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Studies of Queensland Mosquitoes
Part V—Some species of *Aedes* (subgenus *Finlaya*)

BY

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THE UNIVERSITY OF QUEENSLAND PRESS
BRISBANE
19th SEPTEMBER, 1955
PREFACE

In 1943 the Government of Queensland established a National Mosquito Control Committee consisting of the following:

- Director-General of Health (Dr. Abraham Fryberg), Chairman;
- Director-General of Education (Mr. H. G. Watkin);
- Professor of Botany (Professor D. A. Herbert);
- Chief Lecturer in Entomology (Mr. F. A. Perkins);
- Representative (Technical) of the Local Authorities (Dr. I. M. Mackerras).

One of the functions of the Committee is to institute a research programme dealing with all aspects of the mosquito problem in Queensland.

This paper by Miss Marks is one of a series dealing with the systematics and biology of Queensland mosquitoes.

The action of the Government of Queensland in making available the necessary funds to enable this work to be carried out is greatly appreciated.

F. A. PERKINS, Secretary,
National Mosquito Control Committee.
Studies of Queensland Mosquitoes

Part V—Some species of Aedes (subgenus Finlaya)

By ELIZABETH N. MARKS

A new species from Torres Strait, Aedes iwii, is described from females; the male, larva and pupa of Aedes mallochi Taylor and the larva and pupa of Aedes quingulineolatus Edwards are described and figured, and the male of Aedes australisensis (Theobald) described for the first time. Notes are given on the habits and distribution of these species and of Aedes purpureus (Theobald), Aedes biocellatus (Taylor), Aedes monocellatus Marks, Aedes subauriculorum Marks, Aedes palmarum Edwards, Aedes candidoscutellum Marks and Aedes wasselli Marks.

In this paper the nomenclature used in descriptions of larvae is that of Belkin (1950) and in descriptions of pupae that of Belkin (1952) as amended by Belkin (1953, 1954). Abbreviations have been used for adult characters as follows:—apn—anterior pronotum, ppn—posterior pronotum, stp—sternopleuron, msp—mesepimeron.

Aedes (Finlaya) iwii sp. n.

Distinctive Characters: The combination of dark scaled wings, anterior half of scutum white scaled, femora dark apically, and first tarsal segment of all legs with broad basal and apical white bands will distinguish A. iwii from all other known Australasian species of Finlaya.

Holotype female.—Wing length, 2.7 mm. Head: Integument black, clothed with narrow curved black scales on either side of a median stripe of narrow curved silvery scales; the latter also form a border to the eyes; broad flat silvery scales laterally with a couple of dark scales among them; numerous black upright forked scales. A pair (one missing) of long black vertical setae and a row of five strong medially directed ocular setae with finer setae laterally. Torus dark brown, with small dark setae medially; flagellar segments of antenna black with sparse black verticillate hairs and silvery clothing hairs, first flagellar segment with a few dark scales. Clypeus dark brown. Palps and proboscis black scaled, palps 0.25 length of proboscis which is a little longer than fore femur. Labella dark.

Thorax: Integument dark brown to pitchy, scutal scales narrow curved. Anterior half of scutum densely clothed with silvery white scales, the posterior margin of this area rounded, curving back from the scutal angle, with a small extension in the midline. Posterior half of scutum clothed with bronzy black scales with patches of silvery scales above each wing root and in front of the prescutellar bare area; two short lines of silvery scales on each side of this area posteriorly. Three pairs of fine dark acrostichal bristles; no dorso-central bristles on the silver scaled area but a row of 4 posterior to it; 7 strong prescutellar bristles and strong black bristles also round margins of scutum and above wing root. Scutellum with narrow curved silvery white scales on all lobes; 4 long brown bristles to mid lobe and 4–5 to lateral lobes in addition to shorter bristles. Metapostnotum dark brown.

Pleuron: Large patches of broad silvery white scales on apn, propleuron, paratergite, preala below knob, upper stp, lower posterior margin of stp and on upper two-thirds of msp; a couple of broad lanceolate white scales on ppn immediately in front of the bristles; on one side a couple of broad white scales on postspiracular area. Bristles brown; apn with about 5 strong bristles above, some finer below; 7–8 propleural, 4–5 ppn, 3 postspiracular, 3 upper stp, 1–2 long and several shorter on posterior margin of stp; 9 prealar; 9 upper and no lower msp bristles.

Legs: Purplish black scaled with extensive pale markings. Coxae with large patches of broad silvery scales and a few dark scales below. Trochanters with dark and pale scales. Fore femur with a narrow white basal band extending anteroventrally as a streak for half its length and with an elongate white patch at mid length posteriorly. Fore tibia with a patch of pale scales ventrally at base and a ventral white streak on
apical half widening to form a complete band about 1/4 length of tibia; this band is separated from apex of tibia laterally and ventrally by a narrow band of dark scales. Fore tarsal segments with basal 1/4 and apical 1/4 of I, and basal 1/8 of II white; III-V all dark. Mid femur with white basal band and, at mid-length, an elongate white patch anteriorly and 2 or 3 white scales posteriorly; tibia with white basal band 1/16 its length; tarsal segments with basal 1/8 of I and basal 1/8 of II and basal 1/16-1/8 of III white, IV and V all dark. Hind femur with basal half white; tibia with white basal band 1/16 its length; tarsal segments with basal 1/8 and apical 1/8 of I and basal 1/8 of II and III white, IV and V all dark. Claws equal, those of fore and mid legs toothed, hind simple.

Wings: Black scaled; outstanding scales very long and narrow. Cell R₂ 1.4 × length of its stem; cell M₁ equal in length to its stem, its base proximal to that of cell R₄; r-m twice its own length distal to base of M₄+i. Halteres with pale stem; knob dark, clothed with black scales.

Abdomen: Dark scaling purplish black. Tergite I with a medial patch of silvery scales, silver scaled lateral border, and numerous brown bristles. Fine brown bristles along apical and lateral margins of tergites and scattered over sternites. Tergites II-VI dark scaled with basal medial silvery patches, small on II, III, VI and VII, about 1/4 length of segments IV and V; II-VII with large basal lateral silvery patches which on VII are almost the length of the segment and curve slightly away from the lateral margin. Sternites dark scaled with narrow basal silvery bands widening into lateral patches; no outstanding scales on sternites; sternite VIII large, exserted, brown, clothed with fine pale hairs; cerci very short, dark.

Described from a perfect specimen except that right fore tarsal segments III-V were missing. Subsequent to description the scutellar bristles, one halteres and median silvery scales on tergite I were accidentally destroyed.

Two paratype females show the following differences from the holotype: Wing length, 3.0–3.1 mm. Head with a distinct small patch of black scales laterally; in one specimen the median pale scaling forms a broad triangle and most of the upright forked scales are light brown. Scutellum with 8 long bristles to mid lobe and 8 to lateral lobes. Silver scales may be absent on pp, present or absent on subspiracular and postspiracular areas; 7–9 propleural, 3–5 pp, 3–5 postspiracular, 3–4 upper sp, 9–10 prolar and 10–11 upper mesp bristles. Trochanters may be dark scaled. Some white bands on the legs differ in width, viz.: apical, 1/4–1/8 fore tibia, basal 1/4–1/8 and apical 1/4–1/8 fore tarsal segment I; basal 1/4 mid tarsal segments I and II, 1/8 III; basal 1/4 hind tarsal segment I; fore tarsal segment III may have a couple of pale scales basally. Wings may have a few pale scales at extreme base of C and R₁, cell R₁ 1.5–1.7 × length of its stem. Basal medial patches on tergites may extend almost to the lateral patches; tergite VII may have a large medial basal patch. Sternites may have silvery medial and lateral basal patches; VIII light yellowish brown.


The specific name iwi is the word for mosquito in the language of Badu and other western islands of Torres Strait.

Habits: This species was taken biting at night near a small freshwater stream amongst open, mainly eucalypt, forest, not far distant from a hillside clothed with rather dry rainforest.

