

NOTES ON PHILIPPINE MOSQUITOES, I

THE ARMIGERES GROUP¹

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FOUR PLATES AND THREE TEXT FIGURES

The culicine mosquitoes of the Philippines have not been intensively studied. Undoubtedly a good collection from such important islands as Luzon, Mindanao, and Palawan will bring to light many interesting new forms. The main part of what is now known of Philippine culicines is the descriptions based upon specimens sent to Dr. C. S. Ludlow by the United States Army, to Dr. H. G. Dyar by Dean C. F. Baker, and by some other workers to the British Museum and elsewhere. It is regrettable that no duplicate of this material was left in the Philippines, for direct comparison of new material should be made with such type specimens.

¹ Submitted for publication October, 1934. This study was made in the laboratory of Malaria Investigations of which Dr. Paul F. Russell is chief. Malaria Investigations is jointly supported by the Bureau of Science, Manila, and the International Health Board of the Rockefeller Foundation.

The material upon which the discussions are based was collected partly by me while I was stationed in the malaria field laboratory of the Bureau of Health at Tungcong Manga, San Jose, Bulacan Province, Luzon, and on anopheline collecting trips to Mindanao, Palawan, and other places, for Malaria Investigations; partly by the staff of the Bureau of Health malaria field laboratory who submitted to me for identification caught-wild mosquitoes; partly by Mr. D. Santiago and Mr. F. Guinto, of Malaria Investigations; and partly by the staff of the United States Army Medical Department Research Board, who sent mosquitoes to Malaria Investigations for determination. The mounting of adults and the dissection of male terminalia and other structures were done exclusively by Mrs. I. V. Ramos, of Malaria Investigations. All the drawings were traced by me with the aid of a camera lucida and inked by Mr. E. Enriquez and Mr. W. Garcia, artists of Malaria Investigations.

To all these people and particularly to the Director of Health, to Dr. C. Manalang, and to Dr. A. Ejercito, of the Bureau of Health, and to Dr. Paul F. Russell, under whom I have been assigned the last four years, I am greatly indebted.

Seven species are included in this paper, three of which are new. They are the following:

- Armigeres (Armigeres) ejercitoi* sp. nov.
Armigeres (Armigeres) kuchingensis Edwards, 1915.
Armigeres (Armigeres) manalangi sp. nov.
Armigeres (Armigeres) russelli sp. nov.
Armigeres (Leicesteria) digitatus Edwards, 1914.
Armigeres (Leicesteria) flavus Leicester, 1908.
Armigeres (Leicesteria) magnus Theobald, 1908.

The nomenclature employed in the following descriptions is in accordance with the latest published works of Edwards (1932), Christophers (1933), and Barraud (1934). Text figs.

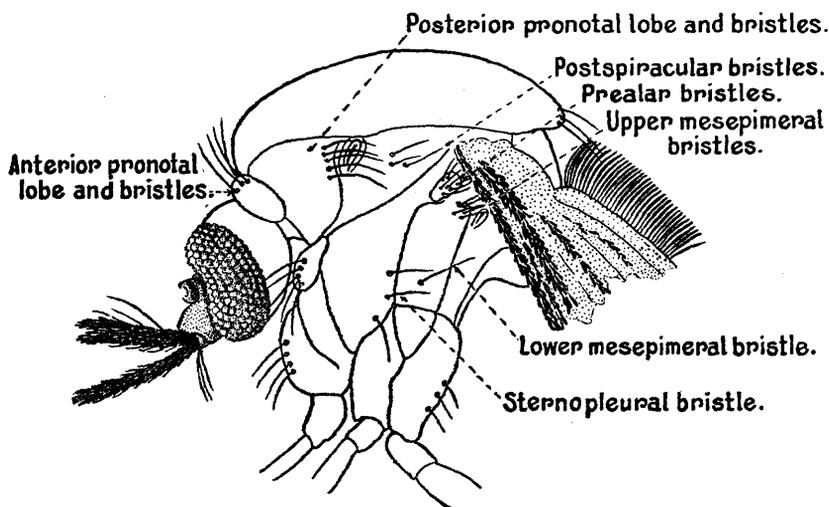


FIG. 1. *Armigeres ejercitoi* sp. nov., pleural side of thorax; from a camera-lucida drawing.

1 (pleural side of thorax) and 2 (male terminalia) show some of the more important parts.

ARMIGERES (ARMIGERES) EJERCITOI sp. nov.

Types.—Male (lot R28-4), and female (lot R28-3) with their corresponding larval skins; cotypes, 6 males and 7 females with their corresponding larval skins; and 10 males and 6 females without larval skins are all in the Philippine Bureau of Health collections at Manila. Collected by F. E. Baisas from Kolambagan, Lanao, Mindanao, March 21, 1934. Larva breeds in fairly good number in tree holes. Habits of adults unknown.

