ZOOTAXA

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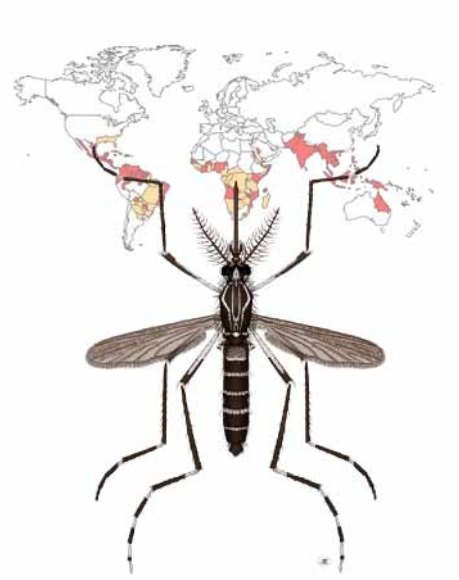
LEOPOLDO M. RUEDA



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Pictorial keys for the identification of mosquitoes (Diptera: Culicidae) associated with Dengue Virus Transmission

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Table of contents

Abstract

Identification keys are provided for female adults and fourth stage larvae of the mosquito species likely to transmit dengue viruses in 4 regions of the world. The keys are illustrated with Auto-Montage® photomicrographs, allowing optimum depth of field and resolution. Species included for the **Afrotropical Region** are: *Aedes (Stegomyia) aegypti* (Linnaeus), *Ae. (Stg.) africanus* (Theobald),

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Ae. (Stg.) albopictus (Skuse), *Ae. (Stg.) luteocephalus* (Newstead), *Ae. (Stg.) opok* Corbet and Van Someren, *Ae. (Diceromyia) furcifer* (Edwards), and *Ae. (Dic.) taylori* Edwards; for the **South Pacific Islands and Australian Region**: *Ae. (Stg.) aegypti*, *Ae. (Stg.) albopictus*, *Ae. (Stg.) cooki* Belkin, *Ae. (Stg.) hebrideus* Edwards, *Ae. (Stg.) hensilli* Farner, *Ae. (Stg.) polynesiensis* Marks, *Ae. (Stg.) rotumae* Belkin, *Ae. (Stg.) scutellaris* (Walker), and *Ochlerotatus (Finlaya) notoscriptus* (Skuse); for the **Oriental Region**: *Ae. (Stg.) aegypti*, *Ae. (Stg.) albopictus*, and *Oc. (Fin.) niveus* subgroup; and for the **American Region** (North, Central and South America, including the Caribbean Islands): *Ae. (Stg.) aegypti*, *Ae. (Stg.) albopictus*, and *Oc. (Gymnometopa) mediovittatus* (Coquillett).

Key words: Diptera, Culicidae, *Ochlerotatus*, *Aedes*, *aegypti*, *albopictus*, dengue, identification key, mosquitoes

Acknowledgments

Appreciation is expressed to T. Litwak for illustrations and help in finalizing the images; to J. Pecor in mounting the specimens; to J. Stoffer for help in laying out and finalizing the images; to D. Strickman and R. Wilkerson for encouragement and support; to M. Potter for initiating the dengue vector identification project and providing reprints; and to S. Schleich of the WRAIR Dengue Vector Control System (DVCS) project for support. Special thanks to R. Wilkerson, Y. M. Huang, B. Harrison, D. Strickman, and B. P. Rueda for reviewing the manuscript and helpful suggestions. This work was performed under a Memorandum of Understanding between the Walter Reed Army Institute of Research and the Smithsonian Institution, with institutional support provided by both organizations.

On the cover: *Aedes (Stegomyia) aegypti* (Linnaeus) adult female, dorsal view. (Drawing by Taina Litwak; world map courtesy of U.S. Centers for Disease Control and Prevention (CDC) (http://www.cdc.gov/ncidod/dvbid/dengue/map-distribution-2000.htm).

Introduction

Aedes and *Ochlerotatus* mosquitoes include species that are known or potential vectors of dengue viruses infecting humans. With an increasing number of human cases of dengue and dengue hemorrhagic fever worldwide, it is essential that identification keys for the mosquito vectors be readily available. A list of mosquito species (Table 1) includes 7 commonly known or potential vectors of dengue viruses in the Afrotropical Region, 9 in the South Pacific Islands and Australian Region, about 3 in the Oriental Region (particularly Southeast Asia) and 3 in the Americas (North, Central and South America including the Caribbean Islands). These species are treated separately according to regions (Fig. A) in the identification keys for both adults and fourth stage larvae. Two species, *Aedes aegypti* (Linnaeus) and *Aedes albopictus* (Skuse), are found in all 4 regions of the world that are treated in this work.

The purpose of this work is to provide a practical pictorial guide to identification of commonly known or potential vectors of dengue viruses worldwide. Auto-Montage® photomicrographs of 16 species from 4 regions of the world are included. The pictorial key to the species was purposely designed for use by non-specialists in mosquito taxonomy. The user is cautioned that mosquito species not included in this guide may also be collected from the same habitats of dengue vector species. It is not uncommon that older adult specimens collected from various sites may have missing body parts or characters (i.e. scales, legs, etc.) that are essential for accurate identifications. Taxonomic authorities should be consulted for verifications of species identifications. Morphological notes, if necessary, are provided in the regional keys to pinpoint some diagnostic characters separating vector species from closely related non-vector species. To those interested primarily in the taxonomy of *Aedes* and *Ochleroratus*, a selected list of useful references for each region is included.

For general information, *Aedes* and *Ochlerotatus* mosquitoes share a combination of diagnostic morphological features that distinguish them from species of other genera. The vertex of the adult head of *Aedes* and *Ochlerotatus* has either a few or numerous forked scales that are restricted or not to the occiput (Fig. C; Afrotropical adult key figs. 1–4). The posterior margin of the scutellum (Fig. C) is trilobed, with a distinct group of setae on each lobe. The thorax (Fig. D) has no setae in the prespiracular area. Vein 1A of the wing (Fig. B) ends beyond the base of fork of vein Cu. The alula of the wing (Fig. C) has narrow fringe scales. The pulvilli of the legs are absent or less developed. The adult abdomen (Fig. B; Afrotropical adult key figs. 5–6) is completely covered with scales. The larvae of *Aedes* and *Ochlerotatus* have a well developed siphon (Figs. F & H), with a single pair of seta 1-S at about the apex of pecten. Comb scales and pecten (Fig. H; Afrotropical larval key figs. 34 & 35, 37 & 39; Americas larval key figs. 140 & 144) are present. Seta 6-C of the larval head (Figs. F & G) is either single or branched, but never spine-like. Morphological generic characters to easily distinguish *Aedes* from *Ochlerotatus* are apparently unavailable. In most cases, *Aedes* and *Ochlerotatus* mosquitoes are best separated at the species level.

Illustrations of the general morphology of mosquito adult (Figs. B–E) and larva (Figs. F–H) are presented. As far as possible, the terminology of Harbach and Knight (1980, 1981) is used.

Before using this key check first if your specimen is a mosquito. Light trap collections and common larval habitats contain numerous specimens that are not mosquitoes. To use the appropriate regional key, you must know the stage of your mosquito specimen and the region where it was collected or originated. Check also if your specimen belongs to either *Aedes* or *Ochlerotatus*; otherwise you cannot use the present keys. Several references (e.g., Mattingly 1971, Harbach and Sandlant 1997, Rueda et al. 1998, Huang 2002) are available to key out various mosquito genera in various regions of the world. You may visit our WRBU website (http://wrbu.si.edu/wrbu.html) for the list of references.

Materials and Methods

The adult and larval specimens used in this study are from the collection of the National Museum of Natural History, Washington, DC, with the exception of additional larvae and reared adults of *Aedes albopictus* from Maryland, USA.

Photomicrographs of mosquito specimens were taken using JVC digital camera (Model KY-F70B, JVC, Pinebrook, NJ) under both Nikon SMZ 1500 stereomicroscope and Nikon Optiphot compound microscope (Nippon Kogaku, Tokyo, Japan) for pinned and slide mounted specimens, respectively. Auto-Montage® software (Syncroscopy, Frederick, MD) was used to optimize depth of focus for 3-dimensional imaging. The images were finalized in JPEG (Joint Photographic Experts Group) format using Photoshop® 6.0 (Adobe Co., San Jose, CA).

The key provides several diagnostic characters in couplets and illustrations in Auto-Montage® photomicrographs. The first one or two characters in each couplet are usually sufficient for identifications of specimens. Critical characters of adults and larvae can be seen with a light stereomicroscope and a compound microscope, respectively. Sufficient lighting and positioning of adult or larval specimens under the dissecting stereomicroscope (at least 60 X magnification) are important. Adult specimens may be mounted on a card point or minuten pin. A microscope stage manipulator may be used to rotate a pinned specimen on two independent axes while maintaining a relatively accurate focus under a microscope. In this way, dorsal, ventral, lateral, frontal and caudal aspects of the pinned mosquito may be observed without touching the specimen. Unmounted trapped adult specimens may be identified under a stereomicroscope using a petri dish with a white paper in the bottom, manipulating specimens with a pair of forceps or pins. Unmounted larval specimens, that are large enough, can be observed under a stereomicroscope while they are submerged under ethyl alcohol or water. Some larval specimens, however, need to be mounted on slides either temporarily (in Hoyer's medium) or permanently (using Euparal medium or Canada balsam) to observe extremely small structures (e.g. setae, pecten, comb scales, etc.) for diagnosis under a compound microscope. It is a good practice to have some specimens kept as reference collections, some sent to museums for deposition or confirmation of identification, and trapped specimens identified locally. For detailed procedures to mount mosquito adults, immature exuviae and whole larvae, visit our website: http://wrbu.si.edu/wrbu.html.

TABLE 1. List of mosquito species associated with dengue virus transmission that are included in the adult and larval identification keys. (Please see map below).

	Selected References
Afrotropical Region (Subsaharan Africa)	
Aedes (Stegomyia) aegypti (Linnaeus)	Trpis & Hausermann (1986), Rodhain and Rosen (1997)
Aedes (Stegomyia) africanus (Theobald)	Rodhain and Rosen (1997)
Aedes (Stegomyia) albopictus (Skuse)	Rodhain and Rosen (1997)
Aedes (Stegomyia) luteocephalus (Newstead)	Rodhain and Rosen (1997)
Aedes (Stegomyia) opok Corbet and Van Someren	Rodhain and Rosen (1997)
Aedes (Diceromyia) furcifer (Edwards)	Rodhain and Rosen (1997)
Aedes (Diceromyia) taylori Edwards	Rodhain and Rosen (1997)
South Pacific Islands and Australian Region	
Aedes (Stegomyia) aegypti (Linnaeus)	Cleland et al. (1916), Rodhain and Rosen (1997)
Aedes (Stegomyia) albopictus (Skuse)	Belkin (1962a, b), Rodhain and Rosen (1997)
Aedes (Stegomyia) cooki Belkin	Rodhain and Rosen (1997)
Aedes (Stegomyia) hebrideus Edwards	Belkin (1962a, b), Rodhain and Rosen (1997)
Aedes (Stegomyia) hensilli Farner	Savage et al. (1998)
Aedes (Stegomyia) polynesiensis Marks	Rodhain and Rosen (1997)
Aedes (Stegomyia) rotumae Belkin	Rodhain and Rosen (1997)
Aedes (Stegomyia) scutellaris (Walker)	Rodhain and Rosen (1997)
Ochlerotatus (Finlaya) notoscriptus (Skuse)	Rodhain and Rosen (1997)
Oriental Region (including Southeast Asia)	
Aedes (Stegomyia) aegypti (Linnaeus)	Hammon et al. (1960), Huang (1979), Rodhain and Rosen (1997)
Aedes (Stegomyia) albopictus (Skuse)	Rudnick and Chan 1965, Smith et al. 1971, Huang (1979), Rodhain and Rosen (1997)
Ochlerotatus (Finlaya) niveus subgroup	Rudnick (1986)
Americas (including the Caribbean Islands)	
Aedes (Gymnometopa) mediovittatus (Coquillett)	Gubler et al. (1985), Freier and Rosen (1988)
Aedes (Stegomyia) aegypti (Linnaeus)	Rodhain and Rosen (1997)
Aedes (Stegomyia) albopictus (Skuse)	Rodhain and Rosen (1997)

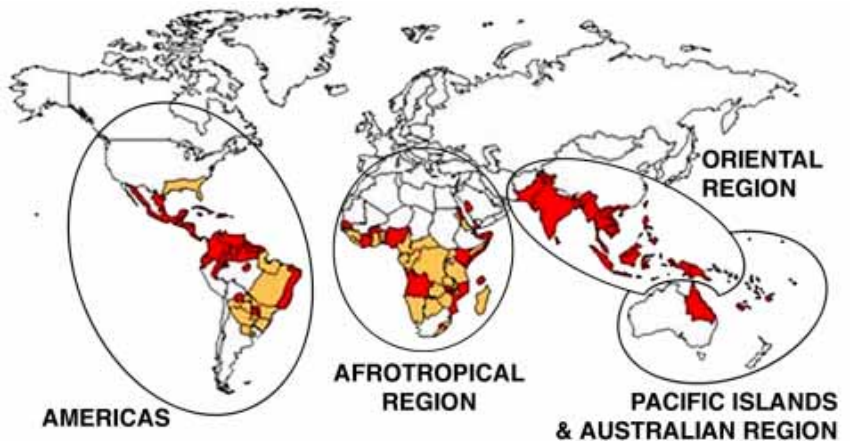

FIGURE A. Map showing different regions of the world, as indicated in the identification keys.

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Morphological features used in the identification keys

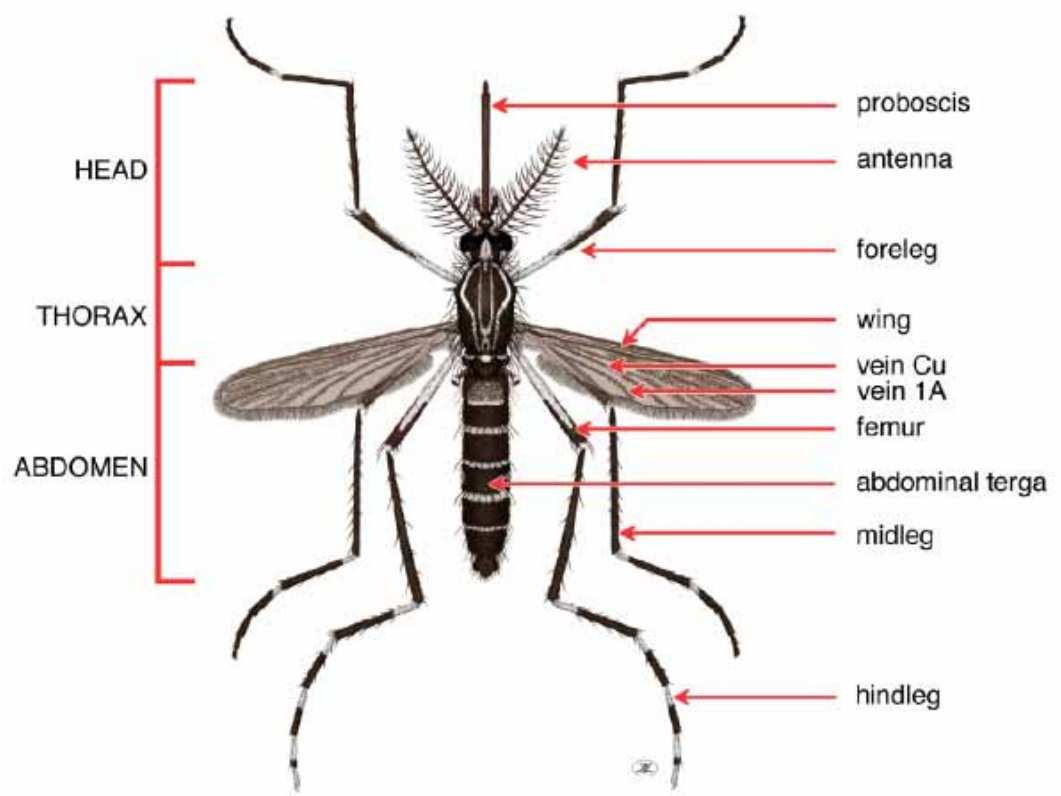

FIGURE B. Dorsal view of adult female mosquito - *Aedes (Stegomyia) aegypti*.

