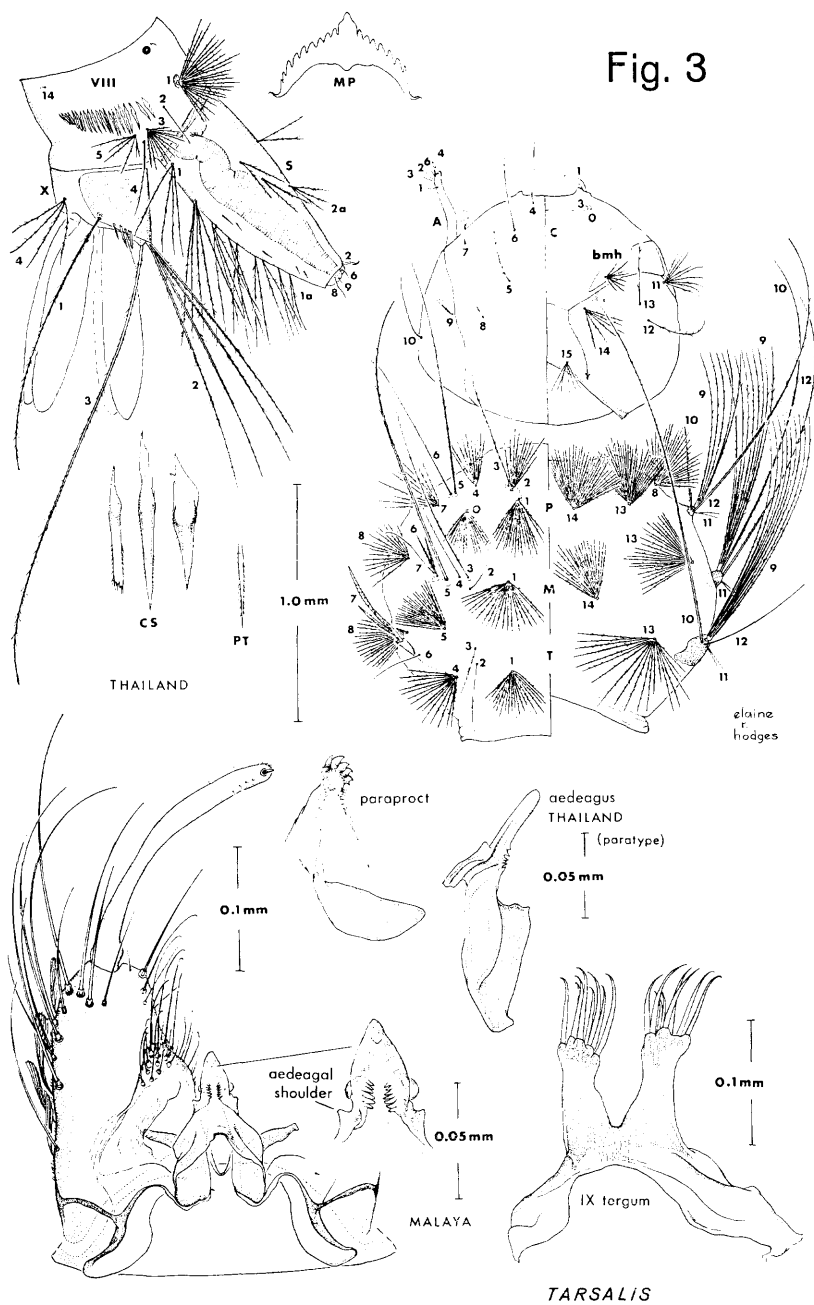
of antenna; 15-C usually with 5-6 branches (2-6). *Thorax*. 7-T a 2-branched heavy, barbed spiniform with serrated tips. *Abdomen*. 6-I-V double; 7-I-II double, 3-branched on one side of segment I of one specimen; segment VIII with 16-25 small comb scales (CS), dorsolateral comb scales pointed, ventral ones broadly flattened and fringed; 1-S with 3-5 (on one side of one specimen, 2) moderately long branches; 1a-S number 8-10 tufts, usually 2-branched (1-2); 3-5 widely spaced pecten teeth (PT) on each side; 2a-S number 7-8, scattered dorsally and laterally with 1-3 branches; saddle with 2-4 stout, relatively long and 2-5 weaker, short marginal spines; 1-X with 1-3 branches; 4-X with 3-4 short branches, about half length of anal papillae; anal papillae about  $2\frac{1}{2}$  times length of saddle.

