

The *Aedes* Mosquitoes of the Philippine Islands¹

I. Keys to Species. Subgenera *Mucidus*, *Ochlerotatus*, and *Finlaya* (Diptera, Culicidae)

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INTRODUCTION

EXTENSIVE COLLECTIONS of mosquitoes made in the Philippines during the last war have resulted in a great increase in our knowledge of the culicid fauna of that island group. This has been particularly true for the genus *Aedes*. In 1945 Bohart listed 34 *Aedes* species for the Philippines, of which only 6 were known in the larval stage from Philippine specimens. The present series of three papers, of which this is the first part, treats 74 named species and subspecies, and Philippine larval specimens were seen for 56 of these.

Material Used

This study has been based primarily upon the collection made from April to October, 1945, by a branch unit of U. S. Naval Medical Research Unit No. 2 (NAMRU-2) on the islands of Luzon, Leyte, Samar, Palawan, Balabac, Culion, Busuanga, Mindanao, Basilan, and Jolo. This collection, consisting very largely of adults associated with their larval and pupal skins, was gathered by L. E. Rozeboom, K. L. Knight, J. L. Laffoon, and D. R. Johnson. In addition, numerous non-technical service personnel contributed considerably to the task.

The second largest source of material

¹The opinions or conclusions contained herein are those of the authors and are not to be construed as official or reflecting the views of the Navy Department or of the naval service at large. Manuscript received November 27, 1950.

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studied was the collection of the U. S. National Museum, which is particularly rich in Philippine type specimens. Before the last war, the Philippine mosquito collection of the National Museum consisted principally of material collected by the U. S. military occupation forces following the Spanish-American War and contributed by them through C. S. Ludlow. The only other important source during this period was the collecting of C. S. Banks. He sent excellent material of many species to both the British Museum and the National Museum, but retained most of the types in Manila, where they were all destroyed in the seizure of that city by the Allied forces in World War II. Following World War II, several collections of mosquitoes from the Philippines were deposited in the National Museum. Important among these contributions are those of H. Hoogstraal, K. V. Krombein, S. E. Shields, J. H. Paullus, J. T. Medler, and A. B. Gurney.

Additional important collections, all made during World War II, that were drawn upon for this paper are those of the Academy of Natural Sciences of Philadelphia, collected by H. R. Roberts; the California Academy of Sciences, collected by E. S. Ross; and Cornell University, collected by J. G. Franclemont. Representative portions of the *Aedes* collection of the Philippine Bureau of Health (made by F. E. Baisas and his associates) were also drawn upon.

A number of the types of Philippine species occur in the British Museum and these were all extensively studied and compared by the senior author in 1946.

Explanations

In the period from 1946 to 1951, the following series of 10 papers was published on Philippine *Aedes* species (48 in all) contained in the NAMRU-2 collection: Knight and Rozeboom (1946), Laffoon (1946), Knight (1946), Knight and Laffoon (1946), Rozeboom (1946), Knight (1947, 1947*a*, 1947*b*, 1948), and Knight and Hull (1951). Because of the limitations of space and to avoid extensive duplication, the descriptive and biological sections and the illustrations for all the species treated in the above series of papers are omitted from this present work.

The specimens in the NAMRU-2 collection of the remaining Philippine *Aedes* species are here reported for the first time. The bulk of the collection used for the previously published treatments is deposited in the National Museum and is listed in the distribution section for each species following the heading, U.S.N.M. The published records of this material are not included under "Literature Record" of distribution, except for the subgenus *Aedes*. The material not previously published is given after the heading, R.K.L. The names of collectors and the number of specimens included have been omitted from those records which have been previously published. In a few other cases, the number of included specimens has been omitted because it is no longer available.

In general, the morphological descriptive terminology employed here is that used and explained by Carpenter, Middlekauff, and Chamberlain (1946). However, several departures from this terminology have been made. Chief among these are the following: the treatment of the paratergite as a pleural sclerite instead of a mesonotal structure, where it morphologically belongs (this has been done for convenience since it is more easily noted when an examination of the pleural sclerites is being made); the use of the term meteosternum for the area designated by them as the metamer; the use of

Marshall's (1938: 40) larval head hair numerical nomenclature; and the listing of the larval eighth abdominal segment hairs in dorsal-ventral order with Arabic numerals.

Subgeneric synonyms are given only in those cases where they were first applied to a species that occurs in the Philippines. The subgeneric descriptions apply specifically only to Philippine species.

Unless otherwise stated, the data included under bionomics are those gathered in the formulation of the NAMRU-2 collection.

The figures in this paper were not drawn to scale. Illustrations marked with the initials WBH were made by the junior author.

A dagger (†) in the synonymy sections denotes types that have been examined by us.

The following abbreviations are used in the descriptions. Adult: *apn*—anterior pronotal lobe; *ppn*—posterior pronotal lobe. Larva: *isc*—inner or upper caudal hair of the anal segment; *osc*—outer or lower caudal hair of anal segment; *lb*—lateral hair on anal plate.

The following abbreviations are used in the species distribution sections to denote the present locations of specimens examined. A.N.S.P.—Academy of Natural Sciences of Philadelphia; C.A.S.—California Academy of Sciences; U.S.N.M.—U. S. National Museum; B.M.—British Museum (Natural History); C.C.—Cornell University; R.K.L.—specimens from the collection of Naval Medical Research Unit No. 2 on which nothing has been previously published and which are now deposited in the U. S. National Museum, the Johns Hopkins University, the Knight collection, the California Academy of Sciences, and the British Museum.

To obtain uniformity in the listing of the distribution of each species, the *Gazetteer to Maps of the Philippine Islands*, second edition, 1944, published by the Army Map Service, Corps of Engineers, U. S. War Department, has been used for the spelling of all place names. The islands of Luzon, Cebu, Panay, Negros, and Mindanao are divided into provinces, and in nearly every case distribu-

Hakansson, MC, USN, for the initiation of this project, and to Captain C. F. Behrens, MC, USN, and Captain A. R. Behnke, MC, USN, for their continuing support of the work. The senior author wishes to express his sincere appreciation to Captain J. J. Saper, MC, USN, for permission to complete this work after coming to his command at U. S. Naval Medical Research Unit No. 3.

For the invaluable privilege of examining material we wish to thank the following: Dr. Alan Stone, National Museum; Dr. H. R. Roberts, Academy of Natural Sciences of Philadelphia; Dr. E. S. Ross, California Academy of Sciences; Mr. F. E. Baisas, Philippine Bureau of Health; Mr. H. Oldroyd, British Museum (Natural History); and Dr. Robert Matheson, Cornell University.

Portions of this work were done in space provided at the National Museum and at the British Museum through the courtesy of Dr. E. A. Chapin and Mr. N. D. Riley, respectively.

KEYS TO THE PHILIPPINE SPECIES OF *Aedes*

Adult Key

- 1. Tarsi all dark..... 2
At least the hind tarsi with pale markings..... 30
- 2. Scutellar scales narrow..... 3
Scutellar scales broad, or mostly so.. 17
- 3. Vertex dorsum, scutum, and scutellum with conspicuous yellow scaling..... 4
Vertex dorsum, scutum, and scutellum largely dark-scaled, not with yellow scaling (*Aedes*)..... 5
- 4. Scutum with a broad area of yellow scales along lateral margin, central portion dark-scaled; wing with pale scaling along vein 1 to junction with stem of vein 2, on vein 5, and, in female, also on Sc.....
..... (*Banksinella*) *lineatopennis*
Scutum with narrow longitudinal medial and lateral lines of yellow scaling; wing dark-scaled.....
..... (?*Aedimorphus*) *ostentatio*

- 5. Abdominal tergites II–VIII always with some white or yellowish basolateral markings, sometimes produced onto dorsum or sometimes reduced to only a few scales; (hind claws simple)..... 6
Abdominal tergites II–VIII entirely brown (in *dux* sometimes with lateral border grayish or sometimes with an indefinite baso-lateral patch of paler brown scales on last few only); (mesepimeron never with more than 4 hairs behind scale patch, none below; about 5–10 small upright-forked scales on nape on either side of mid-line; about 10–12 verticillate bristles on most antennal segments of male)..... 15
- 6. Anterior median portion of sternopleuron with 6 or more fine hairs; (sternites almost entirely white).. 7
Anterior median portion of sternopleuron bare of hairs or with only 1–2 (rarely up to about 8 very small hairs in *butleri* but this species with a considerable portion of the sternites brown-scaled and the scutal integument blackish-brown)..... 9
- 7. Male ninth tergite with a very large median Y-shaped process about as long as basistyle, each branch with an additional hairy branch on its sternal surface; female terminalia with atrial hairs confined to median area, preatrial plates not united...
..... (*Aedes*) *macrodixoa*
Male ninth tergite without such a process; female terminalia with atrial hairs not confined to median area and preatrial plates united for greater part of their length (female of *nubicolus* unknown)..... 8
- 8. Basistyle with a group of about 8–9 stout spines apically on the inner sternal margin; paraproct short; two very long processes arising near apex of basistyle, one with 3–4 stout spines near tip..... (*Aedes*) *uncus*
Inner sternal margin of basistyle without a group of stout spines; paraproct longer than basistyle; a broad

- process near apex of basistyle with a row of about 4 heavy spines apically.....(*Aedes*) *nubicolus*
9. Meteusternum with numerous fine hairs; basistyle with a group of about 8 stout spines on the inner sternal margin near the base; (male fore and mid legs with claws unequal, the larger ones uniserrate, the smaller simple)..... 10
- Meteusternum without hairs; basistyle without such a group of spines..... 12
10. Apico-tergal prolongation of basistyle very wide, its 2 distal forks about equal in length; only 2 other long apical processes, sometimes a more sternal short spine also visible.....(*Aedes*) *adustus*³
- Apico-tergal prolongation of basistyle otherwise; three other long apical or subapical processes present... 11
11. Apico-tergal prolongation of basistyle very wide.....(*Aedes*) *johnsoni*³
- Apico-tergal prolongation of basistyle much narrower.....(*Aedes*) *margarseni*³
12. Mesepimeron with at least 2 hairs below scale patch, usually more numerous..... 13
- Mesepimeron with a number of bristles along upper margin but with no hairs ventral to scale patch and never more than 3-4 behind it... 14
13. Upper sternopleural scale patch usually extending to anterior median angle of sclerite; abdominal sternites II-VII with a wide basal white band, covering at least basal one-half of each segment; male with claws of fore and mid legs equal and toothed, and dististyle simple; female with postatrial sclerite not trilobed...
.....(*Aedes*) *panayensis*
- Upper sternopleural scale patch never extending to the anterior median angle of sclerite; sternites entirely dark brown or with some white scales on basal one-third; male with claws of fore leg unequal, toothed, claws of mid leg unequal, simple, and dististyle forked; female with postatrial sclerite trilobed.....
.....(*Aedes*) *butleri*
14. Scutal integument dark reddish-brown; sternites II-VII with about basal two-thirds of each segment white; male with smaller claws of fore and mid legs each with a small tooth, basistyle with a large patch of flat white scales laterally, and the paraproct forked beyond the middle; female without a large round dark preatrial plate in addition to the paired preatrial plates.....
.....(*Aedes*) *campylostylus*
- Scutal integument blackish-brown; sternites II-VII brown; male with smaller claws of fore and mid legs simple, basistyle with flat brown scales only, and the paraproct simple; female with a large round heavily pigmented preatrial plate in addition to the paired preatrial plates.....(*Aedes*) *nigrotarsis*
15. Hind claws simple in both sexes; female with a pair of hairy processes anterior to the spermathecal eminence.....(*Aedes*) *dux*
- Hind claws unidentate in both sexes; female without paired hairy processes anterior to the spermathecal eminence..... 16
16. Male with larger claw of mid leg simple, smaller claws of fore and mid legs each with a small tooth (females of this and of the following species indistinguishable except on details of the postatrial area; see Laffoon, 1946: 232)..(*Aedes*) *hamistylus*
- Male with larger claw of mid leg with a prominent tooth, smaller claws of fore and mid legs simple.....
.....(*Aedes*) *robertsi*
17. *Ppn* largely clothed with broad overlapping silvery scales; (paratergite with a patch of broad silvery scales)
.....(*Finlaya*) *paradissimilis*⁴

³These three species are separable only on details of the male terminalia.

⁴This group of species is separable only on a combination of larval and male terminalic characters which are discussed in the species treatments.

- (*Finlaya leucopleurus*)
- (*Finlaya luzonensis*)
- (*Finlaya leucomeres*)
- Ppn* not clothed with broad overlapping silvery scales..... 18
- 18. Scutum with prominent anterior white scaling..... 19
 - Scutum without anterior white scaling, or, if present, occurring only in small spots..... 22
- 19. Scutal white-scaled area in female not extending to lateral margin over most of paratergite; male with a line of short stiff curved setae along inner tergal margin of basistyle, followed laterally by a line of thinner setae; baso-tergal scale clump of basistyle with scales narrow, elongate, and mostly of rather uniform length; claspette filament only slightly swollen medially and of uniform texture.... (*Finlaya laoagensis*)
- Scutal white-scaled area in female extending along lateral margin to wing base, or at least to level of prealar region; male terminalia without the above combination of characters..... 20
- 20. Mid femur of female with a median elongate silvery-scaled area on the ventral half of the anterior surface; baso-tergal portion of basistyle with a clump of long setae, none of them striated (one specimen had 2 setae with a very few striations).....
 - (*Finlaya saperoi*)
 - Mid femur of female with anterior surface dark medially except possibly on extreme ventral margin; baso-tergal portion of basistyle with a clump of specialized scales (to be distinguished from normal abdominal type scales)..... 21
- 21. Baso-tergal scale clump of basistyle with some of the scales very broad, others slender and elongate; claspette filament distinctly enlarged medially, the enlarged portion clear..... (*Finlaya lacteus*)⁵
- Baso-tergal scale clump of basistyle with scales setiform; claspette filament evenly and only slightly swollen to middle, of uniform texture..... (*Finlaya niveus*)⁵
- 22. Femora with anterior surface apically dark; scutellum dark-scaled..... 23
 - Femora with an apical white spot on the anterior surface, at least on mid and hind legs; scutellum pale-scaled (white or silvery)..... 28
- 23. Mesepimeron and meteusternum with a number of short fine brownish hairs present; (male palpi approximately 0.6-0.7 as long as the proboscis; mesepimeron with a patch of brownish-white scales).....
 - (*Geoskusea baisasi*)
 - Mesepimeron and meteusternum without short fine hairs (however, *curtipes* possesses several long fine hairs just below mesepimeral scale patch)..... 24
- 24. Pleuron with a patch of broad white scales on propleuron and mesepimeron and with two patches present on the sternopleuron..... 25
 - Pleuron with a few translucent scales (mostly in a single patch), or bare.. 26
- 25. Mesepimeral scale patch confluent with the dorsal hair tuft; hind femur usually with pale scaling ventrally on basal half of anterior surface...
 - (*Skusea fumidus*)
 - Mesepimeral scale patch not confluent with the dorsal hair tuft; hind femur darker-scaled anteriorly.....
 - (*Skusea amesii*)
- 26. First hind tarsal segment as long as, or slightly longer than, the hind tibia; acrostichal bristles present; no lower mesepimeral bristles...
 - (*Rhinoskusea longirostris*)
 - First hind tarsal segment shorter than hind tibia; acrostichal bristles absent; lower mesepimeral bristles present..... 27
- 27. Hind femur anteriorly dark; pleuron yellowish-brown; mesepimeron not with several fine hairs between the dorsal hair tuft and the lower me-

⁵These two species can only be separated on the basis of male terminalic and of larval characters.

