Redescription and Subgeneric Position of *Aedes meronephada* (Dyar and Shannon) with Notes on the Subgenus *Diceromyia* (Diptera: Culicidae)[1]

Yiau-Min Huang
Medical Entomology Project
Department of Entomology
Smithsonian Institution
Washington, D. C. 20560

ABSTRACT. *Aedes meronephada* (Dyar and Shannon) is removed from the subgenus *Stegomyia* Theobald and transferred to the subgenus *Diceromyia* Theobald on the basis of a critical study of all known stages. Both sexes, larva and pupa of this species are redescribed, illustrated and its affinity is discussed. Some morphological characteristics of adults and larvae of the subgenera *Diceromyia* and *Stegomyia* of *Aedes* of the Oriental region are tabulated.

INTRODUCTION

Dyar and Shannon (1925), recognizing the unique characteristics of the adult female of *Aedes meronephada*, placed it in a monotypic genus, *Catatassomyia*. Edwards (1929) considered this species allied to *Ae. albolineatus* (Theobald) and *Ae. edwardsi* (Barraud), with the tarsal markings of the former and the thoracic ornamentation almost as in the latter. Consequently, he placed it in the subgenus *Stegomyia* Theobald of *Aedes* Meigen. Later, Edwards (1932) divided *Stegomyia* into 4 groups which were designated A, B, C and D. Based on the ornamentation of the thorax, both *edwardsi* and *meronephada* were assigned to Group B (*w-albus* group). Knight and Hull (1952) agreed with Edwards' (1932) classification and also included *meronephada* in Group B (*w-albus* group). Mattingly (1965) described the male of *meronephada* and suggested that it was related to *albolineatus* but not *edwardsi*. He also considered this species most closely allied to *Ae. mediopunctatus* (Theobald) and therefore, included it in Group B rather than in Group E (*albolineatus* group). Concurrently, he subdivided Group B (*w-albus* group) into 3 subgroups known as B1 (*w-albus* subgroup), B2 (*meronephada* subgroup) and B3 (*amaltheus* subgroup). He assigned *meronephada* to the monotypic Subgroup B2 and stated that *meronephada* had various characters reminiscent of the subgenus *Aedimorphus* i.e., the distimere of the male terminalia was similar to

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that of the *alboscutellatus* group [Group C of Edwards (1932)] while the claspette resembled those of the *vexans* group (*syntheticus* Barraud), Group G. The larva, though atypical, was more reminiscent of *Stegomyia* than of *Aedimorphus* and Mattingly therefore, retained it in the former subgenus. Reinert (1973a) considered this species a *Stegomyia*, sharing a number of features of the adult ornamentation, male and female genitalia, immature habitats (small plant-containers) and geographical distribution with the *albolineatus* group.

A review of the taxonomic history of this species indicates that since Edwards (1929), *meronephada* has been considered a member of *Stegomyia* on the basis of a few unimportant adult characters, such as the tarsal markings and the ornamentation of the thorax. After a critical study of both adults and the immature stages I believe that it is not a *Stegomyia* and should be removed from this subgenus. It shows a closer resemblance to the subgenus *Diceromyia* Theobald than to any other subgenus of *Aedes*. Therefore, I am placing it in *Diceromyia*.

This study has been based primarily on specimens accumulated by the Medical Entomology Project (MEP), Department of Entomology, Smithsonian Institution. Additional material was borrowed from the following institutions: Bernice P. Bishop Museum, Honolulu (BPBM), National Museum of Natural History, Washington, D. C. (USNM) and the British Museum (Natural History), London (BMNH).

The nomenclature for the chaetotaxy of the larva and pupa and the terminology of the structural parts of the adult largely follow Belkin (1962). Symbols and abbreviations used in descriptions and format of distribution records follow Huang (1977). The information on larval breeding habitats and distribution is based entirely upon the specimens I have examined. The geographical distribution of this species is shown on MAP I.

According to Knight and Stone's (1977) catalog, 13 species of *Aedes (Diceromyia)* have been reported from the Oriental region. Specimens of the following 9 species of Oriental *Diceromyia* have been examined: (1) *franciscoi* Mattingly, ♂, ♀, ♂ terminalia, ♀ terminalia, larva, pupa; (2) *iyengari* Edwards, ♂, ♀, ♀ terminalia, larva; (3) *nummatus* Edwards, ♂, ♀, ♂ terminalia, larva; (4) *periskelatus* (Giles), ♂; (5) *pseudonummatus* Reinert, ♀; (6) *ramachandrai* Reuben, ♂, ♀, ♂ terminalia, ♀ terminalia; (7) *reginae* Edwards, ♀;(8) *scanloni* Reinert, ♂, ♀, ♂ terminalia and (9) *whartoni* Mattingly, ♂, ♀, ♂ terminalia, larva, pupa. The characters of the Oriental *Diceromyia* given in this paper are based entirely upon the above specimens.

Aedes (Diceromyia) meronephada (Dyar and Shannon)
(Figs. 1, 2, 3, 4, 5, 6C)

Catatassomyia meronephada Dyar and Shannon 1925: 71 (♀).
Aedes (Stegomyia) meronephada (Dyar and Shannon) : Edwards 1929: 2,4; Knight and Hull 1952: 174 (♀, L*) (designated lectotype); Stone and Knight 1956:

221; Mattingly 1965: 49 (♂*, ♀*, P*, L*).
Aedes (Aedimorphus) wainwrighti Baisas 1946: 34.
Aedes (Stegomyia) wainwrighti Baisas, Reinert 1973a: 27 (synonymy).

