

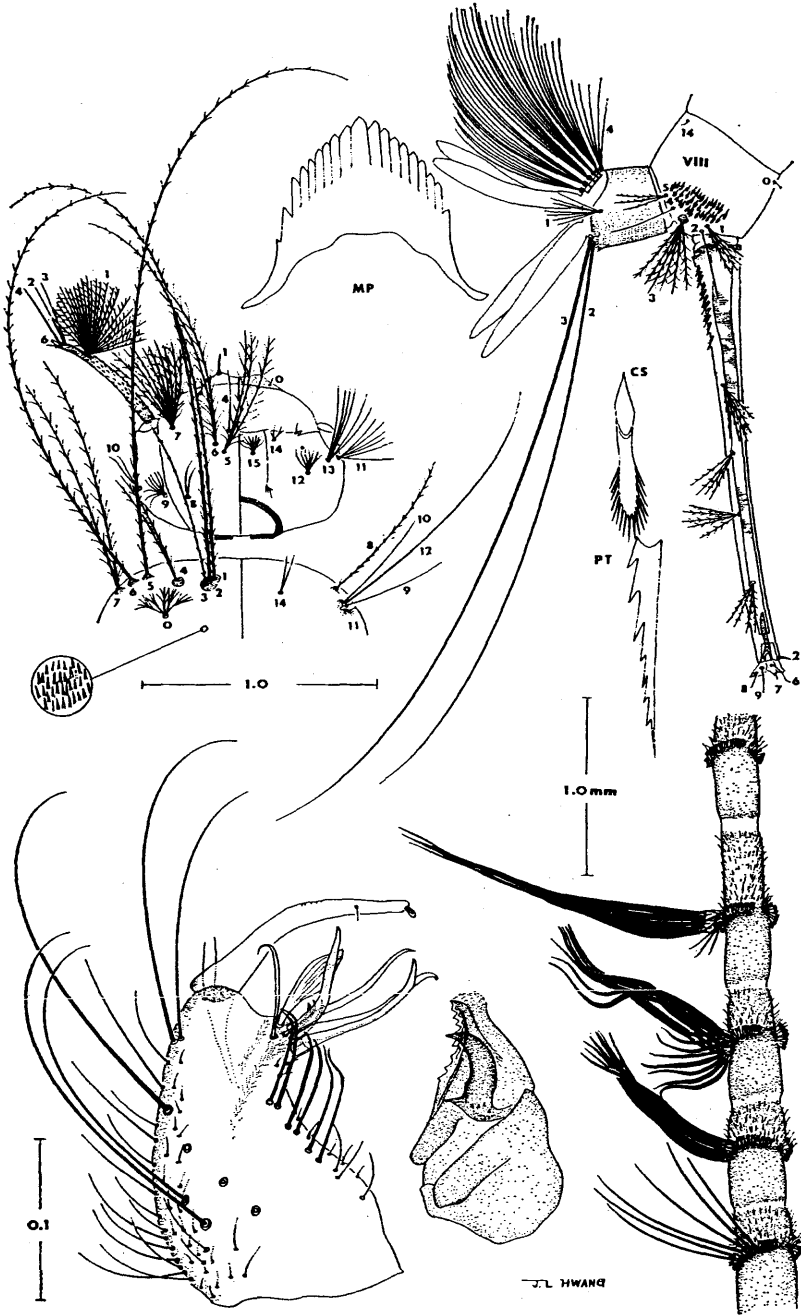
SIX NEW SPECIES OF THE CULEX (LOPHOCERAOMYIA)  
MAMMILIFER GROUP FROM THAILAND  
(DIPTERA: CULICIDAE)<sup>1</sup>

RALPH A. BRAM and MANOP RATTANARITHIKUL  
South East Asia Mosquito Project, Department of Entomology,  
Smithsonian Institution, Washington, D. C. 20560<sup>2</sup>

The most recent and complete taxonomic treatment of the *Culex* subgenus *Lophoceraomyia* in any area of South East Asia was that of Colless (1965). This study described 14 new species, revalidated five synonyms, and generally placed the taxonomy of this difficult group on a sound basis for future investigations. The present study describes six new species from Thailand, all of which belong to the *mammilifer* subgroup of the *mammilifer* group as defined by Colless (1965). The *mammilifer* group of the subgenus *Lophoceraomyia* is distinguished from the *fraudatrix* group mainly by the presence of a mammiliform protuberance on the inner surface of the male antennal torus. In the male terminalia, members of the *mammilifer* group exhibit both an internal process and a spinose or toothed dorsal process which compose the lateral plate of the phallosome; members of the *fraudatrix* group possess a toothless dorsal process only. In the larval stage members of the *mammilifer* group have head hairs 4-C distinctly longer than the distance between their bases, in contrast to the *fraudatrix* group in which these hairs are shorter than the distance between their bases. The *mammilifer* subgroup of the *mammilifer* group is recognized by the presence of one lower mesepimeral bristle in the adult, by the larval antenna with hairs 2 and 3 well separated from the apex of the shaft, and by the general container habitats of the larvae; the *brevipalpus* subgroup of the *mammilifer* group lacks a lower mesepimeral bristle in the adult, hairs 2 and 3 of the larval antenna are inserted at the apex of the shaft, and the larval habitat is generally restricted to pitcher plants (*Nepenthes* spp.).

<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. Immediate publication secured by full payment of page charges—Editor.

<sup>2</sup> Present address of second author—Public Health Division, USOM, Bangkok, Thailand.



In the following descriptions, terminology of the adult habitus and the immature stages conforms primarily to the format of Belkin (1962); terminology applied to the male antenna and male terminalia follows Colless (1965), except as noted below. Colless referred to the first flagellar division of the male antenna as segment III; in our terminology the first flagellar division is called flagellomere I, recognizing only three true antennal segments (namely, the scape, the pedicel or torus, and the flagellum). Structures of the male terminalia recognized as coxite and style of coxite by Colless are termed basimere and distimere, respectively, in this study. Material utilized in this study is housed in the U. S. National Museum and consists principally of collections made by the Department of Medical Entomology, South East Asia Treaty Organization Medical Research Laboratory, Bangkok, Thailand, and to a lesser extent, the D. C.—E. B. Thurman mosquito collection.

