Taxonomy of *Philopterus* (Phthiraptera: Philopteridae) from the Corvidae (Passeriformes), with Descriptions of Nine New Species

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ABSTRACT Seventeen previously described species of *Philopterus* are recognized and redescribed. Nine new species are described: *clayae* (type host *Corvus capensis*), *ptilostomi* (type host *Ptilostomus afer*), *dumani* (type host *Pyrrhocorax graculus*), *cubensis* (type host *Corvus nasicus*), *urocissae* (type host *Urocissa caerulea*), *emersoni* (type host *Dendrocitta formosae*), *dalgleishi* (type host *Corvus tasmanicus*), *craigi* (type host *Corvus coronoides*), and *palmai* (type host *Corvus moneduloides*). *Philopterus cristata* Malcomson and *P. vagabunda* Ansari are placed as new junior synonyms of *P. crassipes* (Burmeister). A key is provided for the identification of these 26 species.

KEY WORDS Ischnocera, *Philopterus*, Corvidae, taxonomy

THE CHEWING LOUSE genus *Philopterus* Nitzsch currently has 210 specific and subspecific names included in it, the majority of these from passerine hosts. This places it with the genera *Brueelia* Keler and *Quadraceps* Clay and Meinertzhagen as 1 of the 3 largest genera of the ischnoceran family Philopteridae. Although the last 2 genera have been the subject of selected taxonomic studies, no significant revisional work has been attempted within *Philopterus*. As a result, this genus has been one of the more abused dumping grounds for workers willing to describe new taxa without basing their differentiations on an adequate study of related forms.

It is far too ambitious to undertake a study of all *Philopterus* material. A logical approach is to select an appropriate portion for taxonomic analysis, expanding from this base as time allows. The rationales for choosing as a starting point the *Philopterus* from the passerine family Corvidae are as follows: (1) there are 35 specific names of *Philopterus*, the largest number by far for any family of birds; (2) some of the oldest louse names are included in this group, including the 1st member of the genus, described by Linnaeus in 1758; and (3) the hosts, with their large size and abundance, have attracted collectors who have deposited abundant material in museum collections. Considerations of phylogenetic relationships within the *Philopterus*, as well as of host associations and specificity, and of coevolution, are premature and must await study of lice from additional host groups.

All measurements are in millimeters. Abbreviations for measured structures are explained the 1st time they are used. Host classification follows those of Howard and Moore (1991) and Sibley and Monroe (1990), which virtually are identical for this group of birds. Characters in the key hold for both sexes unless otherwise stated. In the material sections, obsolete country and region names appear in quotation marks and, the 1st time each appears, are followed by the modern name in parentheses. Abbreviations for institutions serving as a depository site for type specimens are The Natural History Museum, London (BMNH); the Museum of New Zealand, Wellington (MNZ); Oklahoma State University, Stillwater (OSU); the University of Minnesota, St. Paul (UM); and the National Museum of Natural History, Washington, DC (USNM).

An illustration of a generalized male *Philopterus* is given in Fig. 1. Labels are provided for orientation of certain terms used in the following descriptions. The lateral carina length is measured as the distance between the bases of the indicated setae. The width of the lateral sternite on VI is given as the greatest dimension of this sclerite. If an illustration shows a lateral sternite on VI, this indicates the presence of similar sternites on III-V.

Sexual dimorphism is slight among the species of corvid *Philopterus*, any differences being associated with the terminalia, the reduced male abdominal tergal and sternal chaetotaxy, and the generally smaller dimensions of the male. The principal characters valuable for species definition are as follows: (1) the length of the lateral head carina, preconal head region, conus, and preconal and postconal setae; (2) the shape, size, and pigmentation of the dorsal head plate; (3) the pigmentation of the abdominal tergites; (4) the number of tergal and sternal setae; (5) the size and extent of the sternal sclerites; (6) the male genitalia details; and (7) measurements of gross body parts.

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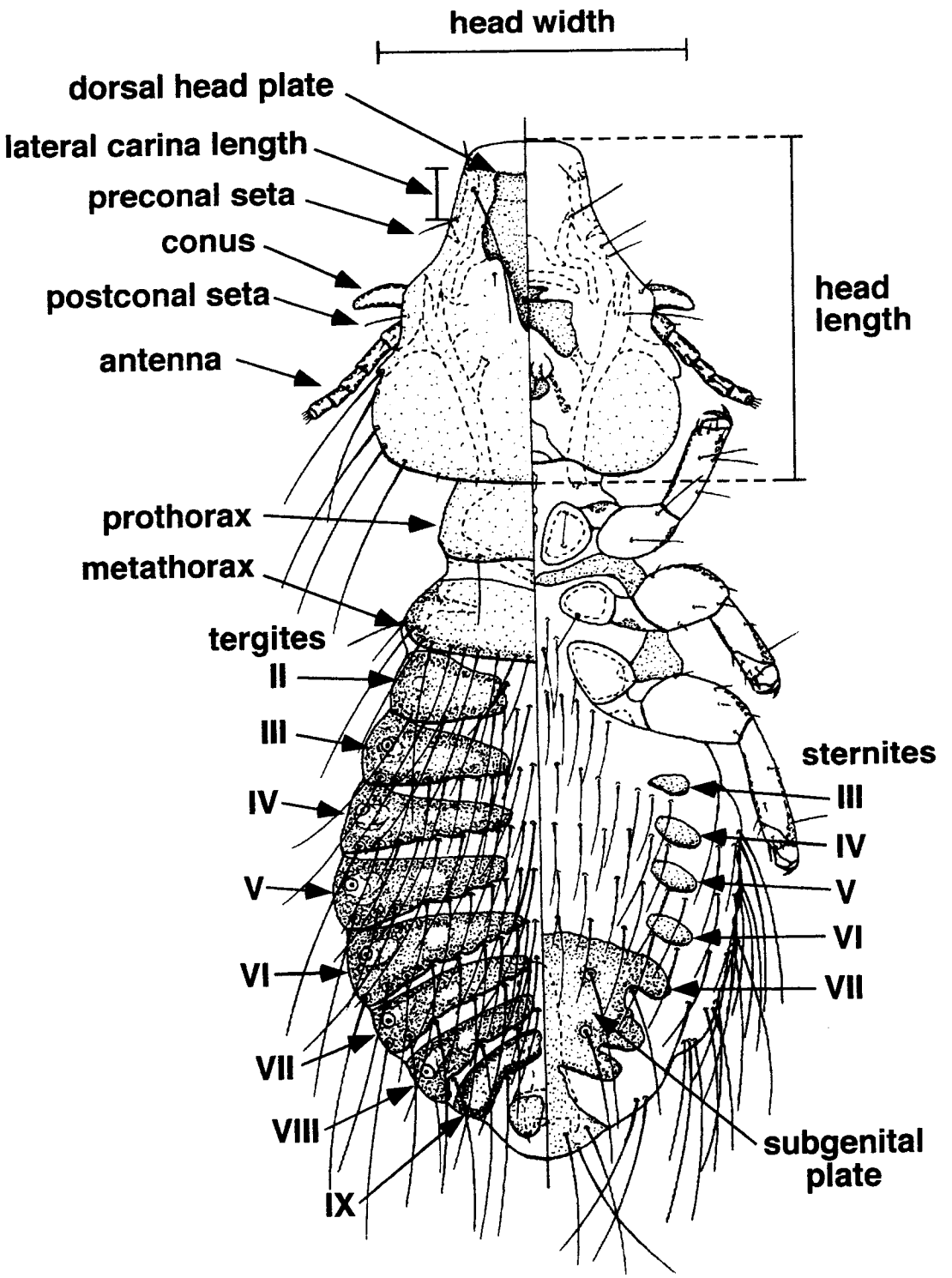
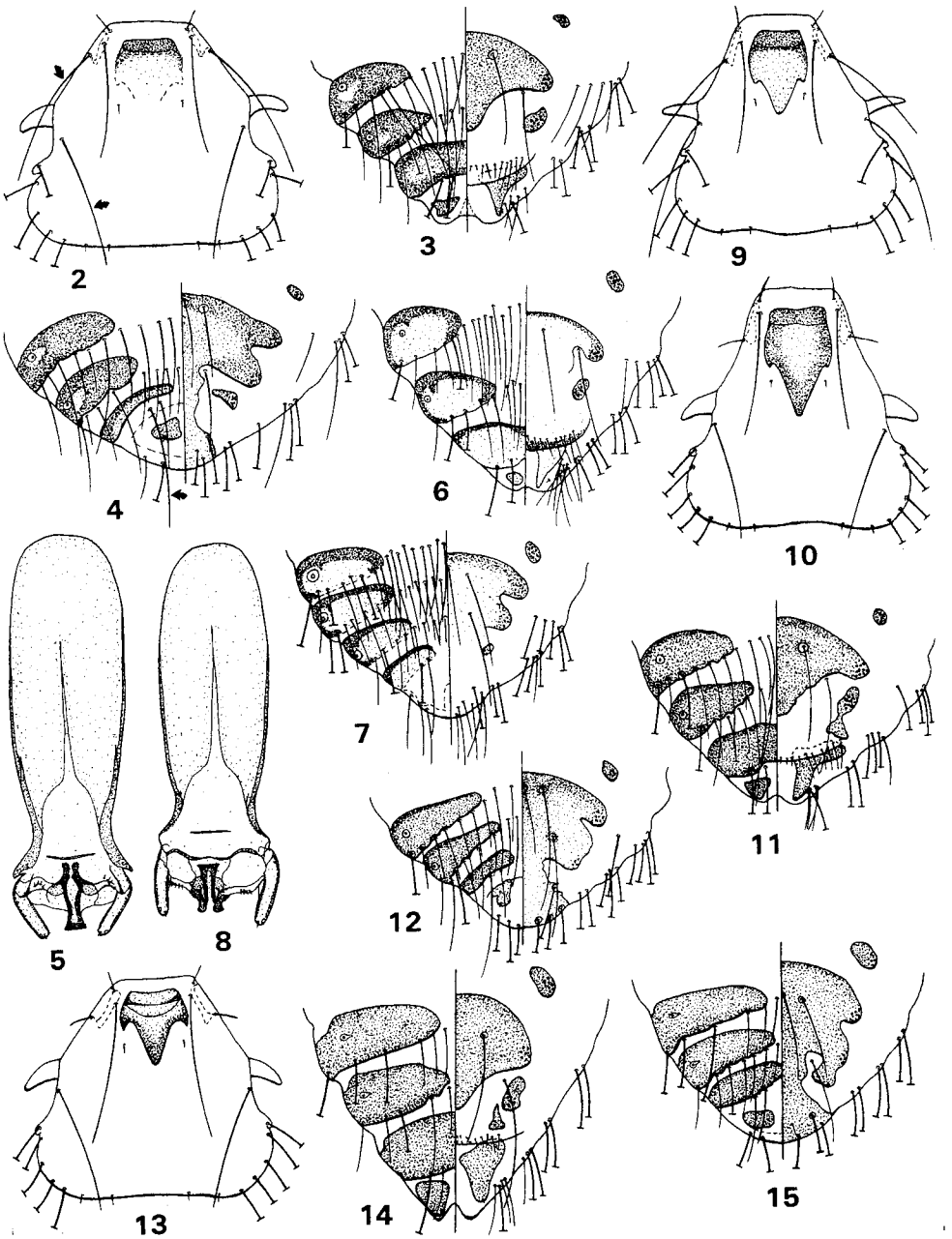


Fig. 1. Male *Philopterus* with labeled parts.



