

ENTOMOLOGY.—*Descriptions of three new species of mosquitoes of the genus Aedes, subgenus Finlaya, from New Guinea.*¹ WILLARD V. KING, Colonel, and HARRY HOOGSTRAAL, Captain, Sn.C., A.U.S. (Communicated by ALAN STONE.)

***Aedes (Finlaya) tsiliensis*, n. sp.**

This is a distinctive species, characterized by a large white scutal patch, white markings on the femora and tibiae, and apical as well as basal white rings on the first segment of the mid and hind tarsi.

Male.—*Head*: Proboscis dark-scaled, slightly longer than fore femur. Palpus about as long as proboscis; long segment with a white ring in the middle, apical segment completely white, sub-apical segment all dark; long slender bristles ventrolaterally from last two segments and apex of long segment. Antenna almost as long as proboscis, densely plumose, the long hairs directed mostly in two planes. Clypeus black, nude. Scales of vertex narrow curved, a median area silvery white, bordered on each side by an area of dark and scattered white scales, a patch of broad white scales laterally extending forward as a narrow line along eye margin; numerous upright forked scales on vertex, palest in median area. *Thorax*: Scutum covered across front half with coarse,

lanceolate, silvery-white scales, continued over upper half of posterior pronotum. (Central part of disk of holotype and paratypes rubbed, with a few remaining fine white scales posteriorly. The original notes on this species read: "Mesonotum with a striking patch of linear white scales across front half and upper part of *ppn* and a broad line around antescutellar space.") Scutellum with narrow and lanceolate silvery-white scales on each lobe (partly rubbed). Postnotum black, nude. Anterior pronotal lobe largely covered by broad silvery-white scales and long black bristles. Posterior pronotum covered on upper half with narrow silvery-white scales, smaller than those on scutum. Postspiracular area black with about six bristles. Patches of broad silvery-white scales on upper and lower posterior sternopleuron, on paratergite, in front of prealar bristles, and a wide patch on mesepimeron curving from upper posterior to middle anterior borders; no lower mesipmeral bristle. Propleuron with broad silvery-white scales and about six bristles. Wing length 3 mm; scales dark except for a short line of white scales at base of costa and vein 1; lateral scales of veins 2 to 4 elongate, those on the tips

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slightly shorter and broader; anterior fork cell about one and a half times as long as its stem arising slightly closer to base of wing than posterior cell; posterior cross vein closer to base of wing than mid by more than its own length. Haltere stem yellowish, knob dark. Coxae with patches of silvery-white scales. Fore femur dark, with a narrow basal white ring and a large white spot midway of posterior surface; mid femur similar but in addition with a conspicuous apical white spot; hind femur completely white on basal half, the apical half dark except for an apical white ring, lengthened below. Fore tibia with an anterior apical white spot about one-fifth its length, the posterior surface entirely dingy white; mid tibia with a narrow subapical white ring extending basad as a line to middle on dorsal surface; hind tibia with a small dorsal apical white spot only. Fore tarsus all dark; mid tarsal segment 1 with a white ring on basal and apical thirds, segment 2 white on basal third; hind tarsus with a basal white spot and a narrow apical ring on segment 1, and a narrow basal ring on segment 2; other segments all dark; fore and mid tarsal claws subequal, the larger claw toothed. *Abdomen*: Tergites IV to VI with dorsal basal median white spots about half length of segment, narrowly separated from lateral spots; tergites II, III, and VII with median spots much smaller; large basal lateral silvery spots on tergites II to VII, those on anterior segments about half length of segment, on posterior segments almost full length; tergite VIII almost entirely silvery-scaled; sternites silvery basally, black apically, without erect scale tufts; coxites silvery-scaled on outer surfaces. *Hypopygium* (Fig. 1, from a paratype): Coxite four times as long as mid width, strongly compressed laterally, the outer surfaces densely clothed with scales and bristles; subbasal lobe in the form of an elongate ridge covered with long bristles; apical half of coxite with a dense patch of long, striated, pointed scales along the inner margin of the lower fold and fine bristles from the upper fold. Style two-fifths as long as coxite, slender, curved, finely pilose basally and along inner side, with a short, subapical hair; terminal appendage nearly one-fourth length of style. Paraprocts strongly curved and heavily sclerotized apically, each ending in two or three large and two or three small teeth. Phallosome bullet-shaped. Stem of

harpago slender, curved, pilose basally, with one long and one shorter subapical bristle; blade not quite as long as stem, arising slightly subapically, greatly widened basally and tapered to a blunt tip. Ninth tergite with well separated lobes, each bearing four stout bristles.