Discussion: A. iwi belongs to Group B (terrens-group) of subgenus Finlaya but differs from the general characters cited for the group by Knight & Marks (1952) in the absence of pale scaling at the apex of the mid and hind femora. No species of this group has been recorded from the Australian mainland but two are known from New Guinea, A. tsiitensis King & Hoogstraal and A. plumiferus King & Hoogstraal. A. iwi does not appear closely related to plumiferus which has broad scales on the vertex, and large tufts of outstanding scales on the sternites. It resembles tsiitensis in the narrow-scaled vertex and lack of scale tufts on the sternites, but differs in the markings of femora, tibiae and tarsi; in tsiitensis the silvery scutal scaling extends on to the upper half of pp. In Group B the two sexes of a species may show considerable differences in head and scutal scaling, so that a close comparison
cannot be drawn between *tusi* known only from females, and *tsiliensis* known only from males. The leg markings of *tusi* are, however, quite distinctive, but while it does not appear very closely related to any of the other species, its correct position and affinities within Group B must await the discovery of the male and larva.

*Aedes* (Finlaya) *mallochi* Taylor, 1944


Taylor described *A. mallochi* from a series of females from Eidsvold, Queensland, collected by Dr. T. L. Bancroft. He did not state the number in the series nor designate a type specimen, nor apparently did he mark the specimens. In 1940 I examined in the School of Public Health and Tropical Medicine, Sydney, a series of seven females of *A. mallochi*, still under the label "*Aedes* (Finlaya) *pulcherrimus*", collected at Eidsvold by Dr. Bancroft and variously dated 20.iv.24, 21.iv.24, 27.iv.24, May 1924, and 5.ix.26. It is probable that this was the series described by Taylor, but there is no proof of it. I re-examined this series in 1949, and marked one specimen which in Knight & Marks (1952) is designated the neotype. Up to 1944, this species was commonly referred to as "*A. pulcherrimus*", due to an erroneous association of the females with the unique type male of *Mimeteomyia pulcherrima* from Cairns, which Taylor (1944) showed was actually a specimen of *A. aegypti* (Linn.), the name therefore falling into the synonymy of the latter species.

The male, larva and pupa of *A. mallochi* are now described for the first time, and some notes given on the females to cover certain characters not mentioned in the original description.

**Distinctive Characters**: A black and white species with lyre shaped scutal pattern, white lines on femora and tibiae, and banded tarsi, *A. mallochi* is most likely to be confused with *A. notoscriptus* (Skuse), but is readily distinguished by its unbanded proboscis. The oval scales of the white scutal lines, the scutellum bare, except for a continuous line of white scales on its posterior border, and the linear pleural pattern are also characteristic of *mallochi*.

**Larva**: Head setae 5 and 6 single, 15 very long, 2-3 branched, clypeal spines hair-like; lateral comb a single row of 8-14 long dark spines, laterally fringed on basal 2/3.

**Pupa**: Seta 7 on abdominal segments II-VI well developed, strong and spine-like.

**Male**: Wing length, 2.4-3.1 mm. **Head**: Integument black, clothed with flat black scales, with a median band of broad and narrow curved white scales extending to, or less than halfway to, vertex; the white scales may also extend laterally round nape; a line of flat oval white scales extends medially between the eyes, and along the ocular border, curving back laterally; below this are two small patches of white scales on the ocular border; upright forked scales numerous, black; 2 long black vertical setae and a row of 4-5 strong medially directed ocular setae, as well as finer ones laterally. Torus large, black, with a dorsal patch of oval white scales; flagellar segments of antenna brown with long dark verticillate hairs lying in a vertical plane, the two apical segments dark with short dark clothing hairs; first flagellar segment with a patch of oval white scales medially. Clypeus dark brown, unscalled. Palps slightly longer than proboscis, black scaled, with dorsal white basal patches covering ½-⅔ segment II, ⅔-¾ III, ¾-IV, and almost or quite to apex of V, segments IV and V downturned; 5-8 long black bristles at apex of III, 15-25 long bristles along IV and numerous shorter bristles on V. Proboscis about 1.2 times length of fore femur, black scaled, sometimes with 1 or 2 white scales laterally at base; labelia dark.

**Thorax**: Integument dark brown to black. Scutum with bronzey black narrow curved scales and a linear pattern of single rows of flat oval white scales, as follows: median longitudinal line extending back over half prescutellar bare area, and sometimes almost to scutellum; a few white scales behind it, on either side of the prescutellar bare area, occasionally connected to the median line; lateral lines forming a lyre-shaped pattern, almost meeting the median line on the anterior border then extending along the anterolateral margin and curving above the scutal angle to continue as a submedian line back to the scutellum; there is a line of larger broad flat white scales above the wingroot; bristles numerous, long, black, 10-16 acrostichal, 7-12 dorsocentral and 4-8 prescutellar, others along the lateral margin and above the wingroot and 3-4 on the
fossa. Scutellum bare except for a continuous line of broad white scales along its posterior margin; 3-6 long black bristles to mid lobe and 3-4 to lateral lobes, with only 1 or 2 additional shorter bristles.

Pleuron with a pattern of almost continuous lines of white scales which are small oval on apn, ppn and in part on subspiracular area, the remainder large, broad and flat. A line, continuous with the upper or middle lateral white marking on head, runs across apn, ppn just below the bristles, paratergite, and continues as the line above the wingroot. A second line runs from the propleuron (where it almost meets its fellow in front) diagonally along the subspiracular area, with patches on the postspiracular area and on prealar below the knob. A third line runs almost parallel to the first, from propleuron, across sip and upper msp (on which it is divided into an anterior patch, and a posterior just in front of upper msp bristles). An almost vertical line runs along lower posterior margin of sip and continues in a line down mid coxa. There are also often 2 or 3 white scales on apn just above propleuron, and on prealar knob. Bristles black, except on msp; 2-5 long on apn as well as shorter bristles; 2-3 ppn; 5-11 prepleural; 2-6 postspiracular; 1-3 upper sip, with 2-4 long and 3-4 short along posterior margin of sip; 6-9 prealar; 5-8 upper and no lower msp bristles.

Legs: Coxae with vertical lines of white scales, trochanters with white and black scales, remainder of leg black scaled with conspicuous white lines and bands. Fore leg: femur with anterior white line from the base, ending just before white knee spot, a postero-ventral white line from base to apex, and some pale-reflecting scales dorsally; tibia with white dorsal or anterodorsal line almost to apex and sometimes with some pale-reflecting scales ventrally; tarsal segments I and II with dorsal white patches covering 1/2 I, 1/4 II; III-V all dark. Mid leg: femur with anterior white line from base, ending just before white knee spot; posteriorly with two parallel white lines, the upper line always complete, ending before apex, the lower line indicated by a few white scales near base, or extending over basal half, or the two lines distinct on apical half and blending into more extensive pale scaling on basal half; tibia with anterodorsal white line from base to, or almost to, apex, posteriorly all dark or with a few pale reflecting scales or an indistinct line on basal 1/2; tarsal segments I and II with dorsal white patches 1/2 I, 1/8 II, III-V all dark or sometimes 1 or 2 white scales at base of III. Hind leg: femur with anterior white line almost to knee spot and posterior white line on apical half, blending into more extensive pale scaling towards base; tibia with anterior white line ending some distance before apex and usually a similar but less distinct posterior line; tarsal segments I-IV with basal white bands (the band on I partly or completely interrupted by dark scales ventrally), 1/2 I, 1/8 II and III, 1/6 IV, V almost entirely white but always with a patch of dark scales at tip. Claws of fore and mid legs unequal, the anterior larger, with two teeth, the posterior with one tooth; hind claws equal, simple.

Wings: Black scaled with a line of white scales on basal 1/2 of C and sometimes 1-11 white scales on the apical half of Rs, rarely 1 or 2 on Sc near its tip. Outstanding wing scales long and narrow. Cell Rs 1.2-1.9 X length of its stem; cell M1 0.7-1.1 X length of its stem, its base slightly or distinctly proximal to that of cell Rs; r = 1.5-2.0 times its own length distal to base of M++. Halteres brown with black scaled knob, sometimes with some pale scales on upper surface.

Abdomen: Tergite I with a medial patch of white scales, sometimes with some dark scales at apex, patch, and with a line of white scales along the lateral lorder. Tergites II-VI black scaled with small lateral basal white patches extending as a lateral line on VII, and usually also on II and VI, small medial basal white patches on III-V or II-VII, sometimes almost complete bands on III-V; sternites black scaled with brown medial and narrow sublateral longitudinal white lines from base almost to apical border; tergite and sternite VIII dark medially, white scaled laterally. Fine brown setae on lateral and apical margins of tergites and scattered over the sternites.