Figs. 2–15. (2–5) *P. corvi:* (2) male head, (3) female terminalia, (4) male terminalia, (5) male genitalia. (6–8) *P. leptomelas:* (6) female terminalia, (7) male terminalia, (8) male genitalia. (9) *P. albidus,* male head. (10–12) *P. atratus:* (10) male head, (11) female terminalia, (12) male terminalia. (13) *P. clayae,* male head. (14 and 15) *P. ptilostomi:* (14) female terminalia, (15) male terminalia.

Philopterus corvi (L.)
(Figs. 2–5)

Pediculus corvi L. 1758: 612. Type host: "Corvis" = *Corvus corax* L.

Nirmus adustus Olfers 1816: 87. Type host: *C. corax.*

Docophorus semisignatus Denny 1842: 41. Type host: *C. corax.*

Docophorus coracis Denny 1852: 7. Type host: "Raven" = *C. corax.* Nom. nov. for *D. semisignatus* Denny.

Docophorus distinctus Kellogg 1896: 477. Type host: *C. corax sinuatus* Wagler.

Description. Head with both preconal and postconal setae 0.25–0.45 long (Fig. 2, arrows); dorsal plate

pigmented only on anterior portion, making length indiscernible. Abdominal tergites uniformly dark, except for light areas associated with spiracles. Lateral sternite on VI 0.06–0.10 wide. Male terminalia as in Fig. 4. Tergal setae: II 20–23, III 23–28, IV-V 24–31, VI 22–29, VII 19–24, VIII 13–19, IX 4–6 (Fig. 4, arrow), with medial division. Sternal setae: II 8–15, III-VI 10–18, VII 2–4. Genitalia (Fig. 5) with >70% having mesosomal structures aligned as shown, remainder inverted as in Fig. 8. Female terminalia as in Fig. 3. Tergal setae: II 20–27, III 26–33, IV-V 30–37, VI 27–32, VII 22–27, VIII 15–22, IX 4–6. Sternal setae: II 9–15, III-VI 10–19, VII 2–3. Subgenital plate with 16–21 marginal setae.

Measurements of Male. Dorsal head plate width (DHPW) 0.15–0.19, dorsal head plate length (DHPL) undetermined, conus length (CONL) 0.08–0.11, lateral carina length (LACL) 0.07–0.08, preconal head length (PRCL) 0.19–0.25, temple width (TMPW) 0.65–0.73, head length (HDL) 0.61–0.70, prothorax width (PTXW) 0.37–0.45, metathorax width (MTXW) 0.51–0.65, abdomen width at V (ABW5) 0.89–1.10, total length (TOTL) 1.90–2.31, genitalia width (GENW) 0.11–0.12, genitalia length (GENL) 0.35–0.45.

Measurements of Female. DHPW 0.17–0.21, DHPL undetermined, CONL 0.09–0.12, LACL 0.07–0.09, PRCL 0.21–0.26, TMPW 0.67–0.80, HDL 0.66–0.78, PTXW 0.38–0.47, MTXW 0.58–0.74, ABW5 0.91–1.32, subgenital plate width (SGPW) 0.49–0.58, TOTL 2.02–2.75.

Material. 62 ♂, 49 ♀ (including ♂ ♀ neoparatypes (USNM) of *P. corvi*), ex *Corvus corax*, 25 collections from the United States, Canada, Mexico, Iceland, Arctic Region, England, Scotland, Morocco, Iran, India, Nepal, Faroe Is.

Remarks. This is the 1st of 3 species separated from all others by the presence of very long preconal and postconal head setae. Characters for distinguishing *P. corvi* from the other 2 will be discussed for each of the following species.

Clay and Hopkins (1950) discuss the problems associated with establishing the identity of *P. corvi*. Our interpretation supports their recognition of *C. corax* as the type host. Interestingly, their illustration of the male genitalia is as in Fig. 8, yet the neoparatype we saw has them as in Fig. 5, to further substantiate the plasticity associated with the alignment of the mesosomal structures.

Philopterus leptomelas (Nitzsch)
(Figs. 6–8)

Docophorus leptomelas Nitzsch [In Giebel] 1866: 358. Type host: *Corvus albicollis* Latham.

Description. Like *P. corvi*, except as follows. Head near Fig. 9, but without well defined posterior margin of dorsal plate. Terminal tergites having extensive pale area with dark anterior border (Figs. 6 and 7). Male terminalia as in Fig. 7. Tergal setae: II 24–27, III 33–36, IV-V 36–43, VI 30–34, VII 25–30, VIII 16–20. Sternal setae: II 13–18, III-V 16–23, VI 13–16. Genitalia as in Fig. 8. Female terminalia as in Fig. 6. Tergal setae: II 26–31, III 30–44, IV-V 32–47, VI 35–42, VII 27–35. Sternal setae: II 12–20, IV-V 15–24. Subgenital plate with 20–26 marginal setae.

Measurements of Male. LACL 0.08–0.09, PRCL 0.22–0.26, GENW 0.12–0.14, GENL 0.41–0.52.

Measurements of Female. LACL 0.08–0.10, PRCL 0.25–0.29, HDL 0.71–0.79.

Material. 6 ♂, 5 ♀, ex *Corvus albicollis*, 5 collections from Uganda, "Basutoland" (Lesotho), Kenya, "Tanganyika" (Tanzania).

Remarks. This species is very close to *P. corvi*, but is differentiated by its somewhat longer preconal head length and lateral carina length, and larger number of tergal and sternal setae on a number of segments. The very light pigmentation of at least the terminal tergites and the reversed alignment of the male mesosomal genitalic structures also support this separation.

Philopterus albidus (Piaget)
(Fig. 9)

Docophorus albidus Piaget 1880: 48. Type host: "Corvus scapulatus" = *Corvus albus* P. L. S. Muller.

Description. Like *P. corvi*, except as follows. Head (Fig. 9) with dorsal plate having heavier pigmentation in anterior portion, lighter posteriorly, but with discernible margin. Pale area on terminal abdominal tergites, much like *P. leptomelas*. Male terminalia close to Fig. 7. Tergal setae: II 19–27, III 23–31, IV-V 26–37, VI 22–32, VII 19–28. Sternal setae: II 10–15. Genitalia (Fig. 8) with >75% having mesosomal structures aligned as shown, remainder as in Fig. 5. Female terminalia close to Fig. 6. Tergal setae: III 27–36, IV-V 29–43, VI 26–37, VII 21–30. Sternal setae: III-VI 13–20.

Measurements of Male. DHPL 0.23–0.27, LACL 0.08–0.10, PRCL 0.23–0.28, TMPW 0.59–0.73, PTXW 0.34–0.43, MTXW 0.52–0.63, ABW5 0.79–1.05, TOTL 1.73–2.19.

Measurements of Female. DHPL 0.25–0.31, LACL 0.08–0.10, PRCL 0.24–0.30, MTXW 0.58–0.67, ABW5 0.89–1.13, SGPW 0.44–0.55, TOTL 2.13–2.45.

Material. 47 ♂, 30 ♀, ex *Corvus albus*, 11 collections from Madagascar, Mozambique, Sudan, "Transvaal" (northeastern South Africa), Kenya, "Tanganyika." 8 ♂, 8 ♀, ex *C. rhipidurus* Hartert, 4 collections from Israel, "Abyssinia" (Ethiopia and adjacent northeastern Africa), "Arabia" (Saudi Arabia and adjacent countries on the Arabian Peninsula). 1 ♀, ex *C. ruficollis* Lesson, 1 collection from "Palestine" (Israel and occupied territories).

Remarks. This is the last of 3 species that are separated from all others by the very long preconal and postconal head setae. It is distinguished from *P. corvi* by the better defined dorsal head plate, the larger preconal head length and lateral carina length, and the lighter pigmentation of the terminal sclerites. It is distinguished from *P. leptomelas* by the smaller number of tergal setae on male II-VII and female VI-VII.

Table 1. Host-parasite list of *Philopterus* from the Corvidae

Host species[a]	Louse species
Corvinae	
Corvini	
Gymnorhinus	
cyanocephalus (*)	*phillipi*
Cyanocitta	
cristata	*crassipes*
stelleri	*crassipes*
Aphelocoma	
coerulescens	*crassipes*
ultramarina	*crassipes*
Psilorhinus	
morio (*)	*underwoodi*
Garrulus	
glandarius (*)	*garruli*
Urocissa	
caerulea (*)	*urocissae*, n.sp.
flavirostris	*urocissae*, n.sp.
erythrorhyncha	*urocissae*, n.sp.
Cyanopica	
cyana (*)	*martinezi*
Dendrocitta	
vagabunda	*crassipes*
formosae (*)	*emersoni*, n.sp.
Pica	
pica (*)	*picae*
nuttalli	*picae*
Podoces	
panderi	*stegmanni*
pleskei (*)	*stegmanni*
Nucifraga	
columbiana	*crassipes*
caryocatactes (*)	*crassipes*
Pyrrhocorax	
pyrrhocorax	*thryptocephalus*
graculus (*)	*dumani*, n.sp.
Ptilostomus	
afer (*)	*ptilostomi*, n.sp.
Corvus	
monedula (*)	*guttatus*
dauuricus	*guttatus*
splendens (*)	*lahorensis*
moneduloides (*)	*palmai*, n.sp.
capensis (*)	*clayae*, n.sp.
frugilegus (*)	*atratus*
caurinus	*osborni*
brachyrhynchos (*)	*osborni*
ossifragus	*osborni*
nasicus (*)	*cubensis*, n.sp.
corone (*)	*ocellatus*
	atratus
macrorhynchos (*)	*extraneus*
	lahorensis
bennetti	*craigi*, n.sp.
coronoides (*)	craigi, n.sp.
tasmanicus (*)	*dalgleishi*, n.sp.
cryptoleucus	*osborni*
albus (*)	*albidus*
ruficollis	*albidus*
corax (*)	*corvi*
	osborni
rhipidurus	*albidus*
albicollis (*)	*leptomelas*

[a] Host names and sequence from Howard and Moore (1991) and Sibley and Monroe (1990).
* Type host.

These 3 *Philopterus* species are restricted in their host distribution to 5 species of *Corvus* that are grouped sequentially by Howard and Moore (1991) and Sibley and Monroe (1990) near the end of the listing for the family Corvidae (Table 1).