**TYPE DATA.** Holotype male #0914/11, *Lower Perak*, Pulau Tiga, MALAYA, 14-11-58 (W. W. Macdonald), terminalia, larval and pupal skins on slides; paratypes all males: #0914/9, same data as for holotype, with cast skins mounted; #01281/24, 8 mi. Bantung Rd, *Selangor*, MALAYA, 27-8-59 (W. W. Macdonald), terminalia, legs, larval and pupal skins mounted; #PU 24-35 and #PU 24-40, both collected in 1964 from *Phatthalung*, Muang, THAILAND (S. Chunchulcherm), and both with terminalia mounted. Both Thailand specimens without associated cast skins. The holotype and 1 paratype with associated larval and pupal skins from Malaya will be deposited in the British Museum (Natural History); the 2 paratypes from Thailand and 1 paratype with associated skins from Malaya are deposited in the U.S. National Museum. In addition there is 1 male from Malaya not labeled paratype which will be at the British Museum, namely, #0677/6 from Templer Park, *Selangor*, 25-6-58, with hind leg and larval and pupal skins mounted.

**DISTRIBUTION.** MALAYA; THAILAND.

**HABITAT.** Tree holes.

**TAXONOMIC DISCUSSION.** *T. denticulatus* differs from similar species, *bambusa*, *malayi*, and *tarsalis*, in having a large tooth on the larger fore claw of the male, equal male mid claws, a simple male mid tarsomere V (lacking spines or tubercles), feather-like scales on male hind tarsomere I, and small but distinct serrations on the distal margin of the aedeagal ventral projection. The aedeagal middorsal teeth of *denticulatus* are confined to the central area, whereas those of *bambusa* extend to the lateral edges of the aedeagus (fig. 5). The male fore claw of *bambusa* (fig. 5) has a small triangular tooth, much smaller than that of *denticulatus* (fig. 4). There are no reliable differences among the larvae and pupae of these species other than the presence of spicules on the pupal paddles of *tarsalis* and *bambusa* which are not present in *denticulatus*. The species most resembling *denticulatus* is *vicinus*, also found in Malaya. The male of *vicinus* has a similar aedeagus, identical feather-like scales on the hind tarsomere I, an equally simple mid tarsomere V, and a fore claw with equally large tooth (fig. 5). However, this tooth arises at about a 70 degree angle from the claw,



