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Occasional Papers

OF THE

CALIFORNIA

ACADEMY OF SCIENCES.

VI.

SAN FRANCISCO,

1899.

PUBLICATION COMMITTEE.

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NEW MALLOPHAGA,
III.

Comprising

MALLOPHAGA FROM BIRDS OF PANAMA, BAJA CALIFORNIA
AND ALASKA,

BY

VERNON L. KELLOGG,

Professor of Entomology, Leland Stanford Junior University

MALLOPHAGA FROM BIRDS OF CALIFORNIA,

BY

VERNON L. KELLOGG AND BERTHA L. CHAPMAN.

THE ANATOMY OF THE MALLOPHAGA.

BY

ROBERT E. SNODGRASS,

Assistant in Entomology, Leland Stanford Junior University.

Issued February 28, 1899.

SAN FRANCISCO,
CALIFORNIA ACADEMY OF SCIENCES.

1899

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AUTHOR'S PREFACE.

The papers presented herewith constitute the third contribution from the Entomological Laboratory of this University (Stanford) to the knowledge of the North American Mallophaga. The two previous papers are respectively, Kellogg, New Mallophaga, I, 1896¹ and Kellogg, New Mallophaga, II, 1896¹ and contain in addition to descriptions of species, an introduction to the study of the group, comprising keys to genera, terminology, bibliography, etc.

Mr. Snodgrass's paper presents the results of the first serious attempt to study comparatively the anatomy of these insects. There is yet needed to make the Mallophaga fairly known a study of their embryonic and post-embryonic life-history. It is hoped that this study can soon be undertaken.

Types of the new species described will be placed in the collections of this University, in the collections of the California Academy of Sciences, and in the collections of the University of Kansas. The authors have to express their obligations for services kindly rendered in connection with the preparation of this paper to Mr. Leverett M. Loomis, Curator of the Department of Ornithology, California Academy of Sciences, to Messrs. R. C. McGregor, J. F. Abbott, Cloudsley Rutter, A. W. Greeley, W. H. Osgood, J. C. Brown, R. C. McLain, R. W. Doane and E. M. Ehrhorn, to Prof. Walter E. Miller and to Miss Mary H. Wellman, artist.

V. L. K.

STANFORD UNIVERSITY,
April 15, 1897.

¹ Proc. Cal. Acad. Sci., 2nd Ser., Vol. VI.

**MALLOPHAGA FROM BIRDS OF PANAMA, BAJA
CALIFORNIA, AND ALASKA.**

(With Plates I-IV.)

BY VERNON L. KELLOGG.

CONTENTS.

Introduction.

Descriptions of New Species, and Identifications of Old Species.

Docophorus.

Nirmus.

Lipeurus.

Goniodes.

Eurymetopus.

Trinoton.

Colpocephalum.

Menopon.

Physostomum.

List of Hosts, with Parasites.

INTRODUCTION.

The Mallophaga described and identified in this paper were collected by Mr. R. C. McGregor (from the Panama birds), by Mr. J. F. Abbott (from the Baja Californian birds) and by Messrs. Cloudsley Rutter and A. W. Greeley (from the Alaskan birds), all these collectors being students of Stanford University. The birds in each case were obtained personally by the collector, and the Mallophaga taken from the freshly killed specimens or newly made skins. The determinations of the Panama birds were made by Mr. Robert Ridgway, curator of birds, U. S. National Museum; the determinations of the Baja Californian birds by Mr. W. W. Price, student of Stanford University, and the determinations of the Alaskan birds by the collectors.

The sequence of genera in the following paper does not indicate the author's views with regard to the natural relationships of these genera, nor even with regard to the phyletic rank of the suborders. The Amblycerous genera, coming last in the present arrangement, are undoubtedly the more generalized of the two subordinal groups. The sequence is that adopted in the European monographs and followed by me in my two previous papers (New Mallophaga, I, 1896, and New Mallophaga, II, 1896), and is retained for the sake of uniformity. The sequence of the species of each genus is determined by the host, the sequence of hosts being that adopted in the Check-List of North American Birds (2nd Edition, 1895), published by the American Ornithologists' Union. The names of the hosts are those used in the Check-List.

Wherever a species of Mallophaga is met, which has been previously identified by me on an American host, reference is made only to this previous identification, where the synonymy, European hosts, and figure and measurements of the species are given.

Docophorus.

Docophorus lari Denny. (See Kellogg, New Mallophaga, I, 1896, p. 98, pl. iv, fig. 4.)

Specimens from *Larus* sp. (Baja California) and from *Larus glaucescens* (North Pacific Ocean, off Alaska). Taken previously by me from several species of *Larus* (Bay of Monterey, California.)

Docophorus icterodes Nitzsch. (See Kellogg, New Mallophaga, I, 1896, p. 96, pl. iv, fig. 1).

Specimens from the Red-crested Merganser, *Merganser serrator* (Kodiak Island, Alaska). Previously taken by me from same host species and from seven other duck species (Kansas and California).

Docophorus cordiceps Giebel. (Plate I, fig. 2).

Insecta Epizoa, 1874, p. 103.

Docophorus glareole Giebel, *Zeitschr. f. ges. Naturwiss.*, 1866, vol. xxviii, p. 312.

Docophorus nitzschia Giebel, *Zeitschr. f. ges. Naturwiss.*, 1866, vol. xxviii, p. 312.

Docophorus mollis, Nitzsch (ed. Giebel), *Zeitschr. f. ges. Naturwiss.*, 1861, vol. xviii, p. 312.

Docophorus frater Giebel, *Insecta Epizoa*, 1874, p. 103.

Docophorus cordiceps Giebel, Piaget, *Les Pediculines*, 1880, p. 80 and p. 664, pl. vi, fig. 2; Picaglia, *Pediculini dell' istituto anat.-zool. d. R. Univ. d. Modena*, 1885, reprint, p. 11.

A male, a female and a young specimen which may be referred to this species from *Tringa macularia* (Panama), and a male from *Tringa* sp. (Baja California). It is probable that Denny's *D. cephalus* (Monograph. Anoplur. Brit., p. 81, pl. ii, fig. 8; and Grube, *Middendorff's Reise*, 1851, p. 470) is this species.

The species may be recognized by its general dark coloration, broad head, short clypeus, and prominent and characteristic genitalia. I figure the male; Piaget has figured the female. The measurements of my specimens are as follows: male, body, length 1.6 mm., width .72 mm.; head, length .56 mm., width .62 mm.; female, body, length 1.65 mm., width .87 mm.; head, length .62 mm., width .75 mm.

Docophorus latifrons Nitzsch. (Plate I, figs. 5 and 8).

Germer's Mag. Entomol., 1818, vol. iii, p. 290.

Pediculus cuculi Fabricius, *Syst. Ent.*, 1775, p. 807.

Pediculus fasciatus Scopoli, Entomol. Carniol, 1763, p. 383.
Docophorus latifrons N., Denny, Monograph. Anoplur. Brit., 1842,
 p. 97, pl. i, fig. 4; Giebel, Insecta Epizoa, 1874, p. 93; Piaget,
 Les Pediculines, 1880, p. 36, pl. ii, fig. 7.

Numerous specimens from a California Cuckoo, *Coccyzus americanus occidentalis* (Baja California), which are referable to this long-known *Docophorus* of the cuckoos, but on account of the markedly larger size, color differences, and other minor differences must be given a varietal name.

Var. *occidentalis* Kellogg. Male, body, length 2.06 mm., width .89 mm.; head, length .75 mm., width .75 mm. Female, body, length 2.5 mm., width 1.12 mm.; head, length .84 mm., width .85 mm. Piaget gives the following dimensions for *latifrons*: female, body, length 1.9 mm., width, .85 mm.; head, length .65 mm., width .6 mm. The male *latifrons* is 1.6 mm. long. My specimens have two long hairs on the temporal margins instead of one as described for *latifrons*, and have a distinct hair, not referred to in the descriptions of *latifrons*, in the posterior angles of the prothorax. The blotches on the ventral aspect of the abdomen of the males are with my specimens not oval, but transversely elongate, differing markedly from those of the female. The head and thorax of var. *occidentalis* are reddish brown, the ground color of the abdomen whitish, and the blotches blackish brown.

Docophorus californiensis Kellogg.

New Mallophaga, II, 1896, p. 483, pl. lxvi, fig. 6.

Eleven specimens from a Narrow-fronted Woodpecker, *Melanerpes formicivorus angustifrons* (Baja California). Type specimens taken from the Californian Woodpecker, *Melanerpes formicivorus bairdi* (Palo Alto, California).

Docophorus rufus n. sp. (Plate I, figs. 6 and 9).

A dozen specimens from the Ash-throated Flycatcher, *Myiarchus cinerascens nuttingi* (Baja California). A member, probably, of the group *femorati* of which *communis* is the chief representative. I have not found on my specimens the characteristic longish hair rising vertically from the dorsal surface of the anterior angles of the clypeus, but the broad clypeus, signature, genital blotches, and pustulated lateral abdominal blotches are of the *femorati* type. The species differs distinctly from *communis* in color, in the peculiar anterior convexity of the clypeus, in the extent of the transverse abdominal blotches, in the presence of transverse median blotches on the ventral aspect of the abdomen, and in the character of the genital blotches.

Description of the male. Body, length 1.56 mm., width .31 mm.; reddish brown, lighter on head and thorax, because the darker lateral abdominal blotches nearly cover the abdomen; broad headed; with ventral median transverse blotches on abdomen.

Head, length .5 mm., width .48 mm.; forehead broad, with expanded frontal uncolored part of clypeus flatly convex, with a shallow, median, curving emargination; no hairs on this frontal margin; sides of forehead with a pair of short hairs and a shorter single one in front of and near the trabeculae; the trabeculae very large, acute; antennae when projected backward not quite reaching the occipital margin; the inconspicuous, slightly pendulous eyes with a hair, and two hairs on the flatly convex temporal margin; occipital margin nearly straight, bare; color, reddish brown; signature large, broad, anterior margin almost straight, the dark, sharp posterior point projecting beyond the mandibles;

antennal bands interrupted distinctly at the suture; occipital bands distinct, divergent, connected at base; ocular bands indistinct; trabeculae weakly colored at base, uncolored distally; antennae colored.

Prothorax quadrangular (as exposed), with a single hair in the posterior angles; posterior margin flatly convex; median part paler; lateral regions darker, and an indistinct posterior border. Metathorax rather short, posterior margin angulated, with a series of pustulated hairs; colored like the prothorax, paler in middle and with fairly distinct lateral borders. Legs concolorous with ground color of thorax, with small, darker, inconspicuous marginal markings. Sternal markings consisting of intercoxal lines and a very small median double blotch on prothorax. (Metathorax obscure).

