

Div. Insects  
U.S. Nat. Mus.

ENTOMOLOGY.—*The Aedes (Mucidus) mosquitoes of the Pacific (Diptera: Culicidae).*<sup>1</sup> KENNETH L. KNIGHT, Lt. Commander, H(S), U.S.N.R. (Communicated by R. E. BLACKWELDER.)

The subgenus *Mucidus* is distinguished by the following characters: Wing membrane surrounding the cross veins clouded; palpi of male longer than proboscis, segments IV–V declined, tip of III and all of IV with many very long ventrolateral hairs, V with hairs but these sparser and shorter; male mesosome simple, not divided into lateral plates; claspettes present, with distinct articulated appendages; *ppn* bristles numerous (10–30); lower mesepimeral bristles present; eighth segment of female abdomen completely retractile, cerci long and narrow; larval mouth parts modified for predacity, the mouth brushes forming matted tufts of serrate-tipped rods, the mandibular teeth very large and strong; and larval ventral brush extending the complete length of the anal segment. Members of the subgenus occur in the Tropics of the Ethiopian, Oriental, and Australasian Regions.

The subgenus has been divided by Edwards (1932) into two groups: Group A (*Mucidus*) and Group B (*Pardomyia*) (see keys for separation points). Group B does not occur in the Ethiopian Region. The subgenus contains the following species and subspecies: Group A: *alternans* (Westwood), *grahami* (Theobald), *kermorganti* (Laveran),

*laniger* (Wiedemann), *mucidus* (Karsch), *nigerrimus* (Theobald), and *scatophagoides* (Theobald). In addition, a new species from the Philippines is described in this paper. Group B: *aurantius aurantius* (Theobald), *a. chrysogaster* (Taylor), *a. nigrescens* (Edwards), and *quadripunctis* (Ludlow).

In the species' synonymic tables that follow, all additional references containing important descriptive, biological, or distributional data are cited.

KEY TO ADULTS

1. Palpi of female over one-half as long as proboscis; scutum with twisted tufts of erect long white scales; about 20–30 *ppn* bristles, some along dorsal margin of *ppn*; general coloration white, yellow, and brown. . . . . (Group A. *Mucidus*) . . . . . 2
- Palpi of female barely one-fourth length of proboscis; scutal scales normal; about 10–16 *ppn* bristles, few or none along dorsal margin of *ppn*; general coloration golden, dark brown, and black. . . . . (Group B. *Pardomyia*) . . . . . 9
2. Tibia with the distal white band subapical; Australasian. . . . . 3
- Tibia with the distal white band apical; Ethiopian and Oriental. . . . . 4
3. Leg scales decumbent and appressed; New Caledonia. . . . . *kermorganti* (Laveran)
- Leg scales long and erected; Australasian. . . . . *alternans* (Westwood)
4. Fore and mid tibiae with a well-developed median white band (fore tibia with apical white band not occupying more than 0.25 of length of segment). . . . . 5
- Fore and mid tibiae without a median white band (occasionally a few pale scales present however). . . . . 6
5. Tarsal segment I with distinct basal and median white bands; fore and mid tarsal segments II–III (and often IV–V) with basal white bands; Ethiopian and Oriental . . . . . *scatophagoides* (Theobald)
- Tarsal segment I with only a narrow basal

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- white band; tarsal segments II-V un-  
banded; Philippines. . . . . *ferinus*, n. sp.
6. Second hind tarsal segment brown, sometimes  
a few scattered white scales along its  
length (hind tarsal segment all  
white except narrowly at apex); tarsal  
segment . . . . . *laniger* (Wiedemann)  
Second hind tarsal segment with at least a  
distinct basal white band; Ethiopian. . . . . 7
7. Second and third hind tarsal segments only  
rather narrowly white at base; costa  
largely yellow. . . . . *mucidus* (Karsch)<sup>2</sup>  
Third hind tarsal segment white except at tip;  
costa dark. . . . . 8
8. Second hind tarsal segment less than half  
white. . . . . *nigerrimus* (Theobald)  
Second hind tarsal segment all white except  
at tip. . . . . *grahami* (Theobald)
9. Scutum entirely golden scaled (may be a few  
dark scales scattered about); Philippines. .  
. . . . . *quadripunctis* (Ludlow)  
Scutum with considerable areas of dark scal-  
ing. . . . . 10
10. Scutum with a moderately broad median  
transverse band of golden scales extending  
right across the scutum, reaching this but  
not passing it is a broad stripe of golden  
scales; Australia<sup>3</sup>. . . . .  
. . . . . *aurantius chrysogaster* (Taylor)  
Scutum not marked as described above. . . . . 11
11. Terminal abdominal tergites (V-VIII)  
broadly yellow; Australasian and Oriental  
. . . . . *a. aurantius* (Theobald)  
Terminal abdominal tergites with yellow scal-  
ing largely confined to mediodorsal area  
(this is not so true of the males, which are  
not readily separable from *a. aurantius*);  
Solomon Islands. . . . . *a. nigrescens* (Edwards)

KEY TO LARVAE<sup>4</sup>

1. Siphon hair tuft attached between the two  
distal pecten teeth (Fig. 5), which are more  
widely spaced, occasionally inserted just  
beyond apical pecten tooth; (siphon hair  
tuft inserted beyond middle). . . . (Group  
B. *Pardomyia*). . . . . 2  
Siphon hair tuft inserted distinctly beyond  
last pecten tooth (Fig. 4). . . . (Group A.  
*Mucidus*). . . . . 3
2. Siphon hair tuft with about 6 branches; comb  
patch consisting of about 20-26 scales;  
pentad hair 2 single; Oriental and Aus-  
tralasian. . . . . *aurantius aurantius* (Theobald)  
Siphon hair tuft with 11-15 prominently  
plumose hairs (Fig. 5); comb patch con-

<sup>2</sup> This section of the key, which relates to the  
purely African species, has been taken from  
Edwards (1941, p. 110).