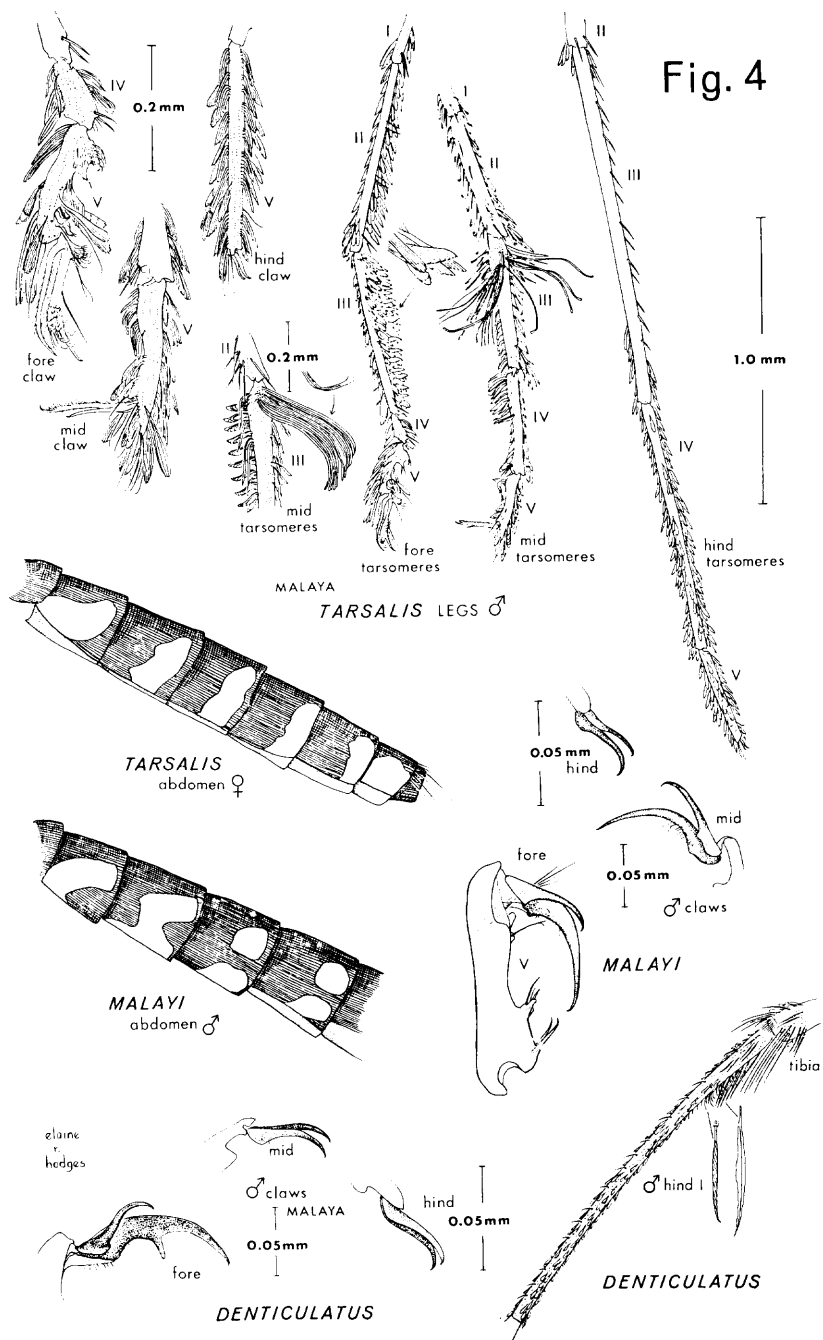


whereas the same tooth of *denticulatus* projects at about a 90 degree angle. *T. vicinus* differs more significantly in that tergum IX has each broad lobe slanted so that the length of inner edge is about one-third length of outer edge and that each lobe bears as many as 28 bristles which are twice as long laterally as medially (fig. 5); the male mid claws are unequal; its pupal paddle is heavily spiculed, and pupal seta 3-VII extends no more than to half the length of VIII. The larva of *vicinus* differs from *denticulatus* in having comb scales on a plate which is sometimes incompletely formed and in having 4-X double, longer than the anal papillae, and almost as long as 1-X.

***Tripteroides (Tripteroides) malayi*, n. sp.**

(Figs. 2, 4, 5)

**MALE. Head.** Vertex with comparatively narrow anterior band of bright blue decumbent scales, lateral portion with silvery scales; the rest of the head with dark brown scales; occiput with row of erect dark brown scales; torus and clypeus grayish-brown; proboscis dark brown and about 1.3 as long as fore femur, several dark basal bristles present; palpi dark brown, 0.1 the length of proboscis. **Thorax.** Integument of scutum dark brown, yellowish on humeral area, with narrow dark brown scales (most are rubbed off); scutellum yellowish and heavily clothed with flat, broad black scales and 8 bristles; postnotum medium brown; anterior and posterior pronota yellowish; 8-9 black bristles and broad dark brown scales on anterior pronotum; narrow dark scales and 1 dark bristle on posterior pronotum; yellowish propleuron with 2 bristles; paratergite, postspiracular area, sternopleuron, mesepimeron, and meron dark brown; silvery broad appressed scales on sternopleuron from below prealar area to above mid coxa; a short line of silvery appressed scales between the sternopleuron and postspiracular area; mesepimeron almost bare except for a small patch of about 5 translucent silvery scales on anterior portion. **Legs.** Coxae with translucent scales; each femur with 2 distinct silvery spots—1 median and 1 sub-apical; mid femur also has silvery line running from just below base to one-third its length; hind tibia with diagonally striated setae on apical fourth and long spines and setae at apex; semi-erect scales on base of hind tarsomere I; no long feather-like scales are apparent on any of the legs and no specialized scales or setae exist on the mid legs; plantar surface of fore tarsomere V modified with 2 stout, sharply pointed basal spines plus 2-5 tubercles with small setae extending from them (fig. 4, holotype); plantar surface of mid tarsomere V modified with about 4 small tubercles, each with a small seta; hind tarsomere V unmodified. **Claws.** (Fore claws drawn from holotype; mid and hind claws drawn from paratype.) Fore and mid tarsal claws unequal, simple; hind claws small, simple, equal. **Abdomen.** (Fig. 4, holotype.) Terga dark dorsally; segments II and III with silvery lateral patches deeply emarginated along their apical borders (emargination more pronounced on III); lateral silvery patches on IV-VI divided into a larger and smaller patch on each segment; on segment IV of the paratype the patches are not as widely separated as on the holotype and are connected anteriorly by a single line of whitish scales; sterna pale gold. **Terminalia.** (Fig. 2, holotype.) Basimere with a few long strong bristles and many short ones; distimere slightly swollen in distal half with a few scattered fine setae and an apical spiniform appendage; aedeagus tapered distally, with strong middorsal teeth on



