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LINCOLN, NEBRASKA

### III.—*Mallophaga from Birds of Costa Rica, Central America*

BY M. A. CARRIKER, JR.

#### INTRODUCTION

The specimens of Mallophaga, upon which the contents of this paper are based, were collected by the author during the summer of 1902, while engaged in a search for natural history specimens in different regions of Costa Rica, Central America. As will be seen from the text, the birds were collected in three principal localities, namely: Juan Vinas, on the Atlantic slope, at an altitude of approximately 3,000 ft.; the volcano Irazu, situated on the continental divide, the majority of the specimens being found between the altitudes of 8,000 and 10,000 ft., although some were collected at the summit, which attains an altitude of 11,198 ft.; Pozo Azul, on the Rio Grande de Pirris, about thirty miles from the Pacific coast, with an altitude of not more than 300 ft.

The birds collected are, with the exception of a few duplicates at the University of Nebraska, now in the possession of the Carnegie Museum, Pittsburg, Pa., and I am greatly indebted to Mr. W. E. Clyde Todd, curator of birds and mammals in that institution, for his kindness in giving me the correct determination of the bird hosts, the host list given in this paper having been arranged and corrected by him. I also extend thanks to Mr. C. F. Underwood, of San Jose, Costa Rica, for his kindness in giving me determinations for my specimens while in that country, and for the privilege of examining birds, collected by him, for Mallophagan parasites. Lastly, my thanks are due Professor Lawrence Bruner, of the University of Nebraska, under whose direction this paper was written, for his many valuable suggestions during the course of the work.

The types of all new forms described in this paper are in the collection of the author, with co-types of most of them in the

collection of the Department of Entomology in the University of Nebraska.

A few words in regard to the distribution of Mallophaga collected would probably be interesting. It was found that birds belonging to genera not strictly tropical, and found principally in the higher altitudes, were much more often infested with the parasites than those strictly tropical and inhabiting the lower altitudes. This statement, however, is only true in a general sense, but when exceptions were encountered it was usually found that the parasites belonged either to the genus *Menopon* or *Colpocephalum*, and were present in great numbers, these two genera, especially the latter, having been taken in large numbers on strictly tropical birds.

The list of Mallophaga collected on *Tinamus robustus* is a very interesting one, including two new genera and several new species, all of which are very aberrant forms of the genera in which they have been placed. Other very interesting forms are *Colpocephalum extraneum* sp. nov. and *mirabile* sp. nov. collected on *Nyctidromus albicollis* and *Zarhynchus wagleri*, in that they possess a very marked mesothoracic suture and have the metathorax enormously developed posteriorly. It seems to me that many of the present genera need a thorough revision and that some of them should be split up into two or more genera or sub-genera, *Colpocephalum*, *Menopon*, and *Physostomum* especially needing it.

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## DESCRIPTIONS AND DISCUSSIONS

**Docophorus bisignatus** N.

Giebel, *Insecta Epizoa*, p. 106, pl. IX, fig. 9.

Piaget, *Les Pediculines*, Sup., p. 11, pl. II, fig. 1.

Numerous individuals of both sexes collected on *Guara alba* at Poza Azul, Costa Rica, June, 1902. This species is readily recognized by the bilobate, clypeal, signature.

**Docophorus platystomus** N.

Nitzsch, in Burmeister, *Handbuch d. Ent.* 1839. II, pp. 426.

Giebel, *Insecta Epizoa*, p. 69, pl. IX, fig. 1.

Denny, *Anoplurorum Britanniae*, p. 108.

Piaget, *Les Pediculines*, p. 17, pl. I, fig. 1.

Osborn, *Notes on Mallophaga and Pediculidae*. *Canad. Ent.*, 1884. XVI, p. 197.

— *Insects Affecting Domestic Animals*, p. 216.

Numerous specimens collected on *Buteo borealis costaricensis*, volcano Irazu, April; on *Buteo abbreviatus*, Poza Azul, June, 1902. While these specimens do not exactly agree with Piaget's plate and description in some particulars, they can be referred to that species.

**Docophorus platystoma umbrosus** var. nov.

MALE.—Body, length 2.22 mm., width 1.02 mm.; head, length .86 mm., width .81 mm. Much larger than Piaget's measurements for *platystomus*, especially the head, which is much narrower in proportion at the temples, with the clypeus very much narrower and deeply emarginate at the tip; the whole head is darker, also the lateral markings of thorax and abdomen; the pustules in the lateral fasciae are very clear and prominent, not obscured as in *platystomus*, while the great number of dorsal abdominal hairs of Piaget's specimens are wanting, there being but a scattering median row on each segment.

Two males collected on *Leucopternis semiplumbea*, at Poza Azul, Costa Rica, June, 1902.

***Docophorus transversifrons* sp. nov., pl. I, fig. 1**

**MALE.**—Body, length 1.76 mm., width .62 mm.; brownish golden; head large with broad truncate clypeus, and abdomen subclavate, with narrow, light smoky brown lateral bands and golden brown transverse bands.

Head, length .66 mm., width .58 mm.; deep golden brown, with long, broad, truncate clypeus and constricted, rounded temples; occiput convex; clypeal angles with two hairs; one marginal and one submarginal hair at clypeal suture; two submarginal hairs just before trabeculae; trabeculae rather small for the genus, pointed, golden; antennae short and stout, first joint thickest, second longest, third and fourth subequal, shortest, and all uniformly golden brown; eye convex, colorless, with a hair; temples evenly rounded, with two rather long hairs and several short bristles; narrow, dark brown, antennal bands, broken at clypeal suture, not reaching clypeal angles, and with bases swollen and bent inward at trabeculae; paler brown, internal, sinuated bands inside of antennal bands; clypeal signature large, broad pointed posteriorly, slightly emarginate at sides, scarcely reaching end of clypeus, and whole deep golden brown; mandibles heavy, chestnut; pale brown occipital bands running from sides of occiput to bases of antennal bands; temples narrowly edged with brown, and whole region brownish.

Prothorax small, quadrangular, with slightly diverging sides; posterior margin bluntly angulated; posterior angles with one stout hair, lateral bands of deep brown, pale at the margins and curving around on posterior border nearly to middle of segment; interior of segment pale golden brown; brown coxal bands visible. Metathorax short, transverse, with strongly convex, diverging sides, and flatly angulated posterior margins, with three hairs on each side; lateral submarginal bands of deep brown; whole segment golden brown. Legs rather short, stout, with well-developed tibiae and aborted tarsi; uniformly concolorous with body, with the exception of pale brown semiannulations at tips of femora and tibiae.

Abdomen short, subclavate, with lateral margins of segments slightly convex, and rounded, projecting, posterior angles fur-

nished with two hairs in segments four to seven, four on each side of the eighth; one hair on posterior margin of segments three to seven just within the lateral bands; a median row of long slender hairs across the middle of segments two to six; narrow lateral bands of translucent brown, broken at the sutures and projecting into adjacent anterior segments; clear pustules at spiracles on segments two to seven; transverse bands of golden brown, separated by clear sutures and broken medially; apical segment clear, with brown tip; genitalia deep brown, short, stout, with inward curving points.

FEMALE.—Body, length 2.15 mm., width .83 mm.; head, length .71 mm., width .66 mm.; larger and lighter than male, with more oval abdomen; lateral bands narrower and transverse bands shorter and more widely separated; apical segment large, rounded, clear, with a median, transverse blotch.

Two males and one female collected on *Micrastur guerilla*, at Pozo Azul, Costa Rica, June, 1902. A rather unique form for a Raptorial bird, but one readily recognized by the long, broad, truncate clypeus.

***Docophorus californiensis* Kell.**

Kellogg, *New Mallophaga* II, p. 483, pl. LXVI, fig. 6.

Numerous males and females collected on *Melanerpes formicivorus* and *Dryobates villosus jardinii*, volcano Irazu, April, 1902, and on *Chloronerpes yucatanensis* and *Melanerpes aurifrons hoffmani* at Juan Vinas, Costa Rica, March, 1902.

***Docophorus bruneri* sp. nov., pl. I., fig. 2**

FEMALE.—Body, length 1.19 mm., width .42 mm.; clear umber brown, with large head having clypeus pale golden and temples deep brown; abdomen elliptical, with narrow, pitchy, lateral bands and median, transverse, brown bands.

Head, length .42 mm., width .42 mm.; very large in proportion to the body, with broad, truncate-conical clypeus, slightly swollen at clypeal angles; one hair in clypeal angles, one marginal and two submarginal ones on sides; narrow golden brown antennal bands; clypeal signature large, pale, pointed posteriorly,

with dusky lateral lobes projecting posteriorly, and the whole separated from adjoining parts by a narrow clear line; trabeculae large, curving, bluntly pointed, concolorous with front of head; antennae long and stout, with first two segments longest, and equal, and last three shorter, and subequal, all with semiannulations of brown and ground color same as temples; eyes large, protruding, clear, with a very fine bristle; temples evenly rounded with two short pustulated hairs and two bristles; occiput convex, heavy, pitchy brown, occipital bands paler and narrower anteriorly, running forward past the posterior root of mandibles to bases of the antennal bands; mandibles large, chestnut; whole temple from occipital bands to margin deep, clear brown.

Prothorax small, short, quadrangular, with concave anterior margin, convex sides and posterior margin; posterior angles with one hair; narrow, dark brown, submarginal, lateral bands; brown coxal bands visible; metathorax larger than prothorax, pentagonal, with convex diverging sides and sharply angulated posteriorly; posterior angles with one long hair and two short ones; posterior margin with five long hairs on each side; dark brown lateral bands, paler at margins; meso-coxal bands visible. Legs stout, with swollen femora and tibiae, concolorous with thorax, with a darker spot at the tips of femora and inner base of tibiae.

Abdomen short, elliptical, with posterior angles acute and slightly projecting, furnished with one hair in fourth segment and two in segments five to seven; narrow pitchy brown lateral bands on segments one to seven, separated at the sutures and projecting into adjacent anterior segments; large clear pustules at the spiracles on segments one to seven; a long pustulated hair arising from the posterior margin of segments one to seven, just within the lateral bands; a second long pustulated hair on posterior margins of segments one, two, three, half way in toward middle of abdomen; a row of six long, pustulated hairs on the median posterior portion of segments four to six; eighth segment with two long hairs on each side; ninth segment very short, indented at tip; clear brown transverse bands, interrupted medially, on segments one to seven, and separated by clear sutures; segments eight and nine entirely brownish; median, ventral trans-



verse bands, of dark brown, separated by broad clear sutures, except between segments five and six.

MALE.—Body, length 1.00 mm., width .42 mm.; head, length .37 mm., width .37 mm.; markings same as female; genital hooks short and stout, tip of abdomen clear.

Numerous individuals of both sexes collected on *Menacus can-daei*, at Juan Vinas, Costa Rica, March, 1902. A species rendered striking by the large head, pale clypeus, and dark brown temples, and narrow lateral bands of abdomen.

***Docophorus underwoodi* sp. nov., pl. I, fig. 3**

FEMALE.—Body, length 2.09 mm., width .89 mm.; clear, with bands and spots of deep, clear brown and pitchy.

Head, length .70 mm., width .62 mm.; conical, end of clypeus emarginate, clear, with one hair in rounded angles; sides concave, with a short hair at the suture and two submarginal ones back of suture; trabeculae large, bent, bluntly pointed and pale brown; antennae medium, first segment largest, colorless, second a trifle smaller, and last three smaller and subequal, and last four deep brown, with narrow clear bases; eye large, clear, with a hair; temples evenly rounded, narrowly margined with brown, with two pustulated and two non-pustulated hairs; occiput convex; clear brown antennal bands, broken at the sutures and not reaching clypeal angles; internal narrow bands of clear brown, following margin of ocular band, running backward half way to the mandibles, then bending inward a short distance, then straight back, and finally spreading out to bases of mandibles; area between antennal and internal bands a pale brown; clypeal signature long, narrow, dark at tip, emarginate, with posterior portion gradually tapering to a point at mandibles; mandibles large and heavy, chestnut; heavy, pitchy occipital bands running from sides of occiput to bases of antennal bands; a pitchy ocular band from eye to junction of antennal and occipital bands, a small, dark brown occipital signature.

Prothorax quadrilateral, with rounded anterior and posterior angles and flatly convex, slightly diverging sides; dark brown lateral, marginal bands and a pitchy line across postero-lateral

portion of segments. Metathorax scarcely longer than prothorax, pentagonal, with convex, widely diverging sides and angulated posterior margin; posterior angles with one short hair, and posterior margin with a row of ten short, pustulated hairs on each side; deep clear brown lateral bands, widening posteriorly; a pitchy brown band around posterior border, slightly submarginal in median portion; meso-coxal bands visible. Legs stout, femora and tibiae swollen at the tips; clear, with bases and tips of femora annulated with pitchy; a pitchy band along posterior border of tibiae, and tips annulated with brown.

Abdomen broadly oval, with lateral margins of segments more or less convex and the rounded posterior angles protruding, with one hair in segments two to eight and one in anterior portion of segments five to seven; a row of hairs across the middle of segments one to seven, pustulated along posterior margin of transverse bands; narrow, pitchy, lateral bands on segments one to eight, separated by a small clear spot in posterior angles; clear brown, lateral transverse bands, extending inward one-third the width of abdomen, narrowing inwardly, with a large, round, clear area just within the lateral bands and a darker oval spot near the inner ends; a large, round, ventral, brown patch covering the apical portion of the abdomen; two median brown spots on the eighth segment and the tips of the ninth brownish.

MALE.—Body, length 1.61 mm., width .62 mm.; head, length .63 mm., width .55 mm.; very similar to female, except the shorter, rounder abdomen; genitalia short, stout, deep brown.

Numerous males and females collected on *Psilorhinus mexicanus*, at Juan Vinus, Costa Rica, March, 1902. This form is of the type of *D. rotundus* Piag. and *corvi* Osb., but is easily distinguished from *corvi* by the slightly fuscus color and dark brown, instead of pitchy markings, and from *rotundus* by the absence of lateral angles in the prothorax and by the double occipital bands; also female is much larger.

#### *Docophorus communis* N.

Nitzsch, Germar's *Mag. of Ent.*, 1818, vol. III, p. 290.

Kellogg, *New Mallophaga* II, 486, pl. LXVI, fig. 7.

Large numbers of this type of *Docophorus* collected on a great

variety of hosts (see host list). I have made no attempt to separate them into varieties from lack of time and material, much as they need it. As Mr. Kellogg says, this group needs revision badly, but it is a difficult undertaking, with much time and material as a requisite.

***Docophorus cancellosus* sp. nov., pl. I, fig. 4**

**FEMALE.**—Body, length 2.51 mm., width .83 mm.; head and thorax translucent, smoky brown; abdomen clear, with pitchy lateral, and deep brown, transverse bands; head conical with narrow emarginate clypeus, and squarish temples.

Head, length .74 mm., width .66 mm.; conical from trabeculae forward, with sinuate sides and narrow emarginate front; two short fine hairs before trabeculae, which are of medium size, bluntly pointed and golden brown; antennae rather small, first joint thickest, second joint longest, last three shortest and subequal, all uniformly golden brown; eye large, clear, prominent, with a short hair in the middle and one at posterior margin; temples squarish, with rounded angles, furnished with several short hairs; occiput slightly concavo-convex; heavy, deep brown antennal bands, widening and darkening to pitchy at bases, which bend inward almost to bases of mandibles; paler brown bands inside of antennal bands; clypeal signature very indistinct; mandible very heavy, chestnut; temples narrowly edged with pitchy brown and whole templar regions deep smoky brown inward to the broken, occipital bands, which do not reach the occipital margin; short faint ocular bands running inward from eyes to occipital bands; a small, brown, occipital signature.

Prothorax small, quadrilateral, narrowed in front, with concave interior margin, convex diverging sides, and concave posterior margin; posterior angles rounded, with a short hair; deep brown, lateral bands, curving around on posterior portion of segment; prominent brownish coxal bands; metathorax larger than prothorax, with convex, diverging sides and angulated posterior margin; posterior angles with one hair, and posterior margin with five hairs on each side, three near the angles and two farther in; broad lateral bands of brown and a broad, pale brown, transverse band in median portion; coxal bands prominent. Legs

short and stout, deep smoky brown, with pitchy edging on anterior margins of femora and both margins of tibiae.

Abdomen rather long for the genus, elongate elliptical, with convex lateral margins to segments and projecting rounded posterior angles, furnished with one hair in segments four and five, two in six and seven, one in eighth, and one short one on each tip of the short, indented ninth; a long hair on posterior margins of segments two to six, just within the lateral bands; two short ones in the median portion of posterior margin of segments one to six, and four in the seventh; two in anterior angles of eighth; broad pitchy lateral bands in segments two to seven, separated by clear posterior angles and projecting into anterior adjacent segments; heavy, dark brown, transverse bands on segments one to six, separated by broad clear sutures; clear pustules at spiracles in segments two to seven, with pale spots running inward from them for a short distance; pale brown, median, ventral bands connect the ends of the dorsal bands and form a dark spot on segment six; tip of ninth pale brown.

MALE.—Body, length 1.93 mm., width .81 mm.; head, length .71 mm., width .65 mm.; abdomen much shorter than female and orbicular, with longer, narrower, transverse bands, narrow clear sutures, and the whole median portion obscured by a brown, ventral patch; ninth segment larger, protruding with rounded tip furnished with fourteen long hairs; genitalia short, compact, and very dark brown; tip of ninth segment with a crescent-shaped band.

Two males and two females collected on *Rhamphastos tocard* at Pozo Azul, Costa Rica, June, 1902. A very striking species, easily recognized by the dark conical head, with emarginate clypeus, and by the heavy bands of the abdomen.

***Nirmus fuscus epustulatus* var. nov.**

FEMALE.—Body, length 2.15 mm., width .52 mm.; pale yellow golden, with the usual markings of *fuscus* in the form of heavy complete antennal bands, narrow templar bands, lateral bands on thorax and abdomen, and the heavy, median, transverse bands of the abdomen.

Head, length .58 mm., width .44 mm.

This variety of *fuscus* is recognized at a glance by the absence of clear pustules and fewer hairs on the transverse abdominal bands, there being but four on each segment, while *fuscus* has eight on segments one to five, and six on segments six and seven.

With the exception of the smaller size, there are no other appreciable differences.

Six females collected on *Accipiter bicolor*, at Juan Vinas, Costa Rica, March, 1902.

***Nirmus curvilineatus* Kell. and Kuw.**

Kellogg and Kuwana, *Mallophaga from Birds of the Galapagos Islands*. Proc. Wash. Acad. of Sci., vol. IV, p. 470, pl. XXIX, fig. 4.

This species, described from specimens collected on *Nesopelia galapagoensis* and *Occanites gracilis* in the Galapagos Islands, was taken in large numbers from several individuals of *Buteo borealis costaricensis*, on the volcano Irazu, April, 1902.

The taking of this species on a *Buteo* complicates still more the already confusing state of its distribution. It seems to me that the present host is more typical of the three, and it leaves room for the query as to whether Mr. Kellogg's specimens might not have straggled from *Buteo galapagoensis*. My specimens agree perfectly with Mr. Kellogg's description and plate in every detail.

***Nirmus atopus* Kell.**

Kellogg, *New Mallophaga* III, p. 18, pl. II, fig. 4.

Numerous males and females collected on *Piaya cayana mehleri*, one male and female on *Myiarchus lawrencei nigricapillus*, and one male and female on *Stelgidopteryx ruficollis uropygialis*, at Juan Vinas, Costa Rica, March, 1902. I am inclined to think that the specimens taken from the last two hosts were stragglers, although there is no direct proof but, since it was described by Mr. Kellogg from a *Piaya* and I took it in such large numbers on a different variety of the same host species, it is probably confined to the Cuculidae.