<sup>3</sup> No specimens were seen. The key character  
here is taken from the type description.

<sup>4</sup> The larvae of *grahami*, *kermorganti*, *laniger*,  
and *chrysogaster* are unknown. The larvae of *a.*  
*aurantius*, *scatophagoides*, *mucidus*, and *niger-*  
*rimus* have not been seen by me.

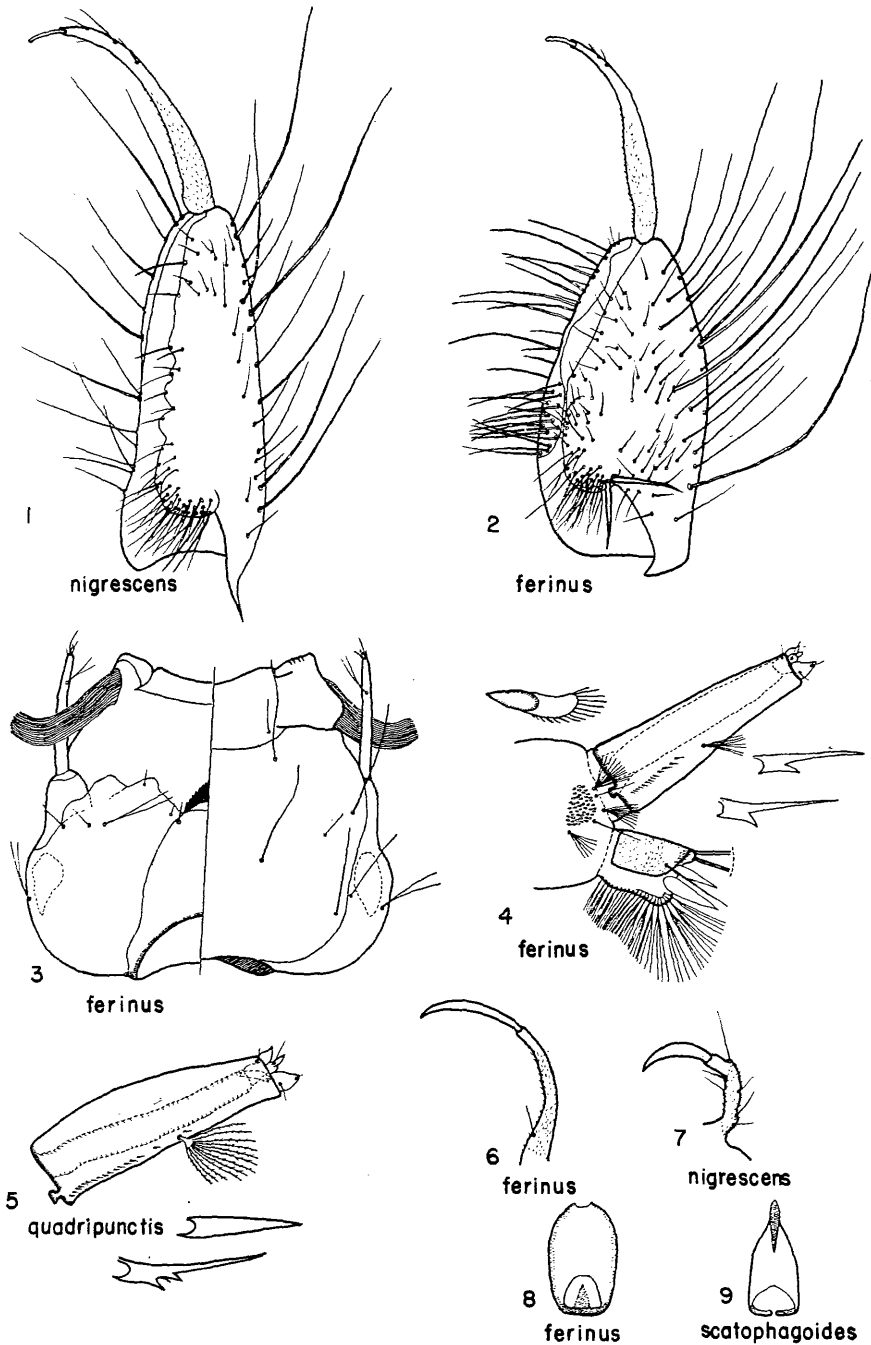
- sisting of about 50-65 scales; pentad hair  
2 double; Philippines. . . . .  
. . . . . *quadripunctis* (Ludlow)  
Solomon Islands. . . . . *a. nigrescens* (Edwards)
3. Pecten teeth with 2-5 ventral denticles (head  
hair 5 extending forward well beyond the  
base of 3); Australasian. . . . .  
. . . . . *alternans* (Westwood)  
Pecten teeth with 1-2 ventral denticles (Fig.  
4). . . . . 4
4. Comb scales fewer than 50; Ethiopian and  
Oriental. . . . . *scatophagoides* (Theobald)  
Comb scales more than 50. . . . . 5
5. Siphon scarcely tapering; siphon hair tuft  
inserted just beyond middle; last 3 pecten  
teeth more widely spaced than the others  
and simple; African. *nigerrimus* (Theobald)  
Siphon tapering at least on distal third;  
siphon hair tuft inserted before middle; the  
last pecten teeth not more widely spaced,  
nor simple (Fig. 4). . . . . 6
6. Pecten consisting of 25-27 teeth; African. .  
. . . . . *mucidus* (Karsch)  
Pecten consisting of 12-16 teeth; Philippines  
. . . . . *ferinus*, n. sp.

