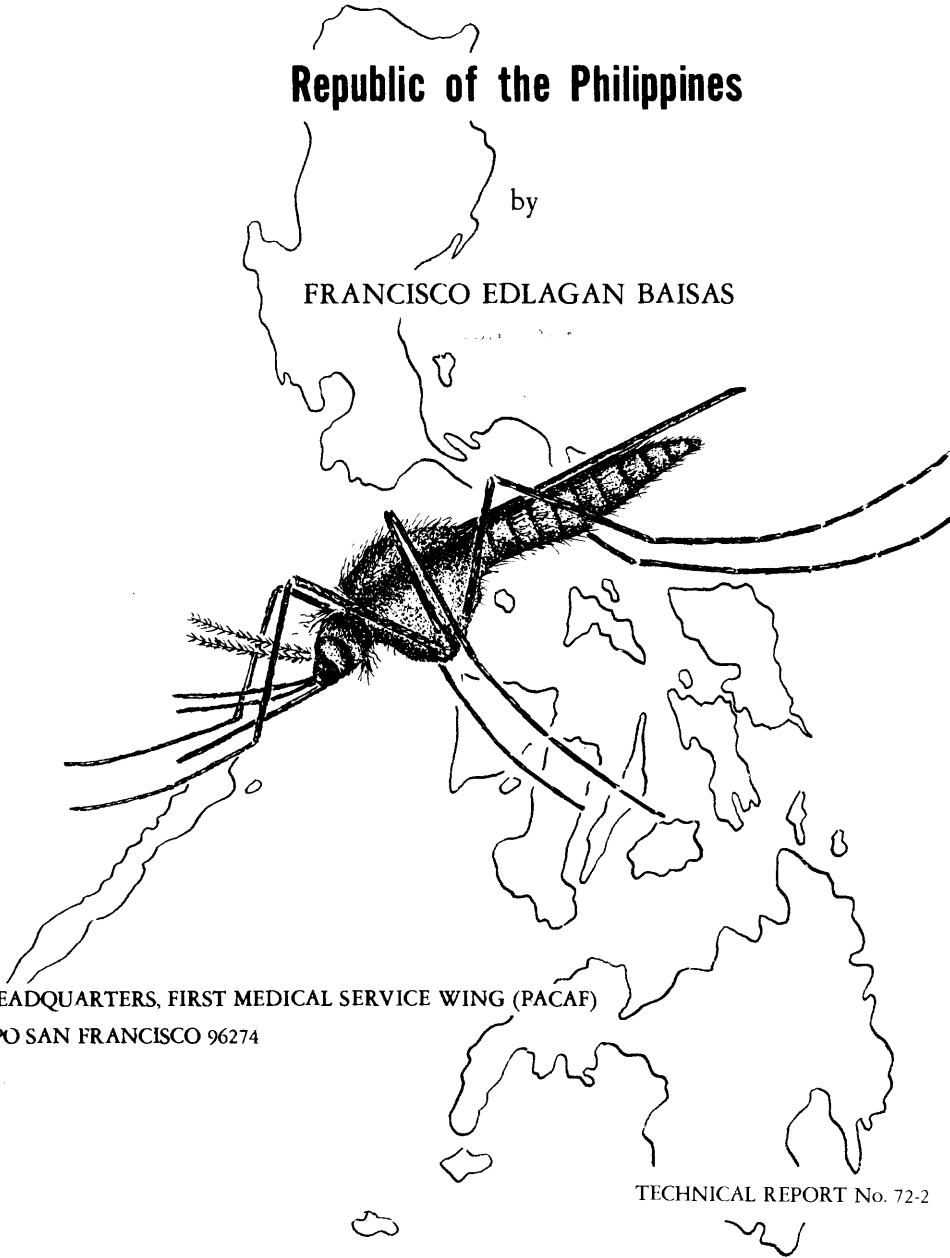


THE MOSQUITO FAUNA OF SUBIC BAY NAVAL RESERVATION

Republic of the Philippines

by

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INTRODUCTION

The mosquito fauna in the U. S. Naval Reservation at Subic, Zambales Province, Luzon Island, consists of sylvan and non-sylvan species. This is due to the preservation inside the Base of strips of forests in the original state wherein the species of mosquitoes suited to that environment exist, while the clearing of parts of the forests for housing and other purposes has introduced those species which breed in waters more or less polluted by man and which feed on man and his domestic animals.

Ten months collecting during the height of the mosquito breeding season were not sufficient to get all the stages of the rare species. In consequence we are presenting in the following pages only the materials we obtained. Those who may need complete information about the different species and subspecies found in Subic Naval Reservation may consult the excellent volume on The Culicine Mosquitoes of the Philippines by Delfinado, 1966, or other equally valuable papers (The genus Culex in Thailand by Bram, 1967; and the series of papers, The Culicine Mosquitoes of the Indomalayan Area, Parts I-VI recently published by Mattingly, 1957 to 1961). Mattingly's works on Genus Ficalbia and Genus Heizmannia, are of special interest since these genera are represented by some very rare species in Subic Naval Reservation. It is apparent from our experience that more time should be spent in collecting the different stages of the rare species.

Ninety one (91) species and subspecies were found. Two subspecies are considered new. The first, an anopheline, is proposed to be named Anopheles ludlowae ssp. cabrerae and the second, Culex (Lophoceraomyia) uniformis ssp. mercedesae. However, a consultation with Dr. Botha de Meillon, Responsible Investigator of the Southeast Asia Mosquito Project, brought the opinion from Dr. Sunthorn Sinivanakarn, their specialist in Culex, that mercedesae is similar to Culex (Lophoceraomyia) kuhnsi King and Hoogstraal 1955. Following the suggestion of Dr. de Meillon, the specimens of mercedesae were sent to the USNM for their study and final opinion.

Another proposal made in this paper is to sink Armigeres joloensis (Ludlow) 1904 as a synonym of Armigeres subalbatus (Coquillett) 1898. We find no difference in the third and fourth-instar larvae, pupae and adults of these two forms.

The different species and subspecies are described, discussed and illustrated alphabetically according to the following list.

GENUS AEADES

1. Aedes (Aedimorphus) vexans nocturnus Theobald 1903.
2. " (Finlaya) flavipennis (Giles) 1904.
3. " " harperi Knight 1948.
4. " " luzonensis Rozeboom 1946.
5. " " melanopterus (Giles) 1904.
6. " " niveus (Ludlow) 1903.
7. " " poecilus (Theobald) 1903.
8. " (Neomelaniconion) lineatopennis (Ludlow) 1905.
9. " (Ochlerotatus) vigilax ludlowae (Blanchard) 1905.
10. " (Rhinoskusea) longirostris (Leicester) 1908.
11. " (Skusea) fumidus Edwards 1928.
12. " (Stegomyia) aegypti (Linnaeus) 1762.
13. " " albopictus (Skuse) 1894.
14. " " boharti Knight & Rozeboom 1946.
15. " " desmotes (Giles) 1904.
16. " " gardnerii (Ludlow) 1905.

GENUS AEDEOMYIA

17. Aedeomyia catasticta Knab 1909.

GENUS ANOPHELES

18. Anopheles (Anopheles) aitkenii James 1903.
 19. " " baezai Gater 1933.
 20. " " bengalensis Puri 1930.
 21. " " fragilis (Theobald) 1903.
 22. " " franciscoi Reid 1962.
 23. " " lesteri Baisas & Hu 1936.
 24. " " manalangi Mendoza 1940.
 25. " " peditaeniatus (Leicester) 1908.
 26. " " pseudobarbistrotris Ludlow 1902.
 27. " " vanus Walker 1860.
 28. " (Cellia) annularis Vander Wulp 1884.
 29. " " filipinae Manalang 1930.
 30. " " flavirostris (Ludlow) 1914.
 31. " " indefinitus (Ludlow) 1904.
 32. " " litoralis King 1932.
 33. " " ludlowae (Theobald) 1903.
 34. " " ludlowae ssp. cabrerai, new ssp.
 35. " " maculatus Theobald 1901.
 36. " " mangyanus (Banks) 1906.
 37. " " philippinensis Ludlow 1902.
 38. " " tessellatus Theobald 1901.
 39. " " vagus ssp. limosus King 1932.

GENUS ARMIGERES

40. Armigeres (Armigeres) baisasi Stone & Thurman 1958.
 41. " " malayi (Theobald) 1901.
 42. " " manalangi Baisas 1935.
 43. " " subalbatus (Coquillett) 1898.
 44. " (Leicesteria) digitatus (Edwards) 1914.
 45. " " magnus (Theobald) 1908.
 46. " (Leicesteromyia) flavus (Leicester) 1908.

GENUS CULEX

47. Culex (Culex) annulus (Theobald) 1901.
 48. " " annulirostris Skuse 1889.
 49. " " bitaeniorhynchus Giles 1901.
 50. " " fuscocephala (Theobald) 1907.

51. Culex (Culex) gelidus Theobald 1901.
 52. " " incognitus Baisas 1938.
 53. " " pipiens quinquefasciatus Say 1823.
 54. " " pseudovishnui Colless 1957.
 55. " " sitiens Wiedemann 1828.
 56. " " tritaeniorhynchus ssp. summorosus Dyar 1920.
 57. " " whitmorei Giles 1904.
 58. " (Culicomyia) nigropunctatus Edwards 1926.
 59. " (Lophoceraomyia) infantulus Edwards 1926.
 60. " " lavatae Stone & Bohart 1944.
 61. " " mammilifer Leicester 1908.
 62. " " minor Leicester 1908.
 63. " " reidi Colless 1965.
 64. " " rubithoracis Leicester 1908.
 65. " " uniformis ssp. mercedesae new ssp.
 66. " (Lutzia) fuscus Wiedemann 1820.
 67. " " halifaxii Theobald 1903.
 68. " (Mochthogenes) laureli Baisas 1935.
 69. " (Neoculex) brevipalpis Giles 1902.

GENUS FICALBIA

70. Ficalbia (Etorlepticomyia) luzonensis (Ludlow) 1905.

GENUS HEIZMANNIA

71. Heizmannia scintillans Ludlow 1905.

GENUS HODGESIA

72. Hodgesia malayi Leicester 1908.

GENUS MALAYA

73. Malaya genurostris Leicester 1908.

GENUS MANSONIA

74. Mansonia (Coquillettidia) crassipes (Van der Wulp) 1881.
 75. " " ochracea Theobald 1903.
 76. " (Mansonioides) annulifera (Theobald) 1901.
 77. " " uniformis (Theobald) 1901.

GENUS ORTHOPODOMYIA

78. Orthopodomyia anopheloides (Giles) 1903.

GENUS TOPOMYIA

79. Topomyia barbus Baisas 1946.
80. " pseudobarbus Baisas 1946.

GENUS TOXORHYNCHITES

81. Toxorhynchites (Toxorhynchites) minimus (Theobald) 1905.
82. " " splendens (Wiedemann) 1819.

GENUS TRIPTEROIDES

83. Tripteroïdes (Tripteroïdes) dyari Bohart & Farner 1944.
84. " " monetifer (Dyar) 1920.
85. " " powelli powelli (Ludlow) 1909.

GENUS URANOÏAENIA

86. Uranotaenia annandalei Barraud 1926.
87. " arguellesi Baisas 1935.
88. " lagunensis Baisas 1935.
89. " lateralis Ludlow 1905.
90. " mendiolai Baisas 1935.
91. " testacea Theobald 1905.

DESCRIPTION

(1)

Aedes (Aedimorphus) vexans nocturnus Theobald 1903. Figure 1.

Mon. Cul. 3:159.

1913. Aedes nocturnus niger Theobald, in Sarasin and Rouf.

Nova Caledonia 1:164.

Eggs: Not studied.

Larvae: First and second-instars: not studied.

Third and fourth-instars: medium-sized, dull colored, without macroscopically visible diagnostic characters.

Head: broader than long. Antenna fairly long, somewhat tapering to tip, spiculed; antennal tuft arises a little below the middle from tip, having some 10 long branches. Preclypeal spines thin, fairly long, single. Hair 4 tiny, branched; h-5 much longer, divided into 3 long frayed branches; h-6 longer, single; h-7 a thick tuft with some 10 long, frayed branches. Without any particular diagnostic character on thorax or on abdomen except on segment VIII; comb with half a dozen or more teeth arranged in a single row, each tooth with a long main central point, and few coarse serrations on either side at base. Hairs 1, 3 & 5 are tufts of moderate sizes, each having some 10 or more frayed, long branches; Nos. 2 & 4 similar to each other, about as long as the tuft hairs, either one divided into two branches

medially. Segment X largely covered by saddle, without spicules. Isc developed, divided near base into 5 or more equally long branches, osc longer, single; lh much shorter, single. Ventral brush thick, many-branched. Anal papillae sharply lanceolate, the dorsal pair slightly longer than the ventral.

Pupa: Trumpet rather short, funnel-shaped, not well reticulated. Metanotal hairs: 10 the shortest of the group, fairly long, slender, 2-branched medially; 11 the longest of the three, single; 12 shorter with half a dozen equally long branches. Without any particular diagnostic characters on abdomen; hair 9 of VIII a medium-sized tuft with several long, frayed branches. Paddle long and broad with a few tiny serrations along half of outer margin. Paddle hair short, single.

Adults: Male and female: above medium size. It is possible to identify vexans nocturnus with the naked eye due to the brownish speckled covering of body and legs. When the female is full-blooded, its abdomen tapers sharply to tip. Under low magnification the proboscis has a visible but variable pale band-like area at the middle. Legs speckled. Tarsomeres with narrow pale rings. Wings dark-scaled. Tip of male clasper enlarged, clavate, the subapical branch or division bearing a strong simple process.

Breeding habits: Breeds in fresh water pools, streams, vegetated sides of lakes, and impounded water.

Biting habits: Primarily zoophilic.

Distribution: Throughout the Philippines, Indonesia, New Guinea, Australia, Fiji, Caledonia.

(2)

Aedes (Finlaya) flavipennis Giles 1904. Figures 2 & 3.

1904. Finlaya flavipennis Giles. Jour. Trop. Med. 7:366.

1906. Finlaya arantana Banks. Phil. Jour. Sci. 1:1001.

1917. Aedes (Ochlerotatus) flavipennis Giles. Edwards, Bul.
Ent. Res. 7:211.

1922. Aedes (Finlaya) flavipennis Giles. Edwards, Ind. Jour.
Med. Res. 10:465.

1925. Finlaya arantana Banks. Dyar and Shannon, Ins. Insc.
Mens. 13:75.

1944. Aedes (Finlaya) arantanus (Banks). Stone & Bohart,
Proc. Ent. Soc. Wash. 46:207.

Eggs: Unknown.

Larvae: First and second-instars: not studied but may be recognized by dark siphon. Third and fourth-instars: a few larvae were collected from Subic Naval Reservation, none of which reached the adult stage. Principal character easily seen with the naked eye: dark siphon in sharp contrast with the rest of the body which is very pale.

Head: broader than long (flat preparation). Antenna short, not spiculed, its single, weak shaft hair arises above middle from base. Preclypeal spines moderately thick and short. H-4 weak, branched into four or five; 5 longer and thicker, usually two-branched; 6 far behind, single, with a few lateral frayings; 7 shorter with two to half a dozen branches. Thorax: without long spines arising from meso- or meta-pleural tubercle. Abdomen: stellate tufts fairly strong,

each with five to twelve branches, the largest branches somewhat expanded at apices which end in usually two or three short points. Segment VIII: comb in a subtriangular patch, each tooth or scale rounded at tip, having fine frayings at apex and on either side. Siphon hardly twice as long as broad (variable), dark, having half a dozen or more pecten teeth. Each tooth flattened, finely fringed along one side to tip. Anal segment short, not entirely enclosed by saddle. Isc and osc long, with long branches. Lh strong, divided into two frayed branches. Ventral tufts few, each with two to six long branches. Anal papillae long and broad, the dorsal pair longer than the ventral.

Pupa: Not available for description.

Adults: Male and female: a very highly marked species, mostly yellowish. Female proboscis long, somewhat curved upwardly, mostly yellow-scaled with dark scales scattered sparsely on the apical 2/3, a larger dark patch at base ventrally. Palpus short, about 1/6 the length of proboscis, dark with numerous mixtures of pale scales, the apical 1/3 pale-scaled. Antenna pilose with dark scales on basal flagellomere. Head: dark with broad patch of white scales on either side bordering eyes. Numerous upright dark forked scales at nape and patches of pale scales on pleuron and coxae. Mostly dark scales and hairs on middle of mesonotum enclosed by narrow pale scales on either side. Scutellum dark-scaled on midlobe with mixture of broad white scales. Legs highly ornamented as illustrated. Tarsomeres liberally

pale-scaled. Wings mostly white-scaled with scattered dark scales and dark scale patches. Basal third to basal half of costa pale-yellowish scaled. Fringe spots present opposite tips of all veins except the 6th. Abdominal terga dark, with broad patches of pale-yellowish broad scales.

Breeding habits: Breeds in axils of various plants, especially abaca and bananas.

Biting habits: Mostly zoophilic.

Distribution: Philippines.

(3)

Aedes (Finlaya) harperi Knight 1948. Figure 4.

1948. Proc. Ent. Soc. Wash. 50:1-8.

Eggs: Not known.

Larvae: First and second-instars: not studied.

Third and fourth-instars: based on a single mounted skin with associated adult (a male). Head: pale; antenna smooth, relatively short, slightly thicker toward base than toward apex, its short 2-branched hair arises at about the middle of shaft. Preclypeal spines relatively weak and slender, single. Hair 4 missing; h-5 long, 2-branched; h-6 still longer, single. Hair 6 a strong tuft with 6-8 long pectinate branches. Hair 7 much weaker, with 2-3 smooth, long, slender branches. Thorax: some stellate hairs with 4-12 smooth slender branches. Pro-hair 1 fairly long and developed having 4 finely frayed branches; 2 shorter and more slender single; 3 a tuft of 8 finely frayed branches; 5-7 longer than pro-1, 5 the longest, split

into 2 equally long frayed branches; 6 shorter, single; 7 equal and similar to 5. Pro-pleural hair group: 9 a fairly large tuft with 8 subequal frayed branches; 10 longer, single, frayed; 11 the shortest and weakest of the group, single; 12 single, equally as long and thick as a branch of 10. Meso-pleural with a more prominent tubercle from which about a dozen spines arise; 9 long, having 3 long frayed branches; 10 longer, single; 11 tiny, 2-branched; 12 slightly shorter than 9, 2-branched. Meta-pleural with a smaller tubercle than that of the meso-pleural, having only one or two points or spines; 9 long, 2-branched; 10 single, longer; 11 represented apparently by hairless socket; 12 about 1/6 as long as 9 or 10, slender, single. Abdomen with many stellate hairs; lh or 6 of I & II, the longest and most prominent hair of the abdomen, each split equally near base into two sparsely frayed branches; 5-6 strong comb teeth in a single row, each with a strong point without apparent serrations or frayings at base. Siphon about twice as long as broad, relatively short, thick, with 3 very sharp well-separated pecten teeth on one side and 4 on other. Tuft of 3 short branches. Anal segment not completely enclosed by plate, serrated at posterior margin; lh single, moderately long; isc longer, 2-branched; osc missing. Ventral tuft about 6 pairs, long, 2-branched each. Anal papillae missing.

Pupa: Respiratory trumpet short and thin, reticulated, about twice as long as broad. Metanotal hairs 10 and 11, fairly long and single; 12 shorter, 2-branched; without prominent abdominal hairs; 9

weak and short on all segments; missing on VIII. Paddle longer than broad, broadly lanceolate with some serrations along the outer margin. Paddle hair weak, single, about 1/3 the length of paddle.

Adults: Based on one male with associated skins and half a dozen females caught in carabao-baited traps.

A well-marked mosquito which may be easily identified even when many mesonotal scales are rubbed off. Proboscis dark with a variable amount of pale scales on the mid-underside surface. Palpus of female about 1/4 as long as proboscis, dark. Head dark, covered by broad dark scales, with white scales bordering the eye margin. Torus bare. Mesonotum with a short median sharply rectangular patch of white scales, fairly broad on the anterior border, but narrowing considerably to the posterior tip ending at about the middle of the mesonotum. A broad patch of white scales on either lateral border of mesonotum visible dorsally. Apn with a small cluster of broad white scales; a similar but much larger patch covers the ppn. Other white patches on pleuron above fore coxa, a very much larger patch covering the upper and lower sterno-pleuron; a smaller one on upper mesepimeron. Mid-scutellar lobe with broad scales; the lateral lobes dark, bare toward base. A white patch on hind coxa; a much smaller (few broad white scales) patch on fore coxa. Wing dark. Legs dark except for the white parts and rings as illustrated. Abdominal terga dark with white lateral patches on VI & VII; VIII completely white scaled.

Total specimens collected from Subic Naval Base: 2 females

with associated skins, 1 male and half a dozen females from carabao-baited traps and 2 larvae.

Breeding habits: Breeds in bamboos.

Biting habits: Apparently zoophilous.

Distribution: Found only in Subic Bay area by Knight (1948) and author. Philippines.

(4)

Aedes (Finlaya) luzonensis Rozeboom 1946. Figures 5 & 6.

1949. J. Parasit. 32:587-595.

Eggs: Not known.

Larvae: First and second-instars: not studied.

Third and fourth-instars: head: antenna long, smooth, rather slender throughout its entire length. Antennal shaft hair fairly stout, usually single, arises a little above the middle of shaft from base. Preclypeal spine not long nor stout, single. Hair 3 at about midway of head between the anterior and posterior margins, weak, with 3 or more short branches; h-4 much longer, single; h-5 slightly shorter and thinner than h-4, single; hair 6 similar to but slightly thinner and more slender than 5; h-7 a small tuft of about 5 branches. Thoracic and abdominal setae not diagnostic specifically. h or h-6 of I & II strong, two-branched, barbed; but h-6 of the succeeding segments weak, single. Abdominal segment VIII: comb of about forty or more teeth arranged in a patch composed of irregular rows, each tooth expanded, rounded and fringed at apex. Siphon moderately long, of uniform thickness from base to slightly above the

middle; then tapering slightly to apex. Tuft arises at the point where tapering begins, with 3 or more subequal barbed branches. Pecten teeth arranged in a row below the siphon tuft. Each pecten tooth pointed with a few denticles from middle to base. Isc a tuft of about 10 slender, smooth branches; osc much longer, single; lh a tuft, branched at middle into about half a dozen. Ventral brush well-developed. Anal papillae narrow, sharply lanceolate, the dorsal and ventral pairs nearly equal in length.

Pupa: Respiratory trumpet fairly long, more than four times as long as broad, uniform in thickness from very close to base up to apex; reticulated as common in Aedes trumpets. Metanotal hair 10 long, single; h-11 about 2/3 the length of 10 divided close to base into two, each branch again dividing medially into two; h-12 the longest of these three hairs, single, fairly thick. Hair 9 of abdominal segment VII a long tuft of about five or more main branches, each branch pectinate. Hair 5, the longest on this segment, divided near base into usually two equal branches. Hair 9 of VIII a thick tuft having a dozen or more pectinate branches. Paddle only slightly longer than broad, without marginal serrations or fringes; paddle hair single, fairly long

Adults: Male and female: this is one of the three dark-legged Philippine Finlayas of the Aedes dissimilis group studied and published by Rozeboom (1946). The type locality of luzonensis is given as "Subic Bay, Luzon Island." Our collections from tree holes and from an oil drum filled with rain water were all within the U. S. Naval Reservation at Subic. For comparison, we used a series of specimens with

associated skins collected from a particularly large tree hole in the well-preserved forest on the western side of Mt. Makiling, Laguna Province, Luzon Island. We interpreted the Makiling species as Aedes (Finlaya) paradissimilis Rozeboom 1946, and those from Subic Naval Reservation as Aedes (Finlaya) luzonensis Rozeboom 1946.

Female: indistinguishable from female paradissimilis except that the pale median stripe of mid femur is longer. Proboscis dark, except labella; palpus of female about one-seventh the length of proboscis, dark. Head: dark-scaled, with silvery white scales bordering the eyes, and extending to nape and on either side. Antenna dark, plumose in male, pilose in female. Mesonotum mostly dark-scaled, sometimes the anterior half largely covered with a patch of silvery scales or sometimes this silvery patch is reduced to a mere short median stripe. Wings dark; tarsomeres entirely dark; abdominal terga dark; sterna with silvery bands not extending upward. Terminalia not easily differentiable, if at all, from that of paradissimilis. Identification of adult female is relatively easy due to the large silvery patches of broad scales on apn, ppn, propleuron, post-spiracular area, upper and lower sternopleuron. When viewed under low magnification, these patches appear to be a single broad subtriangular area with the patch on mid coxae forming the acute angle of the triangle. Abdominal terga dark; sterna with conspicuous silvery patches or bands.

Breeding habits: Usually breeds in tree holes and large artificial containers.

Biting habits: Apparently zoophilic. Half a dozen females were captured in a carabao-baited trap in Subic.

Distribution: Philippines.

(5)

Aedes (Finlaya) melanopterus Giles 1904. Figures 7 & 8.

1904. Ochlerotatus (Finlaya) melanopterus Giles. J. Trop.

Med. 7:367.

Eggs: Not studied.

Larvae: First and second-instars: not studied.

Third and fourth-instars: may be identified with the naked eye due to a pale (opaque) spot on the metathorax, visible even in young, living larvae. Easily identified under low power due to the uniformly bent branches of its principal thoracic and abdominal hairs. The stellate hairs with few, but strong branches.

Head of larva: antenna smooth with single antennal hair arising at about apical 1/3 of shaft. Preclypeal spine single, fairly stout, Hair 4 short, branched into about 4 or more; h-5 much longer, single; h-6 similar to h-5; h-7 weak and short like h-4. Without outstanding character on thorax except that opaque area or spot on the metathorax, visible even in young, living larvae. Easily identified under low power due to the uniformly bent branches of its principal thoracic and abdominal hairs. The stellate hair with few, but strong branches. Abdominal segment II & III: chaetotaxy as illustrated. Segment VIII: comb composed of usually more than thirty teeth, arranged in a patch, each tooth apically broadened and completely fringed. Siphon slightly

darker than the rest of the body. Siphon tuft, having half a dozen or more pectinate branches. About twenty or more pecten teeth, each tooth with a ventral sub-median denticle, finely fringed from denticle to the base of teeth. Segment X not completely enclosed by saddle, with spicules toward the posterior border; lh single or double. Isc branched; osc single and longer than isc. Ventral brush composed of about 10 tufts. Anal papillae lanceolate, the dorsal pair longer than the ventral.

Pupa: Respiratory trumpet fairly widely expanded from base to apex; reticulated. Hair 9 of abdominal segment VII fairly long, split from near the base into two equal branches. Hair 9 of VIII subplumose with five or more long branches. Paddle slightly longer than broad, without fringes or serrations at edges; paddle hair single, moderately long.

Adults: Male and Female: easily recognized due to the conspicuous pale patch occupying a variable portion of the anterior half of the mesonotum. Wings dark. Legs as illustrated, all tarsomeres nearly completely dark.

Breeding habits: Usually breeds in tree holes. More often collected from tree holes in Mt. Makiling, Laguna Province, than in tree holes at Subic Naval Reservation.

Biting habits: Apparently zoophilic.

Distribution: Philippine Islands.

(6) Aedes (Finlaya) niveus (Ludlow) 1903. Figure 9.

1903. Stegomyia niveus Ludlow, Jour. N. Y. Ent. Soc. ii:139.

1905. Scutomyia nevea Ludlow. Theobald, Gen. Insectorum Cul.,
p. 19.
1910. Stegomyia pseudonivea Theobald. Mon. Cul. 5:176.
1917. Aedes (Ochlerotatus) niveus Ludlow. Edwards, Bul.
Ent. Res. 7:211.
1923. Finlaya nivea (Ludlow). In part, Barraud, Ind. Jour.
Ned. Res. 11:480.
1931. Aedes (Finlaya) niveus (typus) (Ludlow). Brug. Arch.
Hydro Biol. Suppl.-Bd. 9:25.
1932. A. (F.) niveus Ludlow. Edwards, Gen. Insectorum, Cul.
Fasc. 194, p. 154.

Eggs: Unknown.

Larvae: First and second-instars: not studied.

Third and fourth-instars: without outstanding external characters.

Head: broader than long (flat mount). Antenna fairly long, sparsely spiculed, slightly tapering from where the antennal tuft arises to apex, Antennal tuft fairly well developed with about ten long frayed branches. Clypeal spines slender, single. H-4 a small tuft of about ten frayed branches. H-5 similar to 4 but with four or more of the branches nearly twice as long as the others. H-6 somewhat longer than the stout branch of 6, with about a dozen frayed branches. H-7 still more developed, with ten or more frayed branches. Thorax: without outstanding diagnostic characters. Pro-1 fairly long, with three or more long but unequal frayed branches; 2 similar to 1; that is with three or

more long but unequal frayed branches; 3 shorter than either 1 or 2, having four or more frayed branches; 5 longer than 1 or 2, more stout, divided close to base into two frayed branches; 6 shorter than 5, single; 7 about equal in length to 6 with four or more frayed branches. Meso-5, 6 and 7 of similar type to pro-5, 6 and 7 but longer, 5 single; 6 divided into four; 7 with three branches. Meta-pleurals 9 and 10 the longest of the thoracic hairs but 12 much reduced as usual. Abdominal hairs of little diagnostic value, the lh or hair 6 of I-VI the longest, branched into two or three each, frayed. Hair 1 of IV-VI also long, with usually three branches each. Segment VIII: comb about eight or more scales, arranged in a single row, each tooth with a strong main point, serrated on either side of the enlarged base. Siphon more than twice as long as broad, tapers to apex from apical half; tuft arises at about the middle of tube. Around eighteen or more pecten teeth, each shorter than the comb teeth, having a short main point and one or more shorter denticles medially or sub-basally. Segment X slightly shorter than VIII, not entirely enclosed by saddle. Saddle with some fine spicules near the posterior margin and longer points along the distal rim. Isc long, three-branched near base; osc longer, single; lh much shorter, single. Ventral tuft moderately developed, each hair having only two to four branches; anal papillae small, rounded at tip, the dorsal pair much longer than the ventral.

Pupa: Not available for description.

Adults: Not available for description.

Knight (1951) thinks that this species and several others probably merely represent polymorphic variations of a superspecies. Of course such questions can be studied and determined only by those who have access to large collections of all the species concerned. Furthermore, this will require studies from progenies raised from eggs of known mothers. We can merely follow the opinion given by Knight (1951) and call the species found in Subic Naval Reservation by the name he and others give to this local form.

Breeding habits: Breeds in tree holes and cut bamboos.

Biting habits: Probably zoophilic.

Distribution: Southeast Asia, India.

(7)

Aedes (Finlaya) poecilus (Theobald) 1903.

1903. Finlaya poicilia Theobald. Mon. Cul. 3:283.

1903. Finlaya poecilipes Theobald. Mon. Cul. xvii, plate 13.

1904. Finlaya poialia Theob. Giles. Jour. Trop. Med. 7:366.

1917. Aedes (Ochlerotatus) poicilia Theob. Edwards. Bul. Ent.

Res. 7:211.

1920. Aedes (Finlaya) poicilia Theobald. Dyar, Ins. Insc.

Mens. 8:183.

1926. Aedes (Finlaya) kochi var. poicilia (Theo.). Edwards,

Bul. Ent. Res. 17:104.

1929. Aedes (Finlaya) poecilia Theo. Edwards, Not. Ent. 9:2.

1934. Aedes (Finlaya) poecilus Theobald. Barraud, Fauna Brit.

Ind. Dipt. 5:157.

1937. Aedes (Finlaya) poecilus Bonne-Wepster and Brug.

Geneesk. Tijdschr. Ned-Ind. 74:44.

1948. Aedes poecilus (Theobald). Stone and Bohart, Proc.

Ent. Soc. Wash. 46:211.

Eggs: Not available.

Larvae: None collected from Subic Naval Reservation during the time field observations and collections were done there.

Pupa: No specimen available.

The only specimens of this mosquito obtained from Subic Naval Reservation were a few females caught in carabao-baited traps. No larvae were found, probably because it breeds very lightly among the many wild bananas which abounded inside and outside the reservation.

Adults: Male and female: quite easy to recognize under low magnification due to the many spotted wings while the legs have many pale spots and bands. May be mistaken for Aedeomyia catasticta (Skuse) 1880; however, Aedeomyia catasticta has striking characteristics of its own.

Head: with a median pale line on vertex, a narrow pale border around the eyes which widens at sides; a dark patch on either side of median pale line. These are, however, variable. Many yellowish upright scales on nape. Antenna, clypeus, palpus, and proboscis dark. Female palpus about 2/5 of proboscis in length. Proboscis dark with a definite white ring a little beyond the middle (from base) and a narrow pale ring or patch at base of labella. Thorax: mesonotum dark, clothed with dark and white scales, some flat white scales in front of wing roots. Midlobe of scutellum with dark and white scales,

lateral lobes dark-scaled. Pleura: integument dark with patches of pale scales, variable in extent, but sometimes forming a more or less continuous line from apn to mesepimeron. A few dark and white scales on ppn. Wings highly speckled, with broad dark and white scales. Variable markings on costal margin, but often with two or three pale costal spots or areas. Legs dark, with many white rings. Apices of femora and tibiae pale. Hind tibia also pale-ringed. Hind tarso-meres I-IV also pale-ringed; V entirely white. Abdomen: terga dark-brown, a pair of submedian white spots at about middle of each segment and a white longitudinal mark on borders and white spots near posterior margins. Sterna: clusters of outstanding dark scales on V-VII.

Breeding habits: Mostly breeds in axils of abaca and bananas, such that the density of adult population depends very much upon a large number of these plants, as in Sorsogon Province and along the eastern parts of every island in the Archipelago.

Biting habits: Has a high percentage as human biters. Said to bite man, even during the day in Sorsogon Province. This is very controversial though; the men assigned in Sorsogon in filaria work claimed they were never bitten by poecilus during the day.

Numerous adults come into certain huts preferred by this mosquito in Sorsogon, but it is hard to determine why some are preferred to others. The author himself participated in the observations while he was still in the government service.

Distribution: Widely in the Philippines, though sparsely where abaca and bananas are few. Known also in other parts of Southeast

Asia (Indonesia, North Bengal, Burma).

Medical Importance: May be a vector of Bancroftian filariasis (Wuchereria bancrofti).

(8)

Aedes (Neomelaniconion) lineatopennis (Ludlow) 1905. Figure 10.

1905. Taeniorhynchus lineatopennis Ludlow. Canad. Ent. 37:133.

1913. Pseudohowardina linealis Taylor. Rpt. 1911. Austral. Inst. Trop. Med: 10.

1915. Banksinella lineatopennis Ludlow. Edwards, Bul. Ent. Res. 5:174.

Eggs: Seen many times but not studied for publication.

Larvae: First and second-instars: examined years ago, but not studied for publication. Third and fourth-instars: dark without readily visible diagnostic character. Head: broader than long (flat preparation). Antenna hardly tapers from base to apex, coarsely spiculed. Antennal hair tuft arises a little below the middle, branched from base into about half a dozen or more. Hair 4 very short, divided into usually over six branches; 5 much more developed, branched into about half a dozen; 6 similar, with four to six branches; 7 also similar but usually with eight to a dozen branches. Thorax: without outstanding characters. Pro-hair 1 single, sometimes two-branched; 2 single or 3-branched; 3 double or branched into five; pro-pleural hair group weak. Meso-pleurals and meta-pleurals more developed except 11 as usual, which in this case seems to be absent. Pro-9 branched into six or more; 10 and 12 single; 11 represented by a socket (absent?)

12 single, moderately long and thick. Meta-pleurals similar to the meso-pleurals, but 12 much reduced. Abdomen: most prominent hairs are those on the dorso-lateral of I & II, each of which bears only two or three branches; lh or 6 of I single or split into two; on II having 2 to half a dozen branches; on III-VI - single. Segment VIII: comb in a row of about eight teeth, each tooth having its basal enlarged portion fringed on either side; apical portion sharply pointed. Siphon more than twice as long as broad, acus small; its small tuft, having two to half a dozen branches, arises subapically. More than a dozen to one and 1/2 dozen pecten teeth in a row, each with usually one median denticle. Anal segment not entirely enclosed by smooth saddle. Isc divided close to base into over half a dozen to over a dozen long branches; osc longer, thicker, single. Anal papillae narrow, sharply lanceolate, exceeds length of anal segment, the dorsal pair longer than the ventral.

Adults: Male and female: easily identified due to the broad lines of golden scales on either side of the mesonotum. Head: also decorated at middle with narrow and upright golden scales. Thorax: dark-scaled with characteristic golden lines on either side of mesonotum as mentioned above. Apn scaleless; ppn sparsely covered with narrow dark scales. Wings: dark with pale golden scales on vein 1 and stem of vein 5. Legs dark; terga with pale golden basal bands.

Breeding habits: Breeds in fresh water, open pools.

Biting habits: Presumably zoophilic.

Distribution: Philippines, Malaysia, Indonesia, India, Africa, Celebes, Queensland, Amboina, Timor and Borneo.

Medical Importance: Low potential vector of Malayan filariasis (Brugia malayi) and Bancroftian filariasis (Wuchereria bancrofti).

(9)

Aedes (Ochlerotatus) vigilax ludlowae (Blanchard) 1903. Figure 11.

1903. Culex annulifera Ludlow (nec E. Blanchard, 1852).

Jour. N. Y. Ent. Soc. 11:141.

1904. Culex annuliferus Ludlow. Can. Ent. 36:72.

1905. C. ludlowi R. Blanchard, Les Moust , p. 630. Nom. nov.

1917. Ochlerotatus annuliferus (Ludlow). Edwards Bul. Ent.

Res. 7:215.

1922. Aedes (Ochlerotatus) vigilax (Skuse). In part, Edwards

Bul. Ent. Res. 13:99.

1925. Culex ludlowi Theobald. Dyar and Shannon, Ins. Insc.

Mens. 13:76.

1929. Culex annulipes Ludl. Edwards, Notulae Ent. 9:2.

Eggs: Unknown.

Larvae: First and second-instars: not available.

Third and fourth-instars: bear no unusual specific characters.

Head: broader than long (flat mounts). Antennae pale or pale-brown, moderately long and thin, differing little in thickness from base to apex. Its weak shaft hair divided into two to four usually unequal branches; arises a little below the middle of shaft from tip. Pre-clypeal spines moderately thick and long, sharply pointed. Hair 4 tiny, having less than half a dozen often unequal branches. Hair

5 behind 6 in position according to the interpretation of Knight & Hull (1951), fairly long, single; 6 similar to 5; 7 a tuft somewhat shorter than either 5 or 6, divided basally into about half a dozen or more, unequal branches. Thorax: without unusual specific character, even its pleural hair groups display characteristics common to many Aedes. Abdomen: setae mostly weak; the lh of I & II divided basally into two branches; of III-VI about as long as 6 of I & II but single. No strong tufts on any segment. VIII: comb composed of less than two dozen teeth or scales of two kinds: the majority having a strong short central point flanked on either side with shorter points. The other kind (fewer in number) more or less rounded and serrated at apex. Hair 3, the strongest tuft on VIII, divided into about a dozen long frayed branches. Siphon short and thick, hardly twice as long as its widest point; its tuft strong with usually about a dozen sparsely frayed branches; arises at about the middle of tube. Half a dozen to a dozen pecten teeth, each tooth rather thin or narrow with two or three serrations or denticles along basal half. Segment X not well covered by saddle; isc divided basally into about a dozen branches; osc with two subequal branches. lh weak and short, single; ventral tuft well-developed. Anal papillae small and short, truly lanceolate in shape, both pairs about equal to each other in length and width.

Pupa: Without outstanding specific characters. Setae weak, including the short 9 on VII & VIII: of VII often two or three-branched basally; of VIII with half a dozen frayed branches. Paddle of the usual type with hardly visible spicules; paddle hair single.

Adults: Palpus of female about 1/6 the length of proboscis, dark, a few pale scales at apex. Head: dark, upright scales on vertex and nape; broad pale scales forming lateral patches; band of broad dark scales at about middle dorsally.

Breeding habits: Breeds in brackish water such as fish ponds, salt beds (when salt concentration is not too high), usually with algae and other floating vegetation.

Biting habits: Undetermined.

Distribution: Only in the Philippines so far as known.

(10)

Aedes (Rhinoskusea) longirostris Leicester 1908. Figures 12 & 13.

1908. Cul. Malaya :228.

1919. Uranotaenia hilli Taylor. Proc. Linn. Soc. N.S.W. 43:841.

Eggs: Not studied.

Larvae: First and second-instars: not studied.

Third and fourth-instars: deceptively like a Ficalbia larva due to the subapical location of its siphon tuft. Head: broader than long; preclypeal spines moderately thick, single; hair 4 a weak small tuft; h-5 a considerably developed tuft of about half a dozen branches, barbed or almost frayed; h-6 much longer, 2-branched, barbed; h-7 a large tuft of more than ten barbed branches. Antenna spiculed, long and thin, its shaft hair a tuft of 5 or more barbed or frayed branches. Abdomen without outstanding diagnostic characters. Segment VIII of abdomen: about forty or more comb teeth, each tooth rather thin but long, expanded at apex and fringed around the rounded

margin. Siphon as illustrated: its tuft well-developed, having half a dozen or more pectinate branches. Pecten teeth rather far apart, lined some distance below the siphon tuft. Each tooth long and thin with sub-basal serrations on one or both sides of the base. Anal segment spiculed on dorso-apical margin. Isc a tuft of 5 or more long, smooth branches; osc much longer, single. Ventral tuft well-developed. Anal papillae short, showing merely as half circles - indicative of its saline water habitat.

Pupa: Without outstanding characters.

Adults: Male and female: head: proboscis dark, except labella. Female palpus very short; dark. Wings dark. Legs dark with lighter areas on bases of femora. Abdomen with some pale patches on bases of lateral sides. Male terminalia characteristic (as illustrated).

It was uncertain if this species was actually the one caught in carabao-baited and light traps until some larvae obtained were reared to adults.

Breeding habits: Breeds in pools and ponds affected by salt water tides.

Biting habits: Appears zoophilic.

Distribution: Throughout the Philippines from Luzon to Mindanao - also known in Malaya, Singapore, Andaman Islands, Thailand, Indochina, Borneo, Ceylon, Australia.

(11)

Aedes (Skusea) fumidus Edwards 1928. Figure 14.

1928. Bull. Ent. Res. 18:274.

1926. Aedes amesii (Ludlow). Edwards, Bull. Ent. Res. 17:119.

Eggs: Unknown.

Larvae: First and second-instars: not studied.

Third and fourth-instars: head: antenna not spiculed, not differing much in diameter from base to tip. Antennal hair weak, single, arises subapically from shaft. H-4 a small tuft of about a dozen branches; 5 much longer, single; 6 similar to 5 but shorter; 7 a tuft larger than 4, having ten or more branches. Thorax: pro-1 and pro-3 branched into 3-8; 2 single. Meso-pleurals: 9 usually branched into more than a dozen; 10 single, stout, long; 11 presumably absent; 12 similar to 10. Meta-pleurals: 9 branched into 5 to 9; 10 single, stout; 11 absent (?); 12 much reduced, single. Abdomen: some dorso-lateral stellate tufts branched each into 6 or more; lh or 6 of I single; on II-VI branched into 2-6 each; sometimes single on VI. Numerous comb scales (80-100) in a patch, each scale with a slightly flattened, rounded tip with fine fringes. Siphon more than twice as long as broad; pecten teeth about a dozen, each tooth pointed, fringed along one side. Anal segment (X) with a small dorsal saddle. Isc long, branched basally into 8 or more; osc longer, single; lh much shorter, single. Ventral brush well-developed. Anal papillae longer than anal segment, narrow, rounded at tip, the dorsal pair larger and longer than the ventral.

Pupa: Without unusual diagnostic characters. Trumpet relatively small, more than twice as wide at tip as the diameter of base (flat mounts) reticulated. Metanotal hair 10 divided basally into four to

half a dozen or more slender branches; 11 longer thick, single; 12 equal in length to 10, but more stout, two branched. Most prominent abdominal hairs are 3 of III & VI which are long and single; 9 or VIII, developed tuft of 8-10 long frayed branches. Paddle longer than broad, broadly lanceolate with long fine fringes on either side as in Stegomyia pupae. Paddle hair nearly twice as long as fringes, single.

Adults: Male and female: seven males and 6 females most of which have associated skins, from Subic Naval Reservation. Dull-colored mosquito, without outstanding characters except the peculiar male terminalia.

Breeding habits: Breeds in tree holes - appears in Subic only from October to January, inclusive.

Biting habits: Presumably anthropophilic.

Distribution: Oriental Region only.

Medical Importance: Vectors Philippine hemorrhagic fever.

(12)

Aedes (Stegomyia) aegypti (Linnaeus) 1762.

1762. In Hasselquist's Reise nach Palastina :470.

1787. argenteus Boiret. J. Phys. Chim. Hist. Nat Arts, Paris
30:245.

1805. fasciatus Fabricius. Syst. Antliat. :36.

1818. calopus Meigen. Syst. Besch. Zweifl. Ins. 1:3.

1827. frater Robineau-Desvoidy. Mem. Soc. Hist. Nat. Paris
3:408.

1828. sugens Wiedemann. Aussereurop. Zweifl. Ins. 1:545.

1828. taeniatus Wiedemann. Aussereurop. Zweifl. Ins. 1:10.
1833. kounoupi Brulle. Exp. Sci. de Moree, Zool. 3:289.
1844. annulitarsis Macquart. Mem. Soc. Sci. Lille, :136.
1848. viridifrons Walker. List. Dipt. Brit. Mus. 1:3.
1848. excitans Walker. List. Dipt. Brit. Mus. 1:3.
1848. formosus Walker. List. Dipt. Brit. Mus. 1:3.
1848. inexorabilis Walker. List. Dipt. Brit. Mus. 1:3.
1856. exagitans Walker. Ins. Saund. Dipt. 1:430.
1859. insatiabilis Bigot. Ann. Soc. Ent. Fr. 3(7):118.
1889. bancrofti Skuse. Proc. Linn. Soc. N.S.W. (2)3:1740.
1889. elegans Ficalbi. Bull. Soc. Ent. Ital. 21:95.
1899. rossii Giles. J. Trop. Med. 2:64.
1901. luciensis Theobald. Mon. Cul. 1:297.
1901. queenslandensis Theobald. Mon. Cul. 1:297.
1901. nigeria Theobald. Mon. Cul. 1:303.
1905. canariensis Pittaluga. Rev. Acad. Madr. 3:432.
1906. persistans Banks. Philipp. J. Sci. 1:996.
1908. albopalposus Becker. Mitt. Zool. Mus. Berl. 4:80.
1908. anguste-alatus Becker. Mitt. Zool. Berl. 4:79.
1911. alboannulis Ludlow. Psyche, Camb., Mass. 18:132.
1919. pulcherrima Taylor. Proc. Linn. Soc. N.S.W. 43:839.
1920. atritarsis Edwards. Bull. Ent. Res. 10:129.

Eggs: Many times seen and examined in connection with colonization work, but not studied for publication.

Larvae: All instars: many times examined but not published.

The full grown larva is entirely dark similar to other Stegomyia larvae and may be differentiated only when killed and its characters examined in details.

During our observation, the larvae of aegypti were collected only twice. A total of only half a dozen larvae were taken, from which two adults emerged. The larvae were taken once in a flower vase inside and once again in a pot outside the same unoccupied building.

May be distinguished from other closely similar forms: (1) about 8 to a dozen comb teeth, each of which has well developed lateral denticles. These teeth arise separately: (2) a comparatively large single point arises from each of the tubercles of the meso- and meta-pleural hair groups. Less significant characters are found on the siphon, which is usually a little more than twice as long as its diameter at base; its tuft arises somewhat above the middle from base, having about half a dozen branches. Pecten teeth a dozen or more, each with a basal denticle. Anal segment X nearly enclosed by saddle. Isc long with half a dozen or more branches; osc longer, single. Ih usually single; ventral tuft developed; anal papillae bluntly lanceolate, much longer than anal segment, the dorsal pair exceeds the ventral in length.

Pupa: Of the common type of Stegomyia pupae, is not differentiable from other pupae.

Adults: Easily recognized when the mesonotal silvery markings are intact, but wild captured specimens usually lose this design and

there is no way to differentiate its female from its close associate in the Philippines, Aedes albopictus.

Breeding habits: Usually breeds in artificial containers inside or outside houses, sometimes in cut bamboos.

Biting habits: Almost exclusively human.

Distribution: Southeast Asia, Indomalayan Region and elsewhere where modern transportation introduced this mosquito.

Medical Importance: Primary vector of dengue, Philippine hemorrhagic fever, and chikungunya in the Philippines, and has been found naturally infected with Wuchereria bancrofti (Bancroftian filariasis). Primary vector of yellow fever in other parts of the world.

(13)

Aedes (Stegomyia) albopictus Skuse 1894. Figures 15 & 16.

1894. Culex albopictus (Skuse). Indian Mus. Notes 3(5):20.

1903. Stegomyia scutellaris ssp. samarensis (Ludlow). J. Ent. Soc. 11:138.

1904. Stegomyia lamberti (Ventrillon). Bull. Mus. Rist. Nat. Paris 10:552.

1910. Stegomyia nigritia (Ludlow). Canad. Ent. 42:194.

1911. Stegomyia quasinigritia (Ludlow). Psyche. 18:129.

Eggs: Not intensively studied; not described or illustrated.

Larvae: First and second-instars: not studied.

Third and fourth-instars: entirely dark larvae similar to larvae of aegypti and scutellaris. Antennal shaft hair single, short, arises well above the middle of shaft from base. Hair 1 fairly

thick, single, not very long; h-4 longer, divided from base into about 14 slender smooth branches; h-5 about twice the length of 4, split submedially into two equal branches; h-6 longest of head hairs, single; h-7 about equal to 4 split sub-basally into 2 branches. Thorax: no hair of diagnostic importance except the base of the meta-thoracic pleural hair group from which arise two equally long strong spines and a short one. The comb and pecten teeth also differentiate albopictus larvae from those of aegypti. Abdominal segment VIII with a row of about 10 comb teeth, each one of which is rather short, pointed, thick, with few fringes on either side at base. Pecten teeth about fifteen, in a row; each tooth pointed, shorter than comb teeth with coarse serrations mostly on one side of base. Tuft arises at about 1/3 of tube from apex, divided basally into two; a saddle almost completely enclosing anal segment. lh long, 2-branched; isc long, 2-branched; osc longer, single. Anal papillae long and broad, the dorsal pair slightly longer and broader than the ventral pair. Ventral brush of about 8 long hairs, each divided near base into 2 equal branches.

Pupa: Without distinctive diagnostic character; much like those of aegypti and scutellaris.

Adults: Male and female: markings on mesonotum: a line of silvery scales running from anterior border to prescutellar bare space, tapering uniformly throughout its length antero-posteriorly. This line and other markings on thorax are not differentiable from those

of scutellaris, but the silvery bands on abdominal terga are basal, whereas those of scutellaris are sub-basal. Scutellar scales all broad and silvery. Abdomen and legs as illustrated; wings entirely dark.

Breeding habits: Breeds mostly in tree holes in Subic, seldom in bamboo, rock holes and artificial containers; often mixed with larvae of scutellaris and aegypti.

Biting habits: Attacks man viciously, but in places far away from human dwellings, probably feeds on animals.

Distribution: Cosmotropical within the 20°C isotherms.

Medical Importance: Vector of dengue, chikungunya, Japanese "B" encephalitis, and tropical eosinophilia (Dirofilaria immitis).

(14)

Aedes (Stegomyia) boharti Knight and Rozeboom 1946. Figures 17 & 18.

1946. Proc. Biol. Soc. Wash. 59:90.

Eggs: Not known.

Larvae: First and second-instars: not studied.

Third and fourth-instars: not illustrated. The following descriptions are based on 5 mounted skins with associated adults, and over a dozen whole preserved larvae - all from Subic Naval Reservation.

Very dark owing to the very numerous piles on the entire thorax, and abdomen including the siphon. Head much paler in contrast due to the absence of piles; integument of abdomen also pale when denuded of

piles. Antenna smooth, not very long, thicker on basal half, and tapering toward the apex. Antennal hair short, slightly more than $1/4$ the length of the antenna 2-branched, arises a little below the middle from tip. Preclypeal spines single, not very thick, about half as long as antenna; hair 4 a well developed tuft of over a dozen branches. There are 2 types: one with shorter thicker branches, the other whose branches are longer, but more slender. Hair 5 very much longer, single, sometimes conspicuously flattened and broadened at middle, sometimes cylindrical like other simple hairs. Hair 6 and 7 equally large, many branched tufts, the branches slender and tapering sharply to tips; h-8 slender, single; 9 a tuft of half a dozen or more slender branches. Thorax very thickly covered all over with many branched piles, most of which appear plumose. Most hairs are thick, many-branched stellate tufts, the branches stout, stiff, extreme tip sometimes notched into 2 short points. Pro-pleurals arising from a moderately small tubercle, 9 a thick stellate tuft; 10 also a thick stellate tuft, much longer, single; 11 weak, single, hardly $1/5-1/6$ of 10; 12 single, longer than 11. Mesopleural with a large tubercle from which arises a very thick spine; 9 a thick tuft with long branches; 10 similar but smaller with less branches; 11 comparatively tiny and weak, often 2-branched; 12 single, long. Meta-pleurals similar to mesopleurals, but with thicker spine on tubercle and 12 a short tuft. Abdomen as thickly covered with piles as the thorax and the principal hairs are heavily stellate. Ih or 6 of I & II relatively weak, with

about half a dozen slender branches; 7 about as long, single. Comb composed of nineteen or more closely set teeth, each long and sharp-pointed with fine serrations on either side of enlarged base. Siphon about twice as long as broad, heavily covered with longer, finer piles, those toward base with usually two branches, those toward apex mostly single. Five or more pecten teeth, each sharp pointed almost as long as comb teeth. Siphon tuft arises below the middle of teeth from base, having usually 3 branches. Anal segment not completely enclosed by saddle, also with numerous branched piles; the posterior margin completely rimmed with long spines. Saddle hair long, 3-branched; isc longer with 10 or more long thick branches; osc longer, single. Ventral tufts well-developed each with about half a dozen long branches.

Considerable variation in the amount of piles on the thorax and abdomen has been noted. Generally those that breed in tree holes are the most heavily pilose; those that breed in bamboos are as heavily pilose as those breeding in tree holes or less; those found in rock holes are usually the least pilose.

Pupa: Trumpets short, widely expanded at apices, reticulated. Metanotal hairs 10 usually 2-branched; 11 longer, single; 12 with 5 or more branches with 4 or more of these branches pectinate; 9 of VIII plumose with a dozen or more long, pectinate branches. Paddle longer than broad, without serrations or fraying along margin; paddle hair branched into 3 to 6 or more.

Adults: Male and female: a small dark mosquito, characterized mainly by a broad line of silvery scales which terminates at about the

middle of the mesonotum. This is seemingly a continuation of a broad stripe of silvery white scales at middle of head. Scutellar scales broad and silvery white on mid-lobe; broad, dark scales on lateral lobes. Legs mostly dark, hind tarsomeres I-III with distinct white basal bands. Wings dark abdomen dark.

Breeding habits: Breeds in tree holes, bamboos and rock holes.

Biting habits: Hardly known. During our observations in Clark Air Base and Subic Naval Base, only one female was caught in a carabao-baited trap. Previous attempts to capture gravid females in Mt. Makiling, Laguna Province, from their daytime resting places and by human exposure during the evening failed to get any. A few were noticed flying from their resting places early at dark, but none seems to be attracted to bite humans. It may be an avian feeder.

Distribution: Fairly wide spread in the Philippines, but according to Knight and Hull (1952) this mosquito was reported by Bonner-Wepster (1932) only from "an unnamed locality in the Netherlands East Indies".

(15)

Aedes (Stegomyia) desmotes (Giles) 1904. Figures 19 & 20.

1904. Jour. Trop. Med. 7:367.

1905. Aedes (Anisocheleomyia?) albitarsis Ludlow. Canad. Ent. 37:131.

1908. gracilis Leicester. Cul. Malaya :81.

1910. albipes Theobald. Rec. Indian Mus. 4:11.

Eggs: Not known.

Larvae: First and second-instars: not studied.

Third and fourth-instars: head broader than long. Preclypeal spines fairly long and stout, single. Hair 4 longer, split close to base into two sub-equal branches. Hair 6 much longer, single; h-7 similar to h-6 but shorter; antenna narrow, long, smooth with a weak single antennal shaft hair which arises a little above the middle from base. Thorax without striking diagnostic characters. Abdominal segment VIII: comb with plate from which arises four or more short, sharp teeth, with a few serrations on either side at base. Siphon much longer than broad, smooth; siphon tuft weak, divided from base into three or more branches; arises at about 1/3 of tube from tip. Anal segment with saddle not completely enclosing the segment; isc long, double; osc longer, single. Ih shorter, 3-branched. Ventral brush composed of about 3 long, single hairs. Anal papillae long, narrow, the dorsal pair about equal in length to the anal segment; the ventral pair, longer and broader.

Pupa: Respiratory trumpet rather short, fairly broad. Metanotal hairs, not distinctive; the middle (No. 10) longest, single; hair 9 of abdominal segments VII & VIII strong, single, that on VIII split near base into two equal branches. Paddle moderately longer than broad, tapers uniformly on either side to tip; fringed around as in other Stegomyia pupae. Paddle hair single.

Adults: Male and female: not highly marked, yet with sufficient diagnostic external pattern on thorax, legs and abdomen to render

identification relatively easy. Head dark-scaled with a line of pale broad scales at middle between eyes and at sides bordering the eyes. Proboscis long, dark. Palpus about 1/4 as long as proboscis, dark-scaled but pale at tip. Antenna of female pilose; torus with broad flat white scales. Patches of broad white scales on pleuron, apn and ppn. Mesonotum with narrow scales, decorated with pale pattern as shown in the illustration. These may be badly rubbed in trap-caught specimens, but usually a sufficient amount is left to show the specific distinction. These together with the leg markings, 2 pale spots on mid femur, pale bands on all tibiae and entirely pale-scaled hind tarsomeres IV & V, plus the basal white bands on abdominal terga are most helpful for specific diagnosis. Male terminalia as illustrated.

Breeding habits: At Subic particularly prefers tree holes and bamboos.

Biting habits: Mostly zoophilic.

Distribution: Philippines, India, Assam, Malaysia, Vietnam, Borneo and Soenba.

(16)

Aedes (Stegomyia) gardnerii Ludlow 1905. Figures 21 & 22.

1905. Aedes gardnerii Ludlow. Canad. Ent. 37:99.

1907. Quasistegomyia gardnerii Ludlow. Theobald, Mon. Cul.

4:168.

Eggs: Not studied.

Larvae: First and second-instars: not studied.

Third and fourth-instars: very similar to larvae of albopictus

and scutellaris, the principal difference being a circular unpigmented area from which the lh of the anal saddle arises; and two or three hairs of the ventral brush not within the barred area at base. Head: hair 1 moderately thick, not prominent, single; h-4 longer than 1 having about 5 branches; h-5 longer, single; h-6 still longer, also single; h-7 slightly shorter than h-6, single; h-8 and h-9 also single. There are no striking diagnostic characters on thorax. Abdominal segment VIII: about 10 comb teeth in a row, each tooth with a central main point, fringed finely on either side of enlarged base. About a dozen pecten teeth lined in a row along the basal half of the siphon below the siphon hair, the smallest being the most basal and the most apical being the largest. Each tooth with a central point and one or two basal denticles.

Pupa: Respiratory trumpet moderately stout, reticulated, not very widely expanded at apex. Hair 10 of metanotum slender, forked into 3 or more branches sub-medially; 11 single, the longest of the metanotal hairs; 12 similar to 11, but slightly shorter. Hair 9 of abdominal segment VII, a thin, dark, sharp, single spine; of VIII longer, and with short, slender lateral branches. Paddle conspicuously longer than broad, fringed on either side to tip. Paddle hair moderately long, single.

Adults: Male and female: when the markings are intact, this mosquito is easy to recognize due to the white pattern on the mesonotum, pleuron and legs. When scales of captured wild specimens are rubbed off, the lone silvery spot on mid-femur may be the only

clue left for correct identification. The tarsomeres have well marked silvery bands or rings. Hind tarsomeres I-V all with basal silvery bands, the apical parts, dark. Wings entirely dark. Terga dark; sterna with silvery white bands or patches.

Breeding habits: Usually bamboo.

Biting habits: Apparently zoophilic.

Distribution: Philippine Islands.

(17)

Aedeomyia catasticta Knab 1909. Figures 23 & 24.

1909. Aedeomyia catasticta Knab. Ent. News. 20:387.

1889. Aedeomyia venustipes (Skuse). Proc. Linn. Soc. N.S.W.
(2) 3:1761.

1901. Aedeomyia squamipenna Theobald. J. Trop. Med. 4:235
(July 15); Mon. Cul. 1:98 and 2:218 (Nov. 23).

Eggs: Not studied.

Larvae: First and second-instars: not studied.

Third and fourth-instars: easy to distinguish due to its unusual characters: (1) much enlarged, curved, spiculed antenna, having 3 equally long, single, and pectinate apical setae and the well-developed, many branched, pectinate antennal shaft hair; (2) siphon tube spiculed, with a well-developed hook and a branched pectinate tuft at the apex; and its subapical long, well-developed, siphon hair with half a dozen pectinate branches; (3) comb with a large plate from the posterior border of which arise a dozen, long, smooth sharp teeth; the conspicuously long, highly pectinate branches along one side of

isc and osc, and ventral tuft. There is an apically cleft, smooth process at tip of antenna; preclypeal spines smooth, fairly long; strong hair 6 and hair 7.

Usually, the larva may be recognized with the naked eye when collecting in breeding waters because: (1) it stays most of the time upside down at the bottom, while feeding, and (2) it has long outstanding hairs on head, thorax and abdomen.

Pupa: Without very striking diagnostic characters. Nonetheless, the paddle shows peculiarities such as the relatively long paddle hair, much broader posterior half of paddle with rather deep cleft where the paddle hair arises, and the stippling at the posterior 1/3 around the midrib. The metanotal hair with its long branches (over 11) and the respiratory trumpet indicate the species quite well.

Adults: Male and female: this mosquito is very distinct due to its variegated colors: dark, pale and yellowish scales; and broad, thick scales on head, wings, legs and abdomen. Although the pattern of markings varies, it is easy to recognize the species within these variations. Antenna of female rather short, with short and thick flagellomeres; that of the male thickly plumose. Legs rather short with conspicuous scale tuft at apex of femora; numerous pale spots, stripes and bands on tibiae and tarsomeres.

Breeding habits: Breeds in fresh water pools and slow-flowing streams with moderate floating vegetation and little algae.

Biting habits: Zoophilic. Adults are often seen resting on walls of houses during the day.

Distribution: Found in the Oriental Region, including Southeast Asia and the Philippines; Australia, New Guinea, Solomons and Fiji.

(18)

Anopheles (Anopheles) aitkenii James 1903. Figure 28.

1903. Anopheles aitkenii James. In Theobald, Mon. Cul. 3:22.

1933. Anopheles aitkenii Christophers. Vol. IV.

1953. Anopheles aitkenii Bonne-Wepster and Swellengrebel.

The treatment and presentation of the entirely dark anophelines found in the Base follow closely Reid's (1965) latest revision. In fact, because we succeeded in getting only a very limited number of specimens, we are quoting Reid's descriptions in full from the "Annals of Tropical Medicine & Parasitology," Vol. 59, No. 1, March, 1965. This is also motivated by a desire to furnish malaria workers a reference on these mosquitoes.

Of this species group we have only 2 females with associated skins and only 1 preserved larva, not yet a full grown third-instar, which is why we are using for our illustrations copies of those given by Russell and Baisas (1936 & 1937).

Eggs: Not known or described locally.

Larvae: First and second-instars: not described or illustrated by Philippine workers.

Third and fourth-instar larvae: as given by Reid (1965) and by Russell & Baisas (1936), and as drawn here, Figure 28, from adult with associated skin.

Pupa: Briefly discussed and illustrated by Baisas (1938).

Adults: As given by Reid (1965). To quote Reid's definition, p. 106: "The A. aitkenii group belongs to the Anopheles series in the subgenus Anopheles. The adults are brown and unornamented, have a culicine resting attitude and fragile appearance, very narrow head-scales, no scales on the pronotal lobes, female palps very slender and about the same length as the proboscis and slightly expanded at the tip, and the phallosome bare or with short scales but without leaflets." All dark without diagnostic character separating it from closely related dark species, the main specific differences being in the male terminalia and in the larva.

Breeding habits: Sylvan creeks.

Biting habits: Unknown.

Distribution: Oriental Region.

(19)

Anopheles (Anopheles) baezai Gater 1933. Figure 29.

1933. Anopheles baezai Gater. Bull. Raffles Mus. 8:162.

1936. Anopheles gateri¹ Baisas. Philipp. J. Sci. 61:205-220.

1953. Anopheles baezai Bonne-Wepster and Swellengrebel.

Eggs: Well illustrated but not described by Baisas (1953, Plate 8).

Larvae: First-instars: fully illustrated but not described by Baisas (1953, Plate 8). Second-instar: not studied.

¹The name gateri was based on the opinion Dr. Gater himself gave in a personal letter that the Philippine form Dr. Russell sent to him and which was labelled A. baezai (adults with associated skins) were not A. baezai.

Third and fourth-instar: fairly large dark larva, without any true palmates on thorax and abdomen - similar to, and indiffereniable from, the full grown larva of A. samarensis Rozeboom 1946. Ic fairly long, equal to or slightly longer than oc in length, with a few fraying toward the apex. Oc as long as or slightly longer than the ic; split at about middle into 5 to 15 long branches; pc, rather short, single, placed rather far apart from each other and far behind the oc in position. Pro-thoracic hair 1, short, single or split into 3 branches; pro-2 much longer with half a dozen or more long lateral branches. Meta-3 a regular hair with several long lateral branches. Abdomen without true palmates, all hairs being well-developed normal setae with more than 10 lateral branches. Lh of IV-VI shorter and weaker than those of other species in series Myzorhynchus, branched into 2 or 3.

Pupa: With wide trumpets and variable tragus. Out of eighteen pupal skins with correlated larval skins and adults 10 have long tragus and 8 have short - just like the short tragus in the pupa of the lone samarensis we have with correlated skins.

Adults: Somewhat smaller than those of the hyrcanus-barbirostris group. Proboscis dark except labella in both sexes. Palpus of female less shaggy than those of franciscoi or pseudobarbirostris, dark. Wings predominantly dark with a conspicuous yellow marking at the apex, similar to but smaller than those in peditaeniatus-lesteri subgroup. Legs: tarsomeres of all legs dark.

Breeding habits: Breeds in small open pools, ditches and canals which are affected by salt water tides.

Biting habits: Not known.

Distribution: Rare; found along littoral areas from Mindanao to as far north as Albay on the eastern side and Subic Naval Base, on western coast. Known elsewhere in the Southeast Asia Region.

(20)

Anopheles (Anopheles) bengalensis Puri 1930.

1930. Anopheles bengalensis Puri. Indian J. Med. Res. 18:955.

1933. Anopheles bengalensis Christophers. Vol. IV, 371, London.

1938. Anopheles bengalensis Baisas. Mon. Bull. Bur. Hlth.

Philipp. Manila 18:175-232.

Eggs: Not studied in the Philippines.

Larvae: First and second-instars: not studied by local workers.

Third and fourth-instars: not studied.

Pupa: Not studied locally.

Adults: Description partly taken from Baisas & Russell (1937) and Reid (1965) and partly as seen in specimens with associated skins from Subic.

Medium sized, dark, Culex-like in posture when alive. Palpus: both sexes slender, dark, slightly swollen at apex of female; male similar but terminal segments clubbed as usual. Normally the scales do not entirely cover the club and the inter-segmental spaces are shiny, appearing pale under certain lights. Proboscis entirely dark including labella. Wings entirely dark with narrower scales. Abdomen dark in both sexes without scales on cerci and coxite. Phallosome of male devoid of leaflets or spinous processes.

Breeding habits: Breeds in sylvan creeks.

Biting habits: Not known.

Distribution: Oriental Region.

(21)

Anopheles (Anopheles) fragilis Theobald 1903.

1903. Anopheles fragilis Theobald. Entomologist 36:257.

1933. Anopheles fragilis Christophers. Vol. IV. Fauna of
British India 371 pp.

Eggs: Not studied in the Philippines.

Larvae: First and second-instars: not studied by local workers.

Third and fourth-instars: the Philippines form frequently has
three branches on its inner clypeals and the post-clypeals have more
branches than those described and illustrated by Reid (1965).

Pupa: Not studied.

Adults: Entirely dark, similar to aitkenii and bengalensis.

Breeding habits: Breeds in sylvan creeks.

Biting habits: Unknown.

Distribution: In the Philippines, usually found in the streams of
frontier areas and mountains in all major islands. Widespread in
Oriental Region.

(22)

Anopheles (Anopheles) franciscoi Reid 1962.

1962. Anopheles franciscoi Reid. Bull. Ent. Res. 53:57.

1936. Anopheles barbirostris Urbino, variety.

Eggs: Studied but not published. Eggs illustrated by Reid.