Abdomen short, just as long as head and thorax; two to three long hairs in posterior angles of segments and numerous pustulated and other long hairs on dorsal surface; narrow, blackish, lateral bands; large dark brown lateral blotch, with clear stigmatal spots and about five pustulations along posterior margin, and leaving only a narrow median part of the abdomen uncovered; on segment 8 a complete transverse band; segment 9 rounded behind, with a narrow blackish posterior border, with a few longish hairs; genitalia showing through in segments 6-9; on ventral surface of segments 1-8 a large transverse median blotch reaching almost to the lateral margins.

Female. Body, length 1.94 mm., width .8 mm.; head, length .6 mm., width .56 mm.; the transverse blotches of abdomen but little smaller than those of male; segment 9 uncolored, with small brown lateral blotches, the posterior margin distinctly angularly emarginated;

ventral abdominal blotches smaller than those of male and not reaching so far laterally, those of posterior segments forming a genital blotch with broad, curving anterior part, narrower median part, and separate small lateral reniform parts.

Docophorus communis Nitzsch. (See Kellogg, *New Mallophaga*, II, 1896, p. 486, pl. lxvi, fig. 7).

Several specimens from the Saint Lucas Cardinal, *Cardinalis cardinalis igneus* (Baja California). Taken previously by me from 16 species of passerine birds (Kansas and California).

Docophorus panamensis n. sp. (Plate I, fig. 1).

From a tanagrine bird, *Phaenicothraupis fuscicauda* (Panama). A *Nirmus*-like form but with distinctly long trabeculae. By shape of head and thorax allied to the *angustifrontes* group of the woodpeckers; resembling my *D. jungens* (*New Mallophaga*, II, 1896, p. 481, pl. lxvi, fig. 4) from *Colaptes auratus* (Kansas).

Description of female. Body, length 1.75 mm., width .61 mm.; narrow, Nirmoid, whitish with distinct brown lateral bands on thorax and abdomen, and quadrangular lateral transverse blotches.

Head, length .5 mm., width .5 mm.; triangular, with narrow front, slightly emarginated; three short hairs on each side of the anterior half of the forehead, and three longer hairs and a prickle in front of the trabeculae; the trabeculae prominent, extending beyond the tip of first segment of the antennae; the antennae rather thick, segment 2 longest, with a prominent short spiny hair; eyes rather large, with a prickle; temporal margin

rounding, with one long hair and a few prickles; occipital margin slightly sinuous; forehead whitish with narrow brown antennal bands terminating at the suture; a palely colored broad suture with straight posterior margin and emarginated anterior border; whole hind head light brown with occipital margin very narrowly bordered with blackish brown.

Prothorax quadrangular, posterior angles rounded, with one hair, posterior margin flatly convex; whitish with dark brown lateral borders extending inward along the posterior margin. Metathorax angulated on abdomen, each latero-posterior side with nine long hairs (including the one in the lateral angle); lateral borders unevenly blackish brown; ground color of segment whitish tinged posteriorly with light brown, this posterior coloration interrupted by a median longitudinal whitish line. Legs very pale brown. Sternal markings consisting of distinct intercoxal lines, and faint traces of light brown median blotches.

Abdomen elongate-elliptical; a few longish hairs in posterior angles, and numerous weak long hairs on dorsal surface of segments in transverse series; ground color whitish with distinct, narrow lateral bands, darkest on anterior segments, and light brown, quadrangular, transverse lateral blotches on all segments, the two blotches of segment 8 meeting on the median line; segment 9 feebly emarginate, with no hairs on the posterior margin.

***Docophorus domesticus* Kellogg.**

New Mallophaga, II, 1896, p. 475, pl. lxxv, fig. 4.

A female and an immature specimen from the Black Martin, *Progne subis hesperus* (Baja California). De-

scribed from a Purple Martin, *Progne subis* (Lawrence, Kansas).

***Docophorus laticeps* Giebel. (Plate I, figs. 4 and 7).**

Insecta Epizoa, 1874, p. 88.

Philopterus cineli Gervais, Hist. nat. d. Insectes aptères, 1847, p. 336.

Docophorus cineli Denny. Monograph. Anoplur. Brit., 1842, p. 85, pl. v, fig. 8.

Docophorus laticeps Giebel, Piaget, Les Pediculines, 1880, p. 65; Koenig; Ein Beitrag zur Mallophagen-fauna, 1884, p. 3, pl. i, figs. 1-5; pl. ii, figs. 6, 7.

One adult female and two immature specimens from the American Dipper, *Cinclus mexicanus* (Kodiak Island, Alaska), which may be referred to this species, but which constitute a distinct variety characterized by the elongate, slender forehead with emarginated front. The species was found on *Cinclus aquaticus*, the European Dipper.

Var. *americanus* Kellogg. Female, body, length 2.06 mm., width .75 mm.; head, length .6 mm., width .5 mm.; thus being one-third longer than the species dimensions as given by Koenig; head elongate, with narrow tapering forehead; front uncolored, with slight, narrowly rounded emargination; signature long, narrow, with posterior point reaching the mandibles; antennal bands distinct; trabeculae long, slender; abdomen elongate-elliptical, with lateral triangular blotches with stigmatal spots and pustulations as in the species types; also, narrow blackish lateral bands; segment 8 wholly colored; ventral surface of abdomen with transverse median blotches; segment 7 with a narrower median blotch (touching blotch of segment 6) and two small lateral reniform blotches; segment 8 wholly colored or nearly so.

Docophorus rutteri n. sp. (Plate I, fig. 3).

A female and an immature specimen from an Oregon Chickadee, *Parus atri-capillus occidentalis* (Kodiak Island, Alaska). Denny has described two species of *Docophorus* from *Parus*, one, *pallescens* (Monograph. Anoplur. Brit., p. 82, pl. i, fig. 8) from *Parus palustris* and *P. major*, being based on immature specimens, and characterized by an emarginate clypeal front; the other, *pari* (ibid, p. 87, pl. vi, fig. 6) from *Parus caudatus*, *P. ater*, and *P. ceruleus*, being of chestnut ground color, without lateral abdominal blotches and with a subacuminate head, and without series of pustuled hairs along posterior margins of metathorax, in all of which diagnostic characters my specimen differs from *pari*. It agrees with it in hairy abdomen, acute trabeculae, angulated metathorax, and general shape of abdomen.

Description of female. Body, length 2. mm., width .91 mm.; well marked with smoky brown blotches with large conspicuous pustulations, and many long hairs on dorsal aspect of abdomen.

Head, length .53 mm., width .6 mm.; a specially stiff, spiny short hair in each anterior angle of the flatly convex front, a hair before the suture and two before the trabeculae; the trabeculae long, slender, and weakly curving; antennae when projecting backward barely reaching the occipital margin, with annulated segments; eye rather prominent, with a hair; a hair just behind the eye and three more on the rounded temporal angles; occipital margin weakly sinuous, the middle third slightly convex; signature large, distinct, with darker posterior acuminate point projecting beyond the mandibles, surrounded by a nearly uncolored region; antennal bands interrupted, widening at base; occipital bands

distinct, blackish brown, diverging, and with anterior extremities reaching the blackish, distinct, curving, linear ocular blotches; region between the occipital bands pale; temples dark brown.

Prothorax small, short, margins rounding, with one long pustulated hair in posterior angle, another on posterior margin just a little inside of the angles, and four grouped together in the posterior median region of the segment; median region pale to uncolored, darkening laterally until the blackish lateral borders are reached. Metathorax roundly angulated on the abdomen; an unpustulated hair in the lateral angles and ten long hairs on each half of the posterior margin, rising from conspicuous pustulations; median region palest, lateral and posterior regions blackish brown, causing the clear pustulations to be very prominent. Legs smoky brown.

Abdomen oval; lateral angles projecting, with long hairs; dorsal surface of segments with single transverse series of long weak hairs; median region almost uncolored; prominent blackish brown, subtriangular, lateral, transverse blotches, with very conspicuous uncolored stigmatal spots and pustulations; segment 8 wholly colored, dark brown; segment 9 with small triangular lateral brown blotches; shallow, angular emargination behind.

Nirmus.

Nirmus punctatus Nitzsch. (See Kellogg, New Mallophaga, I, 1896, p. 109, pl. vi, figs. 1 and 2.)

Specimens from *Larus* sp. (Baja California). Taken previously by me from several species of *Larus* (Bay of Monterey, California).

Nirmus furvus Nitzsch. (Plate II, fig. 1).

Zeitschr. f. ges. Naturwiss. (ed. Giebel), 1866, vol. xxviii, p. 374.

Nirmus furvus N., Burmeister, Handb. d. Ent., 1832, vol. ii, p. 427; Giebel, Insecta Epizoa, 1874, p. 163, pl. v, figs. 2 and 3; Piaget, Les Pediculines, 1880, p. 169, pl. xiv, fig. 3; Supplement, 1885, p. 25; Osborn, Insects Affecting Domestic Animals, Bull. 5, N. S., Div. of Ent., U. S. Dept. Ag. 1896, p. 225.

A male and a female from the Spotted Sandpiper, *Actitis macularia* (Panama). My specimens do not possess the median longitudinal uncolored line across the first six or seven segments of the abdomen, as described for the types of the species, and besides, are very much darker, and are without distinct lateral transverse blotches on the abdominal segments. They are, too, a distinctly wider and less slender form, the head averaging nearly one-fifth wider in both sexes. However, in the present uncertain status of the species *furvus* (see Piaget, Les Pediculines, p. 170) I refer my specimens to the species, distinguishing them by a varietal name. Piaget's variety *alpha* (Supplement, p. 25) from *Vanellus cayensis* has, like my specimens, no uncolored median abdominal line, but no reference is made to any such characteristic dark chestnut to smoky general coloration of the body, as is shown by my specimens. Osborn's specimen is from *Phalaropus tricolor* (Museum Iowa Agricultural College).

Var. *ravus* Kellogg. Male, body, length 1.18 mm., width .34 mm.; head, length .37 mm., width .28 mm. Female, body, length 1.43 mm., width .37 mm.; head, length .40 mm., width .31 mm. Both sexes dark chestnut-brown to smoky, without median uncolored line on any abdominal segment, and without distinct abdominal blotches.

Nirmus fissus Nitzsch. (Plate II, fig. 2).

Germer's Mag. Entomol., 1818, vol. iii, p. 291.

Nirmus fissus N., Burmeister, Handb. d. Ent., 1835, vol. ii, p. 427; Denny, Monograph. Anoplur. Brit., 1842, p. 148, pl. x, fig. 6; Walekenær, Ins. Apt., 1844, vol. iii, p. 344.

Nirmus bicuspis N., Giebel, Insecta Epizoa, 1874, p. 155, pl. v, figs. 11 and 12; Piaget, Les Pediculines, 1880, p. 184, pl. xv, fig. 7.

Several specimens, including male, female and immature specimens, from *Tringa* sp. (Baja California). My specimens are larger than the types of *bicuspis* and offer distinct though minor differences. I have given them a varietal name.