Adult (male and female).—Head clothed with dark brown flat scales, a few white ones on vertex; some upright forked

scales on nape. A border of creamy scales to eyes, somewhat broadening along sides. Clypeus dark, bare. Antennæ normal; tori with broad flat scales all around. Proboscis dark, shorter than front femur. Palpi dark, about one-fourth the length of proboscis in female, and longer by about the length of the apical segment in male. Thorax: Mesonotum covered with dark brown scales; a broad border of white scales along the margin from anterior side to above wing roots. Præscutellar area with a median patch of white scales forming a continuous white line with pale scales on middle of midscutellar lobe. Dark scales cover edges of middle lobe and the whole of two lateral lobes of scutellum. Anterior pronotal lobe covered with white scales. Pleura and coxæ with wide patches of broad, flat, silvery scales. Postspiracular bristles usually two, sometimes four. White scales but no black ones on postspiracular area. One lower mesepimeral bristle. Wings dark-scaled. Legs dark except undersides of fore and midfemora where there is a longitudinal line of white scales extending from bases to apices of segments. Hind femur extensively pale at about basal two-thirds or more underneath. Fore tarsal claws of female normal. Hind tibia as long as middle tibia. Abdominal tergites dark except VIII where there is a median basal pale patch or band. White lateral patches hardly visible dorsally on most of the segments; sternites extensively pale, particularly I and II. Apical dark patches or bands on III to VI; VII usually dark basally, white apically, entirely dark in some individuals.

Male terminalia (Plate 1, figs. 1, 3 to 5, 7, and 8).—Lobes of tergite IX not very prominent, bearing about nine spines each. The median thickening of sternite IX sometimes imperfectly fused with main chitinous part, and bearing about eight spines besides microtrichia. Coxite short and broad. Basal lobe and its spines represented by six or seven clublike spines, besides many smaller ones along inner border. Style rather short, bearing on its slightly expanded apex ten or eleven strong teeth.

The form of the style of the male terminalia resembles that of *Leicesteria*. Other characters, however, are distinctly of the subgenus *Armigeres* aside from the peculiar basal lobe. The shortness of the female palp, the presence of postspiracular bristles, and of white scales but no black ones on the postspiracular area, and the lower mesepimeral bristle, are characteristic of the subgenus *Armigeres*.

ARMIGERES (ARMIGERES) KUCHINGENSIS Edwards, 1915.

A widely distributed species; found in various places, both sylvan and urban, in Luzon and Mindanao; breeds in bamboo joints and tree holes.

Adult (male and female).—Head covered with broad flat scales, some scattered white ones on vertex, and upright scales on nape; a border of white to eyes, broadening at sides; remaining parts blackish. Clypeus black, bare. Antennal tori with broad flat scales. Proboscis dark, about as long as front femur. Palpi dark, less than one-third the length of proboscis in female, longer by about one-half the length of the ultimate segment in male. Thorax: Mesonotum covered with narrow dark brown scales, a border of pale ones around the edges from anterior margin to wing roots. The area behind the anterior pronotal lobe is extensively white and joins the white border line. Præ-scutellar area with a patch of pale scales at middle, forming a continuous line with white scales on middle of scutellar midlobe. Lateral lobes as well as the sides of midlobe of scutellum covered with dark scales. Anterior and posterior pronotal lobes covered with white scales. Postspiracular bristles present; white scales, but no black ones, on postspiracular area; one lower mesepimeral bristle. Extensive patches of white scales on pleura and coxæ. Wings dark-scaled. Legs dark except undersides of femora, which are whitish. Abdominal tergites covered with dark brown scales; tergite VIII with a wide, median, pale basal patch or band. White lateral patches on most of the segments, visible dorsally on posterior segments. Sternites white up to VI; VII dark basally, white apically. In some there are black apical patches on sternites III to VII. The white patches on the lateral side of tergites are continuations of the sternal white parts.

Male terminalia (Plate 3, figs. 1, 3, 5, and 7).—Lobes of tergite IX not very prominent, each bearing about ten spines. Sternite IX with median thickening bearing about seven spines arranged roughly in a single row. Coxite long and broad with numerous long spines. Basal lobe of coxite with three or four curved spines pointing toward the center of the coxite. Style with a row of strong teeth aligned on more than the apical half of the inner side; tip reaches basal lobe when pressed against coxite.

A single specimen sent to us from Mount Kinabalu, at about 4,000 feet elevation, Borneo, is very much like *A. kuchingensis*

