

A REVIEW OF THE MALLOPHAGA
PARASITIZING THE COLUMBIFORMES OF NORTH AMERICA
NORTH OF MEXICO

THESIS

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By

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A REVIEW OF THE MALLOPHAGA
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Approved:

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INTRODUCTION

The American Ornithological Union Checklist (1957) listed twenty-three species and subspecies of pigeons and doves. Wilson (1941) stated that only six of these species were found in large numbers over a wide range north of Mexico. Emerson (1972) listed seven genera of Mallophaga occurring on thirteen species of doves. Within these seven genera there occurred twenty-one species of lice. Reference was made by Emerson at several points in his list to probable North American hosts for which no host-parasite data were available.

The genus Columbicola had been collected from nine columbiform hosts known to occur in North America north of Mexico. Emerson (1972) gave four additional hosts which may have harbored these parasites. The genus Coloceras had occurred on two hosts known to inhabit North America. Emerson (1972) stated that no species of Coloceras had been found on native birds. The genus Bonomiella had been collected from the Domestic Pigeon and the Mourning Dove. Emerson (1972) listed eight other possible hosts for which no data were available. The genus Hohorstiella had been recorded as occurring only on the Domestic Pigeon and the Band-tailed Pigeon. There should be at least ten more possible North American hosts. Colpocephalum had been the only genus found on the Columbiformes which was not normally restricted to this order of birds. The genus had been recorded from the Spotted Dove and the Domestic Pigeon.

The biting lice have not been known to be vectors of any

diseases but may affect the host in other ways. Waterston (1926) wrote that Mallophaga feed on feather fiber, down, skin, scabs, blood, their own egg shells and cast skins, and sometimes are cannibalistic. An injury to birds that affects their normal preening behavior may promote the development of large populations of lice. The birds subsequently may become weakened or succumb. Nelson and Murray (1970) found that a pigeon with its beak clipped developed a population of lice sufficient to cause the bird's death within two weeks.

Clay (1957) believed that Mallophaga are useful as clues to the phylogeny of their hosts and that the distribution of Mallophaga may indicate the previous geographical distribution of the host.

Because Emerson had shown the need for more study on the group of Mallophaga parasitizing the Columbiformes, the present study was undertaken to determine if any of the doves listed in Emerson's paper as probable North American hosts actually were harboring the Mallophagan parasites which he believed should occur on them; whether the list of lice parasitizing the Columbiformes was complete; if the parasites would be found to be host specific or if overlap in distributional range of the hosts allowed intermingling of the Mallophaga between bird species; and if a cosmopolitan host possessed a given species of parasite without regard to geographical distribution. The study also attempted to find whether subspecies of birds showed similarities of parasites and, if not, was this difference due to geographical isolation or host specificity.

MATERIALS AND METHODS

Material for this study was obtained from the U. S. National Museum (Smithsonian Institution), from the collection of Dr. Donald W. Tuff, and from live birds collected by the author.

In collecting, the host was put into a plastic bag along with a sufficient amount of ether to kill or immobilize the insects. The feathers of the bird were then thoroughly ruffled over a white sheet or pan, the quills of primary and secondary feathers examined for parasites inside the calamus, and the remaining feathers of the body searched for lice not previously dislodged. Specimens collected were put into 70% ethanol in a vial labelled with host, collecting locality, date, and the collector.

For slide preparation the lice were incised, softened in potassium hydroxide, then dehydrated in a series of increasing concentrations of ethanol. Specimens which were not heavily sclerotized were stained in aqueous basic fuchsin and destained in ethanol. They were finally transferred from absolute alcohol to xylene for clearing. Permanent mounts were made with Canada balsam.

Illustrations were done with the aid of a Bausch and Lomb bioscope. Measurements, given in millimeters, were made with an ocular micrometer. The ranges for all measurements given for each species are shown parenthetically.

GENUS HOHORSTIELLA EICHLER, 1940

Hohorstiella Eichler, 1940. Zbl. Bakt. (I. Orig.), 145:362.

Columbimenopon Ansare, 1951. Proc. Nat. Inst. Sci. India, 17:130.

Head wider than long. Preocular slit present. Eyes well defined. Temples expanded, rounded marginally. Postpalpal process clearly evident. Antennae four segmented; segment II greatly expanded laterally. Prothorax widest at transverse carinae; narrow behind. Pterothorax with well developed sternal plates. Abdomen nine segmented; oval. Brushes of stout setae on sternites. Some abdominal pleurites with posterolateral angles prolonged. Legs large, stout; femora III with thick brushes.

Key to the Species of Hohorstiella

Females

- 1. Ventral posterolateral angle of pleurites with a well developed spine-like process (Photograph 1) 2
- 1'. Ventral posterolateral angle of pleurites with spine-like process greatly reduced (Photograph 2) H. lata
- 2(1). Abdominal tergites I-VII with numerous short spines interspersed with longer setae (Photograph 3)
..... H. passerinae sp. nov.
- 2'. Abdominal tergites I-VII without short spines. Setae more or less of same diameter and length 3
- 3(2'). Pleurites II-VI with posterolateral angle elongated (Photograph 4) H. frontalis

- 3'. Pleurites II-VII with posterolateral angle elongated
(Photograph 5)..... H. paladinella sp. nov.

Males

1. Ventral posterolateral angle of pleurites III-VI with a well
developed spine-like process H. frontalis
- 1'. Ventral posterolateral angle of pleurites without a well
developed spine-like process 2
- 2(1'). Endomerale plate twice as broad as long (Photograph 10)
..... H. paladinella sp. nov.
- 2'. Endomerale plate four times as broad as long (Photograph
11) H. lata

Hohorstiella lata (Piaget, 1880)

(Figures 1, 2, 3; Photographs 2, 6, 7, 11)

Menopon latum Piaget, 1880. Les Pediculines; 457, pl. 37, fig. 1.

Hohorstiella lata Eichler, 1940. Zentralbl. Bakteriologie (I. Orig.),

145:362; Eichler, 1953. Beitr. Vogelkunde; 169, figs. 1-4.

Type host: Columba livia Gmelin.

Female: Head about three-fourths as long as wide. Antennae normal
to genus; segment II about two-thirds as long as wide.
Preocular slit present. Eyes prominent. Temporal lobes
angulate rounded. Postpalpal process well sclerotized.
Maxillary palpi long. Prothorax trapezoidal; narrow behind.
Pterothorax as wide as head. Sternal plate easily distin-

guishable. Legs stout, coxa I prolonged anteriorly; femora large, robust. Ventral surface of femur III with stout setae forming a brush. Abdominal plates lightly sclerotized. Tergites I-III and sometimes tergite IV with several short, stout, posterolateral setae; long setae posteromedially. Fleurites with short, stout, setae and long setae. Sternites III-VIII with a broad band of setae, becoming more dense laterally; sternites IV-V with most dense patches of stout setae; setae of sternites VI-VIII becoming longer and progressively less dense toward posterior segment. Segment IX with anal corona.

Male: About two-thirds as large as the female. Head and thorax as in female. Legs as in female but patch of setae proportionately smaller. Abdomen more rounded; not as oval as in female. Tergites with row of long setae posteriorly. Fleurites without the medial short, stout setae; posterior margin with some short setae intermingled with the long setae. Sternites IV-V with prominent lateral patches of setae; sternite VI may also display a setal brush; remaining sternites with a single row of long setae posteriorly. Genitalia as in Figure 3 and Photographs 7 and 11.

Figure 1. Female - Hohorstiella lata (Piaget, 1880).

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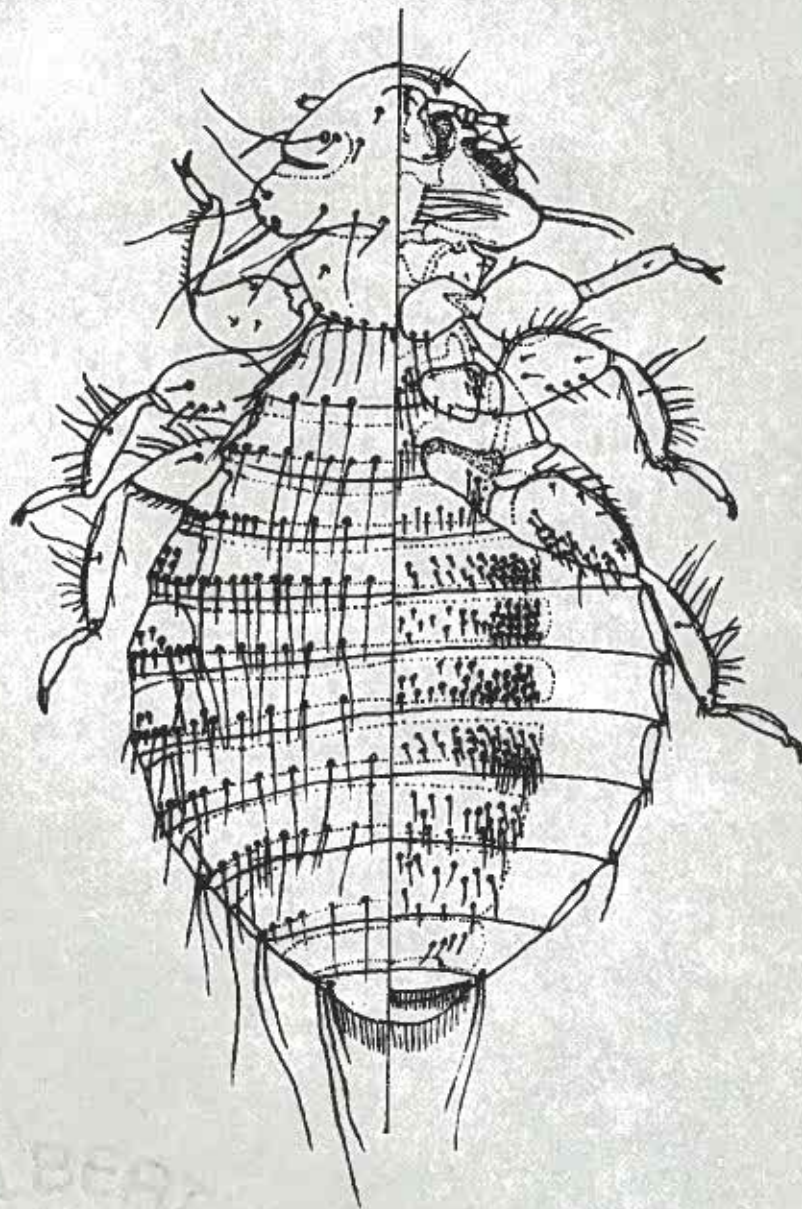


Figure 1

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Figure 2. Male - Hohorstiella lata (Piaget, 1880).

Figure 3. Male genitalia - Hohorstiella lata (Piaget, 1880).

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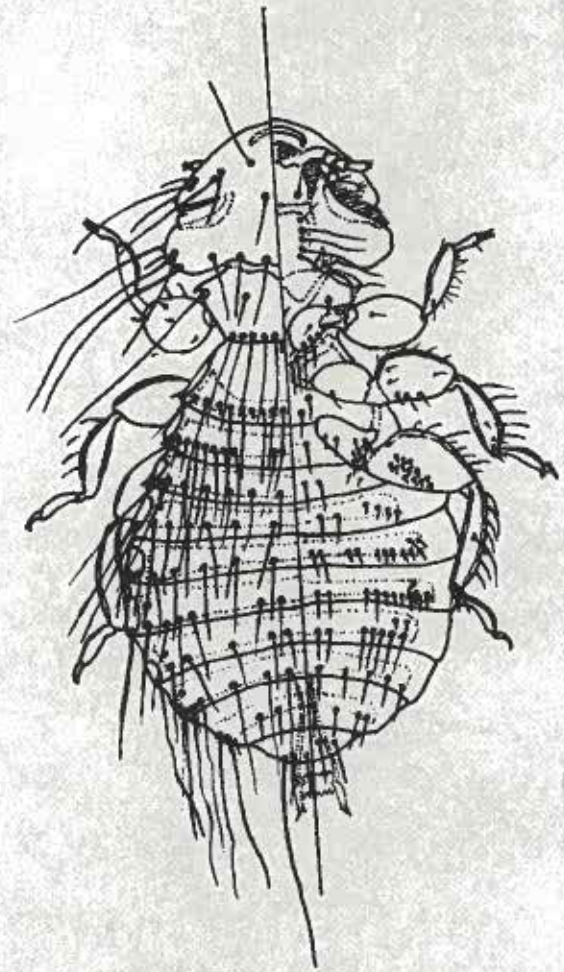


Figure 2



Figure 3

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ORIGINALLY

Measurements:

	Male		Female	
	Length	Width	Length	Width
Head	0.34 (0.33-0.36)	--	0.39 (0.36-0.40)	--
temples	--	0.56 (0.55-0.58)	--	0.67 (0.64-0.70)
Prothorax	0.18 (0.16-0.21)	0.39 (0.38-0.40)	0.24 (0.22-0.25)	0.48 (0.44-0.49)
Pterothorax	0.22 (0.21-0.22)	0.57 (0.56-0.60)	0.31 (0.30-0.34)	0.78 (0.73-0.81)
Abdomen	0.83 (0.81-0.84)	0.82 (0.80-0.84)	1.25 (1.03-1.40)	1.12 (1.08-1.32)
Total	1.58 (1.54-1.62)	--	2.18 (1.87-2.34)	--

Diagnosis:

Hohorstiella lata differs from the other members of the genus because of the reduction in or lack of the projecting ventral postero-lateral angle of the pleurites. It resembles most closely H. paladinella, but the abdomen of H. lata is larger and more rounded. The males of H. lata are considerably smaller than the females and can be separated from males of other species by the genitalia.

Discussion:

Hohorstiella lata seems to be well distributed throughout North America but until Keirans' (1967) paper there was no published record of the genus from a host collected in North America. Carriker (1949) noted that the posterolateral prolongation of the abdominal pleurites may or may not be diagnostic. I have found that these processes are

useful characters for species separation. The prolongation of the pleurites is greatly reduced in females of H. lata and is absent from the males. Eichler (1953) illustrated the antennae, outline of the head, and the postpalpal process. To date no adequate illustration of this species has been published.

Material examined:

Twenty-five females and five males were examined from Columba livia Gmelin: San Diego, Calif., 20 Sept. 1918, Bish. No. 8185, R. W. Wells; Dallas, Texas, 31 Oct. 1918, Bish. No. 8240, H. P. Wood; Mexico City, Mexico, 8 Aug. 1930, Lassman; Sumter, South Carolina, Mar. 1939, Bish. No. 28659, Harold Moise; Sumter, South Carolina, 16 Nov. 1940, Bish. No. 30305, Wendell M. Levi; Sumter, South Carolina, 7 Jan. 1941, Bish. No. 30369, W. F. Hollander; Corpus Christi, Texas, 25 June 1943, F. R. DuChanois; San Francisco, Calif., 10 Apr. 1958, R. W. Coleman; San Marcos, Hays Co., Texas, 10 May 1968, William Hill; San Marcos, Hays Co., Texas, 24 Feb. 1972, William Hill; Martindale, Guadalupe Co., Texas, 12 Sept. 1972, William Hill; Martindale, Guadalupe Co., Texas, 12 Jan. 1973, William Hill.

One female was examined from Zenaidura macroura (L):
Orient, L. I., New York, 2 Oct. 1931, Roy Lathan.