Floats of eggs without filaments extending toward the under-surface
of eggs. Deck divided into a short oval slit at either end of egg,
surrounded by narrow frills.

Larvae: First-instar, studied but not illustrated or published. Resembles first-instar larvae of other species under Myzorhynchus series, and of Anopheles peditaeniatus (see Baisas, 1947).

Second-instar: briefly studied but not published or illustrated. However, changes in hairs at this stage follow those of other species under Myzorhynchus series.

Third and fourth-instars: ic close together, long, single, or branched into two; oc plumose with 16 to 25 branches. Pc short, single, or branched into 2 or more. Pro-thoracic hair 6 with 4-11 lateral branches. Abdominal palmate on segment II, pigmented.

Pupa: Respiratory trumpet with pronounced secondary cleft. Abdominal hairs 2 and 5 on II to V with a few branches; and hair 5 on VII has 3-8 branches.

Adults: Female usually with 2-5 propleural bristles. Legs: first fore tarsomere with an apical pale band, not crossing the joint, mid tarsomeres with narrow pale band or flecks, third hind tarsomere with pale apical band not crossing the joint. Wing with pale fringe spot at vein 2.1, fringe spot on tip of 5.2 usually present; few scattered pale scales at basal half of costa; sometimes this is entirely dark. Abdomen with a very few pale median scales on ventral surface. Male: usually with fringe at tips of veins 1, 2.1 and 5.2. Male terminalia: phallosome usually with 5 or more leaflets.

Breeding habits: Breeds in fresh water pools of a more or less sylvan character.

Biting habits: Presumed to be zoophilic.

Biting habits: Presumed to be zoophilic.

Distribution: Southeast Asia.

(23)

Anopheles (Anopheles) lesteri Baisas & Hu 1936. Figure 30.

1936. Anopheles lesteri Baisas & Hu. Mon. Bull. Bur. Hlth.
Philipp., Manila 16:229.

1953. Anopheles lesteri Reid. Bull. Ent. Res. 44:5-76.

Eggs: (Figure 25). Studied and illustrated by Baisas & Hu (1936). Similar to eggs of peditaeniatus from which it cannot be differentiated.

Larvae: First and second-instars: not studied.

Third and fourth-instars: differ from larvae of A. peditaeniatus only in hair 5 of the mesothorax. In lesteri meso-5 is an ordinary hair with 3 or 4 fairly long straight lateral branches, whereas in peditaeniatus this is a delicate stellate hair with several sinuous branches.

Pupa: Well studied and illustrated by Baisas & Hu (1936), differentiation between lesteri and peditaeniatus possible only by the differences between their respective hair 9 of abdominal segment VIII. In lesteri, this hair is much longer, with long, lateral branches of about 11 or so. In peditaeniatus this is represented with a short, stout, pointed stem with or without very short lateral branches.

Adults: Similar to adults of peditaeniatus except that the fore tarsomeres in lesteri have narrow rings involving only the tips of I-III of the fore tarsomeres, and II, III and IV of the hind tarsomeres.

Breeding habits: Breeds in fresh water pools and sides of ponds, lakes, etc., preferably not affected by salt tides.

Biting habits: Not determined.

Distribution: Southeast Asia.

(24)

Anopheles (Anopheles) manalangi Mendoza 1940. Figure 31.

1940. Anopheles manalangi Mendoza. Previously mistaken by P.I. workers as part of A. barbirostris Van der Wulp 1884.

Eggs: (Figure 26). Differ from eggs of franciscoi: ribs of the floats have longer ventral filaments. Usually the tips of these ribs meet on the undersurface of the eggs.

Larvae: First-instar larva resembles the first-instars of all Anopheles of the Myzorhynchus series in the Philippines. Second-instars not fully studied by local workers.

Third and fourth-instars: very similar in general characters to equivalent stages of other local anophelines of the Myzorhynchus series, differing only from the equivalent forms, especially from A. franciscoi, in having the leaflets of the palmate hair on abdominal segment II unpigmented.

Pupa: Studied locally but thought to be part of the barbirostris complex.

Adults: Reid (1962) says, "propleural hairs branched into 6-12, average 7", which is not at all a definitive specific character. In fact, one will not be able to differentiate caught wild specimens as manalangi or another species; there are many overlapping diagnostic characters. Definitive identification may be made with adults

having associated mounted skins, or adults raised from known eggs.

Breeding habits: Breeds in fresh water pools, ponds and lakes with light vegetation.

Biting habits: Not determined.

Distribution: Southeast Asia and Indo-Malayan Region.

(25)

Anopheles (Anopheles) peditaeniatus (Leicester) 1908. Figure 32.

1908. Anopheles peditaeniatus (Leicester). Stud. Inst.

Med. Res. 3:18-261.

1953. Anopheles peditaeniatus Reid and Hopkins. Bull. Ent.

Res. 44:5-76.

Eggs: (Figure 25). Well studied and illustrated by Baisas & Hu (1935). Deck long and narrow, similar to deck of A. lesteri eggs.

Larvae: First-instar (well discussed and fully illustrated by Baisas (1948),) and second-instar, partly discussed by Baisas (1948).

Third and fourth-instars: oc plumose, ic longer, usually single, close together, sometimes one or the other split near apex into 2; pc short with 3 or more fine branches. Pro-1 usually single, short, sometimes split near apex into 2 or 3. Pro-2 longer with 12 or more long lateral branches. Meso-5 stellate - the only character which differentiates this form from larva of A. lesteri. Ih fairly long, 2 or 3 branched. Palmate hairs mostly not broad, leaflets pigmented.

Pupa: Well studied and illustrated by Baisas & Hu (1936). Mainly differentiated from pupae of lesteri by the short hair 9 of VIII, which may be single, pointed or with a few short lateral branches.

Paddle and paddle hairs as shown by Baisas & Hu (1936), Plates 9 and 10.

Adults: Female. Proboscis: dark, except labella. Palpus: dark, shaggy with 4 white bands: apical, subapical, submedian and sub-basal. Wings with conspicuous yellow marking at tip involving area opposite vein 1 to opposite vein 3, sometimes to opposite vein 4.1. Legs: dark, with conspicuous pale bands on hind tarsomeres involving apex of III and narrow part of the base of IV. Smaller ring at tip of II and a pale subapical spot on I. Pale rings on hind tarsomeres easily visible.

Breeding habits: Breeds in large pools, canals, sides of ponds and lakes not affected by salt water.

Biting habits: Undetermined, but evidently zoophilous by the number of adults that are caught in carabao-baited traps.

Distribution: Southeast Asia.

(26)

Anopheles (Anopheles) pseudobarbirostris Ludlow 1902. Figures 33 & 34.

1902. Anopheles pseudobarbirostris Ludlow. J.N.Y. Ent. Soc.

10:129.

1933. Anopheles pseudobarbirostris Baisas. Mon. Bull. Bur.

Hlth. Philipp., Manila 15:291-339.

1953. Anopheles pseudobarbirostris Bonne-Wepster and

Swellengrebel. 504, 220, Amst.

Eggs: Studied and illustrated by Baisas (1936), but first published as a part of Urbino's paper (1936); also reproduced here.

Larvae: First and second-instars: not studied here.

Third and fourth-instars: easily recognized due to the presence

of stigmal club, the equally long and developed lh or hair 6 of abdominal segment VI, the conspicuously swollen basal portion of the antenna and its long antennal hair; the finely frayed ic and the plumose oc with its rather stout, well-arranged branches which are nearly equal in lengths; tips blunt. Pro-1 fairly short with 2 or 3 submedian branches; pro-2 with about 14 long branches.

Pupa: See also Baisas & Hu (1936), plates 11 and 12 for peculiar trumpet.

Adults: Large, dark. Female proboscis shaggy; palpus dark. The species is furthermore characterized by conspicuous and numerous scattered pale scales on femora especially on their under-surfaces; 1st tarsomere of all legs may have scattered pale scales. Abdominal sterna: segments I to VII usually with conspicuous cluster of broad white scales mostly at middle, but on I also along sublateral sides.

Breeding habits: Breeds in fresh water, clean vegetated small lakes, impounded water and the like.

Biting habits: Zoophilic.

Distribution: Throughout the Philippines and other parts of the Indo-Australian region.

(27)

Anopheles (Anopheles) vanus Walker 1860.

1860. Anopheles vanus Walker. Proc. Linn. Soc. Lond. 4:91.

1953. Anopheles vanus Bonne-Wepster and Swellengrebel. 504. Amst.

Eggs: (Figure 26). Studied and drawn by Baisas (1936) and by Reid (1962), and characterized by the long, ventral filaments of

the float-ribs.

Larvae: First and second-instars: not studied locally.

Third and fourth-instars: differentiated from larva of peditaeniatus by the non-stellate meso-hair 5. Reid (1962) says: "Head: outer clypeal in 39 specimens with 16 to about 25 branches usually not stiff, occasionally more (two specimens from Borneo had 25, 32 and 34, 35 branches), in 11 specimens from Celebes the range was 18-22; sutural hair 7-14 (34), posterior clypeal 1.4 (5), antennal shaft hair 8-9 (4) length variable. Thorax: inner shoulder hair 7-11 (7). Abdomen: palmate II not pigmented (18/29)." (Numbers enclosed in parentheses equal number of specimens examined.)

Pupa: Studied and illustrated by Baisas (1936) as part of pupa of A. barbirostris complex. Studied and illustrated by Reid (1962) from whom the following is quoted:

"Trumpet without any secondary cleft or seam (16/26) and somewhat differently shaped from that of barbumbrosus. Abdominal hairs 2 and 5 with few branches which may be somewhat stiff and spreading, 2, VII with 1-7 branches (31), 5, VII with 5-12 (20). Refractile border of paddle about 3/4 the length of the paddle (0.67-0.77, 5 spec.)."

Adults: Female proboscis dark except labella. Palpus dark, shaggy, without any pale markings. Wings: fringe pale spot present opposite wing vein 2.1 and from 3 to 4.1; usually also at tip of 5.2. With scattered pale scales on basal half of wing costa. Usually with dark scales at tips of sternite VII. Legs dark: first fore tarsomeres usually with pale rings.

Breeding habits: Breeds in large fresh water pools and small lakes with vegetation.

Biting habits: Not determined.

Distribution: Philippines, Borneo, Celebes and Moluccas
(Reid and Hopkins, 1962).

(28)

Anopheles (Cellia) annularis Van der Wulp 1884. Figure 35.

1884. Anopheles annularis Van der Wulp. Notes Layden Mus.
6:249.

1900. Anopheles fuliginosus Giles. Handbook :161.

1901. Anopheles jamesii Liston. Indian Med. Gaz. 36:441.

1901. Anopheles leucopus Donitz. Insektanborse 18:37.

1908. Anopheles lineata Ludlow. Canad. Ent. 40:50.

1911. Anopheles adiei James and Liston. Monog. Anoph. Mosq.
2nd ed. :90.

1911. Anopheles nagpori James and Liston. Mong. Anoph.
Mosq. India 2nd ed. :90.

Eggs: Unknown.

Larvae: First and second-instars: not studied in the Philippines.

Third and fourth-instars: Baisas & Banez (1960) give good illustrations and discussions of the Philippines form. Head: ic with fairly thick fraying toward the apex, oc plumose; pc branched into 3 or more. Thoracic palmate or meta-hair No. 3 fairly developed with flattened but not fully spread leaflets; pro-1 thick with more than 20 branches; pro-2 longer but with fewer branches. Lh or hair 6 of abdominal segments IV & V branched at about middle usually into 3;

of VI branched closer to base into 3 or more.

Larva may be recognized with the naked eye as it is darkish or greenish when alive or when newly killed with no pale markings anywhere.

Adults: Male and female: easily identified due to the conspicuous white hind tarsomeres, general dark coloration of the adult contrasted with white markings, dark spot on forking point of wing vein 5 (the only species outside group Myzomyia with this striking character) and numerous broad pale scales on mesonotum.

Breeding habits: Usually breeds in seepages and pools and impounded fresh water with floating vegetation.

Biting habits: Apparently more zoophilic than anthropophilic. Usually caught in fairly large numbers in carabao-baited traps anywhere in the Philippines.

Distribution: Throughout the Philippines, Indonesia, India, Southeast Asia and Oriental Region in general.

(29)

Anopheles (Cellia) filipinae Manalang 1930. Figure 36.

1930. Anopheles aconitus var. filipinae Manalang. Philipp.

J. Sci. 43:258.

1931. Anopheles filipinae Christophers and Puri. Rec. Malar.

Surv. India 2:481-493.

1936. Anopheles filipinae Baisas. Philipp. J. Sci. 61:205-220.

1942. Anopheles filipinae Simmons and Aitken. Army Med. Bull.

59:213.

1945. Anopheles filipinae Bohart. U.S. Navmed 580, 88, Wash.

1953. Anopheles filipinae Bonne-Wepster and Swellengrebel.

Eggs: (Figure 27a). The eggs are distinguished from those of A. flavirostris and A. mangyanus by the coarser ribs of the floats and the closer position of the ends of the floats to the poles of the deck.

First and second-instar larvae: Not available for illustration and description.

Third and fourth-instar larvae: the main diagnostic characters differentiating the third and fourth-instar larvae of A. filipinae from those of A. flavirostris and A. mangyanus are the clypeal hairs or nos. 2 and 4, sometimes also no. 3, with more or less fine branches; while the tergal plate on abdominal segment II is not indented on the posterior margin.

Its metapalmate and its tiny abdominal hair 0 are like those of A. mangyanus; that is, the leaflets of the metapalmate have long-drawn fine points while hair 0 of the abdomen arises from the tergal plate. These were among the findings of King (1932), whose paper is an important reference in the study of the funestus-minimus subgroup.

Pupa: Without distinctive diagnostic characters.

Adults: The main differences from the adults of A. flavirostris and A. mangyanus are: (1) its proboscis is entirely dark, except the labella; (2) the dark ring separating the apical from the subapical white bands of the palpus is usually broader and sometimes almost equal to the subapical white bands. Wings: costal pale spots usually show the prehumeral, the humeral and the presector plus the four main

pale costal spots: sector, subcostal, pre-apical and apical. Vein 6 has usually 3 dark areas or spots and a pale fringe spot opposite its tip. The tarsomeres usually have narrow pale rings involving the tips and bases of I-IV; V entirely dark. (Note: a ring is represented by pale scales forming a complete circle around the segment. The extreme tips of the segments have very narrow scaleless portions which become shiny, simulating pale rings especially when viewed under very bright electric spot lights; but scaleless portions are not considered true rings.)

Breeding habits: Breeds mostly in clear seepage pools with slight vegetation or in semi-stagnant areas along sides of streams.

Biting habits: Mostly zoophilic, partly anthropophilic.

Distribution: Apparently indigenous to the Philippine Islands.

Medical Importance: This is the third species of Group Myzomyia of genus Anopheles, subgenus Cellia in the Philippines. A number of A. filipinae were found positive with oocysts or sporozoites during the years since 1926 when the Malaria Control Division of the Philippines Department of Health was established. (There was one positive gut reported by Dr. P. F. Russell, formerly a special WHO consultant on Malaria to the Philippines, but we cannot verify this in the literature available to us now.)

(30)

Anopheles (Cellia) flavirostris (Ludlow) 1914. Figures 37 & 38.

1914. Anopheles flavirostris (Ludlow). Psyche. 21:30.

1932. Anopheles flavirostris King. Philipp. J. Sci. 48:485-523.

1936. Anopheles flavirostris Baisas. Philipp. J. Sci.
61:205-220.
1949. Anopheles flavirostris Gapuz & Santiago. Philipp.
J. Sci. 78:127-134.
1952. Anopheles flavirostris Mendoza & Abinoja. Philipp.
J. Sci. 81:53-59.
1953. Anopheles flavirostris Bonne-Wepster and Swellengrebel.
371-504, Amst.

Eggs: As illustrated (Figure 27b).

Larvae: First and second-instars: as described by Baisas (1949). Third and fourth-instars: small dark larva without easily visible diagnostic characters. Microscopically, the larvae possess large tergal plates on the abdomen, a common character found in all species of group Myzomyia. A. flavirostris differs from A. filipinae in that (1) the tergal plate of abdominal segment II has an indentation at the posterior margin, the shape of the other tergal plates tapering on either side; (2) the thoracic palmate (meta-hair 3), has its leaflets rather blunt-ended in contrast with those of mangyanus and filipinae in which these leaflets are drawn into long fine points; and (3) antepalmate hair or No. 2 of segment VII is branched basally or sub-basally. If these main characters are remembered, there is really no difficulty in identification.

Pupa: As illustrated.

Adults: Male and female: small dark mosquitoes having the

common character of Group Myzomyia: the dark spot at the bifurcation point of wing vein 5. The female is easily recognized by the flavescense (small, golden patch, variable in size), on the underside at about the middle of its proboscis. The male does not have this character. Other markings as illustrated in figure 38.

Breeding habits: Breeds in slow flowing, shaded streams, and seepage pools satisfying those qualities. Has low tolerance to salinity.

Biting habits: Largely zoophilic. Precipitin tests of blood meals, however, have shown that natural infections with Plasmodia among flavirostris, (which we take for granted to be human malaria) is very low. Moreover, the infective rate, compared with the infected rate, is still much lower. Nonetheless, with the presence of other favorable factors, this very low infective rate is sufficient to cause malaria epidemics often very serious especially in frontier areas.

Distribution: In the Philippines on every island with fresh water streams from lowlands to about 2,000 feet elevation. Found also in Indonesia.

Medical Importance: Anopheles flavirostris is the most important malaria vector in the Philippines. Based on the total number of A. flavirostris and A. mangyanus caught in the Naval Reservation during our observation, there does not seem to be the least danger of a malaria outbreak in the reservation. The total number of adults and larvae of A. flavirostris and A. mangyanus collected from the Base during our investigation are shown in the following table.

	A d u l t s			L a r v a e
	male	female	total	
<u>A. flavirostris</u>	2	70	72	397
<u>A. mangyanus</u>	1	1	2	6

During the 10 month observation period (November, 1967 to August, 1968 inclusive), the vector species population was much lower than that observed by the Malaria Control Division, even at the height of its intensive nationwide house-to-house spraying program.

The nearest place to Subic Naval Reservation where the Philippine Malaria Division has records of A. flavirostris catches is Barrio San Jose, Pilar, Zambales Province. On 20 December, 1955, a total of 70 A. flavirostris were taken in a carabao-baited trap there. This barrio was highly malarious at that time. Elsewhere in Luzon Island catches of A. flavirostris in carabao-baited traps were very much higher than catches from human-baited traps and light traps.

(31)

Anopheles (Cellia) indefinitus (Ludlow) 1904. Figure 39.

1904. Anopheles indefinitus (Ludlow). Canad. Ent. 36:299.

1956. Anopheles indefinitus Bohart. Insects of Micronesia.

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Eggs: As illustrated in Figure 27. Very differentiable from the eggs of vagus limosus due to the broad frills which spread outwardly when in water.

Larvae: First and second-instars: not studied locally.

The third and fourth-instars may be differentiated from those of others in the group due to the relative lengths of the inner and outer clypeal hairs, the well-developed palmate hairs on its abdominal segment I, and the usually 3-branched lh (or hair 6) on abdominal segments IV-VI, the branches of which arise close to base at points

directly opposite each other in their rachis. There are other minor differences: the comparatively better developed palmate hairs in abdominal segments I-VII and the comb teeth.

Pupa: Without any character of specific value.

Adults: Male and female: female palpus with two broad white bands; the apical and subapical, separated by a dark ring. Proboscis dark except labella. Head, mesonotum and pleuron without distinct diagnostic characters. Wing costa: with very broad or long sectoral and preapical dark areas. Pale fringe spots opposite all wing veins. Legs dark, the fore tarsomeres with pale rings at apex of I, a pale ring at base of II and another such ring at its apex; III and IV similarly marked; V dark.

Breeding habits: Prefers to breed in large vegetated impounded waters in fish ponds during the rainy season when the water has low salt content, and in stagnant parts of shallow rivers and streams.

Biting habits: Highly zoophilic.

Distribution: Widespread in the Oriental Region.

(32)

Anopheles (Cellia) litoralis King 1932. Figures 40 & 41.

1932. Anopheles litoralis King. Philipp. J. Sci. 47:305-342.

1936. Anopheles litoralis Baisas. Philipp. J. Sci. 61:205-220.

1953. Anopheles litoralis Bonne-Wepster and Swellengrebel.

Eggs: Not illustrated or studied in Subic. It may be said that the egg characters of this group show definitive diagnostic

differences, especially with regard to vagus limosus and indefinitus.

Larvae: The first and second-instar larvae were not studied; the third and fourth-instar have a full complement of hairs and so either one may be used for identification.

Pupa: Without diagnostic character of definitive specific value.

Adults: Male and female: relatively easy to recognize by the illustrated characters by the highly yellowish blurred spots, and the pale spots of the femora and tibia. The leaflets of the phallosome of the male terminalia are quite distinct from others in this group.

Breeding habits: Breeds in open pools, fish ponds, and salt water marshes.

Biting habits: Largely zoophilic; attacks man readily during the day if confined in cages.

Distribution: Throughout the Oriental Region, Southeast Asia.

(33)

Anopheles (Cellia) ludlowae (Theobald) 1903. Figures 42, 43 & 44.

1903. Anopheles ludlowae (Theobald). Mon. Cul. 3:42.

1917. Anopheles formosensis Koizumi. Zool. Mag., Tokyo
29:354.

1920. Anopheles hatorii Koizumi. Daiwan Kenkyujo Hokoku
(Rep. Formosa gov.) 8:24.

1921. Anopheles ludlowae var. flavescens (Swellengrebel).
Moded. kolon. Inst. Amst., (Trop. Hyg.) No. 10.
15:47.

1949. Anopheles ludlowae var. torakala Stoker and Waktoedi

Map. Anoph. Imag. Indonesia :58.

Eggs: (Figure 27). Presumably the type of floatless eggs studied and illustrated by Urbino (1936) were laid by a female whose wing vein 6 had 3 dark spots. However, we do not know for certain. On our part, we know definitely that the eggs with floats illustrated here were laid by a female with 2 dark spots on wing vein 6.

Larvae: First and second-instars: not studied.

Third and fourth-instars like those of other studied local anophelines, have a full complement of hairs.

Principal diagnostic characters: relatively long outer clypeals but not as long by actual length and in relation to the inner clypeals, as those of litoralis. A more easily visible character is the number of branches the lateral hairs (hair 6 of abdomen) bear: 4 or more, the location of the first (most basal) branch, rather farther away from the base; the different separated points where the other branches arise from stem.

Pupae: Without characters of specific diagnostic value.

Adults: Male and female: the principal diagnostic characters as illustrated, the better marked pale spots on legs, and the leaflets of male phallosome. Often, there is an extra dark spot or narrow dark ring at the tip of the female palpus.

Breeding habits: Breeds along the sides of slow-flowing, shallow rivers with some algae, or in open pools near such rivers.

Biting habits: Primarily zoophilous.

Distribution: Philippines, Indonesia, Taiwan.

(34)

Anopheles (Cellia) ludlowae ssp. cabrerai new subspecies. Figure 45.

The erection into subspecific status of this form is here proposed, first, because it seems the three dark spots on its wing vein 6 is a stable character: in past years, it has been observed and listed definitely in the records at Clark Air Base where it was thought to be and recorded as Anopheles parangensis (Ludlow) 1914; and second, because it seems to have been increasing steadily year by year. None of the many entomologist-technicians of the Malaria Division throughout the Philippine Archipelago had ever reported this kind anywhere, although in 1957-58, Mrs. Adela C. Ramos, Mr. Domingo Santiago, Mr. Felipe Catangui, Mr. Avelino del Rosario and myself had taken a dozen or more female specimens of this kind during an inspection trip at Kidapawan, Cotabato Province, Mindanao Island. They were all caught in carabao-baited traps. These were merely placed in the records as Anopheles ludlowae (Theobald) 1903. "variety with three dark spots on vein 6 of the wing." The reason for this classification was our failure to find the larvae of parangensis at that time, although search for them was undertaken. On the other hand, larvae of Anopheles ludlowae were successfully found in Kidapawan and in various other places in Mindanao Island at that time.

During the time when Dr. W. V. King worked in the Philippines (1928-1932), I made for him quite a number of collections of Anopheles ludlowae larvae from the Marikina River where ludlowae was breeding

heavily. If the kind with three dark spots on wing vein 6 was present even very rarely then they would not have been missed. Our first definite record of ludlowae with three dark spots on wing vein 6 was in the Tala Malaria Field Laboratory of the Department of Health, where we supposed this form came from Alat River located at a convenient distance within the flight range of mosquitoes: one kilometer or 2.

Eggs: Unknown. Two types of eggs have been reported from the Philippines: (1) the floatless kind described and illustrated by Urbino (1936); and (2) the kind with floats described and illustrated here (Figure 27). We know for certain that the typical ludlowae with two dark spots on vein 6 of its wing lays eggs with floats.

Larvae: First and second-instars: not studied.

Third and fourth-instars: we shall not say we know these stages definitely. The only two skin mounts we have were those turned over to the Baisas Entomological Research Laboratory by Mr. J. L. Libay, technician for the USAF 5th Epidemiological Flight. These skins were in a very unsatisfactory condition. We inspected his work at that time and thought the temperature at which the mosquitoes were reared was much lower than suitable to tropical mosquitoes. We saw adults in individual confinement after emergence from the pupal stage which could not fly at all. We are hazarding a guess by saying this form has larvae with the same diagnostic characters as those of the typical Anopheles ludlowae larva.

Male terminalia: we dissected, examined and mounted terminalia of the 21 males with 3 dark spots on wing vein 6 brought from Clark.

We cannot claim they differ in any details from the terminalia of the typical ludlowae. It must be noted, however, that the phallosome of parangensis is different from that of A. ludlowae.

Pupa: Cannot be differentiated from pupa of the typical Anopheles ludlowae.

Adults: Male and female: outside of the three dark spots on wing vein 6, this subspecies cannot be differentiated by external markings from the typical ludlowae. The male phallosome is also similar to that of the typical form. However, a close study of all the larval instars should be undertaken by anyone who has the opportunity.

Breeding habits: Breeds along shallow vegetated edges of rivers, ponds and lakes, and in small open pools.

Biting habits: Undetermined.

Distribution: Throughout the Philippines, but so far not reported elsewhere.

(35)

Anopheles (Cellia) maculatus Theobald 1901. Figure 46.

1901. Anopheles maculatus Theobald. Mon. Cul. 1:171.

1910. Anopheles pseudowillmori Theobald. Mon. Cul. 5:65.

1924. Anopheles dravidicus Christophers. Indian J. Med.

Res. 12:297.

1925. Anopheles hanabussi Yamada. Sci. Rep. Inst. infect.

Dis. Tokyo Univ. 4:471.

Eggs: Not studied locally.

Larvae: First and second-instars: not studied locally.

Third and fourth-instar larvae: characterized mainly by the frayed ic and oc, but with single pc. Pro-1 and pro-2 rather thick with thick branches; meta-3 with 3 or more long slightly flattened leaflets; palmate or hair 1 on abdominal segment I poorly developed; on other segments well-developed with flattened leaflets and long, fine pointed filaments. Lh or hair 6 of abdominal segments IV-VI with 5 or more branches located at different points on each side of the stem.

Pupa: Not studied in the Philippines.

Adults: Male and female: characterized mainly by highly spotted legs; last hind tarsomere entirely white; IV and III also white, but each has a dark band at about the middle. The apical and subapical white bands of female palps equally broad with a narrow dark ring in between them.

Breeding habits: Breeds in seepage pools and slow-flowing water with algae in open and semi-forested areas.

Biting habits: Mostly zoophilic, but attacks man quite often.

Distribution: All of Oriental Region in general, India, and neighboring countries of Southeast Asia.

(36)

Anopheles (Cellia) mangyanus (Banks) 1906. Figures 47, 48 & 49.

1906. Anopheles mangyanus (Banks). Philipp. J. Sci. 1:991.

1936. Anopheles mangyanus Baisas. Philipp. J. Sci. 61:205-220.

1949. Anopheles mangyanus Gapuz & Santiago. Philipp. J. Sci.

78:127-134.

1953. Anopheles mangyanus Bonne-Wepster and Swellengrebel.

1914. Anopheles febrifera Banks. Philipp. J. Sci. 9:405.

1932. Anopheles febrifera King. Philipp. J. Sci. 48:485-523.

Eggs: (Figure 27).

Larvae: First-instar larva: (Figure 47).

Second-instar: follows the changes in hairs observed in second-instar larva of A. flavirostris.

Third and fourth-instars: similar to equivalent instars of flavirostris; differentiating characters being the metathoracic palmate having long, pointed filaments; the tergal plates of the abdomen more rectangular than oval; antepalmate or hair No. 2 of abdominal segment VII single or branched near the apex into 2 or 3.

Pupa: With no diagnostic character to differentiate it from the pupae of flavirostris or filipinae.

Adults: Male and female: very much like flavirostris, that is, rather small, dark, but without golden patch beneath proboscis at about middle. Dark costal markings at basal half broken usually by humeral and presector pale spots. Tarsomeres entirely dark.

Breeding habits: Breeds in slow-flowing, shaded streams, seepage pools, quiet sides of large rivers, lakes and the like, normally at higher elevations than favored by flavirostris or filipinae. Often found at 200 to 500 feet elevation in semi-forested or forested areas.

Biting habits: More zoophilic than anthropophilic. Differs according to situation and location: less inclined to bite man

in most of Luzon, more anthrophophilic in semi-wild places like the Mangyans in Mindoro.

Distribution: Absent in many parts of the Philippines.

Medical Importance: Effective transmitter of malaria in undeveloped places, like parts of Mindoro Island.

(37)

Anopheles (Cellia) philippinensis Ludlow 1902. Figure 50.

1902. Anopheles philippinensis Ludlow. J. Amer. Med. Asso.
39:426.

1903. Anopheles nivipes Theobald. Entomologist 36:258.

1906. Anopheles freerae Banks. Philipp. J. Sci. 1:993.

1920. Anopheles pampangensis Brunetti. Rec. Indian Mus.
17:114.

1941. Anopheles philippinensis var. hainanensis Takei.
Bull. nav. med. Asso. Japan 30:417.

Eggs: Not studied by local workers.

Larvae: First and second-instar larvae: may be easily picked out with the naked eye when alive in the breeding places or when newly killed because of the conspicuous white markings on the prothorax and on abdominal segments II, III, VI and VIII.

Third and fourth-instars: ic and oc very similar to those of annularis, that is ic with many fine frayings toward the tips, oc, plumose and pc with 3 or more branches. Thoracic palmate or meta-hair No. 3 with flattened but fewer leaflets than those of annularis. Shoulder hairs or pro-1, 2 and 3 unpigmented or white as is most of

the prothorax. Lh or hair No. 6 of abdominal segments IV and V branched beyond middle into usually 3; VI branched at about middle into usually 2.

Pupa: Not studied locally.

Adults: Male and female: generally paler than annularis; without a dark spot on the forking point of wing vein No. 5.

Breeding habits: Breeds in slow-flowing streams, heavily vegetated sides of lakes or ponds, mostly in the open or with little shade.

Biting habits: Mostly zoophilic; less prone to feed on man.

Distribution: Southeast Asia, all of Oriental Region, India, and neighboring countries.

Group Neomyzomyia

Only one species of this group was found in Subic Naval Reservation.

Anopheles (Cellia) tessellatus Theobald 1901. Figure 51.

1901. Anopheles tessellatus Theobald. Mon. Cul., 1:175.

1901. Anopheles formosae Hatori. Kwampo (Off. Rpts. Jap. Gov.) no. 5534:275.

1902. Anopheles deceptor Donitz. Z. Hyg. InfectKr. 41:60.

1904. Anopheles thorn-tonii Ludlow. Canad. Ent. 36:69.

1910. Anopheles ceylonica Newstead and Carter. Ann. Trop. Med. Parasit. 4:377.

1917. Anopheles kinoshitai Koizumi. Zool. Mag. Tokyo 29:135.

Eggs: Baisas (1956) illustrated and briefly described the egg of the Philippine tessellatus.

Larvae: First and second-instar larvae: the first-instar briefly described and illustrated by Baisas (1956). The second-instar not studied locally.

Third and fourth-instars: characterized mainly by the finely frayed ic; the oc very short and simple; the pc short and simple and placed rather farther behind the oc and ic. Shoulder hairs; pro-1 very weak and short with 3 or more short branches; pro-2 longer usually with less than 10 branches. Meta-hair No. 3 poorly developed, bearing a few flattened leaflets. Abdominal palmates or hair No. 1 of abdominal segments I and II poorly developed with about 6 slender branches on II. No. 1 on III-VII with flattened lanceolate leaflets without filaments. Lh on IV and VI rather weak with 2 or more branches. Long and short teeth of comb very well contrasted.

Pupa: Baisas (1936) briefly described and illustrated the pupa of tessellatus found in the Philippines.

Adults: Male and female: easily distinguished under low magnification due to the multiple small dark spots on all wing veins; spotted legs; and apical half of female proboscis entirely golden; of male, dark.

Breeding habits: Breeds in open, but vegetated pools with algae, in unplanted rice paddies and open fields.

Biting habits: Mostly zoophilic; sometimes feeds on man.

Distribution: Throughout Oriental Region, Southeast Asia, Indonesia.

(39)

Anopheles (Cellia) vagus ssp. limosus King 1932. Figure 52.

1932. Anopheles vagus ssp. limosus King. Philipp.

J. Sci. 47:330.

1936. Anopheles vagus ssp. limosus Baisas. Philipp.

J. Sci. 61:205-220.

1953. Anopheles vagus ssp. limosus Bonne-Wepster and

Swellengrebel. The anopheline mosquitoes of the Indo-Australian Region. 504 pp., illus. Amsterdam.

Eggs: As shown in the illustration (Figure 27) frills with definitive diagnostic characters in comparison with those of indefinitus.

Larvae: First and second-instars: not studied locally. The third and fourth-instars differentiable from related species by the relatively short outer clypeals in relation to inner clypeal, by the poorly developed first abdominal palmate and generally less developed leaflets on palmates of other segments; Lh or hair 6 of IV-VI usually only 2-branched each, the branches arising close to base; and by the comb teeth.

Pupa: Without distinct diagnostic characters separating it from pupae of other related species.

Adults: Very closely similar to adult indefinitus except the pale costal markings on wing which are broader than those in indefinitus while the dark spots are a great deal smaller. Female palpus

with broad apical pale band, the subapical pale and dark rings much narrower. Legs very much like those of indefinitus.

Breeding habits: Breeds in open pools containing algae, but often associated with indefinitus in larger bodies of water.

Biting habits: Definitely zoophilic.

Distribution: Widespread in Oriental Region.

(40)

Armigeres (Armigeres) baisasi Stone and Thurman 1958. Figure 53.

1958. Armigeres baisasi Stone and Thurman. J. Wash. Acad. Sci. 48:240.

1935. Armigeres kuchingensis Baisas. Philipp. J. Sci. 56(4):458.

Eggs: Unknown.

Larvae: First and second-instars: not studied.

Third and fourth-instars: cannot be differentiated from the larvae of subalbatus (joloensis). Head: broader than long (flat preparation). Antenna short, not differing much in width from base to apex, not spiculed; antennal hair arises at about the middle of shaft, single, short. Clypeal spines rather long and thin. H-4 relatively short, with four or more branches; h-5 longer, single; h-6 similar to 5; h-7 with two to four branches. Thorax: meso-hairs 5, 6 and 7 arise from a joint plate or tubercle; meso-hair 8 unusual in having its plate connected with the plate of the mesopleurals; and the plate of meta-7 joined with the plate of the meta-pleurals 9 to 12. Abdomen: without outstanding differential character. Ih

or 6 of I branched into five to twelve; 6 of II similar to 6 of I. Lh of these segments, much reduced, only about half as long as 6, split into two or three branches. Segment VIII: comb of eight to twelve teeth, arranged irregularly in a single row; each fringed on either side of the apical portion. Without pecten teeth. Siphon tuft weak and short, often two-branched. Anal segment slightly over half as long as siphon, with a small, subtriangularly shaped saddle. Isc branched into three to six; osc longer, two-branched. Lh weak, branched into two or more. Ventral brush thick, well-developed. Anal papillae very long and broad, with rounded tips, the dorsal slightly shorter than the ventral.

Pupa: Respiratory trumpet - length nearly equal to width at apex; reticulated. Metanotal hairs: 10 branched into five or six; 11 much longer, stiff, single; 12 weakest of these three hairs, split into three or more branches. Hair 9 of VI spinelike, long, single; of VII a tuft of three or more stout branches; of VIII much more developed with a dozen or more frayed branches. Paddle longer than broad, fringed; saddle hair single, twice or more than twice as long as the longest fringe hair.

Adults: Not easy to differentiate from other Armigeres (Armigeres) forms, except by male terminalia characters. Proboscis of female dark, slightly curved downwardly. Palpus dark, about 1/5 the length of proboscis. Head with dark and pale scales; pale medially on nape,

and pale on either side to eye margin. Thorax: dark. Mesonotum with broad pale lateral borders. Mid-lobe of scutellum pale-scaled; lateral lobes dark. Wings dark; legs dark except hind femur which is extensively pale ventrally; a longitudinal dark stripe dorsally. Abdomen: terga dark, with pale lateral patches. Sterna all white except VIII, which is dark with pale apical band.

Breeding habits: Usually breeds in cut bamboos, coconut shells and husks, artificial containers, and plant axils.

Biting habits: Largely zoophilic; but sometimes attacks man even during the day.

Distribution: Philippines.

(41)

Armigeres (Armigeres) malayi (Theobald) 1901. Figure 54.

1901. Armigeres malayi (Theobald). Mon. Cul. 2:258.

1903. Armigeres fusca Theobald. Mon. Cul. 3:135.

1935. Armigeres russelli Baisas. Philipp. J. Sci. 56:490.

Eggs: Unknown.

Larvae: First and second-instars: not studied.

Third and fourth-instars: very similar to larvae of other Armigeres (Armigeres) in the Philippines. Antenna smooth, short, hardly tapers from base to apex. Antennal hair weak, short, arises at about middle of shaft, single, visible under high magnification. Head: broader than long (flat preparation). Preclypeal spines weak and short; h-4 branched into six to over twelve; 5 similar to 4; 6 short and single. Thorax: meso-hairs 5-7 with a combined plate; similar to Armigeres baisasi in having meso-8-12 with a common plate and

meta-7, 9-12 too, have joined plates. Abdomen: lh or hair 6 of I and II similarly strong, split into two equal branches each; h-7 of I less than half as long as lh 6 split into two equal branches; lh 7 of II about 1/4 as long as 6 of this segment split into about half a dozen branches. Comb scales about nine or more, each scale as illustrated.

Siphon like those of other Armigeres (Armigeres) larvae, short and stocky, its weak, slender hair split into two at about the middle; arises subapically from tube. Without pecten. Segment I and its saddle and hairs much like those of Armigeres baisasi larva.

Pupa: No significant differential character; does not differ from pupa of baisasi; 10 and 12 branched; 11 much longer, thicker, single. Hair 9 of abdominal segment VI single, stout, spine-like; of VII more developed with five or more branches; of VIII still more developed with about ten frayed branches. Paddle of the same type as those of other Armigeres pupae, fringed on either side toward apex; paddle hair single, longer than the longest fringe hair.

Adults: Male and female: very similar to adults of other Armigeres (Armigeres) differing only in one external character: broad white scales on either side of clypeus. Differs also in male terminalia (an "internal" character).

Breeding habits: Breeds in cut and split bamboos, coconut shells and husks, artificial and plant containers; often associated with larvae of other Armigeres like subalbatus (joloensis) and baisasi.

Biting habits: Mostly, if not exclusively, zoophilic.

Distribution: Widespread in the Philippines and in other parts of Southeast Asia, Malaya, Thailand, Indonesia, China, New Guinea, Assam, India and Sarawak.

(42)

Armigeres (Armigeres) manalangi Baisas 1935. Figure 55.

1935. Armigeres manalangi Baisas. Philipp. J. Sci. 56:492.

Eggs: Unknown.

Larvae: First and second-instars: not examined.

Third and fourth-instars: all pale, like other larvae of Armigeres. Head: antenna short, smooth, the same thickness from base to apex, its weak, short, single hair arises at about the middle of shaft. Preclypeal spines and head hairs similar to those of other Armigeres (Armigeres) larvae. Thorax: much larger than head. Tubercles of meso-hairs 5, 6 and 8 connected with each other. The plate of meta-7 is, likewise, connected with the meta-pleural plate. Meso-5, 6 and 7 usually single, though sometimes two-branched. Meso-8 has three or four branches; meta-7 branched into three. Abdomen: lh of I and II relatively short, having two or three branches; lh 7 of these segments bears two branches, and is nearly as long as hair 6. Hair 3 of VIII weak with only three or four branches. The comb scales are lanceolate with coarse fringes on either side.

Pupa: Bears no readily recognized diagnostic characters.

Adults: Male and female: appear very similar to adults of other Armigeres, the mesonotal markings shown in the illustration being variable and sometimes absent. The main differential characters are borne by the male terminalia: the style being sub-triangular,

bearing a row of teeth at the apical margin.

Breeding habits: Breeds in bamboo.

Biting habits: Presumably zoophilic.

Distribution: Philippine Islands.

(43)

Armigeres (Armigeres) subalbatus (Coquillett) 1898. Figure 56.

1898. Armigeres subalbatus (Coquillett). Proc. U. S. Nat.
Mus. 21:302.

1901. Armigeres panalectoris Giles. J. Bombay Nat. Hist.
Soc. 13:608.

1904. Armigeres joloensis (Ludlow). Canad. Ent. 36:236.

Armigeres joloensis is proposed to be sunk as a synonym of A. subalbatus, since these two forms are exactly alike in all stages. Previous workers, presumably, did not have materials of all stages of these two mosquitoes to compare.

Eggs: Unknown.

Larvae: First and second-instars: not studied.

Third and fourth-instars: above medium size, pale throughout.

Head: pale, slightly longer than broad; antenna smooth, of equal thickness from base to apex; weak, single antennal hair arises at about the middle of shaft. Preclypeal spines not very thick, short, pointed, single. H-4, a tuft of half a dozen or more branches. H-5, long, single; 6 with two branches; 7 similar to 6. Thorax much broader and longer than head. Meso-hairs 5-6, 8-12 and meta-hairs 7-12 as illustrated. Ih 6 and 7 of abdominal segments I and II and hair 5 of VIII, and comb teeth as shown in the illustrations.

Pupa: Partly illustrated (Figure 56).

Adults - Principal characters: inconstant on mesonotum, as in Figure 56-a; constant on abdominal sterna (Fig. 56-b) characterized by: I scaleless; II white-scaled; III-VIII with basal white bands of different sizes.

Breeding habits: Usually breeds in cut bamboo, sometimes in coconut shells, and artificial containers. Often associated with larvae of Amigeres baisasi and A. malayi.

Biting habits: Mostly zoophilic, seldom anthropophilic.

Distribution: Philippines, Indonesia, Malaysia, Japan.

(44)

Amigeres (Leicesteria) digitatus (Edwards) 1914. Figure 57.

1914. Amigeres digitatus (Edwards). Bull. Ent. Res. 4:262.

1934. Amigeres digitatus Barraud. Fauna of Brit. India,
Vol. V, 330.

1935. Amigeres digitatus Baisas. Philipp. J. Sci. 56:485-497.

1948. Amigeres digitatus Coher. Ent. Amer. 28:75-112.

Eggs: Unknown.

Larvae: First and second-instars: not studied.

Third and fourth-instars: preclypeal spine with prominent tubercle; hair 4 branched; h-5 single; h-6 branched; h-7 divided into three frayed branches. Chaetotaxy of thorax: meso-hair 8 arises from a plate connected with the plate of the mesopleurals; meta-hair 7, likewise, arises from a plate connected with the plate of the meta-pleurals. Abdomen: Lh or hair 6 of segment I, two-branched and is very much longer than hair 7 of the same segment. This is true also with hairs 6 and 7

of segment II; hair 3 of VIII has half a dozen branches and comb scales are distinctive.

Pupa: Respiratory trumpet small, narrow, reticulate and with indistinct trachoid. Metanotal h-10 branched; 11 longer, strong and single; 12 also branched; h-9 on segments VII and VIII well developed. Abdominal hairs weak and short except h-3 and h-5 which are long and stout. Paddle with strong midrib, long fringes; paddle hair single.

Adults: Male and female: medium sized. Vertex and occiput with flat black scales; creamy scales in mid spot, lateral patch and eye margin. Clypeus bare. Proboscis and palpus dark; female palpus about two-thirds the length of proboscis; dark brown scales on mesonotum with a narrow border of creamy scales. Scutellar mid-lobe pale-scaled; lateral lobes dark with a few white scales. Thoracic lobes and pleuron white-scaled. Wings dark. Legs mainly dark, the femora pale ventrally. Abdomen: terga dark brown; segments II-VII having triangular lateral white markings; the upper margin concave, visible on IV-VII of terga. Sterna white-scaled with narrow apical dark bands.

Breeding habits: Breeds in cut bamboo, coconut shells and halved coconut husks.

Biting habits: Probably zoophilic.

Distribution: Philippines, Malaysia, Indonesia, Thailand.

(45)

Armigeres (Leicesteria) magnus (Theobald) 1908. Figure 58.

1908. Armigeres magnus (Theobald). Rec. Indian Mus. 2:293.

1908. Armigeres magnus Leicester. Stud. Inst. Med. Res.

F.M.S. 3(3):18-261.

1934. Armigeres magnus Barraud. Fauna of Brit. India,

Vol. V, 463.

Eggs: Unknown.

Larvae: First and second-instars: not known.

Third and fourth-instars: may be recognized when full-grown, as this species is the largest of the Philippine Armigeres. Pale throughout.

Head: Bears no differential characters. Thorax: some diagnostic characters are indicated by meso-hairs 5, 6 and 7 which do not have a common plate. Abdomen: the lh 6 and 7 of segment I, have a joined plate, 6 somewhat shorter than 7, branched into three, 7 bears two equal branches. Lh 6 and 7 of II also have connected plates, and are similarly longer than lh 6 and 7 of I, each divided near base into two equal long, barbed branches. Hair 3 of segment VIII fairly long, three-branched. Comb teeth diagnostic, being short, the apex divided into short unequal serrated points.

Pupa: May be recognized as illustrated (Figure 58).

Adults: Male and female: largest of local form of Armigeres the most obvious external markings of diagnostic significance being the yellowish, pale and dark checkered patterns on the abdominal terga.

Breeding habits: Usually breeds in bamboo. When in such situation its larvae usually exclusively occupy a whole internode or stump.

Biting habits: Zoophilic - two or three times caught in carabao-baited traps. The author has never been attacked by this mosquito during the day when collecting in thick bamboo grooves although Delfinado (1966) states that females bite freely in such places during the day.

Distribution: Philippines, Ceylon, India, Burma, Thailand, Malaya, Borneo, Hongkong, Taiwan and Indochina.

(46)

Amigeres (Leicesteromyia) flavus (Leicester) 1908. Figure 59.

1908. Amigeres flavus (Leicester). Cul. Malaya :101.

1908. Amigeres apicalis Theobald. Rec. Indian Mus. 2:291.

1910. Amigeres apicalis Theobald. Rec. Indian Mus. 4:7.

Eggs: Unknown.

Larvae: First and second-instars: not studied.

Third and fourth-instars: preclypeal spines fairly long and slender, with prominent tubercles. Head: hair 4 branched; 5 also branched; h-6 single; 7 branched into two. Antenna slender, its small shaft hair arises submedially. Pro-hair 1 single, 2 double, 3 having three short branches. Comb teeth as illustrated. Siphon similar to those of other Amigeres - short and thick, its tuft, a single seta. A large dorsal plate covers the anal segment, which has also a ventral plate.

Pupa: Very much like the pupae of digitatus and magnus, except for the long hairs of abdominal segments, especially h-3 of II and

and III, h-5 of IV and V, and h-9, which are longer than the corresponding hairs in digitatus but shorter than those in magnus.

Adults: Male and female: well described by Thurman (J. Wash. Acad. Sci. 48:393, 1959) from which the following is quoted. "Medium to large sized. Wings dark. Vertex and occiput with creamy yellow scales, few dark scales scattered medially, lateral patch dark; eye margin of drab yellow scales. Female palpus dark, nearly one-half as long as proboscis. Male palpus exceeds the proboscis by the length of the terminal and subterminal segments; with narrow medial yellow ring; IV and V each with narrow basal yellow ring. Clypeus bare. Torus bright yellowish with few yellow and gray scales. First flagellomere with gray scales. Thorax not compressed, not extended over head. Mesonotum brown with golden-bronze luster; anterior border wide, having narrow curved yellowish scales. Scutellum drab yellow, few dark scales scattered. Postnotum with minute pale setae near apex (easily broken). Apn with broad yellow scales, dark scales on dorsal portion; few narrow dark scales mixed; ppn with broad, shaggy yellowish-white scales. Propleuron with drab yellow scales. Drab white scales on pleuron. Wings dark. Legs dark. Tarsomeres pale ringed. Hind tibia shorter than fore- or mid-tibia. Pale stripe on ventral aspect of all tibiae, which continues into tarsomere I. Pale, narrow basal ring on hind tarsomeres. Abdomen: terga dark, with a narrow pale yellow apical band each. Sterna all yellow-white scaled." Philippine specimens: sterna IV to V or V and VI have indefinite brownish or dark patches.

Breeding habits: Breeds in cut bamboo, coconut shells and coconut husks, plant axils.

Biting habits: Not known.

Distribution: Philippines, Malaysia, Indonesia, China, New Guinea, India.

(47)

Culex (Culex) annulus Theobald 1901. Figure 60.

1901. Culex annulus Theobald. Mon. Cul. 1:358.

1938. Culex adelae Baisas. Mon. Bull. Bur. Hlth. Philipp.,
Manila 18:200.

Eggs: Examined but not in details for publication.

Larvae: First to fourth-instars: not easy to differentiate from the larvae of other species of Culex (Culex) whose adults have banded proboscis and tarsi. Identification only by means of comb teeth, pecten teeth and relative sizes of siphon - all of which may be recognized by a look at the comparative illustrations.

Pupa: Inseparable from those of other related forms.

Adults: Can be differentiated from adults of closely allied species by the following characteristics: (1) mesonotum with extensive dull or dirty pale markings forming no definitive pattern; (2) row of stiff translucent hairs arising from underside of long segment of male palpus, each with a small flattened, spoon-like tip; (3) a short row of pale scales along the posterior border of the costa near the humeral crossvein. Male phallosome very difficult to differentiate from those of other allied species even by an

experienced worker.

Breeding habits: Breeds in fresh water ponds, sides of ditches, streams, and lakes.

Biting habits: Primarily zoophilic. Rarely attacks man.

Distribution: Throughout the Philippines, Indonesia and Thailand.

(48)

Culex (Culex) annulirostris Skuse 1889. Figure 61.

1889. Culex annulirostris Skuse. Proc. Linn. Soc. N.S.W.

(2) 3:1737.

1901. bancroftii Theobald. Mon. Cul. 1:367.

1912. jepsoni Bahr. J. Lond. Sch. Trop. Med., Suppl. 1:18.

1912. palpalis Taylor. Bull. N. Terr. Aust. 1a:29.

1912. somerseti Taylor. Rep. Commis. Publ. Hlth. Qd. :28.

1913. consimilis Taylor. Rep. Aust. Inst. Trop. Med. 1911:8.

1914. simplex Taylor. Trans. R. Ent. Soc. Lond. 1913.

Eggs: Not available.

Larvae: First and second-instars: not available.

Third and fourth-instars: clypeal hair-1 dark, large, prominent and spine-like; h-4 single; h-5 with 5 branches; h-6 with 3 branches; h-7 with 10-12 branches. Antenna spinous. Prothoracic h-1, 2 and 3 single. Comb teeth numerous and arranged into two rows. Siphon with five pairs of tufts and one unpaired tuft. Pecten with 10-12 teeth at the basal 1/4. Saddle spiculate. Anal papillae short.

Pupa: Not differentiable from those of sumorosus-annulus sub-group.

Adults: Have better diagnostic characters than the larvae:
(a) speckled legs; (b) a row of pale spots on fore tibia; (c) a short row of stiff hairs along underside of long segment of male palpus, dark and sharply-pointed. Abdominal terga pale banded like those of other allied species. Male phallosome characteristic, and differs markedly from those of others (see illustration).

Biting habits: Zoophilic almost exclusively; very seldom attacks human beings.

Breeding habits: Breeds in fresh water ponds, sides of lakes, slow flowing vegetated streams and ditches.

Distribution: Philippines and Australia.

(49)

Culex (Culex) bitaeniorhynchus Giles 1901. Figures 62 & 63.

1901. bitaeniorhynchus Giles. J. Bombay Nat. Hist. Soc. 13:607.

1901. ager Giles. Entomologist 34:196.

1901. infula Theobald. Mon. Cul. 1:370.

1901. tenax Theobald. Mon. Cul. 2:198.

1903. ambiguus Theobald. Mon. Cul. 3:248.

1907. taeniarostris Theobald. Mon. Cul. 4:299.

1907. ocellata Theobald. Mon. Cul. 4:488.

1907. sarawaki Theobald. Mon. Cul. 4:515.

1913. abdominalis Taylor. Rep. Aust. Inst. Trop. Med. 1911:7.

1913. karatsuensis Mochizuki. Fukuoka Acta Med. 7(1):28.

Eggs: Years ago, preliminary studies were undertaken by local workers, but not completed for publication.

Larvae: First and second-instars: not studied.

Third and fourth-instars: easily recognized by the large size of full-grown larvae. Head: antenna rather small for the size of the larva; spiculed, its large tuft having usually about a dozen long, frayed branches; arises a little below the middle of shaft. Preclypeal spines not very thick, blunt-ended. H-4 the weakest of the frontal hairs, often bifid; h-5 much more developed, often divided near base into three long frayed branches; h-6 slightly thicker and longer than 5, two-branched, frayed; 7 shorter but with more branches (usually over half a dozen). Thorax: without easily recognized diagnostic characters; even the pleural hair groups display the kind common to Culex. Meso-9 and meta-10, well developed tufts, each having usually more than half a dozen subequal frayed branches. Meso-10 and meso-12 and meta-10, longest of the pleurals; meta-12, much reduced as usual. Abdomen: also without striking diagnostic characters. Lh or h-6 of I-VI the longest abdominal setae, each bearing usually three long, subequal, frayed branches; 7 of I about as long as 6 of that segment, but single, frayed. 7 of II-VI reduced to a small tuft having half a dozen or more slender branches. Comb composed of about half a dozen scales or teeth, arranged in an irregular single row, each tooth sharply pointed, with fine serrations on either side of its enlarged base. The mentum is sharply triangular in shape, lined compactly along the lateral sides, with about 40 small teeth. Siphon long (variable) ranging in index from 5 to 9 (Bram, 1967). Subventral tufts weak, variable in number, badly paired or one or sometimes two apparently not paired at all; each

divided basally into three or four slender, simple branches. Segment X not completely enclosed by saddle, with tiny spicules along posterior margin. Isc long, divided basally into about four unequal, simple branches; osc longer, single; lh small in comparison to isc and osc, forked sub-basally. Ventral tuft well developed. Anal papillae relatively small, lanceolate; the dorsal pair slightly longer.

Pupa: Large with trumpet well-expanded apically, like a funnel.

Adults: Male and female: marked variations on scattered pale scales on wings and legs. Pale bands of abdominal terga are sometimes apical, sometimes basal, or sometimes both. Sometimes the last two or three abdominal segments with largely or entirely yellow scales; considered by some as mere variations of no sub-specific significance. Tarsomeres basally pale-ringed.

Breeding habits: Breeds in clear streams, ponds, sides of lakes.

Biting habits: Not known.

Distribution: Philippine Islands, Oriental Region.

(50)

Culex (Culex) fuscocephala Theobald 1907.

1907. Culex fuscocephala Theobald. Mon. Cul. 4:420.

1908. Culex uniformis Leicester. Cul. Malaya :159.

1908. Culex minimus Leicester. Cul. Malaya :160.

1909. Culex taytayensis Banks. Philipp. J. Sci. 4:545.

1910. Culex luteola Theobald. Mon. Cul. 5:378.

1920. Culex inelegans Dyar. Insec. Inscit. Menst. 8:179.

Eggs: Not known.

Larvae: First and second-instars: not examined.

Third and fourth-instars: head: broader than long. Antenna spiculed; its hair tuft well developed, with many frayed long branches; arises at about 1/3 of shaft from tip, at point where enlargement of shaft to base begins; h-1 weak, just like a simple, single, slender seta; h-4 also weak and single; h-7 a tuft, shorter than 5 or 6, but with usually half a dozen or more branches. Thorax: chaetotaxy follows the pattern very common to Culex larvae and bears no particular diagnostic character. Abdomen - segment VIII: comb in a patch composed of about thirty to forty scales or teeth, each with a rounded tip fringed on both sides and tip. Siphon: of moderate (variable) length and thickness having three or four pairs of sub-ventral hairs which are short, weak, branched into 2-4 each. With about a dozen pecten teeth, each sharp pointed, and having 1-3 sharp serrations at one side of base. Anal segment not completely enclosed by saddle; spicules confined in a small area at dorso-posterior margin. Isc long, usually having two unequal branches; osc also long, single. Lh weak, bifid; ventral tuft well developed. Anal papillae slightly exceed the length of anal segment, lanceolate, the dorsal pair longer than the ventral.

Pupa: Of the usual type of Culex pupa.

Adults: Male and female: small, dark mosquito usually recognized readily by the two dark horizontal bands on the pleuron between which is a white-scaled area. Mesonotum, wings, and legs dark. Abdominal

terga with white basal bands: VIII entirely white-scaled in female.

Breeding habits: Breeds in fresh water pools, ditches and rice paddies.

Biting habits: Mostly zoophilic, but rests in good numbers in houses, where some at least have been observed to feed on the human occupants.

Distribution: Philippines, Ceylon, India, Nepal, Burma, China, Formosa, Borneo, Java, Sumatra, Singapore, Malaya, Andaman Islands, Thailand, Indochina.

(51)

Culex (Culex) gelidus Theobald 1901.

1901. Culex gelidus Theobald. Mon. Cul. 2:22.

1901. gelidus var. cuneatus Theobald. Mon. Cul. 2:22.

1913. Theobaldiomyia gelida Theobald. Philipp. J. Sci.
8:307.

1907. Leucomyia gelida var. bipunctata Theobald. Monogr.
Cul. 4:374.

Eggs: Not studied.

Larvae: First and second-instars: not studied.

Third and fourth-instars: without macroscopic character to indicate the species. Head of the usual Culex type: antenna spiculed; its tuft hair also of the type common to Culex. Preclypeal spines not very thick, single, pointed. Hair 4 single, slender, its tip barely reaching the rim of clypeus. Hair 5 and 6 longer than 4, each with three or more long, frayed branches; h-7 similar,

but shorter with usually more than half a dozen branches. Thorax and abdomen bear the typical Culex larval chaetotaxy. Segment VIII of abdomen: comb in a patch; each scale with enlarged and rounded tip, fringed along both sides and tip. Siphon thick, tapers apically, bears 4 pairs of tufts, each with three to six branches. Pecten sharp-pointed with several coarse serrations along one side. Anal segment short, not completely enclosed by saddle, bearing some spicules along posterior margin. Osc long, having two unequal branches; isc about as long, single. Lh single, short. Ventral brush thick. Anal papillae: dorsal pair nearly twice as long as the ventral.

Pupa: Displays the chaetotaxy common to many Culex pupae. Trumpet of moderate size, not too expanded towards apex; trachoid at basal third. Metanotal hairs: 10 bears about ten long branches; 11 longer, divided into two branches; 12 about equal to 10, with some five branches. Hair 9 of VII and VIII fairly well developed tufts. Paddle bears two short, simple, paddle hairs.

Adults: Male and female: easily detected by the naked eye due to large white-scaled area occupying the anterior 2/3 of mesonotum. Female proboscis with a clear-cut white band at about the middle. Abdominal terga with basal bands as illustrated.

Breeding habits: Breeds in fresh water pools, puddles and the like.

Biting habits: Zoophilic.

Distribution: Malaya, Singapore, Indonesia, New Guinea,

Philippines, Formosa, Japan, China, Indochina, Thailand, Burma, Nepal, India, Pakistan, Ceylon.

(52)

Culex (Culex) incognitus Baisas 1938. Figure 64.

1938. Culex incognitus Baisas. Mon. Bull. Bur. Hlth.

Philipp. Manila 18:203.

Eggs: Not studied.

Larvae: First and second-instars: not studied.

Third and fourth-instars: often easily differentiated with the naked eye in breeding waters due to very long, thin siphon. Microscopically, other uncommon characters are noted: (a) well differentiated sizes of comb teeth - the largest, four to six times the size of the smaller; coarser teeth having very long central point, finely fringed on either side at base; small ones with expanded, rounded apices finely fringed all around sides and tip; (b) pecten teeth fairly long with main point long, serrated along one side of basal one-half; (c) variable number of ill-scattered short, weak, siphon tufts, each of two or three branches, or sometimes single. Head as illustrated.

Pupa: Not well differentiated from pupae of other species of the subgroup.

Adults: Wings dark-scaled, conspicuous for the absence of a short row of pale scales along base of costa near the humeral cross-vein which is present in other species of Culex (Culex) with banded proboscis and tarsomeres. Mesonotum with liberal amount of dull-pale

scales forming no constant pattern; proboscis pale-banded at about middle, as common in the subgroup. A row of stiff translucent flattened setae on underside of long segment of male palpus. Legs dark, tarsomeres II and III with pale basal rings. Male terminalia closely similar to, and difficult to differentiate from, those of others in the subgroup.

Breeding habits: Prefers clear sides of streams near forest but may sometimes be found in less clear water with thicker vegetation.

Biting habits: Evidently zoophilic. Low adult population seems to render this mosquito of no medical importance.

Distribution: Widely, though sparsely, scattered in the Philippines.

(53)

Culex (Culex) pipiens quinquefasciatus Say 1823. Figure 65.

1823. Culex pipiens quinquefasciatus Say. J. Acad. Nat. Sci. Philad. 3:10.

1828. Culex pungens Wiedemann. Aussereurop. Zweifl. Inst. 1:9.

1828. Culex fatigans Wiedemann. Aussereurop. Zweifl. Inst. 1:10. Ibid.

1828. Culex aestuans Wiedemann. Aussereurop. Zweifl. Inst. 1:11. Ibid.

1828. Culex ferruginosus Wiedemann. Aussereurop. Zweifl. Inst. 1:12. Ibid.

1848. Culex acer Walker. List Dipt. Brit. Mus. 1:8.
1856. C. cingulatus Doleschall. Natuurk. Tijdschr.
Ned.-Ind. 10:405.
1856. C. cubensis Bigot. In Sagra, Hist. Fis. Isla
Cuba 7:329.
1859. Culex anxifer Bigot. Ann. Soc. Ent. Fr. 3(7):117.
1865. Culex seretinus Philipp. Verh. Zool.-Bot. Ges.
Wien 15:595.
1882. Culex autumnalis Weyenbergh. Los Hab. del Rio
Primero :23.
1886. Culex penafieli Williston. In Sanchez, Naturaleza
7:213:326.
1889. Culex macleayi Skuse. Proc. Linn. Soc. N.S.W.
(2) 3:1746.
1900. Culex skusii Giles. Handbook :338.
1900. Culex doleschallii Giles. Handbook :338.
1901. Culex albolineatus Giles. J. Bombay Nat. Hist.
Soc. 13:609.
1901. Culex quasipipiens Theobald. Mon. Cul. 2:136.
1901. Culex fouchowensis Theobald. Mon. Cul. 2:137.
1901. Culex reesi Theobald. Mon. Cul. 2:145.
1901. Culex sericeus Theobald. Mon. Cul. 2:147.
1901. Culex luteoannulatus Theobald. Mon. Cul. 2:159.
1901. Culex trilineatus Theobald. Mon. Cul. 2:159.

1904. C. pallidocephala Theobald. Rep. Wellcome Trop.
Res. Lab. 1:73.
1905. C. cartroni Ventrillon. Bull. Mus. Hist. Nat.
Paris 11:429.
1906. C. barbarus Dyar and Knab. J.N.Y. Ent. Soc.
14:210.
1906. C. didieri Neveu-Lemaire. Arch. Parasit.
Paris 10:257.
1906. C. pygmaeus Neveu-Lemaire. Arch. Parasit.
Paris 10:256. Ibid.
1907. C. quasilinealis Theobald. Mon. Cul. 4:415. Ibid.
1907. C. christophersii Theobald. Mon. Cul. 4:453. Ibid.
1907. C. raymondii Tamayo. Mem. Municip. Lima 1906:37.
1908. C. aikenii Dyar and Knab. Proc. U.S. Nat. Mus.
35:61.
1908. C. minor Theobald. Rec. Indian Mus. 2:298.
1909. C. revocator Dyar and Knab. Smithson. Misc.
Coll. 52:256.
1909. C. lachrimans Dyar and Knab. Smithson. Misc.
Coll. 52:259.
1911. C. goughii Theobald. Rep. Vet. Res. S. Afr.
1:268.
1914. C. fuscus Taylor. Trans. R. Ent. Soc. Lond.
1913(4):699.

1915. C. aseychae Dyar & Knab. Insec. Inscit. Menst.
3:112.
1919. C. townsvillensis Taylor. Proc. Linn. Soc. N.S.W.
43:836.
1920. C. hensemaeon Dyar. Insec. Inscit. Menst. 8:178.
1920. C. nigrirostris Enderlein. Wien. Ent. Ztg.
38:51.

Eggs: In rafts, often collected but not studied.

Larvae: First and second-instars: many times examined but not studied for publication.

Third and fourth-instars: may be identified readily even under low power due to short siphon, usually shaped in the suggestion of an "S", and the 4 siphon tufts. Preclypeal spines not strong, single; h-4 the weakest of the frontal hairs, as is common in most Culex larvae, usually single; h-5 about twice as long, much more developed, branched from base into six or more, the branches frayed; h-6 similar but with less branches; h-7 again similar to 5 or 6 but exceeding both by the number of branches (about eight or more). Thorax without unusual diagnostic characters, even the pleural hair groups are common. The most prominent in number of branches being meso-9 and meta-10 while the longest of the pleurals are pro-12, meso-12 and meta-10; meta-12 being much reduced. Abdomen has no unusual characters in its chaetotaxy. As mentioned above, the form and shape of the siphon (not well indicated in the illustration) usually suggesting a badly curved "S" provides a most convenient

way of identifying the larvae. Its siphon tufts are badly paired or unpaired, and each of the subventral has about half a dozen subequal branches. Pecten teeth or scales somewhat flattened and rounded at tip, fringed along sides and tip. Comb in a sub-triangular patch, composed usually of over thirty to forty scales; each scale sharp-pointed, with three or four secondary points along basal half. Segment X not entirely enclosed by saddle. Isc long, divided at base into usually three branches. Osc single. Ventral tuft well developed. Anal papillae bluntly lanceolate, the ventral pair slightly exceeds the dorsal in length.

Pupa: Without unusual characters.

Adults: Male and female: differ from many Culex (Culex) with which it is often caught in traps and houses by: (a) the dark unbanded proboscis; (b) dark tarsomeres; but abdominal terga banded similar to those of other Culex (Culex).

Breeding habits: Breeds in non-saline water, preferably foul with high organic content.

Biting habits: Mostly anthropophilic and due to its large number, constitutes the most annoying Culex to human beings. Very seldom taken in carabao-baited traps, but numerous in human-baited traps and in unscreened houses, barns and huts.

Distribution: Worldwide.

Medical Importance: Primary vector of bancroftian filariasis (Wuchereria bancrofti), Malayan filariasis (Brugia malayi), and tropical eosinophilia (Dirofilaria immitis). Secondary vector of Japanese "B" encephalitis. May be a vector of chikungunya. Is a

very poor filaria vector in the Philippines.

(54)

Culex (Culex) pseudovishnui Colless 1957.

1957. C. (Culex) pseudovishnui Colless. Ann. Trop.

Med. Parasit. 51:88.

Eggs: Not available.

Larvae: First and second-instars: not available.

Third and fourth-instars: head - hair 1 pigmented, tapering to a sharp point; h-4 simple, single or branched; h-5 with 3 or 4 pectinate branches; h-6 with 2 or 3 pectinate branches. Thorax: hair 1, 2 and 3 single and pectinate; h-4 bifid and pectinate; h-5 and h-6 single and pectinate; h-7 trifid and pectinate; h-8 bifid, pectinate; h-14 single and simple. Abdomen: 5 to 13 irregularly arranged comb teeth; siphon index ranging from 4.5:1 to 8:5:1; 5 to 7 irregular pairs of subventral tufts and 1 to 3 irregular pairs of lateral tufts; 8 to 11 pecten teeth.

Adults: Male: palpus with pale basal and median bands on segment III; basal white band on IV; and basal and apical white bands on V. Terminalia: subapical lobe of basimere with a blunt rod and 2 hooked rods; inner portion of phallosome with 3 stout teeth; proctiger topped with a tuft of spines. Female head: proboscis with median pale band. Thorax: scutum with patches of brown, pale golden, and white scales; pleuron uniformly light brown; upper and posterior sternopleuron and upper mesepimeron with patches of white scales. Wing: dark brown. Legs: anterior side of hind femur pale with dark apical band; hind tibia with pale apical band; hind tarsus

with pale basal bands. Abdomen: terga dark with pale basal bands; sterna pale with dark apical bands.