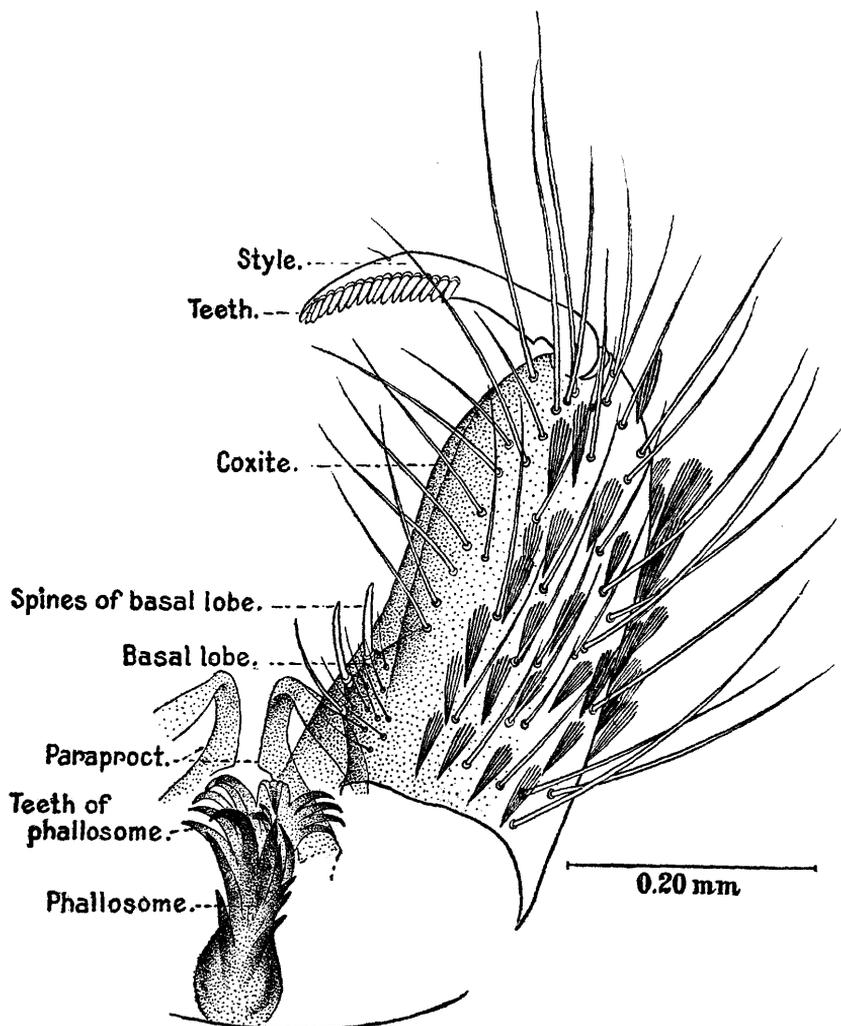


FIG. 2. *Armigeres* sp., from Borneo, one side of male terminalia; from a camera-lucida drawing.

in male genitalic characters (text fig. 2). The style, however, is shorter and the phallosome differs markedly from that of true *kuchingensis*. The specimen is not in good condition, and it is difficult to say exactly what it is.

Armigeres kuchingensis was previously known locally as *ob-turbans* Walker, 1860. In a personal communication Doctor Barraud called my attention to this matter.

ARMIGERES (ARMIGERES) RUSSELLI sp. nov.

Types.—Male (lot SR 1-x), and female (lot SR 1-y); cotypes 12 males and 5 females; all in the Philippine Bureau of Health collections, Manila. Collected by Mr. D. Santiago at Masiit, Calauan, Laguna, August 17, 1930. Known also from Mindanao (F. E. Baisas, 1932). Larva breeds in good numbers in tree holes, bamboo joints, and in axils of fallen areca-palm leaves.

Adult (male and female).—Head clothed with broad flat scales, some white ones on vertex; a few upright, forked, black and white scales at nape. A border of white scales to eyes, broadening at sides. Clypeus dark, clothed with broad, flat, creamy scales along edges; middle bare. Antennæ normal; tori with flat white scales along inner sides. Proboscis dark, about as long as front femur. Palpi dark, about one-sixth the length of proboscis in female, longer by about one-half the length of the ultimate segment in male. Thorax: Mesonotum covered with dark brown scales; a patch of white scales along the border behind the head and above the wing roots; these white patches sometimes imperfectly connected by scattered white scales between them. Præscutellar area with a median white patch connected with the line of broad, flat, white scales on midscutellar lobe. Black scales on sides of midlobe, and dark and pale ones on lateral lobes of scutellum. Anterior pronotal lobe clothed with pale scales. Extensive patches of broad, flat, silvery scales on pleura and coxæ. No spiracular bristle; postspiracular bristles present. A patch of white scales, but no black ones, covers the postspiracular area. One lower mesepimeral bristle in all specimens except one, which has two. Wings dark-scaled. Legs dark except undersides of femora, which are white. Fore tarsal claws of female normal. Hind tibia as long as middle tibia. Abdominal tergites clothed with dark brown scales; a basal median patch or band of pale scales on VIII. Lateral white patches not visible dorsally. Sternites mainly white.

Male terminalia (Plate 2, figs. 2, 4, and 7, and text fig. 3, a.)—Lobes of tergite IX prominent, each bearing about fifteen spines toward apex. Sternite IX with median thickening bearing about fifteen spines, besides two or three small flat scales. Basal lobe