Philopterus atratus Nitzsch
(Figs. 10–12)

Philopterus atratus Nitzsch 1818: 290. Type host: "Corvi frugilegi" = *Corvus frugilegus* L.

Description. Head (Fig. 10) with postconal seta at least 0.25 long, preconal seta only 0.06–0.11 long, dorsal plate well pigmented. Tergites uniformly dark. Lateral sternite on VI 0.05–0.08 wide. Male terminalia as in Fig. 12. Tergal setae: II 19–26, III-V 23–32, VI 20–27, VII 16–24, VIII 12–17, IX 4, with medial division. Sternal setae: II 9–14, III-V 10–16, VI 8–12, VII 2–5. Third of specimens with genitalia as in Fig. 5, two-thirds as in Fig. 8. Female terminalia as in Fig. 11. Tergal setae: II 20–25, III 23–30, IV-V 23–35, VI 22–30, VII 19–27, VIII 12–19, IX 3–4. Sternal setae: II 8–14, III-IV 9–17, V-VI 8–13, VII 2. Subgenital plate with 17–22 marginal setae.

Measurements of Male. DHPW 0.17–0.20, DHPL 0.27–0.33, CONL 0.10–0.15, LACL 0.10–0.11, PRCL 0.26–0.34, TMPW 0.64–0.77, HDL 0.67–0.77, PTXW 0.36–0.44, MTXW 0.53–0.61, ABW5 0.79–1.07, TOTL 1.95–2.40, GENW 0.12–0.14, GENL 0.39–0.48.

Measurements of Female. DHPW 0.17–0.21, DHPL 0.30–0.36, CONL 0.11–0.15, LACL 0.10–0.12, PRCL 0.28–0.35, TMPW 0.67–0.78, HDL 0.71–0.81, PTXW 0.38–0.48, MTXW 0.58–0.70, ABW5 0.86–1.10, SGPW 0.46–0.57, TOTL 2.19–2.53.

Material. 28 ♂, 34 ♀ (including neotype ♂, neoallotype ♀, 18 ♂, 15 ♀ neoparatypes (BMNH) of *P. atratus*), ex *Corvus frugilegus*, 19 collections from Ireland, United Kingdom, Hungary, Slovenia, Croatia, Italy, Poland, Iraq, India, China, Korea. 4 ♂, 6 ♀, ex *C. corone* L., 1 collection from England.

Remarks. This is the 1st of 3 species that are separated from all others by having the postconal head seta very long, and the preconal seta much shorter. Differentiations from the other 2 species of this group will be given below.

We are uncertain whether the single collection of *P. atratus* off *C. corone* represents a true infestation or a case of straggling or contamination. *Philopterus ocellatus* (Scopoli) is without doubt the usual parasite on this host species (Table 1).

Philopterus clayae Price & Hellenthal, new species
(Fig. 13)

Type host: *Corvus capensis* Lichtenstein.

Description. Like *P. atratus*, except as follows. Head (Fig. 13) much shorter and broader, with uniquely different shape of dorsal plate. Lateral sternite on VI 0.07–0.10 wide. Male tergal setae: II 15–19, III-V 16–22, VI 16–18, VII 13–18, VIII 10–14, IX 4–6. Sternal setae: V 11–14, VI 9–14, VII 4–5. Genitalia as in Fig. 8. Female tergal setae: II 15–21, III-VI 18–28, VII 15–20, VIII 9–14. Sternal setae: II 12–16, III-V 13–18, VI 12–14.

Measurements of Male. DHPW 0.14–0.19, DHPL 0.15–0.22, CONL 0.09–0.11, LACL 0.06–0.08, PRCL 0.19–0.26, TMPW 0.57–0.69, HDL 0.54–0.67, PTXW

0.30–0.41, MTXW 0.47–0.59, ABW5 0.77–0.92, TOTL 1.73–2.19.

Measurements of Female. DHPW 0.15–0.20, DHPL 0.20–0.24, CONL 0.10–0.12, LACL 0.07–0.09, PRCL 0.21–0.26, TMPW 0.63–0.77, HDL 0.61–0.72, PTXW 0.32–0.43, MTXW 0.52–0.69, TOTL 2.08–2.51.

Type Material. HOLOTYPE: ♂, ex *Corvus capensis*, South Africa: Cape, 15 April 1954 (BMNH). Paratypes, ex *C. capensis*: 1 ♂, 2 ♀, same data as holotype; 2 ♂, 1 ♀, South Africa, 26 August 1940; 8 ♂, 16 ♀, S.W. Africa; 1 ♂, 3 ♀, Nairobi, February 1903; 2 ♀, "Kenya Colony" (Kenya); 3 ♂, 2 ♀, "Transvaal," May 1947; 1 ♂, 1 ♀, "Damaraland" (north-central Namibia); 1 ♂, Ethiopia: Addis Ababa, 11 September 1958 (BMNH).

Remarks. This species is readily separated from *P. atratus* by much smaller measurements associated with its head structures, grossly different shape of the dorsal head plate, and smaller number of abdominal setae.

Etymology. This species is named for the late Theresa Clay in recognition of her outstanding contributions to louse taxonomy.

Philopterus ptilostomi Price & Hellenthal, new species
(Figs. 14 and 15)

Type host: *Ptilostomus afer* (L.).

Description. Like *P. atratus*, except as follows. Preconal head seta 0.05–0.07 long. Lateral sternite on VI 0.09–0.11 wide. Male terminalia as in Fig. 15. Tergal setae: II 12–14, III-V 12–15, VI 11–13, VII 10–11, VIII 8–13, IX without median division. Female terminalia as in Fig. 14. Tergal setae: II 13–15, III-VI 12–16, VII 10–11, VIII 9–10, IX 4.

Measurements of Male. DHPW 0.12–0.15, DHPL 0.16–0.17, CONL 0.09–0.11, LACL 0.06–0.08, PRCL 0.16–0.20, TMPW 0.52–0.53, HDL 0.52–0.54, PTXW 0.30–0.31, MTXW 0.45–0.47, ABW5 0.64–0.73, TOTL 1.57–1.67, GENW 0.10–0.11, GENL 0.31–0.34.

Measurements of Female. DHPW 0.14–0.16, DHPL 0.17–0.20, CONL 0.10–0.11, LACL 0.06–0.07, PRCL 0.19–0.21, TMPW 0.55–0.57, HDL 0.56–0.58, PTXW 0.31–0.33, MTXW 0.50–0.51, ABW5 0.76–0.79, SGPW 0.36–0.39, TOTL 1.84–2.00.

Type Material. HOLOTYPE: ♂, ex *Ptilostomus afer*, Senegal: Rufisque, 26 June 1955, P. Morel (BMNH). Paratypes, ex *P. afer*: 1 ♀, same data as holotype; 1 ♂, 1 ♀, Uganda: Gulu, 11 May 1936; 1 ♀, "Portuguese Guinea" (Guinea-Bissau); 1 ♂, Uganda, April 1936 (BMNH).

Remarks. This species is readily separated from *P. atratus* by much smaller measurements associated with its head structures, grossly different shape of the dorsal head plate, and smaller number of abdominal tergal setae. It is distinguished from *P. clayae* by its smaller measurements and fewer abdominal setae.

The first 2 of the preceding 3 species are from 2 presumably closely related *Corvus* species placed about a 3rd of the way into the *Corvus* species sequence by Howard and Moore (1991) and Sibley and Monroe (1990) (Table 1). However, the 3rd is from the genus *Ptilostomus* placed by these authors immediately preceding *Corvus* and distant from the hosts of the other 2 louse taxa.

Philopterus thryptocephalus (Kellogg & Paine)
(Figs. 16–19)

Docophorus thryptocephalus Kellogg & Paine 1914: 232. Type host: "Graculus graculus" = *Pyrrhocorax graculus* (L.)—probable error. More likely *Pyrrhocorax pyrrhocorax* (L.).

Description. Head (Fig. 16) with preconal seta at least 0.30 long, postconal seta minute not over 0.01 long, dorsal plate small and shaped as shown. Tergites uniformly dark. Without lateral sternites on III-VI, but with small median sclerite on VI (Figs. 17 and 18). Male terminalia as in Fig. 17. Tergal setae: II 17–20, III-VI 16–26, VII 14–21, VIII 10–15, IX 2 (Fig. 17, arrow), without medial division. Sternal setae: II-IV 15–19, V 12–18, VI 10–14, VII 3–7. Genitalia as in Fig. 19. Female terminalia as in Fig. 18. Tergal setae: II 19–22, III-VI 19–27, VII 15–19, VIII 10–16, IX 2. Sternal setae: II-V 10–17, VI 9–13, VII 2–3. Subgenital plate with 9–16 marginal setae.