Female and larva.—Unknown.

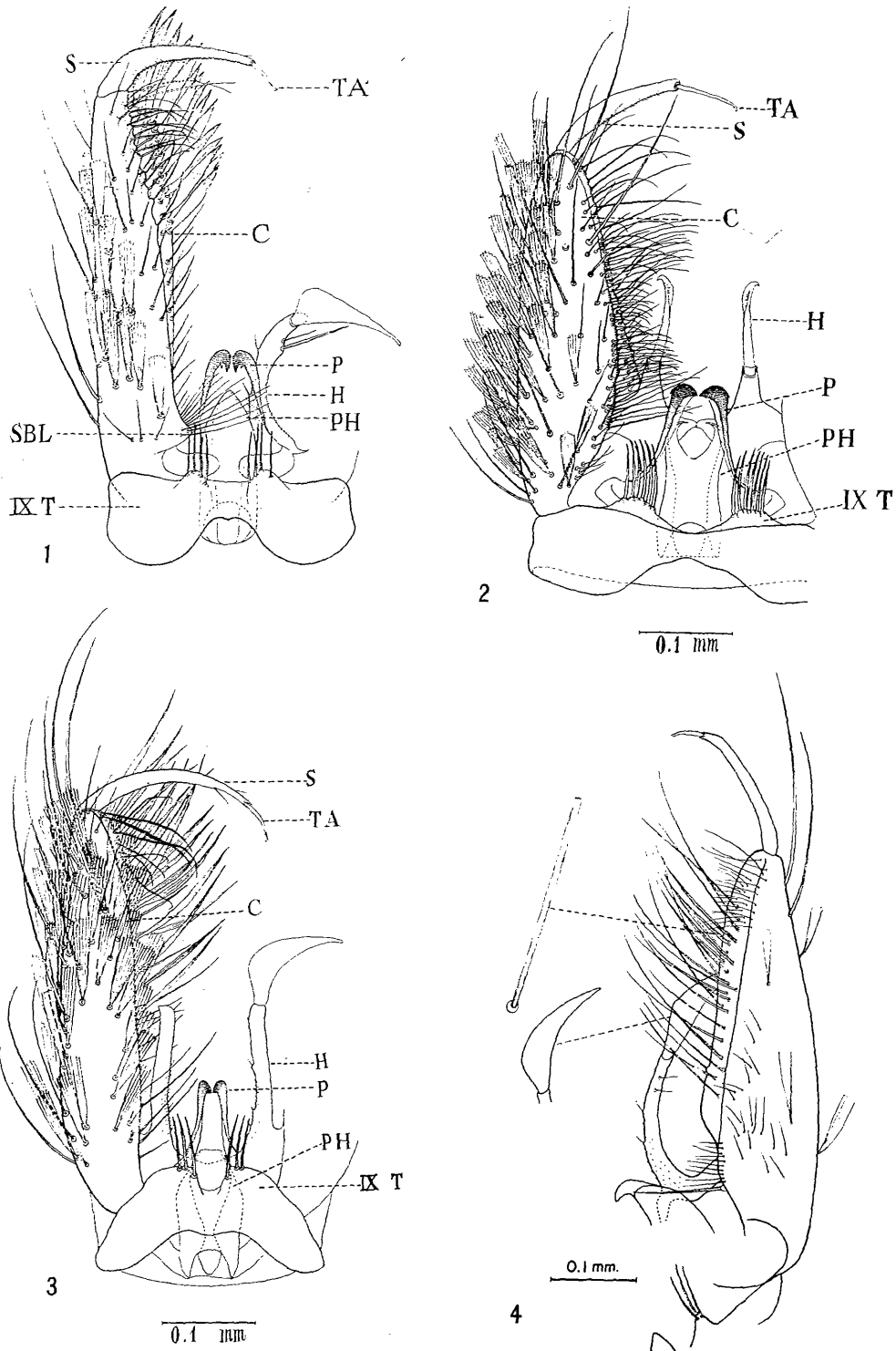
Types.—*Holotype*: Male (K107) reared from larva collected in a tree hole at Tsili Tsili on the Watut River (a branch of the Markham River) in the former mandated territory of eastern New Guinea, September 1943 (W. V. King collector). *Paratypes*: 2 males (one in very poor condition) same data as above. The holotype and one paratype are deposited in the United States National Museum.