Male Terminalia (Fig. 1a): Coxite densely clothed with black and white scales, cylindrical, about 5-6 times as long as broad at base, with a membranous area along its inner aspect which in the specimens examined (cleared in potash) is retracted within the coxite, forming an inner fold. The basal lobe is scarcely differentiated and bears a row of 3-4 long and 1-2 shorter setae, distal to which there are numerous setae in several rows along the whole length of the inner tergal aspect of the coxite, the innermost the shortest except where there is a row of 4-6 longer and stouter setae (their bases within the inner fold). Along the subtergal margin of the membranous area, on the distal 1/4 of coxite is a row of about 20-30 long and very slender setae with flattened lanceolate tips which appear striated under high magnification (their bases also within the inner fold); sternal to these are numerous very long, strong, medially directed setae, with shorter setae proximally; there are also some long setae laterally, and at apex of coxite. Style about.
1/4 length of coxite, slightly curved and tapering, very finely pilose along its inner side, and sometimes with a fairly long seta on its basal half, terminal appendage almost 1/4 length of style, slender, with grooved or bifurcated tip. Harpago about 1/4 length of coxite, slender and curving, with 3–5 fine setae near base and with two strong setae tergally on its apical half, near the lower of which is a fine seta sternoally; appendage about 1/4 length of harpago, with broad rounded membranous expansion on basal 1/4, apical 1/4 very slender, tapering to a pointed tip. Paraproct with 1–2 teeth. Phallosome simple, broadest at midlength, tapering at apex, which is fairly strongly sclerotised. Lobes of IXth tergite only slightly developed, widely separated and joined by a slender straight sclerotisation, 1–3 setae to each lobe; IXth sternite with 4–6 setae.

Fig. 1—*Aedes mallochi* Taylor. a, male terminalia, × 133 (right coxite detached and shown viewed from its inner aspect to illustrate the basal lobe and setae flanking the inner membranous area). b, lateral view of head and thorax of female, showing pattern of white scales (margins of the sclerites dotted).

**Female** (Fig. 1b): Differs from the male as follows:—Wing length, 2.5–3.5 mm. In unshrunk specimens the dorsal patch of white scales on torus forms a line with the patch on first flagellar segment; flagellar segments of antenna black with sparse black verticillate hairs and short silvery clothing hairs. Clypeus usually with elongate patches of white scales on either side. Palps 1/4 length of proboscis, black scaled with white scaled tip and a large dorsal patch of white scales at mid length. Scutal bristles more numerous than in male, about 18 acrostichal, 10–14 dorsocentral, 5–8 prescutellar and 7–10 on fossae; scutellum with 4–8 bristles to mid lobe and 3–5 to lateral lobes in addition to shorter bristles; 4–7 postspiracular bristles. Fore femur may have extensive white scaling dorsally and posteriorly. Line of white scales on basal 1/4–1/4 C; cell M1 0.8–1.3 × length of its stem. Abdominal tergites II–VII all dark medi ally, or with small basal medial white patches on II–VI; medial scales on I may be mainly dark; lateral basal patches show dorsally, and extend in a line along lateral margin to apex of tergites; the sublateral lines of sternites curve out from basal lateral patches; sternite VIII light brown, hairy; cerci very short, dark.

**Larva** (Fig. 2a–d): Length, 7.0–8.5 mm. Head brown, thorax reddish brown anteriorly, siphon, saddle and lateral comb spines dark brown or black; the general body colour is usually white; but a specimen from Kangaroo Valley was dark.
Fig. 2—_Aedes mallochi_ Taylor.  

- a-d, larva;  
- a, head;  
- b, terminal segments;  
- c, lateral comb tooth;  
- d, pecten tooth;  
- e, cephalothorax of pupa.  

- a, b, x 60;  
- c, d, x 350;  
- e, x 40.
Head almost as long as broad. Antenna about 1/4 length of head, about 8 times as long as broad at base, slightly tapering, or sometimes broadest at mid length, non-spiculate; seta I arising at about mid length, single, rarely bifid, simple or inconspicuously frayed; terminal and subterminal setae arising close together, 2 long and slender, 3 and 4 shorter, slender, 6 short, stout. Head setae: 1 (clypeal spine) long, hair-like, with fine curving tip. Base of seta 7 (A) level with base of antenna; 6 (B) slightly anterior to 7 and halfway between it and midline, 4 (D) in line with, and medial to 6, 5 (C) well behind, and slightly lateral to 6. Seta 4 with 30-40 fine branches, about half length of antenna; 5 and 6 single, simple, 6 about equal in length to antenna, 5 longer and sometimes bifurcating near tip; 7, 10-21 branched, finely plumose; 8 (e), 9 (b) and 10, fine, simple, 8 and 9 2-4 branched, 10 1–4 branched; 11, 6-14 branched, finely plumose; 12 and 13 fine, 12 single, plumose, 13 2-4 branched, simple; 14, 2-5 branched, strong, finely plumose; 15, 2-3 branched, very long, strong and finely plumose (equal to or longer than antenna); basal maxillary seta 1-6 branched, short, strong; Mentum triangular with medial tooth and 8–10 fairly even lateral teeth.

Thorax: Base of mesopleural setae with a long tapering spine (about 1/4 times length of setal base) and 2 or 3 shorter spines; base of metapleural setae with several short spines.

Abdomen: Seta 6 on segments I–VI and 7 on I long, finely plumose. On segment I, 6 2-4 branched, 7 single, rarely bifid; 6 on II with 2-4, III 2-3, IV and V, 2, and VI 2–3 branches.

VIIIth segment: Lateral comb a single close-set row of 8-14 long, slender, dark spines, each fringed laterally on its basal 1/2-1/3; setae 1, 3 and 5 long, finely plumose; 1, 2-6 branched; 3, 3-4 branched; 5, 3-7 branched; 2 and 4 single, simple or 2 sometimes inconspicuously frayed.

Siphon: Cylindrical on basal half, swelling slightly at mid length, tapering on apical half; index 2.2-2.3. Pecten extending over basal 1/2-1/3 of siphon, made up of 17-23 close set spines, each rather broad, sharply pointed, with 1–2 small strong and 2–4 fine denticles close to base, the basal pecten spines small. Seta 1 arising at 1/2-1/3 length of siphon, with 3–5 plumose and often rather flattened branches about half length of siphon. Acus represented by variable amount of sclerotisation, seldom distinctly developed.

Anal segment: Saddle covering dorsal 1/2-1/3 of segment without apical spines (some fine spicules present); seta 1 single, stout, finely plumose, about 2 x length of saddle; 2 and 3 simple, 2 2-4 branched, 5 x length of saddle, 3 single, longer. Seta 4 (ventral brush) of 10–11 simple bifid tufts (rarely single or trifid) arising from a partially developed grid except the proximal 2–3 which are precartilaginous. Anal papillae equal, with rounded tips, 1-3 x saddle.

Description based on 8 larval pelts correlated with adults, 7 from Coolatai and 1 from Kangaroo Valley, and on 4 whole larvae and 1 pelt from Cox R., with additional measurements from preserved larvae from Coolatai.

Pupa (Fig. 2r, 3a): In addition to those setae so described, some of the remaining setae may be frayed. Comparative lengths of the setae are indicated in the figures. Cephalothorax: Trumpet evenly pigmented, fairly broad at base (about 21/4-3 times as long as greatest width), with oblique opening; ratio of mentus to whole 1 : 1.3-1.6; apical notch shallow. Seta 1 1-2 branched; seta 2 1-4 branched (in one specimen seta 2 is apparently duplicated); seta 3 1-3 branched; seta 4 1-2 branched, 5 1-3 branched, 7 2–3 branched; seta 6 very short, single; seta 8 1-3 branched, seta 9 single. Metanotum: Seta 10 2–4 branched, 11 longer, single, 12 1-4 branched. All except seta 6 frayed.

