

NEW RECORDS AND SPECIES OF PSYLLIDÆ FROM THE PHILIPPINE ISLANDS, WITH DESCRIPTIONS OF SOME PREADULT STAGES AND HABITS ¹

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FIVE PLATES

The present paper is based largely on the materials I collected while working with Philippine plant galls from Mount Maquiling and the neighboring plains. Prof. Charles S. Banks and the students in economic entomology at the College of Agriculture, University of the Philippines, also contributed a number of specimens.

I have made an effort to follow throughout my paper the classification which has been so carefully worked out during the past seven or eight years by Prof. D. L. Crawford, now of the College of Hawaii, Honolulu, to whom our knowledge of this interesting family of insects is largely due. The terminology adopted for designating the various morphological parts used in classification is that discussed in Crawford's monograph (Crawford '14).

The galls of five of the insects treated in the present work have been described in an earlier paper (Uichanco '19). The character of these galls differs with the causative insect, and ranges from a simple convolution or depression in leaf lamina to very highly specialized and extraordinarily complex, well-defined formations. There are also species which are not gall-makers.

The study of the immature stages of these insects has been practically neglected, although it seems to be a most promising field from both the biologic and the taxonomic points of view. The habits of the nymphs, especially as to formation or non-formation of galls and the general characters of galls formed, are apparently uniformly similar for certain groups. Likewise, a number of distinctive taxonomic characters, such as

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the genal cones of the Triozinæ, early become apparent in the immature forms. A thorough study of these preadult stages may result in a more reliable establishment of the true systematic position of some anomalous genera, or be of help in distinguishing certain apparently closely related groups which hitherto have been difficult to separate. In the present paper descriptions of a few of the nymphal instars and their habits are included, and it is hoped that further collecting and field observations may lead to the accumulation of sufficient material for a more adequate treatise on this phase of the subject.

Subfamily LIVIINÆ Löw

Tribe APHALARINI (Löw)

Genus **HAPLAPHALARA** novum

Head very slightly declivous; vertex less than one-half as wide as long, flat; genæ roundly swollen ventrad to antennal tubercles; frons visible as a short sclerite-bearing anterior ocellus; eyes subglobose, prominent; anterior ocellus visible only from cephalic aspect of head; posterior ocelli not elevated; clypeus large; antennæ slender, not much longer than width of head. Thorax scarcely arched, slightly thicker than abdomen; pronotum nearly half as long as vertex, not depressed below level of latter, terminating laterad almost at level of eyes in a knoblike process; mesopræscutum about three times as long as pronotum; legs moderately long and slender; eight distal spines on hind tibiæ; meracanthi over twice as long as thickness at base; forewings subelliptical, rounded at apex, more or less maculated, subequal in length to body, nearly twice as long as wide; pterostigma large, open proximad. Abdomen slightly shorter than thorax.

Male.—Anal valve slightly longer than genital forceps, both without process. Genital segment roundly produced ventrad below level of adjacent proximal sternite.

Female.—Anal valve about as long as the rest of abdomen; ventral valve shorter than dorsal; both without process.

Type of the genus, *Haplaphalara dahli* (Rübsaamen).

The genus is very closely allied to *Aphalara* Förster, as recharacterized by Crawford ('14:24), resembling the latter in many characters. The following characters, however, distinguish it from *Aphalara*: Longer mesopræscutum in proportion to pronotum; absence of spines on basal tarsi of hind legs; presence of pterostigma; and absence of posterior lobe on male anal valve. The last two characters, according to Crawford,

are always present in *Aphalara*. The present genus is also distinguishable from *Aphalaroida* Crawford ('14:38) as follows: Vertex flattened and longer in proportion to width than in the latter; antennæ longer. The characters it has in common with *Aphalaroida* are as follows: Genæ somewhat roundly swollen ventrad; short frons; slight arching of thorax; lateral termination of pronotum in a knoblike swelling; thickened, semiopaque wings, with pterostigma; absence of process on male anal valve.

Haplaphalara dahli (Rübsaamen). Plate 2, fig. 16; Plate 3, fig. 23; Plate 4, fig. 41; Plate 5, fig. 51.

Aphalara dahli RÜBSAAMEN '05: 23.

Type locality.—BISMARCK ARCHIPELAGO, Coast of Rabakaul, February 27, 1897 (*Dahl*).

Male.—Length of body, 1.2 to 1.36 millimeters; width of head, 0.52 to 0.55; length of antennæ, 0.72 to 0.78; length of forewings, 1.28 to 1.3, width, 0.54 to 0.56. Brownish yellow. More or less thickly mottled with very dark brown as follows: Vertex; antennal segments I and II; distal segment of labium; thoracic nota and pleurites; hind coxæ; and abdominal tergites. Uniformly dark brown: Eyes; genital segment; genital forceps; anal valve; frons; genæ; clypeus; apical segment and distal half of subapical antennal segment; distal spines of hind tibiæ; and ungues. Pale stramineous: Sternum; trochanters; femora; tibiæ; tarsi; abdominal sternites, with exceptions noted above; and antennal segments, except as otherwise indicated above and except distal portions of IV, V, and VII, which are pale brown. Ocelli light brownish red. A uniformly dark brown, subtriangular spot occupying apical fourth of forewings; another lighter brown, broadly and irregularly linear, transverse band at middle portion; and a third subbasal, broadly linear, somewhat transverse, brown band; veins irregularly spotted with dark brown. Body and appendages finely reticulate, sparsely covered with moderately long hairs.

Head slightly narrower than thorax, very slightly declivous, dorsal surface subconfluent with pronotum. Vertex flat, about one and two-thirds times as wide as long, nearly truncate at cephalic margin, slightly rounded down in front; a shallow depression bordering anterior ocellus; caudal margin concave. Frons about one and two-thirds times as wide as anterior ocellus, visible from latter to base of clypeus; length subequal to width. Clypeus (cephalic aspect) subhemispher-

ical, with base located at about two-thirds the distance from dorsal to ventral surfaces of head. Genæ broadly swollen ventrad but not produced into genal cones. Eyes elongately subhemispherical, about two-thirds as thick as distance from margin of eye to median suture of vertex. Anterior ocellus flatly subhemispherical, subequal in diameter to antennal segment III, located mediad on anterior surface of head. Posterior ocelli subhemispherical, somewhat smaller than anterior, located near apices of angles formed by caudal and lateral margins of vertex. Antennæ about one and five-eighths times as long as width of head including eyes; segments I and II subequal in diameter, about one and two-thirds times diameter of III; the rest of the segments subequal in diameter to III; two slender apical setæ, subequal in length to apical segment, to which they are attached.

Thorax not strongly arched, about one and one-eighth times as long as wide; thickness about seven-ninths of length. Pronotum and mesopræscutum somewhat deflected cephalad but not depressed below level of adjoining sclerites; surfaces subconfluent. Pronotum about seven times as wide as long, terminating laterad slightly below level of eyes in a knoblike swelling. Mesopræscutum about two and three-fifths times as long as pronotum, about two and seven-tenths times as wide as long, irregularly subelliptical, more strongly arcuate at caudal than at cephalic margin, somewhat acutely produced laterad. Mesoscutum about one and three-tenths times as long as mesopræscutum, about two and two-fifths times as wide as long, irregularly subreniform; a short, spinelike projection from each lateral margin. Mesoscutellum about half as long as mesoscutum, about half as long as distance between points of attachment of axillary cords, truncate at cephalic margin, with a depressed, anteriorly directed projection which is confluent with surface of mesoscutum. Forewings subelliptical, slightly narrowed basad, rounded at apex; R and M+Cu subequal in length; pterostigma open proximad, slightly longer than first marginal cell; Rs, M, Cu, and anal margin of wing subparallel and subequidistant; first marginal cell elongate, about three times as large as second. Legs moderately long, femora about two and a half times as thick as tibiæ; eight moderately long, dark brown, distal spines on hind tibiæ; meracanthi about two and one-fourth times as long as thick, slightly deflected apicad.

Abdomen about one and one-seventh times as long as thorax, about one and one-eighth times as long as thick, about as thick

as wide. Genital segment roundly produced ventrad below level of adjacent proximal sternite. Anal valve about one-fourth as long as total length of abdomen, about twice as long as thick, rounded subapicad, and produced apicad into a short, slender, subconical projection. Genital forceps about four-fifths as long as anal valve, narrowly attenuate apicad. Anal valve, genital forceps and genital segment more thickly hairy than the rest of abdomen.

Female.—Anal valve about half the total length of abdomen, about as long as thickness at base, subacute distad, slightly flexed dorsad at apex. Ventral valve about two-thirds as long as anal, about twice as long as thickness at base, subconical, very acutely pointed distad.

Redescribed from six males and six females.

LUZON, Laguna, College of Agriculture, Los Baños, at an altitude of about 70 meters, January, 1919. College of Agriculture accession No. 18413.

The insect lives on *Thespesia populnea* (L.) Sal. (Malvaceæ), causing irregular depressions and wrinkles in the leaf lamina. Evidence of the work and of the presence of the preadult stages is noted throughout the year in the locality cited, but the adults seem to appear only in certain months.

The occurrence of this species or of any other representative of the subfamily Liviinæ has never been recorded from the Philippines before.

Rübsaamen ('05) reports the insect as producing galls on *Thespesia macrophylla* Blume in Bismarck Archipelago.

Subfamily PAUROPSYLLINÆ Crawford

Genus PAUROPSYLLA Rübsaamen

Pauropsylla udei Rübsaamen ('99: 262). Plate 1, fig. 1; Plate 2, fig. 13; Plate 3, fig. 18; Plate 4, fig. 33; Plate 5, fig. 44.

Male.—Length of body, 1.76 millimeters; width of head, 0.61; length of forewings, 2.08, width, 1.23. Dark yellowish brown. Light brownish yellow as follows: Ventral half of antennal tubercles; antennal segments I, II, III, IV, and basal three-fourths of V; clypeus; coxæ; meracanthi; trochanters; femora; tibiæ, except distal spines, which are dark yellowish brown; first tarsal segments; lateral borders of mesopræscutum and mesoscutum; ventral third of mesothoracic episternum; medial half of third abdominal tergite and cephalic margin of fourth. Eyes and ocelli reddish brown. Body and appendages finely

reticulated; more conspicuously so on vertex and nota; sparsely beset with moderately long hairs.