Var. *major* Kellogg. Measurements. Male, body, length 1.61 mm., width .38 mm.; head, length .3 mm., width .31 mm. Female, body, length 1.87 mm., width .44 mm.; head, length .47 mm., width .33 mm. Differs from types of *fissus* (which were taken from "*Charadrius minor*") by having a hair in the eye, by having four pustulated hairs on each lateral half of the posterior margin of the metathorax instead of three, two being median and two being near the angle; by having the median longitudinal uncolored line of the abdomen limited to the first two segments, and by being markedly larger. Piaget's specimens of *fissus* are: length, male, 1.3 mm. to 1.4 mm.; female, 1.5 mm.

Nirmus fuscus Nitzsch. (See Kellogg, New Mallophaga, II, 1896, p. 499, pl. lxxvii, fig. 7).

Many specimens from a Sparrow Hawk, *Falco sparverius* (Panama), a Lower Californian Sparrow Hawk, *Falco sparverius peninsularis*, a Duck Hawk, *Falco peregrinus anatum*, and a Saint Lucas Redtail, *Buteo borealis lucusanus* (Baja California). Taken previously by me from three species of hawks at Lawrence, Kansas. The

size of these specimens from Panama and Baja Californian birds corresponds with that of the specimens previously taken by me from the Kansas birds, and is fully one-third greater than that recorded for the European specimens. The American specimens are at least varietally distinct from the typical Old World forms. There are variations manifest among the American specimens but I have not enough material yet to attempt to distinguish varieties.

Nirmus splendidus n. sp. (Plate II, figs. 3 and 6).

Males, females and young from a Caracara, *Polyborus cheriway* (Baja California). Species of *Docophorus*, *Lipeurus*, *Menopon*, and *Colpocephalum* have been taken from *Polyborus* by the European authors, but heretofore no *Nirmus*. The new species is unlike any of the *Nirmi* yet described from raptorial birds. It is large and strikingly marked.

Description of the male. Body, length 2.19 mm., width .84 mm.: large, broad-bodied, whitish with prominent lateral transverse brown abdominal blotches; head and thorax almost entirely colored.

Head, length .62 mm., width .6 mm.; forehead broad between trabeculae and narrowly parabolic in front; forehead with four short separated hairs on each side; trabeculae rather large for *Nirmus*, antennae short; eye large, prominent, with a long hair, and with a fine prickle just behind it; temporal margins flatly convex, with two very long hairs; occipital margin straight; whole head strongly colored with exception of a pale, broad, clypeal, sutural line, and a short median longitudinal line leading from it backwards to the mandibles; the antennal bands narrow, and a little darker than

general color of head, running entirely around frontal margin of head, although paler and nearly "interrupted" at the clypeal suture; trabeculae nearly uncolored.

Prothorax short, oblong, with one hair in posterior angles; segment almost wholly colored. Metathorax short, the whole thorax being little more than one-half the length of the head; obtusely angulated on abdomen; posterior margin with a series of long hairs; segment mostly colored, darkest in median region; a broad white posterior border. Sternal markings consisting of inconspicuous intercoxal lines, and a small, indistinct median blotch on metathorax. Legs pale, though tinged with brown, with distinct, dark brown marginal markings.

Abdomen ovate; posterior angles of segments 1 and 2 without hairs, of segment 3 with a single hair, and of succeeding segments with two hairs; dorsal surface with numerous longish hairs; whitish with distinct lateral transverse blotches, each, with a clear stigmatal spot and some pustulations on segments 1-7; segment 8 with a curving, continuous brown transverse blotch; segment 9 rounded behind, with numerous longish hairs; uncolored except where the chitinized genitalia show through. Ventral surface all whitish except for a well defined and characteristic brown genital blotch on segments 7-9 (see fig. 6, pl. ii).

Female. Body, length 2.37 mm., width .97 mm.; head, length .62 mm., width .62 mm.; the increased size of the female is due to the larger abdomen, the head and thorax being of about the same size in both sexes; lateral abdominal blotches are not so long as in the male; segment 9 is shorter, bears two small blotches, and is slightly emarginated behind.

Nirmus atopus n. sp. (Plate II, fig. 4).

From a bird of the cuckoo family (Cuculidæ), *Piaya cayana thermophila* (Panama). This new form is one of the circumfasciate *Nirmi* of the general character of Rudow's *alchata* (Piaget, Les Pediculines, p. 165, pl. xiii, fig. 12) and allied forms. The few described members of this group have been found on columbine and gallinaceous birds.

Description of female. Body, length 1.84 mm., width .63 mm.; abdomen expanding posteriorly to segment 6; pale brownish white with brown lateral abdominal and thoracic bands and circumfasciate head.

Head, length .59 mm., width .53 mm.; forehead broad, rounded in front, with very few very fine hairs on the margin; trabeculæ small but distinct, acute; antennæ slender, with segment 5 longer than segments 3 or 4; temples rounded, with two long hairs and two or three very fine prickles on margins; eye without a hair, not especially prominent; occipital margin straight, bare; ground color of head whitish with small, inconspicuous brown ocular blotches, temples very narrowly margined with brown, and rather broad chitin band, subtranslucent brownish along the entire front and lateral margins of forehead, and ending posteriorly in small elliptical expansions directed diagonally inwards.

Prothorax very short, quadrangular; lateral margins straight; posterior angles rounded, with one long hair; posterior margin straight; lateral borders brownish, the coloring extending along the posterior margin of the segment. Metathorax pentagonal, lateral margins bare, posterior margin obtusely angled on abdomen, with one hair in latero-posterior angle and four pustulated hairs in two pairs, one pair almost in the latero-

posterior angle on each lateral half of the margin; lateral borders blackish brown, the color extending inward, but paling, in latero-posterior angles. Legs of pale ground color of the body, with narrow dark marginal markings. Sternal markings consisting of intercoxal lines, a small triangular blotch on mesothorax which fits like an apex to a larger pentagonal blotch on the metathorax.

Abdomen widening posteriorly to segment 6, then tapering bluntly; posterior segments with weak longish hairs in posterior angles; numerous weak, longish hairs on dorsal aspect in the broad median uncolored longitudinal line; lateral bands brown, distinct, extending posteriorly only through segment 7; pale brown, quadrangular, lateral, transverse blotches; last segment convex behind, with a very slight median emargination.

Nirmus virgatus n. sp. (Plate II, fig. 5).

Males and females from an icterine bird, *Amblycercus holosericeus* (Panama). Much like *N. illustris* Kellogg (New Mallophaga, II, p. 494, pl. lxxvii, fig. 4), from the Red-winged Blackbird, *Agelaius phœniceus* (Lawrence, Kansas), and like *ornatissimus* Giebel (Insecta Epizoa, p. 144). The new form has a narrower front with the anterior angles not rounded, and does not possess the distinct bands internal to the antennal bands of the head of *illustris*. The lateral bands of the abdomen are wider, and the lateral transverse abdominal blotches are much more clearly indicated.

Description of male. Body, length 1.28 mm., width .47 mm.; whitish with striking broad black lateral borders of thorax and abdomen, black antennal and ocular bands, chestnut-brown outlines of transverse,

lateral abdominal blotches on dorsal aspect, and chestnut-brown transverse median blotches on ventral aspect of abdomen.

Head, length .37 mm., width .37 mm.; front truncate or with a very shallow concavity; a few small hairs on sides of forehead; trabeculae long; antennae slender, segment 5 distinctly longer than either segments 3 or 4; eye distinct, slightly pendulous; temples not much expanded, margins flatly rounded, with one long hair and a few prickles; occipital margin straight; ground color whitish to uncolored; broad black antennal bands running to anterior angles of head and bending in angularly at base of trabeculae; rest of forehead and trabeculae uncolored; no colored clypeal signature; antennae with segment 1 uncolored, other segments entirely blackish brown; ocular bands narrow, blackish; anterior part of temporal margins narrowly blackish; a brown, shield-shaped occipital signature showing through; mandibles and oesophageal sclerite showing through, brown.

Prothorax quadrangular, with rounded posterior angles with one hair in angle; segment whitish with broad lateral blackish brown borders. Metathorax angulated on abdomen; lateral angles obtuse; five long hairs on each latero-posterior margin; segment whitish, with uneven broad blackish lateral borders. Legs whitish with blackish brown blotches and semiannulations. Sternal markings consisting of distinct, chestnut-brown intercoxal lines, with expanded inner ends touching a small median blotch.

Abdomen elongate-ovate, with not very long hairs in posterior angles, and two hairs on the posterior margin of the dorsal aspect of each segment; ground color clear to whitish; broad lateral bands, from which project inwards the outlines of lateral transverse blotches which

are oblong on segments 2-6, and tapering on segments 7-8; on the ventral aspect each segment has a chestnut-brown median blotch which shows through above; segments 8 and 9 are narrow; segment 9 projects narrowly backward, is narrowly but flatly rounded behind, and is mostly colored.

Female. Body, length 1.5 mm., width .53 mm.; head, length .41 mm., width .43 mm.; the head is a little wider in proportion to its length than in the male; last segment with distinct triangular lateral blotches and angularly emarginated behind.

***Nirmus peninsularis* n. sp.** (Plate II, fig. 9).

Numerous specimens from a Phainopepla, *Phainopepla nitens* (Baja California). A member of the difficult group *interrupto-fasciati*, to which belongs my species *vulgatus* (New Mallophaga, II, p. 496, pl. lxvii, fig. 5), from seven passerine species, *simplex* (l.c., p. 492, pl. lxvii, fig. 2) from the Robin, *Merula migratoria*, and the strongly marked species *eustigmus* (l.c., p. 493, pl. lxvii, fig. 3) from Anna's Humming-bird, *Trochilus aeneus*. The species from *Phainopepla* resembles most closely *brachythorax* Giebel (Insecta Epizoa, p. 134) from *Ampelis cedrorum*.

Description of female. Body, length 1.86 mm., width .41 mm.; long, slender, pale, with narrow marginal markings on head and intercoxal lines showing through on thorax.

Head, length .37 mm., width .31 mm.; elongate-triangular, with bluntly rounded apex; marginal hairs of forehead inconspicuous; trabeculae small, uncolored but distinct; antennae when projected backward reaching the occipital margin of head; eye not prominent, with a prickle; temples straight, with a single long hair in

obtuse angle between temporal and occipital margin; occipital margin very flatly convex, ground color whitish; a blackish brown narrow lateral border on temples and forehead, this border turning in angularly at antennal fossa; front of clypeus uncolored and an indistinct, uncolored elongate-oval fossa widening posteriorly; mandibles and œsophageal sclerite showing through pale brown; no occipital border.