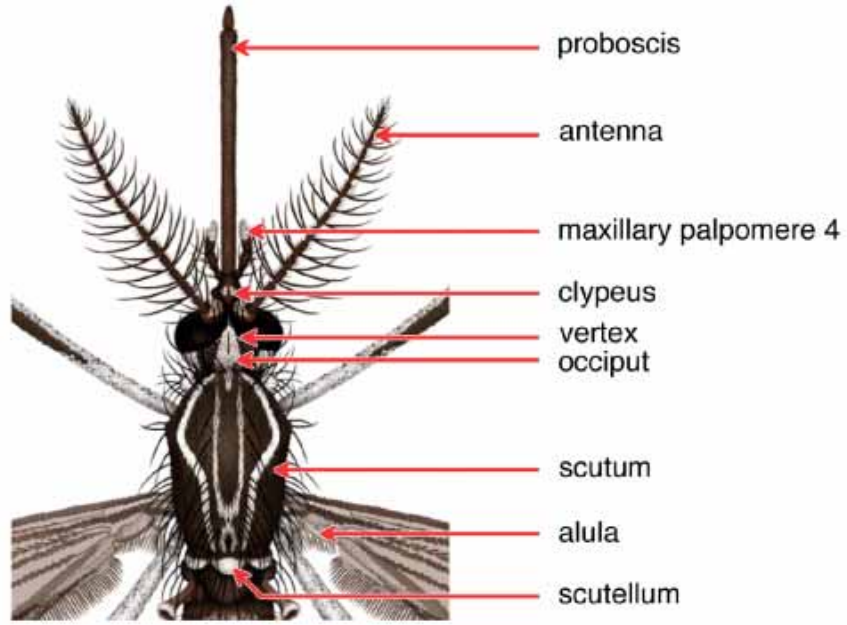

FIGURE C. Dorsal view of adult head and thorax - *Aedes (Stegomyia) aegypti*.

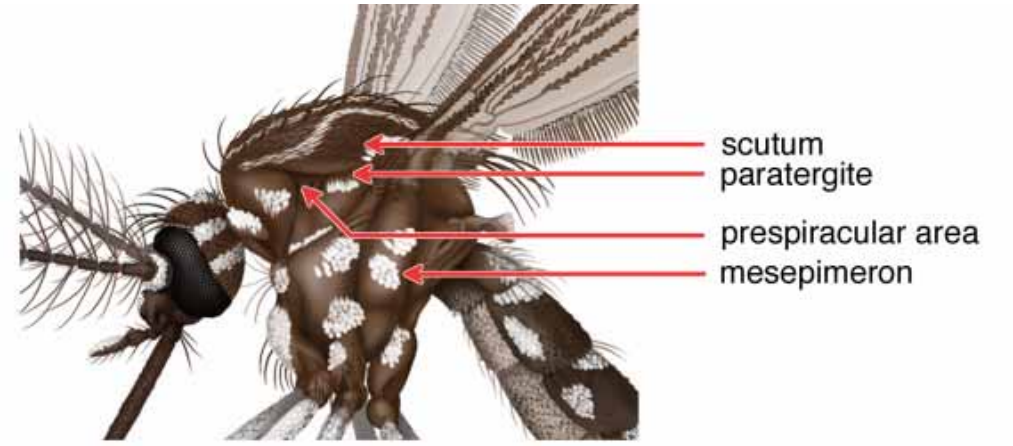

FIGURE D. Lateral view of adult head, thorax and abdomen (part) – *Aedes (Stegomyia) aegypti*.

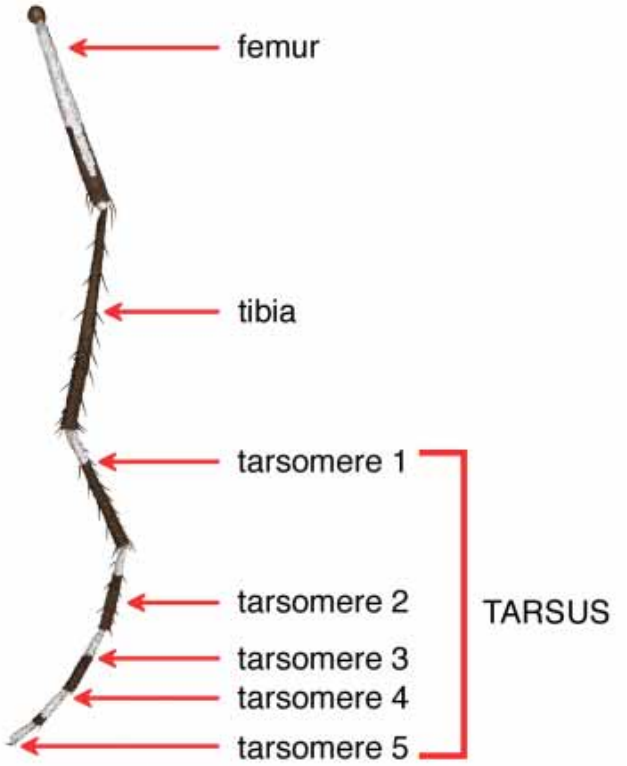

FIGURE E. Anterior view of hindleg – *Aedes (Stegomyia) aegypti*.

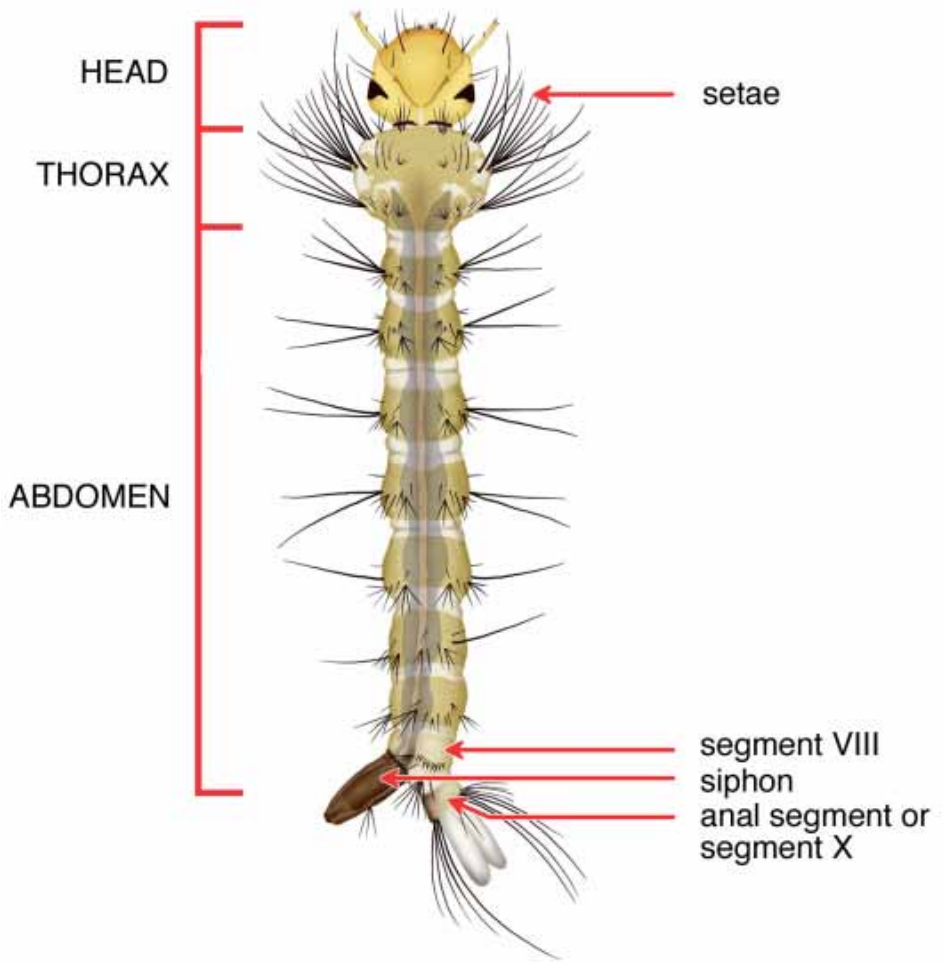

FIGURE F. Dorsal view of mosquito larva (segments VIII and X, lateral view) - *Aedes (Stegomyia) albopictus*.

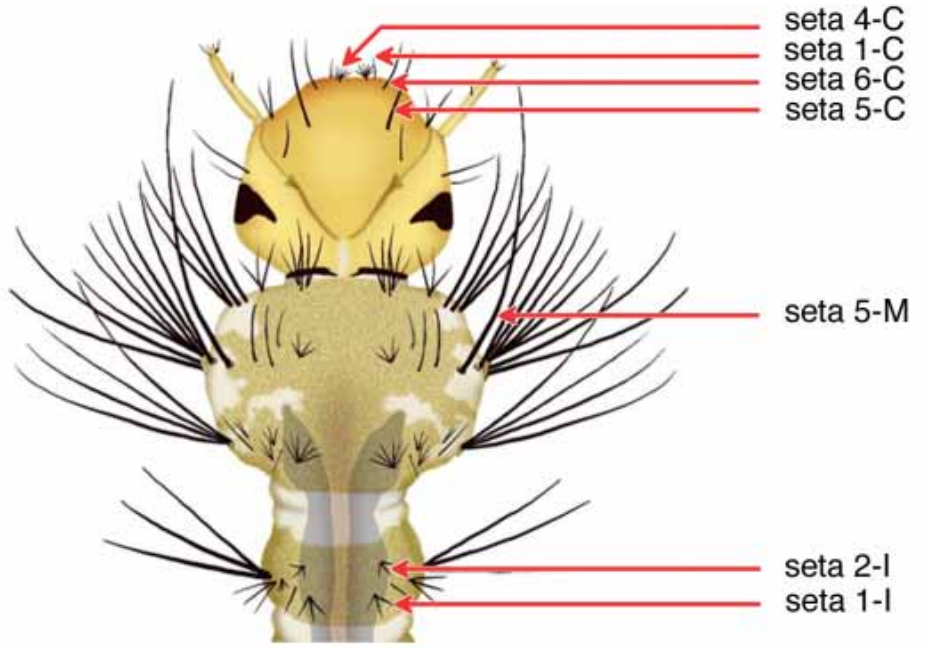

FIGURE G. Dorsal view of larval head, thorax and abdomen (part) - *Aedes (Stegomyia) albopictus*.

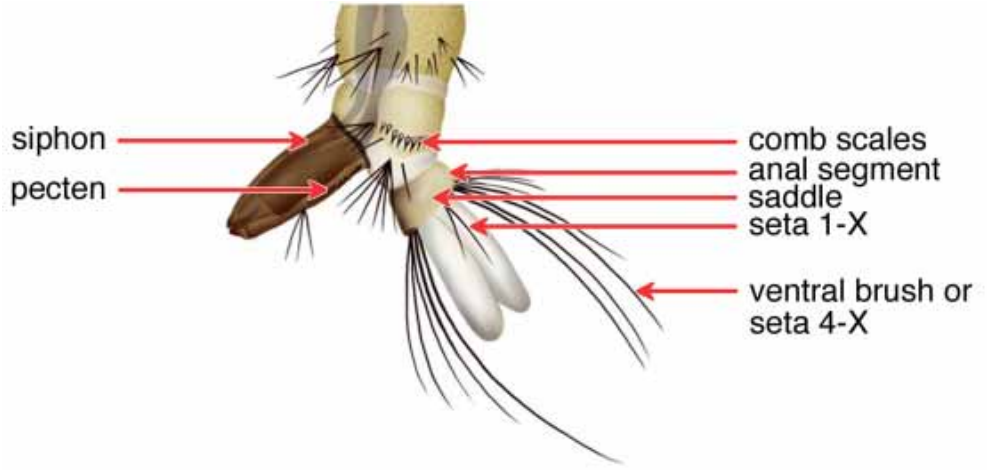

FIGURE H. Lateral view of larval abdomen (part) - *Aedes (Stegomyia) albopictus*.

Key for the Identification of Adult Female Mosquitoes Associated with Dengue Virus Transmission in the Afrotropical Region

1. Head. Vertex with broad erect forked scales numerous, not restricted to occiput (Fig. 1); proboscis with a white band (Fig. 2) 2

   Head. Vertex with erect forked scales not numerous, restricted to occiput (Fig. 3); proboscis without a white band (Fig. 4) 3

FIGURE 1. *Aedes (Diceromyia) furcifer.*

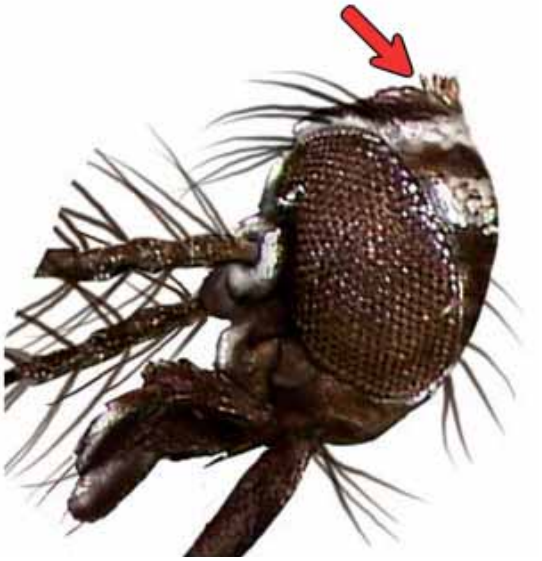

FIGURE 3. *Aedes (Stegomyia) aegypti.*

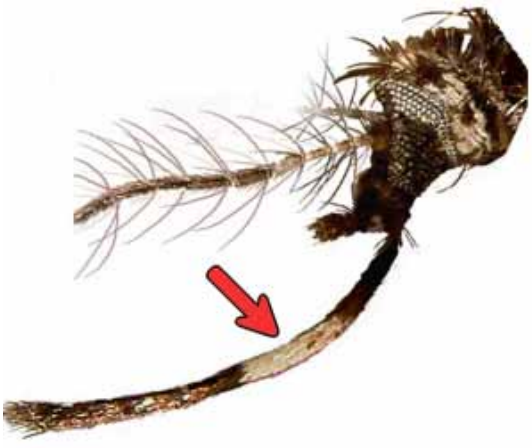

FIGURE 2. *Aedes (Diceromyia) furcifer.*

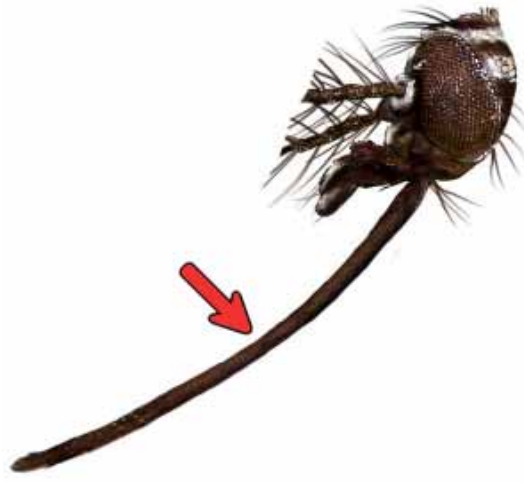

FIGURE 4. *Aedes (Stegomyia) aegypti.*

2(1). Abdomen. Speckled dorsally (Fig. 5) .....*Aedes (Diceromyia) furcifer* [a]
.....
Abdomen. Not speckled dorsally (Fig. 6) .....*Aedes (Diceromyia) taylori* [b]

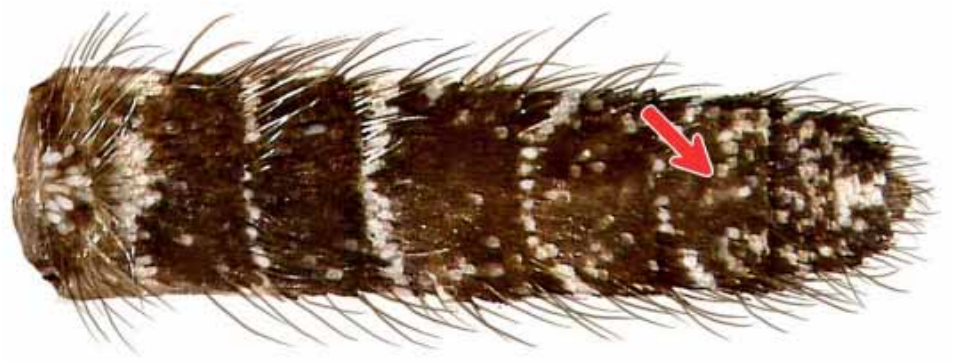

FIGURE 5. *Aedes (Diceromyia) furcifer.*

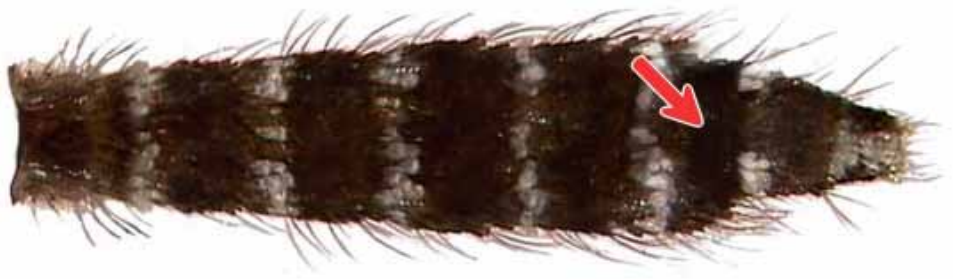

FIGURE 6. *Aedes (Diceromyia) taylori*.

