

MALLOPHAGA FROM BIRDS OF CALIFORNIA.

(With Plates V to IX.)

BY VERNON L. KELLOGG AND BERTHA L. CHAPMAN.

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INTRODUCTION.

The Mallophaga described and referred to in this paper were collected by Messrs. Snodgrass, Osgood, Brown, and McLain, students of Stanford University, California, Mr. Ed. M. Ehrhorn, Horticultural Commissioner for Santa Clara County, California, and by the senior author, Mr. Kellogg. All of the specimens from birds of the Bay of Monterey, California, were taken by Mr. Kellogg from just-killed birds or freshly made skins collected by Mr. Leverett M. Loomis, Curator of the Department of Ornithology, California Academy of Sciences. The authors desire to acknowledge their obligations to these various collectors.

The sequence of genera in this paper is that adopted in the European monographs and in the papers of the senior author (Kellogg, *New Mallophaga I*, 1896;* *New Mallophaga II*, 1896;* *Mallophaga from Birds of*

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Panama, Baja California, and Alaska, in *New Mallophaga* III, 1899). The sequence of species in each genus is determined by the hosts, the sequence of hosts being that of the A. O. U. Check-List of North American Birds, 2d. edition, 1895.

Docophorus.

Docophorus procax n. sp. (Plate V, fig. 1).

Many specimens from two Pigeon Guillemots, *Cephus columba* (Bay of Monterey, California). A member of the group *trianguliferi* Piaget (Les Pediculines, p. 113), and most resembling *pilosus* Piaget (ibid, p. 116, pl. x, fig. 4) from a flamingo, *Phœnicopterus antiquorum*, but differing in the hairs of clypeus, of metathorax, shape of abdominal blotches, etc.

Description of the male. Body, length 1.45 mm., width .76 mm.; head comparatively large, with frontal part of clypeus uncolored and expanded; thorax and first segment of abdomen golden brown with darker markings; abdomen oval, pale, whitish medially, with dark brown transverse bands and blackish lateral bands.

Head, length .52 mm., width .54 mm.; conical, temples wide, sides rapidly approaching each other anteriorly; frontal uncolored clypeal space expanded; front straight or feebly concave; no hairs on the rounding uncolored clypeal region but one short marginal prickle at the point where the clypeus begins to swell beyond the sides of the head; a second short prickle before the suture; two dorsal hairs just before the clear uncolored clypeal region; two short prickles in front of the trabeculæ; trabeculæ large, reaching nearly to the end of the second segment of the antennæ, well col-

ored with pale brown, a short prickle at the base; antennæ small, of the same golden brown as the head, with slightly darker markings; eye inconspicuous, with two short prickles and an ocular fleck; temples rounded, with two long hairs and several prickles; occipital margin straight; clypeal signature broadly shield-shaped, sides constricted anteriorly, with posterior angle reaching almost to the mandibles; the quadrangular space in the middle of the signature is slightly darker than the most anterior portion; antennal bands interrupted by the suture, the bands turning in at the suture, nearly meeting on the median line, the bands themselves becoming narrow and acuminate; the posterior ends of the antennal bands bend in and back till they meet the dark blotch caused by the mandibles showing through the head; ocular blotches distinct; temporal borders narrow, occipital bands distinct, slightly diverging anteriorly; occipital border not extending to the sides of the head.

Prothorax broad, with sides diverging; posterior angles rounding; lateral borders dark, extending in along the posterior margin. Metathorax pentagonal, sides strongly divergent, posterior margin angular, with slightly rounding tip on the abdomen; one short prickle and one long pustulated hair in the posterior angles, three pustulated hairs each side of the posterior marginal angle; segment pale in the middle, growing darker laterally and posteriorly. Legs of the same golden brown as the thorax, darker lateral borders and annulations, claws also dark. Sternal markings consist of dark brown intercoxal lines and a pale median metathoracic blotch.

Abdomen broadly ovate, turbinate; segments 2 to 7 with prominent posterior angles, each bearing

from one to three long hairs; segment 1 wholly golden brown, the transverse blotches meeting near the posterior margin in an acute point; the transverse lateral blotches of segments 2 to 7 are separated by a transparent whitish median space; the lateral margins of the segments are dark brown to black; along the posterior margins of the transverse lateral bands are partially uncolored spots bearing long hairs; stigmal spots distinct; segment 8 wholly pale brown, darker in the middle, owing to the dark genitalia showing through; segment 9 very small and uncolored; genitalia distinct, dark brown reaching as far forward as segment 6.

Female. Body, length 1.62 mm., width .78 mm.; head, length .56 mm., width .53 mm.; abdomen not so broad in comparison with the length as in the male, not turbinate, and the median whitish space larger.

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

Specimens from *Larus delawarensis*, *L. occidentalis* (three birds), and *L. heermanni* (two birds) (Bay of Monterey, California). Previously taken by Kellogg from these and other species of *Larus*.

Docophorus melanocephalus Burmeister. (See Kellogg, New Mallophaga, I, 1896, p. 99, pl. iv, fig. 6).

Two specimens from the Royal Tern, *Sterna maxima* (Bay of Monterey, California), and two specimens from the Pomarine Jaeger, *Stercorarius pomarinus* (Bay of Monterey, California). Previously taken by Kellogg from *Sterna maxima* (same locality).

Docophorus validus n. sp. (Plate V, fig. 2).

A single female specimen of this striking *Docophorus* from a Black-vented Shearwater, *Puffinus opisthomelas*

(Bay of Monterey, California). In general shape and in certain special characters this new form somewhat resembles *D. brevi-antennatus* Piaget (*Les Pédiculines*, p. 108, pl. ix, fig. 9) from *Sula australis* (Museum of Leyden); the differences, however, in shape of metathorax, abdominal blotches, etc., are marked.

Description of the female. Body, length 2.25 mm., width 1.18 mm.; large triangular head with narrow, emarginate front; abdomen nearly circular, with strongly marked, lateral, transverse blotches, mostly acute inwardly.

Head, length .72 mm., width .72 mm., front of the head before the trabeculae elongate and markedly narrowing anteriorly; dark lateral margins extending slightly beyond the narrow, concave, uncolored clypeal region, terminating in a sharp, slightly incurving angle; a short prickle on the anterior margin of this projecting angle, a short hair on the lateral margin of the front, near the suture; two dorsal hairs extending beyond the lateral margin of the head; trabeculae large, reaching to the end of the second segment of the antennae; segment 1 of the antenna long, segment 5 but little longer than segments 3 or 4; eyes prominent, with a short spine and a hair; temples slightly protruding, parabolic, with two long hairs and three short spines; occipital margin slightly convex upon the prothorax; signature distinct, anteriorly concave; deeper chestnut-brown along the anterior margin than through the wide median portion, posteriorly narrowing into a dark, narrow, acuminate point reaching to the mandibles; the anterior portion of this posterior point is darker than the rest of the signature; antennal bands broad, even, of a dark, rich, golden brown, paling slightly in the anterior portion, beyond the suture; posterior extremities bending inwardly, separated by a

pale median space between the occipital bands; occipital bands much paler than the temporal borders, indistinctly fading anteriorly into dark ocular blotches; temporal margins narrowly bordered with dark brown; occipital blotches distinct.

Prothorax small, oblong; angles rounding, with one long hair; lateral blotches distinct, separated by a pale median line, darker along the posterior margin near the angle, and fading gradually anteriorly. Metathorax only two-thirds as wide as the head, with strongly diverging sides, rounding, posterior angles; posterior margin broadly rounded upon the abdomen; one very short prickle and one long hair in a pale brown space on the posterior angle; six long pustulated hairs on the posterior margin; lateral markings little darker than the general dark brown of the metathorax.