Breeding habits: Larvae were collected from ground water in temporary rain pools and streams.

Biting habits: Adults were collected from carabao-baited traps and light traps.

Distribution: Philippines (Bulacan, Rizal, Laguna, Tayabas, Pangasinan, Pampanga and Zambales); Malaya, India and Thailand.

(55)

Culex (Culex) sitiens Wiedemann 1828.

1828. Culex sitiens Wiedemann. Aussereurop. Zweifl.

Ins. 1:542.

1859. C. impellens Walker. Proc. Linn. Soc. Lond. 4:91.

1901. C. microannulatus Theobald. Mon. Cul. 1:353.

1903. C. gnophodes Theobald. Mon. Cul. 3:163.

1906. C. somaliensis Neveu-Lemaire. Arch. Parasit.

Paris. 10:254.

1908. C. nigricephala Leicester. Cul. Malaya :149.

1908. C. salus Theobald. Rep. Wellcome Trop. Res. Lab.

3:256.

1910. C. jepsoni Theobald. Entomologist 43:158.

1912. C. saibaii Taylor. Rep. Comm. Publ. Hlth. Qd. :28.

1913. Culicelsa paludis Taylor. Rep. Aust. Inst. Trop.

Med. 1911:56.

1914. Culicida annulata Taylor. Trans. R. Ent. Soc. Lond.

1913:689.

1914. Culicelsa annulirostris var. milni Taylor. Trans.
R. Ent. Soc. Lond. 1914:196.

1932. C. (Culex) sitiens Wiedemann. Edwards, in Wytsman,
Genera Insect. fasc. 194:204.

1938. C. (Culex) salinus Baisas. Mon. Bull. Philipp.
Hlth. Serv. 18:204.

Eggs: Specimens not available.

Larvae: First and second-instars: not available.

Third and fourth-instars: distinguishable by flattened head hair 1, bulbous anal gills and complete anal saddle. Head: hair 1 dark, broad, flattened and tapering to an irregular apex; 4 single; 5 with 6 to 7 pectinate branches; 6 with 4 pectinate branches; 7 with 7 to 9 pectinate branches. Thorax: hairs 1, 2, 3, 5 and 6 single; 4 and 8 bifid; 7 trifid; all these thoracic hairs are pectinate, except 14 which is single and simple. Abdomen: comb with 30 or more teeth in a triangular patch; siphon index ranging from 3.5:1 to 5.5:1; 5 to 7 pairs of long pectinate tufts with one pair of short and simple tufts arising out of line; pecten with from 10 to 12 teeth at the basal 1/4; saddle covers the whole segment X but indented posteriorly; anal gills bulbous and shorter than the saddle.

Pupa: Not studied.

Adults: Femora with a mixture of dark and pale scales and narrow pale basal bands on abdominal terga. Male head: proboscis with median pale broad band and a tuft of bristles basomedially; palpus

longer than proboscis, with 4 pale bands. Terminalia: basimere with well developed subapical lobe, 3 hooked rods, 4 accessory setae, and a broad leaf; inner portion of phallosome with 5 or 6 stout teeth; proctiger topped with a tuft of small spines; basal sternal process strong and curved. Female head: proboscis with a median wide pale band; palpus short with white scales on tip; vertex with decumbent brownish golden scales; erect scales dark brown. Thorax: scutum with areas of pale scales present on the humeral posterior fossa, dorsocentral, supraalar, prescutellar and mid lobe of scutellum; pleuron with patches of pale scales on the upper mesepimeron and upper and posterior sternopleuron. Wing: predominantly dark scaled. Legs: hind femur mostly of white scales anteriorly, dark scales on the dorsal surface, with dark band subapically and a tuft of yellowish scales at the apex; hind tibia with median stripe of pale scales, apical pale band. Abdomen: terga with basal narrow pale bands on segments II-VIII; sterna mostly white scaled with broad apical dark bands.

Breeding habits: Larvae were collected from tidal swamps in shaded and open fields.

Biting habits: Female adults were collected from carabao-baited and human-baited traps.

Distribution: Philippines (Manila, Rizal, Jolo, Leyte, Panay and Zambales); Thailand, East Africa, Madagascar, Australia and Pacific Islands.

(56)

Culex (Culex) tritaeniorhynchus ssp. summosus Dyar 1920. Figure 66.

1920. C. tritaeniorhynchus ssp. summosus Dyar.

Insec. Inscit. Menst. 8:180.

1931. C. siamensis Barraud and Christophers. Rec. Malar.

Surv. India 2:283.

Eggs: Examined but not studied for publication.

Larvae: First and second-instars: examined but not studied.

Third and fourth-instars: previously studied locally (Baisas, 1938).

Shows no marked differences from other larvae of the group whose adults have banded proboscis and tarsi. May be differentiated from others principally by the weak siphon tufts which are usually short and few-branched; both the tube and tufts variable. The illustration represents a specimen with more developed tufts. Other characters as illustrated. Head: with the usual chaetotaxy of Culex (Culex) larvae. Antenna spiculed mostly from base to point where developed antennal tuft arises; darker on the rest of apical portion. Antennal tuft large, with about two dozen long, well frayed branches originating close to base. Preclypeal spines thick, dark or brownish, taper to not too sharp points. H-4 the weakest of frontal hairs, single; h-5 much more developed, divided basally into usually four frayed branches; h-6 similar, sometimes a bit thicker, with often only three branches; h-7 the largest of frontal hairs, having about nine or more long, frayed branches. Thorax: without striking diagnostic characters differentiating it from other larvae of the subgroup. Even the pleural

hair groups show the common subgroup characters. Meso-9 and meta-9 each branched from base into four or five, frayed; meso-10 and meso-12, also meta-10 equally longer than meso-9 or meta-9, single, frayed. Abdomen: chaetotaxy of the common type for the subgroup. Lh or 6 of I-VI the longest, each with two or three long, frayed branches; Lh 7 of I about as long as 6 of this segment; two-branched; frayed, but 7 of II-VI reduced into a small tuft each with about half a dozen slender branches. H-1 of III-VI also developed, divided basally into three or four branches. Segment VIII: comb consists of over two dozen to about forty scales, arranged in a patch of several irregular rows, each roughly fan-shaped, fringed at around sides and apex. Siphon variable in length, tapering uniformly from base to apex; about half a dozen subventral tufts, weak, variable, each with two to half a dozen slender branches, their lengths hardly exceeding the width of siphon at point of insertion. Pecten composed usually of about ten to about 15 teeth; each individual tooth with a prominent central spine and half a dozen barbs along one side. Siphon varies in length in relation to widest diameter, from about 5 to nearly 10. Anal segment (X) not completely enclosed by saddle, spiculed along dorso-posterior margin. Isc long, divided unequally into usually four branches. Osc longer, single. Lh short, two-branched. Ventral brush well developed. Anal papillae slightly longer than X, narrow, bluntly lanceolate, the dorsal pair longer than the ventral.

Pupa: Trumpet narrow, fairly long, slightly widening at tip, trachoid occupies more than the basal half. Metanotal hairs fairly

long, 10 branched into usually four, 11 and 12 into three each. Hairs 1 and 5 of III and IV and 9 of VII and VIII, most developed setae; of II and III, two-branched each. H-5 of III-VI, branched into two to five. H-9 of VI usually with four, well-frayed branches. Paddle of the usual type; with two short, single, tiny paddle hairs.

Adults: Male: important diagnostic characters: (a) mesonotal scales thinner than those of other species in the subgroup; (b) uniformly dark brown in hue; (c) pale area (on mesonotum) very limited; (d) without long, stiff setae arising in a row from the underside of the long segment of palpus. Female mesonotal covering is identical to that of the male.

In comparing our series of summosus with those of allied forms in the subgroup: (a) the mesonotal scales even in females are less dense, the individual scales narrower and shorter than those of the other species of the subgroup and are uniformly dark brown, hardly overlap each other, and are tousled; (b) absence of pale rings at the tip of male palpus; (c) the absence of stiff, translucent or dark hairs from the underside of the long segment. There are also slight differences (hard to appreciate) in male terminalia and the female bucco-pharynx.

These differences are difficult to see and normally are of use only to the experienced worker in the determination of species.

The mesonotum, even if denuded of scales, almost always has on the lateral sides enough indication of the extent of the pale parts

to indicate the different species. One should remember that the scales near the wing roots in summosus are less dense than those in other allied species.

Biting habits: Largely zoophilic. A certain percentage bite human beings and so this mosquito becomes the object of interest and study in connection with Japanese "B" encephalitis and other diseases of man.

Distribution: Throughout the Philippines and many other parts of Southeast Asia.

Medical Importance: Culex tritaeniorhynchus (sensu strictu) is a primary vector of Japanese "B" encephalitis, chikungunya, sindbis fever, and Getah virus, as well as being a low potential vector of bancroftian filariasis (Wuchereria bancrofti). The exact role in disease transmission of C. t. summosus has apparently not been elucidated.

(57)

Culex (Culex) whitmorei Giles 1904.

1904. Taeniorhynchus whitmorei Giles. J. Trop. Med. 7:367.

1905. Taeniorhynchus argenteus Ludlow. Canad. Ent. 37:98.

1907. Leucomyia plegipennis Theobald. Mon. Cul. 4:375.

1908. C. albus Leicester. Cul. Malaya :148.

1908. C. loricatus Leicester. Cul. Malaya :151.

1913. C. whitmorei Edwards. Bull. Ent. Res. 4:232.

1932. C. (Culex) whitmorei (Giles) 1904. Edwards, 1932.

In Wytzman, Genera Insect., Fasc. 194:203.

Eggs: Not available.

Larvae: First and second-instars: not studied.

Third and fourth-instars: larvae are characterized by slightly curved, gradually tapering siphon and pectinate hair tufts. Head: hair 1 dark and pointed; 4 tiny, single and simple; 5 and 6 bifid and pectinate. Thorax: hairs 1, 2 and 3 single and pectinate; 4 bifid; 5 and 6 single; 7 trifid; 8 bifid, all pectinate; 14 single and simple. Abdomen: comb composed of 4 to 8 teeth in irregular rows; siphon index ranging from 5.4:1 to 5.5:1; siphon tapering and slightly curved; 6 and 8 pairs of hair tufts, the apical small tuft inserted out of line; individual tuft bifid and pectinate, hair 2 of siphon large with hairlets at the base; pecten composed of from 6 to 12 teeth confined to the basal fourth.

Pupa: Not studied.

Adults: Female has a peculiar pattern of silver-white scales on the scutum extending to the prescutellar space and onto the mid lobe of the scutellum. Male head: no baso-median setae on the proboscis. Palpus with 4 pale bands. Terminalia: subapical lobe of the basomere with hooked basal rod and 2 shorter equally hooked rods, 3 hooked accessory setae, a broad leaf and a straight seta; distimere normal and no annulations; inner surface of phallosome with 3 teeth; proctiger topped with spines and 3 cercal setae; basal sternal process short and slightly curved. Female head: proboscis with broad median pale band; palpus short with white scales at the tip; vertex with decumbent silver white scales; erect scales are likewise silvery white. Thorax: on the scutum is a pattern of silvery white scales not as dense as that

of gelidus which extends to the prescutellar space and onto the mid-lobe of the scutellum; within the white area is a pair of eye-like small brown patches located in the anterior dorsocentral portion; sternopleuron darker than the mesepimeron; small patches of pale scales are present on the upper mesepimeron and upper and posterior sternopleuron. Wings: brown as usual. Legs: fore, mid and hind femora with scattered pale scales; hind tibia mostly dark with a median pale stripe; hind tarsus dark with basal pale bands on all tarsomeres; hind tibia are similarly marked; and fore and mid tarsi are also similarly marked. Abdomen: terga with pale basal triangular bands on segments II-VII; apicolateral pale patches present; sterna mostly pale.

Breeding habits: Larvae collected from slow flowing water in streams as well as from fresh ground water ponds.

Biting habits: Collected from carabao-baited traps.

Distribution: Philippines (Pampanga, Laguna, Rizal, Pangasinan, Zambales); Thailand, New Guinea, China, Korea, Japan.

(58)

Culex (Culiciomyia) nigropunctatus Edwards 1926.

1907. Culiciomyia annulata Theobald. Mon. Cul. 4:231.

1926. C. nigropunctatus Edwards. Bull. Ent. Res. 17:121.

1926. C. (Culiciomyia) nigropunctatus Edwards. Barraud 1934.

Fauna Brit. India, Diptera 5:383.

1946. C. (Culiciomyia) pullus Bohart and Ingram. Navmed
1055:31.

Eggs: No specimens.

Larvae: First and Second-instars: the peculiar characteristic

of the larva is the presence of pale ring beyond the middle of the siphon giving the appearance of a false joint. Head: hair 1 filamentous and long; 5 and 6 with 3 or 4 pectinate branches. Thorax: hairs 1, 2 and 3 single and pectinate; 3 shorter than 1 and 2; 4, 7 and 8 bifid and pectinate; 14 single or split and smooth. Abdomen: comb consists of from 35 to 45 scales in 3 irregular rows; siphon index varying from 9:1 to 11:1; beyond the middle is a false pale ring; three pairs of hair tufts on the apical half; pecten with 8 to 11 teeth confined to the basal fifth of siphon.

Pupa: Not studied.

Adults: Male head: proboscis with a tuft of strong setae on the ventral surface. Terminalia: basal rod of the subapical lobe of the basimere separated from the other 2 subequal rods in size and shape; above are 2 narrow striated leaflets, 3 strong accessory setae and 2 broad leaflets without striations; above the subapical lobe is an accessory lobe covered with numerous fine setae; distemere with an apical crest of 15 or more curved spines; a small hook opposite the claw and a variable number of setae on the basal half; lateral plate of phallosome with a large basal tooth and 5 denticles. Female head: proboscis and palpus dark; vertex with light brown decumbent scales on the occiput, lighter to creamy on the orbital line; yellowish brown erect scales throughout. Thorax: upper mesepimeron with black spot and a lighter dark brown area on the upper sternopleuron; one strong lower mesepimeral bristle present. Legs: anterior surface of the fore, mid, and hind femora mostly brown with occasional scattered white

scales. Abdomen: terga with broad pale basal bands and narrower pale apical bands; sterna uniformly pale.

Breeding habits: Larvae were collected from rock and stream pools containing decaying grass and plant leaves.

Biting habits: Adults collected from carbao-baited trap.

Distribution: Philippines (Leyte, Cotabato, Zambales); Borneo, India, Ceylon, Thailand, Malaya, Sumatra, Java, Hainan Island, Ryuku, Palau Island, Caroline Island, Taiwan.

(59)

Culex (Lophoceraomyia) infantulus Edwards 1922.

1922. Culex infantulus Edwards. Indian J. Med. Res. 10:287.

1944. Culex parainfantulus Menon. J. Malar. Inst. India 5:389.

Eggs: Unknown.

Larvae: First and second-instars: not studied.

Third and fourth-instars: head broader than long. Antenna spiculed; tuft large and fully developed. Preclypeal spines dark, single; h-4 weak, short, single; h-5 and 6 much longer and thicker, each divided into two equal barbed branches; h-7 a bigger tuft but shorter than 5 or 6, having normally two barbed long branches. Thorax: pro-hair 1 and 2 relatively long, single, barbed, these are equalled by hair 5. Abdomen: segment VIII bears comb of over thirty teeth arranged in a patch, each enlarged and flattened with a rounded apex surrounded on both sides and tip with frayings. Siphon long and thin (variable) sometimes bears median dark band; four pairs of subventral weak tufts each usually bifid, seldom trifid. Anal segment (X) longer than broad,

not completely enclosed by spiculed saddle. Osc long, divided into three very unequal branches; isc longer, single; lh short, weak, bifid. Ventral fan well-developed; anal papillae lanceolate, both pairs about equal in length.

Pupa: Without any outstanding diagnostic character by which it can be differentiated from pupae of other species of Culex.

Adults: Male and female: small to medium size, not easily differentiated except by the peculiar male phallosome, and the few modified hairs on flagellomeres VII and VIII (not easily visible) of the male antennae.

Breeding habits: Breeds in seepage pools, rock holes, and sylvan creeks.

Biting habits: Not known.

Distribution: Philippines, China, Japan, India, Ceylon, Nepal, Thailand, Java.

(60)

Culex (Lophoceraomyia) lavatae Stone & Bohart 1944. Figure 67.

1944. Culex lavatae Stone & Bohart. Proc. Ent. Soc. Wash.

46:220.

1945. Culex lavatae Bohart. U.S. Navmed. Wash. 580, 88.

Eggs: Not known.

Larvae: First and second-instars: not studied.

Third and fourth-instars: easily recognized due to the dark siphon. The antennal tuft many-branched, as is common to Culex. Preclypeal spines thick with a small tooth on one or both sides.

Hair 4 slender, single, its tip barely reaching the clypeal margin; 5 a well-developed, usually 4-branched, barbed tuft; 6 similar but with only two branches; 7 a much thicker but shorter tuft. Thorax with the usual hairs commonly seen in Culex larvae, but its pleural hair groups without any diagnostic value. Abdomen bears the usual and common hairs of Culex. Siphon usually dark, moderately long and thick, bearing usually four pairs of tufts.

When mixed with other larvae, this mosquito can easily be spotted with the naked eye due to its dark siphon. However, the color varies and may sometimes appear quite pale. Over a dozen pecten teeth, each with both coarse and fine serrations on one side. Comb in a patch, each tooth with an expanded, rounded, fringed apex. Anal segment not completely enclosed by saddle; posterior margin with some fine spicules or points. isc long, 2-branched; osc longer, single; lh short and slender with 3 or more sub-basal branches. Anal papillae thin and fairly long, the dorsal pair exceeds the ventral in length. Fan well-developed.

A few larvae of this mosquito were collected from the U.S. Naval Reservation at Subic, but none were successfully reared to adults.

Pupa: Of the type and color common to Lophoceraomyia pupae, bears no particular difference from pupae of other species of subgenus Lophoceraomyia with which it is often associated in breeding.

Adults: Female: medium size without any character to differentiate it from other Lophoceraomyia. The male may be differentiated by means of some modified hairs on its antenna.

Breeding habits: Breeds in tree holes.

Biting habits: Unknown.

Distribution: Indigenous to the Philippine Islands where it has been reported by Delfinado (1966) from Luzon, Mindoro and Mindanao Islands. The specimens described and named by Stone and Bohart were taken from Mt. Makiling, Los Banos, Laguna Province, Luzon Island (1945).

(61)

Culex (Lophoceraomyia) mammilifer Leicester 1908.

1908. Lophoceraomyia mammilifer Leicester. Cul. Malaya 3:128.

1935. Culex (Lophoceraomyia) mammilifer Leicester. Baisas, 1935. Phil. J. Sci. 57:174.

1934. Culex (Lophoceraomyia) mammilifer (Leicester). Barraud, 1934. Fauna Brit. India 5:374.

Eggs: Not studied.

Larvae: First and second-instars: not studied.

Third and fourth-instars: head - antenna usually uniformly pigmented; spiculed; shaft long and fine; apical bristles finer than the subapical; h-1 spine-like; hair 4 single, short and weak; h-5 and h-6 bifid, rarely trifid; hair 7 with 4-7 shorter branches. Prothoracic h-1, 2 and 3 all single, with h-3 very short. Pleural hair groups of no diagnostic value specifically. Comb teeth of about 35-55 arranged in subtriangular patch, each tooth elongate and fringed near the apex. Siphon with narrow dark band near the

middle, with 3-6 pairs of short branched tufts. Saddle spiculate distally. Pecten with 10-12 spines. Papillae about as long as saddle.

Pupa: Respiratory trumpet long and narrow. Paddle smooth with midrib and outer margin strong; and with two short unequal paddle hairs.

Adults: General coloration rather grayish brown but paler than most species of the fraudatrix-group. This species is differentiable from other closely related forms by the characteristic modifications of the male antenna and other peculiar features of its genitalia.

Male and female: palpus of male slender, longer than proboscis by about 1/2 the length of terminal segment; in female much shorter than proboscis. Torus of antenna with protuberance on inner side. Antenna: flagellomere V of male with three flattened blades and fine short stout bristles; VI-VII with comb-like tuft, each composed of long twisted setae; VIII with larger and broader flattened blades; IX with thicker straight bristles.

Breeding habits: Breeds in streams, tin cans and other artificial containers, and pools in shaded areas.

Biting habits: Not definitely known.

Distribution: Philippines, Malaya, India, Ceylon, Burma, Andaman Island, Borneo, Sumatra.

(62)

Culex (Lophoceraomyia) minor Leicester 1908. Figure 68.

1908. Culex minor Leicester. Cul. Malaya :126.

1934. Culex minor var. bengalensis Barraud. Fauna
Brit. India, Diptera 5:371.

1939. Culex minor var. bandoengensis Brug. Tijdschr.
Ent. 82:112.

Eggs: Not studied.

Larvae: First and second-instars: not studied.

Third and fourth-instars: head of the usual type of *Culex* larvae. Antenna moderately long and slender; spiculed; its well-developed tuft arises at about one-third of shaft from tip. Preclypeal spines not very stout, dark, single. H-4 slender, short, two-branched medially. H-5 much longer, thicker, frayed, two-branched sub-basally; 6 similar to 5. H-7 seven-branched, similar in type to 5 and 6 but shorter. Thorax and abdomen (except VIII and X) without characters of diagnostic value. Comb in a patch as usual; teeth of three types - the first type small, scale-like, fringed at tip; the second larger with a short thick central point flanked on either side with fine fringes; the third type similar to the second, fringed, but without a main central point. Pecten teeth smallest at base of tube, following teeth or scales increasing progressively in size, each tooth pointed, serrated along one side. Siphon long and thin, tapering slightly from base to apex. Three or more weak tufts, each divided basally into two to four slender branches. Anal segment not completely enclosed by saddle, finely spiculed toward base, somewhat coarsely toward posterior margin. Isc long, with two equal branches; osc single, longer. Anal papillae thin, not too long, rounded at tips,

the dorsal pair only slightly longer than the ventral. Lh a short branched tuft. Ventral fan well-developed.

Pupa: As partly illustrated (Figure 68).

Adults: Male and female: small, delicate mosquitoes, pale brown, not differentiable from other small Lophoceraomyia except by modified hairs on male antenna and by male terminalia. Wings dark, legs dark.

Breeding habits: Breeds in fresh water, small pools and large artificial containers; and, according to Delfinado, 1966, in bamboo stumps, tree holes and rock holes in forest streams.

Biting habits: Presumably zoophilic.

Distribution: In many parts of the Philippines, but rather scarcely known elsewhere in Southeast Asia.

(63)

Culex (Lophoceraomyia) reidi Colless 1965.

1965. Culex (Lophoceraomyia) reidi Colless. J. Med.

Ent. 2:279.

1928. Culex (Lophoceraomyia) quadripalpis Edwards. Bull.

Ent. Res. 18:276.

Eggs: Not studied.

Larvae: First and second-instars: not studied.

Third and fourth-instars: may be identified by: abdominal hair 7-1 single; thoracic hair 3 and 4 single; and thoracic integument glabrous. Head: antenna with a dark basal band and darker one above the antennal hair; hair 4 simple; and 6 bifid, pectinate.

Thorax: integument glabrous; hairs 1 and 2 longer than 3, all of

which are single and pectinate; hairs 4, 6, 7 and 14 single or bifid and pectinate. Abdomen: hair 7 single; comb composed of from 35 to 45 scales arranged in a broad sub-triangular patch; siphon index ranging from 5.5:1 to 6.7:1. Occasionally, a wide slightly dark band at the middle is present on the siphon with four pairs of hair tufts distally, having from 2 to 5 simple branches; pecten with from 11 to 13 teeth at the basal third.

Pupa: Not studied.

Adults: Female head: vertex with broad decumbent scales and narrow dark scales in triangularly arranged median patch. Thorax: one lower mesepimeral bristle present; hind femur with dark anterior surface on the apical half, pale on the basal half and narrow dark line along the dorsal border. Abdomen: terga with dark scales. Sterna with dull brown ones. Male head: proboscis with usual long dorsal setae and basoventral bristles. Antenna: flagellomeres V-VIII with tufts of 5 or 6 broad straight long and pointed setae; VI with an internal tuft of 15 or more short, stout, dark and twisted spines; VII with smaller tuft of spines; VIII with a tuft of longer curved setae; IX with 2-5 lanceolate, pointed leaflets; X with a tuft of 4 dark and long setae. Terminalia: basimere with a row of 3-5 submarginal setae which are slightly expanded and bent at the middle; subapical lobe with internal rod expanded at the apex and with a scalloped margin; central and external rods hooked but unequal in length and thickness; with accessory 2 setae and 4 blades; dorsal process of lateral plate of phallosome short, angled and pointed.

Breeding habits: Larvae were collected in slow flowing streams.

Biting habits: Reported biting man.

Distribution: Philippines (Manila, Laguna, Zambales); Malaya, India, Ceylon, Burma, Thailand, Sumatra, Java, Borneo, Formosa, Japan.

(64)

Culex (Lophoceraomyia) rubithoracis Leicester 1908.

1908. Lophoceraomyia rubithoracis Leicester. Cul.

Malaya :119.

1934. Culex (Lophoceraomyia) rubithoracis (Leicester).

Barraud, Fauna Brit. India, Diptera 5:367.

1947. Culex (Lophoceraomyia) rubithoracis (Leicester)

Dantis. Mon. Bull. Philipp. Hlth. Serv. 23:255.

Eggs: Not studied.

Larvae: First and second-instars: not studied.

Third and fourth-instars: live specimens with conspicuous dark bands on abdominal segments I and IV. Head: antenna with a narrow basal band and another just above hair 1; head hair 4 bifid or trifid; 5 and 6 bifid, pectinate; 16 and 17 with tiny spicules. Thorax: integument densely covered with short spicules; hair 3 with 4-8 pectinate branches which are shorter than 1 and 2, bifid and pectinate; 5 and 6 single and pectinate; 7 trifid and pectinate; 8 bifid; 14 tiny, single simple. Abdomen: integument glabrous; hair 7 single; comb with 35 to 50 teeth arranged in a triangular patch. Siphon with 4 pairs of sub-ventral tufts with 2 to 4 branches; pecten consisting of 7-10 teeth arising near the base; individual pecten tooth with 8 to 12 lateral barbs.

Pupa: Not studied.

Adults: This species differs from other members of the fraudatrix group by the absence of mesepimeral bristles and the presence of tufts of narrow, tapering, pointed scales on flagellomere V. Female head: vertex with decumbent pale brown scales; erect scales uniformly dark brown. Thorax: scutum pale brown with reddish tint; pleuron with similar tint. Abdomen: terga brownish; sterna pale. Male head: proboscis with long dorsal setae and shorter ventral hairs. Antenna: flagellomere V with tuft of from 2 to 5 long pointed scales followed by 7 long and stronger setae; VI with internal tuft of 10 to 14 shorter, darker, stronger twisted spines; VII with similar but shorter spines; VIII with heavy tuft of slightly curved spines; IX with from 2 to 5 developed lanceolate and pointed scales; X with from 2 to 4 strong, straight and dark setae. Terminalia: basimere with 3 submarginal curved setae; subapical lobe with expanded internal rod but pointed at the apex, the other two rods are hooked apically; 6 short blade-like seta of variable length present; distemere with fine annulations on the outer surface at tip; dorsal process of the lateral plate of phallosome, curved and pointed.

Breeding habits: Larvae were collected in partly shaded streams and tin cans.

Biting habits: The adults were collected in animal-baited traps.

Distribution: Philippines (Manila, Laguna, Olongapo, Zambales), Thailand, India, Indonesia, China, Borneo, Japan, and Taiwan.

(65)

Culex (Lophoceraomyia) uniformis ssp. mercedesae new subspecies

Figure 69.

1905. Culex uniformis Theobald. J. Bombay Nat. Hist. Soc.

16:245.

We believe the local form is a valid subspecies due to the following differences in certain diagnostic characters of the larvae: (a) the presence of a patch of branched spicules on the underside of the head which is absent in the Ceylon form; (b) the difference in comb teeth, the local form having a main strong central point with a few median lateral serrations on either side; whereas the comb of uniformis from Ceylon has the apical half flattened and rounded, fringed around at tip; (c) pecten teeth with a long central point having a few basal denticles on one side, while the Ceylon larva has stronger and coarser pecten teeth (usually 3 teeth) on one side. The adult of the local form lacks scales on flagellomere IV, the modified hairs on this flagellomere being narrow and non-striated while the corresponding scales of the Ceylon uniformis are broad and definitely striated.

Eggs: Not known.

Larvae: First and second-instars: not studied.

Third and fourth-instars: dark, the thorax and abdomen, including segment X, thickly clothed with branched piles, but head and siphon devoid of such piles, except a small patch on underside of head. Head broader than long. Antenna spiculed, long, and the tuft hair arises very close to apex of shaft. Preclypeal spines long, thick,

pointed, often with a basal denticle on one or both sides. Hair 4 single, short and slender; h-5 three or four times as long, having three frayed, long branches; h-6 similar, 2-branched; 6 also similar but shorter with half a dozen branches. Thorax heavily pilose. Pro-1 and 2 long, single, frayed as common in all Lophoceraomyia. Pleural hair groups developed but of no diagnostic value. Abdomen heavily pilose except the siphon but principal hairs also non-diagnostic. Siphon long and thin; 4 pairs of tufts, each with usually two or three branches. Comb and pecten teeth as discussed above.

Pupa: Without particular diagnostic characters.

Adults: Male and female: small, dull-colored, without external markings to differentiate it from other Lophoceraomyia with which it is often associated and caught. Diagnostic characters found only on male flagellomeres.

Breeding habits: Breeds in tree holes and rock holes.

Biting habits: Unknown.

Distribution: In the Philippines, Luzon and Mindoro Islands.

Specimens found in Subic Naval Reservation: only a few larvae, none of which became an adult in the laboratory. The holotype and allotype were selected from specimens with associated skins, from a tree hole in Mt. Makiling where more of this mosquito were taken by the author before he worked in the Naval Reservation.

For comparison with the Ceylon form, we borrowed a male and a female specimen with associated skins from Dr. P. F. Mattingly of the British Museum (Natural History), taken from the type locality in Ceylon.

The subspecies is named in honor of Dr. Mercedes Delfinado - the first to consolidate in one cover all known Philippine mosquitoes except Aedes, Anopheles and Tripterooides.

(66)

Culex (Lutzia) fuscatus Wiedemann 1820.

1820. fuscatus Wiedemann. Dipt. Exot. 9:341.

1827. concolor Robineau-Desvoidy. Mem. Soc. Hist.

Nat. Paris. 3:405.

1857. luridus Doleschall. Natuurk, Tijdschr. Ned-Ind.

14:384.

1875. setulosus Doleschall. Natuurk, Tijdschr. Ned-Ind.

14:384.

Eggs: Not studied.

Larvae: First and second-instars: not studied.

Third and fourth-instars: larger than most Culex larvae, and may usually be picked out macroscopically by size and when holding other smaller larvae in its powerful mouth-parts.

As the larva of fuscatus cannot be differentiated from the larvae of Lutzia halifaxii, the following applies to both: head: broader than long. Mouth brushes modified for predation. Antenna rather thin and short in relation to the head: shaft smooth; antennal hair very short, single, located sub-basally. Preclypeal spines represented by a short, single seta; h-4 a tiny branched tuft; 5 very much longer, single; h-6 similar to 5; h-7 also similar but shorter. Thorax spiculed; pro-hairs 1 to 3 all single, 1 the longest

but not as conspicuously long as in many Culex (Lophoceraomyia). Pleural hair groups without outstanding characters. Abdomen also spiculate. Segment VIII: comb in a patch composed of some 30 or more scales or teeth. Siphon thickly spiculed, bearing a dozen or more long tufts of pectinate hairs at its mid-ventral surface. (This is one of the most easily spotted characters even under low magnification.) Pecten composed of about a dozen teeth lined along the whole length of tube except the apical and basal portions. Each tooth sharp pointed, with 1 or 2 basal coarse serrations or points on one side. Anal segment spiculed; not completely enclosed by saddle. tsc and osc long and single; lh much shorter, single; ventral fan well developed, thick. Anal papillae short, lanceolate, the dorsal and ventral pairs about equal in length.

Pupa: Trumpets widening considerably to apex, with trachoid on basal 1/4; surface largely reticulated; metanotal hairs weak, 10 branched; 11 single, strong; 12 single. Hair 9 of abdominal segment VII a tuft of over half a dozen single branches. Paddles only slightly longer than broad; without paddle hair.

Adults: Male and female: large, usually easily identified by the golden-scaled terminal segments of abdominal terga. A broad pale band on proboscis of female; mesonotum dark with indefinite pale markings. Wings dark, speckled; legs dark, speckled. Abdominal terga dark, with two or more segments largely or completely pale-scaled.

Breeding habits: Breeds in fresh water pools, drums, etc., where many larvae of other species also breed and upon which fuscans

larvae feed - fuscatus breeds more in open places, halifaxii in sylvan or semi-sylvan streams.

Biting habits: Largely zoophilic; seldom attacks man.

Distribution: In all Southeast Asia countries, Russia, Taiwan, Korea, Japan.

(67)

Culex (Lutzia) halifaxii Theobald 1903.

Mon. Cul. 3:231.

1908. multimaculosus Leicester. Cul. Malaya :155.

1910. aureopunctis Ludlow. Canad. Ent. 42:195.

Eggs: Not studied.

Larvae: First to fourth-instars: similar to those of Culex fuscatus larvae.

Pupa: Also the same as the pupa of fuscatus.

Adults: Male and female: much like adults of fuscatus except: (1) absence of complete pale band on proboscis of female; (2) no pale markings on mesonotum; (3) usually completely dark or limited golden scales on abdominal terga.

Breeding habits: Usually breeds in sylvan or semi-sylvan streams.

Biting habits: Presumably mostly zoophilic, but the author was once bitten by this mosquito while collecting larvae in upper Molawin Creek, Mt. Makiling, Laguna Province.

Distribution: Philippines, Indonesia, New Guinea, Bismarck Archipelago, India, Malaysia, Thailand, Australia, Solomon Islands.

Culex (Mochthogenes) laureli Baisas 1935. Figure 70.

1935. Culex laureli Baisas. Philipp. J. Sci. 57:176.

Eggs: Not known.

Larvae: First and second-instars: not examined.

Third and fourth-instars: usually easily recognized microscopically due to the presence of a dark band at about the middle of siphon.

Head: broader than long; preclypeal spine single; hair 4 very weak, single; 5 slightly longer, branched; 6 longer, 2-branched medially. Hair 7 the strongest frontal hair - a thick tuft with about 10 barbed branches. Antenna fairly long, spiculed, its tuft strong and many-branched. Thorax bears no diagnostic character. Abdominal hairs do not differ from those of other Culex (Mochthogenes) larvae. Comb with teeth in one or more irregular rows, each tooth fringed around the expanded rounded tip. Siphon fairly long; its fairly long tufts bearing 5 to 7 branches each. A dark band often present at about the middle of tube. Pecten teeth rather long and with coarse serrations along one side. Segment X not entirely enclosed by saddle. Saddle with some spicules. isc long, divided into two unequal branches; osc longer, single; lh tiny, branched. Anal papillae lanceolate, the dorsal pair considerably shorter than the ventral; ventral brush thick, many-branched.

Pupa: Trumpet moderately long, slightly expanded toward apical half; basal half largely occupied by trachoid. Metanotal hairs fairly strong; 10 the shortest, 3-branched; 11 longer, 2-branched; 12 slightly shorter, divided into 4 equally long branches.

Adults: Male and female: small dark mosquito, not easily differentiable from other Mochthogenes, except by male terminalia characters. Head: narrow, broad dark brown scales cover vertex; upright dark scales on nape, slightly paler scales around eye margin. Antenna also dark, plumose as usual in male, less hairy in female. Proboscis also dark, long; palpus at most hardly one-eighth the length of proboscis in both sexes. Thorax dark; mesonotal bristles well developed; pleuron without scales; one lower mesepimeral bristle present. Wing entirely dark; apical half of veins more densely scaled than basal half. Abdomen: terga dark with dark-green reflections in certain light. Sterna hardly less dark than terga. Male terminalia: most distinct characters, (1) clasper which is divided into two unequal arms, the stem more slender and longer than that of Culex (Mochthogenes) yeageri Baisas 1935 which also has a divided clasper; (2) subapical lobe of coxite bears three flattened leaflets of different shapes, one of which has several coarse serrations on one side of apical half; three long rods and a shorter thinner one; but (3) without a broad leaf.

Breeding habits: Breeds in clear, vegetated ponds, sides of streams of similar character.

Biting habits: Unknown.

Distribution: Not known outside the Philippines.

(69)

Culex (Neoculex) brevipalpis Giles 1902.

1902. Culex brevipalpis Giles. Handbook, 2nd ed. :384.

1901. longipes Theobald. Mon. Cul. 2:68.
1905. macropus Blanchard. Les Moustiques :327.
1908. uniformis Leicester. Cul. Malaya :136.
1920. fidelis Dyar. Insec. Inscit. Menst. 8:180.

Eggs: Not known.

Larvae: First and second-instars: not studied.

Third and fourth-instars: head slightly broader than long. Pre-clypeal spines rather slender, dark, single; h-4 slender, short, single; 5 much longer, divided into three or more long, frayed branches; h-6 similar to 5, but with only 2 branches; h-7 slightly shorter than 5 or 6, having half a dozen or more branches. Thorax has the usual chaetotaxy of Culex larva, without any hair or character of diagnostic importance specifically. Abdomen: also with the usual Culex chaetotaxy. Segment VIII: comb in a patch, each tooth or scale with a flattened, rounded apex, surrounded by fine fringes laterally and apically. Siphon very long (length very variable) and moderately slender, having a varying number (4-5) of short, branched tufts, none of which exceeds the width of tube at point of insertion. Pecten teeth: each tooth with coarse, sharp serrations along one side. Anal segment largely covered by saddle. isc and osc both very long, single; lh a small tuft with half a dozen or more slender branches. Ventral tuft well developed. Anal papillae much longer than segment X, the dorsal and ventral pairs equal.

Pupa: Without any specific character.

Adults: Male and female: medium sized, without outstanding

external markings; proboscis dark; palpus dark, very short in female, dark; longer in male, usually bent and crooked in various ways in dry specimens; thorax, mesonotum, wings, legs and abdomen all dark.

Breeding habits: Breeds in tree holes, bamboo, large water containers and forest streams.

Biting habits: Not known.

Distribution: Philippines, Thailand, Vietnam, China, Indonesia, New Guinea, Bismarck Archipelago, Okinawa.

(70)

Ficalbia (Etorleptomya) luzonensis (Ludlow) 1905.

1905. O'Reillia luzonensis Ludlow. Canad. Ent. 37:101.

1944. Aedes clavirostris Stone & Bohart. Proc. Ent. Soc.

Wash., 46:123.

Eggs: Not known.

Larvae: First and second-instars: not known.

Third and fourth-instars: head: clypeal spines long and barbed on one or both sides basally. H-4 short, having five or six strong, unequal branches. Antenna spiculed. Antennal shaft hair strong having about a dozen branches. Thorax: without distinct diagnostic characters. Abdomen: segment VIII: comb of about a dozen teeth, arranged in a row. Each tooth long, fringed on either side and at tip. Siphon long, smooth, its tuft usually two-branched, arises a little below the middle from tip. Without pecten teeth. Anal segment (X) not entirely enclosed by saddle; saddle spinous; saddle hair very long and frayed.

Pupa: Principally characterized by narrow, long paddle with serrations on both sides and tip. Trumpet also long and narrow, expanded toward tip. Metanotal hairs single.

Adults: Easily recognized by speckled wings, banded tarsi and the broad wing scales. Proboscis of female dark basally; in male considerably swollen at tip. Thorax: mesonotum clothed with a mixture of narrow dark and pale scales. Dark and pale broad scales cover the scutellar lobes. Wings conspicuously clothed with broad and dark asymmetrical scales. Legs: femora largely dark, pale-speckled. Tarsomeres banded and heavily speckled. Abdomen: terga - largely yellowish with dark patches; sterna more yellowish than terga.

Breeding habits: Breeds in ditches, pools, tin cans.

Biting habits: Probably zoophilic, as a few adults were caught in carabao-baited traps in Clark Air Base.

Distribution: Southeast Asia, Indonesia, Borneo, Hongkong, Taiwan, Okinawa.

(71)

Heizmannia scintillans Ludlow 1905.

Canad. Ent. 37:130.

1908. Wyeomyia funera Leicester. Cul. Malaya :252.

1931. Heizmannia pilosa Brug. Tijdschr. Ent. 74:245.

Eggs: Unknown.

Larvae: None collected in Subic Naval Reservation.

Pupa: Not available.

Adults: Our specimens of this mosquito consist of only seven

females caught at Subic Naval Base in traps at night and by human exposure during the daytime.

A small dark mosquito with some pale markings on the abdomen - main peculiarity being the unusually large apn. Head: dark shiny scales on vertex, with median and lateral white patches. Proboscis dark, slightly swollen toward apex; palpus very short, dark. Antenna sparsely haired. Thorax: mesonotum covered with broad dark and shiny scales, a cluster of short bristles on postnotum. Apn with patch of white scales and some bristles; ppn with few dark scales - white scales extensively cover pleuron. Wings dark. Legs dark; hind tibiae pale on anterior basal surface to about 1/4 of its length. Abdomen dark with pale lateral patches as illustrated.

Breeding habits: Said to breed in tree holes.

Biting habits: Zoophilic and also attacks man even in the daytime.

Distribution: Philippines, Indonesia.

(72)

Hodgesia malayi Leicester 1908. Figure 71.

1905. Hodgesia malayi Leicester. Cul. Malaya :231.

1934. Hodgesia malayi Leicester. Barraud, Fauna of British India 5:463.

1929. Hodgesia malayi Leicester. Edwards, Not. Ent. 9:2 (listed).

1920. Hodgesia ampyx Dyar. Ins. Insc. Menst. 8:176.

1922. Hodgesia malayi Edwards. Indian V. Med. Res. 19:461.

1957. Hodgesia malayi Stone and Knight. Jour. Wash.

Acad. Sci. 47:197.

Eggs: Unknown.

Larvae: First and second-instars: not available.

Fourth-instar: head (based on a single skin mount with correlated adult, a female): broader than long (flat mount); dark throughout; antenna slightly longer than head; broadening a bit at middle, spiculed from base to where tuft arises, less spiculed from there to tip; tuft strong, with 21-22 long barbed branches; apex bears 3 long dark pointed barbed appendages and a much shorter one. Preclypeal spines strong, dark, sharp-pointed; immediately nearby on either side is a similar, but longer spine arising from the maxillary palp. Hair 4 short, three-branched; h-5 behind 4 in position, to which it is about equal in length, branched from base into six; h-6 much longer, single; h-7 a tuft with 5-7 long branches. Thorax: without conspicuous diagnostic character. Tufts strong, specially pro-7 with 5-5 long, stout, frayed branches. Propleural hair group: 9 and 10 long, frayed; 11 shorter, two-branched; 12 longer, two-branched, frayed. Meso-pleurals: 9 and 10 long, frayed; 11 much shorter, two-branched, frayed; 12 longer, two-branched, frayed. Meta-pleurals similar to meso-pleurals, but 12 shorter. Abdomen: lh or 6 of I strong, four or five-branched; 7 arises from the same tubercle as 6, about as long as 6, two-branched; lh 6 and 7 of II similar to 6 and 7 of I but 6 with three branches; 7 single; lh of IV-VI (slide mount of skin in great disorder in this part such that the details of hairs and other characters cannot be

made out). Segment VIII: comb composed of eleven teeth, sharp-pointed, whether serrations on either side present can not be determined. Siphon tuft long, arises close to base of tube, with six long branches. Segment X equal in size to siphon. Isc, osc, lh and anal papillae missing; ventral tuft apparently strong and well developed.

Pupa: Trumpet (folded in mounted specimen) cleft from base to tip, one part larger than the other. Metanotal hairs: 10 short, two-branched; 11 longer, single; 12 similar to 10 but longer, two-branched. Abdomen not good in the mount, principal hairs missing; VII and VIII darker at middle than other segment. Paddle longer than broad without apparent serrations along outer thicker margin; paddle hair short, single.

Adults: Female: small mosquito, without diagnostic markings. Head with broad, flat scales, those along eye margins and vertex white; darker on nape. Palpi and proboscis dark. Thorax dark, scales narrow, bronzy-brown. Apn, ppn and pleuron with patches of silvery white scales. Wing dark, vein 6 terminates at level of bifurcation point of 5. Outstanding scales on vein broad and emarginate at tips. Legs dark brown; femora lighter; tarsomeres dark. Abdomen entirely dark brown, unbanded.

Breeding habits: Breeds in jungle and semi-jungle pools, and sides of creeks.

Biting habits: Said to be in mutual relationship with a certain species of ants.

Distribution: Throughout the Philippines, but sparsely, also in Southeast Asia, Indonesia.

(73)

Malaya genurostris (Leicester) 1908. Figure 72.

1908. Malaya genurostris (Leicester). Cul. Malaya :158.

1911. Malaya caeruleovittata Ludlow. Psyche. 18:131.

1934. Malaya genurostris Barraud. Fauna of Brit. India,
Vol. V. 463.

1945. Malaya caeruleovittata Bohart. U.S. Navmed 580:88.

1946. Malaya genurostris Bohart and Ingram. U.S. Navmed
1955. 110.

1948. Malaya genurostris Knight and Chamberlain. Proc. Helm.
Soc. Wash. 15:1-18.

Eggs: Unknown.

Larvae: First and second-instars: not available.

Third and fourth-instars: head: antenna short, slightly curved, shaft without spicules; shaft hair single, arises from near apex of shaft. Preclypeal spines moderately long, stout, pointed. H-4 small, usually two-branched; h-5 more developed, branched; h-6 and h-7 similar, but 7 with more branches. Thorax: lateral hairs with well-developed tufts, fan-shaped, with many long branches, arising from large tubercles.

Abdomen: lh of I and II fairly long tufts with frayed branches; on III-VI similar but with fewer branches. Segment VIII: about 40 teeth to the comb arranged in a large subtriangular patch; each with a relatively small central point and several secondary serrations. Siphon fairly long, tapering to tip, about four times as long as thickness at

base, several tufts, the dorsal and subdorsal not well arranged, five or six in number, each branched into three or more; two sub-dorsal tufts, also similarly branched; seven or more sub-ventral tufts, the most basal longest, with four or more branches; the others shorter with three or more branches each. Pecten variable; in a group in some specimens and some in widely spaced rows, each tooth frayed, usually transparent. Anal segment with saddle covering dorsal and lateral sides but widely separated ventrally. Isc long with five or more unequal branches, osc much longer, single. Lh with a long branch, and two or more shorter ones. Ventral tuft represented by a single pair much shorter than lh, branched weakly into two or three in addition to the main long branch. Anal papillae long, rounded at tips; the ventral pair slightly longer than the dorsal. A small group of short serrated teeth near posterior margin of saddle.

Pupa: Trumpet short, of normal shape, three times as long as broad at thickest basal point. Hair 9 of VII well developed; branched; of VIII larger and more developed. Paddles thinly chitinized, transparent, somewhat subtriangular and pointed in shape, having no fringes or paddle hair.

Adults: Male and female: small, ornamented with brilliant, silvery blue or violet scales. Proboscis hairy and peculiar in having a flexible joint much enlarged at tip, bearing long bristles - adapted for mutual feeding with a certain species of ants. Legs mostly pale or pale-brownish. Thoracic scales dull with brilliant patches of silvery scales on pleuron. Abdomen: terga dark, with

patches of silvery scales on lateral sides of I and II and IV-VII.

Breeding habits: Breeds mostly in axils of wild bananas.

Biting habits: Live in mutual relationship with a species of ants.

Distribution: Philippines, many parts of Southeast Asia and India.

(74)

Mansonia (Coquillettida) crassipes (Van der Wulp) 1881.

1881. Bijd. Fauna Midden-Sumatra, Dipt. :9.

1901. brevicellulus Theobald. Mon. Cul. 2:212.

1908. pygmaeus Theobald. Rec. Indian Mus. 2:300.

1911. fuscopteron Theobald. Tijdschr. Ent. 54:239.

1920. diaeretus Dyar. Insec. Inscit. Menst. 8:181.

Eggs: Not known.

Larvae: Not collected in Subic or in Clark Air Base.

Pupa: None available.

Adults: (A few females were caught in carabao-baited traps in Subic and Clark.) Distinguished by yellowish brown thorax and femora. Head: (female) covered with narrow and upright forked yellow scales, broader yellow scales on either side; bristles yellow. Antenna, palpus and proboscis brown, the proboscis usually with violet reflections. Palpus brown, 1/4-1/3 the length of proboscis. Thorax: integument yellowish or brown, covered sparsely with narrow yellowish scales. Pleuron brown or dark yellowish, a patch of silvery flat scales on upper mesepimeron; another on lower sternopleuron. Wings: dark-scaled, a few yellowish scales sometimes present at bases of some specimens;

membrane with pronounced purple, blue, and green reflections. Legs: femora yellowish at bases, apical half brownish. Hind femur with some silvery scales on outer surface of middle; tibiae and tarsi brown, having purple or brassy sheen, following segments yellowish, but this is variable; some specimens with only a few such scales.

Breeding habits: Breeds in muddy ponds and the like.

Biting habits: Probably zoophilic.

Distribution: Philippines and in many other parts of Southeast Asia and India.

(75)

Mansonia (Coquillettia) ochracea Theobald 1903.

1903. Taeniorhynchus ochracea Theobald. Mon. Cul. 3:263.

1909. Mansonia chrysogona Knab. Ent. News 2:386.

1963. Coquillettia (coquillettia) ochracea (Theobald).

Ronderos and Bachmann.

Eggs: Not known.

Larvae: Not found.

Adults: Male and female: only a couple of badly damaged females were caught in a carabao-baited trap.

Our long searches for its eggs and different stages were never successful. The following description is given merely for guidance of local entomologists.

This Mansonia is distinguished from other species of the genus in the Philippines by being largely yellowish or golden throughout.

Head clothed with narrow, curved golden scales and upright bronzy scales. Pale golden or bronzy scales adorn mesonotum. Patches of

pale scales on propleuron, upper and lower sternopleuron and upper mesepimeron. Wings speckled. Legs mostly yellowish, speckled with brown scales. Abdomen largely yellowish-scaled, with dark markings on apico-lateral margins of terga II-V.

Breeding habits: Not known in Philippine Islands.

Biting habits: Zoophilic.

Distribution: Southeast Asia, India and Japan.

(76)

Mansonia (Mansonioides) annulifera (Theobald) 1901.

1901. Panoplites annulifera Theobald. Monogr. Cul. 2:183.

1922. Taeniorhynchus (Mansonioides) annuliferus Theobald.

Edwards, Indian J. Med. Res. 10:469.

1904. Mansonia (Mansonioides) annulifera (Theobald).

Giles, J. Trop. Med. 7:365.

Eggs: None collected.

Larvae: None collected.

Adults: Our specimens from Subic Naval Reservation consisted of only a few females caught in carabao-baited traps (not in good condition). The following description is only for the females: small, yellowish-brown mosquito. Head: clothed with narrow, yellowish and numerous pale upright scales. Torus and clypeus, also pale brown. Antenna: flagellomeres also brownish with lighter-hued rings. Proboscis long, pale brown or yellowish, often darker at base and apical 1/3. Palpus about one-third the length of proboscis, yellow basally, apical portion broadly white. Thorax: narrow, yellowish or golden

scales cover mesonotum. Two well defined round white spots near anterior margin, another pair posterior to these and three other pale spots, rather indistinct, especially in caught wild specimens, located at about the level of wing roots; white scales on scutellum, broad on midlobe, narrow on lateral lobes. A few narrow white scales on ppn and patches of broader white scales elsewhere on pleuron. Wings with asymmetrical broad scales, as usual in Mansonia (Mansonioides), speckled with yellowish and dark brown broad scales, mixed fairly evenly. Legs yellowish, marked with numerous snow-white rings; about five of such rings on each femur; knees white; tibiae with four or five rings each, tips also white. Tarsomere I of all legs with medial white ring; basal white ring on mid and hind leg and on IV, V hind tarsomeres. Abdomen: terga brown or yellowish scaled; apical white patches on each segment. Lateral chitinized hooks on VIII widely and evenly spaced. Post-genital plate not divided at base into two lobes, but apex is so divided.

Breeding habits: Breeds in muddy pools, ponds and the like.

Biting habits: Largely zoophilic; seldom anthropophilic.

Distribution: Philippines, Southeast Asia, Indonesia, Thailand.

Medical Importance: Probably the most important vector of Brugia malayi in the Philippines.

(77)

Mansonia (Mansonioides) uniformis Theobald 1901.

1901. Panoplites uniformis Theobald. Monogr. Cul. 2:180.

1905. Mansonia uniformis (Theobald). Ludlow, Canad. Ent.

37:134.

1945. Mansonia (Mansonioides) uniformis (Theobald). Bohart,
U.S. Navmed 580. p. 42.

1929. Taeniorhynchus (Mansonioides) uniformis Theobald.

Not. Ent. 9:3 (listed).

Eggs: Dark brown to black. Not differentiable from M. indiana,
bonneae and annulifera, according to those who have studied these
eggs. (We have not seen any.)

Larvae: First and second-instars: not studied.

Third and fourth-instars: dark brown to almost black. Similar
to M. indiana but differentiable by shoulder hair 4 with only about
4 simple branches. Head: (clypeal) h-1 long and curved; h-4 and 5
with short and fine branches; h-6 and h-7 with apically plumose branches;
h-7 with longer branches. Antenna slender and spiculed, shaft hair
with pectinate branches; h-2 and h-3 arise almost midway between h-1
and tip of antenna. Thoracic and abdominal hairs slender. Abdominal
segment VIII with two short blunt spines. No comb teeth. Siphon
short, sclerotized, pointed, with serrated valve adapted for piercing
roots of aquatic plants to obtain oxygen for breathing. Siphon tuft
with two branches. No pecten teeth. Anal segment cylindrical with
four pairs of tuft hairs.

Pupa: Cephalothorax smooth with very fine hairs. Respiratory
trumpet slightly curved, terminating into 2 strong sclerotized spines
adapted for piercing roots of aquatic plants for attachment and
breathing; the trachoid near the base. Abdominal integument reticu-
late and spiculate. Abdominal hairs very fine. Paddle slightly

elongated with stout midrib, without paddle hair.

Adults: Male and female: a medium-sized light brown mosquito with two longitudinal greenish stripes on the scutum, and a prescutellar yellowish area and over the midlobe of scutellum. Head: vertex covered with decumbent and upright scales with narrow golden scales around eye margin and broad white scales at sides; proboscis with broad median white band. Thorax: areas of broad white scales on upper and lower sternopleuron and mesepimeron. Wing: speckled, Legs: hind femur with five dorsal white spots; mid and fore femora, and all tibiae with various markings; tarsi with complete white banding basally. Abdomen: tergal scales largely dark with white spots on segments I-VII; VIII broadly white; sternal scales mostly white; tergum VIII: comb teeth are arranged as follows: 4.1.7.4. or 5.1.7.1.5. with detached tooth.

Male genitalia: sidepiece elongated with stout and long bristles; basal lobe stout with spine emarginate at tip; clasper broad from base to apical 1/3, then bent and narrowed at tip, with subapical small setae; aedeagus elongated, rounded at tip, with two median projections; paraprocts short and the sclerotized apex with 6-8 small teeth; four cercal setae; parameres tiny.

Breeding habits: Breeds in open swamps with floating aquatic vegetation. The larva and pupa attached to roots of aquatic plants.

Biting habits: Both zoophilic and anthropophilic.

Specimens were collected in carabao-baited traps; a few were caught while biting man in late afternoon.

Distribution: Philippines (Mt. Province, Sorsogon, Leyte, Olongapo, Zambales, Manila and Rizal); Ethiopia, Oriental and Australian regions, Solomon Islands, Japan and Ryukyu-Retto.

Medical Importance: Is a vector of Wuchereria bancrofti and Brugia malayi.

(78)

Orthopodomyia anopheloides (Giles) 1903. Figures 73 and 74.

1903. Orthopodomyia anopheloides (Giles). In Wyville

Thomson, J. Trop. Med. 6:315.

1908. Orthopodomyia nigritarsis Leicester. Cul. Malaya :177.

1946. Orthopodomyia manganus Baisas. Mon. Bull. Bur. Hlth.

Philipp., Manila 22(1):34.

1948. Orthopodomyia nipponica La Casse and Yamaguti. Mosq.

Fauna of Japan and Korea, II:264.

Eggs: Not known.

Larvae: First and second-instars: not studied.

Third and fourth-instars: may be recognized with the unaided eye owing to dark head and dark tergal plates covering segments VII and VIII of the abdomen. Antenna tapers conspicuously and uniformly from base to apex; its tuft moderately medium sized, having six or more well frayed branches; arises at about one-third of shaft from base. Preclypeal spines not very strong, single. Hair 4, 5, 6 and 7 all tufts of different sizes: 4 shortest with six or more highly frayed long branches; 7 about equal in length to 4 with some nine branches of different lengths, frayed; 6 usually the longest. Abdomen: lh or I a tuft with some 8 highly frayed branches; of II similar

but shorter with half a dozen frayed branches. Segment VII with a dark, large tergal plate extending down to about three-fourths the lateral side of the segment. Tergal plate of VIII covers the segment. Comb in a patch composed of markedly large and small teeth, the largest with expanded rounded apex, bearing long, thick spines of various sizes along the apical margin, the points on lateral sides progressively smaller. Siphon long and stout, tapers toward tip; its thick, many-branched tuft arises a little below the middle from base; without pecten teeth. Anal segment (X) covered by saddle. Isc divided into some ten slender, smooth branches. Osc much longer, single. Lh short, two-branched. Anal papillae lanceolate, the dorsal pair nearly twice as long as the ventral. Ventral fan well developed, many-branched.

Pupa: Diagnostic parts as illustrated.

Adults: Male and female: readily identified due to spotted wings and marked pale banded tarsomeres.

Proboscis of female: basal half dark-scaled followed by a broad white band, then dark-scaled again, with a variable white patch dorsally below the tip. Palpus about one half the length of the proboscis, a narrow white ring at the middle and white scaled at apex. Male palpus about $4/5$ the length of the proboscis, white at apex, a narrow white subapical ring, another at middle, a few white scales at base. Wings highly white-marked as illustrated. Legs highly speckled with scattered pale and golden scales on outer surfaces of

the femora and tibiae. Fore and mid tarsomeres pale with golden markings. Hind tarsomere variably white ringed. Abdomen: terga dark, basally white ringed, those of VI and VII distinct. Male terminalia as illustrated.

Breeding habits: Usually breeds in tree holes; may breed in artificial containers mixed with larvae of other species.

Biting habits: Unknown.

Distribution: Philippines, India, Assam, Malaya, China, Japan and Ceylon.

(79)

Topomyia barbuis Baisas 1946. Figure 75.

Mon. Bull. Bur. Hlth. Philipp. Manila 22(4):41.

Topomyia barbuis Baisas. Knight & Chamberlain, Proc. Helm. Soc.

Wash. 15:1-18, 1948.

Eggs: Unknown.

Larvae: First and second-instars: Unknown.

Third and fourth-instars: as the specimens collected from axils of wild bananas in Subic Naval Reservation were very few, none of which reached the adult stage in isolation, the following descriptions were copied direct from the original published by Baisas in 1946.

Identification of specimens from Subic was based on the male terminalia extracted from dead pupae. They were not sufficiently good for permanent mounting.

"Larva: bears some similarities with larvae of Malaya genurostris. Compared, however, with the larva of genurostris on hand, there

are marked differences. In Topomyia barbus the branches of the main frontal hairs are subequal in length or nearly so; the most posterior ventral seta of the head is a normal, fairly long, 4 to 6-branched hair; while the maxillary plate bears at its apex a strong pointed spine with a bulbous base; this spine is internal to the group of apical bristles; in addition there is also a long single subapical hair on the maxillary plate. The frontal hairs of genurostris have the central branch considerably longer and stouter than the lateral branches, and that of 4 is sometimes frayed toward its base; the most posterior ventral hair of the head is represented by a stout spine which may be single or split into 2 or 3 points; the maxillary spine is external to the apical bristles, its base not bulbous, and its tip is split into about five equal points; there is no subapical hair on the maxillary plate. There are many large stellate tufts on the thorax and abdomen of Topomyia barbus, but none or very weak when present in genurostris. The spines on the the thoracic pleural plates are comparatively longer, pointed in Topomyia barbus; short, blunt in genurostris. There are also differences in the type and branchings of hairs on the anal segment, the number and type of comb and pecten teeth, as well as in the tufts of the siphon, but no character seems of generic importance, there being even more marked differences between Topomyia imitatus and Topomyia barbus, than between Malaya and Topomyia."

Pupa: Not available.

Breeding habits: Breeds in axils of wild bananas so far as known.

Biting habits: Unknown.

Distribution: Seems to be only in the Philippine Islands.

(80)

Topomyia pseudobarbus Baisas 1946. Figure 75.

Mon. Bull. Bur. Hlth. Philippines, Manila 22(4):46.

Eggs: Unknown.

Larvae: First and second-instars: unknown.

Third and fourth-instars: no material available for description; specific identification of specimen from Subic was only through a male terminalia extracted from a dead pupa.

The descriptions of adults are copied from Baisas (1946).

"Adult: Cannot be distinguished by external characters from barbus. The style of the male terminalia, however, is twisted toward the tip, does not possess the subapical barb on the external side; while the appendage of harpago does not narrow appreciably toward apex, and the basal lobe of the coxite bears fewer hairs. Tergite IX has a stouter pair of spines."

The male, similar to barbus, has the golden ring or patch at base of the proboscis and the white broad line on underside of mid and hind legs; the female lacks this.

Pupa: Not available.

Breeding habits: Breeds in wild banana axils.

Biting habits: Not known.

Distribution: Seems to be unknown outside Philippine Islands.

(81)

Toxorhynchites (Toxorhynchites) minimus Theobald 1905.

1905. Megarhinus minimus Theobald. Jour. Bomb. Nat. Hist.
Soc. 16:239.

1919. Toxorhynchites minimus (Theobald). Senior White. Sc.
Zeyl. 11:189.

1929. Megarhinus minimus (Theobald). P. J. Barraud, Rev. Cul.
Mosq. Ind. Part XXVI p. 276.

Eggs: Not available.

Larvae: Not available.

Adults: Male (female not available) head: clypeus flat, broader than long, covered with white flat scales; scales of vertex with bronze sheen, flat scales round the eyes with metallic, bluish-green reflections continuing down to occiput; proboscis more slender than those of other Toxorhynchites species, dull purple in hue, curving downwards at about the middle; gradually tapering from base to a rather blunt tip; palpus about as long as the proboscis, turned upwards at about the apical third; a narrow pale apical band on I. Torus white; sparsely covered with fine brownish hair tufts. Thorax: scales of scutum with yellowish-green metallic luster; bluish-green scales over the wing roots; dark green scales over scutellum, apn and upper propimeron. Patches of silvery white scales elsewhere on pleuron. Legs: femora yellowish at the base and beneath, the rest purplish with pale bands. Wings uniformly dark. Abdomen: terga greenish in the middle, pale yellowish at the sides; II & III entirely greenish, basal third of IV also greenish, but apical two-thirds bright purple;

V-VIII all bright purple; lateral tufts at the apex of VI yellowish, basal tufts of VII also yellowish but apical portion dark; lateral tufts of VIII dark. Sterna yellowish.

Breeding habits: Breeds in bamboo (bujo) internodes only during the rainy season, larvae or pupae may be obtained only by splitting the internodes of green (not dry) bamboo (bujo). Selection of right internodes indicated by tiny holes through which a pin head may be inserted. How the eggs are thrown inside through the tiny holes and how adults emerge from these has not been studied locally.

Biting habits: Unknown.

Distribution: Philippines, Ceylon.

(82)

Toxorhynchites (Toxorhynchites) splendens Wiedemann 1819.

1819. Culex splendens Wiedemann. Zool. Mag. 2:1.

1857. Culex regius Thwaites in Tennent, 1859.

1906. Worchesteria grata Banks. Philipp. J. Sci. 1:180.

1934. Megarhinus splendens (Wiedemann) Barraud. Fauna
of Brit. Ind. 5:24.

1953. Megarhinus splendens (Wiedemann) Bhatia,
Notananda and Sambasivan, WHO Reg. Off. SEA/Mal.
1-53-48.

Eggs: Not available.

Larvae: First and second-instars: not available.

Third and fourth-instars: head - subquadrangular in shape;

mouth brush composed of 6-8 curved blades; mentum with 8 teeth on each side of the central tooth. Antennal shaft short, slender, straight and smooth; antennal h-1 with 7-9 branches. Thorax: dorso-lateral plate on mesothorax undivided. Abdomen: dorso-lateral plate on abdominal segment VII with two bristles and three setae. Anal papillae short and rounded. Siphon: tube short and dark, wider at the base, tapers to the tip; one pair of siphon hair tufts located near the base, having 4 or 5 spinous branches.

Pupa: Cephalothorax: trumpet devoid of trachoid and slit. Paddle ovoid, posterior margin with short fine spicules but without terminal hair.

Adults: Male: head - basal half of proboscis stout, rigid and straight, the apical half tapers abruptly at the flexure where curving downward and backward begins, purplish blue, with some greenish scales at the bending point. Palpus as long as proboscis, bent upward at the base of segment III. Clypeus broader than long, rendered whitish with pollinosity. Antenna: torus, clothed with whitish pollinosity; as long as the rigid basal half of proboscis, plumose and with apical tuft of black on the first flagellomere. Thorax: scutum greenish with bluish border from pronotum to the level of wing roots. Apn greenish with blue reflections. Ppn with silvery scales. Pleuron mainly silvery. Legs mostly bluish-purple; fore tarsi entirely dark, mid tarsi with well-defined basal white bands on I and II. Hind tarsi with white basal ring on II. Wing dark with V-shaped thickening opposite tip of vein 5.2 creating an unusual and conspicuous indentation at

that point on the wing fringe. Abdomen: terga greenish-blue with lateral white broken line, bordered with a continuous row of pale long bristles on segments I-V; lateral prominent black tufts on segments VI-VIII. Sterna: dark. Female differs from male by the following characters: head: palpus a little less than half the length of the rigid basal half of the proboscis. Legs: markings variable specially on all tarsomeres; seem to have no definitive diagnostic value. Abdomen: terga II-V wide; others narrow; lateral tufts on IV yellow and dark; on VIII orange.

Breeding habits: Breeds in bamboo stumps, tree holes, and tin cans.

Biting habits: Like other Toxorhynchites species, it is said to subsist on nectar of flowers and on other plant juices.

Distribution: Philippines (Zambales), Java, Sumatra, New Guinea, Fiji, Malaya, Thailand, Indichina, China, India and Ceylon.

(83)

Tripterooides (Tripterooides) dyari Bohart and Farner 1944. Figure 76.

1944. Tripterooides dyari Bohart & Farner. Proc. Biol.

Soc. Wash. 57:72.

1920. Tripterooides dyari Dyar. Insec. Inscit. Menst.

8:175-186.

1949. Tripterooides dyari Baisas & Pagayon. Philipp. J. Sci.

78:43-72.

Our field men in Subic Naval Reservation caught only a few females of this mosquito.

Adults: Female - we presume the specimens taken were dyari since this is the one more common in Luzon Island. Its most striking character is the yellowish integument of the mesonotum; the postnotum also yellowish.

Head: broad, flat blue scales cover anterior half; dark scales posteriorly; a row of upright forked scales at nape. Torus quite large, bare, pale yellowish. A few small dark scales around base of flagellomere I: eight verticils on each flagellomere. Clypeus bare, yellowish. Proboscis rather long (exceeds the length of fore femur, common in the ornate species of Tripteroides), dark. Palpus much shorter, dark. Scutal integument pale yellowish, scales narrow, dark, not very dense. Dorso-central bristles missing and probably rubbed off. Scutellum pale yellowish, with dark broad flat scales. Patch of broad dark scales on yellowish apn; a few narrow dark scales on pale-yellowish ppn. Spiracular bristles detached. A large dense patch of broad silvery scales on posterior part of sternopleuron. No other patches of scales elsewhere on pleuron. Wings dark. Legs dark, undersides of femora pale; two silvery spots on apical half of outer surface and a silvery line on basal half of each femur. Abdomen: terga dark, no traces of bands (rubbed off). Sterna with pale golden scales, except VIII which is dark-scaled.

Breeding habits: Breeds in pitcher plants.

Breeding habits: Breeds in pitcher plants.

Biting habits: probably Zoophilic, as specimens were caught inside carabao-baited traps.

Distribution: Probably only in the Philippines.

(84)

Tripteroides (Tripteroides) monetifer (Dyar) 1920.

1920. Tripteroides monetifer (Dyar). Insec. Inscit. Menst.
8:176.

1944. Tripteroides monetifer Bohart & Farner. Proc. Biol.
Soc. Wash. 57:69-74.

1949. Tripteroides monetifer Baisas & Pagayon. Philipp.
J. Sci. 78:43-72.

1952. Tripteroides monetifer Baisas & Pagayon. Monogr.
Inst. Sci. Tech. Manila 2:198.

Eggs: Not known.