Remarks.—This species is very distinct from any other Australasian *Finlaya* but appears to be related to several Oriental species described as having a white patch on the scutum, apical and basal banding on some of the tarsal segments, and nontufted scaling of the abdominal sternites. *A. (F.) gubernatorius* (Giles) of India, the closest of these, differs in having the scales on vertex and posterior pronotum all broad, tarsal markings more extensive, male palpi all dark, coxite without modified pointed scales, etc. Other Indian species of this group (*A. assamensis* (Theobald), *A. cogilli* Edwards, etc.) have, in addition, flat scales on the scutellum. *A. (F.) seoulensis* Yamada of Korea (also known from Peiping, China) has narrow scales on the posterior pronotum and scutellum, as in *tsiliensis*, but differs (according to available description) in having broad scales on most of the head vertex, and apical and basal banding on the second as well as the first segment of the hind tarsi and the first segment of the fore tarsi. In the male the blade of the harpago is slender for entire length and the coxite lacks the patch of pointed scales.

Aedes (Finlaya) plumiferus, n. sp.

This species (Fig. 6) is immediately recognizable in the known Australasian fauna by the large tufts of scales on the abdominal sternites. The scutum has a large anterior patch of silvery-white scales, and the first segment of the mid and hind tarsi have apical as well as basal white rings.

Male.—*Head*: Proboscis about equal to fore femur, black; palpus all black, slightly



FIGS. 1-4.—Male genitalia: 1, *Aedes tsiliensis*; 2, *A. plumiferus*; 3, *A. quasirubrithorax*; 4, *A. keefei*.

shorter than proboscis, the apical segment about two-thirds as long as preapical, slightly turned downward; scattered long bristles from two apical segments; antenna densely plumose, the long hairs mostly in two planes. Vertex completely covered with broad appressed silvery-white scales, and pale upright scales posteriorly; a few black bristles along eye margin. *Thorax*: Front third to half of scutum (including all of fossae) covered with coarse silvery-white scales, continued posteriorly as a median line that forks around antescutellar space; a large transverse patch of white scales anterior to wing root separated from the anterior white by a stripe of fine black scales of about equal width. Mid lobe of scutellum with a median patch of lanceolate white scales, a few similar scales on the side lobes. Anterior pronotal lobe with broad white scales and long dark bristles. Posterior pronotum with a central patch of broad white scales; three or four dark bristles on posterior border. About four pale postspiracular bristles. Large dense patches of broad silvery-white scales on upper and lower sternopleuron, an elongate patch on upper mesepimeron, a small patch in front of prealar bristles, and a stripe on paratergite. Propleuron with broad white scales and about five bristles. Fore and mid coxae with small patches of white scales anteriorly. Trochanters pale, followed by a black ring at base of all femora. Fore femur all dark except for a broad ventral stripe on most of basal half and a few pale scales at apex; mid femur dark above, mostly white on lower and posterior surfaces except for a broad dark subapical band; hind femur all white except for the basal ring and a broad black ring on subapical third, longer above than below. Fore tibia with a pale stripe beneath and an apical white spot above; mid and hind tibiae all dark except for apical (or slightly preapical) white spots (incomplete rings). Fore tarsus all dark; mid tarsus with basal and apical white rings on segment 1 and a basal ring on 2; hind tarsus with a small spot at base of segment 1 and comparatively broad white rings at apex of 1 and base of 2. Fore and mid tarsal claws unequal, the larger toothed. Wing 2.7 mm., dark except for a few white scales at base of costa; lateral scales of veins 2 to 4 long and linear; first fork cell a little longer than its stem; cross veins well separated. *Abdomen*: Strongly compressed

laterally, the tergites black, segments 3-6 with faint basal bands of dusky scales (probably discolored), joined to slightly enlarged lateral spots (a male paratype shows complete basal segmental white bands); a few slightly raised scales on posterior border of the dorsal median ridge of the last few segments; pale bristles on posterior and lateral borders of segments. Sternites 3-7 with large prominent tufts of erect black scales, the anterior ones on each segment long and narrow, the others decreasing in length posteriorly; a small spot of white scales at base of sternites, the rest of the recumbent scales dark. *Hypopygium* (Fig. 2, from a paratype): Coxite (C) narrowly conical, 3.5 times as long as mid width, the outer surfaces densely scaled and with scattered long bristles; inner margin with numerous long fine hairs along the middle third; margin of upper fold toward base with a double line of fine bristles, longest basally; basal lobe lacking. Style (S) slightly curved, not quite half as long as coxite, pilose on inner side; terminal appendage (TA) about half as long as style, with a small groove at tip. Harpago (H) with a short stem; blade about three times as long, slender, slightly expanded toward tip (not flattened in mount). Paraproct dark, beak-shaped at tip, with a subapical tooth. Phallosome broad, truncate apically. Lobes of ninth tergite produced, with six bristles on one side, seven on the other.

