New Species of Mosquitoes from Taiwan (Diptera: Culicidae)∗

Part I. Two New Species of Aedes (Finlaya)

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Abstract

This report deals with the description of two new species of mosquitoes belonging to subgenus Finlaya of genus Aedes. These mosquitoes were found as larvae in tree-holes on an elevation of 2,400 meters in Central Taiwan. One of them is named Aedes (Finlaya) crossi, n. sp. which is closely related to Aedes suffusus and Aedes oreophilus. The other is named Aedes (Finlaya) hurlbuti, n. sp. which is closely related to Aedes auronitens.

Two species of mosquitoes collected from tree-holes on an elevation of 2,400 meters in central Taiwan were found to be closely related to the mosquitoes of W. Himalayas. One of them is very similar morphologically to Aedes suffusus Edwards in the larval stage and to Aedes oreophilus (Edwards) in the mesonotal marking of adults. The other species is closely related to Aedes auronitens Edwards in having orange markings on the venter of abdomen. The present paper presents the descriptions of the larval, pupal, and adult stages of these two new mosquitoes. Terminology used for description conforms to that of Belkin(1962).

AEDES (FINLAYA) CROSSI LIEN, N. SP.

FEMALE. Proboscis, palpus, and clypeus uniformly dark; torus with small pale scales on inner side; dorsal surface of head covered with broad appressed scales, those on submedian and lower areas dark, others entirely white; numerous yellow upright forked scales on nape; apn with broad white scales; ppn with yellow curved scales on upper margin, with broad scales on middle aspect; paratergite with broad white scales; postspiracular area with a few broad, white scales; one patch each of broad, white scales on propleural, subspiracular, prealar, upper and lower sternopleural areas; a long patch of broad, white scales on mesepimeron; mesonotum covered with yellow and brownish scales, arranged in definite

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**Special contribution
lines (Fig.1, a); all femora dark, with white scales on underside, white scales on mid and hind femora more extensive than those on fore femur; tibiae and tarsi entirely dark; tergites dark, with a lateral white stripe on tergite I, basolateral white patches on tergites II-VIII; sternites dark with white basal bands.

MALE. Differing from females as follows:
Torus with no scales; dorsal surface of head entirely covered with broad appressed white scales, sparsely intermixed with yellow upright forked scales; dark upright forked scales on nape; mesonotum sparsely covered with pale yellow scales, not arranged in lines; white basolateral patches produced on to dorsum on tergites IV-VII to form incomplete basal bands. Terminalia (Fig.1, b-c). Side-piece with a dense collection of hairs on basal tergomesal lobe; claspette filament slightly broadened, apical part tapering to tip; clasper of moderate length, with long terminal appendage; phallosome tube-shaped with tips slightly curved inward; 9th tergite with 5 setae on each lobe; 9th sternite with 4 setae.

PUPA (as Fig.2, g-h).
LARVA (Fig.2, a-f). Head. Hairs 1-C slender, about as long as the distance between the hairs; 3-C single, fine; 4, 5, 6, 7-C all well developed and branched; 4, 6, 7-C in transverse row, slightly posterior to level of bases of antennae; 5-C slightly internal and posterior to 6-C; 7-C with 10-12 pectinate branches; 6-C with 6-8 pectinate branches, 5-C with 8-9 pectinate branches; 4-C with 8 fine branches; 8-C with 2-3, 9-C with 9, 10-C with 3-4 fine branches; 11-C with 12-13 pectinate branches; 12-C with 3-5 fine branches, 13-C with 5-6 pectinate branches; 14-C single; 15-C with 8-10 fine branches. Antenna slender, long, slightly curved inward, shaft sparsely spiculate; a hair tuft of 6-8 pectinate branches at about middle of shaft; mouth-brush hair simple; mentum with 9 teeth on either side of median tooth. Thorax. Integument glabrous; thoracic hairs 1, 2, 3-P arising from a very weakly sclerotized plate, 1-P with 5 branches, 2-P single, 3-P with 4 branches; no definite stellate hairs present on dorsum of thorax and abdomen. Abdomen. Integument glabrous; abdominal hair 1-VIII with 2-4 pectinate stout branches; 2-VIII single, 3-VIII with 5-6 pectinate long branches; 4-VIII single; 5-VIII with 5 pectinate branches; comb consisting of 10 large, sharply pointed teeth in an irregular row, each tooth with fine basal fringe; integument around comb teeth weakly spiculate; siphon dark brown, about three times length of diameter at base when compressed, with acus; pecten confined to basal half of tube, consisting of 26-27 teeth, each tooth with a large and a few smaller denticles on one side; a hair tuft of 5 pectinate branches arising slightly beyond middle of tube; anal segment with a strongly sclerotized saddle, saddle with fine spicules allover, sclerotized area covering more than one-half anal segment in side view when compressed; hair 1-X with 2-3 fine branches, 2-X with 6-7 branches, 3-X single, very long; 4-X consisting of 10 hairs, distal 8 hairs on barred area, each with 5-6 branches, proximal 2 hairs outside of barred area, each with 2-3 branches; anal gills slightly longer than saddle, dorsal pair a little longer, both pairs bluntly pointed.

