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Most of the mosquitoes described in this paper, I collected while investigating *Filaria* vectors in Celebes and in Java. These researches were made with financial help of the „Koningin Wilhelmina Jubileum Stichting” in Batavia. I am much indebted to Dr. F. W. Edwards for valuable help and advice and for granting me access to the mosquito-collection of the British Museum (Natural History).

In fig. 1 the situation of most of the localities in which the mosquitoes were found, is marked. Unless otherwise stated in the text, the localities are in the plains, less than 50 m above sea-level.

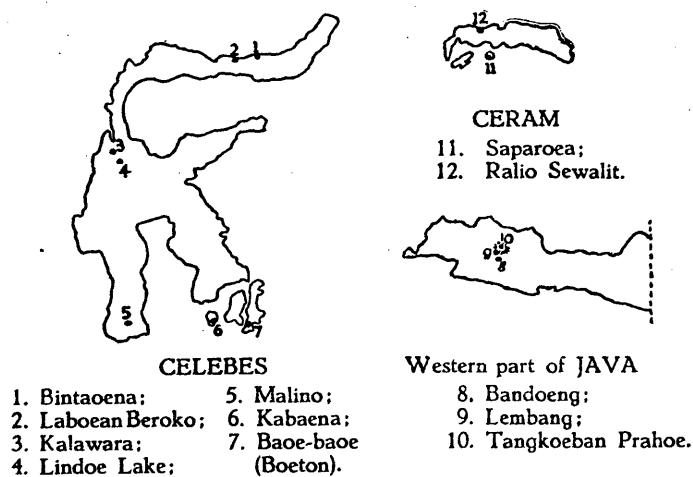


Fig. 1. Situation of localities mentioned in this paper.

*Megarhinus inornatus* Walk. var. *albitarsis* nov. var.

Male. Vertex bluish green. Basal joint of antenna unscaled; 2nd and 3rd joints with some dark scales, metallic green in some lights. Palpi metallic blue, the apical two segments darker; about as long as the proboscis. Proboscis purplish at the base, bluish at the apex of the straight thick part; remainder indefinitely dark coloured with a coppery hue.

Mesonotum dusky green in the middle, pale green at the sides; scutellum dusky green. Anterior pronotal lobes green, posterior mostly white scaled. Pleurae and coxae densely covered with silvery scales. Wings: longitudinal portion of r-m more than thrice as long as the transverse portion. Legs: femora and tibiae mainly dark bluish, tarsi more blackish; inner sides of femora pale golden, apices with pale green knee-spots. Fore tarsi not marked with white; mid tarsi with a sub-basal band on the first joint, second joint almost wholly white, only the apex being black; hind tarsi with the second joint almost wholly white, very few black scales only being present at the apex and at the base.

Abdominal tergite I pale blue in the middle, white at the sides; other tergites dark blue, shining pale blue at the sides, and, on II, IV and V sometimes with some white scales at the lateral ends; VI and VII with large, dense, black scale-tufts; VIII with small orange tufts. Sternites purple, some golden scales laterally on V and VI.

Distinguished from the typical form of *M. inornatus* Walk. by the scales of the vertex being bluish green instead of bronzy green; by most of the scales on the posterior pronotal lobe being white instead of green. The white parties on the mid and hind tarsus are more extensive, in the typical form those on the second mid and hind tarsal joint occupying half the length at most. However, the typical form has a white patch on the first hind tarsal, which *var. albitarsis* has not. In the former there are well defined white lateral patches on the abdominal tergites, in the latter at most some scattered white scales.

Four male specimens were reared from larvae found in leaf-axillae of *Colocasia* in Kalawara (Celebes). Type in the British Museum.

#### *Megarhinus aurifluus* Edw.

Only the male of this species is known from Formosa. In Celebes females were caught and reared, that might be the females of this species. In the absence of females from Formosa and males from Celebes, the identification is not quite certain. The females from Celebes agree in most respects with the males from Formosa, but some differences may be noted:

	Celebes ♀	Formosa ♂
Pleural scales .....	silvery white	light golden
First fore tarsal joint .....	all white	apical third only
Second mid tarsal joint ...	all white	narrow white ring at base
Scale tuft on sixth abdominal segment	orange	black

*Megarhinus sumatranus* nov. sp.

**F e m a l e.** Vertex black-scaled with metallic greenish reflections. Palpi and proboscis purple. Palpi about as long as the first 7 antennal segments (torus included). Mesonotum (rubbed in the middle) and scutellum with metallic blue scales. Pleurae with patches of white scales. Wing: longitudinal portion of r-m about thrice as long as transversal portion. White markings on legs: First fore tarsal joint all white but for a narrow, apical, brown band; in the mid tarsus the basal half of the second joint and the whole third are white and there are some white scales on the base of the fourth joint; hind tarsus with broad, white, basal bands on the 2nd and 3rd joints.

Abdominal tergites; I all green, succeeding segments dark green, towards the tip of the abdomen more purplish; on II—VI lateral golden spots, not visible from above; VI without scale-tufts, VII and VIII with orange scale-tufts. Sternites golden at the sides, black in the middle.

Described from one female, reared from a larva found in a pitcher plant in Benkoelen (Sumatra). — Type in the British Museum.

This mosquito superficially resembles the females of *M. aurifluus* described before. It can be distinguished from it by the palpi being purplish instead of blue; the second joint of the fore tarsus and the third and fourth of the mid tarsus being black instead of white; by the absence of pale spots on the dorsal aspect of the fifth abdominal tergite, and, of an orange tuft to the sixth tergite.

*Tripteroides powelli* (Ludl.).

**L a r v a.** Antenna short, one third as long as the head, somewhat S-shaped, shaft smooth; tuft as a single hair attached near the tip (fig. 2, a). Preclypeal spines strong, curved, blunt-ended, yellow or brownish. Frontal hairs: A 3- to 5-branched, B, C, d and e single; d attached near the clypeal border. B on a level with the antennal base, C more backward. Mental plate (fig. 2, b) rather narrow, with one large central tooth and 8—9 smaller ones on each side.

Thorax and abdomen covered with stellate, stiff, black hairs. Mesothoracic spine simple, straight and barbed; metathoracic spine large, with 1—3 accessory branches, finely barbed and with ragged tips (fig. 2, c, d). Comb on 8th segment consisting of one row of 16—24 long scales, not on a plate, the dorsal ones sharply pointed and smooth, the ventral slenderer, blunt with a long fringe on the tip and a short fringe over all the length (fig. 2, e).

Siphon (fig. 2, f): index  $2\frac{1}{2}$ —3; no acus. Pecten of 4—5 slender smooth teeth, usually in two groups: 2 or 3 before the middle and two far away apically. Ventrally some 11

long, slightly plumose, 2-branched hairs in one row, except the basal pair which has 3 or 4, or, rarely 5 branches. Dorsally and laterally, on both sides together, some ten stiff,

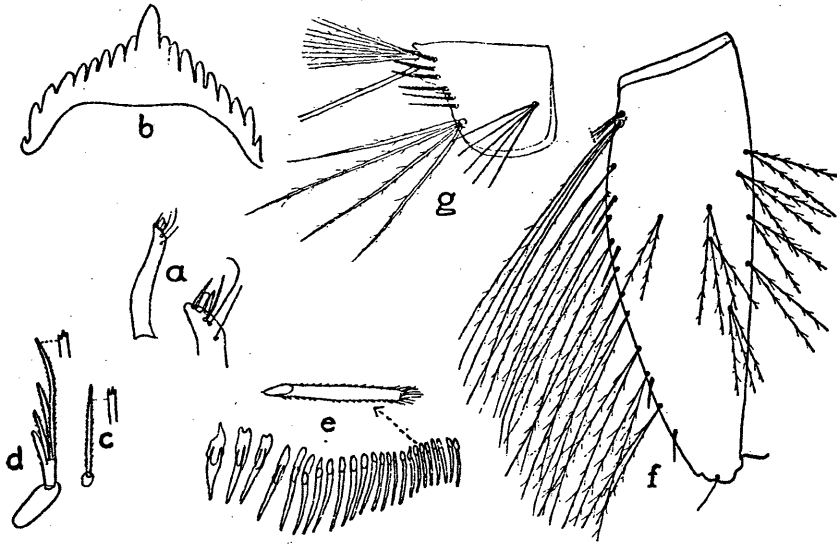


Fig. 2. *Tripteroides powelli*, larva: a, antenna; b, mental plate; c—d, meso- and metathoracic spines; e, comb; f, siphon; g, saddle of anal segment.

