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

William W. Hill and Donald W. Tuff

Abstract.—Two new species of *Hohorstiella* are described and illustrated: *Hohorstiella paladinella* Hill and Tuff sp. nov. from *Zenaidura macroura* (L.) and *Hohorstiella passerinae* Hill and Tuff sp. nov. from *Columbigallina passerina* (L.) and *Scardafella inca* Lesson. A key to the species of mallophagan parasites of North American Columbiformes is included along with a brief discussion of each species. A Host-Parasite list is also given.

Emerson (1972a, b) listed seven genera of Mallophaga occurring on twelve species of doves. Twenty-two species of lice were included in these seven genera. The following study includes eleven species of columbiforms normally found in North America and twenty-one species of Mallophaga associated with them. As noted in the Host-Parasite list, some Mallophaga still have not been recovered from a host found in North America.

Five of the sixteen species of columbiforms listed in the 1957 American Ornithological Union Checklist have been omitted from the present study. They are: *Ectopistes migratorius* (L.), Passenger Pigeon, formerly abundant, became extinct in 1914; *Columba squamosa* Bonnatere, Scaly-naped Pigeon, normally found in the West Indies; *Zenaida aurita* (Temminck), Zenaida Dove, now accidental in the U.S.; *Geotrygon chrysis* Bonaparte, Key West Quail-Dove, found in the West Indies and only a vagrant to Key West; and *Geotrygon montana* (L.), Ruddy Quail-Dove, accidental in the U.S., generally distributed from southern Mexico to northern Argentina.

Material for this study was obtained from the U.S. National Museum (Smithsonian Institution) and from the personal collections of Drs. K. C. Emerson, R. A. Ward, and the authors.

Illustrations of specimens mounted on microscope slides in Canada balsam were drawn 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 are shown parenthetically.

Key to the Species of Mallophaga
 Parasitizing North American Columbiformes

1. Palpi present, two to four segmented; antennae usually four segmented and generally more or less clavate or capitate, concealed in a groove on underside of head; mandibles horizontal, near anterior

- margin of head; meso- and metathorax usually separated by a suture 2
- Palpi absent; antennae three or five segmented, filiform, not concealed; mandibles vertical (near center of head); meso- and metathorax fused 10
2. Forehead armed ventrally with a pair of prominent spine-like processes *Hohorstiella*, 3
- Forehead without ventral spine-like processes 9
3. Female 4
- Male 7
4. Ventral posteromedial angle of pleurites elongated 5
- Ventral posteromedial angle of pleurites with elongation greatly reduced *H. lata*
5. Abdominal tergites I-VII with numerous short spines interspersed with longer setae *H. passerinae* sp. nov.
- Abdominal tergites I-VII without short spines. Setae more or less of same diameter and length 6
6. Ventral posteromedial angle of pleurites II-VI elongated *H. frontalis*
- Ventral posteromedial angle of pleurites II-VII elongated *H. paladinella* sp. nov.
7. Ventral posteromedial angle of pleurites III-VI distinctly elongated *H. frontalis*
- Ventral posteromedial angle of pleurites not elongated 8
8. Endomeral plate twice as broad as long *H. paladinella* sp. nov.
- Endomeral plate four times as broad as long *H. lata*
9. Venter of third femora with comb of fine setae *Colpocephalum turbinatum*
- Venter of third femora without comb of fine setae *Bonomiella columbae*
10. Head longer than wide *Columbicola*, 11
- Head wider than long 18
11. Female 12
- Male 15
12. One pair of coarse, broad, clypeal spines present *C. baculoides*
- Two pairs of coarse, broad, clypeal spines present 13
13. Vulva with small, narrow, posterior groove *C. columbae*
- Vulva with large, wide, posterior groove 14
14. Length of head 0.47-0.54; width of head at temples 0.22-0.25 *C. passerinae*
- Length of head 0.57-0.63; width of head at temples 0.27-0.31 *C. macrourae*

