

# The *Colpocephalum* (Mallophaga: Menoponidae) of the Ciconiiformes<sup>1</sup>

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## ABSTRACT

Forty-three species of *Colpocephalum* s. lat. from the Ciconiiformes are recognized and discussed. Nineteen of these are newly described; they and their type-hosts are *nigrae* (*Ciconia nigra*), *asiatici* (*Xenorhynchus asiaticus asiaticus*), *nipponi* (*Nipponia nippon*), *mycteriae* (*Mycteria americana*), *lamelligeri* (*Anastomus lamelligerus*), *leucocephali* (*Ibis leucocephalus*), *cooki* (*Leptoptilos dubius*), *oxycercae* (*Cercibis oxycerca*), *harpiprioni* (*Harpiprion caerulescens*), *olivaceae* (*Lampribus olivacea ak-*

*leyorum*), *carunculatae* (*Bostrychia carunculata*), *aethiopicae* (*Threskiornis aethiopica*), *melanocephalae* (*Threskiornis melanocephala*), *plataleae* (*Platalea leucorodia major*), *spinicollis* (*Carphibis spinicollis*), *eremitae* (*Geronticus eremita*), *davisoni* (*Pseudibis davisoni*), *scharfi* (*Anastomus lamelligerus*), and *oscitansi* (*Anastomus oscitans*). *C. subflavescens* Piaget is synonymized with *C. turbinatum* Denny. A key is given to the species.

The genus *Colpocephalum* Nitzsch, 1818, as interpreted by most workers on Mallophaga, includes a heterogeneous group of approximately 100 species of lice from birds representing at least 10 orders. The number of genera considered synonymous with *Colpocephalum* by Hopkins and Clay (1952), as well as further genera of dubious validity split off since then from the parent genus, is indicative of a state of confusion resulting from a willingness on the part of certain workers to name genera without an appreciation of the complex in its entirety. To avoid doing this ourselves, we have purposely included a wide diversity of forms under *Colpocephalum* s. lat. until a thorough knowledge of the entire complex can be obtained (e.g., Price and Beer 1963, 1964). Thus, consistent with this approach, we include in the present study all species of ciconiiform lice which we believe are encompassed within the limits of *Colpocephalum* s. lat., recognizing as we do so that certain of these diverge morphologically to varying degrees from the type species *C. zebra* Burmeister from *Ciconia ciconia ciconia* (L.) of the Ciconiiformes.

There has been no modern systematic review of the *Colpocephalum* from the Ciconiiformes; these lice from this host order are in many instances unrecognizable from original descriptions and identification is based essentially on a host-parasite association. The purposes of this study are to evaluate the status of all recognized species and to redescribe each of these; to describe new species; and to develop a key to permit identification of members of this group. Toward this end, we have examined more than 800 adult

specimens of *Colpocephalum* from 29 genera and 42 species of birds within the Ciconiiformes; all these hosts fall within the suborder Ciconiae and represent a high percentage of the 35 genera and 57 species included therein (Peters 1931).

Three species currently recognized as *Colpocephalum* from the Ciconiiformes are not included in this revisional study. *Colpocephalum matosi* Tendeiro, 1958, Type-host: *Ibis ibis* (L.), belongs to *Ciconiphilus* Bedford; *Colpocephalum xenicum* Kellogg, 1910, Type-host: *Ixobrychus sturmi* (Wagler), is a member of either *Comatomenopon* Uchida or *Ciconiphilus*. Both these species will be treated in later studies. *Colpocephalum marabu* (Eichler 1947), Type-host: *Leptoptilos javanicus* (Horsfield), is unrecognizable from its description; it is not conspecific with any material we have from *Leptoptilos* species and, since we are unable to obtain type-material, must be considered a species sedis incertae.

The morphological generalities within the *Colpocephalum* are enumerated by Price and Beer (1963) and will not be repeated here. In the following discussions, the 43 species have been arranged in 12 groups. Each group is first characterized; then individual species within it are treated without repetition of either group or generic characters. All specimens studied represent slide-mounted material. Since all illustrations of entire specimens or parts (except male genitalia, female terminalia, and several other obviously more greatly enlarged portions) are given at the same magnification ( $\times 36$ ), no measurements are provided. The nomenclature of the hosts generally follows that of Peters (1931). Abbreviations given for disposition of type-specimens are BMNH for British Museum (Natural History), USNM for

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United States National Museum, and MC for Meinzhausen Collection.

### *zebra*-group

1. Both sexes with 2 well-developed comb rows on each side of sternite III.
2. Female with at least tergites VI-IX tripartite, with IX having slender elongated median piece between lateral portions.
3. Female with sternites VII-VIII not fused.
4. Female with anus and vulva much as in Fig. 3.
5. Occipital setae short to minute (except possibly *C. nigrae*, *C. asiatici*, and *C. nipponi*).
6. Margin of pronotum with 3 short and 5 long setae on each side.
7. Femur III having 2-3 setae on posterior margin (Fig. 5).
8. Male genitalia much as in Figs. 6, 11, 16, or 22, with genital sclerite having median projection and usually 2 lateroposterior points; penis unbarbed.

This large group of 15 species is essentially restricted to hosts within the Ciconiidae, with 14 recorded from 14 of the 17 species of birds within this family. The only exceptions are *C. nipponi*, n. sp. based on 3 specimens from *Nipponia nippon* (Temminck) and 1 specimen of *C. scalariforme* Rudow from *Mesembrinibis cayennensis* (Gmelin); one or both cases may represent straggling or otherwise incorrect host data.

### *Colpocephalum zebra* Burmeister

*Colpocephalum zebra* Burmeister, 1838, Handb. Entomol. 2: 438. Type-host: *Ciconia alba* = *Ciconia ciconia ciconia* (L.).

FEMALE.—As in Fig. 1. Outer middorsal head setae longer than inner. Antenna (Fig. 4) without second segment greatly expanded distally. Margin of metanotum with 10 setae, shorter medially; anteriorly with 4 medium setae; metasternal plate with 7-9 short to medium setae. Abdominal tergites I-III somewhat longer than IV-VIII; IV-IX clearly tripartite, I-III lightly pigmented medially. Marginal tergal setae, with lengths as illustrated, number: III-V, 15-20; VI, 15-18; VII, 13-15; VIII, 10-11. Irregular single to double row of medium anterior setae on I-VIII: I, 4-11; II, 10-15; III-VI, 20-28; VII, 15-16; VIII, 9-12; those on median plate similar in size to those laterally. Postspiracular setae long to very long on I-V and VIII, short on VI-VII. Single very long seta each side of IX. Median plate of IX with ridgelike sculpturing (as in Fig. 13), without microtrichia. Sternal setae, as illustrated, number: I, 3-5; II-III, 25-31; IV, 43-48; V-VI, 27-37; VII, 25-29.

MALE.—As in Fig. 2. Chaetotaxy differing from female. Some tergites with fewer anterior setae: III, 18-23; IV, 14-19; V-VI, 12-17. Postspiracular setae long to very long on I-VIII. Wide truncate terminal segment. Ventrally with few more sternal setae: I, 5-8; II, 30-36; III, 26-28; IV, 50-56; V, 40-44; VI,

35-42, VII, 33-36. Genitalia as in Fig. 6; lateral plate associated with genital sclerite having 5-8 short projections on each side.

*Material Examined*.—20 ♀, 17 ♂, *C. ciconia*, Africa and New York Zoo.

### *Colpocephalum oreas* Kellogg

*Colpocephalum oreas* Kellogg, 1910, Wiss. Ergebn. Schwed. Zool. Exped. Kilimandjaro 3: 51. Type-host: *Ephippiorhynchus senegalensis* (Shaw) (see Clay 1953: 654).

*Colpocephalum ephippiorhynchi* Mjöberg, 1910, Ark. Zool. 6(13): 43. Type-host: *Ephippiorhynchus senegalensis* (Shaw).

FEMALE.—Close to *C. zebra*, but differing in abdominal chaetotaxy (Fig. 8). More marginal setae on tergites: III-V, 20-26; VI, 19-22; VII, 16-18; VIII, 11-12. Fewer anterior tergal setae on I, 0-4, and II, 2-10; median anterior setae on III-VI shorter than lateral ones.

MALE.—Also close to *C. zebra*, differing only in lengths of certain abdominal tergal setae (Fig. 7). Anterior tergal setae short, usually separated by at least own length from bases of tergoventral setae of same segment. Tergoventral setae on IV short, with few, if any, extending to anterior margin of tergite V.

*Material Examined*.—16 ♀, 16 ♂ (including 2 ♀, 2 ♂ homotypes), *E. senegalensis*, Africa.

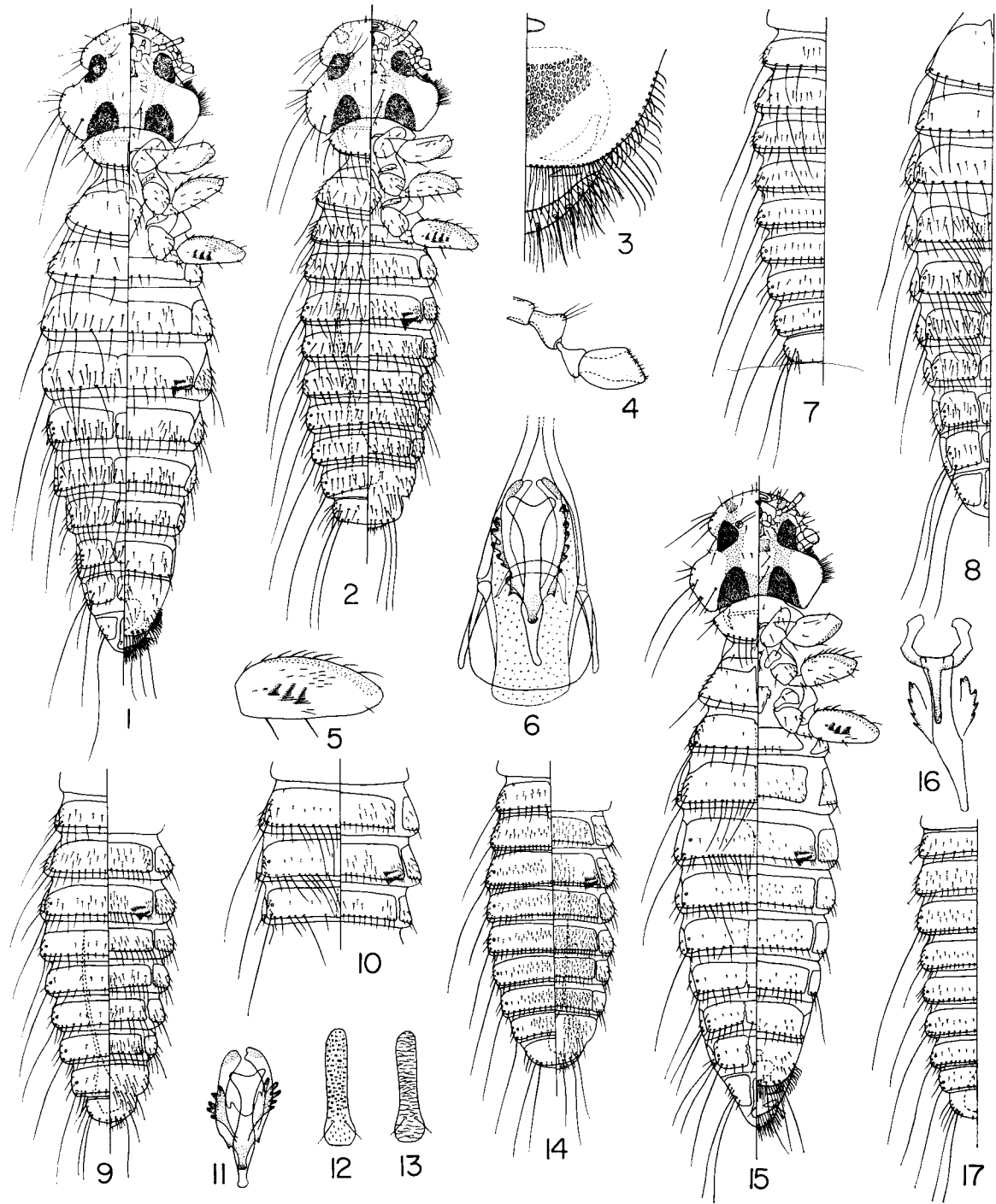
### *Colpocephalum nigrae*, new species

Type-host.—*Ciconia nigra* (L.).

FEMALE.—Head and thorax close to *C. zebra*, except occipital setae medium, outer pair extending to transverse thickening of prothorax; inner pair shorter. Margin of metanotum with 13-14 setae; several medium anterior setae on metanotum; metasternal plate with 7-8 medium setae. Abdominal tergites I-VII marginally with 16-22 medium setae, shorter among longer on anterior segments, relatively uniform length on posterior segments (Fig. 25); single irregular row of 10-26 medium anterior setae on each, most extending to bases of marginal setae of respective segments. Tergite VIII with unusual chaetotaxy; each side with 3-4 medium tergoventral setae (including 1 on median plate) similar in length to those of preceding segment; anterior setae on VIII as long as marginal setae. Postspiracular setae very long on all but VII. Segment IX laterally with 1 very long seta. Sternites with medium setae: II-III, 33-50; IV-VI, 48-67; VII, 34-36.

MALE.—Single specimen with many setae missing; head and thorax close to female, but with inner occipital setae minute, outer pair gone. Chaetotaxy and shape of abdomen as far as discernible close to *C. zebra*. Median tergoventral setae on VI-VII shorter than anterior setae on each respective segment. Genitalia close to *C. zebra* (Fig. 6), but with shorter distal portion of penis.

*Material Examined*.—Holotype ♀ (BMNH), 1 ♂ paratype, *C. nigra*, Russia, MC, Slide 1770; 2 ♀ paratypes, *C. nigra*, Egypt, MC, Slide 4597.



FIGS. 1-6.—*Colpocephalum zebra* Burmeister. FIG. 1.—Female. FIG. 2.—Male. FIG. 3.—Female ventral terminalia. FIG. 4.—Female antenna. FIG. 5.—Ventral femur III. FIG. 6.—Male genitalia.  
 FIGS. 7-8.—*C. oreas* Kellogg. FIG. 7.—Male dorsal abdomen. FIG. 8.—Female dorsal metathorax and abdomen.  
 FIGS. 9-12.—*C. mycteriae*, n. sp. FIG. 9.—Male abdomen. FIG. 10.—Female abdominal segments II-IV. FIG. 11.—Male genitalia. FIG. 12.—Female median tergal plate of IX.  
 FIGS. 13-15.—*C. scalariforme* Rudow. FIG. 13.—Female median tergal plate of IX. FIG. 14.—Male abdomen. FIG. 15.—Female.  
 FIG. 16.—*C. leucocephali*, n. sp., male genitalia.  
 FIG. 17.—*C. occipitale* Nitzsch, male dorsal abdomen.