Head subequal in width to thorax, not strongly deflected. Vertex about four times as broad as long, slightly concave at occipital margin. Frons, a narrow sclerite bounding anterior ocellus, subtriangular along anterior and posterior borders of latter. Clypeus (cephalic view) irregularly subpyriform, subconically raised on each side ectodistad, about one and one-third times as long as wide. Eyes subhemispherical, about three-fourths as thick as distance from lateral margin to median suture of vertex. Diameter of anterior ocellus about three times that of antennal segment III. Posterior ocelli slightly smaller than anterior, somewhat prominently elevated. Antennæ about one and one-third times as long as width of head including eyes; segments I and II short and thick, subequal to each other in length and diameter; III one and one-third times as long and about one-third as thick as II; the rest of the segments distad subequal in diameter to III.

Thorax about one and one-third times as long as wide, one and one-eighth times as long as thick, slightly arched. Prothorax very short, depressed below, and almost hidden by cephalic emargination of mesopræscutum. Mesopræscutum irregularly subhemispherical, about as long as wide. Mesoscutum broadly crescent-shaped with concave margin directed cephalad, about one and a half times as wide as mesopræscutum, about twice as wide as long. Mesoscutellum about half as wide as mesoscutum, about three-fifths as long as wide, slightly deflected caudad; two shallow, broadly concave indentations at cephalic margin. Forewings obovate; apex broadly rounded: $M+Cu$ about one-fifteenth as long as $R+M+Cu$; first marginal cell about three times as large as second; a black, rather inconspicuous spot at anal margin between branches of cubitus; one between branches of cubitus and media; and a third between branches of media. Legs long and slender; hind leg about one and one-third times as long as fore or middle leg; ungues broadly curved.

Abdomen about four-fifths as long as head and thorax combined; slightly narrower than thorax. Genital forceps subequal in length to anal valve, elongately subovoid, about twice as long as wide. Anal valve irregularly subcylindrical, about two and a half times as long as wide. Genital forceps and anal valve more thickly beset with hairs than adjoining segments.

Female.—Genitalia about one-third total length of abdomen. Dorsal and ventral valves subequal in length and basal diameter, acutely pointed distad.

Nymphs (apparently full-grown living specimens).—Length of body, 2.25 millimeters; width of head, including eyes, 0.70; width of thorax, including wing pads, 1.6; length of forewing pads, 0.8, width, 0.4; length of abdomen, 1.3, width, 1.2. Dark orange yellow. Light yellow as follows: Antennæ, wing pads, and legs. Eyes dark brick-red. A slightly raised, median, dorsal ridge visible from middle of pronotum to caudal end of abdomen. Body and appendages smooth and shiny, free from waxy coating, sparsely beset with short hairs.

Head about three and a half times as wide as long, subequal in width to prothorax. Vertex rounded cephalad. Eyes moderately large, subhemispherical; caudal portion recessive into pronotum. Antennæ subequal in length to width of vertex, slender, slightly tapering toward apex.

Thorax not arched, about one and a half times as long as wide, subquadrangular at dorsum. Forewing pads about one and one-third times as long as thorax, semitranslucent, subangularly pointed ectodistad at apex. Legs stout and moderately long, sparsely pubescent; division between tibiæ and tarsal segments indistinct; unguis broadly curved.

Abdomen subcircular from dorsal aspect, very obtusely rounded caudad, shorter but wider than thorax, sparsely pubescent.

LUZON, Laguna, Los Baños Falls, near Los Baños, at an altitude of about 50 meters, January, 1917; Mount Maquiling, at altitudes of 70 to 150 meters, August, 1917. College of Agriculture accession No. 18310 (*Uichanco*).

Numerous specimens of this insect were bred from leaf galls on *Ficus variegata* Blume (Moraceæ). For descriptions of the gall, see Rübsaamen '99: 261, and Uichanco '19: 546, Pl. 6, figs. 2, 4, and 5; pl. 13, fig. 1. The causative insect was tentatively reported in the latter paper as *Pauropsylla montana* sp. nov. (MS); but a further study of the specimens before me shows that their characters are those of *P. udei* Rübsaamen. The nymphs of the present collection differ from the one figured by Rübsaamen ('99: 266, text fig. 13) in that the abdomen of the former is shorter in proportion to the body.

Rübsaamen evidently made an error in reporting the host plant as a species of Rubiaceæ. The shape of the leaf in his text figure 7, page 261, and the position, relative size, and form of the

galls, in this and in his Plate 1, figures 6 and 7, together with his descriptive notes, are apparently identical with the work of this insect as I found it on *Ficus variegata*.

Crawford ('15: 258, pl. 1, fig. F) described the insect as *P. bakeri* sp. nov., and in a later paper (Crawford '19: 145) reported its identity with Rübsaamen's species, by which the former is preoccupied.

Pauropsylla triozyptera Crawford ('13: 296). Plate 1, fig. 5; Plate 2, fig. 14; Plate 3, fig. 19; Plate 4, fig. 34; Plate 5, fig. 45.

Male.—Length of body, 1.7 millimeters; width of head, 0.64; length of antennæ, 0.96; length of forewings, 2.72, width, 1.49. Dark reddish brown. Brownish yellow as follows: Antennal segments I, II, and III, and basal fourth of IV, VI, and VII; ocelli; legs, except distal spines of femora and tibiæ and distal third of ungues, which are dark brown; genital segment; genital forceps; and anal valve. Body smooth and shiny, sparsely and briefly pubescent, more densely so at mesopræscutum, mesoscutum, mesoscutellum, femora, tibiæ, tarsi, genital segment, genital forceps, and anal valve.

Head subequal in width to thorax, not deflected. Vertex about three and one-third times as wide as long, deeply concave. Frons about four and a half times as long as wide, visible as a narrow sclerite from anterior ocellus to base of clypeus. Eyes subhemispherical, about three-fourths as thick as distance from lateral margin to median suture of vertex. Anterior ocellus subhemispherical, subequal in size to posterior. Posterior ocelli prominently elevated. Antennæ about one and a half times as long as width of head including eyes; segment I slightly thicker than II; I and II subequal in length; II about three times as thick as III; III and the rest of the segments distad subequal in diameter.

Thorax robust; length slightly shorter than thickness and about three-fourths of width. Prothorax short and completely hidden from above by cephalic portion of mesopræscutum. Mesopræscutum subpentagonal, about three-fourths as long as wide, broadly rounded down cephalad; cephalic margin describing an angle of about 90°; an abruptly subconical projection on each lateral area. Mesoscutum subreniform; concave margin directed cephalad; about two and two-fifths times as wide as long, about five-sixths as long as præscutum; a lateral, somewhat anteriorly divergent, abruptly subconical projection

on each side. Mesoscutellum about three-fourths as long as mesoscutum, about one and two-thirds times as wide as long, somewhat deflected caudad, roundly emarginate mesocephalad at cephalic margin, abruptly produced subconically ectad at anterolateral angles. Mesosternum slightly produced ventrocephalad. Wings asymmetrically obovate, hyaline; apex somewhat angular along direction of second marginal cell; pterostigma and cubital petiole wanting; first marginal cell about twice as large as second; a small, elongately subtriangular area covered with coarse brown dots between branches of cubitus, one between branches of cubitus and media, and a third between branches of media. Hind legs slightly shorter than body; fore and middle legs somewhat shorter than hind; unguis broadly curved.

Abdomen subequal in length to thorax, somewhat strongly deflected caudad, about one and a half times as long as wide, about as thick as wide. Anal valve about three-sixteenths as long as the whole of abdomen, about twice as long as diameter at base, truncately subconical, slightly constricted subdistad. Genital forceps subequal in length to anal valve, about one and a half times as long as diameter at base, vaguely retort-shaped with diameter of neck about half that of larger portion.

Female.—Dorsal and ventral valves subconcolorous with the rest of abdomen, more densely pubescent than latter. Dorsal valve narrowly subconical, acutely produced apicad, more densely pubescent than ventral, about as long as the rest of abdomen, about three and one-third times as long as diameter at base. Ventral valve slightly shorter than dorsal, about twice as long as diameter at base.

Newly emerged adults.—Bluish green. Eyes dark brown. Greenish yellow as follows: Antennal segments I and II; mesopleura and metapleura; mesosternites and metasternites; legs; and, in male, genital forceps and anal valve.

Nymph (apparently full-grown).—Length of body, 2.12 millimeters; width of head, 0.67; length of antennæ, 0.48; length of forewing pads, 0.8, width, 0.35; length of abdomen, 0.96, width, 0.9. Bluish green, lighter on head. Eyes brick red. Body and appendages covered with a white waxy coating, very sparsely beset with moderately long hairs.

Head slightly narrower than thorax, about two and a half times as wide as long, broadly rounded cephalad. Eyes subhemispherical, with caudal portions touching thorax, about three-eighths as thick as width of head. Antennæ about

three-fourths as long as width of head; segment I slightly thicker than II; II about one and one-third times as thick as III.

Thorax not arched, about one and one-fifth times as long as wide. Forewing pads about three times as long as wide, broadly rounded apicad. Hind legs about half as long as body; fore and middle legs about five-sevenths as long as hind; subdistal third of femora in all legs slightly curved entad; ungues about one and one-fourth times as long as diameter of tibiae, strongly curved subapicad.

Abdomen about one and two-fifths times as long as thorax, about as long as wide, irregularly subcircular from dorsal aspect, slightly narrowing down caudad; caudal margin truncate, without process.

Younger nymphal instars.—Distinguishable from full-grown nymphs by their smaller size, brighter red eyes, and, in very early instars, absence of wax coating.

LUZON, Laguna, College of Agriculture, Los Baños, at an altitude of about 42 meters, January and March, 1917. Accession No. 18309, College of Agriculture collection (*Uichanco*).

This species passes its preadult stages in the very common leaf galls on *Ficus ulmifolia* Lam. (Moraceae). For a description of the gall and some field observations on the adult insect, see Uichanco ('19: 545, pl. 6, fig. 1; pl. 12, figs. 1, 5, and 6). The gall is apparently similar to the work of an Indian species of Psyllidæ on *Ficus glomerata* Roxb., as figured by H. M. Lefroy ('09: pl. 80, fig. 6).

Pauropsylla tuberculata Crawford ('12: 430). Plate 1, fig. 3; Plate 2, fig. 12; Plate 4, fig. 35; Plate 5, fig. 46.

Male.—Length of body, 0.9 to 1 millimeter; width of head, 0.53 to 0.64; length of antennæ, 0.35 to 0.4; length of forewings, 1.12 to 1.36, width, 0.53 to 0.6. Very dark reddish brown. A large, subtriangular, depressed, reddish orange area on metapleura. Yellowish brown as follows: Fore and middle legs; hind tibiae and tarsi; antennæ, except distal segments, which are dark reddish brown; mesopræscutum; and distal third of anal valve. A broadly subtriangular, longitudinal, median, light reddish brown band, and a concolorous, broadly sublinear area on cephalic half of lateral margin, on mesoscutum; also on cephalic margin of mesoscutellum and median third of abdominal tergites III and IV. Body and appendages sparsely and briefly pubescent.