15. One pair of coarse, broad, clypeal spines *C. baculoides*
- Two pairs of coarse, broad, clypeal spines 16
16. Parameres joined narrowly at basal plate (but not fused completely with it) *C. passerinae*
- Parameres broadly fused with basal plate 17
17. Parameres relatively short, broad; posterior, where free (not fused to basal plate), as long as or shorter than anterior (portion fused to basal plate) *C. columbae*
- Parameres long; unfused posterior portion short in relation to anterior fused portion *C. macrourae*
18. Forehead armed ventrally with pair of spine-like processes *Physconelloides*, 19
- Forehead without ventral spine-like processes 27
19. Female 20
- Male 24
20. Posterior margin of vulva convex 21
- Posterior margin of vulva emarginate *P. passerinae*
21. Posterolateral angle of vulva with two or three (rarely four) long setae 22
- Posterolateral angle of vulva with four or five short setae *P. spenceri*
22. Posterolateral angle of vulva with two long setae and one short seta 23
- Posterolateral angle of vulva with three (rarely four) long setae *P. ceratoceps*
23. Posterior edge of vulva sharply convex *P. wisemani*
- Posterior edge of vulva broadly convex *P. zenaidurae*
24. Row of short, ventral subapical setae not extending beyond tip of abdomen *P. spenceri*
- Row of long subapical setae extending beyond tip of abdomen 25
25. Lateral preantennal spine-like process extending posteriorly to near midline of basal segment of antenna *P. zenaidurae*
- Lateral preantennal spine-like process extending posteriorly to posterior margin of basal segment of antenna 26
26. Lateral preantennal spine-like process broad, apex truncate *P. passerinae*
- Lateral preantennal spine-like process narrow, apex acute *P. ceratoceps*
27. Antennae filiform and similar in both sexes *Campanulotes compar*
- Antennae sexually dimorphic; in the male, first segments enlarged, second and third segments elongated, fourth and fifth segments greatly reduced *Coloceras*, 28

- | | |
|-------------------------------------------|----------------------------------|
| 28. Female | 29 |
| - Male | 31 |
| 29. Abdomen widest at segment II | <i>C. lativentre</i> |
| - Abdomen widest at segment IV | 30 |
| 30. Temporal angle with sharp projection | <i>C. chinense</i> |
| - Temporal angle without sharp projection | <i>C. damicornis fahrenheiti</i> |
| 31. Genitalia expanded posteriorly | <i>C. lativentre</i> |
| - Genitalia not expanded posteriorly | 32 |
| 32. Genitalia constricted medially | <i>C. chinense</i> |
| - Genitalia expanded medially | <i>C. damicornis fahrenheiti</i> |

Genus *Hohorstiella* Eichler, 1940

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

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

Hohorstiella lata (Piaget, 1880)

(Figs. 1, 2, 3)

Menopon latum Piaget, 1880. Les Pediculines:457, pl. 37, Fig. 1.

Hohorstiella lata (Piaget), Eichler, 1940. Zentralbl. Bakteriologie. (I. Orig.), 145:362; Eichler, 1953. Beitr. Vogelkunde, 3:169, Figs. 1-4.

Type host.—*Columba livia* Gmelin.

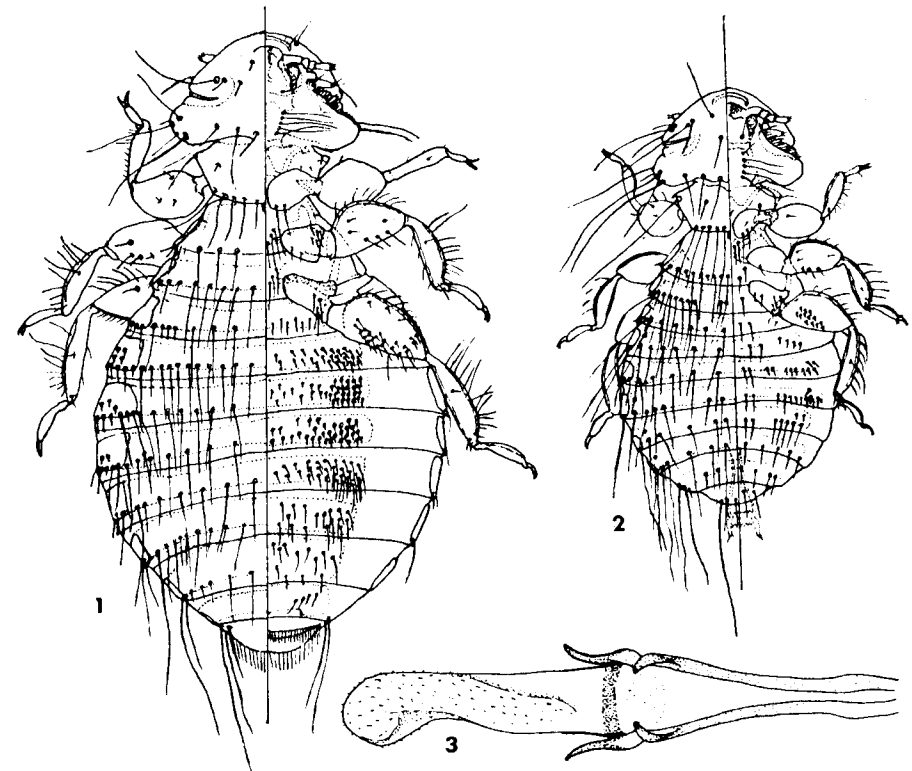
Hohorstiella lata differs from other members of the genus because of the reduction in or lack of an elongated ventral posteromedial angle ("inner, posterior corner" of Carriker, 1949) of the pleurites. It resembles most closely *H. paladinella*, but the abdomen of *H. lata* is larger and more rounded. Males of *H. lata* are considerably smaller than females and can be separated from males of other species by the genitalia (Fig. 3). The parameres are more slender and the basal apodeme is wider than those of related species.