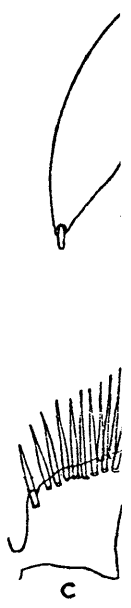
slightly plumose, scattered hairs, each with 2 or 3 branches or sometimes single.

Anal segment with the saddle almost complete, the apical border with 6 or less, large, minutely barbed spines and some smaller ones. Dorsal and lateral hairs very long and slightly plumose, the former with 2—4 branches to the inner hair and the outer single, the latter with 2—4 branches or single. Anal brush represented by one pair of hairs with 5—6 branches each, about as long as the segment and non-plumose (fig. 2, g). Anal gills: dorsal about  $1\frac{1}{2}$  times long as the saddle, ventral a bit shorter.

Described from 8 larval skins and 4 larvae, collected in Java (Bandoeng at 700 m and Lembang at 1000 m altitude) in bamboo-stumps and in a tree-hole.

*Tripteroides powelli* var. *indica* (Barr.).

The larva is distinguished from that of the typical variety by the ventral hairs of the siphon being 3-branched instead of 2 branched. 5 larval skins and 1 larva were collected in Celebes (near Lindoe Lake at 1000 m altitude, at Kalawara, Bintaena and Laboan Beroko) from bamboo-stumps.



a  
f  
v  
t  
l  
c  
v  
f  
c  
t  
F  
c  
E

F  
k  
a

*Tripteroides nitidiventer* (Giles).

**Male.** Not much different from the female. The palpi are exceeding the clypeus by  $1\frac{1}{2}$  times its length as against twice in the female. The antennae are rather densely plumose. Hypopygium: Coxite short and broad; basal lobe with 3 large hairs and some smaller ones; style bulky, thickest beyond the middle, well curved (fig. 3, a). Phallosome (fig. 3, b) slender. Ninth tergite (fig. 3, c) with 2 quadrangular lobes, well separated by a deep incision and with the apex obliquely set off; on each lobe 12—25 powerful hairs, either most of them in one row or there are two complete rows.

**Larva.** Antenna (fig. 3, d, e) short, straight, smooth; the tip set off obliquely. The small, single antennal hair implanted near the tip. Head round. Frontal hairs (fig. 3, d): A bifid, rarely trifid; B, C, d and e single; d implanted near clypeal border, B more backward and outward, C behind B. Preclypeal spines rather short, obtuse, brown, curved.

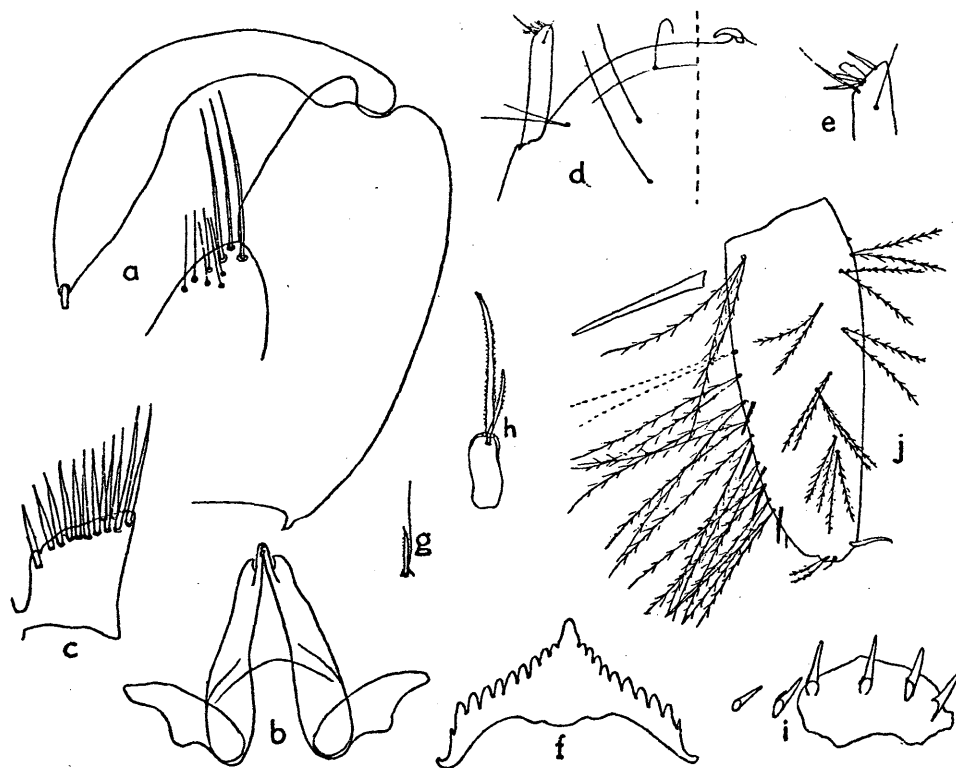


Fig. 3. *Tripteroides nitidiventer*. a—c, hypopygium: a, coxite; b, phallosome; c, lobe of ninth tergite; d—j, larva: d, clypeus; e, tip of antenna; f, mental plate; g—h, meso- and metathoracic spines; i, comb; j, siphon.

Mental plate (fig. 3, f) rather narrow with a large central tooth and some 10 smaller ones on each side.

Mesothoracic spine simple, and smooth or slightly barbed (fig. 3, g); metathoracic spine larger, somewhat curved, double, barbed at the base or all over (fig. 3, h). Numerous, black, stellate, stiff hairs on the thorax and the abdomen. Comb of 3—6 scales, slightly fringed at the base, on a plate; one or two smaller ventral scales sometimes inserted outside the plate (fig. 3, i).

Siphon (fig. 3, j): index 3—3½. Pecten of 3—5 straight, smooth teeth on the apical half of the siphon. No acus. Ventrally there is one pair of trifid hairs near the base and one row of some 9 bifid, or sometimes single ones further on; laterally and dorsally, irregularly distributed, about a dozen of stiff, bifid or single hairs; all the hairs finely plumose.

Anal segment: the saddle embraces almost the whole segment; at the apical border there are some 8 large, smooth spines. The outer dorsal hair is single, the inner 3- (or rarely 4-) branched; the lateral hair single, rarely bifid, and very large; all the hairs plumose. Anal tuft represented by a pair of small, subplumose, 2- or 3-branched hairs. Anal gills 1½ times or twice as long as the segment.

The material consisted of 15 ♂ and 20 ♀, reared from larvae and pupae, 3 larval skins and 17 larvae. The specimens were found breeding in bamboostumps and in a dead bamboo, part of a fence, near Lindoe Lake (1000 m altitude), in Kalawara (both in Celebes) and in Kabaena.

#### *Topomyia auriceps* nov. sp.

Male. Vertex black, in the middle a silver border to the eyes; on the ventral side of the head a broad golden border to the eyes. Proboscis with a golden stripe on the lower side of the basal third, broadest at the base, gradually narrowing further on. Palpi black scaled with a pale brown apex; exceeding the clypeus by a bit more than its length. Antennae pilose.