- sepi-meral bristles.
 (*Cancraëdes*) *miachaetessus*
- Hind femur anteriorly with considerable pale scaling on basal half; pleuron grayish-brown to brown; mesepimeron with several fine pale hairs between dorsal hair tuft and lower mesepimeral bristles.
 (*Cancraëdes*) *curtipes*
28. Scutum, femora, and tibiae with small spots of broad silvery scales; median area of vertex mainly with broad white and dark scales.
 (*Aedimorphus*) *punctifemore*
- Scutum, femora, and tibiae without spots of broad silvery scales; median area of vertex mainly with narrow-curved scales. 29
29. Scutum uniformly scaled on dorsal surface; tibial apices creamy; pleural scale patches dull.
 (*Aedimorphus*) *pampangensis*
- Scutum variegated with indistinct spots of pale scaling; tibial apices with a white patch; pleural scale patches white.
 (*Aedimorphus*) *alboscute-llatus*
30. *Ppn* with 10–30 bristles; wing membrane surrounding crossveins clouded; (wings with intermixed pale and dark scaling; lower mesepimeral bristles present). 31
- Ppn* usually with less than 10 bristles; wing membrane not clouded around the crossveins. 33
31. Scutum sparsely clothed with narrow yellow scales (some scattered brown scales may also be present); female palpi barely one-fourth as long as proboscis; a black and yellow species.
 (*Mucidus*) *aurantius quadripunctis*
- Scutum with several twisted tufts of erect long white scales; female palpi over one-half as long as proboscis; brown, white, and yellow species. . . 32
32. 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. (*Mucidus*) *ferinus*
- Fore and mid tibiae without a median white band, occasionally a few pale scales present, however; apical 0.31 or more of fore tibia white-scaled (*Mucidus*) *laniger*
33. Wings profusely spotted with areas of pale and dark scaling; femora and tibiae spotted and ringed with pale scaling for nearly their whole length. 34
- Wings not profusely spotted with areas of pale and dark scaling; femora and tibiae not spotted and ringed with pale scaling. 40
34. Species with yellow, white, and black scaling. 35
- Species with black and white scaling. . . 39
35. Prealar scale patch connected to the dorsal sternopleural patch by a narrow line of broad white scales, from the anterior margin of the dorsal sternopleural patch a similar line extends ventrally and posteriorly to medio-posterior sternopleural scale patch; larger claw of fore and mid male tarsi with a single basal tooth (*Finlaya*) *stonei*
- Prealar scale patch not connected to dorsal sternopleural scale patch with a line of scales, nor is there a line of scales extending ventrally and posteriorly from the dorsal sternopleural patch; larger claw of fore and mid male tarsi bidentate. . . 36
36. Male with pale hairs scattered over the dorsal aspect of most of the abdominal tergites; female tergites with pale hairs numerous basally and apically so that there appears to be a thick fringe of them at the junction of the tergites; (proboscis nearly always without apico-ventral black scales) (*Finlaya*) *luteus*
- Male with pale hairs of tergites confined to lateral and apical margins; female tergites with only a sparse row of pale hairs at the junction of the tergites. 37
37. Proboscis without apico-ventral black scales, occasionally a few scattered ones present; basistyle of male ter-

- minalia without a tergal subapical scale tuft; (latero-dorsal margins of abdominal tergites II-IV of female dark-scaled, or with yellow scaling present as spots or irregular marks only, not as longitudinal markings; *ppn* with few or no black scales) (*Finlaya*) *croceus*
- Proboscis with a patch of apico-ventral dark scales; basistyle with a tergal subapical elongate scale tuft, in addition to the usual inner median sternally projecting tuft. 38
38. Proboscis of male largely dark-scaled laterally and ventrally, except for a median pale band; subapical scale tuft of basistyle dusky; latero-dorsal margins of abdominal tergites II-IV of female with yellow scaling present as spots or irregular marks only. (*Finlaya*) *medleri*
- Proboscis of male with considerable pale scaling laterally and ventrally; subapical scale tuft of basistyle largely pale yellow; latero-dorsal margins of abdominal tergites II-IV of female with longitudinal streaks of yellow scaling. (*Finlaya*) *flavipennis*
39. Lateral scutellar lobes covered with broad scales, these white except for a few apical dark ones; segment I of fore tarsus with some basal white scales. (*Finlaya*) *poicilius*
- Lateral scutellar lobes with narrow-curved yellowish scales; segment I of fore tarsus without basal white scales. (*Finlaya*) *ananae*
40. Scutum marked with a pattern of several (3-5) narrow longitudinal white or yellow lines, one of the lines being median in position. 41
- Scutum not marked with a pattern of 3-5 narrow longitudinal pale lines. 47
41. Tarsi all dark except for a small basolateral white patch on hind tarsal I (*Stegomyia*) *aurotaeniatus*
- Hind tarsi with basal white bands on at least first 3 segments. 42
42. Postspiracular area not scaled; (hind tarsus with basal and apical bands on I-III, a basal band on IV, V dark or else pale above). (*Finlaya*) *aureostriatus*
- Postspiracular area scaled. 43
43. Hind tarsi with basal and apical white bands on I-IV, V all white dorsally; mid femora with a conspicuous longitudinal median white line anteriorly. (*Finlaya*) *banksi*
- Hind tarsi with basal white bands on I-III (rarely also on IV), V all dark; mid femora without an anterior median line. 44
44. Scutum with median longitudinal pale line forked posteriorly at the pre-scutellar bare space. . . (*Finlaya*) *saxicola*
- Scutum with median longitudinal pale line not forked posteriorly. 45
45. Hind tarsi with the first 4 segments with basal white scaling. (*Finlaya*) *sberki*
- Hind tarsi with only the first 3 segments with basal white scaling. 46⁶
46. Prealar scale patch continuous with the upper sternopleural scale patch (*Finlaya*) *jugraensis*
- Prealar scale patch distinctly separated from the upper sternopleural scale patch. (*Finlaya*) *abadsantosi*⁷
- (*Finlaya*) *burgosi*⁷
47. Scutellum with only narrow and narrow-curved scales. 48
- Scutellum mostly or entirely broad-scaled. 51
48. Scutum with considerable areas of white scaling; vertex dorsum largely broad-scaled; (hind tarsal segments III-V dark). . . . (*Finlaya*) *melanopterus*
- Scutum not white-scaled; vertex dorsum largely narrow-scaled. 49
49. Hind femur anteriorly pale except for a dark apical portion and along the dorsal margin; proboscis dark-scaled; paratergite of female not scaled. (*Banksinella*) *imprimens*
- Hind femur anteriorly speckled with pale scaling; proboscis with evident

⁶Since the type description of *rizali* (Banks) is incomplete on a number of points, it has been impossible to take it beyond this point in the key.

⁷Separable only on male and larval characters.

- pale scaling; paratergite of female scaled. 50
50. Subspiracular area scaled; female torus with white scaling.
 (*Aedimorphus*) *vexans nocturnus*
 Subspiracular area without scales; female torus not scaled.
 (*Ochlerotatus*) *vigilax ludlowi*
51. Hind femora anteriorly dark, marked with a complete broad white band just before the middle and with a wide ventro-apical white area; lateral scutellar lobes narrow-scaled.
 (*Finlaya*) *harperi*
 Hind femora not marked as above; scutellum all broad-scaled. 52
52. Vertex dorsum narrow-scaled, at least along the mid line; scutum brown-scaled, marked with a rather indefinite pattern of small clusters of yellowish scales; some of the hind tarsal segments with narrow apical yellowish bands.
 (*Aedimorphus*) *mindoroensis*
 Vertex dorsum mid line at least partially broad-scaled; scutum not scaled as above; hind tarsal segments not marked with apical yellowish bands. 53
53. Vertex dorsum broad-scaled except for a diamond-shaped anterior area of narrow white scales medially; paratergite bare. 54
 Vertex dorsum all broad-scaled (may be a few narrow scales on nape and along eye margins); paratergite scaled (not in *platylepidus*) 59
54. All three lobes of scutellum largely covered with broad white scales. 55
 Only mid scutellar lobe with broad white scales, lateral lobes covered with broad black scales. 57⁸
55. Median stripe of scutum extending posteriorly to the scutellum.
 (*Stegomyia*) *bambusicolus*
 Median stripe of scutum extending only to level of wing bases. 56
56. An area of broad white scales on the lateral margin of the scutum just before level of wing base.
 (*Stegomyia*) *laffooni*
 No area of broad white scales on lateral scutal margin.
 (*Stegomyia*) *arboricolus*
57. Scales of *apn* and *ppn* all dark.
 (*Stegomyia*) *albolineatus*
 At least some of the scales of *ppn* pale, usually some pale scales on *apn* also. 58
58. Median scutal stripe extending posteriorly to scutellum; *ppn* with narrow-curved creamy scales only.
 (*Stegomyia*) *hoogstraali*
 Median scutal stripe extending posteriorly only to level of wing bases; *ppn* with narrow dark scales dorsally and broad white scales below.
 (*Stegomyia*) *bobarti*
- 59.⁹ Hind tarsal segments IV–V all dark. 60
 Hind tarsal segments IV–V with white markings (V sometimes all dark in male of *gardnerii*). 62
60. Hind tarsal segment III with only a narrow basal white band; proboscis with white markings; (scutum with prominent white scaling; a lower mesepimeral bristle present; hind tarsus with narrow basal bands on I–III). (*Chrophersiomyia*) *brayi*
 Hind tarsal segment III dorsally all white, or nearly so; proboscis dark-scaled. 61
61. Scutum narrow-scaled, with an obovate antero-median patch of silvery scales; hind tarsal segment II with a broad basal band; paratergite scaled. (*Stegomyia*) *meronephada*
 Scutum covered with plate-like broad dark scales; hind tarsal segment II all dark or with just a very few basal white scales; paratergite bare.
 (?) *platylepidus*
62. Hind tarsal segment III all dark, broad basal bands on I–II, IV–V all white (may be some apical black scales on V); (scutum marked with

⁸*Aedes* (*Stegomyia*) sp. near *bobarti* is similar to *bobarti* except that all three scutellar lobes are covered with broad black scales.

⁹*A. wainwrighti* at present cannot be keyed beyond this point since hind tarsal segments II–V are missing from the single known specimen.

- a broad obovate median longitudinal white band that tapers to posterior margin)
- (*Stegomyia*) *mediopunctatus perplexus*
- Hind tarsal segments I-V with white markings 63
- 63. Tibiae ringed with white just before the middle; hind tarsal segments IV-V all white, may be a few apical black scales on IV; (scutum marked with a pair of narrow subdorsal white lines from anterior margin halfway to level of wing bases, a large white patch laterally before wing base, and 3 short longitudinal pale lines between the wing bases) (*Stegomyia*) *desmotes*
- Tibiae not ringed near the middle; hind tarsal IV with a distinct apical dark band 64
- 64. Hind tarsal segment V with at least some dark scaling apically, occasionally all dark; the scales along the posterior portion of the scutum all broad; scutum with a pair of broad subdorsal white bands anteriorly and a large white patch before the wing base (*Stegomyia*) *gardnerii*
- Hind tarsal segment V all white; the scales along the posterior margin of the scutum narrow or mostly so; scutum not marked as above 65
- 65. Scutum with a pair of thin longitudinal submedian lines and a paired broadened antero-lateral crescent-shaped marking (composed of broad silvery scales); female clypeus with white scaling (*Stegomyia*) *aegypti*
- Scutum with a narrow tapered median longitudinal band; female clypeus not scaled 66
- 66. Dorsal abdominal bands basal, detached from the lateral spots; pleural scale patches not forming 2 sharply differentiated longitudinal white bands (*Stegomyia*) *albopictus*
- Dorsal abdominal bands subbasal on more posterior segments, attached on at least some segments to the lateral spots; pleural scale patches arranged into 2 sharply differen-

- tiated longitudinal white bands 67
- 67. Mid femur anteriorly with a median longitudinal white line, may be poorly developed in female (rarely absent); scutum with a line of white scales on antero-lateral margin
- (*Stegomyia*) *paullusi*
- Mid femur without anterior median longitudinal pale markings; scutum without a line of white scales on antero-lateral margin
- (*Stegomyia*) *scutellaris*

Fourth Instar Larval Key

1. Anal plate with an acus (otherwise bare except possibly for spicules on posterior margin) 2
- Anal plate without an acus 7
2. Comb of 8-10 teeth in a row
- (*Aedimorphus*) *vexans nocturnus*
- Comb of 16 or more scales in a patch 3
3. Antenna slender, very few fine spicules scattered near base; comb of 40-80 scales 4
- Antenna rather stout, large spicules scattered over most of length; comb of 16-28 scales 5
4. Head hair 4 with 13-16 branches; ventral brush with 10 tufts
- (*Finlaya*) *leucopleurus* (in part)
- (*Finlaya*) *aureostriatus* (in part)
- Head hair 4 with 4-8 branches; ventral brush with 12 tufts 48
5. Antennal hair with 1-4 branches; ventral brush with 15-17 tufts
- (*Ochlerotatus*) *vigilax ludlowi*
- Antennal hair with 5-13 branches; ventral brush with 12 tufts 6
6. Head hair 5 with 6-7 branches; head hair 6 with 4-6 branches; siphon index about 7.0
- (*Aedimorphus*) *pampangensis*
- Head hair 5 with 3-4 branches; head hair 6 with 2-4 branches (usually 3); siphon index 3.5-3.9
- (*Aedimorphus*) *alboscuteclatus*
7. Mouth brushes forming stout, serrate-tipped rods; ventral brush of more than 20 tufts 8
- Mouth brushes normal, usually with comb-like tips; ventral brush of no

- more than 17 tufts. 9
8. Ventral brush with 30–32 tufts; pentad hair 2 single. (*Mucidus*) *ferinus*
 Ventral brush with 22–26 tufts; pentad hair 2 double.
 (*Mucidus*) *aurantius quadripunctis*
9. Comb teeth in a straight or irregular row (3–24 in number). 10
 Comb teeth in a patch or double row (14–100 in number). 34
10. Ventral brush of 8–10 tufts. 11
 Ventral brush of 12–17 tufts. 24
11. Head hair 5 with 4–20 branches; head hair 12 with 10–25 branches. 12
 Head hair 5 with 1–2 branches; head hair 12 with 2–5 branches. 18
12. Pecten with 2–6 teeth; antennal hair tuft with 1–5 branches. 13
 Pecten with 12–24 teeth; antennal hair tuft with 5–17 branches. 15
13. Posterior margin of anal plate with a small area of short spines; stellate hairs of body with 3–6 slender branches. (*Stegomyia*) *hoogstraali*
 Posterior margin of anal plate with a fringe of strong spines; stellate hairs of body with 6–19 stout branches. 14
14. Ventral brush with all elements borne on the barred area. (*Stegomyia*) *laffooni*
 Ventral brush with 2 tufts off the barred area basally.
 (*Stegomyia*) *albolineatus*¹⁰
 (*Stegomyia*) *bobarti*
 (*Stegomyia*) *arboricolus*
15. Comb teeth fringed to just before apex; ventral brush of 10 tufts.
 (*Finlaya*) *niveus*
 Comb teeth not fringed beyond middle; ventral brush of 8 tufts. 16
16. Antennal hair tuft with 10–17 branches; spicules on posterior margin of anal plate minute. (*Finlaya*) *saperoi*
 Antennal hair tuft with 5–8 branches;
- spicules on posterior margin of anal plate stout, long. 17
17. Head hair 4 with 8–10 branches; 5 with 6–8. (*Finlaya*) *laoagensis*
 Head hair 4 with 13–14 branches; 5 with 9–12. (*Finlaya*) *albolateralis*
18. Siphon with a distinct, narrowly attached acus. (*Finlaya*) *harperi*
 Siphon without a true acus. 19
19. Comb teeth borne on a sclerotized plate. 20
 Comb teeth not borne on a sclerotized plate. 22
20. Barred area of ventral brush not connected laterally; a small patch of spines laterally on the posterior margin of the anal plate.
 (*Stegomyia*) *mediopunctatus perplexus*
 Barred area of ventral brush connected to a prominent sclerotized plate on each side; anal plate smooth. 21
21. Head hairs 5 and 7 single; ventral brush hairs single. (*Stegomyia*) *desmotes*
 Head hair 5 with 3–6 branches; 6 with 3–7 branches; ventral brush hairs double or triple. (*Stegomyia*) *bambusicolus*
22. Meso- and metathoracic pleural spines conspicuous, stout, elongate, and usually curved near apex; comb teeth with prominent lateral spines at the base of the long central spine. (*Stegomyia*) *aegypti*
 Meso- and metathoracic pleural spines slender, straight, and not conspicuous; comb teeth bearing only a fine fringe at the base of the long spine. 23
23. Ventral brush with 2–3 hairs off the barred area basally; *lh* inserted in a clear area within the anal plate.
 (*Stegomyia*) *gardnerii*
 Ventral brush with all hairs borne within the barred area; no clear area around point of attachment of *lh*.
 (*Stegomyia*) *scutellaris*
 (*Stegomyia*) *paullusi*
 (*Stegomyia*) *albopictus*
24. Ventral brush with 14 or more tufts. 25
 Ventral brush with 12 (rarely 11 or 13) tufts. 27
25. Ventral brush of 16–17 tufts; anal plate complete. (*Banksinella*) *imprimens*

¹⁰These species have been provisionally separated as follows:
 Anal gills finger-like, about twice the length of the anal plate (1.6–2.2). *albolineatus*
 Anal gills tapered from base, about 1.5–1.8 times longer than anal plate. *bobarti*
 Anal gills tapered from base, occasionally somewhat lanceolate; dorsal pair 1.05–1.15 times longer than anal plate *arboricolus*

- Ventral brush of 14–15 tufts; anal plate incomplete..... 26
26. Head hairs 5 and 6 with 3 (sometimes 2) branches with the median branch stouter and much longer than the lateral branches; antennal spicules darkly pigmented... (*Aedes nigrotarsis*)
Head hair 5 with 1–4 branches; hair 6 single, stout; antennal spicules pale..... (*Aedes uncus*)
27. Head hair 15 developed as a stout, curved, horn-like projection.....
..... (*Stegomyia meronephada*)
Head hair 15 normal, small, usually branched..... 28
28. Pecten teeth evenly spaced, 20–24 in number..... (*Finlaya lacteus*)
Distal pecten teeth more widely spaced, 5–20 in number..... 29
29. Ventral brush with 3–5 tufts off the barred area basally; comb teeth with a strong central spine about as long as the base of the teeth; antennal spicules stout, dark.....
..... (*Banksinella lineatopennis*)
Ventral brush with 1–2 tufts off the barred area basally; comb teeth with central spine no more than one-half as long as base of teeth, or with no prominent central spine present; antennal spicules small, pale..... 30
30. Comb teeth with a complete apical fringe, no prominent terminal spine; pentad hair 2 with 4–6 branches; mentum with 11–13 lateral teeth...
..... (*Aedes butleri*)
Comb teeth with a distinct terminal spine; pentad hair 2 with 1–3 branches..... 31
31. Mentum with 8–11 lateral teeth; anal gills 1.0–1.5 times as long as anal plate..... (*Aedes dux*)
Mentum with 13 or more lateral teeth; anal gills at least 1.7 times as long as anal plate..... 32
32. Head hair 5 with 2–3 branches; hair 6 with 2–4 branches.... (*Aedes robertsi*)
..... (*Aedes hamistylus*)
Head hair 5 with 5–10 branches; hair 6 with 4–8 branches..... 33
33. Mentum with 18–20 lateral teeth; prothoracic hair 2 single; prothoracic hair 8 double..... (*Aedes campylostylus*)
Mentum with 13–18 lateral teeth; prothoracic hair 2 single or double (usually double); prothoracic hair 8 single or double (usually single)
..... (*Aedes johnsoni*)
..... (*Aedes margarsen*)
34. Antennal hair with 5–7 branches (rarely 4)..... 35
Antennal hair with 1–4 branches.... 36
35. Siphon index 3.4–3.8; pecten teeth with lateral fringe; comb scales with blunt, fringed tips.....
..... (*Rhinoskusea longirostris*)
Siphon index about 2.7; pecten teeth with 2–4 large denticles; comb scales simple, sharply pointed....
..... (*Canacraëdes curtipes*)
36. Ventral brush with 10 tufts (rarely 9 or 11)..... 37
Ventral brush with 12 tufts (rarely 11 or 13)..... 46
37. Anal plate bare, or with a few small spicules..... 38
Anal plate with long spines or scales on posterior margin..... 40
38. Pecten with 23–26 close-set teeth with basal denticles.....
..... (*Finlaya leucopleurus* (in part))
..... (*Finlaya aureostriatus* (in part))
Pecten with 7–17 teeth; each with fringe along entire ventral margin. 39
39. Head hair 4 with 6–10 branches.....
..... (*Skusea amesii*)
Head hair 4 with 13–20 branches....
..... (*Skusea fumidus*)
40. Pecten with 18–29 teeth.....
..... (*Finlaya melanopterus*)
Pecten with 4–13 teeth..... 41
41. Preclypeal spine with at least 2 branches (rarely single in *poicilius*); prothoracic hair 0 large, stellate, with at least 9 branches; margin of anal plate ventral to *lh* with large spines..... 42
Preclypeal spine single; prothoracic hair 0 small, with not more than 5 branches; no spines ventral to *lh* on margin of anal plate..... 44