Prothorax quadrangular, with slightly convex, lateral and posterior margins; posterior angles with one small hair; ground color whitish, a blackish brown blotch in anterior angles, and posterior margin weakly bordered by the intercoxal lines of ventral surface showing through. Metathorax in outline a semicircle with anterior curving part slightly flattened and posterior margin slightly convex; posterior angles with three long pustulated hairs and three shorter, weaker, non-pustulated ones; one of the long hairs is in the apex of the angle, the other hairs are ranged along the posterior margin near the angle; segment whitish with darker anterior marginal markings. Sternal markings consisting of distinct intercoxal lines. Legs concolorous with thorax, with dark brown dorsal marginal markings.

Abdomen elongate, subparallel sided; segments 1 and 2 without hairs in posterior angles, segments 3-6 with one to two short, weak hairs in angles; segment 7 with three hairs in angles, and segments 8 and 9 with a few weak, curving hairs; segment 9 very short, with slight emargination; segments 5 and 6 with a hair on dorsal surface on each side rising from the posterior margin of segment just inward from the lateral band; dorsal surface otherwise naked; color of abdomen whitish, with narrow translucent lateral bands, each segmental portion passing the suture anteriorly.

Male. Body, length 1.34 mm., width .37 mm.; head, length .33 mm., width .26 mm.; being thus markedly shorter than the female; abdomen widening distinctly posteriorly, so that segment 5, which is widest, is more than one and one-half times as wide as segment 1; segment 8 short and much contracted within segment 7; segment 9 truncate behind; the genitalia showing indistinctly through segments 7-9; an indistinct, median pale brownish coloring on all segments.

Nirmus interpositus n. sp. (Plate II, fig. 7).

Three females from Vieillot's Warbler, *Dendroica bryanti* (Panama). A member of the group *interruptofuscitati*, intermediate in markings between *N. vulgatus* Kellogg (New Mallophaga, II, p. 496, pl. lxxvii, fig. 5), from several passerine birds from California and Kansas, and *eustigmus* Kellogg (l.c., p. 493, pl. lxxvii, fig. 3), from *Trochilus annæ*, California. In size the new species is shorter than *vulgatus* but of the same width, and is both shorter and narrower than *eustigmus*. In general outline of body it resembles *eustigmus* more than *vulgatus*, but differs from *eustigmus* in having the sixth abdominal segment widest instead of the fourth.

Description of the female. Body, length 1.41 mm., width .41 mm.; whitish with distinct, broad, black, lateral abdominal bands and thoracic borders; head nearly equilaterally triangular.

Head, length .31 mm., width .34 mm.; outline of head nearly that of an equilateral triangle; the lateral margins of the head are weakly convex outward and the apex is parabolically curved; there are five or six short, inconspicuous hairs on each lateral margin of the forehead; the trabeculæ extend to the end of the

first antennal segment and are uncolored; eye with a prickle; temporal margins with one long hair in the apex of the rounded, nearly right angle; occipital margin bare, very flatly convex; ground color whitish with a faint golden brown tinge; forehead and temporal margins narrowly bordered with blackish brown; front of clypeus uncolored; antennæ uncolored; occipital margin not bordered or only very narrowly and indistinctly so, an indistinct, pale brown, shield-shaped occipital signature showing through.

Prothorax very short, widely rectangular; a single longish hair in posterior angles; color whitish, with the intercoxal lines of under side showing through, and distinct blackish brown lateral borders. Metathorax short, lateral margins bare, sinuous; posterior margin flatly convex, with six or seven longish hairs on each half beginning in the posterior angle; whitish, with an uneven, blackish brown lateral border, and the strongly colored intercoxal lines of underside showing through. Legs whitish with blackish brown dorsal marginal markings. Sternal markings consisting of distinct intercoxal lines and indistinct pale median blotches.

Abdomen narrowest anteriorly, widening posteriorly to segment 4; segments 4-6 about same width, segment 7 slightly narrower, segments 8 and 9 short; short, weak single hairs in posterior angles of segments 3-7, with one or two shorter, weaker hairs in segments 5-7; dorsal surface with no or very inconspicuous hairs; whitish with distinct, rather broad, blackish brown lateral bands on segments 1-7, the segmental parts of the bands passing the suture and separated by nearly uncolored narrow spaces; covering the middle region of segments 6-7 a large, pale brown, shield-shaped blotch; segment

8 with a transverse blotch, pale brown, darker outwardly, and behind not reaching the lateral margins; segment 9 with two very small pale brown linear lateral blotches, and feebly emarginated behind.

***Nirmus audax* n. sp.** (Plate II, fig. 8).

From the yellow-headed Tit, *Auriparus flaviceps* (Baja California). A member of the group *interruptofasciati*, of darker ground color and with much more pronounced abdominal blotches than is usual in this group (see *vulgatus* Kellogg, New Mallophaga, II, 1896, p. 496, pl. lxxvii, fig. 5).

Description of female. Body, length 1.6 mm., width .58 mm.; rather short and broad for *Nirmus*, especially of the *interruptofasciati* type; brownish ground with dark lateral blotches on thorax and abdomen, and blackish lateral bands and marginal markings.

Head, length .38 mm., width .41 mm.; the outline being nearly that of an equilateral triangle with blunted and curving apex and slightly convex legs; the marginal hairs of the forehead are few and very small; trabeculae distinct, uncolored; temporal margins with a long hair in the rounded angle and several prickles; occipital margin weakly concave laterally and weakly convex in the middle; anterior part of forehead with nearly uncolored ground, with two brownish linear blotches bounding the oval fossa laterally; rest of head brownish with darker lateral borders and suggestions of occipital and ocular bands; antennæ colored.

Prothorax short, rectangular, with a single hair in posterior angles; color pale brownish in the middle, with the lateral regions dark brown, darkest on lateral margins. Metathorax angulated behind, with several strong hairs along each latero-posterior margin; latero-

anterior margins bare, convex. Color brownish, paler in middle, stronger laterally and posteriorly, with uneven, blackish latero-anterior borders, and latero-posterior borders nearly uncolored. Legs brown with paler regions at extremities of segments and blackish dorsal margins, sternal markings consisting of distinct intercoxal lines, those between pro- and mesocoxæ with angulated spurs nearly touching; between the metacoxal lines a median blotch.

Abdomen short and broad, in shape an ellipse, segment 4 being the widest; ground color very pale brownish; segments 1-7 with narrow black lateral bands, the segmental parts distinct and passing the suture; quadrangular brown lateral blotches darkest internally on segments 1-7; segment 8 wholly colored; segment 9 uncolored and weakly emarginate behind; ventral surface of segments with a brown median blotch, the blotches of segments 6-7 fusing.

Lipeurus.

Lipeurus confidens n. sp. (Plate III, fig. 1).

Four females from a Black-footed Albatross, *Diomedea nigripes* (North Pacific Ocean). A species which in outline of body, color and markings is very like Piaget's species *tricolor* (Les Pediculines, p. 363, pl. xxx, fig. 4) from *Diomedea fuliginosa* (collection in the Museum of Leyden), but which is one and one-third times as large, without circumfasciate antennal bands, without occipital bands, with metathorax not without hairs as described for *tricolor* but with longish hairs in the posterior angles, without median abdominal blotches, and with last segment of female not acutely but bluntly two-pointed.

Description of female. Body, length 4.13 mm., width 1.03 mm.; large, whitish with sharply defined, black marginal markings, the lateral abdominal bands consisting of segmental pairs of contiguous subtriangular blotches.

Head, length .81 mm., width .7 mm.; subtriangular, widest just behind the eyes; front parabolic, with uncolored margin without hairs; a longish hair at the suture, with three in front of it (the foremost the longest) and two behind it on each side of the forehead; antennæ rather elongate, slender, segment 1 large and as long as segment 2; anterior angles of antennary fossæ acute but projecting little; the fossæ shallow; eyes prominent; temporal margins most convex just behind the eyes, obtusely angulated behind, and bearing a single weak hair and a few short spines; occipital margin nearly straight, bare; ground color whitish; strong, blackish brown antennal bands interrupted at the suture, widening posteriorly and extending back as far as the eye; two triangular blotches on occipital margins appearing as pointed continuations of the lateral bands of prothorax; antennæ uncolored.

Prothorax, as exposed, short, quadrangular, with flatly convex posterior margin and a longish spine in each posterior angle; color whitish, with even, strong, blackish lateral borders, turning in for a little distance at posterior angles. Metathorax with lateral concavities and five hairs in posterior angles, four of these hairs being long, strong, colored, and set closely together in a small uncolored space; posterior margin straight or even slightly concave; segment whitish with uneven, broad lateral borders, widest in middle and not reaching the posterior angles. Legs uncolored except for the chestnut-brown tarsi. No sternal markings.

Abdomen, fourth segment widest; segments of about equal length; posterior angles with few weak, not long, hairs; color whitish, with very narrow, clear lateral margin which sends expanded processes inward, three in each segment; the foremost of the three is the smallest and is contiguous to the suture; the hinder two are covered by two triangular blackish blotches which on some segments are contiguous, on others distinctly separate; segments 8 and 9 narrow, colored laterally; posterior margin of segment 9 truncate, with a very small angular emargination; two short hairs on each of the blunt points.

Lipeurus densus Kellogg. (Plate III, fig. 2).

New Mallophaga, I, 1896, p. 114, pl. vii, figs. 1 and 2.

A single male from a Black-footed Albatross, *Diomedea nigripes* (North Pacific Ocean, off Alaska). This specimen is a full millimeter longer and is much more completely blotched with dark brown than the original type specimen, a female; but I think they are of the same species. The female described is undoubtedly not fully grown and colored. While the antennæ vary in the sexes, that of the male bears no projection: it is simply heavier and larger, with its first segment largest; in the female, segment 3 is the longest. It is a male of this species, probably, which Taschenberg (*Die Mallophagen*, 1882, p. 145, pl. v, fig. 1a) describes and figures as the female of *ferox*.

Description of male. Body, length 5.8 mm., width 1.25 mm.; ground color very pale brown, but body mostly covered by large, dark brown blotches, head and thorax slightly longer than abdomen.

Head, length 1.3 mm., width 1.06 mm.; front parabolic, with a group of three distinct hairs at each side

and two or three shorter ones along margin in front of antennary fossæ; antennæ large, long, (almost 1 mm.), without projection on any segment; segment 1 largest and other segments successively decreasing in width and length, uncolored except for an indefinite brownish annulation on segment 2; eyes projecting, conspicuous; temporal margins slightly expanded, rounded behind, with one short, weak hair and a few prickles; ground color brownish white; even, blackish brown antennal bands running around in front, the small portion of clypeus lying in front of the band being dark subtranslucent brown; temporal regions bounded within by diverging occipital bands, all blackish brown, these blotches acutely pointed in front and almost reaching to, but distinctly separate from, the bases of the antennal bands; on the forehead a dark brown lateral blotch on each side and in front of the mandibles.

