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The Species of *Colpocephalum* (Mallophaga: Menoponidae) Known to Occur on the Strigiformes

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Source: *Journal of the Kansas Entomological Society*, Vol. 36, No. 1 (Jan., 1963), pp. 58-64

Published by: Kansas (Central States) Entomological Society

Stable URL: <http://www.jstor.org/stable/25083305>

Accessed: 21-06-2018 13:57 UTC

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were virgin, it is doubtful that mating would have altered the findings. Males randomly selected from the cultures yielded squash preparations no different from those made from the isolated specimens.

For comparative purposes, males of *Parcoblatta divisa* (S & Z), *Parcoblatta pennsylvanica* (DeGeer), and *Ischnoptera deropeltiformis* (Brunner) were trapped in midsummer. Examination of all specimens revealed testes much reduced in size and more or less devoid of sperm; in these specimens, however, the seminal vesicles were packed with live sperm and spermatids.

A few males of *B. orientalis* caught in dwellings and other natural habitats had greatly reduced, apparently degenerate testes. In all such individuals the saline squash preparations were devoid of spermatozoa but were literally teeming with highly motile microorganisms (presumably bacteria). This apparently pathogenic relationship was not investigated further.

#### SUMMARY

The testes of culture-grown male *Blatta orientalis* L. do not undergo any noticeably rapid degeneration in specimens caged separately up to 40 days post-emergence. It is concluded that the corpora allata do not undergo any premature functional change unique to this insect. An occasional specimen taken from the natural habitat revealed testis degeneration, apparently associated with high-level infestation by an undetermined microorganism.

The testes and seminal vesicles of trapped midsummer males of *P. divisa*, *P. pennsylvanica*, and *I. deropeltiformis* were in a condition very similar to that described for *B. orientalis* by earlier workers. The possibility that this is a hormone-associated effect in these species (which undergo a low temperature diapause) remains to be investigated.

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## THE SPECIES OF *COLPOCEPHALUM* (Mallophaga: Menoponidae) KNOWN TO OCCUR ON THE STRIGIFORMES<sup>1</sup>

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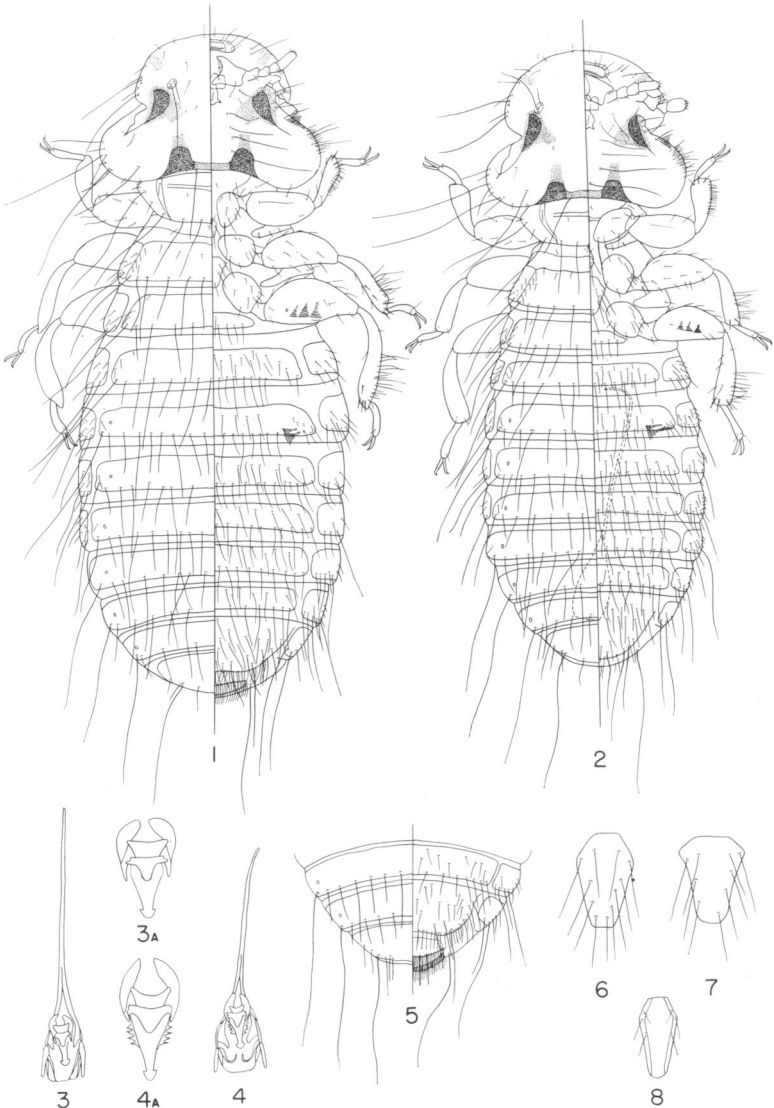
While working upon lice of the genus *Kurodaia* Uchida, 1926, that occur on the Falconiformes (hawks) and the Strigiformes (owls), we