Hohorstiella frontalis Carriker, 1949

(Photographs 4, 8, 9)

Hohorstiella frontalis Carriker, 1949. Rev. Brasil. Biol., 9:302,

Figs. 6 & 7.

Type host: Columba fasciata Bonaparte.

Female: Head large; slightly pointed anteriorly. Antennae clubbed; segment II expanded laterally. Preocular slit distinct. Eyes prominent. Temples broadly rounded. Maxillary palpi long; segments II and III shorter than I and IV; segment III shorter than segment II; segments I AND IV of about equal length. Postpalpal process well sclerotized. Prothorax trapezoidal; narrow behind. Pterothorax not as broad as head. Sternal plate easily distinguishable. Legs stout. Ventral surface of femur III with stout setae forming a brush. Abdominal tergite I or II with some short stout setae posterolaterally; remaining tergites with longer, thin setae. Ventral posterolateral angles of pleurites II-VI elongated. Sternites III-VII with a broad band of setae, becoming more dense laterally; II and VIII with a single line of long setae posteromedially; setae of sternites VI-VIII becoming longer and less dense toward posterior segment. Segment IX with anal corona.

Male: Head and thorax as in female. Abdomen not as elongated as that of female. Legs as in female. Tergites with sparse, long setae posteriorly. Pleurites with short, stout setae and several very long setae. Pleurites II-VI with elongate ventral posterolateral angles. Sternites with band of short setae; sternites IV-V with lateral patches of setae. Genitalia as seen in Photograph 9.

Measurements:

	Male		Female	
	Length	Width	Length	Width
Head	0.33	--	0.41 (0.39-0.42)	--
temples	--	0.57	--	0.70 (0.64-0.73)
Prothorax	0.20	0.31	0.26 (0.24-0.28)	0.48 (0.43-0.50)
Pterothorax	0.24	0.50	0.31 (0.22-0.39)	0.64 (0.61-0.67)
Abdomen	0.89	0.84	1.18 (1.03-1.35)	1.02 (1.02-1.04)
Total	1.62	--	2.09 (1.99-2.27)	--

Diagnosis:

This species is distinct from other Hohorstiella because of the elongation of the ventral posterolateral angle of pleurites II-VI. H. lata has reduced pleural spines while H. paladinella has pleurites II-VII with ventral posterolateral angle elongate. The male of H. frontalis differs from H. paladinella and H. lata because it exhibits the elongated spines of the ventral posterolateral angle.

Discussion:

Carriker's description included a drawing of the female but none of the male or of its genitalia. I have included photographs of the male genitalia and pleural processes of the females even though the specimens obtained on loan were poorly cleared and unstained.

Material examined:

Four females and one male were examined from Columba fasciata
Say: Ft. Apache, Arizona, 1 Sept. 1919, Bish. No. 9366, F. C.
Bishopp; a slide labelled "New Mexico".

Hohorstiella paladinella sp. nov.

(Figures 4, 5, 6; Photographs 1, 5, 10)

Type host: Zenaidura macroura (L.)

Holotype female: Anterior margin of head parabolic. Mandibles small; strongly sclerotized. Maxillary palps with basal segment longer than either segment II or segment III but not as long as segment IV. Terminal segment of antennae suboval. Ocular notch present. Eyes prominent. Temples broadly rounded. Prothorax trapezoidal; narrow behind. Legs strong, stout; ventral surface of femora III with brushes of stout setae. Abdomen oval; abdominal plates lightly sclerotized. Tergites with long setae along posterior border. Pleurites II-VII with ventral posterolateral angles elongated. Abdominal sternites III-VIII with a broad band of setae, becoming more dense laterally on sternites III-V with conspicuous lateral patches of short stout setae. Segment IX with anal corona.

Male: Head proportionately longer than in female. Thorax and legs as in female, though femoral brushes not as extensive. Abdominal tergites with sparse, long setae posteriorly. Pleurites with setae of varying lengths. Sternites with

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Figure 4. Female - Hohorstiella paladinella sp. nov.

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Figure 4

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Figure 5. Male - Hohorstiella paladinella sp. nov.

Figure 6. Male genitalia - Hohorstiella paladinella sp. nov.

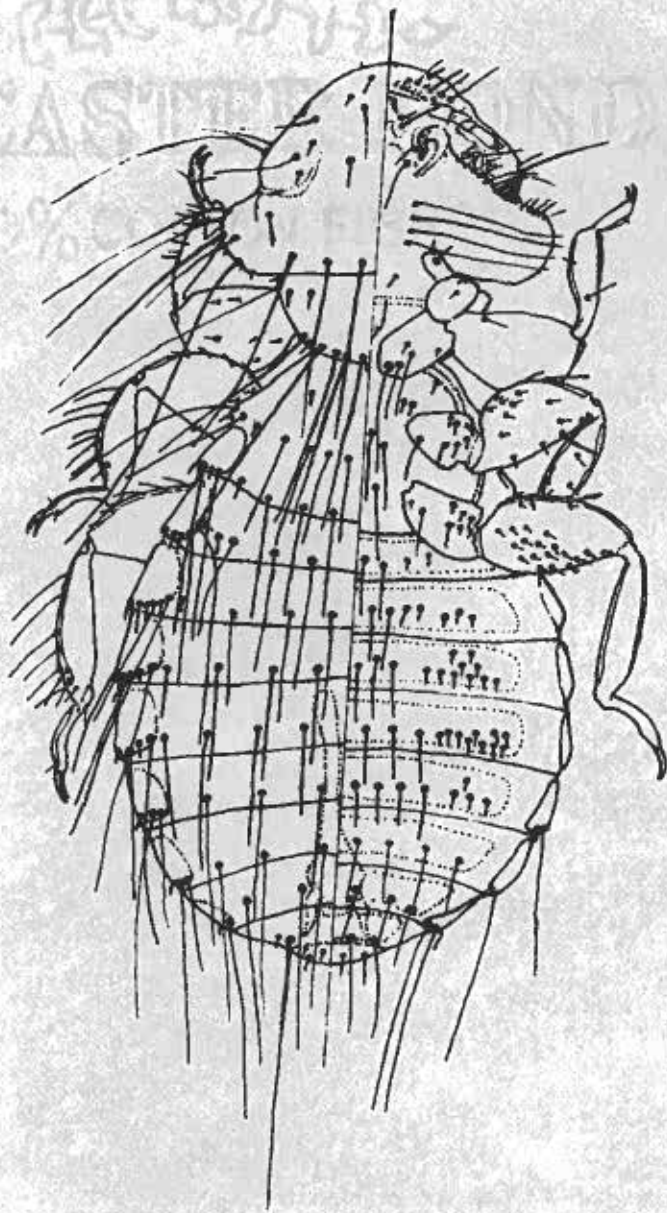


Figure 5

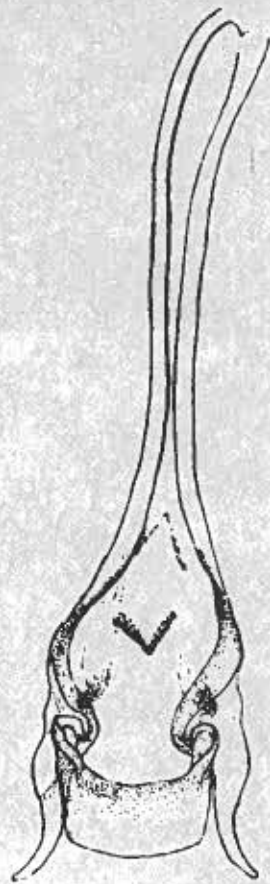


Figure 6

single row of posterior setae except segments IV and V which have lateral patches of short stout setae. Genitalia as in Figure 6 and Photograph 10.

Measurements:

	Male		Female	
	Length	Width	Length	Width
Head	0.33	--	0.40 (0.38-0.42)	--
temples	--	0.51	--	0.69 (0.66-0.74)
Prothorax	0.15	0.33	0.24 (0.20-0.29)	0.48 (0.44-0.51)
Pterothorax	0.19	0.50	0.33 (0.30-0.38)	0.68 (0.63-0.72)
Abdomen	0.72	0.70	1.35 (1.17-1.44)	1.10 (0.98-1.27)
Total	1.40	--	2.28	--

Diagnosis:

The males of Hohorstiella paladinella are easily distinguished by the genitalia. The females can be recognized by shape of the antennae, projection of abdominal pleurites, and chaetotaxy.

Discussion:

The female of this species closely resembles Hohorstiella frontalis in all aspects except the ventral posterolateral projections of the pleurites. Hohorstiella frontalis shows the projections on segments II-VI instead of II-VII as in Hohorstiella paladinella. H. paladinella

cannot be confused with H. passerinae which is much larger, has distinctively different chaetotaxy and distinctly shaped pleurites. H. lata is similar to H. paladinella in size and shape but the absence of projections on the pleurites sets H. lata apart from other species of this genus.

Males of H. paladinella resemble those of H. lata in that they have no elongation of the ventral posterolateral angle of the pleurites.

Material examined:

The holotype female from Zenaidura macroura (L.): Columbia, Mo., Sept. 1936, Bish. No. 26396, G. O. Sigars, U. S. N. M. No. 72973.

Ten paratype females and one male from Zenaidura macroura (L.): Ft. Apache, Ariz., 1 Sept. 1919, Bish. No. 9370, F. C. Bishopp; West End, New Orleans, La., 2 Dec. 1934, E. Beck; 30 mi. S. Marathon, Brewster Co., Texas, 18 Mar. 1971, William W. Hill; 10 mi. N. E. of Van Horn, Culberson Co., Texas, 22 Aug. 1972, William W. Hill; a slide labelled "#367".

Two females from Leptotila verreauxi (Bonaparte): Chihuahua, Mexico, 20 July 1958, J. Knox Jones.

One female from Zenaida asiatica (L.): Escuinapa, Sinaloa, Mexico, 11 Apr. 1960, G. B. Saunders.

One female from a slide labelled "on wild dove": Agua Caliente Ranch, Tucson, Ariz., 22 Apr. 1914, B. R. Coad.

Hohorstiella passerinae sp. nov.

(Figure 7; Photograph 3)

Type host: Collumbigallina passerina (L.).

Holotype female: Head broadly rounded anteriorly. Mandibles heavily sclerotized. Maxillary palpa prominent; segment IV longest, segments II and III about equal in length. Postpalpal process well sclerotized. Antennae four segmented; segment I rhomboid, segment II laterally elongate, segment III conical, segment IV globular. Eyes prominent. Temples expanded. Prothorax trapezoidal, narrow behind. Pterothorax as wide as head. Legs stout; femora III with brushes of stout setae. Abdominal tergites and pleurites with alternate short stout spines and long setae posteriorly. Pleurites with conspicuous carinae; ventral posterolateral angle of pleurites II-VII enlarged and elongated. Sternites III-VIII with a broad band of setae, becoming more dense laterally on sternites III-VI. Sternites III-V with conspicuous lateral patches of short stout setae. Segment IX with anal corona.

Measurements:

	Holotype Female	
	Length	Width
Head	0.35 (0.32-0.35)	--
temples	--	0.58 (0.57-0.60)
Prothorax	0.19 (0.18-0.22)	0.42 (0.39-0.43)
Pterothorax	0.31 (0.28-0.33)	0.62 (0.55-0.64)

Abdomen	1.21 (1.03-1.35)	0.95 (0.84-1.03)
Total	2.05 (1.80-2.23)	--

Diagnosis:

Separation of Hohorstiella passerinae from other members of the genus occurring in North America is relatively simple. As shown in Figure 7 its large size, heavy sclerotization, conspicuous carinae of the pleurites, and the pattern of short setae alternating with long setae on the tergites all serve as identifying characters.

Discussion:

Hohorstiella passerinae very closely resembles H. andina from Leptophaps aymara collected in Peru. Carriker (1949) noted that the median portion of the tergites of H. andina are thickly set with short spines in an irregular fashion and are characteristic of the species. Carriker's illustration showed these short spines to be on tergites III-VII. I have found no setae on the tergites of H. passerinae other than the posterior row. For this reason I believe H. passerinae to be a species distinct from, but closely related to, H. andina.

The female from Scardafella inca is considered conspecific with the specimens from Columbigallina passerina. No males of this species were available for examination.

Material examined:

The holotype female from Columbigallina passerina (L.);

Figure 7. Female - Hohorstiella passerinae sp. nov.

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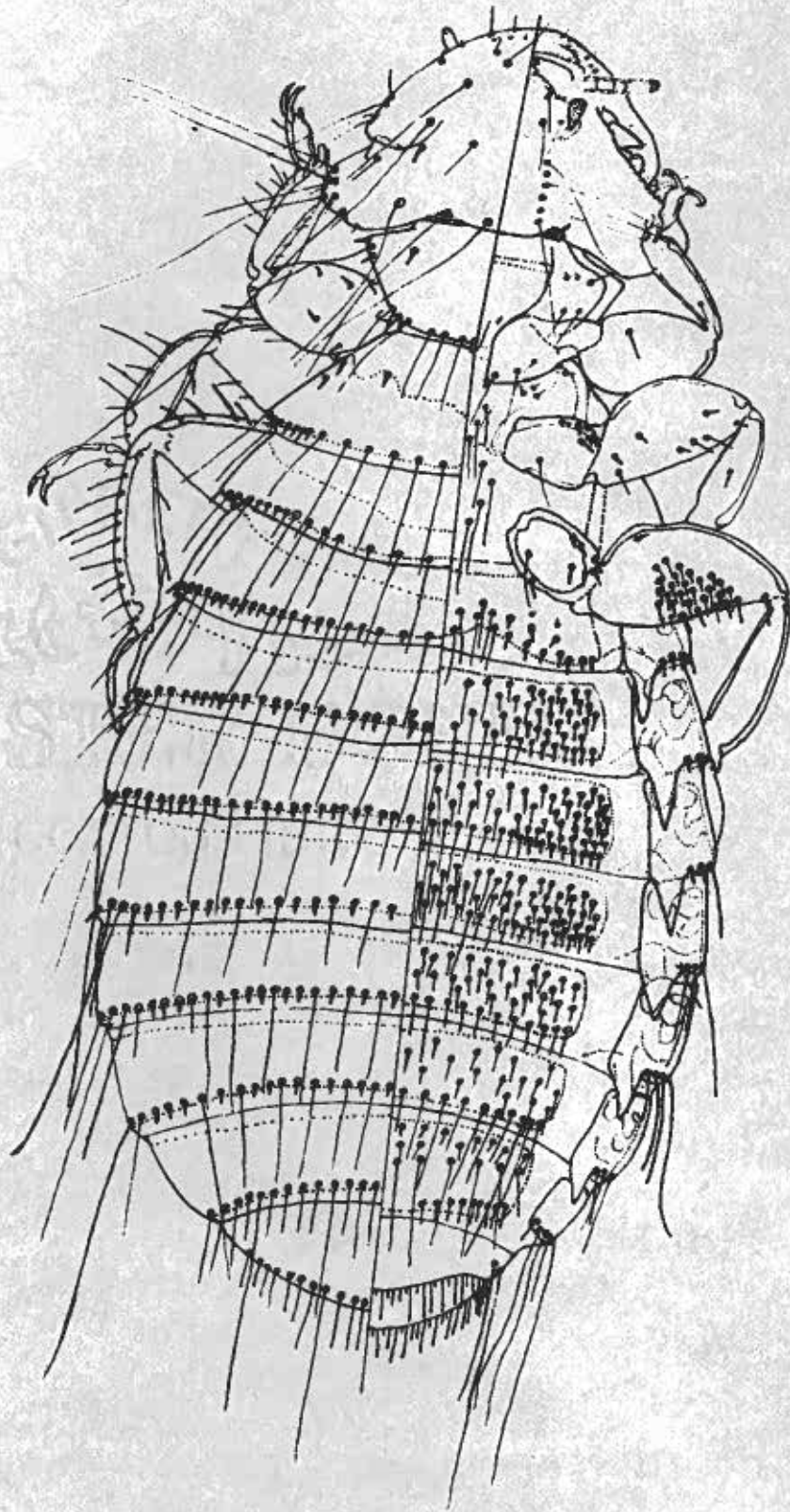


Figure 7

Guantanamo, Cuba, 16 Aug. 1930, Bish. No. 15294, H. S. Peters,
U. S. N. M. No. 72971.