H. 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 posteromedial elongation of the abdominal pleurites may or may not be diagnostic, yet these processes were found to be useful characters for species separation. The elongation of the pleurites is greatly reduced in females of *H. lata* and is absent in males. Eichler (1953) illustrated the antennae, outline of the head, and postpalpal process. To date no adequate illustration of this species has been published.

Material examined.—25 ♀♀ and 5 ♂♂ from *C. livia* (12 Collections), Calif., So. Carolina, Mexico, Texas; 1 ♀ from *Zenaidura macroura* (L.), New York.

Hohorstiella frontalis Carriker, 1949

Hohorstiella frontalis Carriker, 1949. Rev. Brasil. Biol., 9:302, Figs. 6 & 7.



Figs. 1-3. *Hohorstiella lata* (Piaget). 1. Dorsal-ventral view of female; 2. Dorsal-ventral view of male; 3. Male genitalia.

Type host.—*Columba fasciata* Say.

This species is distinct from other *Hohorstiella* because of the elongation of the ventral posteromedial angle of pleurites II-VI. *H. lata* has reduced pleural spines while *H. paladinella* has pleurites II-VII with ventral posteromedial angle elongate. The male of *H. frontalis* differs from *H. paladinella* and *H. lata* because the ventral posteromedial angle of the pleurites is not elongated in the later two species.

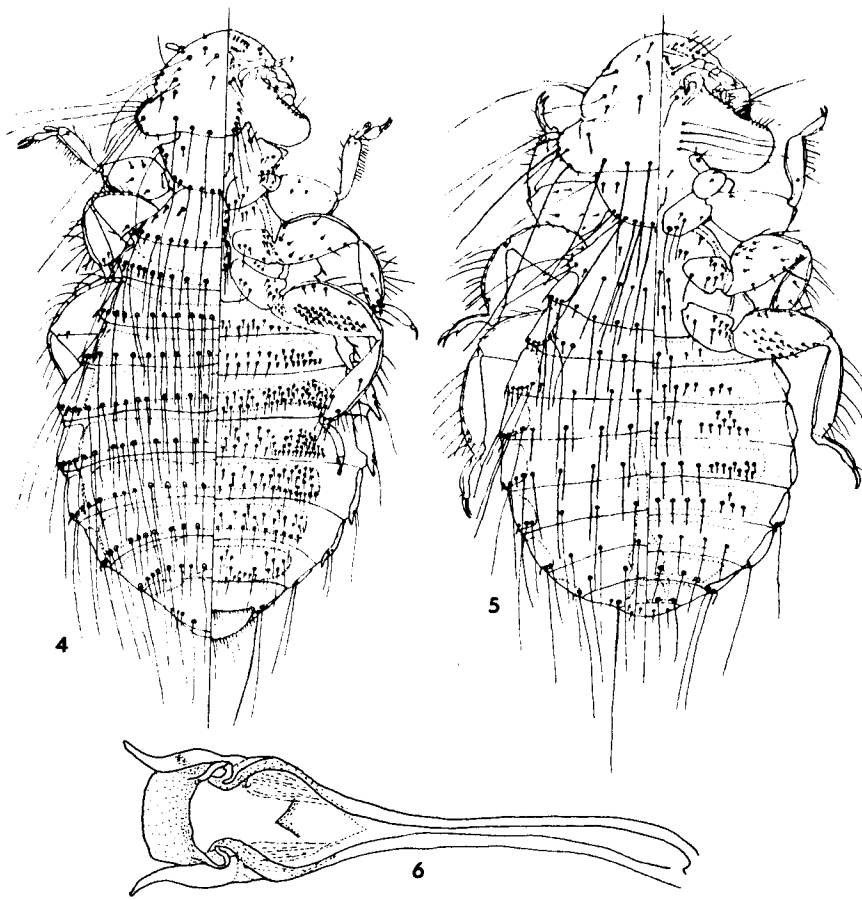
Material examined.—4 ♀♀ and 1 ♂ from *C. fasciata* (2 Collections), Arizona, New Mexico.