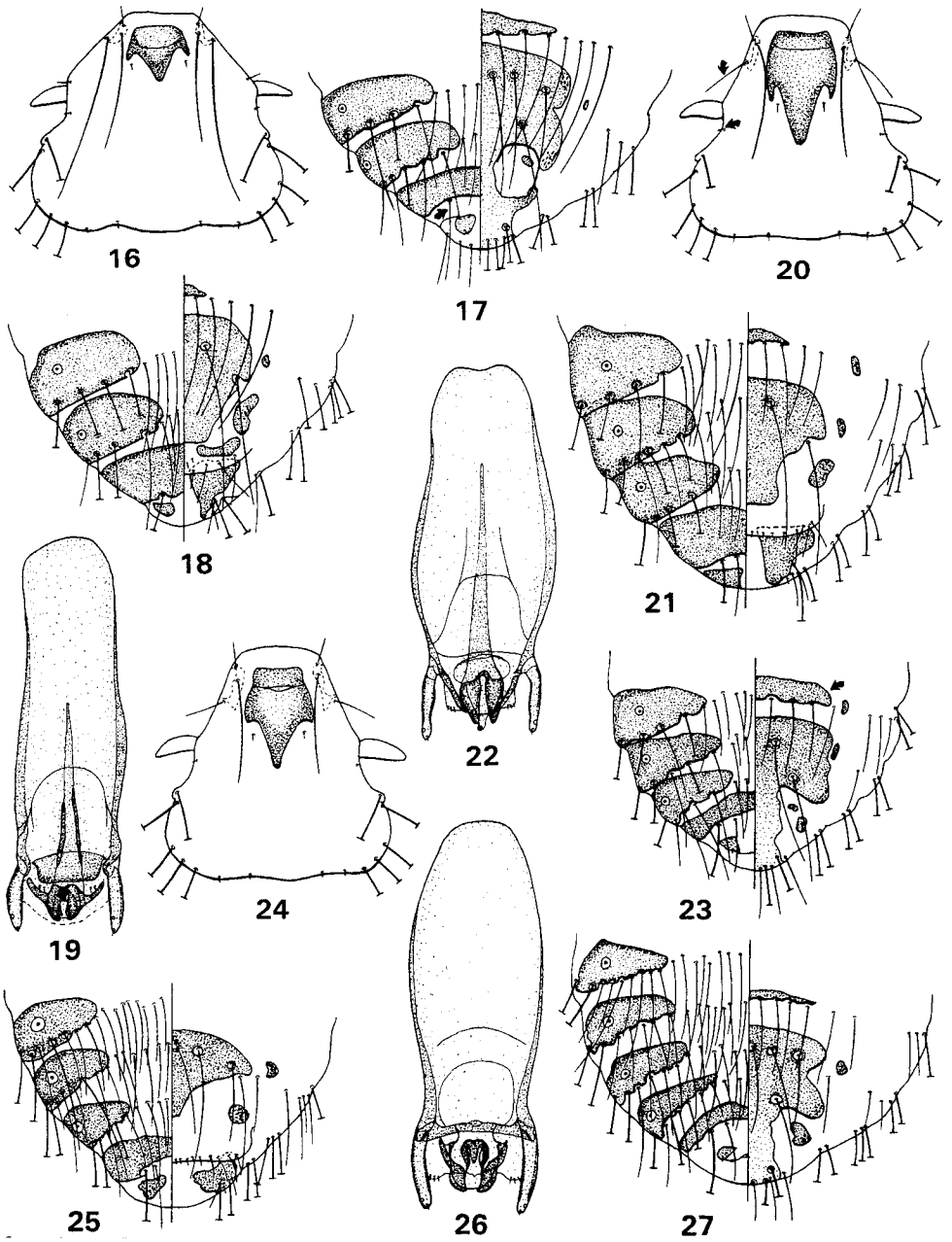
Measurements of Male. DHPW 0.14–0.18, DHPL 0.12–0.20, CONL 0.07–0.09, LACL 0.04–0.06, PRCL 0.14–0.19, TMPW 0.54–0.67, HDL 0.46–0.57, PTXW 0.28–0.34, MTXW 0.43–0.57, ABW5 0.69–0.93, TOTL 1.72–2.06, GENW 0.10–0.11, GENL 0.36–0.40.

Measurements of Female. DHPW 0.15–0.19, DHPL 0.13–0.19, CONL 0.08–0.11, LACL 0.04–0.06, PRCL 0.15–0.19, TMPW 0.61–0.72, HDL 0.51–0.60, PTXW 0.29–0.39, MTXW 0.53–0.60, ABW5 0.85–1.20, SGPW 0.34–0.42, TOTL 1.86–2.60.

Material. 23 ♂, 35 ♀, ex *Pyrrhocorax pyrrhocorax*, 8 collections from Nepal, Afghanistan, "Smyrna" (Izmir, Turkey), Crete, Morocco, E. "Persia" (Iran), "Sikkim" (India).

Remarks. This species is readily separated from all others by its very long preconal head seta and minute postconal seta in conjunction with the median sternal plate on VI, unique male genitalia, shape of the head and dorsal plate, lack of small lateral sternal plates on III-VI, and having only 2 marginal setae on tergite IX. Because both sexes have the very long preconal head seta and the male has a median sternite on VI, *P. thryptocephalus* forms a bridge between the preceding 6 louse species with very long preconal or postconal setae and the subsequent 4 in which the male has a median sternite on VI.

We initially believed that our lice from *P. pyrrhocorax* represented a new species and that those from *P. graculus* were *Philopterus thryptocephalus*. However, it became evident that the "Several males and females from *Graculus graculus* (Chitral and Gilgit, N.W. India)" studied by Kellogg and Paine (1914) were actually similar to those represented in our 8 collections from *P. pyrrhocorax*. The lice in the 9 collections from *P. graculus* are definitely not *Philopterus thryptocephalus* and are a new species described be-



Figs. 16–27. (16–19) *P. thryptocephalus*: (16) male head, (17) male terminalia, (18) female terminalia, (19) male genitalia. (20–23) *P. dumani*: (20) male head, (21) female terminalia, (22) male genitalia, (23) male terminalia. (24–27) *P. guttatus*: (24) male head, (25) female terminalia, (26) male genitalia, (27) male terminalia.

low. The multiple collections and the consistent host occurrence of these lice suggest either an error in the Kellogg and Paine (1914) host designation or an unusual occurrence of *P. thryptocephalus* on *Pyrrhocorax graculus*.

Philopterus dumani Price & Hellenthal, new species
(Figs. 20–23)

Type host: *Pyrrhocorax graculus* (L.).

Description. Head (Fig. 20) with preconal seta 0.07–0.11 long, postconal seta not >0.01. Lateral sternites on VI 0.03–0.05 wide, male with prominent median sternite on VI (Fig. 23), female with small median sternite (Fig. 21). Male terminalia as in Fig. 23. Tergal setae: II 17–20, III 19–21, IV-V 21–26, VI 19–22, VII 15–21, VIII 10–16, IX 2–4, without medial division. Sternal setae: II-III 10–16, IV-V 10–13, VI 8–10, VII 2–3. Genitalia as in Fig. 22. Female terminalia as in Fig. 21. Tergal setae: II 17–22, III-VI 20–32, VII 17–25, VIII

11–18, IX 2–4. Sternal setae: II-VI 8–16, VII 2. Subgenital plate with 11–15 marginal setae.

Measurements of Male. DHPW 0.15–0.18, DHPL 0.20–0.26, CONL 0.09–0.10, LACL 0.06–0.07, PRCL 0.20–0.22, TMPW 0.50–0.56, HDL 0.51–0.56, PTXW 0.28–0.32, MTXW 0.42–0.48, ABW5 0.67–0.78, TOTL 1.71–1.86, GENW 0.10–0.11, GENL 0.34–0.40.

Measurements of Female. DHPW 0.16–0.20, DHPL 0.23–0.28, CONL 0.09–0.10, LACL 0.07–0.08, PRCL 0.20–0.25, TMPW 0.57–0.62, HDL 0.54–0.61, PTXW 0.32–0.37, MTXW 0.50–0.55, ABW5 0.75–0.97, SGPW 0.32–0.40, TOTL 1.84–2.27.

Type Material. HOLOTYPE: ♂, ex *Pyrrhocorax graculus*, E. Nepal: Sankhuwa Sabha District, 10 August 1973, HE-0683 (USNM). Paratypes, ex *P. graculus*: 3 ♂, 2 ♀, same data as holotype; 1 ♂, 2 ♀, Switzerland: Andermatt, 20 March 1939, W. Buttiker 802; 1 ♀, Switzerland: Wengen, 2 February 1936, M. Rothschild 38; 6 ♀, Pyrenees, April 1932 (2 different host birds); 2 ♀, Ladak, April 1925; 2 ♂, 1 ♀, Karakoram, July 1925; 1 ♂, 2 ♀, no data, L. Harrison; 1 ♂, 2 ♀, Slovenia, 24 May 1955, L. Brelih (BMNH, OSU, USNM).

Remarks. This species is recognized by both sexes having a median sternite on VI in addition to small lateral sternites. The unique male genitalia and details of head structure and chaetotaxy further support this separation.

Etymology. This species is named for John G. Duman, University of Notre Dame, in recognition of his generous support of the junior author in his work.

Philopterus guttatus (Denny)
(Figs. 24–27)

Docophorus guttatus Denny 1842: 41. Type host: *Corvus monedula* L.

Philopterus serratus Gervais 1844: 341. Type host: *C. monedula*.

Nirmus monedulae Denny 1852: 7. Type host: "Jackdaw" = *C. monedula*. Nom. nov. for *D. guttatus* Denny.

Description. Like *P. dumani*, except as follows. Head (Fig. 24) with dorsal plate as shown. Without lateral sternites on III-VI, male with thin median sternite on VI (Fig. 27), female without such (Fig. 25). Male terminalia as in Fig. 27. Tergal setae: II 21–25, III-V 24–34, VI 21–28, VII 19–24, VIII 13–20, IX 4–5. Sternal setae: IV-V 10–20, VI 8–13, VII 6–7. Genitalia as in Fig. 26. Female terminalia as in Fig. 25. Tergal setae: II 21–26, III-VI 28–36, VII 22–26, VIII 17–21, IX 4–5. Sternal setae: VII 5–6. Subgenital plate with 13–16 marginal setae.

Measurements of Male. DHPL 0.25–0.30, CONL 0.11–0.14, LACL 0.08–0.10, PRCL 0.21–0.27, TMPW 0.57–0.62, HDL 0.60–0.66, PTXW 0.32–0.38, MTXW 0.47–0.53, ABW5 0.78–0.98, TOTL 1.76–1.96, GENW 0.11–0.15.

Measurements of Female. DHPL 0.28–0.34, CONL 0.11–0.15, LACL 0.09–0.11, PRCL 0.24–0.29, TMPW 0.61–0.68, HDL 0.61–0.71, PTXW 0.35–0.40, MTXW 0.51–0.58, ABW5 0.86–1.07.

Material. 29 ♂, 21 ♀, ex *Corvus monedula*, 18 collections from England, Scotland, Poland, Estonia, Germany, Slovenia, Croatia, Israel, Afghanistan, Faroe Is. 1 ♂, ex *Corvus dauuricus* Pallas, 1 collection from China.

Remarks. This species is characterized by its head chaetotaxy, absence of lateral sternal plates on III-VI, at least 4 marginal setae on tergite IX, and its unique male genitalia. Larger measurements and greater numbers of tergal setae further support this separation.

Philopterus lahorensis Ansari
(Figs. 28 and 29)

Philopterus lahorensis Ansari 1955: 57. Type host: *Corvus splendens splendens* Vieillot.

Description. Head (Fig. 1) with preconal and postconal setae 0.06–0.16 long. Tergites with large lighter central area. Lateral sternites on female VI 0.12–0.15 wide, male with prominent median sternite on IV-VI or V-VI (Fig. 28), with lateral sternites only on III-IV. Male terminalia as in Fig. 28. Tergal setae: II 18–24, III-V 20–28, VI 17–24, VII 13–21, VIII 8–13, IX 2–3, with narrow medial division. Sternal setae: II 9, III-V 10–16, VI 10–12, VII 2–5. Genitalia as in Figs. 5 or 8. Female terminalia as in Fig. 29. Tergal setae: II 18–24, III-VI 22–32, VII 18–21, VIII 11–16, IX 2. Sternal setae: II 7–13, III-VI 10–16, VII 2. Subgenital plate with 16–24 marginal setae.