Larvae: Not available.

Adults: Like dyari only a few females (not in good condition) were caught in carabao-baited traps at Subic. To describe this in detail is nothing but a repetition of the description of female dyari. Two characters readily distinguishing this from others of the ormate Tripteroides are: (1) the opalescent scales (variable in reflections under different light angles, but usually these appear greenish) covering its apn and also (2) similar scales covering the scutellar lobes. The usual reflections of the scales on apn and scutellum of

all other Group B species also change according to light angles, but in the others, the most usual reflection is bluish, sometimes deep blue.

Breeding habits: Breeds in cut bamboos.

Biting habits: Mostly zoophilic, but sometimes attacks man during the day in places where this mosquito breeds.

Distribution: Probably only in the Philippines.

(85)

Tripteroides (Tripteroides) powelli powelli (Ludlow) 1909.

1909. Tripteroides powelli (Ludlow). Canad. Ent. 41:235.

1929. Tripteroides powelli ssp. indicus (Barraud).

Indian J. Med. Res. 16:1061.

1952. Tripteroides powelli ssp. escodae Baisas and Pagayon.

Monogr. Inst. Sci. Tech., Manila. 2:167.

1952. Tripteroides powelli ssp. laffooni Baisas and Pagayon.

Monogr. Inst. Sci. Tech., Manila. 2:168.

1952. Tripteroides powelli ssp. mattinglyi Baisas and

Pagayon. Monogr. Inst. Sci. Tech., Manila. 2:169.

Only a few females of this mosquito were caught in carabao-baited traps in Subic Naval Reservation. Our determination of this form is based mainly on finding a few larvae of powelli in bamboo stumps in Subic Naval Reservation. None of these reached the adult stage in the Laboratory at Subic, and as they were forwarded to Pasig in very bad condition, the identification is based mainly on the two-branched ventral tufts along the underside of the siphon.

In the larval stage powelli powelli has been described by Baisas and Pagayon (1962) as follows: "Head nearly as long as broad, narrower than the thorax. Antenna short, shaft smooth, somewhat broader at middle; its single, short antennal hair arises subapically from shaft. Preclypeal spines (h-1) thick, bent inwardly and downwardly. H-4 slender, single; 5 also single, longer than 4; 6 similar to, but slightly shorter than 5; h-7 nearly as long as 6, but usually three-branched. Thorax: Stellate tufts prominent, the main branches with double or triple short tips. Meso-7 a fairly thick, barbed spine; meta-7 thicker and longer with a secondary point. Abdominal hairs also mostly stellate. The lh or h-6 of I-VI, the longest setae as usual: that on I and II usually split into two equal branches; of III-VI single. Segment VIII: comb without plate, number and sizes of teeth variable (eleven to twenty five). Teeth in a closely set row, with one or two not well aligned with the others. Siphon variable in length and width, relationship between length and breadth not useful for diagnosis. Three or more widely separated, irregularly arranged pecten teeth, each tooth narrow, moderately long, pointed, finely serrate along one side. Dorsal and lateral hairs short, variable in number, each having two or three branches. Ventral hairs much longer, frayed, variable in number (eight to ten) arranged in a single row except the most basal which is always paired, and each hair of the pair split into two or three branches. Anal segment (X) short, largely covered with saddle. Saddle teeth usually about six, lined on either side along the posterior margin between the osc and lh.

isc longer than siphon, branched into three, frayed; osc longer, single frayed; lh nearly as long as the isc, frayed, simple or branched into two or three. Ventral fan represented by a pair of tufts usually longer than the anal segment, each branched into five or more, frayed. Anal papillae rounded at tips, fairly broad, the dorsal pair longer.

Pupa: Not available.

Adults: Female: as specimens were caught wild and not in good condition they are presumed to be powelli due to the finding of a few larvæ of this form in the Base. Unless a female is with associated skin, it cannot be determined for certain. External characters are very similar to those of dyari.

Breeding habits: Breeds in cut bamboo, tree holes, axils of Colocasia.

Biting habits: Zoophilic.

Distribution: Philippines, Southeast Asia, India.

(86)

Uranotaenia annandalei Barraud 1926. Figure 77.

Barraud, Indian J. Med. Res. 14:343.

Eggs: No available materials.

Larvae: First and second-instars: not available.

Third and fourth-instars: head: clypeus h-1 flattened, long and straight. Head h-5 and h-6 flattened, dark and spinous laterally; h-4 single, short and simple; h-7 with 3 branches. Antenna smooth; h-4 and h-6 blade-like in appearance; h-2 conspicuously leaflike arising at midpoint; h-1 small and simple. Abdomen: h-6 with 3 branches;

h-7 single on segment I; h-6 and h-7 double on segment II. Comb plate large with 4-6 large teeth. Siphon slender and pigmented; the siphon tuft with 5-7 leaflets situated after the last pecten tooth; pecten with 8-11 teeth which are fringed apically.

Pupa: Respiratory trumpet short, dark, without slit. Paddle with sharp serrations and one short paddle hair.

Adults: Male terminalia: basal lobe with few short setae; clasper small, swollen at base and tapers towards apex with fine hairs; aedeagus with two broad lateral plates; paramere rod-like. Female head: vertex dark brown, with silvery white scales around eye margin. Thorax: scutum dark brown. A line of bluish white scales from anterior pronotal lobe to pleuron. Wing: brown. Legs: brown. Terga dark; sterna, pale.

Breeding habits: Larvae were collected from slow flowing shaded streams.

Biting habits: Unknown.

Distribution: Philippines (Baguio, Laguna, Zambales), India, Nepal, Burma, China, Taiwan, Ryukyu Islands, Okinawa.

(87)

Uranotaenia arguellesi Baisas 1935. Figure 77.

Philipp. J. Sci. 57(1):68.

Eggs: Not available.

Larvae: First and second-instars: not available.

Third and fourth-instars: head: clypeus h-1 slender and pointed; head h-5 and h-6 dark, flattened and spinous laterally; h-4 with 3-4

short branches; h-7 with 4 long branches. Antenna dark and spiculated; antennal shaft h-1 short and single. Abdomen: comb plate separated dorsally, with 3-10 pointed teeth. Siphon dark at mid portion; pecten teeth numbering from 10-12; siphon tuft with 10 to 12 branches and located at level of last pecten tooth. Saddle long, the posterior border with sharp spicules, saddle h-1 with 4-5 branches.

Pupa: Respiratory trumpet slender with long slit. Paddle: margin serrated with one small paddle hair.

Adults: Male terminalia: basal lobe with four long bristles; clasper short and blunt; aedeagus with two small apical and four large curved teeth. Female head: vertex with a line of bluish white scales around eye margin. Thorax: scutum brown with a short narrow line of white scales in front of wing base; pleuron with a narrow line of white scales across sternopleuron and anterior pronotal lobe and on lower mesepimeron. Wings: base of costa (remigium), basal half of vein 5 and 6 with white scales. Legs: mostly dark with some pale scales on coxae. Abdomen: terga I-V white, VI-VII dark.

Breeding habits: Larvae were collected from slow flowing water of shaded streams.

Biting habits: Unknown.

Distribution: Philippines (Zambales and Laguna).

(88)

Uranotaenia lagunensis Baisas 1935. Figure 79.

1935. Uranotaenia lagunensis Baisas. Philipp. J. Sci.

57(1):70.

Eggs: Not available.

Larvae: First and second-instars: not available.

Third and fourth-instars: clypeal h-1 short; head h-5 and 6 single, long and simple; h-4 with 4-6 short branches; h-7 with 6-8 long branches. Antenna, spiculate and lightly pigmented. Antennal h-1 long and single. Abdominal h-6 double, h-7 single. Comb plate with 10-12 teeth. Siphon slender with numerous pecten teeth extending to 1/2 of its length. Siphon tuft with 7-9 branches. Saddle short and broad with spicules along posterior margin.

Pupa: Respiratory trumpet short, widest at opening but without slit. Paddle margin serrated; with two unequal paddle hairs.

Adults: Male terminalia: basal lobe with bristles of unequal length; clasper slender but swollen at base, apical 1/3 with small setae; lateral plates of aedeagus bear two unequal short teeth and two curved ones. Parameres swollen medially. Female head: vertex with pale upright scales. Thorax: scutum uniformly brown; pleuron also brown with patches of translucent scales on upper and lower sternopleuron. Wings and legs, uniformly brown. Abdomen: with narrow basal white bands on terga I-VI, dark on VII-VIII; sterna pale.

Breeding habits: Larvae were collected from temporary rain pools and rock pools in shaded areas.

Biting habits: Unknown.

Distribution: Philippines (Bataan, Laguna, Palawan, and Zambales).

(89)

Uranotaenia lateralis Ludlow 1905. Figure 78.

1905. Uranotaenia caeruleocephala var. lateralis Ludlow.

Canad. Ent. 37:385.

1906. Uranotaenia lateralis Ludlow. Banks, 1906. Philipp.

J. Sci. 1(9):990.

1913. Uranotaenia caeruleocephala Theobald. Bezzi, 1913

Philipp. J. Sci. 8(4):307 (listed).

1925. Uranotaenia innotata Dyar & Shannon. Insec. Inscit.

Menst. 19:69.

1925. Uranotaenia atra Theobald. Dyar & Shannon. Insec.

Inscit. Menst. 13:69.

Eggs: Not available.

Larvae: First and second-instars: not studied.

Third and fourth-instars: head: clypeal hair 1 curved, short and stout; head h-5 and 6 flattened, dark and pointed; h-4 with 3 short branches; h-7 with 3 longer branches. Antenna smooth; antennal shaft h-1 small and arising at basal fourth, apical hairs normal. Abdomen: lateral h-6 double; h-7 single. Comb plate broad with 7-9 small pointed teeth arranged in one row. Siphon slender with from 10-12 short pecten teeth; siphon tuft located at level of last pecten tooth.

Pupa: No available material.

Adults: Male legs: hind tibia with apical hair tufts; first fore tarsal segment short. Terminalia: basal lobe of side-piece with 6-8 setae; clasper short, swollen towards apex with apical

setae. Female head: vertex with dark brown scales and bluish white scales around eye margin. Thorax: scutum with a narrow line of bluish scales in front of wing base; pleuron with patches of bluish white scales across sternopleuron and anterior pronotal lobe. Wing: normally dark. Legs: all dark without hair tufts. Abdomen: terga dark with lateral white spots on segments II-VII; sterna predominantly pale.

Breeding habits: Larvae were collected from slow flowing water in shaded streams.

Biting habits: Unknown.

Distribution: Philippines (Cotabato, Rizal, Palawan, Bulacan, Laguna, Zambales); India, Ceylon, Andaman Islands, Malaya, Thailand, Indonesia, New Guinea, Australia, Solomon Islands, Borneo.

(90)

Uranotaenia mendiolai Baisas 1935. Figure 79.

1935. Uranotaenia mendiolai Baisas. Philipp. J. Sci. 57(1):71.

Eggs: Not available.

Larvae: First and second-instars: not available.

Third and fourth-instars: clypeal h-1 slender and straight; head: h-5 and h-6 dark, large and spinous; h-4 with three short branches; h-7 with four long branches. Antenna pigmented and spiculate. Comb plate large with seven pointed teeth. Siphon stout and somewhat swollen at midway; there are 8-10 pecten teeth; siphon tuft located halfway from base.

Pupa: Respiratory trumpet with slit at opening. Paddle serrated at margin.

Adults: Male terminalia: basal lobe with one long bristle and several short setae, clasper short and blunt; aedeagus with lateral plates, each carrying five unequal teeth. Female head: vertex dark with broad white scales around eye margin. Thorax: scutum with a line of white scales from wing base to anterior margin; pleuron with white line across sternopleuron to anterior pronotal lobe; and a few white scales on lower sternopleuron and coxae. Wing: dark except the basal 1/3 of radius which is white. Abdomen: terga II-IV with median white patches; complete apical bands on V and VI; VII dark; VIII pale; sterna dark.

Breeding habits: Larvae were collected from rock pools and temporary rain pools in shaded areas.

Biting habits: Unknown.

Distribution: Philippines (Bataan and Zambales).

(91)

Uranotaenia testacea Theobald 1905. Figure 79.

1905. Uranotaenia testacea Theobald. Ann. Hist. Nat. Mus.

Hung. 3:113.

1906. Uranotaenia falcipes Banks. Philipp. J. Sci. 1:1004.

Eggs: Not available.

Larvae: First and second-instars: not available.

Third and fourth-instars: clypeal h-1 elongated and curved.

Head: h-5 and 6 dark, large, prominent and spinous; h-4 dark, slender, less prominent and simple; h-7 with 6 long branches. Antennal shaft (h-1) with 4 to 5 long branches. Abdomen with stellate hairs. Comb

plate large with 10-12 long, pointed and fringed teeth. Siphon long, slender and dark basally; siphon tuft submedian in position; numerous pecten teeth extending to level of siphon tuft. Saddle long.

Pupa: Respiratory trumpet long, slender and wider at opening with slit. Paddle: margin serrated; one paddle hair.

Adults: Male terminalia: basal lobe with three long setae; clasper short and swollen at basal 1/2 with prominent apical setae; aedeagus with broad lateral plates, each bearing four small teeth and one curved tooth; parameres long and rod-like. Female head: vertex with dark scales and with bluish white line around eye margin. Thorax: scutum brown without white scales; pleuron with silvery white scales across sterno-pleuron to anterior pronotal lobe. Wing dark. Legs: dark; hind tarsomeres III-V completely white. Abdomen: terga dark; sterna pale.

Breeding habits: Larvae were collected from rock pools and in shaded streams.

Biting habits: Unknown.

Distribution: Philippines (Manila, Rizal, Bulacan and Zambales); Malaya and Thailand.

S U M M A R Y

A total of 91 species and subspecies were found in the U.S. Naval Reservation at Subic during 10 months observation and collection. Two of these are considered new subspecies: Anopheles ludlowae ssp. cabrerai, and Culex (Lophoceraomyia) uniformis ssp. mercedesae. However, Dr. Botha de Meillon, Responsible Investigator of the Southeast Asia Mosquito Project, brought an opinion concerning mercedesae from Dr. Sunthorn Sinivanakarn, their specialist in genus Culex, that this local form was probably Culex (Lophoceraomyia) kuhnsi King and Hoogstraal 1955. Following Dr. de Meillon's suggestion, the local specimens, some of which have associated skins, were sent to the USNM for checking and final verification. However, until we hear their final decision, we are retaining the provisional name ssp. mercedesae.

Armigeres joloensis (Ludlow) 1904, is proposed to be sunk as a synonym of Armigeres subalbatus Coquillett, 1898; these two forms are identical in all characters of the larvae, pupae and adults. Moreover, A. subalbatus occurs in all areas surrounding the Philippines, which makes it much more probable that its range also includes the Philippines. It seems a comparative study of all stages of these two mosquitoes was not possible to previous workers who did not have adequate materials for comparative examination.

Anopheles flavirostris (Ludlow) 1914, is again proposed to be raised to specific rank. This was proposed in an earlier paper (Baisas 1957) which seems to have been unnoticed.

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FIGURE 1 - Aedes vexans nocturnus

- a. Left half of larval head
- b. Terminal segment of larva showing:
 - b-1. Comb scales
 - b-2. Pecten teeth
- c. Respiratory trumpet (pupa)
- d. Metanotal hairs (pupa)
- e. Pupal terminal segment and paddle
- f. Right half of male terminalia

FIGURE 1

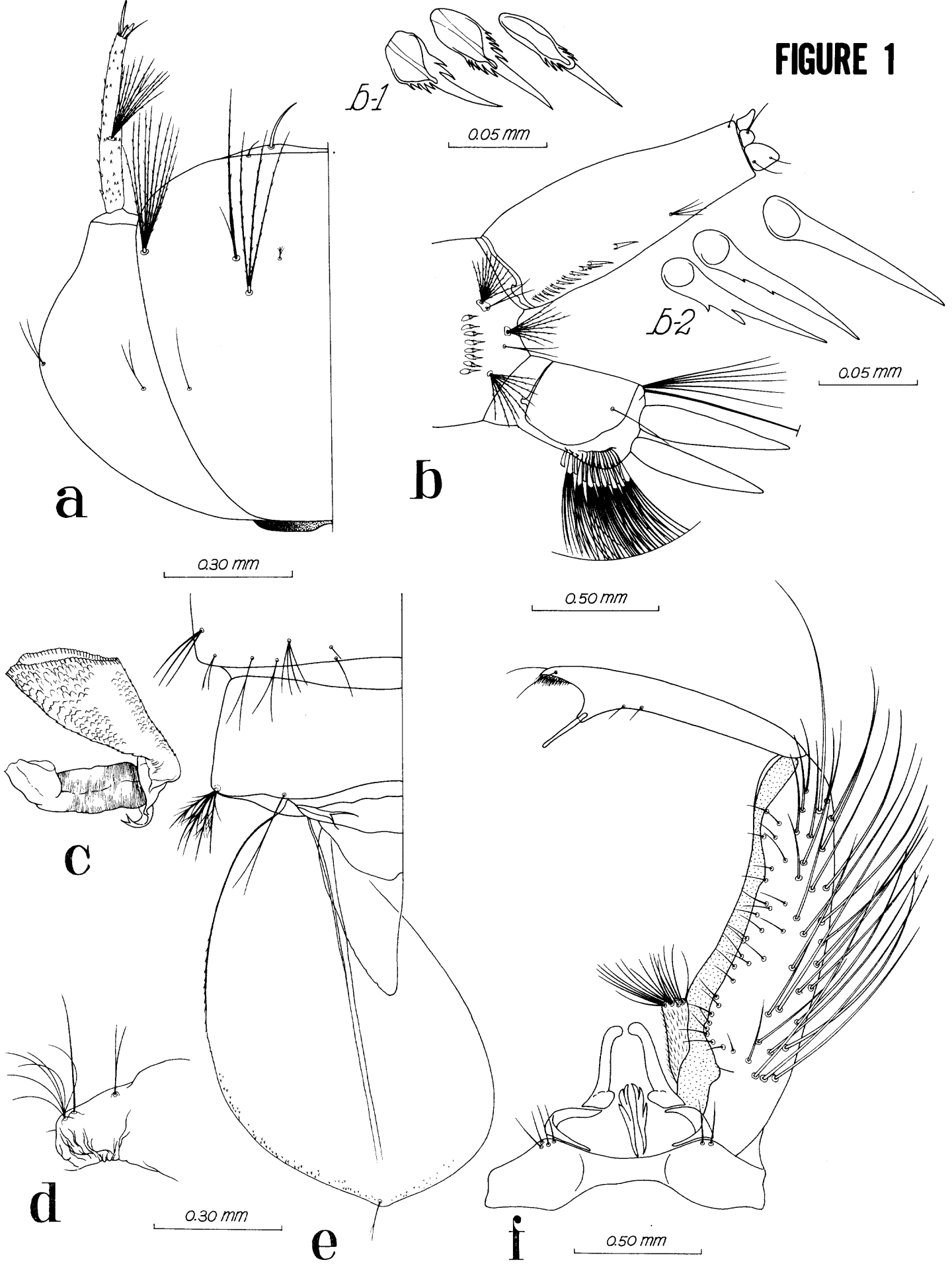


FIGURE 2 - Aedes flavipennis

- a. Left half of larval head
- b. Terminal segment of larva showing:
 - b-1. Comb scales
 - b-2. Pecten teeth
 - b-3. Saddle teeth
- c. Respiratory trumpet (pupa)
- d. Metanotal hairs (pupa)
- e. Pupa terminal segment and paddle
- f. Right half of male terminalia

FIGURE 2

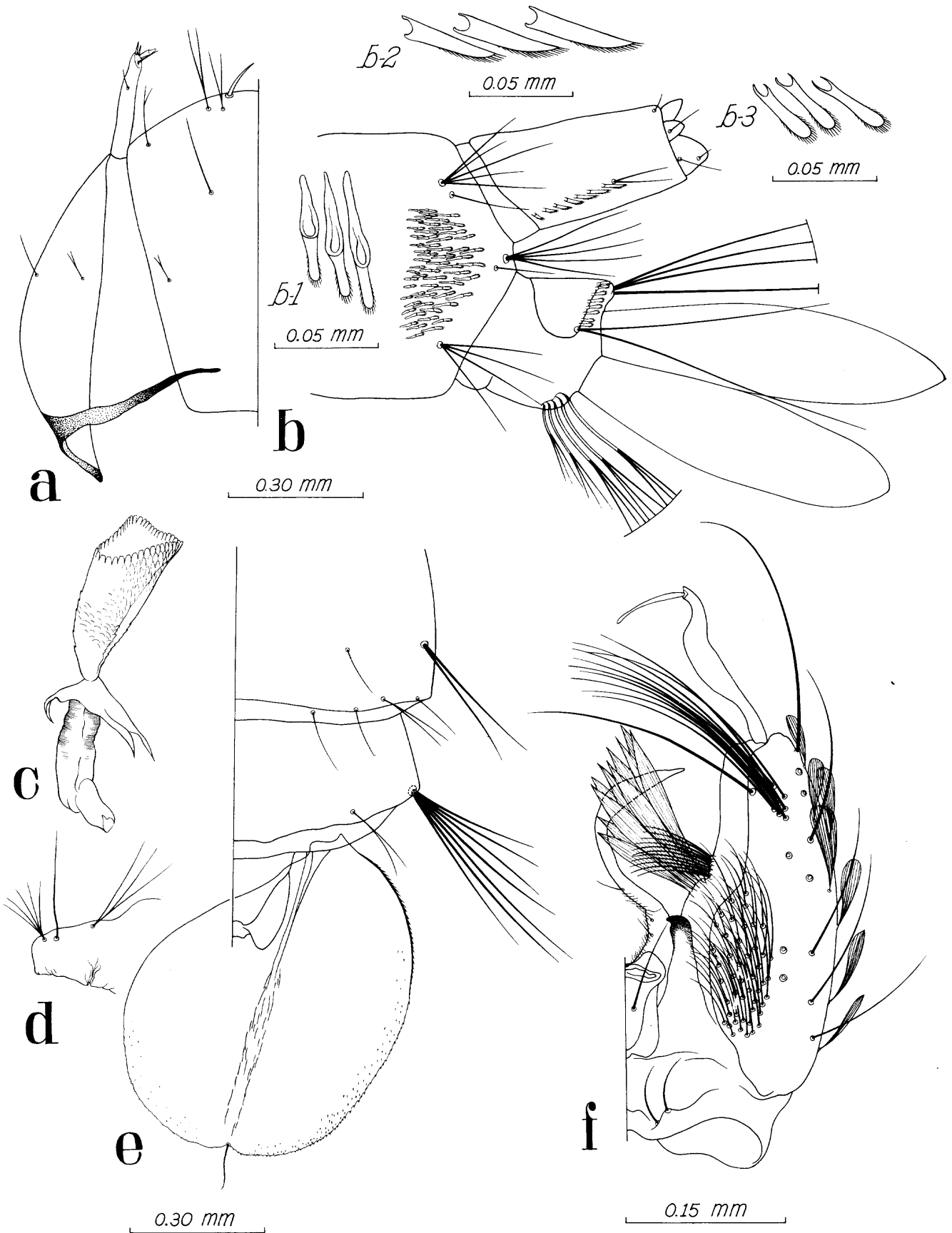


FIGURE 3 - Aedes flavipennis

- a. Lateral view of head and thorax
- b. Wing
- c. Legs
- d. Dorsal view of abdomen
- e. Dorsal view of thorax

FIGURE 3

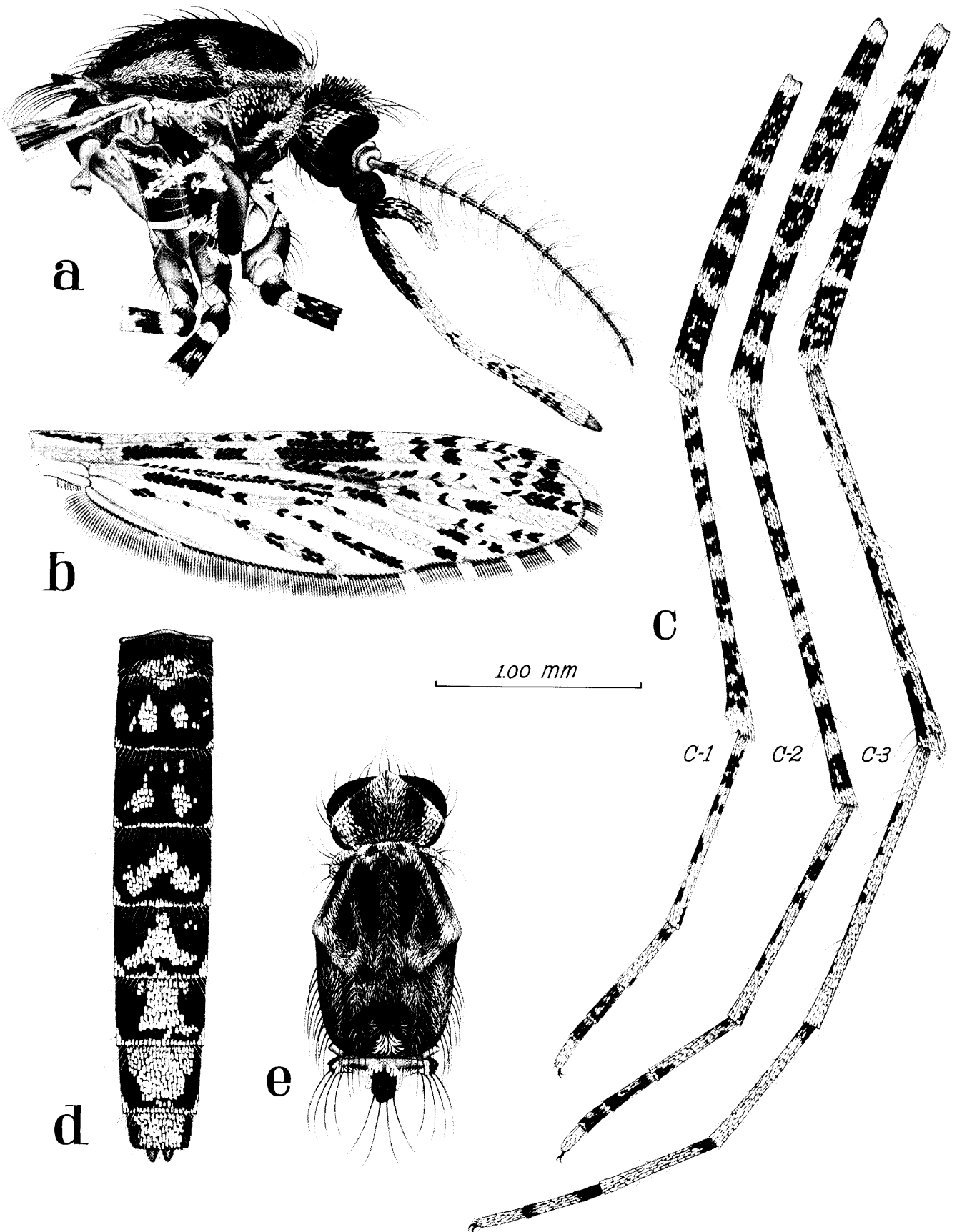


FIGURE 4 - Aedes harperi

- a. Lateral view of head and thorax
- b. Dorsal view of abdomen
- c. Dorsal view of thorax
- d. Legs

FIGURE 4

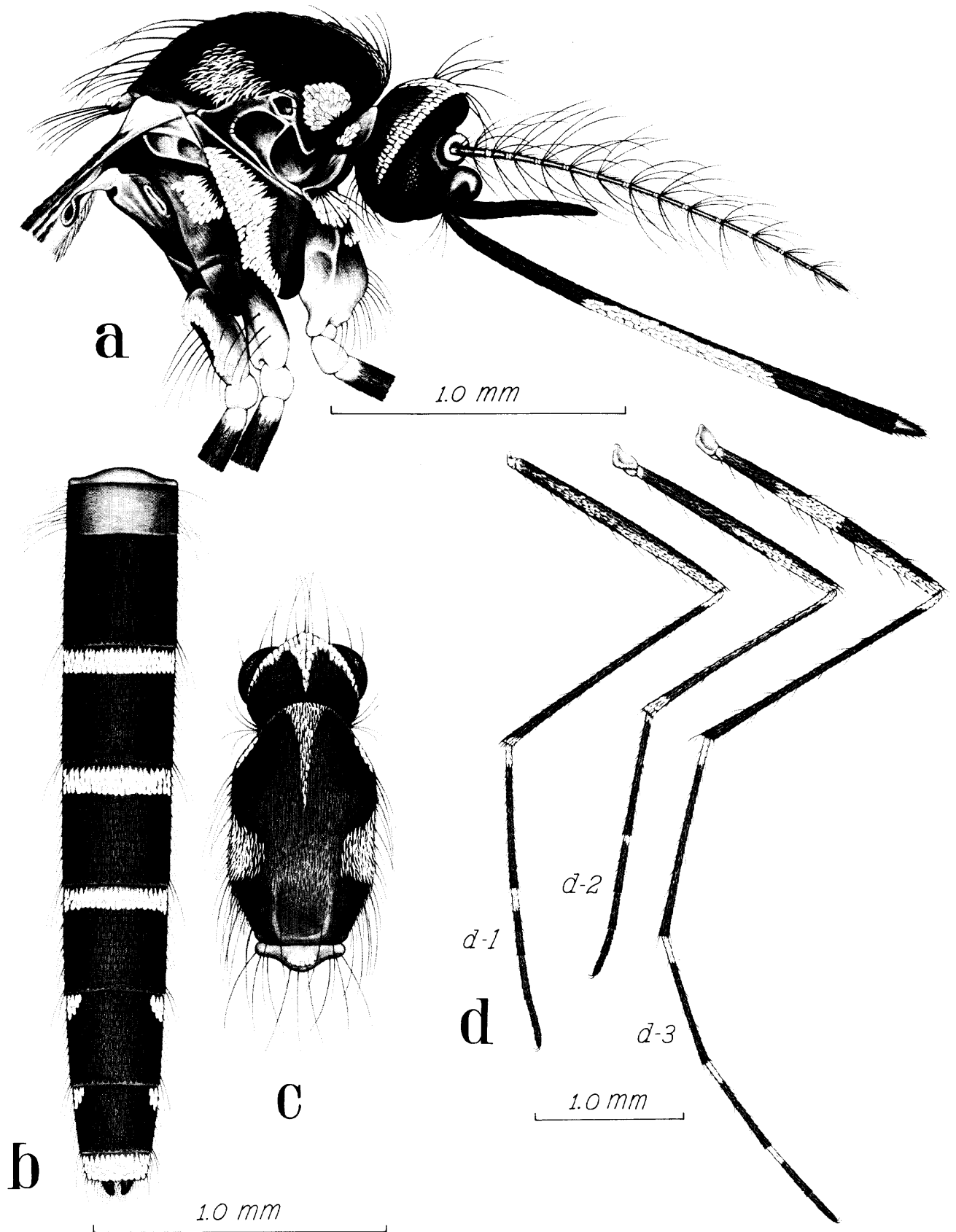
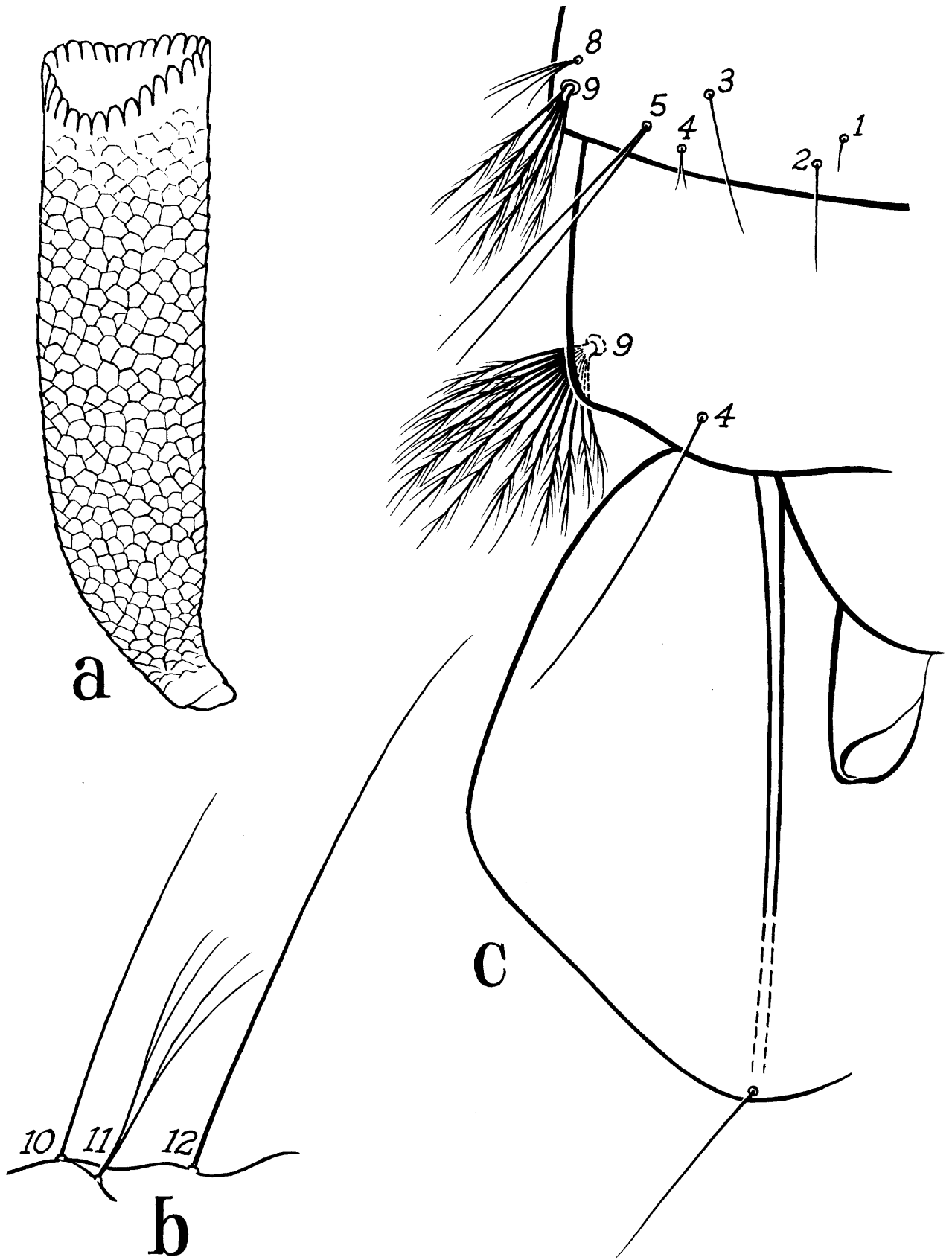


FIGURE 5 - Aedes luzonensis

- a. Respiratory trumpet (pupa)
- b. Mentanotal hairs (pupa)
- c. Pupa terminal segment and paddle

FIGURE 5

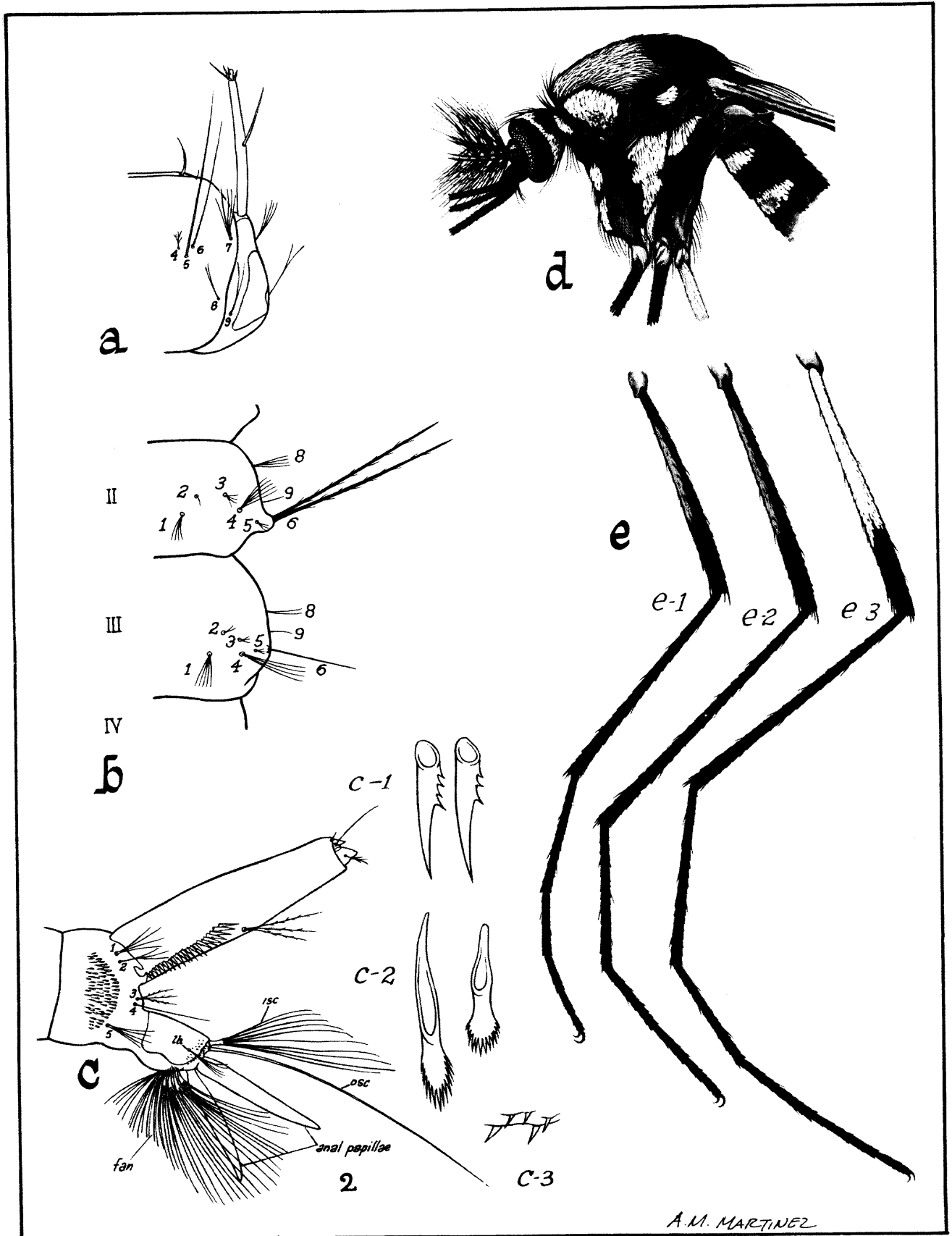


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FIGURE 6 - Aedes luzonensis

- a. Right half of larval head
- b. Larval abdominal segments II - IV
- c. Terminal segment of larva showing
 - c-1. Comb scales
 - c-2. Pecten teeth
 - c-3. Saddle teeth
- d. Lateral view of adult head and thorax
- e. Legs

FIGURE 6

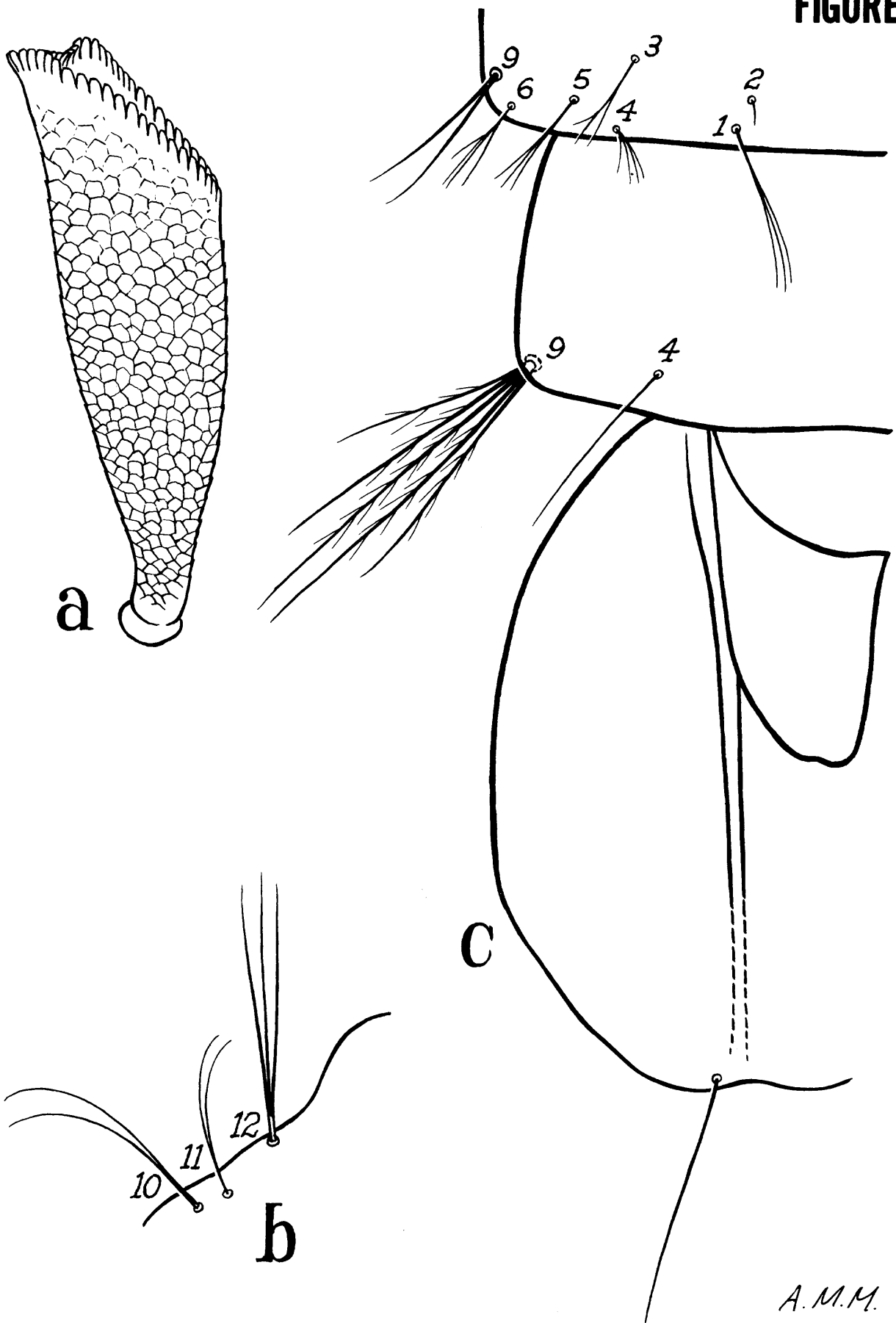


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FIGURE 7 - Aedes melanopterus

- a. Respiratory trumpet (pupa)
- b. Metanotal hairs (pupa)
- c. Pupa terminal segment and paddle

FIGURE 7

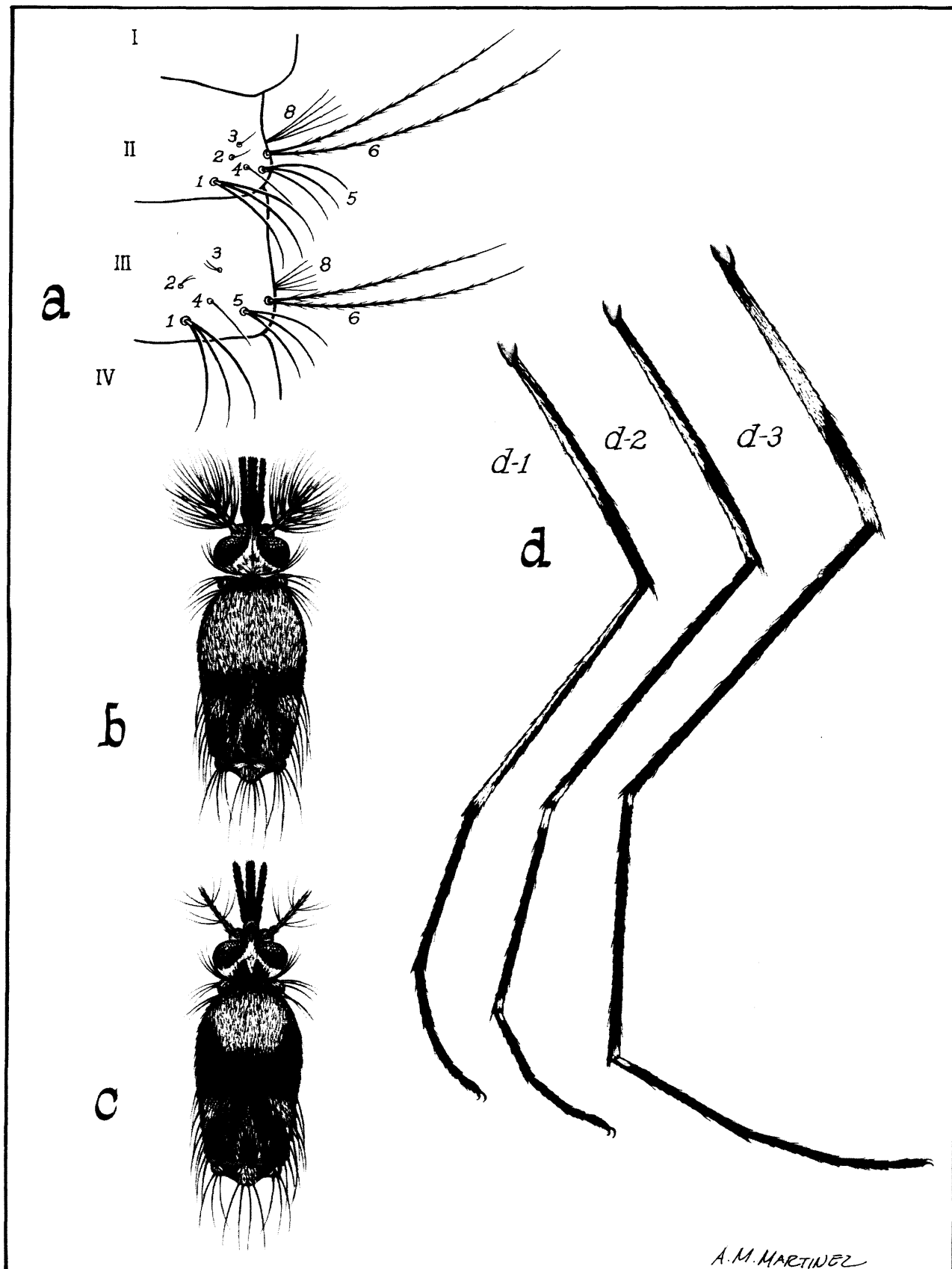


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FIGURE 8 - Aedes melanopterus

- a. Larval abdominal segments I - IV
- b. Dorsal view of adult male head and thorax
- c. Dorsal view of adult female head and thorax
- d. Legs

FIGURE 8



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FIGURE 9 - Aedes niveus

- a. Left half of larval head
- b. Half of larval head and thorax
- c. Larval abdominal segments III and IV
- d. Larval terminal segment showing:
 - d-1. Comb scales
 - d-2. Pecten teeth
- e. Respiratory trumpet (pupa)
- f. Mentanotal hairs (pupa)
- g. Pupa terminal segment and paddle

FIGURE 9

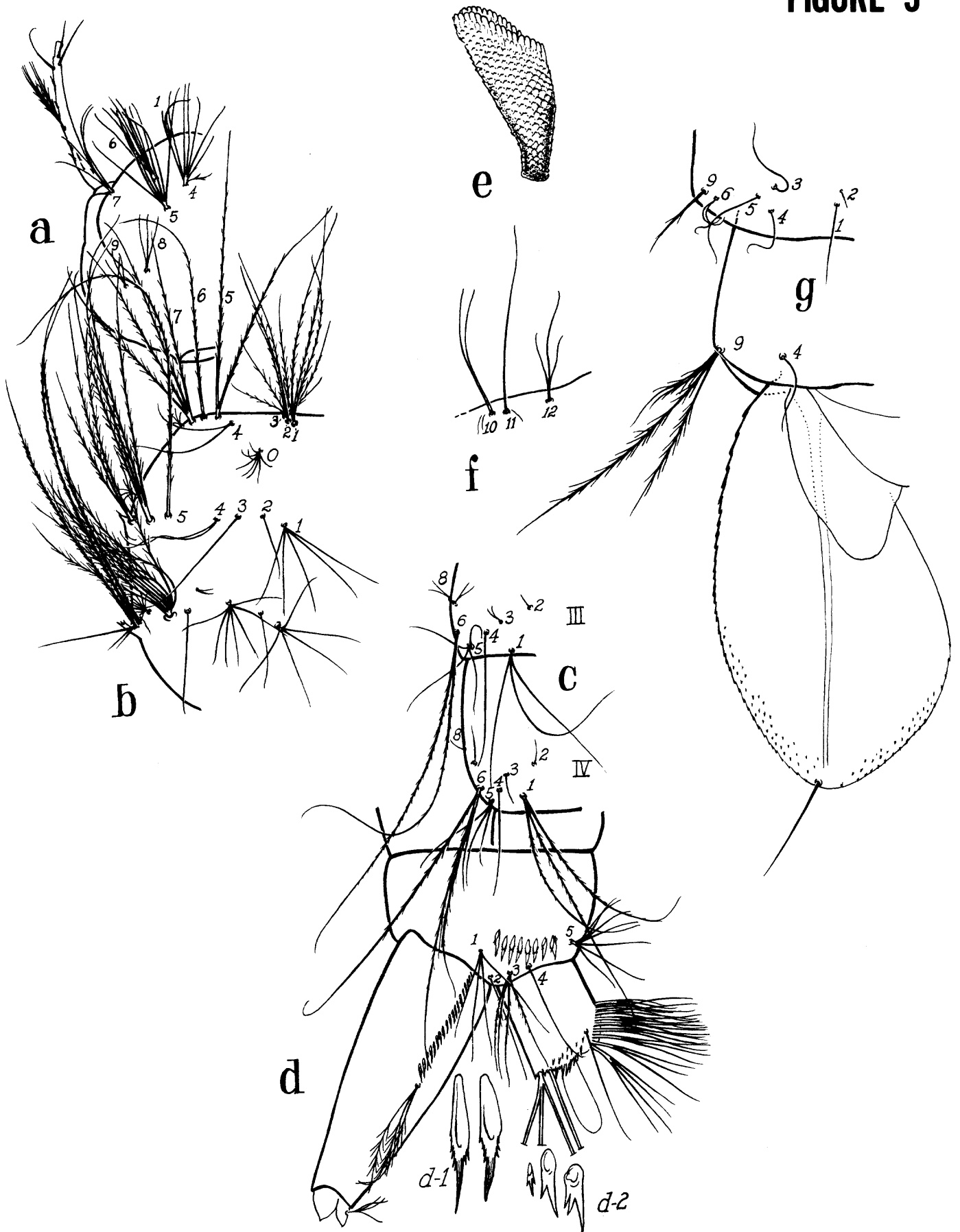


FIGURE 10 - Aedes lineatopennis

- a. Left half of larval head
- b. Terminal segment of larva showing:
 - b-1. Comb scales
 - b-2. Pecten teeth

FIGURE 10

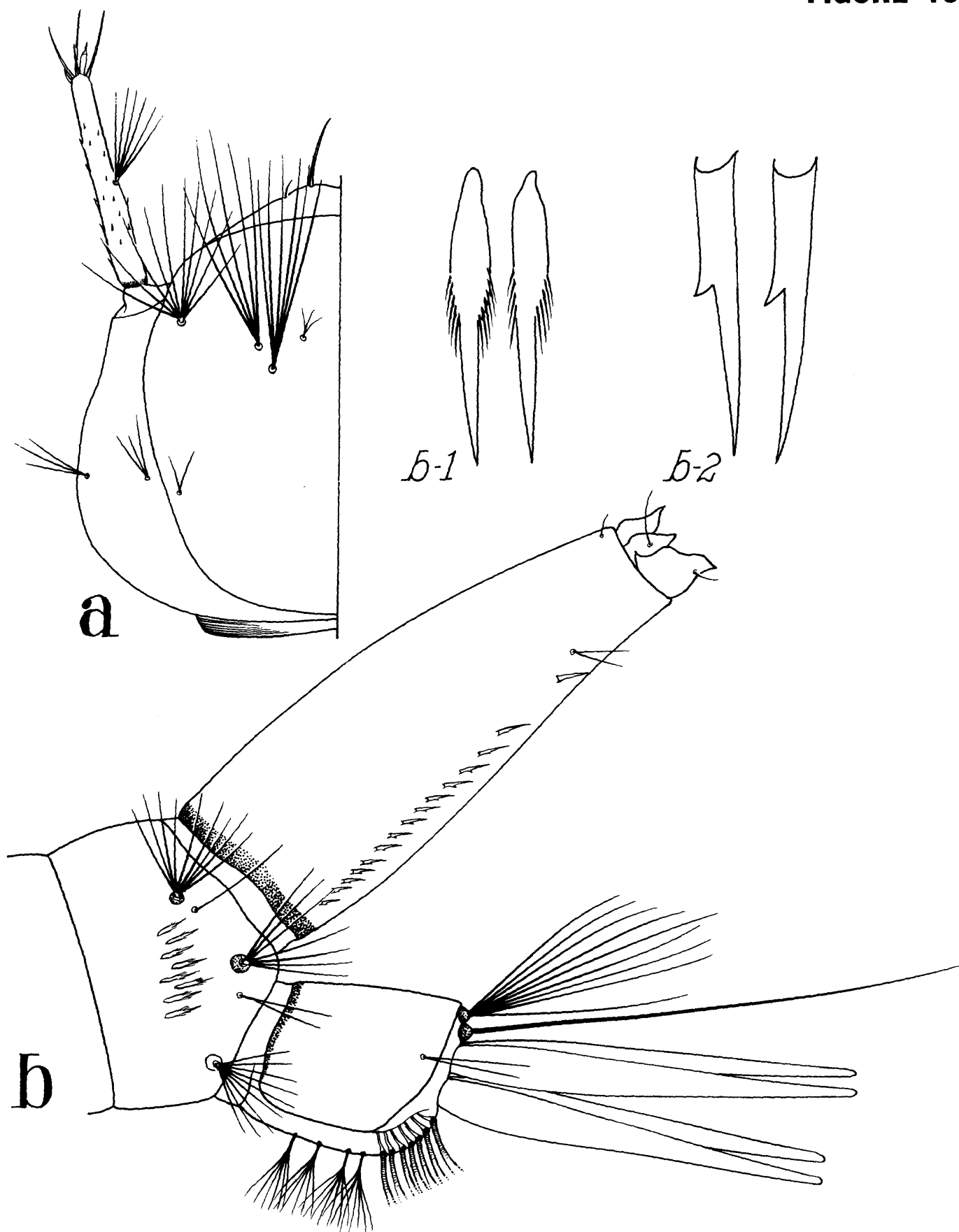


FIGURE 11 - Aedes vigilax ludlowae

- a. Left half of larval head
- b. Terminal segment of larva showing:
 - b-1. Comb scales
 - b-2. Pecten teeth
- c. Respiratory trumpet (pupa)
- d. Metanotal hairs (pupa)
- e. Pupa terminal segment and paddle
- f. Right half of male terminalia

FIGURE 11

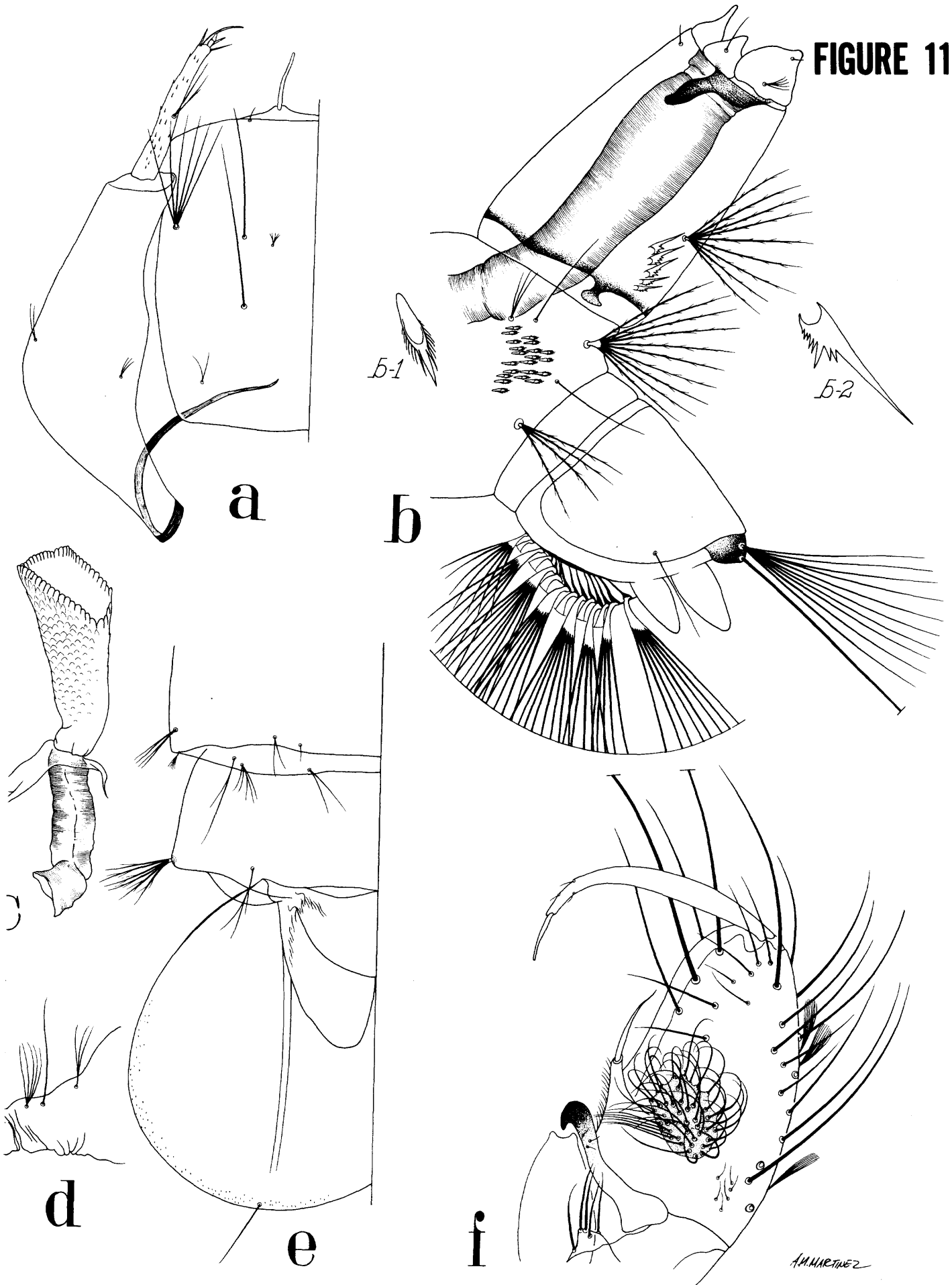


FIGURE 12 - Aedes longirostris

- a. Right half of larval head
- b. Terminal segment of larvae showing:
 - b-1. Pecten teeth
 - b-2. Comb scales

FIGURE 12

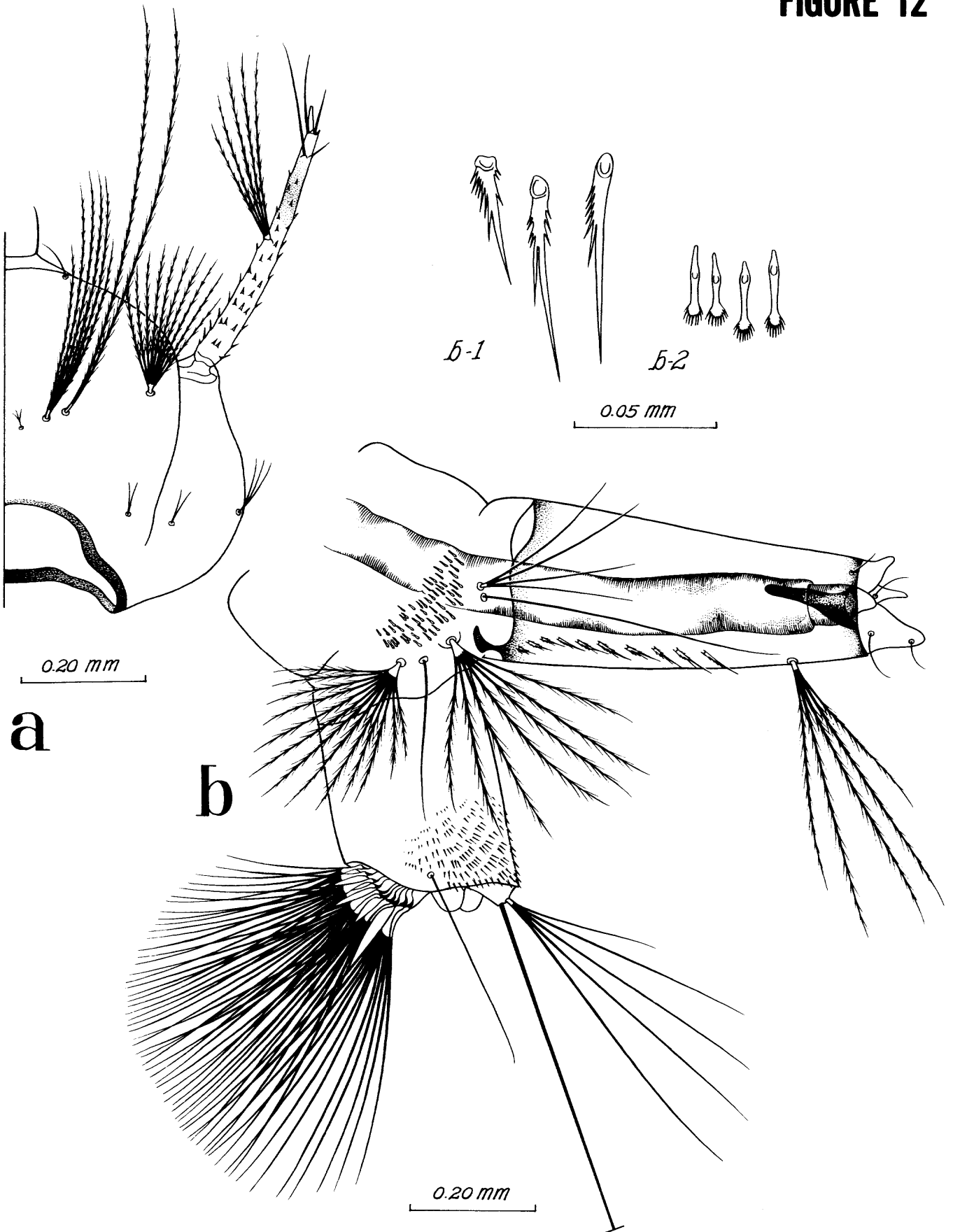


FIGURE 13 - Aedes longirostris

- a. Adult (female) head
- b. Wing
- c. Legs
- d. Right half male terminalia
- e. Respiratory trumpet (pupa)
- f. Metanotal hairs (pupa)
- g. Pupal terminal segment and paddle

FIGURE 13

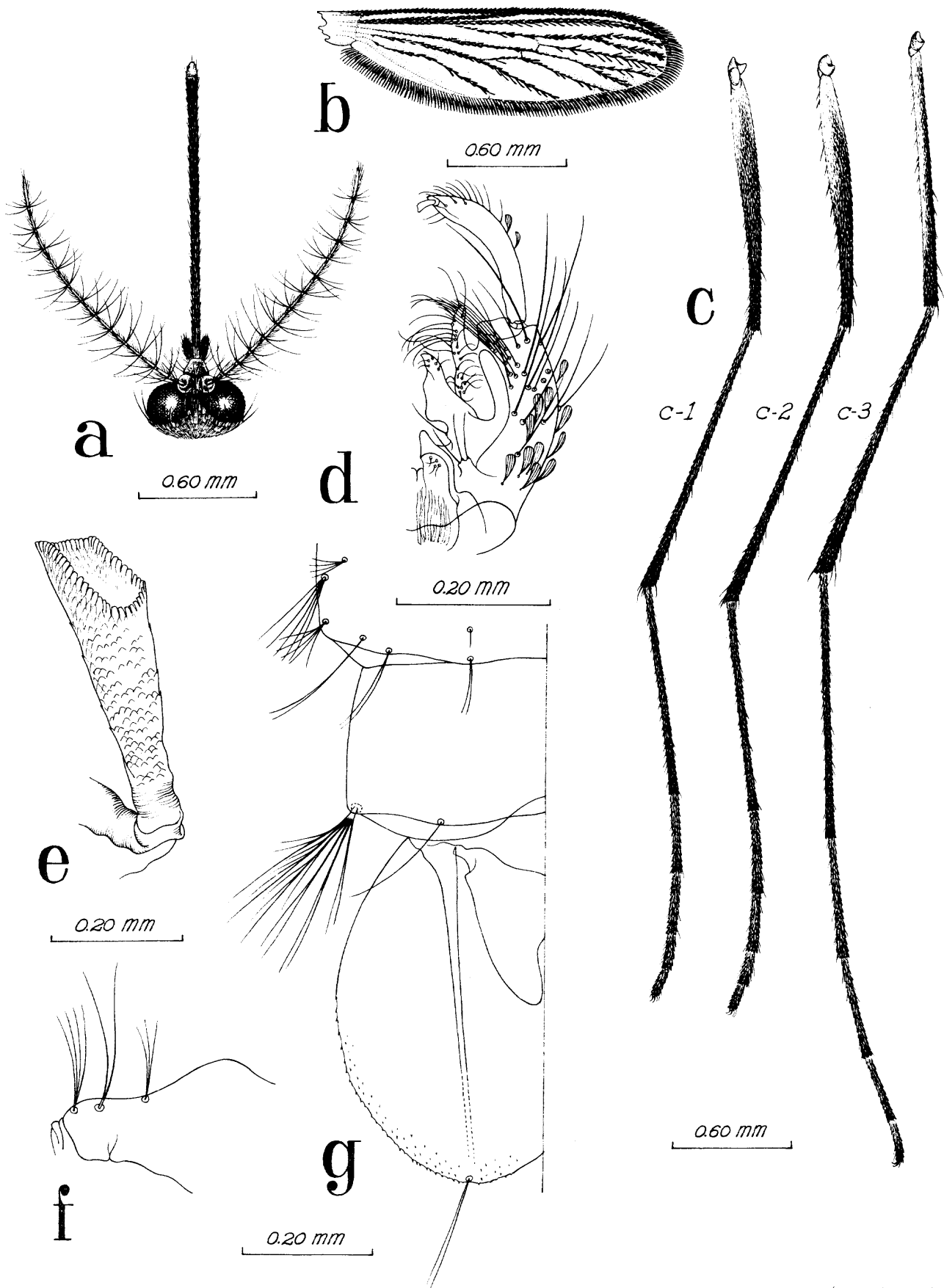


FIGURE 14 - Aedes fumidus

- a. Left half of larval head
- b. Terminal segment of larva showing
 - b-1. Comb scales
 - b-2. Pecten teeth
- c. Respiratory trumpet (pupa)
- d. Metanotal hairs (pupa)
- e. Pupal terminal segment and paddle
- f. Left half male terminalia