Hohorstiella paladinella sp. nov.

(Figs. 4, 5, 6)

Type host.—*Zenaidura macroura* (L.)

Holotype female.—General morphology and chaetotaxy as in Fig. 4. Head



Figs. 4-6. *Hohorstiella paladinella* sp. nov. 4. Dorsal-ventral view of female; 5. Dorsal-ventral view of male; 6. Male genitalia.

length 0.40 (0.38-0.42), width at temples 0.69 (0.66-0.74); prothorax length 0.24 (0.20-0.29), width 0.48 (0.44-0.51); pterothorax length 0.33 (0.30-0.38), width 0.68 (0.63-0.72); abdomen length 1.35 (1.17-1.44), width 1.10 (0.98-1.27); total length 2.28.

Male.—General morphology and chaetotaxy as in Fig. 5, genitalia as in Fig. 6. Head length 0.33, width at temples 0.51; prothorax length 0.15, width 0.33; pterothorax length 0.19, width 0.50; abdomen length 0.72, width 0.70; total length 1.40.

Discussion.—The female of this species closely resembles *H. frontalis* in all aspects except the ventral posteromedial elongation of the pleurites. *H. frontalis* shows the elongation on segments II-VI instead of II-VII as in *H.*

paladinella. *H. paladinella* cannot be confused with *H. passerinae* which is much larger, has distinctively different chaetotaxy and distinctively shaped pleurites. *H. lata* is similar to *H. paladinella* in size and shape but the absence of elongations 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 posteromedial angle of the pleurites. The form of the male genitalia provides a means for easy recognition of this species. The marginal carinae of the basal plate are rather stout and sinuous at the point of articulation with the parameres and there is a V-shaped sclerite in the medial portion of the basal plate.

Material examined.—Holotype female from *Zenaidura macroura* (L.): Columbia, Mo., Sept. 1936, Bish. No. 26396, G. O. Sigars, U.S.N.M. No. 72973; 10 paratype ♀♀, 1♂ 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, W. W. Hill; 10 mi NE of Van Horn, Culberson Co., Texas, 22 Aug. 1972, W. W. Hill; a slide labelled "#367"; 2♀♀ from *Leptotila verreauxi* (Bonaparte): Chihuahua, Mexico, 20 July 1958, J. Knox Jones; 1♀ from *Zenaida asiatica* (L.): Escuinapa, Sinaloa, Mexico, 11 Apr. 1960, G. B. Saunders; 1♀ from a slide labelled "on wild dove": Aqua Caliente Ranch, Tucson, Ariz., 22 Apr. 1914, B. R. Coad.

Hohorstiella passerinae sp. nov.

(Fig. 7)

Type host.—*Collumbigallina passerina* (L.)

Holotype female.—General morphology and chaetotaxy as in Fig. 7. Head length 0.35 (0.32-0.35), width at temples 0.58 (0.57-0.60); prothorax length 0.19 (0.18-0.22), width 0.42 (0.39-0.43); pterothorax length 0.31 (0.28-0.33), width 0.62 (0.55-0.64); abdomen length 1.21 (1.03-1.35), width 0.95 (0.84-1.03); total length 2.05 (1.80-2.23).

Discussion.—Separation of *H. passerinae* from other members of the genus occurring in North America is relatively simple. As shown in Fig. 7 its large size, heavy sclerotization, conspicuous robust elongation of the pleurites, and pattern of short, stout setae alternating with long setae on the tergites all serve as identifying characters. *H. 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* is thickly set with short spines in an irregular fashion and are characteristic of that species. Carriker's illustration showed these short spines to be on tergites III-VII. No such spines were found on the median area of the tergites of *H. passerinae*. For this reason *H. passerinae* is believed to be a species distinct from, but closely related to *H. andina*.