Abdomen: Segment I. Seta 1 strongly developed, dendritic with 10-17 primary branches, each subdividing into 2-4 plumose branches; seta 2 single; seta 3 single, rarely bifid, sometimes plumose; seta 4 1-4 branched; seta 5 3-6 branched; seta 6 single; seta 7 very short, single; seta 10 1–3 branched. Segment II. Seta 1 3-7 branched, frayed; seta 2 single; seta 3 1-2 branched, finely frayed; seta 4 2-5 branched; seta 5 1-3 branched; seta 6 1-2 branched; seta 7 single, strong; seta 8 single; seta 10 1-2 branched. Segment III. Seta 1 3-5 branched, frayed; seta 2 single; seta 3 1-2 branched, frayed; seta 4 2-4 branched; seta 5 1-4 branched; seta 6 1-2 branched; seta 7 single, strong, almost spine-like; seta 8 1-3 branched; seta 10 2-5 branched; seta 11 single; seta 12 1-2 branched. Segment IV. Seta 1 2-4 branched, frayed; seta 2 single; seta 3 2-4 branched; seta 4 1-2 branched; seta 5 1–3 branched, frayed; seta 6 single; seta 7 single, strong; seta 8 1-2 branched; seta 10 1-3 branched; seta 11 single; seta 12 1-2 branched. Segment V. Seta 1 2-4 branched, frayed; seta 2 single; seta 3 1-2 branched; seta 4 2-5 branched; seta 5 1-3 branched, plumose; seta 6 1-2 branched; seta 7 single, strong; seta 8 1-2 branched; seta 10 2–5 branched;
Fig. 3—*a*, *Aedes mallochi* Taylor, metanotum and abdomen of pupa (dorsal setae on left, ventral on right). *b* and *c*, *Aedes quinquelineatus* Edwards; *b* cephalothorax; *c*, metanotum and abdomen of pupa.

*a*-c, x 40.
seta 11 single; seta 12 1–2 branched. Segment VI. Seta 1 2–4 branched; seta 2 single; seta 3 and 4 1–2 branched; seta 5 1–3 branched, sparsely plumose; seta 6 single; seta 7 1–2 branched, strong, may be frayed; seta 8 1–3 branched; setae 9, 11 and 12 single (in one specimen there is an extra single seta near 11 on one side). Segment VII. Setae 1 and 2 single; seta 3 1–3 branched; seta 4 single; seta 5 1–5 branched; seta 6 1–2 branched; seta 7 with 3–7 strong, plumose branches; seta 8 1–2 branched; setae 9, 11 and 12 single (an extra single seta near 11 on one side in same specimen that has extra seta on Segment VI). Segment VIII. Seta 5 single; seta 7 with 4–9 strong plumose branches, about 1/4 length of paddles. Paddles broadly pear shaped; breadth index 1.2–1.5; midrib moderately and buttress slightly developed; a double row of fine denticles round apex; seta 7 single.

The dorsal sensillum lies fairly close to the base of seta 4, and never distinctly lateral to setae 4 and 5; on segment III it lies directly posterior to 4, or between the bases of 4 and 5 (in one specimen it lay between 4 and 5 on one side, and reversed positions with 5 on the other); on segments IV and V it usually lies between the bases of 4 and 5, but on V may lie medial to and in a horizontal line with 4, or anterior to 4, or may be obvious at all.

Description based on 11 pellets correlated with adults, 10 from Coolatai and one from Kangaroo Valley.

Biology: At Coolatai, A. mallochi was found by Miss Walker breeding in a rot hole in the side of a kurrajong tree (Brachychiton diversifolia) in the garden of a station homestead. The hole opened at ground level, and at one collection contained about 1 gallon of water. The water was very thick, mahogany coloured, and almost syrupy and contained dense organic matter—rotting wood (but no leaves) and numerous beetle remains. Associated, and in much greater numbers, were larvae of Tripteroides punctolateralis (Theobald). The garden with numerous trees and shrubs would provide moister and more sheltered conditions than the vegetation in the surrounding area which is savannah, the dominant trees being eucalypts. A second tree hole (from which both A. mallochi and T. punctolateralis were reared) was subsequently found in a large kurrajong in the savannah, well removed from any denser vegetation and about 2 miles from the nearest permanent stream. In the tree trunk, a lateral opening about 1 in. in diameter and 6 in. above the ground led to a cavity 18 in. across. The cavity apparently contained a large amount of moist debris and, when full, only about 1/4 pint of water could be drawn off, but it was impossible to probe it thoroughly through the small opening.

Dr. McMillan supplied the following notes on Cox River specimens: “I originally found five larvae during December, 1952, in a cavity in a river oak [Casuarina cunninghamiana]. The water was black but not foul and the cavity was about four feet above the ground. I believe this cavity would not normally be filled with rain but by the river when it floods, as it does several times yearly. The fact that this cavity contained river gravel strengthened this impression. In May, 1954, I revisited this area and found the original cavity to be dry. From debris and scrapings 14 similar larvae were bred. The culture soon became black although there was not a great deal of apparent organic matter and once again the water was not foul. Nine specimens were bred through and resulted in 5 males, 4 females. The immediate area was not very heavily timbered except for oaks growing along the river bank.”

Mr. Dyce provided the following notes: “The specimen bred out from Kangaroo Valley was from a larva in association with five other species taken from a tree hole at ground level inside a rotted-out river oak. The tree was growing from within the river channel and the water was dark reddish-brown with a heavy residue of frass from Longicorn beetle larvae. The brown suspension did not settle out and in order to pipette the larvae off I had to dilute it with clean water. A. bicellularis larvae were predominant with A. nosoescritus running a close second and a mixture of Tripteroides spp. (probably T. atripes (Scuse) and T. tasmaniensis (Strickland)) were present as a combination in equal numbers to A. nosoescritus. There was a single larva of both A. quasirubitborax (Theobald) and A. mallochi. The latter was a medium sized dark and very active larva, which tended to shun light.”
"On 10.xii.54, I filled with water a cavity in a river at Merricumbene on the Moruya River. A sample taken from the hole on 6.i.55 contained a dense population of mosquito larvae. *A. mallochi* predominated with *A. notoscriptus* and *A. quasirubithorax* in lesser numbers. The *mallochi* larvae are this time whitish, very elongate, languid, and quite different in general macroscopic appearance from the single specimen from Kangaroo Valley. Whereas the latter breeding place was open to general light, the one at Merricumbene has only a three inch opening into the central pipe of the tree. The water at Kangaroo Valley had more flocculated suspension than the Merricumbene sample, but the latter was extremely dark in colour requiring many dilutions to render larvae obvious, and the site contained considerable proportions of rotting Longicorn frass. The river oak dominated flats of rubble bottomed streams, such as the Merricumbene environment, are described as 'Casuarina cunninghamiana consociation'."

The choice of breeding places with small openings near ground level, which may collect large amounts of water, and from which evaporation might be expected to be minimal, probably explains why *mallochi* is sometimes found in numbers in dry inland areas.

The larvae are difficult to observe in the thick liquid in which they apparently usually occur. A sample from the Coolatai tree hole collected on 7.v.47 was thoroughly and minutely examined on 12.v.47 when numerous *T. punctolateralis* and 3 4th instar *A. mallochi* larvae were found; the sample was similarly examined about 16.vi.47 and an additional 4th instar *mallochi* larva discovered. A second sample from the same hole was received about 16.vi.47 in which one 4th instar *mallochi* larva was found. These specimens were removed and the samples pooled, and when re-examined on 15.viii.47 one 4th instar and one 2nd or 3rd instar *mallochi* were present. Also on 16.vi.47 a sample of moist debris from this tree hole was received, and water added to it. It was kept in a jar in the laboratory and examined minutely on 20.vi.47, 18.vii.47 and 15.viii.47, when no larvae were observed. When next examined on 2.x.47 one 4th instar *mallochi* larva was found. In a collection from this tree hole on 4.xi.48, *T. punctolateralis* larvae were again very numerous, and about a dozen *mallochi* larvae and some pupae were present.

The pupal period occupies 3-5 days in the summer and 7-10 days in the cooler months.

**Habits.** In the Coolatai garden adults of *mallochi* were first observed in January, 1946, though their breeding place was not discovered at this time. Females were taken biting just before and at dusk (1800-1830 hrs.), but none were taken in the same place after dark (about 2100 hrs.); an engorged female was collected in a bed net in the garden at 0700 hrs. On one morning, at about 0730 hrs., half a dozen males were seen dancing against the corner of the house, about 2 ft. above a covered concrete grease trap; one was captured and the others quickly disappeared; these were the only males seen. Two days later about 0800 hrs., 5 females were taken biting or resting near the same site. At Longreach, a female was taken in a light trap near calves in a pen, between 1800 and 2020 hrs.

The females are fairly shy biters; the bite is painless though it leaves a slight sting for a few minutes when the stylets are withdrawn.