Female.—Differs from male as follows: Palpus about one-fifth length of proboscis; scales of head vertex all dark except for a median double line of broad white scales, slightly wider in front and ending in a small patch of narrow white scales between the eyes (median white not visible on paratypes); margin of eyes with a line of white scales, the front row of narrow ones, the back row of broad ones. Anterior white patch on scutum covering less than half of fossae. (Median area of scutum, except for the anterior one-fifth, denuded; in paratype females the white patch extends about level with scutal angle, indented behind, and a few white scales in front of and around antescutellar space.) Scutellum denuded (paratypes have a median line of narrow white scales, bordered by broader dark ones on mid lobe, and mixed narrow and semibroad dark scales on side lobes); wing length 3.4 mm; first fork cell about half again longer than its stem; fore and

mid tarsal claws equal, toothed; abdominal tergites with small basal lateral spots of silvery white scales on segments II to VII; VIII very small, nearly all white, the sternite large; cerci short and broad, partly retracted.

Larva (only one damaged skin available).—Antenna rather short (length 0.25 mm), glabrous, a single fine hair arising at apical fourth and reaching beyond tip of shaft; at apex, a long and a short hair and a short spine about equal in length to the apical appendage. Pre-clypeal spines about two-fifths length of antenna, rather stout, straight. Head hair A unusually small with four fine branches, arising behind antennal base; B single, rather short (slightly longer than antenna), arising well inside of and about level with base of antenna; C a long single hair well back of B at about middle of head; *d* minute, about 5-branched, inside of and slightly behind B. Mentum with seven stout teeth on each side of a large median tooth. Lateral hairs of abdominal segments strong, the upper one on segment I with four branches, the lower bifid, the hair on II trifold, on III–VI bifid; submedian hairs with three rather fine branches, nonplumose, the bases not surrounded by sclerotized plates. Comb of 8th segment a patch of about 35 scales, each

apically rounded and fringed apically and laterally. Siphon stout, length 0.65 mm, index about 2:1; pecten of about 20 teeth extending a little beyond middle of tube, each tooth with a single stout median or sub-median denticle, and a fine fringe between denticle and base; hair tuft of five branches opposite the last pecten tooth. Anal saddle not completely encircling the segment, the posterior border with rather long spines; dorsal subcaudal hair of four equal branches; one pair of slender gills visible, a little longer than saddle.

Types.—*Holotype*: Male (344), reared from larva collected in buttress hole of a large rain-forest tree about 250 feet elevation, Hollandia, Netherlands New Guinea, November 21, 1944 (W. T. Nailon). *Allotype*: Female (344), same data. *Paratypes*: Two males, 3 females and 1 larval skin as follows: 1 male (terminalia mount only) and 1 larval skin in poor condition (No. 1985, 220th M. S. U.), from tree hole, Hollandia, New Guinea, 1945; 1 male, 3 females (No. 166 and 165, respectively, Univ. of Queensland), "resting in trechole in shade," Lae, eastern New Guinea, August 1944 (Cpl. F. J. Armbrust). Holotype and allotype deposited in U. S. National Museum. Paratypes from Lae (which were examined through the

