

CONTRIBUTIONS TO THE MOSQUITO FAUNA OF SOUTHEAST ASIA. VII.

GENUS *AEDEOMYIA* THEOBALD IN SOUTHEAST ASIA.¹

By

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INTRODUCTION

The genus *Aedeomyia* was originally validated by inclusion in a key by Theobald in July (1901a :235) and again in November (1901b :98). His generic description appeared that same month (1901c :218) and was based on specimens of *Aedeomyia squammipenna* (L. Arribáizaga) = *Aedeo. squammipennis*. Included in his material were specimens from the Oriental Region which were the then undescribed *catasticta* Knab. He also included *Aedes* (*Aedeomyia*) *venustipes* Skuse as probably being a member of his genus. The following year Giles (1902: 478) emended the spelling of the genus name to *Aedomyia*. Edwards (1912: 24) emended the genus by placing a diaretic mark over the initial e. Brunetti (1914: 54) placed *Aedomyia* in synonymy with *Aedes* but later considered it a valid genus. In 1923 Enderlein described a new species from Africa for which he proposed the new genus *Lepiothauma*. Edwards (1925 :262) placed *Lepiothauma* in synonymy with *Aedomyia*. Amos (1944 :24) incorrectly cited this genus as *Aediomyia*. Because of the many spelling emendations applied to this genus, the literature has been complicated by a variety of names, many of which have been used quite recently.

This paper deals primarily with *Aedeomyia catasticta* Knab but because of past problems involving synonymy and identification of *catasticta* and *venustipes*, the latter is included although not in the range of Southeast Asia.

Specimens of the following species of *Aedeomyia* have been examined: *africana* Neveu-Lemaire, *catasticta* Knab, *furfurea* (Enderlein), *pauliani* Grjebine (larvae only), *squammipennis* (L. Arribáizaga), and *venustipes* (Skuse).

Abbreviations used in references to literature conform to the World List of Scientific Periodicals, 3rd. ed., Academic Press, New York, 1952. An asterisk following the abbreviations used (♀ = female, ♂ = male, P = pupa, L = larva) indicates that at least some portion of that form is figured. New distribution records are indicated by two asterisks.

The following combination of characters are those generally used to separate *Aedeomyia* from other genera: Adults with spiracular and postspiracular bristles absent, lower mesepimeral bristles less than 3; palpi 0.25 or less the length of the proboscis in both sexes; torus, flagellomere I, and clypeus with broad scales; wings densely covered with broad yellow, white, and brown scales; mid and hind femora with large apical scale tuft; male with apical two flagellomeres of antenna swollen. Pupa with hair 9-II-VI usually short and stout; paddles narrow at base, broad at apex and notched at the insertion of the apical hair. Larva with greatly enlarged antenna; trachea of siphon reduced, apex of siphon with a pair of curved hooks and a pair of multibranching hairs; pecten absent, siphon uniformly pubescent; comb scales

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less than 25, usually less than 20, arranged in a single row on a sclerotized plate much as in *Uranotaenia*.

This genus is here divided into two subgenera on the basis of the morphological characteristics listed below. Subgenus *Lepiothauma* includes the Ethiopian species *furfurea* (Enderlein). Subgenus *Aedeomyia* includes the remainder of the recognized species.

Subgenus *Aedeomyia*Subgenus *Lepiothauma*

FEMALE

- Hind tarsomeres with all scales decumbent.

- Hind tarsomeres with many erect scales dorsally.

MALE

- Penultimate flagellomere simple.

- Penultimate flagellomere with a dorsal basal tuft of 3-6 white scales (Figure 6, H).

PUPA

- Abdominal hair 9-II-VIII single or divided, hair-like or much narrowed.

- Hair 9-II-VIII single, broad and heavily sclerotized.

LARVA

- Abdominal hairs 1, 2, 5, 9, 13-I-IV simple or slightly fimbriated.

- These hairs distinctly brush-tipped.

GENUS *AEDEOMYIA* THEOBALD

Aedeomyia Theobald 1901a (July), J. trop. Med. 4: 235; 1901b (November), Mon. Cul. I: 98; 1901c (November), Mon. Cul. II: 218 (generic description). Logotype: *Aedes squamipenna* L. Arribálzaga. (Brunetti 1914: 54).

Aedomyia Giles 1902, Handbook, 2nd. ed. p. 478 (emend.).

Aedomyia Edwards 1912a, Bull. ent. Res. 3: 24 (emend.).

Aedes Brunetti 1914, Rec. Indian Mus. 10:54 (*Aedomyia* syn. of *Aedes*).

Lepiothauma Enderlein 1923, Wien. ent. Zeit. 40(1-4): 25. Orthotype: *furfurea* Enderlein.

Lepisthauma Edwards 1925, Bull. ent. Res. 15(3): 262 (lapsus for *Lepiothauma*).

Aediomyia Amos 1944, Mosq. Cont. Train. Manual p. 24 (lapsus for *Aedeomyia*).

FEMALE. *Head*. Antenna shorter than proboscis, torus and basal flagellomere with broad scales; clypeus with a median patch of white scales; palpus short, 0.20-0.25 the length of the proboscis, segments dorso-ventrally flattened, apical segment longest, usually with white scales at its apex, basal segments with several large bristles; proboscis with 4-6 basal bristles, white rings at or before middle, and before labellum, always present, a ring (usually broken or restricted to a few dorsal white scales) usually present at basal third; labellum dark; orbital bristles long and dark or pale; orbital margin with decumbent white and black scales; vertex with erect scales with truncate or slightly emarginate apices, usually mixed white, yellow and brown scales present. *Thorax*. Scutum with bristles long, those of supralar and prescutellum longest; most pleurites with bristles except spiracular

postspiracular, paratergite, meron, metameron, and metapleuron; upper, anterior and lower mesepimeral bristles present, upper and posterior sternopleural bristles present; scales of scutum mostly decumbent except for erect and semierect scales on the lateral margin of the scutum, the anterior promontory region and the junction of the posterior dorsocentral and the prescutellar region; scales on most pleurites except spiracular, meron and metapleuron, scales of thorax mostly yellow or white with the majority of dark scales restricted to the lateral margin of the scutum; scutellum with 3 lobes, each with long bristles, scales of scutellum usually light at base with the scales at the tip of each lobe dark; postnotum bare. *Wing*. Majority of scales dark or yellow with white scales mainly at wing base, a patch at basal third and a patch at the apical third (*africana* has the basal area mostly yellow scaled), fringe scales long, vaguely infuscated, usually of two lengths and unilaterally expanded; squama with a fringe of broad scales; alula with narrow fringe hairs. *Halter*. Stem pale, knob dark scaled with the stem and sometimes the medial region white scaled. *Legs*. All coxae and trochanters with bristles and scales; femora dark and white scaled but with broad white bands absent, apex of mid and hind femora with a large tuft of erect scales, sometimes present on fore femur but reduced in size; tibiae with most scales dark and several narrow, entire or broken, white bands, scales of fore tibia all decumbent, mid tibia with a few erect scales at base, hind tibia with a large compact tuft just before base (*furfurea*), or as above except with hind tibial tuft small or elongate (*catasticta*, *squamipennis*, *venustipes*), or with tuft absent (*africana*); tarsomere I of fore leg as long as rest of segments combined, tarsomeres II, III with distinct basal pale bands, other segments dark or mottled with white scales; mid leg with tarsomeres I-IV with basal bands, or with I-III banded (*furfurea*); tarsomeres of hind leg with scales decumbent or with erect scales dorsally (Figure 6, A, *furfurea*), basal white band on I-IV, or I-II with III all white (*venustipes*), tarsomere V all white or with a few apical, ventral black scales, or all black (*venustipes*); tarsal claws not toothed (Figure 6, G). *Abdomen*. Cylindrical, broadly truncate at apex; segment VIII with a projecting fringe or erect, elongate scales; scale pattern variable, generally dark with white and yellow scales forming a variety of patterns; segments VI, VII slightly expanded laterally, dorso-ventrally flattened. *Terminalia*. Simple, cerci short and stout, postgenital plate large, broad, and truncate (*venustipes*) or varying to small, narrow, and deeply emarginate (*squamipennis*); atrial plate and ninth and tenth tergites absent (Cohler 1949: 109); spermatheca single, large, with a funnel shaped projection at base of duct (Figure 6, I).