*Nirmus rhamphasti* sp. nov., pl. II, fig. 1

MALE.—Body, length 1.40 mm., width .48 mm., short and robust, with pale testaceous head and thorax, heavy antennal bands broken at the suture; abdomen oval, clear, with clear brown lateral bands.

Head, length .44 mm., width .43 mm.; front sharply conical, sides slightly concave, clypeus narrow and emarginate, with one small hair at the suture; trabeculae small, pale golden; antennae short, of median thickness, pale golden, second segment longest; temples large, expanding laterally and posteriorly, with one hair; eye prominent, colorless, with a very short bristle; occiput convex; antennal band broad, smoky brown, curving inward slightly at base, inner margin sinuate, broken by clear clypeal suture, beyond which they are pale testaceous; clypeus and oval fossa clear, except a dusky submarginal band across the tip; mandibles heavy, deep chestnut; a small black ocular fleck and a short brownish ocular blotch; region between pale occipital bands clear; a rather large brownish occipital signature; whole head, except oval fossa and part between occipital bands, an even testaceous.

Prothorax quadrangular, sides flatly convex, without hairs; rather broad, brownish, lateral bands, extending around on posterior portion; coxal bands visible, interior of segment same color as head. Metathorax larger, pentagonal, posterior margin angulated on abdomen, with four slender hairs on each side and two in the rounded posterior angles; sides flatly convex, widely diverging; broad lateral brown bands, curving inward slightly in median portion of segment. Legs short and robust, pale golden, narrowly edged with testaceous on anterior margins of femora and tibiae.

Abdomen, oval, with round, projecting, posterior angles, bearing one hair in segments three and four, two in five to eight, and six on the posterior margin of the ninth; rather heavy, lateral bands of smoky brown in segments one to seven, separated by clear posterior angles, and the portion extending into the adjacent anterior segment, darker; eighth segment with pale brown spot in lateral portions and ninth with posterior half brownish; a median, longitudinal, dusky area, scarcely broken at the sutures

and darker and wider on segments five and six; genital hooks very short, slender, and widely curving; a hair on the posterior margin of segments three to six, just within the lateral bands; four short hairs on the median portion of the posterior margins of segments two to six, and two on the first.

Two males collected on *Rhamphastos tocard*, at Pozo Azul, Costa Rica, June, 1902. This species resembles Piaget's *coniceps* more than any other form of the genus.

***Nirmus hastiformis* sp. nov., pl. II, fig. 2**

**FEMALE.**—Body, length 1.73 mm., width .53 mm.; uniformly golden brown, with rounded forehead, encircled by the antennal bands, and spear shaped abdomen, having narrow lateral bands, scarcely darker than the heavy transverse bands.

Head, length .47 mm., width .45 mm.; front converging, slightly concave sides and evenly rounded clypeus, with a few very short, fine hairs; trabeculae small, pointed, pale golden; antennae of medium size, joints subequal, pale golden; temples slightly expanded laterally and posteriorly, with one long hair and several short bristles; occiput convex; eye small, obscured, with a fine, short bristle; mandibles heavy, bright chestnut; antennal bands, scarcely darker than the golden brown temples, encircle the forehead, but are broken by a clear, diagonal line at the clypeal suture; region in front of the mandible clear, as is the portion enclosed by the occipital bands, and also a small area at the bases of the antennae; a black ocular fleck, and a golden brown, spear-shaped occipital signature.

Prothorax quadrangular, broader than long, with sides flatly convex and posterior angles with one hair; lateral bands scarcely darker than the interior of the segment. Metathorax pentagonal, posterior margin obtusely angled on abdomen, with four slender hairs on each side, and two spines in the rounded posterior angles; sides slightly convex and diverging; lateral bands and interior portion of segment the same color as in the prothorax. Legs stout, though little swollen, clear golden brown.

Abdomen rather long, spear-shaped, with rounded, widely projecting, posterior angles, furnished with from one to three hairs in segments four to seven and one in the anterior and posterior

angles, and four on the posterior margin of the eighth; narrow, deep golden brown lateral bands on segments one to seven, widely broken by clear posterior angles, and slightly projecting into the adjacent anterior segments; eighth segment very long, as long as the first, with nearly straight, converging sides and completely obscured by the transverse, golden brown band; ninth segment short, and almost transverse posteriorly, uniformly pale golden, with one short hair on each side of the tip; segments one to seven almost completely obscured by deep golden brown, transverse bands, darker medially and in posterior segments, and separated transversely by clear sutures; a clear pustule at the spiracles on segments two to seven and a single long hair on the posterior margins of segments two to six, just within the lateral bands.

A single female collected on *Trogon caligatus*, at Juan Vinas, Costa Rica, March, 1902. This species is easily recognized by the rounded front, with concave sides, completely encircled by the antennal bands; by the length and shape of the eighth segment of the abdomen and the presence of the broad, transverse abdominal bands.

***Nirmus parabolocybe* sp. nov., pl. II, fig. 3**

FEMALE.—Body, length 1.66 mm., width .40 mm., almost entirely obscured by blotches and bands of smoky brown, with narrow pitchy bands on head, thorax, and abdomen; slender, legs short and stout.

Head long, with narrowly parabolic front, bare, with a slight colorless protuberance at the tip of the clypeus; trabeculae small, colorless; antennae short, slender, second segment the longest, whole pale brownish; eye small, clear, with bristle; temples nearly square, narrowly margined with pitchy; flatly rounded angles, bearing one slender hair; occipital margin truncate; narrow, pitchy, submarginal, antennal bands ending at the clear oral fossa, and with the bases curving diagonally inward at the trabeculae for a distance of one-fourth the width of the head; short, deep brown ocular bands running transversely inward from the eye to base of antennal bands; mandibles small, chestnut; a large smoky brown occipital signature; whole interior of head except oral fossa evenly obscured with smoky brown.



Prothorax, small quadrilateral, anterior margin slightly convex, posterior transverse, sides convex; posterior angles with one weak hair; deep, almost pitchy brown, lateral bands, slightly submarginal, curving around on posterior portion of segment, but separated medially; coxal lines show faintly; interior of segment paler than the head; a small clear pustule in the posterior angles.

Metathorax much larger than prothorax, pentagonal, sharply angulated on abdomen; sides convex, diverging; posterior angles with two slender hairs and two more on each side of posterior margin; a pitchy spot in the anterior angles, a large pitchy blotch running inward from the posterior angles, narrowing and nearly meeting in center; remainder of segment same color as head.

Legs very short and stout; concolorous with head, margined anteriorly with pitchy and femora semiannulated at tips.

Abdomen long, subclavate, pointed abruptly by the last two segments; posterior angles rounded and protruding with a single weak hair in segments three to six, three in segment seven, and three on each side and two on posterior margin of eighth segment; ninth segment small, colorless, indented at tip; segments one to seven with deep, smoky brown lateral bands having a pitchy hue through the middle and extending anteriorly into adjacent segments; smoky brown transverse bands on segments one to eight, separated by broad clear sutures and having in segments two to seven, two median longitudinal rows of darker, quadrilateral blotches, joined on segments six and seven; large clear pustules on segments two to seven, just within lateral bands.

MALE.—Body, length 1.34 mm., width .32 mm.; head, length .32 mm., width .25 mm.; differs from the female only in size and in the color and shape of the eighth and ninth abdominal segments, the eighth being clear, except for a narrow brown band around the anterior margin, while the ninth is very small and obscured with brownish; genital hooks small, short, and blunt, being only the length of the eighth abdominal segment.

Numerous males and females collected on *Muscivora tyrannus* and *Tyrannus melancholicus*, at Juan Vinas, Costa Rica, March, 1902. This is quite a distinct form, though resembling somewhat in shape of head and abdominal markings *N. angustifrons* Car.

**Nirmus marginellus** N., pl. II, fig. 4

Giebel, *Insecta Epizoa*, p. 147.

Piaget, *Les Pediculines*, Sup., p. 21, pl. III, fig. 1.

FEMALE.—Body, length 2.13 mm., width .74 mm.; head, length .60 mm., width .60 mm.

MALE.—Body, length 1.90 mm., width .72 mm.; head, length .56 mm., width .56 mm. This species is of the *interrupto fasciati* type, and is distinguished by the shortness or rather by the width of the head and body, the head being an almost perfect equilateral triangle, while the abdomen is a perfect oval, a shape unusual among this group; the head is much darker than the body, being a translucent reddish brown, with heavy chestnut antennal bands; abdomen very pale with reddish fulvous lateral bands and very faint golden transverse bands.

Numerous males and females collected from *Momotus lessoni*, at Juan Vinas and Pozo Azul, Costa Rica, March and June, 1902.

From Giebel's description alone the species is unrecognizable, but Piaget has thoroughly established it from specimens collected on *Prionites momota*.

My specimens agree quite closely with his descriptions and plate with the exception of the head measurements of the male, my specimen being smaller than the female, while he gives the head measurements the same for the two sexes. It is possible that he may have made an error in this point.

**Nirmus francisi** sp. nov., pl. II, fig. 5.

FEMALE.—Body, length 2.19 mm., width .63 mm.; absolutely colorless, with bold markings of pitchy, and smoky brown on head, thorax, and abdomen.

Head, length .59 mm., width .52 mm.; sharply conical from trabeculae forward, with sides concave, and the narrow tip emarginate; three short, fine hairs along sides; trabeculae medium, colorless, equal to the last three, which are deep brown; antennae slender, first two joints longest, eye prominent, colorless, with a short bristle, and slightly obscured by a pitchy ocular blotch; temples almost square, with rounded sides and angles, colorless with one hair in the angle; occipital margin nearly truncate, occi-

put slightly convex; marginal, antennal bands, broken at the clypeal suture, run backwards from the sides of the clear oral fossa nearly to the trabeculae, then straight inward to the bases of the posterior roots of the mandibles; the portion in front of the clypeal suture is clear brown, back of that, brown, with a pitchy stripe along inner portion, and pitchy after leaving the margin; occipital bands of deep brown, fading outwardly, and not reaching occipital margin, join the posterior ends of antennal bands; mandibles chestnut; a smoky brown occipital signature.

Prothorax small, quadrilateral, with anterior and posterior margins straight, lateral margins convex, and one weak hair in posterior angles; pitchy, lateral, submarginal bands, curving part way around on posterior margin, and having a short projection into the anterior angles of the metathorax; brown coxal bands show through.

Metathorax larger than prothorax, pentagonal, sides convex and widely diverging, with posterior margin sharply angulated on abdomen; a series of six slender hairs on each side of posterior margin; heavy pitchy transverse bands in the region of posterior angles, with a projection into the first segment of abdomen; a narrow, submarginal, chestnut band along posterior margin. Legs short and stout, with pitchy spot at base, and semiannulation at tip of femora, and brownish spot at outer side of tip of tibiae.

Abdomen narrowly oval, with rounded, projecting, posterior angles, furnished with one hair in the third segment, and three in four to eight, with two others in anterior angles and four on posterior margin of eighth; ninth segment small, indented at tip, with two chestnut blotches in sides; segments one to eight with narrow, lateral, pitchy bands, separated by clear posterior angles, and projecting slightly into anterior adjacent segments; two median longitudinal rows of deep, smoky brown blotches in anterior portion of segments, with a latero-posterior projection which reaches the lateral margins of abdomen in segments five to eight; spots joined in the eighth segment and connected in remainder by a pale brown, ventral, transverse band, which is expanded into a continuous pale blotch on segments six to seven.

MALE.—Body, length 1.63 mm., width .57 mm.; head, length

.57 mm., width .48 mm.; abdomen shorter, nearer a perfect oval; ninth segment flatly rounded, with a fringe of long hairs; eighth segment with only a narrow brown band around anterior margin, lateral bands absent; genital hooks short, stout, and curving at tips.

Numerous males and females collected on *Zarhynchus wagleri* at Juan Vinas, Costa Rica, March, 1902. This is a very striking and beautiful form, something like the type of *N. ornatissimus* Giebl, a type found on many *Icteridae*.

***Nirmus melanacocus* sp. nov., pl. II, fig. 6**

FEMALE.—Body, length 1.65 mm., width .46 mm., very pale testaceous, almost clear, except the head, which is translucent brownish, with pitchy antennal and templar bands; abdomen clavate, with pitchy lateral bands and brownish, median, transverse bands.

Head, length .38 mm., width .39 mm.; almost an equilateral triangle, with slightly convex sides and truncate occipital margin; clypeus narrowly truncate; trabeculae small, colorless; antennae of medium size, pale testaceous, second segment the longest, third and fourth equal; eye flatly convex, colorless, with a small bristle; angles of temples almost square, with one slender hair; heavy pitchy brown antennal bands not quite reaching the clear oral fossa, with the fossa bending inward slightly at the trabeculae; mandibles long and slender, chestnut; temples margined laterally with narrow pitchy bands, connected with the antennal bands by pale brown bands; whole head, except oral fossa and region enclosed between the pale occipital bands, an even clear brown; a large, deep brown occipital signature.

Prothorax small, quadrangular, with convex sides and a single weak hair in posterior angles; broad pitchy brown lateral bands, curving around on posterior margin; coxal bands visible. Metathorax larger, pentagonal, with convex, diverging sides, and sharply angulated posterior margin, having five weak hairs on each side; a pitchy brown spot in anterior angles, connected with lateral bands of prothorax; pitchy brown transverse blotches in region of posterior angles; coxal lines visible, interior of segment

clear. Legs short and stout, narrowly margined with brownish on femora, concolorous with head.

Abdomen clavate, widest at sixth segment; posterior angles of segments rounded and protruding, with one hair in third, and two in segments four to seven; eighth segment with three hairs on each side; ninth small, clear, and indented at tip; segments one to seven with pitchy lateral bands, slightly paler along outer margins, separated by clear posterior angles and projecting into adjacent anterior segments; segments one to eight with broad, median, transverse bands of pale, smoky brown, separated by clear sutures except between segments six and seven; the band in the eighth segment longer and narrower, nearly reaching the lateral margins of segment.

A single female collected on *Piranga bidentata sanguinolenta* taken on the volcano Irazu, February, 1902.

This form resembles *N. ampullatus* Piag., and is distinguished from that species chiefly by the narrower clypeus, heavier antennal bands, and smaller legs.

***Nirmus pseudophaeus* sp. nov., pl. III, fig. 1**

FEMALE.—Body, length 2.18 mm., width .60 mm.; almost exactly the shape of *N. fuscus*, pale translucent, smoky brown, much darker on head; antennal and temporal bands on head much as *fuscus*, but lateral bands of abdomen wanting.

Head, length .60 mm., width .44 mm.; shape and markings practically the same as in *fuscus*, except that they are a smoky brown instead of golden brown, while the interior is paler and also smoky brown; temples with one long hair.

Prothorax quadrilateral, with sides slightly sinuate and one short hair in the posterior angles; very pale, indistinct lateral bands. Metathorax larger, with slightly expanded anterior angles, sides rounding and diverging, posterior margin truncate, with a short, median, pointed projection on abdomen; posterior angles rounded with one slender hair; four more slender submarginal hairs along lateral portion of posterior margin; a pale brown, median, anterior blotch, about in the region of the mesothorax; a darker band across posterior portion of segment, more

intense in region of posterior angles; posterior margin with a clear border. Legs stout, with femora narrowly edged with dusky anteriorly.

Abdomen oval, widest at fourth and fifth segments; posterior angles acute, but scarcely projecting, with one hair in third and fourth segments, two in five and six, three in seven, two on each side, and two longer pustulated ones on posterior margin of eighth, and a pustulated one in the anterior angles of the ninth; lateral bands absent; clear, pale, brown bands across the posterior portion of segments one to eight, darker, and extending to anterior margin of segment in the median portion, and separated transversely by broad clear sutures; ninth segment small, rounded, indented at the tip and pale brown; two long dorsal hairs in the median anterior portion, and a transverse row of six across the median portion of first segment; segments two to seven with a median transverse row of nine slender hairs, all with only very faint, small pustules or none; clear pustules in regions of spiracles, on segments two to seven.

A single female collected on *Pezopetes capitalis*, on the volcano Irazu, February, 1902.

The finding of this *fuscus*-like species on a *Tanagra* is about as inexplicable as the taking of *N. curvilineatus* on *Nesopelia galapagoensis*, but there was absolutely no chance of straggling from a Raptor, since none were killed in that locality on that trip. The present species is easily recognized by the *fuscus*-like head, the absence of lateral abdominal bands, and the pale continuous transverse bands.

***Nirmus brachythorax ptiliognis* var. nov.**

*Nirmus brachythorax* Gieb., *Insecta Epizoa*, p. 134.

*Nirmus brachythorax* Piaget, *Les Pediculines*, p. 150, pl. XII, fig. 8.

FEMALE.—Body, length 1.61 mm., width .38 mm.

These specimens really come much nearer to Piaget's *N. brachythorax cedrorum* than to *brachythorax*, but since that form is a variety, I will make this another variety, but will compare it with the var. *cedrorum*.

No measurements are given for the variety, but this form is much larger than *N. brachythorax cedrorum*, having a broader head, occipital margin squarely truncate, temples more nearly square, and angles less rounded; abdomen paler, lateral bands pale fulvous instead of deep brown and median bands barely noticeable.

MALE.—Body, length 1.33 mm., width .40 mm.; head, length .33 mm., width .33 mm.

Very abundant on *Ptiliogonys caudatus*, on the volcano Irazu, Costa Rica, February and April, 1902.

***Nirmus caliginus*** sp. nov., pl. III, fig. 2

FEMALE.—Body, length 1.83 mm., width .59 mm.; rather short and stout, pale golden brown, with darker, smoky brown head, smoky brown lateral and transverse bands on abdomen, separated by clear sutures.

Head, length .53 mm., width .51 mm.; sharply conical, with convex sides, bearing four fine, short hairs, and narrow truncate clypeus; trabeculae small, colorless; antennae of medium size, tinged with brownish, second joint the longest; temples broad, narrowly margined with pitchy brown, with evenly rounded angles, bearing one long, pustulated hair; eyes small, with a short bristle; occipital margin concave, occiput slightly convex; rather narrow, smoky, antennal bands ending at the clypeal suture; paler internal bands enclosing the oral fossa, running backward from the lateral angles of the clypeus, converging slightly in middle and spreading out in front of the mandibles; mandibles large, chestnut; narrow occipital bands, but slightly darker than the clear brown temples, running from the posterior roots of the mandibles to the occipital margins; bases of antennal bands connected with occipital bands by a very faint band; small, semi-clear areas at the bases of the antennae, between the antennal and internal bands, and between the occipital bands; a brownish, oval, occipital signature.

Prothorax small, quadrangular, with anterior margin concave, posterior flatly rounded, and sides flatly convex and diverging; posterior angles with one short hair; submarginal, deep brown,

lateral bands curving around on the posterior margin; narrow brown lines cutting across from the middle to ends of lateral bands; brown coxal lines visible; interior of segment golden brown, margins smoky brown. Metathorax much larger than prothorax, pentagonal, posterior margin sharply angulated on abdomen, sides nearly straight, widely diverging and posterior angles broadly rounded, with two hairs; five hairs on each side of posterior margin; a pitchy brown spot in anterior angles; a deep brown lateral band, broadening rapidly posteriorly, with a pitchy projection from posterior angles towards middle of segment; meso-coxal lines visible; interior of segment golden brown. Legs short and stout, concolorous with body.

Abdomen elliptical, with rounded, projecting posterior angles bearing one hair in the third segment, two in the fourth, fifth, and seventh, four in sixth, two on each side and four on the posterior margin of eighth; narrow lateral bands of smoky brown on segments one to seven, broken by clear posterior angles and projecting into anterior adjacent segments; broad, brownish transverse bands on segments one to eight, darker on posterior segments, separated by broad, clear sutures and having two median longitudinal rows of larger quadrilateral spots on segments two to seven; eighth continuous; ninth segment small, deeply indented at tip, and with brown spots on each side; a long hair on the posterior margin of segments three to six; a median row of six hairs along posterior margin of segments one to six and two on segment seven.