Abdomen nearly circular; transverse, lateral blotches distinct, acute inwardly, and darkest at the inner ends; each bearing from one to four pustulated hairs; segment 8 entirely dark brown; segment 9 rounding, with a narrow, angular emargination; one fine hair each side of this emargination.

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

Specimens from a Lesser Scaup Duck, *Aythya affinis*, and from an American Scaup Duck, *Aythya marila nearctica* (Palo Alto, California). Previously taken by Kellogg from the first named host species, and from six other duck species.

Docophorus fusiformis Denny. (Plate V, fig. 3).

Monographia Anoplurorum Britanniae, 1842, p. 84, pl. i, fig. 2.

Docophorus fusiformis D., Giebel, Insecta Epizoa, 1874, p. 104; Piaget, Les Pediculines, 1880, p. 86, pl. vi, fig. 7.

Docophorus fssiformis D., Osborn, Insects Affecting Domestic Animals, Bull. 5, N. S., Div. of Ent., U. S. Dept. Ag., 1896, p. 217.

One male from a Least Sandpiper, *Tringa minutilla* (Palo Alto, California). Denny's specimens were taken from the same host; Giebel's single specimen from the same host, and Piaget's from *Tringa subarquata*. Osborn's specimens are from the "black-billed sandpiper" (Burrnett collection). Our specimen has no emargination of the clypeal front, a character especially noted by Denny and Piaget. But Giebel's specimen is like ours: "der Vorderrand ist nicht tief ausgeschnitten, sondern nur sanft concav." The species can be recognized by the large elongate head, the dark coloration, and narrow genitalia. Our specimen, figured, measures: body, length, 1.31 mm., width .5 mm.; head, length .5 mm., width .44 mm.

Docophorus fuliginosus Kellogg.

New Mallophaga, I, 1896, p. 80, pl. iii, fig. 2.

Specimens from the Black-bellied Plover, *Squatarola squatarola*, and from the Semipalmated Plover, *Agialitis semipalmata* (Pacific Grove, California). Described from *Squatarola squatarola* (Kansas and California).

Docophorus pictus Giebel. (Plate V, fig. 4).

Insecta Epizoa, 1874, p. 74.

Docophorus pictus G., Piaget, Les Pediculines, 1880, p. 23.

Numerous specimens from a Golden Eagle, *Aquila chrysaetos* (Palo Alto, California). The specimens are of the characteristic group infesting eagles, of which *platystomus* N. (Giebel, Insecta Epizoa, p. 69, pl. ix, fig. 1; Piaget, Les Pediculines, p. 17, pl. i, fig. 1) may be taken as type. So many species have been described in this group, on what seems to us slight differences, that one may well despair of making a satisfactory reference of his specimens to any one of the forms to the exclusion

of all others. From this same host half a dozen species of *Docophorus* (all of the *platystomus* type) have been described.

The truncate, not emarginated, clypeal front, and the slight dilation of the uncolored part of the clypeus lead us to refer our specimens to a species proposed by Giebel for specimens collected from the same host as that of our specimens. Osborn (*Insects Affecting Domestic Animals*, 1896, p. 218,) describes a species *halieti* from the Bald Eagle, *Haliaeetus leucocephalus* (Florida). This species has a marked lateral, anterior, clypeal dilation, and the front is emarginate.

The members of the group may be recognized by the uncolored front of the clypeus more or less dilated. We figure a female. Measurements: Male, body, length 2.22 mm., width 1.2 mm.; head, length .85 mm., width .91 mm. Female, body, length 2.81 mm., width 1.4 mm.; head, length .94 mm., width 1. mm.

***Docophorus cursor* Nitzsch.** (See Kellogg, *New Mallophaga*, II, 1896, p. 484, pl. lxvi, fig. 1).

Specimens from two individuals of the American Long-eared Owl, *Asio wilsonianus*, (Ontario, California). Taken previously by Kellogg from *Bubo virginianus* (Lawrence, Kansas). Recorded by Osborn from *Asio wilsonianus* (Ames, Iowa, and Lincoln, Nebraska).

***Docophorus speotyti* Osborn.**

Insects Affecting Domestic Animals, 1896, Bull. No. 5, Div. o Ent., U. S. Dept. Ag., p. 222, fig. 144.

Specimens from a Spotted Owl, *Syrnium nebulosum* (La Honda, California). Agrees well with Osborn's description (except that the abdomen is narrow, with subparallel sides in the *female*, while it is more ellipti-

cal, widest at segment 4, in the *male*, just the reverse of the condition according to Osborn).

***Docophorus ceblebrachys* Nitzsch.** (See Kellogg, *New Mallophaga*, II, 1896, p. 485, pl. lxvi, fig 3).

Many specimens from a Snowy Owl, *Nyctea nyctea* (Pullman, Washington). Taken previously by Kellogg from same host (Kansas).

***Docophorus singularis* n. sp.** (Plate V, fig. 5).

Specimens from a Nuttall's Woodpecker, *Dryobates nuttalli* (Ione, California). Not like any other woodpecker-infesting *Docophori*, but belongs rather to the group *femorati*.

Description of the female. Body, length 1.43 mm., width .71 mm.; dark chestnut-brown with distinct bands on the head and thorax, angular, lateral, transverse blotches on the abdomen; unique in the possession of bipartite trabeculae.

Head, length .65 mm., width .53 mm.; large, broadly concave, uncolored clypeal region broad with straight to slightly concave front; one marginal hair in front of distinct suture, two dorsal hairs near the lateral margin, one rather short and stiff, extending forward beyond the clypeal margin, the second very long; two dorsal hairs in front of the trabeculae; the trabeculae divided, anterior part short and acutely angulated, extending around the base of the posterior portion of the trabeculae on the ventral surface, the posterior portion of the trabeculae nearly as long as the first two segments of the antennae, about the same width throughout, a deep chestnut-brown at the base, with uncolored tip; antennae with the first two joints long and about equal, pale golden brown, last three joints darker chestnut-brown,

a few short spines on the joints, especially numerous and strong on the first two joints; eye with one long hair, and near the posterior margin a second long hair; temples rounding, with three long, pustulated, marginal hairs and one short prickle, occipital margin slightly convex; signature distinct, anterior margin concave, with a slight lateral constriction near the anterior angles, posterior angles extended backward, posterior margin extending in a long, acute angle beyond the mandibles; antennal bands distinctly interrupted at the suture, dark chestnut-brown, posterior extremities inward and back, meeting well defined, diverging occipital bands; temples dark chestnut-brown, with narrow blackish margins, interrupted by large pustulations.

Prothorax small, lateral margins strongly rounding; one long pustulated hair in the posterior angle; lateral blotches dark chestnut-brown, separated by a pale median line; blackish lateral borders. Metathorax with strongly divergent lateral margins nearly as wide as the head; a series of long pustulated hairs on the angulated posterior margin; lateral blotches dark, separated by a pale median line which widens distinctly near the middle; bands of blackish brown on the lateral and posterior margins. Sternal markings composed only of the distinct intercoxal lines between the pro- and mesothoracic legs. Legs pale brown with dark bands.

Abdomen broadly ovate, segments distinctly narrowing on the median line; one to three long hairs in the posterior angles; many long, pustulated, dorsal hairs in a transverse series on the posterior margin of each segment; lateral transverse triangular blotches dark chestnut-brown, slightly darker on the lateral margin; median portion of the abdomen uncolored; posterior margin of the transverse blotches interrupted by uncolored pustulations; segment 8 entirely dark brown;

segment 9 narrowly emarginate, rounding, with two short prickles on the posterior margin; two dark lateral blotches separated by a broad uncolored space; genital blotches distinctly dark brown, broadly rounding on segments 5 and 6, posterior margin rapidly tapering to segment 8.