42. Mandible with a large dark tooth anterior to the longest tooth; scales in distal row of comb patch without a pair of distinct lateral denticles near base; (hair 11 of meso- and metathoracic pleural groups short, weak, with 2-4 branches).... (*Finlaya stonei*)
Mandible without a large dark tooth anterior to the longest tooth; scales in distal row of comb patch with a paired baso-lateral denticle..... 43
43. Preclypeal spine with 3-6 branches; head hair 4 candelabra-like (rarely fan-like), with 11 or more branches; hair 11 of meso- and metathoracic pleural groups prominently stellate, with many branches. . (*Finlaya ananae*)
Preclypeal spine double (rarely single); head hair 4 with 3-7 branches; hair 11 of meso- and metathoracic pleural groups single, stoutly spinose, short..... (*Finlaya poicilius*)
44. Hair 11 of meso- and metathoracic pleural groups single, fairly long, stout, spinose; head hair 7 with 2-3 branches..... (*Finlaya luteus*)
..... (*Finlaya croceus*)
Hair 11 of meso- and metathoracic pleural groups very short, slender, single or double, not spinose; head hair 7 with 4-7 branches..... 45
45. Siphon and anal plate very dark brown..... (*Finlaya flavipennis*)
Siphon and anal plate pale yellow..... (*Finlaya medleri*)
46. No stellate hairs present; body integument not pilose..... 47
Stellate hairs developed to various degrees; integument slightly to densely pilose..... 49
47. Head hair 5 with 7-12 branches; posterior margin of anal plate with a patch of strong spines. (*Finlaya banksi*)
Head hair 5 with 1-2 branches; posterior margin of anal plate with very short or fine spicules only..... 48
48. Lateral hairs on abdominal segments I and II double, stout, darkly pigmented; fringe on apical margin of some comb scales with central element enlarged. . (*Finlaya paradisimilis*)
Lateral hairs on abdominal segments I and II with 3-4 branches, moderately stout, brown in color; apical fringe on comb scales even.....
..... (*Finlaya luzonensis*)
49. The apical 2-5 pecten teeth ventrally out of line with the others.....
..... (*Finlaya abadsantosi*)
..... (*Finlaya sherki*)
The apical 2-5 pecten teeth not ventrally out of line with the others (may be dorsally out of line in *burgosi*)..... 50
50. Metathoracic hair 7 with 7-9 branches, normal, slender, elongate; *lh* with 2 or more branches.....
..... (*Finlaya burgosi*)
Metathoracic hair 7 with 3-5 branches, relatively short, stout, stellate-like, barbed; *lh* single..... 51
51. No simple (without denticles) pecten teeth apically and no teeth distad of the siphon hair tuft base.....
..... (*Finlaya jugraensis*)
Two to 4 simple teeth beyond the base of the siphon hair tuft and usually 1-3 simple teeth basad of the hair tuft..... 52
52. Mesothoracic hair 1 with 1-4 branches; metathoracic hair 1 with 1-5 branches..... (*Finlaya saxicola*)
Mesothoracic hair 1 with 8-9 branches; metathoracic hair 1 with 11-14 branches.... (*Finlaya*) sp. near *saxicola*

SYSTEMATICS

Genus *Aedes* Meigen

1818. *Aedes* Meigen, Syst. Besch. 1: 13.
Genotype: *cinereus* Meigen.

ADULT: Distinct from all the other Philippine genera of the tribe Culicini, except *Mansonia* (*Mansonioides*) and *Armigeres* (*Armigeres*), by the possession of postspiracular bristles. From the former, *Aedes* is distinct in lacking specialized teeth on the female eighth tergite and in not having asymmetrical broad wing scales. From the latter, the genus *Aedes* is distinct with certainty only in the larval

stage, i.e., by the presence of a pecten on the siphon. However, the general habitus of the *Armigeres* adult is relatively distinct, and the proboscis is generally stouter and more conspicuously recurved. Other important characters of the genus *Aedes* are: Prescutellar bristles present (not in *platylepidus*). *Apn* lobes widely separated. Postnotum without setae. Spiracular bristles absent. Upper margin of meron above level of base of hind coxa. Pulvilli absent, or hair-like. Squama with a fringe of bristles (more than four). Wing with distinct microtrichia. Vein 6 reaching beyond base of fork of vein 5.

LARVA: Not distinct from that of *Heizmannia*, but distinguished from the other genera in the Philippines by the combination of the following characters: Siphon with a pecten and with only a single pair of ventral hair tufts, and ventral brush of eighth segment including at least four hairs.

DISTRIBUTION: Worldwide. Of the 23 recognized aedine subgenera, 12 are known to occur in the Philippines. The following subgenera have not yet been found there: *Chaetocruomyia*, *Diceromyia*, *Dunnius*, *Howardina*, *Indusius*, *Leptosomatomyia*, *Levua*, *Macleaya*, *Pseudoskusea*, *Kompia*, and *Soperia*.

Faunistically the Philippine Islands are a part of the Oriental Region. This is well illustrated in the genus *Aedes*. Of the 74 known Philippine species, only 11 also occur in the Australasian Region, 2 in the Ethiopian Region, and 1 in the Palaearctic Region. Within the Oriental Region the Philippine *Aedes* fauna is an intimate part of the Malayan Subregion. However, as would be expected from the isolated position of the Philippines, the *Aedes* fauna there is particularly rich in endemic forms, 46 species at present being in this category.

Subgenus MUCIDUS Theobald

1901. *Mucidus* Theobald, Mon. Cul. 1: 268.
Genotype: *alternans* Westwood (Australia).

ADULT: Distinguished from all the other subgenera in the Philippines by either of the following: Wing membrane surrounding crossveins 2-3, 3-4, and 4-5 clouded, these three approximated; *ppn* with 10-30 bristles. Other characters: Palpi of male as long as or longer than proboscis. Vertex dorsum and scutellum narrow-scaled. Paratergite scaled. Lower mesepimeral bristles present. Fore and mid tarsal claws of male unequal, larger claw bidentate or unidentate, smaller unidentate; hind claws equal, simple or unidentate; of female equal, each unidentate. *Terminalia*: Basistyle with a weakly developed basal lobe, but without an apical lobe. Mesosome simple. Claspettes present.

LARVA: Distinguished from all the other subgenera in the Philippines by any of the following: Mouth parts modified for predacity, the mouth brushes forming matted tufts of serrate-tipped rods and the mandibular teeth very large and strong; head hair 4 considerably external to hairs 5 and 6; ventral brush extending the complete length of the anal segment. Habitat—temporary ground pools.

DISTRIBUTION: The 13 known species and subspecies are confined to the tropics of the Ethiopian, Oriental, and Australasian Regions. Two species and one subspecies are known from the Philippines.

SYSTEMATICS: The subgenus has been divided by Edwards (1932) into two groups: Group A (*Mucidus*) and Group B (*Pardomyia*) (see adult species key for separation points). Group A is represented in the Philippines by *ferinus* Knight and *laniger* (Wiedemann) and Group B by *aurantius quadripunctis* (Ludlow).

Aedes (*Mucidus*) *ferinus* Knight

1947. *Aedes* (*Mucidus*) *ferinus* Knight, Jour. Wash. Acad. Sci. 37: 316 (males, females, pupae, larvae). Type locality: Philippines. San Ramon (Penal Farm), City of Zamboanga Prov., Mindanao (Laffoon and Knight). Type: Male (holotype), with

associated larval and pupal skins, in U. S. N. M. †

DISTRIBUTION: *Specimens examined*. U.S.-N.M. Luzon: Olongapo, Subic Bay, Zambales Prov. Mindanao: San Ramon (Penal Farm) and Zamboanga, City of Zamboanga Prov. A.N.S.P. Leyte: Dulag, C.C. (1 female). Luzon: San Miquel, Tarlac Prov. (Franclemont).

Unknown outside the Philippines.

DISCUSSION: In addition to being closely related to *laniger* (Wied.), this species is also similar to *scatophagoides* (Theo.), from which it differs in tarsal markings and male genitalia (Knight, 1947a: 319). The pupal abdomen has been figured by Knight and Chamberlain (1948: fig. 25).

Aedes (Mucidus) laniger (Wiedemann)

1821. *Culex laniger* Wiedemann, Dipt. Exot., p. 9 (female). Type locality: Java. Type: In Copenhagen Museum.

1901. *Mucidus laniger* Wiedemann. Theobald, Mon. Cul. 1: 269. Different combination.

1906. *Mucidus mucidus* Karsch. Banks, Phil. Jour. Sci. 1: 983. Misidentification.

1908. *Mucidus mucidus* Theobald. Leicester, Cul. Malaya, p. 69. Error in author assoc., and misidentification.

Adult partially described by Barraud (1934: 147) and Knight (1947a: 320). The latter paper also discusses the systematics of this species. The larva is undescribed.

DISTRIBUTION: *Specimens examined*. U.S.-N.M. Mindanao: Ludlow Barracks, Parang. Pettit Barracks, Zamboanga, City of Zamboanga Prov.

Literature records. Mindoro: Calapan (Edwards, 1929: 5). Luzon: Manila, Manila Prov. (Banks, 1906: 983). This record is to be questioned since the species was merely listed as *Mucidus mucidus* Karsch and thus could equally well be *ferinus*.

Known also from Sumatra, Celebes, Java, Malaya, Indo-China, Ceylon, and (?) Assam.

DISCUSSION: Because of the incompleteness

of Wiedemann's description and because of the discrepancies existing between it and the specimens assigned to this species by various authors, the exact identity of *laniger* will remain doubtful until either the types, or specimens from the type area, are studied. It is quite possible that, when more material is available from the Philippines, *ferinus* and the above-mentioned Philippine specimens of *laniger* will prove to be one and the same species. Whether or not the Philippine material will then prove to be specifically different from that of the Netherlands East Indies remains to be seen.

Aedes (Mucidus) aurantius quadripunctis (Ludlow)

1910. *Pardomyia quadripunctis* Ludlow, in Theobald, Mon. Cul. 5: 608 (female). Type locality: Philippines. Parang, Mindanao (Page). Type: Female (holotype), in U. S. N. M. †

1932. *A. (M.) aurantius* var. *quadripunctis* Ludlow. Edwards, Genera Insectorum, fasc. 194: 135. Different combination.

1945. *Aedes (Mucidus) quadripunctis* (Ludlow). Bohart, Syn. Phil. Mosq., p. 55. Different combination.

Adult and larva have been fully described by Knight (1947a: 322).

DISTRIBUTION: *Specimens examined*. U.S.-N.M. Mindanao: Type female, Parang. A.N.S.P. Leyte: Tacloban. Dulag.

Unknown outside the Philippines.

DISCUSSION: In a previous treatment (Knight, 1947a), the senior author followed Bohart (1945: 55) in considering *quadripunctis* a full species. However, in view of the obviously close relationship of this form to *aurantius* and its subspecies, we have here considered it a subspecies (following Edwards, 1932: 135, except that he classed *quadripunctis* as a variety). From the little that we know at present of the *aurantius* complex it would appear that the subspecies are truly geographic in nature, as follows: *a. quadripunctis*

from the Philippines; *a. aurantius* (Theobald) from Malaya, Borneo, Sumatra, and New Guinea; *a. chrysoaster* (Taylor) from Queensland; and *a. painei* Knight (formerly *a. nigrescens*) from the Solomons.

This subspecies is primarily distinct from the other members of the *aurantius* complex on the color of the scutal scaling.

Subgenus OCHLEROTATUS Lynch Arribalzaga

1891. *Ochlerotatus* Lynch Arribalzaga, Rev. Mus. La Plata 2: 143. Genotype: *confirmatus* L. A. (syn. of *scapularis* Rondani) (South America).

ADULT: Distinguished from all the other subgenera in the Philippines by a combination of the following: Male palpi as long as the proboscis, mesosome simple, claspettes present and with filament setiform, and basistyle with a distinct basal lobe. Other characters are: Male palpi approximately equal to the proboscis in length; segment III with apex upturned, IV and V declined; the apex of III and all of IV and V with a dense band of long, laterally and ventrally directed hairs. Vertex dorsum and scutellum narrow-scaled. Acrostichal and dorso-central bristles present. Paratergite usually with sparse scaling. Lower mesepimeral bristles absent. Fore and mid tarsal claws of male unequal, larger claw bidentate (mid of *vigilax ludlowi* has median tooth reduced to a swollen area), smaller unidentate; of female equal and unidentate; hind claws simple in both sexes. *Terminalia*: Basistyle with a distinct basal lobe. Dististyle appendage apical. Mesosome simple. Claspettes present, with distinct spine- or bristle-like filament.

LARVA: Separable from all the other subgenera in the Philippines, except *Aedimorphus* and some specimens of the *Finlaya* species *leucopleurus* and *aureostriatus*, by the possession of an acus on the anal plate. Antennal hair tuft with 1-4 branches. Head hair 4 with 4-5 branches, 5 and 6 single. Comb with 23-28 scales in a patch. Siphon with an attached acus; 5-12 pecten teeth,

evenly arranged. Anal plate incomplete. Ventral brush with 15-17 tufts, all but the basal two arising from a laterally connected barred area. Habitat—temporary, brackish ground pools.

DISTRIBUTION: This is a very large subgenus with many species in all the regions of the world except the Ethiopian and Oriental, where it is represented by only a few species. The single form found in the Philippines is a subspecies of a species common throughout the Australasian Region.

SYSTEMATICS: Edwards (1932: 136) divided the subgenus into eight groups, with the single Philippine species falling into Group A (*taeniorhynchus*-group: *Culicelsa*). This group is distinguished by the absence of a definite apical lobe on the basistyle, and in having the claspette filament bristle-like.

Aedes* (*Ochlerotatus*) *vigilax ludlowi
(Blanchard)

Figs. 2, 3

1903. *Culex annulifera* Ludlow (nec E. Blanchard, 1852), Jour. N. Y. Ent. Soc. 11: 141 (females). Type locality: Philippines. Mangarin, Mindoro (Suggs). Type: Female lectotype here designated from a series of nine female cotypes in the U. S. N. M.† One female cotype also exists in the British Museum.
1904. *Culex annuliferus* Ludlow. Ludlow, Can. Ent. 36: 72. Emendation.
1905. *C. Ludlowi* R. Blanchard, Les Moust., p. 630. Nom. nov.
1917. *Ochlerotatus annuliferus* (Ludlow). Edwards, Bul. Ent. Res. 7: 215. Different combination.
1922. *Aedes* (*Ochlerotatus*) *vigilax* (Skuse). In part. Edwards, Bul. Ent. Res. 13: 99. Synonymized *ludlowi*.
1925. *Culex ludlowi* Theobald. Dyar and Shannon, Ins. Insc. Mens. 13: 76. Error in author association.
1929. *annulipes* Ludl. Edwards, Notulae Ent. 9: 2. In error for *annulifera* when quoted as a synonym of *vigilax*.

ADULT: A medium-sized brown species with pale markings on the proboscis, scutal scales brown (female) or brownish-golden (male), abdominal tergites possessing straight basal white bands, and all the hind tarsal segments marked by basal white bands.