***Culex (Lophoceraomyia) spiculosus*, species novum**

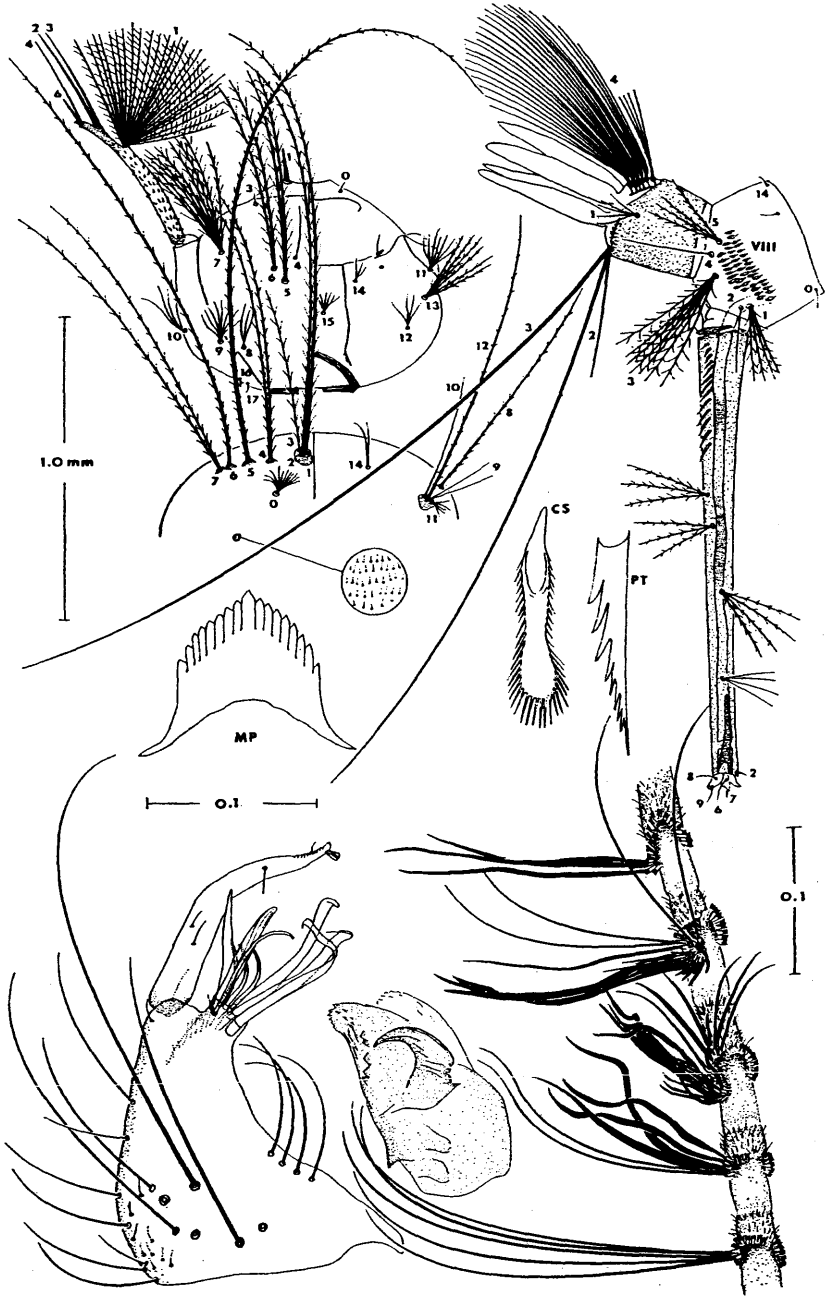
The adult female is very similar to that of *C. traubi* Colless and cannot be separated with certainty. The male is recognized by the absence of conspicuous tufts on antennal flagellomeres V and IX, the submarginal setae of the basimere are arranged in a regular row, and the internal process of the lateral plate of the phallosome does not project beyond the dorsal process. The fourth stage larva is characterized by possessing a long siphon with 4 pairs of strong, long, subventral tufts, having head hair 5-C bifid or trifid, 16, 17-C absent, and having the thoracic and abdominal integument covered with numerous, prominent spicules.

*Female.* Proboscis dark brown with a pair of prominent basoventral bristles and a pair of smaller setae between them; palpus similar in color to the proboscis; antenna longer than the proboscis; decumbent scales of the vertex narrow and dark, somewhat broader and pale immediately adjacent to the orbital line; erect scales forked, uniformly dark brown. Scutum and midlobe of scutellum sparsely covered with dark scales; pleural integument uniformly pale, tinged with green in fresh specimens; one lower mesepimeral bristle present. Wings normal, outstanding scales narrow, including those on veins  $R_2$  and  $R_3$ . Anterior surface of hind femur predominantly pale, with a narrow dark stripe along the dorsal border and a dark band at the apex; hind tibia and tarsus completely dark; mid- and fore-legs uniformly dark scaled, although in some specimens the anterior surface of the mid-femur may exhibit a somewhat paler basoventral area on the anterior surface. Abdominal terga covered with dark brown scales; sterna slightly lighter than the terga.

---

←

Fig. 1, *Culex (Lophoceraomyia) spiculosus* sp. nov. Dorsoventral view of the fourth stage larva, dorsal view of the male terminalia, and lateral view of the antennal flagellomeres V through IX.



J.L. HWANG

*Male.* Similar in general appearance to the female; length of palpus slightly greater than the length of the proboscis. Flagellomeres V through IX as illustrated in figure 1; flagellomere V with a group of from 6 to 8 very narrow, acute scales whose apices do not reach beyond flagellomere VII; flagellomere VIII with an internal tuft of long and rather straight, broad, dark brown setae; flagellomere IX without a tuft of obviously modified setae. Terminalia as illustrated in figure 1; basimere with from 6 to 8 strong submarginal setae inserted in a straight row; subapical lobe of the basimere with the three rods subequal in length and width, gently curved and pointed apically; internal leaflet rodlike, but broad and bent; external leaflet oblong-ovate, pointed apically and striate; accessory processes narrow, setae-like; distimere normal, the apex without annulations; lateral plate of the phallosome with the internal process distinctly curved and pointed distally, not projecting beyond the apex of the dorsal process; dorsal process with an apical knob and approximately 10 short, but distinct, teeth on the lateral margin.