Six paratype females from Columbigallina passerina (L.):
Hog Cay, Ragged Islands, Bahama Islands, 3 July 1930, Bish. No.
15056, H. S. Peters; Acklin Island, Bahama Islands, 19 July 1930,
Bish. No. 15086, H. S. Peters; Grand Cayman, B. W. I., 17 Sept.
1930, Bish. No. 15435, H. S. Peters; Rosedale, Miss., 30 Dec. 1950,
M. G. Vaiden.

One female from Scardafella inca (Lesson): Brownsville, Cameron
Co., Texas, 9 Jan. 1962, Eads.

GENUS COLPOCEPHALUM NITZSCH, 1818

Colpocephalum. Nitzsch, 1818. Germar's Mag. Ent., 3:298.

Ferrisia Uchida, 1926. (nec Fullaway, 1923). J. Coll. Agri.
Tokyo, 9:43.

Neocolpocephalum Ewing, 1933. J. Parasit., 20:65 (new name for
Ferrisia Uchida, 1926).

Pseudocolpocephalum Qadri, 1936. Z. Parasit., 8:640.

Allocolpocephalum Qadri, 1939. Ind. J. Ent., 1:66.

Corvocephalum Conci, 1942. Boll. Soc. Ent. Ital., 74:30.

Dimorphiventer Eichler, 1944b. Dtsch. Ent. Zeitr., 1943:60.

Galligogus Eichler, 1947. Ark. Zool., 39A:10.

Liothella Eichler, 1947. Ark. Zool. 39A:15.

Pelecanigogus Eichler 1949a. Boll. Soc. Ent. Ital., 79:12.

Galliferrisia Ansari, 1951. Proc. Nat. Inst. Sci. India, 17:150.

Picusphilus Ansari, 1951. Proc. Nat. Inst. Sci. India, 17:163.

Cariamigogus Eichler, 1952. Zool. Anz., 149:76.

Scopigogus Eichler, 1952. Zool. Anz., 149:77.

Vulturigogus Eichler and Zlotorzycska, 1963. Acta Parasit. Polon.,
11:205.

Gypsigogus Eichler and Zlotorzycska, 1963. Acta Parasit. Polon.,
11:212.

Lanicephalum Zlotorzycska, 1964. Acta Parasit. Polon., 12:187.

Head truncate anteriorly; three pairs of dark sclerotized areas; one pair on occipital margin, a second pair at each preocular notch and

a third pair at each proximal end of ventrolateral margin. Antennae clubbed; terminal segment without definite signs of division. Prothorax hexagonal; laterally produced. Mesothorax short, length less than pro- and metathorax combined. Legs stout. Ventral surface of posterior femur and some abdominal sternites without definite patches of setae, although combs of setae may be present.

Colpocephalum turbinatum Denny, 1842

(Figures 8 & 9; Photographs 12 & 13)

Colpocephalum turbinatum Denny, 1842. Mon. Anopl. Brit., 198 and 209, pl. 21, fig. 1.

Colpocephalum oxyurum Nitzsch, 1861. In Giebel, Z. ges. Naturw., 17:519.

Colpocephalum ailurum Nitzsch, 1861. In Giebel, Z. ges. Naturw., 17:522.

Colpocephalum bicinctum Nitzsch, 1861. In Giebel, Z. ges. Naturw., 17:524.

Colpocephalum tricinctum Nitzsch, 1861. In Giebel, Z. ges. Naturw., 17:524.

Colpocephalum longicaudum Nitzsch, 1866. In Giebel, Z. ges. Naturw., 28:392.

Colpocephalum caudatum Giebel, 1874. Insecta Epizoa: 261.

Colpocephalum caudatum setosum Piaget, 1880. Les Pediculines: 519.

Colpocephalum dissimile Piaget, 1880. Les Pediculines: 520.

Colpocephalum intermedium Piaget, 1880. Les Pediculines: 521.

(new name for C. tricinctum Nitzsch, 1861).

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Figure 8. Female - Colpocephalum turbinatum Denny, 1842,
(after Price and Beer).

Figure 9. Male - Colpocephalum turbinatum Denny, 1842,
(after Price and Beer).

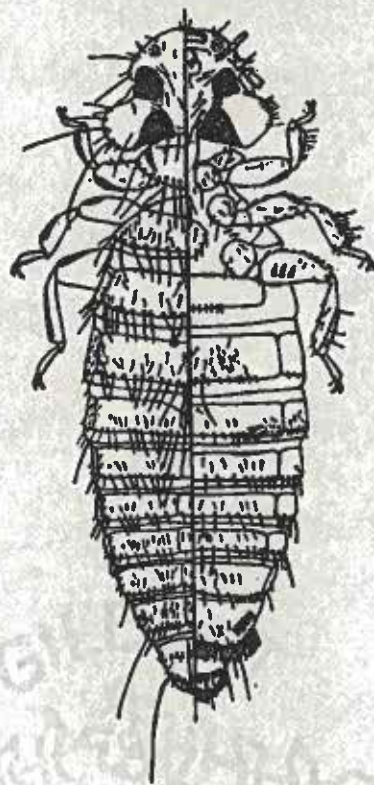


Figure 8



Figure 9

LANCASTER BOND
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- Colpocephalum subflaviscens Piaget, 1880. Les Pediculines: 571,
pl. 48, fig. 2.
- Colpocephalum dissimile major Piaget, 1885 (nec 1880). Les Pediculines,
Supplement: 119, pl. 13, fig. 2.
- Colpocephalum caudatum longipes Piaget, 1885 (nec 1880). Les Pediculines,
Supplement: 125.
- Colpocephalum latifasciatum Piaget. 1885. Les Pediculines, Supplement:
130, pl. 14, fig. 2
- Colpocephalum osborni costaricense Carriker, 1903. Univ. Stud.
Nebr., 3:172.
- Colpocephalum abruptofasciatum Mjoberg, 1910. Ark. Zool., 6:36, fig. 23.
- Neocolpocephalum gypae qadri, 1935. Zeit Parasit., 8:229, fig. 3.
- Neocolpocephalum tricinctum wetzli Eighler, 1941. Arch. Naturgesch.,
B (n. f.), 10:374, fig. 23.
- Vulturigogus eugenii Eichler and Zlotoryzchka, 1963. Acta Parasit.
Polon., 11:207, figs. 2, 3, and 4, pl. 1.
- Vulturigogus femellus Eichler and Zlotoryzcka, 1963. Acta Parasit.
Polon., 11:209, pl. 1, fig. 4.
- Type host: Columba livia Gmelin.
- Female: Head flattened anteriorly, with pronounced ocular emargin-
ation. Temporal lobes expanded, with square or slightly
rounded ends. Dorsolateral margin of head with preocular
notch or short, broad slit. Margin of prothorax with five
long and three short setae on each side. Basal segment of each
tarsus slightly produced distally. Abdominal tergite II

longer than tergite III. Tergites III-IX tripartite. Anus indented dorsally. Vulva flattened, with pronounced lateral row of hooked setae.

Male: As in female except smaller in size, temples not as broadly expanded, and chaetotaxy of terminal segments of abdomen exhibits sexual dimorphism.

Measurements:

	Male		Female	
	Length	Width	Length	Width
Head	0.29 (0.27-0.33)	--	0.30 (0.28-0.33)	--
temples	--	0.44 (0.43-0.45)	--	0.48 (0.47-0.49)
Prothorax	0.10 (0.06-0.12)	0.29 (0.28-0.30)	0.12 (0.11-0.13)	0.32 (0.31-0.32)
Pterothorax	0.15 (0.13-0.16)	0.38 (0.37-0.38)	0.18 (0.17-0.18)	0.46 (0.44-0.47)
Abdomen	0.72 (0.62-0.89)	0.46 (0.45-0.47)	1.08 (1.02-1.19)	0.57 (0.55-0.59)
Total	1.25 (1.14-1.44)	--	1.65 (1.54-1.83)	--

Diagnosis:

Colpocephalum turbinatum Denny, 1842 is the only species of this genus presently recorded from members of Columbiformes in the Western Hemisphere.

Hopkins and Clay (1952) listed Colpocephalum longicaudum Nitzsch as a valid species from Streptopelia chinensis tigrina (Temminick).

C. longicaudum is included here with C. turbinatum, since Emerson (1972b) listed C. longicaudum as a synonym of C. turbinatum.

Discussion:

The genus Colpocephalum Nitzsch, 1818, as presently defined by most workers, is known to occur on birds representing a number of different orders (Price and Beer 1963). Colpocephalum turbinatum is found on at least thirty-five species of hawks in addition to the Domestic Pigeon. The wide variety of hosts of C. turbinatum shows that its host specificity is an exception to the concept that a given species of louse is found only on a single host species. Nelson and Murray (1971) reported that C. turbinatum shelters inside the calamus of primary feathers. Although this possibility was taken into account during examination of host birds, no specimens were found during the course of this study.

Material examined:

Seven females and five males were examined from Columba livia Gmelin: New Orleans, Louisiana, 6 June 1918, Bish. No. 8048; Hsin Ying Tainan, Hsien, Taiwan, 13 July 1959, R. E. Kuntz; Shih-lin, Formosa, 1959, PF 6401.

GENUS BONOMIELLA CONCI, 1942

Bonomiella Conci, 1942. Riv. Soc. Stud. Venezia Tridentina, 23:124.

Head slightly longer than wide; lightly sclerotized; dorsolateral margin with preocular notch. Maxillary palps prominent. Antennae concealed; four segmented; clubbed. Temples weakly expanded. Esophageal sclerite absent. Carinae of thorax well sclerotized. Third femur without ctenidea. Abdomen elongate oval; apical segment well sclerotized; faint sclerotization dorsomedially and laterally. Female with well developed anal corona.

Bonomiella columbae Emerson, 1957

(Figure 10; Photographs 14, 15, 16)

Bonomiella columbae Emerson, 1957. Florida Ent., 40:60, figs. 1-3.

Type host: Columba livia Gmelin.

Female: Head triangular, almost equilateral; labrum well defined by anterior carina. Three pairs of small hooks just anterior to the mandibles. Nodus with three long setae ventrally. Basal segment of antennae normal; second segment slightly expanded laterally; third segment narrow at base, apex large and broadly joined to terminal segment, terminal segment concavo-convex. Temporal lobes not expanded. Occipital margin truncate. Prothorax wider than long; margin of posterior two-thirds of segment with ten evenly spaced long setae. Pterothorax unsclerotized except for sternopleural apophysis; sternal plates present; ten to twelve long setae dorsoposteriorly.

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Figure 10. Female - Bonomiella columbae Emerson, 1957.

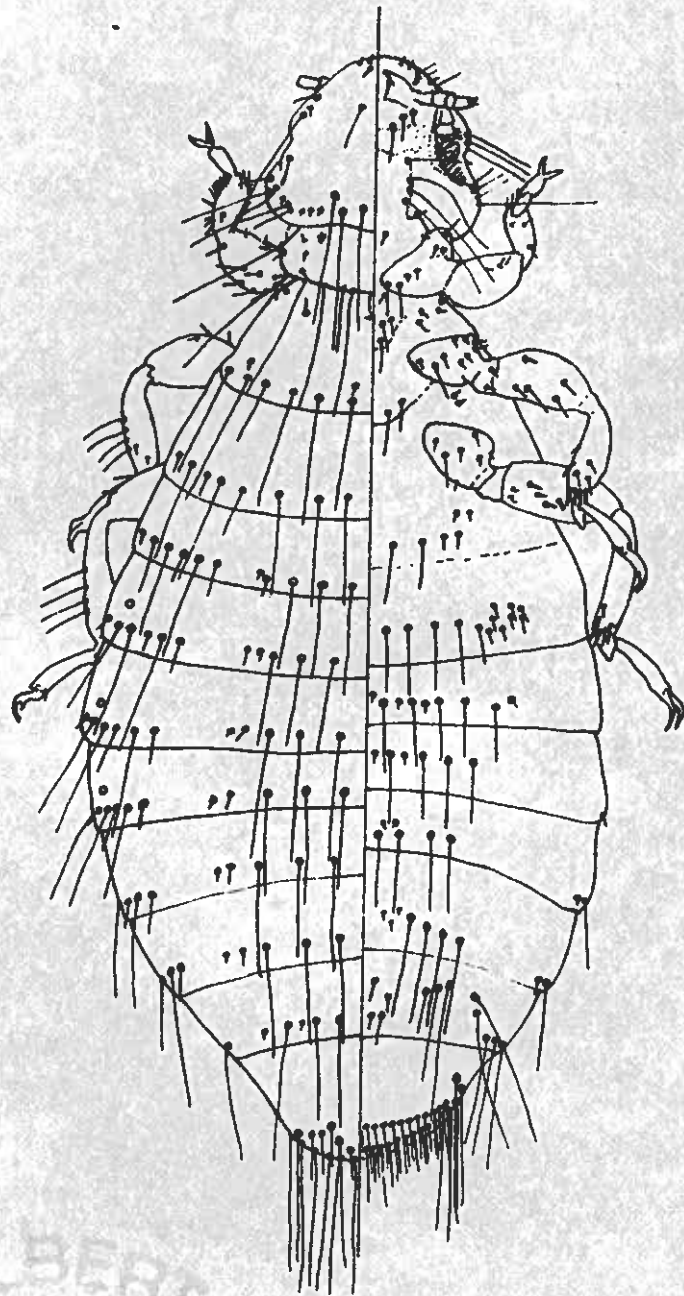


Figure 10

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Abdomen moderately sclerotized on apical segment; light sclerotization on remaining segments medially and laterally around spiracles. Posteromedial area of tergites with six long setae per segment; two short setae lateral to these. Segment I lacking the small lateral setae. Posterolateral angles of sternites I and II with a patch of short setae; those of sternite I barely distinguishable; those of sternite II easily visible. The femur of legs II and III slender. Claw with large basal process.

Measurements:

	Female	
	Length	Width
Head	0.29 (0.28-0.29)	--
temples	--	0.35 (0.33-0.37)
Prothorax	--	0.29 (0.26-0.30)
Pterothorax	--	--
Abdomen	1.21 (1.17-1.24)	0.83 (0.76-0.85)
Total	1.81 (1.77-1.84)	--

Diagnosis:

Bonomiella columbae is the only species of this genus recorded from members of Columbiformes in the Western Hemisphere. It may be

separated from the other amblycerans parasitizing the Columbiformes by the general lack of sclerotization and absence of combs of setae on femur III.