**Aedes (Mucidus) ferinus**, n. sp.

Figs. 2, 3, 4, 6, 8

ADULT. *Male*. Wing approximately 5.5  
mm in length. *Head*: Proboscis largely yellow-  
scaled, the scales on the basal three-fifths  
somewhat outstanding and many of them with  
dark tips or particolored (particularly ven-  
trally), an inconspicuous narrow white band  
just beyond middle, some white scales at apex;  
entire proboscis with numerous short hairs.  
Palpus longer than the proboscis by about the  
length of the last segment; clothed with yellow,  
white, and particolored brown scales, many of  
which are partially erect, segments II-V with  
basal white bands. Torus and first flagellar seg-  
ment with broad white scales mesally. Vertex  
with narrow-curved white scales dorsally, these  
most numerous medially; elongate spatulate  
white scales scattered in this area; forked  
upright scales cream colored, scattered over  
posterior two-thirds of dorsum; broad white  
scales laterally, and along the eye margins  
part way to dorsal midline.

*Thorax*: Scutal integument grayish, marked  
with a lateral brown area before the scutal angle  
and one on the prescutellar area; clothed  
sparsely with narrow and narrow-curved white  
scales, several twisted tufts of erect long white  
scales present. Scutellum with many erect  
twisted elongate white scales on all lobes.  
*Apn* and *ppn* (about 24 anterior and posterior



FIGS. 1-8. *Aedes* mosquitoes of subgenus *Mucidus* (in each case the general geographical locality is given for the specimen from which the drawing was made): 1 (Guadalcanal) and 2 (Mindanao), Inner tergal aspect of basistyle of male genitalia; 3 (Mindanao), larval head, left half ventral, right half dorsal; 4 (Luzon), lateral aspects of larval terminal segments; 5 (Leyte), lateral aspects of larval siphon; 6 (Luzon) and 7 (Guadalcanal), lateral aspect of dissected claspette; 8 (Luzon) and 9 (Senegal, Africa), tergal aspect of mesosome.

dark hairs present) covered with broad white scales, some erect twisted scales also present. Following pleural areas each with a patch of mixed flat broad and erect twisted white scales: proepisternum, postspiracular (only a very few), subspiracular, paratergite, prealar (very few on knob, those below knob connecting with those on upper sternopleuron), upper sternopleural; ventroposterior sternopleural, medio-anterior sternopleural (this sometimes joining the other two sternopleural scale patches); upper three-fifths (except extreme dorsum) of mesepimeral (dorsal mesepimeral hair tuft with about 7-9 hairs; 3-5 lower mesepimeral hairs present in scale patch). Pleural sclerites with pronounced integumental pale areas at the scale patches. Coxae and trochanters white scaled, some particolored brown scales on fore coxa. Femora, tibiae, and first two hind tarsal segments with many erect white and particolored brown scales. Femora clothed with particolored brown scales; each marked by narrow basal and apical white bands and by a narrow band at basal one-fourth and at apical three-fourths. Tibiae the same, each marked with a basal, median, and apical band (the apical band of the fore tibia is 0.20-0.25 as long as the whole tibia). Fore tarsi yellow (may be a few basal white scales on I); mid yellow, a narrow basal band on I; hind with narrow basal white bands on I (has a few erect white scales scattered along medially also) and II, III-V white with narrow yellow apices. Fore and mid tarsal claws unequal, the larger bidentate, the smaller unidentate; hind claws equal, unidentate. Wings clothed with small broad intermixed brown, yellow, and white scales; fringe with alternating dark and light areas; base of posterior fork cell slightly more basal than that of the anterior (this cell shorter than its stem). Halteres white scaled.

*Abdomen:* Tergite I with white scales medially and laterally; II-VII with a baso-lateral patch of erect twisted white scales; II-IV white scaled medially, brown and yellow scaled laterally; V-VII white scaled, with an apico-lateral patch of brownish-yellow scales; side-pieces white scaled basally, dark apically. Sternites II-VI brownish yellow with white basal bands, VII-VIII all white. *Genitalia* (Figs. 2, 6, 8): Inner tergal surface of basistyle with distinctive setal pattern; large basal lobe present bearing two broad spines and numerous hairs. Claspette blade rather widened medially.

Mesosome evenly rounded apically and without beak or flange. Ninth tergite lobes each with 3-8 broadened setae. Eighth tergite and sternite with several large broad swordlike setae apically.

*Female:* Wing approximately 6.0-7.0 mm in length. Proboscis with a broad median white scaled area. Palpus approximately two-thirds to three-fourths as long as the proboscis, clothed with white and particolored brown scales intermixed. Vertex with forked upright scales brown. Some of the scutal scales have a very pale yellowish tint. Only middle one-third of mesepimeron scaled, the dorsal hair tuft consisting of about 20-24 hairs. First hind tarsal segment approximately 0.8 as long as the tibia. Tarsal claws equal, each unidentate.

*LARVA. Head* (Fig. 3): Antenna with a few very small spicules; antennal hair tuft inserted at apical one-fourth, with 2 branches. Hairs 3 (slender), 4, 5, 6, 7, and 8 single; 9 with 1 or 2 branches; 12 single; 13 double; 14 and 15 with 1-3; 17, 18, and 20 single. Hair 5 not extending beyond the base of 6. Mentum with 6 or 7 teeth on each side. Mouth brushes forming matted tufts of serrate-tipped rods.

*Thorax:* Prothoracic hair 0 with 5 or 6 branches; 1, 2, and 3 single (3 once double). Mesothoracic hair 9 with 3-6 branches; 10 and 12 single (11 not seen). Metathoracic hair 9, 10, and 12 single (11 not seen).