MALE. *Head* (Figs. 1C, 6C). Proboscis dark scaled, slender, long, longer than forefemur; palpus slender, short, 0.66 length of proboscis, all dark, segment 5 much shorter than segment 4 and segment 4 without apical bristles; antenna plumose, shorter than proboscis; clypeus bare; torus covered with white scales on inner side only; decumbent scales of vertex all broad and flat, with dark scales at the middle, similar creamy-colored ones on each side posteriorly and ventrally, a row of silvery scales around eye margins and a patch of silvery scales at anterior median area; erect forked scales not numerous, restricted to occiput. *Thorax*. Scutum with narrow dark scales and a prominent median, oblong spot of similar silvery scales which reaches from the anterior margin to the level of the scutal angles, slightly tapering posteriorly; acrostichal bristles absent; dorsocentral bristles present; scutellum with broad dark scales on all lobes and with a few broad silvery ones at base of midlobe; spiracular bristles absent; postspiracular bristles present; postnotum bare; anterior pronotum with narrow silvery scales; posterior pronotum bare; paratergite with broad silvery scales; postspiracular area without scales; patches of broad silvery scales on propleuron and subspiracular areas, on the upper and lower portions of the sternopleuron and on the upper portion of the mesepimeron; the upper sternopleural scale patch does not reach to the anterior corner of sternopleuron; lower mesepimeron without bristles; metameron bare. *Wing*. With dark scales on all veins; with one remigal seta; cell R_2 1.2 times as long as R_{2+3}; squama fringed; alula with narrow scales. *Halter*. With dark scales. *Legs*. Coxae with patches of white scales; knee spot absent on forefemur, present on mid- and hindfemora; fore- and midfemora dark anteriorly; hindfemur anteriorly with basal 0.6 white; tibiae all dark; fore- and midtarsi with small basal white band on tarsomere 1, tarsomeres 2-5 all dark; hindtarsus with basal white bands on tarsomeres 1-3, the ratio of length of white band to the total length of tarsomere is 0.20, 0.33, and 0.83, tarsomeres 4,5 all dark; foreleg with tarsal claws unequal, both toothed; midleg with tarsal claws unequal, both simple; hindleg with tarsal claws equal, simple. *Abdomen*. Terga I-VI with basal lateral silvery spots only; sternum I largely covered with silvery scales; sterna II-VI with basal silvery bands. *Terminalia* (Fig. 2). Basimere short and broad, 1.7 times as long as wide; its scales restricted to lateral and ventral areas, with many setae scattered on the dorsal surface, several stout bristles on the basolateral area of the dorsal surface and 2 stout bristles on the middle of the apical half of the dorsal surface; claspette present, with several modified setae; distimere modified, short, 0.7 of basimere, expanded apically, with setae and a short, stout, spiniform process at apex of inner projection; aedeagus with a distinct sclerotized toothed plate on each side; paraprocts without teeth, sclerotized at apex, lateral and basolateral areas; cercal setae absent; tergum IX concave medially, with 2-4 setae on each lateral lobe; sternum IX with one large seta at the middle and 1-4 smaller setae.

FEMALE. Essentially as in the male, differing in the following respects: *Head* (Figs. 1A, 1B). Palpus 5-segmented, about 0.2 length of proboscis. *Legs*. Fore- and midlegs with tarsal claws equal, both toothed. *Abdomen*. Terga I-VII with basal lateral silvery spots; segment VIII completely retracted. *Terminalia* (Figs. 3C, 5). Sternum VIII with a deep notch at middle and with conspicuous lateral lobes; insula longer than broad, with minute setae and with 3 larger setae on apical 0.25; tergum IX short and broad, poorly sclerotized, without well developed lateral lobes and with 2,3 setae; postgenital plate with shallow notch; cerci short and broad; 3 spermathecae, one slightly larger than the other 2.

PUPA (Figs. 3A, 3B). *Cephalothorax*. Trumpet about 4 times as long as wide medially; seta 1-C single, strong, long, much longer than 2-C and 3-C, at least 2 times as long as 2-C and 3-C; 6-C single, shorter than 7-C; 5-C single; 4-C with 3,4 branches; 8-C at level of the base of trumpet; 10-C branched, mesad and caudad of 11-C; 11-C single, long. *Abdomen*. Seta 1-I well developed, with more than 10 branches, dendritic; 2-I single; 3-I single, long; 2-I and 3-I widely separated, the distance between them twice the distance between 4-I and 5-I; 1-II weak, 2-branched, removed from midline; 2-II, III mesad of 1-II,III and 3-II,III; 3-II,III single, about as long as segment III; 5-IV,V single or double, very long, reaching beyond the posterior margin of the following segment; 2-V cephalad of 3-V; 3-VI mesad of 1,2-VI; 6-VI single; longer than 9-VI; 9-I-V small, single; 9-VI-VIII short, with fine branches; 9-VI 2-branched; 9-VII 3-branched; 9-VII with 6-8 branches. *Paddle*. Short and broad, as long as wide, margins fringed; seta 1-P single, strongly developed, thickened; genital lobe with fine spicules laterally.

LARVA (Fig. 4). *Head*. Antenna 0.5 length of head, without spicules; seta 1-A, 2-branched, inserted near middle of shaft, reaching slightly beyond tip of antenna; 1-C long, slender and recurved; 4-C well developed, fan-shaped, usually with 10 branches (9-12), closer to 6-C than 5-C, mesad and caudad of 6-C; 6-C double, branches equal, cephalad and mesad of 5-C; 4-C and 6-C cephelad of antennal base; 5-C single, cephalad of 7-C; 7-C far caudad of antennal base, fan-shaped, usually with 6 branches (5-7); 8-C usually with 3 branches (2-3); 9-C usually with 2 branches (2-3); 10-C single; 11-C fan-shaped, usually with 8 branches (6-9); 12-C developed as a strong horn-shaped projection; 13-C single; 14-C usually with 4 branches (3-4); 15-C much smaller than 14-C, with 2-3 branches; mentum with 7-8 teeth on each side. *Thorax*. Seta 1-P 2-branched, long, stout; 2-P single; 3-P usually with 12 branches; 4-P single; 5-P usually with 10 branches; 6-P single; 7-P usually with 5 branches, long; 8-P stellate, usually with 14 branches; 9-P usually with 3 branches; 11-P usually with 4 branches (3-4); 14-P 2 branched; 5-M single, long, stout; 6-M with 8-10 branches, long; 7-M single; 8-M usually with 10 branches, long; 9-M usually with 8 branches, long; 10 and 12-M single, long, stout; 11-M not seen; 7-T usually with 14 branches, long; 9-T usually with 6 branches, long; 10,11-T similar to those on mesothorax; 12-T single, much reduced; meso- and metapleural setae (9-12) on very large basal tubercles; 13-T stellate, usually with 20 branches. *Abdomen*. Seta 6-I,II usually with 8 branches long; 7-I 2 branched; 7-II usually with 5 branches; 6-III-VI usually