Prothorax short and quadrangular as exposed; two short, weak hairs in posterior angles, one lying in on posterior margin; narrow median region of segment whitish, widest behind; lateral portions of segment blackish brown, paling inwardly. Metathorax large, long, with lateral margins concave, posterior margin weakly and flatly concave; a single short, weak hair in the apex of the posterior angles, and five longer, stronger, light brown hairs in a very small elongate-elliptical, uncolored space near the apex of the angles; segments all blackish brown, except a whitish, bluntly pointed, arrow-head-shaped, median region; projecting laterally from the posterior tip of this whitish space is on each side a small, linear, whitish space. Legs long, strong, coxæ nearly uncolored; femora dark brown, with uncolored extremities and tibiæ mostly colored. Sternal markings, prosternum with narrow, pericoxal

lines; mesosternum with a rather large, brownish, median blotch; metasternum with weak indications of a median blotch.

Abdomen short, nowhere broader than thorax, with subparallel sides until segment 7 is reached, when the posterior tapering is begun; segments 1-6 of about equal size; segment 7 longer than others; segments 8-10 successively narrower and shorter; an uncolored median longitudinal line extending whole length of abdomen, rest of surface colored blackish brown by large quadrangular lateral blotches, which have clear stigmatal spots and are palest along inner margin; last segment angularly emarginated, with three short hairs on each point; segments 1-4 with a single very short hair in each posterior angle, segments 5-9 with longer hairs.

Lipeurus forficulatus Nitzsch. (See Kellogg, New Mallophaga, I, 1896, pl. ix, figs. 3, 4, 5 and 6).
Many specimens from a Californian Brown Pelican, *Pelecanus californicus* (Baja California). Taken previously by me from same host species (Bay of Monterey, California).

Lipeurus gracilicornis Piaget. (Plate III, fig. 3).
Les Pediculines, 1880, p. 309, pl. xxv, fig. 6.

Many specimens including males, females, and young from a Man o'War Bird, *Fregata aquila* (Panama). My specimens, to which I give a varietal name, differ from Piaget's types (taken from *Fregata minor*), as described, in three important particulars, viz., character of antennæ, metathoracic hairs, and size. In other particulars the specimens from the two bird species agree well.
Var. *major* Kellogg. Measurements (Piaget's meas-

urements of the type specimens are in parentheses), male, body, length 3.12 mm. (2.5 mm.), width .37 mm. (.29 mm.); head, length .66 mm. (.58 mm.), width .39 mm. (.29 mm.) Female, body, length 3.10 mm. (2.4 mm.), width .69 mm. (.53 mm.); head, length .69 mm. (.63 mm.), width .50 mm. (.41 mm.) Distinctly larger than the types of the species; third segment of antenna of male with an appendage; metathorax with six long hairs, five together and one alone. I figure the female as Piaget has figured the male of the species type.

Lipeurus protervus n. sp. (Plate III, fig. 4).

Many specimens from a Willow Ptarmigan, *Lagopus lagopus* (Kodiak Island, North Pacific Ocean). On this Ptarmigan were some specimens of *Goniodes mammillatus* Rudow, found by me on the California Partridge, *Callipepla californica* (New Mallophaga, II, 1896, p. 509, pl. lxxix fig. 2), but this *Lipeurus*, while of similar general character to *Lipeurus docophoroides* Piaget taken by me from *Callipepla californica* (New Mallophaga, II, 1896, p. 508, pl. lxxviii, fig. 8), is distinctly of another species. The most readily noticeable difference is in the character of the lateral abdominal blotches, those of *docophoroides* leaving a comparatively wide, unblotched median region, while those of the new species leave but a narrow, median, unblotched line. The blotches of the first segment meet in the new species; they do not, even nearly, in *docophoroides*.

Description of female. Body, length 2 mm., width .72 mm.; short and broad, and sub-Docophoroid in form; whitish ground color with nearly completely colored head and thorax, and abdomen with large, lateral, quadrangular blotches.

Head, length .5 mm., width .5 mm.; front rounded,

with four very small, inconspicuous hairs on each side; trabeculae small, distinct, acute, uncolored; antennae rather short, segment 2 longest, segment 5 longer than 3 or 4, segments 4 and 5 colored, others uncolored or very weakly colored; eye large, with a hair; temples widest just behind the eyes; temporal margins converging posteriorly, nearly straight, with two long hairs and prickles; occipital margin concave; head pale brown in median region, temples, occipital border, and antennal bands with rim around the front, dark brown; a pale, almost uncolored transversal linear space in front of the mouth, and a similarly pale U-shaped space bounding the median region of the hind-head.

Prothorax small, short, quadrangular as exposed, with a single long hair in each rounded posterior angle; segment wholly brown except an uncolored posterior border. Metathorax small, not as long as broad, posterior margin obtusely angled on abdomen; two long pustulated hairs in a clear space on posterior margin near the lateral angles and two long pustulated hairs in a clear space on posterior margin midway between lateral angles and posterior angles; whole segment brown except a small, angular, median, whitish or uncolored space on anterior margin. Legs pale brown with narrow dark brown marginal markings. Sternal markings consisting of intercoxal lines and a shield-shaped median blotch on metasternum.

Abdomen elliptical, posterior angles of segments projecting slightly and with one to two longish weak hairs; ground color whitish with large quadrangular lateral brown blotches on segments 1-7, these blotches nearly meeting inwardly and separated intersegmentally by a whitish space about one-half as large as a blotch; the outer margins of the blotches are blackish,

forming narrow lateral bands; each blotch with a stigmatal spot, and a few (three or four) pustulations at inner end, in which are seated longish hairs; a long hair arises from a demi-pustulation on the posterior margin of each blotch just behind the stigmatal spot; segment 8 wholly colored and segment 9 nearly so; posterior margin of last segment minutely emarginated.

Lipeurus macgregori n. sp. (Plate III, figs. 5 and 6.)

Numerous specimens from three individuals of the Ani, *Crotophaga sulcirostris* (Panama). This striking *Lipeurus* with its small Nirmoid body, and, except for the antennae, Docophoroid head, shows no near resemblance to any other *Lipeurus* so far described.

Description of the male. Body, length 1.81 mm., width .56 mm.; short and broad for *Lipeurus*, Nirmoid in shape, head with slightly expanded anterior border of clypeus uncolored, and slightly emarginated as with many *Docophori*; ground color of body whitish with strong, dark brown, lateral borders of head, and lateral, transverse blotches of thorax and abdomen.

Head, length .53 mm., width .47 mm.; thus nearly as broad as long, triangular, with sinuate sides and truncated apex; anterior border of clypeus slightly expanded, uncolored, feebly emarginate; seven or eight distinct, rather long hairs on lateral margin; an angular concavity on lateral margin midway between trabecula and anterior angle; trabeculae prominent; antennary fossae deep; eye prominent, almost pendulous, with a hair in it and a prickle just behind it; temporal margins convex, with three long hairs, a fourth one on occipital margin of temple; occipital margin sinuous, bare; antennae long and large, segment 1 heavy, nearly as long as the rest of the segments together; segment

2 next largest and longest, segment 3 with simple appendage at distal extremity, segments 4 and 5 short, subequal; color whitish, with strongly colored, dark brown temples, angulated antennal bands, and lighter brown, distinct signature, pointed behind, straight in front; mandibles and oesophageal sclerite showing through dark brown; trabeculae and antennae paler smoky brown.

Prothorax short, quadrangular, wider than long, with one pustulated hair in posterior angle; a large, nearly square, dark brown, lateral transverse blotch nearly covering each lateral half of the segment, the broad, median line between them whitish. Metathorax short, but little longer than prothorax; posterior margin nearly straight, with five long pustulated hairs ranged along each lateral fourth, the inner two of the hairs may have only demi-pustulations. Sternal markings consisting of distinct, blackish brown intercoxal lines, and a pale brown, indistinct median blotch on metathorax. Legs pale smoky brown with darker margins and semiannulations.

Abdomen elongate-ovate; segment 1 conspicuously narrower than metathorax; one or two short hairs in posterior angles of anterior segments, two or three long hairs in angles of segments 5-9; ground color whitish with broad, dark brown, lateral, transverse blotches on segments 1-7, these blotches subquadrangular, but narrower inwards, and leaving only a broad, median, whitish, longitudinal line on middle of abdomen; in this whitish space a few longish hairs on each segment; rather large, uncolored, stigmatal spots in the transverse blotches of segments 2-7; the transverse blotch on segment 8 continuous across the segment and curving; segment 9 with two backward-projecting, short,

horn-like processes, dark brown, and a narrowly rounded, uncolored posterior border; genitalia extending through segments 6-9 and strongly chitinized.

Female. Body, length 2.41 mm., width .78 mm.; head, length .6 mm., width .53 mm.; considerably larger; abdomen more elongate; antennae rather long, slender, segment 2 longest; lateral, transverse blotches of abdomen less tapering inwards; blotches of segment 8 distinct; segment conspicuously emarginate behind.

Goniodes.

Goniodes mammillatus Rudow. (See Kellogg, New Mallophaga, II, 1896, p. 509, pl. lxxix, fig. 2).

Specimens from the Ptarmigan, *Lagopus lagopus* (Kodiak Island, off Alaska). Previously taken by me from a Californian Partridge, *Callipepla californica* (Mountain View, California).

Eurymetopus.

Eurymetopus taurus Nitzsch. (See Kellogg, New Mallophaga I, 1896, p. 135, pl. xi, figs. 3, 4, 5 and 6).

Specimens from the Black-footed Albatross, *Diomedea nigripes* (North Pacific Ocean, off Alaska). Previously taken by me from *Diomedea albatrus* (Bay of Monterey, California).

Trinoton.

Trinoton luridum Nitzsch. (See Kellogg, New Mallophaga I, 1896, p. 152, pl. xiii, fig. 4).

Specimens from a Green-winged Teal, *Anas carolinensis* (Kodiak Island, off Alaska). Previously taken by me from same host species and six other duck species (Kansas and California).

Colpocephalum.

Colpocephalum abbotti n. sp. (Plate IV, fig. 9).

Taken from a gull, *Larus* sp. (Baja California). This new form is of the general type of *fuscipes* Piaget (Les Pediculines, p. 567, pl. xlvii, fig. 7) from *Larus dominicanus*, and of *funebre* Kellogg (New Mallophaga, I, p. 147, pl. xii, fig. 7) from *Larus glaucescens* (Bay of Monterey). It most nearly in general aspect, and especially in the branching, uncolored median line of abdomen, thorax, and head, resembles *sulcatum* Piaget (Les Pediculines, p. 565, pl. xlvii, fig. 5) from *Sterna nigra*, but is one-half larger, and has transverse series of hairs on the dorsal aspect of the abdomen, while *sulcatum* is here naked.

Description of female. Body, length 2.34 mm., width .88 mm.; rather large, long abdomen; abdomen sombre in color with narrow, black, lateral borders on hind head, thorax, and abdomen; a conspicuous, uncolored, median line on first five segments of abdomen, all of thorax, and hind head, the line dividing in the head and sending a branch to each lateral margin just in front of the ocular emargination.