MALE. *Head*. Antenna short as in female, or slightly longer, flagellomeres II-XI annulate, silver at base, dark at apex, flagellomeres XII, XIII swollen, XII scaleless or with a dorsal basal tuft of 3-6 white scales (*furfurea*); torus and clypeus with yellowish or white scales; palpus short as in female or slightly shorter; proboscis as in female with scales decumbent throughout or slightly rough basally, or with erect dark scales on the ventral basal half (*furfurea*); scales of head as in female. *Thorax*. Scales and bristles of scutum and pleurites as in female. *Wing*. Scaling and pattern of wing scales very similar to that of the female but generally lighter in color. *Halter*. As in female. *Legs*. As for female; fore and mid tarsal claws slightly asymmetrical, major claw with a single median, blunt tooth (Figure 6, F), hind claws small, simple. *Abdomen*. Segments I-V cylindrical, slightly tapering, VI-VII dorso-ventrally flattened and expanded laterally, segment VIII normal, not expanded; scaling of terga variable, usually dark with lateral, apical regions of each segment with white scales forming patches or oblique vittae or mostly white scaled basally and with the black scales becoming dominant apically, or varying to mostly dark scaled. *Terminalia*. Basimeres stout and short, each bearing a patch of strong bristles on the basal lobe; distimeres shorter than the basimeres and nearly parallel sided; differences in shape noted by some authors appear to be due to the angle from which they are viewed; distimeres

usually have small hairs on the apical half (apical 0.66 in *venustipes*) and the apex with a comb-like process, the teeth of which are variable in number but average about 20 (except *africana* which has 15); generally the terminalia are withdrawn into the eighth segment; ninth tergite ill defined, merely a thin sclerotized strip, without definitive characters, which lies basally to the membranous proctiger; proctiger supported laterally by simple paraprocts, each paraproct being connected distally to a sclerite with which it articulates; phallosome complicated, consists of at least 2 distinct parts; the sides of the structure are attached to the parameres and form a "horseshoe" configuration, the distal end of this structure is in the form of an enlarged cap-like structure with a tergal median lip, this lip varies slightly among the species, attached sternally to the cap are a pair of indistinct sclerites (Figure 3, E, ps) with the distal apices expanded, these attach to the sternal surface of the horseshoe but are separate structures, and seem to correspond to the prosophallus in the Dixinae (Belkin 1968: 8). These structures also vary but may not be constant intraspecifically. The homology of the parts of the phallosome is undecided and is open to challenge.

PUPA. Integument vaguely to moderately infuscated, region of paddle before insertion of apical hair with a circular area of infuscation. *Cephalothorax.* Hairs of cephalothorax single or branched, mostly branched in *catasticta*, mostly single in *furfurea* and *africana*; trumpets short and wide (*africana*, *catasticta*) or elongate and more narrow (*squamipennis*) or elongate with the pinna broad (*furfurea*, *venustipes*). *Abdomen.* Hairs 1, 6-I, 1, 5, 6-II-VI and 5-VII usually enlarged and multibranched, branches distinctly plumose to vaguely plumose, or simple (*venustipes*), hair 5-V-VII with some branches long, surpassing base of next segment, or very long with the longest branches surpassing all of the following segment and part of the next segment (*squamipennis*); hair 9-II-VIII short, stout and single or branched - single, heavily sclerotized and spinose (*furfurea*), stout and bifid on III, IV (*venustipes*), small and hair-like on I-VI (*africana*), spine-like and not sclerotized (*squamipennis*) or spine-like and sclerotized on III-VI (*catasticta*). *Paddle.* Narrow at base, wide at apex with a notch at the insertion of the apical hair (1-P), apical hair long and simple or vaguely plumose.

LARVA. Head. Antenna enlarged, nearly as long or longer than the head, 1-A with 6-11 plumose branches (3-5 branches in *pauliani*), placed at or beyond the middle of antenna, 2-4-A elongate and plumose, 5, 6-A much smaller and simple, situated on a pedestal, body of antenna swollen with surface spiculate and with a patch of hairs on the apical, mesal third (absent in *africana* and *pauliani*); head hairs 5-7-C large, multibranched and plumose; 1-C spinose and heavily sclerotized; mouth brushes large; maxilla elongate with a straight terminal spine, similar to 1-C but longer (much longer in *squamipennis* and *africana*) usually simple but barbed in *venustipes*; mandible of 2 separate teeth, mesal tooth bifid; mental plate small and with 5 teeth. *Thorax.* Integument minutely pubescent; main hairs of pleural groups including 4, 5, 7-P elongate and plumose. *Abdomen.* Hairs 1, 2, 5, 9, 13-I-IV multibranched, plumose (vaguely so or simple in *venustipes*) with the apex of most branches simple (*africana*, *pauliani*, *squamipennis*, *venustipes*) or slightly fimbriated (*catasticta*), or strongly brush-tipped (*furfurea*, Figure 5, H); segment VIII with comb scales in a single row on the distal margin of a sclerotized plate, teeth 6-25, each tooth usually with a membranous margin which may or may not be fringed; siphon without pecten, densely, uniformly pubescent, 1-S multibranched and plumose, placed usually slightly beyond the middle of the siphon, 2-S single (6 branched in *squamipennis*) and situated at the apical fifth (near middle in *squamipennis*), 8-S large, multibranched and slightly to distinctly plumose; lateral valves with seta 9 modified to form a pair of hook-like appendages, the function of which is still not understood; anal segment with saddle complete, surface minutely pubescent, dorsal apical region with longer erect and flattened hairs, each of which is fringed unilaterally and usually with a

smaller setiform spicule at the base, anal brush of 6 pairs of long pectinate hairs (6-8 pairs in *pauliani*, 1-IX of 3 branches (2 in *pauliani*) and placed beyond the middle of the saddle, 2, 3-IX elongate and pectinate; anal papillae short.

EGG. Baisas (1938: 191) reports *Aedeomyia* eggs having a silvery polygonal make up similar to those found in anopheline eggs.

DISTRIBUTION. The following is a list of the recognized species of *Aedeomyia* arranged in the zoogeographic regions in which they occur.

NEOTROPICAL

Aedeomyia (Aedeomyia) squamipennis (L. Arribáizaga)

ETHIOPIAN

Aedeomyia (Aedeomyia) africana Neveu-Lemaire

Aedeomyia (Aedeomyia) pauliani Grjebine

Aedeomyia (Lepiothauma) furfurea (Enderlein)

AUSTRALIAN

Aedeomyia (Aedeomyia) venustipes (Skuse)

ORIENTAL, AUSTRALASIAN, MICRONESIAN

Aedeomyia (Aedeomyia) catasticta Knab

The genus is primarily of the Southern Hemisphere. Although *catasticta*, *furfurea*, *africana*, and *squamipennis* do range north of the Equator, none approach the Tropic of Cancer. The species are well isolated except for the sympatric *furfurea* and *africana* (see Edwards 1941: 64 for additional information), and are probably relict populations of a once widespread form. The genus may have arisen in Africa and spread eastward across the Mideast, over what is now an unfavorable route, through Southeast Asia down to Australia. An ancestral form may have invaded South America via Australia and Antarctica when the climate was more propitious. This presence of a species in tropical and subtropical South America is less easily explained unless one accepts a route via Antarctica. A northern passage via Bering Straits without leaving any traces north of Central America seems less likely. The Madagascar *pauliani* is undoubtedly a derivative of *africana* but until adults are collected and described, its relationship remains unknown.

BIOLOGY AND MEDICAL IMPORTANCE. Until recently *Aedeomyia* was considered to be of no medical importance. However, Doherty, *et al.* (1968: 431) reported the isolation of MRM3929 virus, subgroup of Group B, Murray Valley encephalitis virus from *catasticta* in Australia. The virus was also isolated from the swamp pheasant *Centropus phasianinus*. Whitehead, *et al.* (1968: 440) suggested the name Alfuy for this virus. Standfast and Barrow (1968) recorded *catasticta* taken in traps baited with chickens. Aitken (1967: 72) records *squamipennis* engorging primarily on chicks and to a lesser degree on mice. He also observed feeding on wild birds in a canopy situation, as well as a higher frequency of feeding in the canopy compared to near ground level. Mattingly (1949: 399) records *africana* collected commonly on canopy platforms.

The larvae have been collected in a variety of situations: weedy ponds (Barraud 1923: 505), swamps (Mackerras 1937: 260), ponds, ditches and marshes (Penn 1948: 242), wheel ruts (Bonne-Wepster 1954: 58), stock dams and lakes (Douglas 1961: 262), and appear always to be associated with various types of thick aquatic vegetation. Mackerras (*loc. cit.*) reported *venustipes* in water with *Nitella* and Douglas (*loc. cit.*) mentioned *Myriophyllum*. *Aedeomyia catasticta* has been collected in waters heavy with *Pistia stratiotes* (Bonne-Wepster *loc. cit.*), *Spirogyra* (Iyengar & Menon 1956: 788), *Azolla* and *Utricularia* (Assem & Bonne-Wepster 1964: 78), and *Eichhornia crassipes* (Standfast & Barrow 1968: 427). Hamon (1966: 372) records *africana* with

dense *Pistia* growth. Hopkins (1952: 77) records *furfurea* with *Potamogeton* growth. The methods by which the larvae obtain oxygen when submerged are still in question. They are able to spend prolonged periods beneath the surface which lead Mackerras (*loc. cit.*) to suggest they obtain oxygen from the plant material. Douglas (*loc. cit.*) reported that isolated larvae, without plant material, were able to maintain respiration under the surface for long periods. Various authors have suggested cuticular respiration, especially through the enlarged antennae and this may be partially true. Although the trachea in the siphon is greatly reduced it is still utilized and larvae have been observed at the surface. The apex of the siphon is typical of surface breathing species. The enlarged antennae and siphonal hooks are thought to be utilized for clinging (Mackerras *loc. cit.*), but until these interesting adaptations are studied more fully, their total function will remain uncertain. It has been noted that larvae preserved in alcohol easily lose one or both antennae, the reason for which is unexplained. The pupae apparently have no special adaptations for respiration and are recorded as spending most of their time at the surface, being difficult to disturb. Lewis (1949: 60) discussed the position assumed by agitated larvae, namely, inverted while supporting themselves with the tip of the siphon and the dorsum of the thorax. Leicester (1908: 183) records *squamipenna* (= *catasticta*) adults as being similar to *Orthopodomyia* in their resting position.