*Larva.* Chaetotaxy and structure as illustrated in figure 1. Head lightly pigmented, antenna concolorous with head capsule but with a dark basal ring and progressively darker beyond insertion of antennal hair 1-A; 1-A large, multiple, pectinate, but with the lateral hairlets on only one side of the individual branches. Head hair 1-C darkly pigmented, tapering to a sharp point, its length greater than half the distance between bases of the pair; 4-C single, simple; 5-C with 2 or 3 branches, pectinate, 6-C bifid, subequal in length; 16, 17-C absent. Thoracic and abdominal integument densely spiculose throughout, the spicules of the thorax slightly more prominent than those of the abdomen; thoracic hairs 1, 2-P single, pectinate, subequal in length; 3-P single, pectinate, shorter and slenderer than 1, 2-P; 4-P bifid, pectinate; 5, 6-P single, pectinate; 7-P bifid, pectinate; 8-P single, pectinate; 14-P bifid, simple. Comb consisting of from 35 to 45 fan-shaped scales arranged in a broad, triangular patch. Siphon index variable, ranging from 7:1 to 11:1 (average, 8.8:1); 4 pairs of subventral tufts inserted in a line on the siphon; individual tufts 2 to 5 branched, finely pectinate, their length greater than the width of the siphon at the point of insertion; pecten consisting of from 11 to 14 teeth restricted to approximately the basal fourth of the siphon; individual pecten tooth with a prominent distal spine and approximately 6 to 8 lateral barbs, the proximal 2 or 3 barbs very coarse.

*Type Data.* Holotype male with associated larval and pupal skins and terminalia and antennae slide mounted from Doi Sam Sao, Tak Province, Thailand, deposited in the U. S. National Museum, No. 69181. Paratypes: 1 male and 2 females with associated larval and pupal skins with the same data as the holotype. The specific name applies to the characteristic thoracic and abdominal spiculation of the fourth stage larva.

*Distribution.* Known only from the following Provinces in Thailand: Tak, Nakhon Nayok, and Chiang Mai. Eleven individual

---

←

Fig. 2, *Culex (Lophoceraomyia) peytoni* sp. nov. Dorsoventral view of the fourth stage larva, dorsal view of the male terminalia, and lateral view of the antennal flagellomeres V through IX.

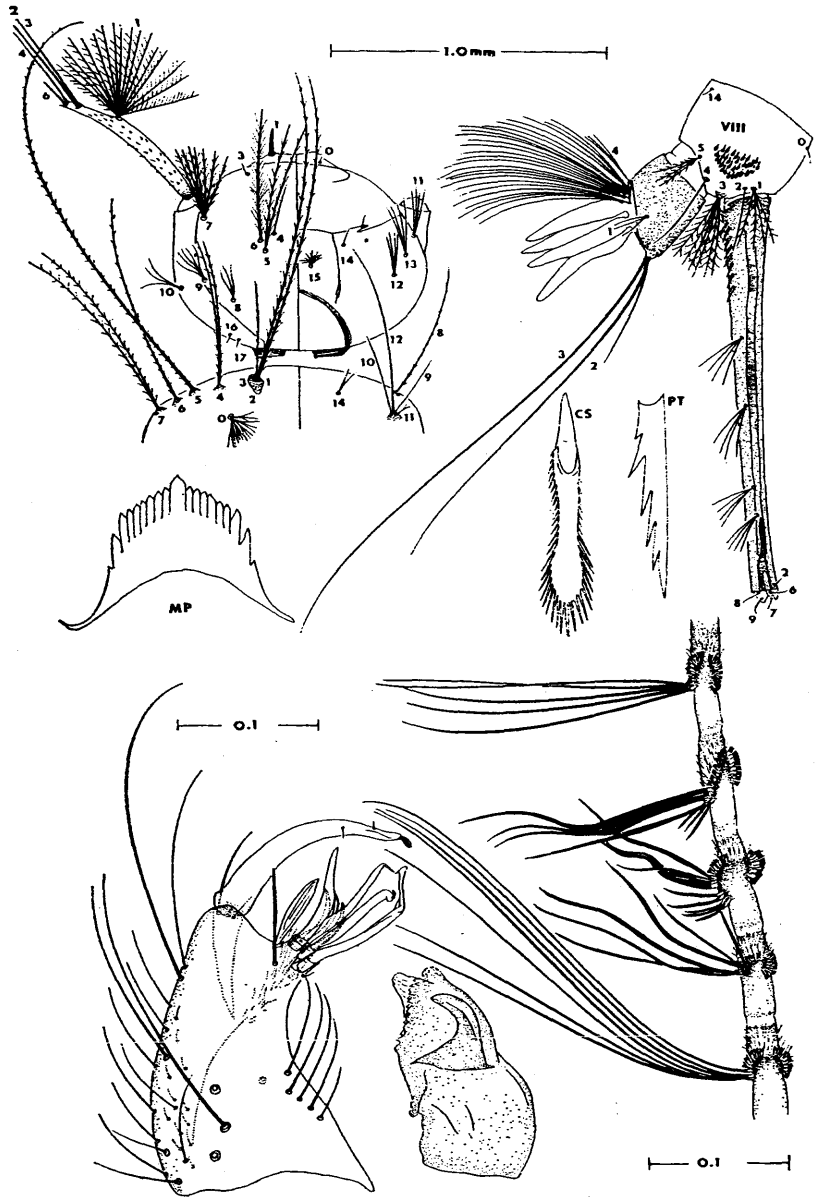


Fig. 3, *Culex (Lophoceraomyia) eukrines* sp. nov. Dorsoventral view of the fourth stage larva, dorsal view of the male terminalia, and lateral view of the antennal flagellomeres V through IX.

rearings have been examined as well as 6 males, 3 females, and 50 larvae.

*Taxonomic Discussion.* This species and *peytoni* sp. nov. clearly fall within the sibling species complex of *C. traubi*-*C. ganapathi* recognized by Colless (1965). Its closest affinity, both in anatomical features and larval biology, is with *traubi* from which it can be separated as follows: in the male terminalia of *spiculosus* sp. nov. the internal process of the phallosome does not project beyond the dorsal process, a condition which does exist in *traubi*; in the larva, hair 2 of the anal segment is single in *spiculosus* sp. nov. as opposed to bifid in *traubi*. Additional distinguishing features may be found in the male antennae.

*Biology.* Larvae of this species have been collected on 16 occasions from primary rain forests; once from a bamboo stump, once from a bamboo internode, once from a stump hole, and on all other occasions from large tree holes. Collections were made during July, August, and September. Habits of the adults are unknown.