Male same size as female; last segment broadly, flatly rounded, with several long hairs on each side of the bare median third of the posterior margin.

***Docophorus californiensis* Kellogg.**

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

Specimens from Williamson's Woodpecker, *Sphyrapicus thyroideus* (El Dorado county, California), the White-headed Woodpecker, *Xenopicus albolarvatus* (El Dorado county, and Kings River Cañon, California), and the Californian Woodpecker, *Melanerpes formicivorus bairdi* (Palo Alto, California). Types collected by Kellogg from *Melanerpes formicivorus bairdi* (Palo Alto, California). The specimens from the El Dorado county birds show narrow heads and bodies, but this is probably due to shrinking in drying, as all the specimens of the small collections from this locality appear to have suffered in the same way.

***Docophorus rufus* Kellogg.**

Mallophaga from Birds of Panama, Baja California and Alaska, in New Mallophaga, III, 1899, p. 7, pl. i, figs. 6 and 9.

Three specimens from an Ash-throated Flycatcher, *Myiarchus cinerascens* (Alameda county, California) and three specimens from another specimen of the same bird species from Ontario, California. Described by Kellogg from *Myiarchus cinerascens nuttingi* (Baja California).

Docophorus fusco-ventralis Osborn.

Insects Affecting Domestic Animals, 1896, Bull. 5, N. S., Div of Ent., U. S. Dept. of Ag., p. 221.

One specimen from an Ash-throated Flycatcher, *Myiarchus cinerascens* (Palo Alto, California). Osborn's specimens were from the Wood Pewee, *Contopus virens* (Cornell University Collection; Burnett Collection).

Agrees well with Osborn's description, except that the fuscous coloration of ventral aspect is in broad transverse bands separated by distinct, paler sutural bands, instead of being "beneath uniformly dark brown."

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

Under this name we group together a large number of very similar forms; or if dissimilar, forms connected by gradatory specimens. These forms are taken from passerine birds and belong to Piaget's group *femorati* (Les Pediculines, p. 53), characterized by the large truncate or feebly convex or weakly emarginated clypeus, with long hair in each anterior angle, by the especially large third pair of legs, and by the conspicuous pustulated hairs of the thorax and abdomen. The marked variation (notably in size of hindmost legs) among individuals from a single bird specimen (let alone bird species) and the series of gradatory forms connecting all the variations manifest in the group make it impossible for us to attempt to distinguish different species in this mass of material. Piaget has, indeed, attempted to define half a dozen varieties of *communis*, but in no very confident manner. The group *femorati* can furnish time-killing work for any student bold enough to undertake its discipline.

Docophori of this group, referable to the species *communis*, in its widest sense, have been determined by us

from the following passerine hosts, all from California: Ash-throated Flycatcher, *Myiarchus cinerascens*; Western Flycatcher, *Empidonax difficilis*, two specimens; Mexican Horned Lark, *Otocoris alpestris chrysolama*; Blue-fronted Jay, *Cyanocitta stelleri frontalis*, three specimens; California Jay, *Aphelocoma californica*; Western Meadow Lark, *Sturnella magna neglecta*; Brewer's Blackbird, *Scolecophagus cyanocephalus*; Pine Siskin, *Spinus pinus*; Western Lark Sparrow, *Chondestes grammacus strigatus*, two specimens; Intermediate Sparrow, *Zonotrichia leucophrys intermedia*; Gambel's Sparrow, *Zonotrichia leucophrys gambelii*, three specimens; Golden-crowned Sparrow, *Zonotrichia coronata*, two specimens; *Spizella* sp.; Western Chipping Sparrow, *Spizella socialis arizonae*; Bell's Sparrow, *Amphispiza belli*; Samuel's Song Sparrow, *Melospiza fasciata samuelis*, two specimens; California Towhee, *Pipilo fuscus crissalis*, two specimens; Black-headed Grosbeak, *Zamelodia melanocephala*; Western Blue Grosbeak, *Guiraca caerulea eurhyncha*, three specimens; Louisiana Tanager, *Piranga ludoviciana*, two specimens; Cedar Waxwing, *Ampelis cedrorum*; Northern Shrike, *Lanius borealis*; California Shrike, *Lanius ludovicianus gambelii*, two specimens; Cassin's Vireo, *Vireo solitarius cassinii*; Yellow Warbler, *Dendroica aestiva*; Vigor's Wren, *Thryothorus bewickii spiturus*; Plain Titmouse, *Parus inornatus*, three specimens; Audubon's Hermit Thrush, *Turdus aonalaschke auduboni*; Western Bluebird, *Sialia mexicana occidentalis*. Previously taken by Kellogg from sixteen species of passerine birds.

Docophorus mirinotatus n. sp. (Plate V, fig. 6).

A female and several immature specimens from a Thurber's Junco, *Junco hyemalis thurberi* (Goat Mt.,

alt. 11,500 ft., Kings River Cañon, California). This Nirmoid form does not much resemble any other *Docophorus* known to us. The strangely emarginated, transverse abdominal blotches are unique.

Description of the female. Body, length 1.65 mm., width .53 mm., slender, Nirmoid in form, with head wider than thorax and almost as wide as abdomen; abdomen yellowish white, with narrow blackish lateral bands, and transverse bands with their anterior margins widely and irregularly emarginated.

Head, length .46 mm., width .43 mm.; clypeus broad, with straight or very slightly concave front; one short hair in the lateral margin near the front, a second longer hair in front of the suture; eye with a long hair; temples flatly rounding, with two very long hairs and two or three prickles; markings indistinct; antennal bands interrupted at the suture; occipital bands widely separated posteriorly but converging rapidly anteriorly, forming a triangle with the mandibles at apex; trabeculae slender, short.

Prothorax narrow, quadrangular, with a long hair in the posterior angle; pale medially, with distinct dark lateral bands. Metathorax with a series of long hairs along the posterior margin which is distinctly angulated on the abdomen; lateral, dark brown borders.

Abdomen slender, elongate-elliptical; from one to three long hairs in the posterior angles of the segments and a dorsal, transverse series of long pustulated hairs on each segment rising near the middle of the segments; segments with median blotches which are widely and irregularly emarginate anteriorly, the blotches also interrupted by the pustulations which fade into the medial emargination; the transverse blotches distinctly darker on the posterior margin just

beneath the uncolored medial space and extending laterally not quite to the lateral bands; distinct narrow blackish bands on the lateral margins; last segment narrowly, angularly emarginate, with a short hair on the posterior margin each side of the emargination, and with pale brown transverse blotches, but no dark bands on lateral margins.

***Docophorus mirus* n. sp.** (Plate V, fig. 7).

A few specimens from two Vigor's Wrens, *Thryothorus bewickii spilurus* (Palo Alto, California). Characterized by the very large head and small abdomen, the head being two-fifths as long as the whole body and almost, if not quite, as wide.

Description of the female. Body, length 1.5 mm., width .65 mm.; head very large in proportion to the body, five-sixths as wide as the abdomen and two-thirds as long.