Discussion:

Emerson (1957) illustrated both male and female of Bonomiella columbae. He compared B. columbae to the only other known species of this genus, B. concii Eichler and B. insolitunquicolata Conci. With only drawings with which to compare, it is difficult to distinguish between the species. It appears that B. insolitunquicolata has a more rounded head and more oval abdomen than B. columbae. Specimens at my disposal showed an overlap in measurements between B. insolitunquicolata and B. columbae and the presence of the small patch of short setae on sternite I (Photographs 15 and 16) is questionable. A larger series of B. insolitunquicolata may determine that there is only one species within this genus. Drawings of B. concii were inadequate for a comprehensive comparison.

Material examined:

Seven females were examined from Columba livia Gmelin: Christchurch, New Zealand, 2 May 1969, R. L. C. Pilgrim; Martindale, Guadalupe Co., Texas, 12 Sept. 1972, William Hill; Martindale, Guadalupe Co., Texas, 17 Jan. 1973, William Hill.

GENUS COLUMBICOLA EWING, 1929

Pediculus L., 1758. Syst. Nat., 10th ed.:610.

Philopterus Nitzsch, 1818. Germar's Mag. Ent., 3:281, 288.

Nirmus Nitzsch, 1818. Germar's Mag. Ent., 3:291.

Esthiopterum Harrison, 1916. Parasitology, 9:26.

Columbicola Ewing, 1929. Man. ext. Parasites:190.

Soricella Clay and Meinertzhagen, 1937. Entomologist, 70 (895):276.

Phagopterus Freire and Duarte, 1944. Bol. Soc. Bras. Med. Vet.,
13:13.

Parasoricella Eichler, 1952. Zool. Anz., 149:77.

Head almost always narrow and more or less elongate, sometimes more expanded and distinctly wider posteriorly. Clypeal region generally always wider than long, with anterior border rounded in majority of species; sometimes slightly emarginate. Anterolateral border more or less convex. Dorsal anterior plate divided on medial line. Marginal band discontinuous; of a uniform width or slightly dilated ventrally in front; on occasion forming a delicate internal projection extending to near sagittal plane on its anterior third. Preantennal suture continuous. A densely chitinous region behind preantennal suture frequently appears; chitinous region rudimentary and considerably shortened in most species, on others absent altogether and on others appears as a transverse band either toward the front or toward the midline between preantennal suture and occipital border. Trabeculae short, triangular, sometimes with dorsoposterior thickening in the males. Antennae usually exhibit sexual dimorphism. Eyes usually small

and slightly protruding from lateral contour of head. Temples more or less rounded, at times sub-rectangular.

Thorax approximately as wide as head. Prothorax quadrangular, with one posterolateral spine. Pterothorax elongate, approximately twice as long as prothorax.

Abdomen more or less elongate in the majority of species, wide and robust in some. Tergal plates divided on all segments, continuous with pleural plates. Pleural plates prolonged into preceding segment. Spiracles present on segments II-VII, situated laterally.

Male genital aperture seemingly opens dorsally on abdominal segment VIII. Male genitalia variable.

Shape of posterior arch of genital plate of female variable.

Key to the Species of Columbicola

Females

1. One pair of coarse, broad, clypeal spines present; antennae of both sexes similar C. baculoides
- 1'. Two pairs of coarse, broad, clypeal spines present; antennae sexually dimorphic 2
- 2(1'). Genital plate with a small, narrow, posterior groove (Photograph 17) C. columbae
- 2'. Genital plate with a large, wide, posterior groove (Photograph 18) 3
- 3(2'). Length of head 0.47 - 0.54 mm; width of head at temples 0.22 - 0.25 mm C. passerinae

- 3'. Length of head 0.57 - 0.63 mm; width of head at temples
0.27 - 0.31 mm C. passerinae

Males

1. One pair of coarse, broad, clypeal spines
..... C. baculoides
- 1'. Two pairs of coarse, broad, clypeal spines 2
- 2(1'). Parameres joined narrowly at basal plate (but not fused
completely with it) C. passerinae
- 2'. Parameres broadly fused with the basal plate 3
- 3(2'). Parameres relatively short, broad; posterior where free
(not fused to basal plate), as long as or shorter than
the anterior (portion fused to basal plate) (Photograph
19) C. columbae
- 3'. Parameres long; unfused posterior portion short in re-
lation to anterior fused portion (Photograph 20)
..... C. macrourae

Columbicola baculoides (Paine, 1912)

(Photograph 21)

Lipeurus baculoides Paine, 1912. Ann. Rep. Laguna Marine Lab.,

1:174. Fig. 95.

Columbicola baculoides (Paine) Thompson, 1950. Ann. Mag. Nat. Hist.,

3:274.

Columbicola triangularis Hopkins and Clay, 1953. Ann. Mag. Nat.

Hist., 6:437.

Type host: Zenaidura macroura marginella Woodhouse.

Female: Head robust, triangular, less than twice as long as wide.

Clypeal region much wider than long, anterior margin semi-circular. Antennae short, relatively robust, with combined length of four apical segments less than width of head.

Segment II longer than combined length of segments III and IV.

Temples prominent, widest near temporal angle. Thorax almost as wide as head. Abdomen elongate. Genital plate relatively wide with a deeply bevelled, narrow posterior; lateral margins subparallel. Posterior tubercles with three short spines.

Male: Head as in female. Antennae short; segment II approximately twice as long as segment I, segment III slightly asymmetric, with a slight posterointernal projection. Thorax as in female. Abdomen elongate. Genitalia with long parameres fused with basal plate. Endomeres short, entire, lateral margin heavily chitinized.

Measurements:

	Male		Female	
	Length	Width	Length	Width
Head	0.54 (0.50-0.57)	--	0.56 (0.51-0.61)	--
temples	--	0.31 (0.30-0.32)	--	0.32 (0.30-0.35)
Prothorax	0.15 (0.13-0.16)	0.23 (0.22-0.24)	0.15 (0.14-0.18)	0.23 (0.21-0.25)
Pterothorax	0.28 (0.26-0.30)	0.29 (0.26-0.32)	0.29 (0.27-0.31)	0.30 (0.27-0.34)

Abdomen	1.21 (1.06-1.23)	0.38 (0.33-0.43)	1.35 (1.24-1.57)	0.39 (0.34-0.46)
Total	2.07 (1.96-2.20)	--	2.29 (2.16-2.48)	--

Diagnosis:

Both the male and female of this species may be readily separated from other members of the genus occurring in North America by the small size of the two pairs of clypeal spines (Photograph 21).

Characteristically these spines are broad and flattened but in C. baculoides the anterior pair is only slightly enlarged and the posterior pair appear as normal, slender setae.

Discussion:

Wilson (1941) noted that it would be expected that the slender louse of Eastern and Western Mourning Dove would be identical. However, the range of Columbicola baculoides is restricted, for the most part, to western North America. Tendeiro (1962) found several specimens of C. baculoides from the Eastern Mourning Dove but these were collected from hosts obtained where geographical ranges to the two subspecies of Mourning Dove overlapped.

Material examined:

Twenty-one females and fifteen males were examined from Zenaidura macroura (L.): El Paso, Texas, 20 Apr. 1930, H. S. Peters; Keno, Oregon, 10 Aug. 1934, H. H. Stage; Ames, Iowa, 11 Oct. 1934, W. G. Bruce; Leavenworth, Kansas, 1 Sept. 1956, K. C. Emerson; Between Cd.

Victoria and Cd. Vure, Mexico, 1 Feb. 1962, R. A. Price; 30 mi. S.
 Marathon, Brewster Co., Texas, 18 Mar. 1971, William Hill; 10 mi.
 E. Van Horn, Culberson Co., Texas, 22 Aug. 1972, William Hill.

Columbicola columbae (L., 1758)

(Photograph 19, 22)

Pediculus columbae L., 1758. Syst. Nat., 10th., ed.:614.

Nirmus filiformis Olfers, 1816. De Veget., 1:90.

Phlopterus (Lipeurus) baculus Nitzsch, 1818. Germar's Mag. Ent.,
 3:293.

Lipeurus baculus Nitzsch, 1866. Z. Ges. natur. Fr., 28:379.

Lipeurus antennatus Giebel, 1874. Insecta Epizoa:213.

Lipeurus bacillus Giebel, 1874. Insecta Epizoa:215.

Esthiopterum baculum (Nitzsch), Harrison, 1916. Parasitol.,
 9:131.

Esthiopterum columbae Harrison, 1916. Parasitol., 9:132.

Esthiopterum filiforme (Olfers), Harrison, 1916. Parasitol.,
 9:134.

Lipeurus columbae Seguy, 1924. Insectes parasites:40.

Columbicola columbae Ewing, 1929. Man. Ext. Parasit. p. 116.

Columbicola antennatus Eichler, 1942. Z. Ges. natur. Fr. 1941:272.

Phagopterus columbae Freire and Duarte, 1942. Bol. Soc. Bras. Med.
 Vet., 13:14.

Columbicola claviformis Thompson, 1950 (nec Denny, 1842), Ann. Mag.
 Nat. Hist., 3:273.

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Columbicola juan-fernandez Hopkins and Clay, 1953. Ann. Mag. Nat.

Hist., 6:437.

Columbicola filiformis Clay and Hopkins, 1960. Bull. Brit. Mus.

(Nat. Hist.) Entom., 9:31.

Type host: Columba livia Gmelin.

Female: Head narrow, elongate, not expanded posteriorly. Clypeal region wider than long, with anterior border more or less widely parabolic. Anterolateral margin rounded. Ventral surface of marginal carina not dilated in front. Posterior border of transverse carina slightly anterior to mid-point between preantennal suture and occipital border. Antennae relatively robust and short, with the combined lengths of last four segments shorter than maximum width of head. Segment II approximately as long as combined length of segments III and IV. Temples slightly rounded and weakly divergent, maximum width in front of temporal angles. Thorax somewhat wider than head. Abdomen more elongate than that of male. Tergal plate VII much longer than wide. Genital plate straight, elongate, with posterior bevel wide and lateral borders subparallel.

Male: Head as in female. First antennal segment not reaching transverse midline of head, longer than segment II. Segment III asymmetrical, with a posterolateral projection. Segments IV and V relatively short, combined length shorter than segment I. Genitalia characterized by short, anteriorly dilated

parameres and by the uneven form of the mesosome.

Measurements:

	Male		Female	
	Length	Width	Length	Width
Head	0.50 (0.48-0.53)	--	0.56 (0.53-0.58)	--
temples	--	0.25 (0.24-0.26)	--	0.26 (0.24-0.28)
Prothorax	0.17 (0.15-0.18)	0.20 (0.18-0.22)	0.17 (0.16-0.19)	0.21 (0.19-0.22)
Pterothorax	0.31 (0.28-0.33)	0.25 (0.22-0.28)	0.31 (0.28-0.33)	0.26 (0.24-0.29)
Abdomen	1.20 (1.15-1.26)	0.30 (0.21-0.37)	1.60 (1.50-1.79)	0.35 (0.28-0.43)
Total	2.06 (1.96-2.17)	--	2.47 (2.25-2.64)	--

Diagnosis:

Females of Columbicola columbae can be separated from C. baculoides by the posterior pair of clypeal spines (Photograph 22). The clypeal spines of C. baculoides are very slender while those of C. columbae are broad and stout. C. columbae may be separated from other related North American species by the form of the genital plate. The genital plate of C. columbae is more or less elongate, with a wide posterior groove and subparallel lateral borders. The genital plate of C. macrourae is wide and strongly arched posteriorly with a strong constriction medially. The genital plate of C. passerinae is more or less elongate with the posterior groove diverging toward the rear.

Male C. columbae may be distinguished from males of related species by the form of the genitalia (Photograph 19).

Discussion:

The normal host for this louse is the Domestic Pigeon but McGregor (1917) collected C. columbae from the Meadowlark and the Mourning Dove. It has also been collected by Emerson (1940) from the Ground Dove. Tendeiro (1962) showed C. columbae to have nearly a worldwide distribution and divided the species into several subspecies. In North America he listed specimens from Alaska, Canada, Montana, New York, South Carolina, Texas, and California. Keirens (1967) believed this to be the most common mallophagan collected and stated that it is certainly the most studied from a physiological point of view.

Domestic Pigeons collected during this study generally yielded some specimens of C. columbae. Some hosts seemed to have an abundance of these parasites while others from the same flock of birds would have relatively few.

Material examined:

Twenty females and twenty males were examined from Columba livia Gmelin: Georgetown, South Carolina, 2 Sept. 1931, H. S. Peters; Sumter, South Carolina, 18 Feb. 1941, F. C. Bishopp; Orient, Long Island, New York, 25 July 1952, Roy Latham; San Francisco, Calif., 13 Mar. 1958, R. W. Coleman; San Marcos, Hays Co., Texas, 4 May 1968, William W. Hill; Littlefield, Lamb Co., Texas, 14 Mar. 1971, William

W. Hill; Wimberly, Hays Co., Texas, 17 May 1971, William W. Hill;
 San Marcos, Hays Co., Texas, 12 Jan. 1972, William W. Hill; San
 Marcos, Hays Co., Texas, 14 Feb. 1972, William W. Hill; Austin, Travis
 Co., Texas, 17 July 1972, William W. Hill; Beeville, Bee Co., Texas,
 12 Aug. 1972, William W. Hill; Martindale, Guadalupe Co., Texas,
 12 Sept. 1972, William W. Hill.

Columbicola passerinae (Wilson, 1941)

(Photograph 23)

Esthiopterum (Columbicola) passerinae Wilson, 1941. J. Parasitol.

27:259.

Columbicola passerinae Guimaraes, 1944. Pap. Avuls. Dept. Zool.

S. Paulo, 6:16.

Columbicola gymnopeliae Hopkins and Clay, 1955. Ann. Mag. Nat.

Hist., 8:180.

Type host: Columbigallina passerina (L.).

Female: Head triangular, elongate. Clypeal region elongate, with
 anterior border parabolic. Anterolateral borders slightly
 rounded. Midpoint of posterior border of transverse carina
 slightly anterior of mid-distance between preantennal suture
 and occipital border. Antennae short, relatively robust,
 combined length of four apical segments much shorter than
 maximum width of head; segment II as long as combined length
 of segments III and IV; segment III slightly longer than IV.
 Temples almost rectangular, with maximum width just in front
 of temporal angles. Thorax approximately as wide as head.

Pterothorax with lateral setae considerably shortened.

abdomen elongate, calviform, wider than that of male.

Tergal plate VII approximately as long as wide. Genital plate wide with a profound posterior groove.

Male: Head as in female. Antennae short, relatively robust, with combined length of the four apical segments shorter than maximum width of head. Segment I much shorter than width of head and as long as segment II; segment III asymmetrical, with a prominent posterolateral protuberance; segments IV and V relatively elongate, combined length as long as segment I. Thorax as in female. Abdomen elongate. Genitalia characterized by short, narrow parameres, broadly separated at base, convergent and rounded at apex. Endomeres widely divergent at base where they join articular point of parameres.

Measurements:

	Male		Female	
	Length	Width	Length	Width
Head	0.45 (0.42-0.47)	--	0.50 (0.47-0.54)	--
temples	--	0.23 (0.22-0.25)	--	0.25 (0.22-0.25)
Prothorax	0.14 (0.13-0.15)	0.17 (0.16-0.18)	0.14 (0.13-0.15)	0.18 (0.16-0.19)
Pterothorax	0.25 (0.24-0.27)	0.22 (0.21-0.23)	0.26 (0.24-0.28)	0.24 (0.21-0.30)
Abdomen	1.03 (0.97-1.09)	0.27 (0.25-0.33)	1.45 (1.36-1.51)	0.34 (0.27-0.49)

Total 1.80 -- 2.25 --
 (1.66-1.90) (2.13-2.33)

Diagnosis:

The males of this species have very characteristic genitalia (Photograph 23). The endomeres are long and thin and near the anterior end they fold inward, then downward to point posteriorly. The female genital plate is more or less elongate with a diverging posterior groove.