*Abdomen* (Fig. 4): Dorsolateral hair of segments I-II single. Lateral hair of I with 6-8 branches; of II with 8-11; of III-VI single. Pentad hair 1 with 17-20 branches; 2 and 4 single; 3 with 6-8; 5 with 5-7; hairs 1, 3, and 5 stellate in type. Comb consisting of a patch of about 50-65 broad apically fringed scales. Siphon pale; index 2.7-4.4; acus present; hair tuft inserted just before middle and distinctly distad to the last pecten tooth, with 5-7 short branches; 12-16 pecten teeth, each with a sharp subbasal denticle. Anal plate incomplete ventrally, with transverse striations, some posterior spines present dorsally; *lh* single; *isc* single. Ventral brush, which extends the whole length of anal segment, consists of 30-32 tufts, those along the posterior half arising from a barred area, each tuft with 7-9 branches. Anal gills lanceolate, with the ventral pair slightly longer than the dorsal pair and about 0.7 as long as the anal plate.

*Holotype.*—Male, with associated larval and pupal skins (U.S.N.M. no. 58363), San

Ramon (Penal Farm), City of Zamboanga Province, Mindanao, Philippines, October 2, 1945 (J. L. Laffoon and K. L. Knight), reared from a grassy ground pool.

*Paratypes*.—One male with associated larval and pupal skins, same data as for holotype; 15 males, 3 females, Zamboanga, Mindanao, September 12, 1945 (J. L. Laffoon, D. R. Johnson, K. L. Knight), from a light trap; 1 male, 1 female, 2 sets of associated larval and pupal skins, Olongapo (Subic Bay), Zambales Province, Luzon, July 21, 1945 (L. E. Rozeboom, E. S. Zolik), reared from a grassy area inundated by rains; 2 females, Dulag, Leyte, November 25, 1944 (H. R. Roberts), reared from a marshy pool. Paratypes deposited in U. S. National Museum, British Museum, and Academy of Natural Sciences of Philadelphia.

*Remarks*.—This species is most closely related to *laniger* Wiedemann but differs in having only about the apical 0.20–0.25 of the fore tibia white-scaled, in possessing sharp median white bands on the fore and mid tibia, and in having a distinct basal band on the second hind tarsal segment.

#### *Aedes* (*Mucidus*) *scatophagoides* (Theobald)

Fig. 9

1901. *Mucidus scatophagoides* Theobald, Mon. Cul. 1: 277 (female). TYPE-LOC.: Burma. Myingyan (Watson). India. Morabad, N.-W. P. (Close). TYPE: 2 females (co-types) in Brit. Mus. Theobald, 1910:126. Barraud, 1929: 1053. Christophers, 1906: 13.
1908. *Mucidus sudanensis* Theobald, 3d Rep. Wellc. Lab., p. 252 (female). TYPE-LOC.: Africa. Upper White Nile (King). TYPE: Female in Brit. Mus. Theobald, 1910:129.
1911. *M. scatophagoides*, Theobald. Edwards, p. 246. Name emended, but without comment. Synonym of *sudanensis* Theobald. Edwards, 1911: 246; 1922a: 450.
1932. *A. (M.) scatophagoides* Theobald. Edwards, p. 135. Barraud, 1934: 138. Edwards, 1941: 110. Hopkins, 1936: 99.

**ADULT.** This species differs distinctly from *ferinus* in tarsal markings and male genitalia. Fore and mid tarsi with distinct basal and median white bands on I, basal white bands on II and III, segments IV and V usually all yellow but may also bear basal bands; hind tarsi with basal and median white bands on I, basal white bands on II–V, the band on II occupying about one-third of the segment, those on III–V about one-half. Abdominal tergites

II–III tend to have the median white scales confined to the base with the remainder of the median area yellow-scaled. The mesosome of the male genitalia is distinct in possessing a remarkable apical flange or beaklike process (Fig. 9). Also apically on the mesal margin of the inner tergal surface of the basistyle there are a few hairs which are longer than the surrounding ones.

In the material examined, African specimens were distinct from the Oriental ones in having the proboscis all yellow-scaled (many brown scales on proximal half). The female of the Oriental material has the median portion of the proboscis with a variable amount of white scaling and the male has a small indefinite median band of white scales. It would seem possible on the basis of this color distinction to regard the African material as sufficiently distinct to constitute a geographical subspecies (in which case Theobald's name *sudanensis* would be available), but considerable material would necessarily have to be examined first. A difference also possibly occurs in the distribution of setae on the inner tergal surface of the basistyle.

**LARVA.** Not seen. Although closely similar to that of *ferinus*, its possession of only 30–40 comb scales and 20–30 pecten teeth (each with 1, rarely 2, ventral denticles) may constitute a significant difference. Also, Hopkins (1936, Fig. 45) figures head hair 5 extending cephalad beyond the base of hair 3, and hair 6 extending one-half of its length beyond the anterior margin of the head.

**Habitat.**—The larvae, which are predatory on other mosquito larvae, are found in all types of temporary open natural pools. Hopkins (1936) believes that the eggs may be laid on a dry surface and that they may need to undergo a period of drying before a flooding will hatch them.

The type females were captured while biting patients in a hospital and one of them deposited separated eggs when placed in a slanted test tube over water.

**Distribution.**—SPECIMENS EXAMINED: U.S. N.M. (3 males, 3 females): *India* (S. R. Christophers). Amritsar (S. R. C.); Calcutta, Bengal (D. E. Hardy, G. F. Johnstone). Also 1 male and 3 females from Africa. British Museum (1 male, 1 female): *India*. Behar: Pusa (F. M. Hewlett). N. Canara: Karwar (H. Cogill).

ADDITIONAL RECORDS FROM THE LITERATURE: Throughout tropical Africa. Widely distributed in the Oriental Region from Rajputana to Burma, and through Central Provinces and Madras to Ceylon (Barraud, 1934). *China*. Kwangtung: Hongkong (Feng, 1938).