MALE.—Body, length 1.49 mm., width .55 mm.; head, length .49 mm., width .46 mm.; slightly darker than female with the abdomen oval, ninth segment rounded, with about ten fine hairs on posterior margin.

One male and one female collected on *Merula grayi*, at Juan Vinas, Costa Rica, March, 1902. This form resembles Kellogg's *N. simplex*, but differs principally in the longer and narrower clypeus and the duskiess of the head and thorax.



***Lipeurus longipes tinami***, var. nov., pl. III, fig. 3

*Lipeurus longipes* Piaget, *Les Pediculines*, p. 329, pl. XXVIII, fig. 3.

MALE.—Body, length 1.90 mm., width .35 mm.; head, length .48 mm., width .40 mm.

This species is easily recognized by the conical head with truncate front and heavy antennal bands; by the short weak anterior legs and enormously developed middle and posterior pairs, the posterior ones being as long as the abdomen; pro- and metathorax quadrangular, with blackish lateral bands; abdomen slightly clavate, with deep brown lateral bands and pale brown transverse bands.

The present variety differs from *longipes* chiefly in the size and shape of the head, the head measurements for *longipes* being .44 mm. by .33 mm., while the body is practically the same; this form has the head in front of the antennae wider and shorter, with the front broader and perfectly truncate, while it is emarginate in *longipes*.

FEMALE (not seen by Piaget).—Body, length 2.15 mm., width .48 mm.; head, length .52 mm., width .44 mm.; whole head darker, especially the temples; antennae scarcely different from the male, except in the absence of the appendage on the third segment and the last three segments being subequal; anterior pair of legs and thorax the same, except a trifle larger; two posterior pairs of legs slightly smaller; abdomen much larger, slightly clavate, but not pointed so abruptly; lateral bands narrower and darker; in addition to the continuous pale transverse bands, which are about the same as in the male, are heavy, translucent, brownish, quadrilateral bands, extending inward from the lateral bands a trifle more than one-third the width of the abdomen; on the last segment this band is continuous; apical segment tapering gradually to the slightly indented tip, which is furnished with two long hairs on each side, two short ones at the tip, and two short ones on each side in the anterior portion; a large median ventral blotch of pale brown extends from the middle portion of segment five to middle of segment eight.

Two males and two females collected on *Tinamus robustus*, at Pozo Azul, Costa Rica, June, 1902.

***Lipeurus longisetaceus* Piag.**

Piaget, *Les Pediculines*, Sup., p. 57, pl. VI, fig. 4.

MALE.—Body, length 1.87 mm., width .33 mm.; head, length .40 mm., width .25 mm.

FEMALE.—Body, length 2.41 mm., width .32 mm.; head, length .56 mm., width .25 mm.

This species, described by Piaget from specimens collected on *Tinamus solitarius*, is distinguished by its exceedingly slender form and nirmoid appearance; the head is conical with straight sides and rounded front and concave occiput; the clypeus is distinctly set off and pale reddish brown, with two slender fleshy appendages on the dorsal surface; the antennal bands are heavy, while the temples are margined with blackish; mandibles large; whole interior of the head clear; thorax and abdomen with heavy lateral bands, interior clear.

Two females and one male collected from *Tinamus robustus*, at Pozo Azul, Costa Rica, June, 1902.

Piaget gives such a clear description and figure that a drawing in this paper is unnecessary.

***Lipeurus postemarginatus*, sp. nov., pl. III., fig. 4**

FEMALE.—Body, length 2.21 mm., width .59 mm.; clear, elongate; head broadly parabolic in front with clear brown temples, antennal bands encircling front and pitchy at base; abdomen spindle shaped, with pitchy brown lateral bands and clear brown transverse bands.

Head, length .51 mm., width .41 mm.; slightly conical, broadly parabolic in front, with five short hairs on each side, trabeculae small, clear; antennae rather short and slender, first segment thickest and subequal to second and fifth, third and fourth shorter, equal, the whole pale fulvous; one short hair in front of the trabeculae; eye prominent, colorless, with a short bristle; temples slightly expanded, evenly rounded, with one long hair and several short bristles and narrowly margined with deep smoky brown; occiput concave; whole temple uniformly clear brown inward to the clear occipital bands, and separated from the base of antennal bands by a transverse clear space; mandibles

large, chestnut; the broad antennal bands completely encircle the front, broken at the clypeal suture, front part deep fulvous, sides darker, with the rounded bases pitchy; a paler internal band, parallel to the lateral portion of the antennal band; interior of head clear.

Prothorax small, quadrilateral, with sides convex and diverging; anterior margin slightly concave, posterior truncate; lateral bands of brown, widening posteriorly, with a pitchy blotch in region of anterior angles; a single hair in the posterior angles; coxal lines showing through.

Metathorax much larger than prothorax, quadrilateral, anterior and posterior margins truncate; sides convex, diverging, and slightly sinuate in region of mesothoracic suture; broad lateral bands of deep smoky brown, with a curving pitchy blotch in the median portion of the sides; a large, median, ventral dusk spot; two short hairs in the posterior angles and four very long, stout hairs on each side of the posterior margin, adjacent to the lateral angles. Legs rather small and weak, pale fulvous with a few short hairs.

Abdomen large, spindle shaped, widest at the fourth and fifth segments; posterior angles rounded, protruding, furnished with one short hair in segments one to four, one short and one long one in five to seven; eighth segment conical, with a conspicuous indentation at the tip, one long hair in the anterior angles and two large, pustulated hairs in the median portion; narrow pitchy brown, lateral bands broken by clear posterior angles; a clear pustule in the middle of segments two to seven, just within the lateral bands; clear, pale brown transverse bands, paler on first three segments, extend inward from the lateral bands nearly to the center of the abdomen, broken by broad clear sutures; pale brown ventral bands connect the ends of these heavier dorsal bands; a long hair arises from the posterior margin of the transverse bands just inside the lateral bands, on segments three to seven; a row of six short dorsal hairs across the middle of segment five, and two in the middle of segments six and seven; a heavy and continuous transverse band on segment nine, with another paler band encircling the posterior emargination.

MALE.—Body, length 1.46 mm., width .38 mm.; head, length .38 mm., width .33 mm.; differs greatly in size from the female, shape of abdomen, size of legs, and antennae.

Head markings the same; first segment of antennae greatly swollen and lengthened, remaining segments subequal, but slightly larger than in female and third having a slight protuberance; two posterior pairs of legs larger than in female, the posterior pair being as long as the abdomen; abdomen short, thick, almost parallel sided and abruptly pointed by the last three segments, which are much aborted; transverse bands continuous and paler.

One male and one female collected from *Ortalis cinereiceps* at Juan Vinas, Costa Rica, March, 1902.

This form is of the type of *mesophelius* and *intermedius*, resembling most *intermedius*, from which it is distinguished by the much shorter metathorax, with truncate posterior margin, by fuller and rounder temples, and by paler abdomen.

***Lipeurus assesor*** Gieb., pl. III, fig. 5

Giebel, *Insecta epizoa*, p. 207.

Piaget, *Les Pediculines*, p. 294, pl. XXIV, fig. 3.

FEMALE.—Body, length 3.45 mm., width .63 mm.; head, length .76 mm., width .50 mm.

This species is easily distinguished by the long, almost straight sided head, with rounded front, and concave occiput; the peculiar curving marks on each side of the front, the black ocular blotches and dusky temples in strong contrast to the clear interior of the head; the thorax has heavy, lateral, blackish bands, while each segment of the abdomen is furnished with broad, black, lateral blotches and dusky transverse bands.

A single specimen collected from *Gypagus papa* at Pozo Azul, Costa Rica, June, 1902.

Although Piaget gives only a drawing of anterior half of head and last two segments of abdomen, his description is good and, together with Giebel's, leaves no doubt but what this specimen can be referred to Giebel's species.

**Gonjocotes eurysema** sp. nov. p. III, fig. 6

**FEMALE.**—Body, length 1.93 mm., width .85 mm.; clear fulvous, with head large, temples produced laterally and angulated behind; abdomen oval, with pale brown lateral bands and narrow, pitchy, submarginal bands.

Head, length .53 mm., width .76 mm.; broadly and rather flatly rounded in front, with slight depressions at the point where the antennal bands touch the margin, trabeculae absent; antennae short, slender, first two segments the longest and equal, last three shorter, equal; temples expanded laterally into a rounded protuberance, bearing two long hairs; posterior portion slightly extended and sharply angulated; occiput deeply re-entering, convex; a broad brownish band running around the front of the head; short, pitchy bands run from the base of the mandibles to the anterior margin at the depression; just within these bands are chestnut-colored protuberances, running a short distance backward from the frontal band; pitchy ocular blotches; a slightly dusky, narrow band runs around the temples from the eye to the posterior angles; heavy pitchy occipital bands run backward from the posterior roots of the mandibles to the sides of the occiput, thence spreading out into a narrow occipital margin; regions between ocular blotches and antennal bands, dusky brown.

Prothorax small, quadrilateral, with anterior and posterior margins slightly concave; sides nearly straight, diverging; posterior angles produced backward into a slender rounded protuberance, bearing one long hair; heavy, pitchy, submarginal bands run backward from the anterior angles to the anterior angles of metathorax; a portion of the coxal lines showing through; median portion of segment clear, region between lateral bands and margin dusky. Metathorax short, transverse, with lateral margins convex and posterior margin slightly angulated on abdomen; heavy, curving, pitchy bands running backward from anterior angles, extend half way across the first segment of the abdomen; lateral margins with two long hairs; a transverse chestnut band across the anterior portion, and another, broken in the center, across the posterior portion of the segment. Legs short and stout, typical of the genus, with pale fulvous edgings on the anterior faces of femora.

**Abdomen** oval, slightly clavate; posterior angles rounded, projecting, with from one to three short hairs; segments one to seven with rather broad, smoky fulvous, lateral bands, whose anterior portion extends inward, forming a rounded, backward-curving protuberance, almost obscured by the narrow, pitchy, transverse bands, widening and fading inwardly; eighth segment clear, rounded and indented, bearing one and two short hairs on each side of the tip.

**MALE.**—Body, length 1.38 mm., width .64 mm.; head, length .43 mm., width .62 mm.; differs from female in having long pitchy ocular blotches extending backward from the eye; a shorter, thicker abdomen, more abruptly rounded posteriorly, with the last segment smaller, less protruding, with a fulvous band around the flatly rounded posterior margin; genital hooks long, slender, and almost parallel.

Numerous males and females collected on *Odontophorus guttatus*, on the Volcano Irazu, Costa Rica, April, 1902. It is of the general type of *G. major* Piag., but it is easily distinguished from that species by the heavy occipital bands and the wide diverging prothorax.

**ORNICHOLAX** nov. gen.

Body short, compact, head large, and with the general appearance of *Gonicotes*; antennae small, without appendages, and similar in the two sexes; trabeculae large, triangular, movable; prothorax small, short; mesothorax large, broad as head, and separated from metathorax by a very distinct suture; metathorax much narrower than the mesothorax and plainly divided into two lobes by a longitudinal, clear suture; abdomen of both sexes with lateral bands, with but eight segments and with the seventh much aborted; legs very short and stout; dorsal surface of the thorax and abdomen thickly and deeply punctured.

Found as yet only on *Tinamus robustus*, but is probably common to the *Crypturi*.

**Ornicholax robustus** n. sp., pl. IX, figs. 1-1c

Two male specimens and one female taken on *Tinamus robustus*, at Pozo Azul, Costa Rica, June, 1902. This is a strikingly

different form from anything so far described, enough so, indeed, to make it the type of a new genus.

FEMALE.—Body, length 2.85 mm., width 1.35 mm. With the exception of the central portion of the abdomen, it is uniformly pale brown, with darker reddish-brown markings. Head, length .86 mm., width .90 mm., somewhat shield-shaped, rounded in front with four short hairs on each side; sides nearly straight; temples obtusely angled, with two longish hairs; occipital margin convex, with two stiff hairs on each side; occiput deeply concave; trabeculae nearly twice the length of the first segment of the antennae, triangular with a darker band along the lateral margin; antennae short, concolorous with head, first segment longest, second and fifth, and third and fourth equal; antennal bands extending in a curve from the anterior point of the trabeculae to the base of the mandibles; a narrow, transverse serrated band across the posterior portion of the head; a dark occipital signature between the occipital margin and the transverse occipital band; occipital bands extending from the base of the posterior root of the mandibles to the transverse occipital band; a narrow transparent lobe extends along the lateral borders of the temples.

Prothorax short, narrow, with lateral angles produced to a blunt protuberance, furnished with a short stiff spine; with the exception of the posterior median portion it is completely encircled by a broad, reddish-brown band.

Mesothorax broad, lateral portion expanded anteriorly; lateral angles blunt, furnished with two stout hairs; postero-lateral portion slightly concave, with two stout hairs towards the angle; the portion touching the prothorax broadly bordered, while two longitudinal curving bands extend across the segment from the ends of the lateral bands of the prothorax, enclosing a median clear spot; posterior margin transverse, slightly concave.

Metathorax scarcely wider than the prothorax, somewhat triangular in shape, but completely divided longitudinally by a clear suture; without hairs and with a broad, dark, slightly curving band extending across the anterior portion and continuous with the lateral bands of the abdomen.

Abdomen short, oval, with the first segment much wider than any of the others, and the seventh aborted (not extending to the lateral margin of the abdomen); lateral margins of the segments convex and the posterior angles of first and second segments with one short hair; the third, fourth, and fifth with two hairs, the sixth with three, and the eighth with a fringe of about twelve hairs on each side; tip of eighth segment slightly indented; a broad submarginal, darker band completely encircling the abdomen, with the enclosed portion much clearer than the remainder of the body; a stout, slightly pustulated hair on the posterior margin of segments one to five, just inside the lateral band; seventh segment with a fringe of about twelve short, weak hairs along the posterior margin. Legs short and stout; tarsi aborted; tibiae almost as large as femora; claws long and stout.

The male is slightly smaller than the female, measuring, length 2.41 mm., width 1.14 mm. Head, length .77 mm., width .83 mm.; the hairs of the temples, thorax, and abdomen longer and stouter than in the female; abdomen more nearly orbicular; seventh segment of the abdomen appearing as two lobes, one on each side of the eighth, which is narrower than in the female, with sides deeply emarginate and tip deeply concave; the fifth segment with three hairs in the posterior angle; the sixth with four, the seventh with six, and the eighth with three short hairs in each angle and four slightly longer, submarginal ones on each side of the middle; the genitalia are simple, curving slightly inward, and about half the length of the eighth segment.

**KELLOGGIA** nov. gen.

Body short, compact, and with the general appearance of Gonocotes, with the exception of the thorax; head of medium size, thorax small; antennae small, without appendages and similar in the two sexes; trabeculae entirely absent; whole thorax small, much smaller than the first segment of the abdomen; meso- and metathorax separated by a distinct suture; metathorax narrower than mesothorax, and completely divided into two lobes by a longitudinal suture; abdomen differing greatly at the tip in the sexes; female with seven segments, male with eight but with



the seventh aborted; lateral bands present in both sexes; legs short and stout; dorsal surface of thorax and abdomen coarsely punctured.

Found as yet only on *Tinamus robustus*.

**Kelloggia brevipes** n. sp., pl. I, figs. 2-2c

Two adult females and five adult males taken on *Tinamus robustus* at Pozo Azul, Costa Rica, June, 1902.

FEMALE.—Body, length 2.22 mm., width 1.05 mm.; with the exception of the central portion of the abdomen, it is a uniform testaceous, with darker smoky brown markings on head and thorax.

Head, length .73 mm., width .73 mm., triangular and about equilateral, narrowly rounded in front, without hairs; sides of head from antennae to temples perfectly straight, with two short marginal and one submarginal hair; temples rounded with two long, stiff hairs; occiput deeply concave with three short stiff hairs on each side; antennae short, simple, and inserted near the front of the head, first joint largest, second and fifth equal, and third and fourth equal; no trabeculae; mandibles prominent, dark colored; antennal bands running in a slight curve from the base of the mandibles to the frontal margin at the sides, thence faintly around the front of the forehead; occipital bands faint, curving backward from the posterior root of the mandibles to the ends of the prominent occipital signature.

Prothorax short, thick, quadrangular, with an emargination at the anterior angles, and the whole segment deeply inserted under the occipital margin, posterior angles drawn out to a blunt spine, armed with a short, stout bristle; margin encircled by a deep band, narrower along the posterior margin; coxal lines showing through.

Mesothorax much broader than prothorax; lateral portions slightly expanded forward and with an emargination just in front of the lateral angles; heavy dark submarginal bands extending longitudinally across each side of the segment, with inner margins curving and extending slightly into the metathorax; lateral angles armed with a long, stout bristle and two stout

hairs; the median posterior margin rounded; the postero-lateral margins concave, with two stout hairs; metathorax much narrower than mesothorax, extending completely over the first segment of the abdomen; divided into two distinct lobes by a longitudinal suture; posterior tips of lobes bluntly pointed.

Abdomen short, thick, narrowing gradually from first segment to the rounded point; first segment much broader than the others; segments two to six projecting under adjacent anterior segments at their lateral portions; segments one to six with broad lateral bands, seventh entirely colored, while the median portion is almost entirely uncolored; segments one to five with one long and one short hair in the posterior angles, segment six with three hairs and segment seven with four weak, slender hairs on each side of tip; a long, stout dorsal hair on each side of the posterior margin of segments one to five, nearly to the inner margin of the lateral bands; dorsal surface of thorax and abdomen strongly, though not closely, punctured.

Legs short and stout, concolorous with body.

The male differs slightly from the female, especially in the tip of the abdomen.

Measurements of male, length 1.76 mm., width .88 mm.; head, length .6 mm., width .65 mm.; the hairs of the thorax and abdomen are longer and stouter; sixth segment of abdomen very wide (longitudinally), almost as wide as the first; seventh segment much aborted, appearing as two lobes, one on each side of the eighth, which is deeply inserted into the sixth; segments four to seven with three hairs in the posterior angles; eighth with one very long and two short hairs at each angle, and the tips slightly indented.

**Goniodes minutus** sp. nov., pl. IV, figs. 1 and 2

MALE.—Body, length .96 mm., width .49 mm.; short and robust, head large, translucent golden brown throughout, with darker smoky brown frontal band, and lateral bands on thorax and abdomen.

Head, length .28 mm., width .39 mm.; quadrilateral, front broad and flatly rounded; sides nearly straight, slightly diverg-

ing with three short bristles; temples bluntly rounded, with one long stout bristle and a spine; occiput concave, with two short bristles on each side; a narrow dark brown band around front, with eight small lobate posterior projections; antennae of medium size, but first joint greatly swollen, ovoid, second much smaller, third emarginate on one side and pointed, with fourth arising from the emargination, fourth and fifth larger than third, subequal; mandibles rather small, chestnut.

Prothorax large, almost bell-shaped, projecting under the head, with anterior and posterior margins concave, posterior angles rounded, with a short spine; wide lateral bands of reddish brown. Metathorax about as long as prothorax and wider; with broadly rounded posterior margin; anterior angles rounded, with two stout bristles and a spine; three stout hairs in the latero-median portion and two shorter ones on each side of median posterior border; wide lateral bands of reddish brown, coxal bands visible. Legs short and stout, concolorous with body.