***Culex (Lophoceraomyia) peytoni*, species novum**

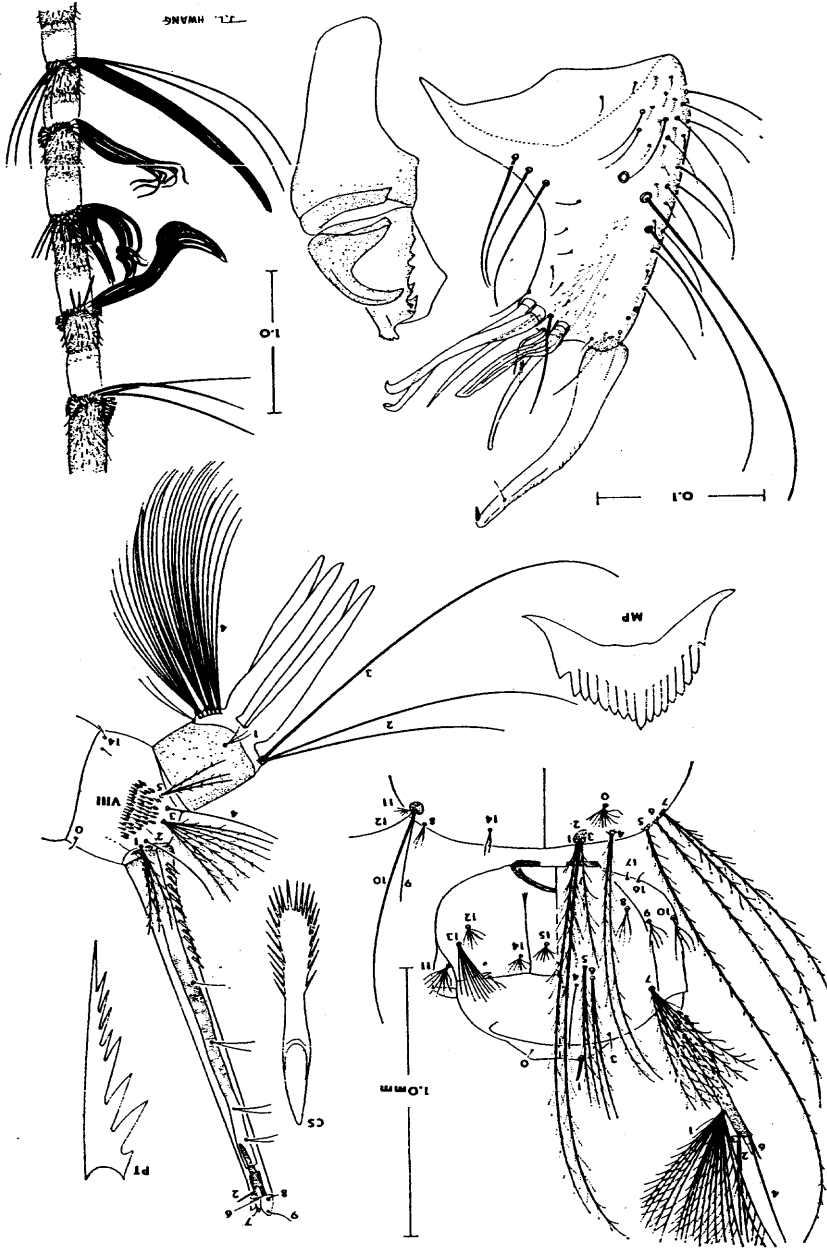
The female is indistinguishable from *spiculosus* sp. nov. The adult male may be recognized by the presence of only a few yellowish long hairs on flagellomere V, an internal tuft of at least 5 strongly sigmoid setae on flagellomere VII, a tuft of obviously modified, dark, strong setae on flagellomere IX, and by the internal rod of the subapical lobe of the basimere slightly expanded subapically, followed by a rather broad, gently curved apex. The fourth stage larva possesses a long siphon with 4 pairs of strong, long, subventral tufts; the thoracic integument is covered with fine spicules, but the abdominal integument is mostly smooth and the lateral denticles of the individual pecten teeth are very broad proximally.

*Female.* No features have been found which differ consistently from the description presented for *spiculosus* sp. nov.

*Male.* Similar to *spiculosus* sp. nov. except as noted below. Flagellomeres V through IX as illustrated in figure 2; flagellomere V with a group of approximately 6 narrow, setaelike scales which extend to approximately the middle of flagellomere IX; flagellomere VIII with an internal tuft of from 6 to 9 gently curved, dark brown setae; and flagellomere IX with a small internal tuft of 3 strong, rather long, dark setae. Terminalia as illustrated in figure 2; basimere with 4 or 5 strong submarginal setae inserted in a straight row; subapical lobe of the basimere with the internal rod slightly expanded subapically, then bent and with a rather broad, lightly sclerotized apex; the central and external rods subequal in length, sharply hooked apically; accessory processes narrow, but somewhat broader than those found in *spiculosus* sp. nov.; internal leaflet rod-like, gently bent; external leaflet slender, striate; distimere with 1 or 2 additional setae on the proximal third; dorsal process of the lateral plate of the phallosome with a subapical knob and 5 short, but distinct teeth on the lateral margin.

*Larva.* Chaetotaxy and structure as illustrated in figure 2, similar to *spiculosus* sp. nov. except as noted below. Head hairs 16, 17-C represented by minute spicules which are easily overlooked even in good preparations. Thoracic integument sparsely spiculate, the spicules fine and rather long; abdominal integument

Fig. 4. *Culex (Lophoceraomyia) pholeti* sp. nov. Dorsoventral view of the fourth stage larva, dorsal view of the male terminalia, and lateral view of the antennal flagellomeres V through IX.