KEY TO THE WORLD SPECIES OF ADULT *AEDEOMYIA*¹

1. Hind tarsomeres without erect scales dorsally (Fig. 6, B-E);
male without scale patch on penultimate flagellomere
..... Subgenus *Aedeomyia* 2
Hind tarsomeres II-IV with erect scales dorsally (Fig. 6, A);
males with a patch of 3-6 white scales at base of penultimate
flagellomere (Fig. 6, H); Africa, Madagascar
..... Subgenus *Lepiothauma* *furfurea*
2. Hind tarsomere III all white, V all black (Fig. 6, B);
Australia *venustipes* (p.12)
Hind tarsomere III with an apical black band, V mostly
white 3
3. Hind tibia without erect scale tuft at ventral base;
wing with a large yellow scale patch at base; Africa *africana*
Hind tibia with erect scales at ventral base; wing
base mottled, without a distinct yellow patch;
Oriental, Neotropical 4
4. Pale scales on mid band of palpus, flagellomere I,
erect scales of head, and generally those of scutum,
yellow or yellowish; Neotropical *squamipennis*
These pale scales white; Oriental, Australasian ... *catasticta* (p. 8)

KEY TO THE WORLD SPECIES OF *AEDEOMYIA* PUPAE¹

1. Seta 9 forked or multiple on at least segment VII, VIII
..... Subgenus *Aedeomyia* 2
Seta 9-II-VIII short, simple, very stout and rapier-like;
Africa Subgenus *Lepiothauma* *furfurea*

¹Adults and pupa of *pauliani* are undescribed.

2. Seta 9 short, stout and bifid on segments III-VI
(Fig. 5, B); Australia *venustipes* (p. 12)
Seta 9-III-IV hair-like, slender, or if spine-like
then not bifid at tip (Fig. 2, B) 3
3. Seta 9-I-VI minute, hair-like, infrequently bifid;
Africa *africana*
Seta 9-III-VI spine-like, even if curved and colorless 4
4. Trumpets long and slender, index 5-7; longest branch
of 5-IV-VI reaching beyond the distal margin of the
next 2 segments; Neotropical *squamipennis*
Trumpets short and broad, index 3-4; longest branch
of 5-IV-VI not reaching much beyond the distal margin
of the next segment; Oriental, Australasian *catasticta* (p. 8)

KEY TO THE WORLD SPECIES OF *AEDEOMYIA* LARVAE

1. Abdominal hairs plumose, slightly fimbriated or
simple Subgenus *Aedeomyia* 2
The majority of the abdominal hairs strongly fimbriated
with broad, brush-like terminals; Africa, Madagascar
..... Subgenus *Lepiothauma* *furfurea*
2. Head hair 6-C equal to 5, 7-C; comb patch of 19 or
more scales (Fig. 5, E); Australia *venustipes* (p. 12)
Head hair 6-C smaller and shorter than 5, 7-C;
comb patch of less than 19 scales (Fig. 5, F-G) 3
3. Antenna without long slender hairs on mesal, apical
half; antennal hairs 5, 6-A about as long as the ped-
estal on which they occur; Africa, Madagascar 5
Antenna with mesal, apical half with closely set hairs
which may sometimes be restricted to the distal 0. 25;
Oriental, Australasian, Neotropical 4
4. Siphon with 2-S branched and placed near middle;
Neotropical *squamipennis*
Siphon with 2-S single and placed well beyond the
middle; Oriental, Australasian *catasticta* (p. 8)
5. Hair 1-IX with 2 branches; comb scales less than 8;
Madagascar *pauliani*
Hair 1-IX with 3 branches; comb scales more than
10; Africa *africana*

AEDEOMYIA (AEDEOMYIA) CATASTICTA KNAB

(Figures 1, 3, 4, 5 F, 6 D, G, I)

- Aedeomyia squammipenna* (L. Arribáizaga), Theobald 1901c, (*in part*), Mon. Cul. II: 219; Banks 1906, Philipp. J. Sci. 1(9): 990.
- Aedeomyia squamipennis*, Green 1901, (*nec* Arribalzaga), Royal Botanic Gardens Circular, Series I(25): 368; Leicester 1908, Stud. Inst. med. Res. F. M. S. 3(3): 182.
- Aedeomyia squamepennis*(Arribáizaga), Giles 1902, (*in part*), Handbook, 2nd. ed., p. 478 (emend.)
- Aedeomyia squamipenna* (Arribáizaga), Brunetti 1907, (*in part*), Rec. Indian Mus. 1(4):366; Brunetti 1912, Rec. Indian Mus. 4:488; Brunetti 1920, Rec. Indian Mus. 17: 177.
- Aedeomyia venustipes*, Taylor 1913, (*nec* Skuse), Aust. Inst. trop. Med. p. 12; Taylor, 1916, Proc. Linn. Soc. N.S.W. 41(3):573 (*catasticta* into syn.); Iyengar 1953, Bull. W.H.O. 9(6): appendix V; Thurman 1963, Proc. 9th. Pacif. Sci. Congr. 9: 52.
- Aëdeomyia venustipes*, Farner 1944, (*nec* Skuse), U.S. Navmed 133: 208.
- Aëdomyia venustipes* (Skuse), Edwards 1924, (*in part*), Bull. ent. Res. 14: 364; Edwards 1925, Bull. ent. Res. 15: 262; Edwards 1929, Bull. ent. Res. 20: 325; Barraud 1934, Faun. Brit. India, Diptera, p. 132 (σ^* , φ^* , P, L*); Baisas 1938, Mon. Bull. Philipp. Hlth. Serv. 18(5): 181 (P*); Carter 1950, Ceylon J. Sci. 24(2): 88; Iyengar & Menon 1956, Bull. ent. Res. 47: 785.
- Aedomyia venustipes* (Skuse), Taylor 1916, Proc. Linn. Soc. N.S.W. 41(3): 573 (*catasticta* syn. *venustipes*); Barraud 1927, (*nec* Skuse), Indian J. med. Res. 14(3): 523 (σ^*); Barraud & Covell 1928, Indian J. med. Res. 15: 676 (φ^*); Borel 1930, Monogr. Coll. Soc. Pat. exot. 3:303 (σ^* , φ , L*); Bonne-Wepster & Brug 1937, Geneesk. Tijdschr. 77: 46 (σ^* , φ^*).
- Aediomyia venustipes*, Amos 1944, (*nec* Skuse), Mosq. Cont. Train. Manual pp. 24, 31.
- Aediomyia catasticta*, Amos 1947, Mosq. Cont. Train. Manual pp. 17, 23.
- Aedomyia catasticta* Knab, Barraud 1923, Indian J. med. Res. 11(2): 505 (L*); Mackerras 1937, Proc. Linn. Soc. N.S.W. 62:259 (L*), (*catasticta* from syn.); Bonne-Wepster & Brug 1939, Geneesk. Tijdschr. 79: 1252 (L*); Brug & Bonne-Wepster 1947, Chron. Nat. 103: 184; Penn 1949, Pacif. Sci. 3: 38 (P*); Bonne-Wepster 1954, Roy. trop. Inst. Amst. Spec. Pub. 20: 55 (σ^* , L*); Macdonald 1957, Stud. Inst. med. Res. F.M.S. 28: 17; Douglas 1961, Proc. Linn. Soc. N.S.W. 86(3): 262; Assem & Bonne-Wepster 1964, Zool. Bijdr. 6: 76 (σ^* , φ , L*).
- Aëdomyia catasticta* Knab, Edwards 1912a, (*in part*), Bull. ent. Res. 3(1): 25 (emend.); Edwards 1912b, Bull. ent. Res. 3(4): 379 (L*); Edwards 1917, Bull. ent. Res. 7: 229 (σ^*); Edwards 1922, Indian J. med. Res. 10(2): 458; Edwards 1932, in Gen. Insect., Fasc. 194: 122 (syn. of *venustipes*); Lee 1944, Atlas Mosq. Larvae Aust. Reg. p. 46 (L*); Iyengar & Menon 1956, Bull. ent. Res. 47: 788 (L*).
- Aëdeomyia catasticta* Knab, Dyar 1920, Insec. Inscit. Menst. 8(10-12): 184; Coher 1948(1949), Ent. Amer. 28:107 (φ^*).
- Aedeomyia catasticta* (Knab), Thurman 1963, Proc. 9th. Pacif. Sci. Cong. 9:54.
- Aedeomyia catasticta* Knab 1909, Ent. News 20:387 (φ); Brunetti 1912, Rec. Indian Mus. 4: 488; Brunetti 1920, (*in part*), Rec. Indian Mus. 17: 177; Knight, Bohart & Bohart 1944, Nat. Res. Counc. Div. med. Sci. p. 40; Bohart 1945, Navmed 580: 44 (L); Knight & Chamberlain 1948, Proc. Helm. Soc. Wash. 15: 15 (P*); Penn 1948, Proc. ent. Soc. Wash. 50(9): 242; Thurman & Thurman 1955, Mosquito News 15: 222; Bohart 1957, Ins. of Micronesia 12: 20 (σ , φ , L); Thurman 1959, Univ. Maryland Agr. expt. Sta. Bull. A-100: 61 (σ^* , P, L*); Belkin 1962, Mosq. S. Pacific 1: 276,

2: 178 (♀*, P*, L*); Standfast & Barrow 1968, *Trans. R. Soc. trop. Med. Hyg.* 62(3): 422; Doherty, Whitehead, Wetters & Gorman 1968, *Trans. R. Soc. trop. Med. Hyg.* 62(3): 431; Whitehead, Doherty, Domrow, Standfast & Wetters 1968, *Trans. R. Soc. trop. Med. Hyg.* 62(3): 440.