***Colpocephalum asiatici***, new species

Type-host.—*Xenorhynchus asiaticus asiaticus* (Latham).

FEMALE.—Close to *C. nigrae*. Middorsal head setae short, not minute. Occipital setae broken off. Tergites II–V with some long marginal setae, twice length of shorter adjacent ones (Fig. 19). Considerably fewer and shorter anterior setae on tergites I–VII: I–II, 0; III–VII, 3–6.

MALE.—Unknown.

Material Examined.—Holotype ♀ (BMNH), *X. a. asiaticus*, India, MC, Slide 4806.

***Colpocephalum nipponi***, new species

Type-host.—*Nipponia nippon* (Temminck).

FEMALE.—Numerous setae missing from single specimen available. Close to *C. nigrae* and *C. asiatici*. Separable by metanotal and tergal-abdominal features (Fig. 20). Metanotum with only about 4 short anterior setae. Tergites III–VIII distinctly tripartite; median plates with setae. Tergocentral setae mostly of uniform medium length. No anterior setae on I, 14 on II, 28 on III, 20–23 on IV–VI, 12 on VII, 4 on VIII. Only slight indication of median plate on IX.

MALE.—Head and thorax as for female. Abdomen (Fig. 21) with long among medium tergo-central setae on II–VII. No anterior setae on I; single row on II–VIII: II, 9–17; III–IV, 15–26; V–VI, 12–23; VII, 10–16; VIII, 10–12. Postspiracular setae probably very long on II–VIII. Segment IX truncate, with sparse anterior minute setae and lateral cluster of long setae with 1 very long seta. Genitalia (Fig. 22) close to *C. zebra* and *C. oreas*, but differ in narrower distal genital sclerite.

Material Examined.—Holotype ♂ (USNM), 1 ♂, 1 ♀ paratypes, *N. nippon* (no data).

***Colpocephalum scalariforme*** Rudow

*Colpocephalum scalariforme* Rudow, 1866, Z. Ges. Naturwiss. 27: 471. Type-host: *Tantalus loculator* = *Mycteria americana* L.

We have 2 closely related species of *Colpocephalum* from *M. americana*, one representing a single collection from Brazil and the other a number of collections from the southern United States and Mexico. The original description of *C. scalariforme* is most inadequate, having neither illustrations nor type-host locality; since we do not know if the type-specimens still exist or, if they do, where, the true identity of this species is open to question. Carriker (1954) was apparently the first to illustrate this species, basing his description on Mexican material which he states to be conspecific with his Colombian lice from the same host species; his illustrations show affinities with our North American series. Since Carriker (1954) has based his description on lice similar to those we have from several collections and since the name *C. scalariforme* has undoubtedly been commonly applied by other workers to this form, we here believe it advisable to designate a neotype to stabilize the identity of this species and to clarify the differen-

tiation from the new species described in this paper from *M. americana*.

FEMALE.—As in Fig. 15. Close to *C. mycteriae*, n. sp., but differs by having middorsal head setae all of same length; metasternal plate with 5–6 minute anterior and 2 slightly longer posterior setae; generally shorter marginal tergal setae on III; postspiracular seta on IV much shorter, about same length as on VII; median plate of IX sculptured as in Fig. 13, without microtrichia; anterior sternal setae minute, very fine, and in magnitude like anterior tergal setae.

MALE.—Head and thorax as for female, but with longer setae on metasternal plate. Abdominal tergites and sternites with abundant short marginal and anterior setae (Fig. 14); more than any of foregoing species. Marginal tergal setae: III–IV, 30–35; V, 28–29; VI, 25–26; VII, 20–22; VIII, 12–13. Anterior tergal setae: I, 17–19; II, 31–35; III–VII, 38–49; VIII, 30–36. Postspiracular setae shorter on I, II, and IV. Sternite III with over 45 setae, II and IV–VII with over 75 each. Terminal segment rounded to occasionally somewhat truncate. Genitalia close to Fig. 11.

Material Examined.—Neotype ♀ (USNM), 2 ♀, 2 ♂ neoparatypes, *M. americana*, Columbus, Miss., 20 Sept. 1937, E. W. S.; neoparatypes, *M. americana*: 2 ♀, Uvalde, Texas, D. C. Parman, 23 Sept. 1922, Bish. 10948; 1 ♂, Hooper, Utah, G. F. Knowlton, 8 Aug. 1930, Bish. 15533; 1 ♀, Safety Harbor, Fla., W. G. Fargo, 7 Apr. 1929, Bish. 8257; 1 ♀, 1 ♂, Cook Coll., M. S. C., 15 Feb. 1935, H. E. S.; 2 ♀, Lake Placid, Fla., 21 July 1960, Braasch, Atyeo; 1 ♀, 1 ♂, Broward Co., Fla., 13 Feb. 1963, F. J. Ligas; 19 ♀, 5 ♂, Mexico, MC, Slide 4810; 1 ♀, 1 ♂, Guatemala, 2 Jan. 1934; 1 ♂, skin (no data). Additionally, 1 ♀, *Jabiru mycteria* (Lichtenstein), Argentina; 1 ♂, *Mesembrinibis cayennensis*, Panama.

***Colpocephalum mycteriae***, new species

Type-host.—*Mycteria americana* L.

FEMALE.—Head and thorax as for *C. zebra* (Fig. 1), except for few minute anterior setae on metanotum. Abdomen differs from both *C. zebra* and *C. oreas* in having anterior row of minute setae on tergites I–VIII, postspiracular setae very long on all but VII, median plate of IX with sculpturing of microtrichia (Fig. 12), and 2 very long lateral setae on each side of IX. Separable from *C. scalariforme* (Fig. 15) in having longer setae on metasternal plate, usually longer marginal setae on tergite III, short anterior sternal setae considerably longer than minute anterior tergal setae (Fig. 10), and microtrichia on median plate of tergite IX.

MALE.—Abdomen (Fig. 9) having longer marginal setae laterally: III, 21–22; IV, 18–19; V–VII, 15–17; VIII, 11–12. Irregular row of short anterior setae, especially sparse posteriorly: I, 6–7, II–III, 16–24; IV, 8–11; V, 6–8; VI–VIII, 3–5. Terminal segment rounded posteriorly. Medium sternal setae: I, 8–11; II, 44–55; III, 34–40; IV, 46–50; V–VII, 29–38. Genitalia (Fig. 11) with lateral plate having only 4–5 finger-like projections, longer than preceding species.

*Material Examined*.—Holotype ♀ (BMNH), 8 ♀, 11 ♂ paratypes, *M. americana*, Brazil, MC, Slide 8392.

### *Colpocephalum occipitale* Nitzsch

*Colpocephalum occipitale* Nitzsch, 1866, *In*: Giebel, Z. Ges. Naturwiss. 28: 394. Type-host: *Anastomus coromandelicus* = *Anastomus oscitans* (Boddaert).

FEMALE.—Minute middorsal head setae, of equal length. Marginal pronotal setae 6, 7, and 8 variable, reduced, occasionally very short. Metanotum typically with 10 marginal setae, 2 or more of these minute; up to 10 minute anterior setae; metasternal plate as for *C. scalariforme*. Dorsal abdomen (Fig. 18) differing from *C. scalariforme* with tergoventral setae medium, of essentially same length on I–VII; marginal pair of setae on median plate of VIII usually as long as corresponding setae on preceding tergites; pair of setae on median plate of IX extending at least to end of plate. Sparse minute anterior setae on tergites I–VIII, occasionally with small number of longer setae medially. Postspiracular setae very long on I–III, V–VI, and VIII; much shorter on IV and VII. Median plate on IX as in Fig. 13; laterally, IX with 2 very long setae. Ventrally as for *C. scalariforme*.

MALE.—Head and thorax as for female, except for pair of anterior spiniform head setae. Abdomen close to *C. scalariforme*, but anterior tergal setae (Fig. 17) quantitatively intermediate between this species and *C. mycteriae*: III, 27–30; IV, 20–22; V, 15–17; VI, 12–16; VII, 10–15; VIII, 10–13. Tergal setae stouter and longer anteriorly; median marginal setae on VIII much shorter than those on I or II. Sternal setae as for *C. mycteriae*. Genitalia with only 2–4 projections on each side of lateral plate (see Fig. 79).

*Material Examined*.—9 ♀, 4 ♂, *A. oscitans*, India and Thailand.

### *Colpocephalum lamelligeri*, new species

Type-host.—*Anastomus lamelligerus* Temminck.

FEMALE.—Inseparable from *C. occipitale*.

MALE.—Close to *C. occipitale*, differing only in having all anterior and tergoventral setae (except extreme lateral ones) on I–VIII minute, much smaller than corresponding sternal setae, and visible only at high magnification; each seta very thin, with length hardly as much as 3 times that of diameter of its alveolus.

We initially believed that our lice from *A. lamelligerus* must represent *C. subzebra* Bedford. However, reference to the description and to type-specimens of this species revealed otherwise. *Colpocephalum subzebra* was described from 1 ♂ (holotype) from *A. lamelligerus* and from a series of both sexes (including allotype) from *Sphenorhynchus abdimii* (Lichtenstein). Dr. du Toit has kindly sent us the holotype of *C. subzebra* and a paratype male from *S. abdimii*; we have found each to represent a different species, but neither being the same as *C. lamelligeri*. Longer tergoventral, anterior tergal, and metanotal setae of *C. subzebra* separate it from *C. lamelligeri*; the male paratype of *C. subzebra* from *S. abdimii* is conspecific with *C. tibiale* Piaget.

*Material Examined*.—Holotype ♂ (BMNH), 1 ♀ paratype, *A. lamelligerus*, Ndumu, Zululand, H. Paterson, 17 Aug. 1956, Brit. Mus. 1957–434; paratypes, type-host: 3 ♂, Butiaba, Uganda, 26 Jan. 1934, G. H. E. Hopkins; 2 ♂, 2 ♀, Uganda (G. E. H.), Oct. 1933, MC, Slide 16507; 13 ♂, 9 ♀, Butiaba, Uganda, 29 Mar. 1937, G. H. E. Hopkins.

### *Colpocephalum subzebra* Bedford

*Colpocephalum subzebra* Bedford, 1939, Onderstepoort J. Vet. Sci. 12: 147. Type-host: *Anastomus lamelligerus* Temminck.

FEMALE.—Unknown.

MALE.—Head and thorax much as for preceding 2 species, including pair of anterior spiniform head setae; differs only in having about 20 longer anterior metanotal setae comparable in length to anterior setae of tergites I–VIII. Abdomen with medium marginal tergal setae of fairly uniform length (aside from extreme lateral ones): I, 13; II–VI, 20–25; VII, 17; VIII, 14. Anterior tergal setae short, but not minute, and of similar length on all segments: I, 36; II–IV, 40–44; V, 34; VI, 29; VII, 24; VIII, 19. Tergal setae generally as long or longer than corresponding sternal setae. Postspiracular setae long to very long on I–VIII. Genitalia close to Fig. 79.

This species was described from a male (holotype) from *A. lamelligerus* and from a lengthy series of both sexes (allotype and paratypes) from *S. abdimii*. The chaetotaxy of a paratype male from *S. abdimii* does not agree with the holotype; instead it is the same as a series of males we have of *C. tibiale* from *S. abdimii*. This points out the danger inherent in describing a species of Mallophaga using a type-series from more than a single species of bird. Unfortunately females offer no known means of separation within this particular complex of species; however, the difference between males, while small, is sufficiently consistent to attest to its reliability. Therefore, the name *C. subzebra* must remain with the single male specimen designated as the holotype and the remainder of the type series, from *S. abdimii*, falls under the name *C. tibiale*.

*Material Examined*.—Holotype ♂, *A. lamelligerus*, Rustenburg Dist. Tr., 5 Feb. 1917, from the Onderstepoort Collection.

### *Colpocephalum tibiale* Piaget

*Colpocephalum tibiale* Piaget, 1888, Tijdschr. Ent. 31: 163. Type-host: *Tantalus senegalensis* = *Ephippiorhynchus senegalensis* (Shaw)—perhaps error. Possibly *Sphenorhynchus abdimii* (Lichtenstein) (see Clay 1953: 654).

FEMALE.—Very close to *C. occipitale*; some specimens perhaps being inseparable, but always with marginal pair of setae on median tergal plate of VIII much shorter than corresponding setae on median plate of VII. Pair of setae on median plate of IX not extending to end of plate.

MALE.—Close to preceding 3 species, but often without pair of spiniform setae at anterior head margin. Metanotum with few minute anterior setae. Longer anterior and tergoventral setae on I–VIII than

for *C. lamelligeri*, these being at least as long as corresponding sternal setae. Lengths and number of abdominal setae close to *C. occipitale* (Fig. 17).

*Material Examined*.—4 ♀, 3 ♂ (including ♂ paratype of *C. subzebra* Bedford), *S. abdimii*, Africa.

### *Colpocephalum fradei* Tendeiro

*Colpocephalum fradei* Tendeiro, 1958, Bol. Cult. Guiné Portug. 13: 158. Type-host: *Ibis ibis* (L.).

**FEMALE**.—Close to *C. scalariforme* (Fig. 15) in chaetotaxy of head, thorax, sternites, ventral terminalia, and margin of tergites II–VII. Differs only in having tergoventral setae of I all essentially same length, tergites II–VII each usually with 4 or more longer median anterior setae, and chaetotaxy of tergites VIII and IX as for *C. tibiale*. At least 3 tergoventral setae much longer than adjacent ones on II separate *C. fradei* from *C. occipitale*, *C. lamelligeri*, and *C. tibiale*.

**MALE**.—Close to *C. subzebra*. Differs from *C. occipitale* in having somewhat longer median marginal (over 0.025 mm vs. 0.018 mm) and anterior (over 0.018 mm vs. less than 0.010 mm) tergal setae at least on VI–VII and from *C. tibiale* in having a pair of spiniform setae at the anterior head margin. Separable from *C. subzebra* in having not over 10 longer anterior metanotal setae, usually associated with some minute setae, and in having fewer anterior tergal setae: I, 20–22; II–III, 30–37; IV, 24–27; V–VI, 17–23; VII, 13–17; VIII, 12–15. Genitalia as in Fig. 79.

*Material Examined*.—7 ♀, 7 ♂ (including 6 ♀, 6 ♂ paratypes of *C. fradei* Tendeiro), *I. ibis*, N. Cameroon and Kenya; 1 ♂, *I. leucocephalus* (Pennant) ?, Nat. Zool. Park.