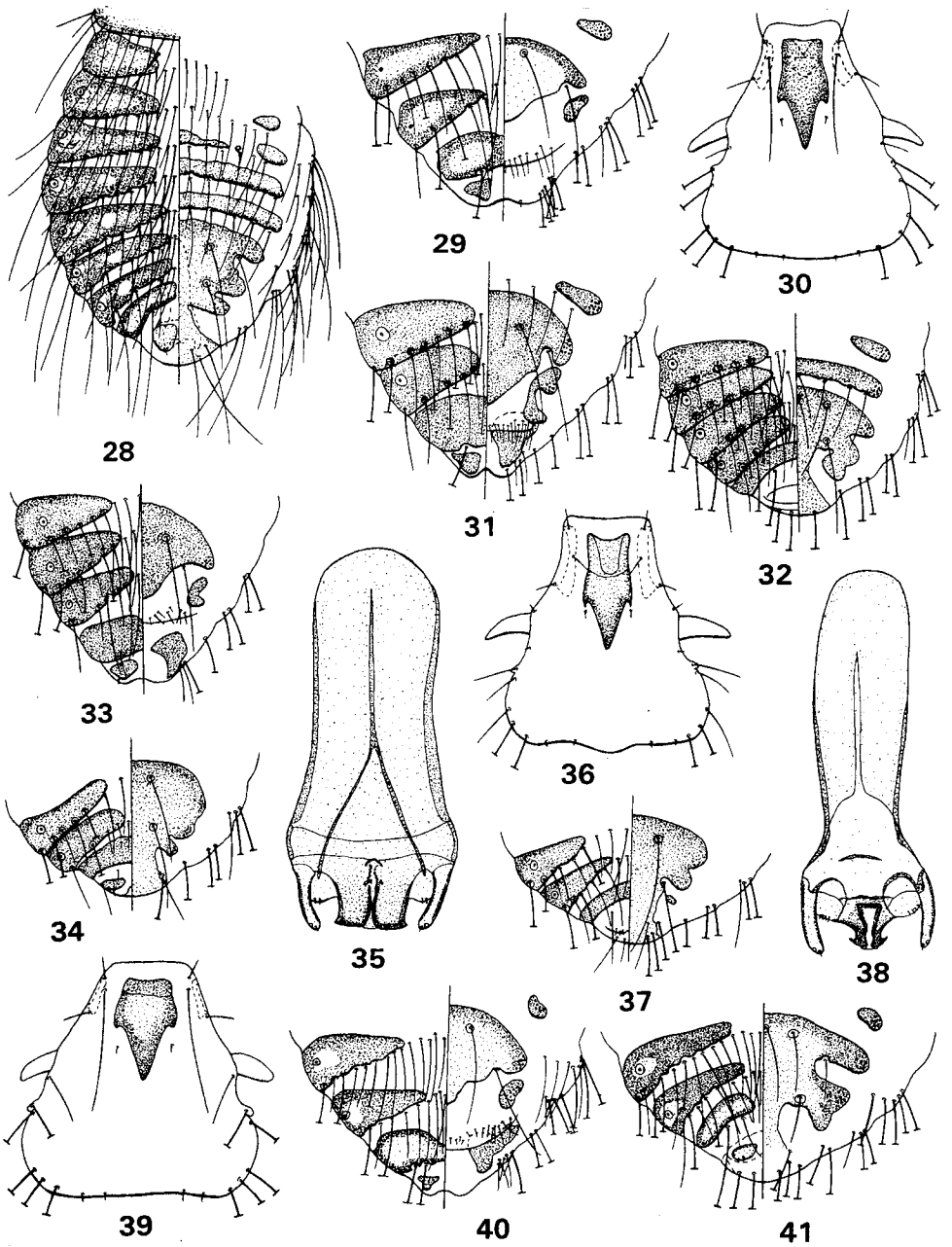
Measurements of Male. DHPW 0.14–0.18, DHPL 0.27–0.33, CONL 0.12–0.14, LACL 0.10–0.12, PRCL 0.25–0.29, TMPW 0.59–0.66, HDL 0.64–0.72, PTXW 0.35–0.41, MTXW 0.54–0.60, ABW5 0.83–0.92, TOTL 1.84–2.07, GENW 0.10–0.11, GENL 0.30–0.38.

Measurements of Female. DHPW 0.14–0.17, DHPL 0.29–0.35, CONL 0.12–0.15, LACL 0.10–0.12, PRCL 0.27–0.31, TMPW 0.66–0.70, HDL 0.70–0.75, PTXW 0.39–0.44, MTXW 0.58–0.63, ABW5 0.88–1.05, SGPW 0.43–0.50, TOTL 2.13–2.41.

Material. 43 ♂, 39 ♀, ex *Corvus splendens*, 7 collections from India, Nepal, "Burma" (Myanmar). 1 ♂, 3 ♀, ex *C. macrorhynchos*, 2 collections from India, Nepal.

Remarks. This is the only known species of *Philopterus* from the Corvidae whose male has the multiple median sternal sclerites. Ansari (1955, 1956, 1958) published *P. lahorensis* as a "sp. nov." 3 different times, a situation common to him but quite contrary to accepted nomenclatorial practice. Only in the last instance did Ansari (1958: 58) provide a description with any meaningful content. The illustrations of an entire male, female terminalia, and male genitalia were of sufficient quality to confirm the correct application of this name to our material.

Although we are suspicious of the 2 collections of *P. lahorensis* from *C. macrorhynchos*, the geographical proximity to *C. splendens* suggests that there might indeed be cases of transfer and establishment on this 2nd host species. The usual *Philopterus* from *C. macrorhynchos* is *P. extraneus* (Piaget).



Figs. 28–41. (28 and 29) *P. lahorensis:* (28) male abdomen, (29) female terminalia. (30–32) *P. cubensis:* (30) male head, (31) female terminalia, (32) male terminalia. (33–35) *P. urocissae:* (33) female terminalia, (34) male terminalia, (35) male genitalia. (36 and 37) *P. emersoni:* (36) male head, (37) male terminalia. (38–41) *P. ocellatus:* (38) male genitalia, (39) male head, (40) female terminalia, (41) male terminalia.

Philopterus cubensis Price & Hellenthal, new species
(Figs. 30–32)

Type host: *Corvus nasicus* Temminck.

Description. Like *P. lahorensis*, except as follows. Head as in Fig. 30. Tergites uniformly dark. Lateral sternites on female VI 0.18–0.19 wide, male with prominent median sternite on VI (Fig. 32), with lateral sternites only on III-V. Male terminalia as in Fig. 32. Tergal setae: II-VII 15–18, IX 2, without medial division. Sternal setae: II-VI 7–12. Genitalia as in Fig. 5. Female terminalia as in Fig. 31. Tergal setae: II-V unknown, VI-VII 17–18. Sternal setae: II-V unknown, VI 8.

Measurements of Male. TMPW 0.57–0.59, MTXW 0.49–0.53, ABW5 0.71–0.78, TOTL 1.63–1.73.

Measurements of Female. TMPW 0.63, PTXW 0.39, MTXW 0.57, ABW5 0.94, TOTL 2.12.

Type Material. HOLOTYPE: ♂, ex *Corvus nasicus*, Cuba, Meinertzhagen 12669 (BMNH). Paratypes: 1 ♂, 1 ♀, same data as holotype (BMNH).

Remarks. The combination of subequally long preconal and postconal head setae, large lateral sternal plate on female VI and large transverse plate on male VI, undivided male tergite IX, presence of only 2 marginal setae on tergite IX, and certain dimensional differences will identify this species.

The preceding 4 species are grouped together on the basis of the male having a transverse sclerite on sternum VI (Fig. 23, arrow) and both the preconal and postconal head setae <0.16 long (Fig. 20, arrows). The hosts for the first 3 are quite close together in the Howard and Moore (1991) and Sibley and Monroe (1990) classifications (Table 1), and only that of the 4th species, *Corvus nasicus*, is distantly removed. This last case represents only a single louse collection and 1 that might prove to be erroneous.

Philopterus urocissae Price & Hellenthal, new species
(Figs. 33–35)

Type host: *Urocissa caerulea* Gould.

Description. Head close to Fig. 36, preconal seta 0.03–0.05 long, postconal seta not >0.01. Tergites uniformly dark. Without lateral sternites on III-VI. Male terminalia as in Fig. 34. Tergal setae: II 10–14, III-VII 12–19, VIII 8–12, IX 2, without medial division. Sternal setae: II-VI 5–10, VII 2. Genitalia as in Fig. 35, with uniquely shaped mesosomal structures. Female terminalia as in Fig. 33. Tergal setae: II 10–15, III-VII 12–19, VIII 8–13, IX 2. Sternal setae: II-VI 4–9, VII 2–4. Subgenital plate with 11–17 marginal setae.

Measurements of Male. DHPW 0.13–0.17, DHPL 0.28–0.34, CONL 0.10–0.12, LACL 0.12–0.16, PRCL 0.26–0.30, TMPW 0.56–0.65, HDL 0.63–0.72, PTXW 0.34–0.41, MTXW 0.49–0.58, ABW5 0.78–0.91, TOTL 1.72–1.93, GENW 0.12–0.16, GENL 0.27–0.34.

Measurements of Female. DHPW 0.14–0.18, DHPL 0.30–0.36, CONL 0.11–0.15, LACL 0.13–0.16, PRCL 0.26–0.31, TMPW 0.59–0.70, HDL 0.66–0.76, PTXW 0.35–0.45, MTXW 0.54–0.68, ABW5 0.81–1.01, SGPW 0.37–0.49, TOTL 2.06–2.38.

Type Material. HOLOTYPE ♂, ex *Urocissa caerulea*, Taiwan: Liukuei, T. C. Maa, TMT-1642 (USNM). Paratypes: 1 ♂, 5 ♀, same data as holotype (UM, USNM).

Other Material. 2 ♂, 6 ♀, ex *U. erythrorhyncha* (Boddaert), 5 collections from Nepal, Pakistan, "Burma." 1 ♂, ex *U. flavirostris* (Blyth), 1 collection from India. 3 ♂, 9 ♀, ex "Magpie," 2 collections from Nepal.

Remarks. This is the 1st of 2 species that easily are distinguished from all other *Philopterus* on the Corvidae by their unusual male genitalia and the absence of lateral sternites on III-VI.

Philopterus emersoni Price & Hellenthal, new species
(Figs. 36 and 37)

Type host: *Dendrocitta formosae* Swinhoe.

Description. Like *P. urocissae*, except as follows. Head as in Fig. 36. Male terminalia as in Fig. 37. Tergal setae: II 12–16, III-VII 16–23, VIII 8–15. Sternal setae: II-VI 8–13. Female terminalia near Fig. 33, but with widely spaced tergites on VII. Tergal setae: II 17–19, III-VI 20–25, VII 18–20, VIII 15. Sternal setae: II-VI 10–12. Subgenital plate with 21–22 marginal setae.

Measurements of Male. TMPW 0.54–0.57, HDL 0.61–0.66, PTXW 0.31–0.37, MTXW 0.44–0.50, ABW5 0.72–0.82, TOTL 1.59–1.71.

