

Additional Descriptions of Three Species of
Culex (*Eumelanomyia*) with the Description
of a New Species from Peninsular Malaysia
(Diptera: Culicidae)¹

by Sunthorn Sirivanakarn²

ABSTRACT. Additional descriptions or notes of the adults and the hitherto unknown pupae and larvae of *Culex* (*Eumelanomyia*) *malayensis* Sirivanakarn 1972, *simplicicornis* Edwards 1930 and *selai* Klein and Sirivanakarn 1969 from Peninsular Malaysia are presented. *Culex jefferyi*, a new species closely related to *malayensis* is recognized. Taxonomic discussions summarizing the diagnostic features and the records of distribution and bionomics of every species are given.

This is the second addition to the previous revision of *Culex*, subgenus *Eumelanomyia* Theobald in Southeast Asia and adjacent areas (Sirivanakarn 1972); the first of this series is that of Sirivanakarn and Ramalingam (1976). It is based on the study of material collected in Peninsular Malaysia during 1968-72 in connection with virus isolation studies by the Arbovirus Research Unit, University of California International Center for Medical Research, Kuala Lumpur, Malaysia under the direction of Albert Rudnick. Part of this material which was first brought to my attention in 1972 was reported to consist of 2 distinct but closely similar forms (coded as *Culex* sp. 1 and *Culex* sp. 3) both of which were found to be important vectors of Bakau virus (A. Rudnick and J. Jeffery, personal communication). I examined the specimens and tentatively identified one of these as *malayensis* with a suggestion that the other probably represents a new species. Because of the limited amount of reared material (especially males), and indefinite field data it was not possible to accurately determine the identity of *malayensis* and no attempt was made to describe the new form. Through recent correspondence with the same organization, I now have additional material and more complete field data of *malayensis* for description. The following new species, *jefferyi* (originally coded as *Culex* sp. 3), is dedicated to John Jeffery who kindly provided the material. In addition, I also received, from the same group, reared and wild caught specimens of *simplicicornis* Edwards 1930 and *selai* Klein and Sirivanakarn 1969 which have provided additional distribution records and material for the description of the hitherto unknown larvae and pupae. Currently, all specimens of these species are in the collection

1

This work was supported by Research Contract DAMD-17-74-C-4086 from the U. S. Army Medical Research and Development Command, Office of the Surgeon General, Washington, D. C.

²Medical Entomology Project, Smithsonian Institution, Washington, D. C. 20560.

of the Medical Entomology Project (MEP), U.S. National Museum (IISNM).

Culex (Eumelanomyia) malayensis Sirivanakarn

(Figs. 1, 2)

Culex (Eumelanomyia) malayensis Sirivanakarn 1972: 10 (♀*, ♂*). Holotype ♂, Rantau Panjang, Selangor (not Kelantan as given in the original description), PENINSULAR or WEST MALAYSIA (USNM).

FEMALE. Small, brownish or blackish species; wing length 2.3-2.7 mm; fore-femur 1.1-1.4 mm; proboscis 1.4-1.9 mm; in general distinguished from most members of *Eumelanomyia* by the small, broad oval plume scales on wing veins R₂, R₃ and R₄₊₅, the presence of complete or incomplete basal pale bands on abdominal terga and by the following additional features. *Head*. Decumbent scales on dorsum of vertex narrow, linear and rather fine; erect scales numerous, slender, entirely dark brown. Palpus and proboscis dark scaled; length of palpus about 0.2 of proboscis. *Cibarial Armature*. As figured and described in Sirivanakarn (1972: 10, Fig. 1D). *Thorax*. Mesonotal integument dark brown to black; mesonotal scales narrow; blackish and moderately dense on disc, pale and scanty on prescutellar space and scutellar lobes; acrostichals present; dorsocentrals, supraalar and scutellar bristles very strong; mid-scutellar lobe with 5 bristles; lateral scutellar lobe with 3,4 bristles. *Apn* and *ppn* dark brown, without scales; *apn* with 2,3 bristles and several weak, short setae; *ppn* with 2,3 posterior bristles and a row of 4,5 weak setae cephalad. Pleural integument slightly paler than mesonotum, usually with a broad dark band running across *ppl*, *ssp*, upper part of *stp* and *mep*; scales absent; *ppl* bristles weak, 5,6 in number; posterior border of *ssp* with a row of 4,5 minute setae which are rather inconspicuous, lower *mep* bristle usually 1, sometimes 2. *Legs*. Without any marked coloration; anterior surface of hind femur with a poorly defined pale stripe extending from base to about 0.5 of total length; rest entirely dark. *Wing*. All scales dark and moderately dense; veins R₂, R₃, R₄₊₅ with small, broad, oval plume scales. *Abdomen*. Tergites II-VII usually with complete basal pale bands, sometimes incomplete or largely superimposed by preceding segments and not readily visible from above; sternites entirely dark scaled.

MALE. In general similar to female. *Head*. Palpus varying from as long as to longer than proboscis by full length of segment 5; segment 3 with minute setae on ventral surface, its apex with 1-3 bristles; segments 4,5 weakly to strongly plumose. Proboscis slender, without any particulars. Antenna slightly shorter than proboscis, flagellar whorls long, strongly plumose; minor whorls of shorter setae absent. *Abdomen*. Tergites II-VII always with complete basal pale bands.