with 4 branches, long; 12-I not present; 1,2,5,11-I stellate; 1,2,5,9-II stellate; 1,2,5,7,9-III-IV stellate; 1-V,VI longer than the preceding ones, usually with 6 branches; 5 displaced cephalad on 1-VI; 1-VII usually with 6 branches, long; comb with 23 scales in a row and with several very small ones in an irregular 2nd or 3rd row, each scale with a fine lateral fringe; 1-VIII large, usually with 10 branches; 2-VIII distant from 1-VIII; 2-VIII and 4-VIII single; 3-VIII usually with 2 branches; 5-VIII much smaller than 1-VIII, usually with 5 branches; siphon 2.6 times as long as wide, acus absent; pecten with 7-10 teeth, evenly spaced, each tooth with fine fringe on ventral margin, less distinct on dorsal side; 1-S single, strong, long, inserted beyond last tooth and in line with teeth, reaching beyond tip of siphon; saddle incomplete, marginal spicules conspicuous; 1-X 2-branched, long, stout; 2-X usually with 4 branches (3-4); 3-X with 2,3 branches; ventral brush with 6 pairs of setae with long basal stalk, each seta with 3,4 branches, all arising from basal boss without distinct bars; no precratal tufts; anal papillae about 3 times as long as saddle, sausage-like.

TYPE-DATA. *Catatassomyia meronephada* Dyar and Shannon, 1 female cotype designated lectotype by Knight and Hull (1952), in USNM; type-locality : Mt. Makiling, 1,500-2,000 ft. alt., Los Banos, Laguna Province, Luzon, PHILIPPINES, 12-V-1921 (F. X. Williams). Paratypes : 14 females, Los Banos, P. I., 12-19-V-1921 (F. X. Williams) in USNM; 1 female, Los Banos, P. I., 12-V-1921 (F. X. Williams) in BMNH.

DISTRIBUTION. 65 specimens examined : 5♂, 36♀, 5♂ terminalia, 13♀ terminalia, 3 individual rearings (3 1, 3 p).

PHILIPPINES. Luzon : Los Banos (12-19-V-1921, F. X. Williams), 16♀, 4♀ terminalia; Gubat (6-III-1957, A. Caluya and M. Mata), 2♂, 2♀, 2♂ terminalia, 3 individual rearings (3 1, 3 p); Camarines Sur : Mt. Isarog (IX-1964, M. Delfinado), 14♀, 6♀ terminalia. Samar : Osmena (VII-1945, Rozeboom, Knight and Laffoon), 1♂, 1♀, 1♂ terminalia. Leyte : Dagami, Mt. Lobi (VIII-1945, H. R. Roberts), 1♀, 1♀ terminalia; Mahaplag (VII-1964, M. Delfinado), 1♂, 1♀, 1♂ terminalia, 1♀ terminalia. Negroes: (VII-1964, M. Delfinado), 1♂, 1♀, 1♂ terminalia, 1♀ terminalia.

REMARKS. There is one slide of a 4th stage larva in USNM, marked Samar, Osmena, VII-31-1945, Rozeboom, Knight and Laffoon. This material has not been included in the larval description since its true identity is not known. However, it represents a larval form similar to *meronephada*. There is no doubt that it belongs to either the known species or to an undescribed member of this subgenus.

TAXONOMIC DISCUSSION. *Aedes meronephada*, formerly placed in the subgenus *Stegomyia*, differs significantly from all other *Stegomyia* species and should be excluded from that subgenus. It shares more important characters in both adult and immature stages with members of the subgenus *Diceromyia* than with *Stegomyia* (see Table 1). Consequently, I believe that it should be transferred to *Diceromyia* rather than remain in *Stegomyia*.

The male *meronephada* can easily be distinguished from that of *Stegomyia* by: the abbreviated segment 5 of the palpus which is much shorter than segment 4 (see Fig. 6A,B,C) and by the irregularly shaped distimere of the male terminalia which is expanded apically. On the other hand, these characters are characteristics of *Diceromyia*.

The most important adult characters for determining the subgeneric position in *Aedes* are those of the male terminalia. The male terminalia of this species appears to have some rather basic characters in common and suggest affinities with 4 subgenera in *Aedes*, namely *Aedimorphus*, *Diceromyia*, *Stegomyia*, and *Ayurakitia* Thurman. However, *meronephada* has more characters similar to those of *Aedimorphus* and *Diceromyia* than those of *Stegomyia*. In addition, the pupal and larval characters of *meronephada* do not at all conform to those of *Stegomyia*.

The pupa of *meronephada* can easily be distinguished from that of *Stegomyia* by seta 1-II weak, 2-branched, removed from midline and seta 1-III-VII strongly displaced laterad. The larva is strikingly different from that of *Stegomyia* with seta 4-C well developed, mesad and caudad of 6-C, meso- and metathoracic setae 9-12 on very large basal tubercles, and comb scales in 2 or 3 irregular rows. On the other hand, these characters are shared with *Diceromyia*.

Present evidence shows that *meronephada* is somewhat a combination of several species belonging to different subgenera in the genus *Aedes*. However, in considering both adults and immatures, the closest affinities of this species are with *Aedes (Diceromyia) franciscoi* Mattingly. It thus seems that *Diceromyia* is the most suitable subgenus for *meronephada* among the currently accepted subgenera of *Aedes*, and I am here making the subgeneric transfer.

Aedes meronephada has several unique features in both adult and larva which differ from the subgenus *Diceromyia* as defined by Reinert (1970, 1973b). These include: the apical 2 segments of male palpus together not very short, at least more than 0.30 length of the remaining segments; the distimere of the male terminalia modified, short, greatly expanded apically; the anteriorly displaced larval seta 5-I-VI; and the ventral brush with its 6 pairs of setae, with long basal stalk, all arising from a basal boss without distinct bars.