<sup>1</sup> Paper No. 4869, Scientific Journal Series, Minnesota Agricultural Experiment Station, St. Paul 1, Minnesota.

became aware of an apparent confusion that exists between lice of this genus and of the morphologically somewhat similar genus *Colpocephalum* Nitzsch, 1818. Eichler (1949) and Emerson (1960), judging from their placement of lice from owls in *Conciella* (now considered by a number of workers as a subgenus of *Kurodaia*) and *Kurodaia*, respectively, do not recognize that *Colpocephalum* also occurs on the Strigiformes. On the other hand, we note that Hopkins and Clay (1952) list as both *Colpocephalum* and *Kurodaia* species of *Colpocephalum sen. lat.* found on owls, further indicating the confusion that exists. We have concluded, after a study of considerable menoponid material from both of these bird orders, that each of these mallophagan genera does occur on the owls as well as the hawks. *Colpocephalum* and *Kurodaia* have been sufficiently characterized by Clay (1947) and further discussed by Price and Beer (in press) so that accurate and unmistakable placement in one genus or the other is possible for every pertinent specimen we have seen. Once having satisfied ourselves that *Colpocephalum sen. lat.* does occur on owls, we have found it necessary to examine the species of both genera in order to place each in the proper genus.

The type species of *Colpocephalum* occurs on the Ciconiiformes and is morphologically divergent from the *Colpocephalum* of owls. However, the genus *Colpocephalum* as presently defined contains such a heterogeneous mixture of forms that it seemed unwise at this time to attempt to place the owl lice in a subgenus or genus of their own. As soon as the *Colpocephalum* from the various bird orders are more completely known, then an evaluation of this problem can be conducted on a sounder basis. It is our intent here to discuss the species of *Colpocephalum sen. lat.* thus far known from owls; a subsequent paper will then deal with the *Kurodaia* of owls.

We have been impressed with the homogeneity of shape and chaetotaxy displayed by all of the *Colpocephalum* we have studied from owls. For this reason, the illustrations of the female and male of *Colpocephalum pectinatum* (Figs. 1 and 2) suffice in large part for this entire group of lice. The only features we have found to be of value in species recognition are (1) shape and chaetotaxy of the metasternal plate, (2) marginal chaetotaxy of abdominal tergite IX, (3) types and numbers of setae surrounding the anus of females, (4) sclerites associated with the genital sac of the male, and (5) dimensions, especially the temple and prothorax widths. The chaetotaxy of the head and thorax was otherwise too constant and that of abdominal tergites I-VIII and sternites I-VII too variable to permit us to discover any features of taxonomic significance. We might point out that all known species of this group have only a marginal row of setae on the abdominal tergites. Emerson (1960) states that *C. brachysomum* has two rows of setae on abdominal tergites I-VI; however, upon re-examination of his material, he (personal communication, 1962) finds this species to have only a single row of tergal setae. All