each side of center line; ventral projection as in fig. 2, without teeth; parameres curved outwardly; paraproct with 5-6 teeth, 4-6 cercal setae; tergum IX with 8 bristles of equal length on each lobe in the holotype, 10 and 12 on lobes of the paratype; each lobe broad and slightly expanded at apex.

**PUPA.** Chaetotaxy similar to *tarsalis* (fig. 5). 3-VII long, reaching beyond posterior margin of VIII. Paddles gently rounded apically, not as pointed as *tarsalis*, smooth, without spicules, 1.8-2.0 times as long as wide (paddle drawn from holotype, fig. 5).

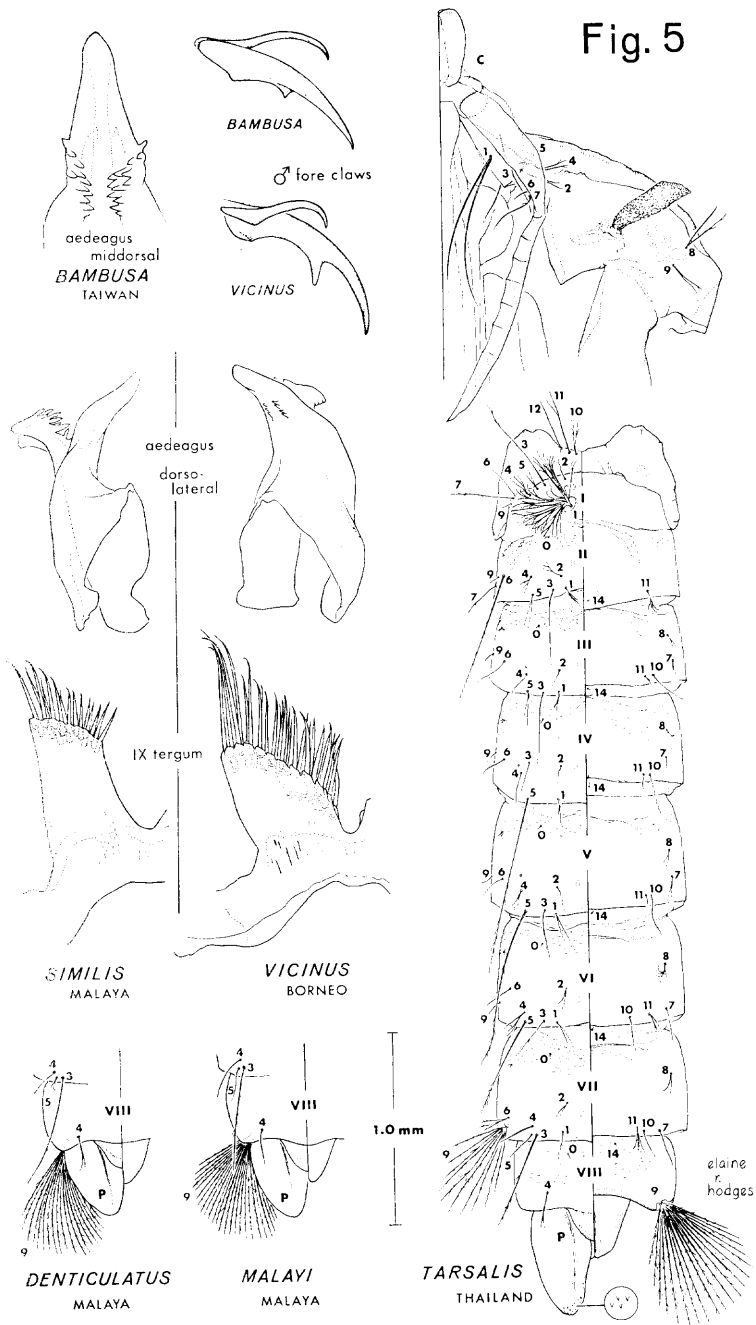
**LARVA.** (Fig. 2, primarily holotype.) *Head.* 4-C single, expanded and flattened medianly, tapering to a fine point; 7-C 5-branched on the one specimen where it was present, a little longer than 4-C; 8-C 1-2 branched; 9-C very short branched tuft; 10-C single although with weak branch on one side of holotype and forked distally on one side of paratype; basal maxillary hair (bmh) strong, short, stellate; 14-C 2-3 branched; 15-C 3-5 branched; mental plate (MP) with 17-20 teeth. *Thorax.* 7-T spiniform, strongly barbed, single or double, longer than in most other species. *Abdomen.* 6-I-II 2-branched, 6-III-V 1-2 branched; 7-I single, 7-II 1-2 branched. Segment VIII with 10-12 comb scales (CS), spine-like except for 2-3 of the most ventral ones which have broad fringed apices; 1-S 3-branched; 1a-S total 9-10 tufts of 1-2 branches; 2a-S with 8-10 tufts scattered dorsally and laterally, 2-3 branched; siphon with 3 pecten teeth (PT) on each side; saddle with 2-3 long, strong marginal spines; 1-X single, very long; 4-X single, short and fairly strong; anal papillae longer than saddle.

**TYPE DATA.** Holotype male #0613/27, *Trengganu*, Gunong Tabu, Kuanta, 20 mi. Pahang Rd, MALAYA, 7.v.58 (W. W. Macdonald), terminalia, legs, larval and pupal skins on slides; paratype male #0613/20, same data as holotype, terminalia, legs, pupal and larval skins on sides. Holotype with associated mounts will be deposited in the British Museum (Natural History), London; paratype and associated mounts will be retained in the U.S. National Museum.