Measurements of Female. TMPW 0.59–0.60, HDL 0.68–0.69, PTXW 0.36–0.38, MTXW 0.52–0.54, ABW5 0.86–0.89, SGPW 0.40–0.42, TOTL 1.89–2.01.

Type Material. HOLOTYPE: ♂, ex *Dendrocitta formosae*, Thailand: Loei, Dai Sai, Kok Sathon, Phu Lom Lo Mt., 27 February 1955, R. E. Elbel, RE-4811 (OSU). Paratypes, ex *D. formosae*: 1 ♂, same data as holotype; 2 ♂, Taiwan: Liukuei, T. C. Maa, TMT-1603; 1 ♂, 1 ♀, Pakistan: Manipur, Kangpokpi, 25 January 1952; 1 ♂, 1 ♀, China: Foochow, 7 April 1922, C. R. Kellogg (BMNH, UM).

Remarks. This species is close to *P. urocissae*, but is separable by having long setae on the margin of tergite IX, consistently smaller measurements, and more tergal and sternal setae.

Etymology. This species is named for the late K. C. Emerson in recognition of his many contributions to our knowledge of chewing lice.

Philopterus ocellatus (Scopoli)
(Figs. 38–41)

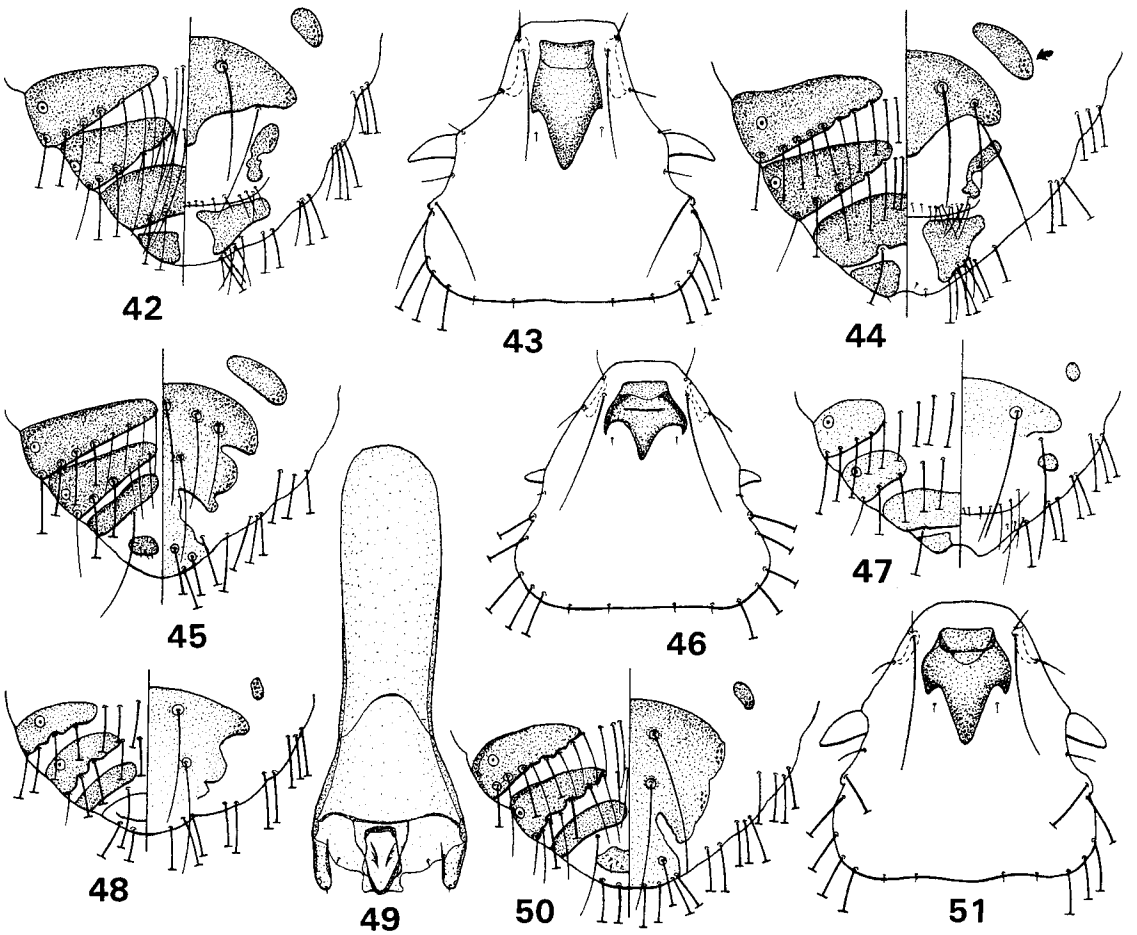
Pediculus ocellatus Scopoli 1763: 382. Type host: "Corvi Cornicis" = *Corvus corone* L.

Pediculus cornicis J C F. 1775: 807. Type host: *C. corone*. Nom. nov. for *P. ocellatus* Scopoli.

Docophorus rotundatus Piaget 1880: 47. Type host: *C. corone*.

Description. Head (Fig. 39) with preconal seta 0.05–0.08 long, postconal seta 0.08–0.18 long. Terminal tergites lightly pigmented. Lateral sternite on VI 0.07–0.12 wide. Male terminalia as in Fig. 41. Tergal setae: II 21–27, III-VI 24–38, VII 20–30, VIII 13–20, IX 4, with medial division. Sternal setae: II-VI 9–16, VII 3–7. Sixty percent of specimens with genitalia as in Fig. 38 with sharp lateral angles distally on mesosome, anterior-posterior reversal of mesosomal parts in 40%. Female terminalia as in Fig. 40. Tergal setae: II 23–28, III-VI 24–37, VII 21–29, VIII 17–21, IX 3–4. Sternal setae: II-VI 10–16, VII 2–3. Subgenital plate with 20–29 marginal setae.

Measurements of Male. DHPW 0.17–0.21, DHPL 0.28–0.34, CONL 0.11–0.15, LACL 0.09–0.12, PRCL 0.22–0.31, TMPW 0.66–0.78, HDL 0.70–0.78, PTXW



Figs. 42–51. (42) *P. dalgleishi*, female terminalia. (43–45) *P. extraneus:* (43) male head, (44) female terminalia, (45) male terminalia. (46–49) *P. stegmanni:* (46) male head, (47) female terminalia, (48) male terminalia, (49) male genitalia. (50 and 51) *P. picae:* (50) male terminalia, (51) male head.

0.39–0.48, MTXW 0.51–0.69, ABW5 0.87–1.13, TOTL 2.06–2.55, GENW 0.12–0.15, GENL 0.40–0.52.

Measurements of Female. DHPW 0.16–0.21, DHPL 0.30–0.35, CONL 0.12–0.16, LACL 0.10–0.14, PRCL 0.25–0.33, TMPW 0.66–0.81, HDL 0.69–0.82, PTXW 0.40–0.49, MTXW 0.57–0.72, ABW5 0.83–1.21, SGPW 0.45–0.55, TOTL 2.02–2.66.

Material. 58 ♂, 56 ♀ (including neotype ♂, 32 ♂, 29 ♀ neoparatypes (BMNH) of *P. ocellatus*), ex *Corvus corone*, 28 collections from England, Ireland, Sweden, Estonia, Yugoslavia, "Palestine," Cyprus, Crete, Egypt, Afghanistan, Japan, "Asia Minor" (most of Asiatic Turkey), Faroe Is.

Remarks. The distinctive distal barbs on the male genitalic mesosome, the medially narrowed female tergite IX, and the pale area within tergite IX of both sexes, in conjunction with the preconal head setae being shorter than the postconal setae, will separate this species.

Clay and Hopkins (1951) discuss the status of this species, providing a number of useful illustrations and fixing its identity with the erection of a neotype. We have studied this neotype and a large number of neoparatypes and agree with them in the validity of this species.

Philopterus dalgleishi Price & Hellenthal, new species
(Fig. 42)

Type host: *Corvus tasmanicus* Mathews.

Description. Much like *P. ocellatus*, except as follows. Head with postconal seta 0.05–0.07 long. Tergites uniformly dark. Male tergal setae: II 18–21, III-VI 18–26, VII 16–22, VIII 10–13. Sternal setae: IV-VI 9–14. Genitalia as in Fig. 8. Female terminalia as in Fig. 42. Tergal setae: II 17–22, III-VI 21–27, VII 19–21, VIII 12–15.

Measurements of Male. DHPL 0.27–0.31, LACL 0.09–0.10, PRCL 0.25–0.29, TMPW 0.65–0.72, HDL

0.69–0.78, PTXW 0.40–0.45, MTXW 0.58–0.65, ABW5 0.91–1.04, TOTL 2.05–2.27, GENL 0.36–0.45.

Measurements of Female. DHPL 0.29–0.33, DHPW 0.18–0.21, CONL 0.12–0.15, LACL 0.09–0.11, TMPW 0.76–0.80, PTXW 0.45–0.51, MTXW 0.68–0.74, ABW5, 1.11–1.24, SGPW 0.54–0.59, TOTL 2.51–2.75.

Type Material. HOLOTYPE: ♂, ex *Corvus tasmanicus*, Tasmania: Brooks Creek, 21 November 1981, R. H. Green (OSU). Paratypes: 12 ♂, 10 ♀, same data as holotype (OSU).

Remarks. This species is separated from *P. ocellatus* by having a shorter postconal head seta, fewer tergal setae, male genitalia without the pronounced barb on the distal mesosome, uniformly pigmented tergites, and the female with a larger terminal tergal plate and broader tergite IX.

Etymology. This species is named for Robert C. Dalgleish in recognition of his deep interest in the chewing lice.

Philopterus craigi Price & Hellenthal, new species

Type host: *Corvus coronoides* Vigors & Horsfield.

Description. Like *P. ocellatus*, except as follows. Head postconal seta 0.07–0.10 long. Tergites uniformly dark. Male tergal setae: II 20, III-VI 19–23, VII 17, VIII 12. Terminalia and genitalia like *P. dalgleishi*. Female terminalia as in Fig. 42. Tergal setae: II 19–22, III-VI 20–28, VII 17–19, VIII 10–13.

Measurements of Male. DHPW 0.15–0.19, DHPL 0.24–0.27, CONL 0.10–0.12, LACL 0.08–0.10, PRCL 0.22–0.27, TMPW 0.57–0.69, HDL 0.62–0.71, PTXW 0.35–0.41, MTXW 0.53–0.60, ABW5 0.82–1.00, TOTL 1.85–1.86.

Measurements of Female. DHPW 0.15–0.17, DHPL 0.27–0.30, CONL 0.10–0.12, TMPW 0.60–0.69, HDL 0.66–0.72, PTXW 0.38–0.42, MTXW 0.56–0.65, ABW5 0.82–0.98, SGPW 0.46–0.50, TOTL 2.04–2.05.

