A REVIEW OF THE COLPOCEPHALUM OF THE CORVIDAE WITH THE DESCRIPTION OF A NEW SPECIES

(MALLOPHAGA: MENOPONIDAE)[1]

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As a continuation of our studies upon lice of the genus *Colpocephalum* Nitzsch, 1818, we here review the status of the lice found upon the family Corvidae (Passeriformes). Although the genus *Colpocephalum* as currently interpreted by most workers is associated with a number of bird orders, the only members of the Passeriformes known to harbor these lice belong to the Corvidae (except for *C. ignotum* Tendeiro reported by Tendeiro (1958) as a possible straggler from the Cuculidae to the Hirundinidae). We have been able to examine over 400 specimens of *Colpocephalum* from 20 species of Corvidae; included among these are series of both sexes from the eight type hosts upon which the seven currently recognized species of *Colpocephalum* are based. Thus we are able to render an opinion as to the status of these species as well as to place the additional materials from the other hosts.

The *Colpocephalum* of the Corvidae may be characterized generically by the same features reported earlier (Price and Beer, 1963b). All specimens we have seen from the Corvidae bear a remarkable similarity not only to each other but also to the *Colpocephalum* of the owls and to the *polybori*-group of *Colpocephalum* from hawks. Both sexes of all of these have (1) four minute middorsal head setae, (2) a minute outer and a long inner pair of occipital setae, and (3) marginal pronotal setae of short, long, short, and three (less often four) long setae on a side. The females have a broadly rounded vulva without a prominent lateral row of hooked setae and have a comparatively simple oval anus without inner setae. All males have genitalia similar to those in Fig. 4, with a barbed penis and the lateroposterior projections of the genital sclerite bluntly pointed.

All observations of lice in this work are based on specimens mounted on slides. Measurements, where given, are in millimeters. The value placed in parentheses following a statement of range represents the mean. The nomenclature of the hosts follows that of Peters (1962).

Colpocephalum fregili Denny

(Figs. 1–4)

Type host.—Pyrrhocorax p. pyrrhocorax (Linn.).

Colpocephalum subaequale Burmeister, 1838 (*nec* Haan, 1829). Handb. Ent. 2: 438.

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[1] Paper no. 5161, Scientific Journal Series, Minnesota Agricultural Experiment Station, St. Paul 1, Minnesota.

Type hosts.—*Corvus frugilegus* Linn. and *Corvus corax* Linn.

Colpocephalum fregili Denny, 1842. Monogr. Anopl. Brit.: 198, 208.

Type host.—*Fregilus graculus* (Linn.) = *Pyrrhocorax p. pyrrhocorax* (Linn.).

Colpocephalum semicinctum Rudow, 1866. Z. ges. Naturwiss. 27: 475.

Type host.—*Corvus scapulatus* Daudin = *Corvus albus* Müller.

Colpocephalum trimaculatum Piaget, 1880. Les Pediculines: 525.

Type hosts.—*Platycercus palliceps* Lear = *P. adscitus palliceps* Lear and *P. barrabandi* (Swainson) = *Polytelis swainsonii* (Desmarest)—errors. **N. Syn.**

Colpocephalum elongatum Piaget, 1880. Les Pediculines: 529.

Type host.—*Pyrrhocorax alpinus* Vieillot = *Pyrrhocorax graculus* (Linn.). N. Syn.

Colpocephalum ellipticum Piaget, 1880. Les Pediculines: 570.

Type host.—*Xulla* (*Larus*) *mangola* [author unknown] = *Corvus e. enca* (Horsfield). N. Syn.

Colpocephalum splendens Ansari, ?1955. Proc. 7th Pak. Sci. Conf. (Sect. Agric.): 51. (Also described as n. sp. in Ind. Jour. Ent. 17 (1956): 399 and Ind. Jour. Ent. 18 (1957): 428.)

Type host.—*Corvus s. splendens* Vieillot. N. Syn.