Head, length .47 mm., width .7 mm.; front broad, very flatly convex, with numerous hairs of which four are longer than the others; on the lateral margins of the forehead in front of the ocular emargination a very long hair, with another shorter one close to it, and two in the angle; the palpi projecting beyond the lateral margins of the head; the ocular emargination deep, angular, with a prominent fringe and a longish hair rising just inward of the double eye; temples rather narrow, projecting, with four long hairs on the margin and one rising at some distance inward from the

occipital margin; six uncolored spots on the forehead, from two of which single long hairs arise and from the remaining four short hairs; occipital margin flatly concave, bare; head smoky brown with narrow black occipital border and curved ocular blotches; a broad, short-stemmed, uncolored Y, the prongs slightly angulated in the middle and terminating broadly in front of the eyes; the stem interrupts the black occipital border and is continuous with a median, uncolored, longitudinal line which traverses the thorax and the first few abdominal segments.

Prothorax broader than long, with obtuse lateral angles containing one longish hair and a spine in the apex of the angle, and a second longish hair arising from a little within and back of the apex; the latero-posterior margins bare, with a single longish hair in the slight angle which may be taken to separate the latero-posterior margin from the true posterior margin; two longish hairs on each half of the flatly convex posterior margin; color smoky brown with narrow black border on latero-posterior margins and on visible parts of latero-anterior margins; the small, slightly curving, longitudinal chitin bars at ends of the indistinct, usual transverse bar are black; the ground color of the segment is darker in posterior half, and the segment is bisected longitudinally by the median, uncolored line. Metathorax with a fairly distinct suture setting off the mesothorax; lateral margins bare; posterior angles with a hair and spines; posterior margin straight, with four weak hairs not on the very margin; color smoky brown with narrow black lateral borders. Legs slightly lighter than segments, and with ill-defined, darker marginal markings. Sternal markings distinct, a median shield on prothorax; a small, elongate, rather

cone-shaped median blotch on mesothorax, and a large, broadly diamond-shaped, median blotch on metathorax; intercoxal lines between pro- and mesothorax distinct.

Abdomen elongate-elliptical; segments with a single long weak hair and some short ones in posterior angles, and some short ones along lateral margins; a single transverse series of not very closely set weak hairs along posterior margin of each segment; general color light smoky brown with very narrow blackish lateral bands; last segment parabolic behind, with short hairs, and at each side a few longish hairs.

Colpocephalum spineum n. sp. (Plate IV, fig. 1).

A single male from a Man o'War Bird, *Fregata aquila* (Panama). Piaget has taken a small *Colpocephalum* from *Fregata minor* (*angulaticeps*, Les Pediculines, p. 569, pl. xlvii, fig. 8), to which this new form must show some resemblance in size and characteristic quadrangular shape of forehead; but the shape of the abdomen, not at all elliptical as described for *angulaticeps*, but elongate-oblong with nearly parallel sides, and the distinct and characteristic abdominal markings and lateral hairs of the prothorax, serve to make any reference of my specimen to *angulaticeps* impossible.

Description of male. Body, length 1.53 mm., width .44 mm.; elongate, narrow, with subparallel sides; pale golden brown with large dark brown head blotches and lateral brown blotches on abdomen.

Head, length .34 mm., width .47 mm.; forehead nearly quadrangular, with a few short hairs along the front and four short ones and two longish ones on sides; palpi and antennæ slightly projecting beyond the margin of the head; temples broad with flatly convex lat-

eral margins bearing numerous hairs of various lengths, two at least being long; occipital margin broadly concave; pale golden brown with broad blackish brown occipital border, greatly expanded triangularly at bases of the occipital bands; ocular blotches large, and a distinct blotch on each side of the front rami of the mandibles extending diagonally to the front margin.

Prothorax short, with a spine and longish hair in each lateral angle and four longish hairs and two spines along each lateral half of the posterior margin. Metathorax longer and wider than prothorax, almost as wide as abdomen; several spines in a double row along the lateral margins, some strong spines in the lateral angles, and a series of ten or twelve strong hairs along the nearly straight posterior margin, whole thorax of pale brown ground color of body. Legs concolorous with the thorax, with dark brown markings near distal extremity of femur and on tibiae. No distinct sternal markings.

Abdomen slender, elongate, with nearly parallel sides, with one long hair in posterior angles of segments 3-8 and numerous short hairs along lateral margins; dorsal surface covered with short spiny hairs, a series along the posterior margin of each segment being composed of longer but still spine-like hairs; color pale golden brown, the sutures whitish, and distinct subelliptical dark brown lateral blotches on segments 3-8, giving the abdomen a strikingly marked character; segment 9 but little narrower than segment 8 and broadly truncate behind; posterior margin with several long hairs and more shorter ones; dorsal surface with a transverse series of longish hairs.

Colpocephalum maculatum Piaget. (Plate IV, fig. 2).

Les Pediculines, 1880, p. 516, pl. xlili, fig. 1.

A male and a female from a Caracara, *Polyborus cheriway* (Baja California), which I refer with much doubt to this species of Piaget, taken from a *Polyborus brasiliensis* (Zool. Garden of Rotterdam). Piaget says that *maculatum* much resembles *C. flavescens*, the common *Colpocephalum* of raptorial birds (see Kellogg, New Mallophaga, II, 1896, p. 525 pl. lxxi, fig. 4). My specimens do not resemble *flavescens* at all closely, lacking the cross bands of the abdomen, being rather differently shaped, etc. But Piaget's description and figure of *maculatum* show it also to differ from *flavescens* in these and other particulars. My specimens measure: Male, body, length 1.62 mm., width .66 mm.; head, length .34 mm., width .53 mm. Female, body, length 2. mm., width .72 mm.; head, length .34 mm., width .53 mm.

Colpocephalum subæquale Nitzsch. (See Kellogg, New Mallophaga, II, 1896, p. 525, pl. lxxii, fig. 1).

Specimens from an American Raven, *Corvus corax sinuatus* (Baja California). Taken previously by me from *Corvus americanus* (Palo Alto, California).

Colpocephalum diffusum n. sp. (Plate IV, figs. 3 and 4).

A well marked species found upon a surprisingly large number of widely related bird species from Panama. Mr. McGregor brought specimens from the following birds: *Amblycercus holosericeus*, *Arremonops striaticeps*, *Saltator albicollis*, *Phænicothraupis fuscicauda*, *Elainea subpagana*, *Dendroica bryanti*, *Piaya cayana thermophila* (2 specimens), *Chiroxiphia lanceolata*, and *Ardea virescens*! From the condition of affairs I should suspect straggling, but Mr. McGregor informs me that

the birds were shot and the parasites collected on different days. We seem to have here a condition similar to the condition shown by *Docophorus communis*. In the list of hosts of this *Colpocephalum*, however, there are bird species of several unrelated families such as the Fringillidæ, Cuculidæ, Ardeidæ.

The specimens of the parasite vary somewhat in strength of color and hence distinctness of bands and blotches. Some of the weaker colored specimens, however, are evidently pupæ or freshly moulted adults. I have described the markings as shown in some well colored specimens from *Amblycercus holosericeus*.

Description of the male. Body, length 1.28 mm., width .53 mm.; ground color very pale, with distinct, blackish brown markings on head, thorax, and abdomen; transverse bands of abdomen uneven in size, the first and last bands being much larger than the middle ones.

Head, length .34 mm., width .47 mm.; a few short hairs on frontal margins; palpi barely projecting; ocular fringe distinct; temples broad, with a few long hairs; color whitish with prominent blackish ocular blotches projecting forward and connecting by a weakly colored, uneven broad line with the small but distinct blackish clypeal blotches; temples clear without dark margin; occipital margin narrowly bordered with blackish in the median part.

Prothorax; the part of the prothorax not concealed by the head is almost of the shape of a semicircle, a little flattened at the pole; the lateral angles lie very close to the occipital margin of the head, are obtuse, and bear three spines; there are three longish hairs on each lateral half of the rounded posterior margin; the segment is almost whitish with indications of darker

borders and indistinct lines caused by the sternal markings showing through. Metathorax pentagonal, posterior margin straight, with four longish hairs and a spine (between the first two) on each lateral half; the posterior angles with two spines; color whitish with dark brown anterior angles, and sternal markings indistinctly showing through. Legs concolorous with thorax, with brownish and blackish markings. Sternal markings distinct, blackish brown, consisting of a median wedge-shaped blotch on prosternum connected by lateral processes with the intercoxal lines; a peculiar four-appendaged blotch on mesosternum composed of median blotch and meso-peri-coxal lines; and a pale median metasternal blotch with darker intercoxal lines.

Abdomen short, broadly elliptical, not turbinated; two or three distinct spines in posterior angles of segments; longish hairs in the angles and on the dorsal surface; segment 1 large; segments 2 and 3 not so large but larger than segments 4-7; segment 8 larger than segment 2 or segment 3; broad blackish brown lateral bands with the sutures distinct; no transverse bands on dorsal surface, but those of ventral surface showing through; these transversal bands arranged as follows: a single broad band covering all of segment 1 and anterior half of segment 2, narrow bands on segments 3-7, and one continuous band or blotch covering all of segments 8 and 9; the genitalia strongly chitinized, conspicuous, and extending through segments 2-9; last segment rounded behind, with a few short hairs; on the ventral surface of segment 2, a group of four very strong, long spines near each posterior angle.

Female. Body, length 1.56 mm., width .66 mm.; head, length .34 mm.; width .5 mm.; abdomen more elongate and the segments differently shaped; segment

1 very long, with straight posterior margin; segment 2 a little shorter, with distinctly curving posterior margin; segment 3 still shorter, with curving margin; segments 4-7 very short; segment 8 longer; ventral bands about as in male, with the last great band or blotch reaching anteriorly, with convex anterior margin, into segment 5.

Menopon.

Menopon titan var. linearis Kellogg.

New Mallophaga, I, 1896, p. 163, pl. xv, fig. 2.

Many specimens from a Californian Brown Pelican, *Pelecanus californicus* (Baja California). Described from same host species from Bay of Monterey, California.

Menopon auri-fasciatum n. sp. (Plate IV, fig. 5).

From a Man o' War Bird, *Fregata aquila* (Panama). Not at all like *M. intermedium* Piaget (Les Pediculines, p. 497, pl. xl, fig. 4) from *Fregata minor*.

Description of female. Body, length 2.19 mm., width 1.03 mm.; whitish with golden yellow transverse abdominal bands; dorsal surface of abdomen with many strong hairs in transverse series.

Head, length .31 mm., width .7 mm.; half-moon shaped, with smooth, even convex border; two short hairs on the front on each side of the middle, and two longish hairs and three shorter ones on each side in front of the antennal cavity; four very long hairs and several short ones in each temple; occipital margin concave, with six rather long hairs; pale yellowish white with black ocular flecks and small brown blotches just inside of the antennary cavities.