Abdomen broadly oval, with lateral angles scarcely protruding, and furnished with a stout spine; three stout hairs in the angles of the sixth segment and three on each side of the tip of seventh; two short hairs on each side of the middle portion of the posterior border of segments one and two, and one hair on the posterior margin of segments one to three just within the heavy lateral bands of reddish brown; broad transverse bands of golden brown, separated by narrow, clear sutures, wider between segments four and five and five and six; segment seven entirely the color of lateral bands and deeply inserted into the sixth; genital hooks short, stout, and simple.

FEMALE.—Body, length 1.11 mm., width .52 mm.; head, length .25 mm., width .43 mm.; temples more projecting, occipital margin less concave; antennae simple, first, second, and fifth joints longest, subequal; third and fourth shorter, equal; abdomen narrower, apical segment protruding, rounded at tip; markings and color same as in male.

Numerous males and females collected on *Tinamus robustus* at Pozo Azul, Costa Rica, June, 1902. A very distinct species having little resemblance to any species heretofore described.

**Goniodes laticeps** Piaget, pl. IV, fig. 3

Piaget, *Lcs Pediculines*, p. 259, pl. XXI, fig. 6.

This striking form is easily recognized by the broad head-shield and the peculiar large posterior tibiae, edged with chestnut and fringed with fine hairs on both sides. The female was not seen by Piaget, and a drawing of it is given here.

Numerous males and females collected on *Tinamus robustus*, at Pozo Azul, Costa Rica, June, 1902.

**Goniodes aberrans** sp. nov., pl. IV, figs. 4 and 5

MALE.—Body, length 2.00 mm., width .68 mm.; abdomen spindle shaped, pointed posteriorly, with heavy transverse bands of smoky golden brown; head deeply constricted back of the antennae, and temples enormously developed posteriorly into a slender, almost pointed process.

Head, length .57 mm., width .70 mm.; front narrow, flatly rounded, with two median, submarginal hairs; antennae placed at the very front of the head, with first joint greatly swollen, second smaller, truncated-conical, third slender, with fourth arising near its base, fourth and fifth slender subequal; a marked constriction behind the antennae, at which point the head is scarcely wider than the length of the first segment of the antennae; a long, stout bristle just in front of the constriction and a shorter one on the first segment of the antennae; behind the constriction the sides of the head diverge widely with convex margins to the bluntly pointed temporal angles, which are furnished with two long, stout bristles; whole posterior margin of head deeply and regularly concave, with two short marginal hairs, and one submarginal on each side of the occiput; a deep chestnut, occipital border, curving forwards at the ends; narrow chestnut antennal bands curving inward from sides of front to bases of mandibles; mandibles small, chestnut; whole head and antennae an even, slightly smoky, golden brown.

Prothorax large, flatly dome-shaped, with the whole border anterior to the posterior angles forming a regular, almost half-circle; posterior angles almost right angles, furnished with one stout bristle; posterior margin flatly convex; narrow, deeply sub-

marginal, lateral bands of dark brown; whole of lateral regions slightly darker than median portion, which is smoky golden brown. Metathorax wider and shorter than prothorax, with rounded anterior angles and transverse posterior margin, slightly angulated medially on abdomen; three long stout bristles in the region of the slightly obtuse posterior angles, and one shorter one farther in towards the middle; narrow, semicircular bands start from the median, anterior portion and pass outward and backward across the segment and half way across first abdominal segment; whole segment uniformly smoky, golden brown. Legs extremely short, femora swollen, but concealed under body, only the short parallel sided tibiae projecting.

Abdomen spindle shaped, and pointed posteriorly, with posterior angles scarcely projecting and furnished with two stout hairs in segments one to five, sixth with four, and seventh with three on each side of tip; six hairs along the posterior margin of segments one to five; (the ventral portion of the abdomen is furnished with hairs very similar to the dorsal portion, and the body is so thin and translucent that care must be taken not to confuse the ventral with the dorsal hairs) all the segments with heavy, smoky, golden brown transverse bands, darker in posterior portion and separated transversely by rather broad, clear sutures; seventh (apical) segment deeply inserted into the sixth, with pointed tip and sides slightly concave; genitalia long, with posterior half slender and tapering to a point, with the slender portion projecting from abdomen.

FEMALE.—Body, length 2.11 mm., width .73 mm.; head, length .63 mm., width .79 mm.; body about the same shape as male; head without the lateral constrictions, front more rounded; antennae shorter, simple, and length of joints much as in *Nirmus*; a large, fleshy ovipositor with numerous stout hairs along sides and on tip protrudes from the tip of the abdomen.

Two females and one male collected on *Tinamus robustus*, at Pozo Azul, Costa Rica, June, 1902.

This is a very distinct and striking form of *Goniodes*, and I am a little doubtful as to whether it really belongs there. The spindle shaped abdomen, with continuous transverse bands and the peculiar sexual organs are very aberrant for this genus.

**Goniodes longipes** Piag.

Piaget, *Les Pediculines*, p. 253, pl. XX, fig. 7.

A single female specimen of a *Goniodes* was collected on *Odonophorus guttatus*, volcano Irazu, Costa Rica, April, 1902, in company with several individuals of an undescribed species of the same genus. There can be no doubt about its being this form, for it agrees exactly with Piaget's description and plate, although the specimens from which he described it were taken on quite a different host.

**Laemobothrium delogramma** sp. nov., pl. IV, fig. 6

FEMALE.—Body, length 10.00 mm., width 2.65 mm.; deep smoky brown, with pitchy markings on head and thorax, pitchy edgings on legs and pitchy lateral bands on abdomen; abdomen with a series of dorsal hairs on each segment arising from clear pustules.

Head, length 1.84 mm., width 1.65 mm.; slightly conical, truncate clypeus and sides straight, interrupted by the antennal swellings; palpi projecting by last two segments; temple produced to a blunt point posteriorly; occiput transverse with numerous short bristle-like hairs, two larger ones at the angles; four long and numerous short hairs on the surface of the antennal swellings; one hair at the eye; a fringe of short hairs on the sides of the temples; temples with three rather long hairs, two of which are pustulated, and several short ones; a pitchy brown blotch running back from the angles of clypeus to the antennal swelling and half way around its inner border; a second band curving inward and backward from the posterior portion of the antennal swelling, to the occipital margin; antennal swellings obscured with brown; mandibles large, tipped with black, temples margined with deep brown; a medium oval ventral spot of brown, the unmarked portion of the head clear, pale brown.

Prothorax shield-shaped, with prominent lateral angles, antero-lateral portion emarginate, and postero-lateral margin slightly angulated in median portion; anterior margin truncate; lateral angles with a long hair and several short bristles; sides with numerous short hairs; a pitchy spot in anterior angles, from

which run pitchy bands, parallel with the lateral margins of segment and joining anterior angles of metathorax; a narrow cross band in the anterior portion; a median longitudinal ventral patch, darker in anterior portion; postero-lateral margins narrowly edged with pitchy brown. Metathorax about as long as prothorax, with slightly concave anterior, and truncate posterior, margins; sides very slightly convex, diverging, bordered with numerous fine hairs; two pustulated hairs in the middle of posterior margin and one on each side in the middle portion of the segment, just with the lateral bands; whole anterior portion of segment pitchy brown; lateral pitchy bands, narrower anteriorly, join the abdominal bands; a median brownish patch divided longitudinally by a clear narrow line running the entire length of segment; regions between median blotch and lateral bands, clear pale brown. Legs long and stout, with anterior pair smaller, with femora and tibiae all margined with pitchy brown; interior portion clear, obscured in femora by a central patch of brown; femora with a row of pustulated hairs along anterior margin; a few on tibiae.

Abdomen large, spindle-shaped, with lateral angles scarcely visible and sides fringed with numerous fine hairs of different lengths, longer posteriorly; posterior margins of segments almost straight with a transverse series of pustulated hairs of different lengths, the shorter hairs arising from smaller pustules; heavy lateral pitchy bands from segment one to the middle of the ninth, unbroken at the suture, and having in segments two to eight three clear pustules, one in the anterior and two in the posterior portion of the segment, from which arise rather long hairs; clear pustules at the spiracles on segments three to eight; inner border of lateral bands rather uneven, fading into a wide, clear, submarginal longitudinal band, on which is a longitudinal row of very fine, short hairs, together with many scattering ones of the same size; median, transverse, deep brown bands on segments one to eight, separated transversely by narrow clear sutures, and longitudinally by a clear line in segments one and two, and interrupted by clear spots on remainder; sides of transverse bands uneven and separated from lateral bands by the clear

submarginal area; tip of ninth segment encircled by a brown band; a median longitudinal deep brown blotch, narrowing posteriorly; a row of about six short hairs in median portion of segment.

MALE.—Body, length 8.47 mm., width 2.32 mm.; head, length 1.67 mm., width 1.57 mm.; darker than the female, with narrower submarginal clear bands on abdomen, and with the tip having two brown lateral blotches instead of one median blotch.

Numerous males and females collected on specimens of *Gypa-gus papa* at Pozo Azul, Costa Rica, June, 1902.

This species also much resembles Piaget's *Lae. titan*, more so than my *oligothrix*, but can easily be separated from it by the presence of median clear lines and spots on the abdomen, by a wider, submarginal clear area, by the absence of a narrow darker transverse band across the anterior margin of the segments, by the presence of clear pustules in the lateral bands, by the lighter ground color of the thorax, and different bands, and by the more slender tibiae.

***Laemobothrium oligothrix* sp. nov., pl. IV, fig. 7**

FEMALE.—Body, length 9.61 mm., width 2.71 mm.; deep smoky brown throughout, with pitchy markings on head and thorax and broad pitchy lateral bands on abdomen.

Head, length 1.79 mm., width .76 mm.; sharply conical with the straight sides interrupted by the swellings of the antennal fossae, and the clypeus squarely truncate; palpi small, projecting by the last two segments; temples produced posteriorly, bluntly pointed; occiput transverse; clypeus, antennal fossae, and lateral portion of temples with numerous fine hairs; temples with three rather weak hairs, one of which is pustulated; whole head an even, clear brown, with an irregular pitchy band on each side, starting just behind the lateral angles of the clypeus, running backward along inner edge of antennal fossa, separating behind it, with one branch curving outward to margin at eye, thence backward to widest portion of temple, and the other branch passing backward and inward to the occiput, with a break at the submarginal, pitchy, occipital band; mandibles large and heavy,



points deep brown; a crescent-shaped patch between the lateral bands of the head, at the point where they nearest approach each other.

Prothorax somewhat shield-shaped, with antero-lateral portion emarginate with some short hairs, postero-lateral portion rounded, with a few short hairs; lateral wings clear, pale brown, whole median portion of segment deep brown; pitchy bands run from the lateral angles to the ends of the lateral bands of the metathorax, around on the margin at the lateral emargination and from the anterior portion of the emargination diagonally backward to the center of the segment, a longitudinal median ventral band of darker brown. Metathorax about as long as prothorax, with straight diverging sides and truncate posterior margin; sides with a few short hairs; heavy pitchy lateral bands, curving around on anterior portion of segment, continuous with lateral abdominal bands, and with branches running diagonally inward at the posterior portion of the segment and connected by a paler band; interior of segment uniformly deep smoky brown. Legs long and stout, concolorous with body, especially the two posterior pairs; anterior femora swollen and orbicular, posterior two lengthened; anterior margin and a portion of posterior margin of femora and both margins of tibiae heavily edged with black, first joint of tarsi swollen, second long and slender; a series of short pustulated hairs along the inner margin of the black edging of the two posterior pairs of femora; other short hairs on margin of femora and tibiae; femora deeper brown than tibiae and darker at base and in median portions.

Abdomen large, elongate oval, with posterior, lateral angles scarcely visible; sides fringed with short slender hairs, heavier and more abundant at posterior portion; posterior margins of segments almost truncate, with a row of eight to ten short hairs on segments two to seven, lateral margins with heavy pitchy bands, narrowing posteriorly and ending at the middle of the last segment; short, pitchy bands run diagonally backward from lateral band in the first segment, corresponding to the bands in metathorax; interior of abdomen an even, deep brown, separated from lateral bands by a narrow pale area; heavier, pitchy brown,

narrow, transverse bands at the anterior margin of segments two to eight, ending at the pale lateral band; a darker median area in segment seven; segment eight translucent, with a deep brown blotch in anterior portion and a clear brown, crescent-shaped band around the tip.

MALE.—Body, length 8.29 mm., width 2.17 mm.; head, length 1.65 mm., width 1.56 mm.; similar to female, except in size, and the tip of abdomen, which is slightly swollen laterally and flatly indented at the tip, with a narrow band around anterior border, a dusky spot in each side of the median portion, and the same band around tip as in female.

Numerous males and females collected from specimens of *Buteo borealis costaricensis*, shot on the volcano Irazu, April, 1902. This form is quite close to Piaget's *Lac. titan*, but is distinguished from that species by the clear temples, the absence of a dark band across the middle of the antennal swelling, by the heavier lateral abdominal bands, internal metathoracic bands, and absence of clear pustules on abdomen, and by the difference in the shape of the legs and fewer hairs on margins of abdomen.

***Physostomum jiminezi* sp. nov., pl. V, fig. 1**

FEMALE.—Body, length 3.06 mm., width .97 mm.; smoky fulvus throughout, abdomen with darker lateral bands and median transverse bands; legs very dusky, femora margined with blackish.

Head, length .71 mm., width .57 mm.; conical, with flatly rounded, bare front; palettes projecting by apical segment; sides of head slightly sinuated with one weak hair at anterior margin of antennal fossae; a slight ocular notch with one very fine bristle; temples produced backward, ending in a blunt spine, very slightly turned outward, with three weak hairs; occipital margin reentering, occiput flatly convex; a pale fulvous band across the forehead at the base of the palettes; a pale indistinct band along the lateral margins of the head, disappearing at the antennal fossae; antennal fossae of unusual size, with inner portion bordered with blackish but outer bounded only by a very faint line; a black ocular fleck; a narrow, fulvous, submarginal occipital

band; a slightly darker occipital patch; whole head smoky fulvous.

Prothorax unusually large with clear lateral wings; anterior and posterior margins concave; lateral angles very obtuse; antero-lateral margins slightly concave, postero-lateral portions straight and diverging; median portion of segment dusky; pale internal bands running back from the lateral margins, near the anterior angles, to metathorax. Metathorax scarcely larger than prothorax, with anterior and posterior margins truncate; sides slightly sinuate, diverging; a faint clear line at the meso-metathoracic suture; anterior region of segment, and broad lateral bands of brownish fulvous, continuous with lateral bands of abdomen.

Anterior legs short and weak, same color as head; two posterior pairs long and stout, with femora margined before and behind with blackish; the whole femora and tibia deep smoky brown.

Abdomen narrowly oval, with scarcely protruding acute angles, furnished with one weak hair; posterior margin of first three segments flatly angulated; four and five transverse and six concave; broad, marginal, unbroken, lateral bands on segments one to seven, with inner border emarginate on segments four to seven; eighth segment clear, vulva convex, fringed with fine hairs; in the middle of the broad lateral band is to be found the peculiar chain-shaped band of chitin common to the genus; broad, median, transverse bands of brownish fulvous, separated by narrow, clear sutures, on segments one to seven.

Three females collected from *Amisillia tzacatl*, at Juan Vinas in March and three females from *Selasphorus flammula* on the volcano Irazu, Costa Rica, February, 1902.

This species much resembles *microcephalum* Kell., but is easily distinguished from that species by the large clear prothorax and the absence of numerous long hairs on the head and thorax. It seems to be a common parasite of several species of hummingbirds since it was taken on quite different species in very different localities.

**Physostomum doratophorum** sp. nov., pl. V, fig. 4

FEMALE.—Body, length 2.41 mm., width 1.10 mm.; short and broad, with sides of head deeply emarginate, abdomen broadly oval, whole body pale golden, darker on head, with clear brown markings on head, thorax, and abdomen.

Head, length .58 mm., width .61 mm.; front broad, slightly concave, with rounded lateral angles; sides deeply emarginate slightly forward of the middle, and just at the base of the palettes, which are very large, filling the emargination and extending around on the sides in front; palpi projecting by almost entire length, long and stout, apical segment largest, globular; sides of head behind bases of palpi convex and diverging; a slight ocular notch; temples small, rounded, with two short weak hairs; occipital margin concave, but the wide occiput strongly convex, with a narrow darker border; a narrow brown band across the forehead just in front of the palettes; anterior margin of palettes bordered by a narrow dark brown band; antennal fossae of medium size, encircled by only narrow lines, and interior slightly darker than general color of the head; a black ocular fleck; a narrow, brown, marginal band, encircling the lateral emarginations at the base of the palettes and palpi.

Prothorax of medium size, shield-shaped, with anterior margin concave, anterior portion of sides slightly concave, and whole margin back of lateral angles nearly evenly rounded; five short, slender hairs on each side of the rounded lateral portion; narrow, brown, marginal bands along the portion of the sides anterior to the lateral angles; narrow, pale, internal bands curving backwards from the anterior angles to the anterior angles of the metathorax; two median, longitudinal bands enclosing a spear-head shaped area. Metathorax about as long as prothorax, sides broadly diverging, slightly sinuate, there being a slight lateral constriction at the suture of the meso- and metathorax and a narrow clear dorsal line; posterior margin flatly rounded; posterior angles rounded and slightly protruding; narrow brown bands from the anterior angles along the lateral margin, broken at the suture, back nearly to the posterior angles, then curving inward and extending half way across the first segment of the abdomen,

where they join the internal chitin bands; heavy, pale, internal bands run backward from the anterior angles into the abdomen; the region of the mesothorax and posterior angles deep golden, about the color of the head. Legs long and stout, femora slightly swollen, tibia much swollen at the tips and second segment of tarsi unusually large, being almost globular; femora margined anteriorly and posteriorly, tibiae posteriorly, and tarsi anteriorly with brown.

Abdomen short and broadly oval, almost clear, with the exception of the transverse bands; posterior angles scarcely protruding, without hairs; posterior markings transverse; eighth segment flatly rounded behind, with a row of short fine hairs; deeply submarginal, chain-like, chitin bands, extending from the prothorax, run almost straight back as far as the middle of the sixth segment; between these bands are faint golden transverse bands, broken by clear sutures; outside, in each segment are spots of the same color as the transverse bands; a few short dorsal hairs on each segment inside and outside of the internal bands.

Four females collected from *Selasphorus flammula*, on the volcano Irazu, April, 1902. I have placed this species in the genus *Physostomum*, but do not think that it rightly belongs there. However, since Mr. Kellogg has placed a very closely related species (*promineus*) in this same genus, I will follow him in the matter at present, though I believe that further collecting of Mallophaga from hummingbirds will produce additional species of this type, upon which a new genus can be safely established.

***Physostomum leptosomum* sp. nov., pl. V, fig. 2**

FEMALE.—Body, length 3.13 mm., width .82 mm.; head and thorax clear pale brown, with brown markings, abdomen brownish golden with deep smoky brown, lateral bands.

Head, length .80 mm., width .61 mm.; slightly conical, with front broad and evenly rounded; sides straight with two short fine hairs in front of the antennal fossae; ocular notch small, with three short, fine hairs; temple produced posteriorly and bluntly pointed, with two rather long and one short hair; occipital margin deeply reentering, occiput very slightly concave; the

protruding palettes faintly tinged with brown; a brownish band across the forehead, joining the bases of the palettes and bearing a row of fine, dorsal hairs; antennal fossae clear, encircled by a narrow brown line, except on the inner side where the line expands into a brown band; a brownish, semicircular band curves from the lateral margin of the head at the base of the palettes upward to the transverse band, and between this and the antennal fossae are large irregular shaped brown blotches; a narrow, submarginal, occipital band, blackish in the median portion.