Head, length .56 mm., width .53 mm., broadly conical; uncolored clypeal front slightly concave in the middle, a rather long stiff dorsal hair rising near the lateral margin and extending forward beyond the margin of the head, a short hair on the margin in front of a distinct suture, two rather long hairs before the trabeculae which reach as far as the end of the second segment of the antennae; segment 2 of the antennae long, segment 5 longer than either segment 3 or 4; eye distinct, a long hair on the dorsal surface and a shorter hair arising near the posterior angle; three long hairs and a short prickle on the rounding angle of the temples; occipital margin slightly convex; signature distinct, pale fulvous, anterior margin slightly concave; lateral margins straight, though the dark, narrow lines of the inner bands make it appear that there is a strong

constriction near the anterior margin; posterior angles rounding; posterior margin extending back beyond the mandibles in a dark, narrow point; antennal bands marginal, narrow, dark chestnut-brown, interrupted by the distinct suture, bending in to meet the anterior ends of the occipital bands in an indefinite, pale fulvous band; temples bordered anteriorly with a narrow border of dark chestnut; occipital bands narrow but distinct posteriorly, widely diverging and apparently connecting with the antennal bands.

Prothorax narrow, about half as wide as the head; lateral margin convex, one long pustulated hair in the posterior angles; a narrow lateral border of dark chestnut-brown. Metathorax with sides convex and strongly diverging; a series of long pustulated hairs on the posterior margin which is obtusely angled on the abdomen; lateral margin bordered with dark chestnut-brown. Legs fuscous, with dark fuscous borders and semiannulations; third pair of legs conspicuously large; a few scattered hairs and spines.

Abdomen broadly ovoid, short in comparison with the large head; first three segments longer than the others, their posterior margins more nearly straight; segments 4 to 8 narrowed, especially in the middle; last segment narrowly emarginate; many long pustulated hairs on the abdomen arranged in series on the posterior margin of each segment, especially thick along the middle; three or four short prickles on the lateral margin of the emargination of the last segment; first four segments dark chestnut-brown, segments 5 to 9 paler fuscous.

Male. Body, length 1.46 mm., width .53 mm.; head, length .53 mm., width .5 mm.; last abdominal segment rounded, with a fringe of about ten rather long weak hairs.

Nirmus.

Nirmus fusco-marginatus Denny. (Plate V, fig. 9).

Monograph. Anoplur. Brit., 1842, p. 136, pl. x, fig. 1.

Nirmus fusco-marginatus D., Giebel, Insecta Epizoa, 1874, p. 178; Piaget, Les Pediculines, 1880, p. 202, pl. xvi, fig. 6.

Many specimens of a *Nirmus* which may be referred to as a variety of this species of Denny, from an American Eared Grebe, *Colymbus nigricollis californicus*; also two specimens (rather smaller) from two Pigeon Guillemots, *Cepphus columba*, and a single specimen from the American Herring Gull, *Larus argentatus smithsonianus* (all the birds from the Bay of Monterey, California). Denny's types were taken from *Podiceps auritus* (Ireland), and Piaget's specimens from *Podiceps cristatus*. It seems to me that the *Nirmus podicipis* of Denny (Monograph. Anoplur. Brit. p. 142, pl. x, fig. 9) and the *Lipeurus runcinatus* Nitzsch (Giebel, Insecta Epizoa, p. 238) are both referable to *fusco-marginatus*. The antennal characters seem to be the same. As Piaget notes, the differing in the antennae of male and female makes it difficult to refer the species to *Nirmus*. It is a form showing a transition to *Lipeurus*. Our specimens are one-fourth larger than the types of the species and differ in some minor particulars.

Var. *americanus* Kellogg and Chapman. (Plate V, fig. 9). Female, body, length 2.62 mm., width .81 mm.; head, length .56 mm., width .44 mm. Differs from the species type in having a spine in the posterior angles of the prothorax, and a hair on each lateral half of the posterior margin; the metathorax has six hairs and a spine on each lateral half of the posterior margin. The species is easily recognizable by its long slender body, short, narrow, pointed head, and the black, lateral, triangular, abdominal blotches with brown inward-projecting processes.

Nirmus pacificus n. sp. (Plate V, fig. 8).

Two males from a Tufted Puffin, *Lunda cirrhata*; one male from a Black-bodied Shearwater, *Puffinus griseus*; and specimens, males and females, from two Pigeon Guillemots, *Cepphus columba*—all the birds from the Bay of Monterey, California. The specimen from *Puffinus* is almost certainly a straggler, as no other specimen was taken from the fifty-five individuals of *Puffinus* examined. The new species belongs to Piaget's group *zonati* (Les Pediculines, p. 187), and is most like *citrinus* (ibid. p. 190, pl. xvi, fig. 8). The metathorax, however, is angulated, not flatly rounded, as with *citrinus*, on the abdomen, and there are other differences.

Description of the male. Body, length 1.46 mm., width .5 mm.; short, broad, Docophoroid in form; light golden brown with conspicuous broad, dark antennal bands and dark brown to black lateral abdominal bands interrupted segmentally.

Head, length .5 mm., width .4 mm.; broadly conical; clypeal front very slightly concave; three marginal hairs on the front, one on the clear portion, and two before the suture; a short marginal prickle in front of the trabeculae, one dorsal hair just back of the first marginal, a second dorsal hair near the second marginal, two dorsal hairs between the suture and the trabeculae which are distinct and slightly colored; the antennae are short, segments 2 and 5 being longer than the others; color, the light golden brown of the head marked with slightly darker brown; eyes inconspicuous, with two short prickles; temples with sides nearly straight, rounding on posterior angles, with one very long hair, one shorter, weaker hair, and two short prickles; occipital margin concave; clypeus with a pale

but distinct pentagonal signature; antennal bands broad and dark, continuing beyond the suture; behind the obtuse posterior angle of the signature a narrow longitudinal uncolored space extending to the mandibles; temples bordered by a very narrow line of dark brown slightly broader just below the eye; a distinct though pale occipital signature.

Prothorax quadrangular, very short, broadly rounded, angles with one rather long hair; pale medially with dark brown lateral margins that bend in along the posterior margin. Metathorax pentagonal with widely diverging sides; posterior angles acute; six hairs in the angle and along the posterior margin; the posterior margin with a distinct elongate angle on the abdomen; dark lateral markings broadest on the posterior angles. Legs pale golden brown with slightly darker marginal markings.

Abdomen slightly elongate-oval, turbinate; posterior margins of segments 1-3 angulated, and anterior margins of segments 6-9 more obtusely angled; lateral angles of segments with one to three hairs; a few hairs on dorsal surface arranged along the posterior margins of the segments; posterior margin of segment 9 broadly rounded, with ten rather long hairs, several shorter hairs on dorsal surface of segment; color of abdomen fuscous; segment 1 without distinct lateral blotches, but segments 2-7 with dark brown to black lateral blotches, darkest in anterior angles and extending along the anterior margin of each segment almost to the median line; segment 8 but little darker in anterior angle, and segment 9 of an even pale fuscous; genitalia distinctly showing through, extending to segment 6.

Female, body, length 1.75 mm., width .6 mm.; head, length .55 mm., width .47 mm.; lateral abdominal

bands distinct, blackish, the posterior part of each segmental portion tapering acuminately; segment 8 without lateral bands; segment 9 widely, angularly emarginate behind, with a single very fine short hair on each obtuse posterior point.

Nirmus maritimus n. sp. (Plate VI, fig. 1.)

Many specimens from numerous individuals of the Ancient Murrelet, *Synthliboramphus antiquus*, Cassin's Auklet, *Ptychoramphus aleuticus*, Rhinoceros Auklet, *Cerorhinca monocerata*. Also a single specimen (straggler) from a Pacific Fulmar, *Fulmarus glacialis glupischa*. All of these birds from the Bay of Monterey, California. Resembling *N. citrinus* Nitzsch (Giebel, Insecta Epizoa, p. 177; Piaget, Les Pediculines, p. 190, pl. xvi, fig. 8) from *Alca torda*, but more slender, with elongate head, angulated posterior margin of metathorax, different disposition of hairs of the head, etc.