On the mesonotum a median silver stripe, composed of a double row of flat scales, gradually broadening posteriorly, continued backward not quite as far as the level of the wing-insertions; remainder of the mesonotum with blackish brown, narrow scales. Scutellum triangular, dark brown scaled. Hind part of sternopleura and mesepimeron with flat, golden scales. Legs all dark with the exception of the inner sides of the femora, which are golden scaled over all the length. Wings dark scaled; anterior fork-cell not quite twice as long as its stem, posterior a trifle longer than its stem; the base of the former nearer the wing base.

Abdomen compressed, dark brown dorsally, golden ventrally, border line straight. Hypopygium (fig. 4, a): Coxite

not specially adorned; basal lobe with two strong hairs and one hair on the coxite laterally of the lobe. Style (fig. 4, b) with basal expansions, the medial axe-shaped, the medial axe-shaped, the lateral with a very stout hair; apex 3-branched, the main branch with a stout spine and acutely curved. Paraprocts largely expanded basally. Phallosome more or less raquet-shaped. Ninth tergite with the lobes rather ill-defined and with 2 large hairs on each lobe and sometimes a third fine one.

**Female.** Largely as the male, but the golden scaling at the underside of the proboscis is confined to a small patch at the base. The pleura is almost wholly covered with silvery scales. The anterior forkcell of the wing is  $2\frac{1}{2}$  times as long as its stem.

This mosquito was found in Kalawara (Celebes) breeding in the leaf-axillae of large, tree-like *Colocasia*. 2 ♂ and 1 ♀ were reared. Type in the British Museum.

#### *Topomyia ? dubitans* Leic.

**Male.** Vertex with a diamond shaped silvery patch anteriorly. At the sides of the head a silvery rim to the eyes; head otherwise black scaled. Proboscis brown, a yellowish band to the base and a fine line of yellowish scales on the ventral side up to the oliva, broadening somewhat at the apex. Palpi very short and black scaled.

Mesonotum with a silvery stripe of two rows of flat, broad scales over all the length, continued on the mid-lobe of the scutellum. Anterior pronotal lobe with silvery flat scales; posterior with dark brown flat scales. Pleurae with many silvery scales. Fore legs all brown. Mid legs: inner sides of femora white and so are the inner sides of the basal halves of the tibiae, further on gradually darkening into pale brown; fifth tarsal joint wholly creamily coloured. Hind legs: inner sides white over all the length. Wings: dark scaled; anterior fork-cell  $3\frac{1}{2}$ —4 times as long as its stem, posterior  $1\frac{1}{2}$  times as long; base of the former much nearer the wing base than that of the latter.

Abdomen compressed; dark brown above, pale golden beneath. Hypopygium (fig. 4, c-f) much as in *T. gracilis* Leic., but there are many small differences. The apex of the coxite is more rounded; the basal rod of the coxite is curved at its base only (in *gracilis* over the whole length), the spine of this structure ends in a hook (in *gracilis* in a sharp point). There is only one subapical hairtuft to the coxite (in *gracilis* two) and the hairs are much finer. The hairs of the basal lobe of the coxite are all about equal in size (in *gracilis* there are 2 or 3 spine-like hairs amongst them). The small lateral hairs on the ninth tergite (fig. 4, f) are inserted further from the middle.

**F e m a l e.** Differs from the male in having the proboscis all dark; the fifth tarsal joint of the mid-leg also dark and the mid and hind legs without pure white, although the inner sides of femora and tibiae have golden scales. As in the male the anterior forkcell is  $3\frac{1}{2}$ —4 times as long as its stem.

**L a r v a.** Head (fig. 4, g) Antenna  $\frac{1}{4}$  as long as the head, rather straight; antennal hair single, half as long as the shaft, implanted at about  $\frac{1}{4}$  of the length from the apex. A-, B-, C- and d-hairs about equal in length; B, C and d single or 2-branched; e with a single stem and forked into 2 or 3 apically. Preclypeal spines long and slender.

Strong propleural as well as meso- and metapleural spines, all about equal in size. Abdomen: Lateral hairs 6- or 7-branched on the segments I and II, bifurcate on III-V, single on the other segments. Comb on the 8th segment consisting of 13—19 scales in 2 or 3 irregular rows, not on a plate, without fringe, sharply pointed (fig. 4, h).

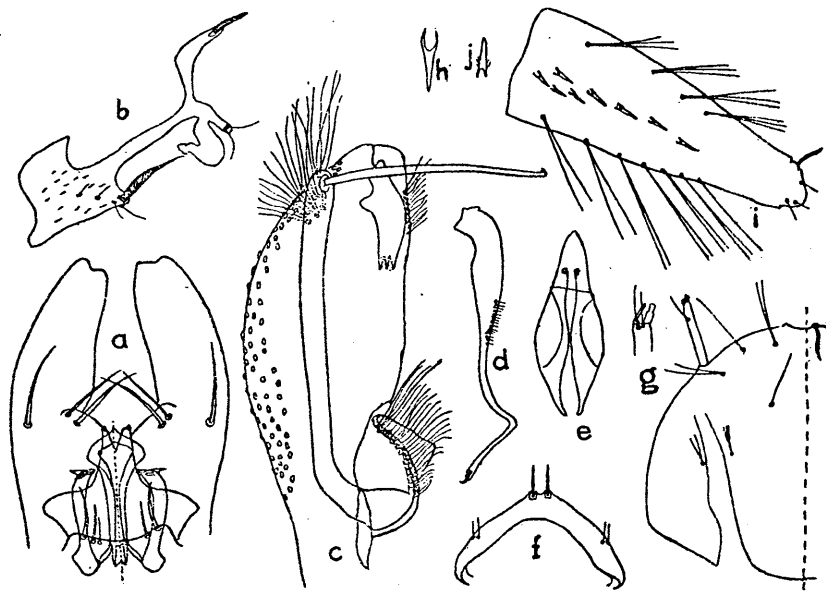


Fig. 4. *Topomyia*. a—b, *T. auriceps*: a, hypopygium; b, style. c—j, *T. ? dubitans*: c—f, hypopygium; c, coxite; d, style; e, phallosome; f, ninth tergite; g—j, larva; g, clypeus; h, comb scale; i, siphon; j, pectentooth.

Siphon (fig. 4, i) conical, index about  $3\frac{1}{2}$ ; without acus. Pecten teeth in a rather regular row, 6—12 in number, sharply pointed, with a minute fringe at the base (fig. 4, j). Ventral hairs about 7 in number, nearly as long as the siphon's breadth, mostly 2-branched. Dorsal hairs regularly placed in 2 rows, each with four 3- or 4-branched hairs.

Anal segment broader than long; saddle covering somewhat more than half the circumference, with some 5 spines apically, the spines slightly fringed at the base. Inner dorsal hair 3- or 4-branched, outer single, both smooth. Lateral hair very large, 3-branched, subplumose. Anal tuft represented by a pair of 4- or 5-branched hairs, a bit longer than the segment's breadth. Anal gills broad, rounded at the apex, almost as long as the siphon.

With some hesitation I name this mosquito "*T. dubitans*". The female tallies fairly well with Leicester's description, but not in all respects. L. described *T. dubitans* as having "very long fork-cells" and he states that the anterior is 4 times as long as its stem; in our specimens this fork cell is  $3\frac{1}{2}$ —4 times as long as its stem, but the posterior can hardly be called "very long". Further, in the original *dubitans* the proboscis is "not as long" as the abdomen, in the specimens before me it is just as long, but this may be due to shrinkage of the abdomen, as my specimens were reared from larvae.

The larva is distinguished from the other known *Topomyia*-larvae by the regular arrangement of the pecten-teeth and, of the siphon-hairs (in rows) and by the small number of spines at the apex of the saddle.

The specimens were found breeding in *Colocasia* leaf-axillae in Kabaena and in Baoe-baue (Boeton) and consisted of 7 ♂, 9 ♀, 4 larval skins (1 ♂, 3 ♀) and 4 larvae. The conspecificity of males and females was proved by the larval skins.