Male. Length of wing 3.0–3.5 mm. *Head:* Proboscis dark, marked with a pale-scaled area beginning at basal one-third on the ventral and lateral aspects and extending to just beyond the middle, the medial portion of this band extending onto the dorsum and forming a complete band. Palpus approximately equal to proboscis in length, with basal white rings on the last three segments. Torus bare. Vertex dorsally with pale narrow scales and pale and dark upright-forked scales (the pale uprights being medial and the dark ones lateral); laterally with a patch of broad creamy scales. *Thorax:* Scutum clothed with small narrow brownish-golden scales; the scales on the prescutellar area and on the scutellum narrow and pale yellow. *Apn* with narrow-curved pale yellowish scales, sometimes a few broadened scales also apparent; *ppn* rather thinly covered with mixed narrow and broad dark scales (the broad scales being mostly ventral), in addition there are a few narrow yellow scales present dorsally and a few broad pale scales ventro-posteriorly. Following pleural areas each with a small patch of broad cream-colored scales: propleural, paratergite (very few and frequently none), postspiracular, prealar (below the knob), upper sternopleural, medio-posterior sternopleural, and upper mesepimeral (this patch begins on the anterior border adjacent to the upper sternopleural patch; in addition there is a more or less detached group of mixed broad and narrow pale scales associated with the hair tuft). No lower mesepimeral bristles. *Legs:* Femora dark-scaled, anteriorly marked with scattered pale scaling, posteriorly partially pale-scaled (the hind femur extensively so). Tibiae dark, fore and mid with posterior pale scaling. Fore and mid tarsi with narrow basal white bands on I–III; hind tarsus with

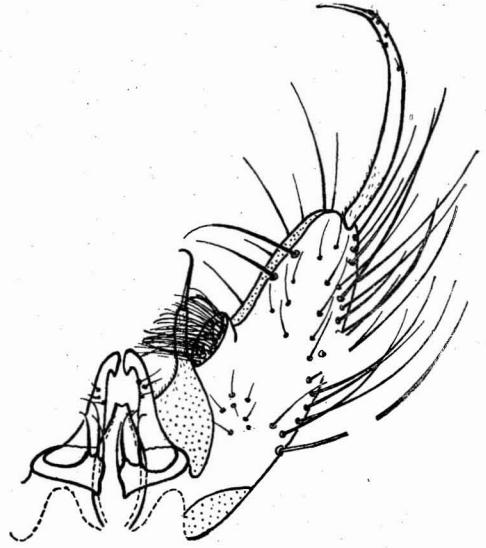


FIG. 2. *A. (Ochlerotatus) vigilax ludlowi*. Male terminalia (Luzon).

basal white bands on all segments, broad on II–V. Fore tarsal claws unequal, the larger claw bidentate, the smaller unidentate; mid tarsal claws unequal, the larger claw with a basal tooth and a swollen area medially, the smaller unidentate; hind tarsal claws equal, simple. *Wing:* Dark-scaled. *Abdomen:* Tergite I with a lateral patch of creamy scales, II–VII with straight basal creamy-white bands. Sternites pale-scaled with apical dark-scaled bands. *Terminalia:* Basistyle with a prominent, densely setose basal lobe; two rather stout bristles subapically on the inner tergal margin. Dististyle appendage apical. Claspette filament spine-like. Ninth tergite lobes each bearing 3–4 bristles.

Female. Length of wing approximately 3.2–3.5 mm. Proboscis dark with creamy scaling laterally and ventrally from level of palpal apex to just beyond middle, the pale-scaled area sharply delimited apically; pale scaling may extend onto dorsal surface. Palpus approximately one-sixth the length of the proboscis; dark with apex narrowly white-scaled. Torus bare or with a few dark hairs. Vertex with upright-forked scales all dark; the lateral patch of broad creamy scales with a

median band of broad black scales. Scutal scales more brownish than in male, indefinite light and dark areas usually apparent; pre-scutellar, supra-alar, and scutellar bristles dusky. *Ppn* densely covered with narrow and narrow-curved dark scales, a few broad dark and pale scales may be present ventrally and posteriorly. Pleural scale patches more strongly developed than in male, always a few scales on paratergite. Fore and mid femora more extensively pale-scaled posteriorly than in male. Tarsal claws equal, fore and mid claws each unidentate, hind claw simple. Wing with or without a basal posterior line of pale scales on the costa, may also be a few pale scales basally on vein 1 and scattered elsewhere. Tergite I with a few baso-median pale scales and a lateral white band; V-VII (sometimes only VI-VII) with narrow creamy apical bands; sub-basal lateral creamy spots present on II-VI. Sternites VI-VII with a pale apical band; on II-VI the pale-scaled area medially may extend to the posterior margin.

LARVA: Head: Antenna sparsely spiculate; antennal hair with 1-4 branches, inserted medially. Mouth brush with comb-like tips. Preclypeal spines stout, curved, darkened. Hair 4 minute, with about 4-5 branches; 5 and 6 single, well-produced; 7 with 7-10 branches; 8 and 9 with 2-3; 12 with 3-5; 13 single; 14 with 1-2; 15 with 2-4; 17 single; 18 with 1-2; 20 with 3-4. Mentum with 8-10 teeth. **Abdomen:** Dorso-lateral hairs on I and II with 3-4 branches. Lateral hairs on I to VI double or triple. Pentad hair 1 with 2-4 branches; 3 with 9-15; 5 with 4-6. Comb with 23-28 small acutely tapered scales in a patch, each with a lateral fringe from base to apex. Siphon pale, short and broad, acus present; 5-12 pecten teeth, each with several basal denticles; siphon hair tuft inserted medially and just before apex of last pecten tooth, with 10-13 faintly plumose branches. Anal plate narrowly incomplete, some small denticles present dorsally on the posterior margin; *lh* single; *isc* with 9-11 branches; ventral brush extends nearly the whole length of the

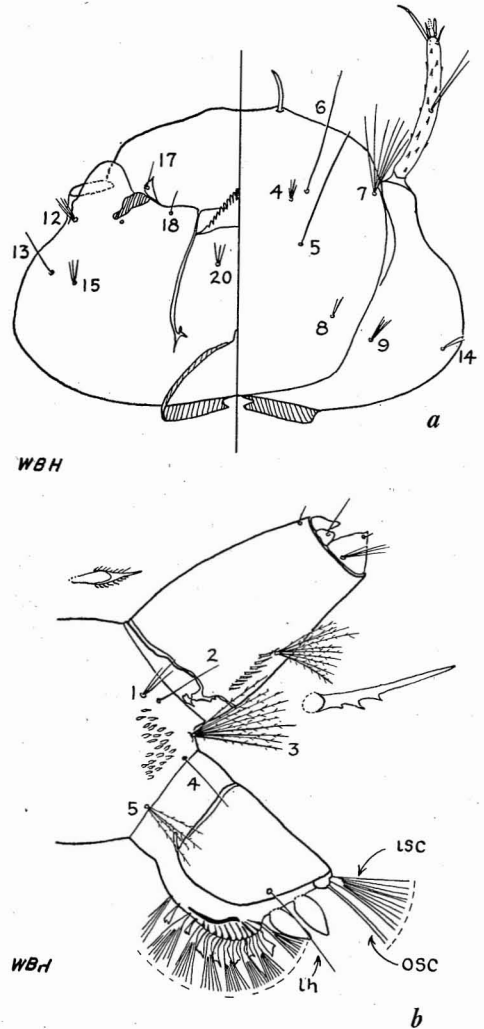


FIG. 3. *A. (Ocblerotatus) vigilax ludlowi*. Larva (Mindoro). *a*, Head; *b*, terminal segments.

anal plate, of 15-17 tufts, each with 4-12 branches, all but the basal two arising from a connected barred area. Anal gills very short, tapered from near base to a round apex; dorsal pair approximately one-half as long as the anal plate and slightly longer than the ventral pair.

BIONOMICS: The only information found in the literature for the adult of this subspecies is a note by Ludlow (1905:135) stating that adults were "caught in woods." The single female cotype specimen in the British Museum is labeled from "mangroves."

Judging from the fact that 6 months extensive collecting in the Philippines produced only two collections of *vigilax ludlowi* (both larval), this subspecies is apparently rather uncommon. Both of these collections were taken from small temporary ground pools surrounding rice paddies. The pools were recorded as being open to the sun, containing many algae, and possessing water rusty in appearance. Unfortunately no record was made as to whether or not the water of the pools was brackish in nature. However, Dr. E. S. Ross collected this species on Mindoro from shaded, temporary brackish pools at the edge of salt marsh. Penn (1948: 245) reported a larval collection taken on Mindoro from a sunlit fresh-water pool with a pH of 6.0.

Aedes vigilax vigilax (Skuse), which is a widespread coastal species in the Australasian and Oriental Regions (but not reported from the Philippines), is a brackish-water breeder of great economic significance. After periods of unusually high tides the larvae occur in tremendous numbers in brackish pools along the seacoast just above the normal high-tide level. The adults soon emerge in great swarms, and since they are vicious and persistent day and night biters, they quickly succeed in seriously impeding all outdoor human activities in the surrounding area. As with the salt marsh mosquitoes of the United States, the adults of *v. vigilax* will travel or drift considerable distances inland. Hill (1925: 71) reported that *v. vigilax* can occasionally be found in fresh water, and that larvae from such breeding sites possess longer and narrower anal gills than those from brackish water.

DISTRIBUTION: *Specimens examined.* U.S.-N.M. (5 males, 11 females, 2 sets assoc. skins). Luzon: Olongapo, Subic Bay, Zambales Prov. (Zolik and MacMillan). Mindoro: Type females, Mangarin. C.A.S. (2 males, 2 females, 2 larvae, 1 set assoc. skins). Mindoro: Nr. mouth of Labangan River (Ross).

Literature records. Mindanao, Panay, Mindoro, Luzon (all Bohart, 1945: 56). Luzon: Manila (Edwards, 1929a: 2). Mindoro: Caminawit Pt. (Penn, 1948: 245).

Not known from outside the Philippines.

DISCUSSION: The Philippine form is treated here as a distinct subspecies of *vigilax* (Skuse) on the basis of the scaling of *ppn* in the female. In *v. vigilax* this area is covered with flat-lying slightly elongate broad scales, except for a fringe of narrow dark scales dorsally. The broad scales are dark except for a small ventral posterior patch of pale ones. The type of *v. vigilax* has not been seen by us, but the types of the synonyms *uniformis* Strickland (female) and *marinus* (Theobald) (male, female), which are in the British Museum, have been. In addition, a series of Australian specimens in the British Museum and two females from the New Hebrides which are in the U. S. National Museum have been studied. In all these specimens of *v. vigilax*, *ppn* was found to be scaled as described above. No other differences have been found, although Philippine specimens have been compared with males, pupae, and larvae of the New Hebrides series.

A. vigilax vigilax and *v. ludlowi* are commonly confused with *Aedes (Aedimorphus) vexans*, from which species they can readily be distinguished by their lack of scales on the torus and on the subspiracular area.

Subgenus FINLAYA Theobald

1903. *Finlaya* Theobald, Mon. Cul. 3: 281.

Genotype: *poicilia* Theobald (Malaya).

1905. *Popeax* Ludlow, Can. Ent. 37: 95. Genotype: *lutea* Ludlow (Philippines).

ADULT: Essentially similar to *Ochlerotatus* but differing in the absence of a distinct basal lobe on the basistyle in most species. Those few species that possess a distinct basal lobe differ from the single Philippine species of *Ochlerotatus* in not having the claspette filament setiform. Male palpi varying from being three-fourths as long as pro-

boscis to exceeding it by the length of the terminal segment; usually similar to *Ochlerotatus* in type but may be simple, straight, and with only a few hairs (at apices of segments III-V). Vertex dorsum and scutellum narrow or broad-scaled, or with intermediate conditions occurring. Paratergite with or without scales. No lower mesepimeral bristles. Fore and mid tarsal claws toothed in both sexes, in the male the larger claws usually bidentate; hind claws simple in both sexes. *Terminalia*: Basistyle with apical lobe absent; basal lobe usually absent but occasionally weakly formed, or rarely even distinct (*harperi*). Dististyle appendage apical. Mesosome simple. Claspettes present (with a peculiar basotergal lobe in *aureostriatus*), with a prominent, variously shaped filament.

LARVA: Extremely varied, but having in common the following few characteristics: Siphon almost always with an acus at level of pecten teeth. Anal plate without acus, always incomplete, nearly always with spines or spicules on posterior lateral margin. Ventral brush with 8-12 tufts, usually borne on a sclerotized, barred area. Habitat primarily of three types: (1) the water-holding spaces of living plants, (2) tree holes and bamboo stumps, and (3) rock holes in stream beds. One species breeds in the water collected in fallen leaves. A number of species have been occasionally found in artificial containers.

DISTRIBUTION: This is a very large subgenus with approximately 165 named species and subspecies and having a worldwide distribution (absent from the northern rim of the Holarctic Region, however). The subgenus has attained its greatest development in the Oriental Region. Twenty-five named species are at present known from the Philippines.

SYSTEMATICS: On the basis of adult ornamentation characters, this subgenus was divided into eight groups by Edwards (1932: 148). Knight and Marks (in press) modified this system by combining two of the groups and by creating subgroups. Except for

Group C, which is confined to the Ethiopian Region, all the groups are represented in the Philippines.

Group A (*kochi*-group). Wings profusely spotted with areas of pale and dark scaling. Represented in the Philippines by *ananae*, *poicilius*, *stonei*, *medleri*, *croceus*, *flavipennis*, and *luteus*.

Group B (*terrens*-group). Hind tarsi with basal and apical white bands on I, a narrow basal band on II, remainder dark. Represented in the Philippines by *melanopterus*.

Group D (*aureostriatus*-group). Scutal marking pattern consisting of 3-5 narrow longitudinal pale lines. Femora and tibiae not lined anteriorly for nearly their whole length. Represented in the Philippines by *aureostriatus*, *saxicola*, *abadsantosi*, *burgosi*, *rizali*, *sberki*, and *jugraensis*.

Group E (*mediovittatus*-group). Similar to Group D except that at least the mid femora and usually also one or more of the tibiae are lined anteriorly with pale scales for nearly their whole length. Represented in the Philippines by *banksi*.

Group F (*alboannulatus*-group). Scutal pale scale pattern not consisting of a set of longitudinal lines. Hind tarsi with basal bands on at least the first three segments. Represented in the Philippines by *harperi*.

Group H (*geniculatus*-group). Tarsi all dark. Represented in the Philippines by *saperoi*, *lacteus*, *laoagensis*, *niveus*, *paradissimilis*, *leucopleurus*, *luzonensis*, and *leucomeres*.

Aedes (Finlaya) ananae Knight and Laffoon Fig. 4

1946. *Aedes (Finlaya) ananae* Knight and Laffoon, Trans. Amer. Ent. Soc. 72: 218 (males, females, pupae, larvae). Type locality: Philippines. Osmena, Basey Municipality, Samar (Laffoon). Type: Male (holotype), with associated larval and pupal skins, in U.S.N.M.†

1947. *Aedes (Finlaya)* sp. near *poicilius*. Marks, Univ. of Queensland Dept. Biol. Papers 2(5): 34.

DISTRIBUTION: *Specimens examined*. U.S.-N.M. Samar: Osmena, Ducong, and Pintanahon, Basey Municipality. Mindanao: 1 male, 2 females, 2 sets of assoc. skins, Lanao, nr. Cotabato-Lanao provincial boundary along the Parang-Malabang Highway, Lanao Prov. (Enke, Hoogstraal). A.N.S.P. Leyte: Lagolago, nr. Baybay; Mt. Lobi, Dagami; Tacloban.

Literature records. Luzon: Lucban, Tayabas Prov. (Marks, 1947: 34).

Unknown outside the Philippines.

DISCUSSION: The only closely related species in the Philippines is *poecilus* (Theobald) which, however, is distinguishable from *ananae* on the basis of the adult and larval characters given in the keys.

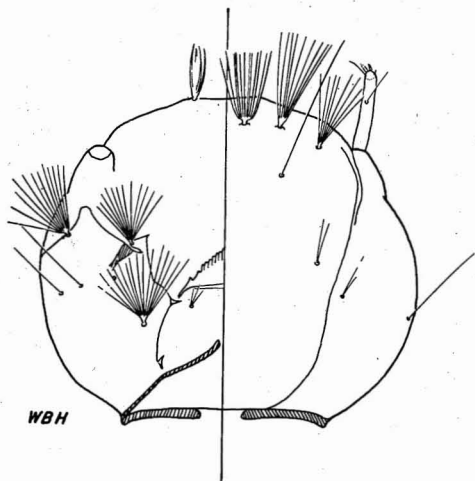


FIG. 4. *A. (Finlaya) ananae*. Larval head (Samar).

Aedes (Finlaya) poecilus (Theobald)

1903. *Finlaya poecilia* Theobald, Mon. Cul. 3: 283 (female). Type locality: Malay Peninsula. Pulau Jerezak, Penang (Freer). Type: Female (holotype) in B. M.†

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

1904. *Finlaya poialia* Theob. Giles, Jour. Trop. Med. 7: 366. Emendation?

1917. *Aedes (Ochlerotatus) poecilia* Theob. Edwards, Bul. Ent. Res. 7: 211. Different combination.

1920. *Aedes (Finlaya) poecilia* Theobald. Dyar, Ins. Insc. Mens. 8: 183. Different combination.

1926. *Aedes (Finlaya) kochi* var. *poecilia* (Theo.). Edwards, Bul. Ent. Res. 17: 104. Different combination.

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

1934. *Aedes (Finlaya) poecilus* Theobald. Barraud, Fauna Brit. Ind. Dipt. 5: 157. Emendation.

1937. *Aedes (Finlaya) poecilus*. Bonne-Wepster and Brug, Geneesk. Tijdschr. Ned.-Ind. 74: 44. Emendation.

1944. *Aedes poecilus* (Theobald). Stone and Bohart, Proc. Ent. Soc. Wash. 46: 211. Lapsus in synonymic table.

Adult and larva described by Barraud (1934: 157), Marks (1947:34), and Knight and Laffoon (1946: 221). Stone and Bohart (1944: 211) have keyed the adult and figured the male terminalia, and Brug (1931: 22) and Bonne-Wepster and Brug (1939: 1246) have described the larva.