Prothorax the same width as the head at the templar angles, quadrilateral, with anterior and posterior margins concave, the anterior half of the lateral margin straight and the posterior half evenly rounded; lateral angles very obtuse (scarcely noticeable), with a short spine and hair, two more hairs on lateral margin behind the lateral angles; broad lateral bands of clear brown and a median, longitudinal, ventral patch of paler brown. Metathorax scarcely larger than the prothorax, with anterior portion rounded and covered by prothorax; sides very slightly concave, posterior border truncate and same width as first segment of abdomen; one slender hair in the posterior angles and a spine in the anterior angles; heavy, brown, lateral bands, passing around on the anterior margin; brown bands pass diagonally forward from the posterior angles to the median anterior portion, broad and pale at base, narrowing and darkening anteriorly; internal portion of segment dusky brown. Legs of medium size, pale fulvous, lighter than body.

Abdomen rather broad, sides parallel, with the tip abruptly rounded by a portion of the seventh and the eighth segments; segments of nearly equal width throughout, with transverse posterior margins, except the sixth, which is slightly concave; one short hair in the region of the posterior angles of segments one to seven; eighth with a fringe of short hairs along the round margin; deep brown, lateral bands on segments one to seven and anterior portion of eighth, heavier along the inner portion and broken by sharply diagonal, clear lines at the sutures; interior of the abdomen an even golden brown, with a slightly darker

median patch covering a portion of segment four, all of segments five and six, and a part of seven.

MALE.—Body, length 2.43 mm., width .69 mm.; head, length .69 mm., width .55 mm.; differs from the female only in smaller size and in last segment of abdomen, which is without the dark lateral bands in anterior portion, i. longer, more flatly rounded, and slightly sinuate on the sides; a dusky, median, transverse band in the anterior portion; genital hooks are slender, widely diverging in the median portion, with ends straight and converging, and extending the width of the sixth and seventh segments.

Two females collected from *Myiarchus lawrencei nigricapillus*, and two males from *Myiozetetes cayanensis*, Juan Vinas, Costa Rica, March, 1902. This form has a superficial resemblance to *P. sucinaceum* Kell., but differs in the shape of the head, markings of thorax, presence of palettes, and size.

**Physostomum angulatum** Kell.

Kellogg, *New Mallophaga* II, p. 515, pl. LXX, fig. 5.

One female of this well-marked species collected on *Tanagra cana*, Juan Vinas, Costa Rica, March, 1902.

This is another strange instance of distribution, but there can be no doubt as to the identification of the specimen since it agrees perfectly with Mr. Kellogg's plate and description of *angulatum*.

**Physostomum australe** Kell.

Kellogg, *New Mallophaga* II, p. 516, pl. LXX, fig. 4.

One female collected on *Tanagra cana*, at Juan Vinas, Costa Rica, March, 1902.

The finding of this species on *Tanagra cana* is as unaccountable as that of *P. angulatum*, but the identification is absolutely certain.

**Physostomum subangulatum** sp. nov., pl. V, fig. 3

FEMALE.—Body, length 4.37 mm., width 1.06 mm.; almost uncolored, with a faint tinge of golden on abdomen, with nar-

row, pitchy, submarginal, lateral bands on abdomen and thorax and pitchy and deep brown markings on the head.

Head, length 1.05 mm., width .80 mm.; conical, with rather narrow, evenly rounded, bare front; large projecting palettes connected by a clear band across clypeal suture; sides of head slightly sinuate in region of antennal fossae; ocular notch shallow with three short bristles; eyes small, nearly obscured by a black fleck; temples rounded, clear, with three weak hairs, produced backward to a point; occipital margin deeply reentering and evenly concave, with a narrow black submarginal border; a brown occipital signature; antennal fossae small, inner border obscured by a pitchy band fading to brown; region between antennal fossae and lateral margins, and a short space in front, clear brown; a dark brown marginal blotch at the ocular notch; pitchy brown antennal bands run forward from the occipital band, passing along the inner margin of the antennal fossae, thence forward to the palpi, with two round, darker spots on them, between the fossae and palpi; a short, curving band connects their ends with the margins at the base of the palettes; a narrow, curving, longitudinal, brown band runs along the inner borders of the anterior portion of the antennal bands.

Prothorax hexagonal, lateral angles rounded, with a bristle and short hair; antero-lateral margin straight, postero-lateral margin curving, with one weak hair; anterior and posterior margins deeply concave; pitchy lateral bands, marginal in front of lateral angles, submarginal behind, and joining anterior angles of metathorax; two narrow, median, longitudinal, pitchy lines, and two diagonal lines in each side of the posterior portion of segment. Metathorax larger than the prothorax, quadrilateral, with sinuated, diverging lateral margins and truncate posterior margin; posterior angles with one hair and a bristle; strong, pitchy, submarginal bands running backward from the anterior angles to the posterior margin of segment; a second band starting at the anterior angles follows the margin backward to median portion of segment, then curving inward cuts the submarginal band and passes forward to the posterior border of the prothorax; the enclosed portion between the marginal and sub-



marginal bands pale brown. Legs long, rather slender, and almost colorless.

Abdomen nearly parallel sided, with acute, scarcely projecting posterior angles, having one weak hair in segments one to four, and two in segments five to seven; eighth segment evenly rounded, with two short hairs on each side; vulva convex, fringed with fine hairs; whole abdomen clear, with only faint tinge of golden, excepting the heavy, pitchy, submarginal, lateral bands, extending from the end of the metathoracic bands to the middle of the eighth segment, where they are marginal and narrow.

Four females collected on *Tanager cana*, at Juan Vinas, Costa Rica, March, 1902. This species is a curious combination of *P. angulatum* and *australe* Kell., having the head resembling *australe* and the thoracic and abdominal markings resembling *angulatum*.

It seems quite remarkable that three closely related species of this genus should be found upon the same host, although they were collected on different individuals. As Mr. Kellogg says, this genus is a peculiar one and must be thoroughly revised as soon as sufficient material is accumulated.

#### **Physostomum picturatum** Car.

Carriker, *New Mallophaga from Nebraska Birds*. Jour. N. Y. Ent. Soc., vol. X, no. 4.

One female collected on *Helminthophila peregrina*, Juan Vinas, Costa Rica, March, 1902.

The finding of this species on this host in Costa Rica is not so surprising as might at first appear, since it was described from specimens collected on *Helminthophila celata*.

#### **Physostomum pallens** Kell.

Kellogg, *New Mallophaga* III, p. 49, pl. IV, fig. 7.

This species described from specimens collected on *Protonotaria citrea* was taken on *Compsothlypis pitiayumi*, a closely related genus, on the volcano Irazu, Costa Rica, April, 1902.

But a single female was taken.

**Colpocephalum gypagi** sp. nov., pl. VI, fig. 2

FEMALE.—Body, length 1.96 mm., width .71 mm.; head smoky brown, with four large pitchy areas; body clear with lateral pitchy spots and paler transverse bands on segments four to seven of the abdomen; femora and tibiae heavily margined anteriorly with deep brown.

Head, length .35 mm., width .53 mm.; flatly rounded in front, with conspicuous ocular emarginations and with the palpi and antennae protruding by apical segment; front with six very fine hairs; three more, slightly longer, on sides in front of the ocular emargination; ocular fringe rather sparse for the genus; temples slightly angulated in the rear, with three rather long hairs, two marginal and one submarginal; occipital margin deeply concave, with six short hairs; very large, pitchy ocular and occipital blotches, the ocular blotches connected with the occipital blotches by dark brown bands and the occipital blotches connected by a similar band.

Prothorax small, oval, with lateral angles produced to a blunt spine, and furnished with a short spine and a long hair; postero-lateral margins with two long hairs; posterior margin transverse, with six short hairs; deep brown chitin bands curving across lateral angles, which are brownish, fading inward; transverse band pale brown. Metathorax larger than the prothorax, quadrilateral, with widely diverging sides and rounded posterior margin; anterior and posterior angles pale golden, remainder of segment clear; region of posterior angles with numerous short, dorsal hairs.

Abdomen large, widest at third segment, thence constricted and tapering sharply to the pointed tip; lateral angles projecting but little, with several short, weak hairs, and lateral margins with several short hairs also; lateral regions of segments one and two with some short, dorsal hairs; posterior margins of segments one to eight with a fringe of fine hairs; first three segments almost clear, except a brownish spot in lateral portions of segment three; segments four to seven with pitchy blotches in the median portion of lateral margins, and pale brownish transverse bands, separated by clear sutures; segments eight and

nine uniformly brown except the tip of the ninth, which is clear; tip of ninth with two longish hairs and a fringe of fine hairs, also a few short hairs along the lateral margins; on the ventral surface is a transverse row of stout hairs across the posterior margin of the eighth segment, and a short row of stiff bristles in the lateral portions; also a fringe of stout marginal hairs along the anterior portion of the eighth, curving upward around the sides of the segment. Legs of medium length and stout, especially the anterior pair; smoky brown the same as the head, with heavy, deep brown anterior borders on the femora and tibiae.

A single female collected from *Gypagus papa*, at Pozo Azul, Costa Rica, June, 1902. This form is of the same type as *setosum* Piag., from which it is distinguished by the absence of transverse bands on the first two segments of the abdomen, by the much narrower lateral bands on segments four to seven, by the presence of transverse bands on segments four to eight, by the presence of a continuous fringe of hairs on the posterior margin of all the abdominal segments, and by the much shorter hairs on the posterior angles of the abdomen.

**Colpocephalum osborni** Kell. var. **costaricense** var. nov.

A large number of males and females collected from *Butco borealis costaricensis*, on the volcano Irazu, Costa Rica, April, 1902. While these specimens resemble quite closely Kellogg's *osborni*, there are sufficient important differences to give them a varietal rank. This form is larger, measuring: female, length 1.70 mm., width .56 mm.; head, length .31 mm., width .47 mm.; male, length 1.57 mm., width .49 mm.; head, length .31 mm., width .46 mm.; the pitchy lateral spots are absent from the first and second segments of the abdomen; there is a dusky transverse band across the metathorax; the pitchy spots of the head are not so closely united, while the marginal bands of the legs are paler.

With these exceptions it agrees with Mr. Kellogg's description of the species.

***Colpocephalum extraneum* sp. nov.**, pl. VI, fig. 3

FEMALE.—Body, length 2.15 mm., width .76 mm.; angulated before and behind, legs long and stout, meso- and metathorax divided, metathorax extraordinarily long and shield shaped, and abdomen constricted posteriorly.

Head, length .45 mm., width .65 mm.; front very flatly rounded, sides sinuate, there being a depression at the point where the palpi project and at the ocular emargination; front with six short hairs, sides with four; palpi projecting by the long apical segment; an antennae projecting by almost all of last two segments; ocular fringe very thick and long; temples expanded broadly, roundly angulated before and behind, with four long hairs on the lateral margin; occipital margin concavo-convex, with a narrow pitchy border; pitchy ocular blotches; mandibles rather small, points pitchy; brownish bands running from end of ocular blotch to frontal margin; a brownish band, curving backward and broadening medially, connects the anterior portion of ocular blotches; whole temples clear brown.

Prothorax hexagonal, with lateral angles produced to a blunt point, furnished with three spines; anterior and antero-lateral margins straight; postero-lateral slightly concave and posterior convex; posterior angles with one hair, a median ventral blotch in anterior portion of segment; narrow brown edging to whole segment; dark brown coxal bands in the form of a flattened semi-circle across the postero-lateral portion of segments.

Mesothorax distinctly divided from metathorax, with convex lateral and truncate posterior margins; a pitchy brown band around sides and anterior angles, broken medially, with short bands running backward from their ends. Metathorax very wide and long, at least three-fourths as long as abdomen; sides straight, diverging; posterior margin elliptical, the region posterior to the lateral angles being longer than that anterior to them; lateral angles very obtuse, with three spines; sides of posterior margin with three long hairs; lateral margins with a narrow pitchy band curving across lateral angles; dark brown bands running inward from posterior portion of lateral margins, almost meeting medially; a lunate ventral patch in median ante-

rior portion; two brownish patches in the posterior portion; coxal outlines, pitchy, showing through (not shown in the plate). Legs long and stout; femora much swollen, especially posterior pair, and all with anterior margins brownish; tibiae swollen apically, with anterior and posterior edgings of brown; second joint of tarsi long; the whole concolorous with body, and having numerous short marginal hairs; a patch of short hairs on the dorsal surface of the posterior femora.

Abdomen short, scarcely wider than metathorax and constricted sharply in the posterior portion; segments subequal in length, with rounded lateral margins; posterior angles with three short spiny hairs; narrow pitchy lateral bands on segments one to eight; deep umber brown transverse bands on segments one to eight, extending inward about one-third the width of the abdomen and scarcely broken at sutures; ninth segment pale clear brown with fringe of fine hairs on the flatly rounded posterior margin; one long hair in posterior angles of the eighth segment and two on each side of ninth, a row of fine, pustulated hairs on posterior margin of transverse bands, except on first segment; median portion of abdomen pale, clear brown.

A single female collected on *Nyctidromus albicollis*, at Pozo Azul, Costa Rica, June, 1902.

***Colpocephalum luroris* sp. nov., pl. VI, fig. 4**

FEMALE.—Body, length 2.03 mm., width .76 mm.; clear tawny brown, with the large abdomen completely obscured by continuous transverse bands.

Head, length .43 mm., width .54 mm.; front very much flattened, sides sinuate; ocular emargination large but shallow and ocular fringe strong; eye large, obscured, protruding from the emargination; temples expanded laterally, angulated behind, rounded before, with three long hairs; occipital margin concavo-convex, with two hairs; front with two hairs in median portion and three at the lateral angles; palpi projecting by half of apical segment; two hairs before the ocular emargination; two long pustulated hairs just within the ocular blotch; an irregular, brownish blotch along interior margin of ocular emargination,

and short curving bands from bases of mandibles to lateral angles of frontal margin, a pale brown occipital blotch; whole head clear tawny brown.

Prothorax hexagonal, with expanded lateral angles, furnished with one bristle; coxal bands very plain; a narrow transverse chitin band; posterior margin convex with four hairs. Metathorax larger than prothorax, pentagonal, with posterior and anterior margins truncate and sides slightly concave, strongly diverging; a single spine in posterior angles; posterior margin with a row of short, stout hairs; anterior angles and lateral margins edged with dark brown; brown bands (starting at lateral margins) cut across posterior angles into the abdomen. Legs long and stout, especially the front femora, which are much swollen; concolorous with body.

Abdomen large, oval, posterior angles projecting slightly, with two or three spines; a long hair in segments seven and eight, and two long ones on each side of the ninth, with a fringe of fine hairs between; posterior margins of segments one to seven with a row of short hairs, heavier, tawny, lateral bands on segments one to eight, broken at the sutures; whole interior of abdomen an even tawny brown.

A single female collected on *Zarhynchus wagleri*, Juan Vinas, Costa Rica, March, 1902.

*Colpocephalum mirabile* sp. nov., pl. VI, fig. 5

FEMALE.—Body, length 1.61 mm., width .66 mm.; clear with bands and markings of brown and pitchy; metathorax enormously developed, wider than head and abdomen and two-thirds the length of abdomen.

Head, length .34 mm., width .56 mm.; clear, with front almost evenly rounded except a slight depression at the projecting palpi; front with two long and six short hairs, one just before and three just behind palpi; a longer one pointing backward from anterior portion of ocular emargination; ocular fringe long and thick; eye very large, clear, with a black fleck; temples expanded and nearly evenly rounded, with four long hairs, occipital margin deeply reentering, occiput straight; mandibles me-

dium with chestnut tips; short, brown, curving bands from bases of mandibles to frontal margin; curving pitchy ocular blotches; short, longitudinal crescent-shaped, brown bands inside of ocular blotches.

Prothorax large, hexagonal, with anterior margins straight, bluntly rounded lateral angles, concave postero-lateral margins, and rounded posterior margin; lateral angles with three spines; pitchy spots in the anterior angles; narrow, broken, pitchy brown edgings to the lateral margins; conspicuous pitchy coxal bands, running from the middle of the antero-lateral margins to median portion of segment; a faint median ventral spot.

Mesothorax distinctly set off from metathorax, with rounded lateral posterior margins; mesocoxal bands of pitchy brown very distinct, running from anterior angles of metathorax around the lateral margins of mesothorax, into the posterior angles of prothorax; from the ends of lateral bands to middle of segment, then bending sharply back into mesothorax. Metathorax very large (.46 mm.  $\times$  .62 mm.), clear, with straight diverging sides, very obtusely rounded lateral angles and truncate posterior margin; lateral angles with four spines and a very long hair; the posterior portion of lateral margin slightly angulated in the median portion, with one spine; deep brown, dorsal bands, forming a figure 8 across the middle of the segment, with short appendages at the ends on the anterior side and long narrow bands curving backward from the posterior portion of ends, into the abdomen as far as the fourth segment. Legs long and stout, clear, with brown spots at tips of femora and tibiae; numerous short, marginal hairs.

Abdomen short, almost parallel sided, with segments five to seven much shorter than remainder, two segments, one, eight, and nine the longest, subequal; sides slightly convex, with a short hair in posterior angles of segments one to eight and a long one in segments one and two, and seven and eight; posterior margins of segments one to seven concave, especially five to seven, eight truncate and nine evenly rounded, with two long hairs on each side, a double fringe of very fine hairs at tip, and a submarginal row of short, stout hairs around the whole poste-

rior margin; a number of short spines on the lateral portion of the posterior margin of segments one to five; short hairs along the posterior margins of segments three to seven, thicker in the portion just inside the lateral bands; irregular pitchy brown spots in the lateral portion of segments one to eight, not as wide as segment, a narrow longitudinal clear line separates these spots from the interior of abdomen; smoky brown transverse bands in segments four to seven, separated by narrow, clear sutures; irregular, lateral, brown spots in eighth segment; interior of segments one to three, and nine, a pale translucent brownish. The abdomen has the appearance of having a flattened lateral area, with the whole central portion convex.

MALE.—Body, length 1.54 mm., width .51 mm.; head, length .34 mm., width .50 mm.; clearer than female, with much smaller metathorax; abdomen a perfect oval, with lateral spots of regular size and shape in all the segments except the ninth; posterior margins of all the segments with a row of hairs; transverse bands on segments three to six separated by wider sutures; genital hooks very large and long, reaching from third to posterior margin of the eighth segment, with the anterior two-thirds a single heavy shaft, widening posteriorly and separating into a perfect trident.

One female and three males collected on *Zarhynchus wagleri*, at Juan Vinas, Costa Rica, March, 1902.

***Nitzschia bruneri* sp. nov.**

This form is very easily distinguished from *pulicaris* by the exceedingly short metathorax (length .34 mm., width .71 mm.), by the very slender hind femora and tibiae of the female, and by the paleness of the transverse abdominal bands. Measurements: Female, length 2.50 mm., width .95 mm.; head, length .50 mm., width .66 mm.; male, length 1.96 mm., width .75 mm.; head, length .45 mm., width .61 mm.

While working over specimens of *Nitzschia* from Costa Rica, I again went over the material collected from *Acrionantes melanoleucus* in Sioux county, Neb., and which I had named: *pulicaris*, var. *tibialis*. I now find that some errors were made at



that time and that several important points were overlooked, which clearly separate this form from *pulicaris*, and I accordingly give it full specific rank as *Nitzschia bruneri*.

***Nitzschia bruneri*, var. *meridionalis* var. nov.**

FEMALE.—Length 2.73 mm., width .99 mm.; head, length .52 mm., width .76 mm.; male, length 2.18 mm., width .74 mm.; head, length .51 mm., width .70 mm.

The variety is distinguished from the species by the darker color, being a translucent brown instead of golden, by the absence of a marginal band on the lateral portion of the mesothorax, by much darker thoracic and lateral abdominal markings, by more and longer hairs at the posterior angles of the abdomen, by shorter and more spine-like hairs along posterior borders of segments, by much smaller posterior tibiae in the male, and, finally, by a difference in size.