***Aedes (Mucidus) laniger* (Wiedemann)**

1821. *Culex laniger* Wiedemann, Dipt. Exot., p. 9 (female). TYPE-LOC.: Java. TYPE: Female in Copenhagen Mus.
1901. *Mucidus laniger*. Wiedemann. Theobald, p. 269.
1908. *Mucidus mucidus*.—Theobald. Leicester, p. 69.
1913. *Mucidus laniger* (Wied.). Edwards, p. 224. Synonymy of *mucidus* Leicester, 1908. Edwards, 1922a: 451. Barraud, 1929: 1053.
1932. *A. (M.) laniger* Wiedemann. Edwards, p. 134. Barraud, 1934: 147. Bohart, 1945: 55.

ADULT. No mention is made in the literature of whether Wiedemann's type has ever been reexamined; and since no one has re-described material from the type locality, the exact determination of *laniger* remains somewhat in doubt. This uncertainty is largely due to the incompleteness of Wiedemann's description and to the discrepancies existing between it and the material assigned to this species by various authors.

I have examined a female specimen from Deli, Sumatra, in the collection of the British Museum, which I am at present considering to be *laniger*, largely because of the nearness of its collection locality to that of the type. This specimen resembled *ferinus* except as follows: proboscis brownish yellow with a few white scales about the middle and at the extreme apex; apices of tibiae appearing more broadly banded; fore and mid tibiae with only basal and apical white bands, hind tibia also with a median band; segment I of hind tarsi with a basal white area and with some white scales scattered along the rest of the segment, II brown with a few white scales scattered over length, III and IV all white except for a narrow apical brown band, V largely white.

The only descriptive notes found in the literature on this species (in addition to the original description) are by Macquart (1838, p. 176) from a female from Coromandel (probably Madras, India); Leicester (1908, p. 69) from Kuala Lumpur, Malaya; Edwards (1913, p. 224; 1922a, p. 451); and Barraud (1934, p.

147) from Ceylon and possibly Assam material. Edwards's notes check with the specimen described above. He states that the first hind tarsal segment is nearly as long as the hind tibia, which is a character I did not check on the Sumatran specimen. Barraud's description is similar.

Leicester's specimens were examined by me in the British Museum and did not appear to differ from the Sumatran specimen. However, in his description he states that the hind tarsi have a narrow basal white band on I, with the rest all white scaled. This is probably an error due to not seeing the separation point between segments I and II. He describes the smaller fore tarsal claw and both hind claws of the male as being simple. Unfortunately I did not check this statement, but if true it constitutes a rather striking difference between *laniger* and *ferinus*.

Wiedemann has several points in his description that do not check either with the Sumatran specimen or with the descriptions mentioned above. According to Theobald's (1901, p. 269) translation, Wiedemann described the proboscis as being yellow with a white band at apex, and the hind tarsi as having white apices. These are the main discrepancies existing in his description and could both easily be errors in observation of color versus structure.

Macquart's notes on a specimen from Coromandel mention that all the tarsi have white basal bands on each segment. This seems very much as if he had a specimen of *scatophagooides*.

I have examined a female from Ceylon in the British Museum that checked with the Sumatran specimen except for the minor points of having a few median white scales on the fore and mid tibiae and having the fore and mid tarsi all dark.

In the U. S. National Museum collection there are two Philippine females of this species that check well with the Sumatran specimen. In these specimens the apical 0.31–0.33 of the fore tibia is white scaled. The specimens differ from *laniger* as described by Edwards and Barraud, however, in having the first hind tarsal segment only 0.81–0.89 as long as the hind tibia. There is also an unassociated male genitalic slide in the U.S.N.M. that is labeled "*Mucidus laniger* Wied." It is very similar to *ferinus* except that the large spines on the basal

lobe of the basistyle are noticeably slenderer.

LARVA. Undescribed.

*Distribution*.—SPECIMENS EXAMINED: U. S. N.M. (2 females, 1 male genitalic slide): *Philippines*. Mindanao: Ludlow Barracks, Parang; Pettit Barracks, Zamboanga (F. Visaya). British Museum (3 females, 1 male): *Malaya*. Kuala Lumpur (G. F. Leicester). *Ceylon*. Trincomali (C. F. S. Baker). *Sumatra*. Deli (A. F. Stanton).

ADDITIONAL RECORDS FROM THE LITERATURE: *Assam* (?) (Barraud, 1934). *Sumatra*. Atchin: Tjane. Djambi: Moeara Tebo. Lampong districts: Semangka Plain (Brug and Edwards, 1931). *Philippines*. Luzon: Manila (Banks, 1906). Mindoro: Calapan (Edwards, 1929).

#### *Aedes* (*Mucidus*) *alternans* (Westwood)

1835. *Culex alternans* Westwood, Ann. Soc. Ent. France 4: 681 (female). TYPE-LOC.: Nova Hollandia (Australia). TYPE: Female originally in Hope Coll., Oxford; now in Brit. Mus. Westwood, 1881: 384. Skuse, 1889: 1726.
1856. *Culex commovens* Walker, Insecta Saundersiana 1: 432 (females). TYPE-LOC.: New Holland (Australia) (Saunders). TYPE: female (holotype) in Brit. Mus. (identified as type by E. A. Waterhouse).
1889. *Culex hispidus* Skuse, Proc. Linn. Soc. New South Wales 3 (n.s.): 1726 (males, females). TYPE-LOC.: Hexham Swamp, near Newcastle and Richmond, New South Wales (Skuse); Mount Kembla, Illawarra, New South Wales (Hamilton); Breakfast Creek, Brisbane, Queensland (Tryon). TYPE: Location unknown to me.
1901. *Mucidus alternans*. Westwood. Theobald, p. 269. Synonymy of *commovens* and *hispidus*. Hamlyn-Harris, 1933: 230. Cooling, 1924: 17. Edwards, 1924: 367; 1922a: 450. Theobald, 1903: 134; 1907: 162; 1910: 125. Felt, 1905: 473.
1932. *A. (M.) alternans* Westwood. Edwards, p. 134. Lee, 1944: 48, 50.