### *Colpocephalum leucocephali*, new species

Type-host.—*Ibis leucocephalus* (Pennant).

**FEMALE**.—Inseparable from *C. occipitale*, *C. lamelligeri*, or *C. tibiale* in that chaetotaxy of median plates on tergites VIII and IX varies from longer to shorter setae. Usually differing from *C. fradei* in having tergoventral setae on II of uniform medium length or occasionally with up to 2 much longer setae.

**MALE**.—Head and thorax as for *C. fradei*. Lengths of tergal setae similar to *C. fradei* and *C. subzebra*. Considerably more marginal and anterior tergal setae than with the former species, approaching or slightly exceeding in number those of *C. subzebra*, especially with 27–37 marginal setae on II–IV and 50–56 anterior setae on II. Genitalia (Fig. 16) differ from those of *C. occipitale* and related species in having genital sclerite displaced anteriorly, without latero-posterior points, and with very long somewhat obscure median projection.

*Material Examined*.—Holotype ♂ (BMNH), 4 ♀, 20 ♀ paratypes, *I. leucocephalus*, Rajputana, March 1937, MC, Slides 8843, 8885; paratypes, type-host: 8 ♂, 10 ♀, India, MC, Slide 4817; 2 ♂, Ceylon, Nr. Hambantota, 22 Jan. 1956, W. W. A. Phillips, Brit. Mus. 1956–256; 7 ♂, 7 ♀, Thailand, Songkhla

Muang, Lake, 10 July 1962, Wanit Songpranob, RE 6307.

### *Colpocephalum longissimum* Rudow

*Colpocephalum longissimum* Rudow, 1869, Zeitschr. Ges. Naturwiss. 34: 398. Type-host: *Leptoptilus crumenifer* = *Leptoptilos crumeniferus* (Lesson).

**FEMALE**.—As in Fig. 78. Minute middorsal head setae; occipital setae short. 10–11 marginal metanotal setae; 5–7 medium anterior setae. Abdominal segment II about twice as long as IV. Tergoventral setae medium to long on I and III–VII, some very long on II, short on VIII. Marginal tergal setae: I, 15–19; II–IV, 21–28; V–VII, 14–20; VIII, 12. Medium anterior setae of similar lengths on I–VIII: I, 12–16; II, 21–29; III, 16–28; IV, 17–19; V–VIII, 13–23. Postspiracular setae very long only on I–III, V, and VIII. Laterally, IX with 2 very long setae. Sternal chaetotaxy and terminalia close to *C. zebra*.

**MALE**.—Differs from other species in having abdominal chaetotaxy similar to *C. cooki* n. sp. (Fig. 24). Anterior tergites slightly enlarged, with II being about half again as long as IV, and with more anterior setae. Postspiracular setae very long only on I–III and VI–VIII. Genitalia much as in Fig. 11, typically with 2–3 projections on each lateral plate.

*Material Examined*.—4 ♀, 5 ♂, *L. crumeniferus*, Africa.

### *Colpocephalum cooki*, new species

Type-host.—*Leptoptilos dubius* (Gmelin).

**FEMALE**.—Head and thorax close to *C. longissimum* (Fig. 78). Abdomen (Fig. 23) having tergites III–IX distinctively tripartite with chaetotaxy as illustrated. Species easily separated from *C. longissimum* by much shorter median tergal setae on III–VII, by relative widths of tergal plates, by setal distribution, and by postspiracular setae very long on I–III and VIII, short on IV–VII. Sparse fine sternal setae.

**MALE**.—Abdominal chaetotaxy as in Fig. 24; apparently inseparable from *C. longissimum*.

*Material Examined*.—Holotype ♀ (USNM), 1 ♀, 2 ♂ paratypes, *L. dubius*, Cambodia ?, 8 Mar. 1926, Hugh M. Smith; 6 ♀, 7 ♂ paratypes, *L. dubius*, Mandalay, Burma, 1 Jan. 1952, H. M. Smith, #342. Additionally, 8 ♀, 4 ♂, *L. javanicus* (Horsfield), India.

### *turbinatum*-group

No diagnosis of this group is necessary here since it has been given elsewhere (Price and Beer 1963). Evidence to date does not indicate that species of this group are normally found on the Ciconiiformes; however, the single species included here apparently has been taken in at least 3 instances from birds of this order and, even though all these cases may represent the straggling of a relatively nonspecific parasite, we are including this within the ciconiiform lice.

### *Colpocephalum turbinatum* Denny

*Colpocephalum turbinatum* Denny, 1842, Mon. Anopl. Brit.: 198, 209. Type-host: *Columba livia* Gmelin (domestic pigeon).

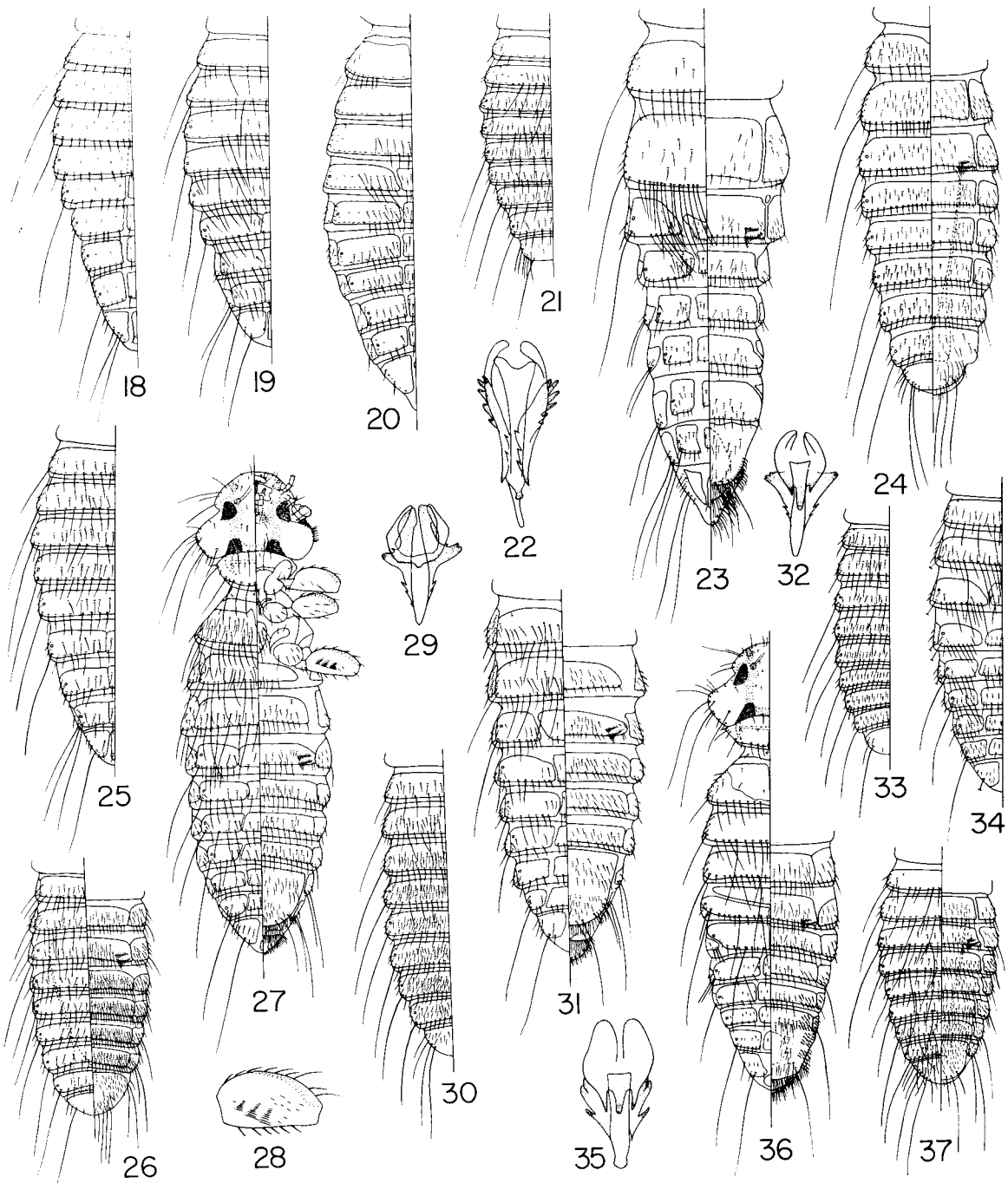


FIG. 18.—*Colpocephalum occipitale* Nitzsch, female dorsal abdomen.  
 FIG. 19.—*C. asiatici*, n. sp., female dorsal abdomen.  
 FIGS. 20-22.—*C. nipponi*, n. sp. FIG. 20.—Female dorsal pterothorax and abdomen. FIG. 21.—Male dorsal abdomen. FIG. 22.—Male genitalia.  
 FIGS. 23-24.—*C. cooki*, n. sp. FIG. 23.—Female abdomen. FIG. 24.—Male abdomen.  
 FIG. 25.—*C. nigrae*, n. sp., female dorsal abdomen.  
 FIGS. 26-28.—*C. trispinum* Piaget. FIG. 26.—Male abdomen. FIG. 27.—Female. FIG. 28.—Ventral femur III.  
 FIGS. 29-31.—*C. oxycercae*, n. sp. FIG. 29.—Male genitalia. FIG. 30.—Male dorsal abdomen. FIG. 31.—Female abdomen.  
 FIGS. 32-34.—*C. harpiprioni*, n. sp. FIG. 32.—Male genitalia. FIG. 33.—Male dorsal abdomen. FIG. 34.—Female dorsal abdomen.  
 FIGS. 35-37.—*C. fusconigrum* Giebel. FIG. 35.—Male genitalia. FIG. 36.—Female. FIG. 37.—Male abdomen.

*Colpocephalum subflavescens* Piaget, 1880, Pediculines: 571. Type-host: *Xenorhynchus senegalensis* = *Ephippiorhynchus senegalensis* (Shaw). NEW SYNONYMY.

Note: 15 additional synonymies are given by Price and Beer (1963).

This species has been described in detail by Price and Beer (1963). No further description will be given here other than to point out possible affinities with lice of the *zebra*-group. Items 1, 2, 6, and 7 for the *zebra*-group are shared by *C. turbinatum*. However, *C. turbinatum* shows females with fused sternites VII-VIII, a different head, anal, and vulval chaetotaxy, and males with quite different genitalia, having a barbed penis and divergent accessory structures.

We have a female of *C. turbinatum* from a green heron (*Butorides virescens* (L.)—Ardeidae) in Texas and a long series of this species from an American flamingo (*Phoenicopterus ruber* L.—Phoenicopteridae) housed in the Washington, D. C., Zoo. Additionally, Dr. Clay has informed us of the conspecificity of *C. subflavescens* with *C. turbinatum* after comparison of Piaget's type specimens with material of *C. turbinatum*. Nevertheless, having seen this louse from over 35 species of Falconiformes as well as the domestic pigeon, we believe it only rarely may occur on the Ciconiiformes, and then perhaps only as a straggler.

#### *trispinum*-group

1. Both sexes with 2 well-developed comb rows on each side of sternite III.
2. Female with tergites III-VIII tripartite, with IX essentially bipartite, having faint to definite indication of oblong to circular terminal plate.
3. Female with sternites VII-VIII fused.
4. Female with anus and vulva much as in Fig. 27; lacking evident internal structure of genital chamber.
5. Occipital setae medium.
6. Margin of pronotum with 3 short and 5 long setae on each side.
7. Femur III having series of short stout setae on posterior margin (Fig. 28).
8. Male genitalia much as in Figs. 29 or 32, with variable genital sclerite; penis unbarbed.

The type-hosts of the 3 species of this group belong to *Theristicus*, *Cercibis*, and *Harpiprion*, respectively; all are members of the Threskiornithidae and listed consecutively in Peters (1931). These louse species are the only *Colpocephalum* known from these host genera.

#### *Colpocephalum trispinum* Piaget

*Colpocephalum trispinum* Piaget, 1885, Pediculines Suppl.: 122. Type-host: *Theristicus caudatus* (Boddaert).

FEMALE.—As in Fig. 27. Metanotum with 20-22 long marginal and many medium anterior setae; metasternal plate with 12-16 medium setae. Median abdominal tergal plates narrowest on IV. Postspiracular setae usually very long on III-VI (although type specimen shows them about half of length illustrated

for IV-VI) and VIII, long on I-II, short on VII. Oblong terminal median plate on IX. Weak auxiliary row of hooked setae on vulval margin. Plate bordering ventral anus cleft medially. Anus with only 4 short inner dorsal setae.

MALE.—Head and thorax as for female, except for pair of spiniform setae on anterior head margin. Abdomen (Fig. 26) with tergites I-V with 16-20 marginal setae; VI-VII, 14-15; VIII, 10. Sparse medium anterior tergal setae: I-VI, 4-15; VII-VIII, 3-8. Postspiracular setae long to very long on all segments. Ventrally with many fine marginal and anterior setae on all sternites, but more numerous posteriorly. Genitalia much as in Fig. 29, but with lateroposterior pair of very short points, difficult to detect.

Material Examined.—14 ♀, 22 ♂ (including 1 ♀, 2 ♂ paratypes of *C. trispinum* Piaget), *T. caudatus*, Chile and Ecuador; 1 ♀, *N. nippon*, Japan.

#### *Colpocephalum oxycercae*, new species

Type-host.—*Cercibis oxycerca* (Spix).

FEMALE.—Head, thorax, and abdominal chaetotaxy much as for *C. trispinum*. Abdomen (Fig. 31) with median tergal plate narrowest on V. No median terminal plate on IX. Sternal setae shorter. Anus with at least 8 short inner dorsal setae.

MALE.—Differs from *C. trispinum* in features of tergal chaetotaxy (Fig. 30). Tergocentral setae on II-IV tend to alternate longer and shorter. Anterior setae on tergites II-VIII much shorter and more numerous: II, 30-44; III-V, 54-86; VI, 48-76; VII, 43-58; VIII, 30-38. Last tergite with 13-19 short anterior setae. Genitalia (Fig. 29) without visible lateroposterior points on genital sclerite.

Material Examined.—Holotype ♂ (BMNH), 22 ♂, 22 ♀ paratypes, *C. oxycerca*, Lethem, Rupununi, British Guiana, 16 Feb. 1961, T. Clay No. 142, Brit. Mus. 1961-188; 1 ♂ paratype, *C. oxycerca*, no data.

#### *Colpocephalum harpiprioni*, new species

Type-host.—*Harpiprion caerulescens* (Vieillot).