DISTRIBUTION: *Specimens examined*. U.S.-N.M. Luzon: Olongapo, Subic Bay, Zambales Prov.; Los Banos, Laguna Prov.; Camp Stotsenberg and Mabalacat, Pampanga Prov.; Ft. Wm. McKinley, Rizal Prov.; Manila, Manila Prov.; Camp Daraga, Albray Prov.; Nagillian. Leyte: Gabas, Tacloban; Abuyog. Samar: Osmena; Pintanahon; Ducong; Calotans; Catubig. Jinamoc Island. Calicoan Island. Palawan: Iwahig; Balsahan River; Puerto Princesa. Culion: Pilapil. Balabac: Cape Melville. Mindanao: Zamboanga, Pasonco, and San Ramon, City of Zamboanga Prov.; Parang, Surigao Prov.; Rugagus, Dansalan, Dansalan City Prov. (Enke, Gutierrez). Nanka, Mumungan, Lanao Prov. (Edgar, Enke). Overton, Lanao Prov. (Enke, Gutierrez, Corcega). A.N.S.P. Leyte: Tacloban; Lagolago (nr. Baybay); Palo; Dulag; Valencia. Dinagat: Panamaon. C.A.S. Mindoro: 5 females, with assoc. skins, San Jose (Ross). Leyte: 1 male, Tunga (Ross). C.C.

Luzon: Agoo, La Union Prov. (Franclemont).

Literature records. Negros: Bago and Mailum, Negros Occidental Prov. (Banks, 1906: 990). Luzon: Lucban, Tayabas Prov. (Marks, 1947: 34).

Known outside of the Philippines from Simaloer, Lombok, Java, Sumatra, Borneo, Celebes, Malaya, North Bengal, and Burma.

DISCUSSION: The type of *poecilus* has been examined and found to differ most notably from the Philippine material described here in lacking the basal spot of white scales on the first segment of the fore tarsus (a clear bare spot is present, however). Because of this difference, although admittedly minor in nature, it seems possible that the Philippine material may represent a distinct form. If it does, then it is not confined to the Philippines because in checking for the presence or absence of basal pale scales on I of the fore tarsus on all the female specimens in the British Museum collection it was found that the specimens (three in all) from Lampongs, Sumatra (Shüffner); Batavia, Java (Brug); and Buitenzorg, Java (Paine), all possessed the basal spot of white scales. On the other hand, the specimens (five in all) from Kuala Lumpur, Malaya (Dusham); Kuching (?), Sarawak, Borneo (Moulton); Mt. Korinchi, Sumatra (Robinson and Kloss); and Sandoway, Burma (Barraud), were all similar to the type in lacking the spot.

The type and the specimens from Kuala Lumpur and Kuching also differed from the Philippine specimens in having the lateral scutellar lobes entirely black-scaled except for 2-3 white scales mesally. The specimens from Mt. Korinchi and Buitenzorg had the lateral lobes white-scaled (white basally and dark apically in the Philippine material). However, since the relative amounts of dark and pale scaling of the lateral scutellar lobes are normally somewhat variable in Philippine specimens, this character is probably not of value.

In view of the above-described variations, it would be of great interest to compare the

male terminalia of specimens from various portions of the geographical range of *poecilus*. Unfortunately there are no male specimens in either the British Museum or the U. S. National Museum from any locality outside the Philippines. Brug (1934: 513) figured the terminalia from unspecified material (undoubtedly from the Netherlands East Indies, however), but, since he did not include the tergal setal pattern of the basistyle, it is impossible to make a complete comparison with Philippine specimens. However, in the details shown there are no apparent differences.

The only larval descriptions of specimens from elsewhere than the Philippines (and where the collection locality is definitely given) are by Brug (1931: 22, from Javan specimens) and by Edwards (in Barraud, 1934: 158, from Brug's Javan material). Brug described the larva as having head hair 5 with 3 branches and as having a stout elongate spine at the base of the thoracic pleural tufts. Edwards' description differs from that of Brug's in stating that no special spines occur on the plates of the thorax (describes head hair 5 as having 2-3 branches). Whether or not the thoracic spines occur, the Javan specimens are markedly distinct from those of the Philippines on the branching of head hair 5. Three larval specimens in the British Museum from Klakali, R. Bedali, East Java (Thieneman, reared ex *Colocasia*), have been compared (presumably the ones referred to by Edwards in Barraud, 1934) with Philippine specimens. The only notable differences found were: antennal hair double in four of six cases (remainder single), hair 1 (pre-clypeal spine) single, and head hair 5 with 2-4 branches. Hair 11 of the meso- and meta-thoracic segments was stoutly spinose as Brug pointed out and as is typical of the Philippine specimens.

Aedes (Finlaya) stonei Knight and Laffoon
1946. *Aedes (Finlaya) stonei* Knight and Laffoon, Trans. Amer. Ent. Soc. 72: 208

(males, females, pupae, larvae). Type locality: Philippines. Ducong, Basey River, Basey Municipality, Samar (Zolik). Type: Male (holotype), with associated larval and pupal skins, in U.S.N.M.†

DISTRIBUTION: *Specimens examined*. U.S.-N.M. Samar: Ducong and Osmena, Basey Municipality. A.N.S.P. Leyte: Mt. Lobi, Dagami.

Unknown outside the Philippines.

DISCUSSION: Distinct from all the other black, yellow, and white species of this group in the Philippines on the basis of the adult and larval characters given in the keys.

Aedes (Finlaya) flavipennis (Giles)

1904. *Finlaya flavipennis* Giles, Jour. Trop. Med. 7: 366 (male, female). Type locality: Philippines. Camp Stotsenberg, Pampanga Province, Luzon (Whitmore). Type: Male and female (cotypes) in B. M.† Male terminalia mounted.

1906. *Finlaya arantana* Banks, Phil. Jour. Sci. 1: 1001 (male, female). Type locality: Philippines. Mailum, Bago Municipality, and Siya-Siya Peak, Canloan Volcano, 700 m., Negros Occidental Province, Negros (Banks). Type: Male (lectotype) in U. S.-N. M.†

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

1922. *Aedes (Finlaya) flavipennis* Giles. Edwards, Ind. Jour. Med. Res. 10: 465. In part. Different combination. Synonymy of *arantanus*.

1925. *Finlaya aranteana* Banks. Dyar and Shannon, Ins. Insc. Mens. 13: 75. Lapsus.

1944. *Aedes (Finlaya) arantanus* (Banks). Stone and Bohart, Proc. Ent. Soc. Wash. 46: 207. Also: Bohart (1945: 56), Knight and Laffoon (1946: 214), Baisas (1946: 30), and Marks (1947: 62). Misidentification.

DISTRIBUTION: *Specimens examined*. U.S.-N.M. Luzon: Ft. McKinley, Rizal Prov.; Camp Stotsenberg, Pampanga Prov.; Baguio, City of Baguio Prov.; Olongapo, Subic Bay, Zambales Prov. Leyte. Samar: Bulusao; Osmena. Calicoan Island. Negros (cotypes). Palawan: Puerto Princesa; Iwahig; Bacungan. Busuanga Island: Coron. Balabac: Cape Melville. A.N.S.P. Leyte: Palo; Tacloban. C.A.S. Mindoro: 2 males, with assoc. skins, San Jose (Ross).

Literature records. Luzon: Llavac, Infanta Municipality, Tayabas Prov.; Calauan, Laguna Prov.; Tungkong Manga, San Jose, Bulacan Prov.; Tala Estate of Caloocan, Manila Prov. (Baisas, 1946: 30).

Not definitely known from outside the Philippines.

DISCUSSION: An examination of the type series of this species in the British Museum and comparison with a female cotype of *arantana*, also in that collection, show Edwards (1922: 465) to have been correct in reducing the latter species to a synonym of *flavipennis*. The one male and two female cotypes of *arantana* in the U.S.N.M. have also been checked and with the same results.

Edwards (1926: 105; 1928: 52) reported this species from Singapore, but it seems likely that a re-examination of that material will show it to be another species. As pointed out by Knight and Laffoon (1946: 215), the material identified by Brug (1934: 513; 1939: 107) is undoubtedly some other species also. The nature of the subapical scale tuft of the basistyle and of the stem of the claspette as illustrated by him are quite different from either of those structures in *flavipennis*. The female specimen reported from the Solomon Islands by Paine and Edwards (1929: 315) is undoubtedly *solomonis* Stone and Bohart. This specimen is also the basis of the Solomon Islands' record of *flavipennis* by Knight, Bohart, and Bohart (1944: 52).

Occasionally a female specimen of this species is found which is apparently indistinguishable from either *medleri* or *croceus*.

Aedes (Finlaya) medleri
Knight and Laffoon

1946. *Aedes (Finlaya) medleri* Knight and Laffoon, Trans. Amer. Ent. Soc. 72: 211 (males, females, pupae, larvae). Type locality: Philippines. Jinamoc Island (Medler). Type: Male (holotype), with associated larval skin, in U.S.N.M.†

DISTRIBUTION: *Specimens examined.* U.S.-N.M. Samar: Pintanahon and Osmena, Basey Municipality. Jinamoc Island. Calicoan Island: Ngolos. Mindanao: Zamboanga, City of Zamboanga Prov. A.N.S.P. Leyte: Tacloban. C.A.S. Mindoro: 1 male, 1 set assoc. skins, San Jose (Ross).

Unknown outside the Philippines.

DISCUSSION: As indicated by the adult and larval keys, this species is closely related to *flavipennis*, differing from it only on minor characters. Since the ranges of the two overlap, it is likely that *medleri* is merely a polymorphic form of *flavipennis*.

Aedes (Finlaya) luteus (Ludlow)

1905. *Popea lutea* Ludlow, Can. Ent. 37: 96 (male). Type locality: Philippines. Camp Stotsenberg, Angeles, Pampanga Prov., Luzon (Whitmore). Type: Male, no longer in existence. However, there is a series of specimens in the U.S.N.M. labeled (apparently in Dr. Ludlow's handwriting) "*Popea lutea* Ludl., female and male cotypes, P.I." This is undoubtedly a subsequent type designation and probably the specimens are those reported by Ludlow (1910: 193).†

1922. *Aedes (Finlaya) flavipennis* Giles. Edwards, Ind. Jour. Med. Res. 10: 465. In part. Synonymized *lutea*.

1944. *Aedes (Finlaya) flavipennis* (Giles). Stone and Bohart, Proc. Ent. Soc. Wash. 46: 208. Misidentification. Also: Bohart (1945: 57), Knight and Laffoon (1946: 216), Baisas (1946: 30), and Marks (1947: 62).

DISTRIBUTION: *Specimens examined.* U.S.-N.M. Luzon: Camp Stotsenberg, Angeles, Pampanga Prov.; Mt. Makiling, 2000 ft. Leyte: Abuyog. Samar: Guirang and Calotons, on the Basey River, Basey Municipality. Mindanao: Pasanonca, City of Zamboanga Prov.; Mt. Apo, Cotabato Prov., 3000 ft. (Hoogstraal *et al.*). Basilan: Isabela. A.N.S.P. Leyte: Tacloban; Lagolago, nr. Baybay.

Unknown outside the Philippines.

DISCUSSION: It was not until the type of *flavipennis* was studied by the senior author and the results compared with the types of *arantana* and *luteus* that it was found that *luteus* represents a valid species. Of course, it is possible that the original type male of *luteus* represented some other black, white, and yellow member of this group. However, since this type is no longer in existence and since we have a series of specimens labeled, presumably by Ludlow, as cotypes of *luteus*, it seems justifiable to take our concept of the species from this series.

The male terminalia and the larva of *luteus* are not separable from those of *croceus*.

Aedes (Finlaya) croceus
Knight and Laffoon

1946. *Aedes (Finlaya) croceus* Knight and Laffoon, Trans. Amer. Ent. Soc. 72: 213 (males, females, pupae, larvae). Type locality: Philippines. Santa Rita, Olongapo, Subic Bay, Zambales Prov., Luzon (Rozeboom). Type: Male (holotype), with associated larval and pupal skins, in U. S.-N. M.†

DISTRIBUTION: *Specimens examined.* U.S.-N.M. Luzon: Santa Rita, Olongapo, Subic Bay, Zambales Prov. C.A.S. Mindoro: 2 females, assoc. skins, San Jose (Ross).

Unknown outside of the Philippines.

DISCUSSION: Closely related to *luteus*, the male terminalia and the larva apparently being inseparable. Because of this close simi-

larity, it seems quite likely that *croceus* is either a subspecies of *luteus* or else a polymorphic form of it. However, insufficient material is available at present to settle the status of these forms.

Aedes sp., near *medleri* and *flavipennis*

There is a single male specimen in the U.S.N.M. which is similar to *medleri* in having the proboscis largely dark-scaled except for a median band, and to *flavipennis* in having the subapical tergal scale tuft of the basistyle long and pale; but it differs from either in that this scale tuft arises in a scattered elongate area extending from the row of stout setae on the basal one-third of the tergal aspect to near the apex of the basistyle, instead of from a compact circular area as in *medleri* and *flavipennis*. This specimen, which was reared from pandanus by J. L. Laffoon, is from Cape Melville, Balabac Island (VI-1945). Whether or not this specimen represents a distinct species can only be determined when more material is available from that area. Deposited in U.S.N.M. as *Finlaya* Sp. 40.

Aedes (*Finlaya*) *melanopterus* (Giles)

Figs. 5, 6

1904. *Finlaya melanoptera* Giles, Jour. Trop. Med. 7: 367 (female). Type locality: Philippines. Camp Stotsenberg, Angeles, Pampanga Prov., Luzon (Whitmore). Type: Female (holotype) in B. M.†
1914. *Popea palawanensis* Ludlow, Psyche 21: 30 (female). Type locality: Philippines. Puerto Princesa, Palawan. Type: Female (holotype) in U.S.N.M.†
1917. *Ochlerotatus* (*F.*) *melanopterus* Giles. Edwards, Bul. Ent. Res. 7: 214. Different combination. Synonymized *palawanensis*.

ADULT: A black and white species with prominent white scutal markings. Hind tarsi with incomplete basal and apical bands on I, a narrow basal band on II, remaining seg-

ments all dark. King and Hoogstraal (1946: 311) have partially described the male and larva.

Male. Wing length 3.0–3.5 mm. *Head:* Proboscis dark-scaled. Palpus approximately equal to the proboscis in length; dark-scaled; V shorter than IV, the hairs on the apex of III and along IV–V rather sparse, segments IV–V not curved and only very slightly down-tilted. Torus bare; some dark scales on the first flagellar segment of antenna. Vertex completely covered with broad white scales, some narrow pale scales on the nape, a band of pale upright-forked scales on the nape (may appear brownish in some lights) and a few scattered anteriorly on the dorsum. *Thorax:* Scutum covered with narrow scales, these white (frequently with a yellowish tinge) except for a transverse band of dark scales at the level of the paratergite (interrupted medially by white scales and with a posterior extension on either side of the prescutellar area) and for an area of dark scales in the postero-lateral corner of the scutum; dorso-central bristles present, acrostichals and prescutellars absent. Scutellum with a patch of narrow white scales on the mid lobe, lateral lobes with a very few hair-like brownish scales. *Apn* with broad white scales; *ppn* with a small dorso-anterior patch of broad white scales. The following pleural areas each with a patch of broad white scales: propleural, paratergite (on the under surface), dorsal sternopleural, medio-posterior sternopleural, and upper mesepimeral (an oblique band extending from the anterior margin in the vicinity of the dorsal sternopleural patch to the dorsal hair tuft). *Legs:* Fore femur with anterior surface dark except for a few basal white scales (one specimen had a dorso-apical white patch), posterior surface marked with a broad pale area from near base to beyond middle; mid femur with anterior surface dark, marked by a ventral white area from near base to beyond middle and by a separate apical white area, posterior surface pale-scaled with a basal dark area and another just

beyond the middle that has a dorsal extension nearly to the apex (this area variable); hind femur pale-scaled, marked anteriorly and posteriorly with a basal and a subapical dark area. Fore tibia with posterior surface pale except for extreme apex, this pale scaling extending onto the anterior surface apically; mid tibia dark except for an apical pale area (some dark scales present on the extreme apex, however); hind tibia dark. Fore tarsus dark; mid tarsus with a broad basal band and an incomplete apical white band on I, a dorso-basal spot on II; hind tarsus with incomplete dorso-basal and apical white bands on I, a narrow incomplete basal band on II, III-V dark. Fore and mid tarsal claws unequal, the larger bidentate, the smaller unidentate; hind claws equal, simple. *Wings*: Dark-scaled, may be a few pale scales at the base of the costa. Halter knob dark-scaled. *Abdomen*:

Tergites I, VI, and VII with lateral white bands; II-III with a baso-lateral white area (sometimes forming a nearly complete basal band on III), IV-VII with narrow basal white bands, IV-VII with the median dark scales somewhat erected. Sternites dark-scaled, a basal patch of white scales present on most of them; III-VII with prominent medial tufts of dark elongate erected scales. *Terminalia*: Basistyle without lobes, a prominent patch of setae on basal half of mesal-tergal surface and another medially on mesal-sternal surface. Mesosome simple, slightly expanded apically. Claspette filament expanded subapically in lateral view. Lobes of ninth tergite interrupted.

The male from Palawan had the transverse dark scutal band broadly interrupted medially.