3(1). Leg. Femora with white knee-spot (Fig. 7); midfemur without 3 large white patches

on anterior surface (Fig. 8); hindtarsomere 5 entirely white (Fig. 9)..... 4

Leg. Femora without white knee-spot (Fig. 10); midfemur with 3 large white patches on anterior surface (Fig. 11); hindtarsomere 5 entirely dark (Fig. 12) 5

FIGURE 7. *Aedes (Stegomyia) aegypti.*

FIGURE 10. *Aedes (Stegomyia) luteocephalus.*

FIGURE 8. *Aedes (Stegomyia) aegypti.*

FIGURE 11. *Aedes (Stegomyia) africanus.*

FIGURE 9. *Aedes (Stegomyia) aegypti*.

FIGURE 12. *Aedes (Stegomyia) africanus*.

4(3). Thorax. Scutum black or brown with a pair of submedian-longitudinal white stripes, but without median-longitudinal white stripe, or with white lyre-shaped markings (Fig. 13); mesepimeron with two well separated white scale patches (Fig. 14). Leg. Anterior portion of midfemur with a longitudinal white stripe (Fig. 15). Head. Clypeus with white scale patches (Fig. 16) ..... *Aedes (Stegomyia) aegypti*

Thorax. Scutum with a narrow median-longitudinal white stripe (Fig. 17); mesepimeron with white scale patches not separated, forming V-shaped white patch (Fig. 18). Leg. Anterior portion of midfemur without a longitudinal white stripe (Fig. 19). Head. Clypeus without white scale patches (Fig. 20) .... *Aedes (Stegomyia) albopictus*

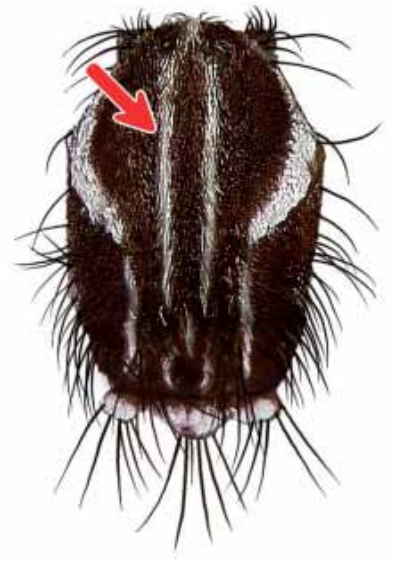

FIGURE 13. *Aedes (Stegomyia) aegypti*.

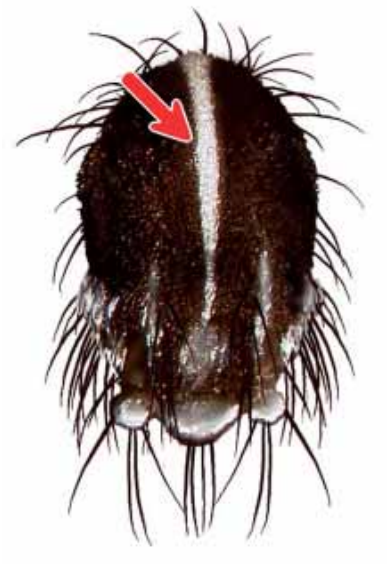

FIGURE 17. *Aedes (Stegomyia) albopictus*.

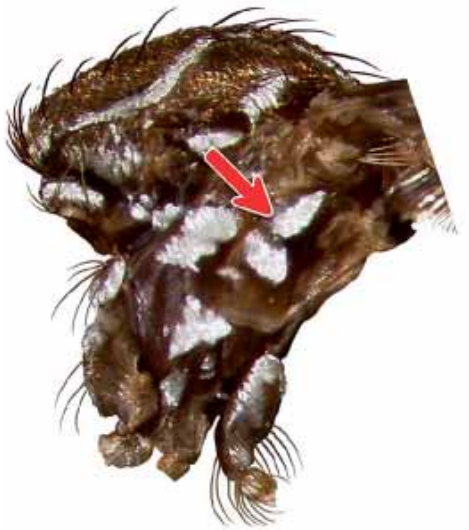

FIGURE 14. *Aedes (Stegomyia) aegypti*.

FIGURE 18. *Aedes (Stegomyia) albopictus*.

FIGURE 15. *Aedes (Stegomyia) aegypti*.

FIGURE 19. *Aedes (Stegomyia) albopictus*.

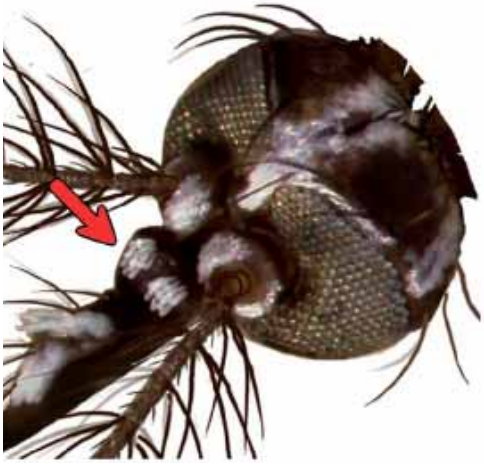

FIGURE 16. *Aedes (Stegomyia) aegypti*.

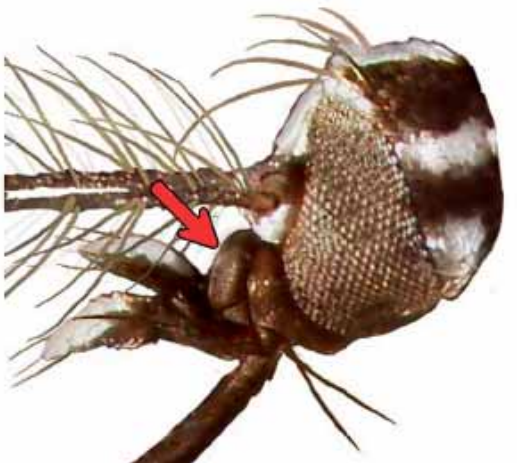

FIGURE 20. *Aedes (Stegomyia) albopictus*.

5(3). Leg. Hindfemur anteriorly with a large pale band at base and with 2 large, white patches on median and apical areas (Fig. 21); hindtarsomere 4 entirely dark (Fig. 22) .....*Aedes (Stegomyia) luteocephalus* [c]

Leg. Hindfemur anteriorly without such a pale band at base, or hindfemur anteriorly with 3 large, white patches on subbasal, median and apical areas (Fig. 23); hindtarsomere 4 not entirely dark, usually with short subbasal white band (Fig. 24)..... 6

FIGURE 21. *Aedes (Stegomyia) luteocephalus.*

FIGURE 23. *Aedes (Stegomyia) africanus.*

FIGURE 22. *Aedes (Stegomyia) luteocephalus.*

FIGURE 24. *Aedes (Stegomyia) africanus.*

6(5). Thorax. Fossal white patch narrow at base along scutal margin (Fig. 25A); prescutellar line of narrow yellow scales absent or sometimes with a few narrow yellow scales (Fig. 25B). Leg. Hindtibia anteriorly dark with a white stripe on posterior surface in basal 0.20 or more (Fig. 26) .....*Aedes (Stegomyia) africanus* [d]
.....

Thorax. Fossal white patch broad at base along scutal margin (Fig. 27A); prescutellar line of narrow yellow scales well developed and with some broad, flat metallic white scales posteriorly (Fig. 27B). Leg. Hindtibia anteriorly dark with a white stripe on posterior surface in basal 0.10 or less (Fig. 28) ... *Aedes (Stegomyia) opok* [e]

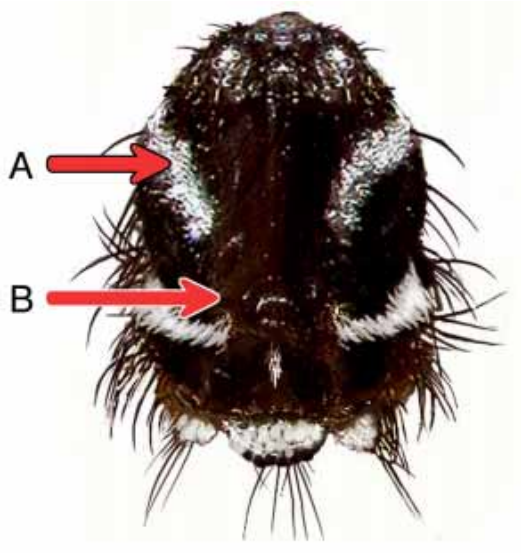

FIGURE 25. *Aedes (Stegomyia) africanus*.

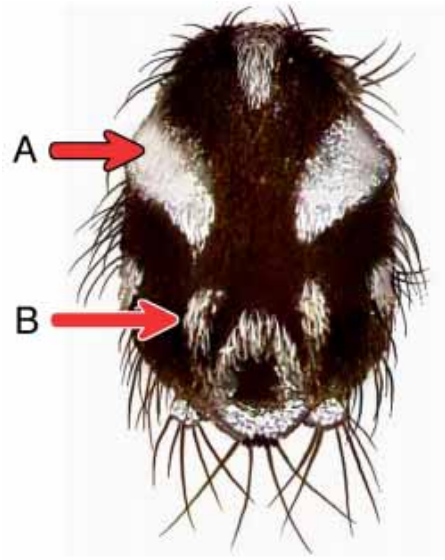

FIGURE 27. *Aedes (Stegomyia) opok.*

FIGURE 26. *Aedes (Stegomyia) africanus*.

FIGURE 28. *Aedes (Stegomyia) opok.*

1. Head. Antenna with spicules (Fig. 29) 2

   Head. Antenna without spicules (Fig. 30) 3

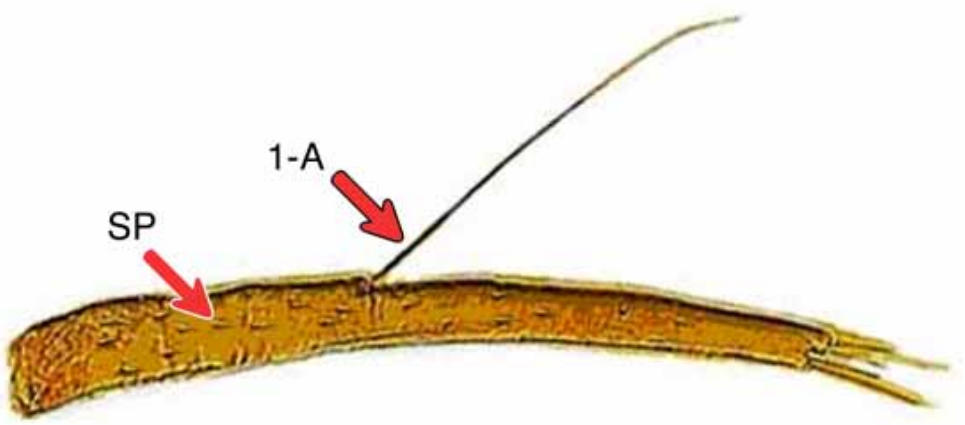

FIGURE 29. *Aedes (Diceromyia) taylori* (SP, spicules; seta 1-A).

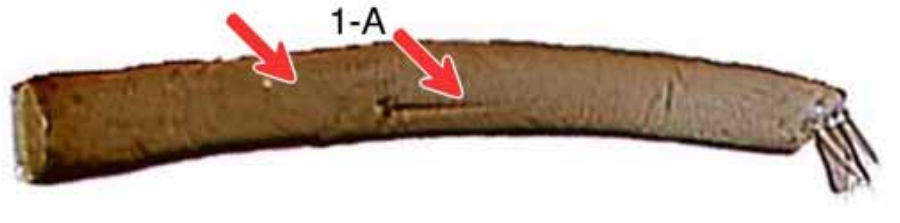

FIGURE 30. *Aedes (Stegomyia) albopictus* (seta 1-A).

2(1). Abdomen. Siphon long, with siphon index (or ratio of siphon length to siphon maximum width) over 3.5 (Fig. 31). Head. Seta 1-A with 1–2 branches (Fig. 29) .... *Aedes (Diceromyia) taylori*

   Abdomen: Siphon short, with siphon index (or ratio of siphon length to siphon maximum width) less than 3.5 (Fig. 33). Head. Seta 1-A with 2–3 branches (Fig. 32) .... *Aedes (Diceromyia) furcifer*

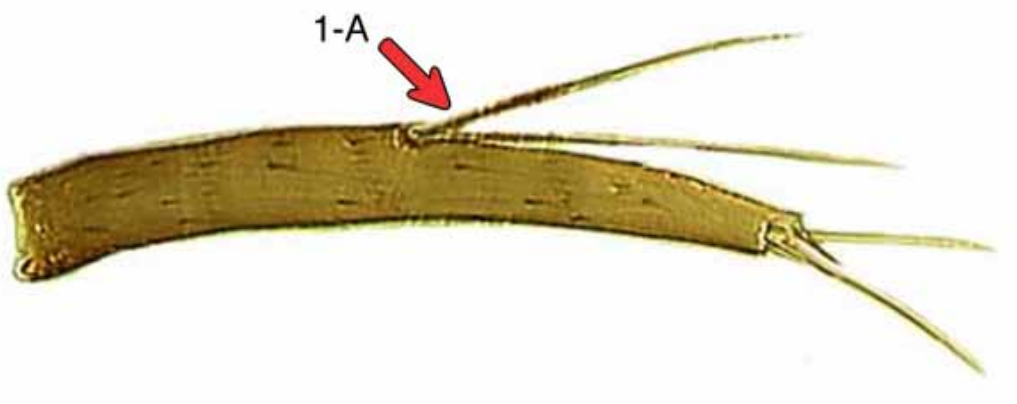

FIGURE 32. *Aedes (Diceromyia) furcifer.*

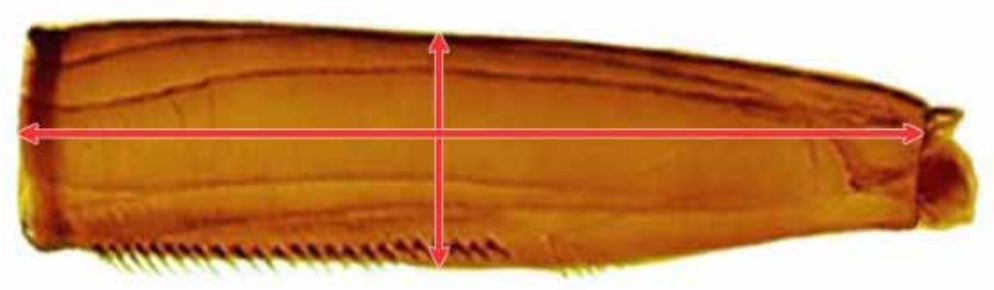

FIGURE 31. *Aedes (Diceromyia) taylori.*

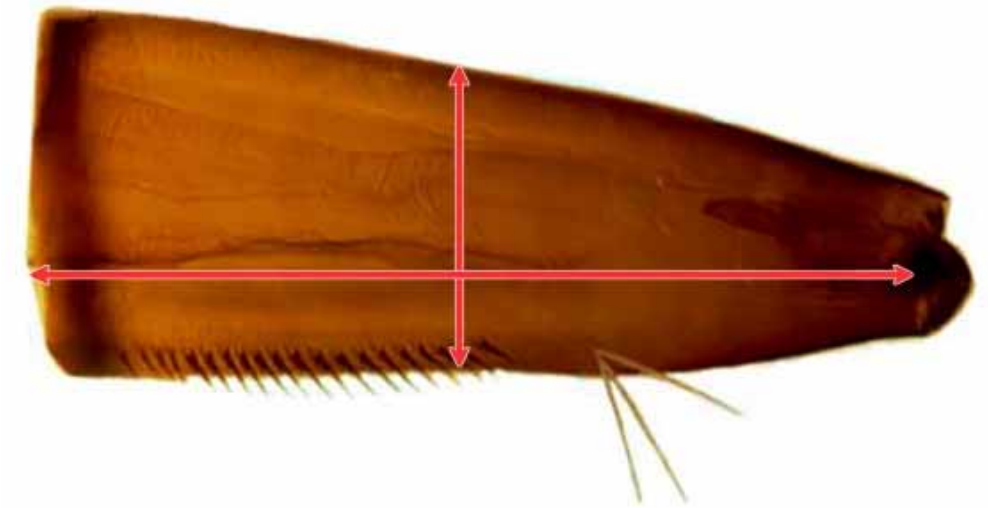

FIGURE 33. *Aedes (Diceromyia) furcifer.*

3(1). Abdomen. Comb scale spatulate, without distinctly larger median spine (Fig. 34) .. 4