FEMALE. (Figure 1) *Head.* Antenna shorter than proboscis, torus with broad white scales on most of its surface, flagellomere I inflated with white or white and black scales on apical half, flagellomeres II-XIII nearly equal in length with strong dorsal, basal bristles; clypeus inflated with a dorsal patch of white or cream-white scales; palpus very short, appearing dorso-ventrally flattened, especially so apically, dark scaled with some white scales at apex of last two segments, penultimate segment with one or more dorsal bristles; proboscis with decumbent dark and white scales, dark basally with a patch of white scales at dorsal, basal 0.25, a complete white ring before 0.5 and another just before the labellum; labellum dark, without scales; orbital bristles large and dark; scales of vertex erect basally, cream-white at middle becoming dark laterally, scales white and decumbent near front, sides dark and white scaled. *Thorax.* Bristles of scutum moderate in length, curved, yellowish or dark, scales mostly decumbent and dark but with a median longitudinal band of yellow-white scales, margined laterally with white scales, this band ends approximately at the middle where it is divided by mixed white and dark scales, the remainder of the scutum is variable dark and white scaled without a definitive pattern; scutellum yellow-white scaled with the tips of the three lobes dark scaled, scutellar bristles longer than thoracic bristles; pleurites without scales or bristles on spiracular, meron, and metapleuron, without bristles but with scales on paratergite, postspiracular and metameron. *Wing.* Scales of wing dark, white, and yellow, white prominent at base, a transverse band crossing wing just before and including base of radial-sector but becoming vague beyond M, a transverse band at 0.66 which becomes vague posteriorly, other areas of white scaling variable in size and position. *Halter.* Stem pale with the knob dark scaled. *Legs.* All coxae and trochanters with scales and bristles; femora with decumbent dark and white scales in variable patterns, fore femur with a small brush of erect scales at ventral apex, mid and hind femora with a large brush of erect scales at or before apex, apex with a small white band; tibiae dark scaled with narrow, oblique white lines which may be broken or entire, hind and sometimes mid tibiae with a variable brush of erect scales before base on ventral margin; tarsomeres variable but with tarsomere I with white bands as on tibiae and with an apical white band which joins a basal white band on tarsomere II, tarsomere II dark apically except for a thin apical white band which joins the basal white band on tarsomere III, this white band is narrow on the fore and mid tarsi but very wide on the hind tarsus, tarsomere IV all dark or with a dorsal basal white band on fore and mid tarsi but all white or white with a ventral, apical dark spot on hind tarsus; claws simple, not toothed. *Abdomen.* Scaling of terga extremely variable, terga of segments I-III either yellow scaled, dark scaled, or dark scaled with variable yellow spots, terga of segments IV-VI similar but usually with lateral white scaling, VI-VII usually with irregular oblique white bands from base, near middle, to apical lateral margins, segment VIII narrower than VII with scales on terga erect near apex and orange medially. *Terminalia.* Cerci short and broad with long bristles and shorter hairs beneath; postgenital plate very broad and slightly emarginate to truncate at apex; spermatheca large, single, with a funnel shaped projection joining the duct.

MALE. (Figure 1) *Head.* Antenna shorter than proboscis, flagellomeres I-XI with whorls of long hairs, shorter mesially, basal half of each segment with silvery reflections, flagellomeres VII-XIII elongate, inflated with hairs much reduced; palpus as in female or slightly shorter; proboscis as in female or slightly longer, basal white mark sometimes enlarged to a complete ring; scaling of head as for female but generally darker. *Wing.* Similar

to female but slightly lighter in general coloration, fringe usually light with some areas of dark scales. *Legs.* As for female but erect scales of base of hind tibia expanded to include the dorsal side as well; fore and mid claws unequal, enlarged major claw with a blunt median tooth, minor claw entire, hind claws as in female. *Abdomen.* Scaling of abdominal terga variable, usually with segments I-II white scaled, III-V white scaled with a median dark area, VI-VIII dorsoventrally flattened, much wider than V or VIII and dark scaled with variable areas of white or cream colored scales, VIII generally dark at base, light at apex with apical scales erect. *Terminalia.* (Figure 3 C-E) As described under generic characteristics (p.3)

PUPA. (Figure 3 A-B) Integument slightly infuscated with the trumpets and a spot just anterior to the insertion of the apical paddle hair the darkest. Most body hairs minutely plumose.¹ *Cephalothorax.* Trumpets dark, striate on basal 0.33; hairs 1-6-C multiple, 7-C single or forked, 8-C multiple, 9-C single or forked, 10-C multiple, 11-C single or multiple at tip, 12-C with short stalk then multiple. *Abdomen.* Hair 1-I a multibranching tuft, 2-I single or multiple at tip, 3-I 2 or 3 branched, 4-I with stalk and multibranching tip, 5-I small, multiple, 6-I 6-8 branched, 7-I elongate, longer than 6-I, single, 9-I single; hair 1-II-VII multiple, 2-II-VII single, spine-like, 5-IV-VII multiple with a median branch elongate, 6-II-V similar to 1-II-V, 9-II-VI single, spine-like and sclerotized, bifid on VII and trifid on VIII. *Paddle.* Paddle pear-shaped, notched at insertion of apical hair, with an infuscated patch anterior of the notch, apical hair long, single, and minutely barbed.

LARVA. (Figure 4) *Head.* Antenna elongate, inflated, and twisted near base to curve mesially, 1-A beyond middle and at lateral margin, of several plumose branches, 2-4-A at distal end, elongate with plumose branches longer than those of 1-A, 5, 6-A short and spine-like, placed on a fleshy pedestal, antennal surface pubescent with a mesal, distal patch of longer hairs; head hair 1-C spine-like, heavily sclerotized and placed on a short tubercle at the side of the labrum; 3-C small, single, 4-C multiple, branches not plumose, 5, 6, 7-C multiple and plumose, 5, 7-C long, equal in length, 6-C shorter, 8-C usually single with tip multiple, 11-C 3-5 branched, 12-C 1-3 branched, 13-C single, 14-C small, multiple, 15-C single, bifid, or trifid at middle; maxillary spine elongate, heavily sclerotized, margins not barbed (Figure 3 F). *Thorax.* 4, 5, 6-P, 9, 10-M, and 9, 10-T very long, 3, 8-P, 1-M, 1, 5-T multiple with their branch tips slightly fimbriated. *Abdomen.* Hair 6-I-VI long, plumose, of 2 or more branches, 1, 2, 5-I-VI and 9, 13-II-VI multiple with fimbriated tips; segment VIII with comb teeth 9-15 on a slightly sclerotized patch, each tooth with a serrate membranous margin; siphon without pecten, uniformly pubescent, 1-S beyond middle, multiple, plumose, 2-S single, at dorsal apical 0.80, 8-S 4 branched, valves with a pair of sclerotized hooks; saddle complete, anal brush with pectinate branches, dorsal, apical region with spines, some of which are erect, flattened, and unilaterally margined, the base of each erect spine with a smaller basal branch, 1-IX 3 branched, anal papillae short.

TYPE DATA. Lectotype ♀ (selected by Stone & Knight 1957: 196) plus 2 ♀♀ and 4 ♂♂ syntypes from Samal, *Bataan*, PHILIPPINES, 31 Jan - 4 Feb -07 (Thru Miss Ludlow). U.S. National Museum #12627.