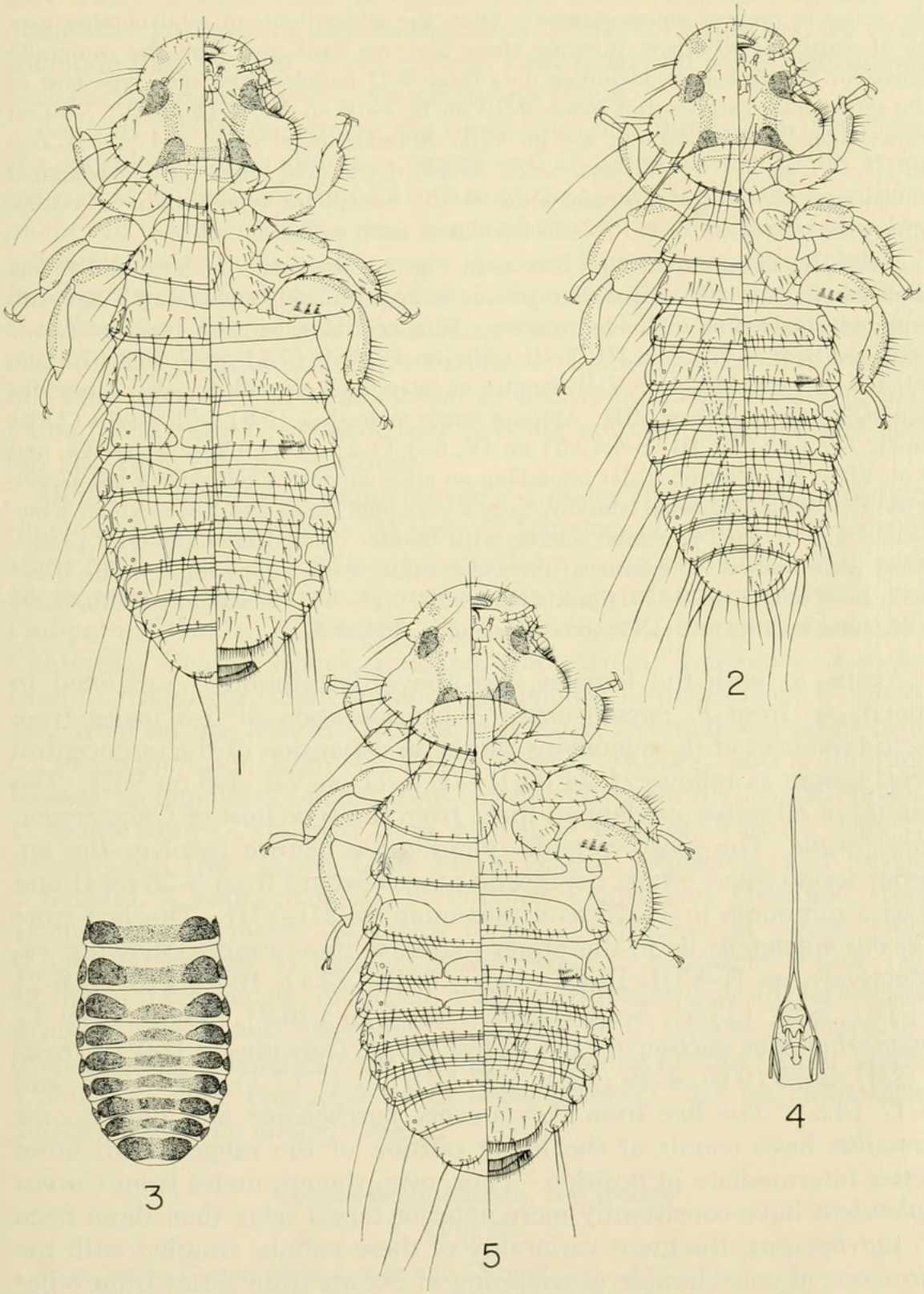
Colpocephalum laurencei Ansari, ?1955 (*nom. nov.* for *subaequale* Burmeister). Proc. 7th Pak. Sci. Conf. (Sect. Agric.): 51. (Also given as *nom. nov.* in Ind. Jour. Ent. 17 (1956): 399 and Ind. Jour. Ent. 18 (1957): 427.) N. Syn.