FEMALE.—Close to *C. trispinum* and *C. oxycercae*, differing in certain tergal aspects (Fig. 34). Metanotum with only 10 or so scattered very short anterior setae. Lateral plates of abdominal tergite IX with minute setae. Median plates of tergites widest on IV-V and generally with more and shorter setae.

MALE.—Metanotum as for female. Dorsal abdominal chaetotaxy (Fig. 33) with marginal setae as for group. Anterior setae on II-VIII more and shorter than for *C. trispinum* and fewer than *C. oxycercae*, with tendency to form single row: II, 15-16; III, 20-24; IV-VII, 24-30; VIII, 21-23. Tergite IX with only 0-3 short anterior setae. Genitalia (Fig. 32), with well-developed lateral points on genital sclerite, differ from other species.

Material Examined.—Holotype ♂ (BMNH), 2 ♂, 1 ♀ paratypes, *H. caerulescens*, Ajo, Buenos Ayres, R. S. Mus., Coll. E. Gibson, 1876.

#### *fuscogrimum*-group

1. Both sexes with 2 well-developed comb rows on each side of sternite III.



2. Female with at least tergites V–VIII tripartite, IX having circular median plate posterior to larger lateral plates.
3. Female with sternites VII–VIII fused.
4. Female with anus and vulva as in Fig. 54.
5. Occipital setae medium.
6. Margin of pronotum with 3 short and 5 medium setae.
7. Femur III with 2 posterior marginal setae (much as in Fig. 5).
8. Male genitalia as in Fig. 35, with genital sclerite having median process and pair of lateroposterior projections; penis unbarbed.

*Guara* is the only genus known to be parasitized by the unique species of this group.

### *Colpocephalum fusconigrum* Giebel

*Colpocephalum fusconigrum* Giebel, 1874, *Insecta Epizoa*: 274. Type-host: *Ibis alba* = *Guara alba* (L.).

FEMALE.—As in Fig. 36. Abdominal tergites I–II undivided, without anterior setae, and with tergo-central setae very long among long; III uniquely divided, having entire transverse anterior sclerite and bipartite posterior sclerite; IV bipartite. Tergal setae much shorter posteriorly. Postspiracular setae long to very long on I–III and VIII, short on IV–VII. Fused sternites VII–IX laterally with patches of short spiniform setae. Vulval margin (Fig. 54) with alternating long and short setae. Internal structure of genital chamber as in Fig. 54. Anus with dense fringe of fine setae ventrally and dorsally, with 4 stout longer inner dorsal setae.

MALE.—Head and thorax as for female, but with 2 pairs of stout spiniform setae at anterior head margin. Abdomen (Fig. 37) with tergo-central setae of few very long among medium to long setae. Short anterior setae in single row on III–VIII or II–VIII; several long anterior setae on IX. Postspiracular setae long on IV–V, very long on I–III and VI–VIII. Genitalia as in Fig. 35.

*Material Examined*.—4 ♀, 4 ♂, *G. alba*, Mexico and Texas.

### *subpenicillatum*-group

1. Both sexes with at least 3 well-developed comb rows on each side of sternite III.
2. Female with tergites III–VIII tripartite, with IX having median circular plate posterior to larger lateral plates.
3. Female with sternites VII–VIII fused.
4. Female with anus and vulva as in Fig. 46.
5. Occipital setae stout, medium.
6. Margin of pronotum with setae 1, 3, and 5 as long and stout as occipital setae.
7. Femur III with 4–6 short posterior marginal setae (as in Fig. 28).
8. Male genitalia as in Figs. 41 or 47, with median process and lateroposterior points on genital sclerite; penis unbarbed.

*Lampribus*, *Hagedashia*, and *Bostrychia* each contains the type-host of a species of this group; these

genera are in the Threskiornithidae and listed consecutively in Peters (1931). The 3 species of lice are very closely related morphologically and are the only *Colpocephalum* known from these host genera. Interestingly, *C. subpenicillatum* Piaget and *C. carunculatae* n. sp. have each been taken from both *H. hagedash* (Latham) and *B. carunculata* (Rüppell) and *C. subpenicillatum* and *C. olivaceae* n. sp. were in the same collection from *L. rara* Rothschild, Hartert, and Kleinschmidt.

### *Colpocephalum subpenicillatum* Piaget

*Colpocephalum subpenicillatum* Piaget, 1885, *Pediculines Suppl.*: 123. Type-host: *Ibis Hagedash* = *Hagedashia hagedash* (Latham).

FEMALE.—As in Fig. 45. About 25 medium to long marginal metanotal setae; numerous short anterior setae. Abdominal segments I–III longer than IV–VIII. Tergo-central setae shortest at midline, longer laterally. Few short to minute anterior setae, most abundant on tergite II. At least several median tergal plates with 2 or more short setae. Circular plate on IX with 6–7 stouter setae anterior to it. Postspiracular setae very long only on II. Sternite II with patch of slender spiniform setae laterally. Sparse short spiniform setae laterally on fused sternites VII–IX.

MALE.—Head and thorax as for female, but with 2 pairs of stout spiniform setae at anterior head margin and about 25 medium setae on metasternal plate. Abdomen (Fig. 48) with few very long tergo-central setae on II–VIII (respectively, 0–3, 1–10, 5–10, 6–8, 4–6, 4–6, and 2–4) among close-set short setae; no median anterior tergal setae on I, sparse on II, more on III, and very many and dense on IV–VIII; tergite IX with about 25 short anterior setae. Postspiracular setae very long on all segments. Considerably fewer sternal than tergal setae. Genitalia as in Fig. 47.

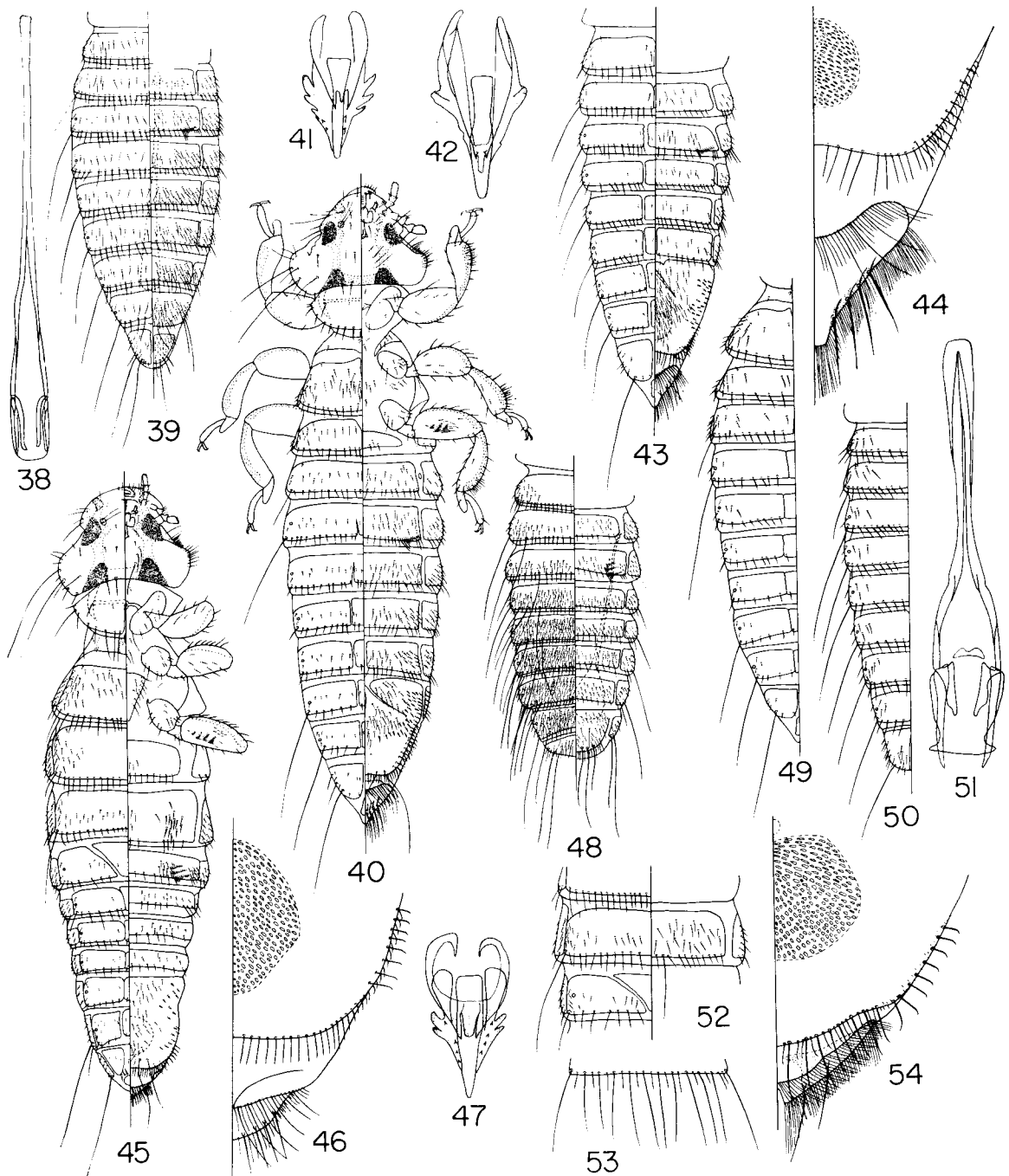
As pointed out by Clay (1953), there are 2 slides in the Piaget collection bearing the name *C. subpenicillatum*, each with a single female; however, these females are not conspecific. Dr. Clay has compared them with the description given here and has found the female on slide 1341 to agree with our interpretation of the name. We here designate this specimen as lectotype of *C. subpenicillatum*.

*Material Examined*.—13 ♀, 19 ♂, *H. hagedash*, Kenya, Fr. Cameroun, Cape Province, Uganda, and Zululand; 12 ♀, 4 ♂, *B. carunculata*, Ethiopia; 1 ♀, *L. rara*, Cameroons; 1 ♀, *Ixobrychus minutus payesii* (Hartlaub), Kenya (probably a straggler).

### *Colpocephalum olivaceae*, new species

Type-host.—*Lampribus olivacea akleyorum* (Chapman).

FEMALE.—Close to *C. subpenicillatum*. Generally without anterior setae, except laterally, on metanotum and most abdominal tergites; few minute anterior setae on metanotum and posterior abdominal tergites, especially lateral plates of IX. Only 4 stouter setae anterior to circular plate on IX. Median marginal setae on tergite I much shorter than lateral ones. Postspiracular setae long to very long on I–IV. Sternite II with



FIGS. 38-40.—*Colpocephalum aethiopicae*, n. sp. FIG. 38.—Male genitalia. FIG. 39.—Male abdomen. FIG. 40.—Female.

FIG. 41.—*C. olivaceae*, n. sp., male genitalia.

FIGS. 42-44.—*C. pygidiale* Mjöberg. FIG. 42.—Male genitalia. FIG. 43.—Female abdomen. FIG. 44.—Ventral female terminalia.

FIGS. 45-48.—*C. subpenicillatum* Piaget. FIG. 45.—Female. FIG. 46.—Ventral female terminalia. FIG. 47.—Male genitalia. FIG. 48.—Male abdomen.

FIGS. 49-51.—*C. melanocephalae*, n. sp. FIG. 49.—Female dorsal abdomen. FIG. 50.—Male dorsal abdomen. FIG. 51.—Male genitalia.

FIG. 52-53.—*C. carunculatae*, n. sp. FIG. 52.—Female abdominal segments I-III. FIG. 53.—Male margin of abdominal tergite II.

FIG. 54.—*C. fusconigrum* Giebel, ventral female terminalia.

evenly distributed medium setae, lacking lateral patch of elongate spiniform setae.

**MALE.**—Close to *C. subpenicillatum*. Only about 4 minute anterior setae on metanotum. Fewer and slightly longer anterior setae on posterior tergites, but quantitation not practical. Genitalia (Fig. 41) with small median process on genital sclerite.

**Material Examined.**—Holotype ♀ (BMNH), 6 ♀, 5 ♂ paratypes, *L. olivacea akleyorum*, Kenya, March 1936, MC, Slides 7508, 7509; 1 ♀, 1 ♂ paratypes, *Ibis olivacea*, W. Central Africa, Liberia, Gola Forest, 1912–164, R. H. Bunting Coll. Additionally, 2 ♀, *L. rara*, Camerouns.

### *Colpocephalum carunculatae*, new species

Type-host.—*Bostrychia carunculata* (Rüppell).

**FEMALE.**—Differs from *C. subpenicillatum* in having longer tergoventral setae on II (approximately same length as those on I and III); longer postspiracular setae on III–VI; slightly wider median tergal plates, most usually without setae; evenly distributed anterior setae on sternite II; and even row of medium marginal setae on sternite II, with median pair of very long setae (see Fig. 52). Separable from *C. olivaceae* by having median anterior metanotal and abdominal tergal setae, more setae (7–11) anterior to circular plate on IX, longer median tergoventral setae on I, longer postspiracular setae on V–VI, and very long marginal setae on sternite II.

**MALE.**—Very close to *C. subpenicillatum*. Head with 1 or 2 pairs of short anterior spiniform setae. Longer tergoventral setae on I; 10 very long tergoventral setae on each of II–VI (much as in Fig. 53) alternating with considerably shorter setae.

**Material Examined.**—Holotype ♀ (BMNH), 1 ♀, 2 ♂ paratypes, *B. carunculata*, Addis Abeba, Ethiopia, 10 Nov. 1958, O. Theodor, Brit. Mus. 1959–234; 3 ♀ paratypes, *B. carunculata*, Abyssinia, MC, Slide 4906. Additionally, 12 ♀, 6 ♂, *H. hagedash*, Kenya, Sudan, and N. Camerouns; 1 ♀, *N. nippon*, Japan.

### *pygidiale*-group

1. Both sexes with only single comb row on each side of sternite III.
2. Female with tergites III–VIII tripartite, and IX with narrow elongate plate posterior to other plates.
3. Female with sternites VII–VIII fused.
4. Female with anus and vulva as in Fig. 44.
5. Occipital setae stout, medium.
6. Margin of pronotum with only setae 1 and 3 short, 2 and 4–8 of same length.
7. Femur III with 2 short setae on posterior margin (Fig. 5).
8. Male genitalia distinctive for each species (Figs. 38, 42, or 51).

Each of the 3 species of this group occurs on 1 or more of the 3 species of *Threskiornis*, the type-genus of Threskiornithidae, and are the only *Colpocephalum* known from these birds. Whereas the females of the 3 louse species have many important features in com-

mon, the males show a marked divergence from each other, especially in structure of the genitalia.