At present, it is felt that the taxonomic position of *meronephada* and its relationship to other members of *Diceromyia* cannot be further discussed until a careful study of all stages of *Diceromyia* has been completed.

BIONOMICS. Females were found resting at the base of trees in wet jungle at about 305m elevation and larvae were collected from the axils of a banana-like plant along a jungle stream at about 240m elevation (Knight and Hull 1952). The specimens from Gubat, Luzon were collected from abaca axils (Mattingly 1965). Baisas et al. (1960 (1962)) collected *meronephada* in leaf

axils of various plants in Sorsogon Province. The highest percentage of leaf axil breeding occurred in October in abaca and in September in bananas. At Clark Air Base, Pampanga Province, the immatures of *meronephada* were collected in leaf axils of cultivated and wild bananas from October through March. In Sorsogon Province, *meronephada* was found infected with noninfective microfilaria larvae. It was observed to be more prone to visit houses than either *Ae. (Finlaya) ananae* Knight and Laffoon or *Armigeres (Armigeres) baisasi* Stone and Thurman. *Aedes meronephada* also bites outdoors during the day and was less common than *Ae. (Fin) poecilus* (Theobald).

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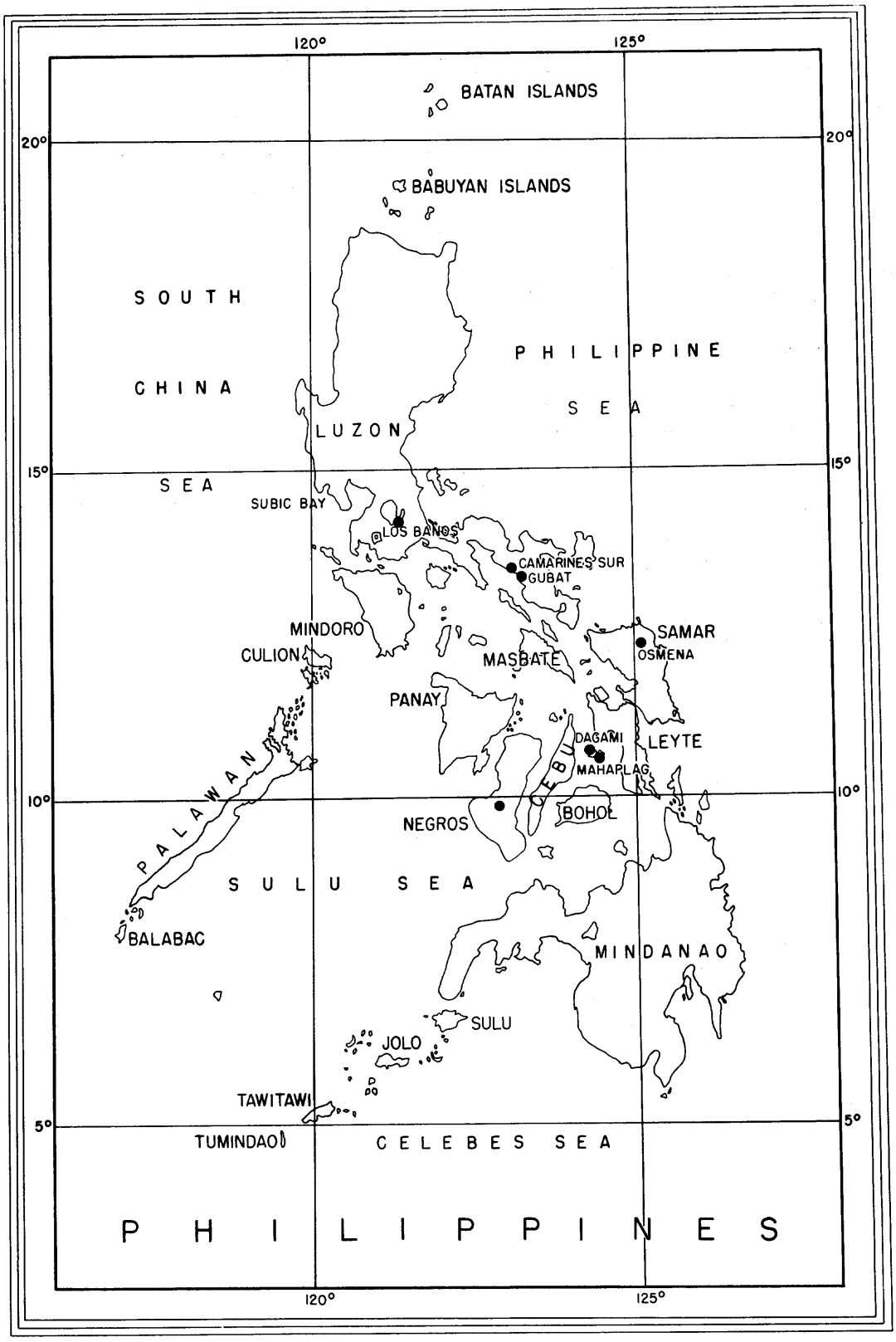
TABLE 1. Some characters of *Aedes meronephada*, *Ae. (Diceromyia)* and *Ae. (Stegomyia)* of the Oriental region.