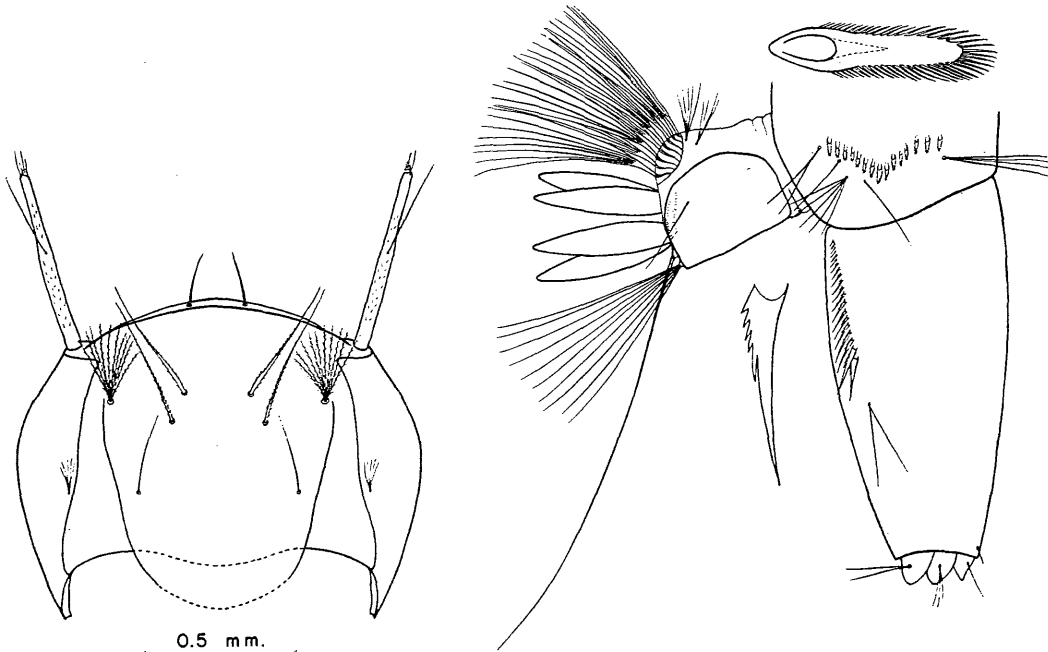


FIG. 5.—Head and terminal appendages of larva of *Aedes keefeii*.

kindness of Miss E. L. Marks) are to be returned to the University of Queensland. Two additional females (Lot 226) are at hand but their markings are badly discolored from wetting with the mounting medium. These were reared from larvae from a tree hole near lot 344 October 27, 1944 (H. Hoogstraal and J. Toffaleti).

Remarks.—The larvae in Lots 226 and 344 were associated with those of *Aedes (Finlaya) notoscriptus* (Skuse), *A. (Stegomyia) albolineatus* (Theobald), and *Megarhinus splendens* (Wiedemann).

A. plumiferus belongs to a small sub-group of Oriental species having tufts of long scales on the abdominal sternites, both apical and