### *Colpocephalum pygidiale* Mjöberg

*Colpocephalum pygidiale* Mjöberg, 1910, Ark. Zool. 6(13): 46. Type-host: *Ibis religiosa* = *Threskiornis aethiopica aethiopica* (Latham).

**FEMALE.**—Head and thorax close to *C. aethiopicae* n. sp. (Fig. 40). Abdomen (Fig. 43) with medium to minute tergoventral setae; very few short to minute anterior setae, medially located. Postspiracular setae long on II–VIII. Median terminal tergal plate on last segment of uniform width, evenly rounded at both ends. Sparse, fine sternal chaetotaxy; short spiniform setae laterally on fused sternites VII–VIII. Sternite VI bipartite. Angular median division in region of sternite VII.

**MALE.**—Chaetotaxy close to female. Anterior head margin with 2 pairs of short spiniform setae. Tergites I–VII apparently with median separation. Very small number of medially located anterior tergal setae characteristic of species. Genitalia (Fig. 42) having genital sclerite with faint median process between lateroposterior points; penis unbarbed.

**Material Examined.**—8 ♀, 4 ♂, *T. a. aethiopicus*, Uganda and Transvaal.

### *Colpocephalum aethiopicae*, new species

Type-host.—*Threskiornis aethiopica* (Latham).

**FEMALE.**—As in Fig. 40. Very close to *C. pygidiale*. Differs by abdomen having more and somewhat longer anterior tergal setae, postspiracular setae considerably shorter on IV–VI, terminal median tergal plate on last segment definitely tapered anteriorly, and without evident internal structure of genital chamber (at least unlike that in Fig. 44).

**MALE.**—Head and thorax as for female, except for fewer and shorter anterior metanotal setae. Abdomen (Fig. 39) quite different from female, as well as *C. pygidiale*. Single row of medium anterior tergal setae on I–VIII. Postspiracular setae long to very long on II–VIII. Tergites VIII–IX bipartite. Sternal chaetotaxy as shown, with indication of median division of genital plate. In shape, abdomen tapered posteriorly, not broadly rounded. Highly distinctive genitalia (Fig. 38), unlike any other known species; slender, with long genital sac (not shown) extending entire length of genitalia, and without evidence of genital sclerite or penis.

**Material Examined.**—Holotype ♂ (BMNH), 3 ♂, 4 ♀ paratypes, *T. aethiopicus pygmaeus*, Rennell Is., Hutuna, 23 Oct. 1953, Brit. Mus. 1954–222. Additionally, 7 ♀, *T. m. molucca* (Cuvier), India.

### *Colpocephalum melanocephalae*, new species

Type-host.—*Threskiornis melanocephala* (Latham).

**FEMALE.**—Close to *C. aethiopicae*. Differs in having fewer (under 10) and shorter anterior metanotal setae and abdominal tergites III–VIII (Fig. 49) virtually without anterior setae (occasionally isolated short seta).

MALE.—Head and thorax as for female. Dorsal abdomen (Fig. 50) with chaetotaxy much as for female on I–VIII, except for very long postspiracular setae on II–VIII. At least tergites VIII–IX bipartite. Abdominal shape and sternal chaetotaxy as for *C. aethiopicae*. Distinctive genitalia (Fig. 51), considerably different from both of preceding species, with expanded basal plate, stout parameres, a laterally expanded apical portion, and without discernible genital sclerite or penis.

*Material Examined*.—Holotype ♂ (BMNH), 2 ♂, 2 ♀ paratypes, *T. melanocephala*, Ceylon, March (or April) 1935, MC, Slide 3474; paratypes, type-host: 2 ♀, Rajputana, March 1937, MC, Slide 8882; 2 ♀, Deccan, Feb. 1937, MC, Slides 8720, 8722; 1 ♂, India, MC, Slide 4823.

#### *scopinum*-group

1. Both sexes with only single comb row on each side of sternite III.
2. Female with tergites VI–VIII tripartite, IX bipartite and without evident terminal plate.
3. Female with sternites VII–VIII fused.
4. Female with anus and vulva as in Fig. 56; no evident internal structure of genital chamber.
5. Occipital setae variable, short to medium.
6. Margin of pronotum with alternating short and long setae.
7. Femur III with 2 short setae on posterior margin.
8. Male genitalia (Fig. 55) with unusual median "Y"-shaped structure.

The 2 very closely related species in this group are both found on *Scopus umbretta* Gmelin, the only species in the family Scopidae, and they represent the only *Colpocephalum* known from this bird family.

#### *Colpocephalum scopinum* Mjöberg

*Colpocephalum scopinum* Mjöberg, 1910, Ark. Zool. 6(13): 47. Type-host: *Scopus umbretta* Gmelin.

FEMALE.—As in Fig. 56. Head without well-developed nodi and carinae. Short middorsal head setae. Inner pair of occipital setae either both minute, 1 minute and 1 medium, or both medium; outer occipital setae minute. Very long tergo-central and postspiracular setae on I–VIII; minute anterior setae. Last tergite most distinctive, with dense vestiture of medium to long setae.

MALE.—Differs from female chaetotaxy primarily in having many more and longer anterior tergal and sternal setae on I–VIII and shorter setae on tergite IX (Fig. 57).

No further description of this species will be given since Clay (1964) has discussed *C. scopinum* in conjunction with the description of *C. smithi* Clay.

*Material Examined*.—1 ♀, 1 ♂, *S. umbretta*, French Cameroun; 6 ♀, *S. umbretta*, N. Cameroon, unassociated with males, representing either *C. scopinum* or *C. smithi*.

#### *Colpocephalum smithi* Clay

*Colpocephalum smithi* Clay, 1964, Proc. Roy. Entomol. Soc. London (B) 33: 11. Type-host: *Scopus umbretta* Gmelin.

FEMALE.—Apparently indistinguishable from *C. scopinum*.

MALE.—Illustrated by Clay (1964). Easily distinguished from *C. scopinum* in having tergal and sternal chaetotaxy much like female *C. scopinum*, namely, with fewer and longer tergo-central setae, sparse and minute anterior tergal setae on all segments including the last, and shorter sternal setae. A detailed discussion of this species is given by Clay (1964).

*Material Examined*.—4 ♀, 3 ♂, *S. umbretta bannermani* C. H. B. Grant, Onderstepoort, Uganda, and Nyasaland.

#### *leptopygos*-group

1. Both sexes with only single comb row on each side of sternite III.
2. Female with tergites III–VIII tripartite, IX bipartite and with short wide median posterior plate.
3. Female with sternites VII–VIII fused.
4. Female with anus and vulva as in Fig. 59; with circular internal structure of genital chamber.
5. Occipital setae medium, stout.
6. Margin of pronotum with alternating short and longer setae.
7. Femur III with 2 short setae on posterior margin.
8. Male genitalia (Fig. 58) with rather stout slightly bent basal plate, laterally expanded apical portion, and no visible genital sclerite or penis.

This group includes only 1 species found on 2 of the 3 species of *Plegadis* and represents the only *Colpocephalum* known from this host genus.

#### *Colpocephalum leptopygos* Nitzsch

*Colpocephalum leptopygos* Nitzsch, 1874, In: Giebel, Insecta Epizoa: 273. Type-host: *Ibis sacra* = *Plegadis falcinellus falcinellus* (L.).

*Ferribia blagoweschenskii* Dubinin, 1938, Trav. Réserve État Astrakhan 2: 182. Type-host: *Plegadis falcinellus* (L.).

*Ferribia gracilis* Dubinin, 1938, Trav. Réserve État Astrakhan 2: 184. Type-host: *Plegadis falcinellus falcinellus* (L.).

*Liothella humboldt* Eichler, 1954, Beitr. Fauna Perus 4: 47. Type-host: *Plegadis guarauna* (L.).

FEMALE.—As in Fig. 59. Head with well-developed nodi and carinae; short middorsal setae. Abdomen without anterior tergal setae on I–VIII, including median plates. Postspiracular setae very long only on III–V. Ventrally, small narrow plate inserted between sternites and pleura of II–V.

MALE.—Head and thorax as for female. Abdomen (Fig. 60) having tergites I–VIII bipartite; tergites II–VIII with more or less alternating short and long tergo-central setae, short anterior setae, and very long postspiracular setae.

*Material Examined*.—3 ♀, 2 ♂, *P. falcinellus*, Israel and USA; 5 ♀, 4 ♂, *P. chihi* (Vieillot), USA.

#### *ajajae*-group

1. Both sexes with only single comb row on each side of sternite III.

2. Female with tergites III-VIII or II-VIII tripartite, IX with more or less circular median posterior plate.
3. Female with sternites VII-VIII fused.
4. Female with vulva and anus as in Figs. 65 or 69.
5. Occipital setae stout, medium.
6. Margin of pronotum with only setae 1 and 3 short, 2 and 4-8 of same length.
7. Femur III with 2 short setae on posterior margin.
8. Male genitalia as in Figs. 66, 68, or 71, with median process as well as lateroposterior pointed projections on genital sclerite; penis barbed.

The first 2 species discussed in this group are found on *Ajaia ajaja* (L.) and 2 species of *Platalea*, these birds being members of the subfamily Plataleinae and, according to Peters (1931), placed at the end of the Threskiornithidae. The other 4 species of *Colpocephalum* occur, respectively, on *Carphibis*, *Pseudibis*, and both species of *Geronticus*, all placed close together immediately behind *Threskiornis* at the front of the subfamily Threskiornithinae.

### *Colpocephalum ajajae* Ewing

*Colpocephalum ajajae* Ewing, 1930, Proc. Biol. Soc. Wash. 43: 126. Type-host: *Ajaia ajaja* (L.).

FEMALE.—As in Fig. 65. Abdominal segment I longest. Tergites II-VIII tripartite, with median plate widest on II and much narrower posteriorly; median posterior plate of IX essentially circular. Tergoventral setae short to medium, absent on median plates. Anterior setae of irregular single row, most numerous on III-VII. Postspiracular setae long at least on III. Each side of IX with 5-6 inner posterior setae. Marginal vulva setae of uniform medium length; anteriorly, all setae likewise of medium length, except for several very long posterior setae. Anus indented dorsally, with 4 stout inner setae on each side. Internal structure of genital chamber close to Fig. 44, but sharply tapered posteriorly.

MALE.—Head (Fig. 64) with unusual expanded anterior region, having pair of weak anterior marginal spiniform setae; 2 stout spiniform setae at lateral preocular angle; ventrally a pair of quadrangular anteclypeal plates. Abdomen (Fig. 67) with tergoventral setae alternating longer and shorter on anterior segments. Few minute anterior setae on tergites I-II; increase in number and lengths posteriorly, to 35-42 medium setae on VIII; IX with about 10 long anterior setae. Postspiracular setae very long on II-VIII. Genitalia (Fig. 66) highly distinctive, with penis rather short and stout, terminally with widely expanded barbs.

*Material Examined*.—3 ♀, 2 ♂, *A. ajaja*, British Guiana and Panama.

### *Colpocephalum plataleae*, new species

Type-host.—*Platalea leucorodia major* Temminck and Schlegel.

FEMALE.—Head and prothorax close to *C. ajajae* (Fig. 65) and *C. spinicollis* n. sp., differing by having weakly developed head carinae and occipital nodi and

the most distally expanded second antennal segment (Fig. 62) of any species. Abdomen (Fig. 63) differs from both species with tergite I about same length as each of tergites II-VIII; terminal plate on last segment distinctly wider than long, usually with squared anterior corners. Separable from *C. ajajae* in having, among other things, more and longer anterior metanotal and tergal setae at least on I-II; tergite II only bipartite, without median plate; longer postspiracular setae on IV-V; fewer inner posterior setae on IX; and shorter spiniform setae laterally on fused sternites VII-IX. Also, distinguishable from *C. spinicollis* by having only tergites IV-VIII tripartite, with median tergal plates very narrow, of almost equal width, and mostly without setae (except few on VII-VIII).

MALE.—Head, without anterior spiniform setae, and prothorax as for female, thus differing markedly from both *C. ajajae* and *C. spinicollis*. Metanotum and abdomen (Fig. 61) separable from *C. ajajae* by lengths and smaller number of marginal tergal setae, tergites VII-VIII each with over 80 shorter anterior setae, about 16 shorter anterior setae on IX, much longer inner posterior setae on IX, and generally fewer sternal setae. Genitalia as for *C. ajajae* (Fig. 66). Separated from *C. spinicollis* by much larger number of anterior setae, especially on tergites VII-IX, and different genitalic structure.

*Material Examined*.—Holotype ♀ (BMNH), 4 ♀, 2 ♂ paratypes, *P. leucorodia major*, Sudan, Dec. 1947, MC, Slide 17022; paratypes, *P. leucorodia*: 2 ♀, 1 ♂, Port Etienne, Mauritania, 5 Aug. 1951, M. H. Routh, Brit. Mus. 1952-376; 1 ♀, Entedebir, Red Sea, 23 Mar. 1962, E62/0016/P, Brit. Mus. 1962-723; 5 ♀, Rajputana, Mar. 1937, MC, Slide 9053. Additionally, 1 ♀, 4 ♂, *P. alba* Scopoli, Kenya.