Head slightly wider than thorax, strongly deflected. Vertex about one and a half times as wide as long, deeply concave at occipital margin, strongly rounded down in front; a shallow, longitudinal fovea cephalad to antennal tubercle. Eyes sub-hemispherical, somewhat thicker dorsad than ventrad, about as thick as distance from lateral margin to median suture of vertex. Genæ somewhat swollen ventrad to antennal tubercles. Posterior ocelli subequal in diameter to anterior, slightly elevated. Antennæ a little more than half width of head, slender from segment III distad; distal segment slightly incrassate; apical setæ very slender, about half the total length of antennæ. Clypeus large and subglobose.

Thorax robust, strongly arched, about one and one-fifth times as wide as long, about one and two-fifths times as thick as wide. Pronotum about one-seventh as thick as vertex, about six times as wide as long, deflected cephalad, greater part of lateral portion concealed by eyes. Mesopræscutum about four times as long as pronotum, about two and seven-tenths times as wide as long. Mesoscutum subequal in length to mesopræscutum, about four-sevenths as long as wide. Mesoscutellum about half as long as mesoscutum, abruptly produced at anterolateral angles. Hind legs excluding coxæ about one and one-ninth times as long as body; basal tarsi with two clawlike spines distad; ungues light brown, short, broadly curved; meracanthi moderately long, about one and two-thirds times as long as diameter at base. Fore and middle legs excluding coxæ subequal in length, about one-third as long as corresponding parts of hind legs. Forewing about one and two-fifths times as long as body, narrowly obovate, about twice as long as wide, about twice as wide subdistad as subproximad, broadly rounded at apex; R one and a half times as long as M+Cu; R+M+Cu subequal in length to R; pterostigma wanting; M_1+2 and Rs subangularly bent with corresponding vertices coalescent; first marginal cell about one-twentieth as large as second.

Abdomen about seven-tenths as long as thorax, about one and two-fifths times as thick as long, about as long as wide; third abdominal tergite greatly produced dorsad; fourth much more so. Anal valve about one-seventh as long as abdomen, about two and four-fifths times as long as thick, slightly thicker basad, truncate apicad. Genital forceps about two-thirds as long as anal valve, thicker basad, somewhat sloping distad, subacute

at apex. Anal valve and genital forceps more thickly pubescent than the rest of body.

Female.—Dorsal and ventral valves acute apicad, abruptly subconical, more densely pubescent than the rest of body. Dorsal valve about three-elevenths as long as abdomen, about one and a half times as long as thickness at base, somewhat elevated at border of anus. Ventral valve about two-thirds as long as dorsal, about as long as wide, abruptly produced apicad.

Newly emerged female.—Bright yellow. Eyes grayish white. Last apical antennal segment black. Abdomen and legs subconcolorous, lighter yellow than thorax. A white, transverse band on two or three proximal abdominal tergites.

Nymph (age unknown; balsam mounts).—Length of body, 1.15 millimeters; width of head, including eyes, 0.44; length of antennæ 0.4; length of forewing pads, 0.43, width, 0.22; length of abdomen, 0.56, width, 0.53. Body and appendages sparsely covered with moderately long hairs.

Head subequal in width to thorax; about one and five-sixths times as wide as long, obtusely subangular at anterior margin. Eyes subhemispherical, about one-fifth as thick as total width of head. Antennæ subequal in length to width of head, acutely pointed distad.

Thorax about as long as wide, about as wide as thick. Hind legs about one-third as long as body; femora slightly arcuate entad; ungues strongly curved. Fore and middle legs subequal in length, slightly shorter than hind, in other respects similar to hind legs. Forewing pads about twice as long as wide, about one and one-sixth times as long as thorax, roundly sloping ectodistad at base; apex subparallel to basal slope; intermediate portion subequal in width throughout.

Abdomen about as long as wide, subcircular from dorsal aspect; caudal margin rounded, without process.

LUZON, Laguna, College of Agriculture, Los Baños, at an altitude of about 50 meters. Five males and five females on pins; seven nymphs on slide; reared from leaf galls on *Alstonia scholaris* R. Br. (Apocynaceæ), May, 1917. College of Agriculture accession No. 18322 (*Uichanco*).

This species is apparently of wide distribution in the Orient. The gall caused by the insect has been described from Bismarck Archipelago by Rübsaamen ('05: 7); by Leeuwen-Reijnvaan from Java ('10: 38) and from Celebes ('16: 24); and by Uichanco from the Philippines ('19: 544, pl. 5, figs. 1 and 2; pl. 12, figs.

2 and 3). The adult (apparently female), nymph, and work, as they occurred in India, have been beautifully figured in colors by H. M. Lefroy ('09: 742, pl. 80, figs. 2-5), and the insect and its host plant casually mentioned in the text, but he evidently did not recognize it then as a new species. The first taxonomic description of this species was published by Crawford ('12) from six females bred on "pumpkin" and on *Alstonia scholaris*. The adult male and the nymphs are described for the first time in the present paper.

Genus **LEPTYNOPTERA** Crawford

Leptynoptera sulfurea Crawford ('19: 147). Plate 1, figs. 5 and 6.

Type locality.—MOLUCCAS, Amboina (*Muir*).

Leptynoptera sulfurea rubrocincta var. nov. Plate 1, fig. 4; Plate 3, fig. 20; Plate 4, fig. 38; Plate 5, fig. 48.

Male.—Length of body, 1.44 to 1.52 millimeters; width of head, 0.45 to 0.48; length of antennæ, 0.72; length of forewings, 2.05 to 2.16, width, 0.9 to 0.96. Light greenish yellow. Light brown as follows: Eyes; antennal segments I and II, and basal half of VIII; fore and middle femora; tibiæ and tarsi in all legs; an irregular, narrowly sublinear band near and parallel to caudal margin of hind coxæ; median third of abdominal sternites III and IV. Very dark reddish brown: Distal half of antennal segments IV, VI (except a proximal greenish yellow portion), distal half of VIII, and the whole of IX; the greater portion of anal valve ventrad; a broad, sublinear marking on each side of genital segment from dorsal margin to apex of its caudoven-tral projection; apices and distal spines of hind tibiæ; and meracanthi. Ocelli brownish yellow. Four longitudinal, narrowly sublinear, white, waxy bands on vertex from caudal margin to level of anterior ocellus and bordering foveæ; another transversely on pronotum; another linear waxy band on median area and one on each side inclosing an irregularly elliptical, sublateral area of mesopræscutum; five longitudinal waxy bands on meso-scutum, the middle one being subconfluent with the corresponding band of mesopræscutum. A subovate, bright red area bounded cephalad by a dark brown line on laterocaudal area of abdominal tergites IV to VII; a bright red, narrow, transverse band bounded cephalad by a dark brown line adjoining caudal margin of IV; a small, subcircular red spot on laterocephalic angle of abdominal sternite III. An elongately subrhomboid brown spot, intercepting a median, elongate, white band, running from

C+Sc entad and occupying about half of cell formed by C+Sc, R+M+Cu, and R; a dark brown, diffuse spot on anal vein near distal end of clavus, another near primary fork of R+M+Cu; a brown, subtriangular spot adjoining anal margin between branches of media and another between branch of media and cubitus. Body and appendages sparsely covered with rather long hairs.

Head slightly narrower than thorax, not deflected. Vertex nearly as long as wide, very slightly concave at caudal margin; cephalic margin somewhat produced laterad into a prominent, abrupt protuberance near base of antennal tubercle; lateral margins slightly raised above level of eyes; one rather deep, narrowly subelliptical, longitudinal fovea on each side of vertex between median suture and lateral margin. Genæ slightly swollen, abruptly produced cephalad beyond margin of vertex. Frons visible ventrad to anterior ocellus as an elongate sclerite, about three and a half times as long as wide, slightly narrower dorsad, rounded at dorsal end. Clypeus about one and two-thirds times as wide as frons, about one and one-fifth times as long as wide, about twice wider distad than proximad. Eyes subhemispherical, slightly thicker than distance from lateral margin to median suture of vertex. Anterior ocellus subhemispherical, not prominent. Posterior ocelli subequal in size to anterior, slightly elevated. Antennæ about one and three-fifths times as long as width of head including eyes; segments I and II subequal in thickness, three times as thick as III, both segments with ventral portions of apex produced.

Thorax robust, not strongly arched, about as thick as long, about six-sevenths as wide as thick. Pronotum short, about one-ninth as long as vertex, about fourteen times as wide as long. Mesopræscutum about six times as long as pronotum, about one and a half times as wide as long, deflected cephalad at an angle of about 45°. Mesoscutum subequal in length to mesopræscutum, about three times as wide as long. Mesoscutellum about half as long as mesoscutum, almost truncate at cephalic margin. Forewings hyaline, costal margin subparallel to anal; apex almost truncate, rounded toward costal margin, somewhat angular toward anal; pterostigma wanting; radial sector broadly arcuate; cubital petiole wanting; cubitus not forked. Hind wings about one-fifth as long as fore, cleft from apex to near base, giving wings a biramous appearance, dark brown along costal margin and base. Hind legs excluding coxæ about five-sixths as long as body, five abrupt, rather stout spines

entad on apices of tibiæ; meracanthi short, about one and one-third times as long as thickness at base; ungues broadly curved. Fore and middle legs shorter than hind.

Abdomen about one and two-sevenths times as long as thorax, about one and four-fifths times as long as thick; thickness subequal to width. Genitalia about half as long as total length of abdomen; genital segment produced caudoventrad beyond genital forceps at an angle of 30° to 40° from median line of body; distance from apex of elongation to base of segment about three times width. Anal valve about one-sixth total length of abdomen, about one and one-third times as long as wide, somewhat attenuate and rounded apicad, abruptly petiolate basad. Genital forceps subequal in length to anal valve, about three times as long as wide, slightly thicker proximad than distad, nearly truncate at apex. Anal valve and genital forceps more densely hairy than the rest of body.

Female.—Abdomen subequal in length to thorax. Genitalia about half total length of abdomen. Dorsal valve about one and one-seventh times as long as ventral, about two and a half times as long as thickness at base, about half as thick at distal half as at basal, rounded at apex. Ventral valve about six times as long as thickness at base, acute apicad. Dorsal and ventral valves more thickly hairy than the rest of body.

Described from eleven males and nine females.

Cotypes.—No. 18348, College of Agriculture, University of the Philippines.