Colpocephalum bengalensis Ansari, ?1955. Proc. 7th Pak. Sci. Conf. (Sect. Agric.): 58. (Also described as n. sp. in Pak. Jour. Sci. Res. 8 (1956): 57 and Ind. Jour. Ent. 17 (1956): 399.)

Type host.—*Corvus macrorhynchus* = *Corvus macrorhynchos* Wagler. N. Syn.

Female.—Specimens from type host as in Fig. 1. Pronotum marginally with a short, long, short, and 3 long setae on each side. Metanotum with majority of marginal setae of moderate length; metasternal plate with 8–11 (9.4) setae. Abdomen with first 2–3 segments somewhat longer than remainder. Tergites III–IV tripartite, with remainder of tergites darker laterally, pigmentation as in Fig. 3. Tergocentral setae: 5–8 (6.0) on I, 9–12 (10.1) on II, 9–14 (11.9) on III, 10–16 (13.0) on IV, 9–13 (10.9) on V, 7–12 (9.4) on VI, 4–8 (6.6) on VII, and 4–5 (4.5) on VIII; these setae usually medium to long, but with occasional short or minute seta within row, especially on more posterior segments; tergocentral setae on VIII typically all minute. Anterior tergal setae: 4–11 (6.8) on I, 10–15 (12.5) on II, 2–4 (3.1) on III, 1–3 (2.1) on IV, 0–7 (2.9) on V, 0–1 (0.3) on VI, and 0 on VII–VIII. Postspiracular setae very long except variable on V and short on IV. Last tergite with 2 minute lateral setae, then 2 very long setae, and a group of 2–5 short to minute inner posterior setae on each side. Sternite II with lateral grouping of shorter setae; sternites II–III usually with at least 2 longer median marginal setae. Vulva flatly rounded, sometimes indented slightly at midline; 32–37 (34.4) evenly spaced short marginal setae. Anal fringe of 44–52 (48.3) setae ventrally, 38–49 (43.8) dorsally. Dimensions: preocular width, 0.33–0.35; temple width, 0.47–0.49; head length, 0.30–0.32; prothorax width, 0.30–0.32; metathorax width, 0.47–0.52; total length, 1.59–1.69.

Although the above description applies only to females from *P. pyrrhocorax*, those from all additional hosts, including the type hosts of all synonyms, show remarkable similarity to this material. The only indication of potential differences lies in such quantitative features as number of tergocentral, anterior tergal, vulval, and anal setae. The setal counts of some individuals are outside the limits given



Figs. 1–4, *Colpocephalum fregili.* Fig. 1. Dorsoventral view of female; Fig. 2. Dorsoventral view of male; Fig. 3. Pigmentation of dorsum of abdomen of female; Fig. 4. Male genitalia.

Fig. 5, *Colpocephalum tristis*, n. sp., dorsoventral view of female.

for lice from *P. pyrrhocorax*; however, there is always sufficient overlap among the series to prevent any separation. Since the wider limits of setal number may be of assistance to others studying these lice, we shall give here the composite range for certain counts, including data from 3–11 females from each type host of the synonyms. Tergocentral setae: 9–19 on II, 7–19 on III, 8–18 on IV, 7–19 on V, 4–16 on VI, 4–13 on VII, 4–9 on VIII. Anterior tergal setae: 4–17 on II, 0–6 on III, 0–7 on IV. Ventral anal setae, 36–56; dorsal anal setae, 33–55. Marginal vulval setae, 28–41. Metasternal setae, 6–15. Except for total length, 1.34–1.93, other size ranges are from 0.02–0.04 wider at each extreme.