DISTRIBUTION. This is the most wide spread species in the genus. Specimens have been noted from as far north as Northern Thailand to as far

¹Note. The minute branches of many of the body hairs in both the larva and pupa have been over-accentuated in order to show properly on the illustrations. Normally, these branches are much thinner and usually not as heavily sclerotized as the main branch.

south as East-Central Australia. Besides the localities listed below, Brug & Bonne-Wepster (1947: 184) included INDONESIA, *Sumatra, Kalimantan, Billiton, Boeton*; SINGAPORE; and CEYLON. Material examined: 50 ♂♂, 64 ♀♀, 152 larvae, 29 larval skins, 14 pupae, 23 pupal skins as follows: THAILAND, *Prachin Buri*, Ban Kut Nao, 8 ♂♂, 7 ♀♀, with associated skins, 9 larvae; *Prachaub Khiri Khan*, Ko Glang Nam Rom, 1 ♂, 1 larval skin, 21-II-64; *Chiang Mai*, Chiangmai, 1 ♂, Thurman; *Tak*, Ban Tah Pui, 1 larva, 20-VII-52, Thurman; *Tak*, Sam Ngao, 1 larval skin, 20-VII-52, Thurman; *Chiang Rai*, Muang, 1 ♂; *Nan*, Nan, 1 larva, 14-II-53, Thurman; South Siam, 1 ♂, -VIII-33, Causey. CAMBODIA, *Kandal* (Phnom-Penh), Chrui Changvar, 1 ♂, 1 ♀, 10-V-67; 26-IV-67; *Sihanoukville*, Banin Pare (?), 1 ♂, 1 ♀, 26-IV-67. SOUTH VIETNAM, Pleiku, Pleiku, 1 ♂, 7 ♀♀, 20-IX-66, 2-X-66, 4-X-66, 14-X-66, 15-X-66, 29-XI-64; *Southern Vietnam*, Cam Ranh Bay, 1 ♀, 2-VI-66; *Binh Dinh*, Qui Nhon, 2 ♂♂, 2 ♀♀, 10-VI-66, 17-VI-66, 25-VI-66, 28-VI-66; *Binh Dinh*, Phu Tai, 2 ♂♂, 3 ♀♀, 4 larvae, rock pool, 20-VII-66, 29-VII-66; *Vinh Long*, Vinh Long, 1 ♂; *Kien Glang* (?), Van Hon, 6-XII-63; Tan Thanh, 30 larvae, rock pool, 20-I-67, Palmer. ANDAMAN ISLANDS, Haddo, 1 ♀, at light, 6-IV-11, C. Paiua. WEST MALAYSIA, *Selangor*, Kuala Lumpur, 5 larval skins, 1-VI-56, Gould; *Trengganu*, Dungum, 3 larvae. EAST MALAYSIA, *Sarawak*, Kuching, 1 ♂, 1 ♀. INDONESIA, *Java*, Batavia, 1 ♀, 1-II-16, Stanton; *Java*, Djakarta, 1 ♂, 16-II-56, Wijono; *Morotai*, 3 larvae, -IX-44, Darlington; *West Irian*, Hollandia, 1 ♀, at light, 31-I-45, King & Hoogstraal. NEW GUINEA, Los Negros, 1 larva, 20-V-44, Ruebush; Koerik, 1 ♂, 2 ♀♀. BRITISH SOLOMON ISLANDS, *Bougainville*, Augusta Bay, 1 ♂, 1 larva, 1944, Gurney; same data, 14 larvae, 2 larval skins, 3 pupae, 17-III-44, Gurney; Guadalcanal, 1 ♂, with associated skins, Belkin, *Kolombangara*, 1 ♂, 1 ♀, 2 larvae, -XI-43, -X-44, Franclemont; Solomon Islands, 1 ♂, -III-44, Gurney. AUSTRALIA, *Queensland*, Mitchell River Station, Magnificent Creek, 10 ♂♂, 13 ♀♀, 10 larvae, Oct-Nov-1963, Standfast & Barrow; Mareeba, 1 ♂, with associated skins, 21-VI-46, Flecher; Horn Island, 1 larva, 1 pupal skin, 15-VIII-52, Mackerras & Marks. FIJI ISLANDS, Fiji, 2 larvae, 11-X-43, Nadi. MARIANA ISLANDS, *Guam*, Sumay, 1 ♂, Oakley. CAROLINE ISLANDS, *Yap*, 1 ♀, 5 larvae, -VII-50, R. J. Goss; same data 34 larvae, 9 pupae, 14-II-46, Frey; Rockhampton, 1 ♀, 4-IV-57, Stoney; Caroline Islands, 1 larva, Frey. PHILIPPINES, *Bataan*, Samal, 1 ♂, 31-I-07 to 4-II-07, *syntype*; *Mindoro*, San Jose, 1 ♂, 4 larvae, 2 larval skins, 3 pupal skins, 10, 11-I-45, E. S. Ross; Caminawit Pt., 1 ♀, 2 larvae, 1 larval skin, 30-XII-49, Penn; *Mindanao*, Parang, 1 ♀; Cotabato, 1 ♂, at light, 15-VIII-58, R. E. Milliron; Lanao, Dansalan, 1 ♂, 15-V-31, King; Bukidnon, Cmp. del Monte, 1 ♂, 30-III-31, King; *Leyte*, Tacloban, 1 ♂, with pupal skin, 13-II-45, Roberts; Lagolago, Baybay, 2 ♀♀, 1 pupal skin, 13-II-45, Roberts; *Luzon*, Olongapo, 6 ♀♀, 1945, Rozeboom, Knight & Laffoon; La Union, Agoon River, 2 ♂♂, 1 ♀, 10 larvae, -VII-45, Franclemont; Rizal, Paranaque, 1 ♂, 24-XII-30, King; Albay, Camp Daraga, 1 ♂; Pangasinan, Manaoag, 13 larvae, 22-I-45, Bray; San Fabian, 1 ♂, 13-III-45, Gurney; Batangas, 2 ♀♀, -VIII-45; *Palawan*, Iwahig, 2 larval skins, 2 pupal skins, 28-V-45; Philippines, no data, 6 ♀♀.

DISCUSSION. This species is the most variable in size and coloration of the genus *Aedeomyia*. Although males tend to be smaller and lighter colored than the females, this does not always hold true. The leg banding of the adults is similar to *squamipennis* and *africana* (Figure 5 C, E) but the characters given in the key to the adults as well as the distinct ranges of the three species will easily separate them. The pupae differ on the number of branches of abdominal hair 9 as well as the moderate length of the median branch of abdominal hair 5-IV-VI. The larvae are separable on the slightly fimbriated body hairs.

AEDEOMYIA (AEDEOMYIA) VENUSTIPES (SKUSE)

(Figures 2, 5 A-E, 6 B)

- Aedes venustipes* Skuse 1889, Proc. Linn. Soc. N.S.W. 3(2): 1761 (♀*).
- Aedes (Aedeomyia?) venustipes* Skuse, Theobald 1901c, Mon. Cul. II: 223.
- Aedomyia venustipes* Skuse, Giles 1902, Handbook, 2nd. ed., p. 479;
- Mackerras 1937, Proc. Linn. Soc. N.S.W. 62: 259.
- Aedomyia venustipes* (Skuse), Douglas 1961, Proc. Linn. Soc. N.S.W. 86(3): 262 (♂*, ♀, P*, L*).
- Aedomyia venustipes* Skuse, Edwards 1932, in Gen. Insect., Fasc. 194: 122;
- Lee 1944, Atlas Mosq. Larva Aust. Reg. p. 45.
- Aedeomyia venustipes* Skuse, Dobrotworsky 1965, The Mosq. of Victoria, p. 68 (♂*, ♀*, L*).
- Aedeomyia venustipes* (Skuse), Taylor 1916 (*in part*), Proc. Linn. Soc. N.S.W. 41: 573.

FEMALE. (Figure 2) *Head.* Antenna shorter than proboscis, torus with white scales over most of its surface, dense mesally, flagellomere I slightly inflated with small dark and white scales over most of its surface, remaining flagellomeres sub-equal in length with XIII longer, most flagellomeres with elongate hairs dorsally, lacking or fewer ventrally; clypeus inflated and with a dorsal patch of white scales; palpus as in *catasticta*; proboscis with white band at basal 0.25 usually incomplete ventrally; labellum dark; orbital bristles large, dark; erect scales of vertex mostly cream-colored becoming darker both laterally and basally with some scattered white scales on sides. *Thorax.* Bristles of scutum moderate in length, recurved; scales decumbent except for some dark erect scales at prealar region, pattern variable but usually with a median yellow scale line from front margin caudal to prescutellar region where it expands, region in middle of expanded area with some dark scales, yellow band margined with lighter scales, rest of scutum dark and light scaled without a definitive pattern; scutellum light scaled with lobes dark scaled; pleuron with bristles similar to *catasticta* although the upper sternopleural and prealar patches are usually connected. *Wing.* Scales and scale pattern are similar to *catasticta*. *Halter.* Stem pale scaled with the knob dark. *Legs.* Similar to *catasticta* but differ as follows: erect scales in tuft at base of hind tibia usually small and sometimes absent, hind tarsomere III all white with V all black; claws as in *catasticta*. *Abdomen.* Mostly dark scaled, terga I with many white scales, terga II-IV dark or dark with some lateral white scales, V-VII similar but white scales more numerous, VIII with erect dark, white and yellow scales.