LUZON, Manila, Government Laboratories accession No. 5160, February 17, 1906, one male, one female, and one imperfect specimen with broken genitalia (*Banks*); Manila, Bureau of Science accession No. 14771, November 16, 1911, two specimens (*Banks*), on *Calophyllum inophyllum* L. (Guttiferæ); Laguna, Los Baños, College of Agriculture accession No. 18348, March 11, 1918, eleven males and nine females (*Uichanco*), on the same plant. The gall has been previously described (*Uichanco* '19: 544, pl. 13, fig. 4).

The present variety differs from the species, as originally described by Crawford, as follows: Longer vertex in proportion to width, presence of waxy bands on vertex and notum; slightly longer antennæ; absence of basal spur on hind tibiæ; longitudinal bifurcation of hind wings; red spots on the abdomen (not evident in one female of the series); and additional brown spots on forewings. The type of the species is unfortunately a single, partly mutilated example, and the differences noted

herein may have been due to the difficulty in working with an imperfect specimen. When more is known about the Moluccan insect, the present variety may finally have to be merged with the species. As the case now stands, however, there appear to be sufficient differences from Crawford's description to justify the tentative placing of the Philippine material before me in a separate variety.

In erecting the genus, Crawford ('19:147) made some remarks regarding its being an anomalous one on account of its possessing some of the characters of both Pauropsyllinæ and Triozinæ. Supplementary to the characters he enumerated may be mentioned the caudally produced genital segment, which in combination with the reduced hind wings and other peculiarities point to a close affinity with certain members of Triozinæ, particularly *Trioza diptera* Crawford ('19:191, pl. 3, figs. 6 and 7).

Genus **PAUROCEPHALA** Crawford

Paurocephala kleinhofæ sp. nov. Plate 1, fig. 2; Plate 3, fig. 21; Plate 4, fig. 37; Plate 5, fig. 47.

Male.—Length of body, 0.88 to 0.96 millimeters; width of head, 0.46 to 0.48; length of antennæ, 0.26 to 0.31; length of forewings, 1.04, width, 0.48 to 0.52. Brownish yellow. Dark brown as follows: Apical and distal half of subapical segments of antennæ; eyes; median suture of vertex; junction of radial, medial, and cubital branches with marginal veins of forewings; a spot on anal vein midway between proximal and distal ends of clavus; pleura and coxæ (unevenly so); anterior, posterior, and lateral margins of abdominal tergites and lateral three-sevenths on each side of abdominal sternites, except genital segment, anal valve, and genital forceps. Light stramineous: A narrow, sublinear band bordering each side of median suture of vertex; laterocephalic tubercle of pronotum; a narrowly subtriangular, median spot from caudal to near cephalic margin of pronotum and another at mesopræscutum; posterior margin of latter; four faintly visible, longitudinal, narrowly linear markings on median third, and a diffusely subcircular area adjoining laterocephalic margin of mesoscutum; lateral third on each side of mesoscutellum near bases of axillary cords; median prominences of pseudometanotum and fourth to seventh abdominal

tergites; hind tibiæ and distal portions of hind femora (more darkly so). Body and appendages very sparsely and briefly pubescent.

Head subequal in width to thorax, somewhat deflected. Vertex about one and four-fifths times as wide as long, concave at caudal margin between posterior ocelli, broadly arcuate at cephalic margin, rounded down in front, somewhat depressed arcuately from lateral margins ventrad. Genæ slightly swollen ventrad to antennal tubercles. Eyes subglobular, about five-sixths as thick as distance from lateral margin to median suture of vertex. Clypeus subglobose, about one and a half times as thick as anterior ocellus. Anterior ocellus subhemispherical, not prominently set. Posterior ocelli subellipsoid, slightly smaller than anterior, somewhat prominently elevated due to up-curved edges of vertex. Antennæ about five-eighths as long as width of head including eyes; diameter of segments I and II subequal and about one and one-third times that of III; the rest of the segments subequal in diameter to III; two apical setæ, subequal in length to each other, and about three times as long as distal segment.

Thorax robust, not strongly arched, about eight-ninths as long as thick; width subequal to length. Pronotum about three-fourths as long as vertex, about four and a half times as wide as long; a prominent, subhemispherical tubercle on laterocephalic margin. Mesopræscutum about one and a half times as long as pronotum, about twice as wide as long, subangular laterad, abruptly deflected at lateral and caudal margins. Mesoscutum about one and two-fifths times as long as mesopræscutum, nearly twice as wide as long, broadly rounded down toward margins. Mesoscutellum about one-third as long as mesoscutum and about the same proportion to distance between points of attachment of axillary cords; anterolateral angles produced into abruptly subconical, somewhat divergent projections. Pseudometanotum produced caudad into a prominent, erect, subconical projection. Wings hyaline, irregularly obovate, broadly rounded at apex; R very slightly shorter than M+Cu; pterostigma slightly smaller than first marginal cell, subelliptical, with an inner, equally subelliptical area bounded by suture; first marginal cell subelliptical, about two and one-third times as long as wide and about twice area of second;

second marginal cell subtriangular. Hind legs longer than fore or middle; unguis broadly curved; meracanthi about three times as long as thick, of uniform thickness, rounded at apex.

Abdomen about one and one-third times as long as thick; width subequal to thickness; fourth, fifth, and sixth tergites with a prominent, erect, abruptly subconical, median tubercle; seventh with a longer and caudally directed projection at caudal margin. Anal valve about one-fourth total length of abdomen, about three times as long as thick, subcylindrical, somewhat flattened out at apex. Genital forceps about two-thirds as long as anal valve, about two and a half times as long as diameter at base, subconical.

Female.—Genitalia deflected at an angle of about 120° , anal valve about half the total length of abdomen, about twice as long as thickness at base, subconical, very acute at tip. Ventral valve about four-fifths as long as anal, about one and three-fourths times as long as diameter at base, very acutely pointed at apex, broadly curved subapically dorsad. Anal and ventral valves beset midway with irregular whorls of somewhat long, caudally divergent, bristlelike hairs.

Described from five males and nine females.

Cotypes.—No. 18415, in College of Agriculture, University of the Philippines.

LUZON, Laguna, College of Agriculture, east of "temporary building," Los Baños, at an altitude of about 50 meters, December, 1918. Accession No. 18415, College of Agriculture collection (*Uichanco*).

Nymphs and adults feed on leaves of *Kleinhofia hospita* L. (Sterculiaceæ), causing shallow, subhemispherical depressions in the leaf lamina. The insect produces no waxy secretion in any of its stages.

Paurocephala psyloptera Crawford ('13: 294).

Type locality.—LUZON, Laguna, Los Baños (*Baker*), on *Ficus ulmifolia* Lam. (Moraceæ).

Paurocephala psyloptera maculipennis var. nov. Plate 1, fig. 6; Plate 2, fig. 17; Plate 3, fig. 22; Plate 4, fig. 36; Plate 5, fig. 50.

Male.—Length of body, 1.5 millimeters; width of head, 0.65; length of forewings, 1.76, width, 0.8. Very dark fuscous. Light stramineous as follows: Ocelli; antennal segments I to III and basal half of IV; hind coxæ and trochanters; prothoracic femora and tibiæ. Brownish yellow: Mesothoracic and

metathoracic femora and tibiæ. Eyes light reddish brown. Body finely and irregularly reticulated. Body and appendages very sparsely and briefly pubescent.

Head subequal in width to thorax, slightly deflected. Vertex about four times as broad as long, conspicuously concave dorsad; caudal half hidden mediad from above by prothorax. Ocelli small, somewhat less in diameter than antennal segment III; anterior subequal in diameter to posterior. Eyes subglobose, subequal in thickness to distance from lateral margin to median suture of vertex. Antennæ about one and two-thirds times as long as width of head including eyes; diameter of segment I slightly greater than II; II about one and two-thirds times III; the rest of the segments distad subequal in diameter to III. Clypeus large and subglobose.

Thorax robust, slightly longer than wide, about as wide as thick. Length of pronotum about one-fifth that of mesopræscutum; the former deflected and partly hidden laterad beneath latter. Mesopræscutum irregularly pentagonal, about half as long as wide, produced on each side into an abrupt, caudolaterally diverging spine. Mesoscutum subequal in length to mesopræscutum; about one and one-third times as wide as long, irregularly subcircular. Mesoscutellum less than half as wide as mesoscutum, concave at cephalic margin. Metascutum with an erect, subconical epiphysis dorsad. Wing hyaline, irregularly obovate, broadly rounded at apex, slightly more than twice as long as wide. Pterostigma about one-third area of first marginal cell, brown. Hind legs slightly longer than body, about one and one-third times as long as middle legs; entire length of hind tibiæ sparsely armed with moderately long spines. Fore and middle legs subequal in length; ungues broadly curved.

Abdomen subequal in length to thorax; length about twice width, and one and one-sixth times thickness. Fifth tergite elevated dorsocaudad above level of sixth. Genital segment, together with anal valve and genital forceps, nearly one-fourth total length of abdomen, strigose. Genital forceps subellipsoidal, slightly shorter than anal valve and subequal in diameter to latter. Anal valve elongately subellipsoidal.

Female.—Genitalia about two-fifths total length of abdomen, deflected at an angle of 80° to 120° from longitudinal axis of body, very sparsely pubescent. Dorsal valve subequal in diameter to ventral; length of former about one and one-fourth times that of latter; both acutely subconical. Ventral valve broadly curved subapically dorsad.

Described from fourteen males and eight females.

Cotypes.—No. 18178, in College of Agriculture, University of the Philippines.

The present variety is distinguished from the species principally by its strongly deflected head, brown pterostigma, and darker brown abdomen, which is concolorous with notum.

Nymphs (living specimens).—Very light whitish yellow. Black as follows: Apical and subapical antennal segments; distal portions of the rest of antennal segments proximad. Eyes red. Tibiæ and tarsi reddish white. Body and appendages sparsely covered with long hairs and an irregular thin coating of wax. A slender, fluffy, waxy filament, usually longer than body, joined to each side of subapical abdominal tergite.

The species, likewise, has been reported to produce similar waxy secretions (Crawford '15:260), and it is said to be attended by ants.

Nymph (apparently full-grown; mounted in balsam).—Length of body, 1.84 millimeters; width of head, including eyes, 0.6; length of forewing pads, 0.64, width, 0.2; length of abdomen, 1.04, width, 0.59; length of larger caudolateral wax glands, 0.2, thickness, 0.09. Light yellow. Eyes red. Brown as follows: Ungues; terminal and subterminal antennal segments. Body and appendages very sparsely covered with moderately long hairs.

Head slightly narrower than thorax, obtuse at cephalic margin. Vertex about one and one-fourth times as long as wide. Eyes subhemispherical, about four-sevenths as thick as width of vertex. Two small, irregularly diffuse areas situated mesocaudad from eyes and concolorous with latter, presumably representing posterior ocelli. Antennæ about twice as long as width of head including eyes; basal two segments shorter and thicker than the rest, as in adult.