Male.—Specimens from type host as in Fig. 2. Chaetotaxy of head and thorax similar to female. All abdominal segments of approximately equal length and with uniformly pigmented undivided tergites. Tergocentral setae: 4–5 (4.3) on I, 4–7 (5.8) on II, 6–9 (7.2) on III, 7–10 (8.0) on IV, 6–9 (7.5) on V, 6–8 (7.2) on VI, 4–5 (4.5) on VII, 4 on VIII; lengths of setae much as with females, except for generally longer setae on VIII. Anterior tergal setae: 5–7 (5.8) on I, 10–13 (11.8) on II, 1–7 (4.5) on III, 1–6 (3.5) on IV, 0–3 (1.2) on V, 0.3 (2.0) on VI, and 0 on VII–VIII. Postspiracular setae long on all segments. Each side of last tergite with 2 medium-long setae laterally, then 2 very long setae, and 2–3 medium setae. Genitalia as in Fig. 4; genital sclerite with bluntly pointed lateroposterior projections; penis barbed. Dimensions: preocular width, 0.32–0.33; temple width, 0.44–0.45; head length, 0.29–0.31; prothorax width, 0.29–0.30; metathorax width, 0.39–0.41; total length, 1.42–1.47; genitalia length, 0.52–0.57.

Again, as with the females, the above description is restricted to specimens from *P. pyrrhocorax*. A consideration of 3–8 males from each type host of the synonyms shows an expansion of the tergocentral setal ranges as follows: 4–14 on II–VI, 3–11 on VII, 4–8 on VIII. The ranges of all series overlapped those from the type host of *Colpocephalum fregili*. The most variable quantitative feature involves the anterior tergal setae, whose composite ranges extend from 5–26 on II and 0 as a minimum to 17–25 as a maximum on III–VIII. The lice from *Corvus splendens* lie in the upper region of these ranges, showing, respectively, on II–VIII, 14–26 (19.6), 6–18 (13.4), 10–19 (13.5), 8–21 (13.8), 7–21 (13.5), 5–18 (12.0), and 4–16 (10.0). Those from *C. macrorhynchos* encompass the widest range, showing on II–VIII, 8–20 (12.0), 3–18 (9.0), 4–19 (9.2), 2–25 (9.8), 0–17 (7.3), 0–16 (6.0), and 0–17 (4.8). The lice from *Pyrrhocorax pyrrhocorax* and *Pyrrhocorax graculus* have counts at the lower portion of the ranges, with other series intermediate in position. Thus, even though males from *Corvus splendens* have consistently more anterior tergal setae than those from *P. pyrrhocorax*, the great variability of these counts, coupled with the presence of considerable overlapping of counts from series from other hosts, makes reliable separation into species seemingly impossible on this basis. Furthermore, these setae may appear shorter when they are more numerous, a deceptive feature should one have at hand only short series of lice lying at both limits of the range. Total length of males varies from 1.12–1.79, with other dimensions being from 0.01–

0.04 wider at each extreme. Thus, with no reliable quantitative or qualitative features for differentiation of species for either sex, we must conclude that, in light of our present knowledge, all series considered here are conspecific with *Colpocephalum fregili.*

Bedford (1939) recognizes the similarities of a number of these lice. He considers *Colpocephalum fregili* and *C. semicinctum* to be synonyms of *C. subaequale*, but fails to note the unavailability of *C. subaequale.* In addition to the type hosts of the above, Bedford notes the following hosts to have this same species: *Corvus macrorhynchos, C. brachyrhynchos* Brehm, *C. capensis* Lichtenstein, *C. rhipidurus* Hartert, *C. albicollis* Latham, and "Australian Common Crow." Hopkins and Clay (1952) point out the correct status of *Colpocephalum subaequale,* but they recognize *C. semicinctum* as a distinct species. Kellogg and Paine (1914) cite *C. semicinctum* as being not only from its type host but also from *Corvus splendens.*

Material examined.—Eight females, 4 males from *Pyrrhocorax pyrrhocorax* from Eire and N. Wales; 29 females, 11 males from *Corvus albus* from Africa; 3 females, 4 males from *P. graculus* from England; 13 females, 4 males from *C. enca* from Sula Mangola, Borneo, and Philippine Islands; 32 females, 21 males from *C. corax* from Lower California, Clarion Island, England, and Africa; 3 females, 3 males from *C. frugilegus* from Scotland; 18 females, 13 males from *C. splendens* from Burma, Maldive Islands, and India; 28 females, 9 males from *C. macrorhynchos* from Thailand, Burma, Malaya, and Philippine Islands; 23 females, 14 males from *C. albicollis* from Africa; 22 females, 17 males from *C. capensis* from Africa; 17 females, 8 males from *C. corone* Linn. from Japan, Cape Verde Islands, Jugoslavia, and Egypt; 2 females, 2 males from *C. coronoides* Vigors and Horsfield from Tasmania; 15 females, 12 males from *C. cryptoleucus* Couch from U.S.A. and Mexico; 11 females, 8 males from *C. ossifragus* Wilson (no locality); 14 females, 15 males from *C. rhipidurus* from Jerusalem, Arabia, Uganda, and Abyssinia; 1 female from *C. typicus* (Bonaparte) from Celebes; 2 females from *Cyanopica cyanus* (Pallas) from Japan; 1 female, 1 male (paratype of *C. trimaculatum*) "Sur un *Platycercus palliceps*" with no further data.