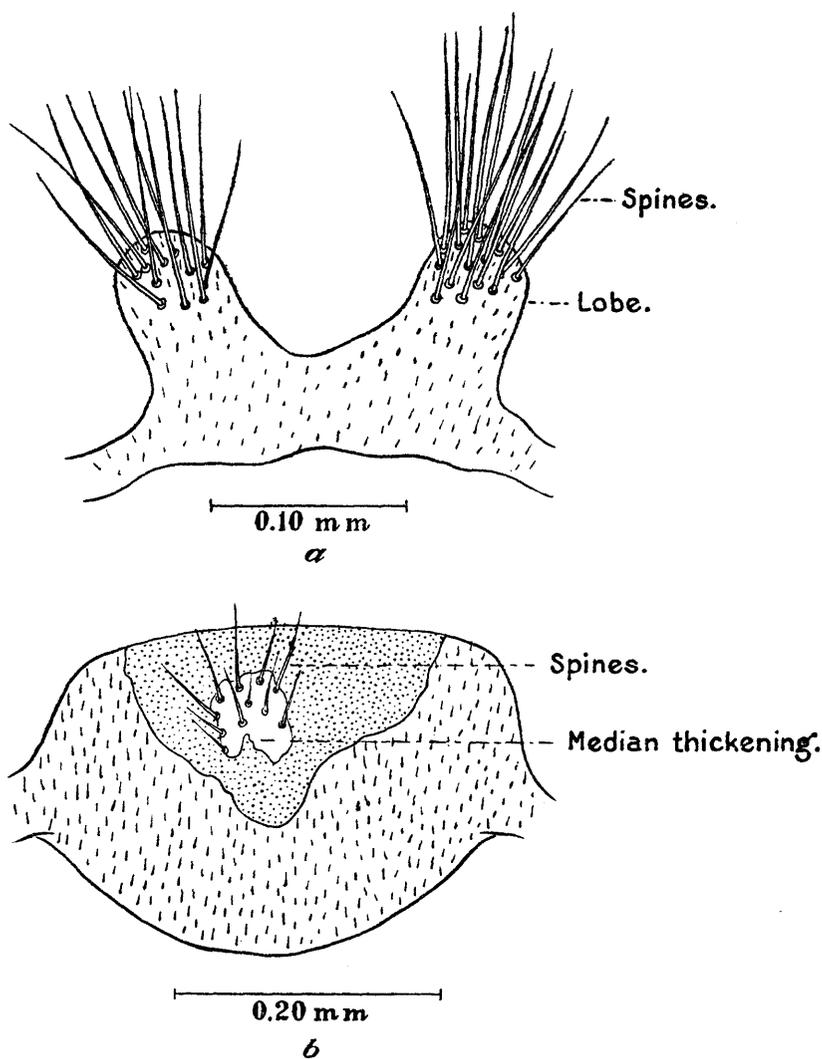


FIG. 3. a, *Armigeres russelli* sp. nov., ninth tergite; b, *Armigeres manalangi* sp. nov., ninth sternite; from camera-lucida drawings.

of coxite with six or seven spines, the one towards inner edge much longer than the rest. Coxite fairly long and broad. Style bears about fifteen strong teeth towards the apex, the uppermost longest.

This species closely resembles *Armigeres* (*Armigeres*) *malayi* Theobald (1901 and 1903), as given by Edwards (1917), and *Neosquamomyia breinli* Taylor (1914), but the male terminalia

differs in certain respects from the illustration given by Edwards (1917). The style of *russelli* is stouter, and its teeth are much longer. The spines of the basal lobe of the coxite are not arranged in one row, while the phallosome differs remarkably from that of any other *Armigeres* and does not seem to be like the one figured by Edwards.

ARMIGERES (ARMIGERES) MANALANGI sp. nov.

Types.—Male (lot PHS 1-x), and female (lot PHS 1-y) in the collection of the Philippine Health Service, Manila. Collected by Dr. C. Manalang at Tungcong Manga, San Jose, Bulacan, November, 1929. Larva breeds in small numbers in bamboo holes. Two males and three females bred out from larvæ collected from a bamboo joint by Mr. D. Santiago, at Mabacan, Calauan, Laguna, November, 1931. Habits of adults unknown.

Adult (male and female).—Head clothed with dark scales, some white ones on the middle of vertex; nape with upright forked scales. A border of creamy scales to eyes, broadening at sides; lateral white patches at about middle on either side. Clypeus black, nude. Antennæ dark; tori with broad, flat, creamy scales. Proboscis dark, slightly shorter than front femur. Palpi dark, a little over one-fifth the length of proboscis in female, and longer by about the length of the terminal segment in male. Thorax: Mesonotum covered with dark brown scales, a narrow border of white ones from anterior margin to wing roots. Præscutellar area with a patch of curved white, and broad white scales, forming a continuous line with white scales on middle of midscutellar lobe. Lateral lobes of scutellum with a mixture of dark and pale scales. Anterior pronotal lobe white-scaled. No spiracular bristle; postspiracular bristles present. A patch of white scales, but no black ones, covers postspiracular area; one or two lower mesepimeral bristles. Pleura and coxæ extensively covered with patches of silvery scales. Wings dark-scaled. Legs dark except the undersides of femora, which are white. Fore tarsal claws of female normal. Hind tibia as long as midtibia. Abdominal tergites with brownish black scales mixed with a few scattered pale scales. Lateral white patches on posterior segments visible dorsally. Sternites mainly pale.

Male terminalia (Plate 2, figs. 1, 3, 5, and 6).—Lobes of tergite IX fairly prominent, the spines of which are arranged along the inner borders. Sternite IX with a median thickening, bear-

ing seven to fifteen spines and numerous microtrichia. Basal lobe of coxite with three blunt-ended straight spines, little differing in length; also hairs of various sizes. Coxite fairly long and broad. Style very much expanded apically [similar to that of Edward's *Dunnius* (1930)], bearing over twenty strong teeth, besides numerous hairs of various lengths. Phallosome with about eleven teeth on either side.

ARMIGERES (LEICESTERIA) DEGITATUS Edwards, 1914.

Found by a number of workers in various places in Luzon. Larva breeds in small numbers in tree holes and bamboo joints.

Adult (male and female).—Head clothed with broad, flat, dark scales; a few white ones at middle of vertex; upright scales at nape. A border of pale scales to eyes; two lateral, broad, pale patches on either side. Clypeus dark, bare. Antennæ normal; tori with broad flat scales on the inner sides. Proboscis dark, about as long as front femur. Palpi dark, about two-thirds the length of proboscis in female, longer by about one-half the length of last segment in male. Thorax: Covered with dark brown scales, a border of broad pale scales around margin from anterior edge to wing roots; a pale patch at middle of præscutellar area contiguous with the line of broad, flat, pale scales at middle of midscutellar lobe. Rest of scutellum dark-scaled. Anterior pronotal lobe white-scaled. No postspiracular bristle; black scales anteriorly and white ones posteriorly occupy postspiracular area. No lower mesepimeral bristle. Pleura and coxæ with extensive patches of broad, flat, white scales. Wings dark-scaled. Legs dark except undersides of femora, which are white. Abdominal tergites dark brown; VIII with a pale basal patch or band. Lateral white patches visible dorsally on III to VII. Sternites extensively white with dark apices.