Discussion:

In North America there are two hosts for Columbicola passerinae, the Inca Dove and the Ground Dove. Emerson (1972) listed no other hosts for this parasite and no new hosts were found in the examination of available material.

Material examined:

Seven females and four males from Scardafella inca (Lesson): Hunter, Comal Co., Texas, 22 Aug. 1971, William W. Hill; San Marcos, Hays Co., Texas, 22 Aug. 1971, William W. Hill; San Antonio, Bexar Co., Texas, 29 Aug. 1971, William W. Hill; San Marcos, Hays Co., Texas, 14 July 1972; William W. Hill.

Nine females and eight males from Columbigallina passerina (L.): Pine Cay, Bahamas, 24 July 1930, H. S. Peters; Pilon, Cuba, 30 Aug. 1930, H. S. Peters; Cayo Cantiles, Cuba, 20 Sept. 1930, H. S. Peters; 8 mi. N. Refugio, Goliad Co., Texas, 6 Sept. 1971, William W. Hill.

Columbicola macrourae (Wilson, 1941)

(Figure 13; Photograph 20)

Esthiopterum (Columbicola) macrourae Wilson, 1941. J. Parasit.,
27:262.

Columbicola macrourae Thompson, 1950. Ann. Mag. Nat. Hist., Ser. 12,
3:274.

Columbicola pseudolipeurusque Hopkins and Clay, 1953. Ann. Mag. Nat.
Hist., Ser. 12, 6:437.

Type host: Zenaidura macrourae carolinensis (L.).

Female: Head elongate, narrow, about twice as long as wide.

Clypeal region slightly wider than long, with anterior border parabolic. Anterolateral border slightly convex. Marginal band clearly wider in front. Posterior border of transverse band approximately midway between preantennal suture and occipital border. Temples rectangular and slightly convex with maximum width near temporal angle. Antennae slightly robust, with combined length of four apical segments almost as long as maximum width of head. Segment II as long as combined length of segments III and IV. Segment III longer than segment IV. Thorax approximately as wide as head. Pterothorax with lateral bristles considerably shortened. Abdomen elongate. Tergite VII longer than wide. Genital plate appearing widely arched posteriorly. Posterior tubercles with three spines.

Male: Head as in female. Antennae relatively robust, with combined

length of the four apical segments approximately as long as maximum width of head. Segment I longer than segment II. Segment III asymmetrical with a posterointernal projection. Segment IV and V relatively elongate, together as long as segment I. Thorax as in female. Abdomen narrower than in female. Genitalia (Photograph 20) characterized by the long and sinuous parameres and by the subtriangular endomerall plate which has broad lateral sclerites becoming narrower posteriorly, and four small, circular, anterior vacuoles.

Measurements:

	Male		Female	
	Length	Width	Length	Width
Head	0.56 (0.52-0.60)	--	0.59 (0.57-0.63)	--
temples	--	0.27 (0.25-0.29)	--	0.28 (0.27-0.31)
Prothorax	0.18 (0.16-0.21)	0.22 (0.19-0.24)	0.18 (0.15-0.20)	0.22 (0.20-0.25)
Pterothorax	0.34 (0.28-0.36)	0.26 (0.23-0.28)	0.31 (0.25-0.36)	0.28 (0.25-0.33)
Abdomen	1.29 (1.21-1.41)	0.38 (0.28-0.40)	1.68 (1.54-1.84)	0.39 (0.31-0.48)
Total	2.30 (2.10-2.42)	--	2.68 (2.50-2.73)	--

Diagnosis:

Females of this species are very difficult to distinguish from other females of the genus Columbicola. The genital plate of C.

Figure 11. Female - Columbicola macrourae (Wilson, 1941).

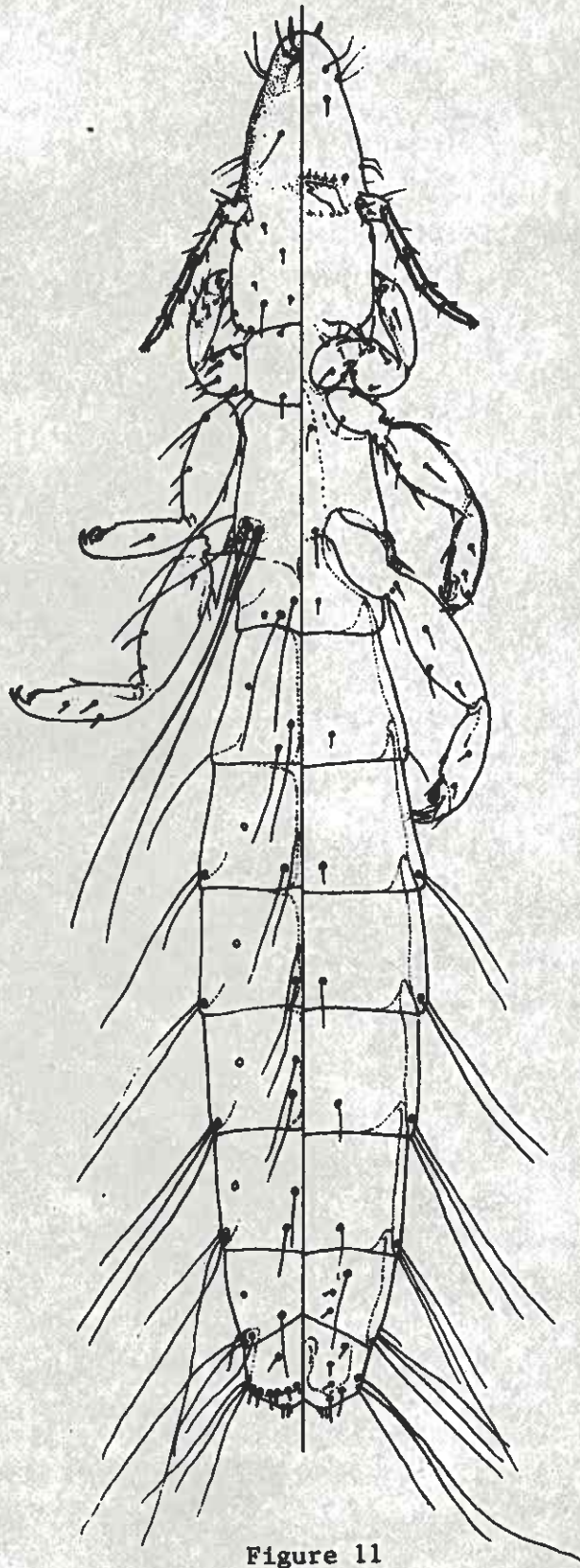


Figure 11

Figure 12. Male - Columbicola sp.

Figure 13. Male genitalia - Columbicola macrourae (Wilson, 1941).

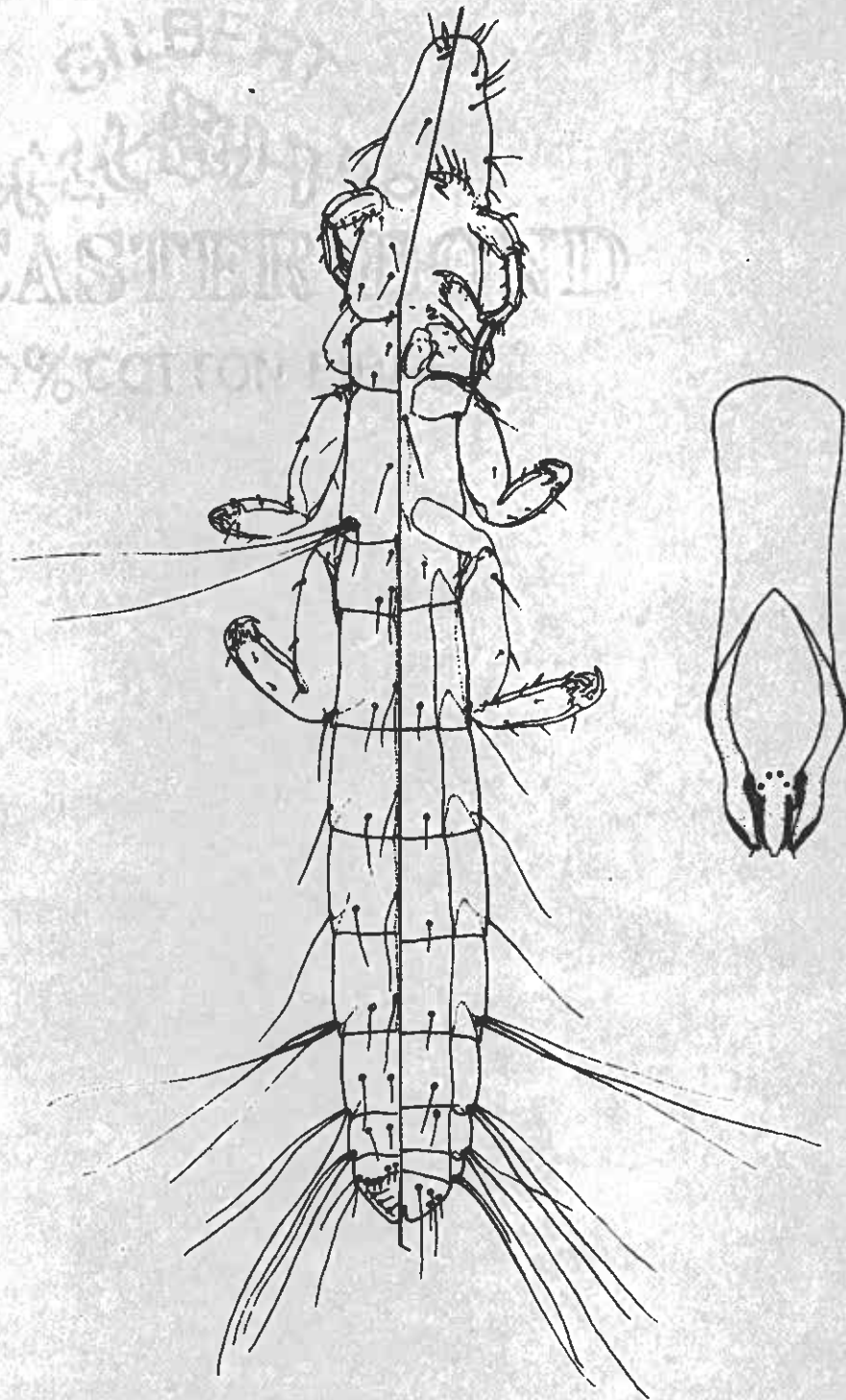


Figure 12

macrourae differs in having a wide, strongly arched, grooved, posterior margin with a strong medial constriction. The males may be easily separated by the genitalia.

Discussion:

Columbicola macrourae is found on at least five different species of hosts including birds from the genera Zenaida, Zenaidura, Leptotila, Columbigallina, and Columba, (Tendeiro, 1962; and Emerson, 1972).

The type host of C. macrourae, Zenaidura macroura, is found throughout North America but C. macrourae occurs primarily on the Eastern Mourning Dove, Zenaidura macroura carolinensis. The Western Mourning Dove, Zenaidura macrourae marginella, harbors its own distinct species of Columbicola. During this study both species of lice were obtained from one specimen of Z. macroura.

I am not in complete agreement with Tendeiro's (1962) description or drawing of the genitalia of the male of Columbicola macrourae. The elongate vacuoles on the posterior part of the endomeral plate do not exist in my specimens of C. macrourae. There is, instead, a narrowing of the fold in the lateral edge of the endomeres as they progress posteriorly. There is also a narrow chitinous bridge at the anterolateral ends of the endomeres which connects the endomeres with the parameres (Figure 13).

Material examined:

Seventeen females and seven males from Zenaidura macroura (L.):
Bonavista Cay, Ragged Island, Bahamas, 29 June 1930, F. C. Bishopp;

Crooked Island, Bahamas, 15 July 1930, F. C. Bishopp; Mona Island, Puerto Rico, 1 Sept. 1955, Warren F. Pippin; Grand Island, Nebraska, 11 June 1959, NB/WA; between Cd. Victoria and Cd. Vure, Mexico, 1 Feb. 1962, R. A. Price; Hays Co., Texas, 29 Aug. 1971, William W. Hill.

Two females from Leptotila verreauxi (Bonaparte): Santa Anna Refuge, Hidalgo Co., Texas, 5 Sept. 1971, William W. Hill.

Seventeen females and four males from Zenaida asiatica (L.): Progreso, Hidalgo Co., Texas, 5 Sept. 1971, William W. Hill; Santa Anna Refuge, Hidalgo Co., Texas, 5 Sept. 1971, William W. Hill.

Columbicola gracilicapitis Carriker, 1955

Columbicola gracilicapitis Carriker, 1955. Bol. Entomol. Venezol.,

11:20, figs., 9-10.

Type host: Leptotila verreauxi Bonaparte.

During this study two specimens of C. gracilicapitis from a host collected in South America were available for study. As far as has been determined, this species has not been collected in North America.

Carriker, 1955, described C. gracilicapitis from specimens of Leptotila verreauxi collected at Taraza, Antioquia, Colombia and at San Felipe, Venezuela.

Columbicola macrourae was the only species of Columbicola obtained from Leptotila verreauxi collected in Hidalgo Co., Texas.

Columbicola fulmeki Eichler, 1942

Columbicola fulmeki Eichler, 1942. SB, Ges. naturf. Fr., 1941:274,

287, fig. 2.

Type host: Streptopelia chinensis (Scopoli)

Eichler, 1942, described this species from Streptopelia chinensis (Scopoli) collected in Sumatra. During this study no specimens of this species were available for study. To date this species of Mallophaga has not been collected from a host in North America.

Columbicola extinctus Malcomson, 1937

Columbicola extinctus Malcomson, 1937. Ann. Entomol. Soc. Amer.,
30:55, fig. 3.

Type host: Ectopistes migratorius (Linnaeus).

This species of Columbicola was described by Malcomson from specimens taken from the Passenger Pigeon, a bird now extinct. No specimens of this mallophagan species were available for study.

GENUS PHYSCONELLOIDES EWING, 1927Physconelloides Ewing, 1927. J. Wash. Acad. Sci., 17:94.Gonicotacanthus Guimaraes, 1936. Rev. Mus. S. Paulo, 20:225.

Front of head rounded; clypeus strongly chitinized; clypeal suture well developed. A pair of ventral spine-like projections arising just posterior to clypeal suture extending back over basal segment of antennae. A similar pair of projections (usually shorter) arise just anterior to the clypeal suture. Antennae five segmented, filiform. Basal segment large, rectangular; second segment longest.

Temples sharply angulate; posterior margin of temporal carinae strongly acute. Eyes present but concealed from above by lateral expansion of temporal lobes. Esophageal sclerite well developed. Prothorax trapezoidal, diverging posteriorly. Pterothorax extending outward beyond prothorax, rounded laterally. Legs without brushes or combs of setae. Abdomen eight segmented. Tergites heavily sclerotized along lateral margins. Margins of sternites and tergites inconspicuous medially. Abdominal setae sparse; not diagnostic for species. Genitalia variable between species.