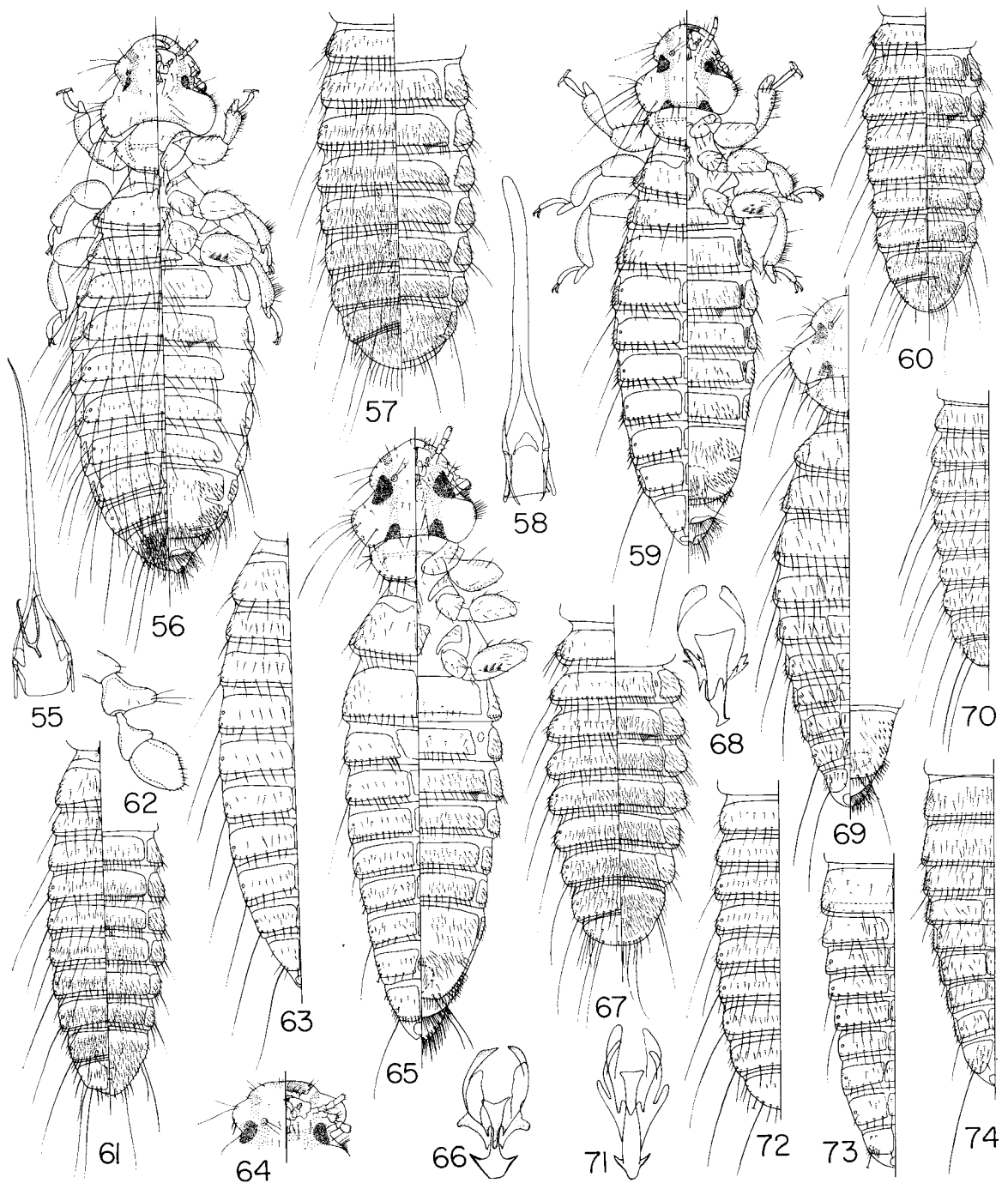
### *Colpocephalum spinicollis*, new species

Type-host.—*Carphibis spinicollis* (Jameson).

FEMALE.—Head, thorax, and ventral abdomen, including terminalia, similar to *C. ajajae*. Although abdomen of specimens with number of missing setae and segments somewhat telescoped, differs from *C. ajajae* in width of median tergal plates (widest on VII), longer marginal and anterior setae on abdominal tergites, presence of setae on most median plates, and absence of row of inner posterior setae on lateral plates of tergite IX (Fig. 73). Separable from *C. plataleae* as discussed under that species.

MALE.—Anterior head with chaetotaxy and shape as for female, except margin with 2 pairs of spiniform setae. Thorax and abdomen close to *C. ajajae*. Fewer and slightly longer sternal setae. Principal differences consist of tergal chaetotaxy (Fig. 72): fewer tergoventral setae, essentially similar in length on each segment; fewer anterior setae in single row on I-VIII; IX anteriorly with only 2-4 short setae and marginally as shown, with much longer inner posterior setae. Genitalia (Fig. 71) with slender penis, less widely expanded barbs, and genital sclerite as shown.

*Material Examined*. — Holotype ♂ (BMNH),



FIGS. 55-57.—*Colpocephalum scopinum* Mjöberg. FIG. 55.—Male genitalia. FIG. 56.—Female. FIG. 57.—Male abdomen.

FIGS. 58-60.—*C. leptopygos* Nitzsch. FIG. 58.—Male genitalia. FIG. 59.—Female. FIG. 60.—Male abdomen.

FIGS. 61-63.—*C. plataleae*, n. sp. FIG. 61.—Male pterothorax and abdomen. FIG. 62.—Female antenna. FIG. 63.—Female dorsal pterothorax and abdomen.

FIGS. 64-67.—*C. ajajae* Ewing. FIG. 64.—Male anterior head. FIG. 65.—Female. FIG. 66.—Male genitalia. FIG. 67.—Male abdomen.

FIGS. 68-70.—*C. eremitae*, n. sp. FIG. 68.—Male genitalia. FIG. 69.—Female. FIG. 70.—Male dorsal abdomen.

FIGS. 71-73.—*C. spinicollis*, n. sp. FIG. 71.—Male genitalia. FIG. 72.—Male dorsal abdomen. FIG. 73.—Female dorsal abdomen.

FIG. 74.—*C. davisoni*, n. sp., female dorsal abdomen.

*Threskiornis spinicollis*, Canberra, Australia, Mar. 1957, R. Mykytowycz, Brit. Mus. 1957-210; paratypes, *C. spinicollis*: 1 ♂, 3 ♀, Australia, MC, Slides 4830, 13497.

***Colpocephalum clayellum* Brinck**

*Colpocephalum clayellum* Brinck, 1955, South African Animal Life 2: 405. Type-host: *Geronticus calvus* (Boddaert).

FEMALE.—Head and thorax as for *C. eremita*, n. sp. (see Fig. 69). Close to *C. ajajae*, but with longer occipital setae (both pairs extending beyond transverse prothoracic thickening, with inner pair longer); longer marginal pronotal setae 4-8; abdominal tergites divided as in Fig. 69, with II entire; considerably longer marginal and anterior tergal setae on all segments; fewer than 25 marginal setae on I-II; without stout short inner posterior setae on lateral plates of IX; postspiracular setae very long on I-V and VIII, considerably shorter on VI-VII; ventrally, fused sternites VII-VIII laterally with small number of short spiniform setae; internal structure of genital chamber with fine detail as in Fig. 3, but covering area as shown in Fig. 69, quite different from that of *C. ajajae*; only 2-3 dorsal inner anal setae on each side. Tergal chaetotaxy of I-IV as for *C. eremita*; separable from this species by features of chaetotaxy of posterior segments (Fig. 88). Much shorter setae on median tergal plates of V-VIII, with 0 on V to 8 on VIII; lateral plates of IX each with 24-26 shorter setae in addition to very long seta; fused sternites VIII-IX with patch of 15-16 short spiniform setae on each side.

MALE.—Shape and chaetotaxy as for *C. eremita*. Head with 1 pair of anterior spiniform setae. Abdominal tergites (see Fig. 70) with long to medium fairly uniform tergoventral setae and regular to irregular single row of medium anterior setae on I-VIII. Tergite IX with 13-22 short anterior setae. Somewhat fewer setae ventrally. Genitalia close to Fig. 68, with blunt median process on genital sclerite extending only as far as tips of lateroposterior projections; an odd asymmetrical distal portion of penis.

Material Examined.—1 ♀, 1 ♂ (paratypes of *C. clayellum* Brinck), *G. calvus*, Natal.

***Colpocephalum eremita*, new species**

Type-host.—*Geronticus eremita* (L.).

FEMALE.—Close to *C. clayellum*. Differs only in certain aspects of chaetotaxy of posterior abdominal segments (Fig. 69). Longer setae on median tergal plates of V-VIII, with 1-3 ( $\bar{X} = 2.0$ ) on V to only 5-7 ( $\bar{X} = 5.5$ ) on VIII. Lateral plates of IX each with only 11-16 ( $\bar{X} = 14.5$ ) longer setae in addition to very long seta. Fused sternites VIII-IX with patch of only 5-10 ( $\bar{X} = 7.8$ ) short spiniform setae on each side.

MALE.—Apparently inseparable from *C. clayellum*. Abdominal tergites as in Fig. 70. Genitalia (Fig. 68) with blunt median process on genital sclerite as short as for *C. clayellum* to as long as illustrated.

Material Examined.—Holotype ♀ (BMNH), 12 ♀, 9 ♂ paratypes, *Comatibis eremita*, Morocco, Nov. 1938, MC, Slide 12016.

***Colpocephalum davisoni*, new species**

Type-host.—*Pseudibis davisoni* (Hume).

FEMALE.—Numerous setae missing from head and thorax, but believed similar to *C. clayellum*. Ventral abdomen, including terminalia, like this species, except for up to 5 inner dorsal anal setae on each side. Dorsally, abdomen (Fig. 74) with 25 or more marginal setae on I, 30 or more on II, the latter distinctly shorter medially. Considerably shorter setae, especially on median areas of tergites III-VIII. Postspiracular setae much shorter on I-VI, longer on VII. Terminal median plate on IX tends to have squared anterior corners.

MALE.—Unknown.

Material Examined.—Holotype ♀ (BMNH), 2 ♀ paratypes, *P. davisoni*, Burma, MC, Slide 4905.

***ferrisi*-group**

1. Both sexes with 2 well-developed comb rows on each side of sternite III.
2. Female either with tergites I-VIII undivided or IV-VIII tripartite; IX bipartite or entire and lacking median plate.
3. Female with sternites VII-VIII fused.
4. Female with anus and vulva as in Figs. 82 or 85; anus more or less oval, without inner setae.
5. Occipital setae medium to long.
6. Margin of pronotum with 3 short and 5 long setae on each side.
7. Femur III with 2 short setae on posterior margin (close to Fig. 5), except for number of stout setae (Fig. 81) with male of *C. ferrisi*.
8. Male genitalia distinctive for each species.

Three of the 4 species of this group have tergites I-VIII undivided, a unique feature among the *Colpocephalum* of the Ciconiiformes. These 4 species of lice occur on *Dissoura*, *Sphenorhynchus*, and both species of *Anastomus*, making them the only other known *Colpocephalum* on the Ciconiidae aside from species of the *zebra*-group. The morphological similarities of these lice along with the presumed close relationship of the 4 host species, which are listed consecutively by Peters (1931), lends support to this grouping.

***Colpocephalum ferrisi* Bedford**

*Colpocephalum ferrisi* Bedford, 1930, Rep. Vet. Res. S. Africa 16: 159. Type-host: *Melanopelargus niger* = *Ciconia nigra* (L.). But probably misdetermination of *Sphenorhynchus abdimii* (Lichtenstein) (see Hopkins 1950: 237).

FEMALE.—As in Fig. 82. All abdominal tergites, including IX, entire. Medium anterior setae on tergites I-VIII; none on IX. Postspiracular setae very long on II-VIII. Ventral anal fringe of unusual short basally enlarged setae; over twice as many dorsal as ventral setae. With only vaguely defined internal structure of genital chamber.

MALE.—Head and thorax as for female, except for femora II–III (Fig. 81) arched, with short spiniform setae on posterior margin. Abdomen (Fig. 80) with tergo-central setae as short or shorter than anterior setae. Last tergite with open posterior area. Genital plate as shown. Genitalia (Fig. 83) distinctive from all other species in gross shape and accessory features.

*Material Examined*.—10 ♀, 10 ♂, *S. abdimiti*, Uganda and Abyssinia.

### *Colpocephalum uchidi* (Qadri)

*Pseudocolpocephalum uchidi* Qadri, 1936, Z. Parasitenk. 8: 641. Type-host: *Dissoura episcopus* (Boddaert).

FEMALE.—As in Fig. 85. Close to *C. ferrisi*. At least median tergo-central setae shorter. Tergite IX bipartite, with posterior pair of small lateral plates and some minute anterior setae. Anus ventrally and dorsally with setae similar in width and number. Large internal structure of genital chamber.

MALE.—Head and thorax, including femora II–III, as for female. Tergites (Fig. 84) with minute tergo-central and anterior setae. Sparse anterior sternal chaetotaxy. Distinctive genitalia (Fig. 86), distally expanded, with unique median structure.

*Material Examined*.—13 ♀, 10 ♂, *D. episcopus*, Uganda; 1 ♂, *D. episcopus*, no data.

### *Colpocephalum scharfi*, new species

Type-host.—*Anastomus lamelligerus* Temminck.

FEMALE.—Close to *C. ferrisi* (Fig. 82). Longer occipital setae. Only 2 short, 1 medium anterior metanotal setae on each side. Abdomen with few anterior tergal setae on I–III, usually none on IV–IX (rarely 1–2 on IV–V). Postspiracular setae much shorter on IV–V than III or VI. Vulva generally without lateral auxiliary row of hooked setae. Anus ventrally and dorsally with setae similar in width and number.

MALE.—Chaetotaxy, except for ventral terminalia, essentially as for female. Genitalia (Fig. 87) characteristic, slightly expanded distally, with median bilobed structure.

*Material Examined*.—Holotype ♂ (BMNH), 7 ♂, 7 ♀ paratypes, *A. l. lamelligerus*, Uganda (G. E. H.), Oct. 1933, MC, Slide 16507; paratypes, type-host: 3 ♀, Kenya, Apr. 1936, MC, Slide 7608; 1 ♀, Uganda, Apr. 1936, MC, Slide 7728; 1 ♀, Uganda (G. E. H.), Mar. 1934, MC, Slide 16508; 3 ♂, 15 ♀, Butiaba, Uganda, 26 Jan. 1934, G. H. E. Hopkins; 4 ♂, 4 ♀, Butiaba, Uganda, 29 Mar. 1937, G. H. E. Hopkins; 1 ♀, Ndumu, Zululand, H. Paterson, 17 Aug. 1956, Brit. Mus. 1957–434.

### *Colpocephalum oscitansi*, new species

Type-host.—*Anastomus oscitans* (Boddaert).

FEMALE.—Head, thorax, and ventral abdomen close to *C. uchidi* (Fig. 85). Separable from other species of group by abdominal tergites IV–VIII tripartite (IV and VIII weakly so) (Fig. 93); distinctly shorter postspiracular setae on IV–V; all tergo-central setae medium to long on I–VIII; single row of medium anterior setae on tergites I–VIII; tergite IX

apparently undivided, with pair of very small latero-posterior plates, and with only 1 lateral very long seta.

MALE.—Chaetotaxy close to female, except for 2 very long setae on each side of last tergite, 1–3 medium anterior setae on last tergite, and differences in ventral terminalia. Genital sclerite and penis as in Fig. 94.

*Material Examined*.—Holotype ♀ (BMNH), 3 ♀, 6 ♂ paratypes, *A. oscitans*, Moirang, Manipur, India, 18 Jan. 1952, MC, Slide 19804.

### *penicillatum*-group

1. Both sexes with at least 3 well-developed comb rows on each side of sternite III.
2. Female with tergite VIII tripartite, VII partially so, and IX bipartite; no median or terminal plates on IX.
3. Female with sternites VII–VIII fused.
4. Female anus and vulva distinctive (Fig. 75).
5. Occipital setae medium.
6. Margin of pronotum with 8 long setae on each side.
7. Femur III with series of short setae on posterior margin (as in Fig. 28).
8. Male genitalia highly characteristic (Fig. 77).