Abdomen. Comb scale not spatulate, with distinct larger median spine (Fig. 35) ... 5

FIGURE 34. *Aedes (Stegomyia) luteocephalus.*

FIGURE 35. *Aedes (Stegomyia) aegypti.*

4(3). Abdomen. Seta 1-S double (Fig. 36); pecten spine about 6 times as long as wide (Fig. 37), usually with single ventral dentricle, sometimes with 1–2 small basal ventral and dorsal dentricles ..... *Aedes (Stegomyia) africanus*

Abdomen. Seta 1-S single (Fig. 38); pecten spine less than 6 times as long as wide (Fig. 39), usually with 2 ventral dentricles, and with 1–2 small dorsal dentricles .... *Aedes (Stegomyia) luteocephalus*

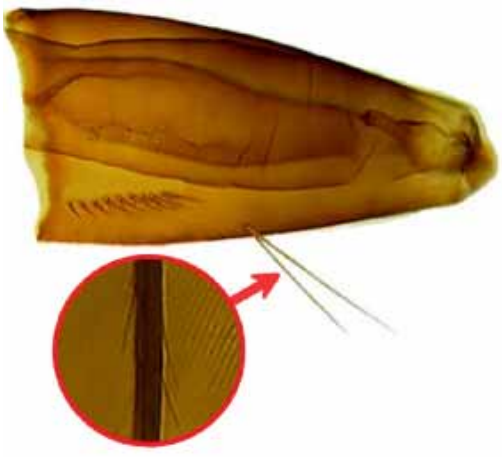

FIGURE 36. *Aedes (Stegomyia) africanus.*

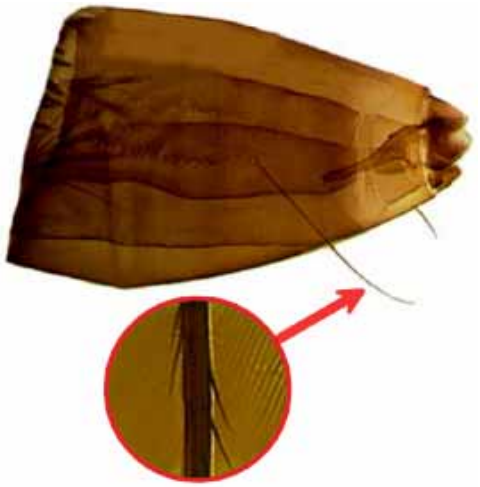

FIGURE 38. *Aedes (Stegomyia) luteocephalus.*

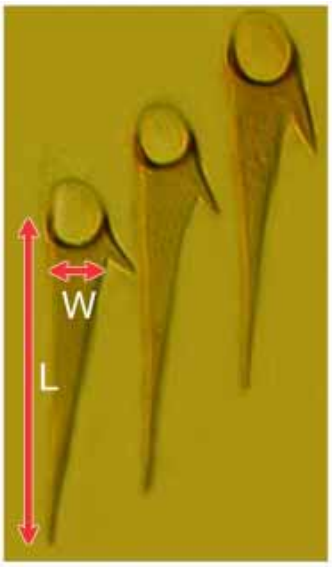

FIGURE 37. *Aedes (Stegomyia) africanus* (L, length; W, width).

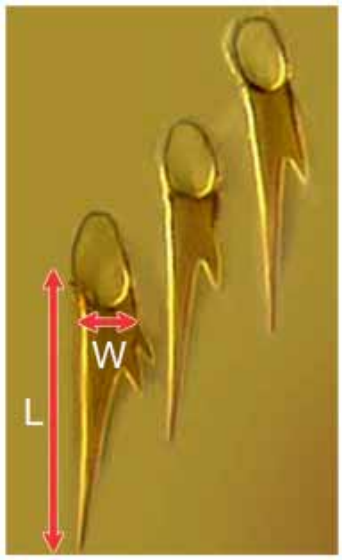

FIGURE 39. *Aedes (Stegomyia) luteocephalus* (L, length; W, width).

5(3). Abdomen. Ventral brush (4-X) with 5 pairs of setae (Fig. 40); seta 4-a,b X branched (Fig. 40); comb scale with stout, subapical spines (Fig. 41) .... *Aedes (Stegomyia) aegypti*

Abdomen. Ventral brush (4-X) with 4 pairs of setae (Fig. 42); seta 4-a, b X single (Fig. 42); comb scale without subapical spines (Fig. 43) .... *Aedes (Stegomyia) albopictus*

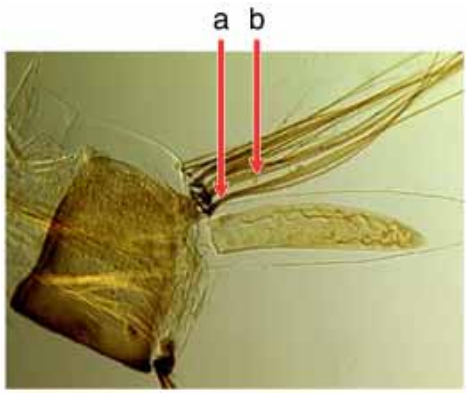

FIGURE 40. *Aedes (Stegomyia) aegypti.*

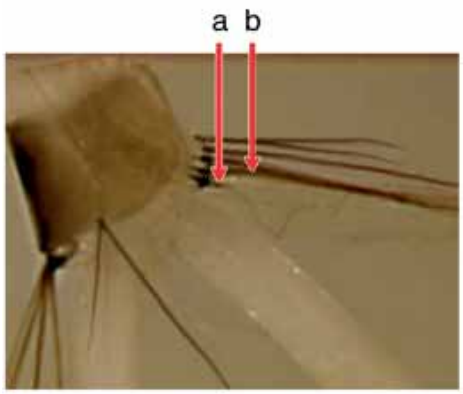

FIGURE 42. *Aedes (Stegomyia) albopictus.*

FIGURE 41. *Aedes (Stegomyia) aegypti.*

FIGURE 43. *Aedes (Stegomyia) albopictus.*

Explanation of Notes

[a]*Aedes furcifer* adult has abdominal terga II–VII with pale scales scattered on both apicolateral and dorsomedian areas. *Aedes cordellieri* Huang, a closely related species to *Ae. furcifer*, can easily be distinguished by having abdominal terga II–VII with yellowish scales scattered on apicolateral areas only and no scattered pale scales on dorsomedian areas.

[b]*Aedes taylori*, *Ae. furcifer* and *Ae. cordellieri* adults can be distinguished from other species by the following combination of shared characters: thorax with acrostichal, dorsocentral, prescutellar and lower mesepimeral setae well developed; paratergite with pale scales; scutellum with broad scales on all lobes; wing veins with white and dark broad scales intermixed dorsally; and, femora, tibiae and tarsomeres 1 sprinkled with white scales. The absence of any speckles on the abdominal terga is a reliable specific character for *Ae. taylori* to separate it from *Ae. furcifer* and *Ae. cordellieri*.

[c]*Aedes luteocephalus* adult can be distinguished from other species by the following combination of characters: scutum with a median-longitudinal yellow stripe; scutellum with all broad white scales on lateral lobes; abdominal terga II–VI each with a basal pale band and basolateral white spots; hindtibia has basal 0.10 to 0.25 white stripe on ventral surface; hindtarsomere 3 with basal 0.50 to 0.80 white stripe; and, hindtarsomere 4 entirely dark. *Aedes ruwenzori* Haddow and Van Someren can be distinguished from *Ae. luteocephalus* by the scutellum having broad dark scales on the lateral lobes, and the hindfemur with 3 white patches on the anterior, median and apical areas.

[d]*Aedes africanus* adult differs from other species by the following combination of characters: scutum with short anterior median-longitudinal white stripe, and with fossal white patch narrow at base along scutal margin; and, hindtarsomere 4 has basal 0.2–0.3 white stripe on ventral surface.

Ae. corneti Huang can be distinguished from *Ae. africanus* by the hindfemur having 3 white patches on the anterior surface.

[e]*Aedes opok* adult differs from other species by the following additional character: scutum with fossal white patch broad at base along scutal margin. Larval specimens of *Ae. opok* are not available for this work.

References

Huang, Y.M. (1986) Notes on the *Aedes* (*Diceromyia*) *furcifer* group, with a description of a new species (Diptera: Culicidae). *Proceedings of the Entomological Society of Washington*, 88(4), 634–649.

Huang, Y.M. (1990) The subgenus *Stegomyia* of *Aedes* in the Afrotropical Region. 1. The *africanus* group of species (Diptera: Culicidae). *Contributions of the American Entomological Institute*, 26(1), 1–90.

Huang, Y.M. (2001) A pictorial key for the identification of the subfamilies of Culicidae, genera of Culicinae, and subgenera of *Aedes* mosquitoes of the Afrotropical Region (Diptera: Culicidae). *Proceedings of the Entomological Society of Washington*, 103(1), 1–53.

Huang, Y.M. and Ward, R.A. (1981) A pictorial key for the identification of the mosquitoes associated with yellow fever in Africa. *Mosquito Systematics*, 13(2), 138–148.

Rodhain, F. and Rosen, L. (1997) Chapter 3. Mosquito vectors and dengue virus-vector Relationships. *In:* Gubler, D.J. & Kuno, G. (Ed.), *Dengue and Hemorrhagic Fever.* CAB International, Wallingford, UK, pp. 45–60.

1. Head. Vertex with erect forked scales numerous, not restricted to occiput (Fig. 44); proboscis with submedian white band (Fig. 45) *Ochlerotatus (Finlaya) notoscriptus* [a]

   Head. Vertex with erect forked scales not numerous, restricted to occiput (Fig. 46); proboscis without submedian white band (Fig. 47) 2

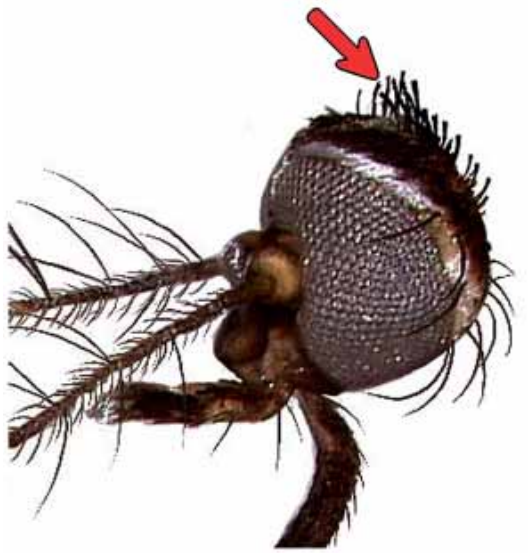

FIGURE 44. *Ochlerotatus (Finlaya) notoscriptus.*

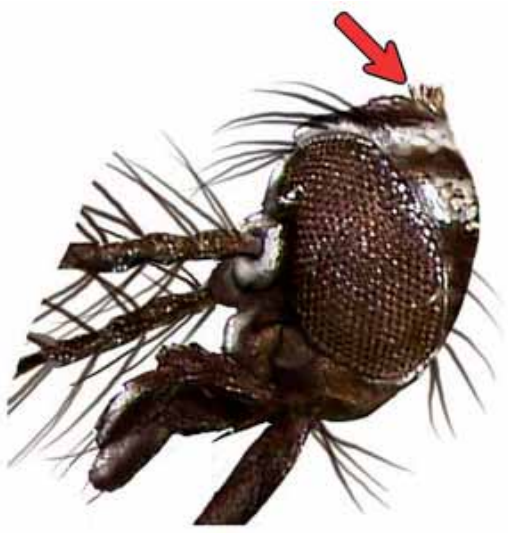

FIGURE 46. *Aedes (Stegomyia) aegypti.*

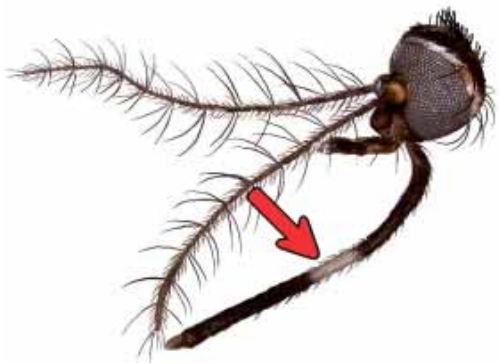

FIGURE 45. *Ochlerotatus (Finlaya) notoscriptus.*

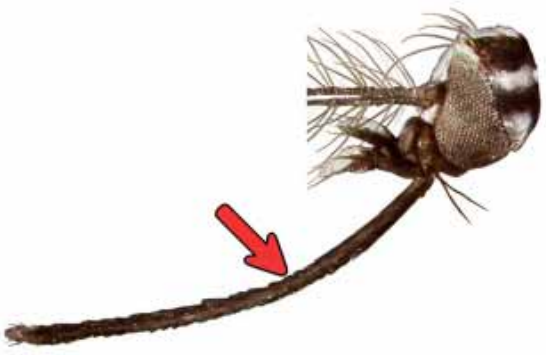

FIGURE 47. *Aedes (Stegomyia) albopictus.*

2(1). Thorax. Scutum black or brown with a pair of submedian-longitudinal white stripes, but without median-longitudianal white stripe, or with white lyre-shaped markings (Fig. 48). Head. Clypeus with white scale patches (Fig. 49) .... *Aedes (Stegomyia) aegypti* [b]

Thorax. Scutum with a narrow median-longitudinal white stripe (Fig. 50). Head. Clypeus without white scale patches (Fig. 51) 3

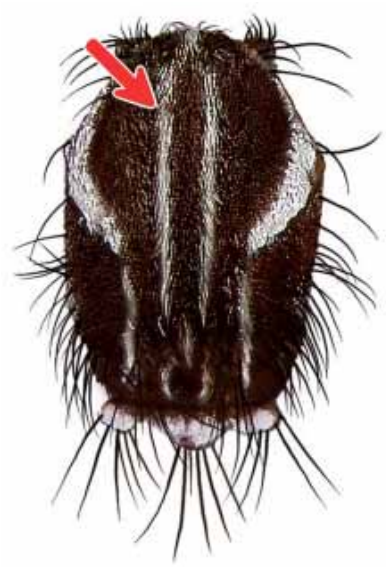

FIGURE 48. *Aedes (Stegomyia) aegypti.*

FIGURE 50. *Aedes (Stegomyia) albopictus.*

FIGURE 49. *Aedes (Stegomyia) aegypti.*

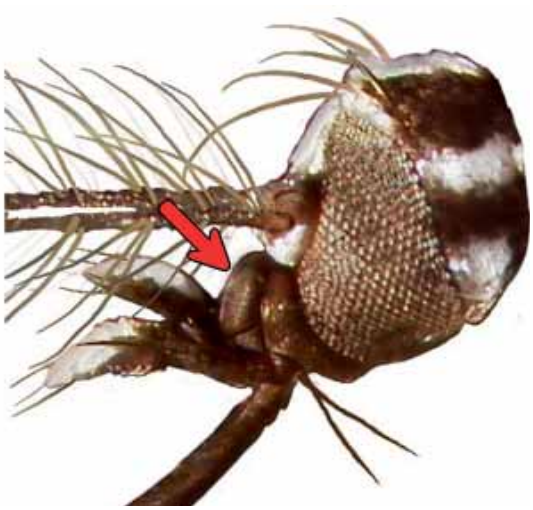

FIGURE 51. *Aedes (Stegomyia) albopictus.*

3(2). Abdomen. Abdominal terga with complete basal white bands (Fig. 52). Thorax. Mesepimeron with white scale patches not separated, forming a V-shaped white patch (Fig. 53) ..... *Aedes (Stegomyia) albopictus* [c]

Abdomen. Abdominal terga without complete basal white bands (Fig. 54). Thorax. Mesepimeron with white scale patches separated, or if not separated not forming V-shaped white patch (Fig. 55) 4

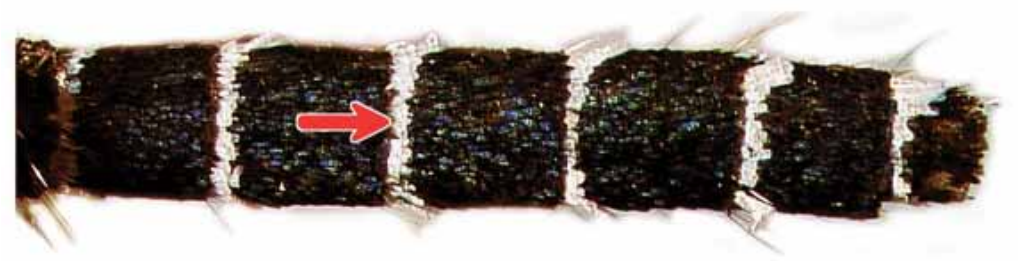

FIGURE 52. *Aedes (Stegomyia) albopictus.*

FIGURE 54. *Aedes (Stegomyia) rotumae*.