MALE GENITALIA (Fig. 1). Essentially as figured and described by Sirivanakarn (1972: 10-11; Fig. 1C), with following additional description. *Basimere*. Slender, conical, about 0.2 mm in length; tergal surface with about 10 strong bristles and several weaker bristles. *Subapical Lobe*. Small, short,

bearing on its apex 3 rodlike setae, 2 of which are stout, subequal, 1 narrower shorter, followed distally by 1,2 hairlike setae and 3,4 narrow blade-like setae; leaflets not developed. *Distimere*. Simple, weakly curved, about 0.5 length of basimere; outer margin smooth; 1 ventral and 1 dorsal tiny seta present at 0.75 from base; subapical spiniform slender, rather long and apically hooked. *Phallosome*. Complete tergal aspect of aedeagus as figured; lateral plates broad, triangular and strongly sclerotized, connected by a broad upper and lower tergal bridge; apical portion of lateral plates forked into 2 strong, simple, median spines, apical lateral margin produced into an acute angle, small teeth or denticles absent. *Proctiger*. Apical crown with several short spinelike spicules; paraproct and cercal sclerite well sclerotized; basal sternal process of paraproct not developed; cercal setae usually 2, sometimes 3.

PUPA (Fig. 1). Abdomen: 2.3 mm. Paddle: 0.6 mm. Trumpet: 1.0 mm; index 20. As figured; strikingly different from most local species of *Eumelanomyia* in the long, brownish trumpet. Cephalothorax and abdomen uniformly brownish. *Trumpet*. Very long, uniformly cylindrical; meatus strongly annulate; apical margin truncate; pinna poorly developed or not emarginate, slit present. All setae developed, most of which are extremely weak and rather inconspicuous, the following are diagnostic. *Cephalothorax*. Setae 1,3-C double; 5-C 3,4 branched; 8-C double or triple; 9-C double. *Metanotum*. Seta 10-C weak, short, usually double (1-2); 11,12-C stronger, double. *Abdomen*. Seta 1-I relatively weak, with 9,10 pectinate branches; 1-II double or triple, as long as 3-II; 2-II single, subequal to 3-II; 3-I-III single or double; 1-III-V usually triple (2-3); 1-VI-VII double; 5-IV triple; 5-V double; 5-VI single or double; all setae 6-III-VI very weak, subequal, usually double (2-3); 9-VII weak, short, double; 9-VIII a little longer than 9-VII, triple; setae 10-III-VII strong and long; 10-III,IV double; 10-V-VI single; 10-VII single or double. *Paddle*. Pale whitish, contrasting sharply with abdomen and cephalothorax; midrib weak, lightly pigmented; seta 1-P present; 2-P absent.

LARVA (Fig. 2). Head: 0.60 mm. Siphon: 1.5 mm; index 10. Saddle: 0.32 mm; siphon/saddle ratio about 5. As figured; the following are diagnostic. *Head*. Integument yellowish white; seta 1-C dark, spiniform, its length about 0.3 the distance between bases of the pair; 4-C single, fine, 5,6 strong, double, length of 5-C varying from 0.50-0.75 of 6-C; 7-C 8 branched; 9-C cephalad of ocular bulge; 10-C 3,4 branched; 11-13-C well developed; 11-C 7,8 branched; 12-C 18 branched; 13-C 8 branched; 14-C bifid; 16,17-C present, minute. Antenna rather long, exceeding head length, shaft entirely brownish; spicules numerous and strong; seta 1-A strongly plumose, with about 22 pectinate branches; 2,3-C strong, bristlelike, clearly subapical. Mental plate with 7 lateral teeth on each side of median tooth. *Thorax*. Unspiculate; seta 3-P triple, about 0.25 of the length of 1,2-P; 4-P double, subequal to 1,2-P; 7,8-P strong, subequal, both triple; 14-P single or double; 5-M usually double, sometimes triple; 8-M 5 branched; 9-M 6,7 branched; 7,9-T 7 branched; 13-T weak, short, 8,9 branched. *Abdomen*. Spiculation absent; all setae except setae 6-I,II and 7-I very weak and rather inconspicuous; 6-I,II triple; 7-I double; 1-III-VI and 6-III-VI 4,5 branched. Comb scales small, about 60, aggre-

gated into a broad oval patch; scales in anterior row short, those in posterior row slightly elongate, all with truncate apical fringe of evenly fine spicules. Seta 1-VIII 2-4 branched; 2-VIII double; 3-VIII 7 branched; 4-VIII single; 5-VIII double. Saddle dark brown, seta 2-X with 1 short and 1 long branch; 4-X with 5-5.5 pairs of branched setae; anal gills slender, 2,3 times length of saddle. *Siphon*. Moderately long, slender; color entirely dark brown; pecten teeth 13-16; all apparently simple or with a fine barb of minute denticles; siphonal tufts weak, short and rather inconspicuous, composed of 4 irregular pairs, inserted subventrally or laterally, each tuft double, shorter or as long as siphonal width at point of attachment; 2-S small, spine-like; median caudal filament developed, 9-S strong and apically hooked.