***Armigeres (Armigeres) candelabrifer* nov. sp.**

Male and female. Vertex with a white rim to the eyes and a rather large patch of white scales in the centre. Anterior prothoracic lobes with flat, white scales, posterior with narrow, white ones. Mesonotum with a rather narrow, white border and a prescutellar patch of white scales. Scutellum with white patches on each of the lobes, very small on the lateral. Hind femora white on the outer side to the tips. Abdominal tergites with lateral, white patches, that on the second over all the length, on the succeeding segments basally only, the apical dark brown part gradually broadening in the apical segments. Abdominal sternites: II all white, III all white except for black triangular patches on the lateral apical angles, IV usually with a complete, black, apical band, broadening laterally, V and VI always have such a band, VII all black, VIII apically black, basally white.

The hypopygium of the male is especially characterised by the presence of three candle-shaped hairs on the basal lobe of the coxits (fig. 5, a).

Larva. Only one damaged larval skin was obtained,

missing the abdominal hairs. The comb on the eighth segment consists of 12 scales with a characteristically finely denticulate apex (fig. 5, b).

Habitat: near Lindoe Lake (Celebes, at 1000 m altitude) and at Bintaoena (Cel.). From the larvae, found breeding in bamboo-stumps, in loose, cut pieces of bamboo and in a tree-hole, 30 ♂ and 19 ♀ were reared. Type in the British Museum.

In external characters this mosquito resembles *A. confusus* Edw., but, in the male the white border to the mesonotum is less broad. Moreover in *A. confusus* there are no white scales on the lateral lobes of the scutellum and the first six abdominal sternites are all white. The hypopygium resembles that of *A. obturbans* (Walk.), but the shape of the hairs on the basal lobes of the coxite is quite otherwise.

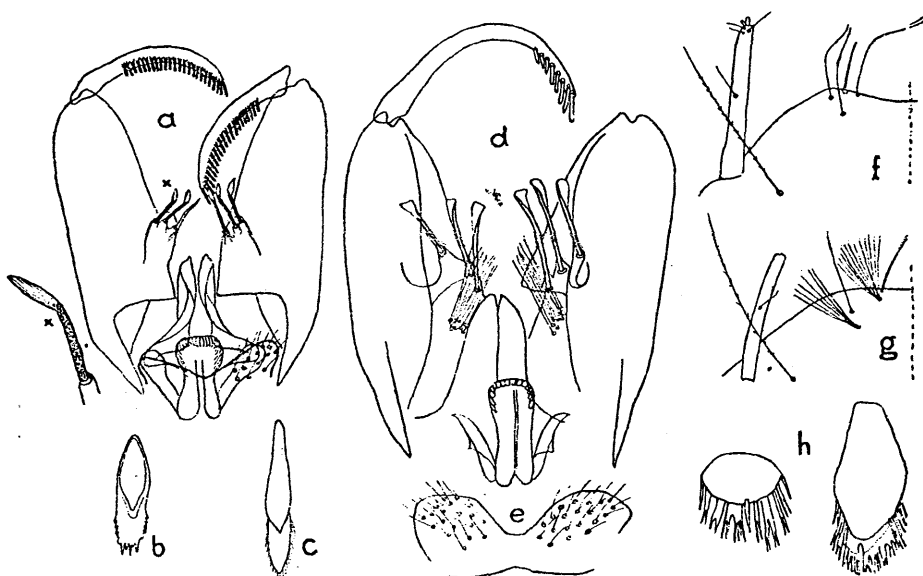


Fig. 5. *Armigeres*. a—b, *A. (Armigeres) candelabris*: a, hypopygium; b, combscale. c, *A. (A.) kuchingensis* var. *javanensis*: combscale. d—e, *A. (A.) spathulatus*: d, hypopygium; e, ninth tergite. f—h, *A. (Leicestertia) annulipalpis*: f—g, showing range of variation in branching of frontal hairs; h, comb-scales.

***Armigeres (Armigeres) kuchingensis* Edw. var.**

***javanensis* nov. var.**

Male. Vertex with a rim of white scales to the eyes and a central white patch. Tori thickly clothed with white, flat scales. Clypeus bare. Mesonotum with a white border and a short, white prescutellar line, continued on the mid lobe of the scutellum: some white scales on the lateral lobes of the latter; mesonotum and scutellum otherwise black-scaled.

Outer side of hind femur with a white stripe reaching the apex. Tergites with white, basal, lateral patches, those on the second covering all the length of it. Sternites II and VI white, the others black. Hypopygium: On the basal lobe of the coxite there are 2 spines, in shape and position agreeing with those of *A. kuchingensis* Edw.; in other respects the hypopygium much resembles that of *A. obturbans* (Walk.), the style, when depressed, reaching the basal lobe.

**F e m a l e.** The coloration differs from that of the male in the following respects: The white border on the mesonotum is somewhat narrower and the white median prescutellar line often rudimentary. Sometimes the scutellar scales are all dark. In addition to the second and sixth abdominal sternites the fifth also is largely white scaled, a narrow apical, black band only being present.

**L a r v a.** Frontal hairs: A usually with 3 branches, sometimes with 2; B single; C 2—5 branched; d 4—6 branched. Number of branches in the dorso-lateral hairs of the first 5 abdominal segments: 7—9, 4—7, 2, 2, 2. Comb on the 8th abdominal segment of 14—38 scales, each scale with a large base and a short shaft, the latter with a fine fringe all over the border (fig. 5, c).

This mosquito is especially characterised by the ornamentation of the abdominal sternites. It can be recognised, even with the naked eye, the white sixth sternite of the male (5th and 6th of the female) standing out very clearly against the other, black ones. The larva comes near that of *A. obturbans* but usually it has more scales (20—30) in its comb.

**Habitat.** On mountain Tangkoeban Prahoe (Java) at an altitude of 1600 m the larvae were found breeding in fern-tree-stumps and in holes in fallen trees. 66 ♂, 45 ♀, 1 larval skin and 10 larvae were secured. Type in the British Museum.

***Armigeres (Armigeres) spathulatus* nov. sp.**

**M a l e.** Externally much like *A. obturbans* (Walk.) but the pale scales are white as against creamy coloured or even yellow in *obturbans*, and, moreover, there are some differences in design. The pale border to the eyes is equally narrow over its whole length, the black-scaled area of the vertex being continued to the under side of the head; in *obturbans* the black area is restricted to the dorsal side. The central pale spot on the vertex is obvious in *obturbans*, rudimentary in *spathulatus*. In the latter species the 7th abdominal sternite is all dark whereas in *obturbans* it shows an apical, pale band.

The main differences, however, are in the hypopygium (Fig. 5, d, e). The style is strongly curved and has 8 teeth only, the latter occupying one third of the length and gradually decreasing in size from the apex on. The basal lobe of the coxite bears 3 spathulate spines and a broom-shaped tuft of

hairs basally. The lobes of the 9th tergite are broad, ovate and covered with many small hairs.

One male specimen was reared from a larva found in a beached cano in Ralio Sawalit on the North-coast of Ceram (Moluccas). Type in the British Museum.

*Armigeres (Leicesteria) annulipalpis* (Theo.).

*Larva*. Antenna cylindrical, straight, smooth, with a fine single hair at  $\frac{2}{5}$  of the length from the tip, or a little beyond the middle. Preclypeal spines long, slender, not set on a tubercle. Frontal hairs rather variable (fig. 5, f, g), especially C and d, as may be seen in the following state:

Larval skins	Number of branches					
	A	B	C	d	e	
No: I	1-1	1-1	5-6	10-12	1-2	In no: I and II B was set well inside the preclypeal spine.
II	2-2	1-1	3-4	7-10	2-2	
III	1-1	1-1	1-2	1-1	1-?	In no: III and IV B was set behind the preclypeal spine.
IV	2-2	1-1	3-3	1-1	1-1	

Unfortunately the 4 larvae all yielded females, not showing any difference in colouration. Mental plate with a triple central tooth and 5 lateral ones on each side, the outer of which is the largest.