TYPE SPECIMENS. Holotype, female, with larval and pupal skins (62478. 3), tree-hole, between Tashan and Alishan, Wufeng, Chiai County, Taiwan, December 15, 1962, C. L. Chung and P. S. Chen; allotype, male, with larval and pupal skins (62479. 4), same data as holotype; paratypes, seven females(62478. 1-2-4-6; 62479. 1-2-3) with corresponding larval and pupal skins, same data as holotype,
and three females (62486.1, 2, 3), tree-hole, between Hsinkaokou and Alishan, Wufeng, Chiai County, Taiwan, December 16, 1962, C. L. Chung and P. S. Chen. All specimens are in the collection of Taiwan Provincial Malaria Research Institute, Nankang, Taipei County, Taiwan, Republic of China.

DISTRIBUTION. Known only from type locality.

BIOLOGY. The larva breeds in tree-holes on high elevation of over 2,400 meters, in one instance together with Aedes (Finlaya) hurlbuti, other instances alone. The surface of water was frozen when the larvae were collected. The habits of adults are unknown.

SYSTEMATICS. This species falls into subgroup V (suffusus) of Group II (geniculatus-group; protomacleaya) according to grouping by Knight and Marks (1952). Aedes suffusus Edwards is the only known species included in the subgroup. This species is very closely related to suffusus but differs from it as follows: The female has definite dark areas on dorsal surface of head and female mesonotum is covered with yellow and brownish scales, arranged in definite lines. In suffusus there are no definite dark areas on dorsal surface of female head, and yellow and brownish scales on female mesonotum not arranged in lines. In the larva there are more pecten teeth (26-27 vs. 16-21 in suffusus) confined to basal half of tube (basal 1/3 in suffusus) and siphon hair tuft arising beyond middle (at basal 1/3 in suffusus).

REMARKS. This species is named in honor of Dr. John H. Cross, Head of the Department of Medical Ecology, U.S. Naval Medical Research Unit No. 2, who afforded every convenience and valuable advice.

AEDES (FINLAYA) HURLBUTI LIEN, N. SP.