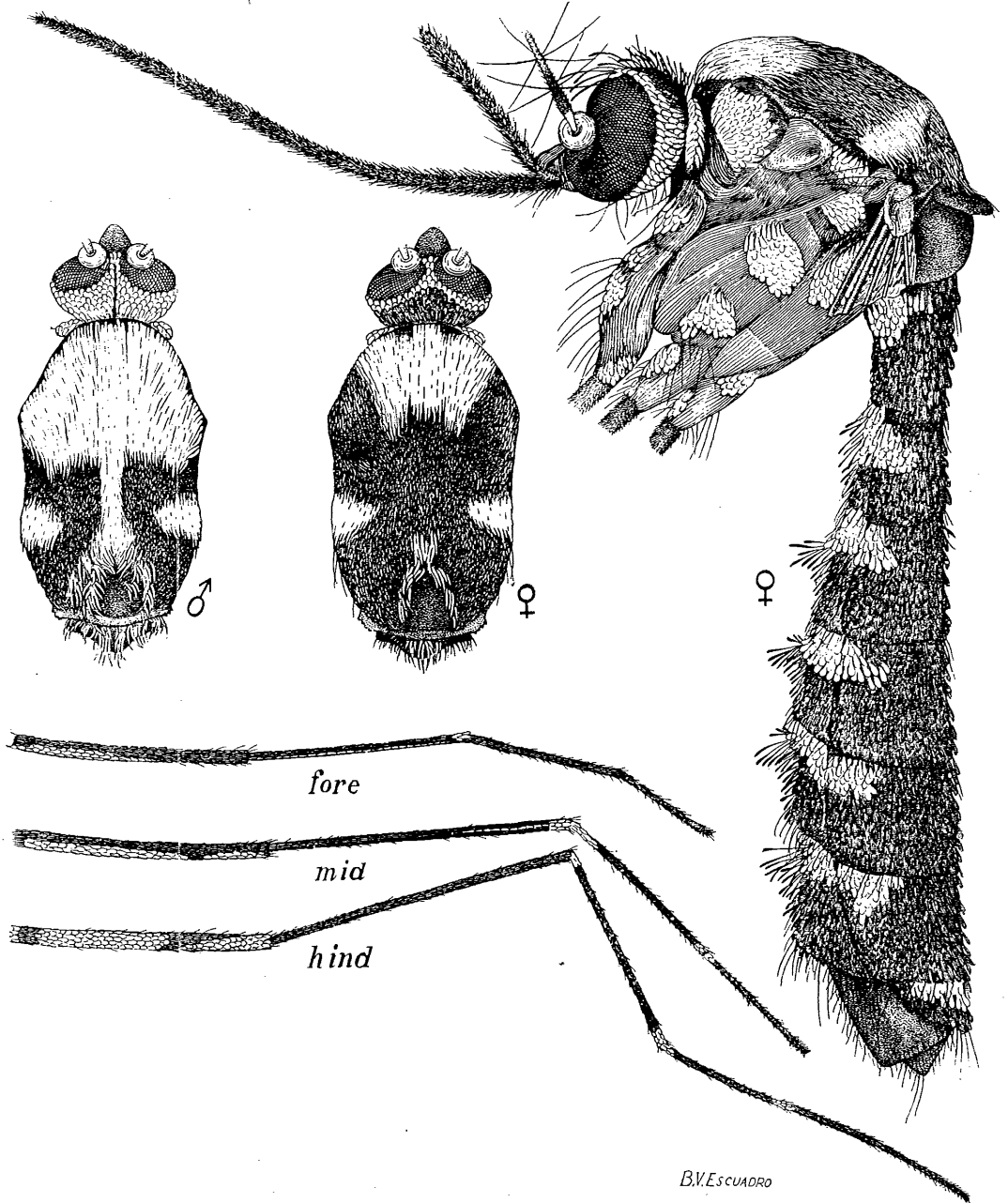


FIG. 6.—Ornamentation of adults of *Aedes plumiferus*.

basal white rings on the first tarsal segment of the mid and hind legs and a large patch of white on the scutum. These species include *A. prominens* (Barraud) and *A. khazani* Edwards of India, *A. melanopterus* Giles of the Philippines, and *A. watasei* Yamada of Japan. It differs from the first two in having narrow scales on the scutellum, only white scales on the head in the male and a median white strip on the head in the female. The posterior pronotum is also bare of scales in *prominens*. *A. watasei* (of which only the female has been described) differs in having tufts of long scales on tergites 5-7 similar to those on the sternites, broad basal segmented white bands on the venter and flat scales on the scutellum. From a comparison with specimens of *A. melanopterus* recently obtained in the Philippines, *plumiferus* is found to be very similar, although the larva is distinct. In the male of *melanopterus* the palpi seem to be somewhat shorter, failing to reach the base of the labella, the blade of the harpago is more distinctly widened at the apical third, the lobes of the ninth tergite have four bristles each instead of six or seven, the base of the style is swollen and the bristles near the base of the coxite form more of a patch. The principal difference between the larvae is in the submedian hairs of the abdominal segments. In *melanopterus* (two specimens of which were examined through the kindness of Dr. K. L. Knight) these hairs are branched from two to six times and are unusually long and stout, sparsely plumose and have a small sclerotized plate around the basal papilla. In *plumiferus* the hairs are less than half as long, 3-branched, nonplumose, and not arising from a plate. A typical hair on segment 5 measured 0.22 mm, compared with 0.48 mm for a hair on the same segment of *melanopterus*. Other minor differences were noted as follows: preclypeal spines in *melanopterus* somewhat stouter and distinctly curved, saddle hair double instead of single, dorsal subcaudal hair of anal segment of six branches instead of four, and spines on posterior border of saddle about twice as long, especially toward the lower corner.

***Aedes* (*Finlaya*) *keefeii*, n. sp.**

This species is somewhat above medium size and has an ornamented scutum consisting of faint median and submedian golden lines

and wider lateral curved lines. The hind tarsal segments have broad basal bands and segment 5 is entirely white. It is closely related to the Australian species *A. (F.) quasirubrithorax* (Theobald).