Key to the Species of Physconelloides

Females

1. Posterior margin of genital plate convex 2
 1'. Posterior margin of genital plate emarginate
 P. passerinae

- 2(1). Posterolateral angle of genital plate with two or three (rarely four) long setae 3
- 2'. Posterolateral angle of genital plate with four or five short setae P. spenceri
- 3(1). Posterolateral angle of genital plate with two long setae and one short seta 4
- 3'. Posterolateral angle of genital plate with three (rarely four) long setae P. ceratoceps
- 4(3). Posterior edge of genital plate sharply convex (Photograph 24) P. wisemani
- 4'. Posterior edge of genital plate broadly convex (Photograph 25) P. zenaidurae

Males

1. Row of short, ventral subapical setae not extending beyond tip of abdomen P. spenceri
- 1'. Row of long subapical setae extending beyond tip of abdomen 2
- 2(1'). Lateral preantennal spine-like process extending posteriorly to near midline of basal segment of antenna P. zenaidurae
- 2'. Lateral preantennal spine-like process extending posteriorly to posterior margin of basal segment of antenna 3
- 3(2'). Lateral preantennal spine-like process broad, apex truncate P. passerinae

- 3'. Lateral preantennal spine-like process narrow, apex acute P. ceratoceps

Physconelloides ceratoceps Ewing, 1927

(Photograph 26)

Physconelloides ceratoceps Ewing, 1927. J. Wash. Acad. Sci., 17:94.

Type host: Leptotilia verreauxi chlorauchenia (Salv. & God.).

Female: Head about three-fourths as long as wide; anterior margin rounded. Marginal carinae well-developed. Clypeal projections sharply pointed at apex. Acute posteriorly projecting margin of preantennal region terminating near posterior margin of basal segment of antennae. Temples strongly angulate. Occipital margin convex. Prothorax rounded laterally. Vulval plate characteristic; three long setae and one short spine in posterolateral angle.

Male: Head, thorax, and shape of abdomen as in female. Genital plate with three setae at posterolateral angle; two rows of setae between genital plate and apical sclerite; six subapical setae and four longer apical setae.

Measurements:

	Male		Female	
	Length	Width	Length	Width
Head	0.37 (0.35-0.40)	--	0.47 (0.40-0.48)	--
temples	--	0.50 (0.48-0.55)	--	0.60 (0.56-0.66)
Prothorax	--	0.30 (0.28-0.32)	--	0.36 (0.33-0.39)

Pterothorax	--	0.40 (0.38-0.43)	--	0.48 (0.45-0.52)
Abdomen	--	0.56 (0.52-0.61)	--	0.69 (0.57-0.76)
Total	1.19 (1.09-1.47)	--	1.54 (0.41-1.72)	--

Diagnosis:

Separation of this species from other Physconelloides may best be determined by the presence of the sharply pointed clypeal projection and the female genital plates. The tergites of P. ceratoceps (Photograph 26) are not as curved as are those of P. zenaidurae (Photograph 27) and P. passerinae (Photograph 28). The male genitalia varies in setal pattern. The two rows of setae on the terminal segment have a pattern of 6-4, 6-5, 6-6; 6-4 normal to the species.

Discussion:

Ewing (1927) gave a description with measurements but did not illustrate the species. Emerson (1960) helped by illustrating both the male and female genitalia and the clypeal projections and compared these genitalia with those of other known species of Physconelloides. Carriker (1963) listed measurements of both male and female and stated that the genitalia are uniform characters for identification with only an occasional difference in setal pattern. For the majority of specimens I have found this to be true, but one should consider clypeal projections as well as other characteristics.

Material examined:

Twenty females and nine males were examined from Leptotila

verreauxi (Bonaparte): Huarmey, Peru, 26 Feb. 1932, M. A. Carriker; Suchiman, Peru, 9 Mar. 1932, M. A. Carriker; Sta. Ana Rio Coroica, Bolivia, 20 July 1934, M. A. Carriker; Tres Zapatas, Mexico, 25 Jan. 1940, M. A. Carriker; Taraza, Ant., Colombia, 26 Apr. 1948; Vega de Dropouche, Trinidad, 21 Aug. 1956, TRVL 299, W. G. Downs; Toco Road, Trinidad, 13 Mar. 1957, No. 627, W. G. Downs; El Tambo Cavca, Colombia, 20 Feb. 1959, M. A. Carriker; Santa Anna Refuge, Hidalgo Co., Texas, 5 Sept. 1971, William W. Hill.

Physconelloides zenaidurae (McGregor, 1917)

(Photograph 25, 27)

Goniodes zenaidurae McGregor, 1917. Entomol. News. 28:433;

plate 28, figs. 1, 4.

Campanulotes zenaidurae (McGregor) Keler, 1939. Nova Acta Leop-Carol.:230.

Physconelloides zenaidurae (McGregor) Clay 1953. Checklist of Mallophaga:291.

Type host: Zenaidura macroura (L.).

Female: Head about one-fourth again as wide as long; anterior margin rounded. Marginal carinae well developed. Clypeal projections bluntly rounded at apex. Acute posteriorly projecting margin of preantennal region terminating near midline of basal antennal segment. Temples strongly angulate. Occipital margin convex. Prothorax about three-fifths as long as wide. Abdomen widest at fourth and fifth segments. Vulval plate

characteristic, broadly rounded posteriorly; two long setae and one short spine in posterolateral angle.

Male: Head and thorax as in female. Abdomen sub-oval. Genital plate with three setae at posterolateral angle; two rows of setae between genital plate and apical sclerite; six short setae anteriorly and six longer posteriorly.

Measurements:

	Male		Female	
	Length	Width	Length	Width
Head	0.34 (0.31-0.40)	--	0.45 (0.42-0.46)	--
temples	--	0.47 (0.39-0.55)	--	0.62 (0.58-0.67)
Prothorax	--	0.24 (0.22-0.31)	--	0.33 (0.31-0.37)
Pterothorax	--	0.34 (0.30-0.42)	--	0.46 (0.43-0.49)
Abdomen	--	0.52 (0.37-0.61)	--	0.69 (0.64-0.73)
Total	1.02 (0.85-1.29)	--	1.62 (1.48-1.74)	--

Diagnosis:

This species can easily be distinguished from others within the genus by the clypeal spines and by both male and female genitalia.

An exception is P. wisemani. P. wisemani has the same setal pattern on the terminal abdominal segment of the female. The male genitalia of P. zenaidurae closely resembles that of P. wisemani. The difference

is in the double row of setae between the genital plate and the apical sclerite. P. zenaidurae has six per row and P. wisemani has eight per row.

Discussion:

McGregor (1917) gave a detailed description of P. zenaidurae. He illustrated the body and one leg of a female. Keler (1939) included the species in a key with measurements of the female. Emerson (1957) illustrated both the male and female. He also recorded P. zenaidurae from Columba livia. The differences between P. zenaidurae and P. wisemani appear to be slight. Several specimens of P. zenaidurae show overlap in both size and taxonomic characters with those given by Emerson (1960) for P. wisemani. Emerson stated that the male of P. wisemani was larger and the female smaller than P. zenaidurae. A large series of both species may show them to be conspecific.

Material examined:

Eleven males and eighteen females from Zenaidura macroura L.:
 Miami, Florida, 21 Aug. 1919; Sonora, Texas, 12 Aug. 1921, Bish. No. 10191, O. G. Babcock; Lakewood, Ohio, 4 Aug. 1929, Bish. No. 13660, E. C. Hoffman; Fredericksburg, Virginia, 1 Aug. 1931, Bish. No. 15822, E. B. Marshall; Laramie, Wyoming, 20 Mar. 1934; Keno, Oregon, 10 Aug. 1934, Bish. No. 1327, Bruce; Nueces Co., Texas, 2 Oct. 1943, J. M. Anderson; 10 mi. S. China, Mexico, 4 Aug. 1955, R. E. Beer; Leavenworth, Kansas, 1 Sept. 1956, K. C. Emerson; between Cd. Victoria and

Cd. Vure, Mexico, 1 Feb. 1962, M. A. Price; Van Horn, Culberson Co., Texas, 22 Aug. 1972, William W. Hill.

Physconelloides wisemani Emerson, 1960

(Photograph 29)

Physconelloides wisemani Emerson, 1960. J. Kansas Ent. Soc., 33:122, figs. 4, 9, and 14.

Type host: Zenaida asiatica (L.).

Since only one specimen was available for examination, a critical discussion of this species will not be given. P. wisemani closely resembles P. zenaidurae. No major differences could be found between chaetotaxy and shape of the vulval plates nor the size and shape of clypeal projections of the two species. The range of measurements for P. wisemani and P. zenaidurae overlap. Characteristics of the single specimen of P. wisemani available for study indicate the species are conspecific. An examination of additional material and a comparison of types may show this to be the case.

Measurements:

	Female	
	Length	Width
Head	0.30	--
temples	--	0.61
Prothorax	--	0.37
Pterothorax	--	0.49
Abdomen	--	0.75
Total	1.63	--

Material examined:

One female from Zenaida asiatica (L.): Huarney, Peru, 26 Feb. 1932, M. A. Carriker, Jr.

Physconelloides passerinae Emerson, 1957

(Figure 14; Photograph 28)

Physconelloides passerinae Emerson, 1957. J. Kansas Entomol. Soc., 30:37, fig. 4.

Type host: Columbigallina passerina (L.).

Female: Head about three-fourths as long as wide; anterior margin rounded. Marginal carinae well developed. Clypeal projections bluntly rounded at apex. Acute posteriorly projecting margin of preantennal region terminating near posterior margin of basal segment of antennae. Temples strongly angulate. Occipital margin convex. Prothorax with posterolateral angles elongate. Pterothorax rounded laterally. Vulval plate characteristic; emarginate posteriorly, a row of numerous setae along posterolateral margin, decreasing in length medially.

Male: Head, thorax, and shape of abdomen as in female. Genital plate with two setae at posterolateral angle; two rows of setae between genital plate and apical sclerite; eight short subapical setae and eight longer apical setae.

Measurements:

	Male		Female	
	Length	Width	Length	Width
Head	0.42 (0.38-0.44)	--	0.45 (0.40-0.49)	--
temples	--	0.61 (0.51-0.67)	--	0.66 (0.60-0.70)
Prothorax	--	0.37 (0.33-0.40)	--	0.41 (0.38-0.43)
Pterothorax	--	0.44 (0.38-0.47)	--	0.49 (0.47-0.53)
Abdomen	--	0.67 (0.54-0.73)	--	0.73 (0.60-0.84)
Total	1.36 (1.08-1.49)	--	1.62 (1.47-1.74)	--

Diagnosis:

Two characteristic differences separate P. passerinae from other members of the genus, the elongate posterolateral angle of the prothorax and the outline of the vulval plate. In addition to these characteristics the species appears to have more sclerotization throughout. The recurved processes of the pleurites are slightly more pronounced than that found in other members of the genus. The clypeal projections of P. ceratoceps are about equal in length to those of P. passerinae but the projections of P. ceratoceps are slender and terminate in a sharp point while those of P. passerinae are rather broad and terminate bluntly. The two rows of setae found on the terminal portion of the male are not always as described. Specimens have been observed with patterns of 5-7, 6-6, 6-7, 7-7, or 7-8.

Discussion:

Emerson (1960) compared P. passerinae with P. zenaoidurae. He illustrated both male and female of P. zenaoidurae but only the head of a male of P. passerinae. Differences between the clypeal spines and genitalia were mentioned but no comparisons of the pleurites or of the prothorax were given. Carriker (1963) disagreed with Emerson's designation of the paratypes. Carriker illustrated differences of the male genitalia within the paratypes of P. passerinae. Since Emerson's paratypes came from two subspecies of Collumbigallina passerina collected from various locations throughout the Western Hemisphere, Carriker (1963) disagreed with Emerson's designation of paratypes on the basis of the morphological variation of the male genitalia. I have found differences in setal patterns of the genitalia of male specimens collected from the same host in one locality. It would appear that one should consider not only the genitalia but the other criteria given by Carriker (1963) and Emerson (1960) as well.

Material examined:

Six females and one male from Scardafella inca (Lesson): Hunter, Comal Co., Texas, 22 Aug. 1971, William W. Hill; San Antonio, Bexar Co., Texas, 29 Aug. 1971, William W. Hill; San Marcos, Hays Co., Texas, 14 July 1972, William W. Hill.

Twenty-four females and sixteen males from Columbigallina passerina (L.): St. Croix, Virgin Islands, 1935-36, No. 25645(a); Bonito Springs, Florida, 22 Nov. 1936, No. 26878, B. V. Travis;

Conejo, Veracruz, Mexico, 12 Feb. 1940, M. A. Carriker, Jr.; Hato San Jose, Bolivar, Venezuela, 4 Apr. 1967, No. 12574; eight mi. No. Refugio, Goliad Co., Texas, 6 Sept. 1971, William W. Hill; nine mi. S. Beeville, Bee Co., Texas, 12 Aug. 1972, William W. Hill.

Physconelloides spenceri Emerson and Ward, 1958

Physconelloides spenceri Emerson and Ward, 1958. J. Kansas Entomol. Soc., 31:239-240, figs. 1 and 4.

Emerson and Ward (1958) described this species from Columba fasciata Say collected in British Columbia. No specimens of this species were available for examination. The separation of P. spenceri in the key is based on characteristics given for the species by Emerson and Ward.

Figure 14. Female - Physconelloides passerinae Emerson, 1957.

1859
LANCASTER BOND
100% COTTON FIBRE

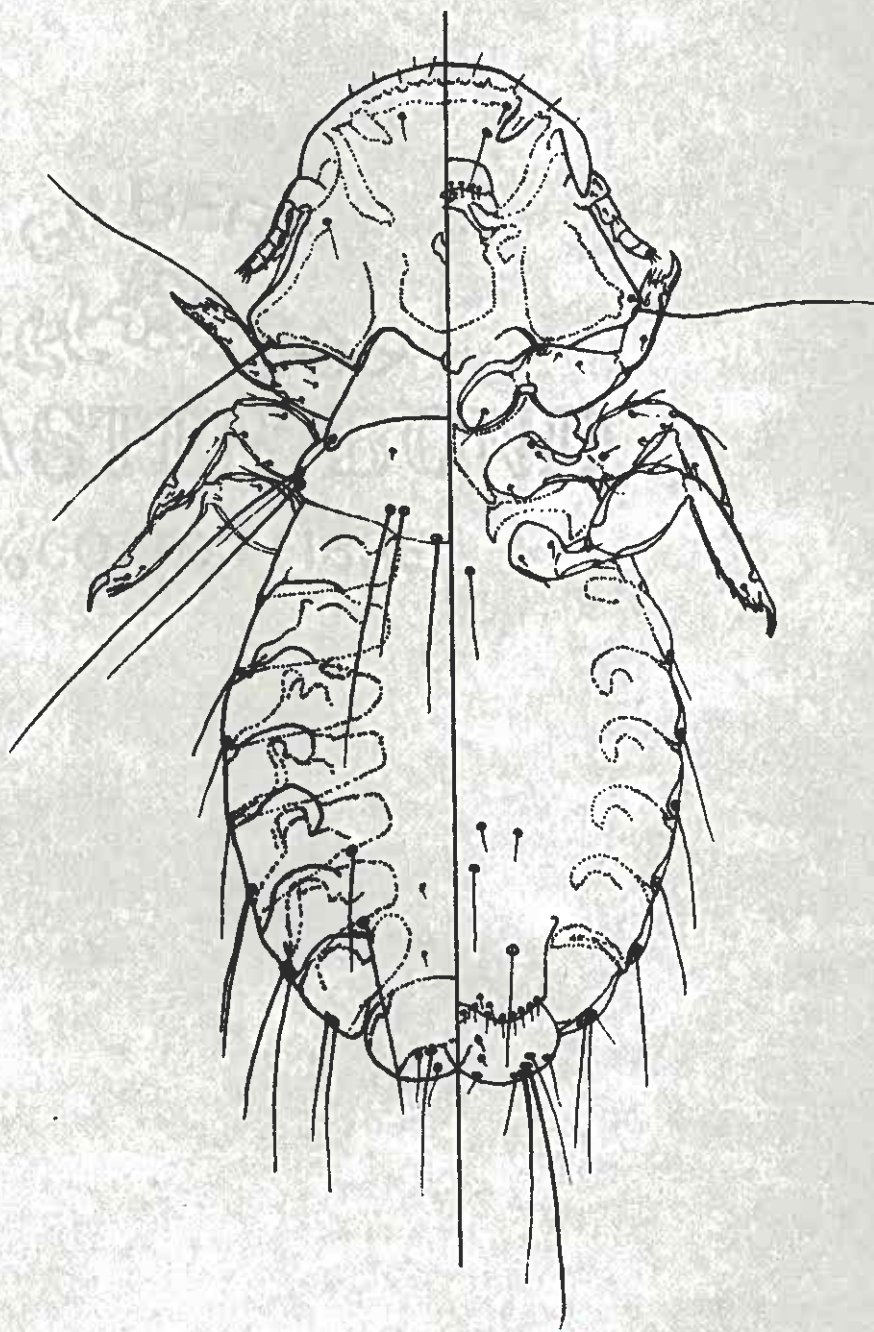


Figure 14

GILBERT
 (1939)
 LA NEA STATE
 100% COTTON FIBRE

GENUS CAMPANULOTES KELER, 1939

Campanulotes Keler, 1939. Nova Acta Leop.-Carol. (n.f.), 8:157.