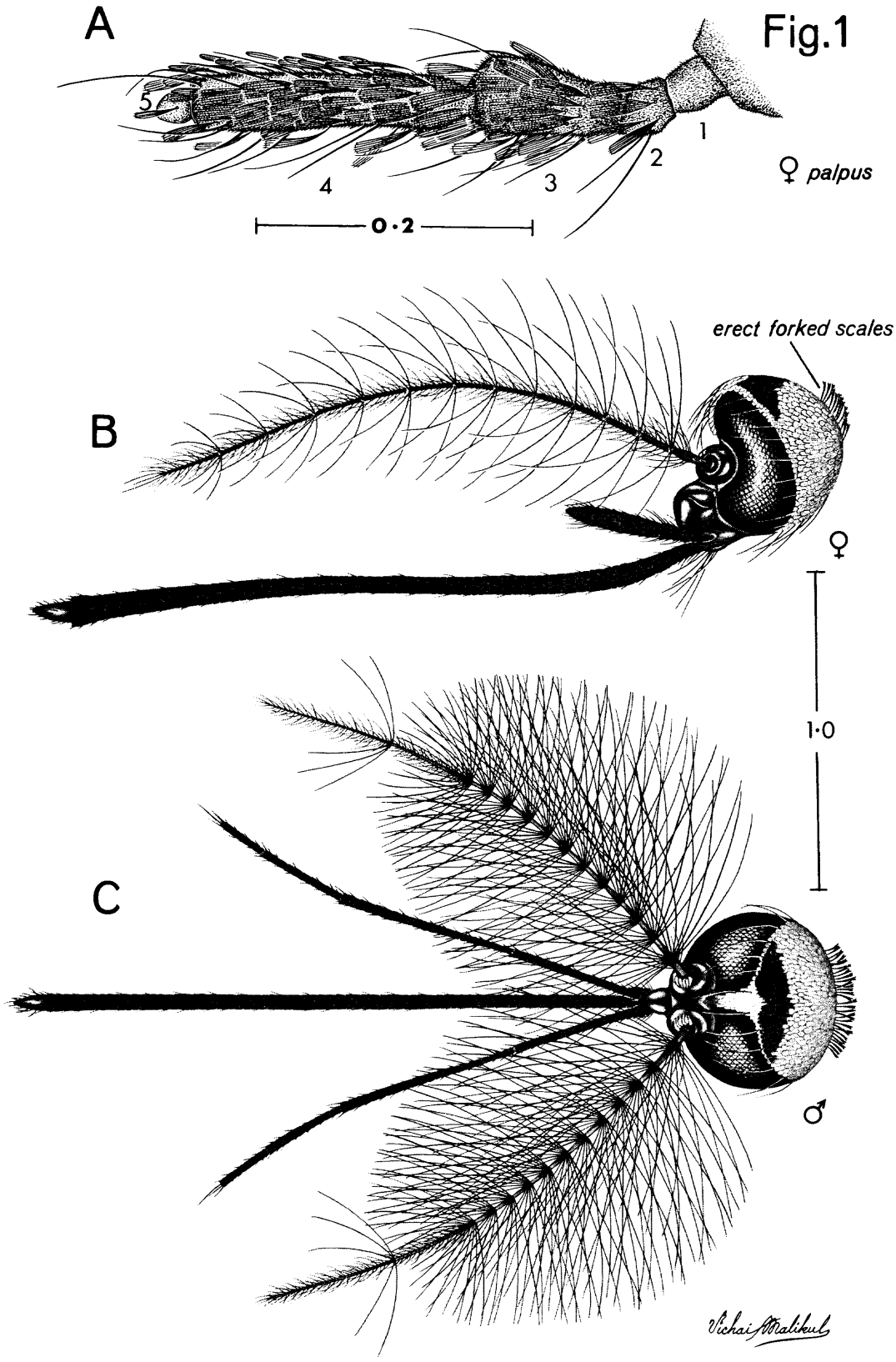
Structure	Character	Taxa		
		meronephada	*Diceromyia*	*Stegomyia*
	ADULT			
Head	Vertex with decumbent scales largely broad	+	+	+
	Erect scales confined to occiput	+	±	+
	♂ palpus - segment 5 much shorter than 4	+	+	-
Thorax	Acrostichal bristles	-	±	-
	Dorsocentral bristles	+	±	±
	Postspiracular bristles	+	+	+
	Paratergite with scales	+	±	±
	Scutellum with all scales broad	+	±	+
	Lower mesepimeron without bristles	+	±	±
	Prosternum with scales	+	±	+
	Postnotum bare	+	+	+
Wing	Remigial setae	+	+	±
♀ terminalia	Cerci short and broad	+	+	+
	Insula longer than broad	+	+	+
♂ terminalia	Proctiger without cercal setae	+	+	+

Table 1 con't.