FIGURE 53. *Aedes (Stegomyia) albopictus.*

FIGURE 55. *Aedes (Stegomyia) cooki.*

4(3). Thorax. Lower mesepimeral white scale patch absent or very small, with no more-than 3 scales (Fig. 56) ..... *Aedes (Stegomyia) rotumae* [d]

Thorax. Lower mesepimeral white scale patch present or well developed, with more than 3 scales (Fig. 57) 5

FIGURE 56. *Aedes (Stegomyia) rotumae.*

FIGURE 57. *Aedes (Stegomyia) cooki.*

5(4). Leg. Hindtarsomere 5 not entirely white or with basal one-half white (Fig. 58)..... ..... *Aedes (Stegomyia) hensilli* [e]

Leg. Hindtarsomere 5 entirely white (Fig. 59) ……..... 6

FIGURE 58. *Aedes (Stegomyia) hensilli.*

FIGURE 59. *Aedes (Stegomyia) cooki.*

6(5). Abdomen. Some abdominal terga with complete subbasal white bands (Figs. 60 and 61) ..... *Aedes (Stegomyia) scutellaris* [f] and *Aedes (Stegomyia) hebrideus* [f]

Abdomen. Abdominal terga without or with incomplete subbasal white bands (Fig. 62) 7

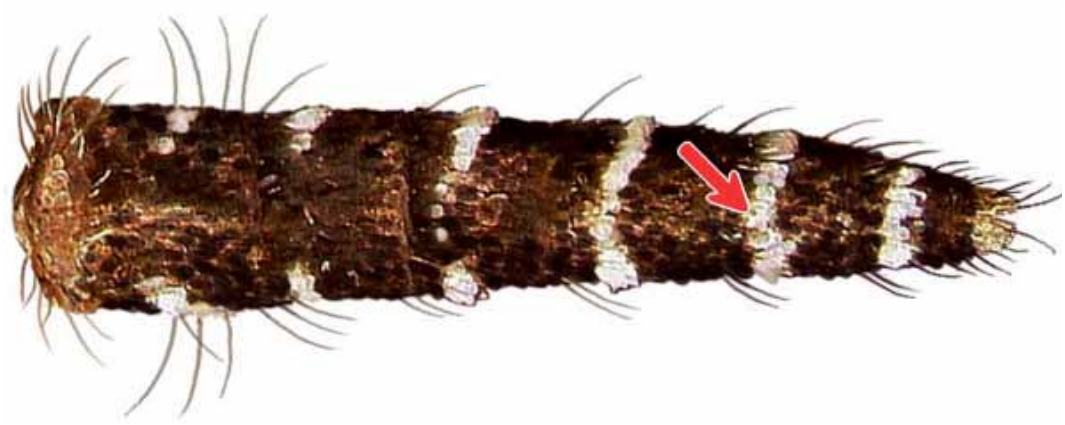

FIGURE 60. *Aedes (Stegomyia) scutellaris.*

FIGURE 61. *Aedes (Stegomyia) hebrideus.*

FIGURE 62. *Aedes (Stegomyia) polynesiensis.*

7(6). Leg. Hindtarsomere 4 usually white for less than 0.67 (Fig. 63) .....
..... *Aedes (Stegomyia) cooki* [g]
Leg. Hindtarsomere 4 usually white for more than 0.67 (Fig. 64) .....
..... *Aedes (Stegomyia) polynesiensis* [g]

FIGURE 63. *Aedes (Stegomyia) cooki.*

FIGURE 64. *Aedes (Stegomyia) polynesiensis.*

1. Head. Seta 1-C stout and usually strongly hooked (Fig. 65); seta 4-C usually caudad to seta 6-C (Fig. 66). Abdomen. Siphon with acus (Fig. 67); comb scales more than 20, not in a single row, and each scale usually spatulate, fringed with short spinules (Fig. 68); ventral brush (4-X) with 6 pairs of setae (Fig.69) .... *Ochlerotatus (Finlaya) notoscriptus*

   Head. Seta 1-C not stout (Fig. 70); seta 4-C usually cephalad to seta 6-C (Fig. 71). Abdomen. Siphon without acus (Fig. 72); comb scales less than 20, in a single row, and each scale not spatulate (Fig. 73); ventral brush (4-X) with 4–5 pairs of setae (Fig. 74) 2

FIGURE 65. *Ochlerotatus (Finlaya) notoscriptus*.

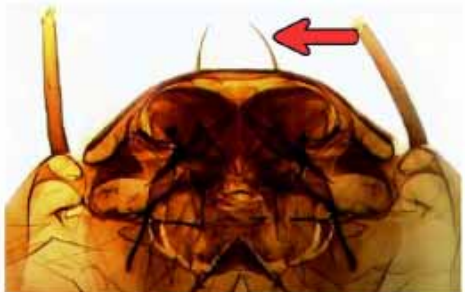

FIGURE 70. *Aedes (Stegomyia) albopictus.*

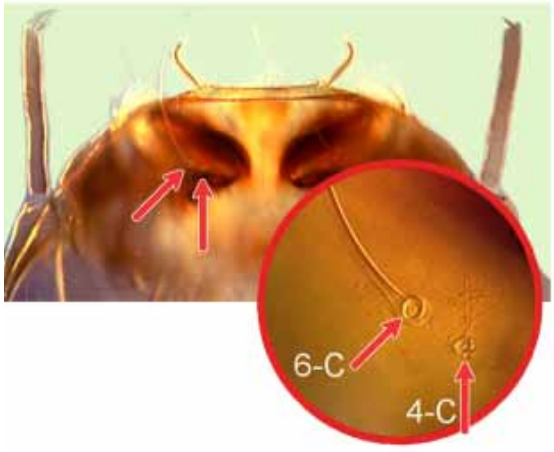

FIGURE 66. *Ochlerotatus (Finlaya)* notoscriptus.

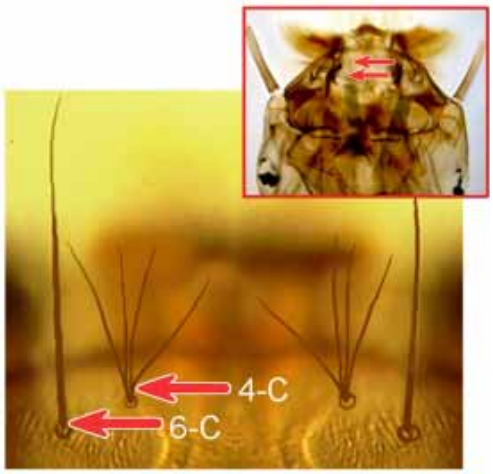

FIGURE 71. *Aedes (Stegomyia) aegypti.*

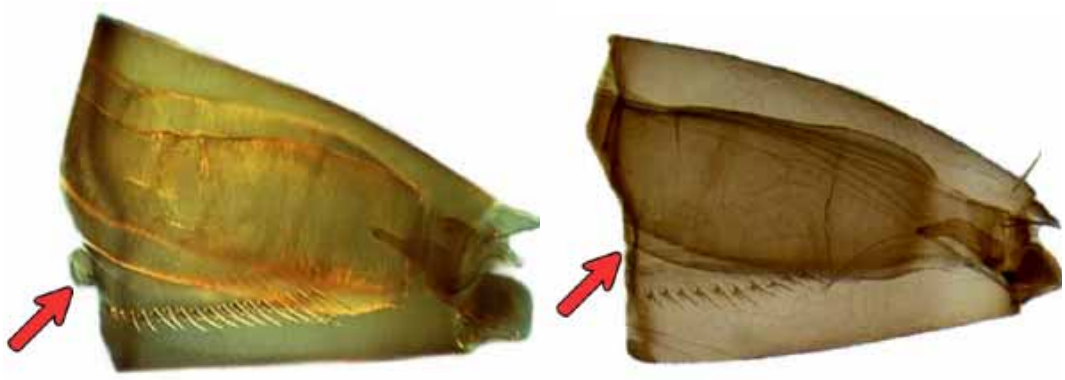

FIGURE 67. *Ochlerotatus (Finlaya) notoscriptus.* **FIGURE 72.** *Aedes (Stegomyia) aegypti.*

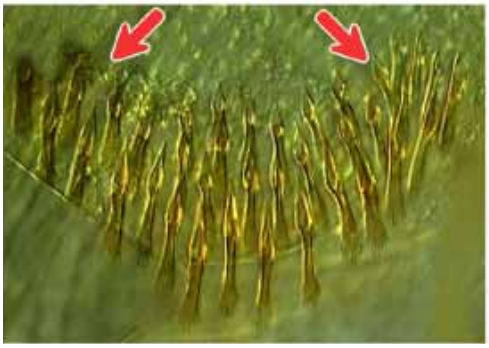

FIGURE 68. *Ochlerotatus (Finlaya)* notoscriptus.

FIGURE 73. *Aedes (Stegomyia) aegypti.*

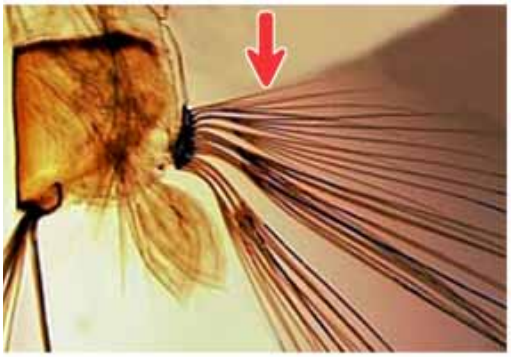

FIGURE 69. *Ochlerotatus (Finlaya)* notoscriptus.

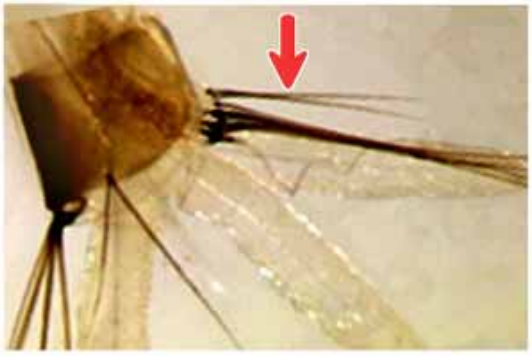

FIGURE 74. *Aedes (Stegomyia) albopictus.*

2(1). Abdomen. Comb scales with stout, subapical spines or with multiple stout spines (Fig. 75) 3
Abdomen. Comb scales without subapical spines or multiple stout spines (Fig. 76) 4

FIGURE 75. *Aedes (Stegomyia) aegypti.*

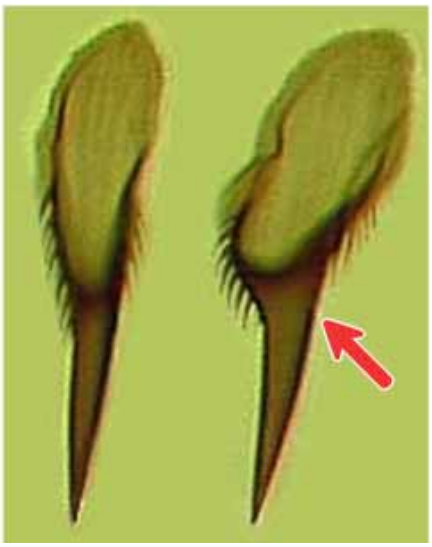

FIGURE 76. *Aedes (Stegomyia) albopictus.*

3(2). Abdomen. Anal segment, X, without strong marginal spicules (Fig. 77); saddle incomplete (Fig. 78); seta 1-X about 0.7 saddle length (Fig. 79); ventral brush (4-X) with 5 pairs of setae (Fig. 80) .....*Aedes(Stegomyia) aegypti*
Abdomen. Anal segment, X, with short, strong marginal spicules (Fig. 81); saddle complete (Fig. 82); seta 1-X about 1.5 saddle length (Fig. 83); ventral brush (4-X) with 4 pairs of setae (Fig. 84) ..... *Aedes (Stegomyia) rotumae*

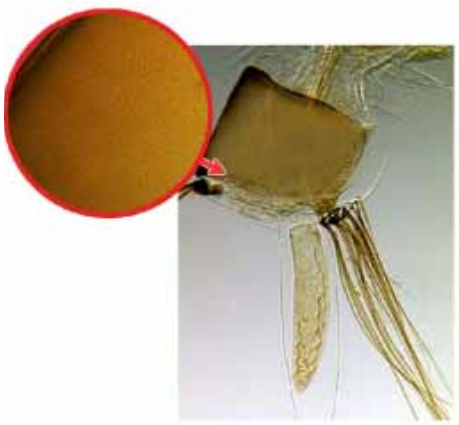

FIGURE 77. *Aedes (Stegomyia) aegypti.*

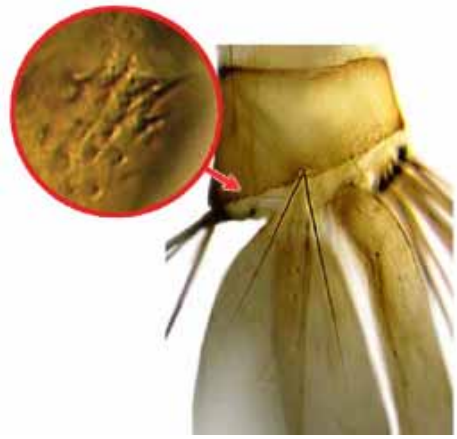

FIGURE 81. *Aedes (Stegomyia) rotumae.*

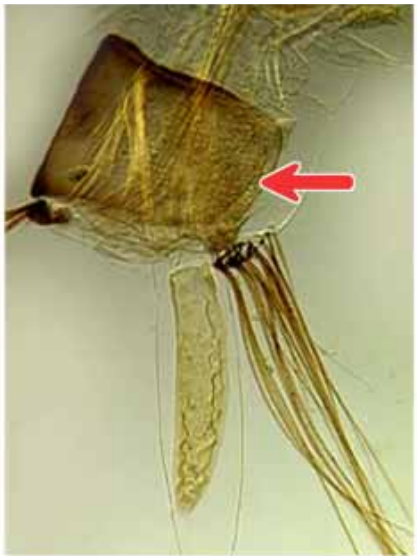

FIGURE 78. *Aedes (Stegomyia) aegypti*.

FIGURE 82. *Aedes (Stegomyia) rotumae*.

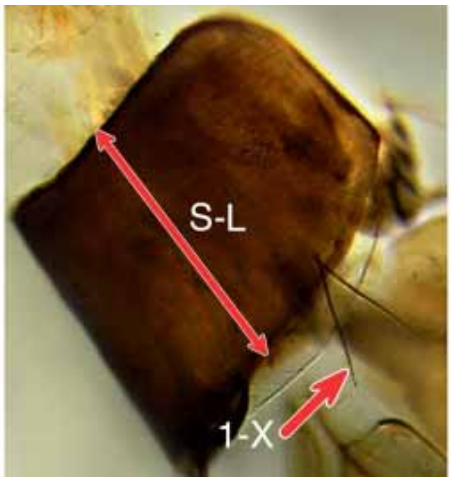

FIGURE 79. *Aedes (Stegomyia) aegypti* (S-L, saddle length) .