Male terminalia (Plate 1, figs. 2 and 6).—Tergite IX with prominent lobes, each bearing apically about twelve long spines. Coxite long, fairly broad. Basal lobe of coxite with about six sharp-pointed spines arranged roughly in double rows. Style with five strong spines at its apex.

ARMIGERES (LEICESTERIA) FLAVUS Leicester, 1908.

Males and females bred out from larvæ collected from tree hole at Lilio, Laguna, Luzon, by Mr. D. Santiago.

Adult (male and female).—Head clothed with broad, flat, pale scales; some upright scales at nape. Two dark patches on either side. Clypeus dark, bare. Antennæ normal, tori orange

with broad flat scales on inner sides. Proboscis dark, slightly shorter than front femur. Palpi dark, less than one-half the length of proboscis in female, longer by about the length of the ultimate segment and pale-ringed at the joints in male. Thorax: Mesonotum clothed with brownish scales, a border of pale scales from anterior margin to wing roots. Præscutellar area dark. Scutellar lobes pale-scaled. Anterior pronotal lobe dark above, pale below. Postspiracular area covered with black scales anteriorly and a white patch posteriorly. One lower mesepimeral bristle. Extensive patches of broad, flat, white scales on pleura and coxæ. Postnotum with one to four very minute hairs on posterior part, but no scales in specimens examined. Wings dark-scaled, except the humeral and the prehumeral areas of the costa, which are white. Legs dark brown; fore and mid-femora white beneath; hind femora white on the anterior and posterior surfaces; tibiæ pale basally; hind tibiæ with pale apical ring; mid and fore tibiæ with pale patches beneath. Tarsi with basal pale rings on first two or three segments, more conspicuous on the hind tarsi than on the others. Abdominal tergites dark; II to VI with pale, median, apical patches. Pale lateral patches visible dorsally only on VIII, which is otherwise entirely dark above, sometimes lateral pale patches also visible on VI and VII dorsally. Sternites pale.

Male terminalia (Plate 4, figs. 1 and 4).—Tergite IX with many strong spines at the apices of lobes. Coxite fairly long and broad; basal lobe with two or three blunt-ended spines. Style bears five teeth at its apex and a few scales on the outer border.

ARMIGERES (LEICESTERIA) MAGNUS Theobald, 1908.

A widespread species; found in several places in Luzon and Mindanao. Larva breeds in tree holes and bamboo joints. Female bites freely during the day in bamboo grooves.

Adult (male and female).—Head covered with broad flat scales; a patch of white towards nape; a pair of pale patches on either side laterally. A narrow rim of pale scales to eyes; remaining area dark. Clypeus dark, nude. Antennæ normal; tori dark with broad flat scales. Proboscis dark, about as long as front femur. Palpi dark, about two-thirds the length of proboscis in female, longer by about the length of last segment in male. Thorax: Mesonotum covered with dark brown scales; a

border of broad white scales around the margin from anterior side to wing roots. A patch of white scales at middle of præscutellar area. Midscutellar lobe with white scales posteriorly, dark ones anteriorly. Lateral lobes mainly dark-scaled, with a few pale scales posteriorly. Anterior pronotal lobe white-scaled. Postspiracular area occupied by a patch of dark scales anteriorly, and a patch of white scales posteriorly. No lower mesepimeral bristle. Pleura and coxæ extensively covered with patches of white scales. Wings dark-scaled. Legs with the femora pale underneath and at the apices; tibiæ pale at the apices; tarsi usually with pale basal patches on segments 1 to 3. Abdominal tergites dark brown with pale basal patches excepting I. Lateral white patches visible dorsally on III to VII. Sternites extensively pale with dark apices, and yellow basal patches, the yellow extending to the lateral and dorsal sides, forming complete basal bands on the posterior segments.

Male terminalia (Plate 4, figs. 2, 3, 5, and 6).—Lobes of tergite IX not prominent, each bearing about six to ten spines. Sternite IX without a median thickening. Coxite broad and fairly long. Basal lobe of coxite with three or four pointed spines. Style with about ten teeth at its somewhat expanded tip; there may be some scales on the outer border.

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ILLUSTRATIONS

PLATE 1. MALE TERMINALIA

- FIG. 1. *Armigeres ejercitoi* sp. nov., coxite and style.
2. *Armigeres degitatus* Edwards, coxite and style.
3. *Armigeres ejercitoi* sp. nov., one side of phallosome.
4. *Armigeres ejercitoi* sp. nov., tip of phallosome, dorsal view.
5. *Armigeres ejercitoi* sp. nov., one lobe of ninth tergite.
6. *Armigeres degitatus* Edwards, one lobe of ninth tergite.
FIGS. 7 and 8. *Armigeres ejercitoi* sp. nov., ninth sternites.

PLATE 2. MALE TERMINALIA

- FIG. 1. *Armigeres manalangi* sp. nov., coxite and style.
2. *Armigeres russelli* sp. nov., coxite and style.
3. *Armigeres manalangi* sp. nov., phallosome.
4. *Armigeres russelli* sp. nov., one side of phallosome.
5. *Armigeres manalangi* sp. nov., one lobe of ninth tergite.
6. *Armigeres manalangi* sp. nov., ninth sternite.
7. *Armigeres russelli* sp. nov., ninth sternite.