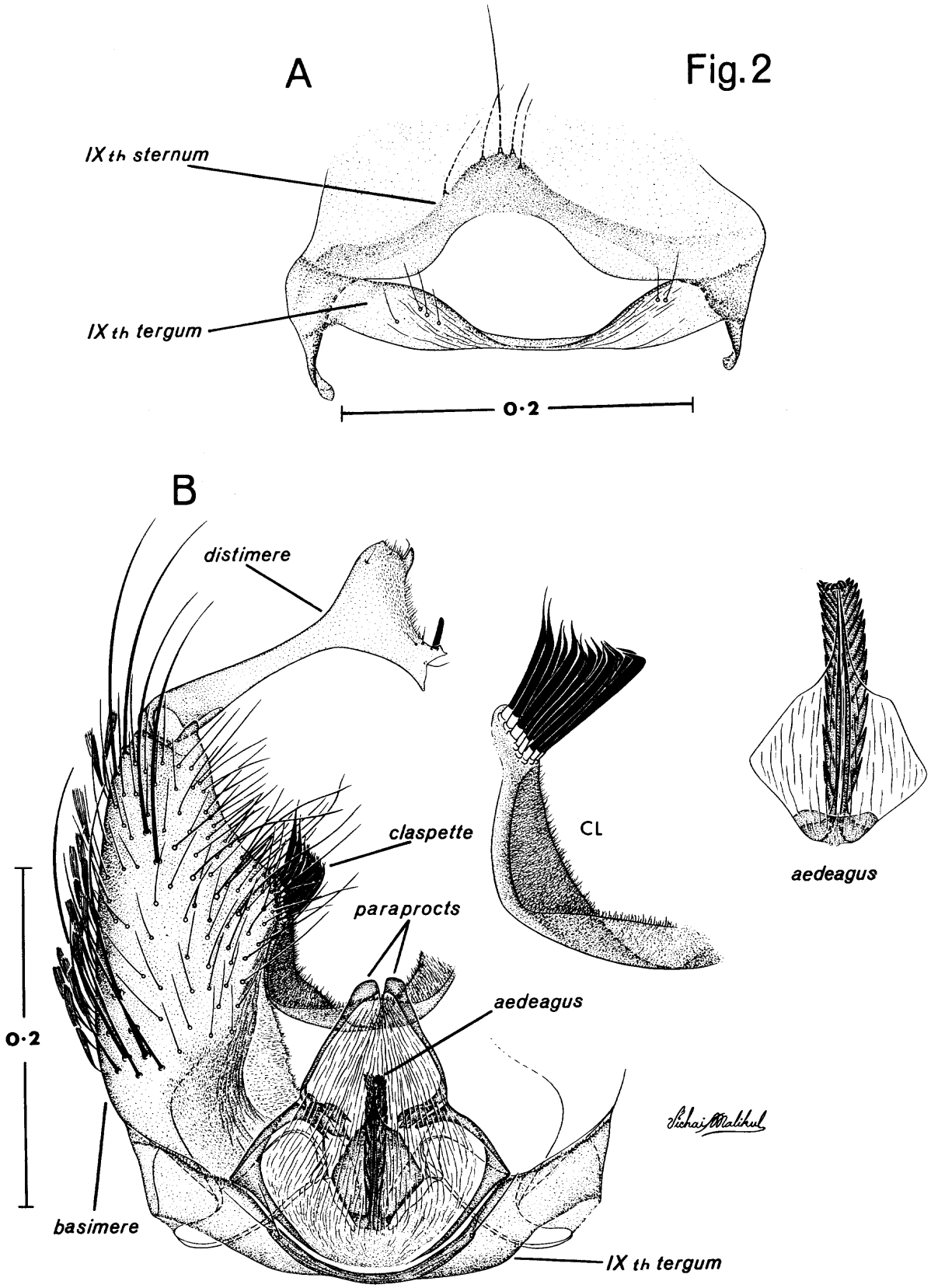
Structure	Character	Taxa		
		meronephada	*Diceromyia*	*Stegomyia*
♂ terminalia	Aedeagus strongly toothed	+	+	+
	Claspette present	+	+	+
	Distimere irregular in shape, expanded apically	+	±	-
	LARVA			
Head	Seta 4-C well developed, mesad and caudad of 6-C	+	+	-
Thorax	Setae 9-12-M, T on very large, basal tubercles	+	+	-
Abdomen	Seta 12-I not developed	+	+	+
	Setae 5-I-VI strongly displaced cephalad	+	-	-
	Comb scales in 2,3 irregular rows	+	±	-
	Ventral brush with 6 pairs of setae, with long basal stalk, all arising from basal boss, without distinct bars	+	-	-
	Precratal tufts	-	±	-



• Distribution of *Aedes (Diceromyia) meronephada* (Dyar & Shannon). Based on specimens seen by the author.



Aedes (Diceromyia) meronephada (Dyar & Shannon)



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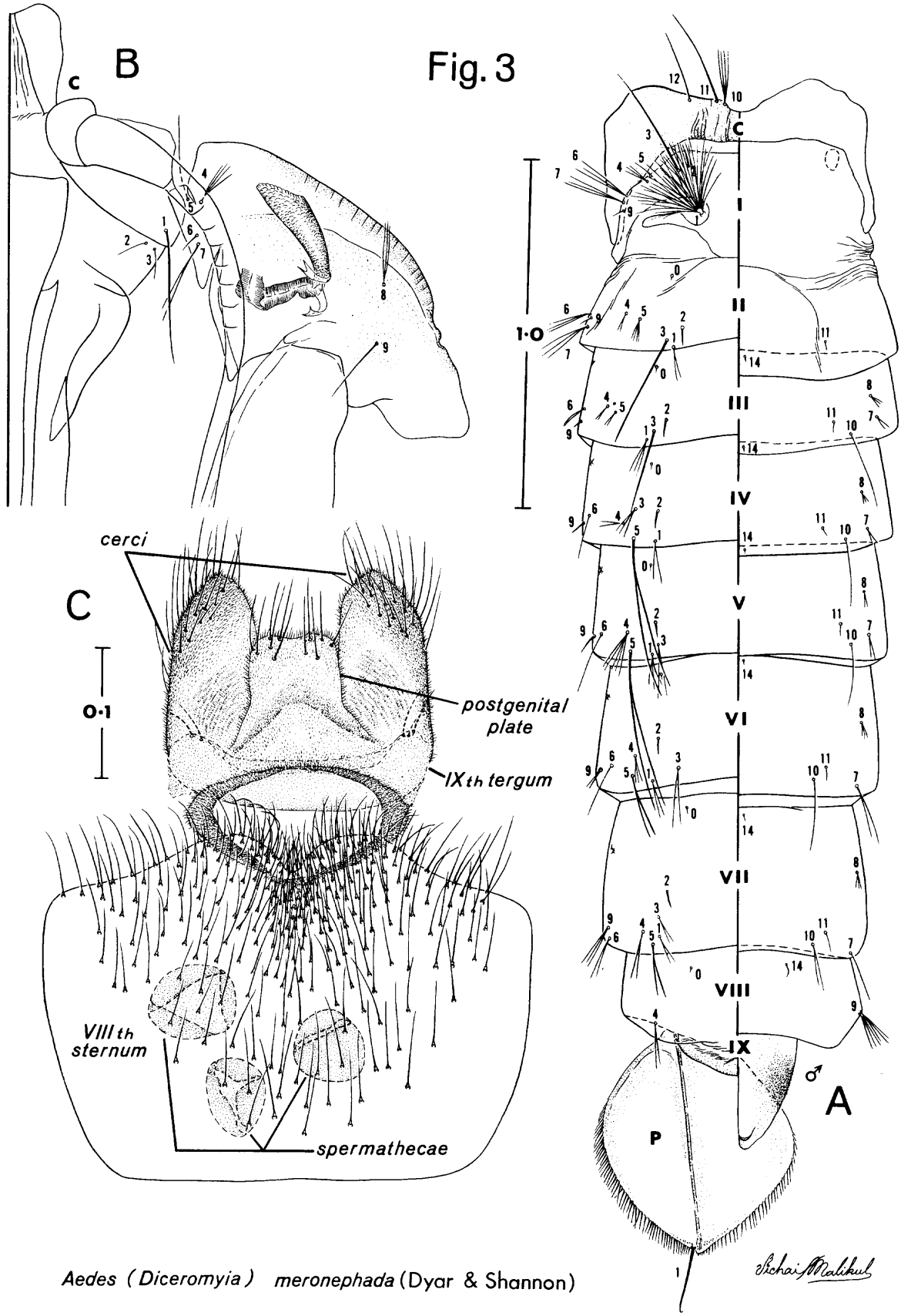