Comb on 8th abdominal segment of about 35-40 scales of *Leicesteria*-type; the tips irregularly frayed, more so than in *A. (L.) flavus* (Leic.) (fig. 5, h).

Siphon: index about 1 in the perhaps somewhat flattened specimens at hand; triangular in outline, with a single or bifid hair implanted at about  $\frac{2}{3}$  of the length from the base. Anal segment with a dorsal chitinous plate only. Inner dorsal hair with 5-6 branches, outer 4- or 5-branched, both slightly plumose and longer than the siphon. Lateral hair very small, 3- or 4-branched, removed from the apex. Anal brush of 10 slightly plumose 4- or 5-branched hairs (the basal hairs may have 6-7 branches), about as long as the dorsal hairs. Anal gills bulky, twice as long as the saddle.

Described from 4 larval skins; the larvae were found in bamboo-stumps in Kabaena.

*Aedes (Stegomyia) albolineatus* (Theo.).

Variability of the *larva*. From a series of 15 males and 18 females, bred from larvae from Ceram (Moluccas) and homogenous in colouration and in structure of male hypopygia, 13 larval skins were preserved, showing the following variation:

Size of the antenna and its hairs: In fig. 6, c the antennae of two specimens with the same head size are depicted; in that on the left not only the shaft is much longer, but also the hairs are much longer in relation to the shaft's length. The frontal hairs B (fig. 6, d) showed the following numbers

of branches in the different specimens: 1, 1, 1, 1, 1, 6, 7, 9, 10, 10 (in 2 specimens they were missing). The relative position of the insertions of B, C and d is very variable. In some specimens the siphon and the saddle of the anal segment are covered all over with small dark hairs, in others they are not (fig. 6, e). The spines at the apex of the vary considerably in size (fig. 6, e).

There is no correlation between these many varying characters. It is true that a large antenna coincides in all specimens with a many branched B-hair. However, large spines on the apex of the anal segment may be combined with a large antenna, but also with a small antenna. The presence or absence of small hairs on the siphon and the saddle show the same dis correlation with the antennal size; moreover they may occur in specimens with large spines on the saddle as well as in such with small spines. Much more material is wanted in order to make out in how far we have to do here with different forms or with variability of one form.

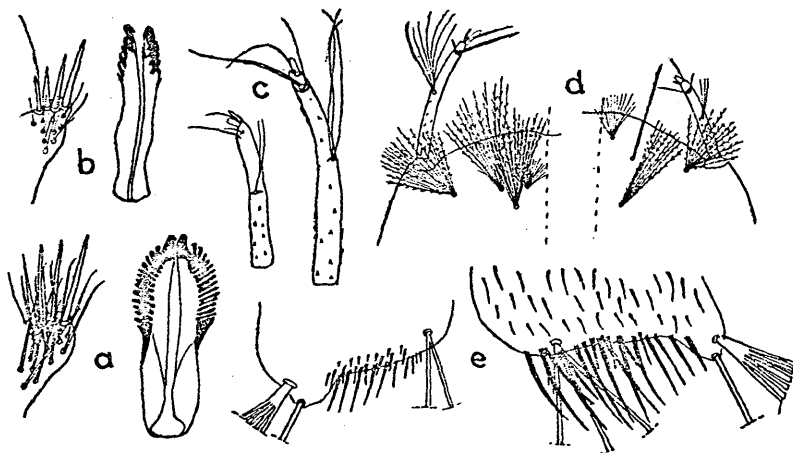


Fig. 6. a, *Aedes (Stegomyia) pseudalbolineatus*: basal lobe of coxite and phallosome. b—e, *A. (S.) albolineatus*: b, basal lobe of coxite and phallosome. c—e, to show range of variation in larval characters: c, antennae of 2 specimens with the same head-size; d, frontal hairs; e, apex of saddle of anal segment.

***Aedes (Stegomyia) pseudalbolineatus* nov. sp.**

Male. Externally the male can only be distinguished from that of *A. (S.) albolineatus* by the scutellum being completely covered with silvery white scales only, whereas in *albolineatus* the mid lobe only is so. The hypopygia are rather similar, but there are two characteristics that may serve to distinguish them (fig. 6, a, b): 1. The hairs on the basal lobe of the coxite are stout and almost as thick as the 4 spines, in the new species, whereas in *albolineatus* the hairs are fine and can be easily distinguished from the spines. 2. On the apical half of the phallosome there are, on each side

14—16 laterally outstanding teeth as against 6—7 only in *albolineatus*, in which they are directed more apically; so, the phallosome looks much broader in front view.

**Female.** Distinguished from the female *albolineatus* besides by the all-white scutellum, by having, in addition to the white basal bandings on the first and second hind tarsal, most of the third tarsal white on three sides, leaving only the fore side, and sometimes a narrow apical band, black. In some specimens even a larger or smaller part of the fourth tarsal is white.

**Larva.** The larva is very similar to that of *A. albolineatus* and the three larval skins, I possess, fit into the range of variability discussed under that species. It seems to be just as variable as that of *albolineatus*; amongst the 3 specimens there were 2 with large antennae and one with small antennae; two have many small hairs on the saddle, one has not. The only difference that I could observe was that the outer occipital hair has 6—10 branches in *pseud-albolineatus* as against 2—3 (once 4 and once 5) in *albolineatus*. But it is doubtful whether this character will hold good when more material is available.

This mosquito was bred from larvae found in a broken bottle, in bamboostumps, in a dead bamboo of a fence, in tree-holes in the virgin forest and in a hole of a mango-tree. It occurred in Malino at 1000 m altitude and in Laboan Beroko (both in Celebes), in Kabaena, and in Taroena (Sangir Islands, north of Celebes). In all 18 males, 22 females, and 3 larval skins were collected.

Type in the British Museum.

*Aedes* (*Stegomyia*) *gardnerii* (Ludl.).

The hypopygium of this species has been described by Dyar (*Ins. Insc. Menstr.*, 1920, VIII, 182). It is figured here (fig. 7, a, b). 7 males and 7 females were reared from larvae found in tree-holes and in a bamboo-stump in Kalawara and in Bintaena (Celebes).

*Aedes* (*Finlaya*) *notoscriptus* (Skuse) var. *montana* nov. var.

It was a great surprise to me to find a specimen of *A. notoscriptus* (Skuse) when rearing larvae found in a tree hole in Lembang (Java) at an altitude of 1250 m. Until now this species was considered to be truly Australian, not being found further westward than in Saparoea, a small island near Ceram (Moluccas). — The specimen was a male; externally it differed from Australian and New Guinea specimens only by the white stripe on the outer side of the hind tibia. In Australian specimens this stripe extends over the basal  $\frac{3}{4}$  of the tibia's length and is equally broad all over. In the Java specimen it gradually narrows apically and does not occupy more than half the length of the tibia.

The hypopygium shows some differences with those of specimens from the Australian region. The style is longer, the apical spine of it shorter in relation to the style's length (fig. 7, c, e). The appendage of the harpago is longer; on the base of the shaft there is a long hair reaching beyond the base of the appendage; in the Australian specimens this hair is much shorter (fig. 7, c, f). The ninth sternite bears 3 large hairs and 4 small ones, in the *var. typica* there are one or two main hairs (shorter than in *var. montana*) and some small ones (fig. 7, d, g).

Type specimen in the British Museum.