**HABITATS.** No record.

**DISTRIBUTION.** MALAYA.

**TAXONOMIC DISCUSSION.** Despite aedeagal resemblances to *vicinus*, *bambusa*, *tarsalis*, and *denticulatus*, *malayi* can be differentiated by its simple untoothed male tarsal claws, the absence of unusual setae and scales on the male legs, ventral projection of aedeagus without serrations, middorsal teeth confined to centerline of aedeagus, and the silvery lateral abdominal patches which are medianly emarginate on III and double on IV-VI. Tergum IX of *malayi* differs from that of *vicinus* in the same way as does this structure in *denticulatus*, although *malayi* has more tergal bristles (8-12) than *denticulatus* (see *vicinus*, fig. 5). The larva of *malayi* differs from the above mentioned species in having 4-X single and only 11-12 CS, but it resembles the larva of *similis* (Leicester), also found in Malaya, in these as well as in some other characters. However, *similis* has even fewer CS (6-7), a larger bmh, and a large stellate tuft for 14-C. The pupa of *similis*, like *vicinus*, differs from *malayi* in having spicules on its paddle and a short 3-VII,



reaching no more than one-half the length of VIII. There are clear differences between *malayi* and *similis* in the adult stage; *similis* has silvery scaling on the anterior and posterior pronota, large and unbroken lateral abdominal silvery patches, and a tooth on the larger fore claw of the male. Its terminalia resembles *nitidoventer* (Giles) with markedly swollen distimere, tergum IX with short bristles becoming somewhat longer laterally, and aedeagal ventral projection bearing anterior teeth without hump (see *similis*, fig. 5). Adult characters of *malayi* which differentiate it from *similis*, in addition to those mentioned earlier, are black scaling on the pronotal lobes, a relatively slender distimere, long bristles on tergum IX, and an untoothed aedeagal ventral projection with anterior hump.