ADULT. Resembling *ferinus* but differing chiefly as follows: *Male*. Proboscis without a median white scaled area. Scutum white scaled, marked with distinct areas of yellow scaling. Postspiracular area with many broad white scales; all of mesepimeron scaled except ventral margin; pleuron rather uniformly brown colored. Femora with apical white scaling much reduced, sometimes even lacking on fore femur; fore femur with the subbasal white band usually absent; hind femur sometimes with whole basal one-half white. Tibiae

each with basal, median, and subapical white bands. Fore and mid tarsi with basal and medium white bands on I (in Australian material, these two bands tend to coalesce), II and III with basal three-fifths white; hind tarsi with a basal and median band on I, II and III with about basal one-half white, IV and V with about basal three-fourths white. Tergites II-III largely yellow dorsally, a few median white scales; IV-VII with broad white basal areas, the white extending posteriorly on the midline. Genitalia essentially as in *ferinus* except that there are 1-2 stouter, more elongate setae apically on the inner margin of the inner tergal surface of the basistyle (figured by Felt, 1905, pl. 7).

*Female*. Vertex with the scales along the eye margins and on the midline white, narrow yellow scales subdorsally, broad yellow scales laterally, some broad white scales at extreme lateral margins. Scutum brownish-yellow scaled, several tufts of erect twisted white scales. Tergites largely yellow dorsally, basal white bands on V-VII, a basomedian white spot extending posteriorly on midline of IV-VII.

LARVA (1 larva, from New Caledonia). Closely similar to that of *ferinus*, but possibly differing as follows: head hairs 5 and 6 noticeably longer, 5 extending cephalad beyond the base of 3 and 6 extending about one-third of its length beyond the anterior margin of the head. (Meso- and metathoracic pleural tufts missing.) Pecten teeth 20-21 in number, most of them with 2-4 ventral denticles.

*Habitat*.—The predatory larva is commonly found in high-tide marshy pools, but during the seasons of low tides is often taken in inland fresh-water ground pools.

The adult is a vicious biter, even entering homes to do so, and bites mainly at sundown. It commonly migrates a considerable distance inland from the coast. The eggs are deposited singly on the water.

*Remarks*.—The types of *alternans* and of *commovens* have been examined by me. That of *alternans* is in such poor condition as to be almost completely unrecognizable.

The adult of this species is well distinct from either *scatophagoides*, *laniger*, or *ferinus* on the basis of the subapical white tibial band. The larva is apparently distinct in having pecten teeth with 2-4 denticles each.

*Distribution*.—SPECIMENS EXAMINED: U.S.

N.M. (16 males, 23 females, 1 larva): *New Caledonia*. (A. R. Gaufin); Ducas Penin. (K. L. Knight); Noumea (Dunlop): Baie Chambeyron, La Foa (Platsch and Remington). *Australia*. Queensland: Normantown and Townsville (G. F. Hill); Rockhampton and Townsville (F. H. Taylor); Burpengary (T. L. Bancroft); Eidsvold (C. F. Baker); Brisbane (Hamlyn-Harris); Cairns.

ADDITIONAL RECORDS FROM THE LITERATURE: *Australia*. Victoria. New South Wales. Northern Territory. *New Guinea*. Papua (Edwards, 1924).

***Aedes (Mucidus) kermorganti* (Laveran)**

1901. *Culex kermorganti* Laveran, C. R. Soc. Biol. 53: 568 (2 females). TYPE-LOC.: New Caledonia. Noumea. TYPE: Female (holotype), dissected and mounted on 2 slides, Pasteur Institute, Paris.
1922. *Mucidus kermorganti* (Laveran). Edwards, 1922a, p. 99. Edwards, 1922b: 450; 1924: 367.
1932. *A. (M.) kermorganti* Laveran. Edwards, p. 134.

ADULT. Apparently indistinguishable from *alternans* except that the scales of the abdomen and legs are very small and all closely appressed.

This species is still known only from the type series. According to Edwards (1922a), there were two females (apparently the type series) of this species in the Paris Museum. Of these, one specimen, from Calama, 1869 (Delacour), was presented to the British Museum where I examined it in 1946. The other specimen, judged from Edwards's (1922a) account, should still be in the Paris Museum.

However, J. A. Reid, who kindly searched for Laveran's types for me in the collections of the Paris Museum in October 1946, was unable to find the *kermorganti* type there. But in the collections of the Pasteur Institute, Paris, along with other Laveran types, he did find a dissected, slide-mounted female of this species. This I am considering to be the type for the species.

***Aedes (Mucidus) quadripunctis* (Ludlow)**

Fig. 5

1910. *Paromyia quadripunctis* Ludlow, in Theobald, Mon. Cul. 5: 608 (female). TYPE-LOC.: Philippines. Parang. Mindanao. TYPE: female (holotype) in U.S.N.M. Edwards, 1922b: 451.

1932. *A. (M.) aurantius* var. *quadripunctis* Ludlow. Edward, p. 135.

1945. *Aedes (Mucidus) quadripunctis* (Ludlow). Bohart, p. 55.

ADULT. *Male*. Wing approximately 4.2-4.7 mm in length. *Head*: Proboscis yellow-scaled, some black scales basally on ventral and lateral aspects, may be a few apical dark scales also. Palpus equal to proboscis in length, or somewhat longer; yellow-scaled with sparse black scales at the apices of each segment, V with the apical one-half dark. Torus orange, bare. Vertex with narrow golden scales dorsally, thickest along eye margins; brownish-yellow forked upright scales over whole dorsum; broadened yellow scales laterally.