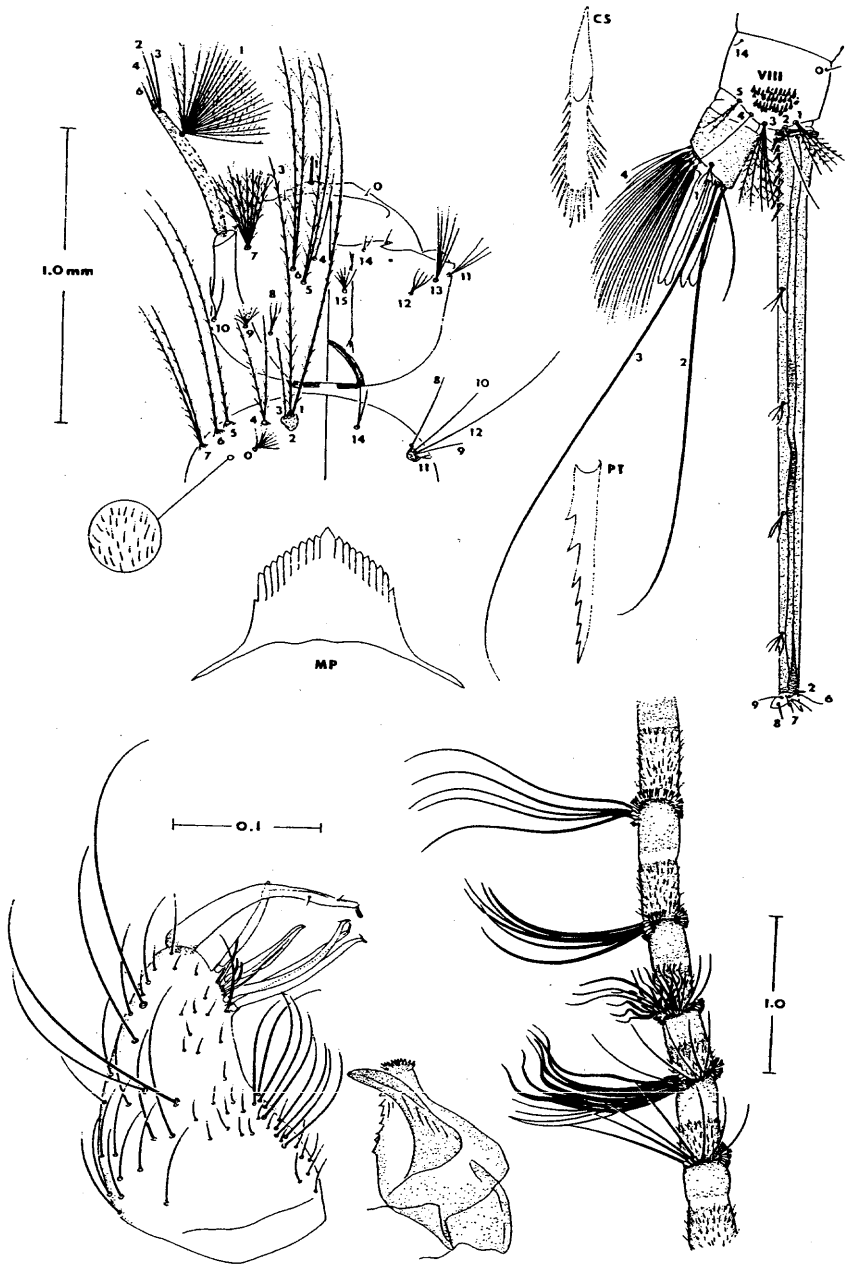
glabrous. Thoracic hair 7-P single or bifid, pectinate. Comb consisting of a broad, triangular patch of from 35 to 50 elongate, fan-shaped scales. Siphon index variable, ranging from 6.6:1 to 9.2:1 (average, 8:1); 4 pairs of subventral tufts inserted in a line on the siphon; individual tufts 3 to 5 branched, their length greater than the width of the siphon at the point of insertion; pecten consisting of from 10 to 14 teeth restricted to the basal fourth of the siphon; individual pecten tooth with an extended, fine distal spine, and from 6 to 10 lateral barbs, the basal barb (sometimes the proximal 2 or 3 barbs) very large and rather rounded apically.

*Type Data.* Holotype male with associated larval and pupal skins and terminalia and antenna slide mounted from Phatthalung Province, Thailand, 34 kms. on Phatthalung to Trang Road, 15. X. 1964, K. Mongkolpanya, from tree hole 12 feet above ground, deposited in the U. S. National Museum, No. 69182. Paratypes: 1 male and 1 female with associated larval and pupal skins with the same data as the holotype, and 2 males from Ko Chang Island, Ranong Province, Thailand, 16. IX. 1964, K. Mongkolpanya, from a tree stump hole with associated larval and pupal skins. This species is named in honor of SFC E. L. Peyton of the SEATO Medical Research Laboratory.

*Distribution.* The authors have seen specimens from the following Provinces in Thailand: Trang, Chiang Mai, Sara Buri, Narathiwat, Phatthalung, Chumphon, Ranong, and Chanthaburi. Sixteen individual rearings have been studied, as well as 4 additional males and 70 larvae.

*Taxonomic Discussion.* As indicated under *spiculosus* sp. nov., this species falls within the *traubi*—*ganapathi* sibling species complex. Its anatomical affinity seems closest to *ganapathi*, but larval biology is rather intermediate between the two. The adult females cannot be distinguished from the three other members of the complex. The male may be separated from *ganapathi* primarily by the presence of a tuft of modified setae on flagellomere IX as well as the presence of 1 or 2 setae on the proximal third of the distimere; the male differs from *traubi* and *spiculosus* sp. nov. by the presence of a tuft of long, narrow, tapering scales on flagellomere V whose apices reach to approximately the middle of flagellomere IX. The larva may be distinguished from *ganapathi* by the form of the pecten tooth in which the lateral denticles are very broad basally and by the fact that head hair 1-C is never expanded on the basal half as frequently found in *ganapathi*; the larva is distinguished from *traubi* and *spiculosus* sp. nov. by the glabrous abdominal integument and the undeveloped median caudal filament.

*Biology.* Larvae have been collected on 33 occasions from tree holes, root holes, bamboo internodes, and bamboo stump holes in primary rain forests. One collection was made from a rock hole in dense forest. Habits of the adults are unknown.



J.L. HWANG

**Culex (Lophoceraomyia) eukrines**, species novum

The adult female is virtually indistinguishable from *spiculosus* sp. nov. and its relatives, but does exhibit slight differences in the scaling patterns on the anterior surface of the hind femur. The adult male exhibits an internal tuft of 3 gently curved setae on flagellomere VII and a tuft of obviously modified, dark, strong setae on flagellomere IX. The larva may be immediately recognized by the head hair 6-C which is always single and stout.

*Female.* Similar to *spiculosus* sp. nov. except for the following difference. Anterior surface of hind femur completely pale on the proximal half, with a narrow apical dark band which extends proximally along the dorsal border.