MALE. *Head.* Antenna shorter than proboscis, whorls of hairs as in *catasticta*; palpus slightly shorter than females, white scaled at tip; proboscis somewhat longer but with general scale pattern of female, white ring at 0.25 enlarged and ill-defined. *Thorax.* As for female but general color pattern lighter. *Legs.* Mesal, basal portion of femora with many white scales, mid tibia with some erect scales at base, hind tibia with a tuft of broad, erect scales; claws as in *catasticta*. *Terminalia.* As described for the genus, no definitive characters of specific value found.

PUPA. (Figure 5 A-B) Integumental infuscations as in *catasticta*, body hairs not minutely plumose. *Cephalothorax.* Trumpets wide, slightly elongate, hairs 8, 10-C multiple. *Abdomen.* Most body hairs as described for *catasticta*, 7-I short, not longer than 6-I, 9-I single or bifid, 9-II single, 9-III-VI bifid at tip, 9-VII trifid at tip, 9-VIII with many branches. *Paddle.* Paddle with apical hair without small barbs.

LARVA. (Figure 5 C-E) *Head.* Similar to *catasticta* but differs in having hair 6-C equal in length to 5, 7-C, maxillary spine elongate, heavily sclerotized and with small barbs mainly on the basal half (Figure 5 C). *Abdomen.* Hairs 1, 2, 5, 9, 13-I-IV vaguely plumose if at all, the apices of

branches simple, not fimbriated; comb scales over 19, membraneous margin not serrate.

TYPE DATA. Holotype ♀, Elizabeth Bay, near Sydney, *New South Wales*, AUSTRALIA, 1886 (Skuse), Macleay Museum of Natural History, Sydney. Allotype ♂, 3 morphotype larvae and 3 morphotype pupae (designated by Douglas 1961: 262) from Woodside, *Victoria* (Douglas), National Museum of Victoria, Melbourne.

DISTRIBUTION. This species is restricted to the extreme south-east section of Australia (see Map). Material examined: 4♂♂, 4♀♀, 6 larvae, 1 larval skin and 2 pupal skins as follows: AUSTRALIA, *Victoria*, Woodside, 3♂♂, 4♀♀, 5 larvae, 1 larval skin, 2 pupal skins, 3-2-53, 8-1-53, 23-12-52, 8-12-55, G. W. Douglas; Yarram, Gippsland, 1♂, 9-3-55, reared, T. Pearce; Gifford Bolands, 1 larva, 30-4-53, G. W. Douglas. Other localities given in the literature include National Park, *New South Wales* (Mackerras 1937: 261); Melbourne, Bairnsdale, Box Ridge, Darriman, Giffard, Won Wron, Ouyen, all of *Victoria* (Douglas 1961: 262).

DISCUSSION. This species and *catasticta* share several characteristics but can be easily separated on the scale pattern of the hind tarsomeres. The larvae differ in the number of comb teeth (9-15 in *catasticta*, 19-25 in *venustipes*); the length of head hair 6-C (equal to 5, 7-C in *venustipes*, shorter than 5, 7-C in *catasticta*); and the maxillary spine (simple in *catasticta*, barbed in *venustipes*). The pupae differ in the lack of plumose abdominal hairs, the non-barbed apical paddle hair, and the short abdominal hair 7-I.

The ranges of the two species are distinct but *catasticta* approaches the northern range of *venustipes*. The barrier involved in the separation of the two is unknown but the climate conditions of *Victoria* and *New South Wales* differ from the rest of the country. It is possible that *catasticta* is limited to the warmer regions of the North Coast.

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Distribution of *Aedeomyia catasticta* Knab (●), and *Aedeomyia venustipes* (Skuse) (○) in the Southeast Asia - Australasian Regions.