Type Material. HOLOTYPE: ♂, ex *Corvus coronoides*, W. Australia: S. Perth Zoo, 1967, R. H. Stranger (BMNH). Paratypes, ex *C. coronoides*: 1 ♂, Tasmania: Middleton, 3 April 1961, T. Wolfe; 1 ♀, Australia: George's Basin, L. Harrison; 1 ♂, no data, L. Harrison (BMNH).

Other Material. 2 ♀, ex *C. bennetti* North, 2 collections from Australia.

Remarks. This species is separated from *P. ocellatus* by its smaller measurements, fewer tergal setae, absence of pronounced barbs on the distal mesosome of the male genitalia, and female with larger tergite IX and terminal tergite. It is separated from *P. dalgleishi* by its longer postconal head setae, its smaller measurements, and female with fewer tergal setae on VII-VIII.

The preceding 3 species are grouped together on the basis of their having usually 4 (2+2), less often 3 (2+1), marginal setae on tergite IX along with medium to long preconal and postconal head setae and relatively small lateral sternites on III-VI. An examination of the placement by Howard and Moore (1991) and Sibley and Monroe (1990) of the 4 *Corvus* species serving as hosts for these louse species reveals that they are grouped closely together (Table 1), again suggesting a possible louse support of presumed avian classification, or vice versa.

Etymology. This species is named for the late George B. Craig, Jr., in recognition of his contributions to the field of medical entomology and his interest in our work on lice.

Philopterus extraneus (Piaget)
(Figs. 43–45)

Docophorus extraneus Piaget 1885: 3. Type host: *Corvus macrorhynchos* Wagler.

Description. Head (Fig. 43) with preconal and postconal seta 0.04–0.16 long. Tergites uniformly dark. Lateral sternite on VI 0.14–0.21 wide. Male terminalia as in Fig. 45. Tergal setae: II 16–21, III-VI 17–30, VII 13–22, VIII 9–15, IX 2–4, with medial division. Sternal setae: II-V 7–16, VI 8–12, VII 4–7. Genitalia as in Fig. 8. Female terminalia as in Fig. 44. Tergal setae: II 18–21, III-VI 18–31, VII 14–23, VIII 11–16, IX 2–4. Sternal setae: II-V 8–17, VI 7–14, VII 2–5. Subgenital plate with 17–28 marginal setae.

Measurements of Male. DHPW 0.14–0.18, DHPL 0.27–0.35, CONL 0.10–0.15, LACL 0.09–0.12, PRCL 0.23–0.31, TMPW 0.61–0.70, HDL 0.64–0.76, PTXW 0.37–0.46, MTXW 0.53–0.63, ABW5 0.78–0.99, TOTL 1.85–2.14, GENW 0.11–0.14, GENL 0.33–0.42.

Measurements of Female. DHPW 0.15–0.19, DHPL 0.26–0.37, CONL 0.12–0.15, LACL 0.10–0.14, PRCL 0.25–0.33, TMPW 0.68–0.76, HDL 0.71–0.81, PTXW 0.40–0.50, MTXW 0.61–0.73, ABW5 0.98–1.12, SGPW 0.50–0.58, TOTL 2.29–2.60.

Material. 61 ♂, 35 ♀ (including lectotype ♂ (BMNH) of *P. extraneus*), ex *Corvus macrorhynchos*, 28 collections from Afghanistan, India, "Ceylon" (Sri Lanka), Nepal, Thailand, "Burma," Malay Peninsula, Taiwan, Philippines.

Remarks. This species and the next are best recognized by their very large lateral sternites on VI and uniformly dark-pigmented tergites. Our study of the lectotype male of *P. extraneus* and comparison of it to other series of lice have convinced us that this species is the common and widespread parasite of *C. macrorhynchos*.

Philopterus palmai Price & Hellenthal, new species

Type host: *Corvus moneduloides* Lesson.

Description. Like *P. extraneus*, except as follows. Head near Fig. 43, but with postconal seta <0.01 long. Male tergal setae: II 14, III-VI 14–15, VII 13, VIII 9, IX 2. Sternal setae: II-VI 6–8. Genitalia as in Fig. 5. Female tergal setae: II 13, III-VI 15–17, VII 12, VIII 9, IX 2. Sternal setae: II-VI 6–8.

Measurements of Male. ABW5 0.77, GENW 0.10.

Measurements of Female. CONL 0.11, TMPW 0.63, HDL 0.68, MTXW 0.59, ABW5 0.84, SGPW 0.48, TOTL 2.05.

Type Material. HOLOTYPE: ♂, ex *Corvus moneduloides*, New Caledonia: Gilles, 6 August 1983, P. Millener (MNZ). Paratype: 1 ♀, same data as holotype (MNZ).

Remarks. This species is separable from *P. extraneus* by its extremely small to absent postconal head seta coupled with somewhat smaller female measurements and consistently fewer tergal setae.

Etymology. This species is named for Ricardo L. Palma, Museum of New Zealand, in recognition of his deep interest in chewing louse taxonomy and for his cooperative studies with us.

Philopterus stegmanni Clay
(Figs. 46–49)

Philopterus stegmanni Clay 1936: 905. Type host: *Podoces pleskei* Zarudny.

Description. Head (Fig. 46) with preconal seta 0.05–0.06 long, postconal seta not >0.01. Tergites uniformly dark. Lateral sternite on VI 0.05–0.06 wide. Male terminalia as in Fig. 48. Tergal setae: II 11–15, III-VI 13–16, VII 12, VIII 10, IX 2, with medial division. Sternal setae: II 5–7, III-V 8–11, VI 7–9, VII 2. Genitalia as in Fig. 49. Female terminalia as in Fig. 47. Tergal setae: II 13–14, III-VI 14–21, VII 13–16, VIII 8–10, IX 2. Sternal setae: II 4–5, III-VI 8–9, VII 2. Subgenital plate with 10–13 marginal setae, long laterally, short medially.

Measurements of Male. DHPW 0.20–0.21, DHPL 0.18–0.22, CONL 0.06–0.07, LACL 0.08–0.10, PRCL 0.24–0.26, TMPW 0.57–0.61, HDL 0.59–0.61, PTXW 0.30–0.31, MTXW 0.47–0.52, ABW5 0.67–0.83, TOTL 1.80–1.82, GENW 0.11–0.12, GENL 0.32–0.33.

Measurements of Female. DHPW 0.21–0.24, DHPL 0.19–0.22, CONL 0.06–0.08, LACL 0.09–0.10, PRCL 0.23–0.27, TMPW 0.63–0.67, HDL 0.61–0.65, PTXW 0.31–0.36, MTXW 0.52–0.57, ABW5 0.79–0.82, SGPW 0.43–0.48, TOTL 1.87–2.00.

Material. 2 ♂, 2 ♀ (including HOLOTYPE: ♀, 2 ♂, 1 ♀ paratypes (BMNH) of *P. stegmanni*), ex *Podoces pleskei*, 1 collection from E. "Persia." 1 ♂, 1 ♀, ex *P. panderi* Fischer, 2 collections from "Turkestan" (Turkistan).

Remarks. This species is unique among the corvid *Philopterus* because of the shape and size of the head and dorsal plate, the extremely small coni, the chaetotaxy of the head and female subgenital plate, and the somewhat unusual male genitalia.

Philopterus picae (Denny)
(Figs. 50 and 51)

Docophorus picae Denny 1842: 41. Type host: "Pica caudata" = *Pica pica pica* (L.).

Docophorus subcrassipes Nitzsch 1866: 116. Type host: "Corvo pica" = *P. p. pica.*

Docophorus singularis Kellogg and Chapman 1899: 61. Type host: "Dryobates nuttallii"—error. Probably mistranscription of *Pica nuttalli* (Audubon).

Description. Head (Fig. 51) with preconal and postconal setae 0.03–0.06 long. Tergites uniformly dark. Lateral sternite on VI 0.05–0.08 wide. Male terminalia as in Fig. 50. Tergal setae: II 20–23, III-VI 24–31, VII 21–23, VIII 12–17, IX 2, with medial division. Sternal setae: II 10–11, III-V 11–18, VI 10–13, VII 2–3. Genitalia as in Fig. 8. Female terminalia close to Fig. 55. Tergal setae: II 21–26, III-VI 24–35, VII 21–26, VIII 12–18, IX 2. Sternal setae: II 9–11, III-VI 11–16, VII 2. Subgenital plate with 16–27 marginal setae, shorter than in Fig. 55.

Measurements of Male. DHPW 0.17–0.20, DHPL 0.23–0.26, CONL 0.10–0.14, LACL 0.07–0.09, PRCL 0.23–0.27, TMPW 0.57–0.62, HDL 0.60–0.66, PTXW 0.31–0.35, MTXW 0.49–0.52, ABW5 0.81–0.89, TOTL 1.85–1.95, GENW 0.11–0.12, GENL 0.34–0.37.

Measurements of Female. DHPW 0.18–0.23, DHPL 0.25–0.30, CONL 0.11–0.14, LACL 0.07–0.10, PRCL 0.24–0.28, TMPW 0.61–0.70, HDL 0.62–0.71, PTXW 0.33–0.39, MTXW 0.51–0.60, ABW5 0.87–1.04, SGPW 0.45–0.53, TOTL 1.89–2.38.

Material. 19 ♂, 30 ♀, ex *Pica pica*, 11 collections from USA, Croatia, Afghanistan. 11 ♂, 19 ♀, ex *P. nuttalli*, 2 collections from USA.

Remarks. The small size of the lateral sternites on VI, the short lateral head carina length, presence of only 2 (1+1) marginal setae on tergite IX, and preconal and postconal head setae <0.07 long will distinguish this species.

Philopterus underwoodi (Carriker)
(Figs. 52 and 53)

Docophorus underwoodi Carriker 1903: 130. Type host: "Psilorhinus mexicanus" =*Psilorhinus morio* (Wagler).