***Tripteroides (Tripteroides) tarsalis*, n. sp.**

(Figs. 3, 4, 5)

**MALE. Head.** Anterior half of vertex with bright blue decumbent scales, lateral portion with silvery scales; occiput with a row of erect dark brown scales; clypeus and torus bare, gray-brown; proboscis dark, measuring about 1.25 as long as fore femur, several dark basal bristles present; palpi dark, measuring about 0.1 length of proboscis. **Thorax.** Scutum yellowish-brown with narrow blackish scales, brownish supraalar and anterior promontory bristles; scutellum and postnotum yellowish-brown; anterior and posterior pronota and propleuron yellowish; anterior pronotum with broad dark scales and about 6 dark bristles; posterior pronotum with narrow dark scales interspersed with a few broad dark ones and 1 long, dark bristle; propleuron with 2 brown bristles; scutellum with broad dark scales and 8 dark bristles; dark medium brown patch covering paratergite, postspiracular and subspiracular areas, sternopleuron, mesepimeron, and meron; silvery broad appressed scales on sternopleuron from below prealar area to above mid coxa, a row of a few silvery appressed scales between the sternopleuron and postspiracular area; mesepimeron largely covered with silvery broad scales. **Legs.** Coxae with translucent scales; femora with the usual anterior silvery spots, 1 median and 1 subapical; mid femur with silver line extending from base to about one-third; on fore femur this stripe appears to be composed of yellowish scales extending from base to half length of femur, and on hind femur the stripe is absent. Fore tarsomeres II-V modified; II with some semi-erect scales; III with many erect and semi-erect scales; IV about half length of V with a few semi-erect scales; V with a few plantar tubercles surmounted by strong setae and 2 small pointed spines near the base, a number of very long scales also on the plantar surface followed by a long seta extending from shortly below a much reduced empodium, the latter with unusually short setae projecting from its apex; from the apex of tarsomere V projects a long, slender pedestal bearing a club-shaped structure covered with very narrow scale-like setae with recurved tips; mid leg with tarsomeres II-V modified; II with some semi-erect scales; III with semi-erect scales and a prominent basal patch of long, narrow, sinuous striated scales, the longest of these reaching to near the apex of the tarsomere; this patch of scales is visible in pinned specimens as a curved tuft which stands out at an angle as shown in fig. 4; mid tarsomere III also with a row of erect scales which in pinned specimens look like spines; mid tarsomere IV about two-fifths longer than V with a row of erect scales on basal half; mid tarsomere V

lacks any tubercles but is slightly modified in having its diameter narrowed medially, presenting a curved appearance, and in having a greatly reduced empodium; hind leg is as usually seen in the subgenus, without any modifications. *Claws*. (Legs and claws drawn from holotype.) Fore tarsal claws elongated and slender, subequal, the smaller claw narrow and hairy to before tip, the larger claw expanded into a very setiferous lobe medianly with a long seta arising below the lobed portion and reaching nearly to the tip of the claw; mid claws unequal, narrow, the smaller one simple, the larger bearing many setae and a small setiferous lobe near the apex; hind claws very small, simple, equal. *Abdomen*. (As in fig. 4, paratype female.) Terga dark brown dorsally with silvery-white lateral bands on III-VI, subapical on II-IV, apical on V-VI, with silvery patches almost completely covering the sides of II and VII; none of the silvery patches or bands meet dorsally; segments I and VIII all dark brown; sterna pale gold. *Terminalia*. (Fig. 3, holotype). Basimere with long strong bristles on lateral and distal margins; 4-6 long and many short bristles on basal lobe; distimere attenuated at middle, fine setae at distal portion and with an apical flattened spiniform appendage; aedeagus tapered distally with sharply projecting lateral shoulders, strong sharp middorsal teeth confined to each side of center line, a narrow ventral projection without teeth; paraproct with 5-7 teeth, usually with 4 cercal setae (2-5); parameres outwardly curved; tergum IX with 4-8 bristles on each lobe.