FIGURE 14

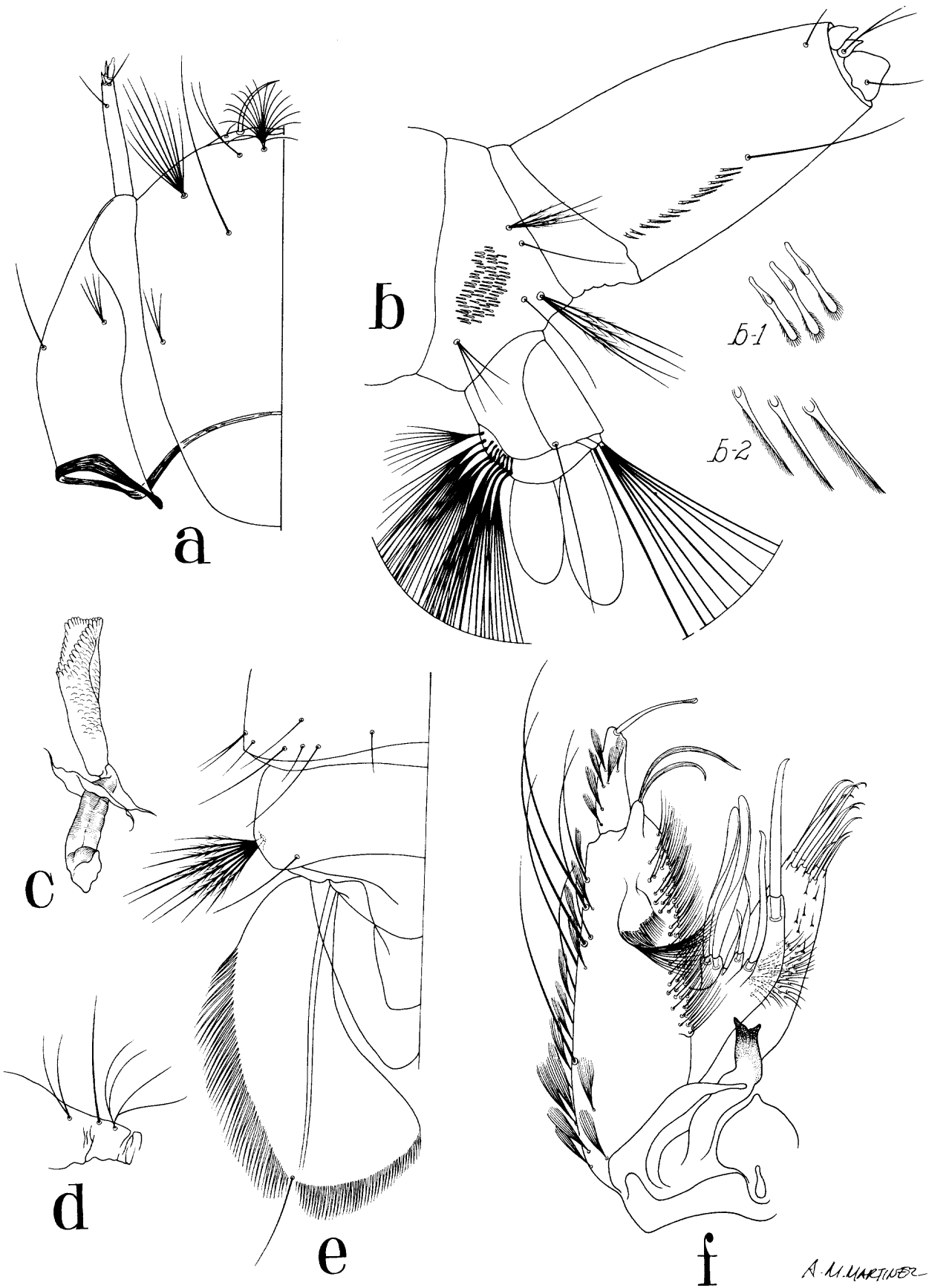


FIGURE 15 - Aedes albopictus

- a. Left half of larval head
- b. Terminal segment of larva showing:
 - b-1. Comb teeth
 - b-2. Pecten teeth
- c. Respiratory trumpet (pupa)
- d. Metanotal hairs (pupa)
- e. Pupal terminal segment and paddle

FIGURE 15

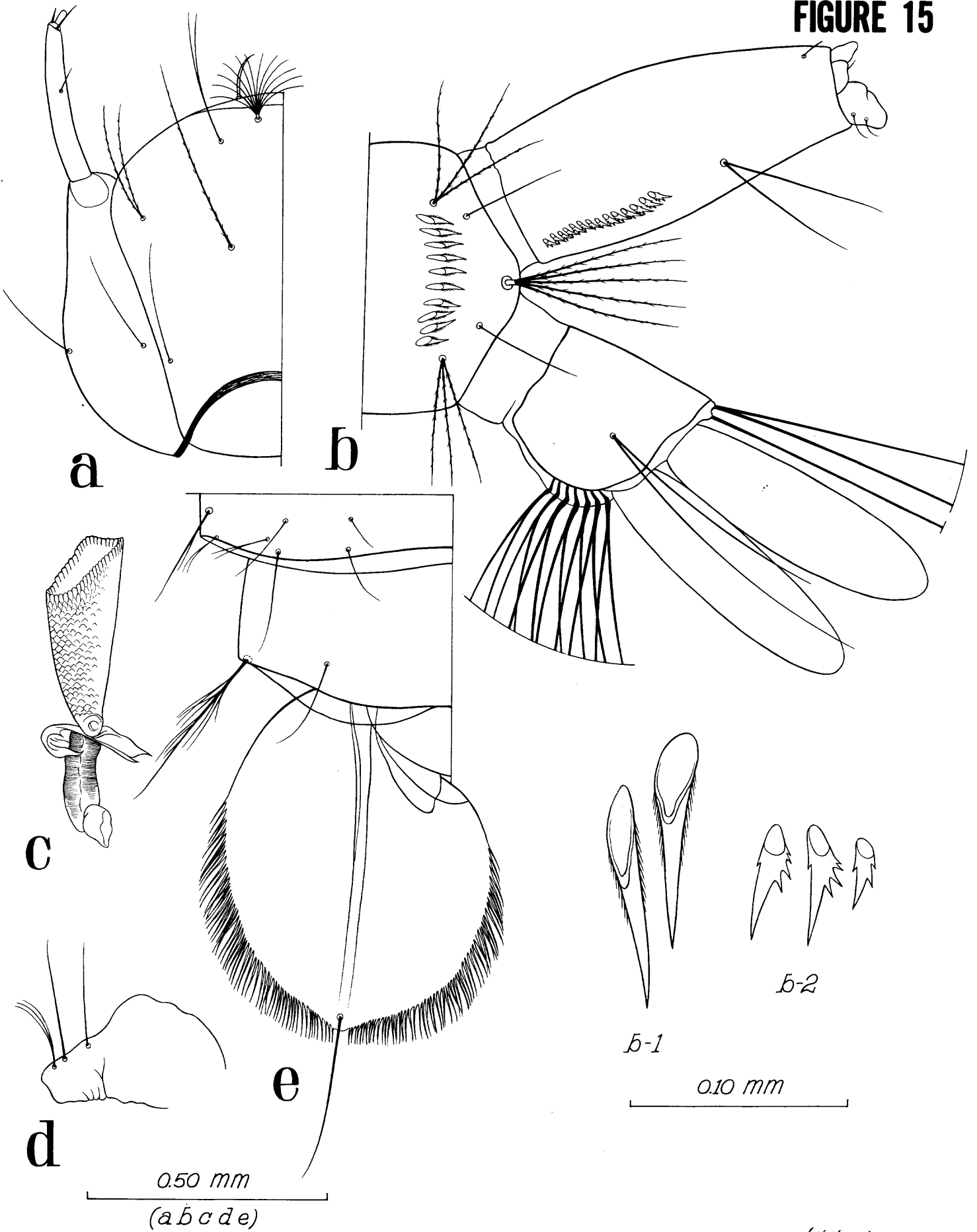


FIGURE 16 - Aedes albopictus

- a. Lateral view of female head and thorax
- b. Dorsal view of abdomen
- c. Dorsal view of head and thorax
- d. Legs

FIGURE 16

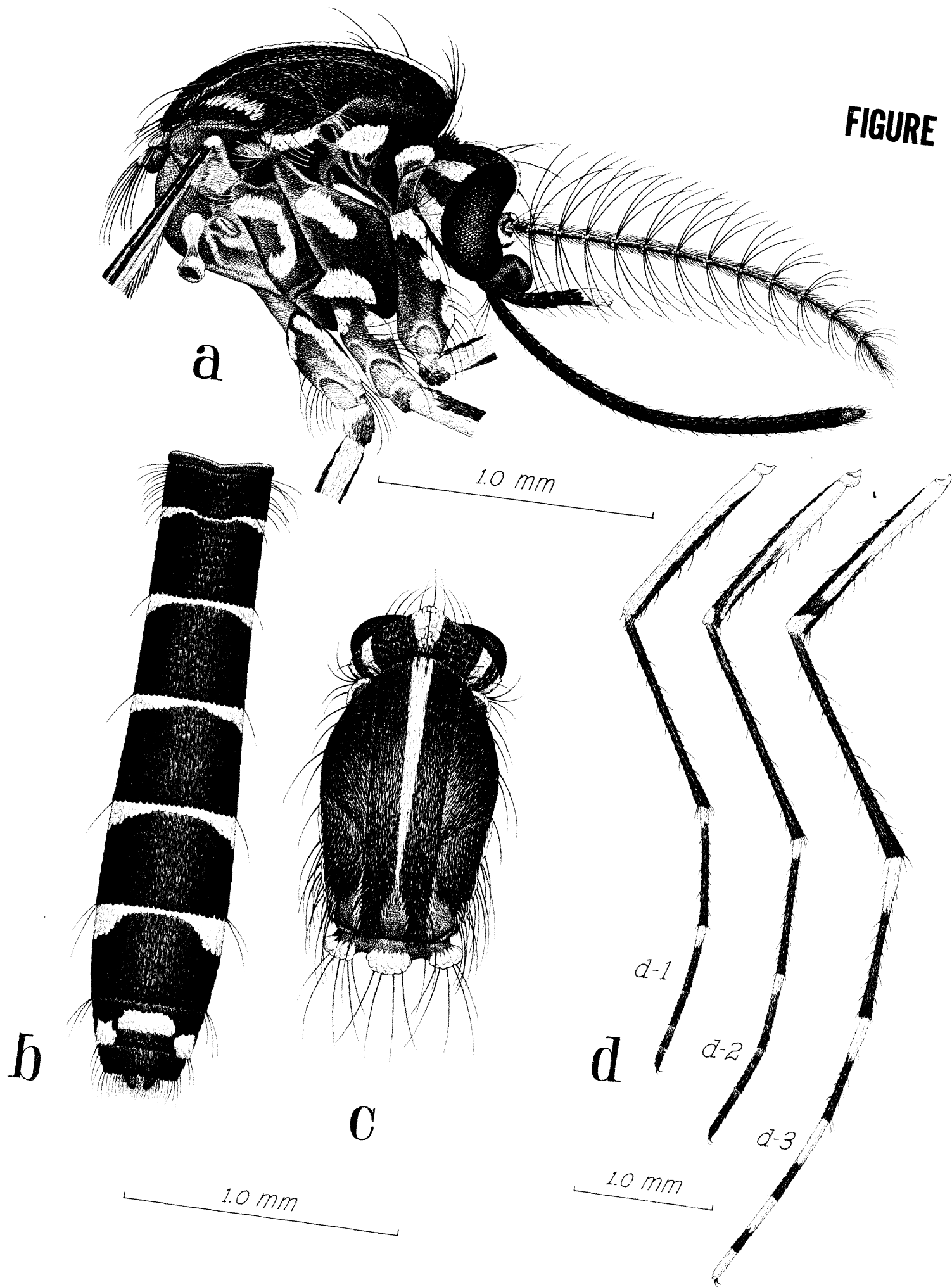
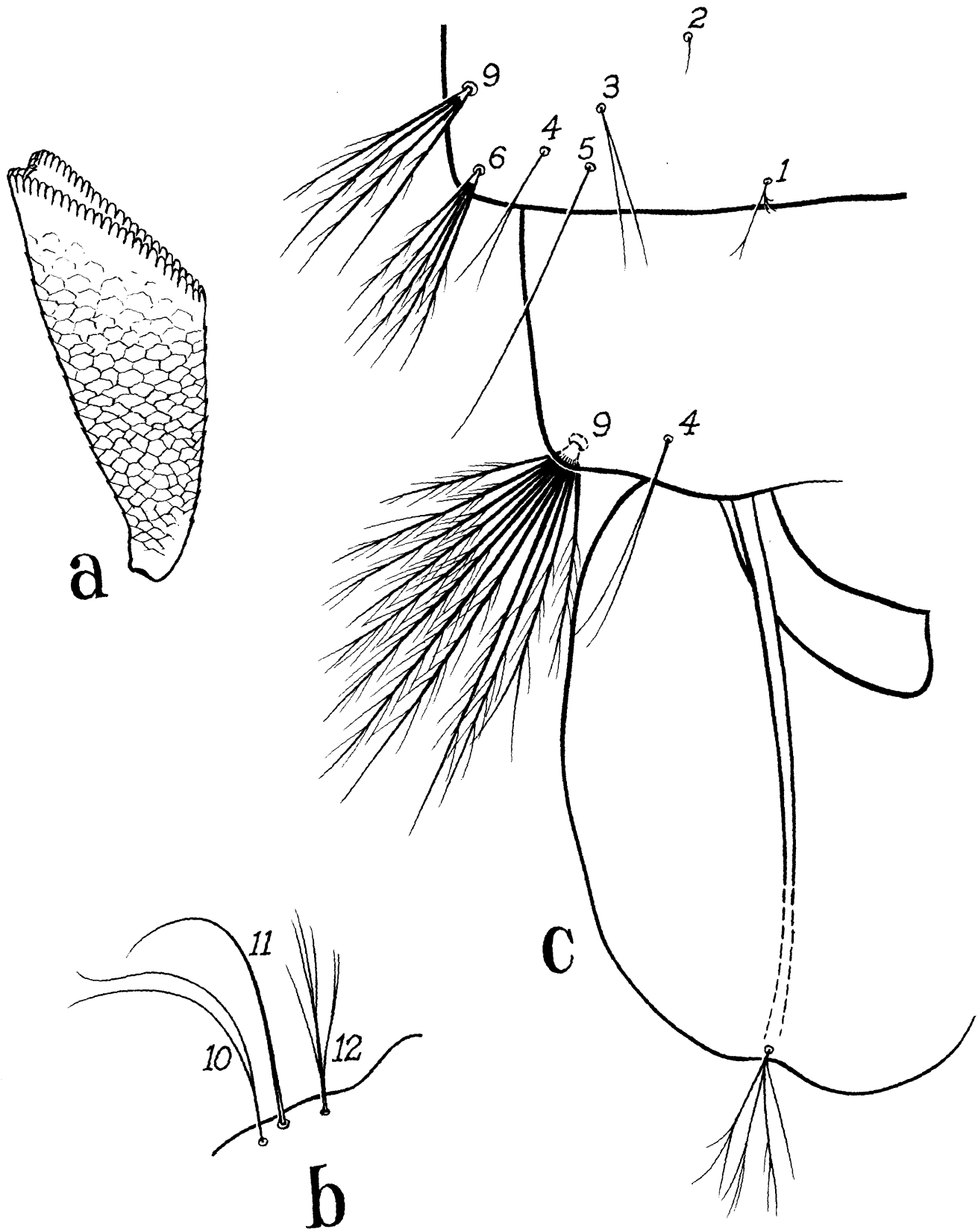


FIGURE 17 - Aedes boharti

- a. Respiratory trumpet (pupa)
- b. Metanotal hairs (pupa)
- c. Pupal terminal segment and paddle

FIGURE 17

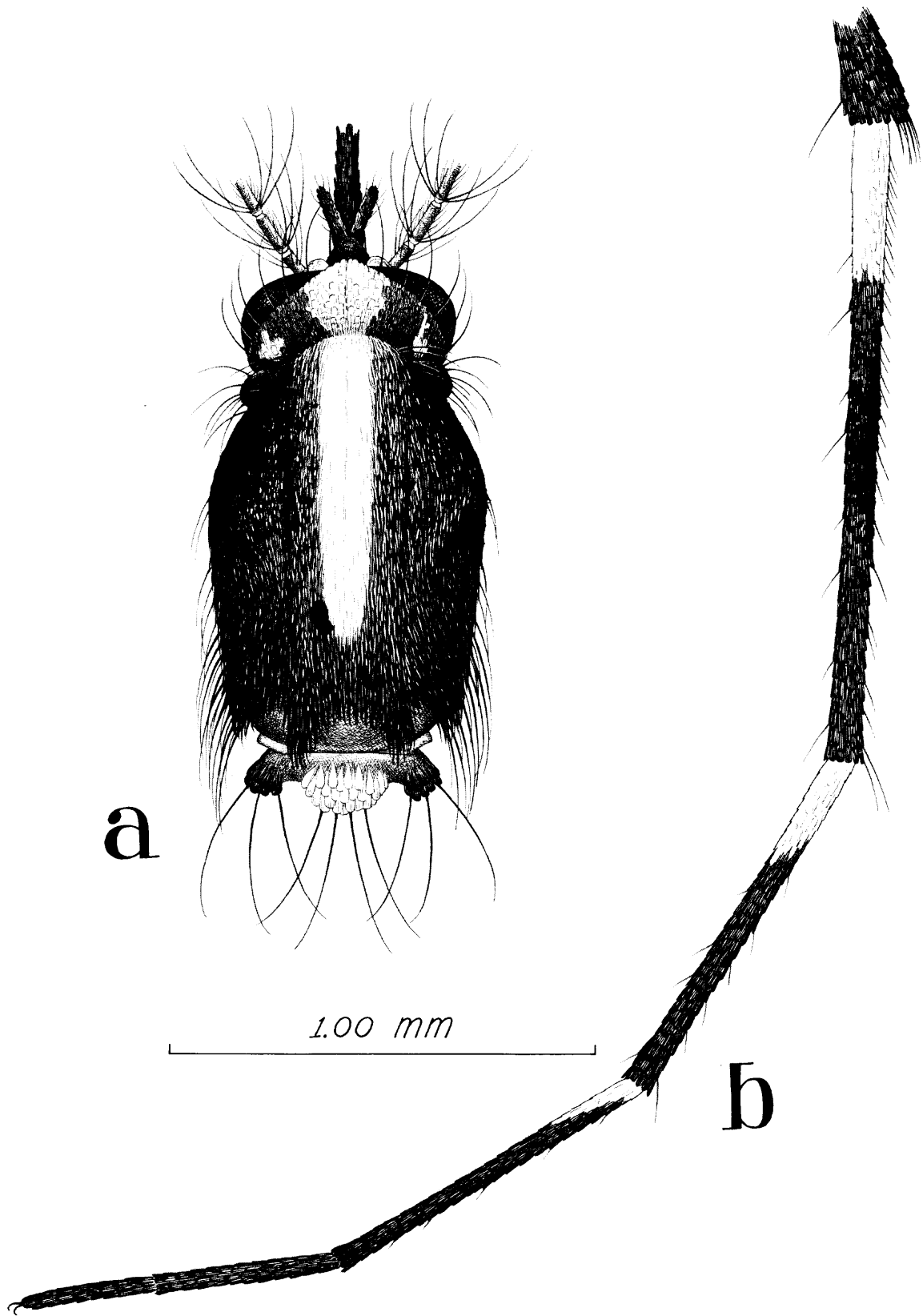


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FIGURE 18 - Aedes boharti

- a. Dorsal view of adult head and thorax
- b. Leg

FIGURE 18



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FIGURE 19 - Aedes desmotes

- a. Left half of larval head
- b. Terminal segment of larva showing:
 - b-1. Comb teeth
 - b-2. Pecten teeth
- c. Respiratory trumpet (pupa)
- d. Metanotal hairs (pupa)
- e. Pupal terminal segment and paddle
- f. Right half of male terminalia

FIGURE 19

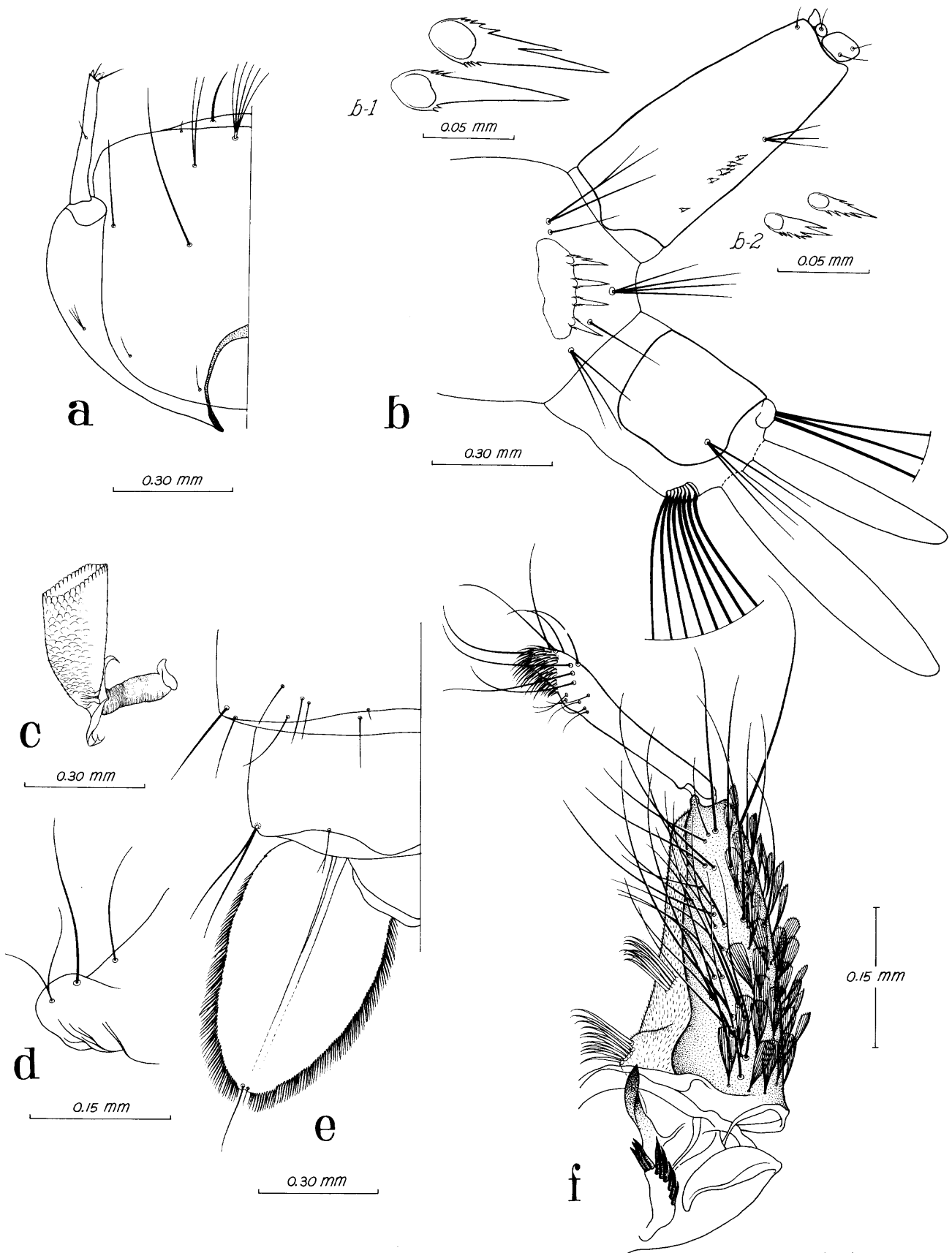


FIGURE 20 - Aedes desmotes

- a. Lateral view of female head and thorax
- b. Dorsal view of abdomen
- c. Dorsal view of head and thorax
- d. Legs

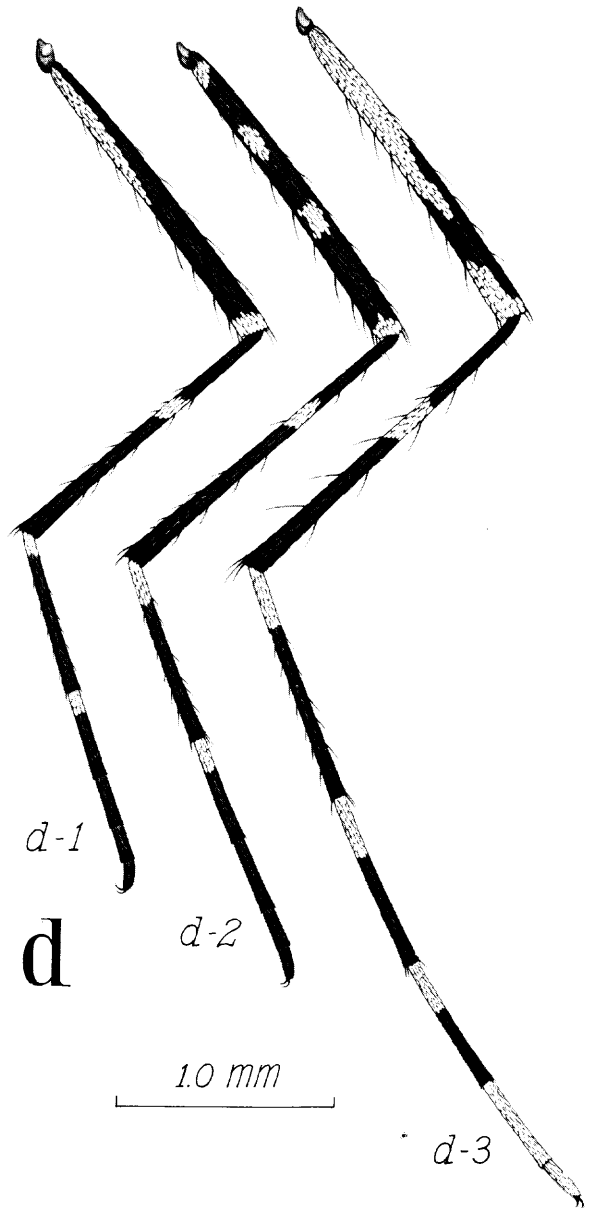
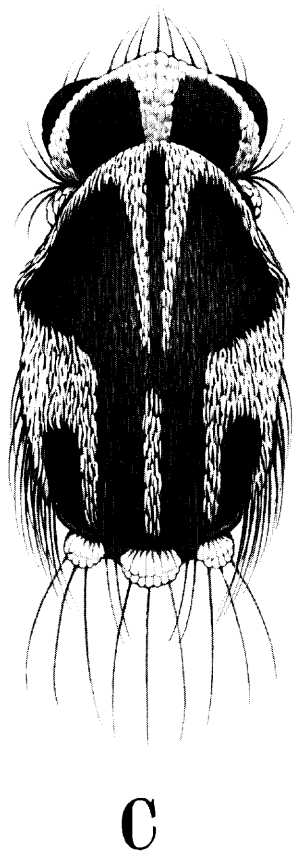
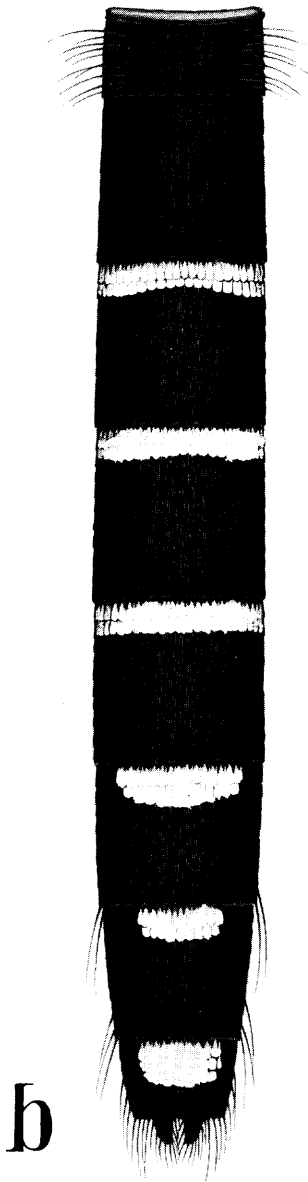
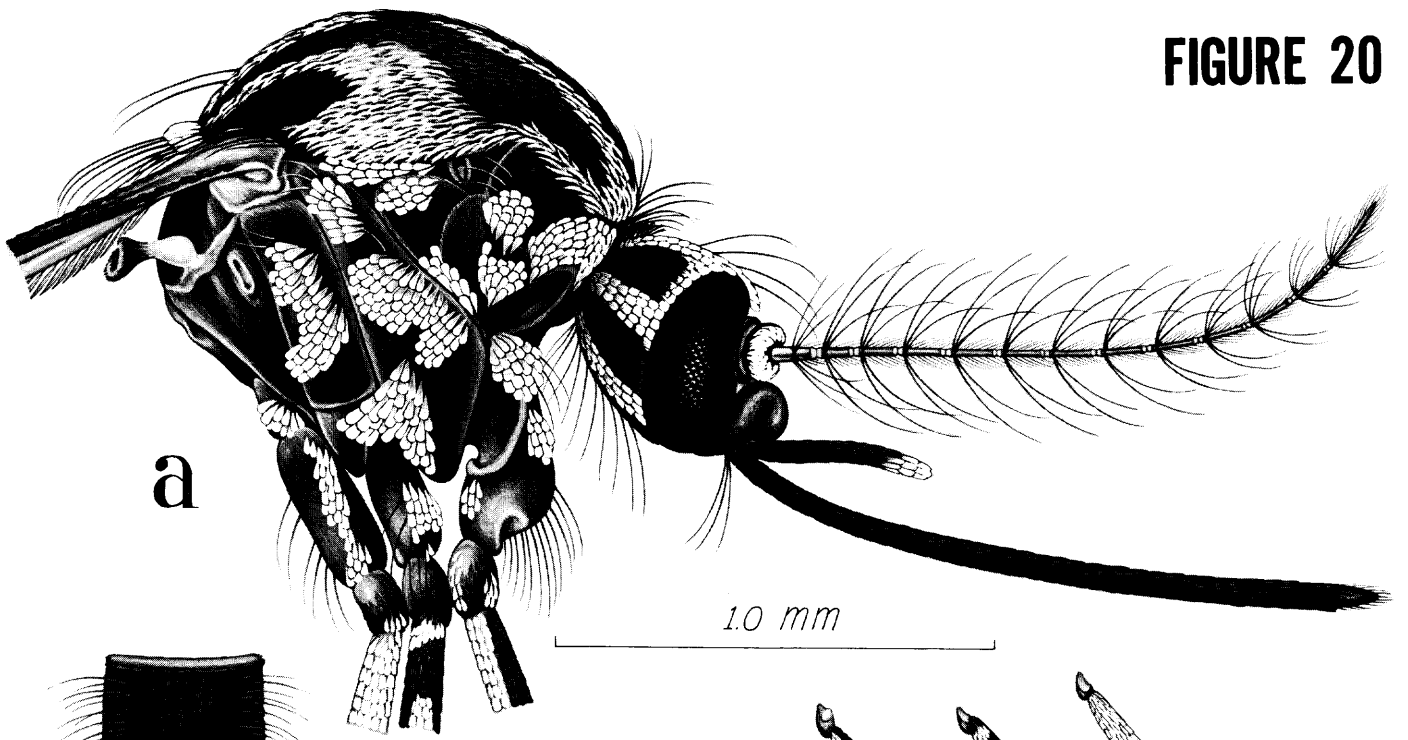
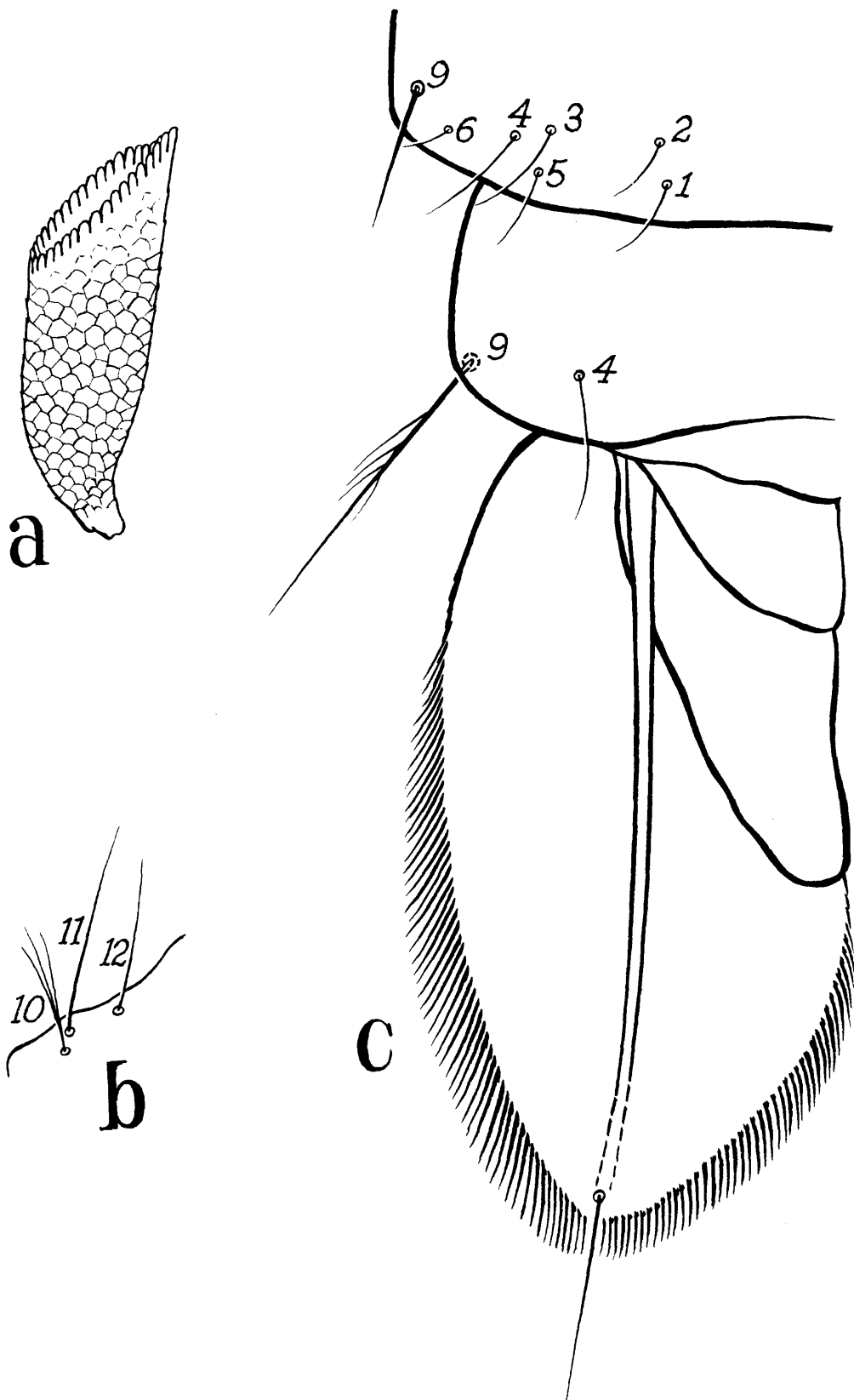


FIGURE 21 - Aedes gardnerii

- a. Respiratory trumpet (pupa)
- b. Metanotal hairs (pupa)
- c. Pupa terminal segment and paddle

FIGURE 21

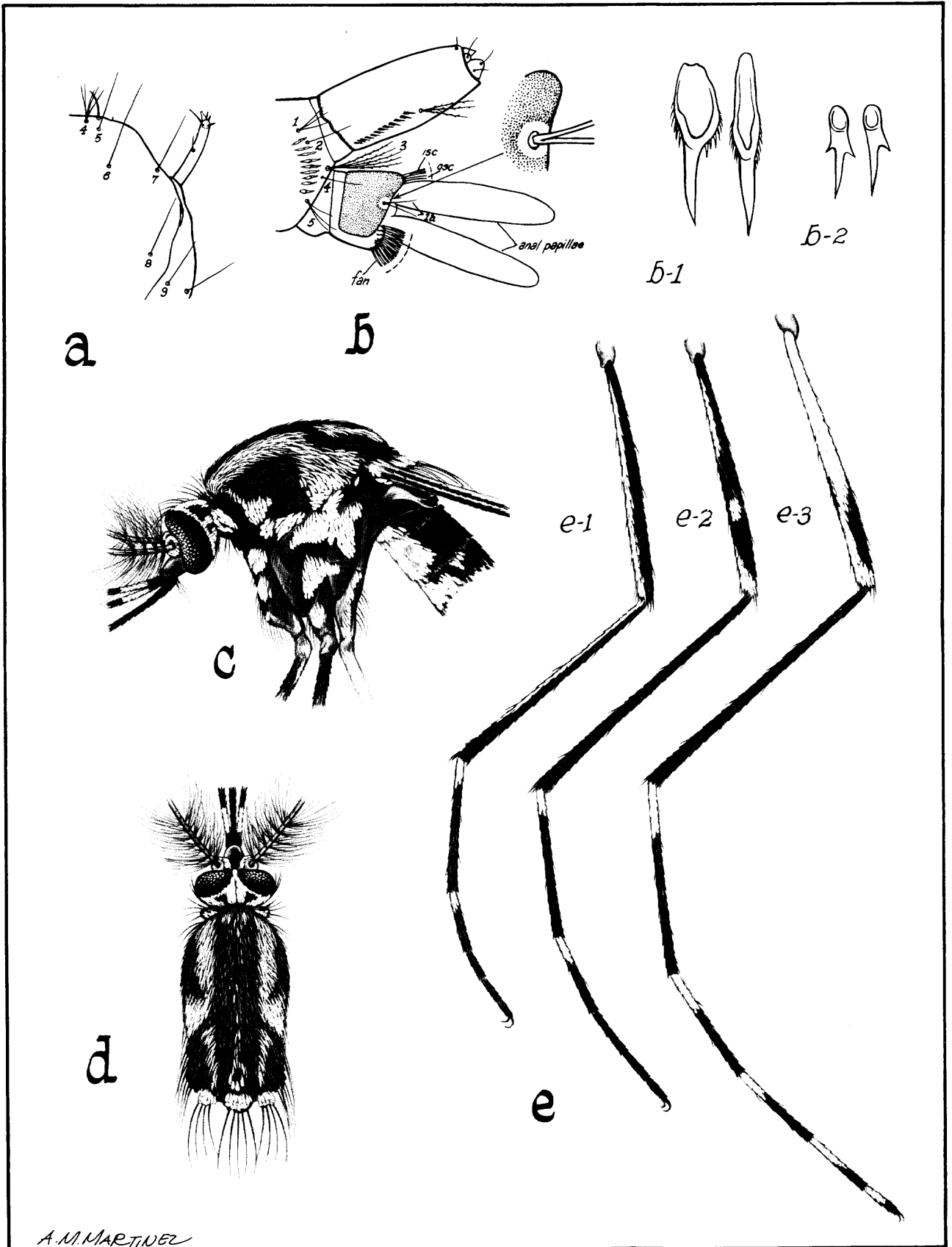


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FIGURE 22 - Aedes gardnerii

- a. Part of larval head
- b. Terminal segment of larva showing
 - b-1. Comb teeth
 - b-2. Pecten teeth
- c. Adult head and thorax (lateral view)
- d. Adult head and thorax (dorsal view)
- e. Legs

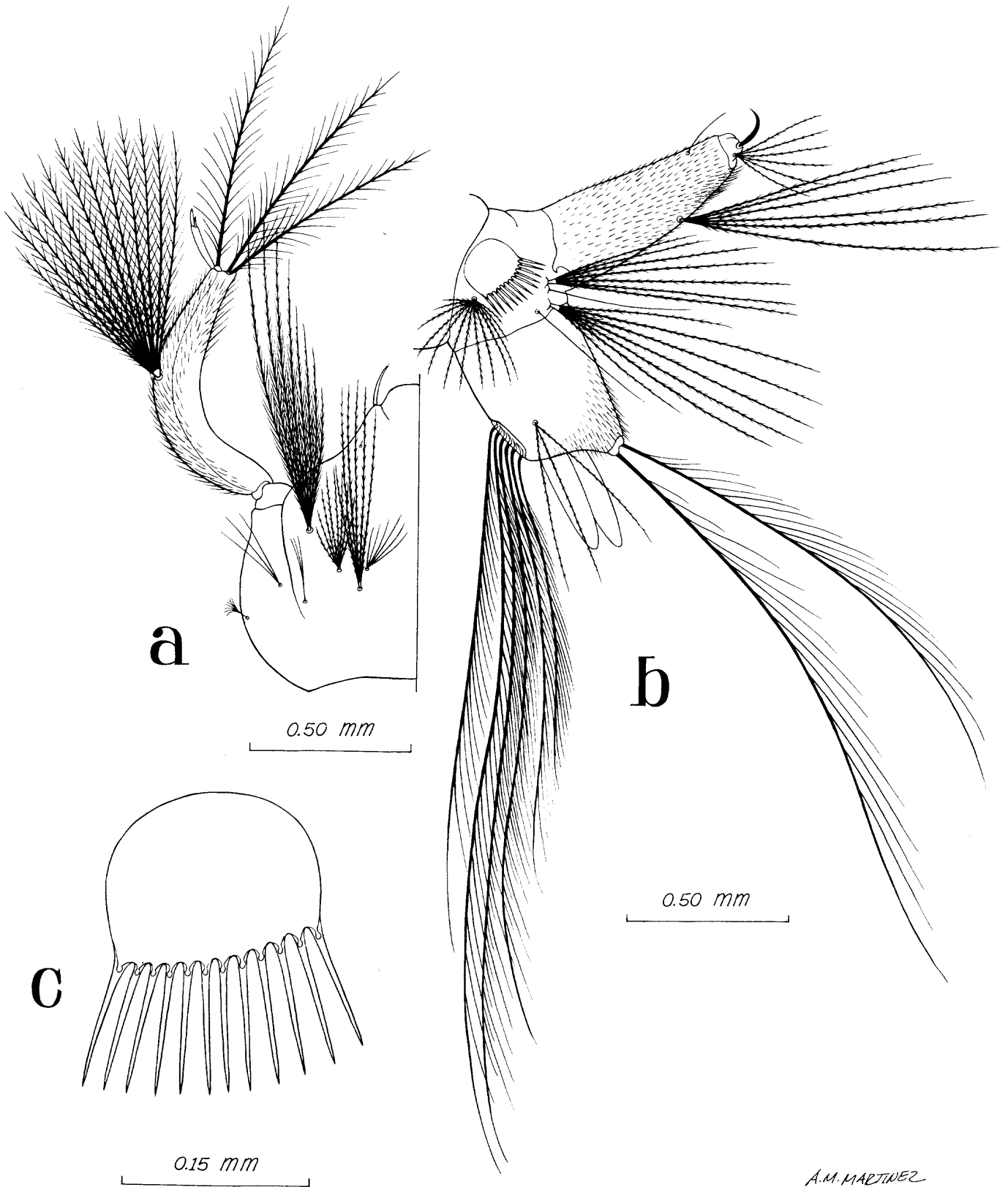
FIGURE 22



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FIGURE 23 - Aedeomyia catasticta

- a. Left half of larval head
- b. Terminal segment of larva
- c. Comb scale



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FIGURE 24 - Aedeomyia catasticta

- a. Wing
- b. Legs
- c. Respiratory trumpet (pupa)
- d. ~~Metanotal~~ hairs (pupa)
- e. Pupal terminal segment and paddle

FIGURE 24

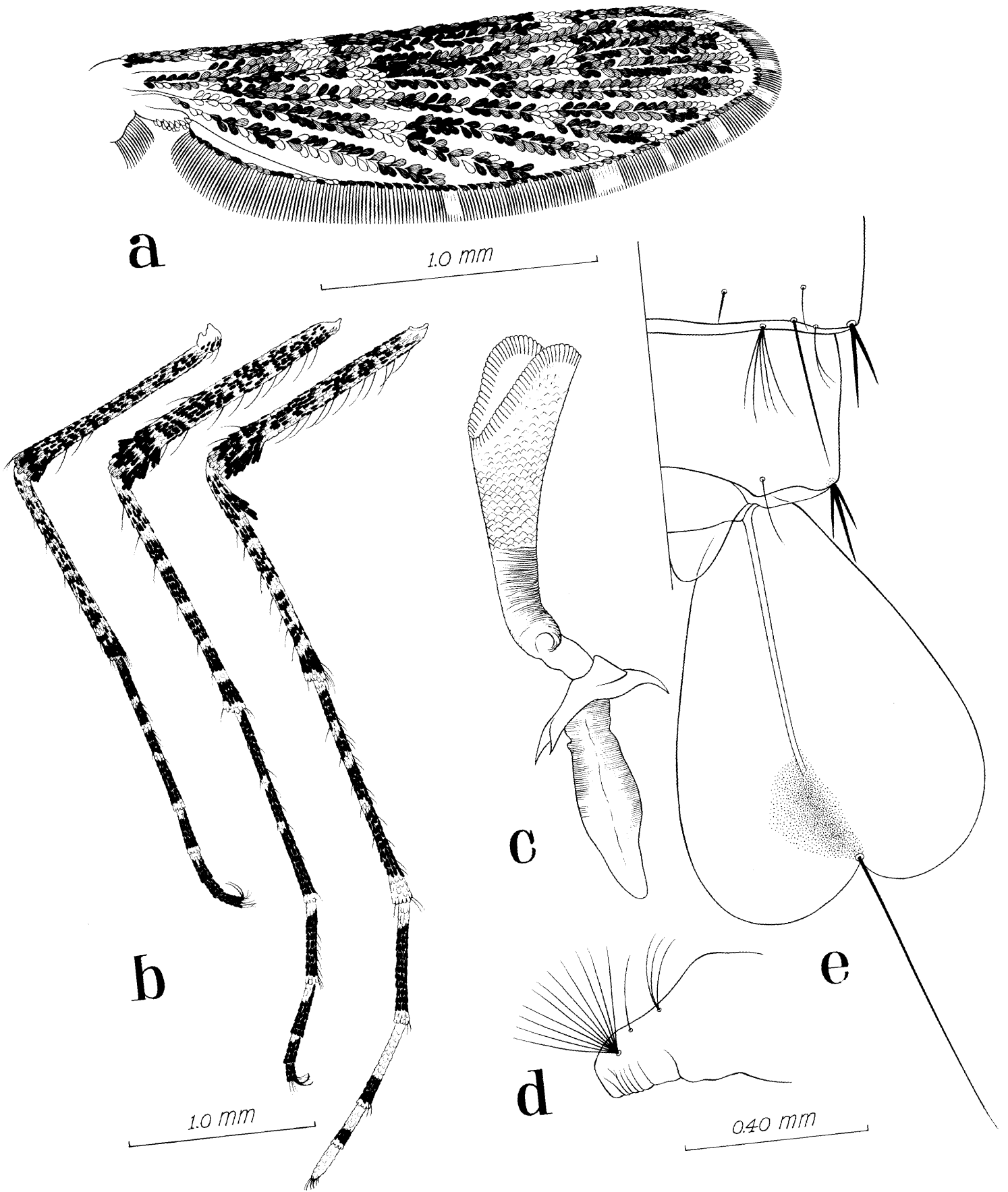


FIGURE 25 - Anopheles peditaeniatus - Eggs

FIGURE 25

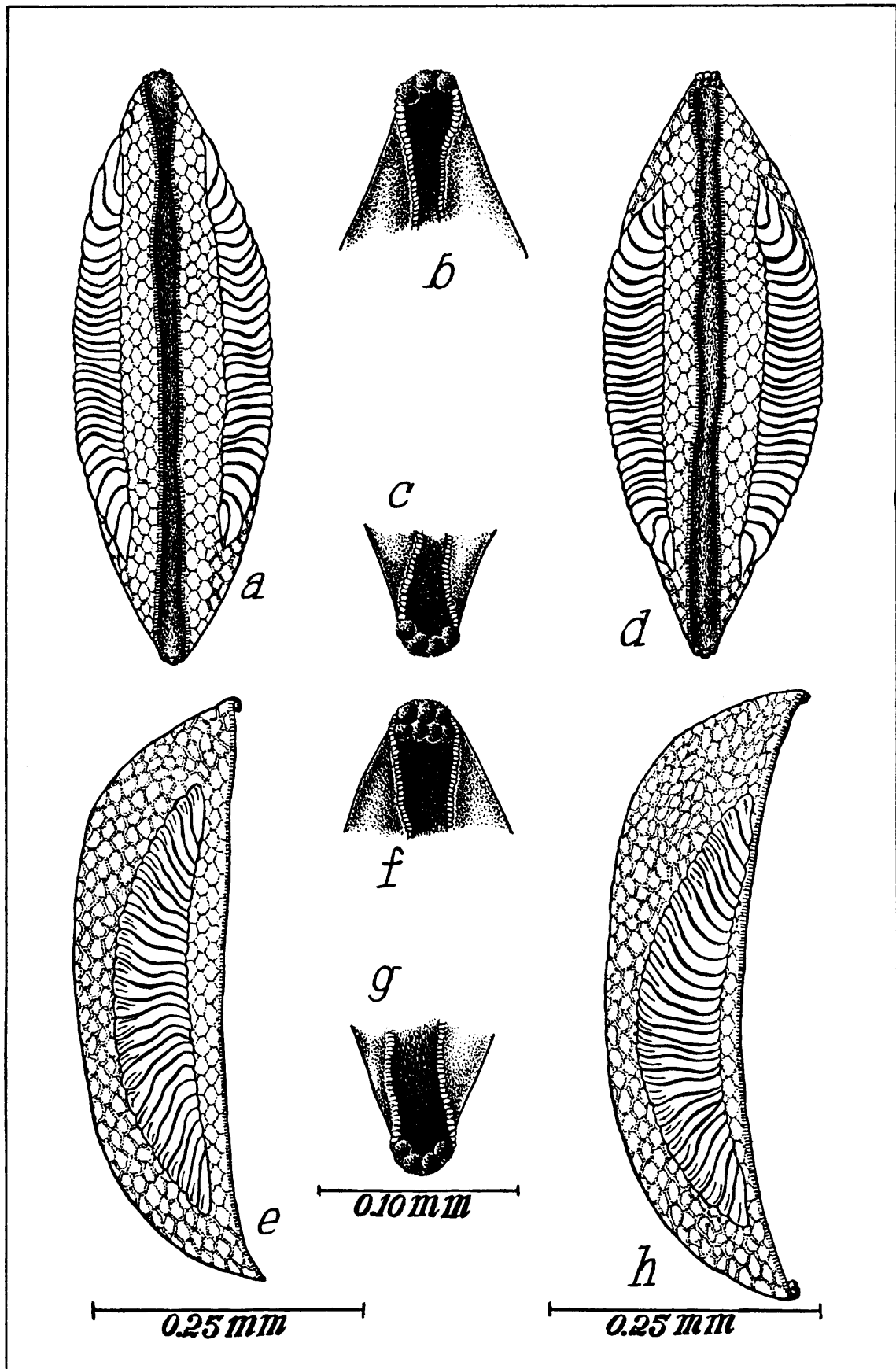


FIGURE 26 - Eggs

1. Anopheles vanus
2. Anopheles manalangi

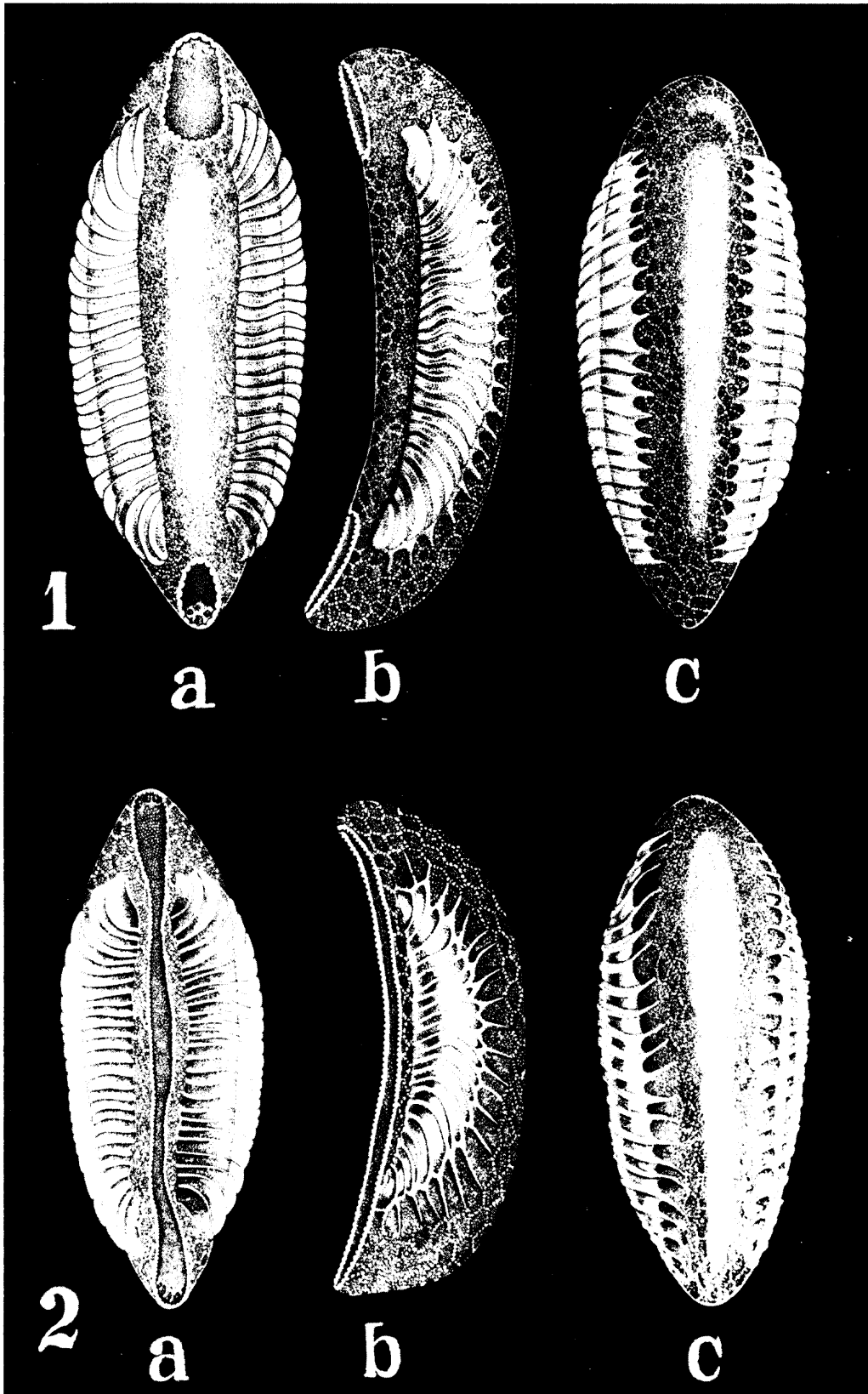


FIGURE 27a

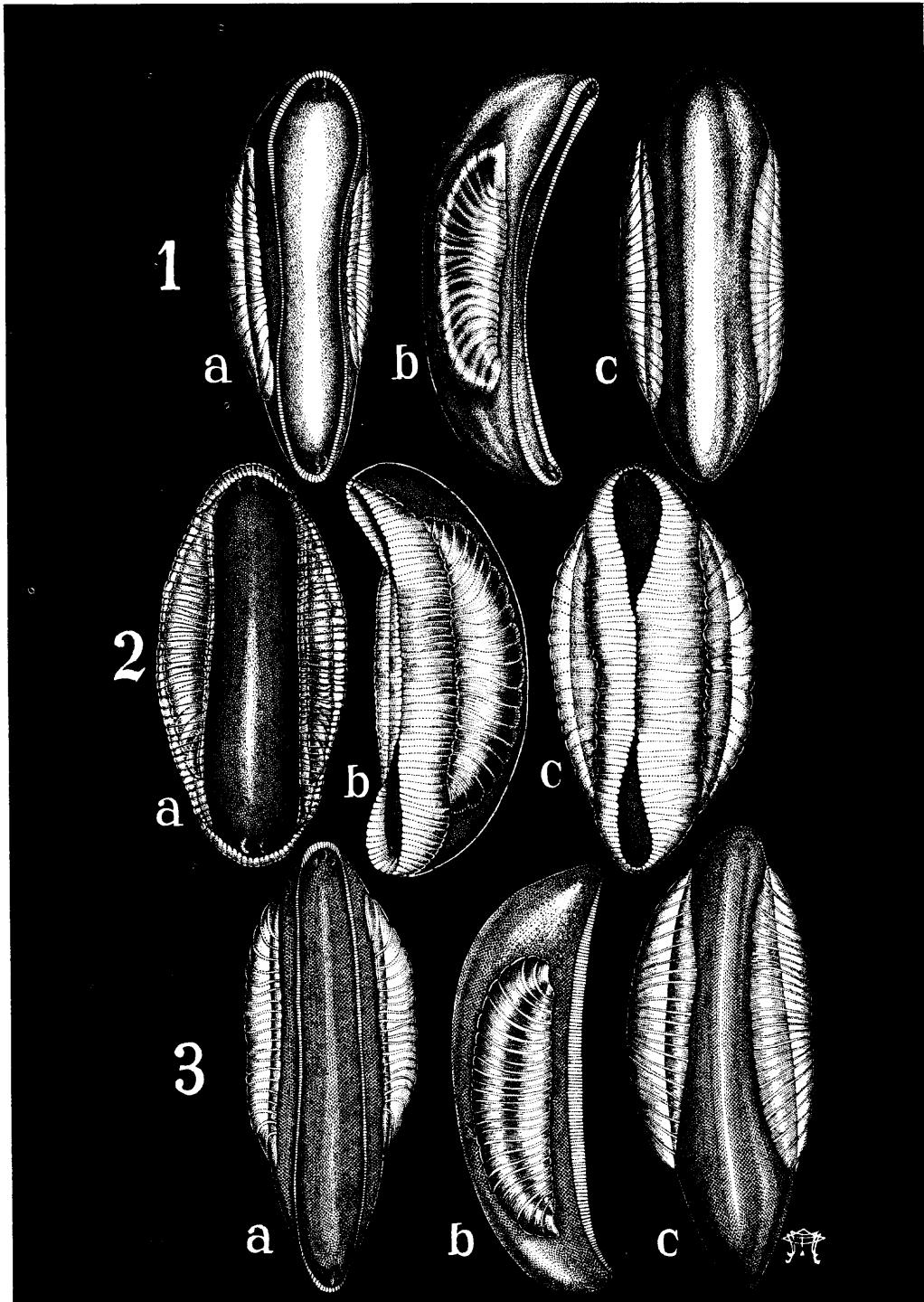


FIGURE 27a - Eggs

1. Anopheles ludlowae
2. Anopheles subpictus indefinites
3. Anopheles vagus limosus

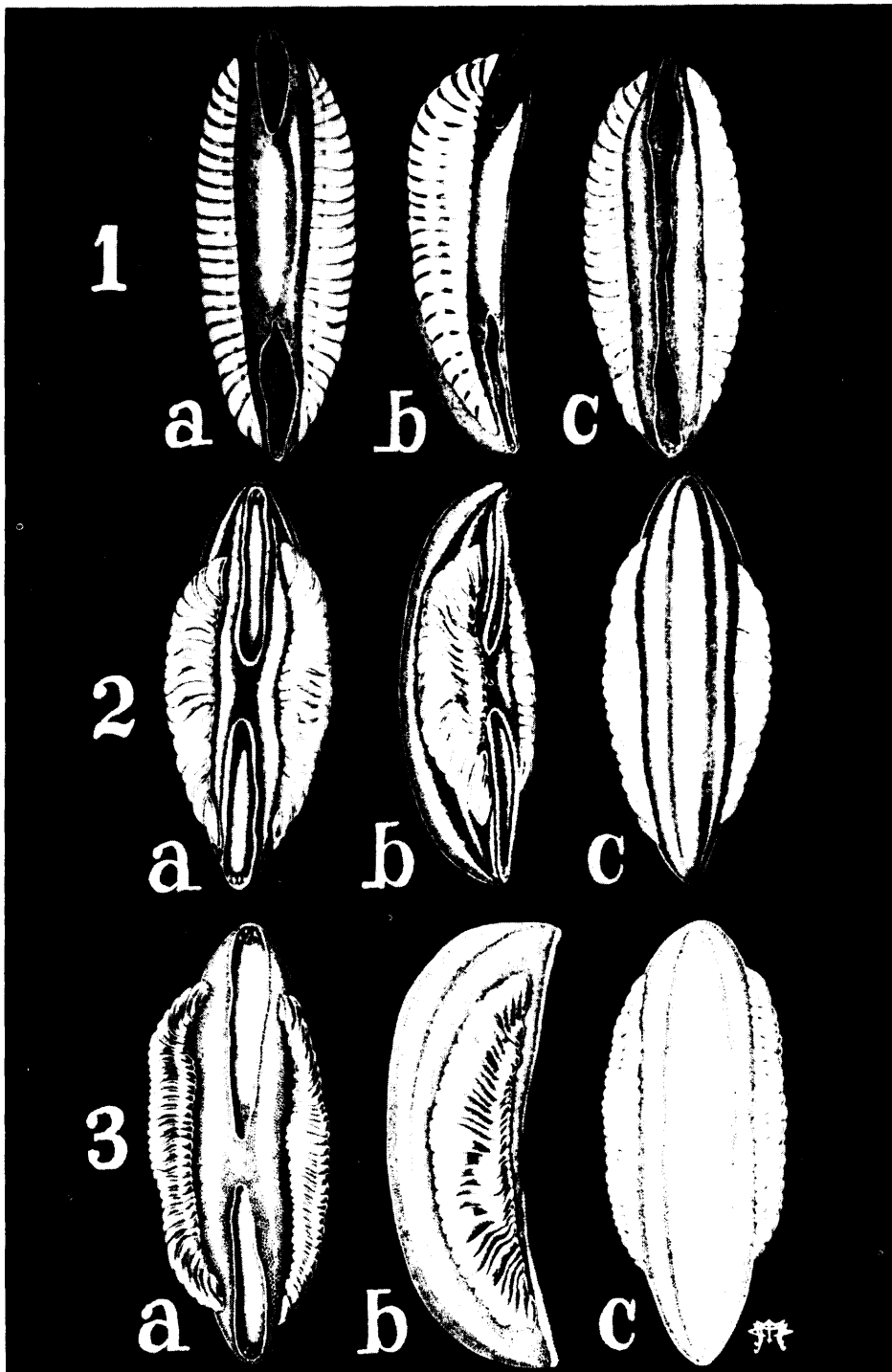


FIGURE 27b - Eggs

1. Anopheles filipinae
2. Anopheles mangyanus
3. Anopheles flavirostris

FIGURE 28 - Anopheles aitkenii

- a. Anopheles aitkenii wing
- b. Dorsal view of Anopheles aitkenii adult head
- c. Larval hairs of Anopheles aitkenii
- d. Larval hairs of Anopheles bengalensis
- e. Larval hairs of Anopheles fragilis
- f-i. Types of Anopheles aitkenii larval hairs
- j-k. Left half of Anopheles aitkenii terminalia

FIGURE 28

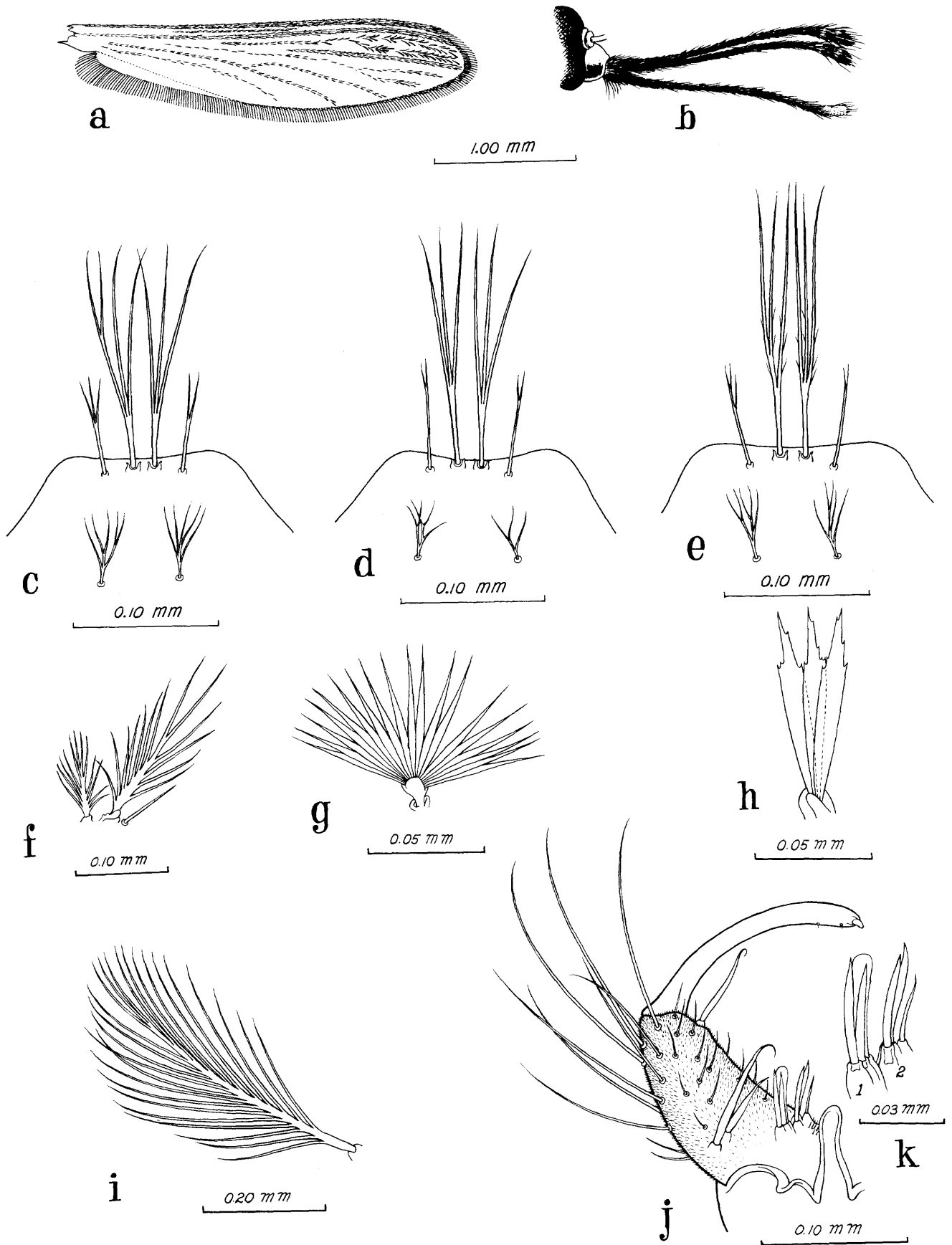


FIGURE 29 - Anopheles samarensis
Anopheles baezai

- a-e. Types and position of Anopheles samarensis larval hairs
- f. Anopheles samarensis respiratory trumpet (pupa)
- g. Anopheles haezai larval hairs
- h. Anopheles baezai respiratory trumpet (pupa)

FIGURE 29

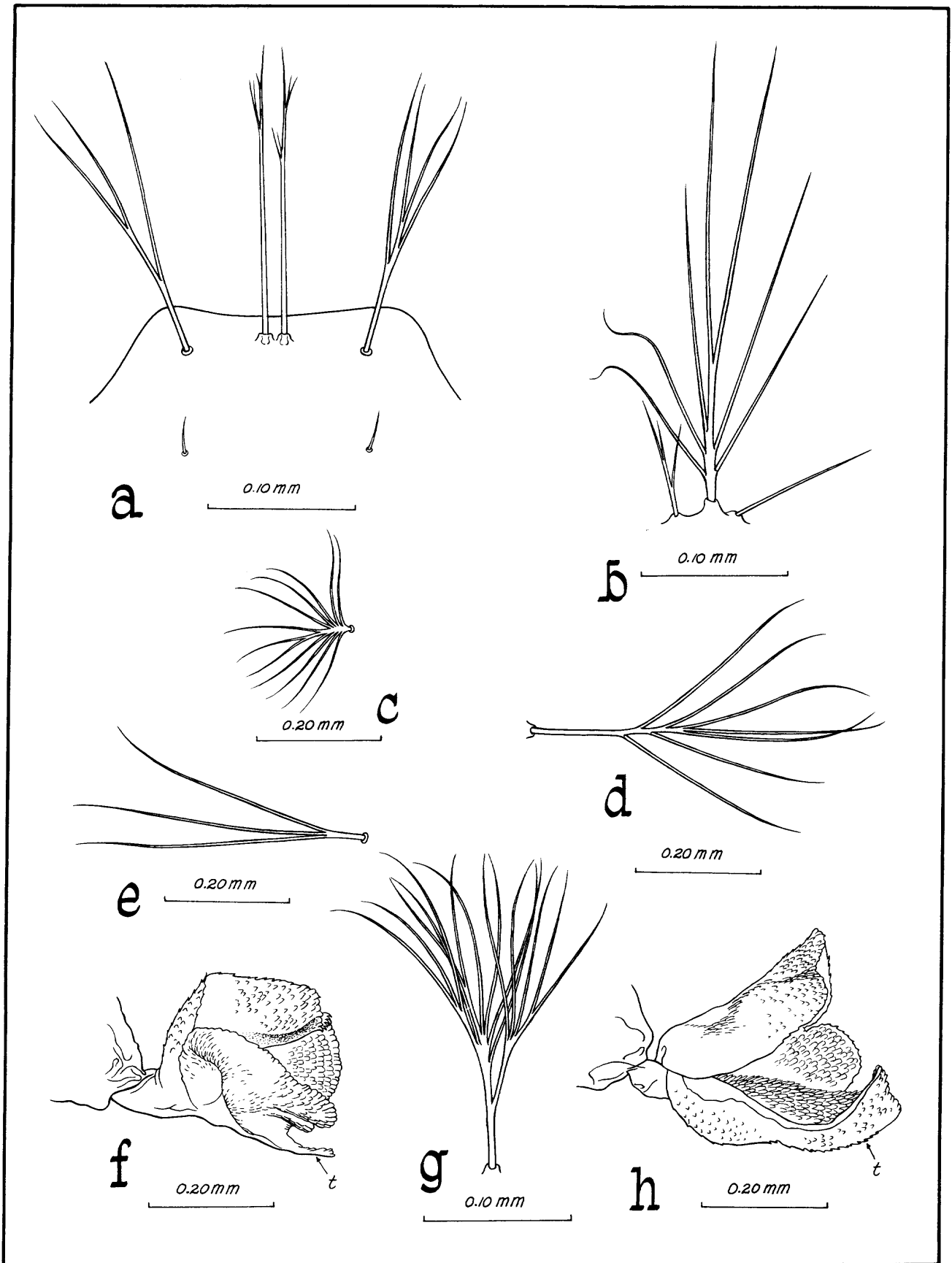


FIGURE 30 - Anopheles lesteri

- a. Wing
- b. Lateral view of adult head
- c. Legs
- d-h. Types and positions of larval hairs