*Thorax*: Scutal integument brownish gray, with areas of dark brown; sparsely clothed with narrow yellow scales (some scattered brown scales may also be present). Scutellum with narrow yellow scales on each lobe. *Apn*, *ppn* (about 10-13 posterior bristles) and proepisternum sparsely covered with narrow and narrow-curved yellow scales. A small patch of broadened elongate yellow scales on each of the following areas: paratergite, prealar (below the knob), upper sternopleural, ventroposterior sternopleural and middle mesepimeral. Coxae yellow-scaled, fore may also have a median patch of black scales. Trochanters with mixed dark and yellow scaling. Femora and fore and mid tibiae yellow, with a variable amount of spotted black scaling, these dark markings reduced posteriorly; hind tibia black, marked with a small basal yellow band and some yellow mottling. Fore and mid tarsi yellow, the apical half of II and all of III and IV may show a dusky sheen; hind tarsus black, I-III with narrow basal yellow bands (that on III may be absent), V completely creamy-white scaled. Fore and mid tarsal claws unequal, each with a single tooth; hind claws equal, simple. Wings with costa and vein 1 covered with very small yellow and black scales, remainder of veins with such small scales as to appear virtually unscaled; both forkcells considerably shorter than their stems, the second fork cell beginning more basally than the first. Halter pale, knob dark and pale scaled.

*Abdomen*: Tergites golden-scaled, usually some scattered dark scales on one or more of the segments. Sternites golden scaled, some dark scales on II-III. *Genitalia*: Apparently not dis-

tinnet from that of *a. nigrescens* (see Figs. 1 and 7).

*Female.* Wing approximately 5.0–5.7 mm. in length. Palpus approximately one-fourth the length of the proboscis; golden, with apices dark. Torus mesally with a patch of golden scales. Tarsal claws equal, each unidentate. In general, the legs of the female have more extensive dark scaling than they do in the males. The fore and mid tarsi may be largely dark with basal pale bands on I and II. The abdominal tergites may also have more scattered black scales than described for the male.

*LARVA* (description based on 5 adult-associated skins from Leyte). Closely similar to that of *ferinus* but differing most noticeably as follows: Antennal hair tuft with 3–5 branches. Head hair 3 located on the line of the suture, broad basally and tapered acutely (not a normal slender hair as in *ferinus*); hair 5 extending beyond the base of hair 6 nearly to the anterior margin of head; hair 20 double. Mesothoracic hair 9 with 6 or 7 branches. Metathoracic hair 9 with 8 or 9 branches. Lateral hair of abdominal segments III–IV double; of V–VI single. Pentad hair 1 with 11–15 branches, 2 double, 5 with 9–14. Siphon hair tuft (Fig. 5) inserted just beyond the middle of the siphon and between the last two pecten teeth, the base of the tuft strongly fan-shaped, with 11–15 prominently plumose branches. Pecten teeth 17–22 in number, sharply pointed and with 2–4 ventral denticles; the last two teeth more widely separated than the others, simple or with only 1 or 2 very small denticles. Anal plate with posterior margin smooth. Ventral brush consisting of 22–26 tufts, the basal 6 or 7 not arising from the barred area, each tuft with 7–11 branches.

*Habitat.*—The larvae, which are obviously predacious, were collected from rain-filled temporary puddles.

*Remarks.*—Closely similar to *a. aurantius* (see under that species for differences). The type has been examined, and all the scutellar scales were found to be yellow instead of partly brown as described by Ludlow.

The larva has not previously been described.

*Distribution.*—SPECIMENS EXAMINED: Acad. Nat. Sci. Philadelphia (4 males, 5 females, 5 sets of adult-associated larval and pupal skins): *Philippines*. Leyte: Tacloban and Dulag (H. R. Roberts). U.S.N.M. (1 female): *Philippines* (R. C. McGregor).

***Aedes (Mucidus) aurantius aurantius***  
(Theobald)

1907. *Pardomyia aurantia* Theobald, Mon. Cul. 4: 280 (female). TYPE-LOC.: Borneo. Kuching, Sarawak (Barker). TYPE: Female (holotype) in Brit. Mus.
1908. *Ekrinomyia aureostriata* Leicester, Cul. Malaya, p. 71 (males, females). TYPE-LOC.: Malaya. Klang, Kuala Lumpur (Leicester). TYPE: 3 females, 3 males (cotypes), in Brit. Mus.; 1 female (cotype) in U.S.N.M.
1913. *Pardomyia aurantia*, Theo. Edwards, p. 224. Synonymy of *aureostriata* Leicester. Edwards, 1922b: 451. Paine and Edwards, 1929: 305.
1931. *M. (Pardomyia) aurantius* Theo. Brug and Edwards, p. 257.
1932. *A. (M.) aurantius* Theobald. Edwards, p. 135.
1944. *Aedes (Mucidus) aurantius aurantius* (Theobald). Knight, Bohart, and Bohart, p. 33.

*ADULT* (described from Theobald's and Leicester's type material). Closely similar to *quadripunctis* but chiefly distinct in having the scutum dark scaled except for a prominent anterior transverse area of narrow yellow scales (also a few yellow scales around the prescutellar space and over the wing base).

Also: Proboscis may possess considerable black scaling. Forked upright vertex scales vary from golden to brownish in color. A few dark hairlike scales usually present on the subspiracular area along the dorsal-anterior margin of the sternopleuron. Wing fork cells nearly as long as their stems. In the female, tergites I–III are largely dark scaled; I with a narrow yellow band laterally, II–III with a divided median yellow patch, remainder of the tergites yellow except for occasional scattered dark scales. The tergites of the male marked approximately the same, except usually there are somewhat fewer dark scales. Male genitalia similar to that of *a. nigrescens* (see Figs. 1 and 7).