**FEMALE.** Coloration as in male. *Legs*. Apex of hind tibia and basal fifth of tarsomere I with long semi-erect setae, many of which are diagonally striated, and with a few feather-like ones on the tibia like those drawn for the male *denticulatus* (fig. 4, enlargement of setae and scales). *Claws*. Simple, small, equal on fore and mid; simple, small and unequal on hind leg.

**PUPA.** Chaetotaxy as in fig. 5 (not drawn from paratypes, 20 specimens examined). 3-VII reaches to or beyond posterior margin of VIII; paddles 1.5-2.0 as long as wide, pointed apically and with fine spicules on apical portion, extending up inner margin.

**LARVA.** (Fig. 3, not drawn from paratypes, 17 specimens examined). Description based on cast skins of paratypes. *Head*. 4-C single, long, expanded and flattened medially, tapering to a fine point; 7-C shorter than 4-C, with 3-5 branches; 8-C usually with 1-2 branches (1-3); 9-C about as long as 8-C, with 2-5 branches; mental plate (MP) with 15-18 teeth; bmh ranges from about half to three-fourths the length of 14-C, 8-16 branched; 14-C about two-thirds length of antenna, with 6-12 branches; 15-C 5-9 branched. *Thorax*. 6-M a barbed, stout spiniform, usually single, but 2-3 branched in some specimens; 7-T normally a 2-branched, pointed, barbed spiniform, occasionally single or 3-branched. *Abdomen*. 6-I-IV with 2 branches, 6-V occasionally single; 7-I-II single, though 2-branched on one side of one specimen; segment VIII with 16-26 comb scales; the dorsolateral scales pointed, a few lateroventral ones flattened, fringed; 1-S with 3-5 branches; 1a-S 8-14 in number, 1-3 branched; 2a-S number 8-12, scattered dorsally and laterally, usually with 2 branches (1-3); siphon with 3-5 PT on each side; saddle with 3-5 long, 2-3 short marginal spines; 4-X normally with 3-4 branches (3-5); 1-X usually single, long; anal papillae more than twice the length of saddle.

**TYPE DATA.** Holotype male #689/3, Fraser's Hill, W. Pahang, MALAYA, Sept., 1954 (J. A. Reid), terminalia and legs on slide; 3 paratypes from MALAYA include 1 female #689/5, same data as holotype,

with hind leg and antenna, larval and pupal skins mounted; 1 male #0611/2, Gunong Tabu, *Trengganu*, 7-5-58 (W. W. Macdonald), terminalia, larval and pupal skins mounted. Sixteen male paratypes from THAILAND were collected by SEATO Lab personnel in 1963 and 1964 (Sgt. E. Peyton, P. Boonyakanit, S. Chunchulcherm, C. Diraphat, S. Esah, S. Maneechai, S. Maniwongse, K. Mongkolpanya): Six originate from the province *Nakhon Nayok*, THAILAND: #NY 37-20 and #NY 37-24 from Moh Sing To, both with larval and pupal skins mounted; #NY 37-22 also from Moh Sing To; #NY 122-32 from Phaklory Mai, terminalia and larval skin mounted; #NY 123-10 from Khaoyai, terminalia and legs mounted; #NY 123-11 from Khaoyai. Five specimens came from *Chiang Mai*: #T-2195-10L and #T-2123-1P from Doi Sutep; #T-2413-1P, #T-2753, #T-2761. Two specimens were collected in a rain forest, 1 mile in altitude, located at Doi Sam Sao, *Tak*: #00265-104 and #00265-110. One specimen is from each of the following provinces: *Chanthaburi*, Khao Sai Dao Tai, evergreen forest, 1 mile altitude, #00864-8, pupal and larval skins mounted; *Nakhon Si Thammarat*, Ban Thuan Lek, primary rain forest, 1,000 ft. altitude, #01082-104; *Trang*, #TG-102-33, terminalia mounted. The holotype with associated slides will be deposited in the British Museum (Natural History), London; paratypes with associated slide mounts will be distributed between the British Museum (Natural History), London and the U.S. National Museum, Washington, D.C.