TAXONOMIC DISCUSSION. *Culex malayensis* can be recognized in all stages except the female by the above combination of characters. Among the previously known Southeast Asian species of *Eumelanomyia*, *malayensis* adults are exceedingly similar to *simplicicornis* Edwards in the general facies but can be readily separated from it by several features of the male genitalia. The pupae and larvae as described and figured here for both species are also strikingly different and can be readily separated from one another by a few or several diagnostic features.

The affinity of *malayensis* is evidently closest to *jefferyi* described below. The 2 species are basically similar in all stages but exhibit a striking difference in the shape of the lateral plate of the male phallosome. Both apparently form a distinct complex or subgroup in the *rubinotus-rima* group of *Eumelanomyia* as defined by Sirivanakarn (1971, 1972).

DISTRIBUTION. Apparently widespread in Peninsular Malaysia, also recorded from Sabah. *Material examined*: 11 ♂, 5 ♀, 2 L; 2 individual rearings (1 pupal, 1 larval).

MALAYSIA. *Peninsular Malaysia-Selangor*: Kuala Langat, Tanjong Rabok; Telok Forest Reserve; 10 ♂, 3 ♀, 2 L, 1 p, 1 lp; *Perak*: G. Besout, Slim River: 2 ♀; August 1969-January 1972, collected by John Jeffery, Ahmad bin Abdul Hamid, V. Nagiah and Tee Kem Tho. *Malaysia-Sabah*: Beaufort; 1 ♂ (No. S 354), 4 April 1970, James and Sulaiman.

BIONOMICS. *Culex malayensis* is apparently a common species in heavily shaded tropical forest. The adults were frequently collected while resting on vegetation in a fresh water peat swamp (John Jeffery, personal communication). The immatures and reared adults from a series of collections (PR9-7) were obtained from rearing an egg raft laid by a gravid female collected in the field. The natural habitat of the immatures is not definitely known. However, from data on the adult collection, it appears most likely to be fresh water peat swamp. Wild caught adults have been found to be naturally infected with Bakau virus (A. Rudnick, personal communication).

Culex (Eumelanomyia) jefferyi n. sp.

(Fig. 3)

FEMALE and MALE. Very similar to *malayensis* from which it is virtually inseparable.

MALE GENITALIA (Fig. 3). Resemble *malayensis* in most features, differ particularly in the following. *Subapical Lobe*. Accessory setae distad of 3 rodlike setae fewer and weaker. *Phallosome*. Most distinctive, upper tergal bridge of lateral plate broader and strongly curved mesotergad; apical portion of lateral plate with a large lateral, spinelike process in addition to 2 smaller and shorter median spines.

PUPA (Fig. 3). In general similar to *malayensis* in the dark brown cephalothorax and abdomen and in the long, thin trumpet, differs in having most setae stronger and in the following. *Cephalothorax*. Seta 8-C stronger, 3,4 branched. *Metanotum*. Seta 10-C stronger, 3-5 branched, its length subequal to 11,12-C; 11,12-C triple. *Abdomen*. Seta 1-II stronger, 7-9 branched; 1-III, IV 7-9 branched; 1-V 5,6 branched; 1-VI 4,5 branched; 1-VII triple; 5-IV-VI stronger, 5-IV 3,4 branched; 6-III-V usually triple (2-3); 9-VII stronger, usually 3,4 branched, sometimes double; 9-VIII same as 9-VII, 2-4 branched. *Faddle*. Midrib stronger; areas surrounding apical portion of midrib lightly infusate.

LARVA. As figured and described for *malayensis*, differing slightly in the following. *Head*. Seta 4-C distally forked into 2 branches; 5-C stronger and longer, nearly as long as 6-C; 9-C stronger, 4-6 branched.

TYPE-DATA. *Holotype* ♂ (PR9-9-17) with associated pupal skin and genitalia slide, Carey Island, Selangor, Peninsular Malaysia, MALAYSIA, reared from egg raft laid by a gravid female collected while resting in a pit at the base of a rubber tree, August 1969, John Jeffery and Tee Kem Tho, deposited in USNM; *allotype* ♀ (PR9-9-3) with associated pupal and larval skins and slide of cibarial armature; *paratypes*: 1 p♂ (PR9-9-16), 1 ♂ (PR9-9-2), 1 ♀ (PR9-9-28), 3 whole larvae (PR9-9, PR9-9-18), same data as holotype, all deposited in USNM.

TAXONOMIC DISCUSSION. Besides the striking difference in the male phallosome of *jefferyi* and *malayensis*, both species appear to be distinct ecologically. According to Mr. Jeffery (personal communication), the adults of *jefferyi* were frequently collected from crab holes in brackish water of a mangrove swamp, whereas those of *malayensis* were found only in fresh water peat swamp. In addition, their occurrence also appears to be separated by a decided gap; *jefferyi* is restricted to the coastal zone while *malayensis* is found only in the inland areas. As discussed under *malayensis*, the 2 species apparently fall into a distinct complex of the *rubinotus-rima* group.

DISTRIBUTION. Presently known only from Carey Island, Selangor. *Material examined*: 3 ♂, 2 ♀, 3 whole larvae; 4 individual rearings (3 pupal, 1 larval).

BIONOMICS. Based on the field data provided by John Jeffery, the adults of *jefferyi* were frequently collected while resting in crab holes in brackish water mangrove swamps along the sea coast. A gravid female was collected while resting in a pit at the base of a rubber tree near a mangrove swamp. As in the case of *malayensis*, *jefferyi* has also been shown to be naturally infected with Bakau virus (A. Rudnick, personal communication). No other reports are available as to its feeding habits and disease relationship.