Prothorax rather large, with three short spines and a

long hair along the narrowly rounded margin of the lateral angles, and five long hairs on each lateral half of the flatly rounding posterior margin; the lateral margins narrowly darker than the rest of segment, which presents no blotches; the uncolored transverse chitin bar is distinct, and the curving longitudinal bars at its extremities are darker than general color of segment. Metathorax as short as or shorter than prothorax, with very slight lateral emargination; lateral posterior angle with several small spines, and posterior margin, which is flatly convex, bears, beginning in lateral angles, two long hairs, then a spine, then eight long hairs, on each lateral half; a narrow transverse pale brown blotch runs across the segment near the posterior margin and expands at its lateral extremities. Legs of pale ground color of thorax with narrow darker marginal markings.

Abdomen ovate, rather turbinate, with longish hairs in the posterior angles of the segments and a single series of strong hairs across the dorsal aspect of each segment, ranged along the posterior margin of a pale brown transverse band which extends entirely across each segment; this band covers only about one-half the dorsal aspect of each segment, the uncovered half being of the whitish ground color of the general body, ninth segment flatly convex behind, with fringe of uncolored fine hairs, and with a few long hairs at lateral rounded angles.

Menopon striatum n. sp. (Plate IV, fig. 6).

Six specimens from a Willow Ptarmigan, *Lagopus lagopus* (Kodiak Island, North Pacific Ocean). Nearly twice as large as Grube's *M. lagopi* from *Lagopus alpinus*, though in general appearance the species must be

similar. Grube describes the temples of *lagopi* with but one long hair; *striatum* has four, and the prothorax of *lagopi* is figured by Grube as being extraordinarily long.

Description of female. Body, length 2.22 mm., width .91 mm.; well marked, with entire transversal abdominal bands, with wide, whitish intersegmental spaces, and distinct, blackish, narrow lateral bands.

Head, length .3 mm., width .66 mm.; broadly parabolic in front, with slight rectangular orbital emargination; half a dozen short hairs on each lateral margin of forehead and three long hairs in region just in front of orbital emargination; the palpi projecting, as also the antennæ; temples narrow, five longish hairs, two more rising from occipital margin of temporal region; occipital margin concave, straight in the middle; ground color light brown, palest in median region, with very narrow blackish occipital border, blackish curving ocular blotches, and transversal dark brown bar in mandibular region.

Prothorax rather large, long; lateral angles obtuse, with three spines; posterior margin, from angle to angle, making a flattened semicircle and bearing 14 long hairs; ground color pale smoky brown, regions of lateral angles distinctly darker, transverse chitin bar dark, narrow, with a spine rising from each extremity; curving chitin bars at extremities of the transverse bar distinct, narrow. Metathorax with a broad whitish sutural space separating the small colored mesothoracic region from metathorax; metathorax with nearly straight posterior margin, and a series of hairs along straight posterior margin of broad chestnut-brown; transverse bar with narrow blackish lateral borders. Legs pale to smoky brown, with narrow, blackish dorsal

marginings and conspicuous spiny hairs. Sternal markings consisting of pale brown linear transversal blotch on prosternum, distinct, narrow blackish diagonal intercoxal lines between pro- and mesolegs, with pale brown median triangular blotch emarginated on anterior margin, very pale, indistinct intercoxal lines between meso- and metalegs, with a pale brown triangular median blotch between them, and another smaller pale brown median blotch apparently between the metacoxæ, really on first abdominal segment.

Abdomen elongate-elliptical; two to three or four longish hairs in lateral angles of segments; on segments 1-8 a regular series of alternating whitish (sutural) and chestnut-brown transversal (segmental) bands, each colored band bearing a single series of longish hairs on small pustules along its posterior margin; a longer hair on larger pustule at each end of each of these series; narrow, segmentally interrupted blackish lateral bands, separated from the brown transverse bands by a narrow whitish space; segment 9 wholly chestnut-brown except pale to uncolored posterior border; posterior margin with thick-set fringe of uncolored longer and shorter hairs. Ventral surface of abdomen of segments 2-8 with a median pale brown transversal band, bearing numerous fine hairs rising from small pustules; segment 9 mostly colored.

Menopon præcursor n. sp. (Plate IV, fig. 8).

Many specimens from a Gila Woodpecker, *Melanerpes uropygialis* (Baja California). Denny is the only author who has hitherto described a *Menopon* from the woodpeckers (*M. pici*, from *Picus viridis*, Monograph. Anoplur. Brit. p. 219, pl. xx, fig. 5). From his brief de-

scription and strange illustration I cannot determine whether my specimens resemble his or not.

Description of the female. Body, length 1.56 mm., width .75 mm.; golden brown, with chestnut-brown transverse abdominal bands.

Head, length .28 mm., width .58 mm.; being thus twice as wide as long; very few short hairs along front; from a partly clear spot on the dorsal surface on each side of the forehead three hairs arise of which one is very long; the palpi project by the length of the terminal segment; no distinct ocular fringe; the temples narrow and bearing three very long hairs and two or three shorter ones; occipital margin weakly concave, with six longish hairs, two being median; ground color of head pale subtranslucent brown, with nearly uncolored temples; black ocular flecks, irregular brownish ocular blotches, and a very narrow blackish occipital border. On the ventral surface are two backward-projecting, segmented, pointed, chitinous processes arising apparently at about the origin of the labial palpi.

Prothorax large, the obtuse lateral angles projecting even with the insertion of the last of the three long occipital hairs; the lateral margins and posterior margin (separated by a very obtuse but obvious angulation) with a few longish, slightly pustulated hairs (two on each lateral margin and six on the posterior margin); a spine in each lateral angle; the regions of the lateral angles smoky, with narrow blackish border on lateral margin; the straight, transverse chitin bar uncolored, the curving, longitudinal chitin bars blackish; middle region of segment concolorous with middle region of head. Metathorax short, but little wider than prothorax; posterior margin straight, with a series of longish hairs; region of posterior angles and an indistinct

transverse blotch entirely across segment darker. Legs concolorous with the pale ground color of the body, with very narrow darker dorsal margining. Sternal markings consisting of a narrow transversal median blotch on prosternum, and intercoxal lines curving backward at inner ends on mesosternum.

Abdomen rather short and broad, ovate; posterior angles projecting but slightly and bearing two to three long hairs; on the lateral margins of each segment a spine; a transverse series of hairs across each segment near its posterior margin; ground color very pale yellowish brown, with a chestnut-brown transverse band entirely across each segment except the ninth; posterior margin of segment 9 flatly angulated and with a close fringe of hairs.

Male. Body, length 1.34 mm., width .6 mm.; head, length .25 mm., width .53 mm.; the few specimens of males in the lot taken from the single bird examined are paler in color than the females; the transverse band of the eighth abdominal segment is hardly noticeable; segment 9 flatly rounded behind, with a few prominent hairs.

Physostomum.

With regard to the characters used in distinguishing species in this genus I am in much doubt. I believe that the genus is not at all well understood and that the specific determinations including my own (see *New Mallophaga II*, 1896, p. 513, *et. seq.*) need a thorough revision. This revision cannot, however, be undertaken until much more material is in hand. I describe the two following species with this doubt in mind, simply giving here as best I can additional data, for the

reviser. In the case of the two species here described, the unrelated hosts accredited to each suggest that we have to do in this genus with a few species of wide range of host, or with many species of very similar appearance.

Physostomum pallens n. sp. (Plate IV, fig. 7).

Specimens from a Prothonotary Warbler, *Protonotaria citrea* and from a Flycatcher, *Elainea subpagana* (Panama).

Description of female. Body, length 3.6 mm., width .87 mm.; pale buffy brown, with blackish brown head markings and thoracic markings and lateral abdominal bands.

Head, length .67 mm., width .66 mm.; front slightly expanded, flatly rounded; with laterally projecting palattes; several short prickle-like hairs in the slight ocular emargination; temples projecting backward, acute, with three long hairs, one on margin just behind the eye, and two close together on dorsal surface near the margin farther back; color whitish to clear with usual brown longitudinally arranged lateral blotches.

Prothorax hexagonal, front and posterior margins concave; a long hair and two spines in each lateral angle, and a long hair and two or three spines on each lateral margin near the posterior angles; lateral margins unevenly bordered with blackish brown, interrupted by a nearly uncolored spot in each lateral angle. Metathorax longer than prothorax, with straight posterior margin, and a single hair and spine in each posterior angle; a slight, rounded swelling behind anterior angles bearing spines; blackish brown, narrow, even, submarginal, longitudinal bands. Legs uncolored.

Abdomen parallel-sided, with a single hair and spine or prickle in posterior angles of segments; whitish with distinct, even, blackish brown submarginal longitudinal bands; vulva flatly rounded, with fringe of fine hairs; posterior margin of last segment flatly rounded, with fine, uncolored hairs.

Physostomum invadens n. sp.

Specimens from a woodpecker, *Melanerpes wagleri* and from *Chiroxiphia lanceolata* (Panama). The finding of this species on *Melanerpes* is the first recorded occurrence of *Physostomum* on a non-passerine bird.

Description of female. Body, length 3 mm., width .81 mm; pale translucent brownish with dark brown to blackish head and thoracic markings and lateral abdominal bands; in outline and structural characters very like *pallens*.

Head, length .66 mm., width .6 mm.; almost identical with that of *pallens*; ground color browner; the hairs of ocular emargination rather longer and fewer. Prothorax with lateral angles hardly apparent, but marked by the presence of a long hair and spine. Legs with a little brownish coloring. Abdomen with longer hairs and more in posterior angles of segments, and with two hairs on posterior margin of each segment just a little distance inward from posterior angle. Lateral bands of abdomen rather broad and marginal; in each of these broad brown longitudinal bands the true lateral bands, chitinized, may be seen.



LIST OF HOSTS, WITH PARASITES.