The single species in this group is the only *Colpocephalum* known from *Lophotibis* and is so unusual in its morphology as to necessitate its solitary placement.

### *Colpocephalum penicillatum* Piaget

*Colpocephalum penicillatum* Piaget, 1880, Pediculines: 552. Type-host: *Ibis cristata* = *Lophotibis cristata cristata* (Boddaert).

FEMALE.—As in Fig. 75. Anterior tergal setae only on posterior segments. Fused sternites VII–IX with extensive lateral patches of spiniform setae. No median marginal vulval setae. Unusual combination of short anal setae. Distinct round internal structure of genital chamber, with microtrichia.

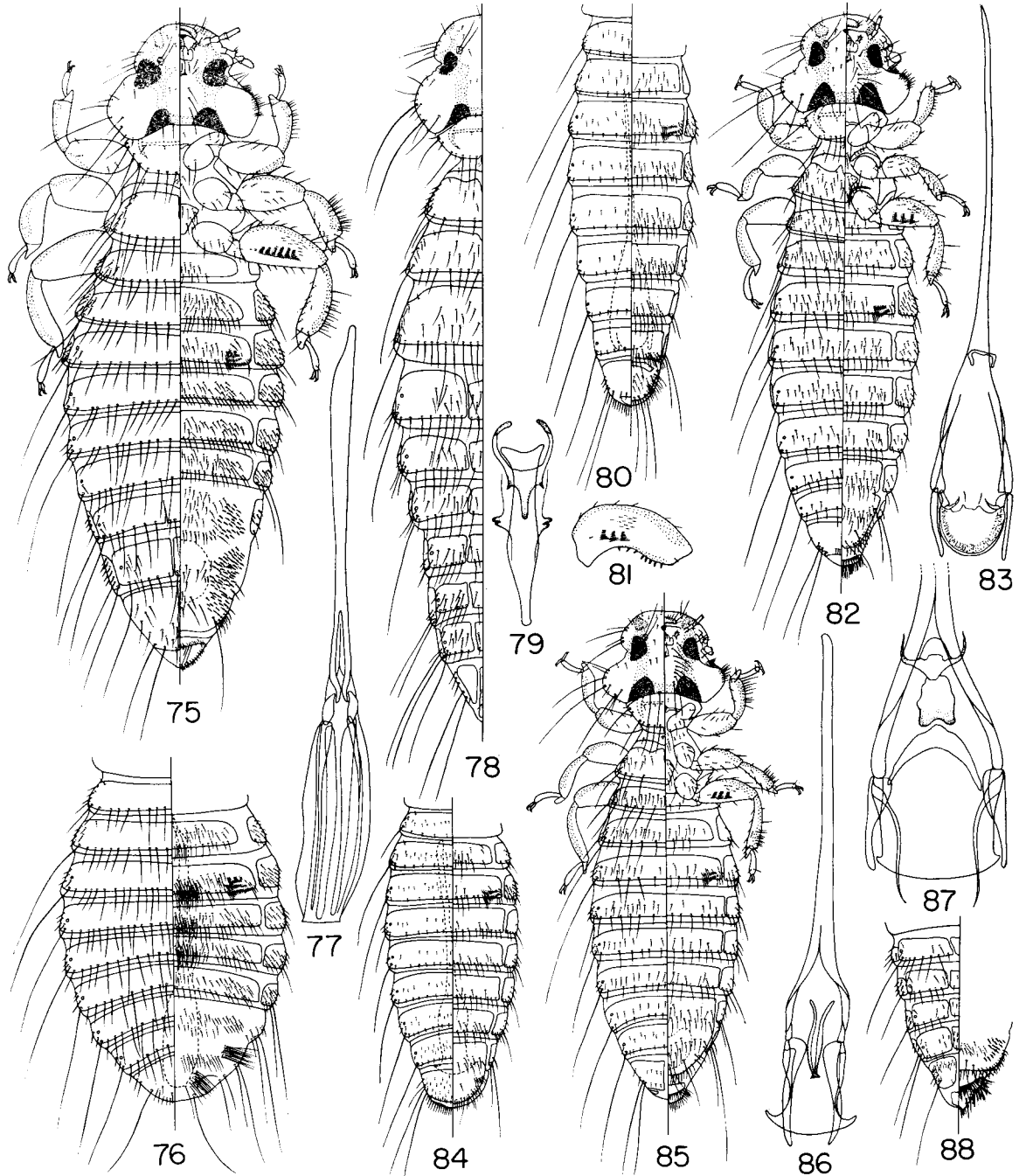
MALE.—Abdomen (Fig. 76) without anterior tergal setae. Dense median brushes of setae on sternites III–V and laterally on genital plate. Genitalia as in Fig. 77, differing grossly from all other known species from the Ciconiiformes.

*Material Examined*.—5 ♀, 3 ♂, *L. c. cristata*, Madagascar.

### *heterosoma*-group

1. Both sexes with only 1 well-developed comb row on each side of sternite III.
2. Female with at least tergites VI–VIII tripartite, IX bipartite and with or without pair of terminal plates.
3. Female with sternites VII–VIII fused medially.
4. Female with anus and vulva as in Figs. 89 or 92, anus with or without inner setae.
5. Occipital setae minute.
6. Margin of pronotum with variable chaetotaxy.
7. Femur III with 2 short setae on posterior margin (as in Fig. 5).





FIGS. 75-77.—*Colpocephalum penicillatum* Piaget. FIG. 75.—Female. FIG. 76.—Male abdomen. FIG. 77.—Male genitalia.

FIG. 78.—*C. longissimum* Rudow, dorsal female.

FIG. 79.—*C. fradei* Tendeiro, male genitalia.

FIGS. 80-83.—*C. ferrisi* Bedford. FIG. 80.—Male abdomen. FIG. 81.—Male ventral femur III. FIG. 82.—Female. FIG. 83.—Male genitalia.

FIGS. 84-86.—*C. uchidi* (Qadri). FIG. 84.—Male abdomen. FIG. 85.—Female. FIG. 86.—Male genitalia.

FIG. 87.—*C. scharfi*, n. sp., male genitalia.

FIG. 88.—*C. clayellum* Brinck, female terminal segments.

8. Male genitalia (Fig. 90) with genital sclerite having bluntly rounded lateroposterior projections and median process; penis unbarbed.

Members of this group also diverge from other species with head having only a shallow preocular notch and lacking carinae and occipital nodi, with multiple minute outer dorsal pronotal setae, and with spiracles of females located on pleura. These species are apparently restricted to the 3 species of *Phoenicopterus*

and are the only *Colpocephalum* normally known to occur on birds of the family Phoenicopteridae.

#### *Colpocephalum heterosoma* Piaget

*Colpocephalum heterosoma* Piaget, 1880, Pediculines: 572. Type-host: *Phoenicopterus antiquorum* Temminck.

*Colpocephalum heterosoma boliviana* Carriker, 1956, Rev. Brasil. Entomol. 5: 139. Type-host: *Phoenicopterus chilensis* Molina.

FEMALE.—As in Fig. 89. Metanotum with median minute setae. Only tergites VI–VIII tripartite; IX with pair of small terminal plates. Minute anterior tergal setae. Postspiracular setae set in on tergites, with lengths as shown. Lateral vulval margin lacking row of hooked setae. Anus oval, without inner setae. No obvious internal structure of genital chamber.

MALE.—Differs from female in abdominal structure and chaetotaxy (Fig. 91). Spiracles located on tergites; postspiracular setae long on all segments. Many anterior setae, longer on more posterior segments. Genitalia (Fig. 90) as for group.

Material Examined.—1 ♀, 1 ♂ paratypes of *C. heterosoma* Piaget; 15 ♂, *P. antiquorum*, Sudan; 1 ♂, *P. ruber* L. (no data); 18 ♀, 24 ♂, Flamingo, Florida and Louisiana; 1 ♀, *P. chilensis*, Texas Zoo.

#### *Colpocephalum salimalii* Clay

*Colpocephalum salimalii* Clay, 1951, Ann. Mag. Nat. Hist. (12) 4: 1162. Type-host: *Phoenicopterus antiquorum* Temminck.

FEMALE.—As in Fig. 92. Readily separable from *C. heterosoma* by larger metanotum with long marginal setae, lengths of postspiracular setae, tripartite tergites on IV–VIII, an unusual attenuated terminal segment, presence of lateral hooked vulval setae, extreme "V"-shaped anus with inner dorsal setae, and generally larger size.

MALE.—Excellent discussion and illustrations given in original description. Best separated from *C. heterosoma* by fewer anterior abdominal tergal setae, many being minute on all segments.

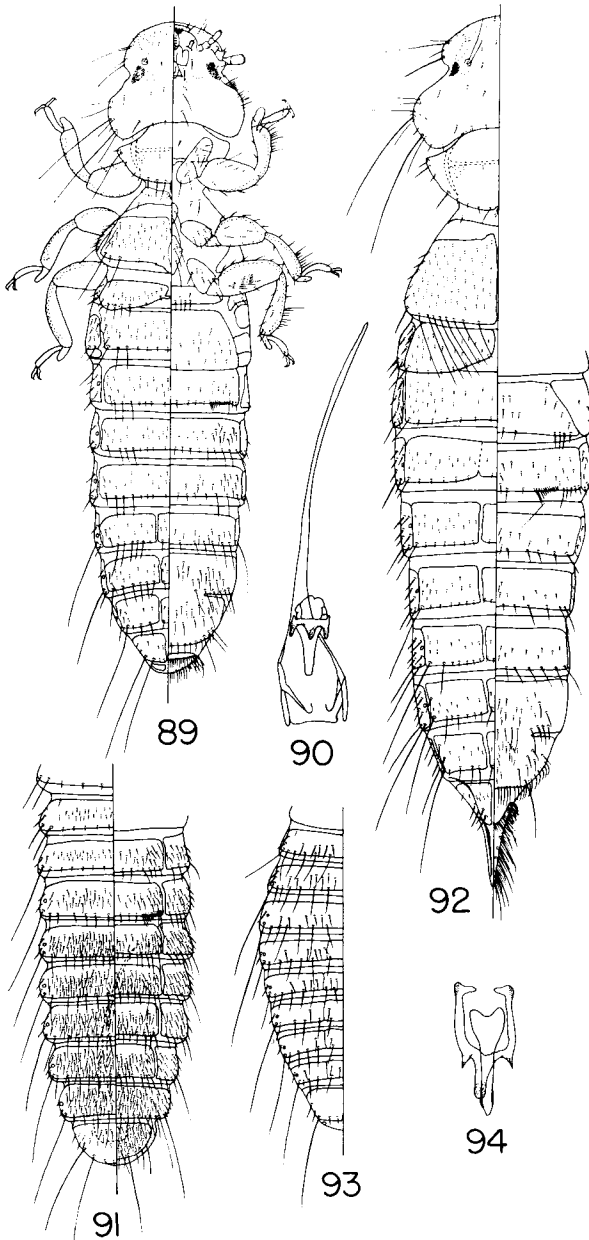
Material Examined.—1 ♂ paratype of *C. salimalii* Clay, *P. antiquorum*, Somaliland; 12 ♀, *P. antiquorum*, India.

#### *Colpocephalum pooypoensis* Carriker

*Colpocephalum pooypoensis* Carriker, 1956, Rev. Brasil. Entomol. 5: 140. Type-host: *Phoenicopterus chilensis* Molina.

In the absence of type-material, we can make no decision on the status of this species since both *C. heterosoma boliviana* and *C. pooypoensis* are recorded from *P. chilensis*. Male chaetotaxy and shape of female abdomen resemble *C. heterosoma*, but interpretation of other characters is not possible without having confirmed *C. pooypoensis* material for study.

In the following keys, absence of material has necessitated the omission of *C. subzebra* Bedford from the female key, *C. davisoni* and *C. asiatici* n. spp. from the male key, and *C. pooypoensis* Carriker from both. In all instances, Roman numerals applied to tergites, pleura, and sternites refer to structures located on the abdomen.



FIGS. 89–91.—*Colpocephalum heterosoma* Piaget. FIG. 89.—Female. FIG. 90.—Male genitalia. FIG. 91.—Male abdomen.

FIG. 92.—*C. salimalii* Clay, female.

FIGS. 93–94.—*C. oscitansi*, n. sp. FIG. 93.—Dorsal female abdomen. FIG. 94.—Male genitalia.