Culex (Eumelanomyia) simplicicornis Edwards

(Fig. 4)

Culex (Neoculex) simplicicornis Edwards 1930: 306 (♂). Lectotype ♂, Samawang Jungle, near Sandakan, Sabah, MALAYSIA (BM).

Culex (Eumelanomyia) simplicicornis Edwards, Sirivanakarn 1972: 9 (♂*, ♀*).

FEMALE and MALE (including genitalia). Described and figured by Sirivanakarn (1972: 9-10, Fig. 1A).

PUPA (Fig. 4). Abdomen: 2.34 mm. Paddle: 0.52 mm. Trumpet: 0.60 mm; index about 9. As figured, cephalothorax and abdomen pale with brownish tinge not forming a definite pattern. *Trumpet*. Moderately long, meatus narrow at base, gradually increased in diameter towards apex; pinna well developed, oblique, with slit extending to meatus. All setae well developed, most of which are somewhat flattened; the following are diagnostic. *Cephalothorax*. Seta 1-C 5,6 branched; 3-C 3,4 branched; 8-C 5 branched. *Metanotum*. Seta 10-C single or double, as long as 11-C; 11-C double. *Abdomen*. Caudolateral angle of segments III-VIII with distinct patches of strong spicules on lateral ventral surface; seta 1-II small, brushlike or dendritic; 2-II minute, single; 3-II, III strong, single or distally forked into 2 branches; all setae 1-III-VII well developed; 1-III 14-16 branched; 1-IV 9-10 branched; 1-V,VI 7,8 branched; 1-VII 5 branched; 5-IV,V strong, flattened, as long as segment following, 5-IV 4 branched; 5-V double; 5-VI triple, about 0.5 of segment following; 6-III-VI 3,4 branched; 7-VI,VII strong, double; 9-VII with 7,8 distally dendritic branches; 9-VIII 9 branched, similarly developed as 9-VII and far removed from caudolateral angle; 10-III,IV 5,6 branched; 10-V-VII double. *Paddle*. Entirely pale yellowish, apical margin emarginate and with distinct patch of several strong spicules; basal external margin lightly spiculate; midrib weak, lightly pigmented; seta 1-P present; 2-P absent.

LARVA (Fig. 4). Head: 0.75 mm. Siphon: 2.0 mm; index about 12. Saddle: 0.36 mm; siphon/saddle ratio about 5.5. As figured, distinctive in the following. *Head*. Integument yellowish white; seta 1-C stout, spiniform, its length about 0.25 of distance between bases of the pair; 4-C double, as long as distance between bases of the pairs; 5,6-C weak, short, double; 5-C about 0.5 of 6-C; latter not reaching beyond anterior margin of frontoclypeus; 7-C strong, dark, 8,9 branched; 9-C moved cephalad, 6 branched; 16,17-C not developed. Antennal shaft entirely brownish; spicules strong and numerous. *Thorax*.

Spiculation absent; 3-P weak, single; 4-P double, as long as 3-P; 7,8-P strong, subequal, usually triple (3-4); 14-P single; 5-M triple or 4 branched. *Abdomen*. Setae 6-I,II and 7-I, strong, dark, rest of setae weakly developed and rather inconspicuous; 6-I triple; 6-II double; 7-I single; 6-III-VI 4-6 branched, length about 0.5 of 6-I,II. Comb scales about 34, strongly differentiated into 2 forms, 25,26 scales on anterior and middle rows small, short, subequal; 7,8 posterior scales large, elongate, all with round apical fringe of extremely minute spicules; seta 1-VIII with 6 pectinate branches; 2-VIII 2-4 branched; 3-VIII 6 branched; 5-VIII triple. Saddle complete, same color as head; seta 2-X usually double, sometimes single; 4-X with 6 pairs of setae; anal gills long, slender, about 2 times as long as saddle. *Siphon*. Very slender and relatively long, yellowish white with variable amount of brownish tinge; 12 pecten teeth, distal teeth slightly elongate, with characteristic barb of 1 stout denticle in middle, followed distally by 3,4 weaker denticles; subventral tufts weak, rather inconspicuous, 2.5-3 pairs, pairing irregular, single or double, all subequal, about as long as siphonal width at point of attachment; 2-S weak, short; median caudal filament of spiracular apparatus well developed; seta 9-S weak.

TAXONOMIC DISCUSSION. *Culex simplicicornis* has been previously known only from the adult males and females collected in Sabah. Additional new record of this species from Selangor suggests that it is probably widespread throughout Malaysia. The new record which is confirmed here was brought to my attention by John Jeffery (personal communication).

The adults of *simplicicornis* are identical to *malayensis* and *jefferyi* in general facies but their male genitalia are strikingly different from the latter 2 species. The larva and pupa which are described here for the first time are also very distinct and both can be readily recognized by several characters as given in the diagnosis. As in the case of *malayensis* and *jefferyi*, *simplicicornis* apparently falls into the *rubinotus-rima* group as previously interpreted (Sirivanakarn 1971, 1972). However, its affinity is not clear. On the basis of adult morphology, it is somewhat intermediate between the *malayensis-jefferyi* complex and the *tenuipalpis* subgroup of the *Mochthogenes* Group.