Thorax about one and one-eighth times as long as wide, subuniform in width throughout. Hind legs about one and one-fifth times as long as middle; fore and middle legs subequal in length; unguis curved apicad.

Abdomen about one and six-sevenths times as long as thorax; width about half the length; uniform in width from thorax to beginning of caudolateral wax glands; obtusely angular caudad, terminating in a small, subcylindrical, caudal segment, about twice as wide as long and about two-sevenths as wide as larger portion of abdomen; two short, bristlelike hairs on each side of caudal segment ectodistad. Larger pair of subreniform wax

glands about twice as long as wide, nearly one-sixth as long as total length of abdomen, apparently situated on each side of fifth abdominal segment. A smaller pair, immediately caudad to and adjoining larger pair, about three-fifths as long as latter, nearly three times as long as wide, subuniform in width throughout.

LUZON, Laguna, Los Baños, at an altitude of about 50 meters, February 2, 1918, College of Agriculture accession No. 18178 (*Uichanco*). On nether surface of fully expanded young leaves of *Ficus nota* Merrill (Moraceæ).

The insects are mostly confined to an area along the midrib, and their presence is accompanied by a deposition of a white, fluffy coating of wax on the infested area of the leaf. The leaf margins are often more or less curved inferiorly.

Subfamily CARSIDARINÆ Crawford

Genus TYORIA Walker

Tyoria indica Crawford ('19:159). Plate 1, fig. 7; Plate 3, figs. 24 and 25; Plate 4, fig. 39; Plate 5, fig. 49.

Male.—Length of body, 2.24 to 2.72 millimeters; width of head, 0.6; length of forewings, 3.2 to 3.6, width, 1.12 to 1.28. General color light clay yellow, with conspicuous, longitudinal, reddish orange streaks marking borders of foveæ on vertex and terga; distal portions of antennal segments IV to VIII, inclusive, and the whole of IX and X, dark brown. Body and appendages very sparsely and briefly pubescent.

Head slightly narrower than thorax, not deflected. Vertex somewhat broader than long, with one longitudinal fovea on each side between median suture and lateral margin. Frons visible as a narrow, elongate, subtriangular sclerite bordering anterior ocellus, subequal in width to diameter of anterior ocellus. Anterior ocellus large, reddish brown, prominent. Posterior ocelli subequal in diameter to anterior, less prominent. Eyes dull yellowish brown, subhemispherical; diameter about three-fourths length of vertex. Genæ produced cephalad into moderately large antennal sockets. Antennæ about three-fourths as long as body without wings; segments I and II subequal in length, about one-fifth as long as III; diameter of I about one and one-fourth times that of II; of II, about one and one-fourth times that of III; IV to X, inclusive, subequal in diameter to III.

Thorax not strongly arched; about two and a half times as long as wide. Pronotum two-thirds as long as vertex; with

eight ridges, conspicuous but less prominent than those bordering foveæ at vertex, arranged as follows: One bordering each lateral margin of pronotum; another parallel to and very near each of former; the last two pairs almost aligned with ridges at vertex. Three much less prominent ridges on mesopræscutum, equidistant from each other and from the lateral margins of latter. Five obsolescent, longitudinal, subequidistant ridges on mesoscutum. Legs concolorous with body; hind legs slightly longer than thorax; first and second pairs slightly shorter than third. Characteristic basal spur on hind tibia concolorous with the rest of leg. Hind tibiæ and tarsi of all legs equipped with dark brown, distal spines. Wings hyaline. Forewings about three times as long as broad; subacute at apex; $R+M+Cu$, cubital petiole, and media in almost one continuous straight line; $R+M+Cu$ and cubital petiole subequal in length; area of first marginal cell about half that of second; a dark brownish tinge on terminal portions of veins; pterostigma wanting; a dark brown, acutely triangular spot between branches of media, and another between branches of media and cubitus.

Abdomen subequal in length to head and thorax combined, gradually tapering caudad. Longer pair of genital forceps about two and three-fifths times as long as anal valve, the forceps consisting of two parts: (1) a suberect, slender pair, curved cephalad near apex, about four times as long as diameter at base, abruptly pointed apicad; and (2) a shorter pair, about half as long as, and situated cephalad and parallel to, former, about four times as long as diameter at base, slightly curved cephalad, subacute apicad. Anal valve without process, about one and a half times as long as wide, somewhat constricted basad; the rest of uniform thickness. Penis drawn subhorizontally cephalad beyond anal valve to about seventh abdominal tergite; length from dorsal surface of genital segment to apex of penis about three and one-third times that of anal valve.

Female.—Dorsal and ventral valves subequal in length; both acute and tapering, forming with the genital segment a very slender, subconical projection which is slightly shorter than eighth abdominal segment. Eighth abdominal sternite beset caudad with numerous long, bristlelike hairs.

LUZON, Manila, Bureau of Government Laboratories accession No. 9931, February 11, 1909, two males and eight females on pins and two males on slides (*Banks*). MINDANAO, Kolambugan, Bureau of Science accession No. 18567, June, 1914 (*Banks*).

The specimens before me appear to differ from Crawford's original description in certain minor color characters only.

Subfamily PSYLLINÆ Puton

Genus EIPSYLLA Kuwayama

Epipsylla forcipata Crawford ('17:167). Plate 2, fig. 8; Plate 3, figs. 26 and 28; Plate 5, fig. 54.

One slightly damaged female specimen, apparently belonging to this species, collected in Manila on May 8, 1910 (*Banks*), No. 18568, Bureau of Science collection. This specimen appears to differ slightly from Crawford's type as follows: Pterostigma opaque; another proximal opaque area contiguous to pterostigma and bordering costal margin of wing. However, in as much as the specimen before me is imperfect and I have no means of deciding whether or not this is an abnormality, I deem it inadvisable to place this insect in another variety.

Genus PSYLLA Geoffroy

Psylla simlæ Crawford ('12:246). Plate 2, fig. 10; Plate 3, fig. 29; Plate 4, fig. 42; Plate 5, fig. 52.

One male, two females, and a fourth specimen with broken abdomen, collected at Los Baños, Laguna, Luzon, at an altitude of about 50 meters, accession No. 18516, College of Agriculture collection, March 8, 1915 (*Banks*); from the same locality, accession No. 18517, College of Agriculture collection, February 17, 1917 (*A. Goco*). This species was formerly known only from Simla, West Himalayas, at an altitude of about 2,100 meters.

Subfamily TRIOZINÆ Puton

Genus MEGATRIOZA Crawford

Megatrioza banksi sp. nov. Plate 2, fig. 15; Plate 3, fig. 32; Plate 4, fig. 43; Plate 5, fig. 53.

Male.—Length of body, 3.44 millimeters; width of head, 0.64; length of antennæ, 1.4; length of forewings, 5.36, width, 1.36. General color dark yellowish brown; ventral surface of body, legs, and antennal segments III to VII lighter brown; antennal segments I and II, longitudinal ectal halves of genal cones, and ocelli red, unicolorous; vertex and notum pale yellowish brown, with lateral margins of dorsal sclerites dark brown; two dark brown, sublinear, rather broad, subparallel, longitudinal stripes extending from lateral fourth on each side of mesoscutellum to

cephalic margin of pronotum; a dark brown, very broadly linear spot bounding median suture of vertex, occupying about one-third total area of latter, and continuous thence through longitudinal ental half of genal cones. Body and appendages sparsely beset with rather long hairs; genal cones densely hirsute.

Head scarcely narrower than thorax, very slightly deflected. Vertex about one and a half times as broad as long, slightly and broadly concave mediad, broadly cleft at caudal margin. Ocelli large, subequal to each other in diameter; anterior more prominent than posterior. Eyes subhemispherical, slightly thicker than distance from lateral margin to median suture of vertex, dark brown. Genal cones porrect, long, slender, subconical, rounded apicad, noncoalescent, more densely hirsute ventrad than dorsad, about three times as long as diameter at base, slightly shorter than vertex. Antennæ about twice as long as width of head; segments III to IX slender.

Thorax robust, less than twice as long as wide, slightly arched. Pronotum about one-third as long as vertex; pronotum and cephalic two-thirds of mesopræscutum with a broadly suppressed, longitudinal, median carina which terminates cephalad in a short, horizontal, subtriangular emargination. Mesopræscutum and mesoscutum with a pair of abruptly subconical projections at lateral margins. Hind legs about twice as long as thorax; hind femora and tibiæ relatively thick; the latter somewhat hirsute, equipped with moderately large, subconical, divergent spurs basad and subdistad, and four black spines and a number of bristlelike hairs apicad; ungues broadly curved. Forewings about four times as long as wide, hyaline and membranous, with a faint brownish tinge, subacute at apex; cubital petiole and pterostigma wanting; Rs about half the length of M, the two veins subparallel; first marginal cell about one and a half times as large as second; a large, elongately subtriangular, dark reddish brown mark along anal vein between Cu_2 and base of wings; a very small, much less conspicuous, subtriangular, light brown spot between branches of cubitus, another between branches of cubitus and media, and a third between branches of media, near apex.

Abdomen subequal in length to thorax; about twice as long as wide. Genital forceps slightly longer than anal valve, both subconical, rounded apicad.

Female.—Anal and ventral valves about one-third total length of abdomen, the former slightly longer than the latter, subequal to each other in diameter, both subacute apicad, slightly

hairy; hairs on anal valve somewhat longer than those on ventral.

Described from one male and one female.

Type and allotype.—No. 18569, in Bureau of Science collection.

MINDANAO, Kolambugan, Bureau of Science accession No. 18569, June, 1914 (*Banks*). Food plant not recorded.

This species appears to be closely related to *M. armata* Crawford ('15: 264), but is distinguishable from the latter as follows: Presence of large, reddish brown spot along anal vein of forewings subbasad; genal cones slightly shorter than vertex; antennæ shorter in comparison with width of head; and pronotum much shorter than vertex.

Megatrioza pallida sp. nov. Plate 2, figs. 9 and 11; Plate 3, figs. 27, 30, and 31; Plate 4, fig. 40; Plate 5, fig. 55.

Male.—Length of body, 1.76 millimeters; width of head, 0.48; length of antennæ, 0.6; length of forewings, 2.88 to 3.04, width, 0.96. Light yellowish brown. Dark brown as follows: Two irregularly linear markings running longitudinally cephalocaudad from caudal margin of mesoscutum, near cephalic angles of mesoscutellum, to cephalic margin of mesopræscutum; marginal areas of pronotum, cephalic marginal area of mesopræscutum, and submarginal areas of abdominal tergites and sternites I to V; an irregularly diffuse spot marking each of the two foveæ at vertex; apices of genal cones; distal portions of antennal segments IV and VI, proximal and distal portions of VII, the whole of VIII, except a very small, faintly yellow, basal portion, and the whole of IX and X. Apex of genital forceps and ungues brownish black. Distal tarsal segments in all legs yellowish brown. Body and appendages very sparsely and briefly pubescent.