MALE. Vertex with narrow golden scales intermixed with some golden upright forked scales on median area, pale broad flat scales submedially and laterally, a patch of dark broad flat scales in the submedian pale patch, another patch of dark broad flat scales in the middle of lateral pale patch, some golden upright forked scales on nape; torus, antenna, clypeus, palpus and proboscis entirely dark; antenna very plumose, apical and subapical flagellar segments subequal in length, the combined length of the remaining segments about 2.3 times the length of apical segment; palpus shorter than proboscis by about the length of apical segment, the last two segments curved downward, with stout hairs; proboscis stout on basal half, slender and slightly curved downward on apical half, about 1.4 times as long as fore femur; mesonotum with a median line of narrow golden scales running for whole length and forking before prescutellar space, a broad stripe of narrow dark-brown scales on each side of the golden median line, a broad line of dark-brown scales starting just behind scutal angle, directing posteriorly toward lateral lobe of scutellum, the remaining area (i.e. a large area on scutal angle, a narrow longitudinal posterior line and an area above and in front of wing base) covered with narrow golden scales; suctellar scales narrow and golden; apn with pale broad scales; ppn with some narrow golden scales along dorsal border and a patch of broad flat scales on middle aspect. The following pleural areas each with a patch of pale broad scales; area just below prealar
bristles, postspiracular area, subspiracular area, propleuron, upper part of sternopleuron, medioposterior part of sternopleuron, upper part of mesepimeron, medioanterior part of mesepimeron; paratergite bare or with a few scales in some paratype specimens; all coxae with a patch of white broad scales near base; fore femur dark except for a narrow pale area at base, a small pale spot at apex on underside and a narrow pale stripe on posteroventral aspect; mid femur dark except for a pale, narrow, apical ring and a pale broad stripe on basal half on all aspects, dark on apical half, a pale narrow band also present at apex; all tibiae entirely dark except for a pale area at base of hind tibia on underside; fore tarsus dark except for a small indistinct pale spot at base of I and II posteriorly; mid tarsus dark except for a pale basal band on I; hind tarsus dark except for a fairly broad pale band on I, II and III and an indistinct narrow pale basal spot on IV. Wing dark-scaled, alula with dark bristles along its margin, squama fringed with dark bristles. Halter knob dark, with some pale scales at tip. Dorsum of abdomen dark except for a narrow silvery-white basal band on II-VII and a pale broad band on VIII. small silvery-white spots present latero-basally on I-VIII; sternum of abdomen largely dark, with small silvery-white spots latero-basally on II-VII, an apical band of orange-colored broad scales on II-VII, and a broad silvery-white band on VIII. Termindia (Fig. 1, e-i). Side-piece with 4 setae on basal tergomesal lobe; claspette filament slightly broadened, apical part tapering to tip; clasper of moderate length with long terminal appendage, phallo-some tube-like, simple; 9th tergite with 2-3 setae on each lobe; 9th sternite with 5 setae. 

FEMALE. Agreeing with male in general coloration, only differing as follows: Vertex with narrow golden scales intermixed with some golden, upright, forked scales on a large median area, pale broad flat scales laterally, a patch of dark broad flat scales in middle of pale lateral patch, some golden upright forked scales on nape. Torus dark, with some pale broad scales on inner side and polinosity on outer side; antenna dark, antennal flagellar segments subequal in length, with sparse flagellar bristles and dense pubescence, some pale scales present on the first flagellar segment. Palpus dark, about one-fourth the length of proboscis; proboscis slender, about 1.4 times as long as fore femur. Broad pale scales on ppp narrower than those in male. Mesonotal marking similar to that of male (Fig. 1, d). Fore femur with a short pale line at base dorsally in addition to basal and apical pale areas; fore tarsus entirely dark; dorum of abdomen dark, with a narrow median silvery-white patch on I, a narrow silvery-white basal band on III-VI and silvery-white patches latero-basally on I-VII; orange-colored scales on sternum of abdomen more extensive than in male. 
PUPA(as Fig. 3, g, h). 
LARVA(Fig. 3, a-f). Head. Antenna slender, about 17 times the length of its basal diameter, sparsely spiculate, a hair tuft of 1-2 branches at about basal three-fifths; head hair 1-C slender, slightly curved inward, about as long as the distance between the hairs or even longer; 7-C with 7-9 pectinate branches, slightly shorter than antenna; 6-C bifid, very long, much longer than the length of whole head, one of the branches more slender and shorter than the other; 5-C close to 6-C, with 6 pectinate long branches; 4-C close to 6-C, with 10-17 branches; 7-C with 3-7 slender branches; median hairs of mouth brush with no teeth; mentum with 27-29 teeth. Thorax. Integument glabrous; thoracic hairs 1, 2, 3-P arising close
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together, 1-P with 3-5 branches, 2-P single, 3-P long, single or bifid, 4-P small, with 1-3 branches, 5-P with 3 long branches, 6-P long, single, 7-P very long, single or bifid, 8-P small, with 2 branches. Abdomen. Integument glabrous; comb consisting of 28 elongate teeth arranged irregularly, each tooth fringed laterally and apically; abdominal hair 1-VIII with 3-5 branches, 2-VIII with 4-5, 3-VIII with 3-4 pectinate long branches, 4-VIII long, single or bifid, 5-VIII with 4-5 long branches; anal segment with strongly sclerotized saddle occupying about two-thirds of the segment, minute spicules present on saddle and also on posterior border of saddle; 1-X with 2-3 branches, 2-X with 2-3 long branches, 3-X single, long; ventral brush 4-X with 9 long hairs arising from barred area, and in addition to these hairs there are two smaller single hairs arising outside barred area toward base of the segment, those on barred area with 2-3 long branches; siphon dark-brown, gently tapering from basal one-fifth to tip, not swollen at middle, about 4 times as long as its basal diameter; no acus; pecten of 20 long teeth, each with two short lateral denticles near base; hair tuft 1-IX with 3 pectinate branches at about middle.