Leicester (1908) described the hind female claws as being simple, but actually they each have a very small tooth.

*LARVA.* Not seen. Described and figured however, by Edwards and Givens (1928, Singapore specimens) and by Lee (1944, specimens from Milne Bay, New Guinea). Dorsal characters of the head similar to those of *quadripunctis* except that Lee figures head hair 5 as not extending cephalad beyond the base of hair 6. Thoracic hairs not specifically described.

Dorsolateral hair of abdominal segment I single; lateral hair of I with 6 branches, of II with 10, of III-VII double. Comb patch of about 20-26 bluntly rounded and apically fringed teeth. Pentad hair (as fig. by Lee, 1944) 1 and 5 with 8 branches, 2 single. Siphon index about 2; acus well-developed; pecten composed of about 20 rather close-set teeth, each with 2-5 denticles, the line of teeth extending to just beyond the middle of siphon, the two distal teeth more widely separated than the others; siphon hair tuft with about 6 branches, inserted between the two distal pecten teeth. Anal segment as in *quadripunctis*.

PUPA. Partially figured and described by Edwards and Givens (1928).

*Habitat*.—The predacious larva has been reported from pig wallows, small clear marshy pools, a pot-hole in a mangrove swamp, and grass-grown pools in swamps.

*Remarks*.—All the type specimens of *a. aurantius* and *aureostriata* have been examined. This species is distinct in the adult from *quadripunctis* on the color of the scutal and abdominal tergal scales, and in the larva (possibly) on the length of head hair 5, on the number of comb scales, and on the number of branches of the siphon hair tuft and of pentad hair 2.

*Distribution*.—SPECIMENS EXAMINED: U.S. N.M. (8 males, 3 females): *New Guinea*. Papua: Gilli Gilli. Dutch New Guinea: Toem (long. 139°, lat. 1° 59') (E. S. Ross).

ADDITIONAL RECORDS FROM THE LITERATURE: *Sumatra*. Lampong districts: Moeara Tebo. *Riouw Archipel*: Doerian (Brug and Edwards, 1931). *New Guinea*. Papua: Milne Bay (Lee, 1944).

***Aedes (Mucidus) aurantius nigrescens***

(Edwards)  
Figs. 1, 7

1929. *Pardomyia aurantia* var. *nigrescens* Edwards, in Paine and Edwards, Bull. Ent. Res. 20: 314 (female, larva). TYPE-LOC.: Solomon Islands, Lady Lever Plantation, Kulambangra (Paine). TYPE: female (holotype) in Brit. Mus.
1932. *A. (M.) aurantius* var. *nigrescens* Paine and Edwards, p. 135.
1944. *Aedes (Mucidus) aurantius nigrescens* Edwards, Knight, Bohart, and Bohart, p. 50.

ADULT. Very similar to *a. aurantius* but differing chiefly in the color of the abdominal

tergite scaling. In the female, tergites II-IV black marked with a narrow basal yellow line and a median pair of yellow spots, and sometimes with a few scattered yellow scales; V-VII black, each broadly marked by a median patch of yellow scales that reaches the posterior margin of the segment. The male tergites however, are colored practically as in *a. aurantius*, except that there are rather more scattered black scales laterally on IV-VII. Male genitalia (Figs. 1 and 7) similar to that of *quadripunctis* and *a. aurantius*.

LARVA (2 larval skins from Solomon Islands). Apparently not separable from that of *quadripunctis*. In the type description, Edwards states that the larva differs from that of *a. aurantius* only in having the antenna slightly longer and the siphon distinctly longer (index about 2.7). However, the specimens in the U. S. National Museum differ from *a. aurantius* on the same characters that *quadripunctis* differs from it.

*Habitat*.—The predacious larva occurs in all types of rain-filled temporary puddles and pools, either in the open or in swamps or woodlands.

*Remarks*.—I have examined the type. As Edwards indicates, *a. nigrescens* appears to be only a geographical subspecies based essentially on female color characters. The larva is not distinct from that of *quadripunctis*.

*Distribution*.—SPECIMENS EXAMINED. U.S.-N.M. (5 males, 15 females, 4 sets of adult-associated larval and pupal skins, 2 larvae, 1 larval skin, 2 pupal skins): *Solomon Islands*. Guadalcanal: Lunga district (J. N. Belkin, A. B. Gurney, L. E. Rozeboom, J. L. Laffoon). *New Georgia* group: Banika Island (W. G. Downs). *Bougainville*: Torokina area (A. B. Gurney).

***Aedes (Mucidus) aurantius chrysogaster***

(Taylor)

1927. *Mucidus chrysogaster* Taylor, Bull. Ent. Res. 18: 67 (female). TYPE-LOC.: Australia, Berner Creek, near Innisfail, Queensland (Taylor). TYPE: 2 females (holotype and paratype), in Australian Inst. Trop. Med., Townsville, Queensland.
1944. *Aedes (Mucidus) aurantius chrysogaster* Taylor, Knight, Bohart, and Bohart, p. 50.

Since the type description, there have been no additional published notes on this species;

nor have I seen the types. However, from a careful consideration of the type description, it appears to have no significant differences from *a. nigrescens* except in scutal markings. Taylor describes the scutum as follows: "Scutum chocolate-coloured, covered with mixed golden and chocolate-brown, narrow-curved scales; there is a moderately broad median transverse band of golden scales reaching right across the scutum, reaching this but not passing it is a broad (about a quarter the width of the scutum) stripe of golden scales, the golden scales are very pronounced on the anterior margin of the scutum."

The larvae were found in a shallow rock pool containing a large quantity of decaying vegetable matter.

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