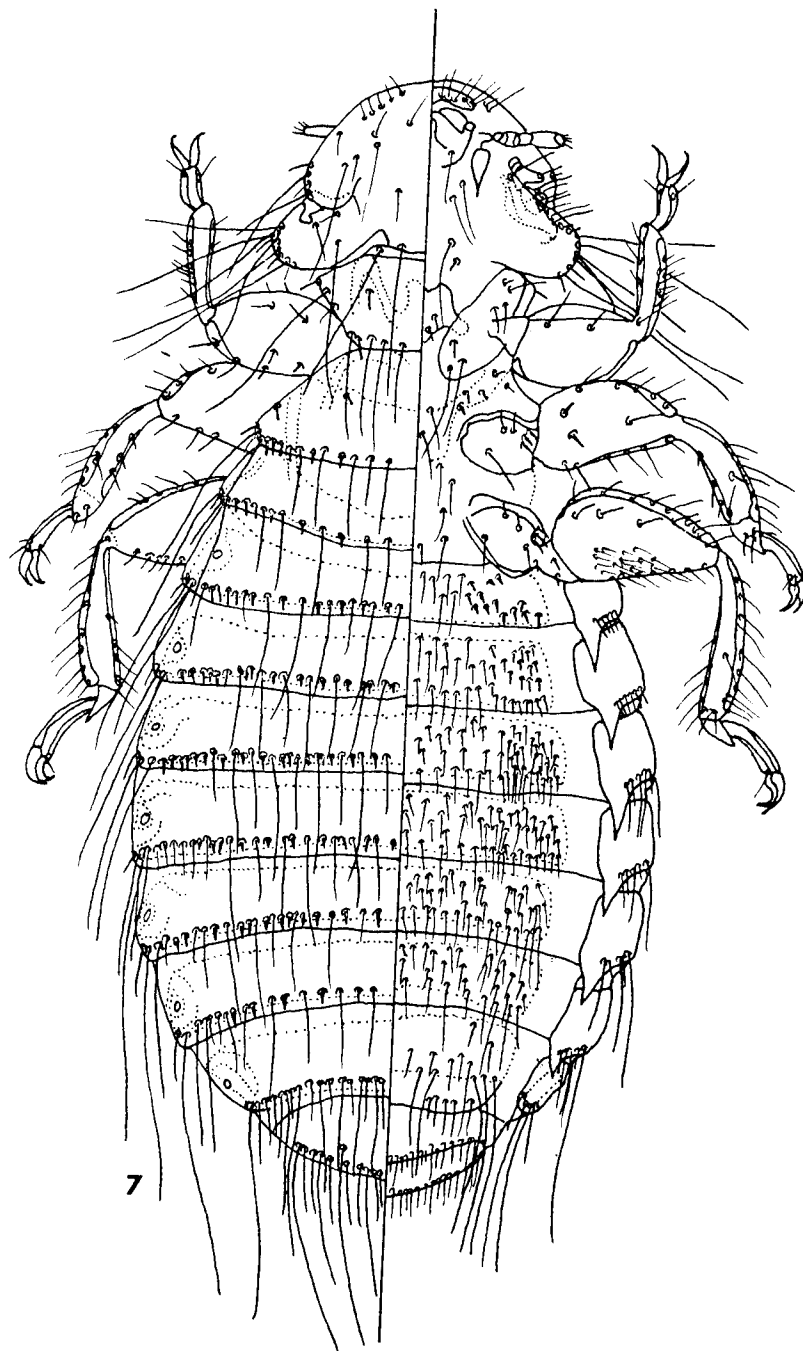


Fig. 7. *Hovorstiella passerinae* sp. nov., dorsal-ventral view of female.

A single female specimen from *Scardafella inca* (Lesson) was examined and is considered to be conspecific with the specimens from *C. passerina*. No males of this species were available for study.

Material examined.—Holotype female from *Columbigallina passerina*: Guantanamo, Cuba, 16 Aug. 1930, Bish. No. 15294, H. S. Peters, U.S.N.M. No. 72971; 6 paratype ♀♀ from type host: 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; 1 ♀ from *Scardafella inca*: Brownsville, Cameron Co., Texas, 9 Jan. 1962, Eads.