DISTRIBUTION. The additional new record of *simplicicornis* from Selangor, Peninsular Malaysia is based on the study of 3♂ (No. E8-424,6-VIII-68), 4 L and 1♂ with associated larval and pupal skins (No. PR9-22,6-XII-69), collected in a fresh water peat swamp, from Tanjong Rabok, Kuala Langat Forest Reserve, Richard Garcia and John Jeffery, collectors.

BIONOMICS. All specimens of *simplicicornis* from the above locality came from a general field collection in a fresh water peat swamp in a tropical forest. The single male and larvae (No. PR9-22) were reared from an egg raft laid by a female. They were found in association with the specimens of *malayensis*. As in the latter species, field data suggest that it probably utilizes forest swamp as a breeding site. Nothing is known about the adult biology and its disease relationship.

Culex (Eumelanomyia) selai Klein and Sirivanakarn

(Fig. 5)

Culex (Mochthogenes) selai Klein and Sirivanakarn 1969: 589 (♂*). Holotype ♂, Kompong Sela, Koh Kong, CAMBODIA (USNM).

Culex (Eumelanomyia) selai Klein and Sirivanakarn, Sirivanakarn 1972: 44 (♂*).

FEMALE. Wing: 2.0 mm. Forefemur: 0.9 mm. Proboscis: 1.3 mm. Abdomen: 1.44. Very small to minute species. In general similar to the male (Klein and Sirivanakarn 1969:589, Sirivanakarn 1972: 44-45). *Head*. Decumbent scales on dorsum of vertex entirely broad, oval, dark brownish in center, pale whitish on ocular line; erect scales very slender, relatively few, largely restricted to occiput. Palpus dark, about 0.17 proboscis length. Proboscis dark; labial basal setae 0.50-0.75 of palpal length. *Cibarial Armature* (Fig. 5). Cibarial bar small, with about 20 teeth; 12 median teeth fine; 7,8 lateral teeth coarse. *Thorax*. Mesonotal integument with distinct dark spots on fossa and supraalar, pale brownish on acrostichal line and elsewhere; scales narrow, rather sparse and entirely dark; acrostichals developed; mid-scutellar lobe with 4 bristles, lateral scutellar lobe with 3 bristles. Pleural integument dark on *ssp* and upper corner of *stp*, pale elsewhere, scales practically absent; *mep* with characteristic patch of minute, scalelike setae dorsad and laterad of the lower *mep* bristle. *Legs*. Anterior surface of hindfemur with a distinct pale stripe from base to near apex, rest entirely dark. *Wing*. Scales moderately dense and dark; scales on veins R₂, R₃ and R₄₊₅ narrow, clavate. *Abdomen*. Tergites entirely dark, sternites pale yellowish.

MALE (including genitalia). As described and figured by Sirivanakarn (1972: 44-45, Fig. 10A).

PUPA (Fig. 5). Abdomen: 1.4 mm. Paddle: 0.42 mm. Trumpet: 0.30 mm; index about 8. Cephalothorax generally pale with darkened areas involving antennal, palpal, leg and wing cases; metanotum pale in the middle, dark laterally; abdomen pale on segments I-V, darkened on VI-VIII. *Trumpet*. Slender, meatus dark on basal 0.5, pale in apical 0.5; pinna oblique, lightly infuscate, slit present. All setae developed, the following are diagnostic. *Cephalothorax*. Seta 1-C double; 5-C 5,6 branched; 8-C triple. *Metanotum*. Seta 10-C very weak, short, triple; 11-C strong, flattened, double. *Abdomen*. Setae 5-IV-VI thickened, subequal, all about 0.3 of segment length, 5-IV,V 8-10 branched; 5-VI 5,6 branched; 6-III-VI double or triple; 2-VII mesad of 1-VII; 9-VII, weak, double; 9-VIII 5 branched, placed at caudolateral angle. *Paddle*. Broad, pale whitish, hemispherical in outline; midrib strong and moderately pigmented; setae 1,2-P present.

LARVA (Fig. 5). Head: 0.36 mm. Siphon: 0.83 mm; index 7-8. Saddle: 0.26 mm; siphon/saddle ratio 2.5-3. As figured, distinctive in the following. *Head*. Pale yellowish; labrum broad; seta 1-C spiniform, placed on a distinct tubercle; 4,5-C minute, subequal, both single; 6-C weak, 2 times as long as 4,5-C, single or double; 7-C longer than 6-C, 4,5 branched; setae 8-15-C all weak, short, 11-13-C subequal, single; 16-C present, 4,5 branched; 17-C absent. An-