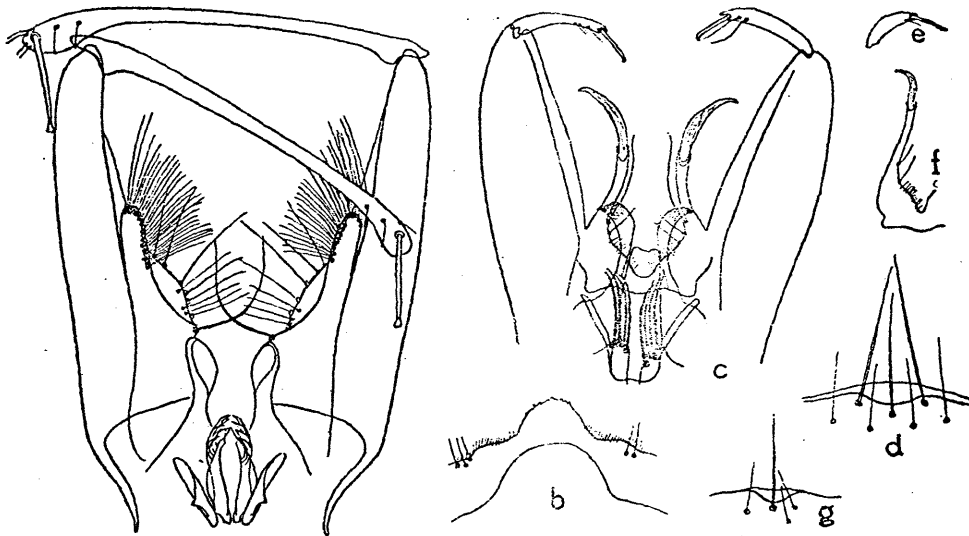


Fig. 7. a—b, *Aedes (Stegomyia) gardnerii*: a, hypopygium; b, ninth tergite. c—g, *A. (Finlaya) notoscriptus*: c—d, *var. montana*: c, hypopygium; d, tenth sternite; e—g, *var. typica*: e, style; f, harpago; g, tenth sternite.

#### *Aedes (Finlaya) alboniveus* Barr.

*Larva*. Barraud (Fauna of British India, Diptera, V, 210) has given a short description of the larva. More material, including several larval skins, is now at hand and Barraud's description can be completed thus:

Head (fig. 8, a): Antenna about  $\frac{3}{4}$  as long as the head, curved inward, with numerous spicules. Tuft inserted before the middle, with about 12—14 plumose branches, the longest  $\frac{3}{4}$  as long as the shaft; subapical hairs unequal in length, the longest half as long as the shaft; one long apical hair. Frontal hairs A, B, C and d all well developed, with 9—11, 7—10, 8—10, and 10—11 plumose branches; e small, bifid. Preclypeal spines long and slender. Mental plate (fig. 8, c) with a blunt, central tooth and about 10 smaller ones on each side.

Comb on the 8th abdominal of 10—13 scales, sharp pointed and fringed on the basal half (fig. 8, d).

Siphon bulging a little near the middle; index 3 or a bit less. Pecten with 16—25 teeth, each with one denticle before the middle (fig. 8, e); it covers half the length of the siphon or a bit more. Siphonal tuft at the middle or a trifle beyond, 4- to 6-branched, the branches plumose and about as long as the siphon's breadth. Close to the siphon's base, near where the pecten begins, there is a small chitinous plaque that might best be described as a detached acus (fig. 8, b).

Anal segment with the saddle almost complete, longer than broad, with a row some 20 tiny spines at the apex. Submedian dorsal hairs: inner 2- or 3-branched, outer single, both plumose. Lateral hair well developed, about as long as the segment, 2-branched, subplumose. Anal brush consisting of 8—12 three- or four-branched hairs, non-plumose. Anal gills long, the dorsal pair about twice as long as the segment, the ventral pair a bit longer, slender, cylindrical or slightly conical.

Described from 13 larval skins and 9 larvae found in holes of a cinnamon tree and of another tree in Lembang (Java) at 1250 m altitude.

In the larva of *A. (F.) niveus* (Ludl.) the antenna is shorter, slenderer and less curved and the spicules less obvious (fig. 8, h). The scales of the comb are a bit more

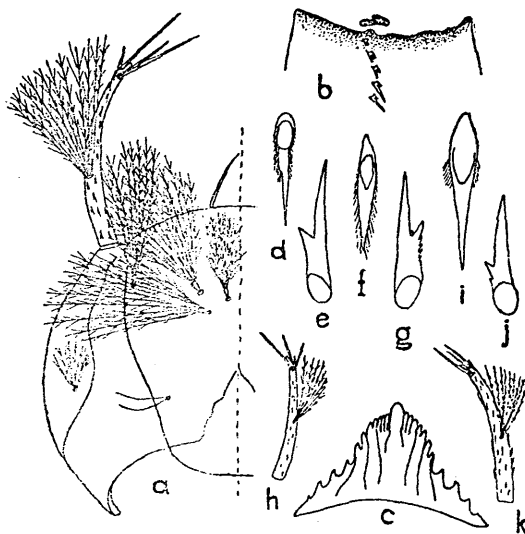


Fig. 8. *Aedes* (*Finlaya*). a—e, *A. (F.) alboniveus*: a, head; b, base of siphon; c, mental plate; d, comb-scale; e, pecten-tooth. f—h, *A. (F.) niveus*: f, comb-scale; g, pecten-tooth; h, antenna. i—k, *A. (F.) niveoides*: i, comb-scale; j, pecten-tooth; k, antenna.

N.B. The pecten teeth are twice as much enlarged as the comb-scales.

numerous (14—17) and fringed over all the length (fig. 8, f). There is no detached acus. The siphon is shorter (index 2 at most), the pecten's teeth have a pale tip, and, in addition to the denticle, a fringe on the basal half (fig. 8, g); the siphon's tuft has 8—11 branches. The spines at the apex of the saddle are stouter; the inner submedian dorsal hair is 8-branched and so are the hairs of the anal brush. The gills are carrot-shaped and shorter than the anal segment.

The larva of *A. (F.) niveoides* Barr. is distinguished that of *A. (F.) alboniveus* by the following characters: Antenna (fig. 7, k) about as in *niveus*. The comb consists of 7—8 scales, fringed at the base only (fig. 7, i). The siphon is much longer, the index being  $4-4\frac{1}{2}$ .

*Aedes (Finlaya) flavipennis* (Giles) var. *avistyla* nov. var.

The colouration of this variety is very variable. Externally it cannot be distinguished from the typical variety (Giles). However, the male hypopygium is rather different. I figured that of the typical variety formerly (Bull. Ent. Res., 1934, XXV, p. 513). That of var. *avistyla* (fig. 9, f) misses the second (lateral) scale-tuft on the coxite, moreover, the stem of the harpago is slenderer, its blade less curved and broader. The bird-like outline of the style, and the hair tuft near the medial scale-tuft on the coxite (not drawn in the paper just mentioned and on the right side only in fig. 9, f) they have in common.

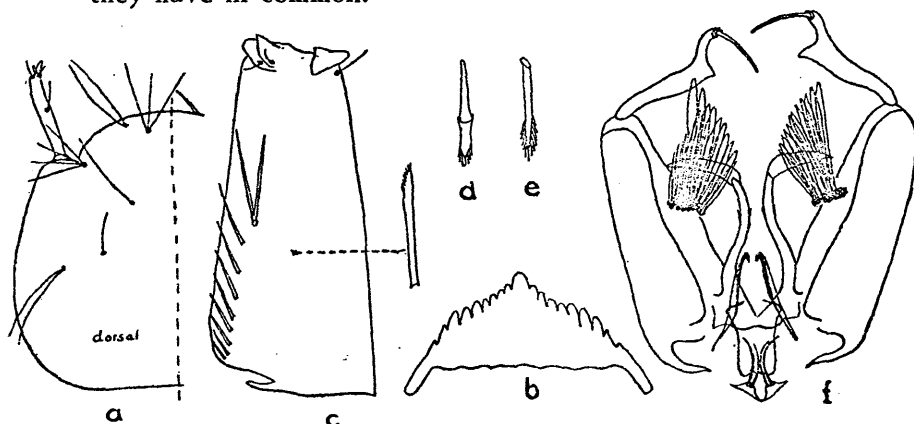


Fig. 9. *Aedes (Finlaya) flavipennis* var. *avistyla*: a—e, larva; a, head; b, mental plate; c, siphon; d, comb-tooth; e, spine on saddle. f, male hypopygium.