Female. Wing length about 3.5 mm. Differs from male mainly as follows: Palpus approximately one-fifth as long as the proboscis. Torus with fine dusky hair-like scales medially. Vertex dorsum with broad dark scales (may be a very few pale ones medially), a patch of narrow pale scales anteriorly on the median line and some also on the nape, a line of pale scales along the eyes, and scattered dark upright-forked scales; lateral area with broad white scales. Scutum with narrow scales, dark except for a large anterior area of white scales, a white area before the wing base, and before and along the prescutellar area. Scutellar mid lobe with narrow pale scales, narrow dark scales intermixed laterally; lateral lobe with a few narrow pale scales. Tarsal claws equal, fore and mid each unidentate, hind simple. Tergites dark, IV-VII with a small baso-median white spot, VIII with a broad basal white band, lateral aspect marked as in male.

LARVA. *Head*: Antenna smooth; antennal hair single, inserted at apical one-third. Mouth brush with comb-like tips. Preclypeal spine single, stout. Hair 4 with 4-7 branches, very small; 5 and 6 single; 7 with 2-5; 8 with 2-3; 9 with 2-4; 12 with 4-7; 13 with 1-2; 14 with 1-3; 15 with 4-7; 17 and 18 single or

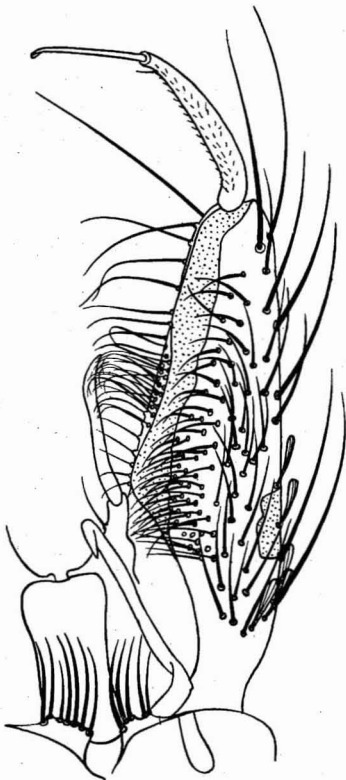


FIG. 5. *A. (Finlaya) melanopterus*. Male terminalia (Luzon).

double; 20 with 1-3. Mentum with 7-10 lateral teeth. *Thorax*: Some of the meso- and metathoracic hairs stellate-type. Prothoracic hair 0 with about 7-10 branches, small, stellate; hair 1 with 2-4 branches; 2 single; 3 with 5-7. Mesothoracic hair 9 with 6-7 branches, very long, stout; 10 and 12 single, long, stout; 11 with 1-3 minute branches. Metathoracic hair 9 with 5-7 branches; 10 and 11 as on mesothorax; 12 single, greatly reduced in size. *Abdomen*: Some of the dorsal and ventral hairs stellate-type. Dorso-lateral hairs of I and II with 3-4 branches. Lateral hairs of I-VI double, rarely triple. Pentad hair 1 with 3-6 branches; 3 with 9-10; 5 with 4-6. Comb with about 28 to 35 scales in a patch, scales apically broadened and com-

pletely fringed. Siphon brownish, detached acus present, index 2.4-3.3; 18-29 pecten teeth, each with a strong ventral denticle near middle and a fine fringe from denticle to base; siphon hair tuft inserted beyond middle and shortly before the end of the line of pecten teeth, with 5-9 plumose branches; dorso-lateral valve hair approximately as long as siphon diameter at apex; the two ventro-lateral valve hairs shorter than the valve in length. Anal plate narrowly incomplete, posterior margin heavily spined both above and below *lb*; *lb* with 1-2 branches; *isc* with 4-6; ventral brush of 10 tufts, all but the basal 1-3 tufts arising from a heavily sclerotized, connected barred area, each tuft with 4-8 branches. Anal gills tapered from base, dorsal pair slightly longer than ventral pair and 1.25-1.5 times longer than the anal plate.

Four larvae from Tacloban, Leyte, differed from the above series in having the anal gills almost bud-like and the abdominal hairs much less developed. The specimen from Palawan and two of those from Tacloban had a curious medial lateral bulge on the pre-clypeal spine.

BIONOMICS: The adults were not encountered in nature. All the larval material of this species was taken from various types of tree holes, except for the collection from Busuanga, which was found in a water-holding enameled refrigerator.

DISTRIBUTION: *Specimens examined.* R. K. L. (10 males, 19 females, 23 sets assoc. skins, 1 larva). Luzon: Olongapo, Subic Bay, Zambales Prov. (Rozeboom). Palawan: Balsahan River (Johnson, Laffoon). Culion: Pilapil (Laffoon, Fitzgerald). Busuanga: Coron (Fitzgerald). A.N.S.P. Leyte: Tacloban (Roberts). C.A.S. Mindoro: San Jose (Ross).

Literature records. Palawan: Puerto Princesa (Bohart, 1945: 57).

Unknown outside the Philippines.

DISCUSSION: This species, which is the sole representative of Group B in the Philippines, is closely related to *plumiferus* King and Hoogstraal from New Guinea.

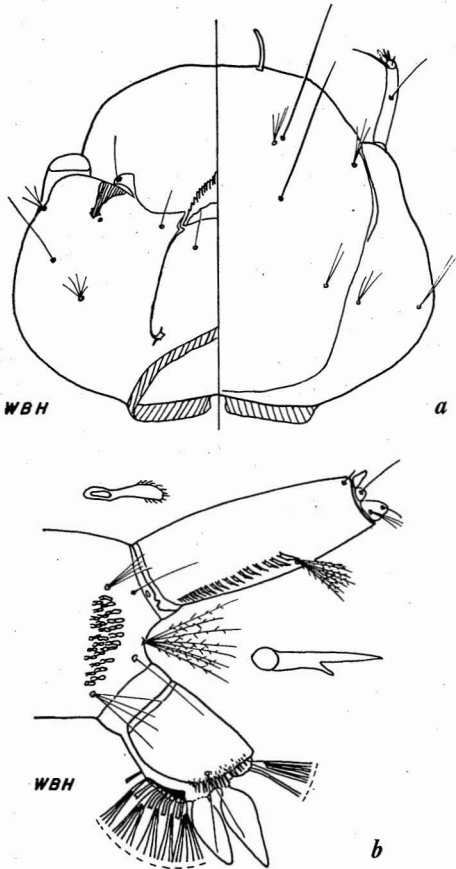


FIG. 6. *A. (Finlaya) melanopterus*. Larva. *a*, Head (Busuanga); *b*, terminal segments (Leyte).

***Aedes (Finlaya) aureostriatus* (Doleschall)**

Fig. 7

1857. *Culex aureostriatus* Doleschall, Nat. Tijdschr. Ned.-Ind. 14: 385 (female). Type locality: Amboina. Type: Non-existent.

1924. *Finlaya greeni* (Theo.) var. *Ranarana* Barraud, Ind. Jour. Med. Res. 11: 850 (male, female). Type locality: India. Karwar, N. Kanara (Barraud). Type: Location not known.

1934. *Aedes (Finlaya) greeni* (Theobald) var. *kanaranus* Barraud. Barraud, Fauna Brit. Ind., Dipt. 5: 185. Emendation. Edwards, p. 442 in above reference, questioningly synonymizes *kanaranus*.

ADULT: Scutum with a linear pattern of yellow lines. Hind tarsi with basal and apical markings on I-IV, V largely or all pale dorsally in female.

Male. Wing length about 2.4 mm. *Head*: Proboscis dark. Palpus about three-fourths as long as proboscis; similar in type to that of *saxicola*; all dark. Vertex dorsum with a median longitudinal area of narrow yellow scales (may be a few broad yellow scales marginally), an anterior submedian area of broad dark scales, and a lateral area of broad white scales which extends across the lateral surface, nape with a band of pale upright-forked scales. *Thorax*: Scutum with a pattern of broad yellow-scaled lines as follows: a longitudinal median line to prescutellar area where it forks to the posterior margin (this line of scales is parted medially), a complete longitudinal submedian line, a line or area along lateral margin from the beginning of the subdorsal line to over the wing base, a transverse line from lateral margin along anterior fossa to the subdorsal line, remainder of scutum dark-scaled. Scutellar mid lobe with narrow yellow scales medially, broadened dark scales laterally; lateral lobes with narrow yellow scales. *Apn* with broad pale scales; *ppn* with narrow yellow scales, some broadened scales may occur ventro-posteriorly. The following pleural areas each with a

patch of broad white scales: propleural, subspiracular, prelar, dorsal sternopleural, medio-posterior sternopleural, and mesepimeral. *Legs*: Fore and mid femora anteriorly dark, a small basal pale area and a few scattered pale scales along the ventral margin. Hind femur pale anteriorly, with a subapical dark band that extends basally along the anterior margin. Tibiae dark, a ventral area of pale scaling basally. Fore tarsus dark. Mid tarsus with a basal band on I, some indefinite pale scaling over the junction of I and II. Hind tarsus with basal and apical bands on I-III, a basal band on IV, complete only on I and at the base of II, V dark or else palish above. *Wings*: Dorsally dark-scaled. Halter knob dark-scaled. *Abdomen*: Tergites dark-scaled, I with a lateral white band, II-VI with baso-lateral silvery-white spots, a few basal white scales medially on some of the segments. Sternites with basal silvery bands. *Terminalia*: Tergal surface of basistyle with a group of elongate bristles apically and a group of short ones basally; below this basal setose area and

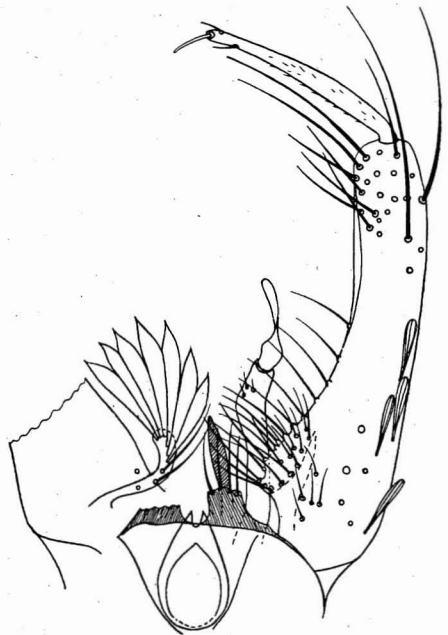


FIG. 7. *A. (Finlaya) aureostriatus*. Male terminalia (Mindoro).

tergally attached to the base of the claspette is a slender elongate detached lobe that bears a curving line of blade-like scales (omitted from right side of figure but shown isolated on left side); inner tergal margin with a line of stiff setae from base to near middle. Claspette filament a twisted blade-like structure.

Female. Wing length about 2.5 mm. Differing from the male as follows: Palpus about one-fifth as long as proboscis, dark. Torus not scaled. Hind tarsal V with dorsal pale scaling (probably for whole length but difficult to make out on the single specimen at hand). Tergite VII with a complete basal band.

The female from Culion differs from the above specimen as follows: Median scutal line not parted down the middle, the anterior portion of the submedian line and the line along the anterior fossa largely obsolete, all of the scutal markings more reduced in size. Hind tarsus with basal and apical banding on I–IV, V definitely white-scaled dorsally for its whole length. Complete basal bands on tergites III–VII.

LARVA: Apparently identical to the larva of *leucopleurus* except for the following points: Head hair 5 (present on one side only) with 5 branches. Lateral hairs on abdominal segments I and II are stouter, and the lateral hair on II is the same length as the lateral hair on I. All ventral brush tufts arising from a connected barred area. A detachedacus is present on the anal plate of the single specimen examined.

BIONOMICS: The adults were not encountered in nature. Both the larval collections were from tree holes.

DISTRIBUTION: *Specimens examined.* R.K.L. Culion Island: 1 female, Pilapil (Laffoon, Fitzgerald). C.A.S. Mindoro: 1 male, 1 female, 1 set assoc. skins, San Jose (Ross).

Outside of the Philippines this species is known from Sumatra, Java, Celebes, Kaibaena, Alor, Soembawa, Timor, Ceram, Amboina, Dutch New Guinea, and India.

DISCUSSION: Not previously known from the Philippines.

The identification of these specimens is based upon a comparison with a series of specimens from Hollandia, New Guinea, of what is believed to be *aureostriatus*. However, as the type of *aureostriatus* is non-existent, this latter identification can only be regarded as provisional. The New Guinea specimens differ slightly as follows: The upright-forked scales of the vertex are brown, the lateral scutellar lobes have brown narrow scales, and the abdominal tergal bands are incomplete except occasionally on VI–VII, the lateral larval hair on abdominal segment I is stouter, and the lateral larval hair on segment II is double, stout, and long (rather than single, short, and slender). The male terminalia appear to be completely similar. The scutal markings are exactly similar to those of the female specimen from Culion.

Aedes (Finlaya) aureostriatus var. *greenii* (Theobald), known from India, Ceylon, Assam, Sumatra, and Java, is apparently separable from the type species only on the basis of the suffused nature of the scutal pale scale pattern. It is possible that the Mindoro specimens should be considered this variety. The type of *greenii*, which has been seen by us, has the upright-forked scales yellow, the lateral scutellar scales brown, and complete abdominal bands on tergites III–VI.

On the basis of the remarks by Edwards (in Barraud, 1934), *kanaranus* is here regarded as a synonym of *aureostriatus*. The location of the type of this form is at present unknown.

Aedes (F.) okinawanus Bohart from Okinawa is very closely related to *aureostriatus*, apparently differing only slightly on details of the male terminalia.

Aedes (Finlaya) saxicola Edwards

1908. *Hulecoeteomyia fluviatilis* Leicester (nec Lutz, 1904), Cul. Malaya, p. 111 (male, female). Type locality: Malay Peninsula. Ulu Gombak (Leicester). Type: Non-existent.

1922. *Aedes (Finlaya) saxicola* Edwards, Ind. Jour. Med. Res. 10: 466 (nom. nov.).

1923. *Finlaya greigi* Barraud, Bul. Ent. Res. 13: 406 (male, female). Type locality: Assam. Haflong, Cachar Hills (Barraud). Type: Male, female (cotypes) in B. M.†

1932. *A. (F.) saxicola* Edwards, Gen. Insect., Fasc. 194: 151. Synonymy of *greigi*.

1946. *Aedes (Finlaya) rizali* Banks. Baisas, Phil. Bur. Health Mon. Bul. 22: 21. Mis-identification.

Adult and larva have been described by Barraud (1934: 191) and Knight (1947b: 628).

DISTRIBUTION: *Specimens examined*. U.S.-N.M. Palawan: Puerto Princesa. Irahuan and Balsahan Rivers.

Outside of the Philippines it is known from Malaya, Java, Siam, and India.

DISCUSSION: There are four larval specimens from Palawan deposited in the U. S. National Museum as *Finlaya* sp. No. 42 that possibly represent a species near to *saxicola*. They have been described by Knight (1947b: 647). The differences between these larvae and that of *saxicola* apparently consist entirely of the possession by the former of more heavily branched hairs. This difference, although striking in appearance, is a rather minor one. Consequently, they may represent only a polymorphic form of *saxicola*, rather than a new species.

Aedes (Finlaya) abadsantosi Baisas

1946. *Aedes (Finlaya) abadsantosi* Baisas, Phil. Bur. Health Mon. Bul. 22: 25 (male, female, pupa, larva). Type locality: Philippines. Llavac, Infanta Municipality, Tayabas Prov., Luzon (Baisas). Type: Male (holotype), with associated larval and pupal skins, in the Philippine Bureau of Health, Manila. Terminalia separated.

Adult and larva also described in detail by Knight (1947b: 641).

DISTRIBUTION: *Specimens examined*. U.S.-N.M. Samar: Osmena and Sohoton Springs, on Basey River. Mindanao: San Ramon, Zamboanga Prov. A.N.S.P. Leyte: Lagolago, nr. Baybay, Dagami. Samar: Osmena.

Literature records. Luzon: Upper Molawin Creek, Los Banos Agr. Coll., Laguna Prov. Type series, Llavac, Infanta Municipality, Tayabas Prov. (Baisas, 1946: 25).

Unknown outside the Philippines.

DISCUSSION: This and the following three species (*burgosi*, *rizali*, and *sberki*) are all very closely related and probably represent either a polymorphic or a polytypic species. Quite likely, *jugraensis* can also be included within this complex. However, the available collection data are too meager to solve this problem.

Aedes (Finlaya) burgosi Baisas

Fig. 8

1946. *Aedes (Finlaya) burgosi* Baisas, Phil. Bur. Health Mon. Bul. 22: 27 (males, females, larvae, pupae). Type locality: Philippines. Titunod Creek in Kolambugan, Lanao, Mindanao (Guinto). Type: Male (holotype), non-existent. Paratypes in the Philippine Bureau of Science, Manila, and in the U.S.N.M.

DISTRIBUTION: Known definitely only from the type series.

DISCUSSION: From the discussion of this species by Knight (1947b: 643), it would appear that *burgosi* probably represents only a polymorphic form of *abadsantosi*. The adults are not separable on external characters. The male terminalia differ only in that *burgosi* possesses 12-30 bristles on each lobe of the ninth tergite, whereas *abadsantosi* has 4-10 bristles on each lobe. The larva of *burgosi* differs from *abadsantosi* on the greater number of branches of some of the hairs, and on the pecten not having any of the teeth distinctly out of line ventrally.