Description of the female. Body, length 1.96 mm., width .46 mm.; slender, elongate; pale fuscous with darker lateral borders on the head and thorax and broad lateral bands on the abdomen.

Head, length .5 mm., width .37 mm.; narrowly elongate, conical, with clypeal front convex; three marginal hairs, the first one near the front and the third in front of the suture, the second is midway between these; a short prickle in front of the trabeculae which reach to the end of the first segment of the antennae; antennae short, not reaching more than two-thirds of the distance to the occipital margin; segment 2 longer than segment 1, and segment 5 longer than segments 3 or 4; a few short hairs on the segment; eye with a hair and a short prickle; temples with sides nearly parallel; one long hair, one short hair, and three short

prickles on the margin; occipital margin slightly concave; signature distinct, shield-shaped, anterior margin convex, posterior margin produced in a narrow point; antennal bands broad, interrupted by a distinct uncolored suture; the anterior extremities of the antennal bands bend broadly in at the suture, being separated medially by a narrow uncolored line that reaches nearly if not quite to the mandibles; ocular blotch fading inwardly; temporal borders narrow but well defined, broader just below the eye, gradually narrowing till it disappears before the occipital angle; a distinct conical occipital signature showing through from the under side of the head.

Prothorax with sides slightly diverging; posterior angles rounding, with one short hair; marginal borders dark golden brown, darker on the inner margin of the border; interrupted on the posterior margin by a broad pale median line. Metathorax with broadly rounding sides, diverging posteriorly; three hairs in the posterior angles; one long and one short hair on the posterior margin each side of the long, acute, median angle; lateral margins bordered with dark golden brown, darker on the inner margin. Legs pale fuscous with narrow dark marginal bands. Sternal markings consisting of pale fuscous intercoxal markings and a distinct median sternal blotch.

Abdomen narrow, elliptical; sides of the middle segments parallel; posterior angles with from one to two hairs; four dorsal hairs on the posterior margins of the segments, two near the middle and one each side near the lateral margin; transverse bands fuscous; lateral bands deep golden brown, broader anteriorly and extending beyond the suture into the segment in front; segments 2-6 with a pale posterior border; segments

7 and 8 with pale longitudinal median band; last segment narrowly rounding, with a narrow emargination; one short hair on the posterior margin, each side of the emargination; ventral surface with broad transverse median blotches.

Male. Body, length 1.5 mm., width .4 mm.; head, length .46 mm., width .34 mm.; distinctly shorter than the female; abdomen more broadly elliptical; segments 7 and 8 narrowed distinctly in the middle; last segment broadly rounded, with ten long hairs on the posterior margin; transverse bands distinctly dark on segments 1 to 6; last segment evenly pale yellow; genitalia darker brown, extending anteriorly to segment 5.

Nirmus triangulatus Nitzsch. (Plate VI, fig. 2).

Zeitschr. f. ges. Naturwiss. (Giebel), 1866, vol. xxviii, p. 378.
Nirmus normifer Grube, v. Middendorff's Sibir. Reise, 1851, Zool. i, p. 478, pl. i, fig. 8.
Nirmus triangulatus N., Giebel, Insecta Epizoa, 1874, p. 177; Piaget, Les Pediculines, 1880, p. 201, pl. xvi, fig. 5.

Many specimens of this striking *Nirmus* from one out of two birds shot of the Pomarine Jaeger, *Stercorarius pomarinus* (Bay of Monterey, California). Our specimens differ from Piaget's figure in having the head distinctly shorter and narrower in front, giving the insect an appearance markedly different from the effect given by the figure. There is probably no doubt, however, regarding the identity of the species.

Nitzsch's specimens were taken from "*Lestris crepidula*," Grube's from "*Lestris richardsoni*," and Piaget's from *Stercorarius pomarinus* and *Larus canus* (Zool. Garden of Rotterdam).

The species may be readily recognized by the characteristic black, subtriangular, lateral, abdominal blotches, and the chestnut-brown, median, abdominal

blotches (see figure). My specimens measured: Male, body, length 1.8 mm., width .62 mm.; head, length .53 mm., width .53 mm. Female, body, length 2.1 mm., width .63 mm.; head, length .6 mm., width .6 mm.

Nirmus lineolatus var. **atri-marginatus**. Kellogg and Chapman (For *lineolatus* see Kellogg, New Mallophaga, I, 1896, p. 113, pl. vi, figs. 7, 8 and 9).

Many specimens from *Larus canus*, *vega*, *brachyrhynchus* and *Rissa tridactyla pollicaris* (Bay of Monterey, California). A readily recognized variety of *lineolatus*, characterized by the presence of black temporal borders, usually strongly marked, sometimes weakly so. Other characters those of *lineolatus*.

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

Specimens from *Larus delawarensis* (Bay of Monterey, California). Taken previously by Kellogg from *Larus occidentalis* (same locality).

Nirmus giganticola Kellogg.

New Mallophaga, I, 1896, p. 105, pl. v, fig. 6.

Many specimens from a Short-tailed Albatross, *Diomedea albatrus*, and a single specimen from a Dark-bodied Shearwater, *Puffinus griseus* (Bay of Monterey, California). Described from *Diomedea albatrus* (same locality).

Nirmus complexivus n. sp. (Plate VI, fig. 3).

Many taken from the Sanderling, *Calidris arenaria* (Pacific Grove, California); found on every one of fifteen birds shot, and two specimens from a Least Sandpiper, *Tringa minutilla* (Palo Alto, California). This

form belongs to the group *zonati*, of Piaget (Les Pediculines p. 187) and shows but slight differences from several of the species of this group already described, one or two from the same host, indeed; but on the other hand Nitzsch's and Piaget's species differ among themselves but little, and the American specimens differ quite as much from any described species. In fact they are interesting as showing a combination of several characters which are presented as diagnostic of *cingulatus* (the interrupted first abdominal band), *zonarius* (the hairs and spines of the temples, and the head longer than wide), and *scalaris* (the size). In addition they present characters (metathoracic hairs, *et al.*) which are not shown by any one of the described species. I describe the American form therefore as a new species. The group needs revision; probably four or five of the present species should be reduced to varieties of the oldest named form, i. e. *cingulatus*.

Description of the female. Body, length 1.71 mm., width .5 mm.; readily distinguishable by its general dark color, and rounding, uncolored clypeus with the distinct colored signature, on each side of which lie the narrow triangular projections of the anterior ends of the antennal bands; the posterior ends of the antennal bands bend so strongly in at the suture that they mark the fore part of the head off from the hind part into a small cone.

Head, length .4 mm., width .34 mm.; elongate, triangular, with clypeus broadly rounding, the uncolored region slightly expanded beyond the suture; two short hairs on the rounding margin of the uncolored clypeus, one rather long hair in front of the trabeculae; trabeculae prominent, angular, reaching beyond the first joint of the antennae; antennae short, reaching barely two-

thirds of the distance to the occipital margin, pale fulvous with darker, broad annulations; segment 5 half as long again as segments 3 or 4; eyes distinct, with a hair and an ocular fleck; temples broadly rounding, with three long pustulated hairs, one short hair, and one prickle on the margin; occipital margin straight; clypeal signature constricted anteriorly, with the posterior, lateral angles projecting slightly backward; the posterior angle extending back indistinctly to the mandibles; antennal bands conspicuous, blackish brown, extending into long, paler, triangular projections on the clypeus; the blackish posterior ends extending in, meeting on the median line; ocular blotches contiguous with the dark temporal borders; occipital bands very definite, looking like two dark bars, bending outwards towards the ocular blotch but fading into the dark chestnut-brown of the temples; occipital blotch distinct; a pale transverse space behind the bent antennal bands, running like a curving bar across the head from margin to margin; occipital signature dark fuscous, spear-head-shaped.