Numerous males and females collected from *Chaetura griseiventris*, at Pozo Azul, Costa Rica, June, 1902. While these specimens closely resemble *bruneri*, they can be scarcely called that, and have accordingly been given varietal rank.

***Menopon tridens costaricense* var. nov.**

FEMALE.—Body, length 1.48 mm., width .61 mm.; head, length .32 mm., width .49 mm.; whole body uniformly translucent fulvous, with black tips to the mandibles, black ocular flecks, narrow blackish occipital margin, while the peculiar, characteristic, occipital process is deep brown; occipital margin with four hairs, while the posterior margin of the pro- and metathorax and the abdominal segments is furnished with a row of stout hairs; just inside the lateral bands is a longitudinal area covered with short, fine hairs. The rotundity of the abdomen is also a prominent character.

A single female collected from *Porzana cinereiceps*, at Juan Vinas, Costa Rica, March, 1902. Unlike the varieties described by Mr. Kellogg, this form has the lateral bands of the abdomen uncolored, as Piaget gives for *tridens*, but while it agrees with the species in this respect, it differs radically in others.

**Menopon ortalidis** sp. nov., pl. VII, fig. 1

MALE.—Body, length 1.81 mm., width .71 mm.; very pale throughout, with only a faint tawny tinge; markings of head and thorax and lateral spots of the abdomen light smoky brown.

Head, length .37 mm., width .54 mm.; front, beyond ocular emargination, almost evenly rounded, with two short, fine hairs near the middle, two more just back of the projecting palpi, and two longer ones arising just in front of the ocular emargination; the ocular emargination shallow with a strong fringe of hairs; the temples slightly drawn out latero-posteriorly, with five long, stout hairs, four of which are pustulated; occipital margin concave, bare, with a slight, marginal, dusky band on each side of the occiput; the mandibles small, cinereous, and placed near the front of the head; palpi long and stout, projecting by nearly all of the last two segments; just behind the base of each palpus is a dark cinereous, cone-shaped protuberance, between which are two short dorsal hairs; the eye is large, clear, with a short hair and partly obscured by a large black fleck on the anterior side; the antennae rather stout, apical joint much the largest, nearly globular, and projecting by a trifle more than half its length; a dark band along the inner border of the ocular depression; pale smoky, occipital bands, curving from each side of the occiput to the anterior margin of the ocular depression; three short, dorsal hairs along each occipital band.

Prothorax very large, nearly as broad as the head and almost hexagonal in shape; lateral lobes expanded, dusky, and lateral angles bluntly rounded, with one short spine; the postero-lateral margins with six long hairs, and the posterior margin with four shorter ones; narrow, dusky bands start from the median portion of the antero-lateral margins, curve gently backward nearly to the posterior margin, then bend inward and unite, the whole enclosing a nearly quadrilateral space; fainter narrow bands run diagonally backward from the anterior corners of this quadrilateral, nearly to the center of the segment, joining a faint ventral spot; a still fainter band connects these diagonal bands transversely. Metathorax about the same size as the prothorax, with straight, diverging sides, and flatly rounded posterior mar-

gin; posterior angles with one long hair and posterior margin with a row of about ten slender hairs; the middle coxae show through as curving brown bands in the region of the anterior angles; pale brown bands cut across the posterior angles from the lateral margins and extend nearly across the first segment of the abdomen. Legs long and stout, with swollen femora and slender tibiae, and well-developed tarsi; pale throughout, with a few short hairs.

Abdomen clear with very pale smoky transverse bands (hardly noticeable) and wide, perfectly clear sutures; lateral angles protruding slightly, with one long and two shorter hairs; posterior margin of segments furnished with a row of fine hairs, while a second row runs across the middle of each segment except the first, eighth, and ninth; ninth segment with one long and two shorter hairs on each side of the rounded posterior margin, and some shorter ones between; in the lateral portion of segments one to eight are smoky brown spots with a darker rounded protuberance in the median portion; genital hooks short, of medium size, and typical of the genus.

A single male collected on *Ortalis cinericeps*, at Juan Vinas, Costa Rica, March, 1902. This species resembles *pallescens* N., but is much paler, has very slender tarsi, while the markings of the head and thorax differ considerably.

**Menopon fasciatum** Rud., pl. VIII, fig. 4

Rudow, *Zeitsch. f. d. ges. Nat.* XXIV, 403.

Giebel, *Insecta Epizoa*, p. 279.

Piaget, *Les Pediculines*, p. 418.

FEMALE.—Body, length 2.08 mm., width .93 mm.; head length .38 mm., width .69 mm.

MALE.—Body, length 2.00 mm., width .84 mm.; head, length .35 mm., width .64 mm.

Although the description is vague enough to fit any one of several closely related species, from the fact that my specimens were collected on the same host as Rudow's, and that what description he does give agrees very well with this specimen, there seems to be no reason for creating another species.

This form is very readily distinguished by the broad head and the clavate abdomen, with heavy, chestnut, transverse bands and narrow, pitchy, lateral bands.

Several males and females collected on *Gypagus papa*, at Pozo Azul, Costa Rica, June, 1902.

**Menopon macrocybe** sp. nov., pl. VII, fig. 2

FEMALE.—Body, length 1.34 mm., width .48 mm.; head wider than the abdomen; abdomen almost parallel sided, with heavy, transverse, smoky brown bands.

Head, length .36 mm., width .57 mm.; very large, somewhat quadrangular, front almost truncate, sides convex and diverging, interrupted by the shallow ocular emarginations; two long and one short hair in front of ocular emargination; a short sparse ocular fringe; temples rounded, with four long hairs and several short ones; occipital margin deeply reentering, occiput transverse, with two long hairs; mandibles rather large, well toward the front of the head; dark brown antennal bands run diagonally backward from the clypeal angles to the bases of the mandibles, then straight back to the large pitchy ocular blotch; a black ocular fleck; whole head evenly clear, pale, brown.

Prothorax large, lateral angles bluntly pointed, anterior and latero-anterior sides straight; whole margin back of lateral angles evenly rounded, with one hair on each side; whole segment clear brown, darker in lateral portions, with a transverse band. Metathorax scarcely larger than prothorax, with straight, widely diverging sides and rounded posterior margin; six long hairs on each side of posterior margin, interior of segment clear brown, with lateral portion deep smoky brown. Legs large and stout, clear pale brown, almost the same color as head, with anterior margin of femora and both margins of tibiae edged with darker brown; second joint of tarsi very large in posterior pair of legs.

Abdomen short, almost parallel sided, abruptly rounded by the large apical segment; segments subequal in length, with lateral angles scarcely visible, furnished with one long hair and one short one in segments one to eight; ninth with one long hair on

each side of tip and a median fringe of slender hairs; a row of seven or eight short, slender hairs along the posterior margin of segments one to eight; segments one to nine with heavy continuous transverse bands of deep smoky brown, darker in the lateral portion of segments one to three and separated transversely by clear sutures except between eighth and ninth.

A single female taken on *Buteo platypterus*, at Juan Vinas, Costa Rica, March, 1902. Easily recognized by the broad head and parallel sided, banded abdomen.

**Menopon praecursor meridionale** var. nov.

FEMALE.—Body, length 1.73 mm., width .73 mm.; head, length .36 mm., width .54 mm.; differs from *praecursor* in brownish occipital bands curving outward from each side of the occiput to base of the antennae, and having a black spot at their base; eight hairs along the occipital margin instead of six; two long hairs in the posterior angles of the prothorax instead of one; posterior margin very flatly rounded instead of slightly angulated; transverse bands of abdomen narrower and paler; in segments six to eight there are, in addition to the row along the posterior margin, two other rows of short hairs transversely across the segment.

MALE.—Body, length 1.48 mm., width .59 mm.; head, length .31 mm., width .52 mm.; paler than the female as in *praecursor*, but has the transverse bands on the eighth segment of the same intensity as the others.

Three males collected from *Melanerpes aurifrons hoffmanni*, at Juan Vinas, Costa Rica, in March, 1902, and three females and one male from *Odontophorus leucolaemus*, on the volcano Irazu, April, 1902.

**Menopon tityrus** sp. nov., pl. VII., fig. 4

FEMALE.—Body, length 1.04 mm., width .52 mm.; very short and broad, deep smoky brown, with wide short head having large pitchy ocular bands; broadly oval abdomen, with heavy transverse smoky brown bands, pitchy in lateral portions.

Head, length .24 mm., width .48 mm.; twice as long as broad, whole margin in front of the bluntly pointed temple angles a

slightly flattened arc; whole occipital margin evenly concave with a narrow, pitchy submarginal band, and two median marginal hairs, two short hairs on the front, one at the slightly projecting labial palpi, two long ones and a short one in front of the ocular fleck; three long marginal ones and several short ones on the pointed temples; a pitchy brown submarginal band around front, broadening at bases into brownish areas covering the whole sides of the head except the paler apical portions of the temples; a large black ocular fleck; a short dark longitudinal band runs forward from bases of mandibles almost to margin of head; two curving bands in occipital region, joining at anterior ends and then extending laterally to the dark portion of the head.

Prothorax broad, with produced, bluntly pointed lateral angles, with anterior portion flatly rounded, and very obtuse posterior angles, making nearly straight postero-lateral margins and flatly rounded posterior margin; lateral angles with one long hair and a spine; posterior angles with a long hair, and posterior margin with six slender hairs; whole segment narrowly edged with chestnut; narrow, lateral, deeply submarginal, and a narrow median transverse band of chestnut; whole segment deep smoky brown. Metathorax scarcely larger than prothorax, with straight, widely diverging sides and flatly rounded posterior margin having row of about ten fine hairs and one in posterior angles; a lateral emargination at the mesothoracic suture; anterior and lateral margins edged with deep chestnut; segment deep smoky brown paler in mesothoracic region. Legs large and stout, posterior pair largest, with tibiae very large, longer than femora and edged with pitchy.

Abdomen broadly oval, with broad, flatly rounded tip; posterior angles rather sharp, projecting, with one long and one short hair in segments one to eight; segments nine with several long, and a fringe of fine hairs on the flatly rounded posterior margin, posterior margins of segments one to eight with a row of about twelve to sixteen short hairs; broad continuous, transverse bands of deep smoky brown on all the segments, darkening to pitchy in the lateral portions of segments one to eight and separated transversely by clear sutures except between segments eight and nine.

MALE.—Body, length .91 mm., width .45 mm.; head, length .24 mm., width .45 mm.; slightly paler than the female, with narrower abdominal bands; apical segments of abdomen same shape as in female; genitalia long, very slender and widely separated with tips curving inward slightly.

One male and one female collected on *Tityra personata*, at Juan Vinas, Costa Rica, March, 1902. This species approaches *M. maestum* Kell., but differs greatly in size, shape, and intensity of markings.

***Menopon distinctum* Kell.**

Kellogg, *New Mallophaga* III, p. 126, pl. VIII, fig. 7.

One male and one female of this well-marked species, described from *Myiarchus cinerascens*, were collected from *Myiarchus laurencei nigricapillus*, at Juan Vinas, Costa Rica, March, 1902.

***Menopon stenodesmum* sp. nov., pl. VIII, fig. 2**

FEMALE.—Body, length 1.54 mm., width .60 mm.; clear pale testaceous, with brown and pitchy markings on head and thorax, pitchy brown, lateral bands and clear brown, median transverse bands on abdomen.

Head, length .33 mm., width .45 mm.; front rounded, with a depression at the projecting palpi and another at the ocular emargination, four hairs on front, between palpi; three short ones behind palpi and two longer ones just in front of the ocular emargination; ocular fringe heavy; temples expanding, clear, with four long hairs and a couple of short ones; occipital margin reentering, occiput very slightly convex, with a narrow, pitchy border; eye large, clear, with a black fleck; an elongated, pitchy, ocular blotch; mandibles large, brown; antennal bands run back from frontal margin at palpi, past the bases of the mandibles and along the inner border of the ocular blotches for half their length, then bend abruptly inward and join, forming a backward curving band of deep brown across the middle of the head; a large brown occipital signature; antennae project slightly.

Prothorax almost hexagonal, lateral angles produced, blunt, with two spines; posterior angles very obtuse with one long

hair, lateral margin flatly rounded with four short hairs; lateral regions brownish; a median ventral brown spot, with pitchy lines rimming backward to its posterior angles from the antero-lateral margins. Metathorax much larger than prothorax, clear, bands of brown and pitchy; mesothoracic suture plainly marked; sides, back of suture, straight, diverging, posterior angles rounded, with one hair and three spines; posterior margin flatly rounded with numerous fine hairs; a pitchy band around anterior and lateral margin of mesothorax, broken in median portion, with narrow bands running slightly diagonally backward from the ends to the middle of segment; a ventral brown blotch at the junction of the pro- and mesothorax and a larger wedge-shaped one in the median portion of metathorax; brownish bands run straight backward from margin at mesothoracic suture across the lateral portion of segment and half way across first segment of abdomen, then bend abruptly inward from anterior portion of lateral bands, fading into the median blotch; some brown coxal lines visible, in addition to above. Legs of medium length, clear, with slightly swollen femora and tibiae except the posterior tibiae, which are slender and parallel sided; tibiae brownish at tips.

Abdomen elliptical, clear, with rounded, projecting, posterior angles, furnished in segments one to seven with three spiny bristles, in eighth with five; ninth segment large, clear, rounded posteriorly, with three long hairs on each side and a fringe of shorter ones between; rather narrow, pitchy lateral bands in segments one to eight; posterior margins of segments with a row of fine hairs; median transverse bands as follows: a crescent-shaped one open behind, extending across portions of first and second segments; narrow, straight bands, separated by wide, clear sutures, on segments three to six; and a large, somewhat quadrilateral blotch extending from posterior portion of sixth into the anterior portion of the ninth.

One female and one male collected on *Empidonax atriceps*, on the volcano Irazu, April, 1902, and one female on *Tanagra palmerum melanoptera*, Juan Vinas, Costa Rica, March, 1902.

This form resembles *Col. quadrimaculatum* Car. more than



any other, but is distinguished from that species by the larger size, slenderer posterior femora and tibiae, and darker, narrower lateral bands of abdomen.

**Menopon thoracicum** Gieb., pl. VII, fig, 3

FEMALE.—Body, length 1.4 mm., width .54 mm.; pale fulvous, with narrow, dusky, occipital margin; two blackish ocular flecks; fuscus markings on head and thorax and deep fuscus lateral bands on abdomen.

Head, length .28 mm., width .40 mm.; front rounded, with four short hairs between the projecting palpi and two longer ones in front of the ocular emargination; the emargination distinct, rather shallow, and with ocular fringe; temples moderately expanded, rounded, with four long, slightly pustulated, hairs; occipital margin concave, transverse in center, with two short marginal hairs, and the whole narrowly margined with blackish; a large, faint, occipital signature, with pale bands curving from its anterior corners to the base of the mandibles, which are small, with dark points; ocular bands indistinct, filling the ocular depression, with a black fleck in the center and another on the large clear eye; a brown spot on the margin just in front of the palpi.

Prothorax with slightly produced, blunt anterior angles, bearing three spines, the posterior angles bear one long hair, and the flatly rounded posterior margin four hairs; the chitin bars quite distinct, in the form of slightly flattened semicircles in the region of the anterior angles, a pale transverse line; metathorax with quite a prominent suture setting off the mesothorax, which has an angulated posterior margin and heavy bands on the anterior angles; sides of metathorax straight, widely diverging, and with narrow marginal bands; posterior angles obtuse, dusky, and with one long hair and three spines; posterior margin flatly rounded, with a complete row of hairs; pale brown coxal bands showing through; legs concolorous with body, bearing a few short hairs and with indistinct marginal markings on tibiae.

Abdomen rather large, elliptical, lateral angles serrate, armed with one long hair and several short bristles; posterior margins

of segments with a row of longish, slender hairs; ninth segment large, rounded posteriorly, with two long hairs on each side and a double fringe of very fine hairs on the tip; lateral bands broad, deep, smoky brownish, ending with the eighth segment; very dim, brownish, transverse bands on segments three to eight, separated from lateral bands by a clear place, and from each other by clear sutures; ninth segment dusky in lateral portion, tip clear.

MALE.—Body, length 1.00 mm., width .37 mm.; head, length .28 mm., width .37 mm., the head of the male being but slightly different from the female, while the abdomen is much smaller and slightly darker in color; genital hooks large but simple, resembling more the common form of the *Colpocephali*.

Numerous specimens of a *Menopon* were collected from *Catharus gracilirostris*, *Chlorophonia callophrys*, and *Piranga bidentata sanguinolenta* on the volcano Irazu, Costa Rica, April, 1902. These specimens can be referred, without doubt, to *thoracicum*. Giebel's description is, for the most part, quite comprehensive, and every point which he mentions agrees with this form. A detailed description, together with plate, is given in order to thoroughly establish the species.

***Menopon thoracicum* var. *majus* var. nov.**

The female measures: length 1.72 mm., width .73 mm.; head, length .38 mm., width .56 mm.

One female was collected from *Merula grayi* and one female from *Tanagra cana*, at Juan Vinas, Costa Rica, March, 1902, which agree very closely with the species, except that they are paler and much larger.

***Menopon thoracicum*, var. *fuscum* var. nov.**

This variety measures practically the same as the species, the variation being the pale brown color of the entire body, instead of light golden, with markings of head and thorax and abdomen a deep clear brown; in the species the transverse bands of the abdomen are very faint or wanting, while here they are very noticeable, being pale on segments one and two but darkening backward and almost uniting on the last four segments to form

a continuous, brownish patch filling almost the entire space between the lateral bands, and broken by only very faint pale transverse lines at the sutures.

Numerous specimens collected on *Ramphocelus passerinii*, Juan Vinas, Costa Rica, March, 1902.

*Menopon difficile* sp. nov., pl. VIII, fig. 1

FEMALE.—Body, length 1.86 mm., width .70 mm.; clear smoky brown, with broad, slightly darker transverse abdominal bands; narrow, pitchy, thoracic, lateral abdominal and ocular bands.

Head, length .32 mm., width .53 mm.; lunate, with deeply concave occipital border and small ocular emarginations; palpi projecting by the apical joint and antennae concealed; front bare; three long and two very fine hairs in front of the ocular emargination; ocular fringe meager; temples flattened and rounded with three long and two shorter hairs; occipital margin with a narrow blackish border and six slender hairs; mandibles small, with darkened tips; a faint submarginal band encircling front of head beyond ocular emargination with a branch joining the anterior portion of the heavy, blackish, ocular bands; a large quadrilateral occipital spot with curving bands connecting its anterior angles with the bases of the mandibles; eye large, rounded, with a black fleck.

Prothorax broad, pentagonal, with broadly rounded lateral angles, furnished with two spines; whole front from lateral angles forward flatly convex; sides almost straight, converging, with two long hairs and a spine; posterior angles obtuse, with one long hair; posterior margin truncate with six short hairs; whole segment deep smoky brown, with pitchy diagonal coxal lines, and brown transverse chitin bands; a median, ventral brown blotch. Metathorax scarcely larger than prothorax, with sides straight and broadly diverging; a slight lateral constriction at the mesothoracic suture; posterior angles acute, with one hair and one spine; posterior margin flatly rounded, with about sixteen short hairs; anterior angles with a short pitchy band and curving pitchy meso-coxal bands; dark brown meta-coxal bands, curving backward from mesothoracic sutures, across lateral por-

tion of segment, and extending into first abdominal segment; whole segment deep smoky brown. Legs stout, with swollen femora and rather long tibiae and tarsi, concolorous with body, with some short hairs.