Head slightly narrower than thorax, somewhat declivous. Vertex about one and a half times as broad as long, cephalic emargination describing an angle of about 120° ; a rather deep, angular fovea on each side extending from caudal margin to proximity of base of antennal tubercles and located midway between median suture and lateral margin of vertex. Ocelli subconcolorous with vertex; anterior ocellus moderately large, fairly prominent; posterior ocelli somewhat smaller than anterior, a large portion basad hidden beneath cuticular surface. Eyes large and prominent, dark yellowish brown, subhemispherical, about as thick as distance from lateral margin to median suture of vertex. Genal cones small, about one-fourth

as long as vertex, subporrect, slightly curved dorsad at apices. Length of antennæ about one and one-fifth times width of head; diameter of segment I about one and one-third times that of II; of II, about one and two-thirds times that of III; the rest of the segments distad subequal in diameter to III.

Thorax robust, slightly arched, about one and one-third times as long as broad. Pronotum about one-seventh as long as mesopræscutum, slightly deflected but confluent with surface of latter. Mesopræscutum about one and one-sixth times as long as wide; cephalic margin broadly angular, caudal broadly curved. Mesoscutum remotely crescent-shaped, about twice as wide as long. Cephalic margin of mesoscutellum about one-third width of mesoscutum. Wings large, hyaline, membranous, with a faint yellowish tinge, about three times as long as wide, subacute at apex; wing veins subconcolorous with body; cubital petiole and pterostigma wanting; Rs slightly shorter than M; the two veins running subparallel to each other; first marginal cell about two and a half times as large as second; a small, inconspicuous, acutely subtriangular, marginal spot, consisting of minute dark brown dots, between branches of media, another between branches of media and cubitus, and a third between branches of cubitus. Hind legs about one and one-third times as long as thorax; hind tibiæ equipped with a short basal spur and three distal, broadly curved spines. Middle legs subequal in length to thorax, slightly longer than forelegs; ungues broadly curved.

Abdomen subequal in length to thorax, about twice as long as broad. Anal valve slender, subconical, about twice as long as diameter at base, broadly curved caudad near apex. Genital forceps slightly shorter than, and subequal in basal diameter to, anal valve, less acutely pointed distad than latter, curved caudad near apex. Genital segment, genital forceps, and anal valve beset with much longer hairs than the rest of body.

Female.—Dorsal valve about two-fifths total length of abdomen, about one and two-fifths times as long as diameter at base, subconical. Ventral valve slightly shorter than dorsal, about three times as long as diameter at base; apical half about three-fifths as thick as basal. Dorsal and ventral valves more thickly beset with longer hairs than the rest of body.

Cotypes.—No. 18174, in College of Agriculture, University of the Philippines.

Nymph (earlier instar).—Length of body, 1.44 millimeters; width of head, 0.5; length of antennæ, 0.26; width of thorax, including wing pads, 1.2; length of forewing pads, 0.84, width,

0.36; length of abdomen, 0.61, width, 1. Ventral surface of body somewhat convex, dorsal almost plane. Cephalic margin of head, costal margin and apex of forewing pads, and abdomen fringed with numerous subcylindrical hairs. Hairs slightly attenuate apicad, about seven times as long as thick, semitranslucent. Basal tubercle of hair about one and one-fourth times as thick as hair, about one and a half times as long as wide; insertion of hair visible through distal third of tubercle. Surfaces of body and of wing pads less thickly covered with hairs; hairs of the same description as above.

Head about one and four-sevenths times as wide as long; cephalic margin broadly rounded, with a deep, narrow, median cleft. Eyes subhemispherical; caudal fourth partly hidden laterad by thorax; about one-sixth as thick as total width of head. Antennæ about half as long as width of head including eyes, somewhat thicker basad, slightly attenuate at apical third; a moderately long hair on apical segment distad; another subdistad.

Length of thorax apparently subequal to width.² Forewing pads about three times as long as wide, subacute apicad, rounded ectoproximad; intermediate portion uniform in width throughout. Hind legs about two-thirds as long as body; fore and middle legs slightly shorter than hind; ungues sharply bent over at apical third.³

Abdomen subequal in length to thorax, about two-thirds as long as wide, subhemidiscoidal; anal segments without process.

LUZON, Laguna, Los Baños, at an altitude of about 50 meters, January, 1918. College of Agriculture accession No. 18174 (*Uichanco*). Reared from leaf galls on *Mallotus philippensis* (Lam.) Muell.-Arg. (Euphorbiaceæ). For a description of the gall, see Uichanco '19: 546, pl. 5, fig. 3; pl. 13, figs. 2 and 3.

² The lateral margins of the thorax are very much obscured by the wing-pads and are almost indistinguishable in the mounted specimens.

³ No living specimens were available at the time of writing, and on this account color notes, presence or absence of waxy coating, and such other characters as can be studied only from fresh material are not reported here. The present description is based on balsam mounts and some fragmentary field notes.

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ILLUSTRATIONS

[Unless otherwise specified, all illustrations of adult parts are based on the male.]

PLATE 1

- FIG. 1. *Pauropsylla udei* Rübsaamen, forewings, female, \times 29.5.
 2. *Paurocephala kleinhofiae* sp. nov., forewings, \times 29.5.
 3. *Pauropsylla tuberculata* Crawford, forewings, \times 29.5.
 4. *Leptynoptera sulfurea rubrocincta* var. nov., forewings, \times 29.5.
 5. *Pauropsylla triozyptera* Crawford, forewings, \times 29.5.
 6. *Paurocephala psylloptera maculipennis* var. nov., forewings,
 \times 29.5.
 7. *Tyoria indica* Crawford, forewings, \times 29.5.

PLATE 2

- FIG. 8. *Epipsylla forcipata* Crawford, forewings, \times 26.2.
 9. *Megatrioza pallida* sp. nov., forewings, \times 26.2.
 10. *Psylla simlæ* Crawford, forewings, \times 26.2.
 11. *Megatrioza pallida*, outlines of forewing pads, nymphs, \times 56.4.
 12. *Pauropsylla tuberculata*, outlines of forewing pads, nymphs, \times
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 13. *Pauropsylla udei*, outlines of forewing pads, nymphs, \times 56.4.
 14. *Pauropsylla triozyptera*, outlines of forewing pads, nymphs, \times 56.4.
 15. *Megatrioza banksi*, sp. nov., forewings, \times 26.2.
 16. *Haplaphalara dahli* (Rübsaamen) gen. nov., forewings, \times 26.2.
 17. *Paurocephala psylloptera maculipennis*, outlines of forewing pads,
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 22. *Paurocephala psylloptera maculipennis*, head, anterior aspect,
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 24. *Tyoria indica*, head, female; anterior aspect, \times 50.8.
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 35. *Pauropsylla tuberculata*, male genitalia, $\times 63.5$.
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 54. *Epipsylla forcipata*, female genitalia, $\times 50.8$.
 55. *Megatrioza pallida*, female genitalia, $\times 50.8$.

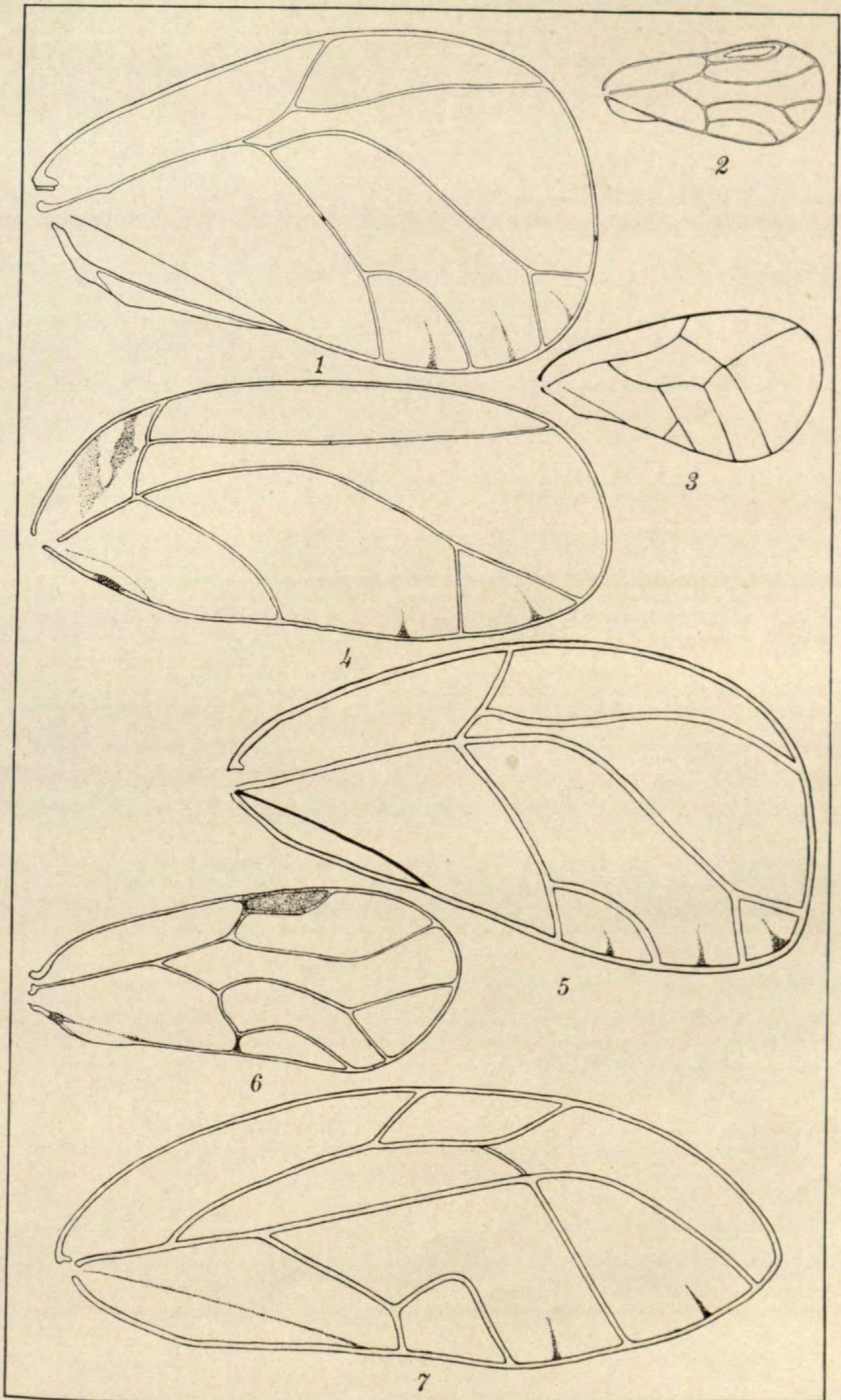


PLATE 1. PHILIPPINE PSYLLIDÆ.