tenal shaft pale whitish proximally, darkened distally; spicules weak and rather few in number; setae 2,3-A apical or nearly so. Mental plate with 6 lateral teeth on each side of median tooth. *Thorax*. Spiculation absent; whole mount specimen with distinct pattern of pale and greenish bands; 1-P strongest of all prothoracic setae; 3-P short, single; 4-P minute, triple or 4 branched; 7-P triple, 8-P single, subequal to 7-P; 14-P double; 1-M strong, 4,5 branched, longer than 3,4-M; 8,9-M double; 7-T 4,5 branched; 9-T 4 branched; 13-T minute, 4 branched. *Abdomen*. Whole mount specimens with striking pattern of greenish and pale bands on segment III-VIII; setae 6-I,II double; 7-I single; 1-II strong, subequal to 1-III-VI, 4,6 branched; 1-III-VI 4-6 branched; 6-III, 4,5 branched; 6-IV-VI triple or 4 branched. Comb scales 16-20, all spinelike, strongly differentiated in size; 6 posterior scales enlarged, forming a prominent row, rest shorter, aggregating into a patch. Saddle seta 2-X single; 4-X with 6 pairs of setae; anal gills unequal in length, dorsal pair short, about as long as saddle, ventral pair about twice longer. *Siphon*. Relatively short; acus present; basal margin dorsad of acus strongly oblique; middle portion with a distinct dark ring, rest pale; pecten teeth 6-8, distal ones strongly elongate, with an extremely fine barb of several minute denticles; subventral tufts strong, 6 pair, 4,5 branched each, forming a prominent double row; first proximal pairs 2,3 times as long as siphonal width at point of attachment, rest gradually shorter; 2-S weak and short; median caudal filament developed; seta 9-S dark, strong and apically hooked.

TAXONOMIC DISCUSSION. *Culex selai* shows a strong affinity with *pluvialis* Barraud and *campilunati* Carter and Wijesundara and with the latter 2 species, falls into the *pluvialis* subgroup of the *Mochthogenes* Group as previously interpreted (Sirivanakarn 1972: 42). It can be readily separated from *pluvialis* and *campilunati* in the adults by the entirely broad decumbent scales of the vertex and the presence of a patch of minute scalelike setae dorsad and laterad of the lower mesepimeral bristle and in the male genitalia by the stronger submarginal setae of the basimere, the shape and denticulation of the phallosome. The pupa and larva which were described here for the first time are also diagnostic and can be readily separated from other local species by the characters noted above.

DISTRIBUTION. The additional new record of *selai* from Peninsular Malaysia is based on the examination of 4 ♂, 4 ♀, 4 L, 2 slides of pupal skins and 1 slide of pupal and larval skins (Collection No. E9-713 and PR9-18) from Tanjung Rabok, Kuala Langat, Forest Reserve, *Selangor*, 19 July 1969, Ahmad Abdul Hamid and Tee Kem Tho, collectors.

BIONOMICS. The above adults were collected by an aspirator among vegetation. The reared adults and immatures (No. PR9-18) came from rearing eggs laid by a wild caught female. No data are available as to its breeding site, adult feeding behavior and disease relationship.

ACKNOWLEDGEMENTS

I sincerely thank Ronald A. Ward and John F. Reinert for reviewing the manuscript, Thelma Ford Smith for preparing the illustrations and Janet D. Rupp for typing the preliminary drafts. I am deeply grateful to Albert Rudnick and John Jeffery, Arbovirus Research Unit, University of California International Center for Medical Research for their generous support in providing the material and related field data on the bionomics and medical importance.

REFERENCES CITED

- Edwards, F. W. 1930. Mosquito notes.-IX. Bull. Entomol. Res. 21: 287-306.
- Klein, J. M. and S. Sirivanakarn. 1969. Four new species of *Culex*, subgenus *Mochthogenes* from Southeast Asia (Diptera: Culicidae). Proc. Entomol. Soc. Wash. 71: 582-92.
- Sirivanakarn, S. 1971. Contributions to the mosquito fauna of Southeast Asia. XI. A proposed reclassification of *Neoculex* Dyar based principally on the male terminalia. Contrib. Am. Entomol. Inst. (Ann Arbor) 7(3): 62-85.
- _____. 1972. Contributions to the mosquito fauna of Southeast Asia. XIII. The genus *Culex*, subgenus *Eumelanomyia* Theobald in Southeast Asia and adjacent areas. Contrib. Am. Entomol. Inst. (Ann Arbor) 8(6): 1-86.
- Sirivanakarn, S. and S. Ramalingam. 1976. A new species of *Culex* (*Eumelanomyia*) Theobald with notes on three other species from Malaysia (Diptera: Culicidae). Mosq. Syst. 8: 209-16.