Abdomen large, subelliptical, with one hair and several spines in segments one to eight; ninth segment rounded, with a fringe of hairs in the median portion; posterior margin of segments with a row of fine hairs; narrow, pitchy, lateral bands, broken at the angles; heavy continuous transverse bands of deep smoky brown, separated by clearer sutures on segments one to eight; ninth segment clear, with a brown posterior band and a brownish spot in lateral portions.

MALE.—Body, length 1.52 mm., width .57 mm.; head, length .29 mm., width .49 mm.; very similar to female.

Numerous males and females collected on *Buarremon brunneinuchus*, on the volcano Irazu, Costa Rica, February, 1902. This species resembles, in a general way, Piaget's *M. extraneum*, but differs greatly in markings of thorax, size of legs, and other details.

***Menopon palloris* sp. nov., pl. VIII, fig. 3**

FEMALE.—Body, length 1.54 mm., width .53 mm.; pale, clear golden, with a slight smoky tinge; no conspicuous markings, temples bluntly angulated anteriorly and very short, abdomen very hairy.

Head, length .34 mm., width .50 mm.; front broad, flatly rounded, with four short hairs; sides sinuate, slightly diverging, with two long and two short hairs; anterior margin of temples almost transverse; a prominent ocular fringe, temples with anterior and posterior angles (similar to *Nitzschia*) bluntly rounded, and four long pustulated hairs along the lateral margins; occipital margin concave, occiput slightly convex, with two short hairs; a pale ocular blotch and a black fleck; mandibles small, chestnut at tips; a pale band over palpi, which project slightly; a narrow, brown, occipital margin.

Prothorax hexagonal, lateral angles slightly produced, bluntly rounded, with three spines; anterior, antero- and postero-lateral

margins concave; posterior margin flatly rounded, with six hairs; one faint coxal band visible on each side. Metathorax larger than prothorax, with almost straight diverging sides and very flatly convex posterior margin, set with a row of fine hairs; mesothoracic suture plainly visible; posterior angles with a long hair and a spine; a pale, lateral, marginal band, interrupted at the mesothoracic suture. Legs long and stout, with swollen femora and tibiae, but short tarsi; a few short hairs on margin.

Abdomen subclavate, with lateral margins of segments convex, and posterior angles projecting, with one long hair and several stout bristles in segments one to seven; eighth with two long hairs and two bristles, and two long hairs on posterior margin; ninth evenly rounded at tip, with two long hairs on each side and a few short bristles; posterior margins of segments with a series of fine short hairs; two other transverse rows of very fine short hairs across segments three to seven and a single row across two and eight; whole abdomen a uniform, translucent golden, with a slight tawny tinge.

The male is slightly smaller, with abdomen somewhat constricted posteriorly.

A single male and female collected on *Stelgidopteryx ruficollis uropygialis*, at Juan Vinas, Costa Rica, March, 1902. Of the type of *M. rusticum* Piag. and *dissimile* Kell., but differs in the shape of the head, and the markings of thorax and abdomen.

**Menopon laticorpus** sp. nov., pl. VII, fig. 5

FEMALE.—Body, length 1.40 mm., width .70 mm.; clear brown, with numerous markings and bands of deep smoky brown; abdomen very large and broad, oval; head broad and very short.

Head, length .27 mm., width .58 mm.; front flatly rounded, with rather prominent, though not deep, ocular emarginations; two rather long hairs in front; labial palpi very long and stout, projecting by fourth and part of third segments; two short hairs and one long one just back of the palpi; two short hairs pointing backward from front of ocular emargination; ocular fringe very sparse; temples short, produced laterally, and evenly rounded with two long pustulated hairs and several shorter ones,

occipital margin concave, with four hairs, and a narrow, marginal, pitchy border; a pitchy brown submarginal band almost entirely around the front of the head; mandible small, pointed; two broad brown bands starting from the frontal band at the palpi, extend backward past the bases of the mandibles, around the inside of the pitchy ocular blotches, and backward to the occipital margin, their posterior portions spreading out laterally along the temple; lateral portion of temples clear; region outside of the pitchy, curving, ocular blotches, deep brown; a large black ocular fleck, nearly obscuring the large clear eye; a large deep brown blotch with a clear circular center nearly fills the median occipital region.

Prothorax large, with lateral angles produced and broadly rounded, with two spines; whole margin posterior to lateral angles evenly rounded, with five long hairs on each side; lateral wings deep clear brown; a pitchy band runs inward from lateral angles for a short distance along the antero-lateral margin, then curves backward nearly across the segment; narrow pitchy bands run diagonally backward from the anterior angles to the median portion of segment; a narrow, sinuate, transverse band; a triangular, median brown blotch. Metathorax short, broad, with nearly straight, widely diverging sides, and flatly rounded posterior margin, set with numerous short hairs; posterior angles with two longish hairs; pitchy bands around anterior angles, curving backward across segment; heavier pitchy bands running diagonally backward and inward, from anterior angles to middle of segment; narrower pitchy bands curving backward and inward from lateral margins, across the segment as far as the middle of segment two of abdomen; a deep smoky brown band across posterior portion of segment. Legs long and stout, with swollen femora, and tibiae slightly enlarged at tips, concolorous with body, and furnished with numerous short marginal hairs.

Abdomen very large, a perfect oval, with lateral, posterior angles acute, but scarcely projecting, and furnished with one long hair and a bristle in segments one to eight; ninth large, rounded behind, with three long hairs on each side and a fringe of fine hairs between; posterior margin of segments one to eight with

a row of short hairs; segments one to eight with continuous transverse bands of deep clear brown across the posterior portion of the segments; a large band in ninth, not reaching lateral margins.

MALE.—Body, length .86 mm., width .41 mm.; head, length .25 mm., width .51 mm.; differs little from female except in much smaller abdomen, and slightly smaller head, the legs being nearly as large; genitalia long, very slender, widely separated, with slightly curving tips.

A male and female collected on *Thamnophilus dolius*, at Juan Vinas, Costa Rica, March, 1902. This is of the same general type as *M. maestum* Kell. and *tityrus* sp. nov.

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LIST OF HOSTS WITH PARASITES

Tinamus robustus	Menopon ortalidis sp. nov.
Docophorus sp.? (juv.)	Guara alba
Lipeurus longipes tinami var. nov.	Docophorus bisignatus N.
Lipeurus longisetaceus Piag.	Lipeurus sp.? (juv.)
Ornicholax robustus sp. nov.	Gypagus papa
Kelloggia brevipes sp. nov.	Lipeurus assesor Gieb.
Goniodes minutus sp. nov.	Laemobothrium delogramma sp. nov.
Goniodes laticeps Piag.	Colpocephalum gypagi sp. nov.
Goniodes aberrans sp. nov.	Menopon fasciatum Rud.
Porzana cinereiceps	Accipiter bicolor
Menopon tridens costaricense var. nov.	Nirmus fuscus epustulatus var. nov.
Odontophorus guttatus	Buteo borealis costaricensis
Goniocotes eurysema sp. nov.	Decophorus platystomus N.
Goniodes longipes Piag.	Nirmus curvilineatus Kell. and Kuw.
Odontophorus leucolaemus	Laemobothrium oligothrix sp. nov.
Menopon praecursor meridionale var. nov.	Colpocephalum osborni australe var. nov.
Ortalis cinereiceps	
Lipeurus postemarginatus sp. nov.	

- Buteo abbreviatus*  
*Docophorus platystomus* N.  
*Buteo platypterus*  
*Menopon macrocybe* sp. nov.  
*Leucopternus semiplumbea*  
*Docophorus platystomus umbrosus* var. nov.  
*Micraster guerilla*  
*Docophorus ultimus* sp. nov.  
*Docophorus transversifrons* sp. nov.  
*Piaya cayana mehleri*  
*Nirmus atopus* Kell.  
*Rhamphastos tocard*  
*Docophorus cancellosus* sp. nov.  
*Nirmus rhamphasti* sp. nov.  
*Chloronerpes yucatanensis*  
*Docophorus californiensis* Kell.  
*Melanerpes formicivorus*  
*Docophorus californiensis* Kell.  
*Melanerpes aurifrons hoffmannii*  
*Docophorus californiensis* Kell.  
*Menopon praecursor meridionale* var. nov.  
*Dryobates villosus jardini*  
*Docophorus californiensis* Kell.  
*Trogon caligatus*  
*Nirmus hastiformis* sp. nov.  
*Nyctidromus albicollis*  
*Colpocephalum extraneum* sp. nov.  
*Chaetura griseiventris*  
*Nitzschia bruneri meridionalis* var. nov.  
*Amizillis tzacatl*  
*Physostomum jiminezi* sp. nov.  
*Selasphorus flammula*  
*Physostomum jiminezi* sp. nov.  
*Physostomum doratophorum* sp. nov.  
*Thamnophilus doliatus*  
*Menopon laticorpus* sp. nov.  
*Tityra personata*  
*Menopon tityrus* sp. nov.  
*Manacus candaei*  
*Docophorus bruneri* sp. nov.  
*Muscivora tyrannus*  
*Nirmus parabologybe* sp. nov.  
*Tyrannus melancholicus*  
*Nirmus parabologybe* sp. nov.  
*Myiozetetes cayanensis*  
*Physostomum leptosomum* sp. nov.  
*Myiarchus lawrencei nigricapillus*  
*Nirmus atopus* Kell.  
*Physostomum leptosomum* sp. nov.  
*Menopon distinctum* Kell.  
*Empidonax atriceps*  
*Menopon stenodesmum* sp. nov.  
*Momotus lessoni*  
*Nirmus marginellus* N.



- Psilorhinus mexicanus*  
*Docophorus underwoodii* sp. nov.
- Zarhynchus wagleri*  
*Nirmus francisi* sp. nov.  
*Colpocephalum luroris* sp. nov.  
*Colpocephalum mirabile* sp. nov.
- Junco vulcani*  
*Docophorus communis* N.
- Acanthadops bairdi*  
*Docophorus communis* N.
- Chlorophonia callophrys*  
*Docophorus communis* N.  
*Menopon thoracicum* Gieb.
- Calospiza guttata chrysochrys*  
*Docophorus communis* N.
- Tanagra cana*  
*Physostomum angulatum* Kell.  
*Physostomum australe* Kell.  
*Physostomum subangulatum* sp. nov.  
*Menopon thoracicum majus* var. nov.
- Tanagra palmarum melanoptera*  
*Menopon stenodesmum* sp. nov.
- Piranga bidentata sanguinolenta*  
*Nirmus melanacocus* sp. nov.  
*Menopon thoracicum* Gieb.
- Ramphocelus passerini*  
*Menopon thoracicum fuscum* var. nov.
- Pseliophorus tibialis*  
*Docophorus communis* N.
- Pezopetes capitalis*  
*Docophorus communis* N.  
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- Buarremon brunneinuchus*  
*Menopon difficile* sp. nov.
- Stelgidopteryx rubicollis uropygialis*  
*Nirmus atopus* Kell.  
*Menopon pallidoris* sp. nov.
- Ptiliogonys caudatus*  
*Docophorus communis* N.  
*Nirmus brachythorax ptiliogonys* var. nov.
- Helminthophila peregrina*  
*Physostomum picturatum* Car.
- Compsothlypis pitiayumi*  
*Docophorus communis* N.  
*Physostomum pallens* Kell.
- Wilsonia pusilla*  
*Docophorus communis* N.
- Catharus gracilirostris*  
*Menopon thoracicum* Gieb.
- Merula grayi*  
*Nirmus caliginus* sp. nov.  
*Menopon thoracicum majus* var. nov.
- Merula nigrescens*  
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3. *Docophorus underwoodii* sp. nov.
4. *Docophorus cancellosus* sp. nov.

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2. *Nirmus hastiformis* sp. nov., female.
3. *Nirmus parabologybe* sp. nov., female.
4. *Nirmus marginellus* sp. nov., female.
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5. *Lipeurus assesor* Giebel, female.
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2. *Goniodes minutus*, head of female.
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5. *Goniodes aberrans*, head of female.
6. *Laemobothrium delogramma* sp. nov., female.
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## PLATE V

1. *Physostomum jiminezi* sp. nov., female.
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2. *Menopon macrocybe* sp. nov., female.
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PLATE IX

- 1-1c. *Ornichelax robustus* sp. nov.
- 2-2c. *Kelloggia brevipes* sp. nov.

PLATE I

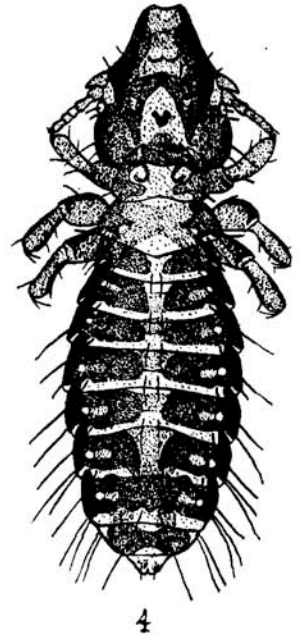
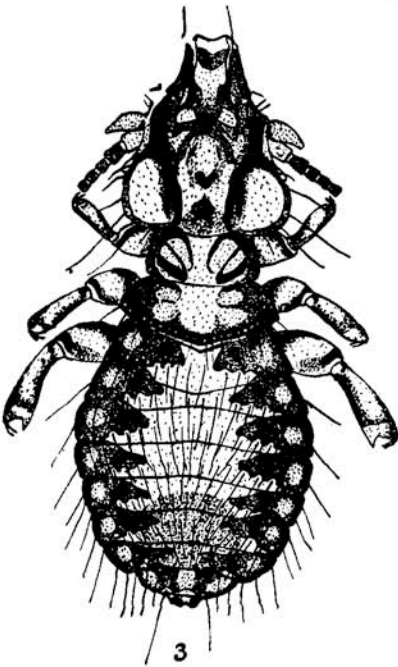
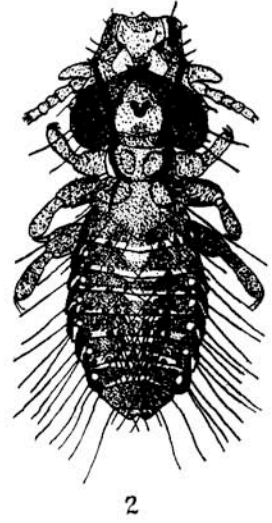
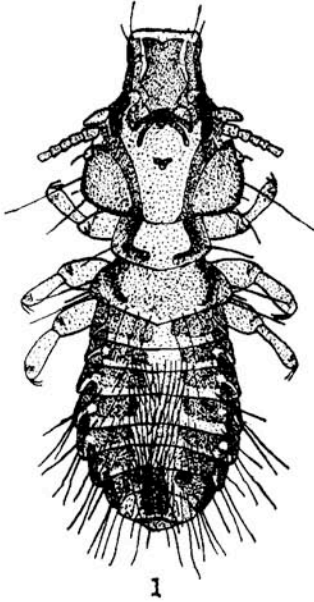


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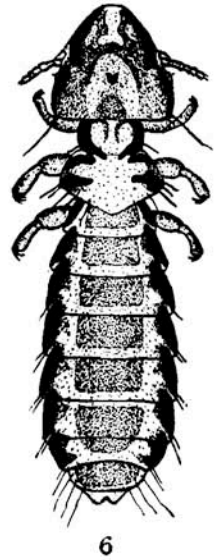
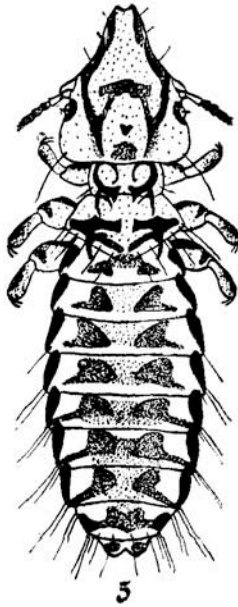
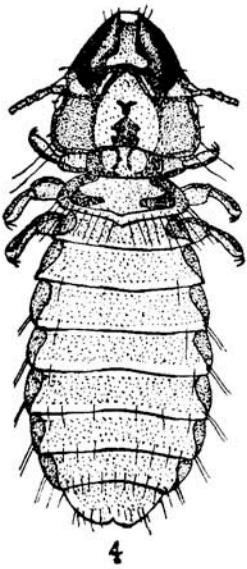
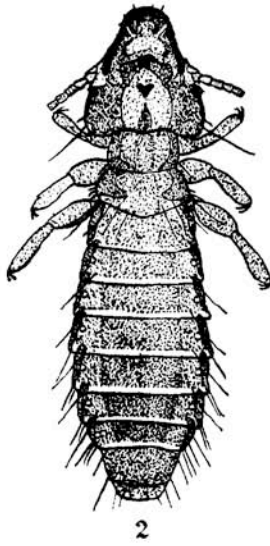
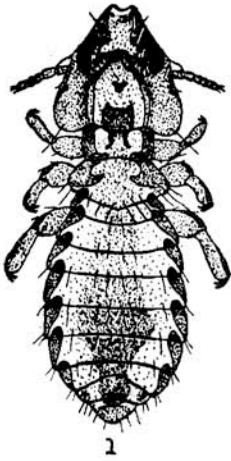


PLATE III

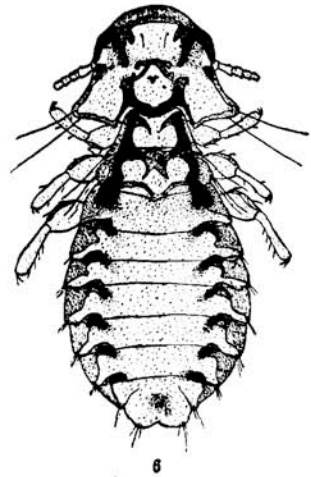
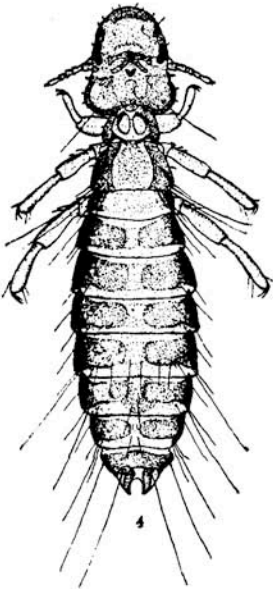
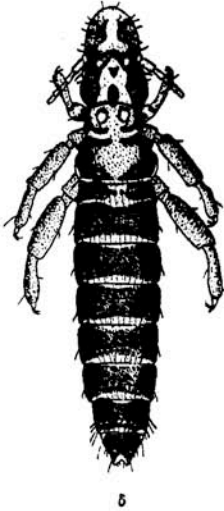
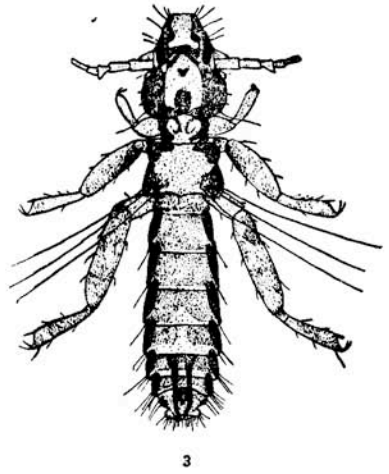
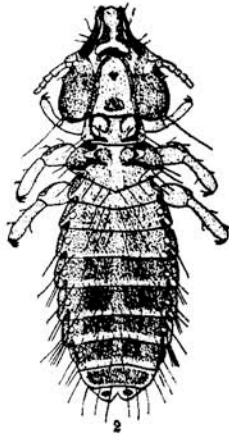
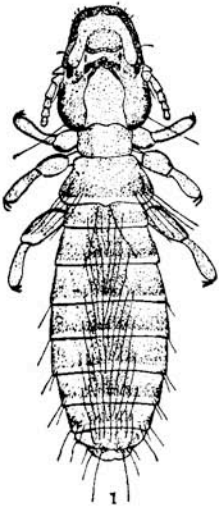