KEY TO SPECIES OF *Colpocephalum* FROM THE CICONIIFORMES

## FEMALES

1. Sternite III with only 1 comb row on each side . . . 2  
Sternite III with 2 or more comb rows on each side . . . 14
2. Dense brush of setae on last tergite (Fig. 56) . . . *scopinum* Mjöberg  
*smithi* Clay  
Without dense brush of setae on last tergite . . . 3
3. Spiracles on pleura III-VIII . . . 4  
Spiracles on tergites III-VIII . . . 5
4. End of abdomen broadly rounded (Fig. 89) . . . *heterosoma* Piaget  
End of abdomen pointed (Fig. 92) . . . *salimalii* Clay
5. Median posterior tergal plate on IX either much longer than wide (Fig. 43) or much wider than long (Fig. 59); tergites with or without anterior setae . . . 6  
Median posterior tergal plate on IX circular to oval, less often square; all tergites with some anterior setae . . . 9
6. Median terminal plate on IX wider than long (Fig. 59); alternating short and long setae on pronotal margin . . . *leptopygos* Nitzsch  
Median terminal plate on IX longer than wide; pronotal setae not as above . . . 7
7. Long postspiracular setae on II-VIII; definite circular internal genital structure (Fig. 44) . . . *pygidiale* Mjöberg  
Short postspiracular setae on IV-VI; without definite circular internal genital structure . . . 8
8. Anterior setal row on all abdominal tergites (Fig. 40) . . . *aethiopicae*, n. sp.  
Without anterior setal row on most abdominal tergites (Fig. 49) . . . *melanocephalae*, n. sp.
9. Internal genital structure about as long as wide; tergites II-VIII bipartite to tripartite (II sometimes only partly divided) . . . 10  
Internal genital structure much wider than long; tergite II undivided, III-VIII tripartite . . . 12
10. Tergite II with wide median plate (Fig. 65) . . . *ajajae* Ewing  
Tergite II without median plate . . . 11
11. Tergite II widely bipartite; median tergal plates of VI-VIII wider than those of III-V and each with some setae (Fig. 73) . . . *spinicollis*, n. sp.  
Tergite II narrowly to incompletely bipartite; median tergal plates of III-VIII all narrow and often without setae (Fig. 63) . . . *plataleae*, n. sp.
12. Tergites I-II each with 25 or more marginal setae, those on II distinctly shorter medially (Fig. 74) . . . *davisoni*, n. sp.  
Tergites I-II each with fewer than 25 marginal setae, those on II not distinctly shorter medially 13
13. Fewer than 20 setae each side of tergite IX (Fig. 69) . . . *eremitae*, n. sp.  
Over 20 setae each side of tergite IX (Fig. 88) . . . *clayellum* Brinck
14. Sternite III with 3 or more comb rows on each side . . . 15  
Sternite III with only 2 comb rows on each side . . . 18
15. Not more than tergites VII-VIII tripartite; no median plate on IX (Fig. 75) . . . *penicillatum* Piaget  
Tergites III-VIII tripartite; circular medioposterior plate on IX . . . 16
16. No median anterior setae on tergite II; metanotum with only few minute median anterior setae . . . *olivaceae*, n. sp.  
Row of anterior setae on tergite II; metanotum with number of medium median anterior setae . . . 17
17. Sternite II with lateral patch of spiniform setae and without pair of long median marginal setae (Fig. 45) . . . *subpenicillatum* Piaget  
Sternite II lacking lateral spiniform setal patch and usually with pair of long median marginal setae (Fig. 52) . . . *carunculatae*, n. sp.
18. Tergite III with anterior undivided transverse plate and bipartite posterior plate (Fig. 36) . . . *fuscigrum* Giebel  
Tergite III not transversely divided . . . 19
19. Femur III with 4 or more stout setae on posterior margin (Fig. 28) . . . 20  
Femur III with not over 2-3 setae on posterior margin (Fig. 5) . . . 22
20. About 10 short anterior metanotal setae; lateral tergal plates of IX with minute anterior setae (Fig. 34) . . . *harpiprioni*, n. sp.  
Over 20 medium anterior metanotal setae; longer anterior setae on lateral tergal plates of IX . . . 21
21. Median tergal plate narrowest on V (Fig. 31) . . . *oxycercae*, n. sp.  
Median tergal plate narrowest on IV (Fig. 27) . . . *trispinum* Piaget
22. None of tergites I-VIII tripartite; anus oval, without inner setae . . . 23  
At least some of tergites I-VIII tripartite; anus variously shaped, usually with inner dorsal setae . . . 25
23. Last tergite divided at midline (Fig. 85) . . . *uchidi* (Qadri)  
Last tergite undivided . . . 24
24. All tergites I-VIII with anterior setae (Fig. 82) . . . *ferrisi* Bedford  
Anterior setae absent at least on tergites VII-VIII . . . *scharfi*, n. sp.
25. Anus oval, without inner setae; last tergite apparently undivided medially (Fig. 93) . . . *ocsitansi*, n. sp.  
Anus variously shaped, always with somewhat stouter inner dorsal setae; last tergite divided medially . . . 26
26. Dorsal anal rim indented at midline, usually with 1 inner dorsal seta on each side; sternite II with median pair of long marginal setae among much shorter ones (as in Fig. 52) . . . *turbinatum* Denny  
Dorsal anal rim not indented at midline; sternite II without such a longer pair of median marginal setae . . . 27
27. Abdominal segments I-II enlarged; tergite II with over 20 close-set tergoventral setae, at least 8-10 of them long and extending across segment III, and with 12 or more medium anterior setae (Fig. 23) . . . 28  
Without above combination of characters . . . 29
28. All setae on median tergal plate of III much shorter than anterior tergal setae on I-II (Fig. 23) . . . *cooki*, n. sp.  
Setae on median tergal plate of III essentially same length as anterior tergal setae on I-II (Fig. 78) . . . *longissimum* Rudow
29. All tergoventral and anterior tergal setae on VIII of medium length, similar to preceding segment (Figs. 19 or 25) . . . 30  
Some tergoventral setae of VIII short to minute and anterior setae medium; or tergoventral setae medium and anterior setae minute or absent; or tergoventral setae short to minute and anterior setae minute or absent . . . 32
30. Tergites III-VIII tripartite; median plate of IX reduced; chaetotaxy as in Fig. 20 . . . *nipponi*, n. sp.  
Not more than tergites VI-VIII tripartite; median plate of IX not reduced; chaetotaxy as in Figs. 19 or 25 . . . 31
31. Tergites I-VII each with 10-17 medium anterior setae (Fig. 25) . . . *nigrae*, n. sp.  
Tergites I-II without anterior setae, III-VII each with only 3-6 shorter anterior setae (Fig. 19) . . . *asiatici*, n. sp.
32. Outer middorsal head setae longer than inner; postspiracular seta on IV almost as long as on III and V . . . 33  
Middorsal head setae short to minute, essentially same length; postspiracular seta on IV much shorter than on III and V . . . 35

33. Anterior setae on tergites I-VIII minute to absent (Fig. 15)..... *mycteriae*, n. sp.  
Anterior setae on tergites I-VIII medium length (Fig. 1)..... 34
34. Tergites III-V each with 14-20 marginal setae, VI with 15-18; anterior tergal setae on I, 4-11, and II, 10-15..... *zebra* Burmeister  
Tergites III-V each with 20-26 marginal setae, VI with 19-22; anterior tergal setae on I, 0-4, and II, 2-10..... *oreas* Kellogg
35. Tergocentral setae on I with some at least twice as long as others (Fig. 15)..... *scalariforme* Rudow  
Tergocentral setae on I all essentially same length 36
36. At least 3 tergo-central setae on II much longer than adjacent setae..... *fradei* Tendeiro  
Tergocentral setae on II essentially of equal length, occasionally 1-2 much longer ones..... 37
37. Marginal pair of setae on median tergal plate of VIII usually as long as corresponding setae on VII; 1-2 setae on median plate of IX extending nearly to or beyond end of plate. *occipitale* Nitzsch  
*lamelligeri*, n. sp.  
*leucocephali*, n. sp. (in part)  
Median setae on VIII much shorter than those on VII; shorter setae on median plate of IX.....  
*tibiale* Piaget  
*leucocephali*, n. sp. (in part)
- MALES
1. Sternite III with only 1 comb row on each side.... 2  
Sternite III with 2 or more comb rows on each side..... 13
2. Head with occipital nodi and associated carinae weak to absent..... 3  
Head with well-developed occipital nodi and associated carinae..... 7
3. All occipital setae medium, stout, extending to transverse prothoracic thickening; genitalia as in Fig. 66..... *plataleae*, n. sp.  
At least outer pair of occipital setae minute, fine; genitalia not as above..... 4
4. Over 75 short anterior setae on tergite IX (Fig. 57)..... *scopinum* Mjöberg  
Considerably fewer and often minute anterior setae on tergite IX..... 5
5. Long heavy median tergo-central setae on I; genitalia as in Fig. 55..... *smithi* Clay  
Minute fine median tergo-central setae on I; genitalia as in Fig. 90..... 6
6. Tergites IV-VIII with many short to medium setae (Fig. 91)..... *heterosoma* Piaget  
Tergites IV-VIII with fewer setae, majority being minute..... *salimalii* Clay
7. Tergite VIII with fewer than 5 median anterior setae; genitalia as in Figs. 42 or 51..... 8  
Tergite VIII with more than 5 median anterior setae; genitalia not as above..... 9
8. Tergites I-VIII each with few median anterior setae; last tergite undivided, without median anterior setae; genitalia as in Fig. 42.....  
*pygidiale* Mjöberg  
Tergites I-VIII without median anterior setae; last tergite divided at midline, with median anterior setae (Fig. 50); genitalia as in Fig. 51.....  
*melanocephalae*, n. sp.
9. At least tergites II-V distinctly bipartite, all with minute anterior setae (Fig. 60); genitalia as in Fig. 58..... *leptopygos* Nitzsch  
Tergites II-V not completely divided, at least some with short to medium anterior setae; genitalia not as above..... 10
10. Tergites VIII-IX bipartite (Fig. 39); genitalia as in Fig. 38..... *aethiopicae*, n. sp.  
Tergites VIII-IX not both divided; genitalia otherwise..... 11
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12. Over 10 anterior setae on last tergite (Fig. 70); anterior head margin with only 1 pair of stout spiniform setae; genitalia as in Fig. 68..... *clayellum* Brinck  
*eremitae*, n. sp.  
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13. Sternite III with 3 or more comb rows on each side..... 14  
Sternite III with only 2 comb rows on each side..... 17
14. Dense median setal cluster on sternites III-V; genitalia as in Fig. 77..... *penicillatum* Piaget  
Without such setal cluster on sternites III-V; genitalia otherwise..... 15
15. Metanotum with few minute median anterior setae; genitalia as in Fig. 41..... *olivaceae*, n. sp.  
Metanotum with number of medium median anterior setae; genitalia as in Fig. 47..... 16
16. Anterior head margin with 2 pairs of stout spiniform setae; tergite II with only 0-3 long marginal setae (Fig. 48)..... *subpenicillatum* Piaget  
Anterior head margin with only 1 pair of stout spiniform setae; tergite II with 10 long marginal setae (Fig. 53)..... *carunculatae*, n. sp.
17. Both femora III with series of 4 or more stout setae on posterior margin (Figs. 28 or 81)..... 18  
One or both femora III with not more than 2-3 setae on posterior margin (Fig. 5)..... 21
18. Tergites I-VII each with fewer than 13 marginal setae, with all tergo-central setae short to minute; last tergite with open posterior area (Fig. 80); genitalia as in Fig. 83..... *ferrisi* Bedford  
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19. Only about 10 short anterior metanotal setae; about 20-30 anterior tergal setae each on III-VII, in irregular single row (Fig. 33); genitalia as in Fig. 32..... *harpiprioni*, n. sp.  
Over 20 medium anterior metanotal setae (Fig. 27); tergites III-VII each either with all fewer than 20 or all more than 40 anterior setae; genitalia close to Fig. 29..... 20
20. Tergites III-VII each with over 40 anterior setae (Fig. 30)..... *oxycercae*, n. sp.  
Tergites III-VII each with fewer than 20 anterior setae (Fig. 26)..... *trispinum* Piaget
21. Each abdominal segment I-VII with about 4 very long tergo-central setae among much shorter ones (Fig. 37); genitalia as in Fig. 35.....  
*fusconigrum* Giebel  
Abdomen with fairly uniform tergo-central setae on any segment or with more numerous long setae alternating with short setae; genitalia not as above..... 22
22. Genitalia with pair of lateral subapical barbs on penis..... *turbinatum* Denny  
Genitalia with no such barbs on penis..... 23
23. Last tergite with over 25 minute anterior setae; segments I-VIII with all tergo-central and anterior setae minute (Fig. 84); genitalia as in Fig. 86..... *uchidi* (Qadri)  
Last tergite either lacking or with considerably fewer anterior setae; segments I-VIII often, but not always, with longer tergo-central and anterior setae; genitalia otherwise..... 24
24. Tergites IV-VIII without anterior setae (occasionally 1-2 on IV-V); genitalia as in Fig. 87.....  
*scharfi*, n. sp.  
Majority of tergites IV-VIII with at least row of anterior setae; genitalia otherwise..... 25

25. Abdomen distally truncate; genitalia (Figs. 6 or 22, less often 11) with each lateral plate having 5-8 projections ..... 26  
Abdomen distally rounded; genitalia much as in Figs. 11, 16, 79, or 94, with fewer than 6 projections on each lateral plate ..... 30
26. Without anterior setae on tergite I (Fig. 21); genitalia as in Fig. 22 ..... *nipponi*, n. sp.  
With 4 or more anterior setae on tergite I; genitalia close to Fig. 6 ..... 27
27. Numerous short anterior setae on tergites III-VIII, in at least double row (Fig. 14); genitalia as in Fig. 11 ..... *scalariforme* Rudow (in part)  
Fewer, generally longer, setae on tergites III-VIII, in more or less single row; genitalia as in Fig. 6 ..... 28
28. Shorter anterior tergal setae, their ends usually separated by nearly length of seta from bases of tergo-central setae of same segment (Fig. 7) .....  
..... *oreas* Kellogg  
Longer anterior tergal setae on all segments, their ends reaching near to bases of tergo-central setae of same segment ..... 29
29. Median tergo-central setae on VI-VII almost as long as anterior setae (Fig. 2); penis as in Fig. 6 .....  
..... *zebra* Burmeister  
Median tergo-central setae on VI-VII shorter than anterior setae; penis distally much shorter than in Fig. 6 ..... *nigrae*, n. sp.  
30. Tergites I-II with minute anterior and tergo-central setae, much shorter than corresponding sternal setae .....  
..... *lamelligeri*, n. sp.  
Tergites I-II with anterior and marginal setae as long or longer than corresponding sternal setae ..... 31
31. Majority of tergites IV-VII with fewer than 10 anterior setae and with shorter median tergo-central setae (Fig. 9); postspiracular seta on IV as long as on III or VI ..... *mycteriae*, n. sp.  
Majority of tergites IV-VII with over 10 anterior setae, or with tergo-central setae all much the same length; postspiracular seta on IV distinctly shorter than on III or VI ..... 32
32. Tergites VI-VIII each with 30 or more short anterior setae and distinctly more corresponding anterior sternal setae (Fig. 14) .....  
..... *scalariforme* Rudow (in part)  
Some or all of tergites VI-VIII with fewer than 30 anterior setae, or, if 30 or more, approximately same number of corresponding anterior sternal setae ..... 33
33. Genitalia as in Fig. 16 ..... *leucocephali*, n. sp.  
Genitalia much as in Figs. 11, 79, or 94 ..... 34
34. Over 25 marginal setae on tergite II (Fig. 24) .....  
..... *longissimum* Rudow  
..... *cooki*, n. sp.  
Not over 25 marginal setae on tergite II ..... 35
35. Without pair of spiniform setae at anterior head margin ..... 36  
With pair of spiniform setae at anterior head margin ..... 37
36. Long occipital setae and tergo-central setae on VIII; genitalia as in Fig. 94 ..... *oscitansi*, n. sp.  
Short to minute occipital setae and tergo-central setae on VIII; genitalia close to Fig. 79 .....  
..... *tibiale* Piaget (in part)
37. Metanotum with about 20 short median anterior setae comparable in length to anterior setae of tergites I-VIII ..... *subzebra* Bedford  
Metanotum with about 10 median anterior setae, some to all minute ..... 38
38. Median marginal setae on tergites IV-VI of essentially same size as corresponding setae on sternites ..... *fradei* Tendeiro  
Median marginal setae on tergites IV-VI shorter than corresponding setae on sternites .....  
..... *occipitale* Nitzsch  
..... *tibiale* Piaget (in part)

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