Genus *Colpocephalum* Nitzsch, 1818

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

Colpocephalum turbinatum Denny, 1842

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

Type host.—*Columba livia* Gmelin.

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

Hopkins and Clay (1952) listed *Colpocephalum longicaudum* Nitzsch as a valid species from *Streptopelia chinensis tigrina* (Temminck). *C. longicaudum* is included here with *C. turbinatum*, since Emerson (1972b) listed *C. longicaudum* as a synonym of *C. turbinatum*. See Price and Beer (1963) and Emerson (1972b) for the extensive synonymy.

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.—4 ♀♀ and 3 ♂♂ from *C. livia* (1 Collection), Louisiana.

Genus *Bonomiella* Conci, 1942

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

Bonomiella beieri Eichler, 1959

Bonomiella beieri Eichler, 1959. Dtsch. GesWesen, 14:1173.

Eichler (1959) described this species taken from a Spotted Dove (*Streptopelia chinensis ceylonensis*) collected in 1902 in Ceylon. Specimens of *B. beieri* Eichler were unavailable for study. This species is not known to occur on hosts found in North America.

Bonomiella columbae Emerson, 1957

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

Type host.—*Columba livia* Gmelin.

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.

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. insolitnguicolata* Conci. With only drawings with which to compare, it is difficult to distinguish between the species. It appears that *B. insolitnguicolata* has a more rounded head and more oval abdomen than *B. columbae*. Specimens at my disposal showed an overlap in measurements between *B. insolitnguicolata* and *B. columbae* and the presence of the small patch of short setae on sternite I is questionable. A larger series of *B. insolitnguicolata* may determine that there is only one species within this genus. Drawings of *B. concii* were inadequate for a comprehensive comparison.

Material examined.—7♀♀ from *Columba livia* (3 Collections), New Zealand and Texas.

Genus *Columbicola* Ewing, 1929

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

An extensive generic synonymy is given in Tendeiro (1962).

Columbicola baculoides (Paine, 1912)

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.

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. 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.

Wilson (1941) noted that it would be expected that the slender louse of Eastern and Western Mourning Doves 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 of the two subspecies of Mourning Dove overlapped.

Material examined.—21♀♀ and 15♂♂ from *Zenaidura macroura* (7 Collections), Iowa, Kansas, Mexico, Oregon, Texas.

Columbicola columbae (L., 1758)

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

Columbicola columbae (L.), Ewing, 1929. Man. Ext. Parasites, p. 116.

Type host.—*Columba livia* Gmelin.

For the rather extensive synonymy associated with this species the reader is referred to Tendeiro (1962).

Females of *Columbicola columbae* can be separated from *C. baculoides* by the posterior pair of clypeal spines. 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 vulva. The genital plate of *C. columbae* is more or less elongate, with a wide posterior groove and subparallel lateral borders. The vulva of *C. macrourae* (Wilson) is wide and strongly arched posteriorly with a strong constriction medially. The vulva of *C. passerinae* (Wilson) 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.

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. Keirans (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 speci-

mens 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.—20 ♀♀ and 20 ♂♂ from *Columba livia* (12 Collections), California, New York, South Carolina, Texas.

Columbicola passerinae (Wilson, 1941)

Esthiopterum (Columbicola) passerinae Wilson, 1941. J. Parasitol. 27:259.
Columbicola passerinae (Wilson), 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.).

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

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

Material examined.—7 ♀♀ and 4 ♂♂ from *Scardafella inca* (Lesson), (5 Collections) Texas; 9 ♀♀ and 8 ♂♂ from *Columbigallina passerina*, (4 Collections), Bahamas, Cuba, Texas.

Columbicola macrourae (Wilson, 1941)

Esthiopterum (Columbicola) macrourae Wilson, 1941. J. Parasitol. 27:262.
Columbicola macrourae (Wilson), Thompson, 1950. Ann. Mag. Nat. Hist., Ser. 12, 6:437.

Type host.—*Zenaidura macroura carolinensis* (L.).

Females of this species are very difficult to distinguish from other females of the genus *Columbicola*. The vulva of *C. macrourae* differs in having a wide, strongly arched, grooved, posterior margin with a strong medial constriction. The males may be easily identified by the form of the genitalia.

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, 1972a). 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*

macroura 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.