PLATE 3. MALE TERMINALIA

- FIG. 1. *Armigeres kuchingensis* Edwards, coxite and style.
2. *Armigeres obturbans* Walker, of India, coxite and style.
3. *Armigeres kuchingensis* Edwards, one side of phallosome.
4. *Armigeres obturbans* Walker, of India, one side of phallosome.
5. *Armigeres kuchingensis* Edwards, one lobe of ninth tergite.
6. *Armigeres obturbans* Walker, of India, one lobe of ninth tergite.
7. *Armigeres kuchingensis* Edwards, ninth sternite.
8. *Armigeres obturbans* Walker, of India, ninth sternite.

PLATE 4. MALE TERMINALIA

- FIG. 1. *Armigeres flavus* Leicester, coxite and style.
2. *Armigeres magnus* Theobald, coxite and style.
3. *Armigeres magnus* Theobald, one side of phallosome.
4. *Armigeres flavus* Leicester, one lobe of ninth tergite.
5. *Armigeres magnus* Theobald, ninth tergite.
6. *Armigeres magnus* Theobald, ninth sternite.

TEXT FIGURES

[From camera-lucida drawings.]

- FIG. 1. *Armigeres ejercitoi* sp. nov., pleural side of thorax.
2. *Armigeres* sp., from Borneo, one side of male terminalia.
3. a, *Armigeres russelli* sp. nov., ninth tergite; b, *Armigeres manalangi* sp. nov., ninth sternite.

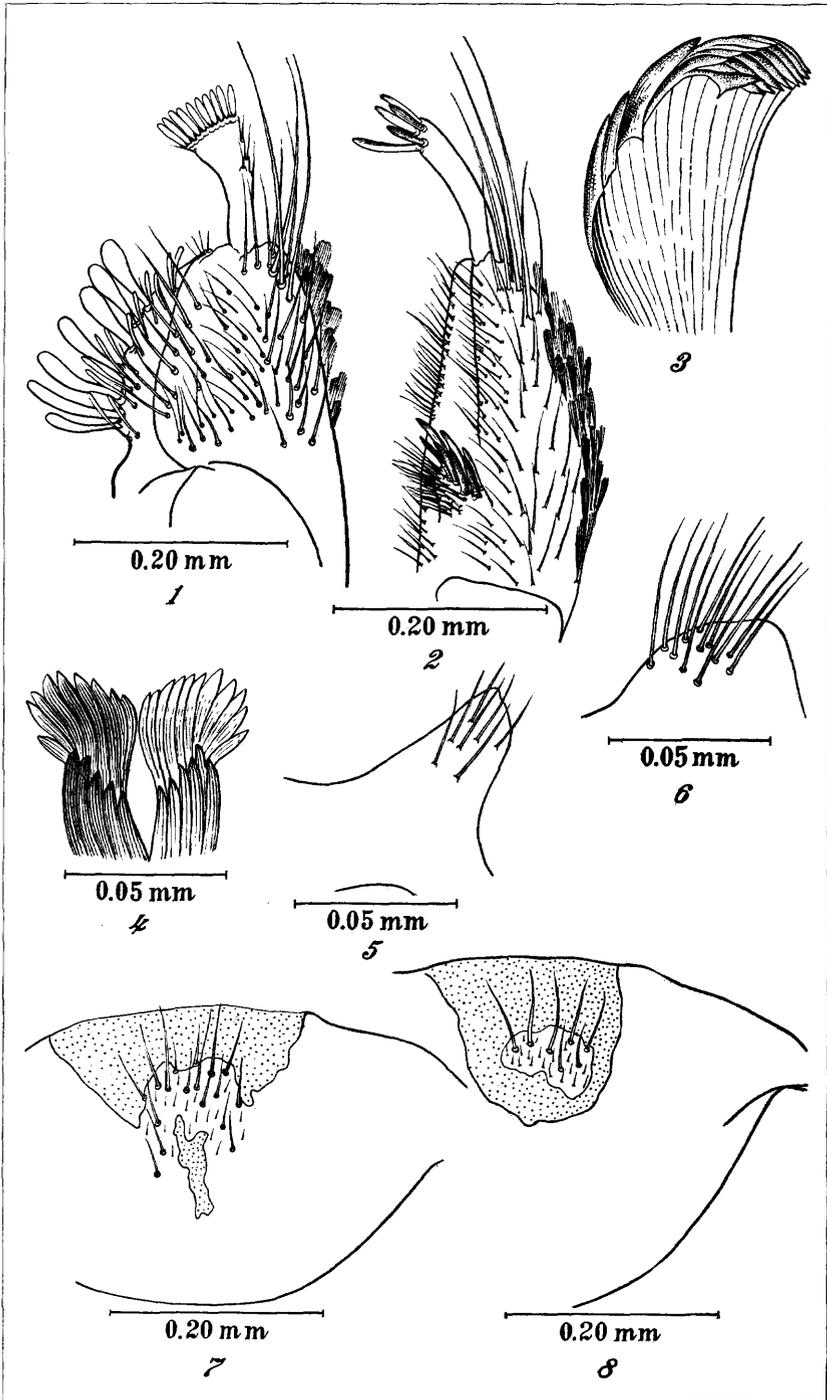


PLATE 1.