*Male.* Similar to *spiculosus* sp. nov. except as noted below. Flagellomeres V through IX as illustrated in figure 3; flagellomere V with a tuft of 6 very narrow, pale setae extending beyond flagellomere IX; flagellomere VII with an internal tuft of from 3 to 5 gently sigmoid, specialized setae and several shorter, straight setae; flagellomere IX with a tuft of from 3 to 5 long, strong, dark setae. Terminalia as illustrated in figure 3; similar to *peytoni* sp. nov. but with 5 or 6 submarginal setae on the basimere, without setae on the basal third of the distimere, and with approximately 15 teeth on the lateral margin of the dorsal process of the lateral plate of the phallosome.

*Larva.* Chaetotaxy and structure as illustrated in figure 3, similar to *spiculosus* sp. nov. except as noted below. Head hair 5-C usually bifid, sometimes single, pectinate; 6-C always single, pectinate, somewhat stouter than the individual branches of 5-C; 16, 17-C represented by minute spicules. Thoracic and abdominal integument glabrous; thoracic hairs 5, 6, 7, 8-P single, pectinate, but 7-P occasionally bifid. Comb consisting of from 35 to 50 elongate, fan-shaped scales arranged in a broad triangular patch. Siphon index variable, ranging from 7:1 to 10:1 (average, 8.2:1); 4 pairs of subventral tufts inserted in a line on the siphon; individual tufts with from 2 to 4 branches, their length greater than the width of the siphon at the point of insertion; pecten consisting of from 8 to 12 teeth restricted to the basal third to fourth of the siphon; individual pecten tooth with a prominent distal spine and from 5 to 9 lateral barbs, the proximal 2 or 3 barbs more prominent than the apical barbs.

*Type Data.* Holotype male with associated larval and pupal skins and terminalia and antenna slide mounted from Huai Bong Ti, Kanchanaburi Province, Thailand, 2. VI. 65, K. Mongkolpanya, from rock pool in bamboo grove, deposited in the U. S. National Museum, No. 69183. Paratypes: 1 male and 2 females with associated larval and pupal skins from Khao no Chang, Kanchanaburi Province, Thailand, 6. VI. 65, E. L. Peyton and K. Mongkolpanya; and 1 male with associated larval and pupal skins from Ban Sai Yok, Kanchanaburi Province, Thailand, 26. V. 1965, S. Chumchulcherm, from a rockhole in a bamboo grove in a mountainous area. The specific name is derived from the Greek adjective meaning clear or distinct.

←

Fig. 5, *Culex (Lophoceraomyia) fuscisiphonis* sp. nov. Dorsoventral view of the fourth stage larva, dorsal view of the male terminalia, and lateral view of the antennal flagellomeres V through IX.

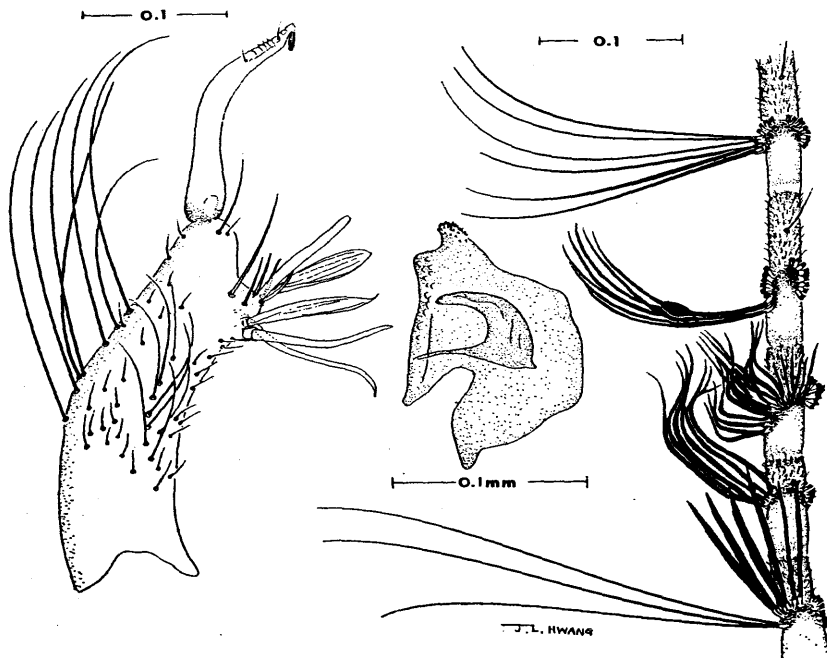


Fig. 6, *Culex* (*Lophoceraomyia*) *incomptus* sp. nov. Dorsal view of the male terminalia, and lateral view of the antennal flagellomeres V through IX.

**Distribution.** The authors have examined 24 collections from Kanchanaburi Province, Thailand and one collection each from Nakhon Nayok and Trang Provinces. Fourteen individual rearings were studied, as well as 17 additional males, 21 additional females, and 120 larvae.

**Taxonomic Discussion.** The adult stage (both male and female) demonstrates affinity to the *traubi*—*ganapathi* sibling species complex but the larva appears sufficiently distinctive to exclude it from this complex. The female differs from the species previously mentioned only on the basis of the scale patterns of the anterior surface of the hind femur, and this character is frequently difficult to evaluate. The adult male is differentiated from the members of the *traubi*—*ganapathi* complex by the presence of an internal tuft of approximately 3 gently sigmoid specialized setae on flagellomere VII; it differs from *peytoni* sp. nov. by lacking setae on the basal third of the distimere and by possessing approximately 15 teeth on the dorsal margin of the outer process of the lateral plate of the phallosome; it differs from *spiculosus* sp. nov. on the basis of the internal rod on the subapical lobe of the basimere which is slightly expanded subapically then bent and with a rather broad, lightly sclerotized

apex. The larva is primarily distinguished from the members of the *traubi-ganapathi* complex by the glabrous thoracic and abdominal integument and by the fact that head hair 6-C is always single, rather stout, and apparently somewhat flattened.

*Biology.* The type habitat of this species was a rock hole located on the face of a cliff in a secondary rain forest which contained about two gallons of water. Larvae of *eukrines* sp. nov. have also been collected from flood pools in a primary rain forest environment, bamboo internodes in a primary rain forest, a coconut shell in a secondary rain forest, a wheel track in a bamboo grove, a teak tree hole, and a pandanus axil in a primary bamboo grove. Most of the collections, however, were made in mountainous areas from bamboo internodes, or rock pools or other container habitats in close association with bamboo groves. Nothing is known of the adult biology.