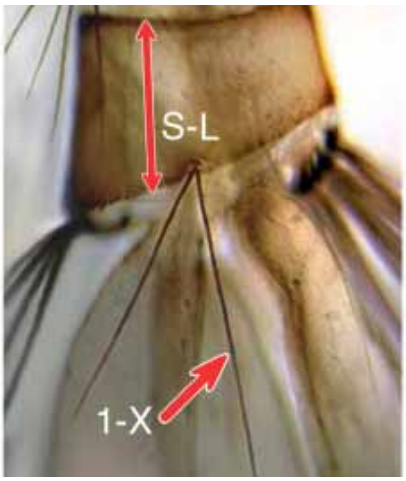

FIGURE 83. *Aedes (Stegomyia) rotumae* (S-L, saddle length) .

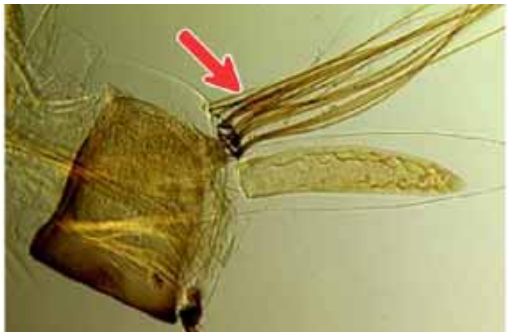

FIGURE 80. *Aedes (Stegomyia) aegypti*.

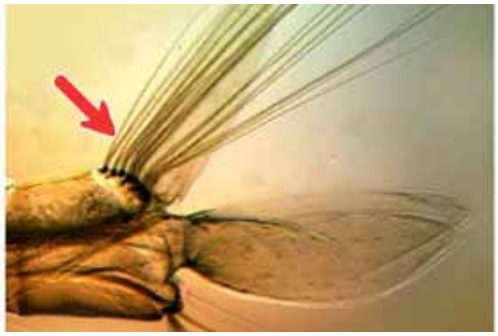

FIGURE 84. *Aedes (Stegomyia) rotumae*.

4(2). Abdomen. Saddle complete (Fig. 85) 5

Abdomen. Saddle incomplete (Fig. 86) 6

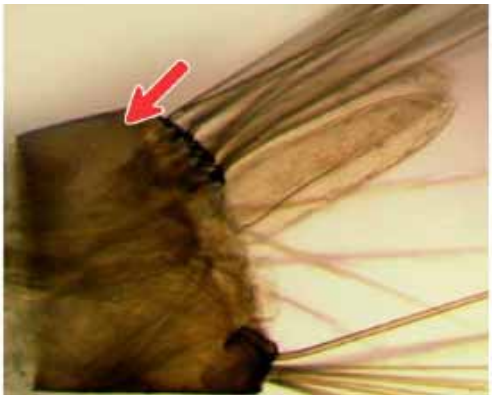

FIGURE 85. *Aedes (Stegomyia) polynesiensis.*

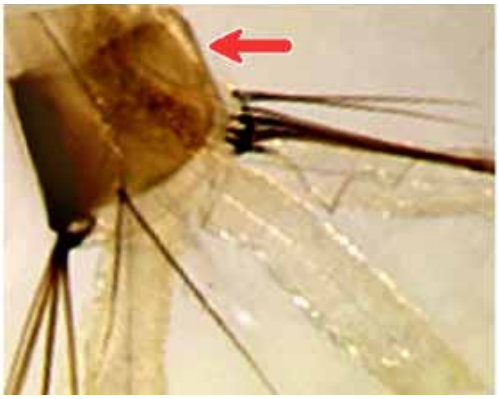

FIGURE 86. *Aedes (Stegomyia) albopictus.*

5(4). Head. Seta 6-C double (Fig. 87). Thorax. Seta 5-M usually double (Fig. 88) .... *Aedes (Stegomyia) cooki*

Head. Seta 6-C single (Fig. 89). Thorax. Seta 5-M usually single (Fig. 90) .... *Aedes (Stegomyia) polynesiensis*

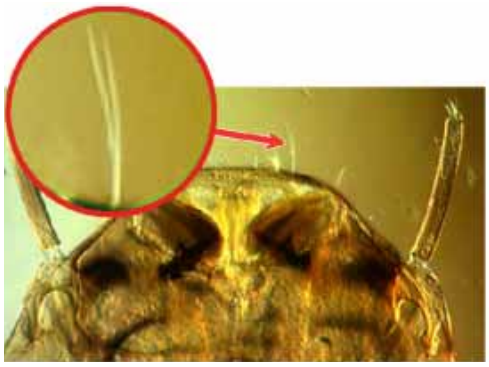

FIGURE 87. *Aedes (Stegomyia) cooki.*

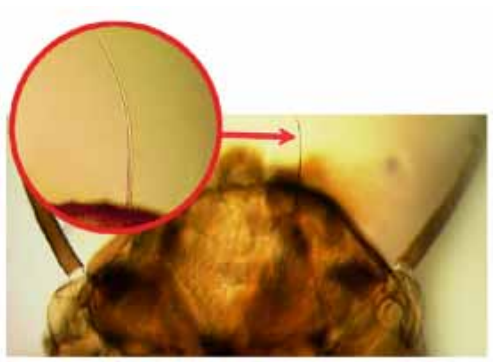

FIGURE 89. *Aedes (Stegomyia) polynesiensis.*

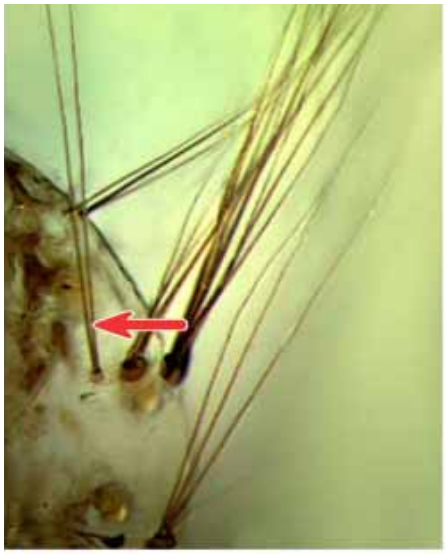

FIGURE 88. *Aedes (Stegomyia) cooki*.

FIGURE 90. *Aedes (Stegomyia)polynesiensis*.

6(4). Head. Seta 6-C usually double (Fig. 91). Abdomen. Seta 4-d X single (Fig. 92) .... *Aedes (Stegomyia) albopictus*

Head. Seta 6-C single (Fig. 93). Abdomen. Seta 4-d X double (Fig. 94) … 7

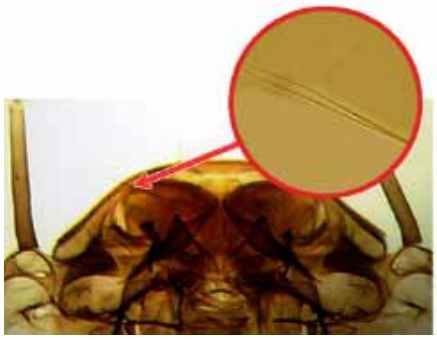

FIGURE 91. *Aedes (Stegomyia) albopictus.*

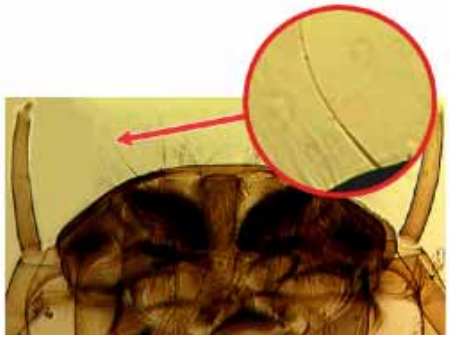

FIGURE 93. *Aedes (Stegomyia) scutellaris.*

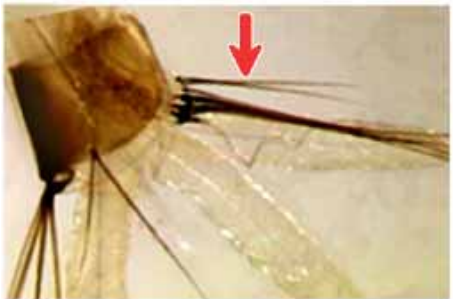

FIGURE 92. *Aedes (Stegomyia) albopictus.*

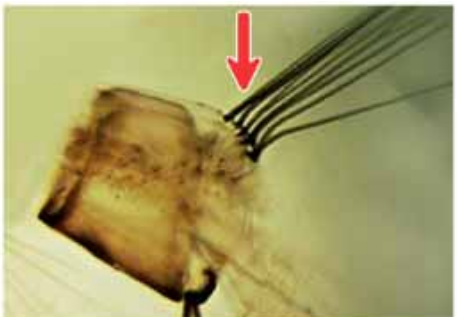

FIGURE 94. *Aedes (Stegomyia) hebrideus.*

7(6). Abdomen. Anal segment, X, with short, strong marginal spicules (Fig. 95) ....*Aedes (Stegomyia) scutellaris*

Abdomen. Anal segment, X, without strong marginal spicules (Fig. 96) ….....8

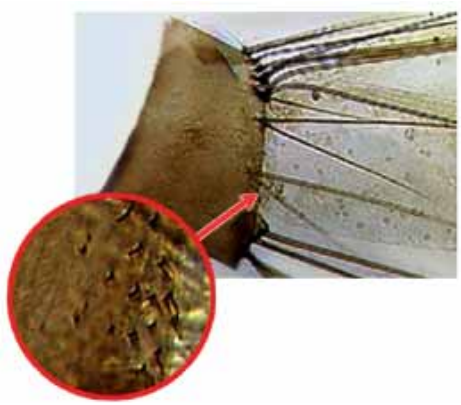

FIGURE 95. *Aedes (Stegomyia) scutellaris.*

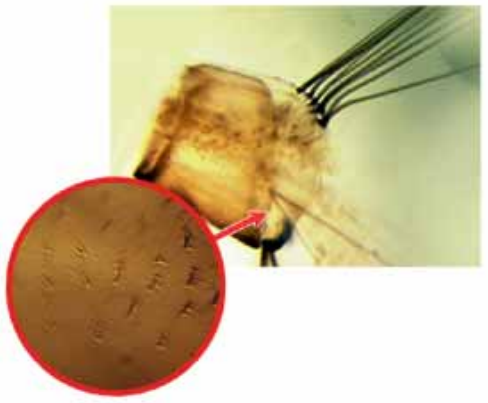

FIGURE 96. *Aedes (Stegomyia) hebrideus.*

8(6). Abdomen. Seta 4-c X usually single (Fig. 97) ..... *Aedes (Stegomyia) hensilli*

Abdomen. Seta 4-c X double (Fig. 98) ..... *Aedes (Stegomyia) hebrideus*

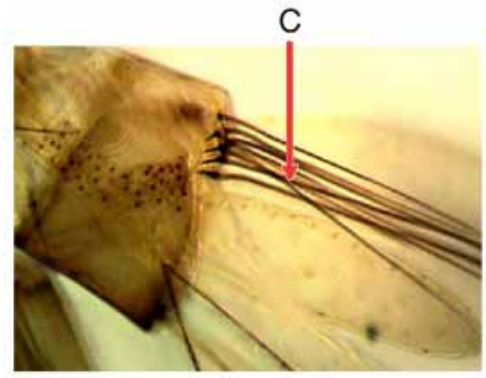

FIGURE 97. *Aedes (Stegomyia) hensilli* (C, abdominal seta 4-c X).

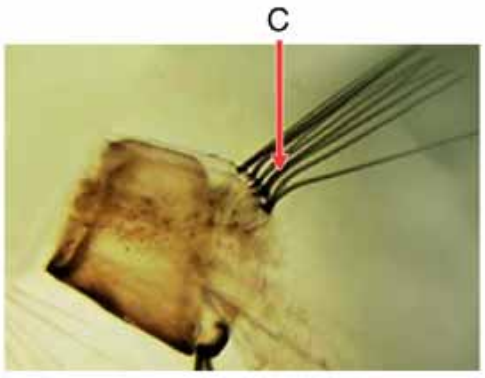

FIGURE 98. *Aedes (Stegomyia) hebrideus.* (C, abdominal seta 4-c X).

Explanation of Notes

[a]*Ochlerotatus notoscriptus* adult has a small group of white scales at the lower caudal portion of the patch of dark scales on the pronotum. The prescutal lateral white line is always connected to

posterior dorsocentral white line. There is a strongly developed patch of white scales in front of the wing root. The adults exhibit individual morphological variations in ornamentation. In New Zealand and Australia, adults have the scutum with light yellowish scales and well-developed dorsocentral anterior pale line. In New Caledonia, adults have the scutum with white scales and poorly developed anterior dorsocentral pale line.

[b]*Aedes aegypti*, the yellow fever mosquito, has a pair of white patches on the clypeus. The mesepimeron has separate white scale patches and the anterior portion of midfemur has a longitudinal white stripe.

[c]*Aedes albopictus*, the Asian tiger mosquito, can be distinguished from related species by the presence of broad flat white scales on the lateral margin of the scutum just before the level of wing root; other species (e.g. *Aedes pseudoscutellaris*) has only narrow curved white scales in this position. When scutal markings are rubbed off, *Ae. aegypti* can easily be misidentified as *Ae. albopictus*. It can be distinguished by having separated white scale patches on the mesepimeron whereas they are connected in *Ae. albopictus*. The anterior portion of the midfemur has no longitudinal white stripe in *Ae. albopictus.*

[d]*Aedes rotumae* adults resemble *Ae. upolensis* Marks in the complete absence of a lower mesepimeral white scale patch, or with a very few mesipemeral white scales. *Aedes rotumae* can be distinguished from *Ae. upolensis* by having hindtarsomere 4 with basal 0.75 or more white. *Aedes upolensis* has hindtarsomere 4 with basal 0.60–0.70 white.

[e]*Aedes hensilli* can be distinguished from *Ae. hakanssoni* Knight and Hurlbut by the presence of white scale patches on all scutellar lobes, and usually with a few apical dark scales on midlobe. The hindfemur of *Ae. henselli* has white markings on the anterior surface tapering towards apex, and its hind tarsomere 5 is not entirely dark (only distal one-half dark). The hindfemur of *Ae. hakanssoni* has white markings on the anterior surface sloping off ventrally towards apex, and its hindtarsomere 5 is entirely dark.

[f]*Aedes scutellaris* cannot be distinguished from *Ae. hebrideus* by using female adult morphological characters. Males of both species, however, can be separated morphologically. The male genitalia of *Ae. scutellaris* has a claspette with specialized setae at most two-thirds as long as the largest tergal setae whereas the claspette setae are at least as long as the largest tergal setae in *Ae. hebrideus*.

[g]*Aedes cooki* has abdominal terga with incomplete subbasal white bands while *Ae. polynesiensis* has abdominal terga usually without subbasal white bands, but with subbasal white lateral patches.

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Savage, H.M., Fritz, C.L., Rutstein, D., Yolwa, A., Vorndam, V., & Gubler, D.J. (1998) Epidemic of dengue-4 virus in Yap State, Federated States of Micronesia, and implication of *Aedes hensilli* as an epidemic vector. *American Journal of Tropical Medicine and Hygiene*, 58(4), 519–524.

Key for the Identification of Adult Female Mosquitoes Associated with Dengue Virus Transmission in the Oriental Region

1. Thorax. Scutum with a patch of white scales on anterior half (Fig. 99); paratergite bare (Fig. 100). Leg. Hindtarsomeres entirely dark (Fig. 101). Head. Palpomere 4 without white scales at apex (Fig. 102) ..... *Ochlerotatus (Finlaya) niveus* subgroup[a]

   Thorax. Scutum with various patterns of white scales (Fig. 103); paratergite with broad white scales (Fig. 104). Leg. Hindtarsomeres with basal pale bands (Fig. 105). Head. Palpomere 4 with white scales at apex (Fig. 106) 2

FIGURE 99. *Ochlerotatus (Finlaya) niveus* subgroup.

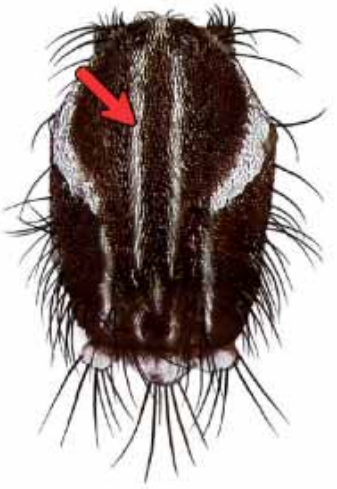

FIGURE 103. *Aedes (Stegomyia) aegypti.*

FIGURE 100. *Ochlerotatus (Finlaya) niveus* subgroup.