Dorsal-ventral view of *Colpocephalum pectinatum*: FIG. 1, female; FIG. 2, male. Male genitalia: FIGS. 3 and 3a, *C. pectinatum*; FIGS. 4 and 4a, *C. brachysomum*. FIG. 5, dorsal-ventral view of female terminal segments of *C. cholibae*. Metasternal plates: FIG. 6, *C. brachysomum*; FIG. 7, *C. pectinatum*; FIG. 8, *C. cholibae*.

observations concerning the following species were made of specimens mounted on slides and measurements, where given, are in millimeters. Where quantitative information is reported, the numbers represent the mean and range, respectively. The nomenclature of the owls follows that of Peters (1940).

*Colpocephalum pectinatum* Osborn, 1902

*Colpocephalum pectinatum* Osborn, 1902, Ohio Nat. 2:201. Type host: *Speotyto cunicularia hypugaea* (Bonaparte).

FEMALE. As in Figure 1. Margin of pronotum with 1 short, 1 long, 1 short, and 3 long setae on each side. Variable number of marginal metanotal setae (11, 10–12), marginal abdominal tergal setae (I, 10, 8–11; II, 16, 13–19; III, 17, 15–20; IV, 17, 15–19; V, 16, 13–18; VI, 14, 13–16; VII, 10, 8–12; VIII, 8, 7–8) and abdominal sternal setae (I, 9, 5–10; II, 39, 34–44; III, 25, 22–27; IV, 40, 37–43; V, 35, 33–39; VI, 30, 22–35; VII, 27, 20–31). Abdominal tergite IX marginally with 2 medium, 1 very long, and 1 medium seta on each side. Metasternum (Fig. 7) often angulate anteriorly with slightly concave sides and 11 (8–13) setae. Vulva with 32 (29–39) marginal and 31 (22–37) submarginal setae. Setae of anal fringe all of homogeneous type (38, 32–43, ventrally; 31, 26–38, dorsally). Three comb rows of 10 (6–12) setae each on third femora with 2–4 additional setae occasionally forming another row; two comb rows of 15 (12–17) setae each on third abdominal sternite. Dimensions: preocular width, 0.40 (0.37–0.41); temple width, 0.54 (0.50–0.57); head length, 0.33 (0.30–0.35); prothorax width, 0.34 (0.32–0.36); metathorax width, 0.49 (0.44–0.53); total length, 1.76 (1.66–1.83).

MALE. As in Figure 2. Sexual dimorphism limited to differences in terminal segments and to a slightly smaller size. Genital plate with 42 (39–47) setae. Genitalia as in Figures 3 and 3a, lacking lateral serrations along basal half of penis; genitalia length, 0.57 (0.52–0.65). Dimensions: preocular width, 0.39 (0.34–0.41); temple width, 0.49 (0.46–0.53); head length, 0.33 (0.32–0.35); prothorax width, 0.32 (0.30–0.34); metathorax width, 0.43 (0.42–0.43); total length, 1.50 (1.46–1.54).

Eichler (1949) listed this species among his *Conciella* and Emerson (1960) placed it in his key to North American *Kurodaia* subgenus *Conciella* from owls. Hopkins and Clay (1952) include it as *Kurodaia pectinata* in their check-list. However, Dr. Knull kindly allowed us to examine the type material, including the lectotype, of *C. pectinatum* in the Ohio State University collection and this species definitely belongs in *Colpocephalum sen. lat.*

In addition to the series from *Speotyto cunicularia*, for which the data are given above, we had material from *Athene brama* (Temminck) and *A. b. indica* (Franklin) that was indistinguishable except for its tendency to have a greater number of tergal and sternal setae.