#### ***Culex (Lophoceraomyia) pholeter*, species novum**

The female is virtually indistinguishable from *spiculosus* sp. nov. The adult male is distinguished by flagellomere V possessing a conspicuous tuft which has from 1 to 4 long, broad scales, by the presence of 3 long, prominent submarginal setae on the basimere, and by the shape of the internal process of the lateral plate of the phallosome. The fourth stage larva exhibits a long siphon with 4 pairs of long, rather fine, usually bifid subventral tufts and thoracic hair 8-P is branched and reduced in size.

*Female.* The adult female is virtually indistinguishable from *spiculosus* sp. nov., but the abdominal sterna are very pale in contrast to the condition found in *spiculosus* sp. nov.

*Male.* Similar in general appearance to *spiculosus* sp. nov. except as noted below. Flagellomeres V through IX as illustrated in figure 4; flagellomere V with at least one very broad scale which tapers to a sharp point and extends to flagellomere VIII, as well as several more narrow, but equally long setae-like scales; flagellomere VIII with a tuft of 5 or more strong, broad, dark setae which exhibit a prominent median bend; flagellomere IX with an internal tuft of 3 to 5 long, rather straight, strong setae. Terminalia as illustrated in figure 4; basimere with 3 strong submarginal setae inserted in a straight row; subapical lobe of the basimere with the internal rod tapering to a sharp point and somewhat shorter than the central and external rods which are subequal in length and broadly bent apically; internal leaflet rod-like, fine; external leaflet oblong-ovate, bluntly rounded apically and striated; accessory processes narrow, setae-like; distimere minutely annulate on the apical third of the convex surface; dorsal process of the lateral plate of the phallosome with an apical knob and approximately 7 short, but distinct teeth on the lateral margin.

*Larva.* Chaetotaxy and structure as illustrated in figure 4, similar to *spiculosus* sp. nov. except as noted below. Head hair 1-C darkly pigmented, tapering to a sharp point, its length less than half the distance between bases of the pair; 16, 17-C represented by small, but distinctive, spicules. Thoracic and abdominal integument glabrous. Thoracic hair 8-P with 2 or 3 branches, simple, very short and fine; 14-P bifid or trifid. Comb consisting of a broad, triangular patch of from 60 to 80 elongate, fan-shaped scales. Siphon index variable, ranging from

6:1 to 7:1; 4 pairs of subventral tufts inserted in a line on the siphon; individual tufts usually bifid (occasionally trifid or single), their length greater than the width of the siphon at the point of insertion; pecten consisting of from 8 to 11 teeth restricted to approximately the basal third to fourth of the siphon; individual pecten tooth with a prominent distal spine and from 7 to 10 lateral barbs, the proximal two barbs very coarse, the distal barbs fine.

*Type Data.* Holotype male with associated larval and pupal skins and terminalia and antenna slide mounted from Khao Mai Ha Wa, Chon Buri Province, Thailand, 19. VII. 65, E. L. Peyton, from a crab hole in a mountainous secondary rain forest, deposited in the U. S. National Museum, No. 69184. Paratypes: two females with associated larval and pupal skins and one male from the type locality and habitat, 30 VI. 65. The specific name applies to the larval habitat and is taken from the Greek noun meaning one who lurks in a hole.

*Distribution.* This species is known only from the type locality and from Khao Mai Kaeo, Chon Buri Province, Thailand. Three individual rearings were studied as well as 3 additional males and 4 larvae.

*Taxonomic Discussion.* The adult male appears to have its closest affinity to *C. mammilifer* (Leicester), due to the presence of the conspicuous tuft on flagellomere V; however, it may be separated from *mammilifer* on the basis of having only 3 prominent submarginal setae on the basimere and the internal process of the lateral plate of the phallosome does not project beyond the apex of the dorsal process. The larva is also similar to that of *mammilifer*, but can be recognized by the presence of 4 pairs of subventral tufts on the siphon; the form of the thoracic hair 8-P is also distinctive, and hair 6 of abdominal segment I is bifid rather than 3 or 4 branched.

*Biology.* The type habitat of *pholeter* sp. nov. is a small crab hole in a secondary rain forest in a mountainous area. Another collection was made from a crab hole in a tapioca plantation near the type habitat. Collections were made during June, August, and October. Habits of the adults are unknown.

#### *Culex (Lophoceraomyia) fuscosphonnis*, species novum

The adult female is indistinguishable from *spiculosus* sp. nov. The adult male is recognized by flagellomere V lacking a conspicuous tuft of long, board scales, by having the prominent submarginal setae inserted in two irregular rows on the basimere, and by the internal process of the lateral plate of the phallosome projecting beyond the apex of the dorsal process. The fourth stage larva exhibits a long, darkly pigmented siphon with 4 pairs of fine, rather short subventral tufts and thoracic hair 8-P single.

*Female.* Indistinguishable from *spiculosus* sp. nov.

*Male.* Similar to *spiculosus* sp. nov., except as noted below. Flagellomeres V through IX as illustrated in figure 5; flagellomere V with an internal tuft of about 5 narrow, acute setae whose apices do not reach beyond flagellomere VII; flagellomere IX with a tuft of from 3 to 5 strong, rather long, dark setae.

Terminalia as illustrated in figure 5; basimere with approximately 9 submarginal setae inserted in two parallel but, irregular rows; subapical lobe of the basimere with the internal rod rather broad, constricted at the apex and filamentous beyond the constriction; the central and external rods subequal in length, gently curved apically; lateral plate of the phallosome with the internal process rather narrow, distinctly curved and pointed distally, projecting beyond the apex of the dorsal process; dorsal process with an apical knob and approximately 10 short teeth on the lateral margin.

*Larva.* Chaetotaxy and structure as illustrated in figure 5, similar to *spiculosus* sp. nov. except as noted below. Head moderately pigmented, antenna slightly darker with a distinctly darker basal ring. Thoracic and abdominal integument covered with a sparse pattern of extremely fine, rather long spicules; thoracic hair 7-P single or bifid, pectinate; 14-P usually bifid, occasionally single, simple. Comb consisting of from 30 to 45 elongate, fan-shaped scales arranged in a broad triangular patch. Siphon index variable, ranging from 10:1 to 12.6:1 (average, 11.8:1); 4 pairs of subventral tufts inserted in a line on the siphon; individual tufts fine, with from 2 to 4 branches, their length equal to, or greater than the width of the siphon at the point of insertion; pecten consisting of from 7 to 10 teeth restricted to approximately the basal fourth or less of the siphon; individual pecten tooth gently curved, with a prominent distal spine and with from 6 to 10 lateral barbs; distal barbs fine, proximal barbs coarse, and conspicuous; siphon and anal segment very darkly pigmented, more so than in any other species examined. The association of the larvae with the male is presumptive: larvae were collected along with a pupa from which the holotype male was reared.