PLATE IV

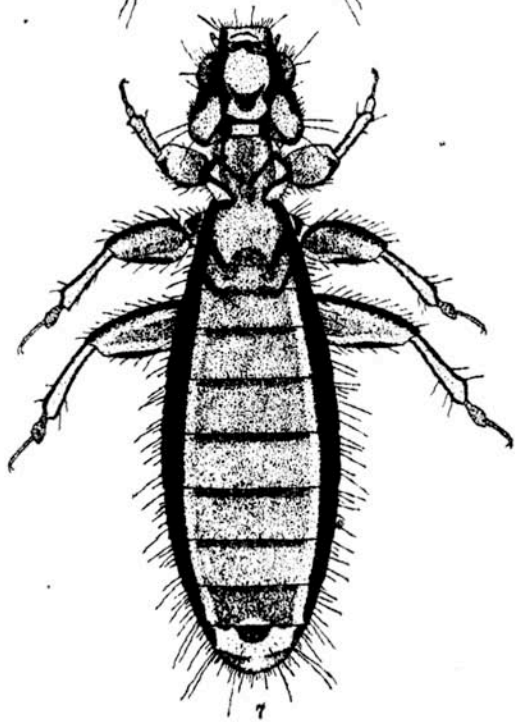
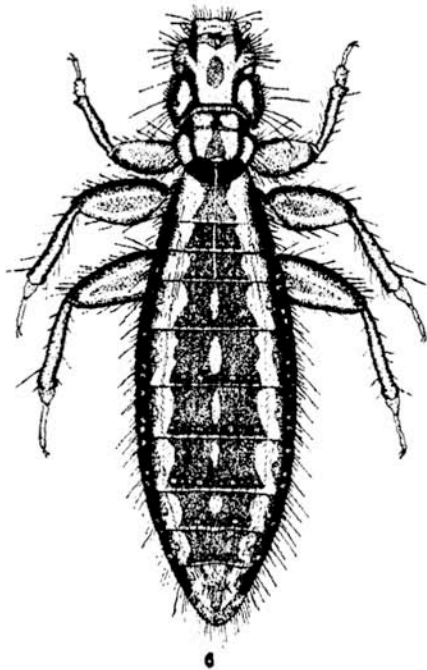
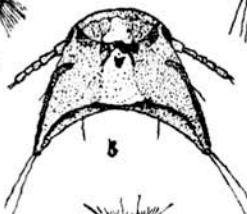
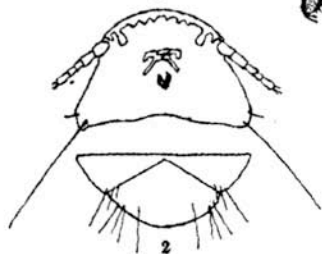
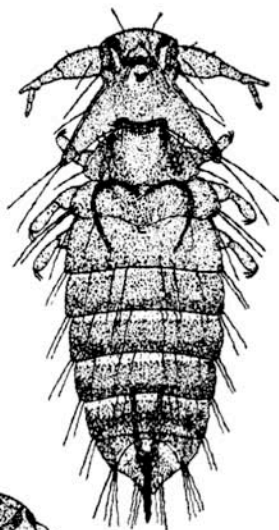
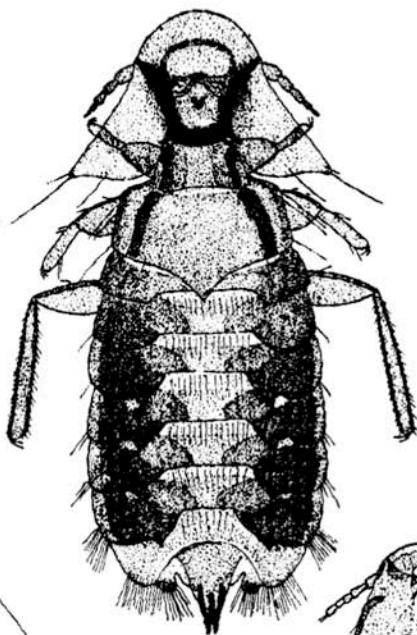
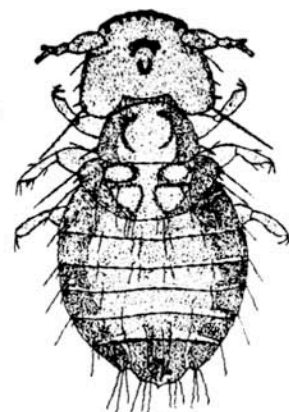
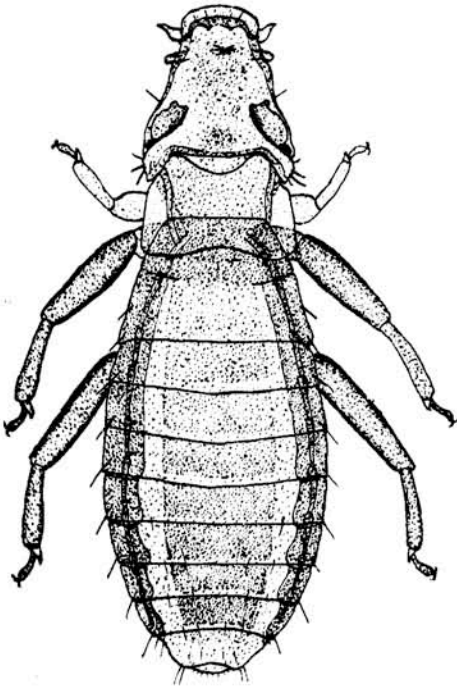
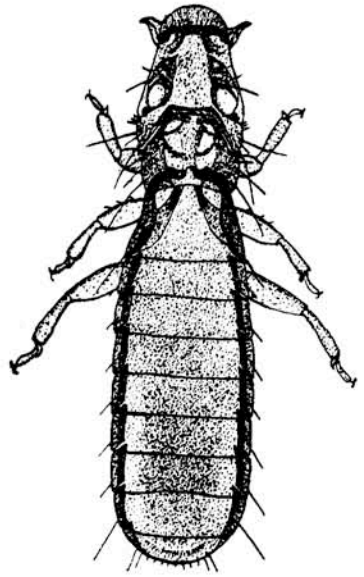




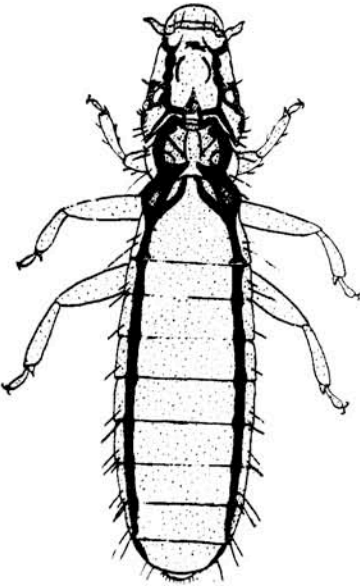
PLATE V



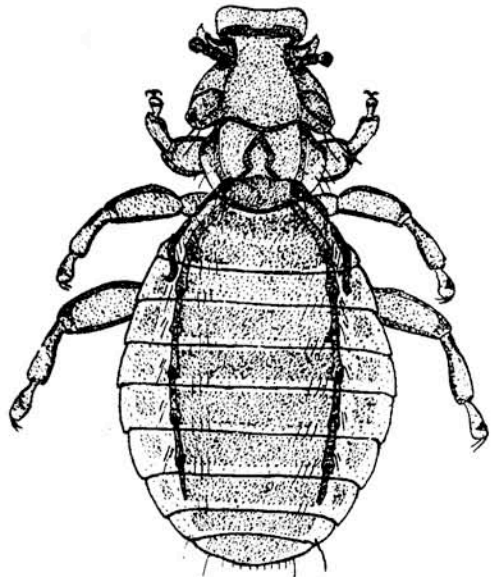
1



2



3



4

PLATE VI

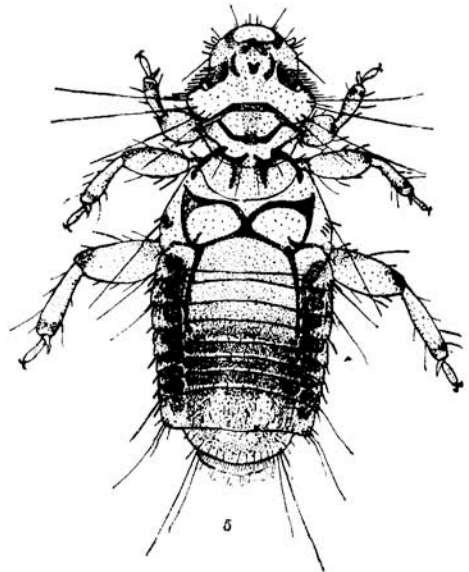
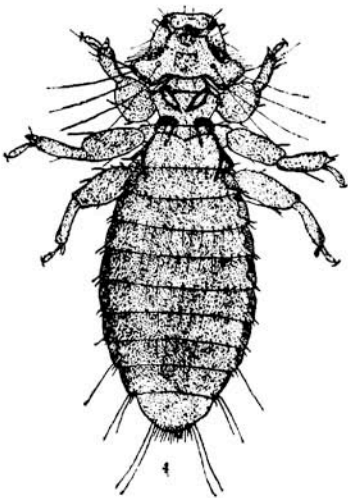
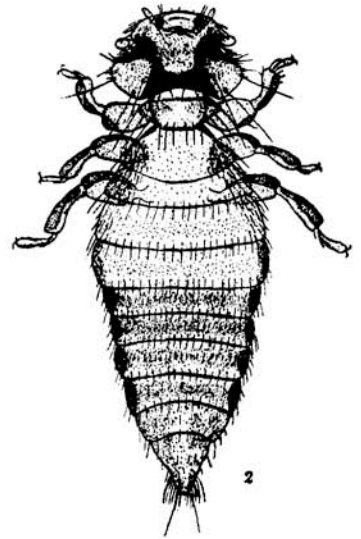
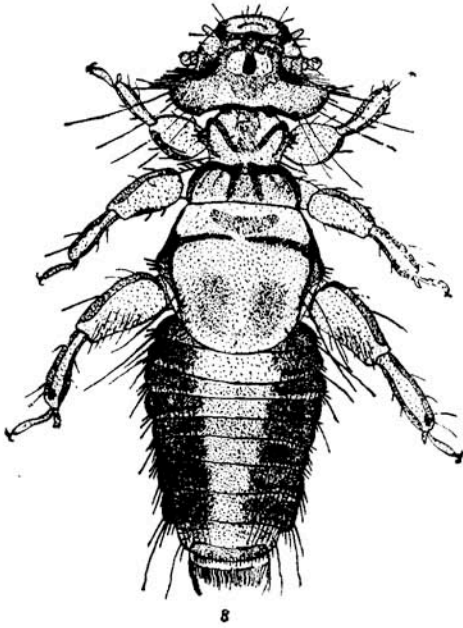


PLATE VII

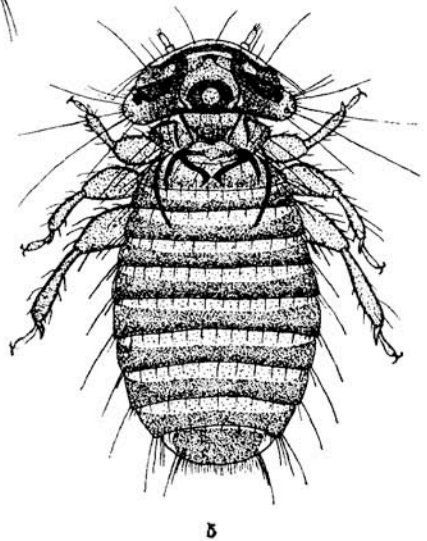
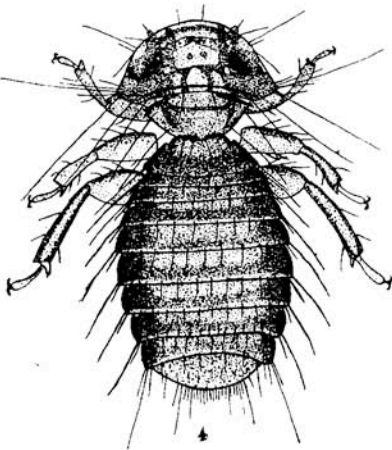
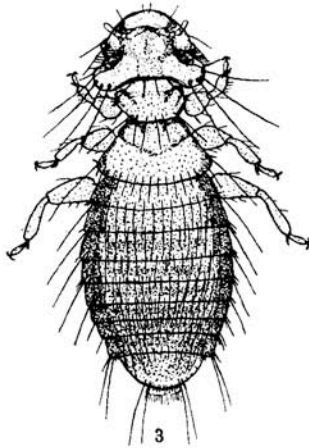
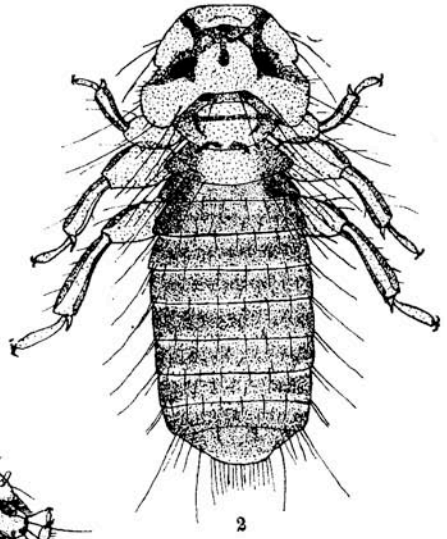
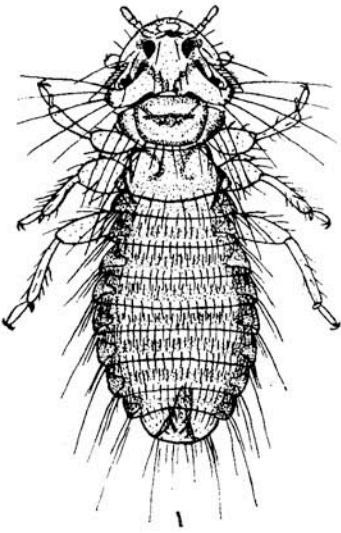


PLATE VIII

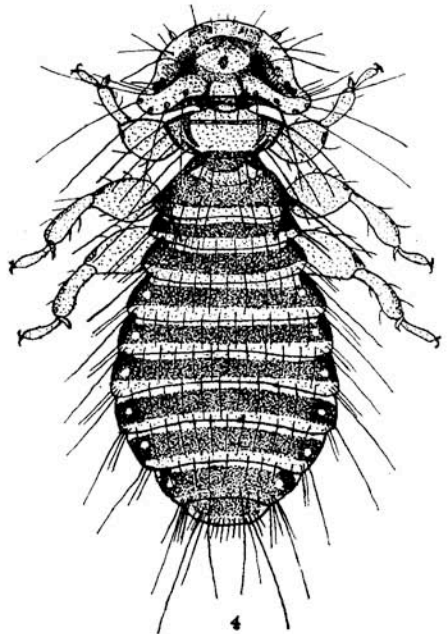
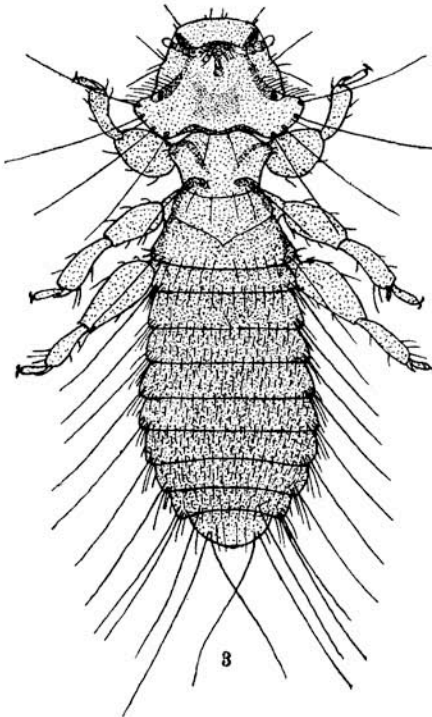
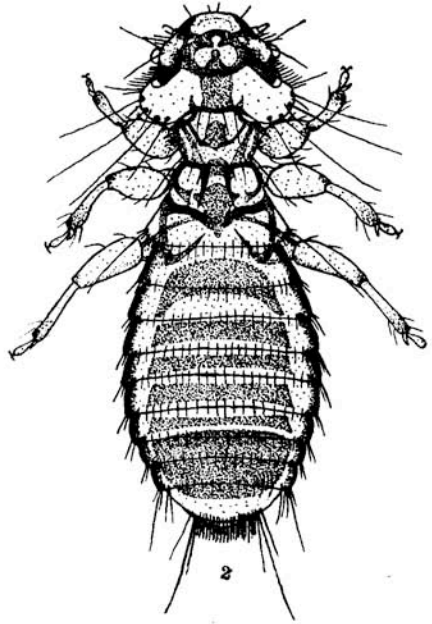
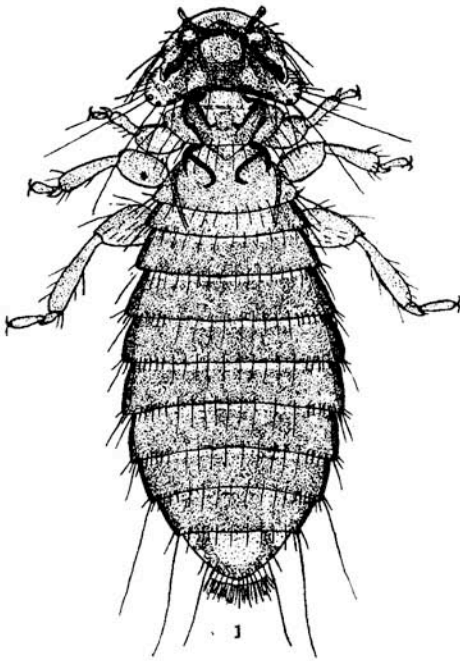
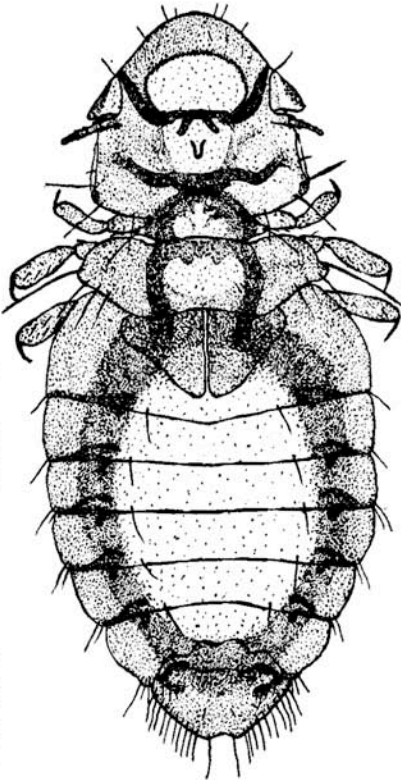
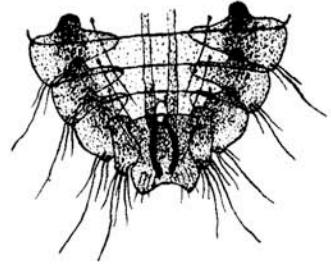


PLATE IX

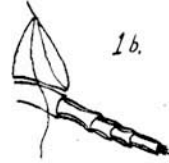
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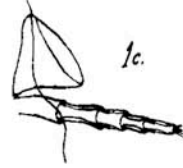
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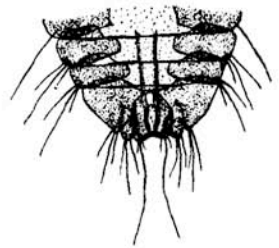
1b.



1c.



2a.



2b.



2c.



2