Anterior of head broadly convex. Antennae filiform; basal segment in a shallow emargination. Eyes not prominent. A chitinous ridge anterior to mandibles. Temples strongly angulate, bearing two long setae at the posterolateral angle. Posterior margin of head slightly concave in middle, with one spined obtuse angle at each end of the concavity. Prothorax narrow, short, trapezoidal, posterolateral angles obtuse. Pterothorax projecting posteriorly, partially covering first abdominal segment. Legs short, stout, with scattered setae. Abdomen broad, elongate oval, with conspicuous internolateral carinae.

Campanulotes compar (Burmeister, 1838)

(Figures 15, 16; Photographs 30, 31)

Goniocotes compar Burmeister, 1838. Handb. Ent., 2:431.

Goniocotes formosanus Sugimoto, 1929. Rep. Dept. Agr. Res. Formosa, 43:25.

Campanulotes compar (Nitzsch), Keler, 1939. Nova Acta Leop.-Carol. (n.f.), 8:157.

Type host: Columba livia Gmelin.

Female: Head bell-shaped. Anterior margin broadly convex. Marginal carina narrow anteriorly, broad laterally and posteriorly. Antennae filiform, basal segment stout; set in a shallow emargination. Eyes not prominent. Distinct band or ridge anterior to mandibles. Temples angulate with two long setae.

Figure 15. Female - Campanulotes compar (Burmeister, 1838).

Figure 16. Male - Campanulotes compar (Burmeister, 1838).

GILBERT

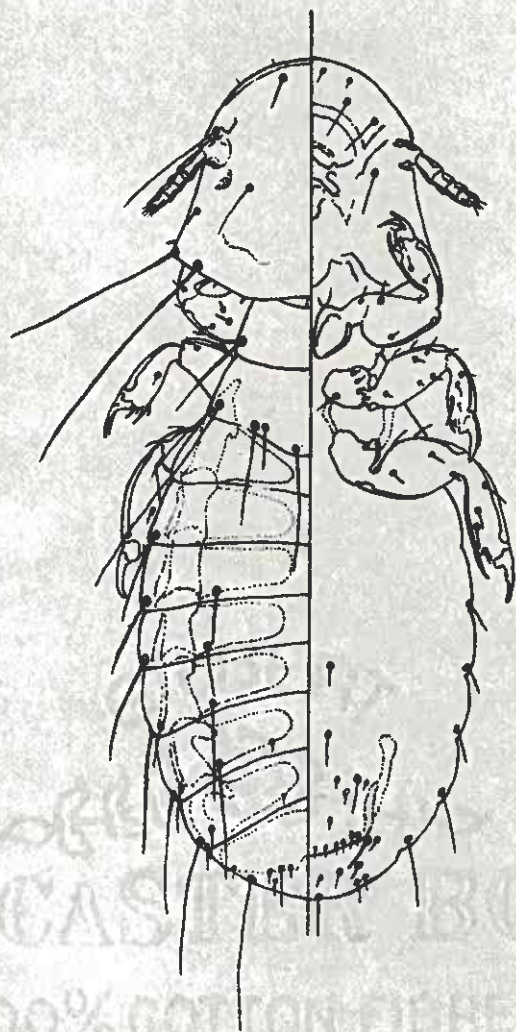


Figure 15

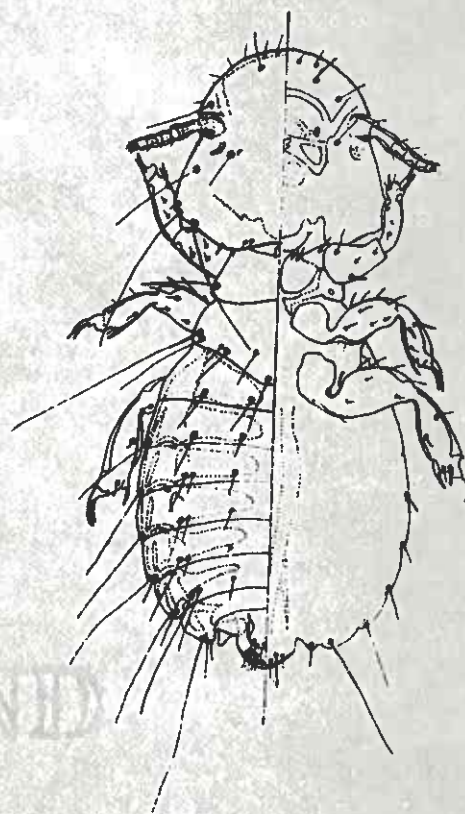


Figure 16

Posterior margin of head slightly concave in middle with one angle at each end of the concavity. Prothorax about one-half as wide as head; trapezoidal. Pterothorax extended posteriorly over first abdominal segment. Legs short, stout. Abdomen oval, with conspicuous internolateral carinae. Genital plate with posterior row of small setae. Setae sparse over entire body.

- **Male:** As in female except smaller in size and with terminal segment of abdomen projecting and chitinized. Genitalia extends almost entire length of abdomen.

Measurements:

	Male		Female	
	Length	Width	Length	Width
Head	0.34 (0.31-0.36)	--	0.40 (0.34-0.42)	--
temples	--	0.37 (0.31-0.39)	--	0.42 (0.37-0.46)
Prothorax	0.08 (0.07-0.11)	0.23 (0.21-0.25)	0.09 (0.07-0.11)	0.24 (0.19-0.26)
Pterothorax	0.15 (0.13-0.16)	0.29 (0.27-0.31)	0.17 (0.14-0.19)	0.32 (0.27-0.34)
Abdomen	0.48 (0.44-0.52)	0.47 (0.44-0.51)	0.70 (0.63-0.78)	0.55 (0.48-0.60)
Total	1.06 (0.93-1.18)	--	1.36 (1.20-1.49)	--

Diagnosis:

Campanulotes compar is the only species of this genus found in

North America. The most closely related species to C. compar is C. bidentatus (Scopoli), from Columba palumbus. Clay (1951) noted that the major difference between these two species is the smaller size of C. compar. It is apparently for this reason that C. compar is listed by some authors as a subspecies of C. bidentatus. It resembles two other genera from columbiform hosts; Physconelloides and Coloceras. Campanulotes lacks the ventral spine-like processes found on the head of Physconelloides and differs from Coloceras in not having sexually dimorphic antennae.

Discussion:

This is a rare genus found only on the Columbidae. Though only one species has been recorded from North America it is widely distributed. It has been reported by Wilson (1928) from New York, Peters (1928) from Ohio, Emerson (1940) from Oklahoma, Brimley (1942) from North Carolina, Brown and Wilk (1944) from Alberta, Whitehead (1954) from Quebec, and Wiseman (1959) from Texas. I have found it to be quite abundant on most domestic pigeons collected.

Material examined:

Thirty-six females and twenty-four males from Columba livia Gmelin: Leavenworth, Kansas, 7 July 1956, K. C. Emerson; San Marcos, Hays Co., Texas, 22 May 1968, William W. Hill; Littlefield, Lamb Co., Texas, 14 Mar. 1971, William W. Hill; Wimberly, Hays Co., Texas, 17 May 1971, William W. Hill; San Marcos, Hays Co., Texas, 12 Jan. 1972, William W. Hill; Austin, Travis Co., Texas 17 July 1972, William

W. Hill; Beeville, Bee Co., Texas, 12 Aug. 1972, William W. Hill;
Martindale, Guadalupe Co., Texas, 12 Sept. 1972, William W. Hill.

GILBERT

Gilbert

LANCASTER BOND

100% COTTON FIBRE

GENUS COLOCERAS TASCHEBERG, 1882

Coloceras Taschenberg, 1882. Nova Acta Leop.-Carol., 44:42.

Ancistrodes Keler, 1939. Nova Acta Leop.-Carol., (n.f.), 8:65.

Nitzschiella Keler, 1939. Nova Acta Leop.-Carol., (n.f.), 8:67.

Head large, broadly and evenly rounded in front and narrowly circumfasciate. Semicircular ridge anterior to mandibles opens posteriorly; well developed carinae at its posterolateral limits pass outward and upward to join with narrow front carina. Antennae sexually dimorphic, those of males having segment I globular; segment II conical, almost as long as segment I; segment III nearly as long as II with base same thickness as apex of II, outer margin straight and inner bulging to form thickened apex; segments IV and V minute, IV as thick as tip of III, V much smaller. Antennal segment I on females globular but smaller at tip; segment II slightly shorter than I with tip thicker than base; segments III, IV, and V nearly equal in length and about half as long as segment II. Lateral temporal bands distinctly angular. Eyes large. Prothorax narrow with sides straight, and divergent; pterothorax with rounded sides, posterior margin produced medially into a rounded extension. Abdomen in both sexes broadly oval, laterally notched at junction of segments, tergites interrupted medially.

Though they have been reported from columbiform hosts which occur in North America, no specimens of this genus were collected during the course of this study. Emerson (1973) feels that the genus is relegated to the Old World and thus far no specimens have been taken from native

birds.

Doves that occur in North America and are known to harbor members of the genus Coloceras are the Domestic Pigeon, Columba livia Gmelin, parasitized by Coloceras damicorne fahrenheitzi Eichler, 1950, and the Spotted Dove, Streptopelia chinensis (Scopoli, 1786) host of Coloceras chinense (Kellogg and Chapman, 1902) and Coloceras lativentre (Uchida, 1916).

Key to the Species of Coloceras

Females

1. Abdomen widest at segment II C. lativentre
 1'. Abdomen widest at segment IV 2
 2(1'). Temporal angle with sharp projection C. chinense
 2'. Temporal angle without sharp projection
 C. damicorne fahrenheitzi

Males

1. Genitalia expanded posteriorly C. lativentre
 1'. Genitalia not expanded posteriorly 2
 2(1'). Genitalia constricted medially C. chinense
 2'. Genitalia expanded medially C. damicorne fahrenheitzi

Coloceras lativentre (Uchida, 1916)

(Photographs 32, 33)

Goniodes lativentris Uchida, 1916. Annot. Zool. Jap., 9:81, figs. 1-2.

Nitzschiella lativentris (Uchida) Keler, 1939. Nova Acta Leop.-Carol.,

(n.f.), 8:65.

Figure 17. Female - Coloceras damicorne (Nitzsch)
(after Keler)

Figure 18. Male - Coloceras damicorne (Nitzsch)
(after Keler)

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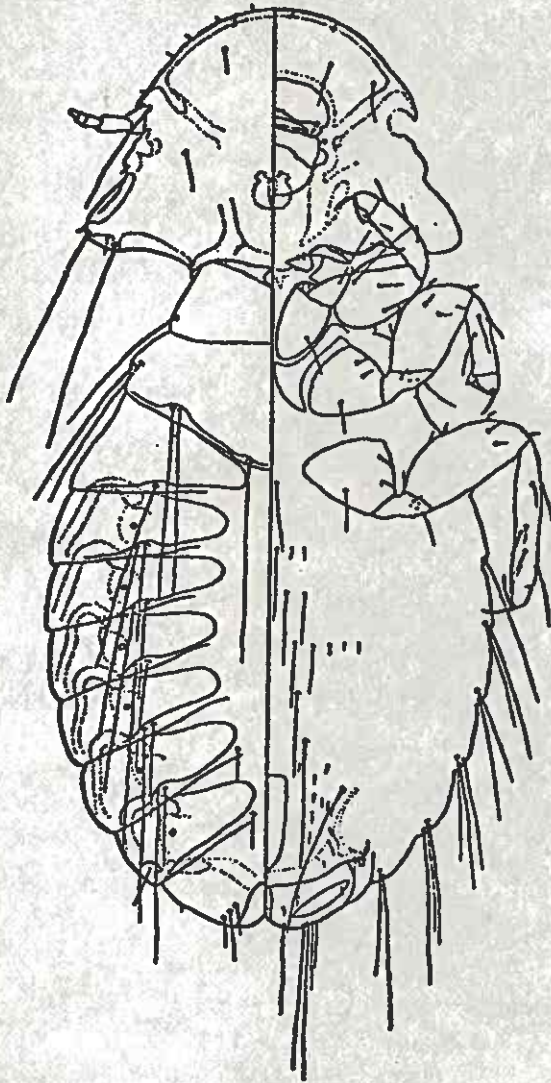


Figure 17



Figure 18

Coloceras lativentre (Uchida) Hopkins and Clay, 1952. Check-list
of Mallophaga:74.

Type host: Streptopelia chinensis (Scopoli).

Female: Head somewhat quadrilateral, with slightly projecting temples and rounded occipital margins. Sclerotization weak, evident on mandibles, supporting structures and in occipital region. Prothorax small, quadrilateral; posterior margin slightly convex. Abdomen very broad, oval, widest at second segment; lateral margins of segments convex.

Male: As in female except head more laterally compressed, temporal angle more acute. Genitalia well sclerotized, expanded posteriorly, narrowed anteriorly.

Measurements:

	Male		Female	
	Length	Width	Length	Width
Head	0.37 (0.36-0.38)	--	0.39 (0.37-0.41)	--
temples	--	0.42 (0.42-0.43)	--	0.49 (0.46-0.53)
Prothorax	0.16 (0.15-0.18)	0.28 (0.27-0.28)	0.14 (0.13-0.15)	0.29 (0.28-0.29)
Pterothorax	0.21 (0.19-0.24)	0.39 (0.39-0.40)	0.21 (0.19-0.22)	0.39 (0.38-0.39)
Abdomen	0.69 (0.67-0.71)	0.68 (0.64-0.69)	0.82 (0.82-0.84)	0.67 (0.64-0.69)
Total	1.43 (1.38-1.47)	--	1.56 (1.54-1.59)	--

Diagnosis:

Coloceras lativentre differs from both C. chinense and C. damicorne fahrenheitzi in that it has a more campanulate head and its abdomen is obovate. The male genitalia is largely expanded posteriorly.