**Distribution.** Specimens have been examined from the following localities. QUEENSLAND: Eidsvold (in addition to the neotype and associated series in School of Public Health, and Tropical Medicine, Sydney, there are 3 females in Queensland Museum Collection, one labelled "Eidsvold, Q., 27.iv.24, Bancroft", one labelled "New Scutomyia, 25.i.4", and one unlabelled, and one female in University of Queensland Collection labelled "Aedes pulcherrimus Taylor, l.vii.26" in Bancroft’s hand; all these are recognisable as Bancroft's specimens and presumably are topotypical); Splitters Creek, near Bundaberg, 1 female (3.x.1945, biting in dry scrub, 1700 hrs., J. L. Wassell); Longreach, 1 female (23.iv.1955, E. J. Reye). NEW SOUTH WALES: Coolatai, 30 m. N. of Wariwala, 24 females, 5 males (4.i.1946, 7.i.1946, 8.i.1946, females biting in garden, 5.1.1946, male taken in flight, E. N. Marks; 7.v.1947, K. A. Walker and 4.i.1948, E. N. Marks, larvae from hole in kurrajong tree); Cox River, 3 females, 5 males (5.v.1954, larvae from hole in river oak, B. McMillan); Kangaroo Valley, 1 female (20.vii.1954, larva from hole in river oak, A. L. Dyce).
Additional New South Wales records are Coolatai (25.1.1955, larvae from hole in kurrajong tree, E. N. Marks & K. A. Walker); Merricumbene (6.1.1955, larvae from hole in river oak, A. L. Dyce).

Lines (unpublished) records collections of *A. mallochi* by E. J. Waterhouse from dry inland areas of South Australia. Mr. G. W. Douglas informs me that this species has not yet been collected in Victoria.

Discussion: *A. mallochi* was placed in Group E, Subgroup II, notoscriptus, of subgenus *Finlaya* by Knight & Marks (1952). On male terminalia and larval characters the other included species, *A. notoscriptus, A. quinquelineatus* and *A. albilabris* Edwards are more closely allied to one another than to *mallochi* and probably represent a superspecies. The terminalia of *mallochi* show some resemblance to those of *notoscriptus* and *albilabris*; the elongate harpago and the presence of fine lanceolate-tipped setae on the inner sternal margin of the membranous area of the coxite are apparently characteristic of the subgroup, but both *notoscriptus* and *albilabris* lack the preapical row of strong setae on the tergal margin of the membranous area; the form of IXth tergite also differs in *mallochi*, the other two species having well developed lobes. The slender clypeal spines, strong development of head seta 16, and sinuclike lateral comb teeth are among the characters distinguishing the larva of *mallochi* from those of *notoscriptus, quinquelineatus* and *albilabris*. The strong development of seta 7 of *mallochi* pupal abdomen is distinct from the fine seta 7 in *notoscriptus* and *quinquelineatus*. *A. mallochi* is probably sufficiently distinct to warrant its being placed in a separate subgroup, but this is deferred while the male of *A. quinquelineatus* remains unknown.

*Aedes* (Finlaya) *quinquelineatus* Edwards, 1922

*Type* female in the British Museum (Natural History). I have examined this specimen which is labelled "Queensland, 1911, Dr. T. L. Bancroft". Edwards (1924) gives the locality as "Eidsvold?" and this may be correct, as Mrs. T. L. Bancroft has informed me that Dr. Bancroft lived at Eidsvold from 1910 to 1930.

No specimens other than the type have been recorded in the literature. The male of *quinquelineatus* is still unknown; the larva and pupa are described below.

*Female:* Wing length, 2.2-3.6 mm. A small species with banded proboscis (the band may be broad, or scarcely show dorsally), linear scutal pattern of narrow curved golden scales, and broad pale scales on scutellum. Pleuron with patches of flat pale scales on *apn*, over most of *ppn* (which also has some flat dark scales along its upper margin), on propleuron, upper and lower *stp*, paratergite, preala below knob, upper and lower *msp*, and occasionally on subpirapicular area. Anterior surface of fore and mid femora with longitudinal pale lines, sometimes rather broken on fore femur, hind femur pale anteriorly on basal 1/5 to 1/4, except for dorsal dark line, dark scaled ventrally towards apex so that pale scaling continues as an anterior streak; fore femur dark at apex anteriorly, mid and hind with pale knee spots. Tibiae dark anteriorly except mid, which may have a more or less definite line of pale scales. Fore and mid tarsal segments I-II and hind I-IV with basal white bands, extending on to apexes of preceding tarsal segments, hind tarsal segment V occasionally with a basal white patch. Abdominal tergites I-VII with white lateral patches; III-VI with rounded basal medial creamy patches, sometimes a few pale scales medially on I, II and VIII, or III dark medially. Sternites dark scaled with white lateral patches, or more extensively pale scaled.

This species is closely allied to *A. notoscriptus*, apparently a rather variable species, specimens of which taken in rainforest sometimes have a golden scutal pattern, and tarsal banding as in *quinquelineatus*, and might at first sight be confused with it.

In the scutal pattern of *quinquelineatus*, the principal lines are the median and the submedian; the latter are continuous back to the scutellum and anteriorly meet the lateral lines which run along the anterolateral margin to a short distance behind the scutal angle, where a discontinuous patch connects them to the submedian lines; behind this they can be traced back as indefinite sublateral lines to the scutellum. In *notoscriptus* the basic pattern is similar but the principal lines are the median and lateral; the latter, behind the scutal
angle, curve in to a submedian position and are continuous back to the scutellum; they are not connected to the sublateral lines above the wing root. On the anterior half, the submedian lines may be narrow or absent but even when as broad as the median and lateral, they seldom meet the lateral anteriorly and never connect posteriorly with the submedian continuation of the lateral line. *A. notoscriptus* also has a small anterior knee spot on the fore femur; dark scaling extending ventrally almost to base of hind femur, so that there is a distinct anterior longitudinal line; and an anterior white line on hind tibia.

Fig. 4—*Aedes quinquelineatus* Edwards, larva; *a*, head; *b*, terminal segments; *c*, lateral comb tooth; *d, e*, pecten teeth. *Aedes notoscriptus* (Skuse), lateral comb tooth for comparison with *c* (from larva from treehole, Brisbane Botanic Gardens). *a, b*, x 60; *c, d, e*, x 350.

Larva (Fig. 4): A rather small larva with lightish brown head, siphon and saddle, very like *A. notoscriptus* but may be distinguished in the field by its whitish body colour (grey or brown in *notoscriptus*). It apparently also has a less sinuous swimming action. The smaller number of comb and pecten teeth, and more pointed shape of comb teeth also distinguish it from *notoscriptus*.

Head about as broad as long. Antenna about 1/4 length of head, 10 times as long as broad, cylindrical, non-spiculate; seta 1 arising at 1/4 length, single, short, simple; terminal and sub-terminal setae arising close together, setae 3, 4 and 6 short, stout, subequal, seta 2 twice their length, stout and curved. Head setae: 1 a very stout, strongly curved spine (in Springbrook specimens 1/4 as broad as antenna). Base of seta 7 level with base of antenna, 6 anterior to 7 and more than half way between it and mid line, 4 close to and slightly posterior to 6, 5 directly behind 6 and slightly posterior to 7. Seta 4 short, with 2–4 fine branches; 5 and 6 single, 6 equal in length to antenna, simple, 5 longer, finely frayed; 7 3 branched, finely frayed; 8, 9 and 10 fine, simple, 8 single, 9 2–3 branched, 10 single or bifid; 11–13 fairly fine, simple, 11 3 branched, 12 single, 13 3–4 branched; 14 stronger, single or bifid, simple; 15 2–3 branched, fairly fine, simple (about half length of antenna). Mentum triangular with medial tooth and 9–10 even lateral teeth.
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Thorax: Base of mesopleural setae with a stout pointed spine (about equal in length to setal base) and several short spines; base of metapleural setae similar but the large spine is shorter. (In A. notoscriptus there is no distinctly longer spine on base of meso- and metapleural setae, but 3 or 4 subequal spines fused together almost to their tips.)

Abdomen: Seta 6 on segments I–VI and 7 on 1 long, finely frayed; on segment 1, 6 2–3 branched, 7 single; 6 on II with 2–4, on III and IV with 2–3, on V with 3 and on VI with 3–4 branches.