Fig.1

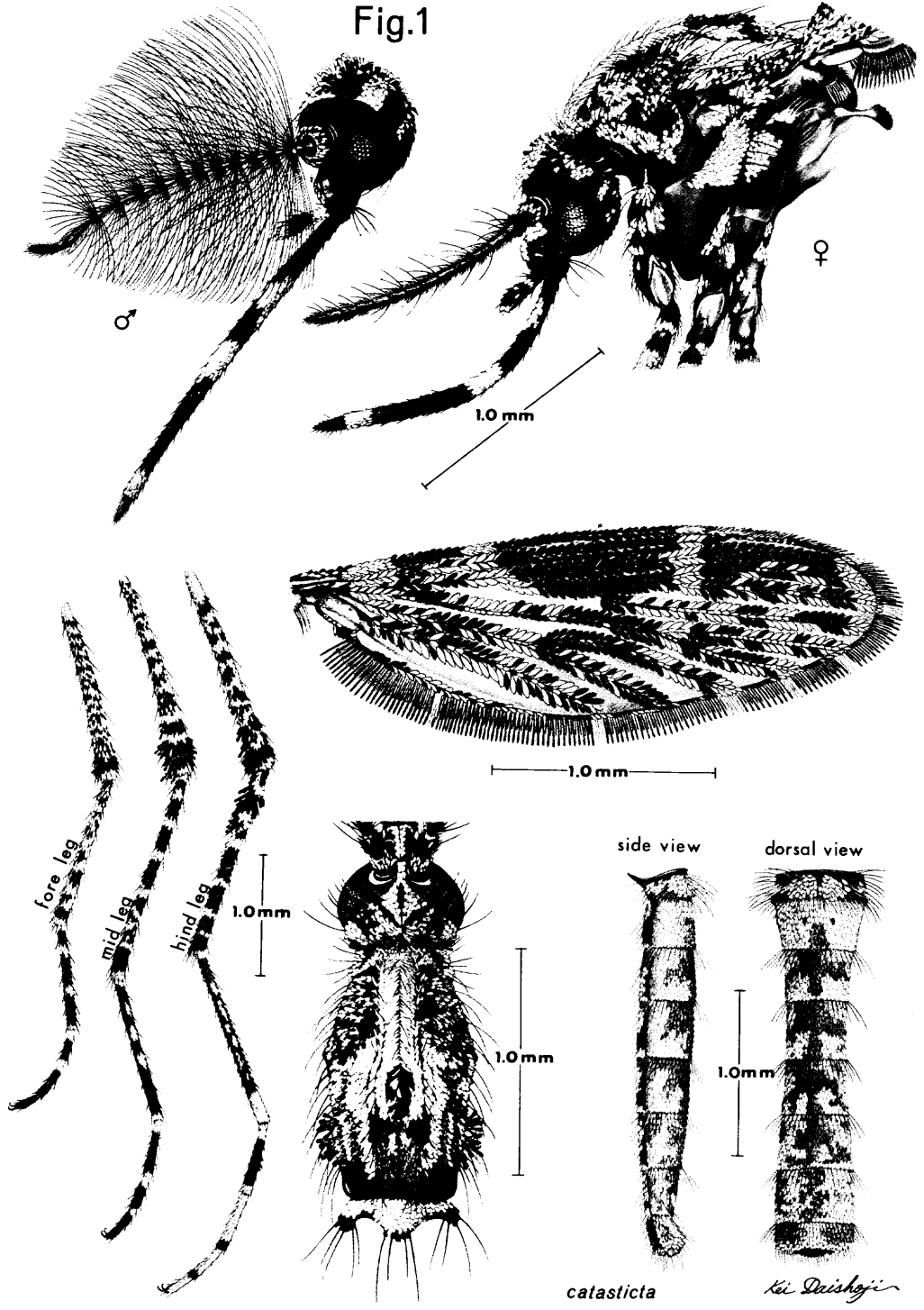


Fig. 2

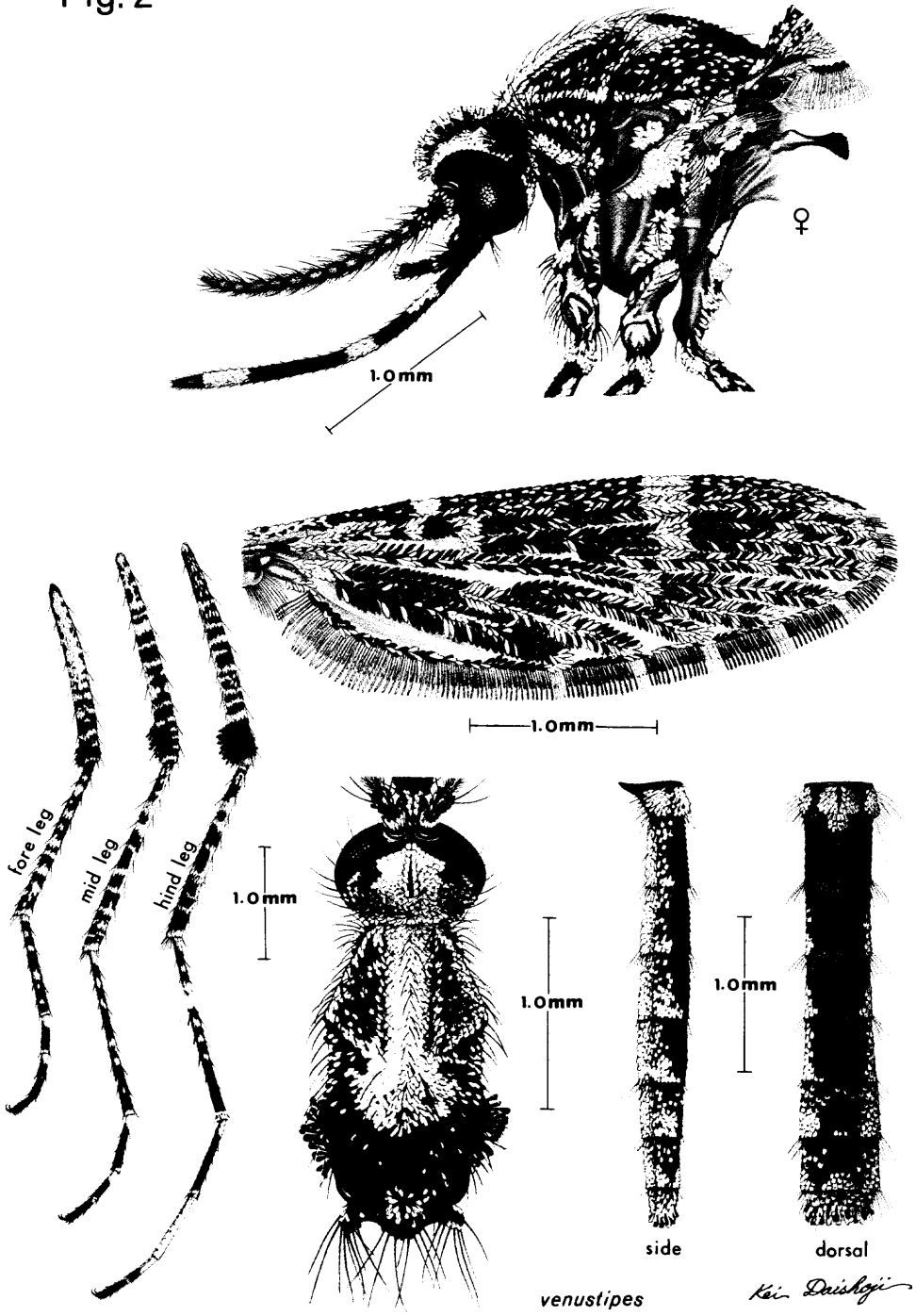
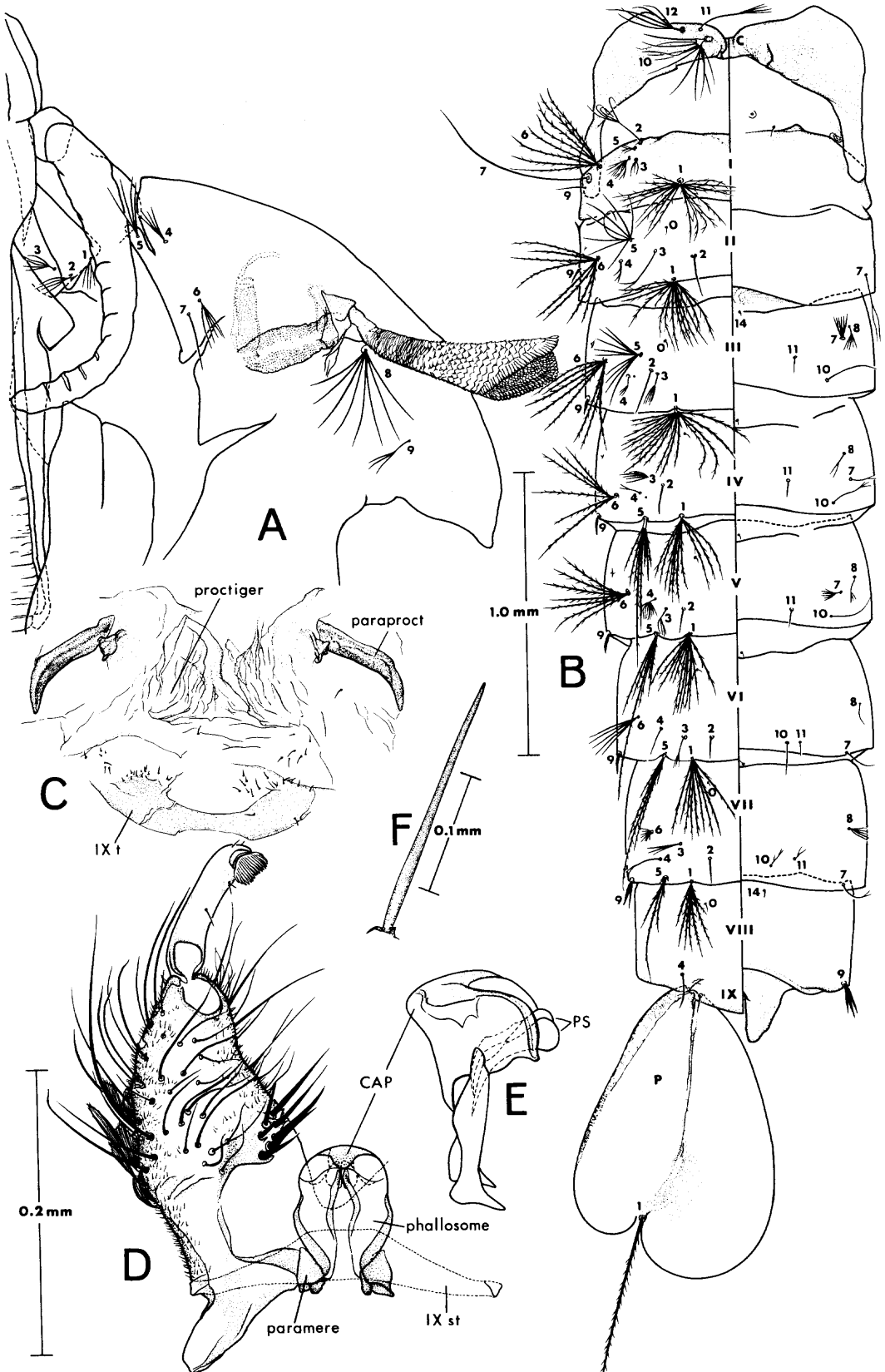