Prothorax short, sides rounding; lateral quadrangular blotches separated by a narrow uncolored median line; lateral margin distinctly bordered with dark brown. Metathorax with strongly rounding sides; a short prickle in the anterior angle, a short prickle and a long pustulated hair near the middle of the lateral margin, two long pustulated hairs and two shorter hairs in the posterior angles, two short hairs on the posterior margin; the posterior margin rounding slightly upon the abdomen; strong, dark lateral bands. Legs light fulvous with dark marginal bands. Sternal markings consisting of intercoxal lines extending backward to the tip of the coxa of the second pair of legs;

a median sternal blotch rounding posteriorly with a sharp constriction about midway to the arrow-headed anterior portion.

Abdomen elongate, with one or two slender hairs in the posterior angles of the segments, two strong, pustulated hairs in the posterior margins of the segments; abdomen dark fulvous brown with broad, ill-defined, darker lateral bands, and a transverse linear band along the posterior margin of each segment of a darker brown, adjacent to which are the small uncolored stig-matal spots; the uncolored sutural lines distinct; segment 1 has the transverse band divided by a narrow uncolored median line; segments 8 and 9 more evenly colored; last segment angularly emarginated, with two anal blotches; two short hairs on the posterior margin each side of the emargination.

Nirmus actophilus n. sp. (Plate VI, fig. 4).

Many specimens from nine out of fifteen individuals shot of the Sanderling, *Calidris arenaria* (Bay of Monterey, California). A member of Piaget's group *obscuraturati* (Les Pediculines, p. 169) and resembling somewhat *inaequalis* (ibid., p. 176, pl. xv, fig. 1) from *Numenius arquata*.

Description of the female. Body, length 1.59 mm., width .4 mm.; pale, with distinct, narrow, lateral bands of dark brown to black, head darker brown than the thorax, with dark narrow marginal markings.

Head, length .37 mm., width .28 mm.; conical, but little wider through the temples; clypeus broadly rounded, with four marginal hairs, three on the front before the suture, and one long one before the trabeculae, also a short prickle just at the angle of the trabeculae; a dorsal hair between the two anterior marginal hairs,

two other dorsal hairs on each side near the anterior extremity of the incurving antennal bands; trabeculae distinct, reaching nearly to the end of the first segment of the antennae; antennae with segment 2 longer than segment 1, and segment 5 longer than segments 3 or 4; color pale fulvous, slightly darker on the last three segments, sutures uncolored, lateral margins slightly darker fuscous; eyes not conspicuous, flattened, with a fine hair and a short prickle; temporal margins slightly rounded, with one long weak hair, one very short hair, and three short prickles; occipital margin concave; clypeal markings distinct, marginal; signature short, distinct anterior margin fading into a broadly rounded posterior angle; behind the signature a transverse linear uncolored space, continuous with the clypeal sutures, forming a distinct uncolored transverse bar across the forehead; antennal bands well defined, bending forward at the clypeal suture into broad, quadrangular ends, posterior extremities bending backward nearly to the distinct ocular blotches, which meet posteriorly the anterior ends of the narrow black temporal borders; occipital blotches small; a distinct, elongate, oval, occipital signature showing through from the ventral side; the mandibles distinctly showing through the head, the oesophageal sclerite showing faintly.

Prothorax with flatly rounded lateral margins, each posterior angle with one pustulated hair; general color pale brown to whitish, with narrow dark lateral bands. Metathorax expanded posteriorly, angles extended, with three long pustulated hairs, and some short weak hairs in the angle and along the lateral third of the posterior margin; posterior margin slightly angulated on the abdomen; narrow black submarginal markings, broadening but less definite on the anterior angles; intercoxal

lines, and a narrow, lanceolate, median, sternal blotch showing through. Legs of an even fuscous, first pair lighter than the second or third pair.

Abdomen elongate, slightly attenuated anteriorly; segments 8 and 9 tapering rapidly; posterior angles acute, each containing from one to three hairs; dorsal surface with a few hairs, four on the posterior margins of segments 1 to 7, two near the middle and two near the lateral margins; ground color pale fawn, gradually growing darker posteriorly, with dark brown lateral bands which send out from their anterior half an indefinite line that partially surrounds the stigmatal spot; segment 9 angularly emarginate, each broadly rounded angle bearing a short bristle; ventral surface with broad transverse bands of dark fawn, which give a darker tone to the paler transverse bands of the dorsal surface; a more definite series of hairs on the posterior margin of the segments than above; segment 8 with a group of three short hairs near the lateral margin.

Nirmus cordatus Osborn.

Insects Affecting Domestic Animals, Bull. 5, N. S., Div. of Ent.,
U. S. Dept. Ag., 1896, p. 228, pl. ii, fig. a.

One female specimen from a Great Marbled Godwit, *Limosa fedoa* (Pacific Grove, California). We had determined this to be an undescribed form, and had partially written a description when Professor Osborn's paper appeared, naming and describing the species from a single female and an immature specimen from the Hudsonian Godwit, *Limosa hemastica* (Burnett Collection, locality?). Our specimen agrees well with Osborn's description, except that it is somewhat larger, being 2.75 mm., long (Osborn's type 2.44 mm.), and 1.2

mm. wide, (Osborn's type .94 mm.); head, length .7 mm., (Osborn, .66 mm.), width .85 mm., (Osborn, .73 mm.) Osborn's figure, after a photograph, shows the characteristic outline, but we think there is also needed a figure showing the markings which are also very characteristic. The broad rounding anterior emarginations of first two transverse abdominal bands differ notably from the not uncommon narrow angular emarginations of these bands.

Nirmus incœnis n. sp. (Plate VI, fig. 5).

A single female from a Black-bellied Plover, *Squat-
arola squatarola* (Pacific Grove, California). Distinctly different from Kellogg's *ovarius* (New Mallophaga 1, 1896, p. 104, pl. v, fig. 5) from *Charadrius dominicus* (Lawrence, Kansas) or *bephilus* (ibid, p. 107, pl. v, fig. 7) from *Aegialitis vocifera* (Lawrence, Kansas).

Description of the female. Body, length 1.65 mm., width .31 mm.; strikingly elongate, narrow; head long, with subparallel sides; pale golden brown with very narrow blackish lateral borders on the head, thorax, and abdomen; an ill-defined brownish band across the head in front of the antennal bands.

Head, length .37 mm., width .21 mm.; clypeal front broadly rounding, with three marginal hairs about equally distant apart, the third just before the suture, one hair arising from the dorsal surface, extending beyond the lateral margin of the head, a short fine hair in front of the small acuminate trabeculae, antennae short, segment 2 longer than segment 1, and segment 5 longer than segments 3 or 4; eye flat, with a prickle near its posterior angle; temples with sides parallel, with one long hair, one short fine hair, and one short prickle on the margin; occipital margin

straight and bare; general color of the head golden brown, a narrow, irregular, marginal border on the clypeal front, darker on the inner margin; a weak brown band across the head in front of the antennal bands, which are narrow and distinctly dark golden brown; small ocular blotches and temples with very narrow dark brown borders.