If the series of specimens from Mt. Apo, Davao, Mindanao, described by Baisas (1946:

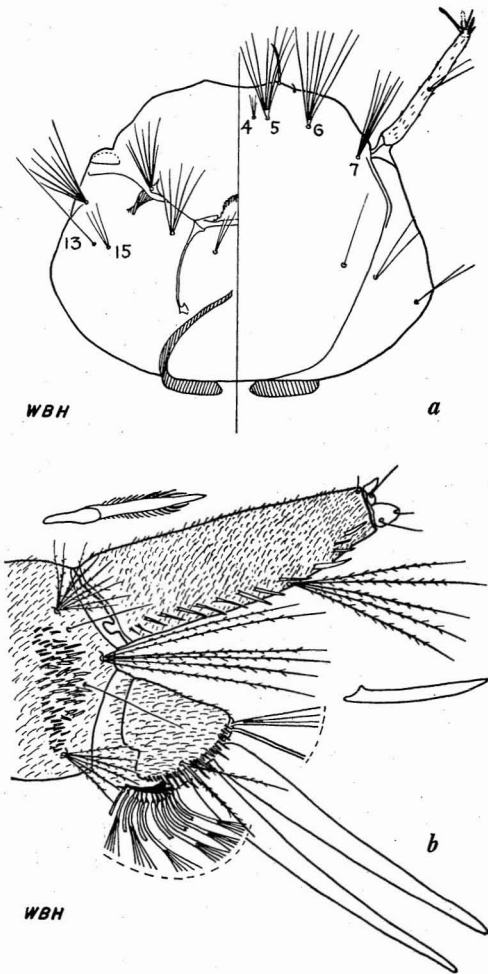


FIG. 8. *A. (Finlaya) burgosi*. Larva (Mindanao). a, Head; b, terminal segments.

28) are considered to be *burgosi*, even the male terminalic difference disappears because these specimens have a range of only 9–11 bristles on each ninth tergite lobe.

***Aedes (Finlaya) rizali* (Banks)**

1906. *Culex rizali* Banks, Phil. Jour. Sci. 1: 999 (2 females). Type locality: Philippines. Volcano Canlaon, Mt. Siya-Siya, at altitude of 760 m., Negros Occidental Prov., Negros Island (Banks). Type: Female (holotype), non-existent.

1922. *Aedes (Finlaya) rizali* Banks. Edwards, Ind. Jour. Med. Res. 10: 466. Different combination.

DISTRIBUTION: Known only from the type series.

DISCUSSION: The status of this species has been discussed by Knight (1947b: 644). As stated above, *rizali* has apparently not been retaken since Banks' type series was collected; nor have any additional notes ever been published on the types (destroyed during World War II). However, it must be very closely related to *abadsantosi* and *burgosi*, the only significant difference apparent from a study of the type description being the complete or nearly complete tergal bands of the latter two species (always complete on VIII). The extent of the tergal markings is subject to so much variation in this group of species that it is even possible that this character does not offer a valid distinction. Consequently, until material is again collected from the type locality of *rizali* its exact status will probably remain undetermined. With only the type description to go on, this species is also not separable from *jugraensis*.

The novotype material designated for *rizali* by Baisas (1946: 21) is cospecific with *saxicola*.

***Aedes (Finlaya) sherki* Knight**

1947. *Aedes (Finlaya) sherki* Knight, Ann. Ent. Soc. Amer. 40: 645 (males, females, pupae, larvae). Type locality: Philippines. Baguio, City of Baguio Prov., Luzon (Rozeboom). Type: Male (holotype), with associated larval and pupal skins, in the U. S. N. M.†

DISTRIBUTION: Known only from the type series. However, the type series is the result of four separate collections (and all by different people) so that the species must be well established at Baguio.

DISCUSSION: This species is only definitely distinct from the preceding three by the

presence of a basal white patch or band on segment IV of the hind tarsus. No definite character for the separation of the larva of *abadsantosi* and the larva of *sberki* has been found. All characters examined seemed to show sufficient intergradation to render them useless for positive identification. Consequently, it seems likely that *sberki* represents, at the most, only a subspecies of *abadsantosi*.

As pointed out in the type description, the larva is polymorphic.

***Aedes* (*Finlaya*) *jugraensis* (Leicester)**

Fig. 9

1908. *Helecocteomyia jugraensis* Leicester, Cul. Malaya, p. 109 (male, female). Type locality: Malaya. Jugra (Leicester). Type: Male, female (cotypes), non-existent. Note: Error in generic name spelling.

1922. *Aedes* (*Finlaya*) *jugraensis* Leicester. Edwards, Ind. Jour. Med. Res. 10: 466. Different combination.

Adult described by Knight (1947b: 647) and larva by Edwards and Given (1928: 343), both from Malayan material. The following larval description is based upon two Philippine specimens and constitutes the first record

of this species in the Philippines. No adults were taken.

LARVA: *Head:* Antenna slender, a few small spicules present; antennal hair double, inserted just beyond middle. Mouth brush with prominent comb-like tips. Hair 4 double, small; 5 and 6 with 3-4 branches; 7 with 3-5; 8 single; 9 double; 12 with 3-4; 13 single; 14 with 1-2; 15 with 3-4; 17 with 3-8; 18 with 1-2; 20 with 2-4; hairs 4, 5, and 6 are all in a straight line. Mentum with 11-13 lateral teeth. *Thorax:* Prothoracic hair 1 with 3 branches; 2 with 1; 3 with 3; all rather large and borne together on a sclerotized plate. A stout spine occurs at the base of the pleural hair tufts. Hair 1 of the mesothorax single, stout, darkly pigmented; hair 7 of metathorax with 4 branches, each short, very stout, darkly pigmented, and barbed. *Abdomen:* Dorso-lateral hairs on I and II double. Lateral hairs on I and II single; on III to VI double, once triple. Pentad hair 1 with 2-3 branches; 2 and 4 single; 3 with 4-7; 5 with 2-4. Comb with 14 to 19 large scales in a patch or double row, each scale pointed and fringed laterally. Segment VIII and anal segment ventral to anal plate pilose. Siphon incomplete basally, with an attached acus, index 2.4-3.0; 9-11

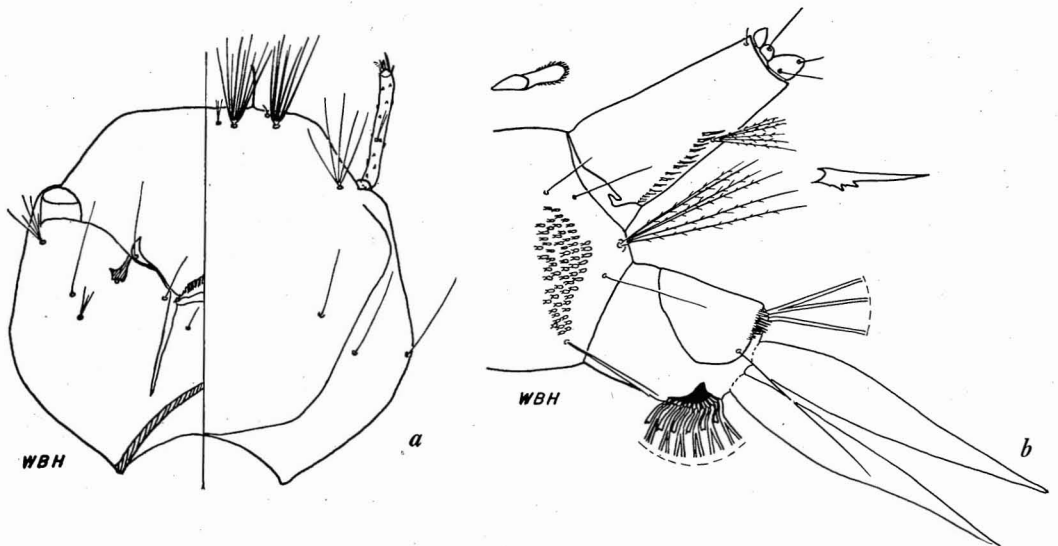


FIG. 9. *A. (Finlaya) jugraensis*. Larva (Balabac). *a*, Head; *b*, terminal segments.

pecten teeth in an even row, none beyond siphon tuft, each tooth with 1 or 2 ventral denticles; siphon hair tuft with 3–5 branches. Anal plate broadly incomplete, with a row of short spines on posterior margin; *lb* single, stout; *isc* with 3–6 branches, *osc* single; ventral brush of 12 tufts, each tuft with 2–6 branches, sometimes one tuft off the barred area basally; barred area joined laterally by a sclerotized line. Anal gills long, tapering, subequal, about 3.0 times longer than anal plate.

DISTRIBUTION: *Specimens examined*. R.K.L. Balabac Island: 2 larvae, Cape Melville (Johnson).

Outside of the Philippines this species is known only from Malaya.

DISCUSSION: Since the male terminalia of *jugraensis* has not been described, it is impossible to discuss its exact relationship with the closely related group of four species just preceding (*abadsantosi*, *burgosi*, *rizali*, and *sberki*). However, there is no question but that it is closely related to this group.

Aedes (Finlaya) spp., near *abadsantosi*

In the British Museum collection there is a female specimen from the Philippines that possibly represents an unknown species. It closely resembles *abadsantosi* except that the anterior portion of the postspiracular scale patch consists of narrow yellowish scales and does not extend to the ventral margin of the spiracle. All of the abdominal tergites are dorsally dark except for a complete basal band on VIII. The specimen has the following data: Mt. Mupo, Dansalan, Mindanao, 28–III–1920 (Dr. A. Moore).

In the collection of the Academy of Natural Sciences of Philadelphia, there is a female specimen, Lagolago, Leyte (H. R. Roberts), with the postspiracular scales similar to those of the above specimen but differing in having the tergites with complete basal bands.

Also, in the U. S. National Museum there is

a male specimen, with associated larval and pupal skins, which cannot be separated from *abadsantosi* except on male terminalia. The claspette filament is slender and tubular instead of being laterally flattened (this is utterly unlike anything known in this group), and there are 11–13 hairs on each of the ninth tergite lobes. The data for this specimen are: San Ramon, Mindanao (Knight and Laffoon), reared from rock hole in hill stream, 17–IX–1945.

Aedes (Finlaya) *banksi* Edwards

Figs. 10, 11

1906. *Hulecoetomyia pseudotaeniata* Giles. Banks, Phil. Jour. Sci. 1: 986. Misidentification of specimens from Luzon.

1922. *Aedes* (Finlaya) *banksi* Edwards, Ind. Jour. Med. Res. 10: 270 (males, females). Type locality: Philippines. Montalban, Rizal Prov., Luzon (Banks). Type: Male (holotype) in B. M. † Terminalia mounted.

ADULT: Characterized by the pattern of narrow sharply defined yellow lines on the scutum, by the median pale-scaled longitudinal line along the anterior surface of the mid femora, and by the hind tarsi having basal and apical bands on segments I–IV and with V all white dorsally.

Male. Wing length about 2.8 mm. *Head*: Proboscis dark. Palpus slightly shorter than the proboscis; dark, basal half of V white-scaled dorsally; a number of hairs apically on III and laterally along IV–V. Vertex dorsum with a median longitudinal stripe of narrow pale scales (some also present on the nape), remainder broad-scaled, the dorsal portion being dark-scaled and marked with a longitudinal white band medially, a line of pale scales along the ocular margin; the lateral surface of vertex with broad pale scales; dark upright-forked scales scattered over the dorsum. *Thorax*: Scutum covered with narrow dark scales, marked with sharply defined thin longitudinal lines of narrow yellowish scales as follows: A median line that forks at the

prescutellar space, a short subdorsal line beginning near the anterior margin and extending posteriorly to the level of the fossae, a line curving mesally along the fossae and then extending straight back to the posterior margin of the scutum, a short line above the wing base, and an even shorter line or patch on the lateral margin just above the paratergite; dorso-central, acrostichal, and prescutellar bristles present. Scutellum with small broad dark scales on the mid lobe, some pale scales may be present basally, lateral lobes with sparse narrow pale scales. *Apn* with broad pale scales; *ppn* with a line of narrow-curved pale scales along dorsal margin, broadened dark scales centrally, and a small patch of broadened pale scales ventrally. The following pleural areas each with a patch of broad pale scales: Propleural, subspiracular, postspiracular, paratergite, sub-prealar, dorsal sternopleural, medio-posterior sternopleural, and mesepimeral. *Legs*: Fore femur with anterior surface dark except for a thin longitudinal white line very near to the ventral margin, mid femur similar except the line is median, hind femur similar except the line is broader and is near to the dorsal margin for at least a portion of its course. Fore tibia with an apical pale band, mid tibia may have a broken white-scaled anterior line, all of the tibiae with a short ventro-basal area of pale scaling. Fore tarsus dark, mid tarsus with a basal white band on I and usually some apical pale scales; hind tarsus with basal and apical bands on I-IV (apical pale area on IV incomplete ventrally), V all white on dorsal surface. Fore and mid tarsal claws unequal, the larger bidentate, the smaller unidentate; hind tarsal claws equal, simple. *Wings*: Dark-scaled, a short subbasal pale area on the costa. *Abdomen*: Tergite I with a lateral band of pale scales, II with a small medio-basal pale spot, III-VI with basal white bands. Sternites with basal white bands. *Terminalia*: Basistyle without basal and apical lobes, lateral surface heavily scaled (omitted in figure). Claspette appendage elongate, slen-

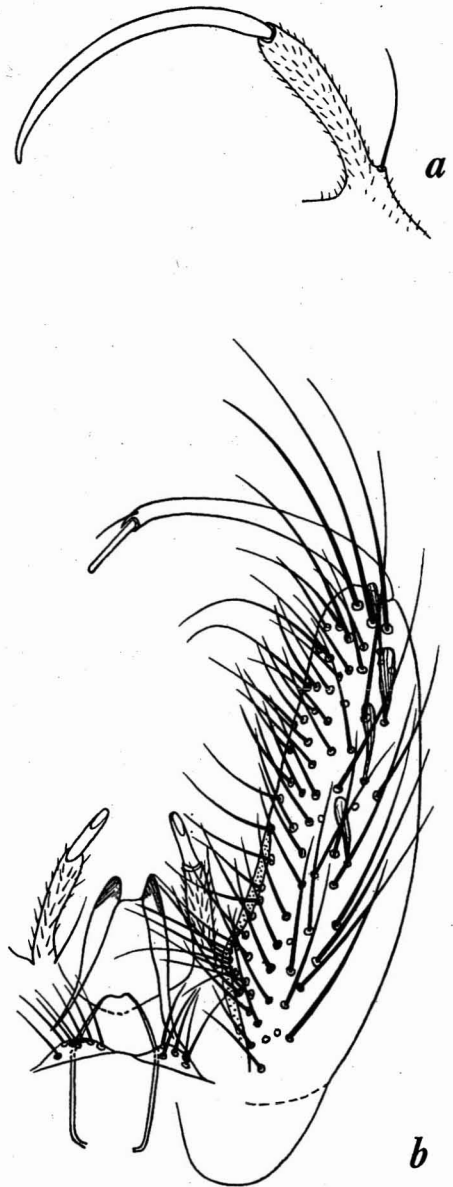


FIG. 10. A. (*Finlaya*) *banksi*. Male terminalia. a, Lateral aspect of claspette (Samar); b, terminalia (Mindanao).

der, only slightly broadened in lateral view.

Female: Differs from male chiefly as follows: Palpus approximately one-fourth as long as the proboscis, apex pale-scaled, a small subbasal pale patch usually present. Torus with pale scales medially. Fore tarsus with a narrow

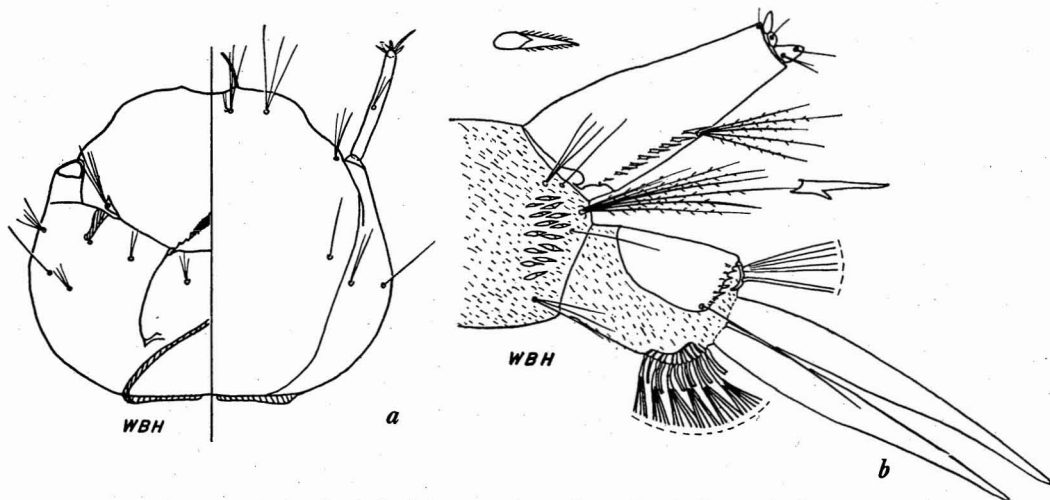


FIG. 11. *A. (Finlaya) banksi*. Larva (Samar). *a*, Head; *b*, terminal segments.

basal pale band on II, may be some apical pale scaling on I; mid tarsus with small basal bands on I–IV and apical pale scaling on I–II. Tarsal claws equal, fore and mid each unidentate. Tergites II–VI and VIII with basal bands, VII with a baso-lateral white patch, and sometimes a small medio-basal spot.

The series of specimens from Mindoro and Jolo differ slightly from the Samar series in having hind tarsal segment IV all white dorsally (was very narrowly interrupted on two specimens). Also, the subbasal white patch on costa is frequently obsolete dorsally or reduced to a line of scales on the anterior margin only.