Material examined.—17 ♀♀ and 7 ♂♂ from *Zenaidura macroura*, (6 Collections), Bahamas, Puerto Rico, Mexico, Nebraska, Texas; 2 ♀♀ from *Leptotila verreauxi* (Bonaparte), (1 Collection), Texas; 17 ♀♀ and 4 ♂♂ from *Zenaida asiatica* (L.) (2 Collections), Texas.

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 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* 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.

Genus *Physconelloides* Ewing, 1927

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

Goniocotacanthus Guimaraes, 1936. Rev. Mus. S. Paulo, 20:225.

Physconelloides ceratoceps Ewing, 1927

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

Type host.—*Leptotila verreauxi chalcauchenia* (Sclater and Salvin).

Separation of this species from other *Physconelloides* may best be determined by the presence of the sharply pointed clypeal projection and the female vulva. The tergites of *P. ceratoceps* are not as curved as are those of *P. zenaidurae* and *P. passerinae*. The male genital segment 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.

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.—20 ♀♀ and 9 ♂♂ from *Leptotila verreauxi* (9 Collections), Bolivia, Colombia, Mexico, Peru, Texas, Trinidad.

Physconelloides zenaidurae (McGregor, 1917)

Goniodes zenaidurae McGregor, 1917. Entomol. News, 28:433; plate 28, Figs. 1, 4.

Campanulotes zenaidurae (McGregor), Keler, 1939. Nova Acta Leop.-Carol. (n.f.), 8:230.

Physconelloides zenaidurae (McGregor), Hopkins and Clay, 1952. Checklist of Mallophaga: 291.

Type host.—*Zenaidura macroura* (L.).

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 of the male and the apical sclerite. *P. zenaidurae* has six per row and *P. wisemani* has eight per row.

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.—18 ♀♀ and 11 ♂♂ from *Zenaidura macroura* (11 Collections), Florida, Kansas, Mexico, Ohio, Oregon, Texas, Virginia, Wyoming.

Physconelloides wisemani Emerson, 1960

Physconelloides wisemani Emerson, 1960. J. Kansas Entomol. 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 of the female nor the size and shape of clypeal projections of the two species. The range of measurements for *P. wisemani* and *P. zenaidurae* overlaps. 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.

Material examined.—1 ♂ from *Zenaida asiatica*, Peru.

Physconelloides passerinae Emerson, 1957

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

Type host.—*Columbigallina passerina* (L.).

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 plates of the female. In addition to these characteristics the species appears to have more sclerotization throughout. The recurved processes of the pleurites are slightly more pronounced than those 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, 7-7, or 7-8.

Emerson (1960) compared *P. passerinae* with *P. zenaidurae*. He illustrated both male and female of *P. zenaidurae* 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 *Columbigallina passerina* collected from various locations throughout the Western Hemisphere, Carriker's disagreement with Emerson was on the basis of the morphological variation of the male genitalia. I have found differences in setal patterns of the genital plates of males collected from the same host in one locality. It appears that considerable morphological variation exists within this species.

Material examined.—6♀♀ and 1♂ from *Scardafella inca* (3 Collections), Texas; 24♀♀ and 16♂♂ from *Columbigallina passerina* (6 Collections), Florida, Mexico, Texas, Venezuela, Virgin Islands.

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* 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.

Genus *Campanulotes* Keler, 1939

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

Campanulotes compar (Burmeister, 1838)

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.—*Columbia livia* Gmelin.

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 and Hopkins (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*. 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.—36♀♀ and 24♂♂ from *Columba livia* (8 Collections), Kansas, Texas.

Genus *Coloceras* Taschenberg, 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.

Though members of the genus *Coloceras* 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*, parasitized by *Coloceras damicorne fahrenheitzi* Eichler, 1950, and the Spotted Dove, *Streptopelia chinensis* host of *Coloceras chinense* (Kellogg and Chapman, 1902) and *Coloceras lativentre* (Uchida, 1916).

Coloceras lativentre (Uchida, 1916)

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.

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

Type host.—*Streptopelia chinensis* (Scopoli).

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.

Coloceras lativentre has been collected from the Spotted Dove but to date it has not been taken from that host in the Western Hemisphere.

Material examined.—3♀♀ and 3♂♂ from *Streptopelia chinensis* (3 Collections), Thailand.