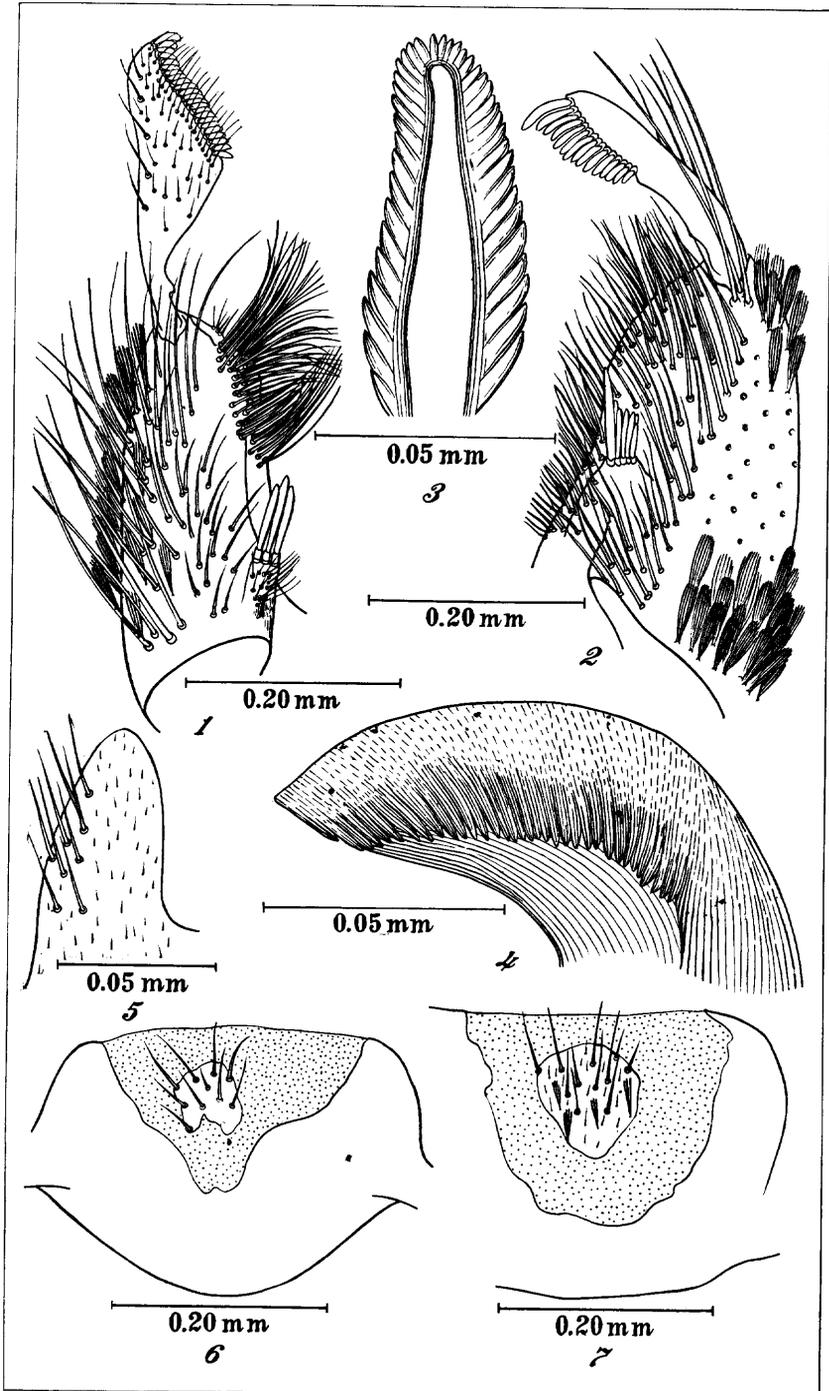


PLATE 2.