FIGURE 104. *Aedes (Stegomyia) aegypti.*

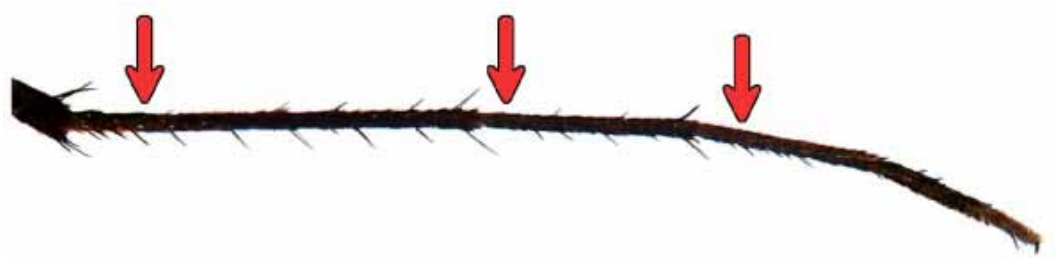

FIGURE 101. *Ochlerotatus (Finlaya) niveus* subgroup.

FIGURE 105. *Aedes (Stegomyia) albopictus.*

FIGURE 102. *Ochlerotatus (Finlaya) niveus* subgroup.

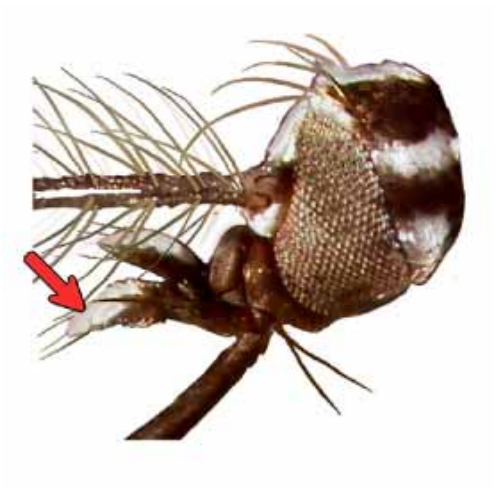

FIGURE 106. *Aedes (Stegomyia) albopictus.*

2(1). Thorax. Scutum black or brown with a pair of submedian-longitudinal white stripes, but without median-longitudinal white stripe, or with white lyre-shaped markings (Fig. 107); mesepimeron with two well separated white scale patches (Fig. 108). Leg. Anterior portion of midfemur with longitudinal white stripe (Fig. 109). Head. Clypeus with white scales (Fig. 110) ..... *Aedes (Stegomyia) aegypti* [b]

Thorax. Scutum with narrow median-longitudinal white stripe (Fig. 111); mesepimeron with white scale patches not separated, forming V-shaped white patch (Fig. 112). Leg. Anterior portion of midfemur without longitudinal white stripe (Fig. 113). Head. Clypeus without white scales (Fig. 114) .... *Aedes (Stegomyia) albopictus* [b]

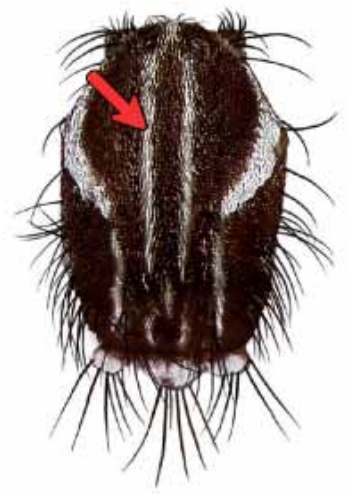

FIGURE 107. *Aedes (Stegomyia) aegypti*.

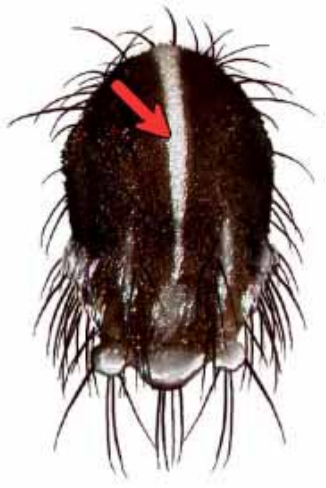

FIGURE 111. *Aedes (Stegomyia) albopictus*.

FIGURE 108. *Aedes (Stegomyia) aegypti*.

FIGURE 112. *Aedes (Stegomyia) albopictus*.

FIGURE 109. *Aedes (Stegomyia) aegypti.*

FIGURE 113. *Aedes (Stegomyia) albopictus.*

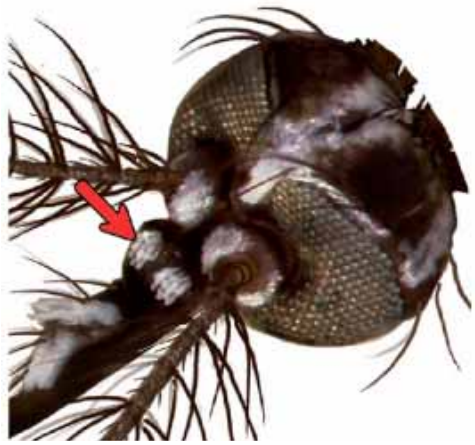

FIGURE 110. *Aedes (Stegomyia) aegypti.*

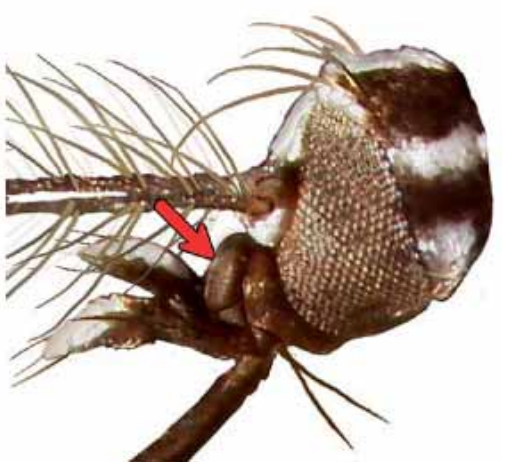

FIGURE 114. *Aedes (Stegomyia) albopictus.*

Key for the Identification of Fourth Stage Mosquito Larvae Associated with Dengue Virus Transmission in the Oriental Region

1. Head. Antenna spiculate (Fig. 115); seta 1-A branched (Fig. 115); seta 4-C usually caudad to seta 6-C (Fig. 116). Abdomen. Siphon with acus (Fig. 117) .... *Ochlerotatus (Finlaya) niveus* subgroup

   Head. Antenna smooth (Fig. 118); seta 1-A single (Fig. 118); seta 4-C cephalad to seta 6-C (Fig. 119). Abdomen. Siphon without acus (Fig. 120) 2

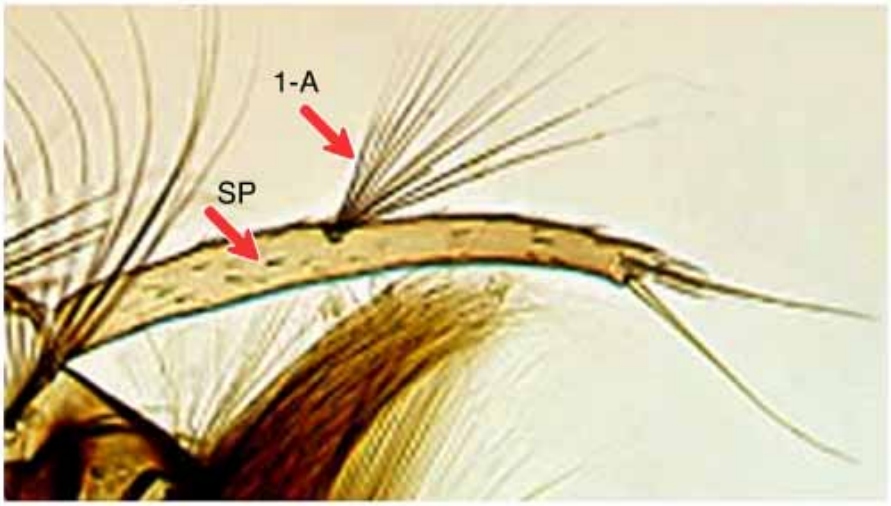

FIGURE 115. *Ochlerotatus (Finlaya) niveus* subgroup (SP, antennal spicules).

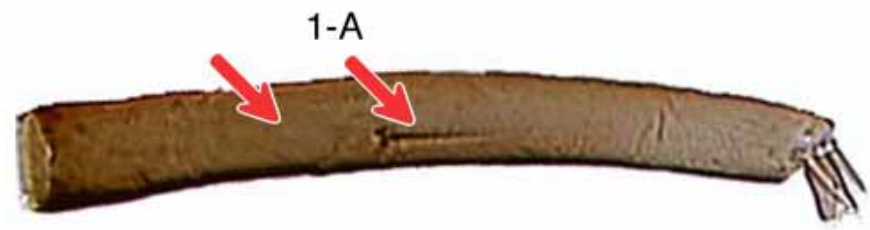

FIGURE 118. *Aedes (Stegomyia) albopictus.*

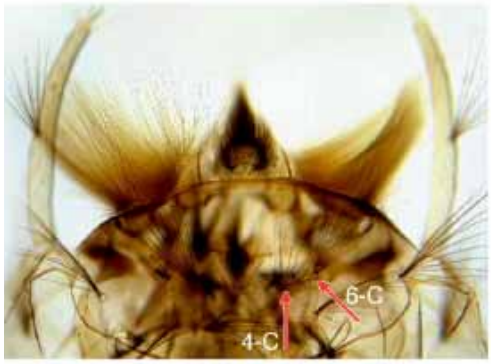

FIGURE 116. *Ochlerotatus (Finlaya) niveus* subgroup.

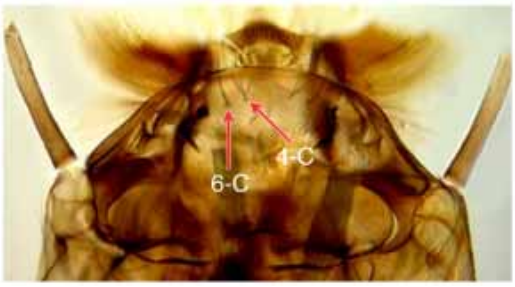

FIGURE 119. *Aedes (Stegomyia) aegypti.*

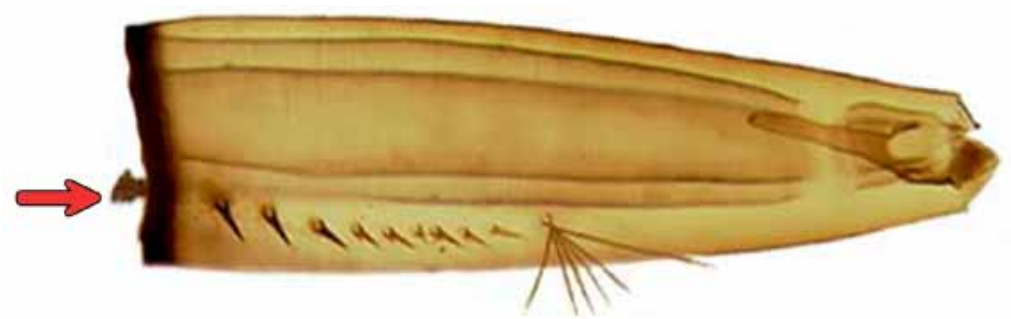

FIGURE 117. *Ochlerotatus (Finlaya) niveus* subgroup (arrow, acus).

FIGURE 120. *Aedes (Stegomyia) aegypti.*

2(1). Abdomen. Ventral brush (4-X) with 5 pairs of setae (Fig. 121); seta 4-a,b X branched (Fig. 121); comb scale with stout, subapical spines (Fig. 122) .... *Aedes (Stegomyia) aegypti*

Abdomen. Ventral brush (4-X) with 4 pairs of setae (Fig. 123); seta 4-a, b X single (Fig. 123); comb scale without subapical spines (Fig. 124) ....*Aedes (Stegomyia) albopictus*

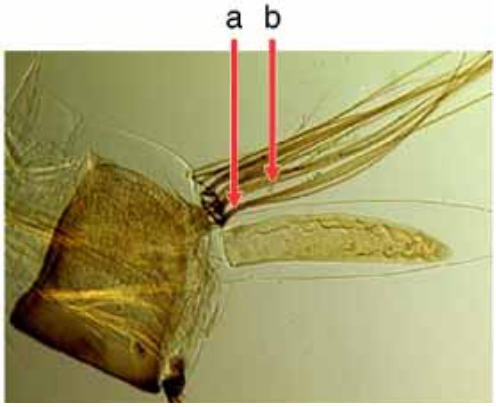

FIGURE 121. *Aedes (Stegomyia) aegypti.*

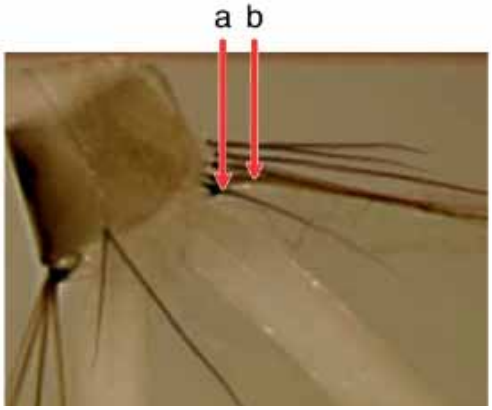

FIGURE 123. *Aedes (Stegomyia) albopictus.*

FIGURE 122. *Aedes (Stegomyia) aegypti.*

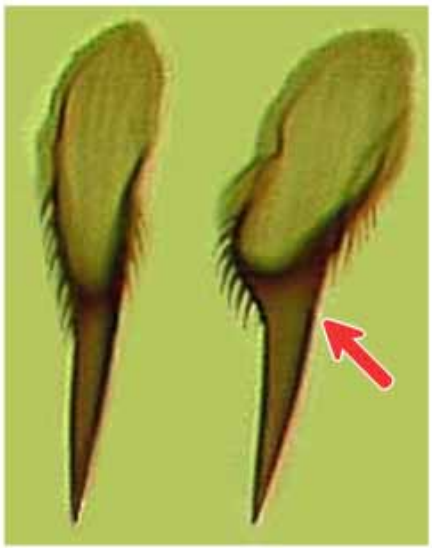

FIGURE 124. *Aedes (Stegomyia) albopictus.*

Explanation of Notes

[a]*Ochlerotatus (Finlaya) niveus* subgroup mosquitoes have been incriminated as vectors of dengue of humans in the forests. They transmit the dengue virus in monkeys in high tree canopies. Out of 11 species of *Ochlerotatus (Finlaya) niveus* subgroup in the Peninsular Malaysia, 9 species were found attracted to humans, both at ground and tree canopy levels, namely: *Oc. albolateralis* (Theobald), *Oc. inermis* (Colless), *Oc. leonis (*Colless), *Oc. litoreus* (Colless), *Oc. niveoides* (Barraud), *Oc. novoniveus* (Barraud), *Oc. pseudoniveus* (Theobald), *Oc. subniveus* (Edwards), and *Oc. vanus* (Colless) (Rudnick and Lim 1986).

[b]*Aedes albopictus*, the Asian tiger mosquito, can be distinguished from related species by the presence of broad flat white scales on the lateral margin of the scutum just before the level of the wing root; other species have only narrow curved white scales in this position. When scutal markings are rubbed off, *Ae. aegypti* can be easily misidentified as *Ae. albopictus.* It can be distinguished by having separated white scale patches on the mesepimeron, whereas they are connected in *Ae. albopictus*.

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Key for the Identification of Adult Female Mosquitoes Associated with Dengue Virus Transmission in the North, Central and South America, including the Caribbean Islands

1. Thorax. Scutum with median-longitudinal pale stripe (Fig. 125A) and dorsocentral longitudinal pale stripes (Fig. 125B); scutellum without broad flat white scales on all lobes forming a complete transverse band (Fig. 125C). Leg. Hindtibia with a patch of white scales about 1/3 distance from base (Fig. 126) .... *Ochlerotatus (Gymnometopa) mediovittatus* [a]

   Thorax. Scutum with median-longitudinal white stripe (Fig. 133) or submedian-longitudinal white stripes (Fig. 127B); scutellum with broad flat white scales on all lobes forming a complete transverse band (Fig. 127C). Leg. Hindtibia without a patch of white scales (Fig. 128) 2

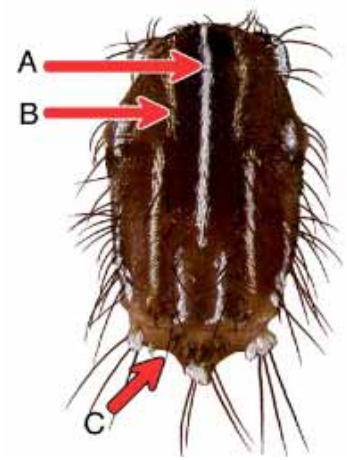

FIGURE 125. *Ochlerotatus (Gymnometopa)* mediovittatus.