VIIIth segment: Lateral comb an uneven row of 10–11 unequal, slender, bluntly pointed, fringed scales; setae 1, 3 and 5 long, 1 and 5 inconspicuously frayed, 3 finely plumose; 1 3–5 branched; 3 4–5 branched; 5 1–7 branched; 2 and 4 single, simple.

Siphon: Slightly tapering, index 1.3–1.7. Pecten extending over basal 4/6–5/6 of siphon, made up of 8–11 well spaced spines, of which the basal 2 or 3 are very small; each spine tapers to a fine point at apex, and has a strong lateral denticle at about 1/3 from base with a fringe of about 8 very fine denticles proximal to it. Seta 1 arising just beyond pecten, 2–4 branched, finely frayed, about 1/3 length of siphon. Acus present.

Anal segment: Saddle covering dorsal 1/3 of segment with about 5 pointed spines on each side dorsally at apex and a few finer spines. Seta 1 5–8 branched, simple, equal in length to saddle; 2 and 3 long, simple, 4 4 branched, 3 single. Ventral brush (seta 4) of 13 3–5 branched tufts arising from a grid. Anal papillae unequal with rounded or bluntly pointed tips, the upper pair 1.2–2.2 X saddle, the lower 0.7–1.3 X saddle.

Pupa (Fig. 3b, c): In addition to those setae so described, some of the longer setae may be frayed. Comparative lengths of setae are indicated in the figures. Cephalothorax: Trumpet evenly pigmented, narrow at base (about 3–5 times as long as greatest width), with oblique opening; ratio of meatus to whole 1 : 1.4–1.6; apical notch shallow. Setae 1, 2 and 3 single (1 and 2 sometimes forked near tip); seta 4 1–2 branched; seta 5 2 branched; seta 6 1–2 branched, very small; seta 7 1–2 branched; seta 8 1–2 branched; seta 9 single. Metanotum: Seta 10 1–2 branched; setae 11 and 12 single.

Abdomen: Segment I. Seta 1 dendritic, with 12–14 primary branches each subdividing into 2–4 plumose branches; setae 2 and 3 single; setae 4 1–3 branched; setae 5 3 branched; setae 6, 7 and 10 single. Segment II. Seta 1 2–7 branched, frayed; seta 2 single; seta 3 single, frayed; seta 4 2–4 branched; seta 5 1–3 branched; seta 6 single; seta 7 very small, single; seta 10 single; a single seta, probably 11, may be present on one side, ventrally. Segment III. Seta 1 2–3 branched; seta 2 single; seta 3 1–2 branched; seta 4 1–4 branched; seta 6 1–2 branched; seta 7 very small, single; seta 8 1–2 branched; seta 10 2–3 branched; seta 11 single; seta 12 1–2 branched. Segment IV. Setae 1–2 branched; setae 2 single; setae 3 2–6 branched; setae 4 2–3 branched; setae 5 1–2 branched, frayed; seta 6 single; setae 7 very small, single; setae 8, 10 and 12 1–2 branched; setae 11 single. Segment V. Setae 1 1–2 branched; setae 2 single; setae 3 1–2 branched; setae 4 4–5 branched; setae 5 bifid at tip, stout, plumose; setae 6 1–3 branched; setae 7 very small, single; setae 8 2 branched; setae 10 3–4 branched; setae 11 and 12 single. Segment VI. Setae 1 and 3 1–2 branched; seta 2 single; setae 4 2–3 branched; setae 5 1–2 branched; setae 6 single; setae 7 very small, single; setae 8 2–3 branched; setae 10, 11 and 12 single. Segment VII. Setae 4 and 5 1–2 branched; setae 6 2 branched; setae 7 strongly developed, 3–6 branched; setae 8 and 10 1–2 branched; setae 11 and 12 single. Segment VIII. Seta 5 single; setae 7 with 6–8 strong plumose branches, about 1/3 length of paddles. Paddles oval; breadth index 1.25–1.3; midrib moderately and buttress slightly developed; a double row of fine denticles round apex; setae 7 2–3 branched.

The dorsal sensillum lies fairly close to the base of seta 4; on segment III it is medial, lateral, anterior or posterior to 4 and anterior or lateral to 5; on segment IV it is medial, lateral or posterior to 4, lateral and usually anterior to 5; on segment V it lies between but slightly lateral to 4 and 5.

Descriptions based on larval and pupal pelts correlated with one female from Kinnane's Creek and two females from Springbrook.

Biology: The Kinnane's Creek larva was collected from a small cavity in a buttress of a rainforest tree on a creek bank. The pupal period in November occupied between 24 and 3 days. Springbrook larvae were from a hole 2 in. in diameter and 6 in. deep, where a branch had broken from a small rainforest tree. The sample contained a deposit of soft, finely divided vegetable debris in which the larvae were frequently seen burrowing vertically until only the

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siphon and anal papillae remained visible. They might thus frequently escape collection where only water was drawn from a treehole. Whether this is a normal feeding habit, or was due to shortage of food in the water, is unknown. The pupal period in June occupied 7 days.

**Habits:** *A. quinquelineatus* readily bites man and is usually associated with rainforest. (There is no rainforest at Eidsvold, but this does not rule out the possibility of this being the type locality; *A. biocellatus*, also usually associated with rainforest, has been collected at Eidsvold.)

**Distribution:** Specimens have been examined from the following localities: **NORTH QUEENSLAND:** Blue Mts., Cape York Peninsula (29.x.1946, J. L. Wassell); Mountain Creek, Burdekin Mt. (24.viii.1947, biting 1600 hrs., J. L. Wassell; 25 iii 1949, biting 1800-2000 hrs., E. N. Marks; 24.iii.1952, biting, 23.xi.1952, biting 1000 hrs., E. N. Marks); Camp Mountain (27.i.1945, biting 1700 hrs., E. N. Marks); Mt. Glorious (11.iii.1943, 15.iii.1955, biting in rainforest, E. N. Marks); Mt. Ballymore, Lamington National Park (3.xi.1943, F. A. Perkins & E. N. Marks); Mt. Ballymore (4.v.1943, biting in rainforest, E. N. Marks); Kinnane’s Creek at foot of Wilson’s Peak (2.xi.1952, larva from tree hole, E. N. Marks); Canungra (12.iii.1955, biting in rainforest, I. Cook); Springbrook (10.iv.1955, larvae from tree hole, E. N. Marks).

There are five of Bancroft’s specimens of *A. quinquelineatus* in the Queensland Museum Collection, without locality data, one labelled “Scutomyia new sp.?” and one “Aedes quinquelineatus 4 v. 24.”

**Aedes (Finlaya) australiensis** (Theobald, 1910)

A redescription of the female of *A. australiensis* from the only two known specimens other than the type, and descriptions of the larva and pupa were given by Marks (1948). The following additional notes are based on a series of 5 males and 4 females since collected and, where stated, on examination of the type female in the British Museum.

**Female:** Wing length 2.4–3.4 mm. **Head:** In the type the upright forked scales are all dark brown; in the other specimens seen they are all creamy or creamy medi ally with some brown ones laterally. In one specimen there are a couple of small dark scales medially on the torus, in addition to the fine hairs, and also a couple of scales on the basal half of the first flagellar segment. Palps entirely dark scaled or with a couple of white scales, or a distinct patch, at 1/4 length from base. Proboscis entirely dark scaled in all specimens, including the type.

**Thorax:** Integument brown rather than reddish brown. The scaling on posterior third of scutum may be dark with a distinct pattern of golden lines as follows: a median line extending from posterior margin of the silver scaled area to the prescutellar bare area where it forks, or is discontinuous with a short line of larger scales on either side just in front of the scutellum; just lateral to the prescutellar bristles (which may number 12) a line runs from the silver scaled area to the scutellum and there is a short line above the wingroot; there may be some dark scales lateral to the silver scaling, just above the paragerteges, giving a slight curve to the posterior margin of the silver scaling. Frequently much of the darker posterior scaling of scutum is golden or gives golden reflections and the pattern of lines is therefore indistinct; 4–6 scutellar bristles to each lobe. *Apm* with pale scales, all narrow curved or narrow curved above, broad below, or all broad; *ppm* may have a couple of broad pale scales below the narrow curved ones; in all specimens, including the type and Gracemere specimens previously described, there are some broad white scales on the subspiracular area; one specimen has paragerteges unscaled; 4–7 posterior pronotal and 3–9 postspiracular bristles (0 in the type).