Discussion:

Coloceras lativentre has been collected from the Spotted Dove but to date none have been taken from that host in the Western Hemisphere.

Material examined:

Three females and three males from Streptopelia chinensis (Scopoli): Kanchanabur, Thakhanun, Hinlaen, Thailand, 7 Nov. 1952, R. E. Elbel and H. G. Diegnan; Hua Mae, Chiangmai, Thailand, 6 Nov. 1962, SMRL #1746, SEATO Research Lab.

Coloceras chinense (Kellogg and Chapman, 1902)

(Figures 17, 18; Photograph 35)

Goniodes minor Piaget, 1880. Les Pediculines:256, pl. 21, fig. 3

(nec. p. 241).

Goniocotes chinensis Kellogg and Chapman, 1902. J. N. Y. Ent. Soc.,

10:160, pl. 13, fig. 5.

Goniodes piagetii Johnston and Harrison, 1912. Roy. Soc. Qd., 24:19

(new name for G. minor Piaget, 1880, p. 256).

Coloceras chinense (Kellogg and Chapman), Keler, 1939. Nova Acta

Leop.-Carol., (n.f.), 8:215.

Type host: Streptopelia chinensis (Scopoli).

Female: Temporal margins sharply diverging, meeting the occipital margin at an acute angle with a short spine on a sharp angular projection of the temporal margin beyond real angle of temples. Base color of head pale yellow with dark narrow band on rounded anterior margin. Distinct chestnut brown patch in front of eye, temples with distinct yellow marginal bands; occipital margin dark brown. Prothorax narrow, sides diverging, posterior angles not prominent. Dark brown lateral bands and sternal markings bending medially and posteriorly. Abdomen obovate, widest at segment IV, dark lateral bands resembling vertebrae, becoming lighter in color posteriorly.

Male: As in female except temples not as broadly expanded, abdomen more shortened and plump. Genitalia well sclerotized, constricted medially and diverging posteriorly.

Measurements:

	Male		Female	
	Length	Width	Length	Width
Head	0.57 (0.57-0.57)	--	0.59 (0.57-0.61)	--
temples	--	0.70 (0.69-0.70)	--	0.84 (0.82-0.85)
Prothorax	0.26 (0.25-0.27)	0.44 (0.42-0.46)	0.28 (0.28-0.28)	0.50 (0.49-0.50)
Pterothorax	0.15 (0.15-0.15)	0.61 (0.58-0.64)	0.22 (0.21-0.22)	0.66 (0.65-0.67)
Abdomen	0.90 (0.85-0.94)	0.92 (0.88-0.96)	1.14 (1.11-1.17)	1.00 (0.97-1.03)
Total	1.87 (1.83-1.91)	--	2.22 (2.16-2.29)	--

Diagnosis:

Coloceras chinense resembles more closely C. damicorne fahrenheitzi than it does C. lativentre. C. chinense possesses distinctive projections on the temporal angle. These projections are lacking on both C. damicorne fahrenheitzi and C. lativentre. The male genitalia exhibits a distinct medial constriction.

Discussion:

Though C. chinense has been collected from the Spotted Dove, a species which occurs in North America, to date none have been taken from that host in North America.

Material examined:

Two females and two males from Streptopelia chinensis (Scopoli):
 Chaing Rai, Chiang Saen Kao, Thailand, 24 Feb. 1953, R. E. Elbel and
 H. G. Deignan; Chiang mai sanasi, Ban Hua Rin, Thailand, 19 June
 1962, Kitti Thonglongya.

Coloceras damicorne fahrenheitzi Eichler, 1950

(Photograph 34, 36)

Coloceras damicorne fahrenheitzi Eichler, 1950. Doriana, 1:3.

Type host: Columba livia Gmelin.

Female: Temples sharply diverging, meeting the occipital margin in an acute angle. Carinae moderately sclerotized. Mandibles, their associated carinae, and a patch in front of eye dark brown. Prothorax narrow, sides diverging posteriorly.

Posterior angles prominent. Abdomen obovate, widest at segment IV. Distinct lateral bands resembling vertebrae, of uniform coloration.

Male: Head as in female, abdomen terminating bluntly. Genitalia well sclerotized, slightly expanded medially.

Measurements:

	Male		Female	
	Length	Width	Length	Width
Head	0.72 (0.70-0.73)	--	0.79 (0.74-0.88)	--
temples	--	0.98 (0.95-1.00)	--	1.13 (1.12-1.18)
Prothorax	0.40 (0.37-0.42)	0.60 (0.58-0.61)	0.35 (0.32-0.37)	0.63 (0.58-0.64)
Pterothorax	0.25 (0.24-0.25)	0.92 (0.81-1.03)	0.25 (0.24-0.25)	0.88 (0.82-0.91)
Abdomen	1.15 (1.12-1.19)	1.26 (1.21-1.32)	1.37 (1.30-1.44)	1.27 (1.24-1.29)
Total	2.51 (2.44-2.59)	--	2.72 (2.68-2.79)	--

Diagnosis:

C. damicorne fahrenheitzi more closely resembles C. chinense than it does C. lativentre. The temples are more expanded than those of C. lativentre and lack the conspicuous projections found on the temporal angle of C. chinense. The male genitalia of C. fahrenheitzi have parallel sides the entire length except for a medial expansion.

Discussion:

C. damicorne fahrenheitzi, though reported from other localities on birds that occur in North America, has to date not been collected in the New World.

Material examined:

Four females and two males from Columba livia Gmelin: Hoy Orkney Island, Britain, 5 Aug. 1950, G. H. E. Hopkins.

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SUMMARY

The results of this study have shown that some birds listed by Emerson (1972) as probable North American hosts of Mallophaga actually harbor mallophagan parasites not previously described. Two new species of Hohorstiella were found: H. paladinella sp. nov. from Zenaidura macroura (L.) (Mourning Dove) and H. passerinae sp. nov. from Columbigallina passerina (L.) (Ground Dove) and Scardafella inca Lesson (Inca Dove).

Taxonomic keys to the genera and species of the Mallophaga parasitizing the Columbiformes were written and a representative of each genus was illustrated.

The geographical distribution of the Mallophaga was limited primarily by the distribution of the hosts. Two species of Columbicola were found to parasitize Zenaidura macroura (L.). C. baculoides (Paine) was found on Z. macroura marginella (Woodhouse) in Western North America and C. macrourae (Wilson) on Z. macrourae carolinensis (L.) in Eastern North America. In addition, specimens of both species of lice were taken from one host specimen where the geographical ranges of the hosts overlapped. Columbicola macrourae (Wilson) was also taken from Zenaida asiatica (L.) (White-winged Dove) and Leptotila verreauxi Bonaparte (White-fronted Dove).

The Domestic Pigeon, Columba livia Gmelin is a cosmopolitan host. Throughout its range it was found to harbor the same species of Mallophaga. An exception occurred with the genus Bonomiella. Bonomiella columbae Emerson was found in the Western and Eastern Hemispheres

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while B. concii Eichler and B. insolitunquicolata Conci were found only in the Eastern Hemisphere. Campanulotes compar (Burmeister), Colpocephalum turbinatum Denny, Hohorstiella lata (Piaget), Physconelloides zenaidurae (McGregor), and Columbicola columbae (L.) all were found throughout the range of Columba livia Gmelin. Coloceras damicorne fahrenheitzi Eichler has not been found on the Domestic Pigeon in the Western Hemisphere. During this study, specimens of Bonomiella columbae Emerson, Campanulotes compar (Burmeister), Hohorstiella lata (Piaget), and Columbicola columbae (L.) were taken from Columba livia Gmelin.

Two doves from separate genera, Columbigallina passerina (L.) and Scardafella inca Lesson, were found to harbor the same species of parasites. Hohorstiella passerinae sp. nov., Physconelloides passerinae Emerson, and Columbicola passerinae (Wilson) all occurred on these two species of doves. This indicated that the two birds may be more closely related than was implied taxonomically.

There were some mallophagan parasites found specifically on one host. Hohorstiella frontalis Carriker was found only on Columba fasciata Say (Band-tailed Pigeon), Physconelloides ceratoceps Ewing was found only on Leptotila verreauxi Bonaparte, and Physconelloides wisemani Emerson was specific to Zenaida asiatica (L.).

The Spotted Dove, Streptopelia chinensis (Scopoli) was known to harbor four species; Coloceras chinense (Kellogg and Chapman), Coloceras lativentre (Uchida), Colpocephalum turbinatum Denny, and Columbicola fulmeki Eichler yet none of these species were collected.

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The Red-billed Pigeon, Columba flavirostris Wagler, the White-crowned Pigeon, Columba leucocephala L., and the Ringed Turtle Dove, Streptopelia risoria (L.) have limited ranges in North America and no data are available concerning mallophagan parasites of these birds.

HOST - PARASITE LIST

Columba fasciata Say, 1823. Band-tailed Pigeon.

Columbicola macrourae (Wilson, 1941).

Hohorstiella frontalis Carriker, 1949.

Physconelloides spenceri Emerson and Ward, 1958.

Columba livia Gmelin, 1789. Domestic Pigeon.

Bonomiella columbae Emerson, 1957.

Campanulotes compar (Burmeister, 1838).

Coloceras damicorne fahrenheitzi Eichler, 1950.

Colpocephalum turbinatum Denny, 1842.

Columbicola columbae (Linnaeus, 1758).

Hohorstiella lata (Piaget, 1880).

Physconelloides zenaidurae (McGregor, 1917).

Columbigallina passerina (Linnaeus, 1758). Ground Dove.

Columbicola macrourae (Wilson, 1941).

Columbicola passerinae (Wilson, 1941).

Hohorstiella passerinae sp. nov.

Physconelloides passerinae Emerson, 1957.

Leptotila verreauxi Bonaparte, 1855. White-fronted Dove.

Columbicola gracilicapitis Carriker, 1955.

Columbicola macrourae (Wilson, 1941).

Hohorstiella paladinella sp. nov.

Physconelloides ceratoceps Ewing, 1927.

Scardafella inca Lesson, 1847. Inca Dove.

Columbicola passerinae (Wilson, 1941).

Hohorstiella passerinae sp. nov.

Physconelloides passerinae Emerson, 1957.

Streptopelia chinensis (Scopoli, 1786). Spotted Dove.

Coloceras chinense (Kellogg and Chapman, 1902).

Coloceras lativentre (Uchida, 1916).

Colpocephalum turbinatum Denny, 1842.

Columbicola fulmeki Eichler, 1942.

Zenaida asiatica (Linnaeus, 1758). White-winged Dove.

Columbicola macrourae (Wilson, 1941).

Hohorstiella paladinella sp. nov.

Physconelloides wisemani Emerson, 1960.

Zenaida aurita (Temminck, 1810). Zenaida Dove.

Columbicola macrourae (Wilson, 1941).

Zenaidura macrourae (Linnaeus, 1766). Mourning Dove.

Bonomiella columbae Emerson, 1957.

Columbicola baculoides (Paine, 1912).

Columbicola macrourae (Wilson, 1941).

Hohorstiella paladinella sp. nov.

Physconelloides zenaidurae (McGregor, 1917).

Other North American hosts for which no data are available.

Columba flavirostris Wagler, 1831. Red-billed Pigeon.

Columba leucocephala Linnaeus, 1758. White-crowned Pigeon.

Streptopelia risoria (Linnaeus, 1758). Ringed Turtle Dove.

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PHOTOGRAPH 2



PHOTOGRAPH 3



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PHOTOGRAPH 5



PHOTOGRAPH 6



PHOTOGRAPH 7



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PHOTOGRAPH 10



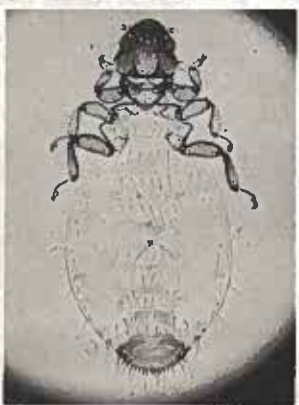
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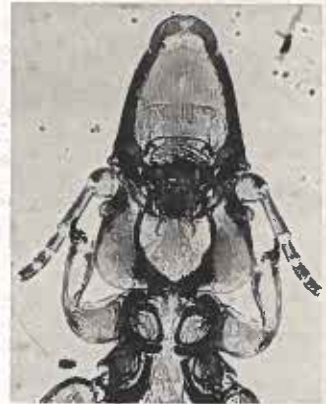
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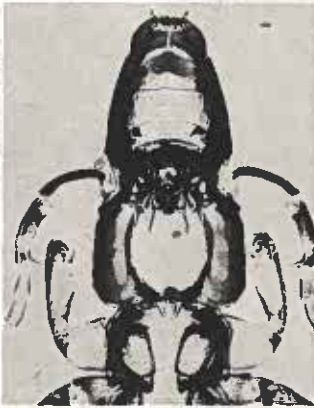
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PHOTOGRAPH 21



PHOTOGRAPH 22



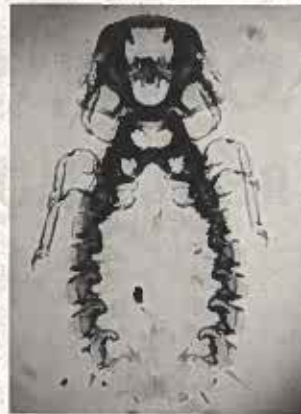
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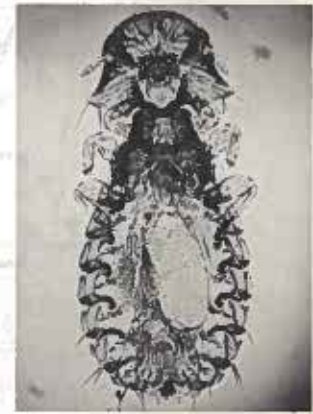
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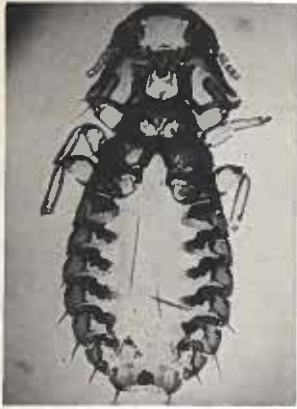
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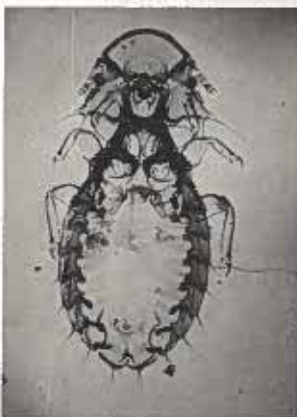
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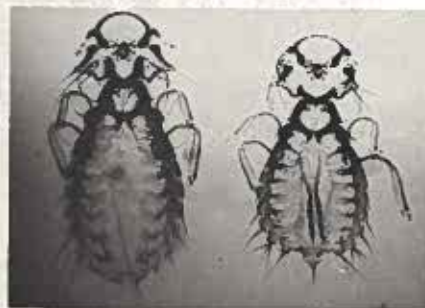
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