Coloceras chinense (Kellogg and Chapman, 1902)

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 piageti Johnston and Harrison, 1912. Roy. Soc. Qd., 24:19 (new name for *G. minor* Piaget, 1880:256).

Coloceras chinense (Kellogg and Chapman), Keler, 1939. Nova Acta Leop.-Carol. (n.f.), 8:215.

Type host.—*Streptopelia chinensis* (Scopoli).

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. To date no specimens have been taken from a Spotted Dove collected in North America.

Material examined.—2 ♀♀ and 2 ♂♂, from *Streptopelia chinensis* (1 Collection), Thailand.

Coloceras damicorne fahrenheitzi Eichler, 1950

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

Type host.—*Columba livia* Gmelin.

The temples of this species are more expanded than those of *C. lativentre* and lack the conspicuous projections found on the temporal angle of *C. chinense*. Also the male genitalia has parallel sides the entire length except for a medial expansion.

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.—4 ♀♀ and 2 ♂♂ from *Columba livia* (1 Collection), England.

Host-Parasite List

Columba fasciata Say, Band-tailed Pigeon.

Columbicola macrourae (Wilson, 1941).

Hohorstiella frontalis Carriker, 1949.

Physconelloides spenceri Emerson and Ward, 1958.

Columba flavirostris Wagler, Red-billed Pigeon.
(no data available)

Columba leucocephala L., White-crowned Pigeon.
(no data available)

Columba livia Gmelin, Domestic Pigeon.

Bonomiella columbae Emerson, 1957.

Campanulotes compar (Burmeister, 1838).

**Coloceras damicorne fahrenheitzi* Eichler, 1950.

Colpocephalum turbinatum Denny, 1842.

Columbicola columbae (L., 1758).

Hohorstiella lata (Piaget, 1880).

Physconelloides zenaidurae (McGregor, 1917).

Columbigallina passerina (L.), Ground Dove.

Columbicola macrourae (Wilson, 1941).

Columbicola passerinae (Wilson, 1941).

Hohorstiella passerinae sp. nov.

Physconelloides passerinae Emerson, 1957.

Leptotila verreauxi (Bonaparte), White-fronted Dove.

**Columbicola gracilicapitis* Carriker, 1955.

Columbicola macrourae (Wilson, 1941).

Hohorstiella paladinella sp. nov.

Physconelloides ceratoiceps Ewing, 1927.

Scardafella inca (Lesson), Inca Dove.

Columbicola passerinae (Wilson, 1941).

Hohorstiella passerinae sp. nov.

Physconelloides passerinae Emerson, 1957.

Streptopelia chinensis (Scopoli), Spotted Dove.

**Bonomiella beieri* Eichler, 1959.

**Coloceras chinense* (Kellogg and Chapman, 1902).

**Coloceras lativentre* (Uchida, 1916).

**Colpocephalum turbinatum* Denny, 1842.

**Columbicola fulmeki* Eichler, 1942.

Streptopelia risoria (L.), Ringed Turtle Dove.
(no data available)

Zenaida asiatica (L.), White-winged Dove.

Columbicola macrourae (Wilson, 1941).

Hohorstiella paladinella sp. nov.

Physconelloides wisemani Emerson, 1960.

Zenaidura macroura (L.), Mourning Dove.

Bonomiella columbae Emerson, 1957.

Columbicola baculoides (Paine, 1912).

Columbicola macrourae (Wilson, 1941).

Hohorstiella paladinella sp. nov.

Physconelloides zenaidurae (McGregor, 1917).

Acknowledgment

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Footnote

* This species has not been taken from a host collected in North America.

CORRECTION

In the January 1978 issue of the Journal of the Kansas (Central States) Entomological Society v. 51 (1), an incorrect statement was made in the article by Smith and Enns "The Click Beetle Subfamilies . . . in Missouri, Part II" in lines 9-11 on page 42 which read: "Of the 60 species of *Melanotus* . . . north of Mexico (Arnett, 1962) . . ." This statement should have read: "Of the 47 species of *Melanotus* stated to occur in North America north of Mexico (Quate and Thompson, 1967; Becker, 1973) . . ."

The citation for Becker is:

Becker, E. C. 1973. A European Species of *Melanotus* now established at Baltimore, Maryland (Coleoptera: Elateridae). *Proc. Entomol. Soc. Washington* 75(4):454-458.

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ANNOUNCEMENT

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An Italian Coleopterist (30 years) would like to exchange specimens. If interested, write him.