- | | |
|--|---|
| <i>Larus glaucescens</i> | <i>Melanerpes wagleri</i> . |
| <i>Docophorus lari</i> | <i>Physostomum invadens</i> . |
| <i>Larus</i> sp. | <i>Melanerpes uropygialis</i> . |
| <i>Docophorus lari</i> . | <i>Menopon præcursor</i> . |
| <i>Nirmus punctatus</i> . | <i>Melanerpes formicivorus angustifrons</i> . |
| <i>Colpocephalum abbotti</i> . | <i>Docophorus californiensis</i> . |
| <i>Diomedea nigripes</i> . | <i>Myiarchus cinerascens nuttingi</i> . |
| <i>Lipeurus confidens</i> . | <i>Docophorus rufus</i> . |
| densus. | <i>Elainea subpagana</i> . |
| <i>Eurymetopus taurus</i> . | <i>Physostomum pallens</i> . |
| <i>Pelecanus californicus</i> . | <i>Colpocephalum diffusum</i> . |
| <i>Lipeurus forficulatus</i> . | <i>Corvus corax sinuatus</i> . |
| <i>Menopon titan</i> var. <i>linearis</i> . | <i>Amblycercus holosericeus</i> . |
| <i>Fregata aquila</i> . | <i>Nirmus virgatus</i> . |
| <i>Lipeurus gracilicornis</i> , var. <i>major</i> . | <i>Colpocephalum diffusum</i> . |
| <i>Colpocephalum spineum</i> . | <i>Colpocephalum striaticeps</i> . |
| <i>Menopon auri-fasciatum</i> . | <i>Colpocephalum diffusum</i> . |
| <i>Merganser serrator</i> . | <i>Saltator albicollis</i> . |
| <i>Docophorus ieterodes</i> . | <i>Colpocephalum diffusum</i> . |
| <i>Anas carolinensis</i> . | <i>Chiroxiphia lanceolata</i> . |
| <i>Trinoton luridum</i> . | <i>Physostomum invadens</i> . |
| <i>Ardea virescens</i> . | <i>Colpocephalum diffusum</i> . |
| <i>Colpocephalum diffusum</i> . | <i>Cardinalis cardinalis igneus</i> . |
| <i>Tringa macularia</i> . | <i>Docophorus communis</i> . |
| <i>Docophorus cordiceps</i> . | <i>Phœnicothraupis fuscicauda</i> . |
| <i>Nirmus furvus</i> var. <i>ravus</i> . | <i>Docophorus panamensis</i> . |
| <i>Tringa</i> sp. | <i>Colpocephalum diffusum</i> . |
| <i>Nirmus fissus</i> var. <i>major</i> . | <i>Progne subis hesperus</i> . |
| <i>Lagopus lagopus</i> . | <i>Docophorus domesticus</i> . |
| <i>Lipeurus protervus</i> . | <i>Phainopepla nitens</i> . |
| <i>Goniodes mammillatus</i> . | <i>Nirmus peninsularis</i> . |
| <i>Menopon striatum</i> . | <i>Protonotaria citrea</i> . |
| <i>Polyborus cheriway</i> . | <i>Physostomum pallens</i> . |
| <i>Nirmus splendidus</i> . | <i>Dendroica bryanti</i> . |
| <i>Colpocephalum maculatum</i> . | <i>Nirmus interpositus</i> . |
| <i>Falco sparverius peninsularis</i> . | <i>Colpocephalum diffusum</i> . |
| <i>Nirmus fuscus</i> . | <i>Cinclus mexicanus</i> . |
| <i>Crotophaga sulcirostris</i> . | <i>Docophorus laticeps</i> var. <i>americanus</i> . |
| <i>Lipeurus macgregori</i> . | <i>Parus atricapillus occidentalis</i> . |
| <i>Coccyzus americanus occidentalis</i> . | <i>Docophorus rutteri</i> . |
| <i>Docophorus latifrons</i> var. <i>occidentalis</i> . | <i>Auriparus flaviceps</i> . |
| <i>Piaya cayana thermophila</i> . | <i>Nirmus audax</i> . |
| <i>Nirmus atopus</i> . | |
| <i>Colpocephalum diffusum</i> . | |

EXPLANATION OF PLATES.

PLATE I.—Fig. 1, *Docophorus panamensis* Kellogg, ♀. Fig. 2, *D. cordiceps* Giebel, ♂. Fig. 3, *D. rutteri* Kellogg, ♀. Fig. 4, *D. laticeps* G., var. *americanus* Kellogg, ♀. Fig. 5, *D. latifrons* N., var. *occidentalis* Kellogg, ♀. Fig. 6, *D. rufus* Kellogg, ♀. Fig. 7, *D. laticeps* G., outline of head. Fig. 8, *D. latifrons* N., var. *occidentalis* Kellogg, abdomen of ♂, ventral aspect. Fig. 9, *D. rufus* Kellogg, abdomen of ♀, ventral aspect.

PLATE II.—Fig. 1, *Nirmus fureus* N., var. *ravus* Kellogg, ♀. Fig. 2, *N. fissus* N., var. *major* Kellogg, ♀. Fig. 3, *N. splendidus* Kellogg, ♀. Fig. 4, *N. atopus* Kellogg, ♀. Fig. 5, *N. virgatus* Kellogg, ♀. Fig. 6, *N. splendidus* Kellogg, genital blotch of ♂. Fig. 7, *N. interpositus* Kellogg, ♀. Fig. 8, *N. audax* Kellogg, ♀. Fig. 9, *N. peninsularis* Kellogg, ♀.

PLATE III.—Fig. 1, *Lipeurus confidens* Kellogg, ♀. Fig. 2, *L. densus* Kellogg, head of ♂. Fig. 3, *L. gracilicornis* P., var. *major* Kellogg, ♂. Fig. 4, *L. protervus* Kellogg, ♀. Fig. 5, *L. macgregori* Kellogg, head of ♂. Fig. 6, *L. macgregori* Kellogg, ♀.

PLATE IV. Fig. 1, *Colpocephalum spineum* Kellogg, ♂. Fig. 2, *C. maculatum* P., ♂. Fig. 3, *C. diffusum* Kellogg, ♂. Fig. 4, *C. diffusum* Kellogg, ventral aspect of abdomen of ♀. Fig. 5, *Menopon auri-fasciatum* Kellogg, ♀. Fig. 6, *M. striatum* Kellogg, ♀. Fig. 7, *Physostomum palleanus* Kellogg, ♀. Fig. 8, *Menopon praecursor* Kellogg, ♀. Fig. 9, *Colpocephalum abbotti* Kellogg, ♀.

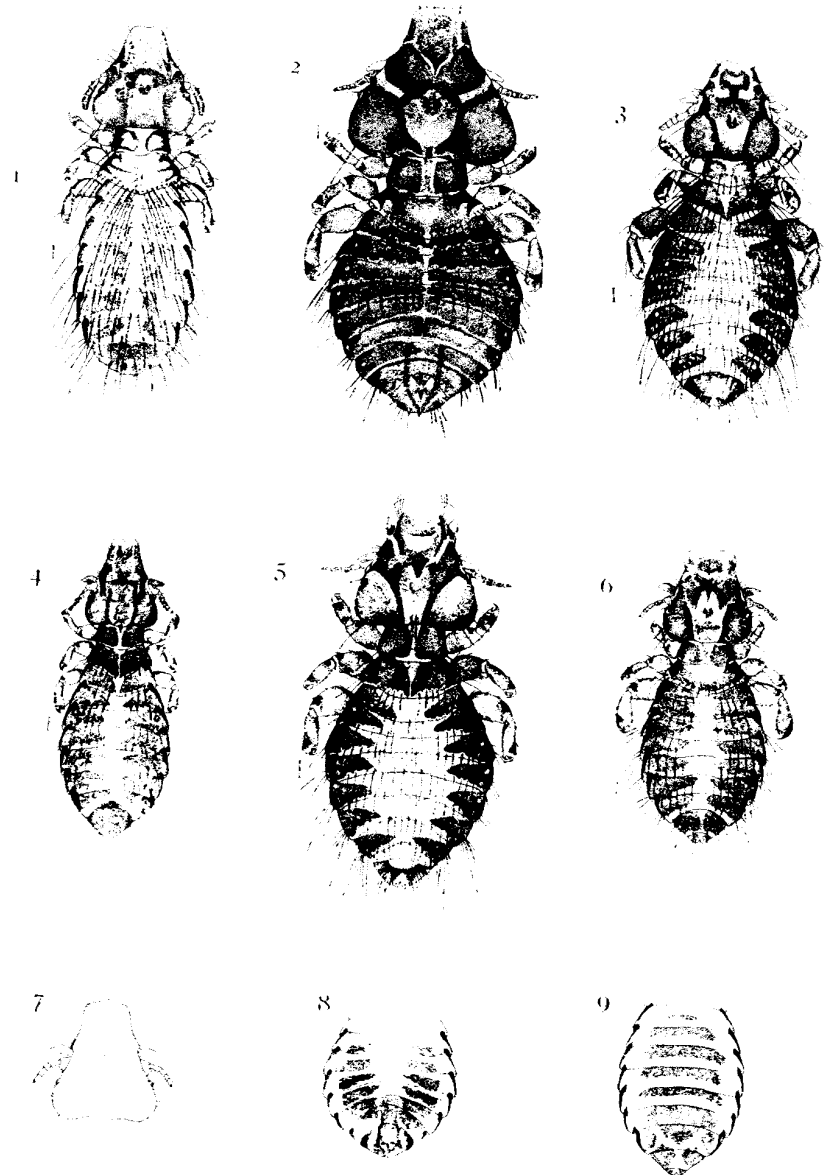
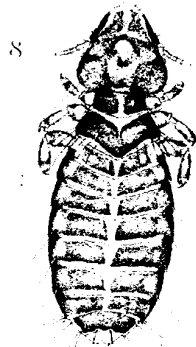
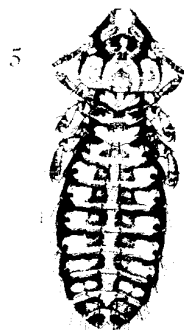
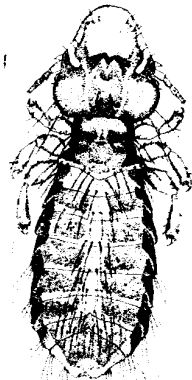
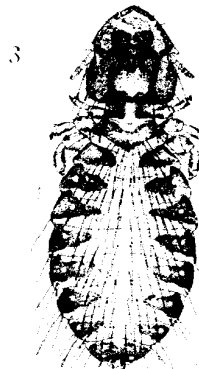
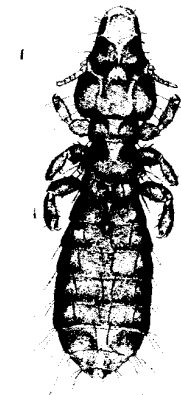
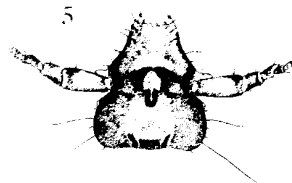
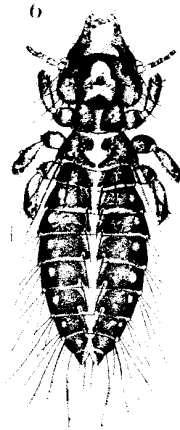
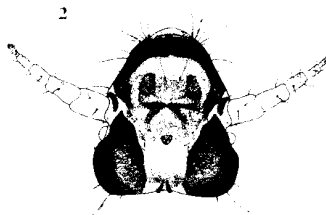
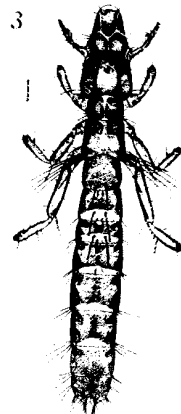


PLATE I

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