There is, however, distinct overlap of the ranges and there is insufficient evidence for considering these two series as separate species.

*Material examined:* 26 females, 15 males from *S. cunicularia* from the United States (including type material); 5 females, 5 males from *A. brama* from Thailand; 3 females, 4 males from *A. b. indica* from Rajputana; 2 females, 3 males from *Otus b. bakkamoena* Pennant from Ceylon.

*Colpocephalum brachysomum* Kellogg and Chapman, 1902

*Colpocephalum brachysomum* Kellogg and Chapman, 1902, J. New York Ent. Soc. 10:162. Type hosts: *Asio flammeus* (Pontoppidan) [and *Pluvialis dominica* (Müller)—error].

*Colpocephalum discrepans* Kellogg and Chapman, 1902, J. New York Ent. Soc. 10:164. Type hosts: *Carpodacus mexicanus* (Gmelin) and *Anous stolidus* (Linn.)—both errors.

*Kurodaia keleri* Emerson, 1961, Proc. Biol. Soc. Washington 74:191. Type host: *Bubo virginianus* (Gmelin).

FEMALE. Differs from *C. pectinatum* only in slightly larger size, in having more ventral setae in the anal fringe (47, 46–48), and in the shape of the metasternal plate (Fig. 6), this last feature being rather inconstant. Four of the five females of the type series have a telescoped abdomen, giving them an exceptionally short and broad appearance. The fifth individual assumes the more typical elongated form. Measurements revealed that the only difference between the “short” and “long” forms lay in abdominal length, an obvious result of the telescoping from mounting. Dimensions: preocular width, 0.45 (0.42–0.46); temple width, 0.60 (0.59–0.61); head length, 0.37 (0.33–0.40); prothorax width, 0.39 (0.37–0.42); metathorax width, 0.55 (0.54–0.57); total length of “short” form, 1.47 (1.41–1.53), of “long” form, 1.84 (1.83–1.85).

MALE. Also similar to that of *C. pectinatum* except for slightly larger size and for presence of a serration along the basal half of the penis (Figs. 4 and 4a); genitalia length, 0.57 (0.54–0.59). Dimensions: preocular width, 0.43 (0.41–0.44); temple width, 0.56 (0.54–0.57); head length, 0.35 (0.33–0.36); prothorax width, 0.38 (0.35–0.41); metathorax width, 0.46 (0.46); total length of “short” form, 1.08, of “long” form, 1.59.

*C. brachysomum* was described from two females recorded by Kellogg and Chapman (1902) from *Asio flammeus* and two females from *Pluvialis dominica* from a collection of Hawaiian birds; *C. discrepans* was based on a male recorded from *Carpodacus mexicanus* and a female from *Anous stolidus* from the same collection of birds. All of these type specimens were made available to us through the cooperation of Dr. Paul R. Ehrlich of Stanford University. We are unaware how these lice could have been recorded from four such diverse hosts in the same collection of birds unless there was some failure of host isolation. Since all of these specimens of lice are similar to one another and agree with another series we have from *A.*

*flammeus*, we believe the assumption by Hopkins and Clay (1952) is correct that only this owl represents the true type host and that *C. discrepans* is a synonym of *C. brachysomum*. *C. brachysomum* was listed as *Conciella brachysoma* by Eichler (1949) and as *Kurodaia brachysoma* by Emerson (1960). However, it lacks the differentiating features characteristic of *Kurodaia* and should be placed in the genus *Colpocephalum* *sen. lat.*

A study of two pairs of paratypes of *K. keleri* supplied by Dr. Emerson failed to reveal any evidence enabling this species to be separated from *C. brachysomum*.

*Material examined:* 5 females, 1 male, presumably from *Asio flammeus* from Hawaii, of which we have designated as lectotype a female on slide 1214 from *A. flammeus*, Iao Valley, Maui; 1 female, 1 male from *A. flammeus* from Puerto Rico; 2 females, 2 males (paratypes of *K. keleri*) from *Bubo virginianus* from the United States.