*Type Data.* Holotype male with terminalia and antennae slide mounted from Muang, Phatthalung Province, Thailand, 15. X. 1964; S. Chumchulcherm, from a tree hole in a primary forest, deposited in the U. S. National Museum, No. 69185. Paratypes: one female with its associated larval and pupal skins from the type locality; one male from Muang, Trang Province, 9. X. 1964, S. Chumchulcherm, reared from a root hole. The specific name is of Latin origin and applies to the exceptionally dark siphon of the fourth stage larva.

*Distribution.* In addition to the type locality, this species has also been collected in Thailand from Trad and Trang Provinces. The following material was examined in addition to the types: 2♂ reared from pupae; 1♀ with associated larval and pupal skins; and 13 larvae.

*Taxonomic Discussion.* The adult male of this species is extremely similar to *C. demissus* Colless, and on the basis of Colless' description of the unique holotype specimen, the terminalia appear to be inseparable; however, the internal tuft of antennal flagellomere V in *fuscosphonis* sp. nov. does not exhibit the distinctively long setae which are said to be present in *demissus*. The larva is rather similar to that of *C. wilfredi* Colless but may be distinguished on the basis of the very darkly pigmented siphon and anal segment in *fuscosphonis* sp. nov. and by hair 2 of the anal segment which is bifid in the case of *fuscosphonis* sp. nov. and trifid in the case of *wilfredi*.

*Biology.* The type habitat of this species was a tree hole located in a primary rain forest. Specimens have also been collected from root holes in mountainous primary rain forests and one collection was made from a tree hole in a secondary scrub stand near the sea coast. The biology of the adults is unknown.

***Culex (Lophoceraomyia) incomptus*, species novum**

The adult male may be recognized by the presence of 2 rows of submarginal setae on the basimere, by the 6 acutely pointed scales on flagellomere V, and by the characteristically bulbous setae on flagellomere VIII.

*Female.* Unknown.

*Male.* Similar to *fuscosphonis* sp. nov., except as noted below. Flagellomeres V through IX as illustrated in figure 6; flagellomere V with an internal tuft of approximately 6 acute, striated setae which extend almost to flagellomere VII (these setae are somewhat stronger than those found in *fuscosphonis* sp. nov.); flagellomere VIII with an internal tuft of 7 strong, dark, gently curved setae, the distal 2 of these setae with a characteristic bulbous, median expansion; flagellomere IX with an internal tuft of 3 short, slender setae and 3 longer, slender setae. Terminalia as illustrated in figure 6; basimere with 10 strong, submarginal setae inserted in two irregular rows; subapical lobe of the basimere with the internal rod rather robust, constricted at the extreme apex and pointed, the central and external rods subequal in length, hooked apically; internal leaflet rod-like, quite slender; accessory processes narrow and setae-like; distimere with minute annulations on the apical third of the convex surface; dorsal process of the lateral plate of the phallosome with an apical spiculate knob and 12 or more teeth on the lateral margin; internal process robust, distinctly curved, not projecting beyond the apex of the dorsal process.

*Larva.* Unknown.

*Type Data.* Holotype male with terminalia and antennae slide mounted from Doi Sutep, Chiang Mai Province, Thailand, 7. I. 53, D. C. and E. B. Thurman, deposited in the U. S. National Museum, No. 69186. Paratypes: two males with terminalia and antennae slide mounted and with the same data as the holotype, deposited in the U. S. National Museum. The specific name applies to the overall adult habitus and is derived from the Latin adjective meaning unadorned.

*Distribution.* In addition to the type locality, one specimen was collected resting at Doi Tad Fah, Chiang Mai Province, Thailand. Four males and their associated terminalia and antennae were studied.

*Taxonomic Discussion.* This species demonstrates a close affinity to *fuscosphonis* sp. nov. and *demissus*, but the bulbous expansion of setae on flagellomere VIII and the shape of the processes on the subapical lobe of the basimere clearly separates this species from its close relatives. *C. bandoengensis* Brug, another member of the *mammifer* group which exhibits the submarginal setae in two rows, is

easily separated on the basis of the shape and number of the subapical lobe of the basimere.

*Biology.* Virtually nothing is known of the biology of this species. Larvae were collected (and the skins subsequently lost) from a tree hole on Doi Sutep Mountain, and one adult male was collected from a low plant under shady damp jungle on Doi Tad Fah Mountain.

#### ACKNOWLEDGMENTS

The authors are indebted to Dr. Botha de Meillon, SEAMP, Smithsonian Institution and Dr. Alan Stone, Agricultural Research Service, U. S. Department of Agriculture who reviewed the manuscript and offered many suggestions throughout the study. Lt. Colonel J. E. Scanlon, Walter Reed Army Institute of Research initiated the collections which led to these studies while at the South East Asia Treaty Organization Medical Research Laboratory, Bangkok.

Personnel of the Department of Medical Entomology, SEATO Medical Research Laboratory, Bangkok, Thailand collected most of the material and prepared specimens for study. Included among these were: Dr. D. J. Gould, SFC E. L. Peyton, Mr. S. Esah, Mr. S. Maneewangse, Mr. S. Chumchulcherm, Mr. K. Mongkolpanya, Mrs. R. Rattanarithikul, Miss S. Sandhinand, and Miss P. Narawat. Technical assistance at SEAMP, Smithsonian Institution was provided by Miss C. C. Lipscomb who typed the manuscript and Miss J. L. Hwang who prepared the illustrations. Dr. P. F. Mattingly kindly permitted the first author to compare specimens with types in the British Museum (Natural History).

#### LITERATURE CITED

- Belkin, J. N.** 1962. The mosquitoes of the South Pacific. Univ. Calif. Press, Berkeley, 2 vols., 608 and 412 pp.
- Colless, D. H.** 1965. The genus *Culex*, subgenus *Lophoceraomyia*, in Malaya (Diptera: Culicidae). Jour. Med. Ent. 2: 261-307.
-