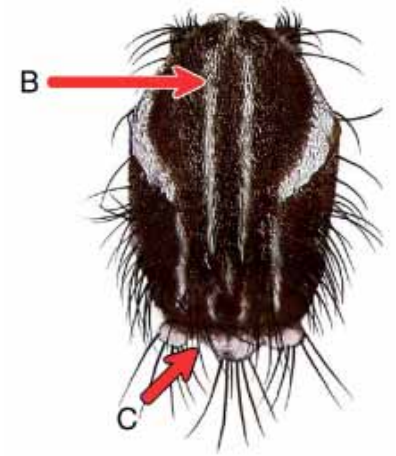

FIGURE 127. *Aedes (Stegomyia) aegypti.*

FIGURE 126. *Ochlerotatus (Gymnometopa) mediovittatus.*

FIGURE 128. *Aedes (Stegomyia) albopictus.*

2(1). Thorax. Scutum black or brown with a pair of submedian-longitudinal white stripes, but without median-longitudinal white stripe, or with white lyre-shaped markings (Fig. 129); mesepimeron with two well separated white scales patches (Fig. 130). Leg. Anterior portion of midfemur with longitudinal white stripe (Fig. 131). Head. Clypeus with white scales (Fig. 132).....*Aedes (Stegomyia) aegypti* [b]

Thorax. Scutum with narrow median-longitudinal white stripe (Fig. 133); mesepimeron with white scale patches not separated, forming V-shaped white patch (Fig. 134). Leg. Anterior portion of midfemur without longitudinal white stripe (Fig. 135). Head. Clypeus without white scales (Fig. 136) *Aedes (Stegomyia) albopictus* [b]

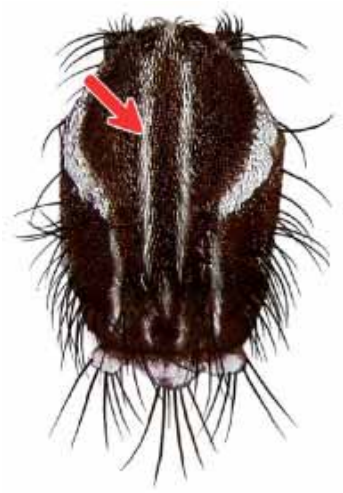

FIGURE 129. *Aedes (Stegomyia) aegypti.*

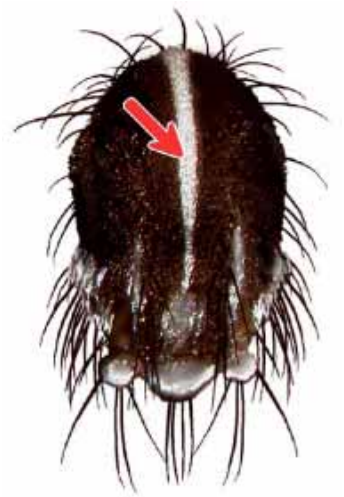

FIGURE 133. *Aedes (Stegomyia) albopictus.*

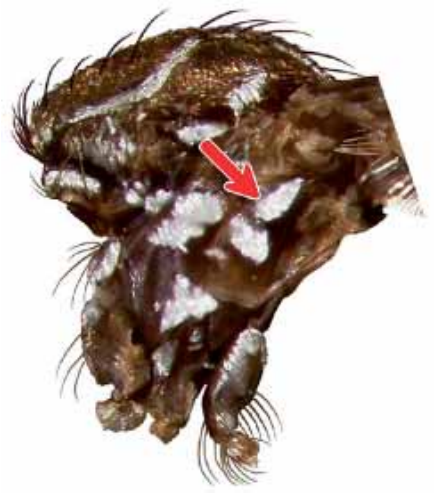

FIGURE 130. *Aedes (Stegomyia) aegypti.*

FIGURE 134. *Aedes (Stegomyia) albopictus.*

FIGURE 131. *Aedes (Stegomyia) aegypti.*

FIGURE 135. *Aedes (Stegomyia) albopictus.*

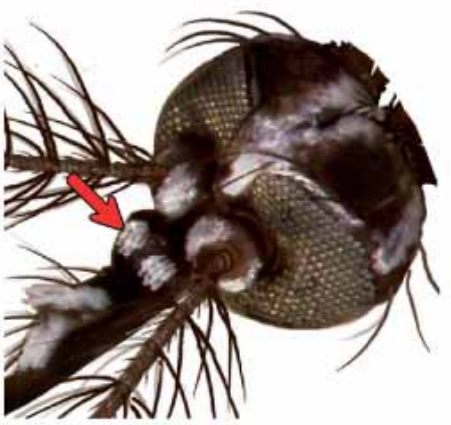

FIGURE 132. *Aedes (Stegomyia) aegypti.*

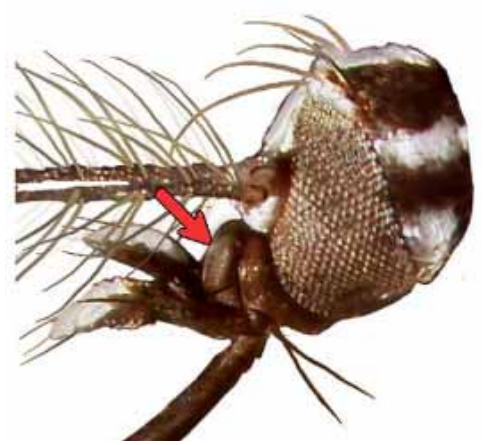

FIGURE 136. *Aedes (Stegomyia) albopictus.*

1. Head. Seta 1-C very stout (Fig. 137); seta 4-C usually caudad to seta 6-C (Fig. 138). Abdomen. Setae 1,2-I-VII stellate (Fig. 139); siphon with pecten spines strongly arctuate (Fig. 140); pecten spine without subapical dentricle (Fig. 140) .... *Ochlerotatus (Gymnometopa) mediovittatus*

   Head. Seta 1-C not stout (Fig. 141); seta 4-C cephalad to seta 6-C (Fig. 142). Abdomen: Setae 1,2-I-VII not stellate (Fig. 143); siphon with pecten spines not strongly arctuate (Fig. 144); pecten spine with 2 or more subapical dentricles (Fig. 144)..... 2

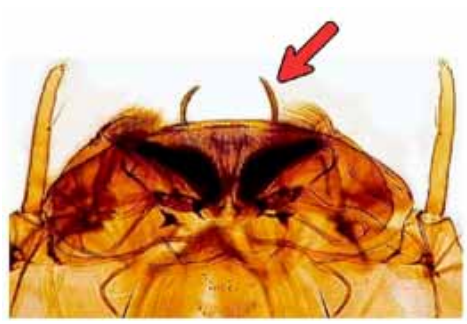

FIGURE 137. *Ochlerotatus (Gymnometopa) mediovittatus*.

FIGURE 141. *Aedes (Stegomyia) albopictus.*

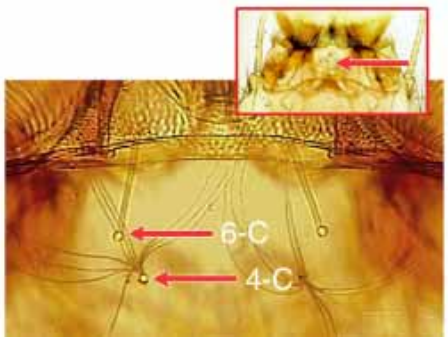

FIGURE 138. *Aedes (Gymnometopa) mediovittatus*.

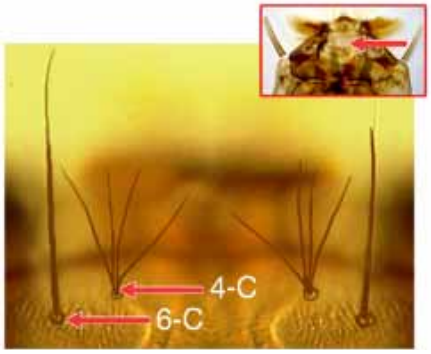

FIGURE 142. *Aedes (Stegomyia) aegypti.*

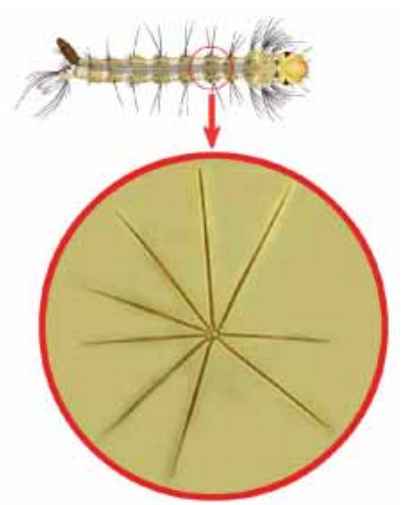

FIGURE 139. *Ochlerotatus (Gymnometopa) mediovittatus.*

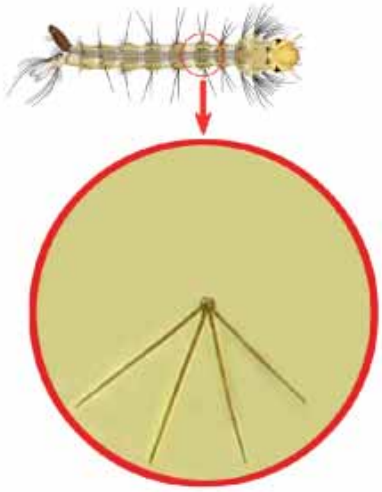

FIGURE 143. *Aedes (Stegomyia) albopictus*.

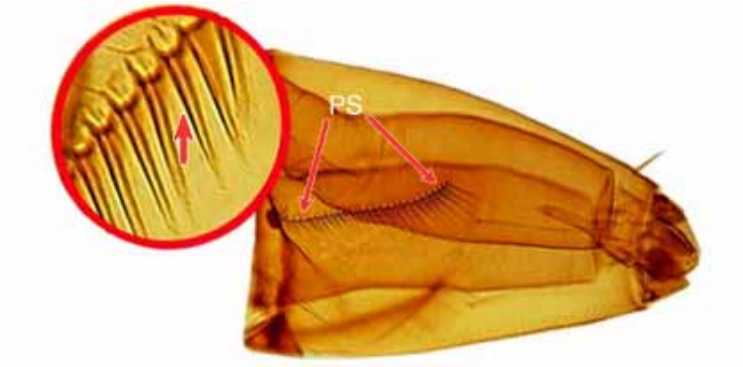

FIGURE 140. *Ochlerotatus (Gymnometopa) mediovittatus* (PS, pecten spine).

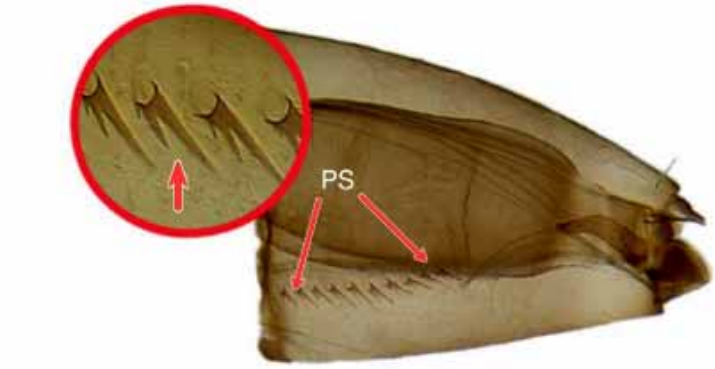

FIGURE 144. *Aedes (Stegomyia) aegypti* (PS, pecten spine).

2(1). Abdomen. Ventral brush (4-X) with 5 pairs of setae (Fig. 145); seta 4-a,b X branched (Fig. 145); comb scale with stout, subapical spines (Fig. 146) .... *Aedes (Stegomyia) aegypti*

Abdomen. Ventral brush (4-X) with 4 pairs of setae (Fig. 147); seta 4-a, b X single (Fig. 148); comb scale without subapical spines (Fig. 148) .... *Aedes(Stegomyia) albopictus*

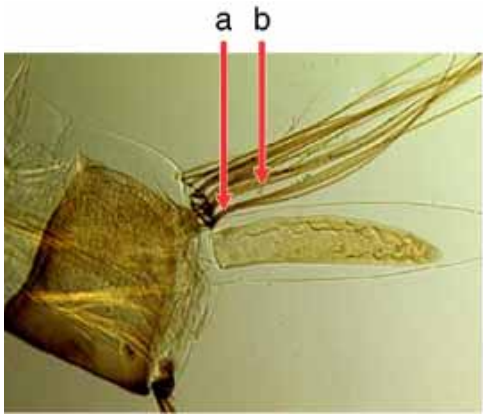

FIGURE 145. *Aedes (Stegomyia) aegypti.*

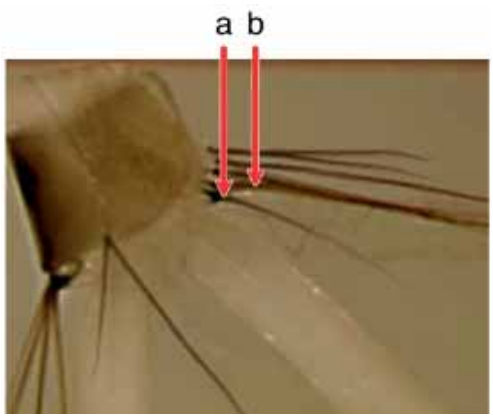

FIGURE 147. *Aedes (Stegomyia) albopictus.*

FIGURE 146. *Aedes (Stegomyia) aegypti.*

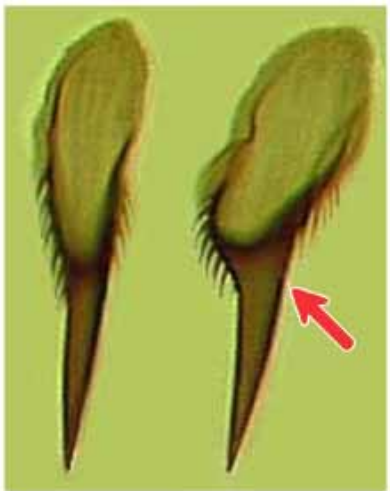

FIGURE 148. *Aedes (Stegomyia) albopictus.*

Explanation of Notes

[a]*Ochlerotatus mediovittatus* in the adult stage can be separated from the other members of the genera *Aedes* and *Ochlerotatus* in the Americas using various diagnostic characters, namely: scutum

with a narrow median-longitudinal white stripe; presence of a silver patch of scales or short line in the fossa and above the prealar knob but no patch of scales on or below the prealar knob; posterior pronotum with narrow, curved dark scales; paratergite, scutellar lobes and front of mesothoracic spiracle with broad, flat white scales; hindfemur with a long narrow white line on the anterior surface; hindtarsomeres with pale bands; and, abdominal segments 6–7 not flattened laterally unlike *Ochlerotatus triseriatus* (Say) (B. A. Harrison, unpublished information).

[b]*Aedes albopictus*, the Asian tiger mosquito, can be distinguished from related species by the presence of broad, flat white scales on the lateral margin of the scutum just before the level of wing root. When scutal markings are rubbed off, *Ae. aegypti* can be easily misidentified as *Ae. albopictus*. It can be distinguished by having two separate white scale patches on the mesepimeron whereas they are connected in *Ae. albopictus*.

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(Numbers or letters in parentheses under a given species designate the figure(s) for that species.)

About this book

Mosquito species that are known or likely to transmit dengue viruses to humans are treated in the pictorial keys. The keys for the identification of adults and fourth stage larvae of mosquitoes include 148 colored images or photomicrographs, seven colored illustrations and one map showing four regions of the world, namely Afrotropical Region, South Pacific Islands and Australian Region, Americas (including the Caribbean Islands), and Oriental Region (including Southeast Asia). The keys were purposely designed for use by non-specialists in mosquito taxonomy, including public health personnel and preventive medicine practioners. Morphological characters of adults and larvae were carefully selected for easy recognition as possible and accurate diagnosis. Additional notes are provided to pinpoint some diagnostic characters separating vector species from closely related non-vector species. For further reading, a selected list of useful references is included for each region. In the future, the identification keys should be revised to accommodate other vector species when they become known in each region. It is essential to know the vector so as to understand the dengue threat.

About the author

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