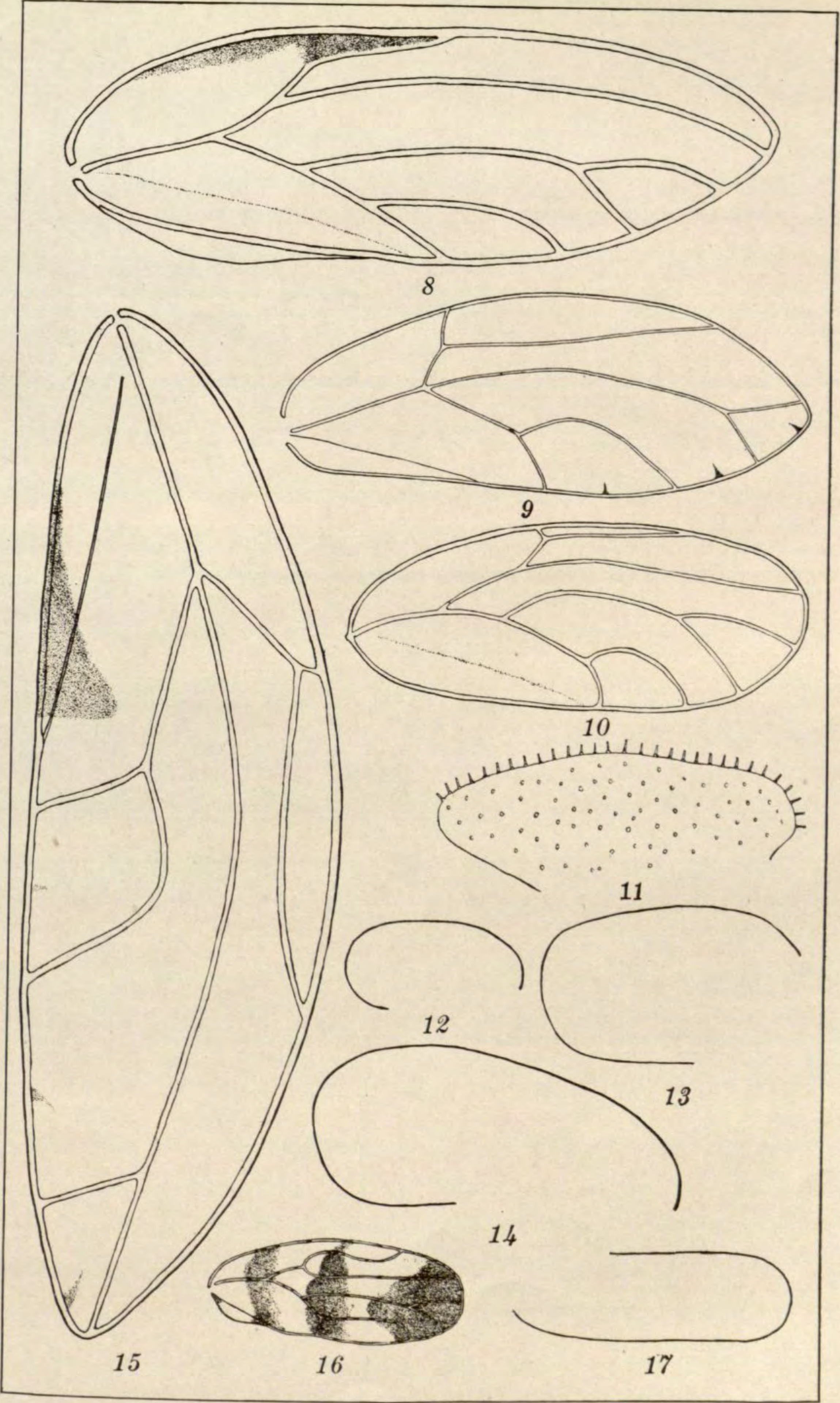


PLATE 2. PHILIPPINE PSYLLIDÆ.

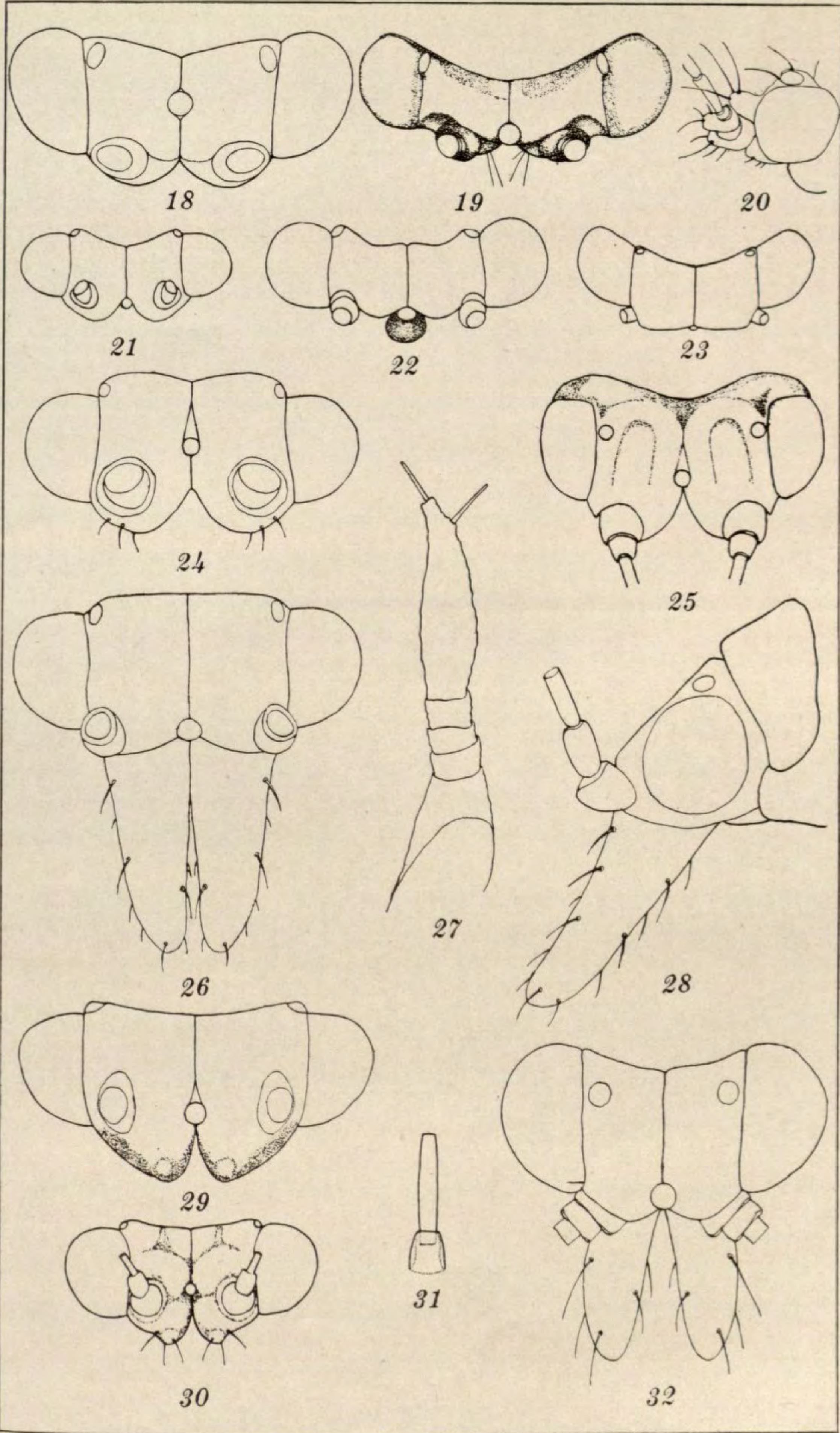


PLATE 3. PHILIPPINE PSYLLIDÆ.

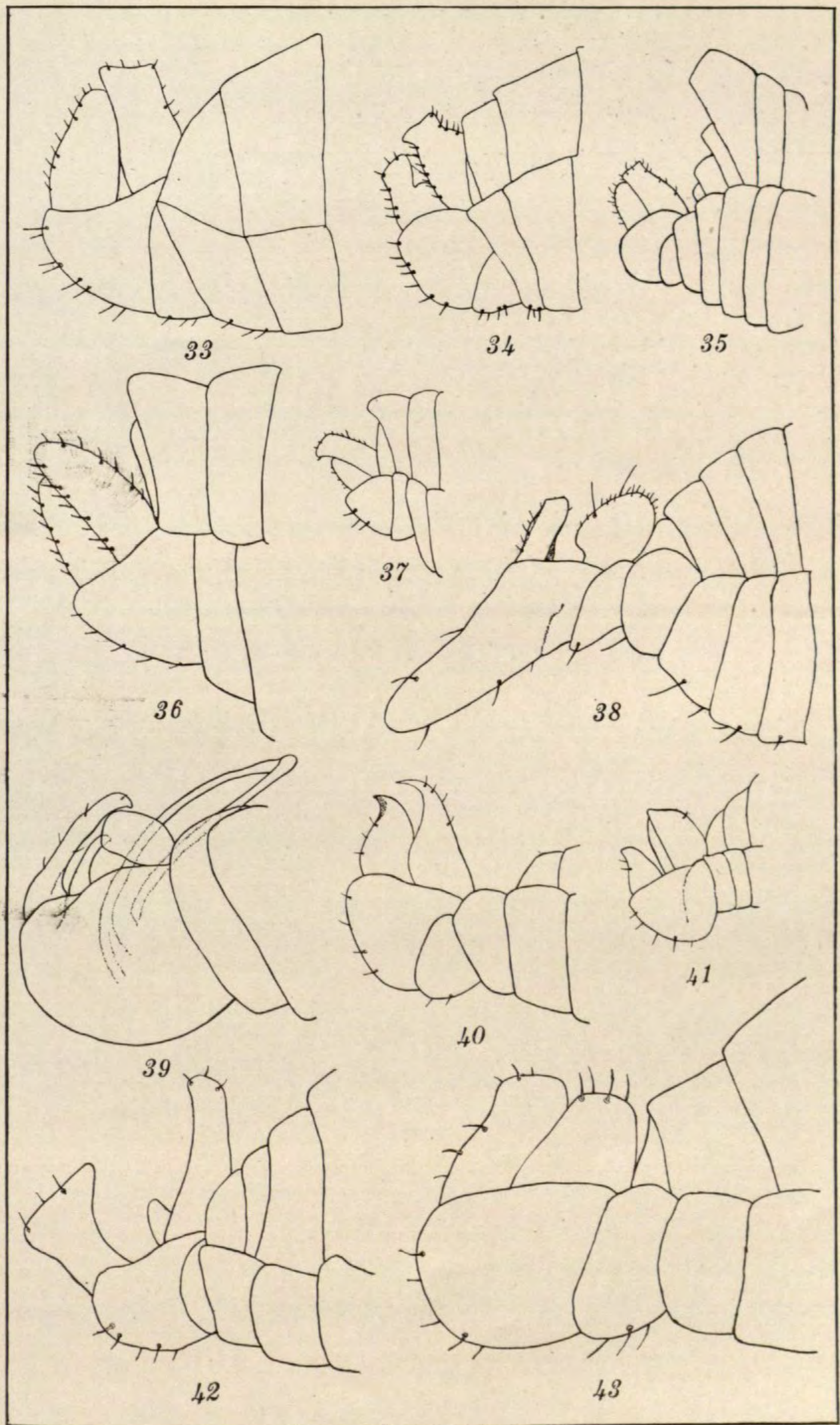


PLATE 4. PHILIPPINE PSYLLIDÆ.