**Legs:** The pale scaling on fore femur may not reach quite to apex posteroventrally; fore tarsal segment I may lack a ventral pale streak and the basal white band measure barely 1/4 its length; fore tarsal segment III may have a white basal patch. The mid femur is always pale on the basal 1/3–1/2 posteriorly, extending as a ventral streak to 1/2 length and sometimes with scattered pale scales beyond that to apex; mid tibia may have less pale scaling than described for Gracemere specimens but at least is pale scaled.
posteriorly except for subbasal and apical dark scales; bands on mid tarsal segments \(1/4-1/4\) I, \(1/4-1/4\) II, \(1/4\) III, or may be only 1 or 2 white scales at base of III; I may lack a ventral pale streak. On the hind femur the preapical dark scaling may extend towards the base as a dorsal streak; hind tibia with distinct basal pale patch; bands on hind tarsal segments \(1/4\) I, \(1/4-1/4\) II and III.

Wings: Theobald’s description was “wings with brown scales, some traces of ochreous ones”. In the type specimen the square scales are dark but the plume scales do appear paler in some lights; none of the specimens examined, however, have any distinctly pale scales on the wing. Cell \(R_4\) 1.6–1.8 \(\times\) length of its stem, cell \(M_1\) 0.75–1.0 \(\times\) length of its stem, their bases practically level; \(r-m\) 1.0–1.5 times its own length distal to base of \(M_{4+4}\).

Abdomen: The creamy basal bands on the tergites may have straight posterior margins and cover \(1/4-1/4\) the segments.

Male: Shows similar variations in the females in most characters but differs from them as follows: Wing length, 2.6–3.1 mm. Head: Tori very large, brown. Antennae with dense brown verticillate hairs lying in a vertical plane. Palps equal in length to proboscis, the two apical segments slightly down-turned; black scaled with broad basal white bands on segments III–V, \(1/4-1/4\) III, \(1/4-1/4\) IV, \(1/4-1/4\) V; a ventral row of fairly long setae comprising about 8 at apex of III and 12–14 along IV; a second inner row of 20–23 long setae along IV; sparse shorter setae along V and at its apex, also dorsally at apex of III and IV.

Thorax: Scutal scaling as in the female except that there may be a slight indentation of dark scales into the silver scaled area on the line of the dorsocentral bristles, and a broader median line of golden scales in front of the prescutellar bare area; 8–15 prescutellar and 3–5 dorsocentral bristles; 4–5 long bristles to midlobe and 3–5 to lateral lobes of scutellum.

Legs: Mid tarsal segment III may be all dark or with only a couple of white scales basally. Claws of fore and mid legs unequal, the anterior longer with a strong medial and a finer basal tooth, the posterior shorter with a single tooth; hind claws equal, simple.

Wings: Cell \(R_4\) 1.1–1.2 \(\times\) length of its stem, cell \(M_1\) 0.65–0.7 \(\times\) length of its stem, its base usually slightly proximal to that of cell \(R_4\); \(r-m\) 1–2 times its own length distal to base of \(M_{4+4}\).

Abdomen: There may be a few dark scales in the silver medial patch on tergite I; tergites II–V or II–VII with broad straight or medially produced silvery or creamy basal bands up to half the length of segments and merging with the silvery lateral patches; medially VI may have only a few pale scales at base or a narrow creamy band and VII be dark or with a rounded creamy patch; tergite and sternite VIII silver scaled; coxites short with dark scales laterally and a medially directed preapical tuft of golden scales. Male *Terminalia* appear quite indistinguishable from those of *A. biocellatus* (Taylor), and the figure and description of terminallia of *biocellatus* in Marks (1948) are fully applicable to *australiensis*, the only variation being that there are 5–7 setae on sternite IX of *australiensis*; in one specimen there appears a slight swelling on the tergal aspect of the narrow basal half of the harpagophore appendage, but there is an indication of this also in some *biocellatus* specimens.

Larva: Head seta 6 (B) may be 5 branched; lateral comb may have only 12 or 17 scales; on segment VIII, seta 3 may be 3 branched and seta 5 5 branched; anal papillae may be scarcely 2x saddle.

Pupa: Lateral seta (7) of segment VIII, 3–7 branched.

Biology: Larvae were collected from a tree cavity on Palm I., and on two occasions bred from the same small tree cavities near creeks, at Arcadia, Magnetic I., and Little Crystal Creek, Mt. Spec. The Magnetic I. breeding place was a rot hole 8 in. deep and 3 in. in diameter, 8 ft. above ground in the end of a broken branch of a “cookie apple” tree (*Planchonia careya*), and at the second visit was dry, but larvae were bred in washings from it; associated species were *A. notoscriptus*, *A. purpureus*, *A. quasirubithorax*, and *Megarhinus* sp. At Mt. Spec associated species were *A. notoscriptus* and *Megarhinus* sp. *A. australiensis* appears to be associated with dry scrubbs (i.e., monsoon forest) and has not so far been collected in dense rain forest.

\(^{3}\)Claws of fore and mid legs of *A. biocellatus* and *A. monocelatis* are similar to those of *A. australiensis*, though this is not clear from descriptions in Marks (1948).
Habits: A male of *A. australiensis* was taken resting amongst vegetation in Townsville Botanic Gardens.

Distribution: The specimens examined provide new locality records all within 60 miles from Townsville, North Queensland, viz.—Palm Island, 1 female (27.v.1948, J. L. Wassell); Mt. Spec, 2 males (27.iv.1952, and breeding in same site 21.xi.1954, E. N. Marks); Magnetic Island, 3 females; 2 males (20.iv.1952, and breeding in same site 3.xii.1954, E. N. Marks); Townsville, 1 male (24.xi.1954, B. McMillan).

Type Specimen: I examined the type specimen of *A. australiensis* at the British Museum (Nat. Hst.) in 1949. It has the head, scutum and abdomen somewhat rubbed, and lacks the right wing, right mid and hind legs and left mid and hind tarsi.

Discussion: *A. australiensis* belongs to subgroup VIII, biocellatus of Group F of the subgenus *Finlaya* (as defined by Knight & Marks, 1952), to which also belong *A. biocellatus* and *A. monocellatus*. A close relationship between *australiensis* and *biocellatus* was already indicated, since no very reliable characters have been found for separating their larvae; this relationship is confirmed by the equally close resemblance of the male terminalia of the two species; the adults, however, are readily distinguished on scale colour characters. *A. australiensis* has a northern distribution and has not been found south of Rockhampton; *biocellatus* has not been found north of Eidsvold (about 140 miles south of Rockhampton) and its range extends south into New South Wales, but since both are rarely collected their ranges may yet be found to overlap. There is some evidence that *australiensis* is associated with dry scrubs (monsoon forest) and *biocellatus* usually with rain forest (though there is no rain forest at Eidsvold) and collections from these environments between Eidsvold and Rockhampton might reveal whether there is any hybridisation between them.

*Aedes (Finlaya) purpureus* (Theobald, 1910)

*Molpemyia purpurea* Theobald, 1910, Mon. Cat. 5: 479


Taylor (1944) synonymised *priestleyi* and *pocunius* with *purpureus*. Knight & Marks (1952) added *priestleyi hamadryadis*, a name published in a footnote by Cooling, to the synonymy, and also gave the location of all type specimens. I have examined Theobald’s, Taylor’s and Edwards’ types, and specimens from Derby, W.A., which are presumably those described by Cooling.

The thoracic ornamentation, male terminalia and larva are figured by Cooling (1924), the larva by Lee (1944) and male terminalia by Taylor (1944).

Adult: Wing length, females 4.1–5.2 mm., males 3.1–4.3 mm. A large dark species with purplish black scaling and large patches of broad flat silvery scales on scutum and pleuron. Fore tarsal segments I–II, mid I–II or III and hind I–III with basal or subbasal white bands, the band covering 1/4 or more of mid tarsal I (there is usually a small patch or very narrow band of dark scales at the extreme base of all first tarsals, sometimes a similar patch also on other banded segments). Abdominal tergites with large medial and lateral basal silvery patches, or with complete bands; sternites mainly silver scaled with some dark scales along distal margins.

The principal variations are in the upright forked scales of the head, and scales in the midline of scutum. Upright forked scales may be all dark (in the types of *purpureus*, *priestleyi* and *pocunius*, females from Darwin, Atherton, Trinity Bay and Townsville and males from Townsville and Redbank Plains), dark, with a few pale at vertex (females from Townsville), or pale medially and dark laterally (*hamadryadis*, males from Vanrook, Wrotham Park, Townsville and Magnetic I.).