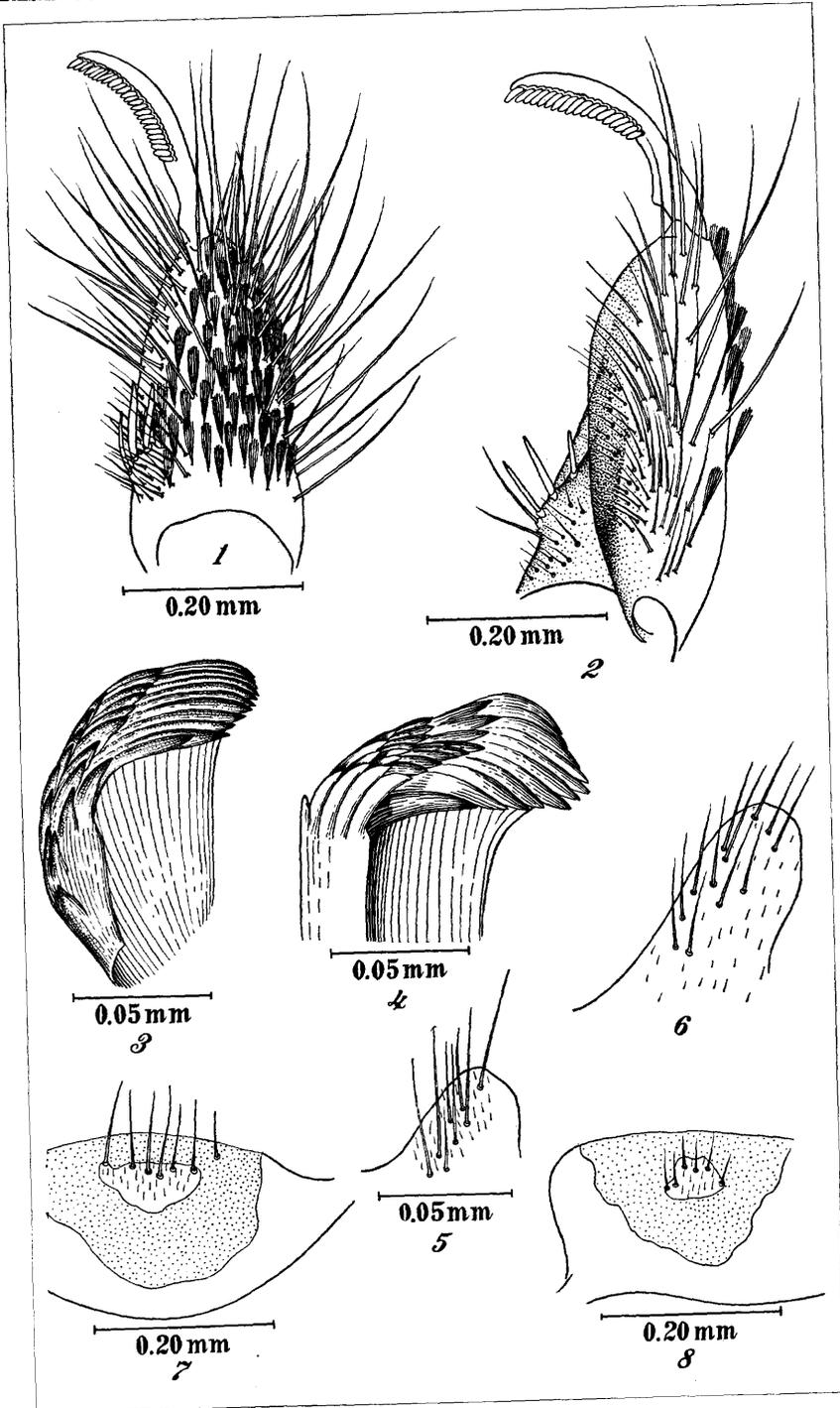


PLATE 3.

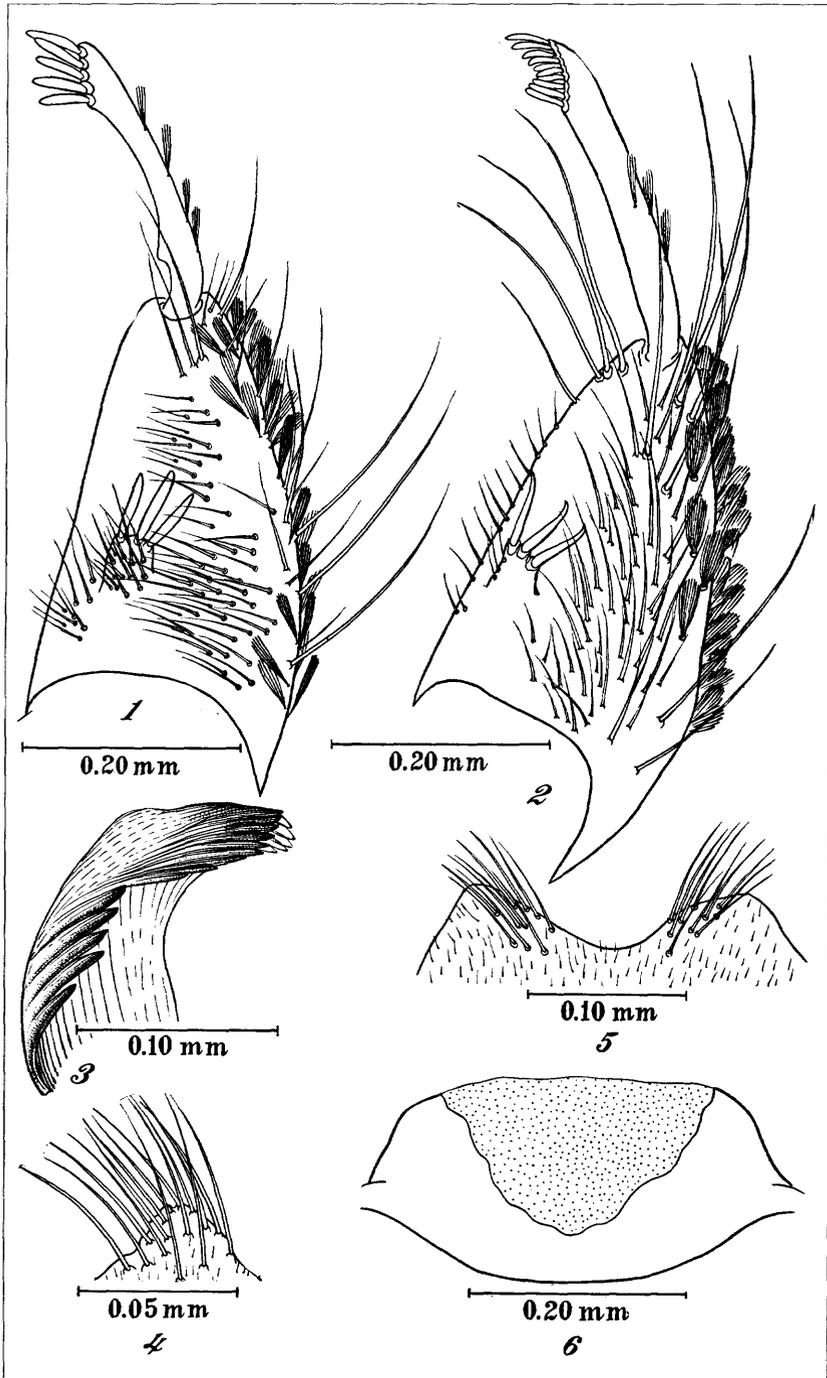


PLATE 4.