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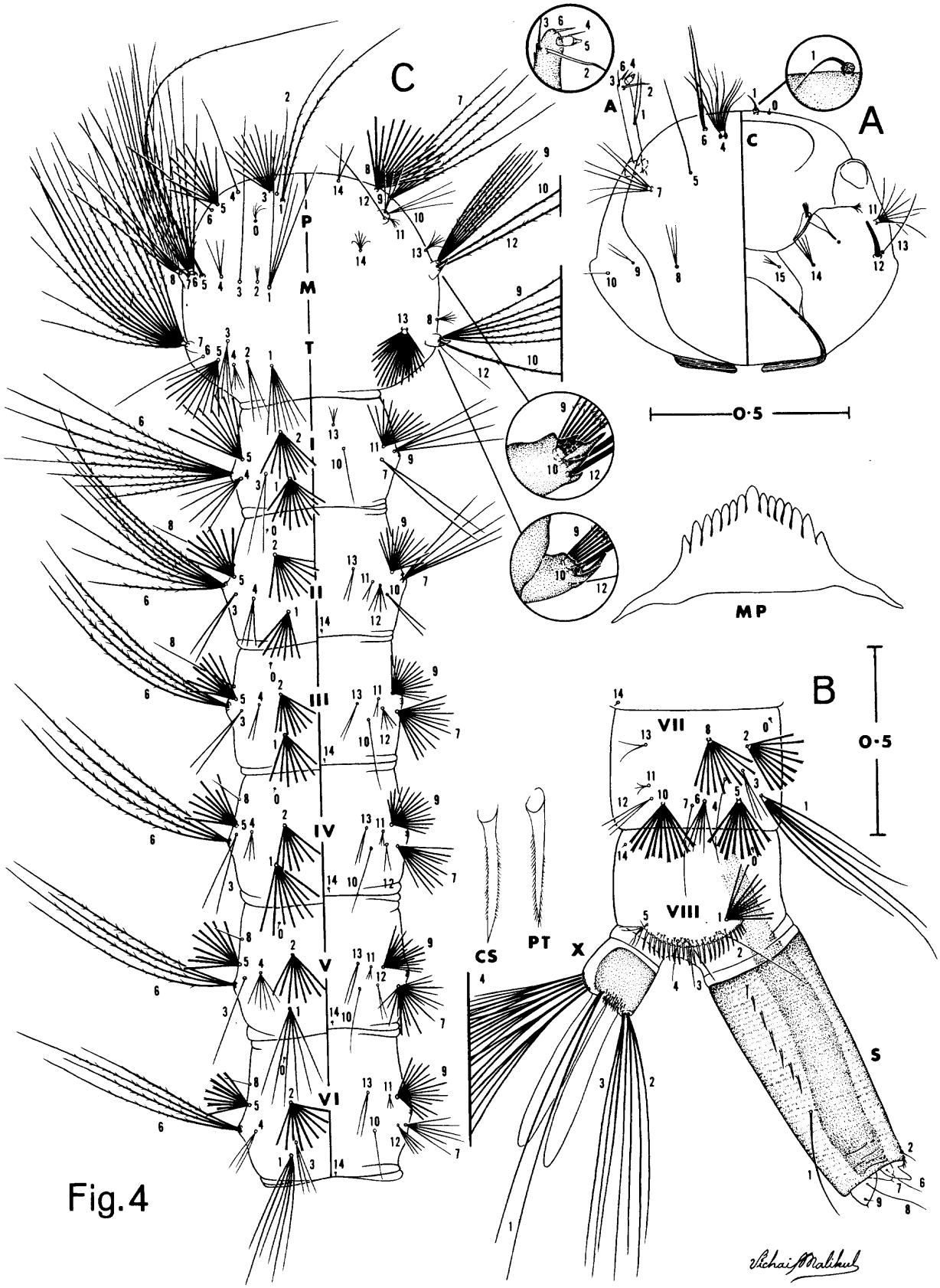
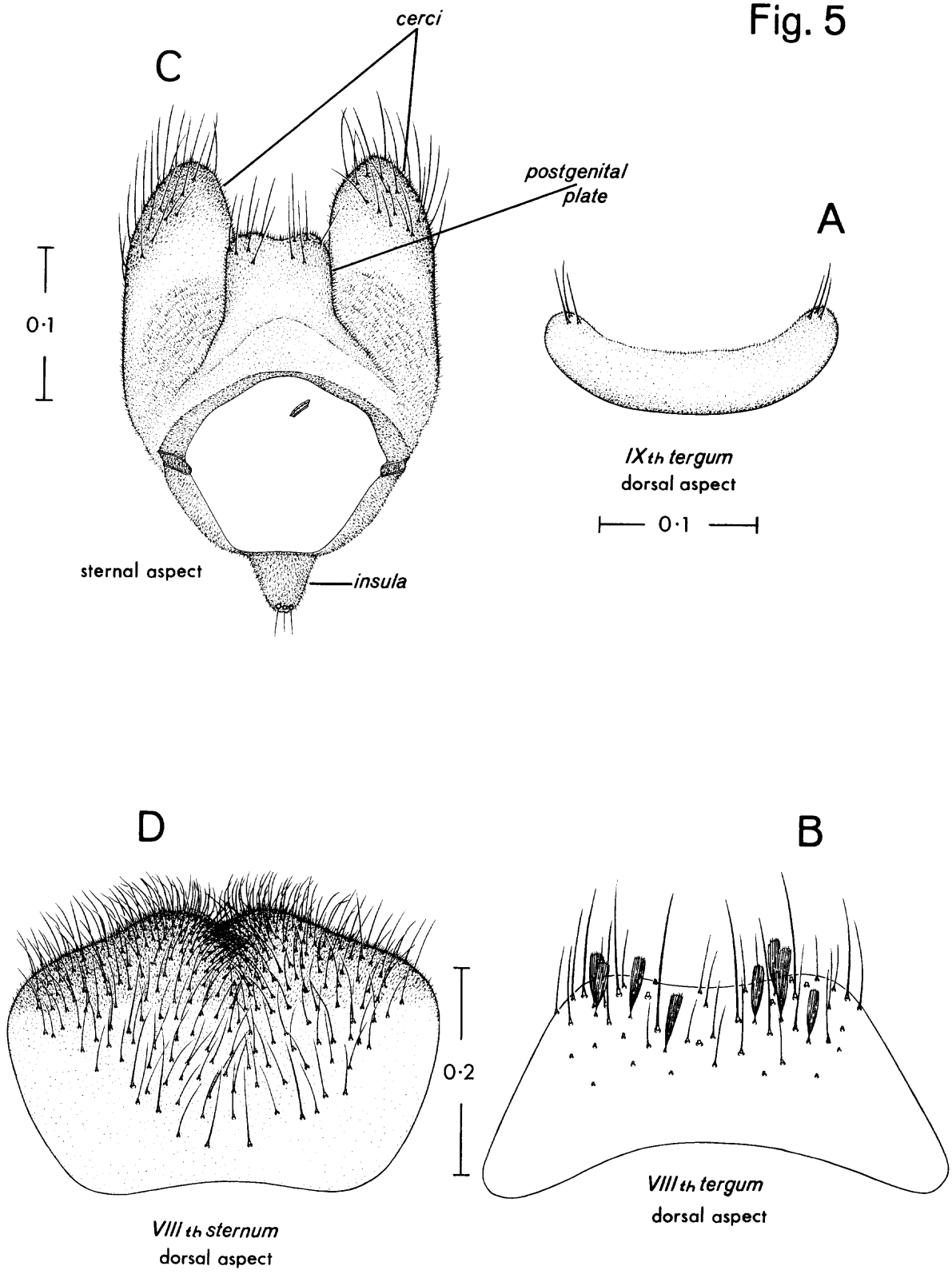