Female.—*Head*: Proboscis dark-scaled, about equal in length to fore femur. Palpus dark-scaled, one-sixth as long as proboscis. Torus tan. Clypeus black, nude. Vertex with scattered lanceolate silvery scales, a denser border along eyes, and numerous dark upright forked scales; lateral surface with broad silvery-white scales. *Thorax*: Scutum and pleura with yellowish-brown integument; scutum covered with fine dark-brown scales, three small patches of white scales with yellowish tinge on anterior border; faint median and submedian lines each represented by a single broken line of silvery scales reaching the middle of scutum; laterally with a narrow line of white scales extending from the anterior margin to the scutal angle, there broadening around the posterior border of the fossa and then continuing as a narrow line nearly to the scutellum; a few narrow pale scales over the wing bases. Scutellum densely clothed with silvery white scales, broad appressed ones on mid lobe, long lanceolate ones on side lobes, narrowest at outer side. Postnotum yellowish, nude. Anterior pronotal lobe with lanceolate white scales with yellowish tinge, and with dark bristles. Posterior pronotal lobe with black, moderately broad, spatulate, appressed scales on upper two-thirds, somewhat narrower ones on upper margin and a few broad pale scales low down; six dark bristles along posterior margin. Paratergite with broad white scales. About eight postspiracular bristles. Sternopleuron with a patch of broad white scales on upper half, another on lower posterior border; long bristles along upper and posterior margins. A small patch of white scales at base of prealar knob. Mesepimeron with a patch of broad white scales on anterior half extending from upper margin to lower third; yellowish bristles above the white patch. Propleuron with broad white scales and a group of about 14 long pale bristles. Wing length: 3.8 mm. All scales dark; lateral scales of veins 2 to 4 long and narrow, those on the tips slightly broader and shorter; anterior fork cell almost one and a half times as long as its base, arising about level with posterior fork cell; posterior cross vein more basal

than mid by at least twice its own length. Haltere entirely yellow. Coxae with pale scales, a patch of dark ones on anterior surface of fore coxa. Fore and mid femora each with a broad line of pale yellowish scales on inner surface for about half its length; basal two thirds of both inner and outer surface of hind leg pale yellow; knee spots silvery white on all legs. Tibiae completely dark. Fore and mid tarsi with distinct white basal rings on segments 1 and 2, and a small spot on 3; hind tarsus with broad white rings on segments 1-4, that on 4 about two-fifths length of segment, segment 5 entirely white; fore and mid tarsal claws about equal and toothed. Tergites dark-scaled with metallic reflection, narrow median basal pale spots on III to VI almost connected with lateral spots; large silvery white basal lateral spots on II to VII, becoming gradually larger on the apical segments, extending full length of segment and onto dorsum; sternites broadly pale-scaled basally, with narrow posterior dark bands; eighth sternite compressed laterally, small, scaleless; cerci broad, partly retractly.

Male.—Differs from female as follows: Palpus about equal in length to proboscis, the two apical segments turned downward; a ventrally directed row of long bristles from tip of long segment and basal portion of subapical segment, sparse short bristles on remainder of the two apical segments; white basal spots on the two apical segments, about one-third their length, and a white ring in the middle of long segment; antenna densely plumose, the long hairs arranged mostly in two planes; first fork cell about a third longer than its petiole; abdominal tergites III-V with complete, rather wide, white basal bands, a narrow one on VI. *Hypopygium* (Fig. 4): Coxite long (0.45 mm) and slender, nearly four times as long as mid width, heavily scaled on outer surfaces, inner fold extending to tip; basal lobe lacking, represented by a small patch of bristles, the basal one of which is much longer than the others; apical half of the margin of lower fold with a dense line of long bristles, slightly modified, their stems showing one or two striations; above these on both the upper and lower folds, several rows of long very fine hairs. Style very slender, slightly more than a third as long as coxite; terminal appendage about one-fourth as long as style. Harpago with a long slender stem (reaching about to middle of coxite), its

basal half sparsely pilose; blade slightly shorter than stem, much widened near base, curved and tapered to a slender tip. Paraproct with a black, beak-like tip and a small subapical tooth. Phallosome broad, simple. Lobes of ninth tergite produced, each with three bristles.

Larva (Fig. 5).—Head about 0.8 mm long, half again as wide; antenna long and slender, about two-thirds as long as head, spiculate, a single hair from middle of shaft, reaching beyond tip of shaft; two long and two short apical bristles and a finger-like appendage. Preclypeal spines long and slender. Head hair A a large tuft of about 10 branches, B and C long and single, B about level with base of antenna, C slightly ahead and inside of B, *d* a multiple tuft of rather long hairs between the bases of B; *e* single or forked at middle, *f* with about 7 branches. Anterior submedian prothoracic hairs 1 to 3 set on a plate, No. 1 a short tuft of about six branches, 2 long, single, 3 long, bifid. Upper lateral hair of abdominal segment I with five or six branches, the lower with four; lateral hair on II 3-branched, on III to V double; submedian hairs long, double. Comb of eighth segment a long, even, curved row of about 18 teeth, each rounded and evenly fringed. Air tube short and stout, index about 2:1 (length 1.2 mm); acus present; pecten of about 20 closely set teeth on basal half of tube, the individual tooth long, sharp, with 5-7 denticles on one side of the widened basal half, the teeth progressively longer toward tip of pecten; tuft of two or three branches beyond pecten. Anal saddle covering a little more than half of segment, spiculate on posterior border; lateral hair single; one or two small tufts in front of ventral grid; dorsal subcaudal tuft with about ten branches, the ventral subcaudal hair single as usual. Anal gills small, slightly longer than the saddle.