FIGURE 30

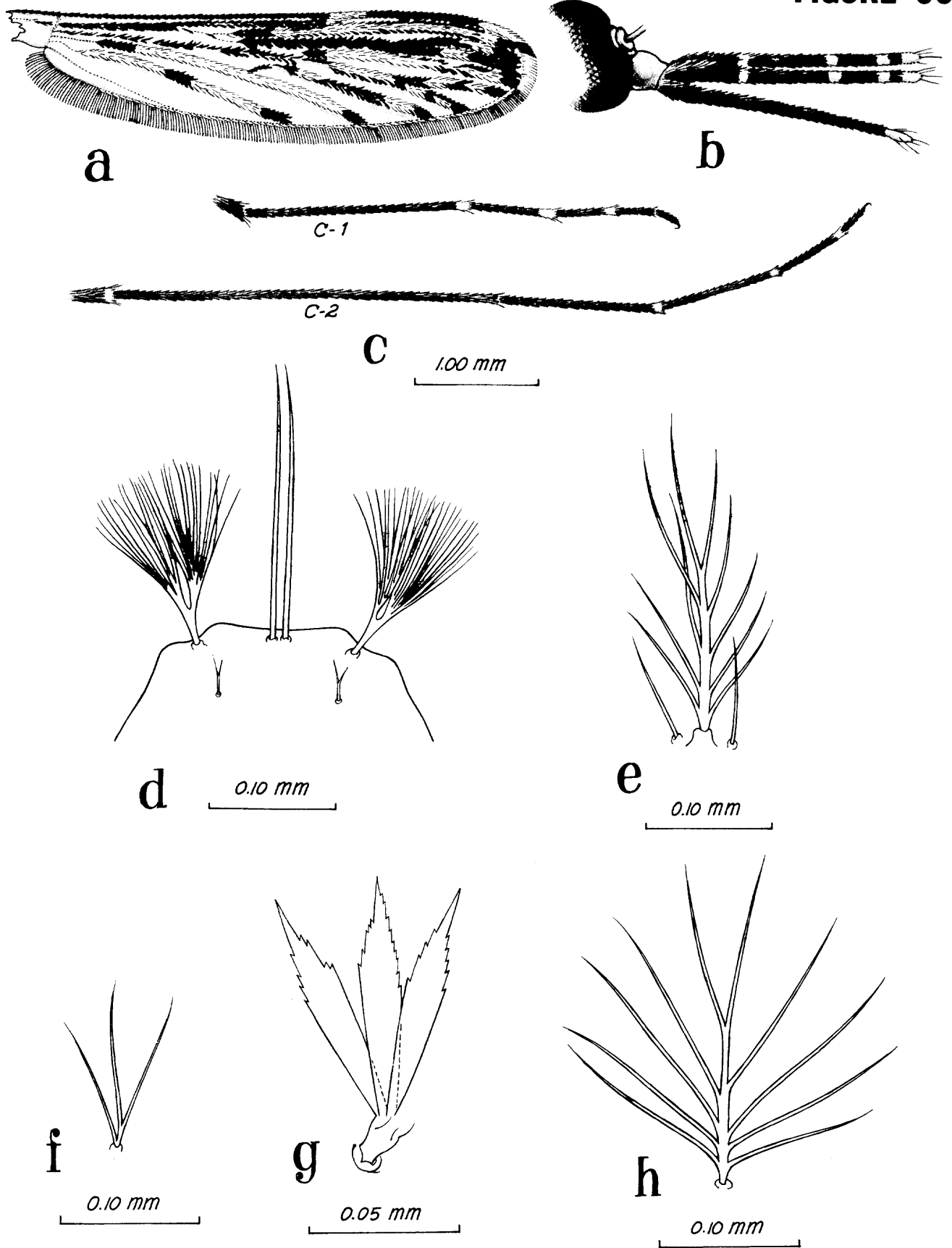


FIGURE 31 - Anopheles manalangi

- a. Wing
- b. Lateral view of adult head
- c. Legs
- d-h. Types and positions of larval hairs
- i. Comb scale

FIGURE 31

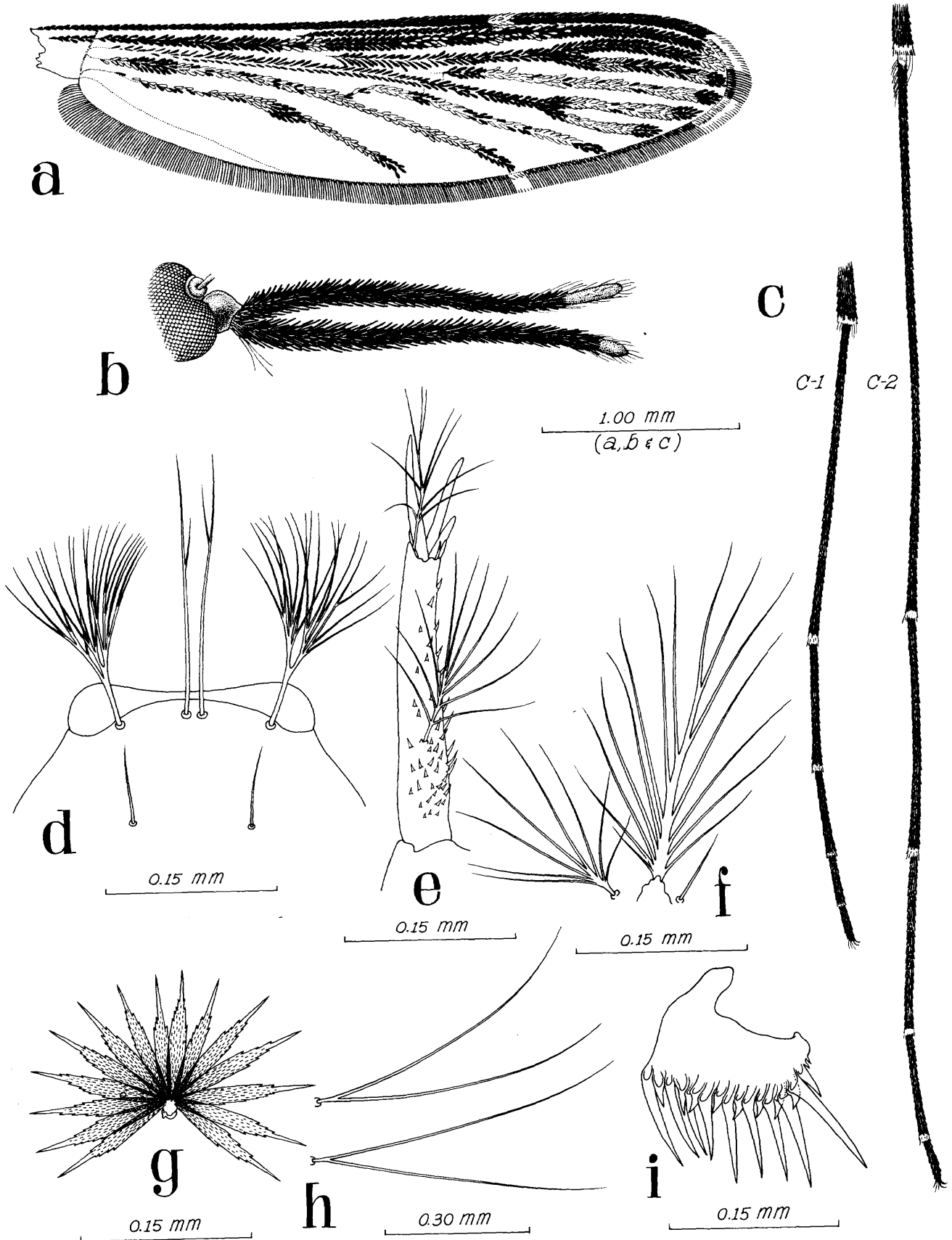


FIGURE 32 - Anopheles peditaeniatus

- a. Wing
- b. Lateral view of adult head
- c. Legs
- d-h. Types and positions of larval hairs

FIGURE 32

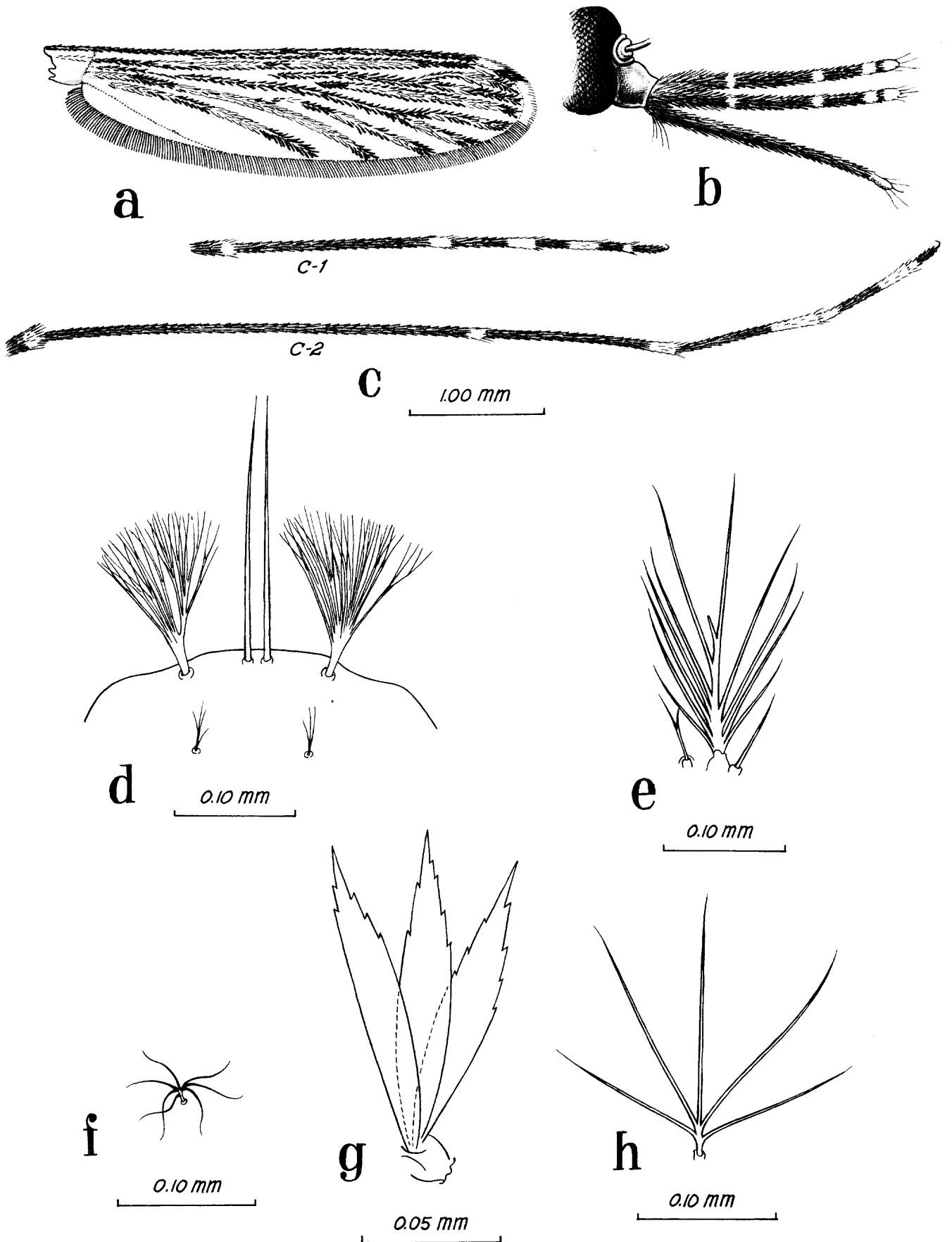


FIGURE 33 - Anopheles pseudobarbistrois

- a-d. Types and positions of larval hairs
- e. Respiratory trumpet (pupa)
- f. Stigmal club (dorsal and lateral views)

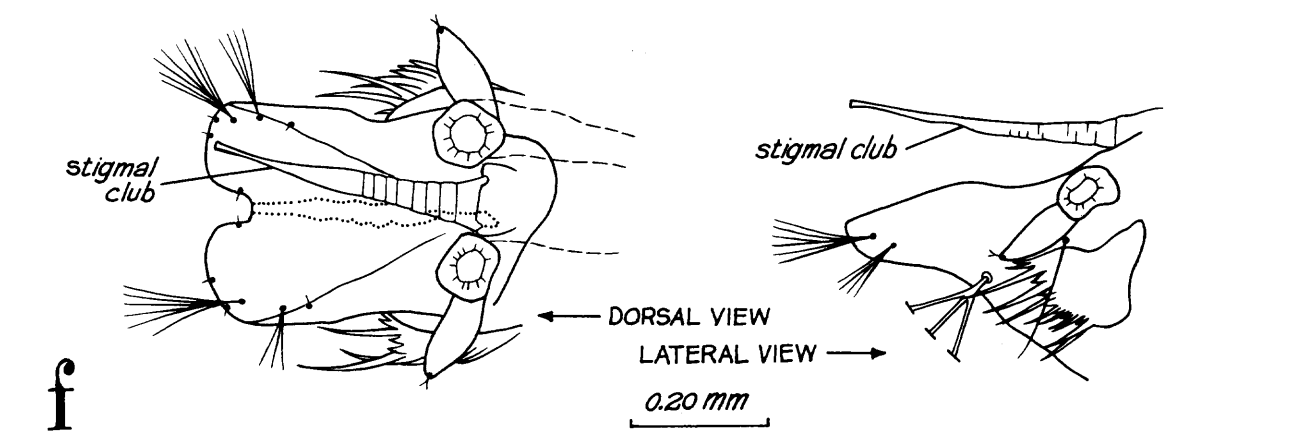
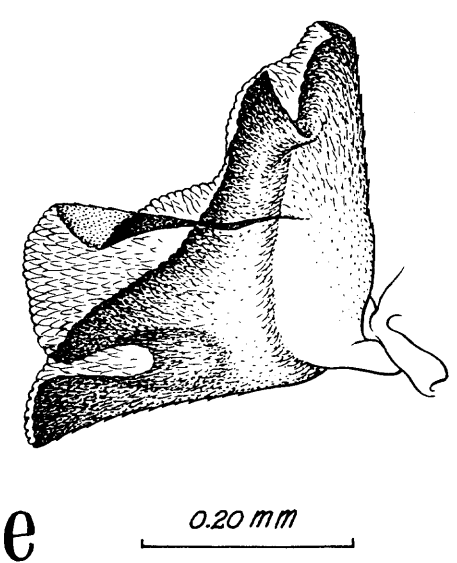
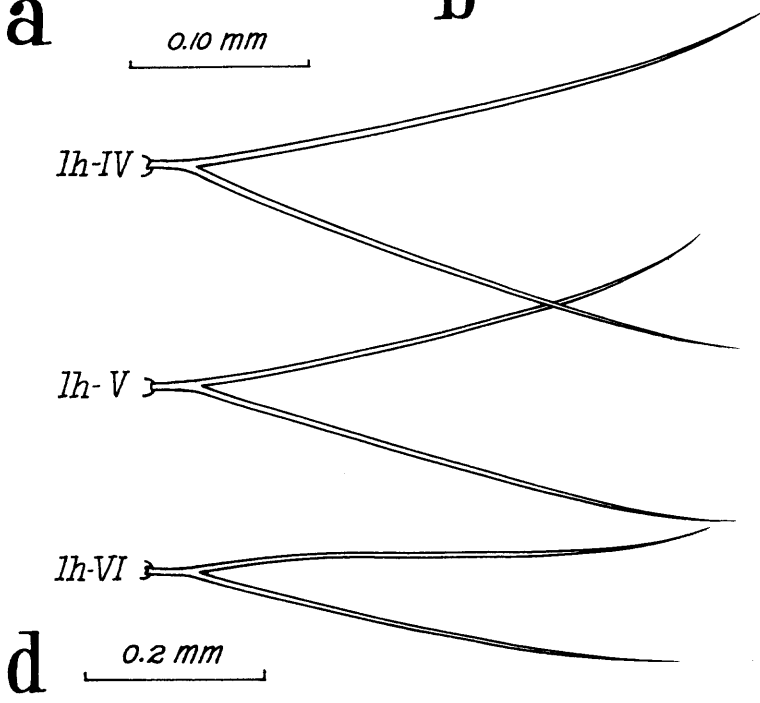
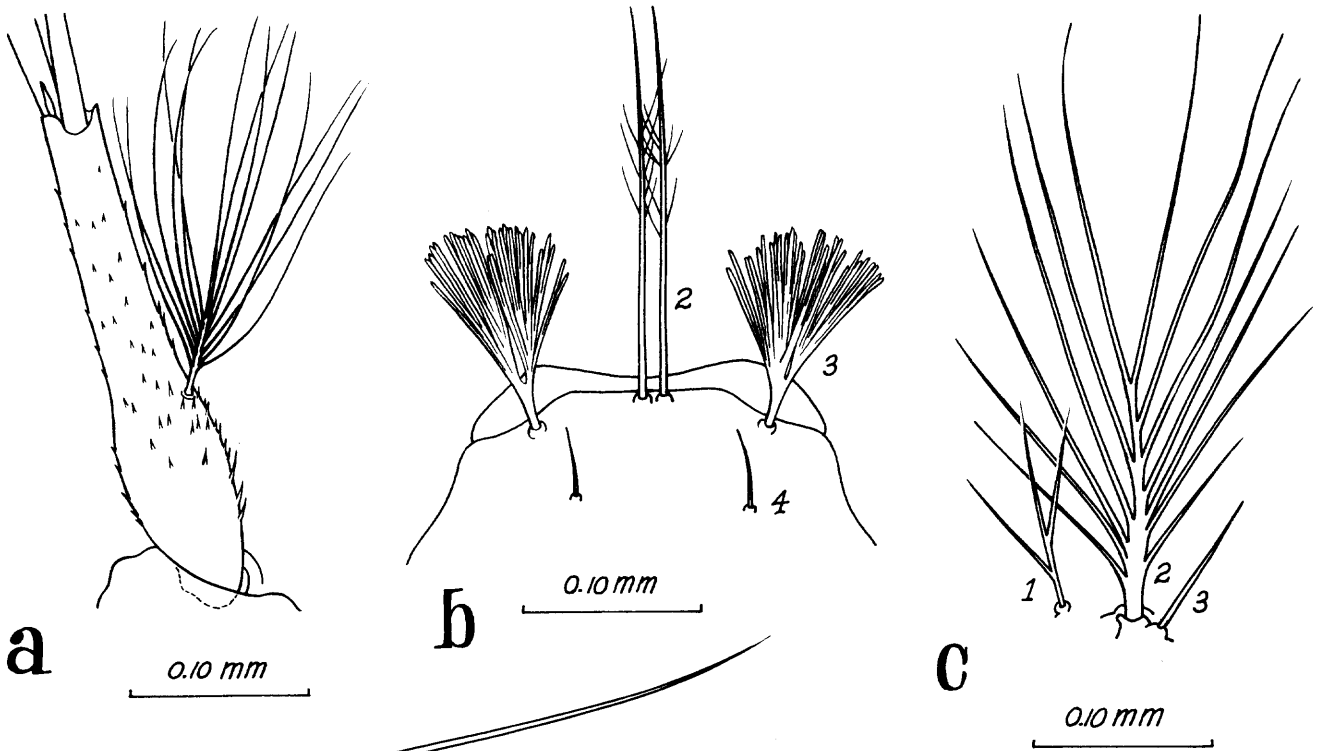


FIGURE 34 - Anopheles pseudobarbistrois

- a. Adult abdomen
- b. Legs
- c. Femur and tibiae (legs)
- d. Eggs

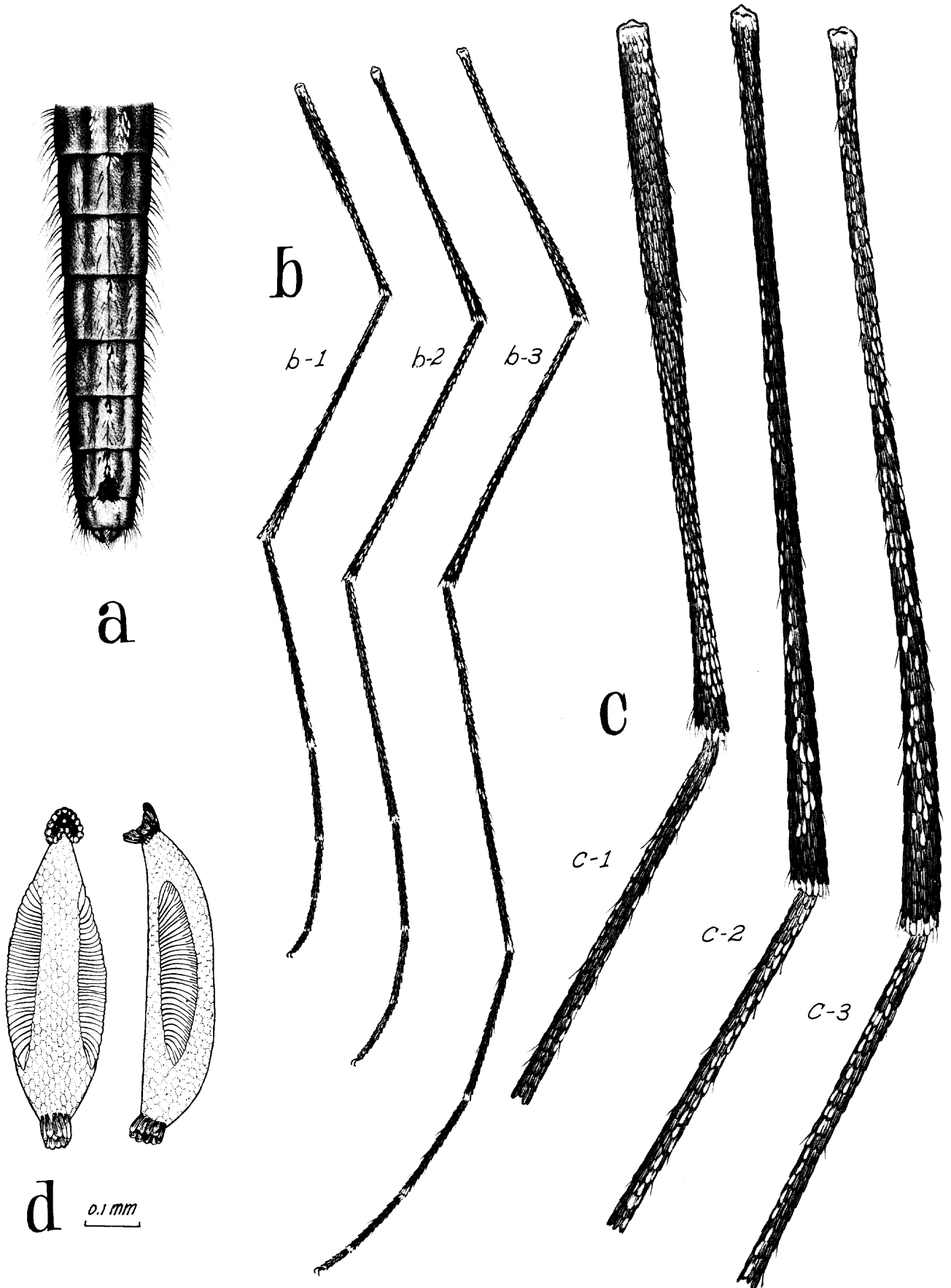


FIGURE 35 - Anopheles annularis

- a. Wing
- b. Latera view of adult head
- c. Legs
- d-h. Types and positions of larval hairs

FIGURE 35

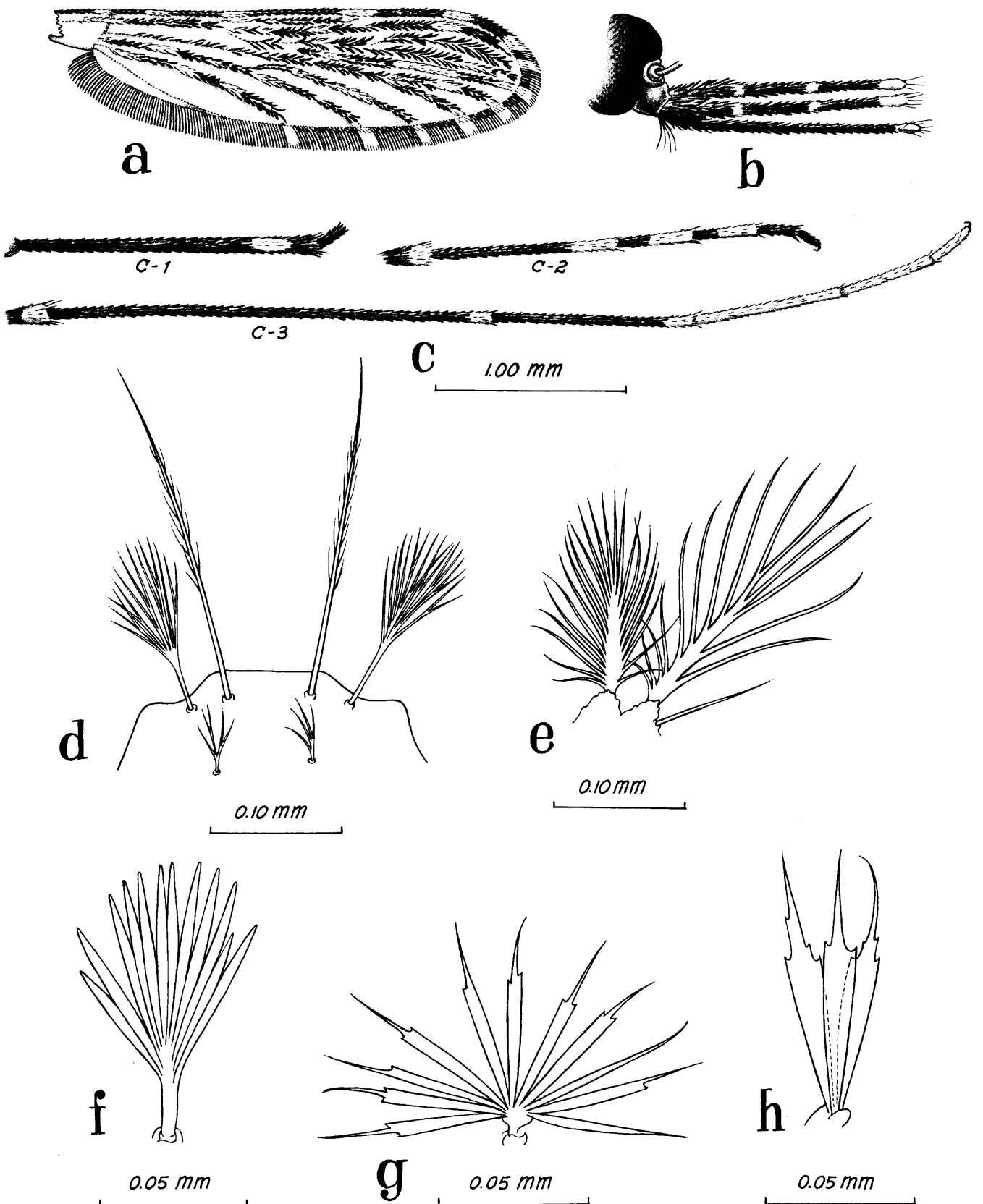


FIGURE 36 - Anopheles filipinae

- a. Wing
- b. Lateral view of adult head
- c-f. Types and positions of larval hairs
- g. Abdominal segments II-VII of larva

FIGURE 36

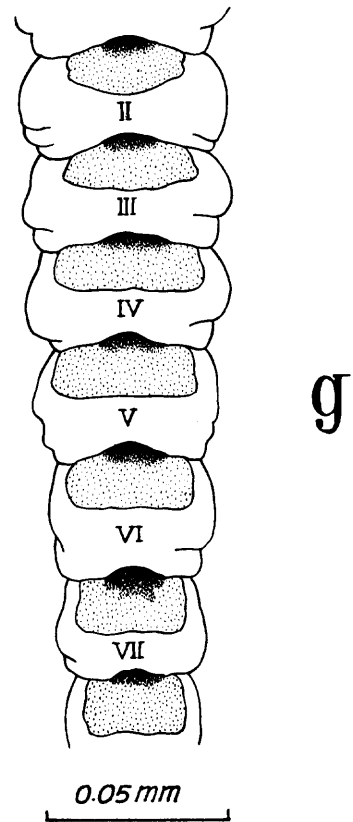
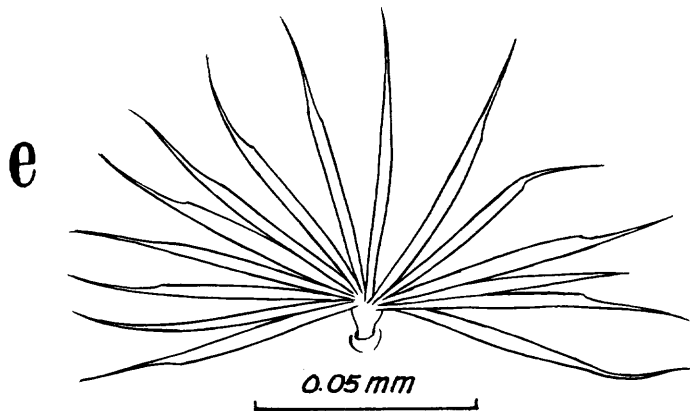
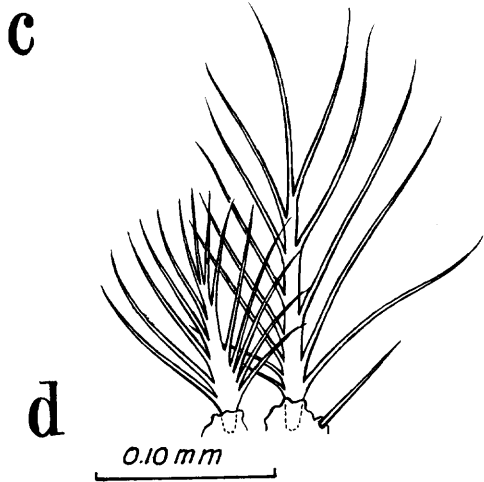
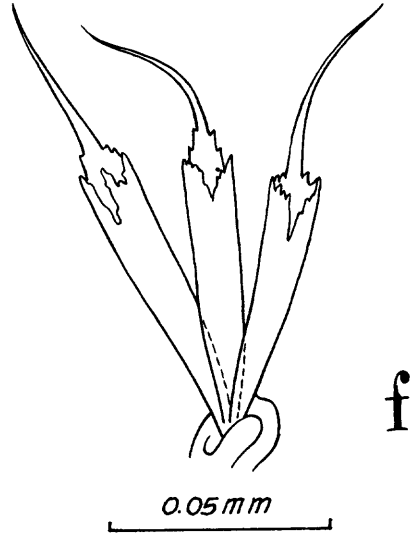
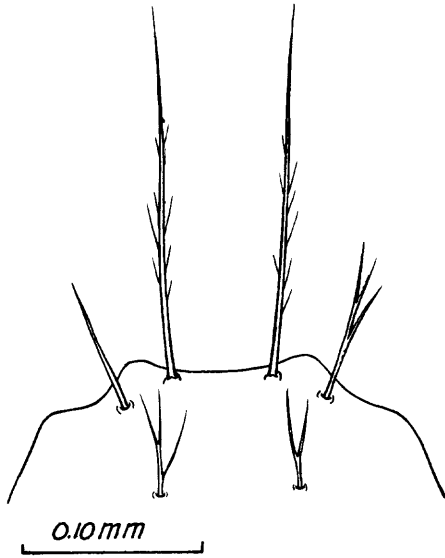
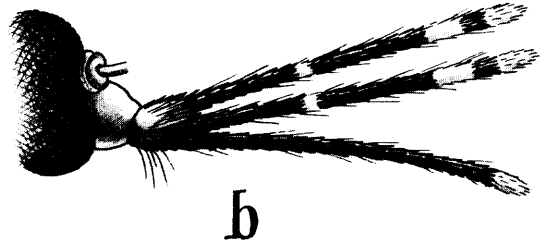
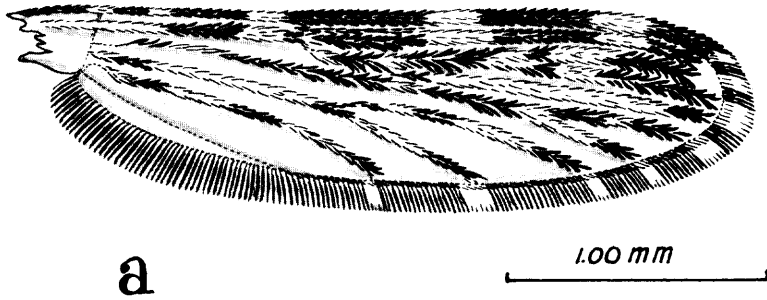


FIGURE 37 - Anopheles flavirostris

- a. Propleural hair group; meso-pleural hair group; meta-pleural hair group of larva
- b. Dorsal half of abdominal segments I-VII of first instar larva

FIGURE 37

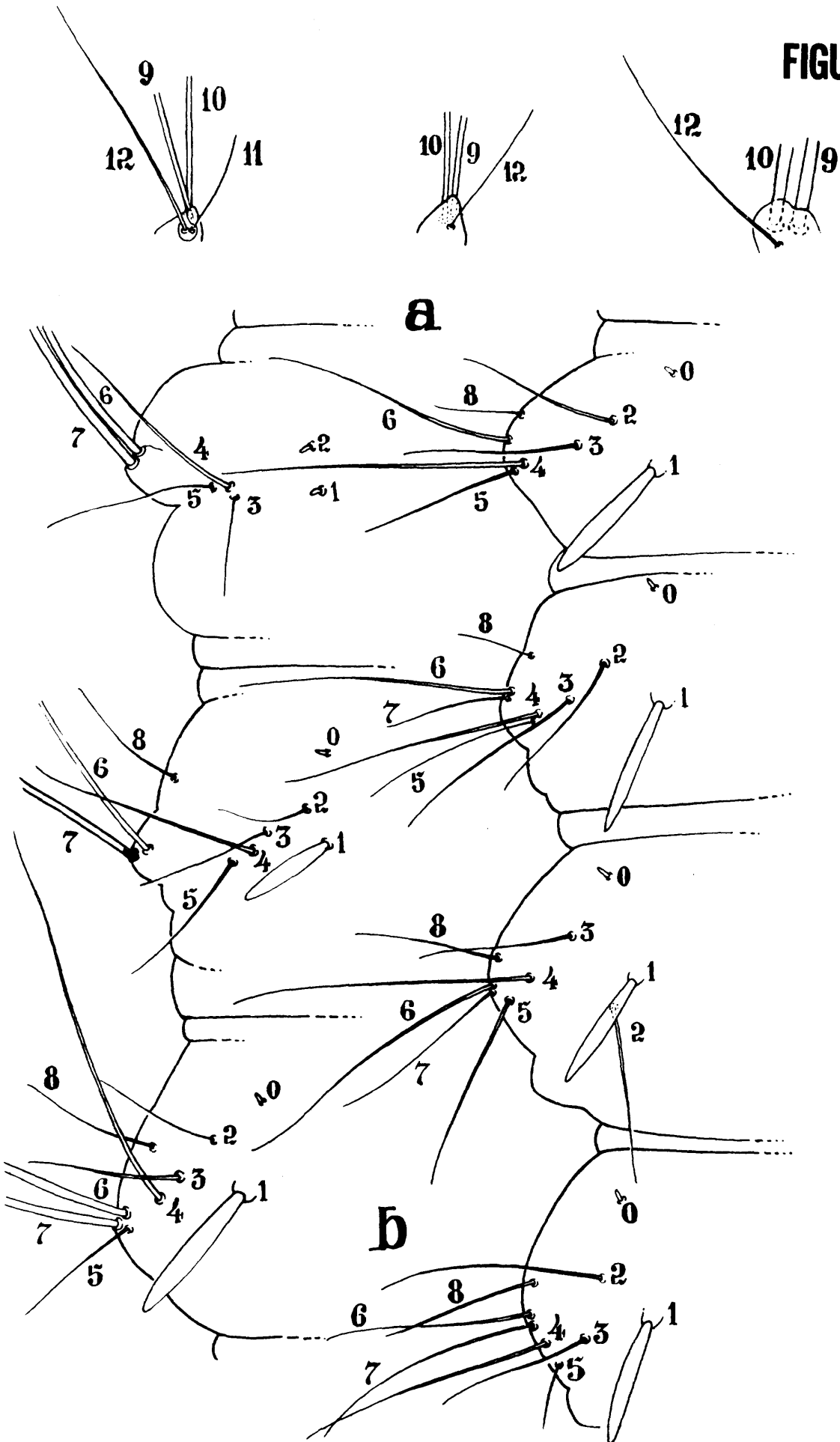


FIGURE 38 - Anopheles flavirostris

- a. Wing
- b. Lateral view of adult head
- c-f. Types and positions of larval hairs
- g. Abdominal segments II-VII of larva

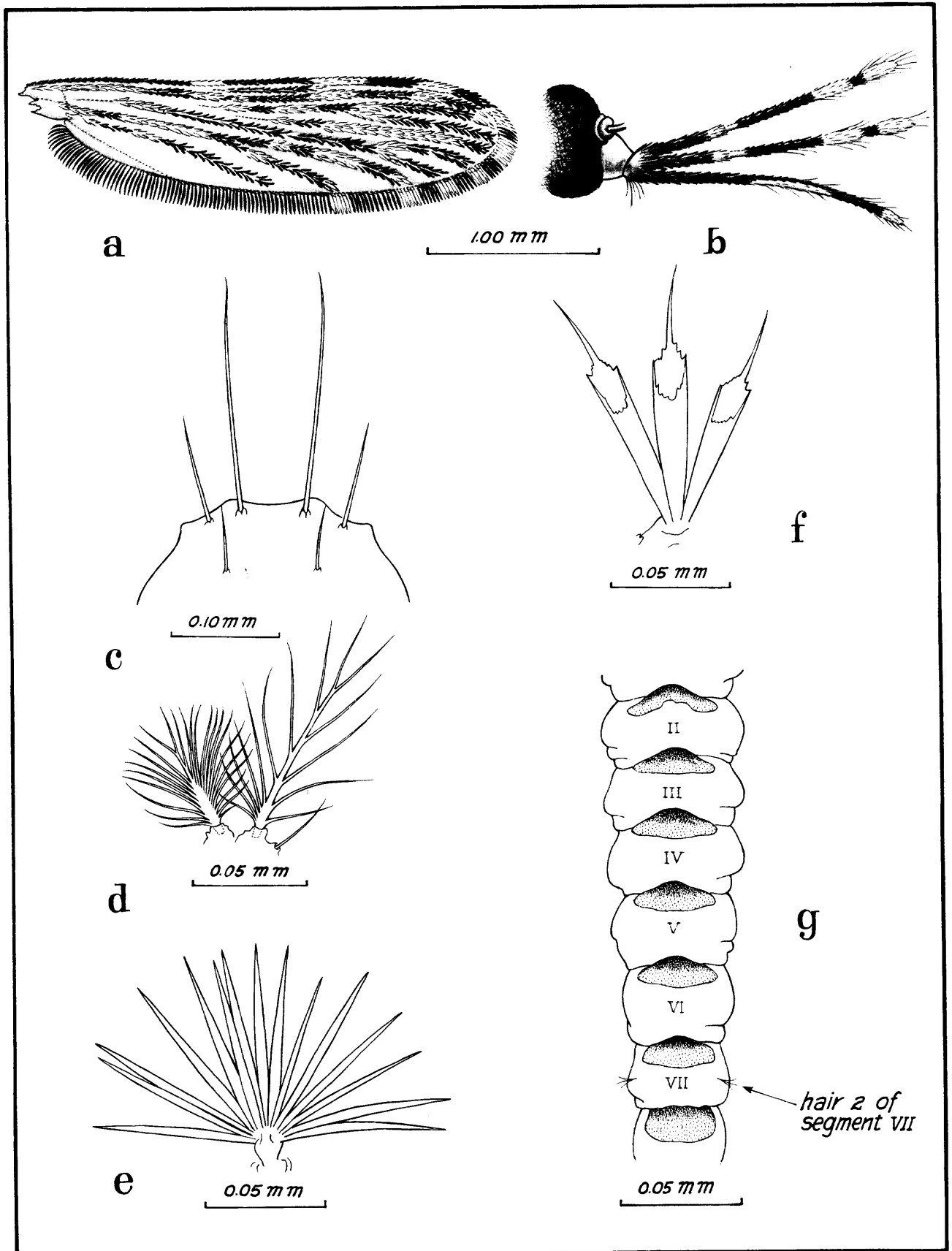


FIGURE 39 - Anopheles indefinitus

- a. Wing
- b. Lateral view of adult head
- c. Legs
- d-h. Types and positions of larval hairs

FIGURE 39

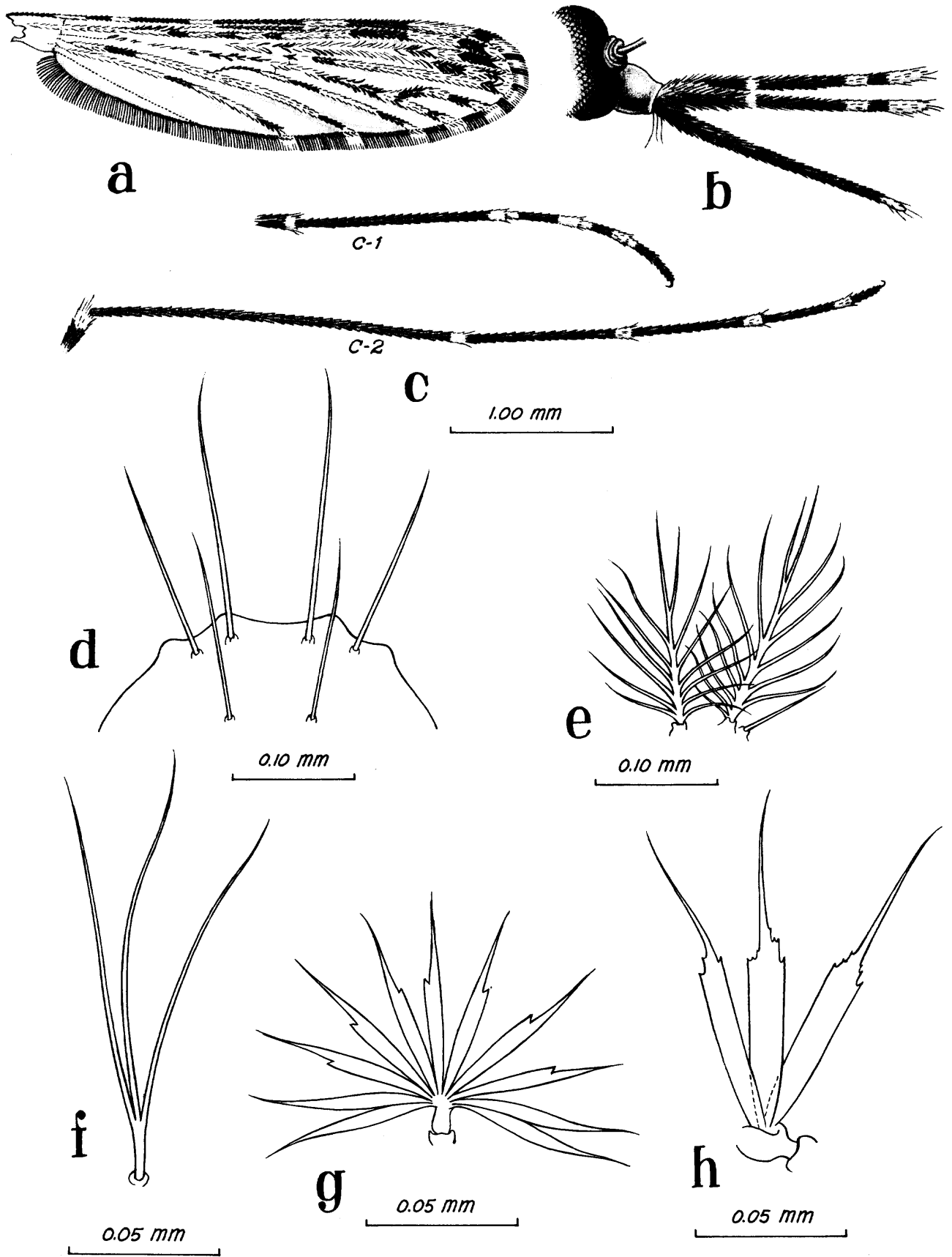


FIGURE 40 - Anopheles litoralis

- a. Clypeal hairs
- b. Meta-hair-3
- c. Palmate hair I
- d. Some leaflets of palmate hair IV
- e. Prothoracic hairs 1-3
- f-1. Hair 6 of abdominal segment IV
- f-2. Hair 6 of abdominal segment V
- f-3. Hair 6 of abdominal segment VI
- g. Comb scale

FIGURE 40

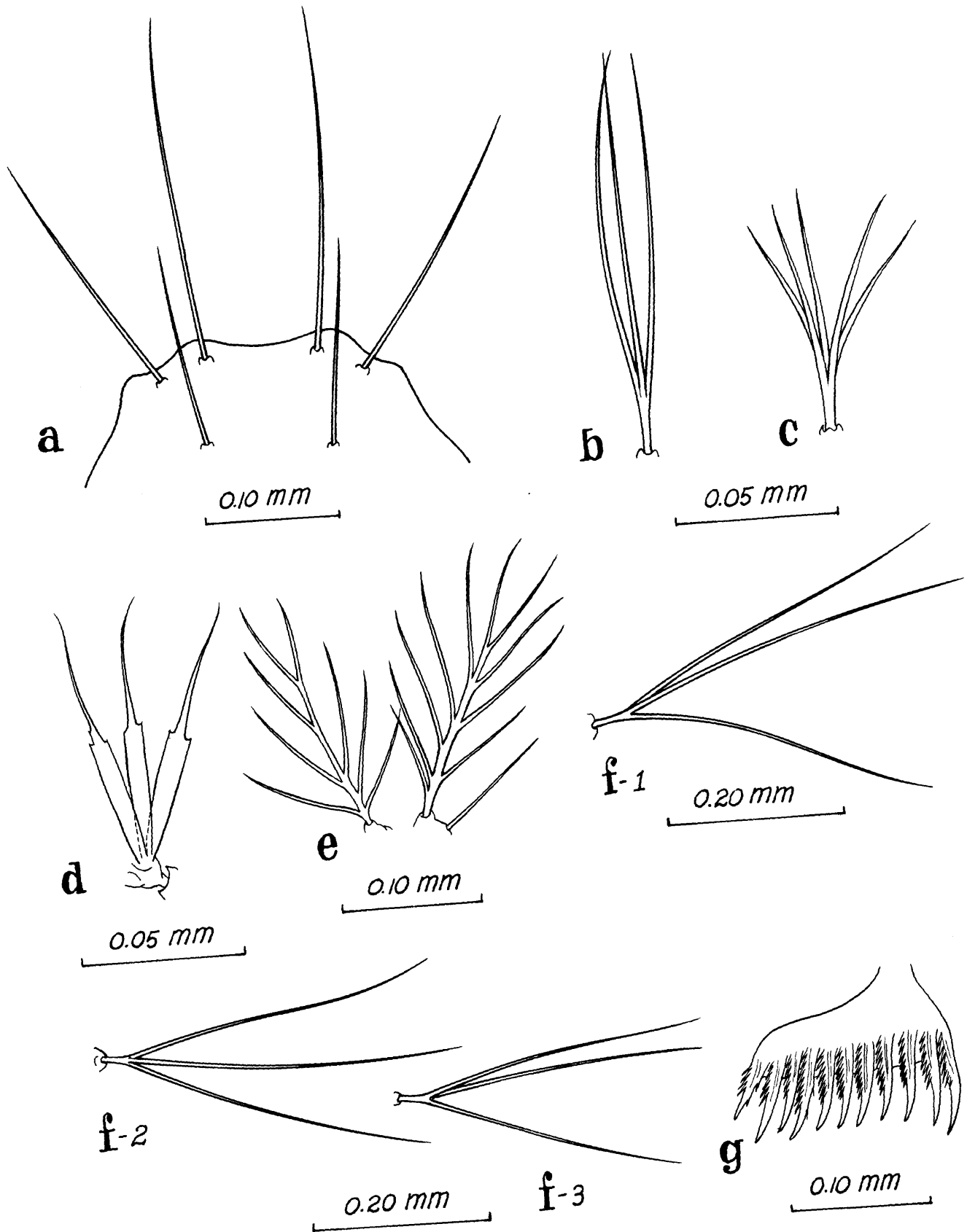


FIGURE 41 - Anopheles litoralis

- a. Dorsal view of adult head and thorax
- b. Wing
- c. Proboscis and palpi
- d. One fore and 2 hind tarsimeres of a female
- e. Half of a male phallosome

FIGURE 41

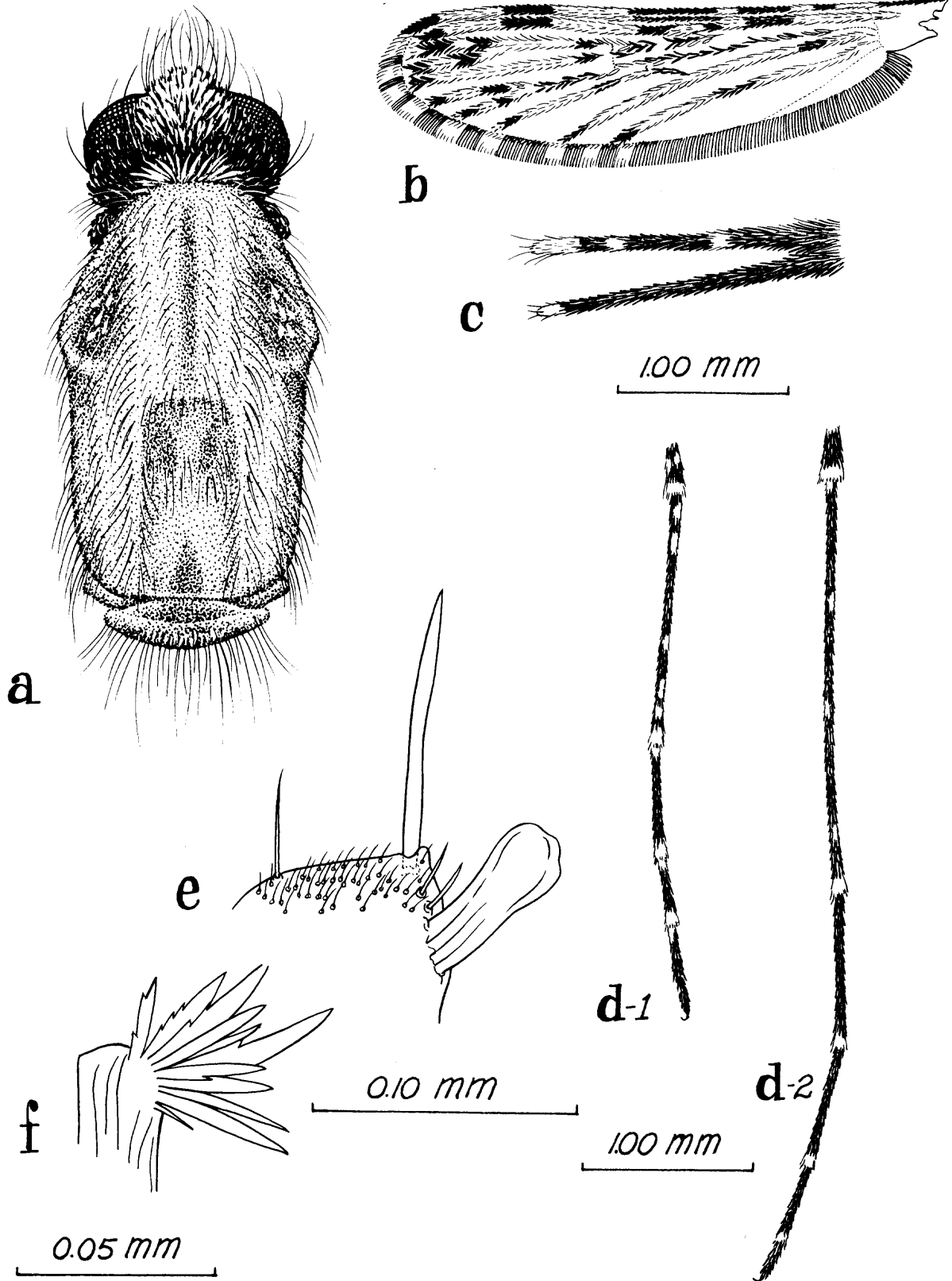
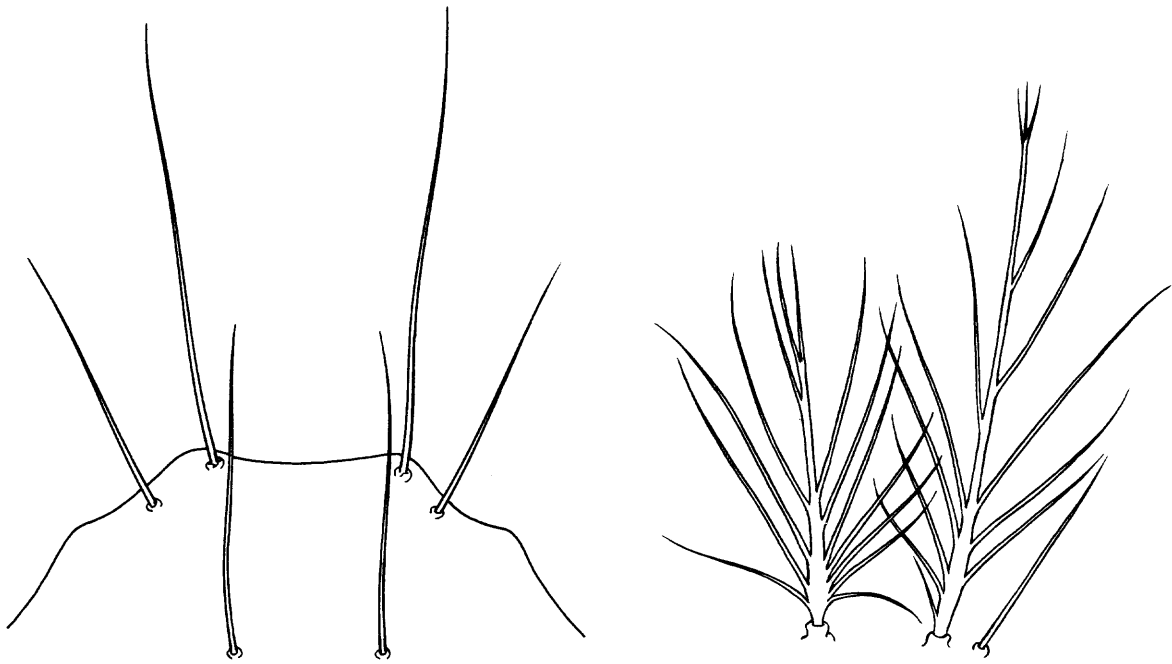


FIGURE 42 - Anopheles ludlowae

a-c. Types and positions of larval hairs

d. Comb scale

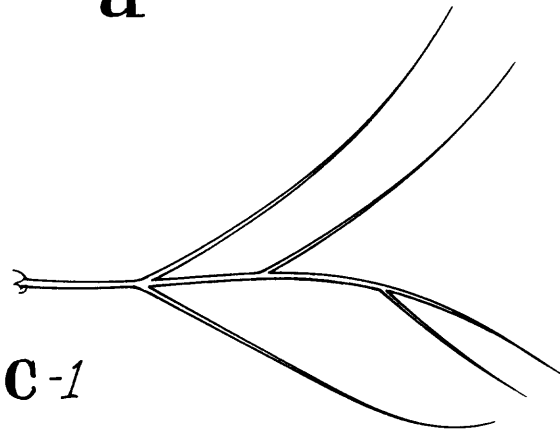
FIGURE 42



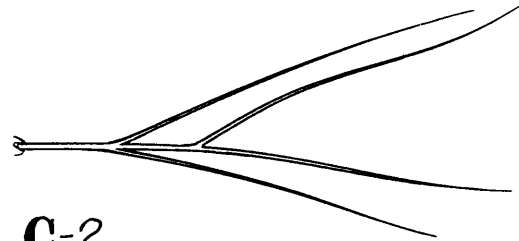
a

0.10 mm

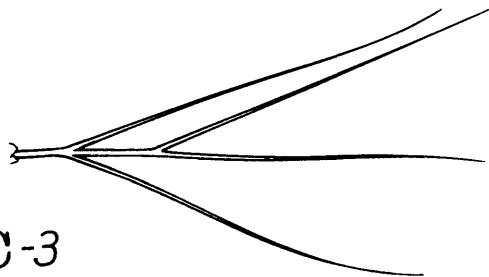
b



C-1



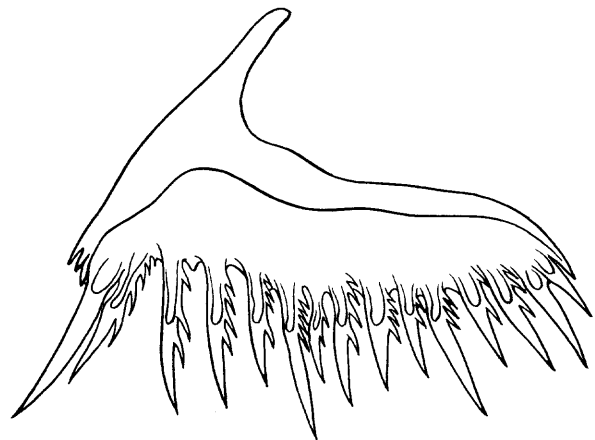
C-2



C-3

0.2 mm

(C1-C-2-C-3)



d

0.10 mm

FIGURE 43 - Anopheles ludlowae

- a. Respiratory trumpet (pupa)
- b. Metanotal hairs (pupa)
- c. Pupa terminal segment and paddle

FIGURE 43

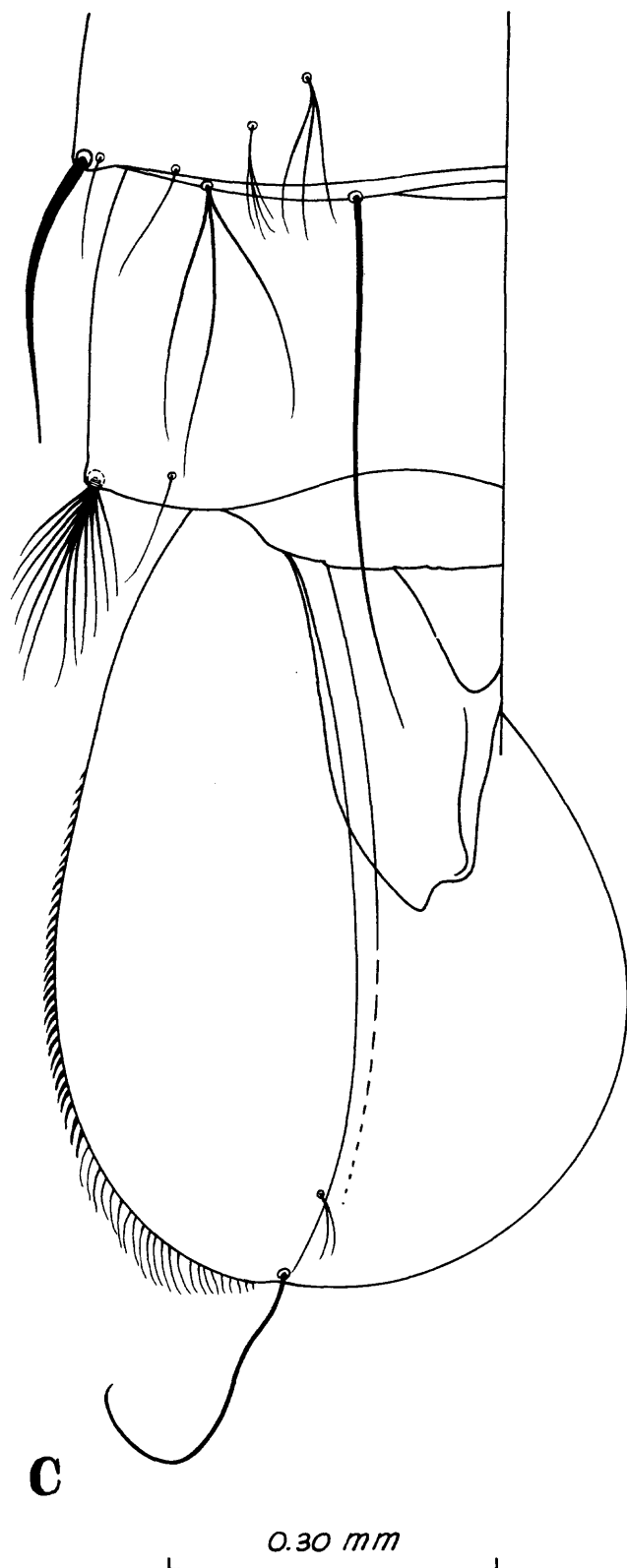
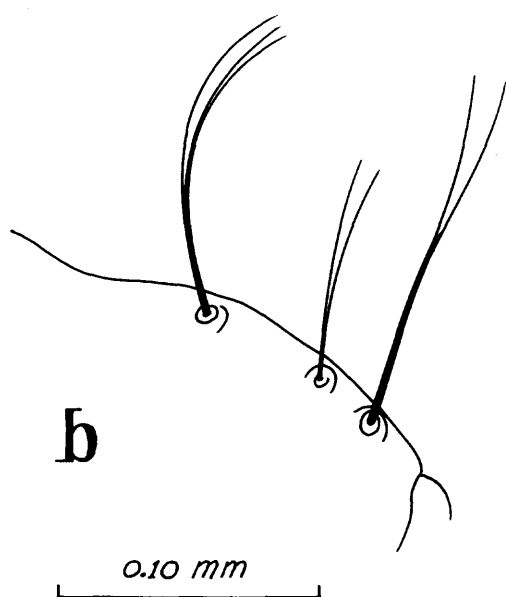
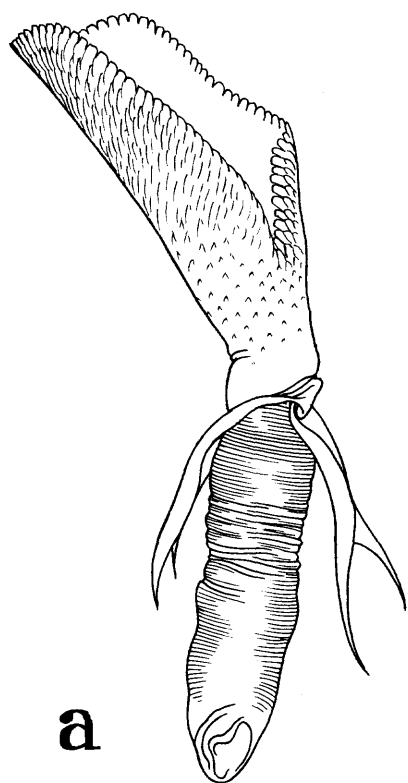
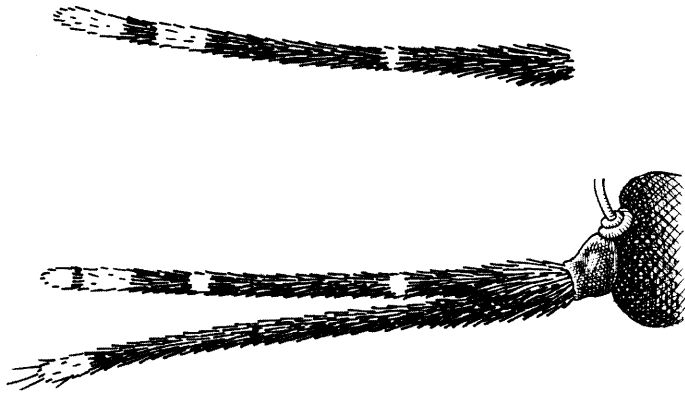


FIGURE 44 - Anopheles ludlowae
Anopheles parangensis

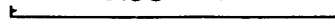
- a-d. Differences between Anopheles ludlowae (a-c) and Anopheles parangensis (d) in regard to palpus banding, hind leg scaling, larval hairs and terminalia

FIGURE 44



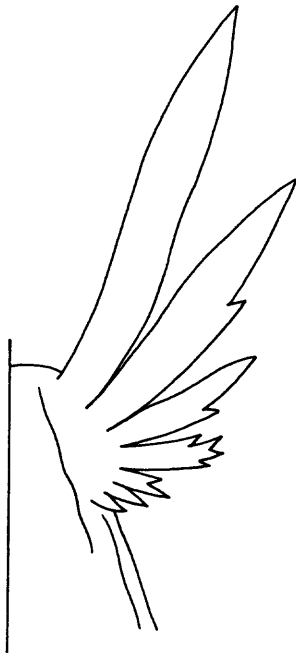
a

1.00 mm



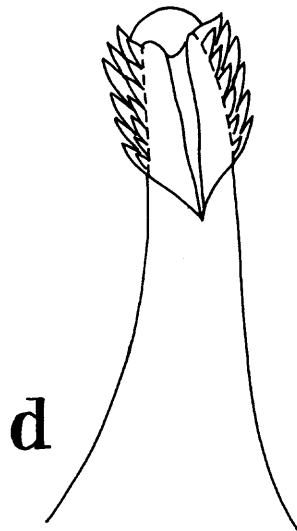
b-1

b-2



c

0.05 mm



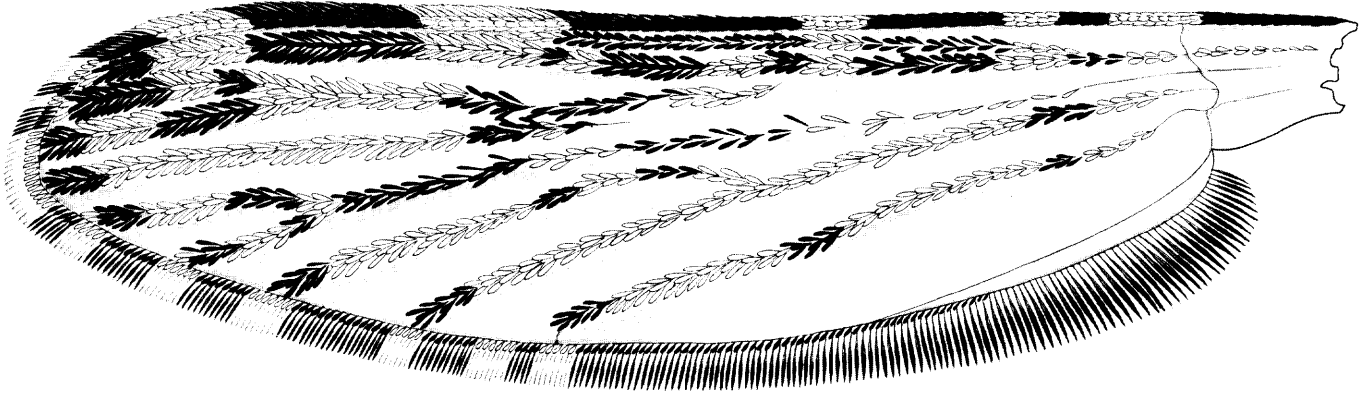
d

0.10 mm



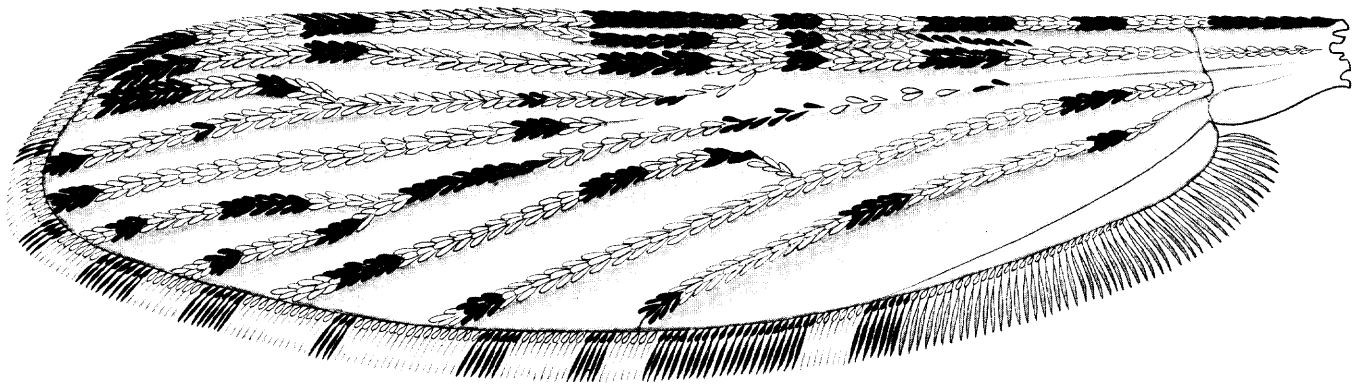
FIGURE 45 - Anopheles ludlowae ssp cabrerai
Anopheles parangensis

- a. Wing scaling pattern of Anopheles
ludlowae ssp cabrerai
- b. Wing scaling pattern of Anopheles
parangensis



a

1.00 mm



b

1.00 mm

FIGURE 46 - Anopheles maculatus

- a. Wing
- b. Dorsal view of head with palpus banding
- c. Legs
- d-h. Types and positions of larval hairs