Prothorax quadrangular, with rounding, posterior angles, each with one hair; transverse blotches golden brown, darker on the lateral margins and in the anterior and posterior angles; a broad, pale, median line separating the transverse blotches. Metathorax more than twice as long as the prothorax, and as wide as the head; sides diverging but little; a slight constriction near the anterior angles; a series of hairs on the rounding posterior margin; same golden brown as the prothorax, a narrow marginal border and a small brown spot in the anterior angles, a narrow but well defined border on the posterior half of the metathorax, the anterior ends bending in, making the slight constriction appear more than it really is. Legs paler golden brown than the thorax, with very narrow marginal borders of dark brown.

Abdomen narrow, elongate, with parallel sides, not tapering till segment 7; segment 1 narrower and shorter than those that follow; posterior angles but little extended, with one or two fine hairs; four long pustulated hairs on the posterior margins of the segments; transverse bands on segments 2 to 8 are golden brown, darkening towards the lateral margins where the lateral band is dark, narrow, and clearly defined; segments 7 to 9 without lateral bands; a pale transverse median band, caused by the uncolored stigmatal spots, thus the transverse blotches appear like two dark bands across each

segment; segment 9 narrowly emarginate, with two pale brown blotches.

Nirmus opacus n. sp. (Plate VI, fig. 6).

Several specimens from two individuals of the Semipalmated Plover, *Egialitis semipalmata* (Pacific Grove, California). The new species belongs to the group *bicuspidati* (Piaget, Les Pediculines, p. 184), being in size, outline and marking much like *bicuspis* N. (Giebel, Insecta Epizoa, p. 155, pl. v, figs. 11 and 12; Piaget, Les Pediculines, p. 184, pl. xv, fig. 7) from "*Charadrius minor*," *C. hiaticula* and *Recurvirostra avocetta*.

Description of the male. Body, length 1.11 mm., width .47 mm.; body dark colored all over, with narrow black lateral abdominal bands.

Head, length .4 mm., width .31 mm.; elongate-conical, with broad, rounding front; uncolored clypeal region slightly expanded in front of the suture; five marginal hairs, one in the rounding anterior angle, one just behind this, one at the suture, and two before the trabeculae; a few dorsal hairs project beyond the margin; trabeculae distinct, rather slender, acute, prominent for *Nirmus*; antennae short, not reaching the occipital margin when projected backward, segment 2 longest, segments 3 and 4 short, subequal, segment 5 longer, concolorous with ground color of the head; eyes flat, with a long hair and a fine prickle; temporal margins flatly rounding, with two long hairs and two prickles; occipital margin straight; front of clypeus uncolored; signature large, colored, shield-shaped, from its posterior point a narrow uncolored line runs backward to the mandibles or beyond; antennal bands distinct, blackish brown, interrupted at suture, the part behind the suture curving, with anterior extremity

expanded; hind head separated from fore head by an angulated, rather broad pale transversal space; temples unevenly bordered with blackish brown.

Prothorax quadrangular, with posterior angles nearly rectangular, with one long hair; brown with blackish, even, lateral borders. Metathorax pentagonal, angulated on abdomen; lateral angles with one short hair and three long pustulated hairs, and two long pustulated and one short pustulated on each postero-lateral margin; brown, darker in anterior angles. Legs colorous with palest color of the thorax, and with narrow dark dorsal margining. Sternal markings composed of distinct intercoxal lines, a linear median blotch on prothorax and a more distinct, larger median blotch on metathorax.

Abdomen elongate-elliptical; posterior angles of segments projecting slightly, with three or four longish hairs beginning with segment 3; dorsal hairs of segment 1 arranged as follows: two on each side of the median line (one in the inner anterior and one in the inner posterior angle of each lateral blotch); segment 2 with four pustulated hairs along the posterior margin; segments 3 and 4 with six pustulated hairs on posterior margin; segments 5 and 6 with two pustulated hairs near the middle of the posterior margin, and a very long hair on the posterior margin near the posterior angles; segment 8 with six pustulated hairs along the posterior margin; segment 9 with eight dorsal hairs and four long marginal hairs; dark brown, with distinct narrow black lateral bands; a narrow uncolored median line reaching nearly to posterior margin of segment 2; the dark brown transverse blotches on segments 6-8 broadly emarginated posteriorly; segment 9 with elongate-elliptical transverse lateral blotches meet-

ing on the median line (there are four pustulated hairs on each blotch); genitalia distinct, extending to posterior margin of segment 4.

Female. Body, length 1.75 mm., width .45 mm.; head, length .47 mm., width .28 mm. Metathorax with but two pustulated hairs on each postero-lateral margin; the narrow uncolored median line extends entirely through segment 2, and slightly into segment 3; segments 3-6 with four pustulated hairs on posterior margin, segment 7 with two median pustulated hairs on posterior margin, and segment 8 with two pustulated hairs in the rounding posterior angles; segment 9 deeply, angularly emarginated, the acute joints with a short prickle.

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

Specimens from the Western Goshawk, *Accipiter atricapillus striatulus* (Pullman, Washington), the Desert Sparrow Hawk, *Falco sparverius deserticolus* (Palo Alto, California), the Western Red-tailed Hawk, *Buteo borealis calurus* (Palo Alto, California), and the White-tailed Kite, *Elanus leucurus* (Palo Alto, California). Taken previously by Kellogg from *Buteo swainsoni*, *Circus hudsonius* and *Archibuteo lagopus sancti-johannis*, all from Lawrence, Kansas. Recorded by Osborn from *Buteo swainsoni* (Ames, Iowa), and from *Accipiter velox* (locality?).

These specimens combine characters of *fuscus*, *rufus*, *et al.* of Nitzsch, so as to lead us to doubt the distinctness of these various species of Nitzsch. We have with *Nirmus fuscus*, *sens latus*, of the hawks, a repetition of the condition shown by *Docophorus communis* of the passerine birds.

Nirmus vulgatus Kellogg.

New Mallophaga, II, 1896, p. 496, pl. lxxvii, fig. 5.

Many specimens from numerous species of passerine birds. This *Nirmus* must be treated like *Docophorus communis*, in that we must group together under one specific name forms rather variant (notably in length and intensity of coloration), without being able as yet to distinguish categorically these variations. Osborn's *pallidus* (Insects Affecting Domestic Animals, 1896, Bull. 5, N. S., Div. of Ent., U. S. Dept. Ag., p. 227). from *Zamelodia ludoviciana* (Ames, Iowa) is probably based on palely colored specimens of this species. The name *N. pallidus*, by the way, is preoccupied (see Piaget, Les Pediculines, 1880, p. 144).

We refer to this species specimens from the Western Blue Grosbeak, *Guiraca caerulea eurhyncha* (4 birds, California); the Western Lark Sparrow, *Chondestes grammacus strigatus* (Ontario, California); the House Finch, *Carpodacus mexicanus frontalis* (Ontario, California); the California Towhee, *Pipilo fuscus crissalis* (2 birds, Palo Alto, California); the Spurred Towhee, *Pipilo maculatus megalonyx* (Palo Alto, California); the Golden-crowned Sparrow, *Zonotrichia coronata* (Palo Alto, California); the Lazuli Bunting, *Passerina amena* (Palo Alto, California); the Mountain Chickadee, *Parus gambeli* (El Dorado county, California); the Californian Chickadee, *Parus rufescens neglectus* (Palo Alto, California); the Western Bluebird, *Sialia mexicana occidentalis* (Palo Alto, California); the Yellow Warbler, *Dendroica aestiva* (Palo Alto, California); the Lutescent Warbler, *Helminthophila celata lutescens* (Palo Alto, California); the Black-chinned Hummingbird, *Trochilus alexandri* (Ontario, California); the Blue-fronted Jay, *Cyanocitta stelleri frontalis* (King's River

Cañon, California); the American Dipper, *Cinclus mexicanus* (Ontario, California); the Western Flycatcher, *Empidonax difficilis* (2 birds, Ontario, California), and the Ash-throated Flycatcher, *Myiarchus cinerascens* (Ontario, California). The specimens from the two last-named bird species, Flycatchers, show a common variation from the type specimens in a greater length, less angulated posterior margin of metathorax, and paler markings. Taken previously by Kellogg from eight species of passerine birds.