Fig. 1

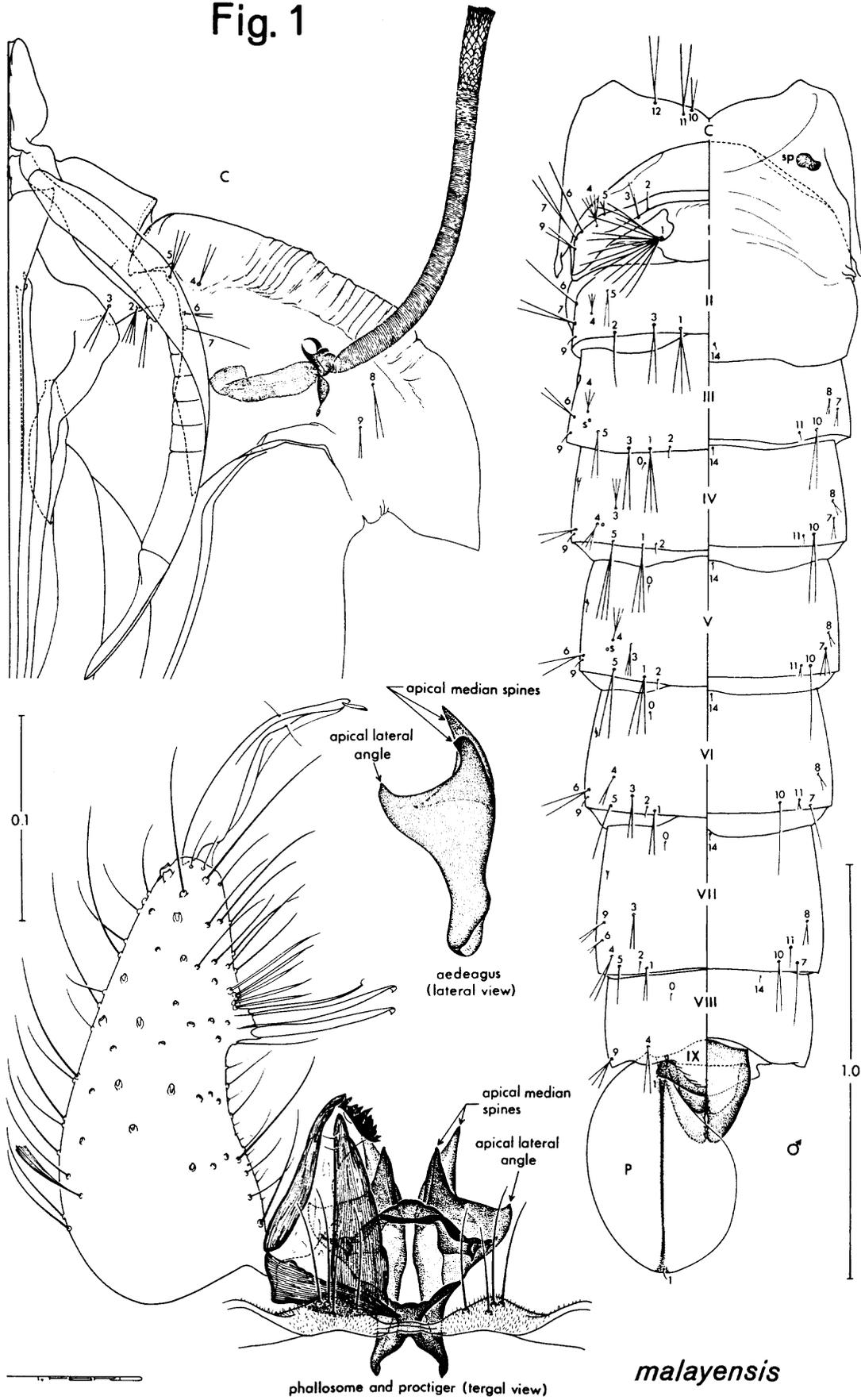


Fig. 2

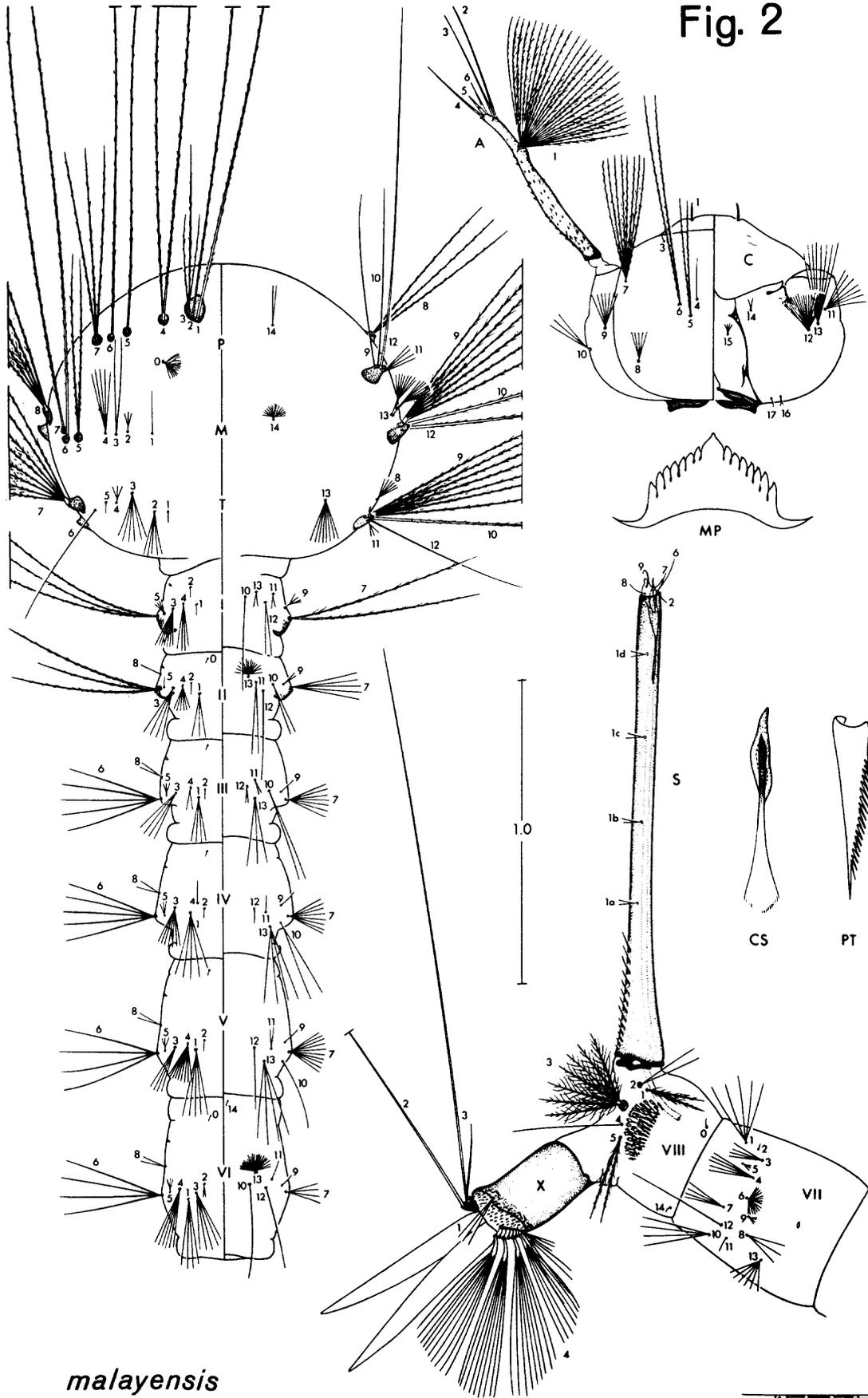