Fig. 4

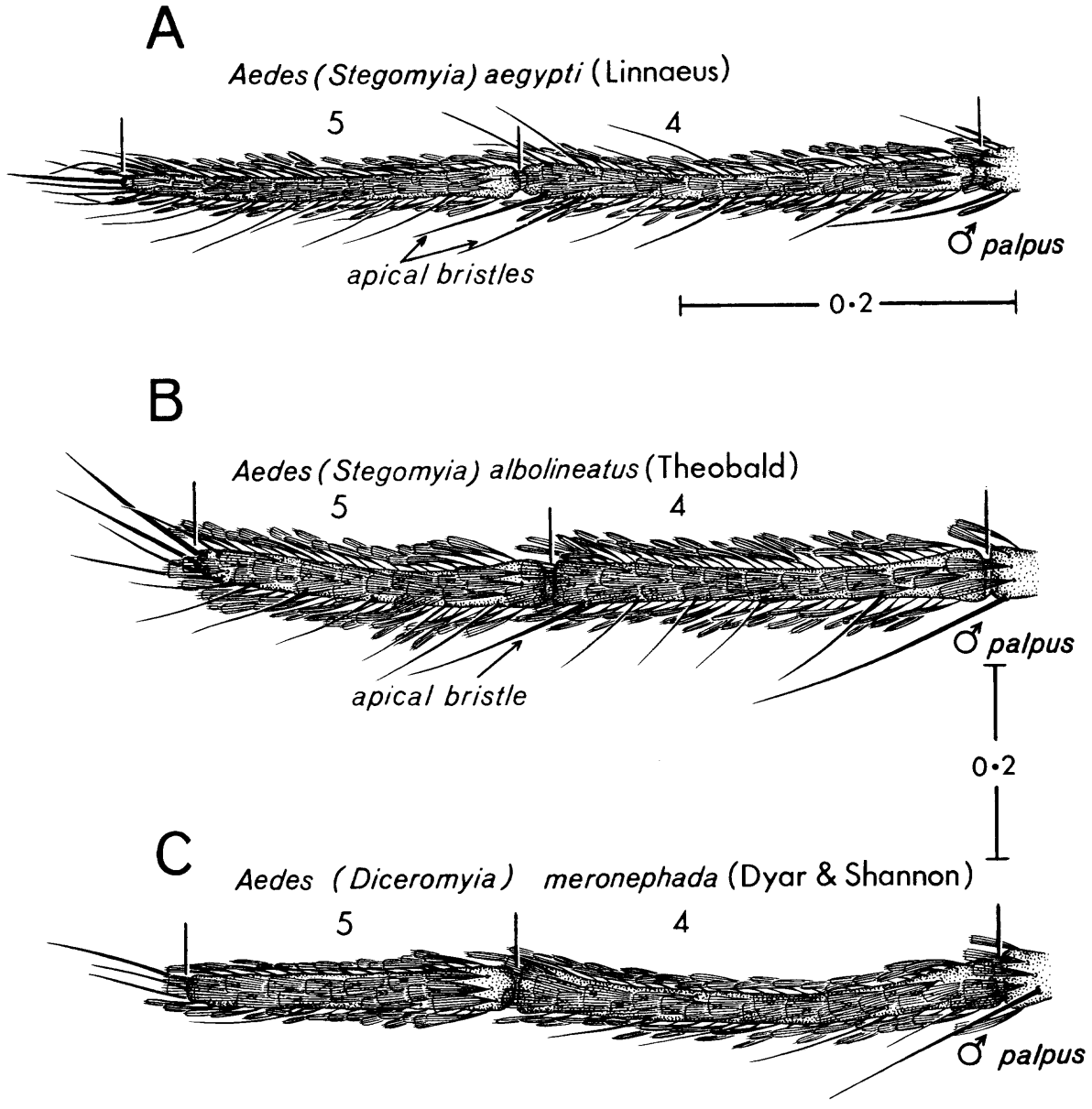
Aedes (Diceromyia) meronephada (Dyar & Shannon)

Fig. 5



Aedes (Diceromyia) meronephada (Dyar & Shannon)

Fig. 6



Vichai Malikul