Nirmus fœdus n. sp. (Plate VI, fig. 7).

Specimens from the Ash-throated Flycatcher, *Myiarchus cinerascens* (Ontario, California), the Long-tailed Chat, *Icteria virens longicauda* (Ontario, California), Say's Phoebe, *Sayornis saya* (Ontario, California), the Arkansas King-bird, *Tyrannus verticalis* (Ontario, California), the California Shrike, *Lanius ludovicianus gambeli* (Ontario, California) and the Phainopepla, *Phainopepla nitens* (Ontario, California). This species belongs to Piaget's second group of *circumfasciati*, and resembles *platyclypeatus* P. and *frater* (Les Pediculines, p. 145, pl. xii, figs. 1 and 2) from *Motacilla alba* and *Lamprolornis amethystina*, respectively.

Description of the female. Body, length 2.21 mm., width .75 mm.; abdomen broad for *Nirmus*, pale fuscous, head darker than the thorax or abdomen, narrow dark lateral borders on the head and thorax, but no dark lateral abdominal bands; pale brown median, transverse abdominal blotches.

Head, length .56 mm., width .43 mm.; clypeal front varying from narrowly to broadly parabolic, with four short hairs on the margin, a short marginal prickle before the trabeculae, and two long dorsal hairs

arising before the trabeculae, which are small, yet distinct; antennae short, segment 2 longer than the other segments, segment 5 longer than segments 3 or 4, a few short hairs on the segments; eye distinct, with one very long hair and a short prickle at its posterior angle; temples rounded, with two long marginal hairs and two or three short prickles; occipital margin straight; head of a general dark fulvous, clypeal front paler, clearer yellow brown; antennal bands very narrow, blackish brown, strictly marginal and not extending far anteriorly; antennae an even, pale fuscous; ocular blotches dark and extending angularly inward; temples with a narrow border of blackish brown.

Prothorax with sides rounding and slightly divergent, with a long hair in the posterior angle; three short dorsal spines near the anterior angle, two near the median line, and one nearer the lateral margin; lateral margins with irregular dark borders; intercoxal lines showing through from the under side distinctly, as sharply defined lines, directed in towards the median line, before the posterior margin. Metathorax but little wider than the prothorax, slightly constricted near the anterior angles; posterior angles broadly rounded, with one short hair and one spine; posterior margins nearly straight on the abdomen, except for the acute median angle; a series of long pustulated hairs on the posterior margin each side of the acute angle. Legs pale fuscous without definite markings.

Abdomen broadly elliptical; angles of segments not projecting, a series of long hairs on the posterior margin of the segments; transverse bands an even, pale fuscous, indistinct to wanting, without darker lateral bands; last segment broadly rounding, with slight emargination, two or three short marginal hairs and

several long dorsal hairs; ventral surface with broad median transverse bands of dark fuscous; blotches of the last segment posteriorly emarginate and laterally interrupted by the pustulations of two long hairs; these ventral blotches show through above.

Nirmus ductilis n. sp. (Plate VI, fig. 8).

One female from a Western Flycatcher, *Empidonax difficilis* (Ontario, California). A member of the group *interrupto-fasciati*, but well distinguished by its sharp, distinct, blackish marginal markings, without trace of median abdominal blotches.

Description of the female. Body, length 1.9 mm., width .4 mm.; long, slender, transparent white, with narrow, distinct, blackish lateral margins of head and abdomen.

Head, length .37 mm., width .28 mm.; elongate, conical, front narrow and slightly concave; a few short hairs along the margin of the front, the longest hair in front of the trabeculae, which are small but distinct and uncolored; antennae with second segment longest, segment 5 longer than segments 3 or 4, segments 1 and 2 pale transparent whitish, segment 3 with a slight shade of brown, segments 4 and 5 dark brown; eye with a prickle; temporal margins with one long hair and two antennal bands narrow, blackish brown, fading out along the inner margins and anteriorly, before reaching the uncolored frontal margin, the posterior extremities bending angularly in, meeting the dark ocular blotches which in turn meet the dark brown marginal borders of the temples.

Prothorax with flatly rounding lateral margins and posterior angles, dark blackish brown lateral borders, which bend in and back on the anterior and posterior

extremities, the posterior borders almost meeting on the median line. Metathorax as wide as the head, sides diverging strongly; posterior angles with three or four long hairs, a series of pustulated hairs along the outer third of the posterior margin that is rounded upon the abdomen; dark, interrupted lateral blotches narrow and marginal on the anterior angles, and large, irregular submarginal blotches, darker near the posterior angles, growing paler near the middle. Sternal markings consisting of distinct intercoxal lines and a pale brown median blotch on the metasternum. Legs translucent whitish with blackish brown marginal bands and semiannulations.

Abdomen very long, elliptical, with subparallel sides not tapering posteriorly until after segment 7; posterior angles of the segments slightly projecting, each bearing one weak hair, till segment 7, which has two hairs in the angle; segment 8 has one lateral marginal hair besides two hairs in the posterior angle; segment 9 broadly rounding, with angular emarginations, two short hairs on the posterior margin; two dorsal hairs arising near the posterior angle of each segment except segment 8 which has a series of posterior marginal hairs; pale translucent whitish with distinct, narrow blackish brown linear bands on the lateral margins of segments 1 to 7; segment 8 with small pale brown blotches near the lateral margin and one pale brown blotch on the median line; last segment uncolored; genital blotches pale brown, linear each side of the median line on the posterior margin of segment 7, also a pale brown blotch on the median line of segment 6.

Nirmus lautiusculus n. sp. (Plate VI, fig. 9).

A single male from a Bell's Sparrow, *Amphispiza belli* (Ontario, California). The new species, strikingly

marked, is a member of the group *interrupto-fasciati*, in general shape like *vulgatus* K. (New Mallophaga II, p. 496, pl. lxvii, fig. 5) and with the characteristic angulated, colored internal border of the antennal fossa. In the distinctness and contrast of the markings it recalls *illustris* K. (New Mallophaga II, p. 494, pl. lxvii, fig. 4).

Description of the male. Body, length 1.65 mm., width .4 mm.; translucent whitish with sharp, black, narrow marginal bands on head and abdomen; legs with annulations and semiannulations; thorax with intercoxal lines showing through distinctly, and abdomen with median linear brown transverse blotches, two to a segment, on ventral aspect.

Head, length .34 mm., width .31 mm.; front narrow, slightly convex; two or three short hairs on the lateral margin of the front; a short prickle in front of the trabeculae which are distinctly angular and uncolored; antennae long; segment 2 longer than other segments, segment 5 distinctly dark brown; eye prominent, with two prickles, one on the eye itself and a second just at its posterior angle; temples rounding, with one very long hair, one short fine hair, and three short prickles; occipital margin straight and bare; antennal bands narrow, clearly defined, not fading inwardly, their anterior extremities separated by the uncolored clypeal front, interrupted just before the trabeculae by a distinct uncolored space, posterior extremities acutely meeting the dark narrow bands that angularly margin the antennary fossae and the eye; the temples irregularly dark on the margins; the occipital signature distinctly showing through as a narrow brown blotch on the occipital margin and in front as a triangular blotch.

Prothorax with rounding lateral margins and posterior angles; three short spines on the dorsal surface