Fig. 4

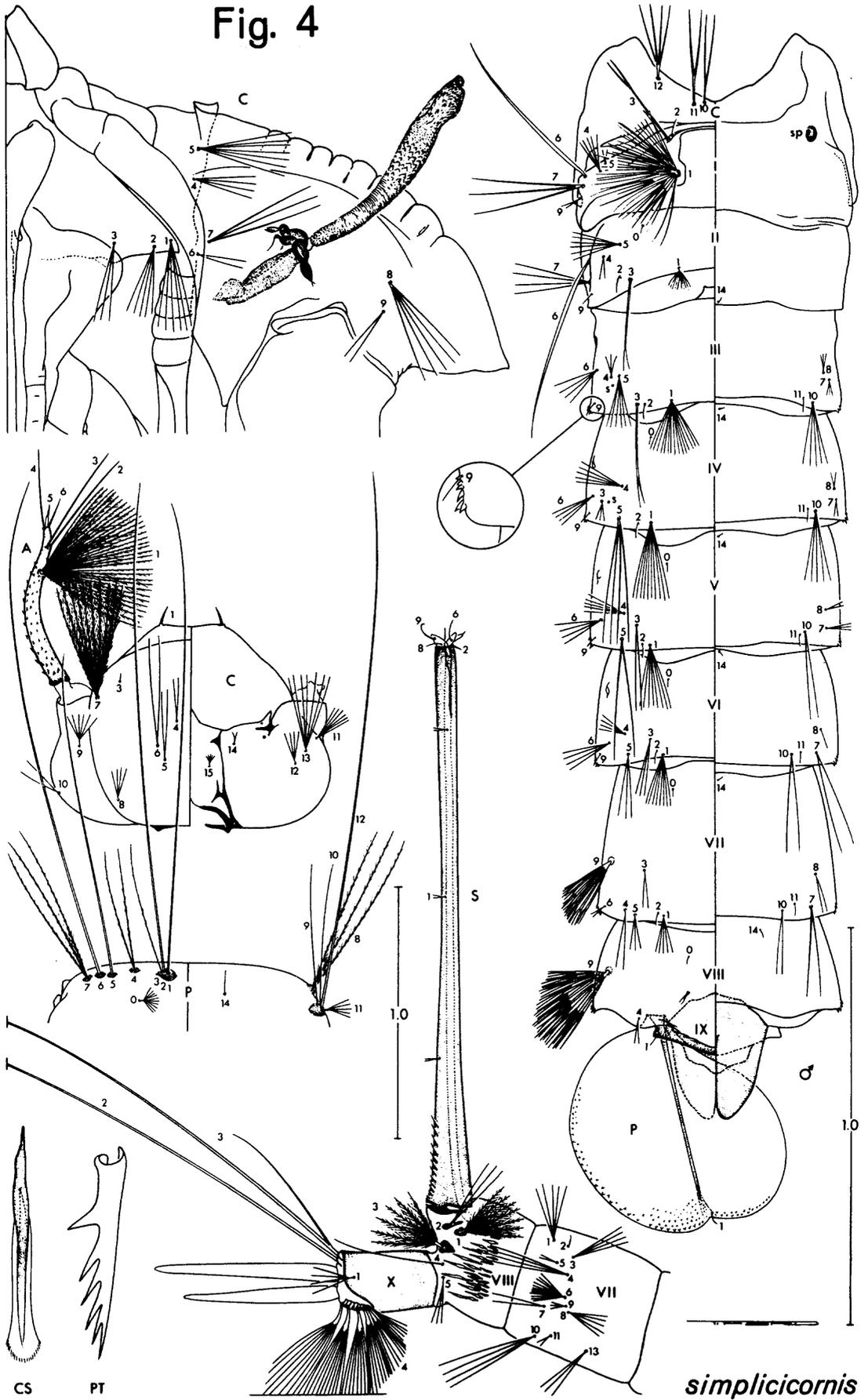


Fig. 5