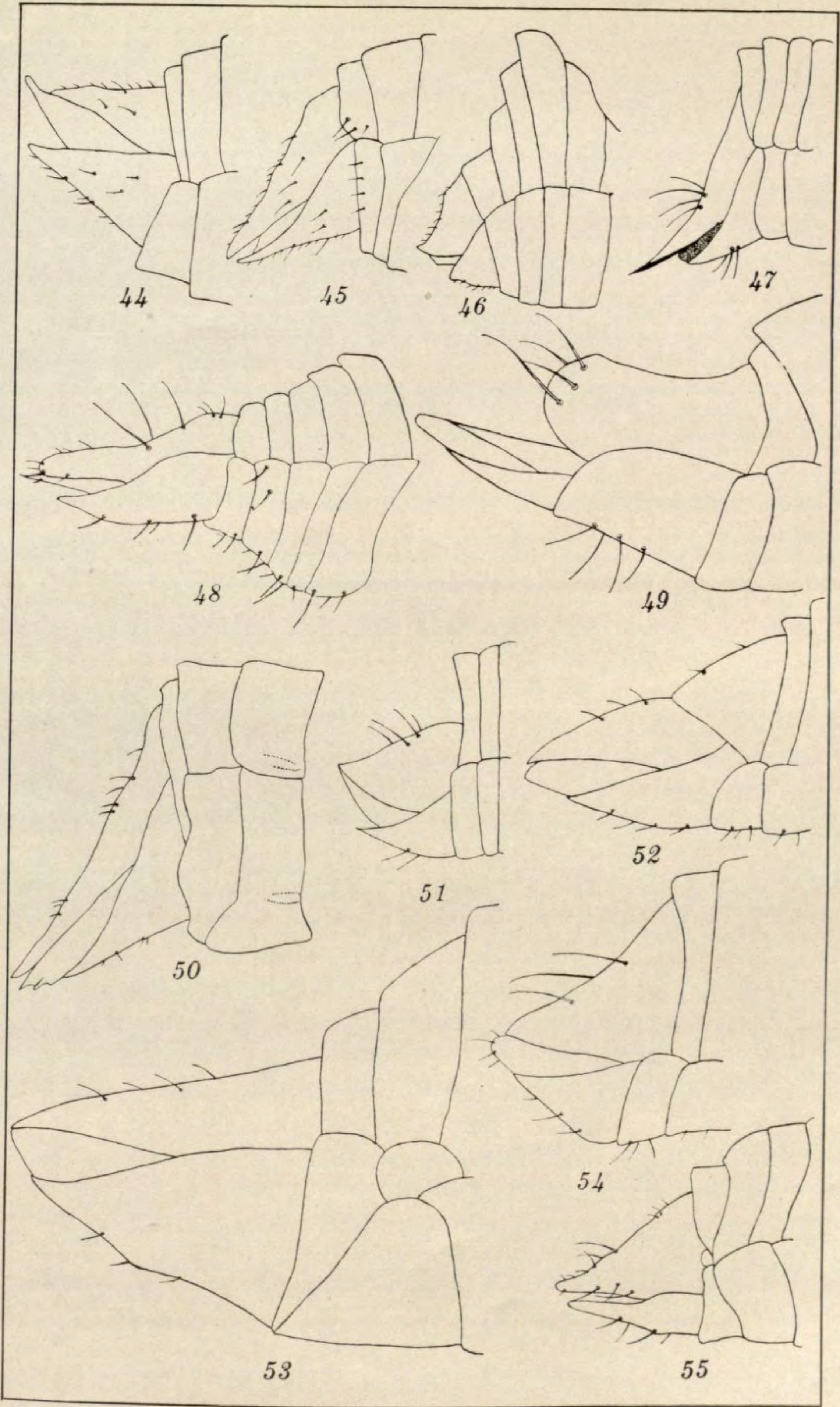


PLATE 5. PHILIPPINE PSYLLIDÆ.

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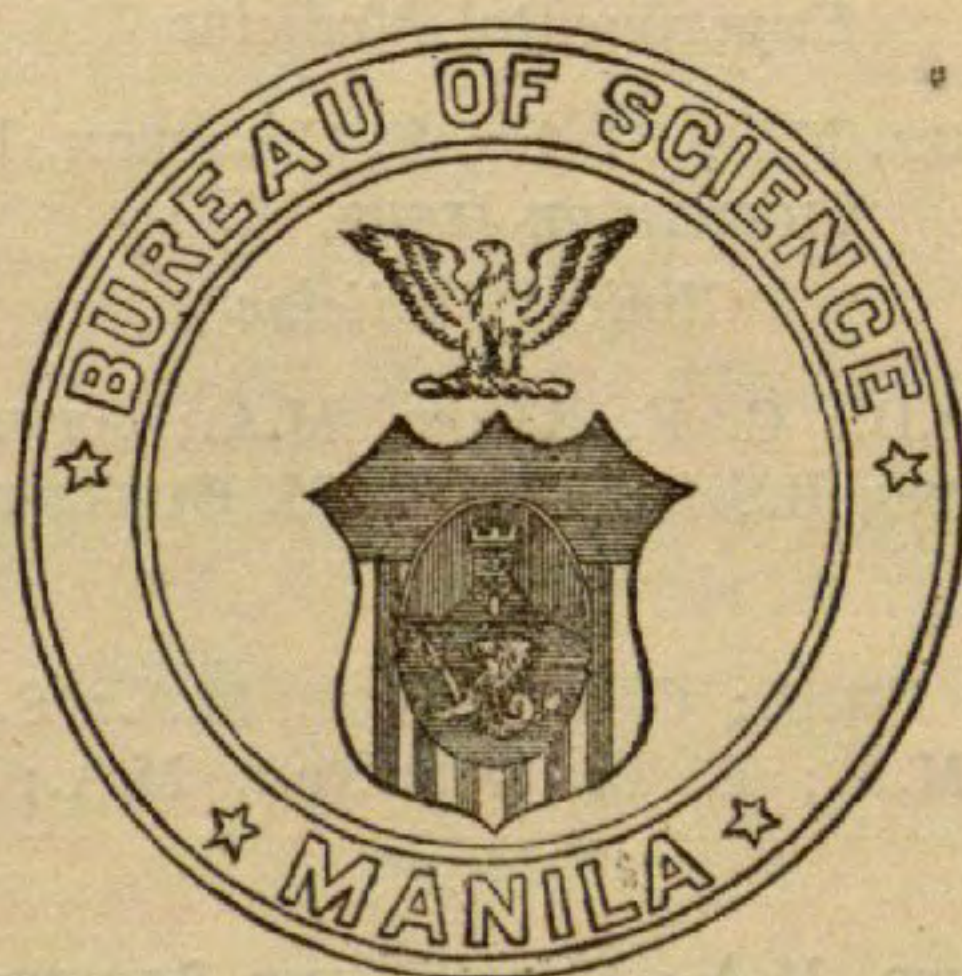
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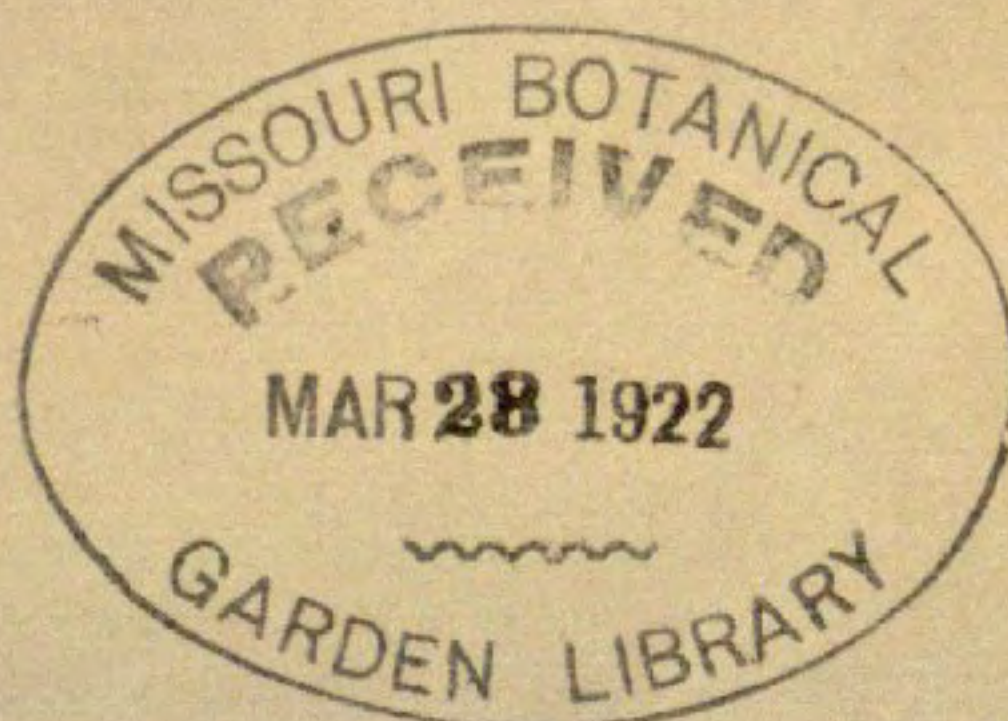
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