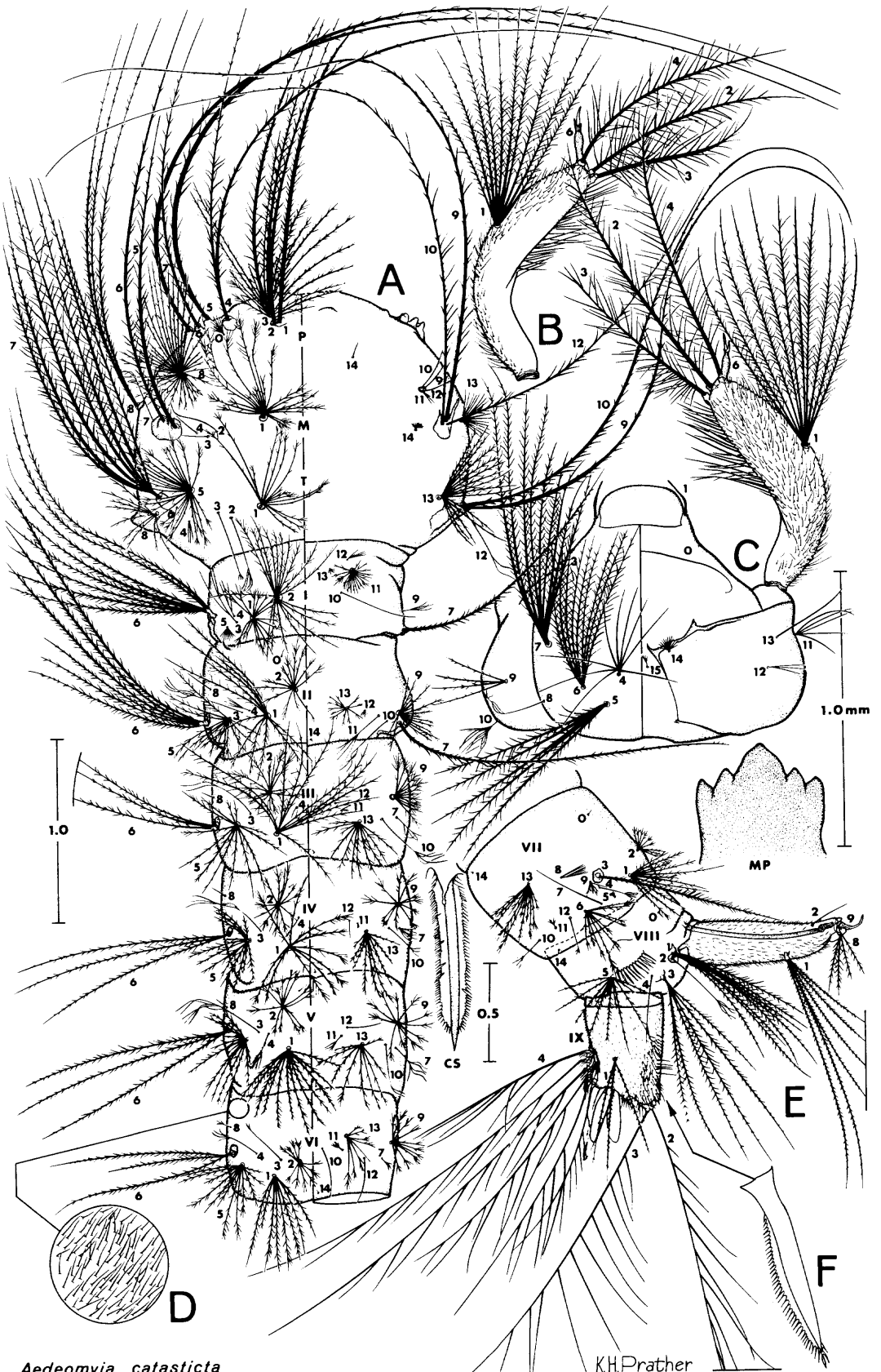
Fig.3



Aedeomyia catasticta

KH Prather

Fig.4



Aedeomyia catasticta

KH.Prather

Fig.5

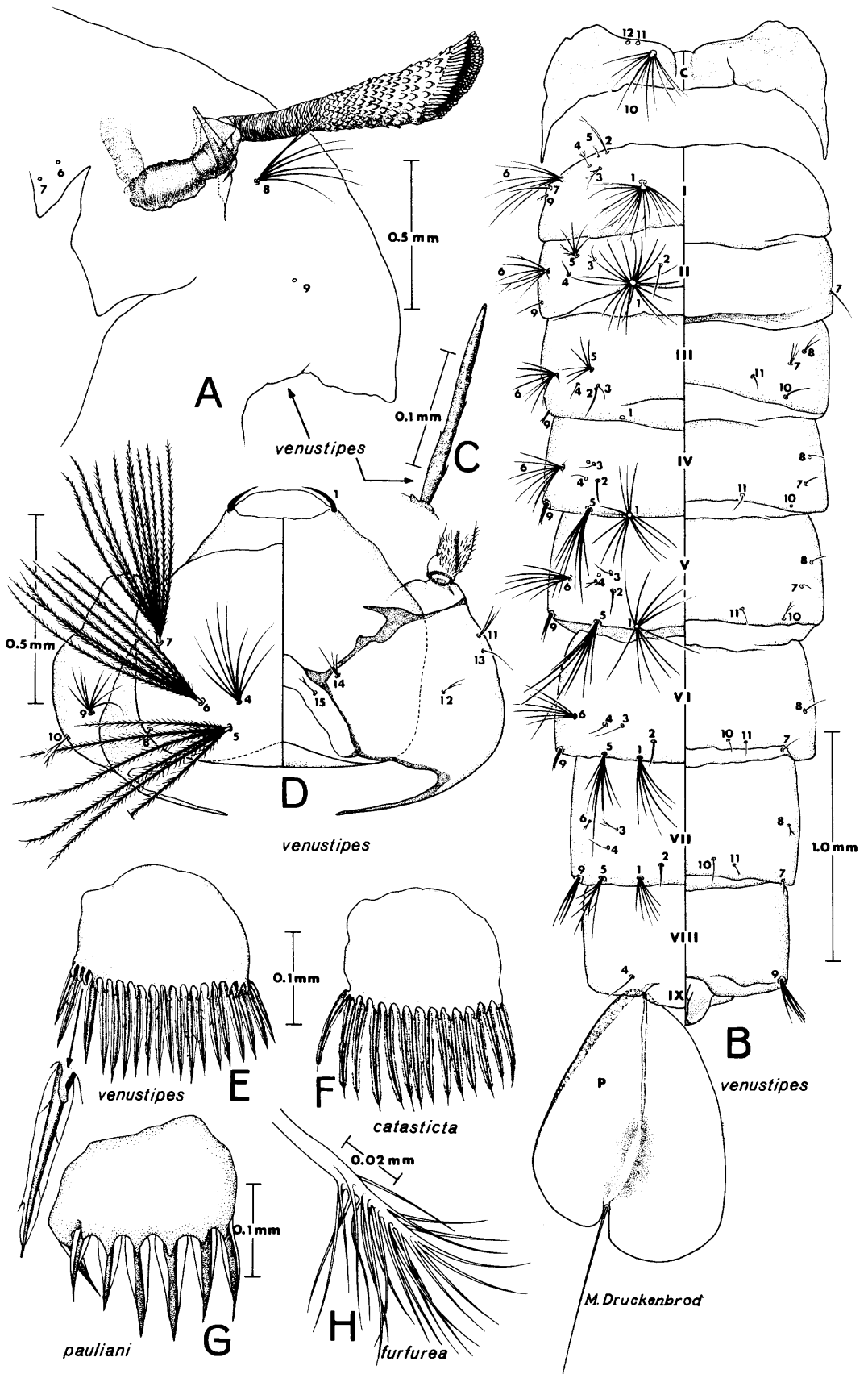


Fig. 6

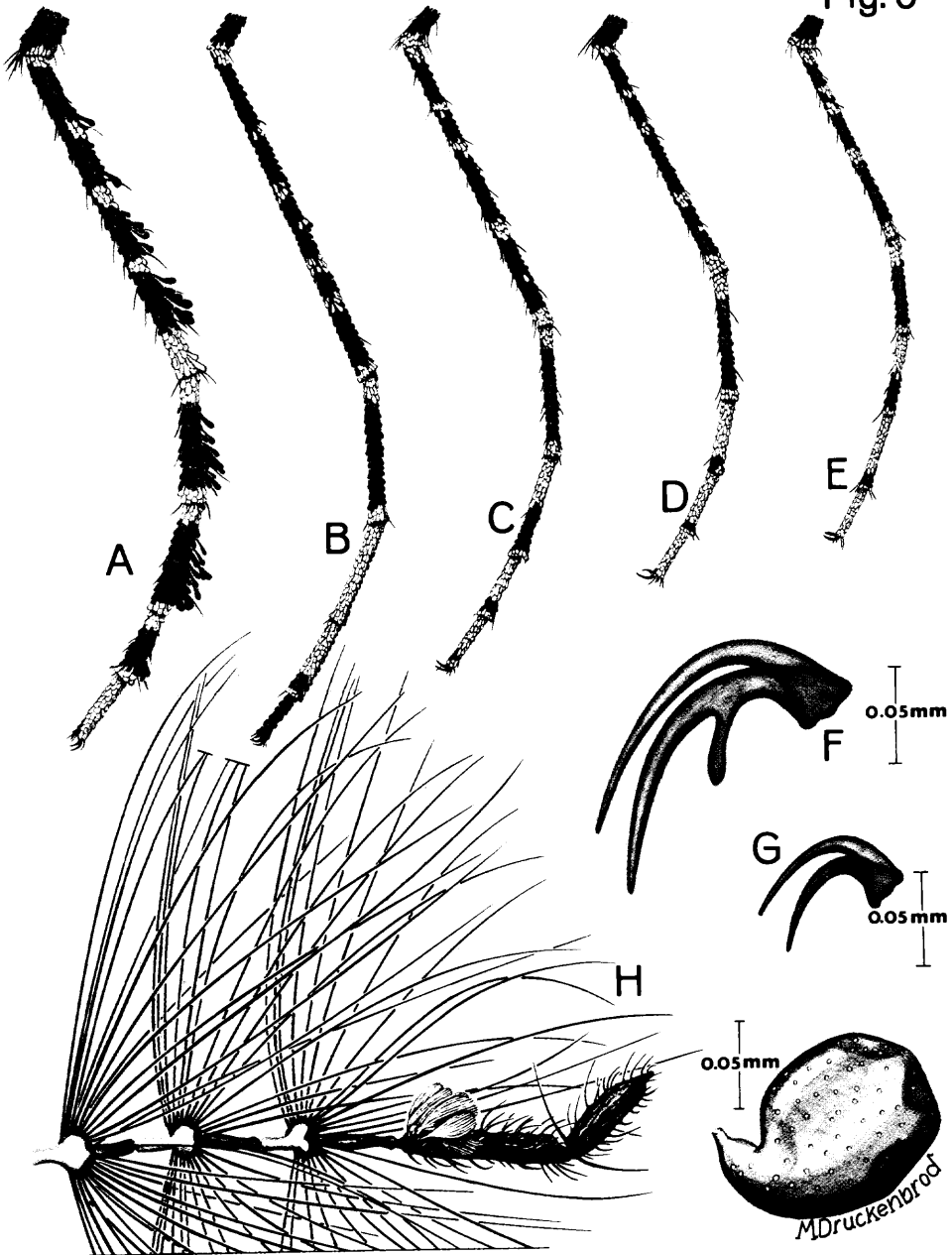


Figure.6 *Aedeomyia (L.) fufurea*, A, ♀ hind tarsus; F, ♂ fore tarsal claw; H, apical flagellomeres of ♂ antenna. *Aedeo.(A.) venustipes*, B, ♀ hind tarsus. *Aedeo.(A.) squamipennis*, C, ♀ hind tarsus. *Aedeo.(A.) catasticta*, D, ♀ hind tarsus; G, ♀ hind tarsal claw; I, spermatheca. *Aedeo.(A.) africana*, E, ♀ hind tarsus

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