There are always large patches of flat silvery scales on the fossae, though the patches vary somewhat in shape and extent, there are also flat silvery scales above the wing root and surrounding the prescutellar bare area. In the mid line of the scutum there is a longitudinal line, one or more scales wide, of broad flat
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silvery scales (in the type of *pectinosus*, in *hamadryas*, in all males listed above and in females from Darwin, Mareeba and Townsville) or a line of narrow curved creamy scales (type of *prietleyi*) or a few, sometimes only 2 or 3, small narrow curved creamy or white scales (type of *purpureus*, females from Atherton and Trinity Bay).

The scutellum is always clothed with broad flat silvery scales. (This was overlooked by Knight & Marks (1952) who as a supplementary character for Group F, Subgroup IV, purpureus give "scutellum with narrow scales", the condition in *A. auridorsum* Edwards, the other member of subgroup IV.)

On the pleuron there are large patches of flat silvery scales on *apn*, *ppn*, propleuron, upper and lower *stp*, paratergitae, preala below knob, *mp*, and frequently some on the subspiracular area.

**Biology:** Hodgkin & Britton (1956) record the predacious habits of *A. purpureus* larvae. Debris collected on 2.vi.52 from a dry tree hole about 2 ft. above ground in a eucalypt on the bank of Vanrook Creek was immersed in a jar of water. By 9.vi.52 a 4th instar *purpureus* larva was present, as well as 4th instar larvae of *A. notoscriptus*, *A. quasirubithorax* and *A. tremula* (Theo.). The *purpureus* larva was placed in an excavated block with *tremula* and 2 *notoscriptus* and within 5 minutes held a *tremula* larva with the maxillae, like pincers, gripped on either side of the prey's abdomen. The mouthparts were active, chewing or sucking up the contents of the *tremula* larva; the mouthbrushes took no part and were held extended. The maxillae moved in and out occasionally apparently with the effect of squeezing the prey forward into the mouth. When *purpureus* ceased feeding segments III–VI of the abdomen of *tremula* had been consumed, though a connecting skin still joined II to VII. Later *purpureus* came browsing past its victim and held segment VIII while it devoured the gills. At other times it browsed on bottom debris in the normal way, creating a current with the mouthbrushes. The very similar larva of *A. auridorsum* is also predacious (Marks, 1948).

At Redbank Plains *A. purpureus* was breeding in a hollow pipe in the stump of a eucalypt which had been felled and had sprouted again; the water was 6 inches below the top of the stump, and was murky with rotting wood. *A. tremula*, *A. notoscriptus*, and *A. quasirubithorax* were again the associated species. At Wrotham Park, *A. purpureus* was breeding in a large tree hole in a mango tree, in which the water was very foul with rotting leaves and mangoes; associated species were *A. notoscriptus*, *A. tremula* and *A. agypti.*

The Magnetic I. breeding place is described on p. 25; *purpureus* was taken only in the second collection. On the Townsville common, two breeding places were found, the first closely similar to the Magnetic I. site, in a rot hole in a branch of a "cookie apple" tree (*Planchonia careya*), the second a larger and deeper rot hole in a teatree (*Melaleuca sp.*). In the former, in 1952, *A. notoscriptus* and *A. quasirubithorax* were the associated species. The hole was dry on 10.xi.54, when it was filled, and on 24.xi.54, 1 3rd instar and 10 4th instar *purpureus* larvae were collected from it, the first of which pupated on 26.xi.54 and emerged on 28.xi.54; another collection on 28.xi.54 contained 4 4th instar *purpureus* and 1 3rd instar *notoscriptus*.

Species breeding in association with *purpureus* in the teatree cavity were *Megarhinus sp.*, *Tripteroides magnessiana* (Edwards) and an undescribed *Aedes* (Macleayia) sp.

This species has not been taken in dense rain forest, and is apparently usually associated with eucalypt forest country. Living *purpureus* larvae are dark grey with brown head and in general appearance like a large stout *notoscriptus* larva. The pupal period occupies about three days.

**Distribution:** *A. purpureus* has been recorded from north Western Australia, Northern Territory and Queensland. **Queensland:** Previous records are Stannary Hills (type locality of *purpureus*), Townsville (type locality of *prietleyi*) and Herberton (Taylor, 1944). Its known range is now extended nearly 700 miles south to Redbank Plains, 18 miles S.W. of Brisbane (15.xi.1953, E. N. Marks). Additional records from North Queensland are Vanrook Station, 77 m. N.E. of Normanton (2.vi.1952, E. N. Marks), Wrotham Park Station, 82 m. N.W. of Chillagoe (30.xi.1947, J. L. Wassell), Atherton (iii.1944), Mareeba (iii.1952, G. Gnedzilloff), Trinity Bay (vi.1944, R. L. Lehfledt), Townsville (1944; 10.iv.1952, biting man on common at night; 14.iv.1952, 24.xi.1954, larvae from tree hole in *Planchonia careya*, E. N. Marks; 19.xi.1954,
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_Aedes (Finlaya) biocellatus_ (Taylor, 1914)


_Aedes (Finlaya) monocellatus_ Marks, 1948

SOUTH QUEENSLAND: Wilson’s Peak (1. xi. 1952); Springbrook (6. ii. 1956); O’Reilly’s, Lamington National Park (2. vi. 1955); Mt. Nemo (14. xi. 1954) (all collections by E. N. Marks of larvae from treeholes in rainforest, an additional O’Reilly’s collection from a large hollow log in open eucalypt forest, near rainforest margin).

_Aedes (Finlaya) subaurudosum_ Marks, 1948

SOUTH QUEENSLAND: Mt. Ballow (5. iv. 1953, biting, E. N. Marks); Canungra (20. ii. 1955, biting in rather dry rainforest, H. Standfast); Camp Mountain (19. iii. 1955, larvae from hollow stump of Angophora sp. in eucalypt forest, E. N. Marks). NEW SOUTH WALES: Colo Vale, near Mittagong (recorded by Lee, Clinton & O’Gower (1954)).

_Aedes (Finlaya) palmarum_ Edwards, 1924

NORTH QUEENSLAND: Massey Spur Valley, near Coen (25. ii. 1954, larvae from old snailshell in rainforest, J. L. Wassell); Mourilyan Harbour (15. v. 1952, biting in rain forest, E. N. Marks & D. Kennedy); Palm Island (27. v. 1948, larvae from fallen “bean” pods on shaded track, J. L. Wassell); Little Crystal Creek, Mt. Spec (23. xii. 1954, biting in rain forest, E. N. Marks). SOUTH QUEENSLAND: Springbrook (10. iv. 1955, larvae from fallen palm fronds in rainforest, E. N. Marks); O’Reilly’s, Lamington National Park (2. vi. 1955, larvae from old bottle in secondary rainforest, E. N. Marks).

Mr. Wassell furnished the following note on the habits of the larvae collected at Palm I.:

> “These larvae have a remarkable habit of gripping the inside surface of the bean pod when disturbed and defying the pull of the pipette. Often several attempts must be made to dislodge them and greater force used than seems safe. Gripping is apparently done by means of the clypeal spines and/or mouth brushes being inserted into the soft inner layer of the pod.”

_Aedes (Finlaya) candidoscutellum_ Marks, 1947


_Aedes (Finlaya) wasselli_ Marks, 1947

SOUTH QUEENSLAND: Mountain Creek, at foot of Buderim Mt. (the type locality) (23. xi. 1952, biting 1000 hrs. in rain forest, E. N. Marks); Canungra (19. ii. 1955, biting in rather dry rain forest, H. Standfast). These two records represent the only two specimens known, besides the type.
ACKNOWLEDGMENTS

I am indebted to Messrs. N. D. Riley and P. F. Mattingly for allowing me to examine type specimens in the British Museum (Natural History); to Mr. D. J. Lee for similar facilities at the School of Public Health and Tropical Medicine, Sydney; to the late Mr. H. A. Longman and to Mr. G. Mack for access to specimens in the Queensland Museum; to Miss K. A. Walker for her considerable co-operation in collecting *A. mallei*, and to Dr. B. McMillan and Mr. A. L. Dyce for making available their specimens and notes on breeding places of this species; to Mr. J. L. Wassell for numerous notes and specimens and to the various other collectors mentioned in the text who have forwarded specimens or co-operated in field work.

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