FIGURE 46

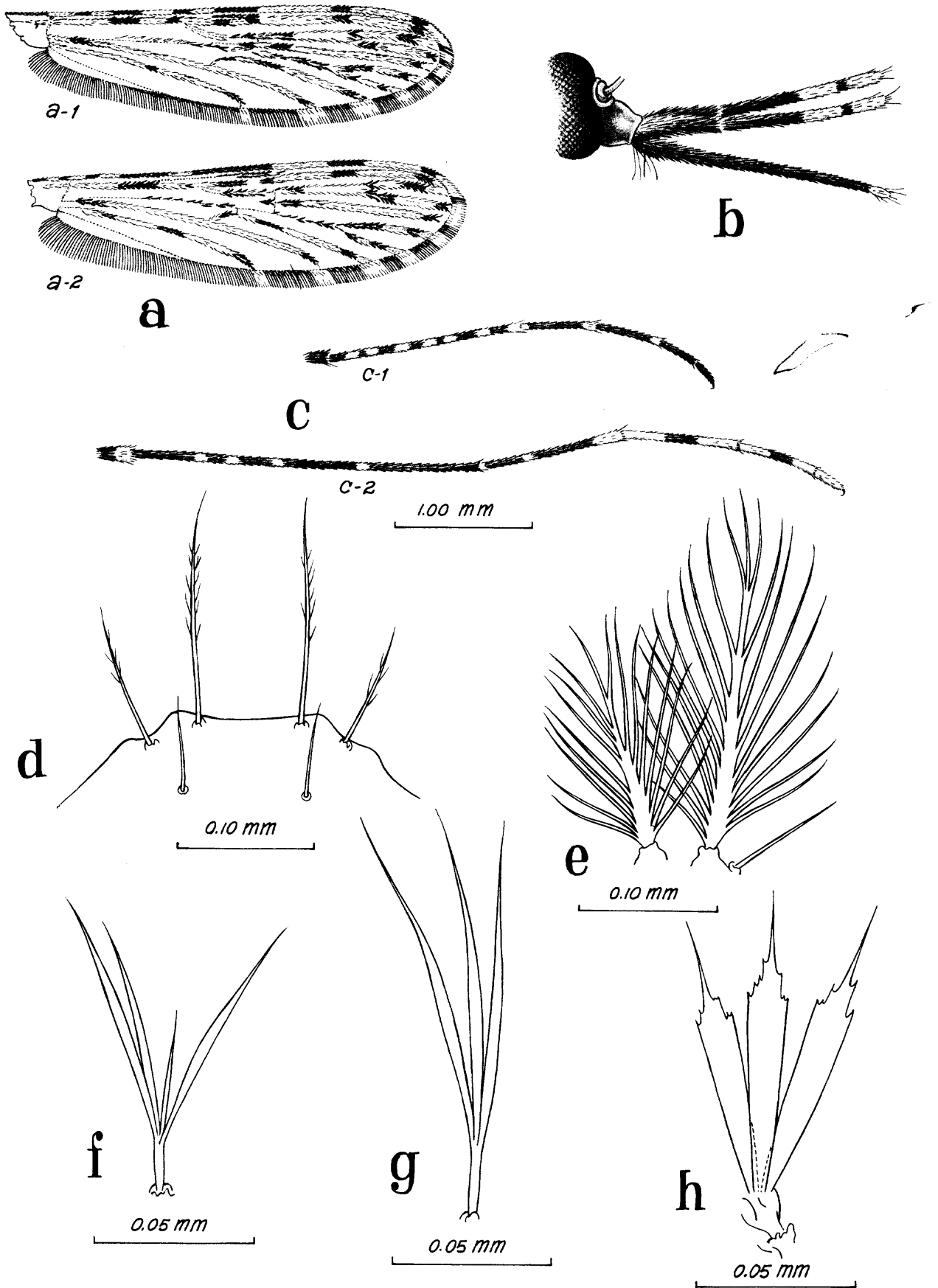
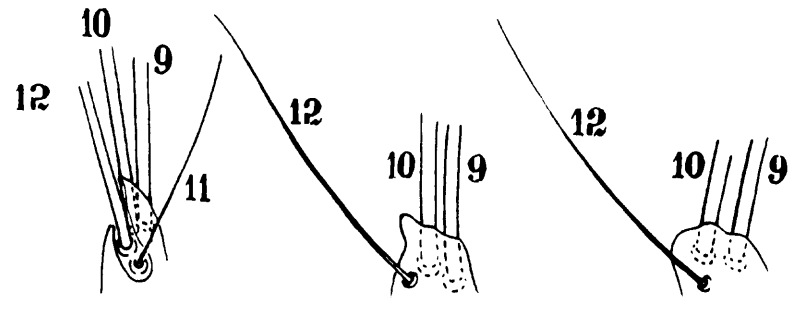


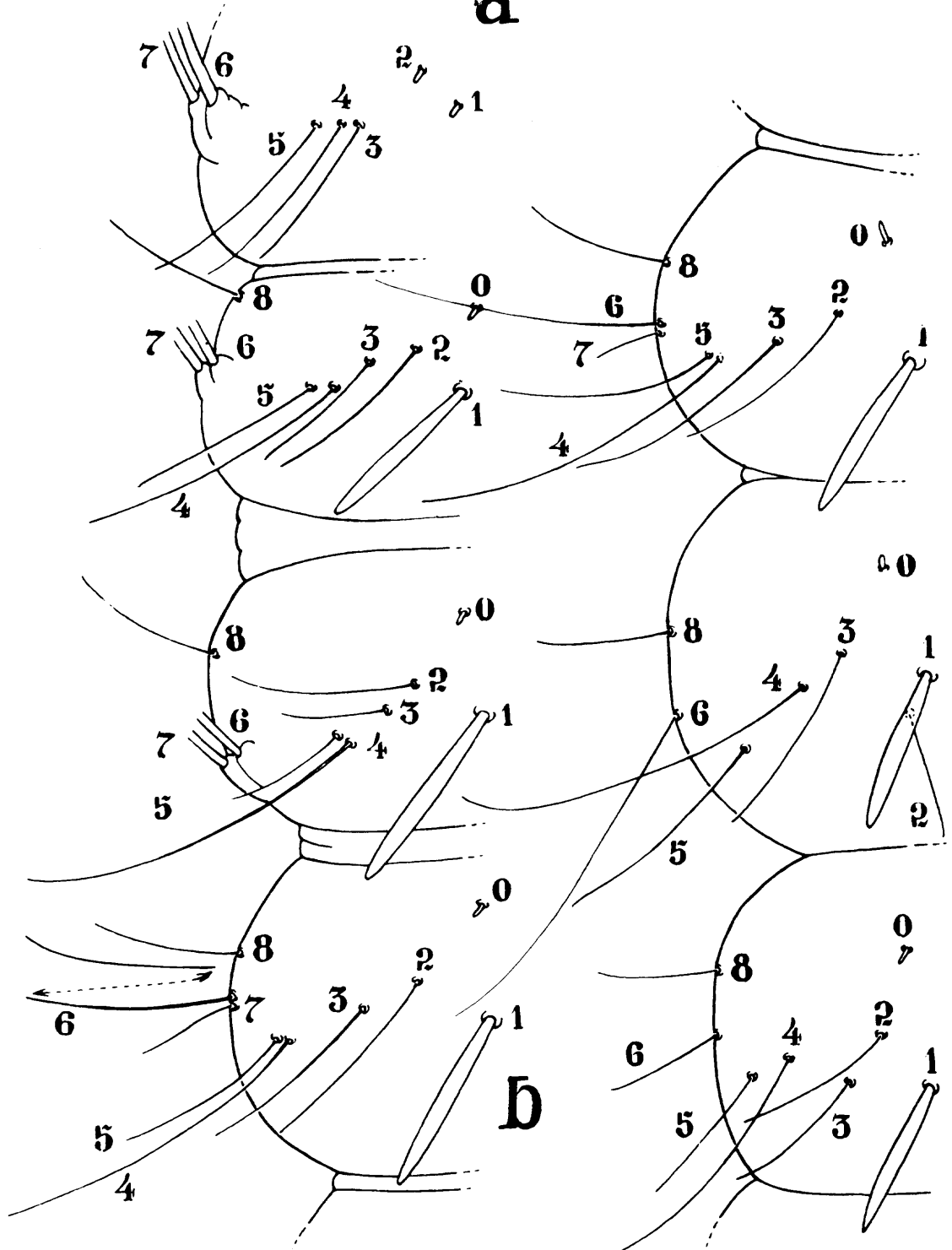
FIGURE 47 - Anopheles mangyanus

- a. Pro-pleural hair group; meso-pleural hair group; meta-pleural hair group of larva.
- b. Dorsal half of abdominal segments I-VII of first instar larva

FIGURE 47



a



b

FIGURE 48 - Anopheles mangyanus

a-k. Types and positions of fourth
instar larval hairs

FIGURE 48

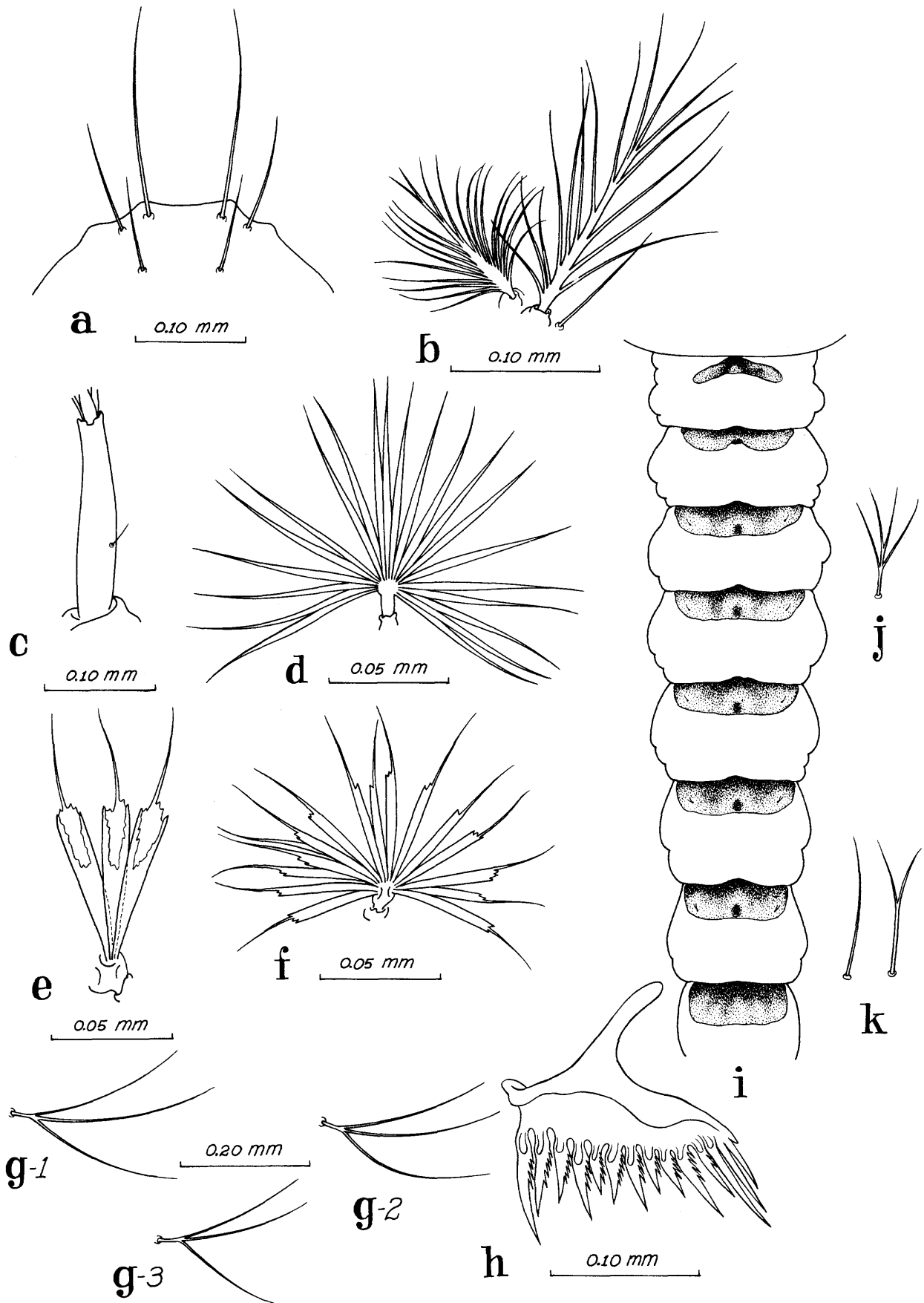


FIGURE 49 - Anopheles mangyanus

- a. Wing
- b. Head showing banding of palpus
- c. Legs
- d. Larval scales
- e. Respiratory trumpet (pupa)
- f. Metanotal hairs (pupa)
- g. Pupa terminal segment and paddle



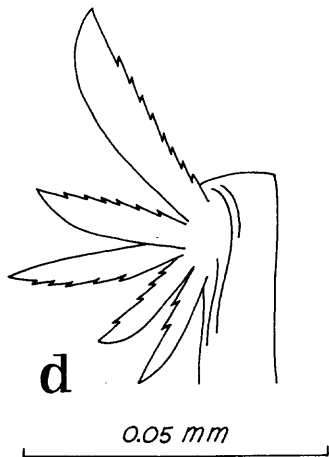
a

1.00 mm



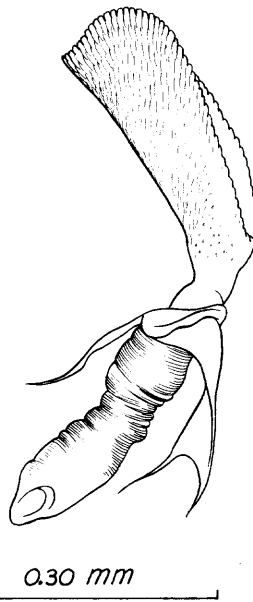
b

1.00 mm



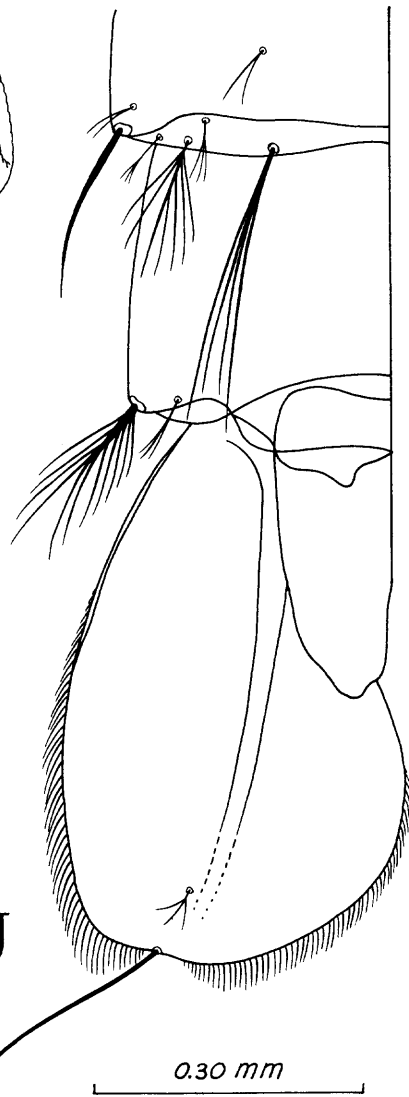
d

0.05 mm



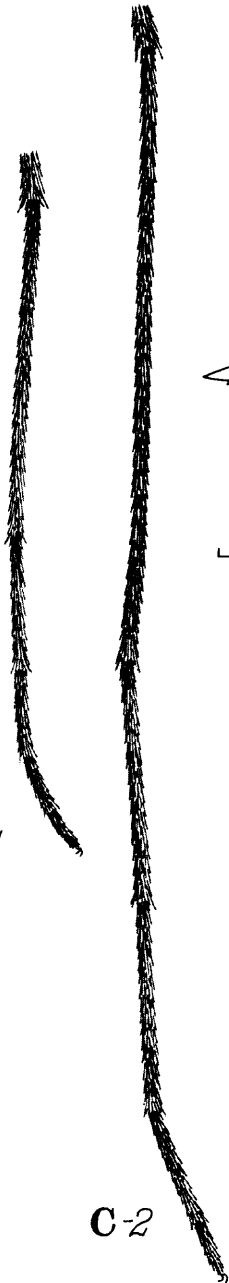
e

0.30 mm



g

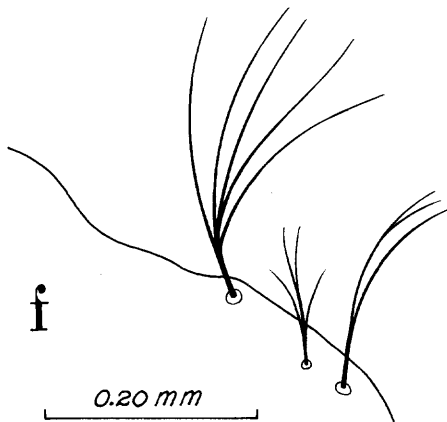
0.30 mm



C-1

C-2

1.00 mm



f

0.20 mm

FIGURE 50 - Anopheles philippinensis

- a. Wing
- b. Head showing banding of palpus
- c. Legs
- d-h. Types and positions of larval hairs

FIGURE 50

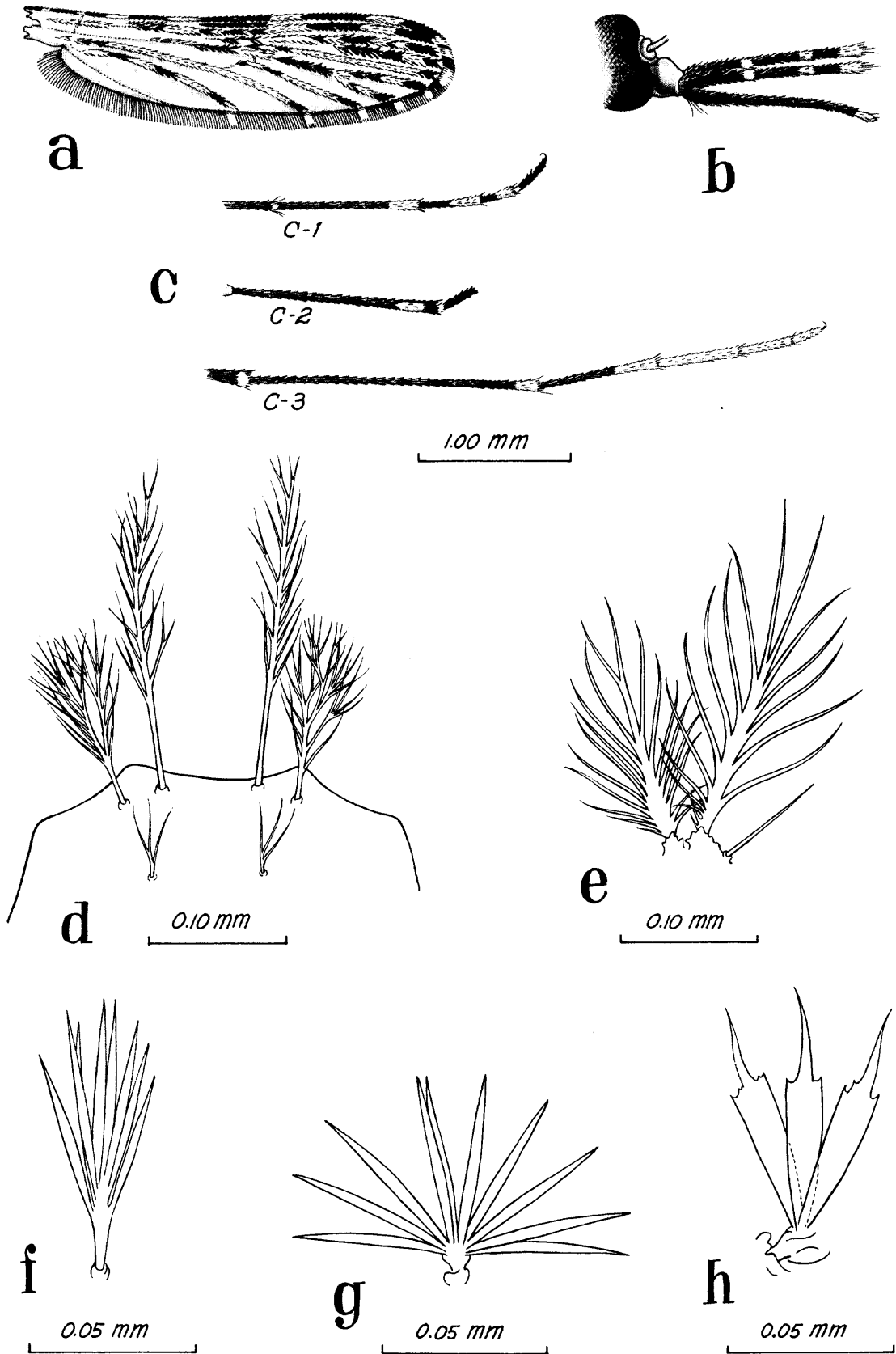


FIGURE 51 - Anopheles tessellatus

- a. Wing
- b. Head showing banding of proboscis and palpus
- c. Legs
- d-h. Types and positions of larval hairs

FIGURE 51

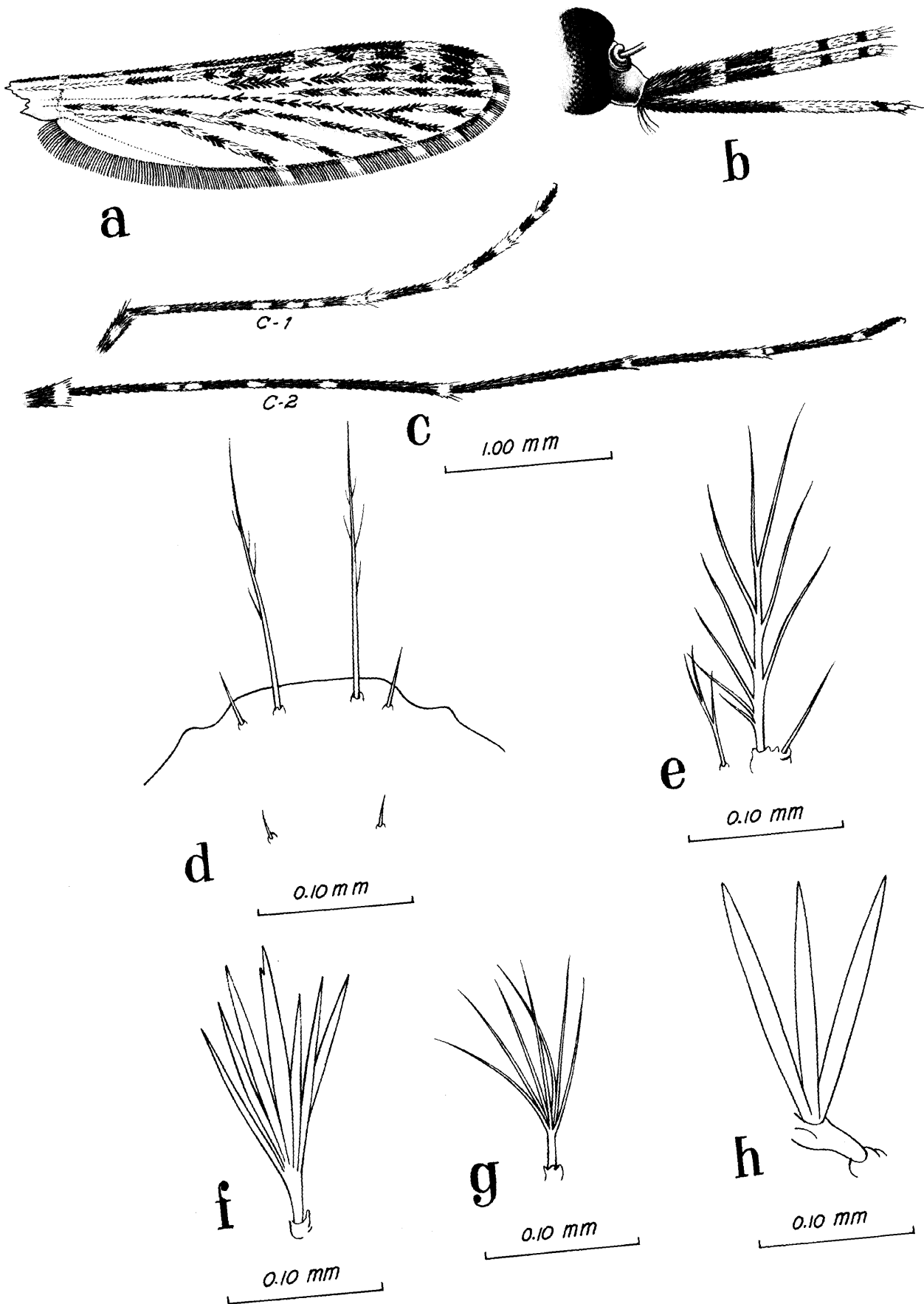


FIGURE 52 - Anopheles vagus limosus

- a. Wing
- b. Head showing banding of proboscis and palpus
- c. Legs
- d-h. Types and position of larval hairs

FIGURE 52

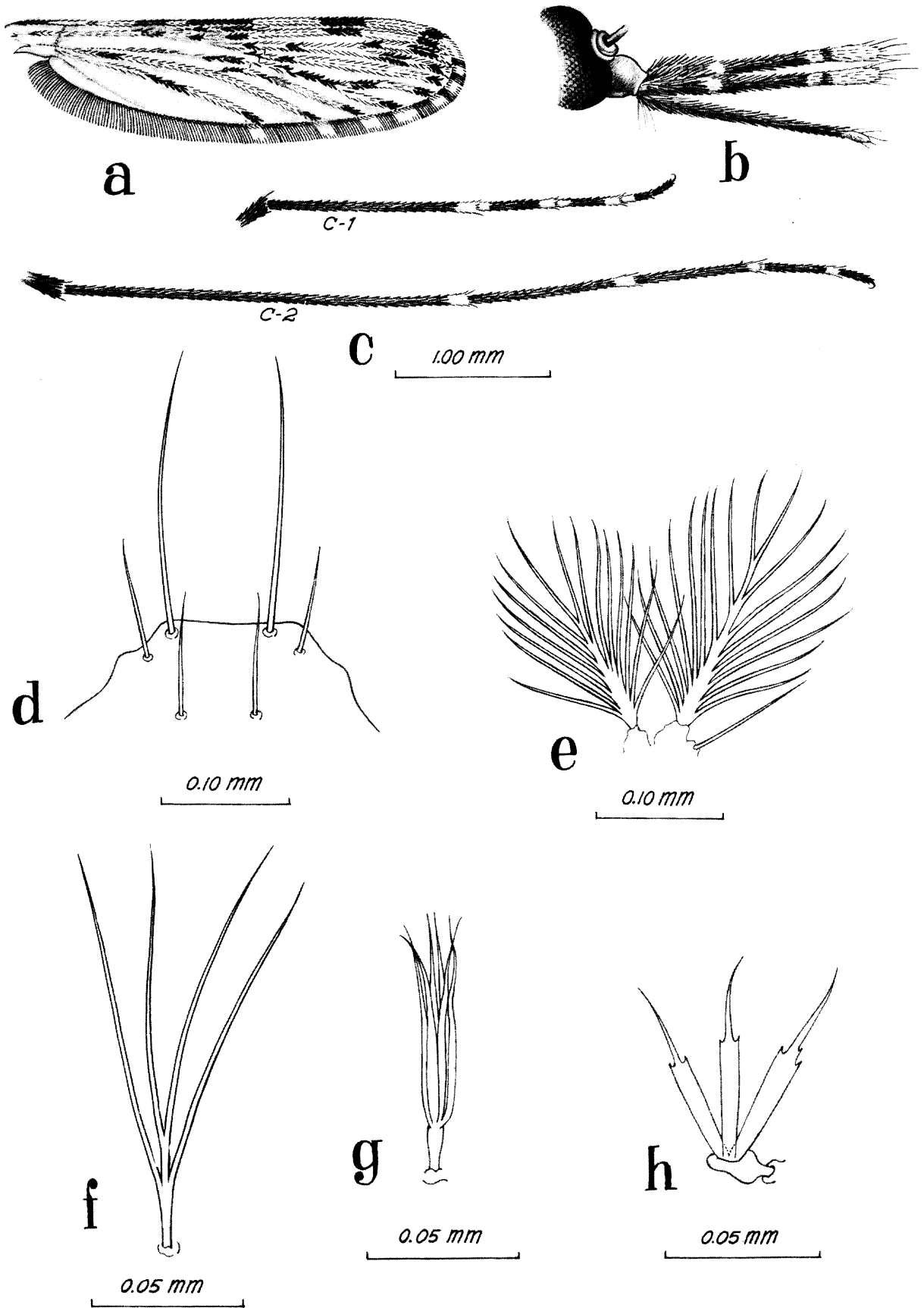
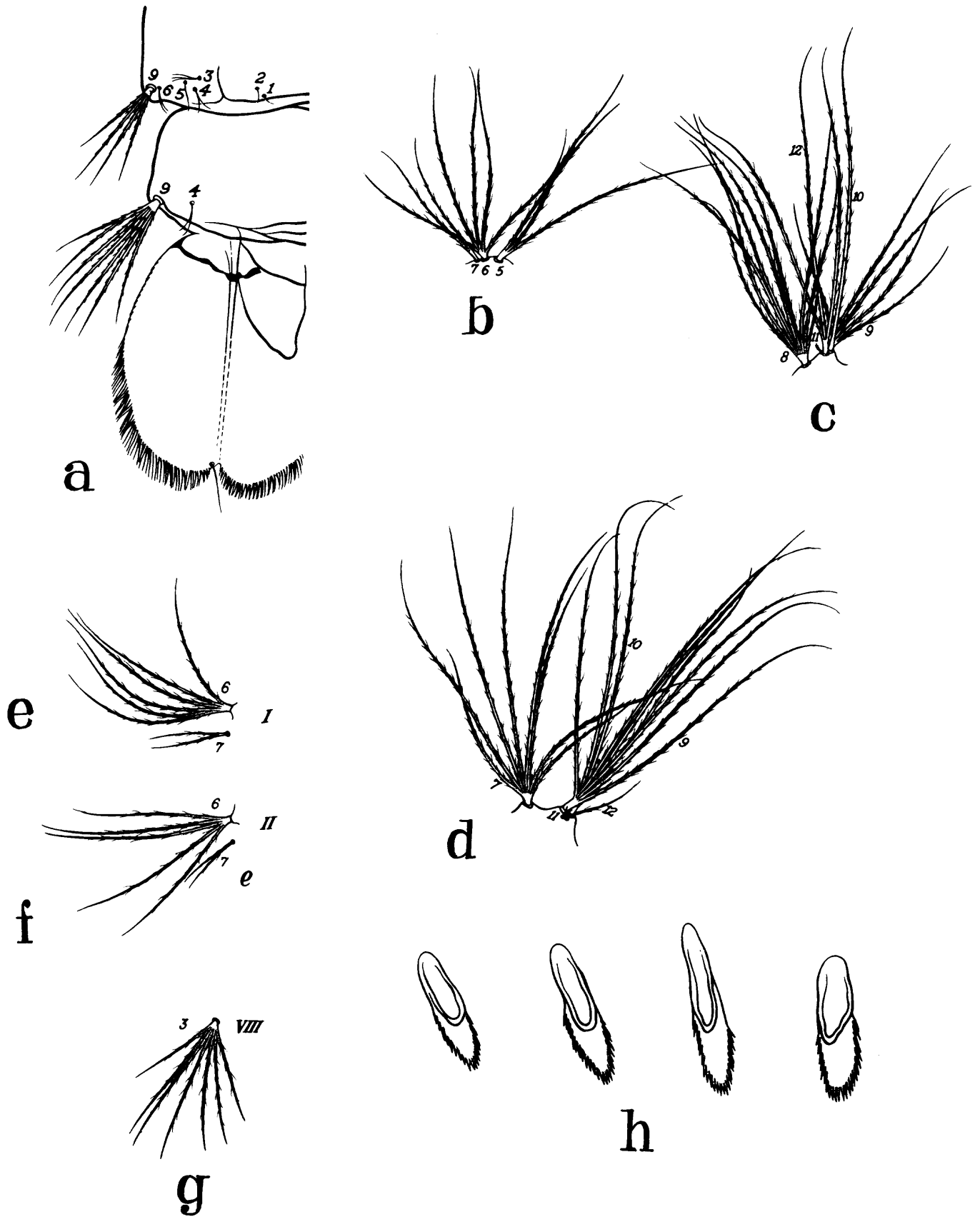


FIGURE 53 - Armigeres baisasi

- a. Papa terminal segment and paddle
- b-g. Types and positions of larval hairs
- h. Comb teeth

FIGURE 53



A.M.M.

FIGURE 54 - Armigeres malayi

- a. Pupa terminal segment and paddle
- b-g. Types and positions of larval hairs
- h. Comb teeth

FIGURE 54

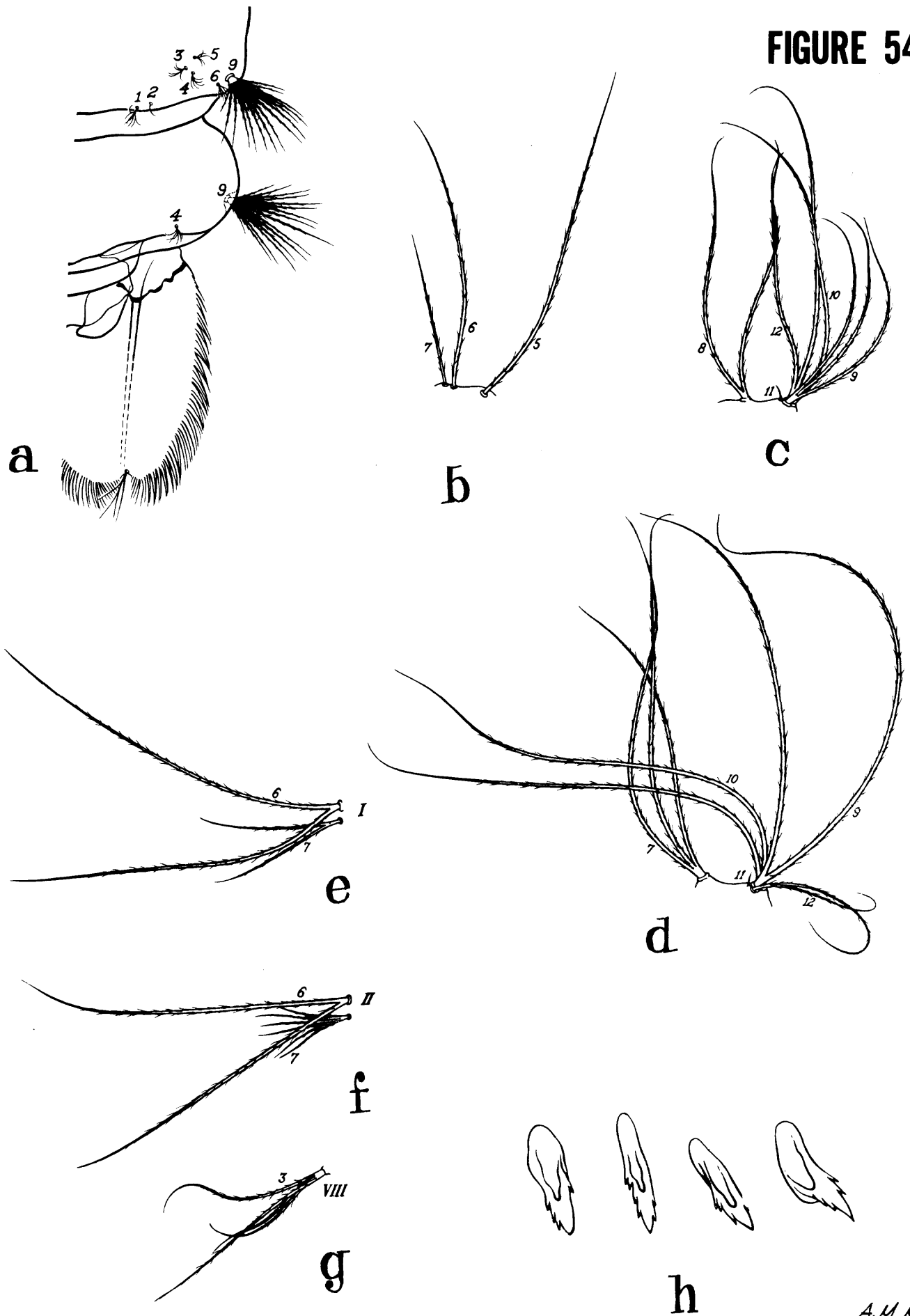


FIGURE 55 - Amigeres manalangi

- a. Dorsal view of head and thorax
- b. Left half of male terminalia
- c. Pupa terminal segment and paddle
- d-i. Types and positions of larval hairs
- j. Comb teeth

FIGURE 55

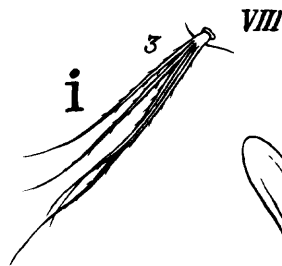
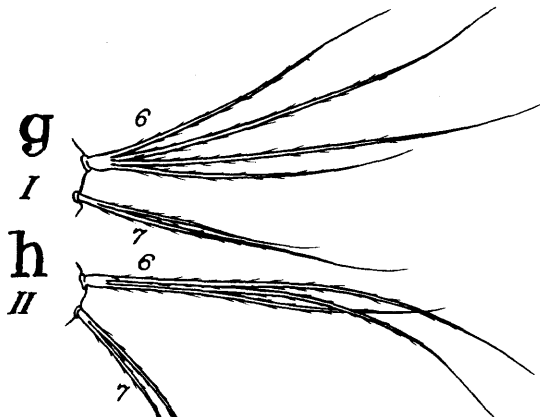
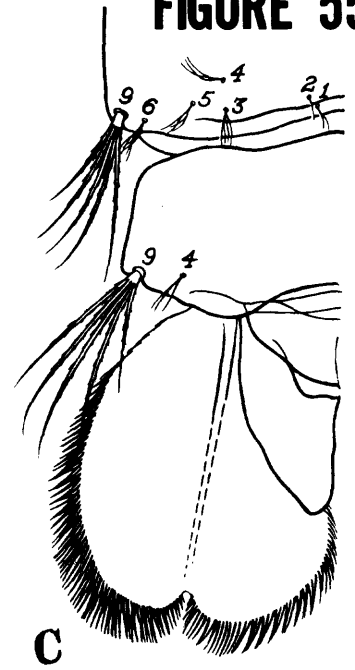
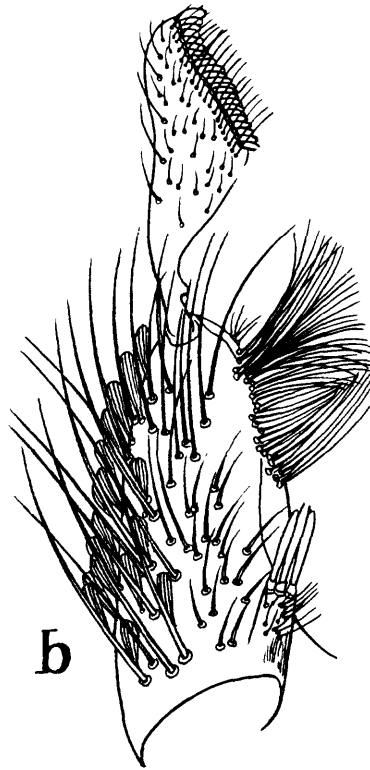
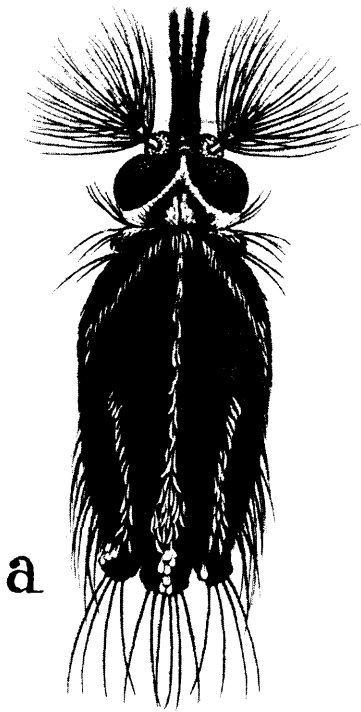


FIGURE 56 - Armigeres subalbatus

- a. Dorsal view of adult head and thorax
- b. Adult abdomen
- c. Pupa terminal segment and paddle
- d-i. Types and positions of larval hairs
- j. Comb teeth

FIGURE 56

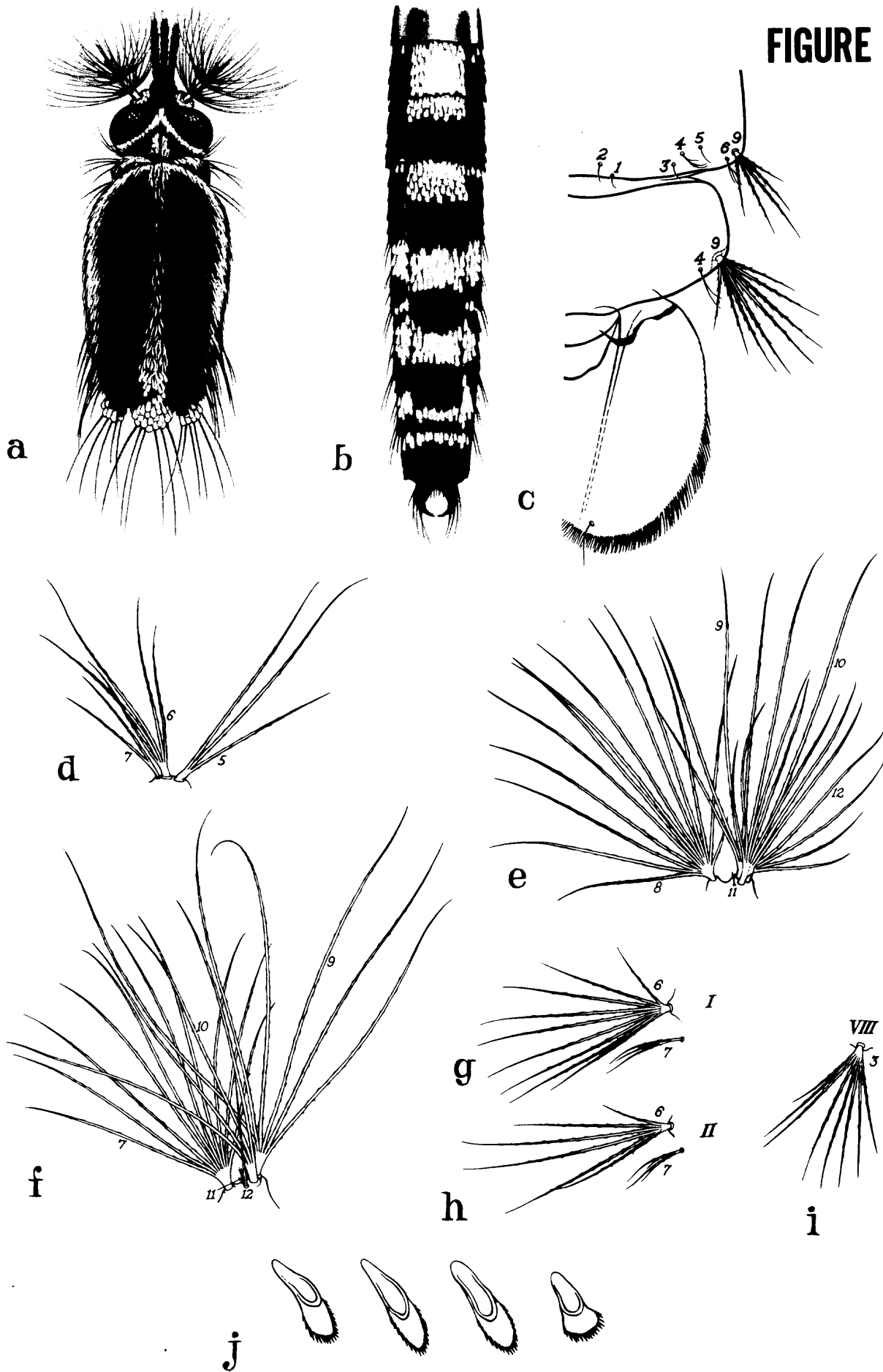
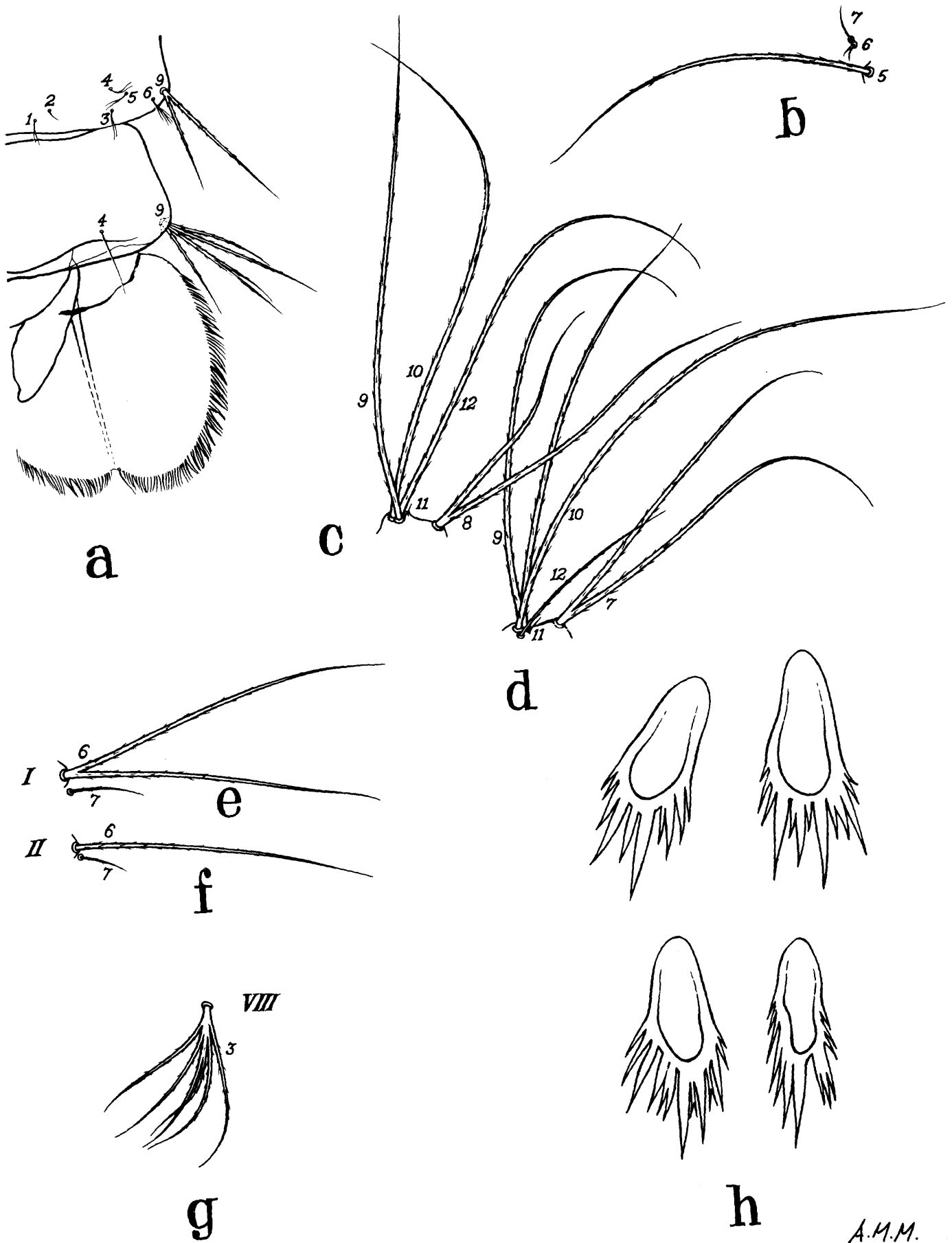


FIGURE 57 - Armigeres digitatus

- a. Pupa terminal segment and paddle
- b-g. Types and positions of larval hairs
- h. Comb teeth

FIGURE 57



A.M.M.

FIGURE 58 - Armigeres magnus

- a. Pupal terminal segment and paddle
- b-g. Types and positions of larval hairs
- h. Comb teeth

FIGURE 58

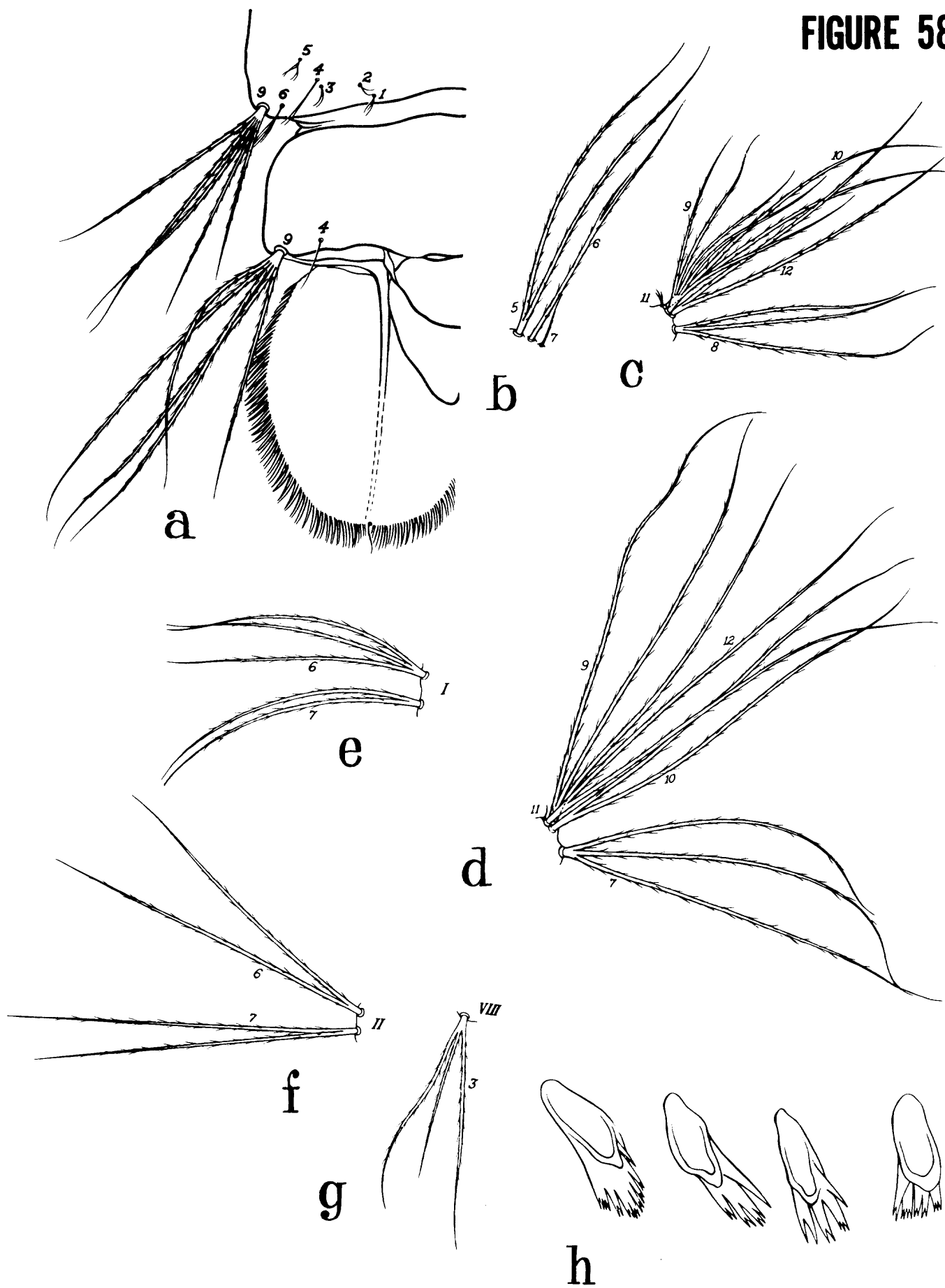


FIGURE 59 - Amigeres flavus

- a. Pupal terminal segment and paddle
- b-g. Types and positions of larval hairs
- h. Comb teeth

FIGURE 59

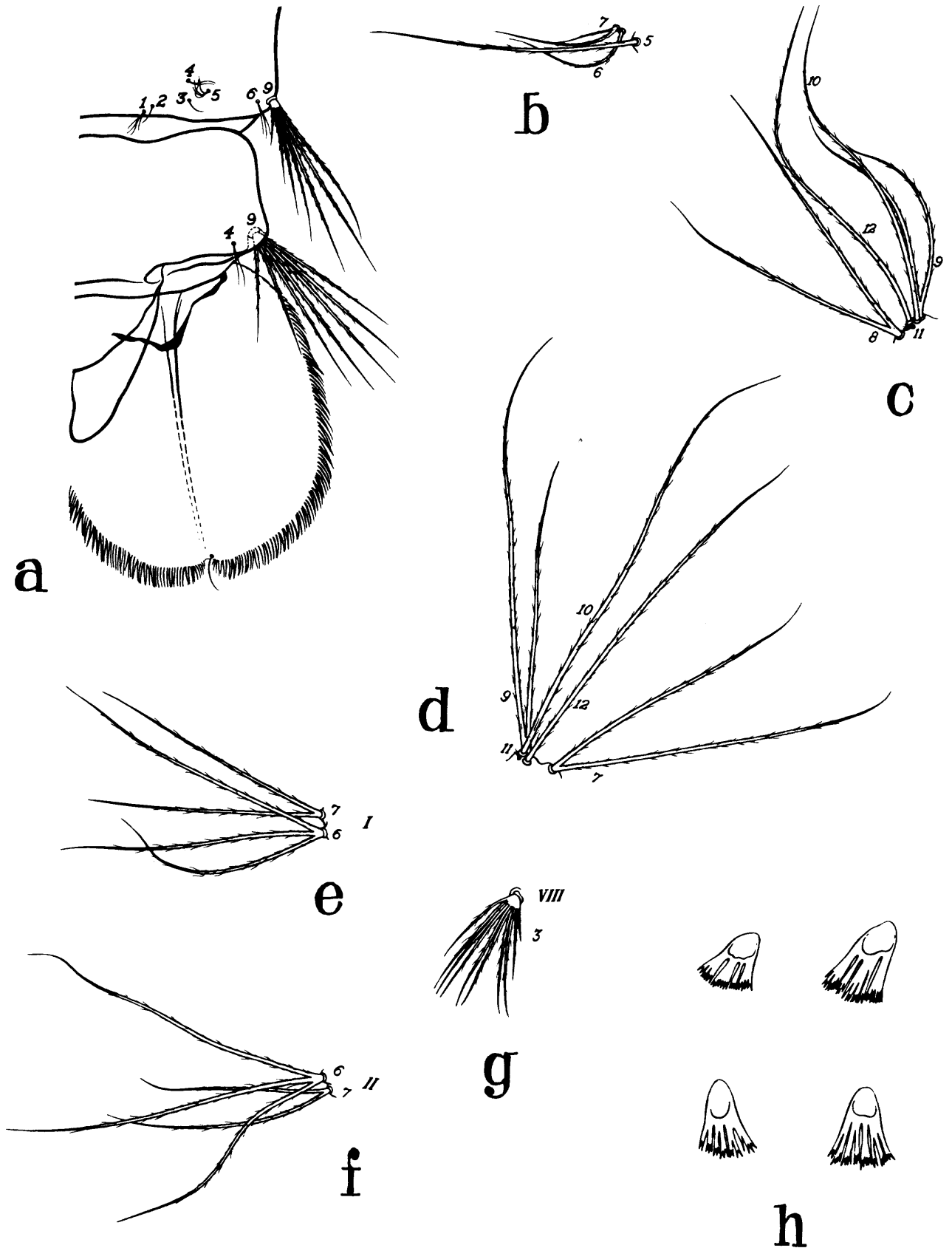


FIGURE 60 - Culex annulus

- a. Right half of larval head
- b. Terminal segment of larva showing
 - b-1. Comb teeth
 - b-2. Pecten teeth
- c. Male phallosome

FIGURE 60

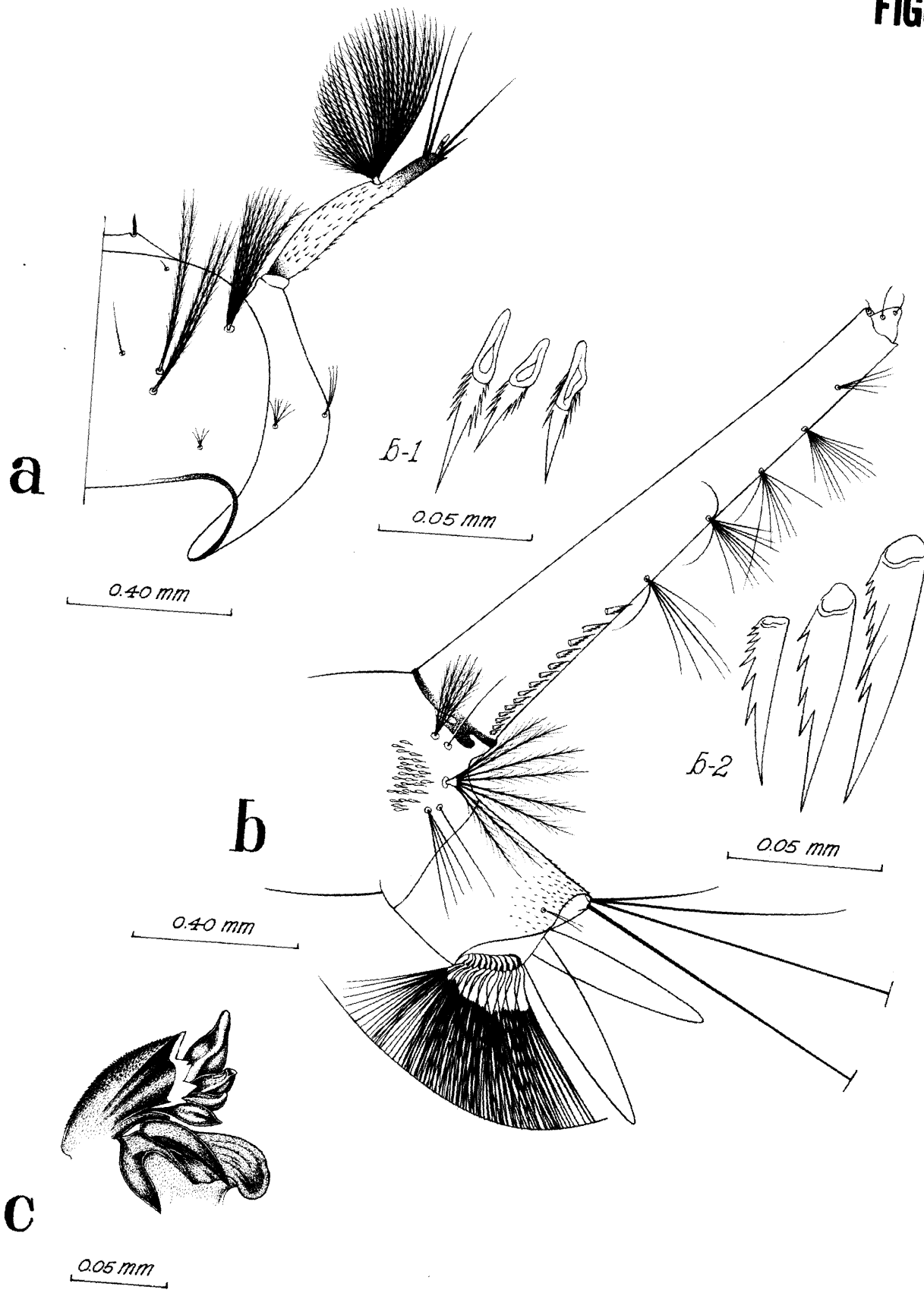


FIGURE 61 - Culex annulirostrus

- a. Right half of larval head
- b. Terminal segment of larva showing
 - b-1. Comb teeth
 - b-2. Pecten teeth
- c. Part of Wing showing scaling pattern
- d. Male phallosome

FIGURE 61

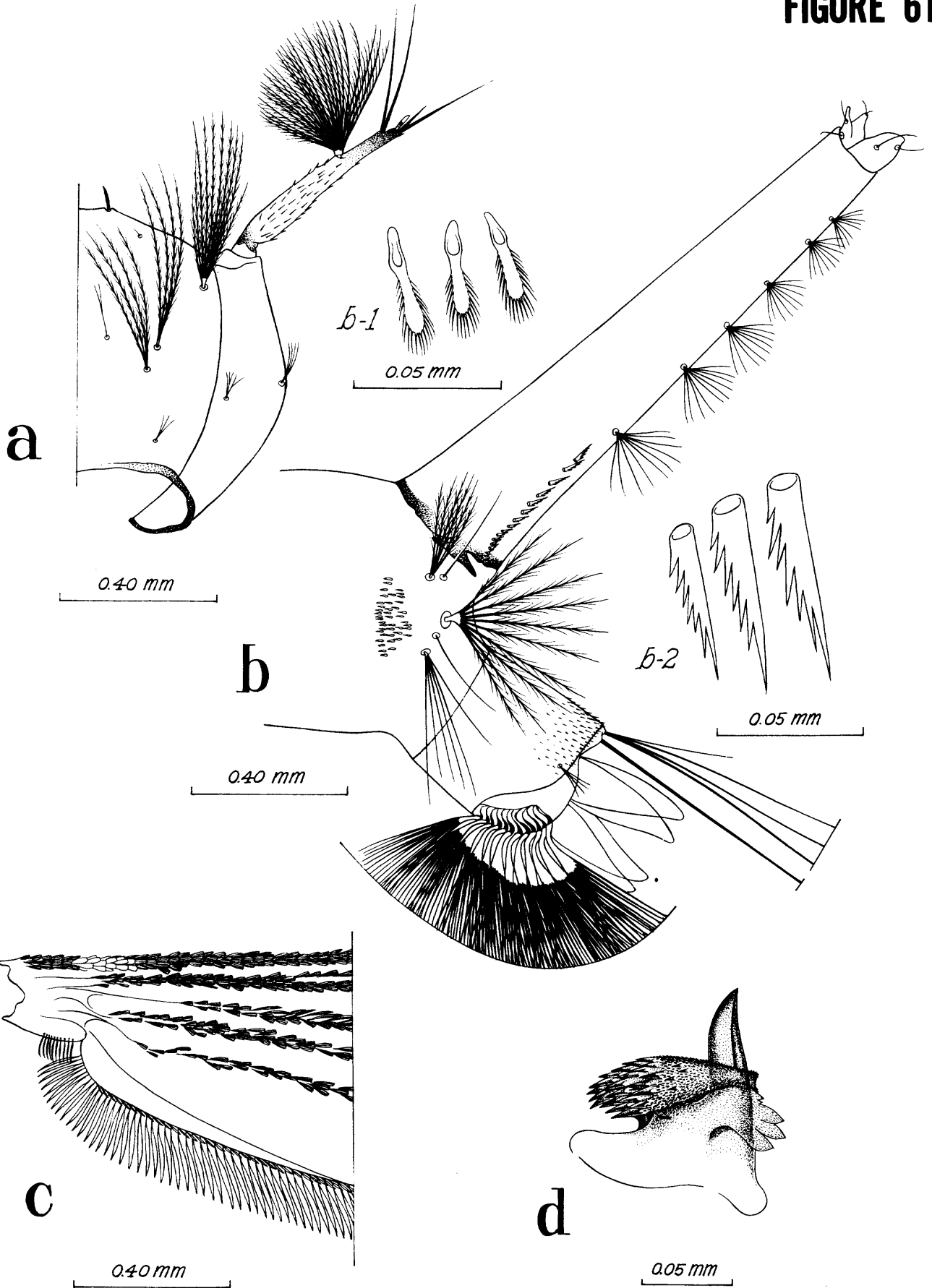


FIGURE 62 - Culex bitaeniorhynchus

- a. Right half of larval head
- b. Terminal segment of larva showing
 - b-1. Pecten teeth
 - b-2. Comb teeth

FIGURE 62

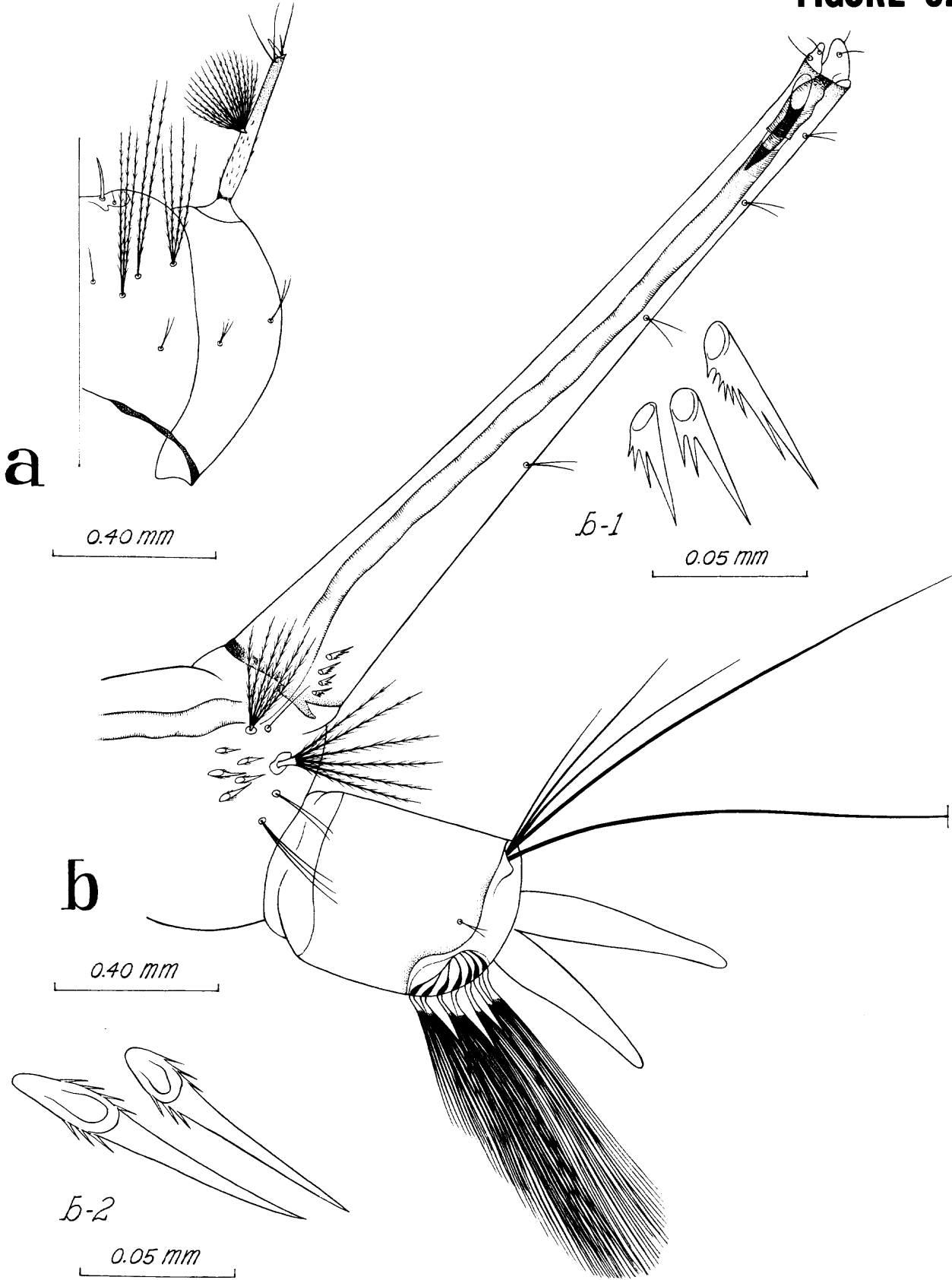


FIGURE 63 - Culex bitaeniorhynchus

- a. Head showing banding of proboscis and palpus
- b. Wing
- c. Legs
- d. Respiratory trumpet (pupa)
- e. Metanotal hairs (pupa)
- f. Pupa terminal segment and paddle
- g-h. Parts of male terminalia