Types.—*Holotype*: Female (K 128B-3) reared from larva collected in a stump hole near K. B. Mission, Milne Bay, Papua, New Guinea, October 1943 (Chaplain A. M. Keefe collector). *Allotype*: Male from same lot. *Paratypes*: 1 male, 8 females (with several larvae and pupal skins and whole larvae) as follows: 2 females (K 128B-3), same data as holotype; 1 male (H-1-1) seven females (H-313-1, H-1-5, H-1-2, H-1-10, H-1-7), "Hilimoi, Milne Bay, Papua, N. G. Penn & Bick" (probably late 1943); 1 female (46 B) "Sariba Is. N. G. 1-10-44. T. K.

Ruebush" (probably in Milne Bay area). Holotype and allotype deposited in U. S. National Museum. The paratypes from Hilimoi and Sariba Islands were examined in the collection of this museum. One paratype from lot K 128B-3 to be deposited in the museum of the Division of Economic Entomology, Council for Scientific and Industrial Research, Canberra, A. C. T., Australia.

Remarks.—This species is very similar in general appearance to *A. (F.) quasirubrithorax* (Theobald) but differs distinctly in having broad (instead of narrow) scales on the mid lobe of the scutellum, and small, flat, black scales (instead of narrow yellowish ones) on the upper half of the posterior pronotum. The scutal pattern is also less distinct. In this respect most of the New Guinea specimens of *quasirubrithorax* that have been examined have a less distinct pattern than specimens from Australia but seem otherwise to be very similar. In the male genitalia of *quasirubrithorax* (Fig. 3, from a Hollandia, New Guinea specimen) most of the modified scales on the inner margin of the lower fold of the coxite are distinctly broader than those in *keefeii* and the wider ones show three or four striations.

From the original collection at Milne Bay (K 128B-3), seven adults were reared by the senior author from larvae that were thought to represent a single species. The adults were found to consist of one male, three females of a new species, and two males, one female of *quasirubrithorax*. The larvae had not been individually isolated but all the skins were saved. A tentative association of the larvae of the two species was made on the basis of the number of each (four of one and three of the other). This association was later confirmed by larvae in the U. S. National Museum associated with a collection of adults of the new species from Hilimoi, Milne Bay. The larval material consisted of several whole larvae and three larval skins, at least two of which appeared to be

associated by subnumbers ("1:7" and "1:10") with individual adults. In the Museum collection there was found also a series of adults and larvae of *quasirubrithorax* bearing Roberts lot numbers and likewise collected in the Milne Bay area. While the larvae of the two species are very similar, two slight differences in hair branching, which appeared to be constant, were noted. In *quasirubrithorax* head hair B was double or sometimes triple on each of fourteen larvae examined (including those in lot K 128B), and hair 3 of the submedian prothoracic group was single on each; in *keefeii* head hair B was single on at least one side, usually on both sides, on nine specimens, while prothoracic hair 3 was usually double. In specimens of both species the airtube is distinctly shorter in comparison to the diameter (index about 2:1) than that shown for Australian *quasirubrithorax* by Lee (*Atlas of mosquito larvae of the Australasian Region*, 1944, p. 62), in which the index is 3:1 or more. The comb scales are also apically fringed instead of bare as illustrated by this author.

A. quasirubrithorax has not previously been reported from New Guinea. In addition to the Milne Bay records, we have three females and a male (lots 811 and 848) reared from larvae collected in tree holes in March 1945 by members of the 19th Medical General Laboratory in the Hollandia area of northern Netherlands New Guinea, and one female from the island of Kiriwina (east of New Guinea) collected in August 1943 by the 5th Malaria Survey Unit.

We have also a female (Lot 796) collected while biting on Mount Defonso in the Cyclops Range, Hollandia area, in March 1945 (W. R. Fullem and H. Cook collectors), which differs from both the previously mentioned species in having broad white scales on all lobes of the scutellum. The specimen is so badly denuded and broken, however, that its relationship can not be determined.