LARVA: Head: Antenna spiculated, antennal hair double (occasionally single), inserted before middle. Mouth brushes with prominent comb-like tips. Hair 4 small with 1–5 branches; 5 with 7–12; 6 with 7–11; 7 with 3–6; 8 single; 9 single or double; 12 with 3–6; 13, 14, and 17 single; 15 with 3–5; 18 and 20 single or double. Mentum with 12–15 lateral teeth. **Thorax:** Prothoracic hairs 1 and 2 single, hair 3 with 2–3 branches; this group borne together on a small sclerotized plate. Mesothoracic hair 9 with 5–6 branches; hairs 10 and 12 single, stout; hair 11 single, very small. Metathoracic hair 9 with 4 branches;

10 single, stout; 12 greatly reduced. **Abdomen:** Dorso-lateral hairs on I and II double. Lateral hair on I single or double; on II to V double; on VI single. Pentad hair 1 with 1–3 branches; 2 and 4 single; 3 with 4–8; 5 with 1–4. Comb of 40–61 scales in a patch, the scales rounded and fringed apically and laterally. Siphon with acus narrowly attached, rarely detached, index 1.2 to 2.0; 12–25 pecten teeth in a straight row with ventral denticles; siphon hair tuft with 4–11 branches, length less than width of siphon. Anal plate incomplete, with a patch of spines on the posterior lateral margin; *lb* single, stout; *isc* double, *osc* single; ventral brush with 11–13 tufts on a barred area, the tufts with 2–3 branches; barred area connected on each side to a sclerotized plate. Anal gills subequal, broadest at base and tapering sharply to a long slender point; dorsal gills 2.7–3.4 times longer than the anal plate.

DISTRIBUTION: *Specimens examined.* U.S.-N.M. Luzon: 4 larval skins, 1 larva, Baguio, City of Baguio Prov. 8 larvae, Burgos, Mountain Prov. R.K.L. Samar: 4 males, 20 females, 14 sets assoc. skins, 2 larvae, Kena-matayan River, Osmena (Knight, Laffoon, Rozeboom). Mindanao: 2 males, 9 females, 8 sets assoc. skins, San Ramon (Johnson, Laffoon, Knight). Basilan: 1 male, 3 females,

3 sets assoc. skins, 4 kilometers from Isabela (Knight). C.C. Luzon: 8 males, 38 females, 6 larvae, Antamok, Mountain Prov. (Franclemont).

Literature records. Luzon: Gorge Camp, Manila waterworks, Rizal Prov. (Banks, 1906: 986).

Unknown outside the Philippines.

DISCUSSION: This species, which is the sole representative of Group E in the Philippines, is closely related to *pseudotaeniatus* (Giles) of India. However, *pseudotaeniatus* is distinct from *banksi* in having hind tarsal segment V all dark. Other minor color variations also occur. Male terminalia and larvae are very similar.

Aedes (*Finlaya*) *harperi* Knight

1948. *Aedes* (*Finlaya*) *harperi* Knight, Proc. Ent. Soc. Wash. 50: 4 (males, females, pupae, larvae). Type locality: Philippines. Zig-Zag Pass, Subic Bay, Zambales Prov., Luzon (Rozeboom and MacMillan). Type: Male (holotype) in U. S. N. M. † Terminalia mounted.

DISTRIBUTION: *Specimens examined.* U.S.-N.M. Type series. Luzon: Zig-Zag Pass, Olongapo, and Matain, all in Subic Bay area, Zambales Prov.

Unknown outside the Philippines.

DISCUSSION: This species, which is the sole representative of Group F in the Philippines, is closely related to *stevensoni* (Barraud) of India. However, *stevensoni* differs as follows: vertex without a white median area; only the first three hind tarsal segments banded (sometimes a trace of a marking on IV); female tergites without complete bands except VIII, which is all white; and the basal white-scaled area on costa very small. The larva is unknown.

Aedes (*Finlaya*) *niveus* (Ludlow)

Fig. 12

1903. *Stegomyia niveus* Ludlow, Jour. N. Y. Ent. Soc. 11: 139 (female). Type locality:

Philippines. Oras, Samar. Type: Female (lectotype) in B. M. †

1905. *Scutomyia nivea* Ludlow. Theobald, Gen. Insectorum, Cul., p. 19. Different combination.

1910. *Stegomyia pseudonivea* Theobald, Mon. Cul. 5: 176 (male). Type locality: Andaman Islands (Lowis). Type: Male (allotype) in the B. M. † Terminalia mounted.

1917. *Aedes* (*Ochlerotatus*) *niveus* Ludl. Edwards, Bul. Ent. Res. 7: 211. Different combination.

1923. *Finlaya nivea* (Ludl.). In part. Barraud, Ind. Jour. Med. Res. 11: 480. Different combination.

1931. *Aedes* (*Finlaya*) *niveus* (typus) (Ludlow). Brug, Arch. Hydrobiol. Suppl.-Bd. 9: 25. First association of male terminalia and larva. Sumatra and Bali.

1932. *A.* (*F.*) *niveus* Ludlow. Edwards, Gen. Insectorum, Cul., Fasc. 194, p. 154. Synonymy of *pseudonivea* Theobald, 1910 (male only). Pointed out that the female of *pseudonivea*, described by Theobald (1905: 75), is a distinct species.

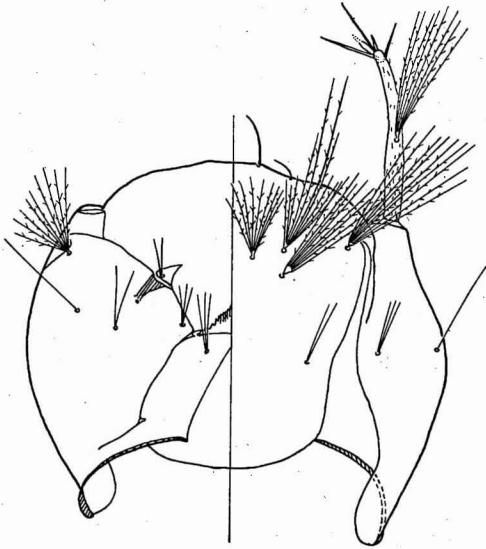
Adult and larva are described by Barraud (1934: 208) and Knight (1946: 278).

DISTRIBUTION: *Specimens examined.* U.S.-N.M. Luzon: Batangas, Batangas Prov.; Subic Bay, Zambales Prov. Samar: Oras. Palawan: Puerto Princesa, Irahuan River, and Tacburos. Busuanga: 1 larva, Coron (Fitzgerald). A.N.S.P. Leyte: Tacloban (Roberts). C.A.S. Mindoro: 3 males, 3 females, San Jose (Ross).

Literature records. Of the Philippine records given by Bohart (1945: 58), only that for Oras is definitely this species.

From outside the Philippines there are apparently reliable literature records from South Bengal, Ceylon, Andaman Islands, Sumatra, Bali, Java, Flores, Malacca, Borneo, and Siam. The records from China and Japan are probably not for this species.

DISCUSSION: This species and the following three are members of the *niveus* subgroup



WBH

FIG. 12. *A. (Finlaya) niveus*. Larval head (Palawan). Drawn from exuvium.

of Group H. The *niveus* subgroup, consisting at present of 12 valid species and subspecies, is distributed throughout the Oriental Region. Although insufficient data are available at present, it appears to be at the super-species stage in development.

Since the appearance of the treatment of the *niveus* subgroup by Knight (1946), the senior author has had the opportunity of seeing the lectotype of *niveus* and the male allotype of *pseudonivea* in the British Museum. The terminalia of the latter was separated and examined. Both specimens were found to be typical *niveus* as treated here.

Knight (1946: 278) described the female scutum as having the anterior two-thirds solidly white-scaled. However, in a number of the specimens from Leyte and in one of the three females from Mindoro listed in the distribution section above, the white scutal patch is interrupted posteriorly for as much as three-fourths of its depth by a median extension of the posterior dark-scaled area.

Apparently the female of this species is not definitely separable from that of *lacteus*. However, it is possible that the palpi are

shorter in *lacteus* (about one-eighth length of proboscis in few observed cases) than they are in *niveus* (one-fifth to one-sixth as long).

Aedes (Finlaya) lacteus Knight

1946. *Aedes (Finlaya) lacteus* Knight, Jour. Wash. Acad. Sci. 36: 275 (male, female, larvae). Type locality: Philippines. Cape Melville, Balabac Island (Laffoon and Johnson). Type: Male (holotype) in U. S. N. M.† Terminalia mounted.

DISTRIBUTION: Known only from the type series of one male, one female, and two larvae. A female specimen in the U.S.N.M. from Parang, Mindanao (Paullus), is possibly this species, but in the absence of a male positive identification is not possible.

DISCUSSION: This species possibly represents only a polymorphic form of *niveus*, being closely similar to it in the adult and larval stages.

Externally, the male is not definitely separable from that of either *niveus* or *laoagensis*.

Aedes (Finlaya) saperoi Knight

Fig. 13

1946. *Aedes (Finlaya) saperoi* Knight, Jour. Wash. Acad. Sci. 36: 271 (males, females, larvae). Type locality: Philippines. Subic Bay, Luzon (Zedeck and Zolik). Type: Male (holotype), with associated larval and pupal skins, in U. S. N. M.† Terminalia mounted.

DISTRIBUTION: *Specimens examined*. U.S.-N.M. Luzon: Subic Bay, Zambales Prov. Mindanao: 4 females, 3 sets assoc. skins, Pasanonco, Zamboanga (Laffoon). 3 males, 3 females, Kisante, Kidapawan, Cotabato Prov. (Enke, Corcega).

Unknown outside the Philippines.

DISCUSSION: The Pasanonco specimens listed above were treated by Knight (1946: 280) as an unidentified species. The later

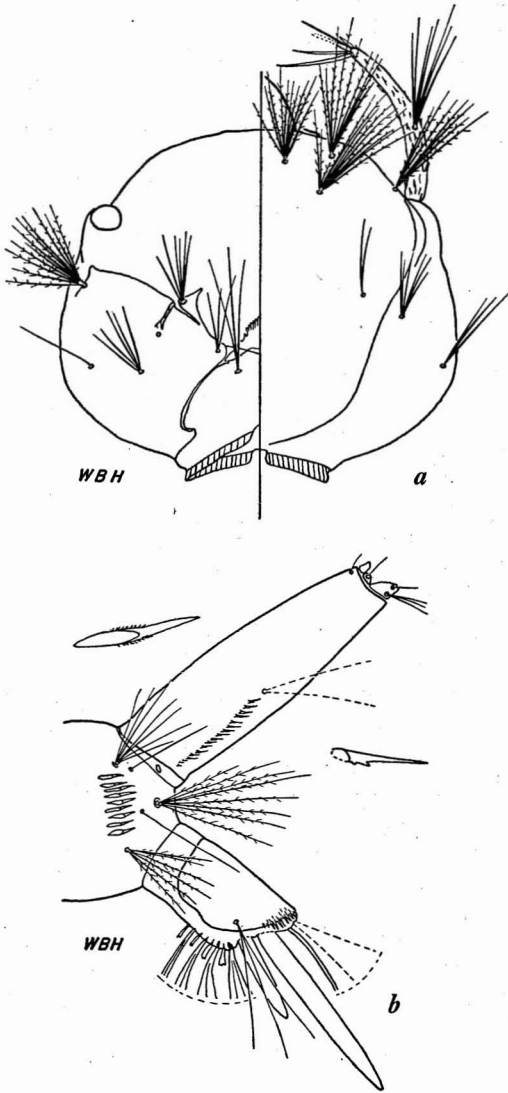


FIG. 13. *A. (Finlaya) saperoi*. Larva (Culion). a, Head; b, terminal segments.

opportunity of seeing male terminalia from the Cotabato series showed all the Mindanao specimens to be *saperoi*, differing from the previously known specimens in having the apical dark area of the hind femur broadly complete on the anterior aspect.

A re-examination of the larval specimen (Fig. 13) from Culion Island, tentatively named as *albolateralis* (Theobald) by Knight (1946:279), has shown it to be equally similar to *saperoi*. Because of this finding, *albolateralis*

has been dropped from the Philippine species list. However, the Culion specimen is included in the larval key under the name *albolateralis* to call attention to the possibility that this species may still be found to occur in the Philippines.

This species is very similar to *laoagensis*.

Aedes (Finlaya) laoagensis Knight

1946. *Aedes (Finlaya) laoagensis* Knight, Jour. Wash. Acad. Sci. 36: 276 (males, female, larva). Type locality: Philippines. Laoag, Ilocos Norte Prov., Luzon (Hoogstraal). Type: Male (holotype) in U. S. N. M. † Terminalia mounted.

DISTRIBUTION: *Specimens examined*. U.S.-N.M. Luzon: Laoag, Ilocos Norte Prov.; Baguio, City of Baguio Prov.; Subic Bay, Zambales Prov.; San Fernando; Rizal Prov.; Laguna Prov.; Tayabas Prov.

Unknown outside the Philippines.

DISCUSSION: Distinguishable from the other species of the *niveus* subgroup in the Philippines on the divergence of the scutal white-scaled area from the lateral margin over the paratergite in the female. Although the terminalic characters differ slightly, the male does not differ externally from *saperoi*. The larva is not distinguishable with certainty from that of *saperoi* except possibly on the number of branches of the antennal hair tuft and on the spiculation of the posterior margin of the anal plate.

Aedes (Finlaya) paradissimilis Rozeboom

1946. *Aedes (Finlaya) paradissimilis* Rozeboom, Jour. Parasit. 32: 587 (males, females, pupae, larvae). Type locality: Philippines. Cape Melville, Balabac (Johnson and Laffoon). Type: Male (holotype), with associated larval and pupal skins, in U. S. N. M. Terminalia mounted.

DISTRIBUTION: *Specimens examined*. C.A.S. Mindoro: 4 males, 4 females, 9 sets assoc. skins, San Jose (Ross).

Literature records. Leyte: Lagolago, Baybay; Libjo, Dinagat Island; Diit River, Tacloban. Calicoan Island (nr. Samar): N'golos. Palawan: Irahuan River. Balabac Island: Cape Melville (Rozeboom, 1946: 588).

Unknown outside the Philippines.

DISCUSSION: This species and the following three are members of the *dissimilis* subgroup of Group H. The *dissimilis* subgroup, consisting at present of five valid species and subspecies and of one unrecognized name (*leucomeres*), is distributed over Malaya, India, China, and the Philippines. The members of this subgroup are all extremely similar and probably constitute either a polytypic species or a superspecies.

A. paradissimilis appears to be most closely related to *dissimilis* (Leicester) from India and Malaya, but is stated by Rozeboom (1946: 590) to differ from that species in larval characters.

Aedes (Finlaya) *leucopleurus* Rozeboom

1946. *Aedes* (Finlaya) *leucopleurus* Rozeboom, Jour. Parasit. 32: 588 (male, pupa, larvae). Type locality: Philippines. Irahuan River, Palawan (Johnson and Laffoon). Type: Male (holotype), with associated larval and pupal skins, in U. S. N. M. Terminalia mounted.

DISTRIBUTION: Known only from the type series. Palawan: Irahuan River. Culion Island: Pilapil. This series is divided between the U.S.N.M. and the B.M.

DISCUSSION: Distinguishable from *paradissimilis*, only in the larval stage, by the following characters: Head hairs 4, 5, and 9 and prothoracic hair 0 each with a greater number of branches; posterior process of mandible truncate; lateral hair on abdominal segment II only about one-half the length of that on I; and apical fringe of comb scales without a stout central spine.

The female is unknown.

Aedes (Finlaya) *luzonensis* Rozeboom

1946. *Aedes* (Finlaya) *luzonensis* Rozeboom, Jour. Parasit. 32: 589 (males, females, pupae, larvae). Type locality: Philippines. Subic Bay, Zambales Prov., Luzon (Mac-Millan). Type: Male (holotype), with associated larval and pupal skins, in the U. S. N. M. Terminalia mounted.

DISTRIBUTION: *Specimens examined.* C.A.S. Mindoro: 2 males, 4 females, 2 sets assoc. skins, 1 larva, San Jose (Ross).

Literature records. Type series. Luzon: Subic Bay, Zambales Prov.

Unknown outside the Philippines.

DISCUSSION: The adult of this species is separable from those of *paradissimilis* and *leucopleurus* by the presence of 2-3 hairs of about equal size at the apex of the claspette of the male terminalia. The larva differs mainly in having the lateral hair of abdominal segments I and II paler, slenderer, and more branched, and of segments III-V more branched; and on the structure of the pecten teeth.

Aedes (Finlaya) *leucomeres* (Giles)

1904. *Stegomyia leucomeres* Giles, Jour. Trop. Med. 7: 367 (female). Type locality: Philippines. Camp Stotsenberg, Pampanga Prov., Luzon (Whitmore). Type: Female (holotype) in B. M.†

This species is known only from the type female. This specimen has been examined and found to be somewhat damaged. The antennae, fore and hind legs, and one mid leg are entirely missing, and the scutum is rubbed bare over the median area. The type was compared with paratype females of *paradissimilis* and *luzonensis*. It was found similar to *luzonensis* in having two pale setae on the upper part of propleuron but differed in having a short median spot on the mid femur (rather than one that is one-half the length

of the femur), and in having this spot extending onto the ventral aspect. The type differed from *paradisimilis* only in having two, rather than one, propleural bristles.

Since the members of the *disimilis* subgroup cannot be adequately distinguished in the female, the true relationship of *leucomeres* is unknown at present.

As Rozeboom (1946: 590) pointed out, the two anterior scutal spots described by Giles from the type are actually the silvery scale patches on *ppn*. No scutal markings are apparent now on the type.

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