*Colpocephalum cholibae*, n. sp.

FEMALE. Head similar to *C. pectinatum* except for having flatter anterior margin and for being slightly narrower. Thorax differs in shape and chaetotaxy of metasternal plate (Fig. 8), which always has six setae positioned as shown. Aside from terminal segments with characteristic chaetotaxy (Fig. 5), abdomen similar to *C. pectinatum*. The previously discussed species do show the post-spiracular setae on abdominal tergites IV and V shorter than those on the adjacent segments; all post-spiracular setae are equally long on the one specimen of *C. cholibae* that permits observation to our satisfaction, so this may be a further difference. Margin of tergite IX with 3–5 setae on each side median to the very long seta. More setae in the anal fringe, with 45 (44–45) ventrally and 45 (42–47) dorsally; the ventral row includes 4–5 longer stouter setae spaced among the other setae. All of these features easily enable this species to be separated from the other known *Colpocephalum* of owls. Dimensions: preocular width, 0.33 (0.32–0.34); temple width, 0.49 (0.49–0.50); head length, 0.33 (0.32–0.33); prothorax width, 0.34 (0.33–0.35); metathorax width, 0.51 (0.50–0.51); total length, 1.59 (1.56–1.62).

*Material examined:* 4 females from *Otus choliba crucigerus* (Spix), Coalmine, Sangre Grande, Trinidad, Feb. 22, 1957, W. G. Downs. Holotype deposited at the United States National Museum, 2 paratypes in the collection of Dr. K. C. Emerson, and 1 paratype at the University of Minnesota.

*Species Sedis Incertae*

*Colpocephalum menoponoides* Ewing, 1930

*Colpocephalum menoponoides* Ewing, 1930, Proc. Ent. Soc. Washington 32:117. Type host: *Fulica* sp.—error. Probably *Nyctea scandiaca* (Linn.).

This species was originally described from “. . . three females taken from a coot, *Fulica* sp., at the National Zoological Park.” Hop-

kins (1950), based on correspondence with Emerson, concluded that the presence of a louse close to *Strigiphilus ceblebrachys* (Denny) on the same slide indicated that there was probably an error in labeling and that the true host was probably *Nyctea scandiaca*. Dr. Emerson has kindly re-checked these lice for us and he still believes the material is close to *C. pectinatum*. Since the condition of the types does not allow detailed study and the specimens were from a zoo animal, it seems inadvisable to make any conclusions either as to the species of the louse or the host. Emerson included *C. menoponoides* in his key to North American *Kurodaia* from owls. However, since he also included *K. pectinata* and *K. brachysoma*, and the types of both of these show them to be *Colpocephalum sen. lat.*, it is reasonable to assume that *K. menoponoides* is actually a *Colpocephalum sen. lat.* also.

#### SUMMARY

We consider that there are now three recognizable species of lice of the genus *Colpocephalum sen. lat.* occurring on owls, including a new species described here. These species and their respective host ranges are as follows: *C. pectinatum* Osborn from *Speotyto cunicularia*, *Athene brama*, and *Otus bakkamoena*; *C. brachysomum* Kellogg and Chapman from *Asio flammeus* and *Bubo virginianus*; and *C. cholibae*, new species, from *Otus choliba*. *C. menoponoides* Ewing is considered as a *species sedis incertae*.

#### ACKNOWLEDGMENTS

We would like to express our gratitude to Drs. K. C. Emerson, Stillwater, Oklahoma, and Theresa Clay, British Museum (Natural History), for their generous cooperation in this study, including the loan of a number of critical specimens and the reading of this manuscript; in addition, we thank Drs. G. W. Byers, University of Kansas, P. R. Ehrlich, Stanford University, J. N. Knull, Ohio State University, and W. E. LaBerge, University of Nebraska, for the loan of additional specimens.

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