Larva. Head (fig. 9, a). Antenna about one third as long as the head, smooth. Antennal hair single, fine, not quite half as long as the shaft, set a bit beyond the middle. Head slightly broader than long. A-hair 3- or 4-branched, B 2-branched, C single or bifid, d 2- to 4-branched, e single

or bifid; d inserted inside B, both near clypeal border, C far behind B; A, B and d about equally long, C the longest, e the shortest; outer occipital hair bifid or trifid, rather large. Preclypeal spines moderately long, slightly curved, not pigmented, inserted just before d. Mental plate (fig. 9, b) triangular with a large central tooth and some 9 lateral on each side, the inner 3 or 4 smaller than the succeeding 3, the outer 2 very small.

Meso- and metathoracic spines small. On the thorax and the abdomen there are many stellate, stiff, pale hairs, each with 8—10 branches, the latter frayed and sometimes broadened at the tips. Comb on the 8th segment of some 50 scales in a triangular patch. The scales slender with an obtuse, fringed tip (fig. 9, d).

Siphon (fig. 9, c): index not quite 2. Pecten occupying about the basal half, consisting of 7—10 teeth, the basal ones very small, apically the teeth gradually grow larger; they are very slender, straight, and with a fine fringe on the tip. Siphon hair set a little beyond the middle, with 2 or 3 stiff, smooth branches, shorter than the siphon's diameter.

Anal segment: the saddle embraces a bit more than half the circumference, about as long as broad, subapically with a row of some 10 large spines, fringed at the tips (fig. 9, e), and some smaller ones. Inner dorsal hair with 4—6 smooth branches, more than  $1\frac{1}{2}$  times as long as the siphon, outer single, more than twice as long. Lateral hair as long as the inner dorsal, with 2 or 3 smooth branches. Anal tuft of some 10 hairs, forked into three rather far from the base (at about  $\frac{1}{5}$  of the length), not plumose. Anal gills broad, rounded at the tips, anterior pair twice as long as the segment, posterior a bit shorter.

Described from 30 males and 32 females, reared from larvae and pupae, 6 larval skins and 12 larvae. The species was frequently found breeding in the leaf-axillae of *Colocasia* and once in a bamboo-stump. It occurred near Lindoe Lake at 1000 m altitude and in Kalawara, both in Celebes, and in Bae-bae (Boeton). In Bintaoena (Celebes) a female was observed to attack man, but this might as well have been a specimen of the typical variety.

Type in the British Museum.

*Aedes* (*Skusea*) *kabaenensis* nov. sp.

Male. Vertex with uniformly dark brown flat scales and some upright forked ones on the nape. Antennae densely plumose. Proboscis black,  $1\frac{1}{2}$  times as long as the fore femur. Palpi  $\frac{2}{3}$  as long as the proboscis, not hairy; the subapical segments each with some 3 bristles at their tips.

Mesonotal integument black, covered with small, dark brown, curved scales and with many bristly hairs. Mid part

of the scutellum with flat, black scales, side lobes unscaled, but with a black patch in the integument, between those three black parties the integument is dirty yellow or pale brown. Anterior pronotal lobe unscaled, dirty yellow; posterior with black, flat scales on the upper part. Pleurae: integument brown, patches of dirtily cream-coloured flat scales on the sterno-pleura and the upper mesepimeron, on the latter not intermixed with hairs; no lower mesepimeral bristles. Wings: outstanding scales mostly linear, ligulate on the branches of the anterior fork; the base of the posterior fork-cell nearer the wing-base than that of the anterior; the stem of the former a trifle longer than the cell, that of the latter just as long. Legs: Inner sides of femora dirty yellow, otherwise all black; hind tibia  $\frac{7}{6}$  times as long as the first tarsal joint.

Tergites dark brown, with, from the second on, dirtily cream-coloured, lateral, basal patches; sternites creamy coloured basally, dark brown apically. Hypopygium (fig. 10, a): Coxites long and slender, with a ventrally protruding, large basal lobe, that is thickly set with whip-like, short hairs, basal part of each hair being stout and straight, the apical part lash-like; at the remotest part of the lobe the hairs are longer, thin all over the length and wavy. Styles thickest subbasally, curved in the apical half, with a rather long, straight appendage. The hypopygium protruding out of the abdomen all these characters can be made out in the unprepared specimen, especially the basal lobe offers a characteristic aspect when the abdomen is seen from the side (fig. 10, b). Phallosome very simple, without detached blades or teeth; harpagos absent; crown of paraproct with one tooth only. Ninth tergites with prominent lobes, each with 1—3 thick hairs and 1—2 fine ones.

**F e m a l e.** As the male, but the palpi are  $\frac{1}{5}$  as long as the proboscis. The cerci are rather long, and slender (fig. 10, h), more so than in *A. (S.) fumidus* Edw. (fig. 10, i). Eighth segment sometimes almost completely retracted, sometimes exerted.

**L a r v a.** Head (fig. 10, c). Antenna about  $\frac{3}{4}$  as long as the head, slightly curved, with small spicules all over. Tuft set before or at the middle or slightly beyond, with 3—4 sub-plumose branches. Frontal hairs: A 10—12 branched, moderately sized; B very large, brown, single, plumose; C a bit shorter, bifid or trifid, plumose; d very small, at the base with 4—5 branches, that bifurcate again further on; e rather long, single; B, C and d inserted far behind the clypeal border. Pre-clypeal spines, long curved, very slender. Mental plate (fig. 10, d) high, with one large central tooth and some 13 smaller on each side.

Comb on 8th segment of more than 80 scales in a semi-circular patch; the tips of the scales expanded and with a

long fringe, a fine fringe all over the sides (fig. 10, g).

Siphon (fig. 10, e) brown, rather broad at the tip, index about 3, with a small, L-shaped acus. Pecten of 14—20 teeth, covering a little more than half the length, the teeth dark brown, sharp, with a denticle before the middle and often one or two very small additional ones (fig. 10, f). Insertion of the siphon's tuft removed some distance from the last tooth; tuft consisting of 4 smooth branches, shorter than the siphon's diameter.

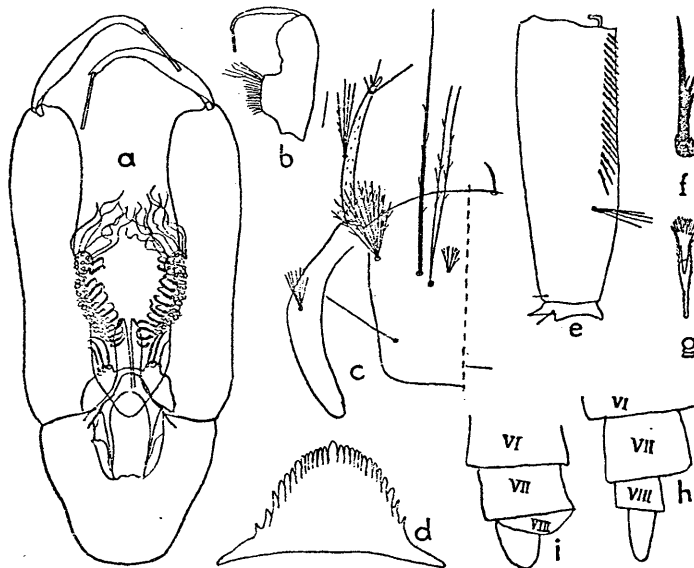


Fig. 10. *Aedes* (*Skusea*). a—h, *A. (S.) kabaensis*: a, hypopygium; b, same, side view; c—g, larva: c, head; d, mental plate; e, siphon; f, pecten-tooth; g, comb-scale; h, tip of abdomen of female. i, *A. (S.) fumidus*: tip of abdomen of female.