FIGURE 63

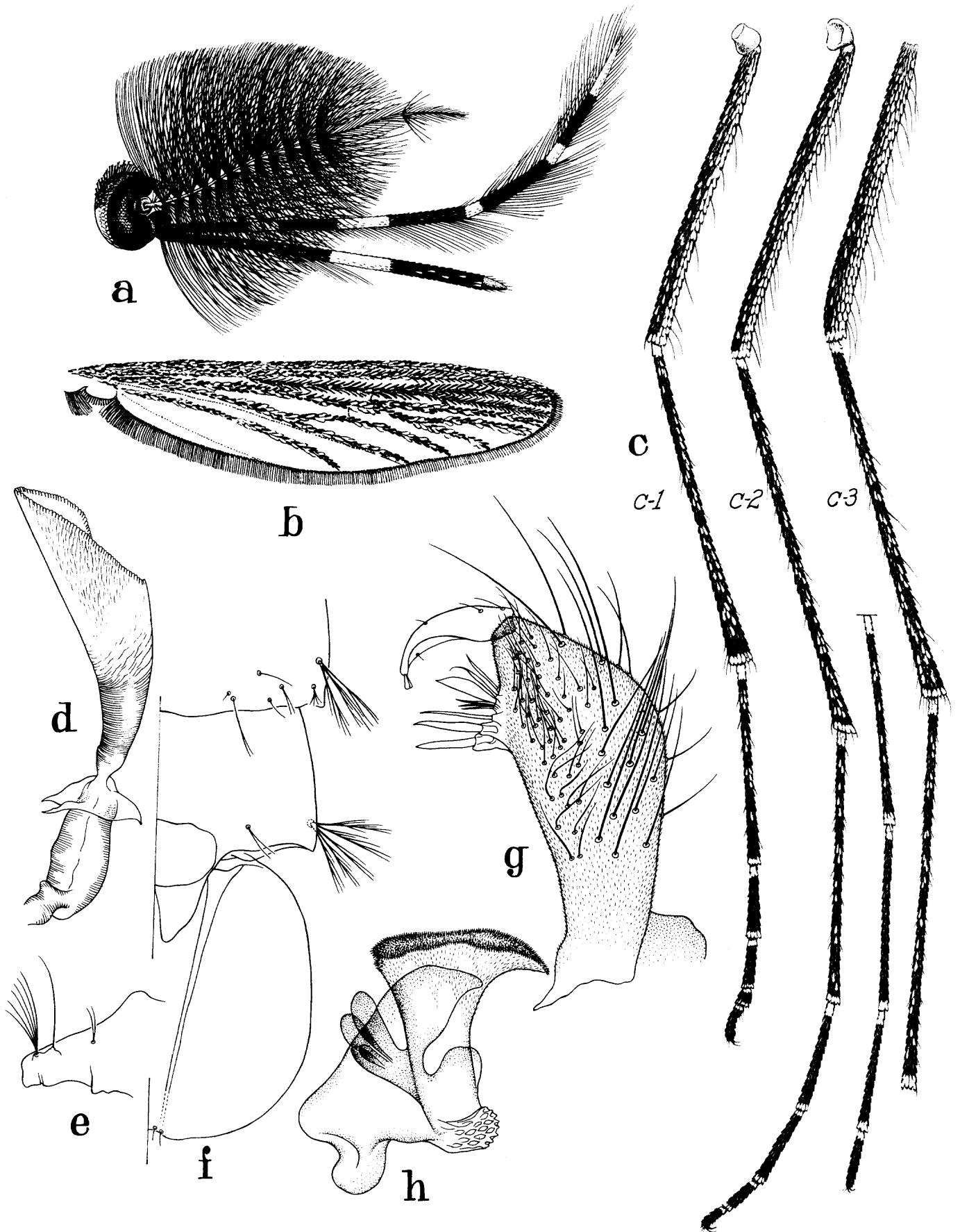


FIGURE 64 - Culex incognitus

- a. Right half of larval head
- b. Terminal segment of larva showing
 - b-1. Comb teeth
 - b-2. Pecten teeth
- c. Part of wing showing scaling pattern
- d. Male phallosome

FIGURE 64

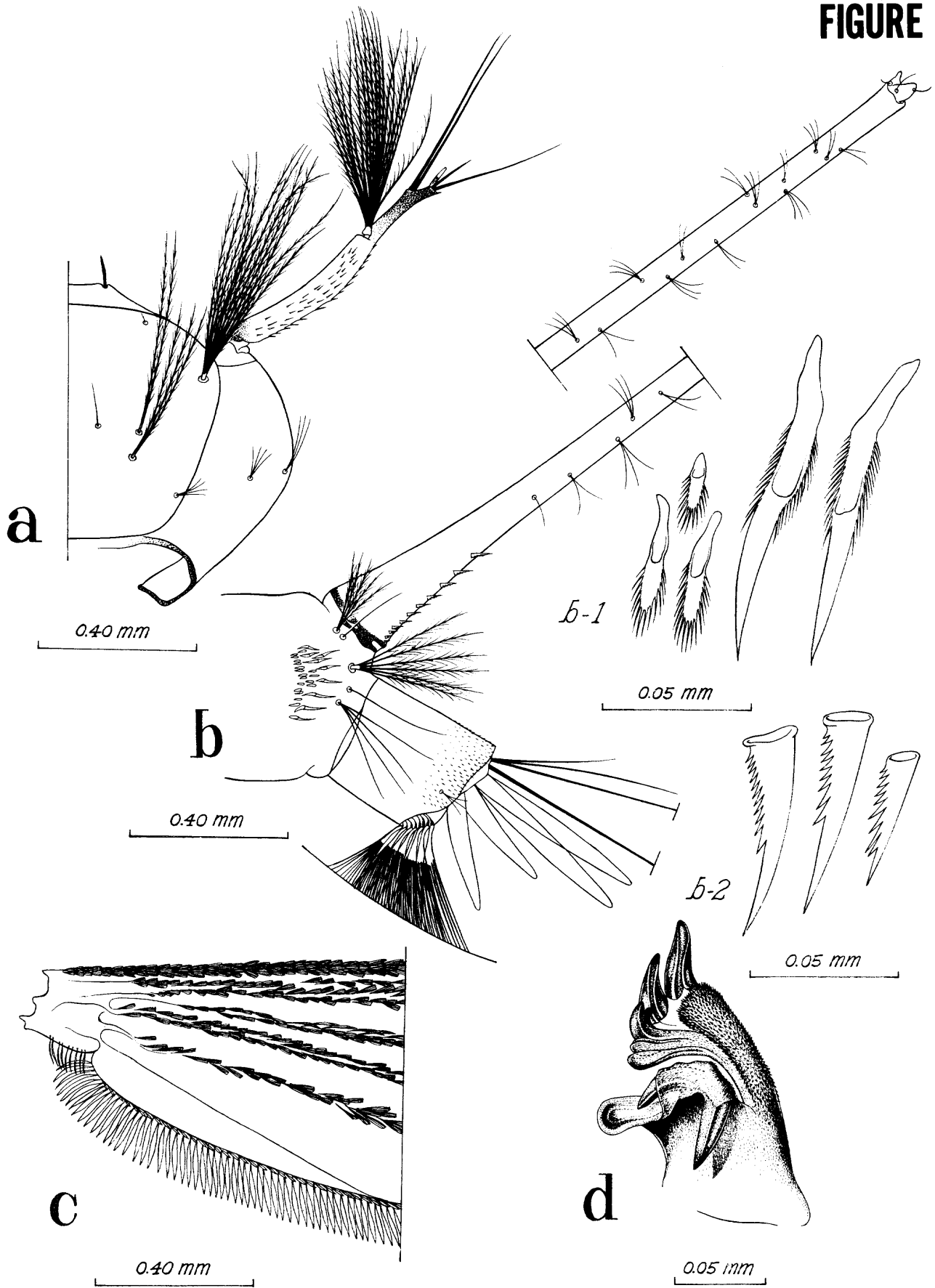
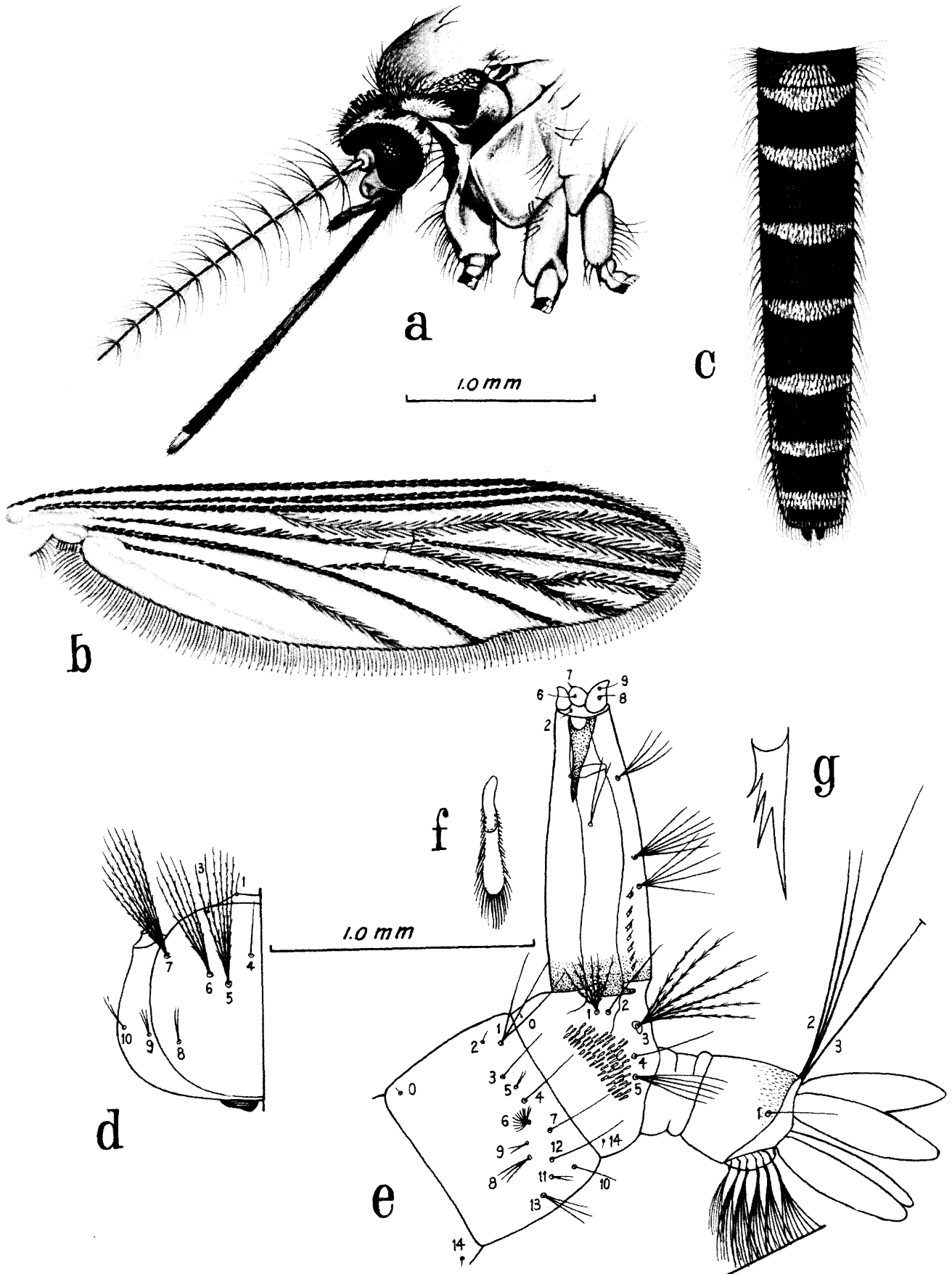


FIGURE 65 - Culex quinquefasciatus

- a. Lateral view of adult head and thorax
- b. Wing
- c. Adult abdomen
- d. Left half of larval head
- e. Terminal segment of larva
- f. Comb teeth
- g. Pecten teeth

FIGURE 65

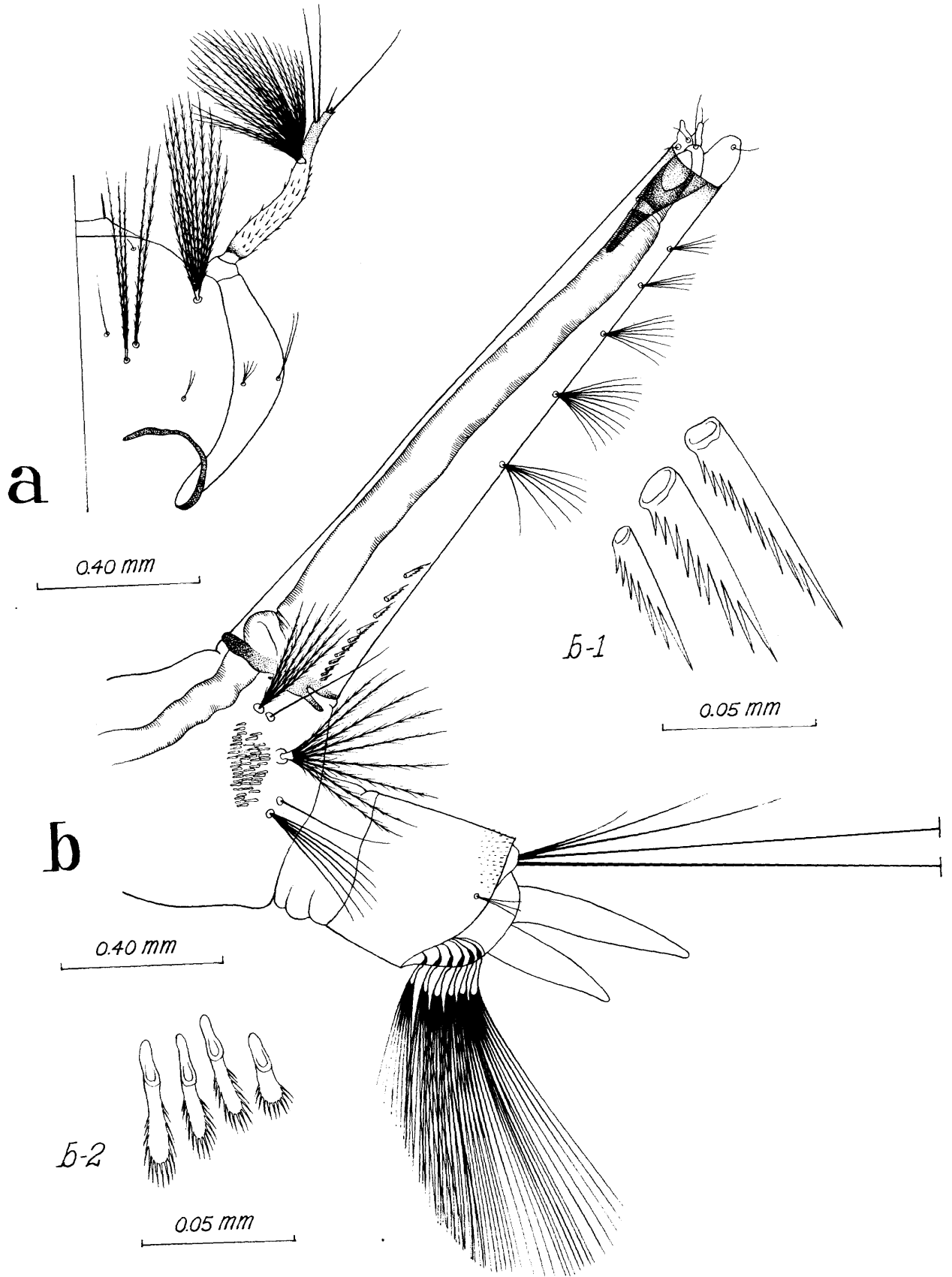


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FIGURE 66 - Culex tritaeniorhynchus summosus

- a. Right half of larval head
- b. Terminal segment of larva showing
 - b-1. Pecten teeth
 - b-2. Comb teeth

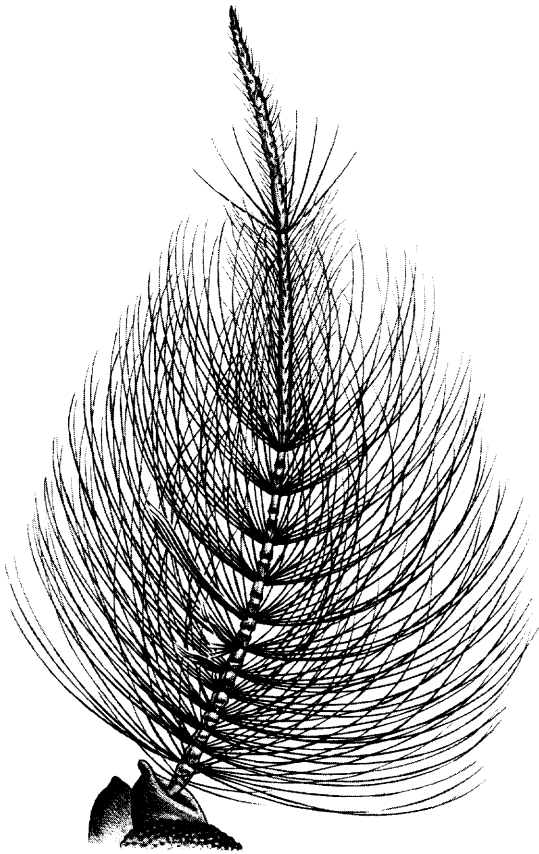
FIGURE 66



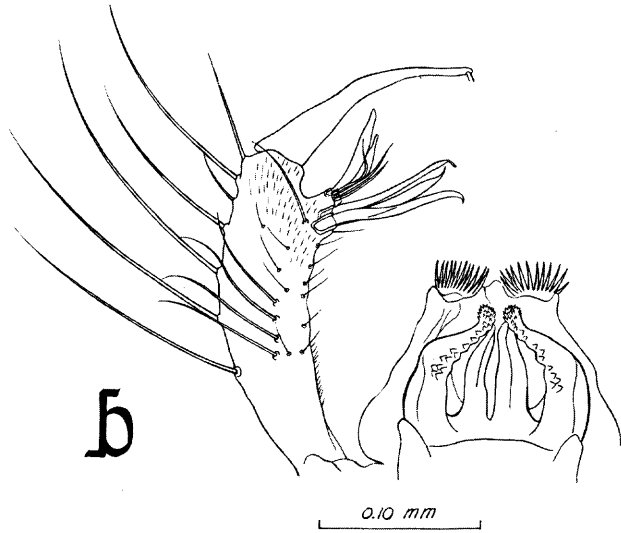
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FIGURE 67 - Culex lavatae

- a. Male antenna
- b. Left half of male terminalia
- c-1. Respiratory trumpet (pupa)
- c-2. Metanotal hairs (pupa)
- c-3. Left half of terminal segments and paddle
- d. Larval parts showing terminal segment and right half of larval head

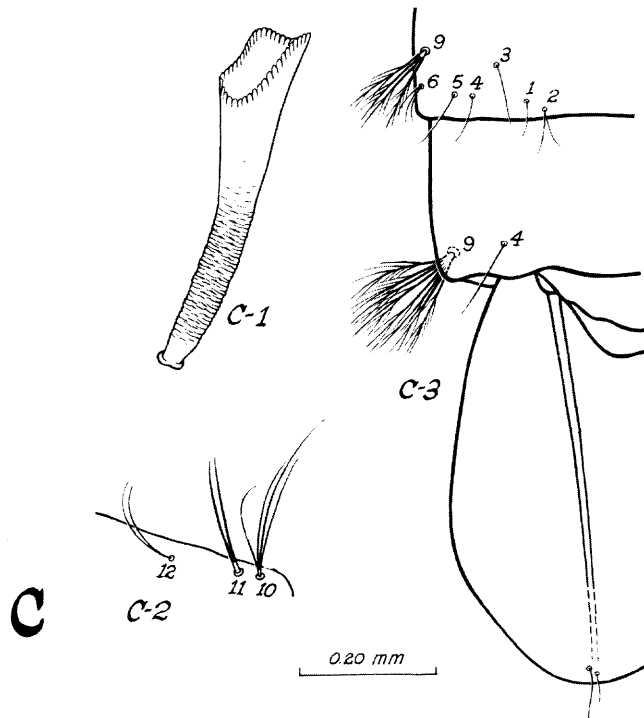


a



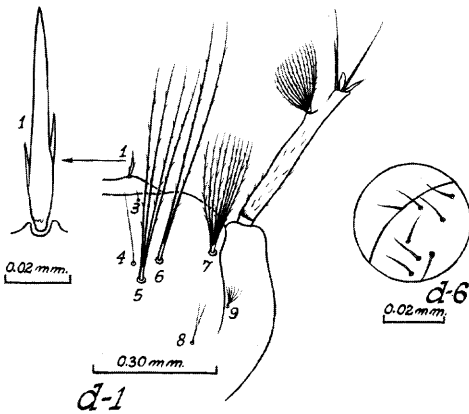
b

0.10 mm



c

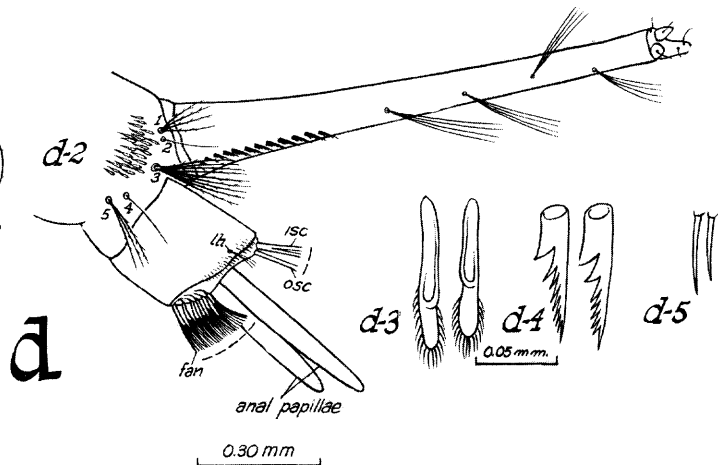
0.20 mm



d-1



d-6



d

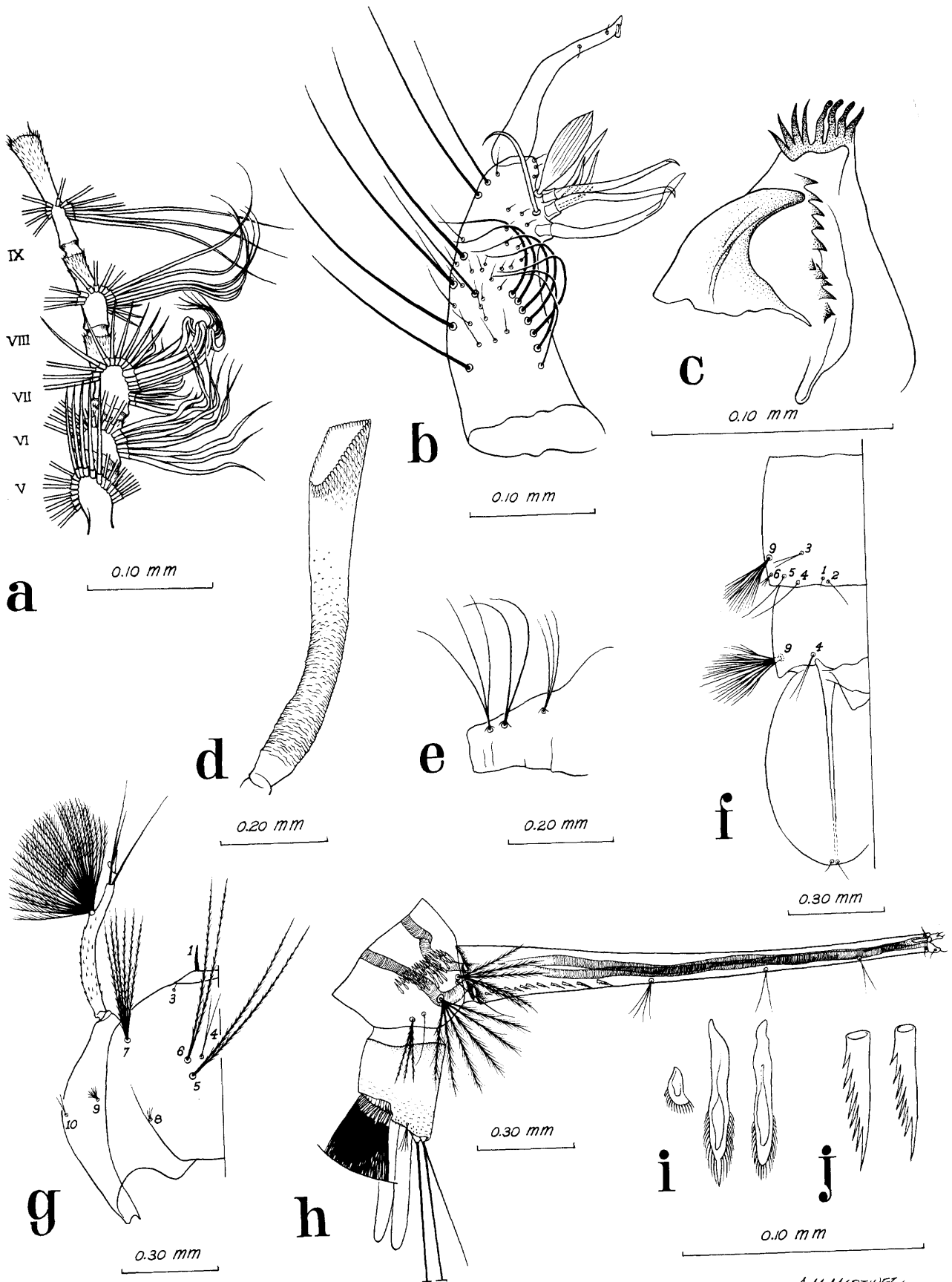
0.30 mm

0.05 mm

FIGURE 68 - Culex minor

- a. Male antennae
- b. Left portion of male terminalia
- c. Male phallosome
- d. Respiratory trumpet (pupa)
- e. Metanotal hairs (pupa)
- f. Left half of pupa terminal segments and paddle
- g. Left half of larval head
- h. Terminal segment of larva
- i. Comb teeth
- j. Pecten teeth

FIGURE 68



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FIGURE 69 - Culex uniformis

a-b. Male antenna

c-d. Parts of larva showing types and positions of hairs; terminal segments showing comb scales and pectin teeth; right half of larval head; and thorax showing types and positions of thoracic hairs

FIGURE 69

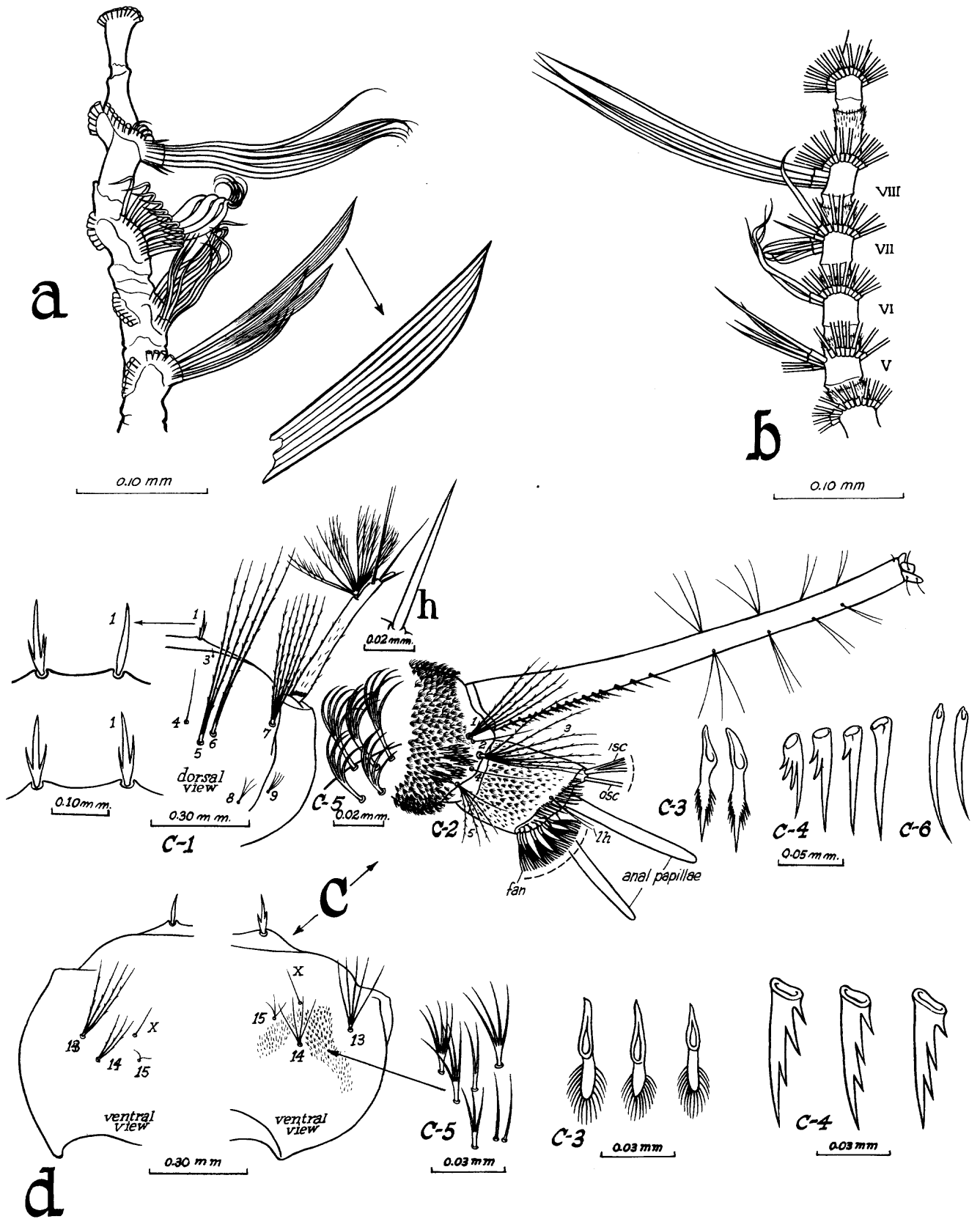


FIGURE 70 - Culex laureli

- a-d. Male terminalia
- e. Respiratory trumpet (pupa)
- f. Metanotal hairs (pupa)
- g. Left half of larval head
- h. Terminal segment of larva
- i. Comb teeth
- j. Pecten teeth

FIGURE 70

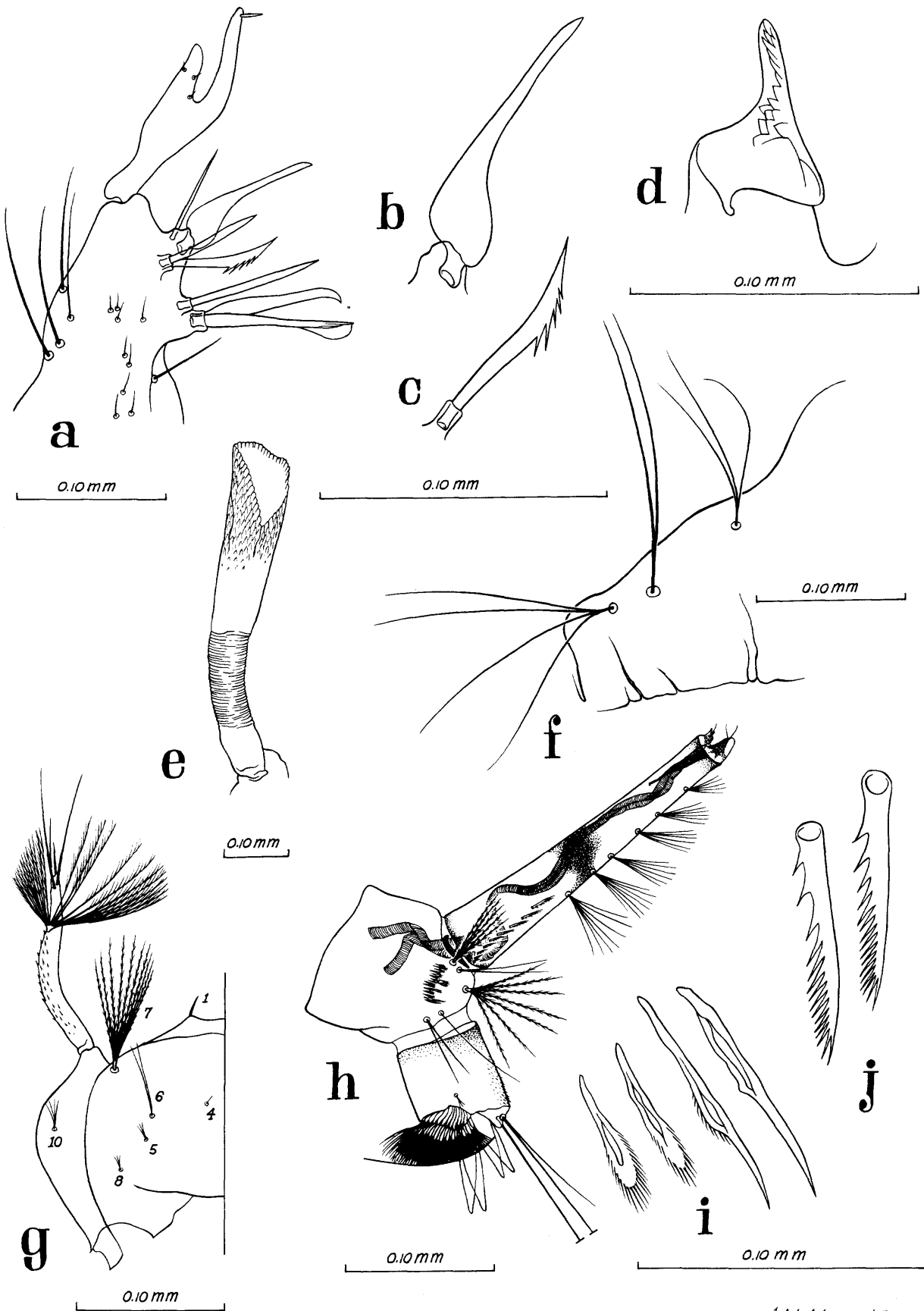


FIGURE 71 - Hodgesia malayi

- a. Left half of larval head
- b. Terminal segments of larva showing
 - b-1. Pecten teeth
 - b-2. Comb teeth
- c. Respiratory trumpet (pupa)
- d. Metanotal hairs (pupa)
- e. Right half of pupa terminal segment and paddle

FIGURE 71

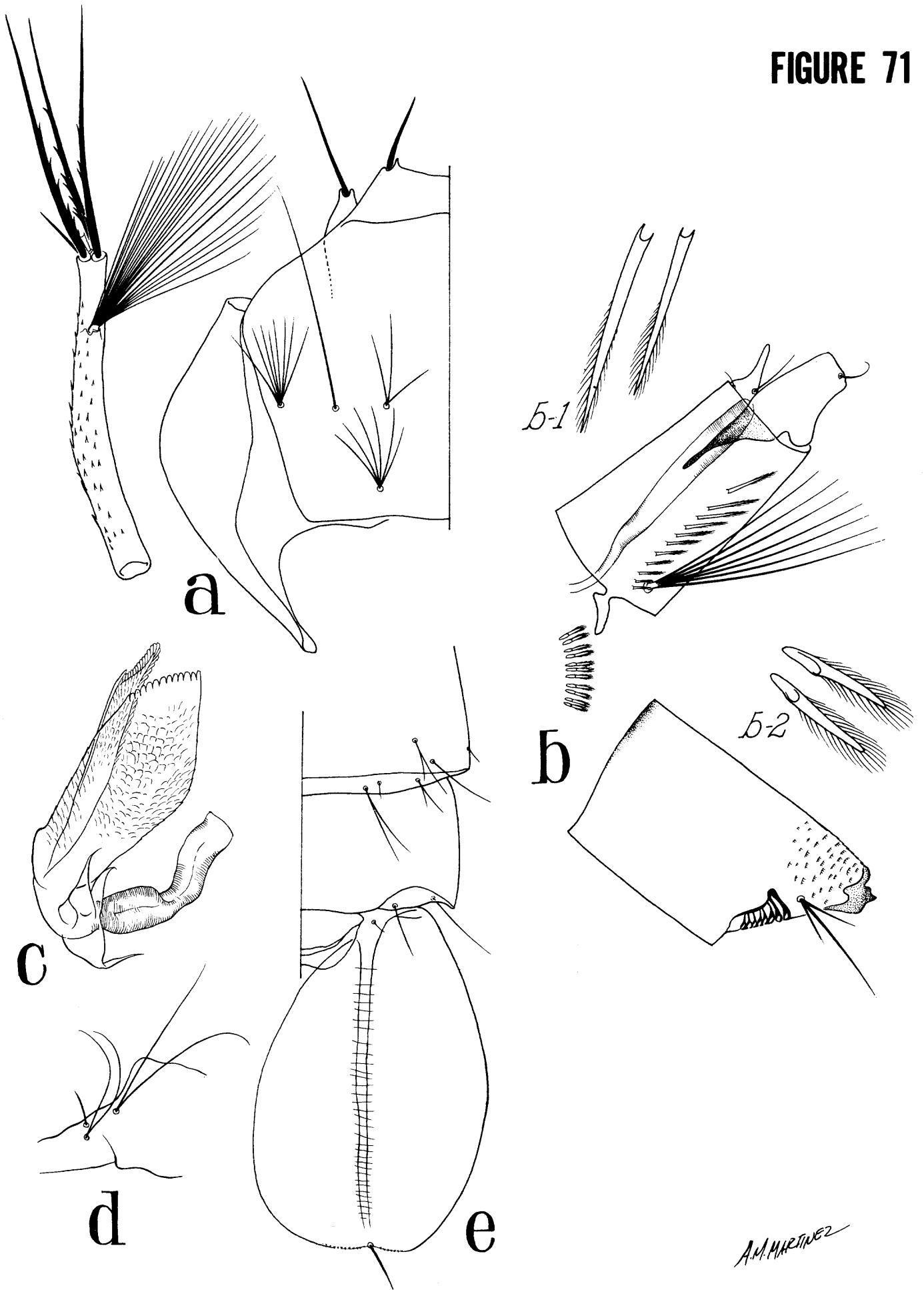


FIGURE 72 - Malaya genurostris

- a. Claspette
- b. Proboscis
- c. Terminal segment of larva showing
comb teeth and pecten teeth

FIGURE 72

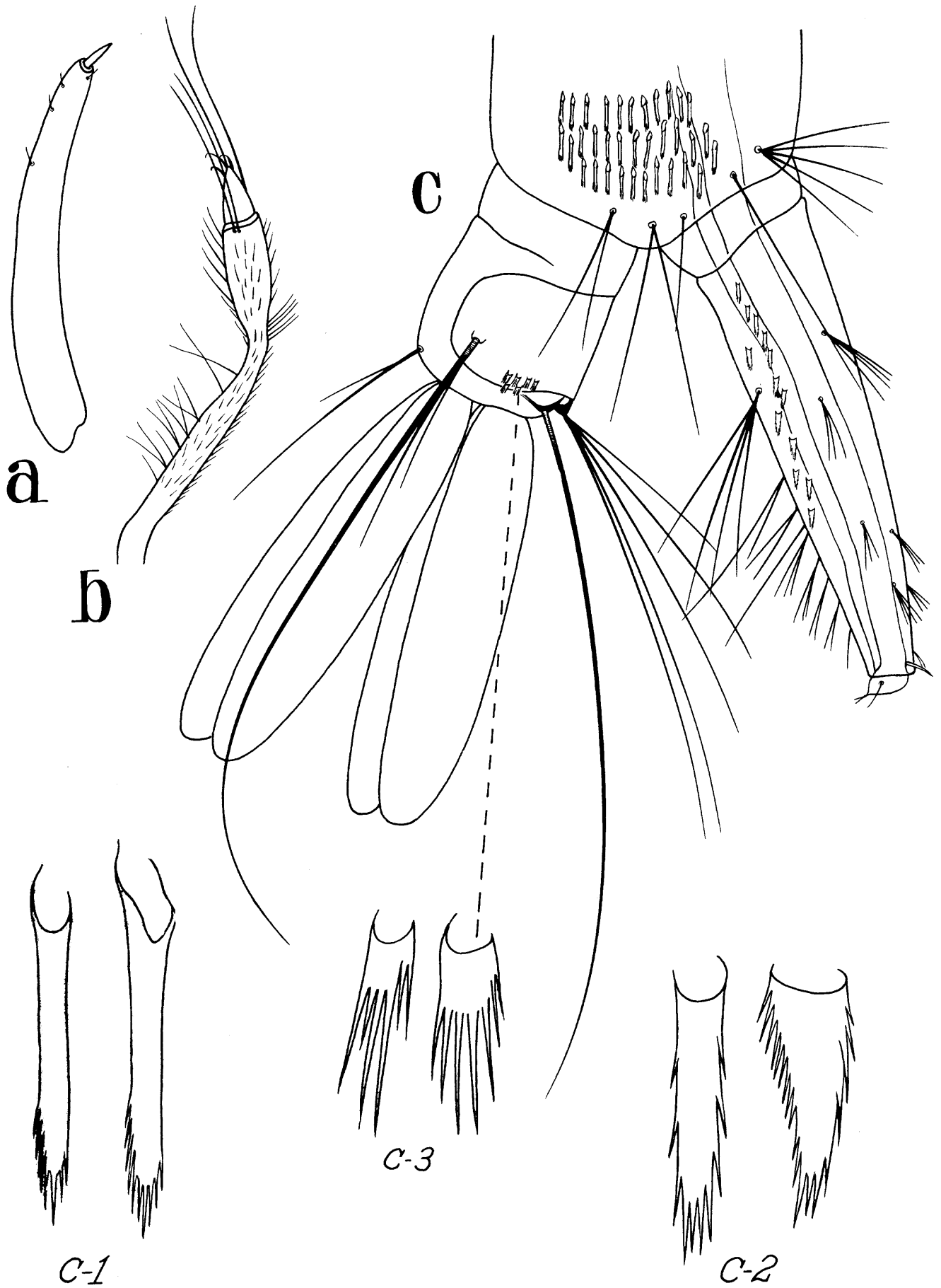
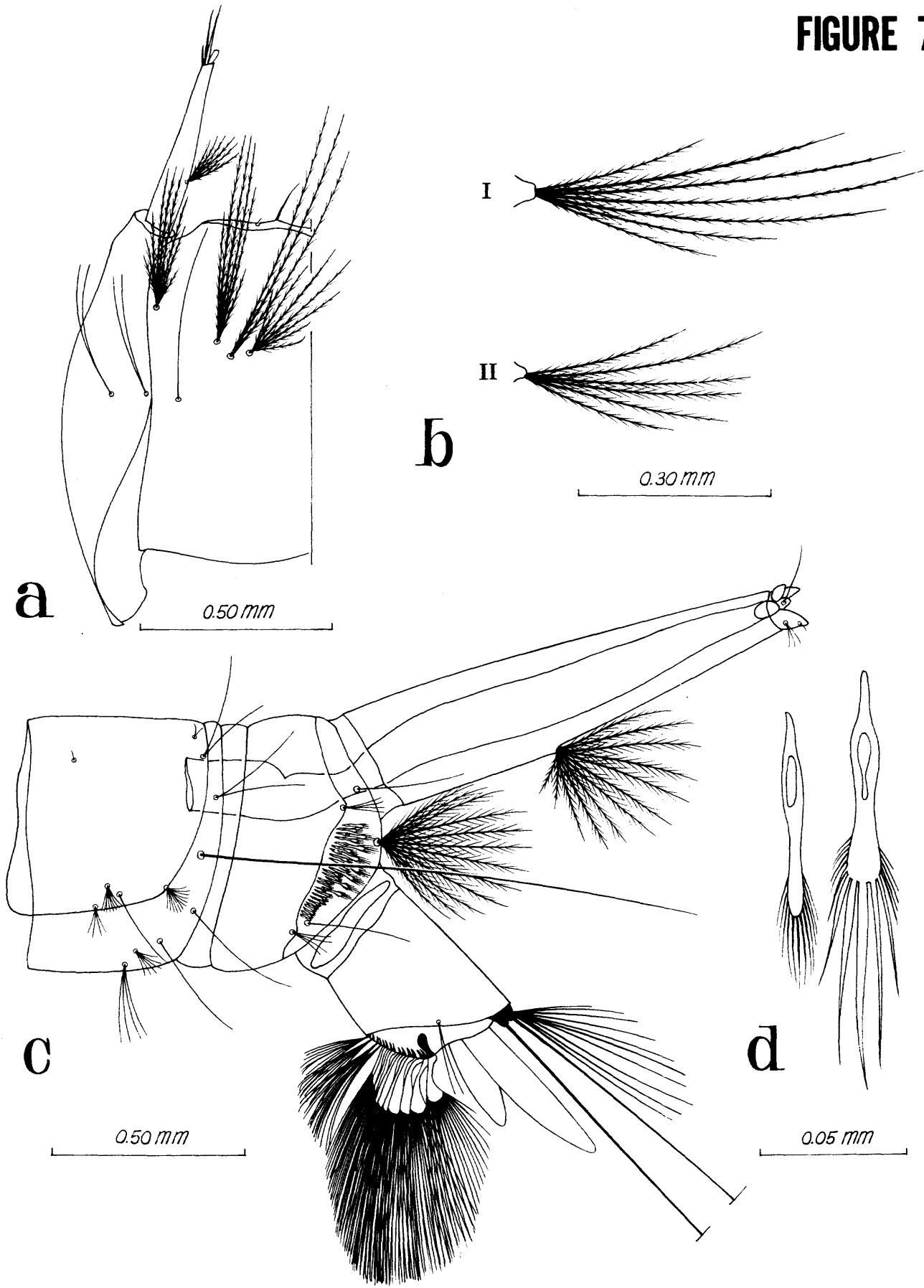


FIGURE 73 - Orthopodomyia anopheloides

- a. Left half of larval head
- b. Hairs of abdominal segments I - II
- c. Terminal segments of larva
- d. Comb scales

FIGURE 73

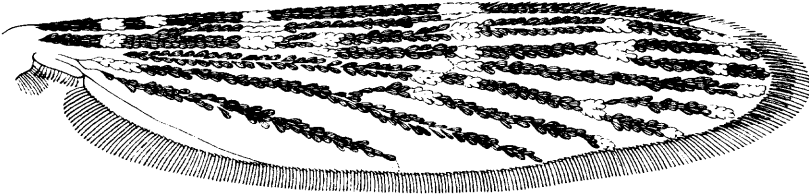


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FIGURE 74 - Orthopodomyia anopheloides

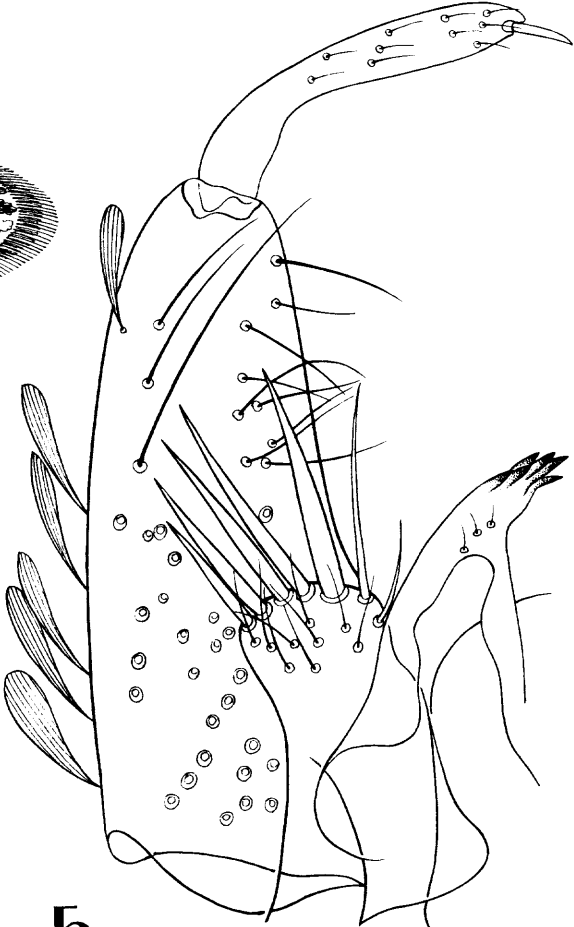
- a. Wing
- b. Left half of male terminalia
- c. Left half of pupa terminal segments and paddle
- d. Respiratory trumpet (pupa)
- e. Metanotal hairs (pupa)

FIGURE 74



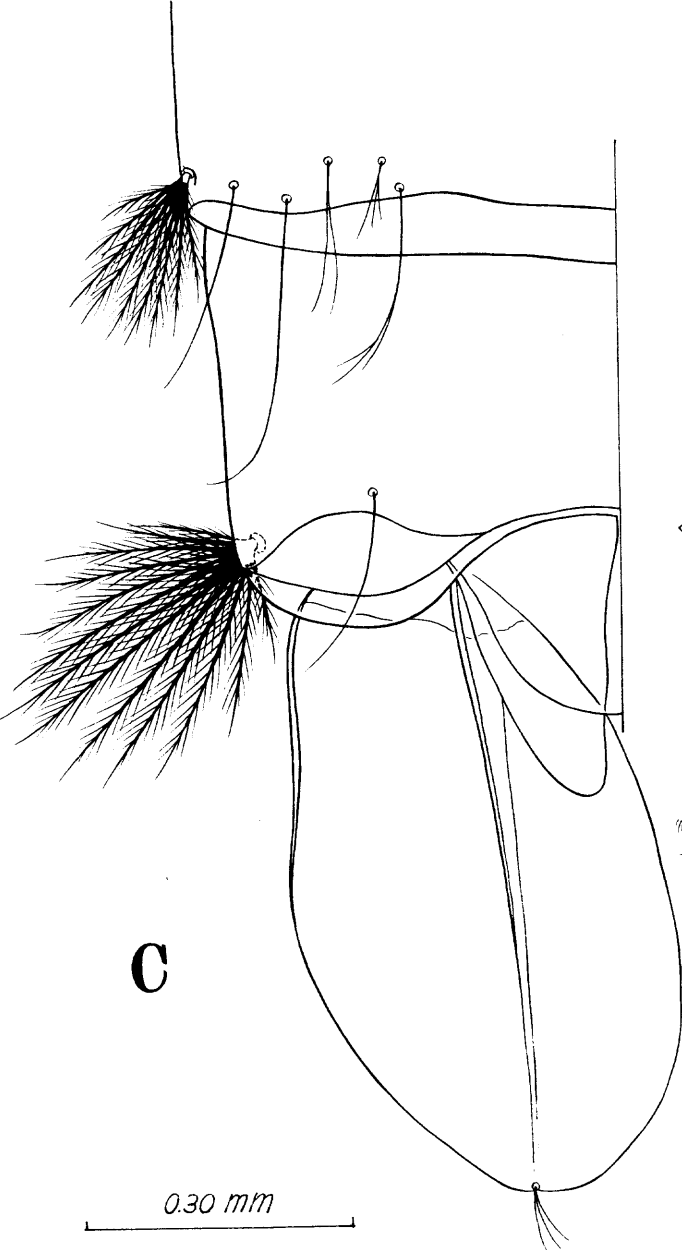
a

1.0 mm



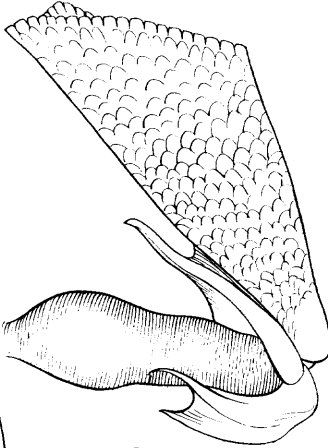
b

0.10 mm

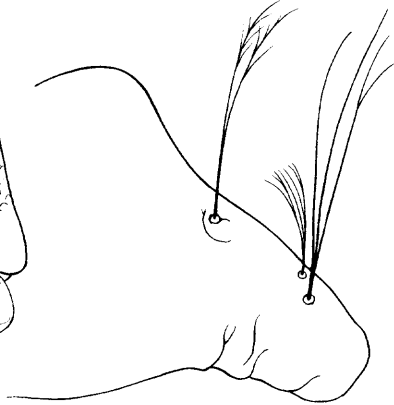


c

0.30 mm



d



e

0.30 mm

FIGURE 75 - Topomyia barbuis
Topomyia pseudobarbus

- a. Left half of T. barbuis larval head
- b. Terminal segments of T. barbuis larva showing:
 - b-1 Comb scales
 - b-2 Pecten teeth
 - b-3 Saddle teeth
- c. Parts of I. barbuis immatures showing trumpet, paddle, types and positions of larval and pupal hairs
- d-e. Parts of I. barbuis male terminalia
- f-g. Parts of I. pseudobarbus male terminalia

FIGURE 75

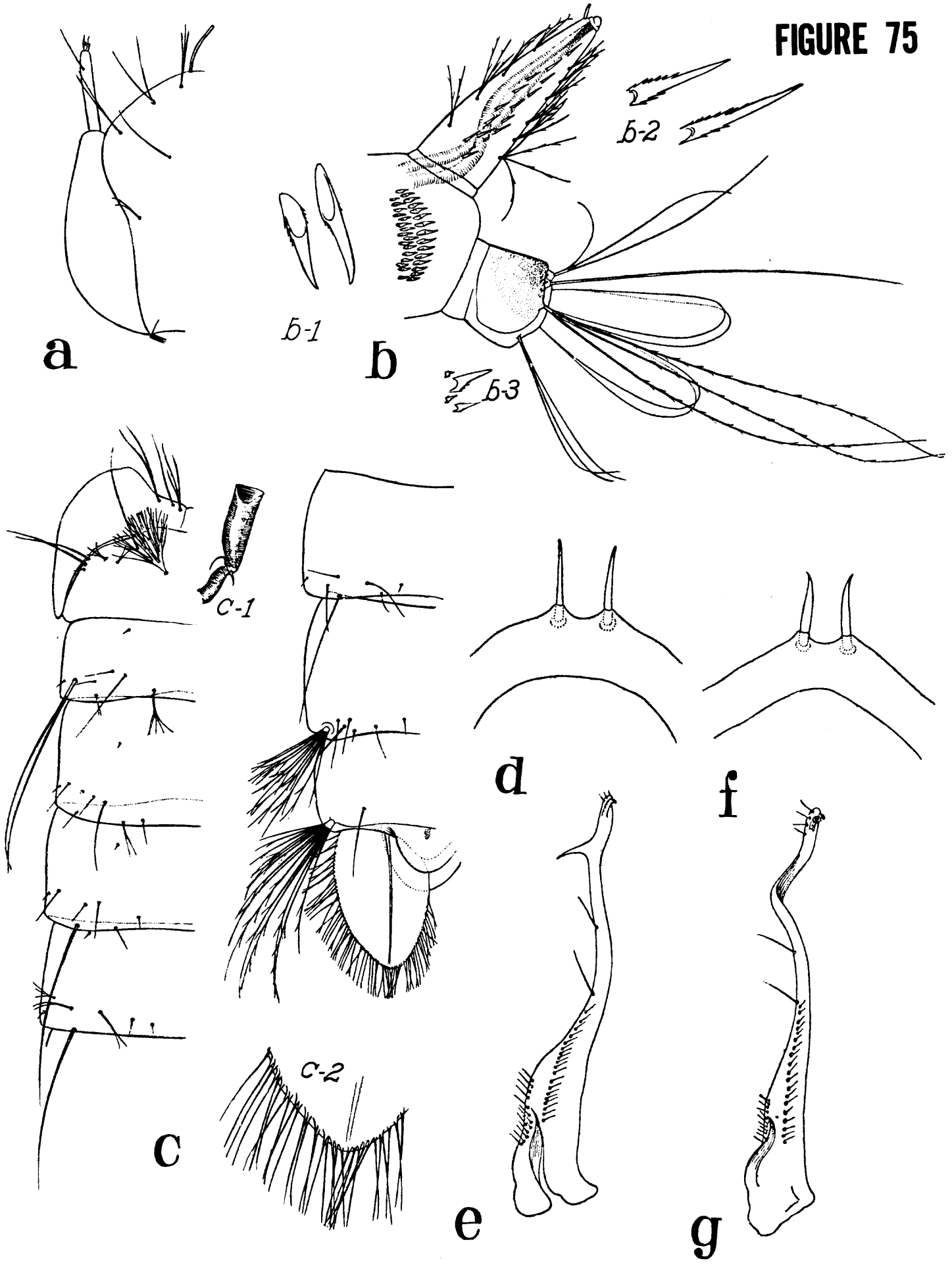


FIGURE 76 - Tripteroides dyari

a. Larval antenna

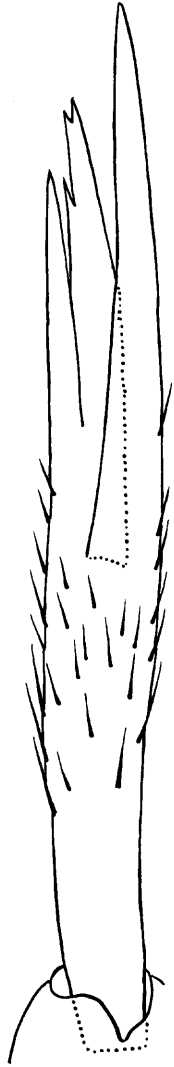
b-f. Parts of male terminalia

FIGURE 76

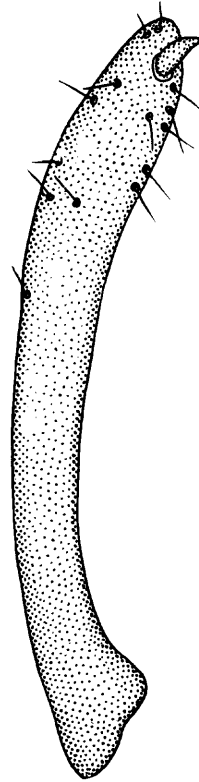


a

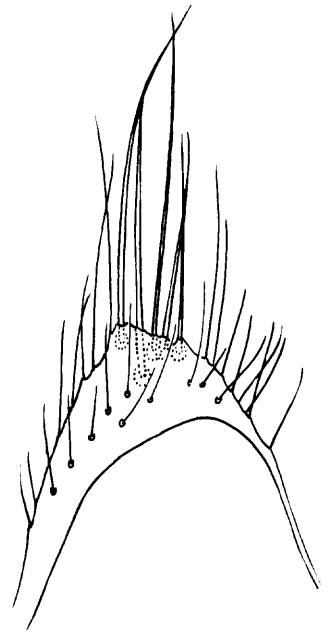
1



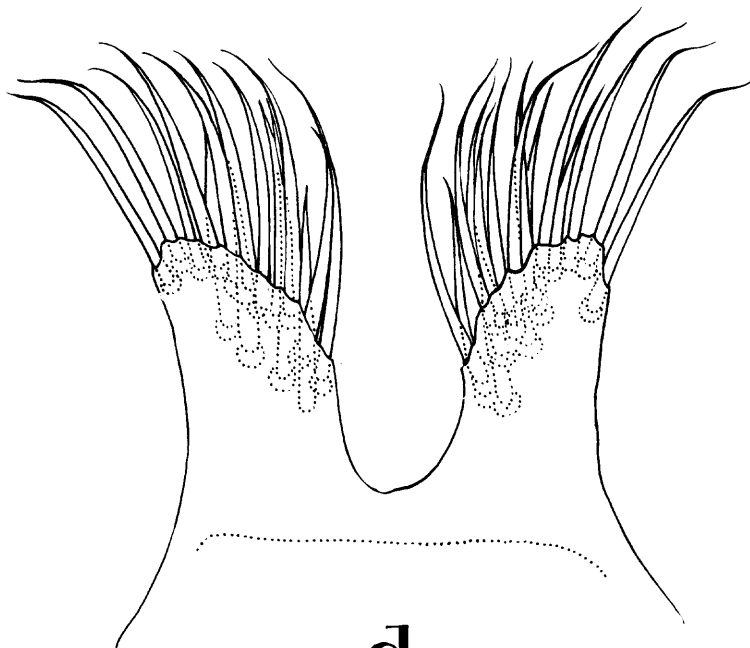
2



b



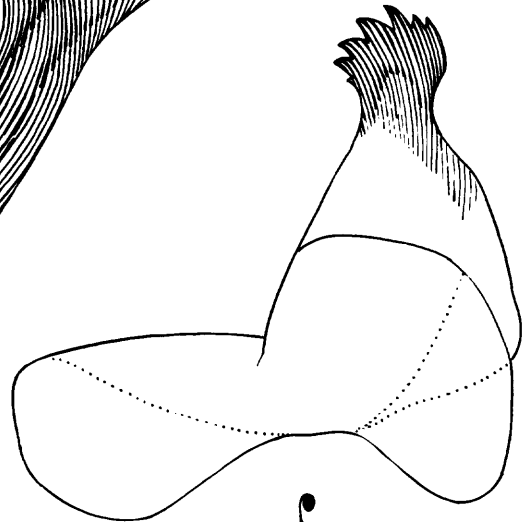
c



d



e



f

FIGURE 77 - Uranotaenia annandalei
Uranotaenia arguellesi

- a. U. annandalei showing left half of larval head, terminal segments of larva, pupal paddle and male terminalia
- b. U. arguellesi showing left half of larval head, terminal segments of larva, pupal paddle and trumpet, and left half of male terminalia

FIGURE 77

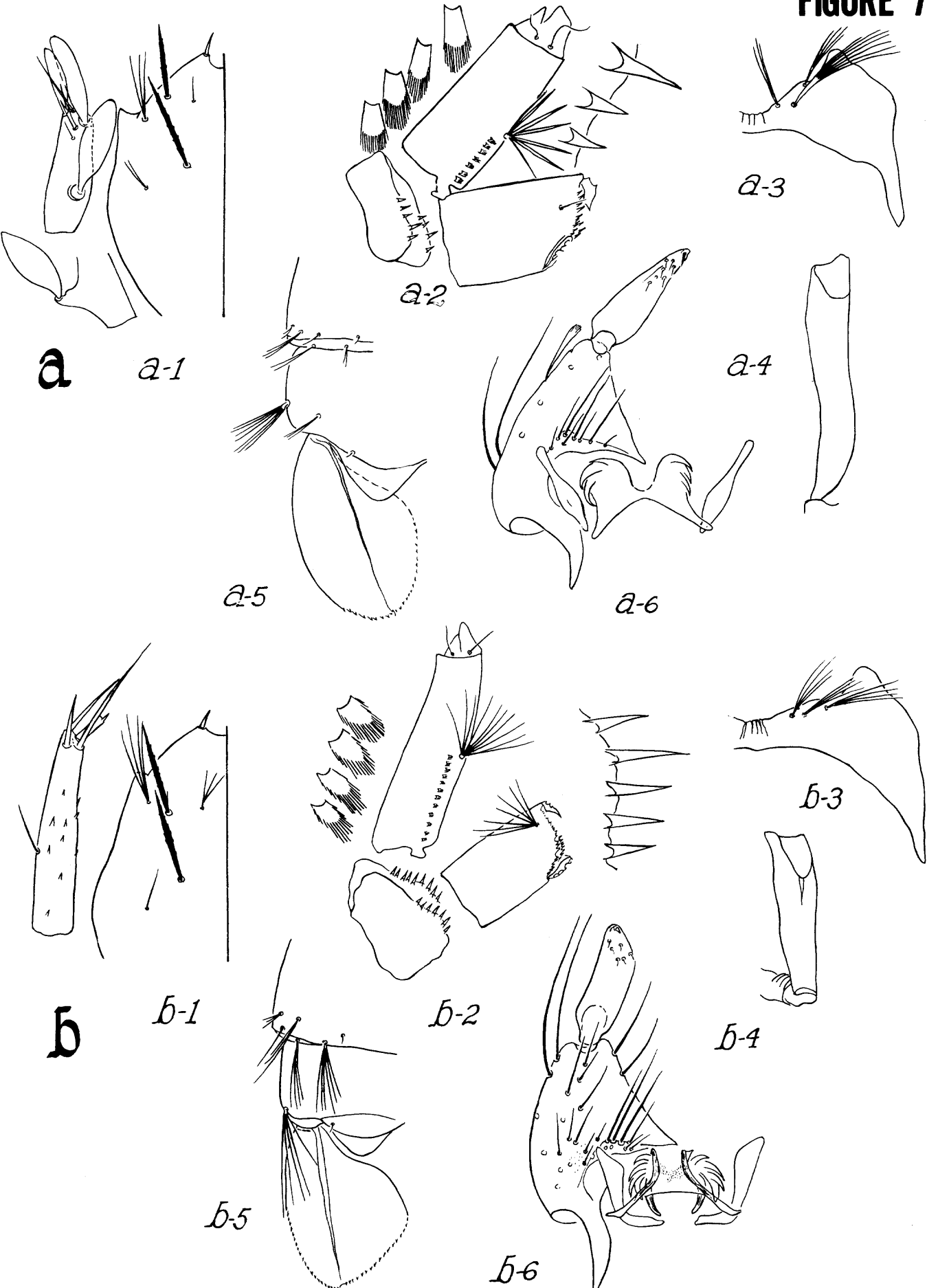


FIGURE 78 - Uranotaenia lateralis

- a. Left half of larval head showing antenna
- b. Left half of larval thorax and abdominal segments showing types and positions of hairs
- c. Terminal segments of larva showing
 - C-1. Comb scale
 - C-2. Pecten tooth
- d. Respiratory trumpet (pupa)
- e. Metanotal hairs (pupa)
- f. Pupa terminal segments with paddle
- g. Left half of male terminalia

FIGURE 78

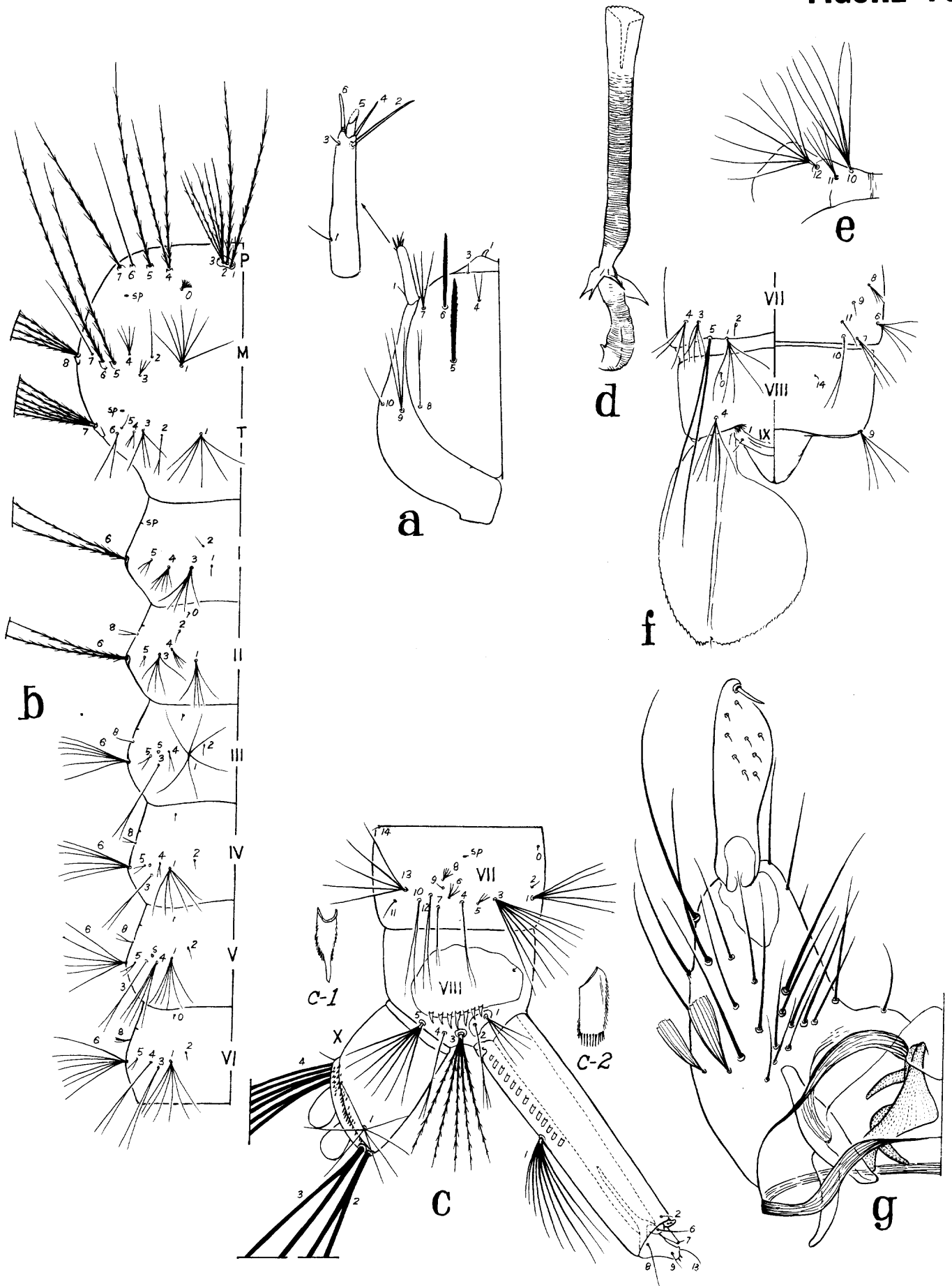


FIGURE 79 - Uranotaenia lagunensis
Uranotaenia mendiolai
Uranotaenia testacea

- a. U. lagunensis showing left half of larval head, terminal segments of larva, and left half of male terminalia
- b. U. mendiolai showing left half of larval head, terminal segments of larva, respiratory trumpet and pupal paddle, and left half of male terminalia
- c. U. testacea showing left half of larval head; terminal segments of larva; pupa trumpet; pupa terminal segments and paddle; and left half of male terminalia

FIGURE 79