HABITAT. Tree holes.

DISTRIBUTION. MALAYA, THAILAND. In addition to the holotype and paratypes, 1 male with associated pupal skin from *Selangor*, MALAYA, and 25 specimens from THAILAND were examined. The Thailand material contained 1 whole larva and 17 males with 9 associated larval and pupal skins from *Chiang Mai*; 3 males, 2 with associated pupal skins, and 1 female with associated pupal skin from *Nakhon Nayok*; and 2 males, 1 with associated larval and pupal skins, and 1 female with associated pupal skin from *Chanthaburi*.

TAXONOMIC DISCUSSION. *T. tarsalis* can be distinguished from other known species of the subgenus by its male tarsal and claw modifications, especially by the prominent tuft of long scales on mid tarsomere III, erect scales on mid tarsomeres III and IV and on fore tarsomere III, and by its elongated hairy and lobed claws. The aedeagus of *tarsalis* differs from its nearest morphological relatives (*bambusa*, *denticulatus*, *malayi*, *vicinus*) in having sharply defined lateral shoulders. Mid-dorsal teeth are confined to the center line of the aedeagus, in contrast to *bambusa*. The aedeagal ventral projection is without teeth, unlike *denticulatus*. The lobes of tergum IX tend to be narrower than those of *malayi* and differ from *vicinus* for the same reasons as does tergum IX of *denticulatus* (see *vicinus*, fig. 5). The pupa is distinguishable from *malayi* and *denticulatus* in having paddle spicules, from

*vicinus* in having 3-VII long, reaching to or beyond posterior margin of VIII, whereas in *vicinus* 3-VII is much shorter. Pupae of *tarsalis* and *bambusa* are virtually indistinguishable, inasmuch as *bambusa* possesses paddle spicules in the same positions as does *tarsalis*, as well as other similar characters. The *tarsalis* larva shows no reliable difference from *bambusa* and *denticulatus*. It differs from *malayi* in having a branched 4-X, a greater number of comb scales, and more branches in 14-C. The larva of *vicinus* differs from *tarsalis* in the possession of a complete or incomplete comb scale plate, and long double 4-X.

## ACKNOWLEDGMENTS

We are very appreciative of the help given us on this group by Drs. Botha de Meillon and Alan Stone.

## REFERENCES

- Baisas, F. E. and A. Ubaldo-Pagayon.** 1953. Notes on Philippine mosquitoes, XVI. Genus *Tripteroides*. Monogr. Inst. Sci. Tech., Manila, 198 pp., illus.
- Belkin, J. N.** 1962. The mosquitoes of the South Pacific. Univ. Calif. Press, Berkeley. 2 vols., 608 and 412 pp., illus.
- Edwards, F. W.** 1914. New Culicidae from Borneo and Hong Kong. Bull. Ent. Res. 5(2):125-128.
- Giles, G. M.** 1904. Notes on some collections of mosquitoes, etc., received from the Philippine Islands and Angola; with some incidental remarks upon classification. J. Trop. Med. 7:365-369, illus.
- Knight, K. L.** 1968. Contributions to the mosquito fauna of Southeast Asia. IV. Species of the subgroup *Chrysolineatus* of group D, genus *Aedes*, subgenus *Finlaya* Theobald. Cont. Amer. Ent. Inst. 2(5):1-32, illus.
- Leicester, G. F.** 1908. The Culicidae of Malaya. Stud. Inst. Med. Res. F. M. S. 3(3):18-261, illus.
- Lien, J. C.** 1968. New species of mosquitoes from Taiwan (Diptera: Culicidae) Part II. New species of *Tripteroides*, *Orthopodomyia*, *Culiseta* and *Uranotaenia*. Trop. Med. (Japan) 10(1):1-20, illus.
- Yamada, S.** 1917. Nipponsan bunkwa no ni shinska (Two new species of Japanese Culicidae). Dobutsugaku Zassi (Zool. Mag.) 29 (No. 341):61-72 (in Japanese).