Colpocephalum tristis, new species

(Fig. 5)

Type host.—*Corvus tristis* Lesson and Garnot.

Female.—Specimens from type host as in Fig. 5. Chaetotaxy of head as for *C. fregili.* Pronotum marginally with a short, long, short, and 4 long setae on each side. Median marginal setae of metanotum all minute; metasternal setae, 10–13 (10.9). Tergites III–IV tripartite with II and/or V often showing similar signs of division. Tergocentral setae: 11–18 (13.1) on I, 20–25 (22.0) on II, 20–27 (22.5) on III, 18–25 (22.5) on IV, 17–24 (20.2) on V, 14–21 (18.2) on

VI, 14–19 (16.0) on VII, 7–12 (9.3) on VIII; short to minute on I, longer laterally and shorter medially on II–VII, minute on VIII. Usually no anterior setae (1 specimen with 1 on II, 4 on IV, and 1 on V; 2 other specimens with 1 on IV). Postspiracular setae very long on all but IV–V. Last tergite with same chaetotaxy as in *C. fregili*, but more sharply indented at midline. Ventral abdominal chaetotaxy much as for *C. fregili*, but with marginal vulval setae, 39–53 (45.5), ventral anal setae, 50–64 (58.7), and dorsal anal setae, 44–72 (57.6). Dimensions all within the limits given for *C. fregili*; the slightly telescoped state of the abdomen of the illustrated female accounts in large part for the appearance of being shorter and broader.

Females of *C. tristis* may be separated from those of *C. fregili* by (1) the larger number of long marginal pronotal setae (although *C. fregili* rarely may show the 4 long median setae on only one side, its usual condition is 3 long setae), (2) the larger number and relative lengths of tergocentral setae, (3) the very short marginal metanotal setae, and (4) the larger number of marginal vulval and ventral and dorsal anal setae.

Male.—Close to that of *C. fregili*, but distinguished by the following features: (1) margin of pronotum with same chaetotaxy as with female, that is, with 4 long inner setae on each side instead of 3; (2) a greater number of tergocentral setae on most segments: 8–12 on I, 16–17 on II-V, 12–14 on VI, 11–12 on VII, and 8–10 on VIII; (3) a tendency for the tergocentral setae to be shorter than with *C. fregili*, with few if any extending completely across the following tergite; and (4) fewer and shorter anterior tergal setae: 0–1 on I, 1–5 on II, 1–4 on III, 0–7 on IV, 0–6 on V–VI, 0–3 on VII, 0–1 on VIII.

The foregoing is based on the 2 males from the type host. Three other males are available from *Corvus fuscicapillus* Gray, these presumably representing the same species. They closely agree with characteristics of the above, showing tergocentral setae 10–14 on II, 15–18 on III–V, 13–14 on VI, 10–12 on VII, 5–7 on VIII, and anterior tergal setae 0–4 on II, 0–1 on III, 0–4 on IV, 0–3 on V–VI, and 0 on VII–VIII.

The 3 host species listed in material examined are interestingly enough all found in the same geographic area and are listed consecutively in Peters (1962). Thus, the occurrence of this species of louse, which is distinctive from the other species found on *Corvus* in other parts of the world, may substantiate the presumed relationship between these species of birds.