TYPE SPECIMENS. Holotype, male, with larval and pupal skins (61677.14), depressions on fallen trees, between Hsinkcêukou and Alishan, Wufeng, Chiai County, Taiwan, April 9, 1961, J. C. Lien and C. L. Chung; allotype, female, with larval and pupal skins (61677.16), same data as holotype. All specimens are in the collection of Taiwan Provincial Malaria Research Institute, Nankang, Taipei County, Taiwan, Republic of China.

DISTRIBUTION. Known only from type locality.

BIOLOGY. The larva breeds in shaded depressions on fallen trees together with Toxorhynchites manicatus and also in a tree-hole together with Aedes crosi. The larva, when living, dark-colored, resembling Orthopodomyia in the characteristic attachment of head to thorax at almost a right angle. The habits of adults are unknown.

SYSTEMATICS. This species falls into subgroup VII (auroniens) of Group F (alboannulatus-group : Danielsia) according to grouping by Knight and Marks (1952). It is very closely related to Aedes auronitens Edwards in having orange-colored scales on sternum of abdomen in adults, but differs from it chiefly in having a pale basal marking on first segment of mid-tarsi. In auronitens there are pale basal markings on first three segments of mid-tarsi.

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References


台湾産蚊族の新種（双翅目：蚊科）第一報 Aedes属の二新種

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摘 要

本報は、台湾産蚊族の新種の内、Aedes 属の Finlaya 亜属に属する二新種の記載を試みて記載した ものである。これらの蚊は中部台湾の2,400mの高所の樹洞より幼虫として発見された。其中の一新種は Aedes suffusus 及び Aedes oreophilus に近似し、Aedes (Finlaya) crossi, n. sp. と命名された。他の一新種は Aedes auronisens に近似し、Aedes (Finlaya) hurlbuti, n. sp. と命名された。近似種とは次の点相違点がある。

Aedes crossi の翅有成虫は頭頂に明確な暗色帯があり、中胸背の黄色と褐色の鱗片は明確な縦状帯を形成する。Aedes suffusus では頭頂に明確な暗色帯がなく、中胸背の黄色と褐色の鱗片は縦状帯を形成しない。成熟幼虫では呼吸管筋の数が多く26-27 (suffusus では16-21) で、呼吸管の基端部 (suffusus では基部 1) に存在し、呼吸管毛は直中と直脛で存在する (suffusus では基部1の所) に存在する。

Aedes hurlbuti は中脛第一膜節基部に白帯を有するのみであるが Aedes auronisens は中脛第一から第三膜節まで各節基部に白帯を有する。
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**Fig. 1**  
Fig. 2  *Aedes crossi*: A-F, larva; A, head; B, mentum; C, tip of antenna; D, terminal segments; E, comb teeth; F, pecten teeth; G & H, pupa; G, cephalothorax; H, metanotum & abdomen.
Fig. 3  *Aedes haributi*: A-F, larva; A, head; B, mentum; C, tip of antenna; D, terminal segments; E, comb teeth; F, pecten teeth; G & H, pupa; G, cephalothorax; H, metanotum & abdomen.