Anal segment. Saddle covering less than half the circumference; apical border without spines. Inner dorsal hair about 12-branched, outer single, both non-plumose. Lateral hair small single. Anal tuft of 12 hairs with 13-non-plumose each, very dense. Anal gills oval, short, not more than  $1\frac{1}{2}$  times as long as broad.

This mosquito was found breeding in crab-holes near the shore in Kabaena. In all, 38 males, 29 females, 6 larval skins and 9 larvae were obtained. Type in the British Museum.

#### *Aedes* (*Skusea*) *fumidus* Edw.

Larva. The larva has been described, from Singapore specimens, by Edwards (Bull. Ent. Res., 1926, XVII, 119) under the name *Aedes amesi* (Ludl.). In Bintaoena (Celebes) and in Kabaena new material was collected: 9 larval skins

and 20 larvae; from 3 of the skins males have hatched with a quite characteristic hypopygium.

Generally the larvae agree with Edwards' description, but there are some small differences. In the Singapore larvae the antennal hair is very small, in my material it exceeds the tip of the antenna. The e-hair is bifid (rarely single) as against single in the Singapore specimens. The pecten teeth do not show the small denticles at the base described by Edwards. The anal gills are twice or thrice as long as the segment, in the Singapore larvae they were just as large. The anal brush is composed of 10 hairs.

The following characters not mentioned by Edwards, could be made out in the new material: The C-hair of the frons is rather long and single. The inner dorsal hair of the anal segment is 6—9 (mostly 7—8) -branched, the outer single; the lateral hair is single and a bit longer than the segment.

#### *Aedes* (Skusea) *furvus* Edw.

Amongst a party of larvae found in a tree-hole with brackish water near the shore in Kabaena, from which 3 males of *A. (S.) furvus* were reared, 13 specimens closely resembled the larvae of *A. (S.) fumidus*, but they showed some constant differences. Very probably they are the larvae of *A. (S.) furvus*; in the absence of larval skins the identity, of course, is not absolutely certain. (Besides the specimens mentioned the breeding place yielded 1 male and one female *A. (S.) longirostris* (Leic.), 1 male and 1 female *Culex spathifurca* Edw. and 1 female *A. (Stegomyia) albopictus* (Skuse).

The differences between these larvae and those of *A. (S.) fumidus* were the following: The frontal C-hair is bifid (in one specimen single on one side and bifid on the other side). The inner dorsal hair of the anal segment has 10—13 branches (mostly 11—12) as against 6—9 (mostly 7—8) in *fumidus*. The anal gills are shorter than the saddle, at most  $\frac{2}{3}$  times as long; in *fumidus* they are 2 or even 3 times as long. The latter character, however, may not be of specific value as the larvae were found in brackish water and the *fumidus* specimens in fresh water.

#### *Culex* (Mochthogenes) *malayi* (Leic.).

Larva. 10 larvae from a batch from which 16 males and 9 females were reared, agreed fairly well with Borel's description. The identity is not absolutely certain as skins were preserved.

The head (fig. 11, a) is almost twice as broad as long. Antennae as long as the head, with spicules mainly on the basal two thirds; tuft inserted on  $\frac{2}{3}$  of the length from the

base, with some 18 plumose branches, the longest  $\frac{2}{3}$  as long as the shaft; subapical hairs inserted at about a siphon's breadth from the tip, nearly as long as the tuft. Frontal hairs: A large with some 9 plumose branches; B moderately long, 2- (sometimes 3-) branched, non plumose; C, d and e very small, with 2-4, respectively 1-2 and 3-5 branches. Preclypeal spines rather short, blackish brown. Mental plate as described by Borel.

Comb on 8th segment of 18-29 scales in 3 irregular rows; there are two types of scales (fig. 11, c): with a sharp point and a tiny fringe at the base, and, smaller ones with a long apical fringe. Siphon: index  $5\frac{1}{2}$ ; acus large and of a characteristic shape, with a triangular process ventrally and a club-shaped one dorsally. Pecten, siphon hairs and anal segment with appendages as described by Borel.

The larvae were found in a stone basin, in Kabaene, together with those of *Anopheles barbumbrosus* Strickl. & Chowd.

**Culex (Culex) tritaeniorhynchus var. siamensis Barr.**

**Larva.** Morphologically closely corresponding with the *tritaeniorhynchus*-larva from Karwar as described by Barraud (Fauna of British India, Diptera, V, 405). The siphon's index is 8 and the lateral hair of the anal segment is half as long as the saddle; the fifth (or sixth) lateral tooth of the mental plate larger than the preceding ones (fig. 10, d). The only difference I can detect, is that the antennal tuft in Barraud's figure shows 11 branches whereas in the specimens from the Malay Archipelago there are about 30.

Frontal hairs: A, B and C on an oblique straight line, with 6-8, 2 and 3-4 plumose branches, A and C about as long as the antenna, B somewhat longer; d small, single; e small, with 3-4 branches. Preclypeal spines moderately long, sharp, brown.

While in hypopygeal characters this variety approaches *C. (C.) vishnui* Theo. the larval structure does not show such a tendency; the number of comb-scales f.i. is about 35.

**Culex (Lophoceratomyia) minor var. bandoengensis nov. var.**

**Male.** Distinguished from the *var. typica* Leic. by the palpi exceeding the proboscis in length by about the last segment, by the absence of specialized hairs on the sixth antennal joint and by some differences in the hypopygium: One of the three rods on the subapical lobe of the coxite is strongly curved before the middle; there are two small hairs with fishhook-shaped tips on this lobe (fig. 11, e). Near the dorsal border of the coxite there is a double row of whip-like hairs (fig. 11, e), in all 19 in number, as against a single row of 7 hairs only in the *var. typica* and of 5 hairs in the

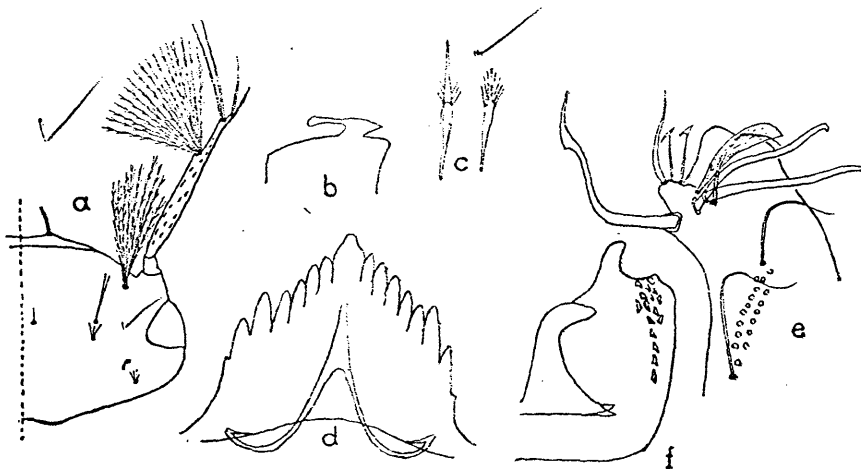


Fig. 11. *Culex*. a—c, *C. (Mochthogenes) malayi*: a, head; b, acus; c, comb-scale. d, *C. (Culex) tritaeniorhynchus* var. *siamensis*: mental plate. e—f, *C. (Lophoceratomyia) minor* var. *bandoengensis*: e, upper part of coxite; f, phallosome.

var. *bengalensis* Barr. The teeth of the phallosome are more numerous (16) than in the var. *typica* (5 in Barraud's figure, 8 in Borel's figure) (fig. 11, f).

One specimen was obtained from a larva, found in a bamboo-stump near Bandoeng (Java) at 800 m altitude. Type specimen in the British Museum.

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