Material examined.—Fifteen females, 2 males from *Corvus tristis* from New Guinea; 3 females, 3 males from *C. fuscicapillus* from Waigeu (Western Papuan Islands); 1 female from *C. woodfordi woodfordi* (Ogilvie-Grant) from Solomon Islands; 2 females from *C. w. meeki* Rothschild from Bougainville Island.

The material from *Corvus tristis* was chosen as the type series and the disposition of the type material is as follows: holotype female, allotype male, and 8 female paratypes deposited at the British Museum (Natural History); 6 female, 1 male paratypes at the University of Minnesota.

Discussion

As noted earlier in this paper, the *Colpocephalum* from the Corvidae show a remarkable similarity to those from the owls and of the *polybori*-group from the hawks. Aside from specific differences in chaetotaxy, the principal means of separation was initially believed to lie in the tripartite nature of abdominal tergites III–IV for all females of the Corvidae material. Virtually all of the lice which are not overly cleared and are without internal interference show conspicuous division of these two tergites, as illustrated in Figs. 1 and 5. All *Colpocephalum* from owls (Price and Beer, 1963a) have females with complete abdominal tergites, without the pattern of Fig. 3, usually with a distinctively shaped gula, and lacking anterior tergal setae on the abdomen. *C. fregili* always has at least some anterior tergal setae, a differently shaped gula, and usually tergites III–IV conspicuously tripartite. Although females of *C. tristis* lack anterior tergal setae, the lengths and numbers of tergocentral setae and the tripartite tergites are most distinctive from the owl lice. Males of owl *Colpocephalum* also always lack anterior tergal setae and show little sexual dimorphism; the males of the Corvidae *Colpocephalum* usually have anterior tergal setae on at least several segments and show a distinct sexual dimorphism.

The species of the *polybori*-group (see Price and Beer, 1963b) of the hawk *Colpocephalum* have females with an anterior setal row present on some abdominal tergites and thus differ from *C. tristis*. The inclusion of *C. trimaculatum* Piaget within the hawk lice resulted solely from its close morphological similarity, since we only had the one female and one male paratypes from what we presumed to be an incorrect host. However, now that we have studied the *Colpocephalum* of the Corvidae, we realize that the correct affinity of *C. trimaculatum* is with the lice of the Corvidae and that it is synonymous with *C. fregili*. The type host of *C. trimaculatum* was from the Zoological Garden of Rotterdam, thus offering opportunity for straggling from one host to another; coincidentally with this, Piaget (1880) described his *C. elongatum* from *Pyrrhocorax alpinus* from the same Zoological Garden. Although *C. maculatum* Piaget as well as several other hawk species of *Colpocephalum* was likewise collected from this site, additional specimens we obtained from other sources verified the correctness of the hosts.

The abdominal pigmentation shown by the remaining three species of the *polybori*-group of hawk lice is very close to that of Fig. 3, and on several specimens weak lines on tergite III and sometimes IV may be an indication of a division of these tergites. In our paper on the *Colpocephalum* of hawks, we had concluded that these tergites for this group of hawk lice were probably entire, although poorly sclerotized centrally. We must now admit that the possibility of a tripartite state

for tergites III–IV exists among lice of the *polybori*-group; however, it is not as pronounced in material we have seen as with most *Colpocephalum* of the Corvidae. Reference to our keys (Price and Beer, 1963b) to the species of hawk and owl *Colpocephalum* will enable differentiation of females of *C. fregili* from *C. maculatum, C. ?ibicter* (Eichler), and *C. polybori* Rudow, and males of *C. fregili* from *C. ?ibicter* and *C. polybori*, bearing in mind that *C. trimaculatum* is a synonym of *C. fregili*. The number of anterior tergal setae on III–VI will usually, but not always, enable separation of males of *C. fregili* from *C. maculatum*.

ACKNOWLEDGMENTS

We wish to thank Dr. Theresa Clay, British Museum (Natural History), and Dr. K. C. Emerson, Stillwater, Oklahoma, for the loan of many important specimens and for their help pertinent to the preparation of this manuscript. In addition, we thank Dr. J. F. Gates Clarke, United States National Museum, Dr. Jerry A. Powell, University of California, and Dr. J. Porter Woodring, Louisiana State University, for the loan of additional lice for this study.

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