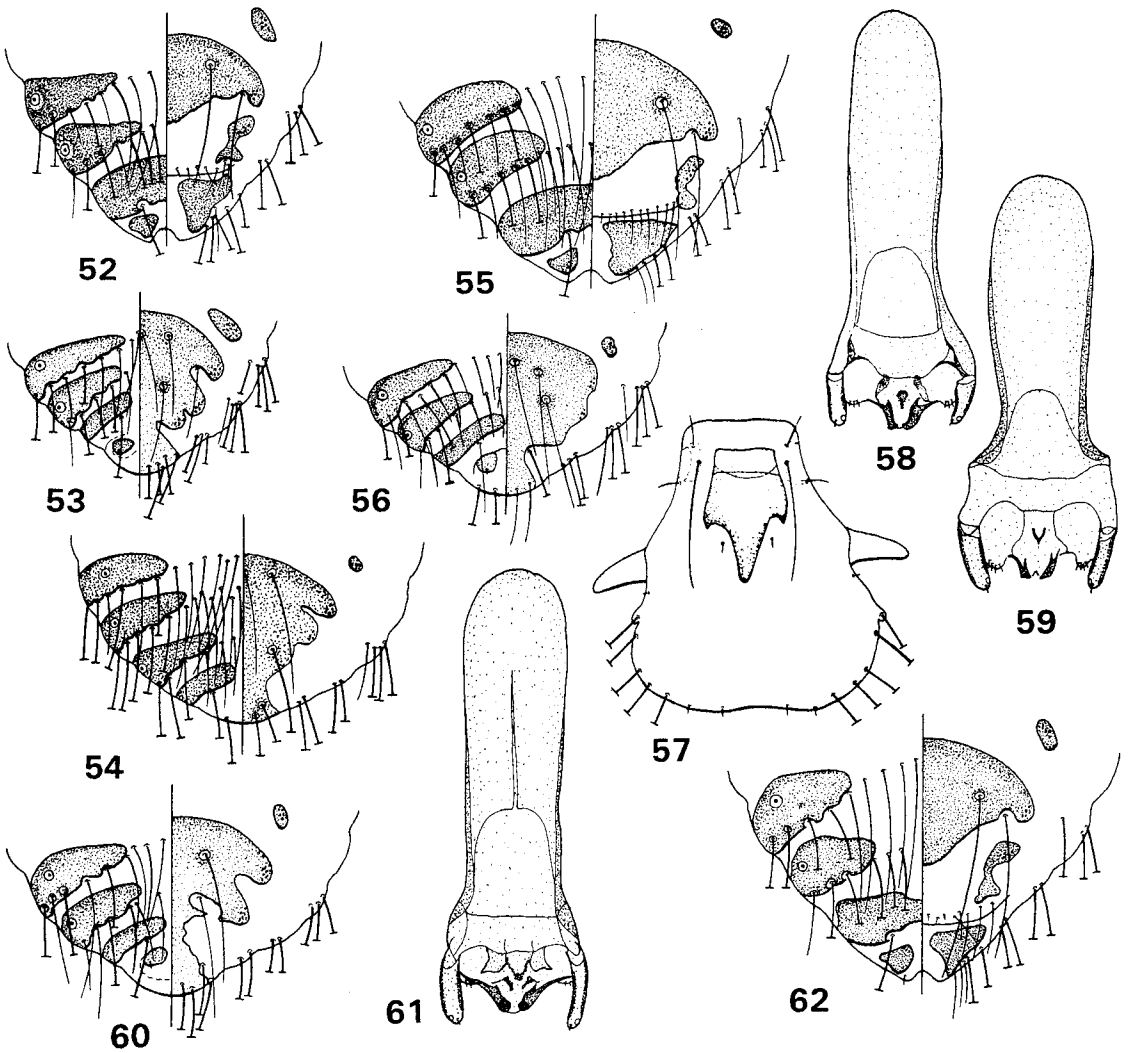
Description. Like *P. picae*, except as follows. Head near Fig. 43. Lateral sternite on VI 0.09–0.12 wide. Male terminalia as in Fig. 53. Tergal setae: II 13–19, III 16–20, IV-VI 16–22, VII 14–18, VIII 9–12. Sternal setae: II 6–8, III-VI 7–11, VII 3–4. Female terminalia as in Fig. 52. Tergal setae: II 16–19, III-V 19–24, VI 17–22, VII 16–20, VIII 10–15. Sternal setae: III-VI 8–12, VII 2–4. Subgenital plate with 13–19 marginal setae.

Measurements of Male. DHPW 0.12–0.15, DHPL 0.29–0.32, LACL 0.10–0.11, PRCL 0.26–0.30, TMPW 0.57–0.58, HDL 0.63–0.67, PTXW 0.35–0.38, ABW5 0.67–0.79, TOTL 1.73–1.81, GENL 0.31–0.35.

Measurements of Female. DHPW 0.12–0.16, DHPL 0.31–0.36, LACL 0.11–0.14, PRCL 0.27–0.33, HDL 0.69–0.73, PTXW 0.40–0.42, ABW5 0.80–1.01, SGPW 0.42–0.48.

Material. 8 ♂, 9 ♀ (including 1 ♂, 2 ♀ paratypes (OSU) of *P. underwoodi*), ex *Psilorhinus morio*, 4 collections from Mexico, Costa Rica.

Remarks. This species is separated from *P. picae* by its larger lateral sternites on VI, different shape and measurements of the dorsal head plate, fewer tergal and sternal setae, and longer lateral head carina and preconal region.



Figs. 52–62. (52 and 53) *P. underwoodi:* (52) female terminalia, (53) male terminalia. (54) *P. crassipes,* male terminalia. (55–58) *P. garruli:* (55) female terminalia, (56) male terminalia, (57) male head, (58) male genitalia. (59) *P. martinezi,* male genitalia. (60–62) *P. phillipi:* (60) male terminalia, (61) male genitalia, (62) female terminalia.

Philopterus osborni Edwards

Lipeurus corvi Packard 1870: 95 (nec L. 1758). Type host: "Crow"—most likely *Corvus brachyrhynchos* (Brehm).

Docophorus corvi Osborn 1896: 220 (nec L. 1758). Type host: "Corvus americanus" = *C. brachyrhynchos.*

Philopterus osborni Edwards 1952: 27. Type host: *C. brachyrhynchos.* Nom. nov. for *D. corvi* Osborn.

Description. Like *P. picae,* except as follows. Head close to Fig. 39, with preconal seta 0.04–0.09, postconal seta 0.06–0.16 long. Lateral sternite on VI 0.09–0.13 wide. Male terminalia as in Fig. 53. Tergal setae: II 15–23, III 21–27, IV-VI 19–29, VII 18–24, VIII 12–22. Sternal setae: II 9–13, III-V 9–16, VI 9–13, VII 2–6. Female terminalia close to Fig. 52. Tergal setae: II 17–24, III-VI 21–33, VII 18–24, VIII 11–19, IX 1–2. Sternal setae: II 8–13, III-IV 10–17, V-VI 8–14.

Measurements of Male. DHPW 0.14–0.20, DHPL 0.26–0.33, LACL 0.09–0.15, PRCL 0.23–0.31, TMPW 0.58–0.74, HDL 0.63–0.75, PTXW 0.34–0.49, MTXW 0.47–0.67, ABW5 0.73–1.18, TOTL 1.80–2.43, GENL 0.35–0.45.

Measurements of Female. DHPW 0.14–0.20, DHPL 0.26–0.36, LACL 0.10–0.15, PRCL 0.23–0.32, TMPW 0.63–0.78, HDL 0.69–0.81, PTXW 0.38–0.49, MTXW 0.56–0.74, ABW5 0.79–1.17, TOTL 1.97–2.70.

Material. 89 ♂, 113 ♀, ex *Corvus brachyrhynchos,* 42 collections from USA, Canada. 7 ♂, 5 ♀, ex *C. cryptoleucus* Couch, 5 collections from USA, Mexico. 6 ♂, 3 ♀, ex *C. caurinus* Baird, 2 collections from USA. 13 ♂, 20 ♀, ex *C. corax,* 3 collections from USA. 5 ♂, 20 ♀, ex *C. ossifragus* Wilson, 5 collections from USA.

Remarks. As with *P. underwoodi*, this species is separated from *P. picae* by its larger lateral sternites on VI, different shape and measurements of the dorsal head plate, fewer tergal and sternal setae, and longer lateral head carina and preconal region. It is distinguished from *P. underwoodi* by having larger measurements and more tergal and sternal setae.

Hopkins and Clay (1953) placed *P. osborni* as a synonym of *P. ocellatus*. Current practice follows Emerson (1972) in recognizing *P. osborni* as a subspecies of *P. ocellatus*. However, although there are many similarities between these 2 taxa, the presence of only 2 marginal setae on tergite IX of *P. osborni*, as well as fewer tergal setae on most segments and different mesosome structure of the male genitalia, provides a clear separation of these. This is further supported by differences in some measurements. *Philopterus ocellatus* is restricted to an Old World host, *Corvus corone*, whereas *P. osborni* is found on 5 species of *Corvus* in North America (Table 1).

We are suspicious of the host accuracy for the 3 collections from *C. corax*, as the usual parasite of this host is *P. corvi*. However, its being based on multiple collections, all in the northwestern USA, suggests the possibility that *P. osborni* may on occasion become established on *P. corax*. There is no obvious close relationship other than the geographical proximity of the 5 *Corvus* host species for *P. osborni*, based on the Howard and Moore (1991) and Sibley and Monroe (1990) sequence.

Philopterus crassipes (Burmeister)
(Fig. 54)

Docophorus crassipes Burmeister 1838: 425. Type host: "Corvus caryocatactes" = *Nucifraga caryocatactes* (L.).

Philopterus crassiceps Harrison 1916: 92. Type host: *N. caryocatactes*. Nom. nov. for *D. crassipes* Burmeister.

Philopterus cristata Malcomson 1929: 729. Type host: *Cyanocitta cristata cristata* (L.). New synonymy.

Philopterus vagabunda Ansari 1955: 52. Type host: *Dendrocitta vagabunda pallida* (Blyth). New synonymy.

Description. Head near Fig. 57, with preconal seta 0.03–0.09 long, postconal seta not >0.01. Tergites uniformly dark. Lateral sternite on VI 0.04–0.10 wide. Male terminalia as in Fig. 54. Tergal setae: II 18–24, III-VI 19–32, VII 17–26, VIII 10–18, IX 2, with medial division. Sternal setae: II 8–11, III-V 10–18, VI 9–13, VII 2–3. Genitalia as in Fig. 58. Female terminalia close to Fig. 55. Tergal setae: II 18–29, III-VI 21–36, VII 19–32, VIII 13–20, IX 2. Sternal setae: II 7–12, III-V 10–21, VI 9–15, VII 4–5. Subgenital plate with 14–22 marginal setae.

Measurements of Male. DHPW 0.14–0.19, DHPL 0.23–0.31, CONL 0.09–0.12, LACL 0.08–0.11, PRCL 0.20–0.28, TMPW 0.51–0.63, HDL 0.54–0.67, PTXW 0.27–0.36, MTXW 0.41–0.54, ABW5 0.64–0.94, TOTL 1.57–2.06, GENW 0.10–0.12, GENL 0.24–0.36.

Measurements of Female. DHPW 0.15–0.21, DHPL 0.25–0.34, CONL 0.09–0.14, LACL 0.08–0.14, PRCL 0.21–0.30, TMPW 0.56–0.70, HDL 0.59–0.71, PTXW 0.31–0.39, MTXW 0.45–0.61, ABW5 0.72–1.03, SGPW 0.39–0.53, TOTL 1.73–2.32.

Material. 10 ♂, 20 ♀, ex *Nucifraga caryocatactes*, 5 collections from France, Italy, Estonia, Siberia, Taiwan. 15 ♂, 13 ♀, ex *N. columbiana* (Wilson), 10 collections from USA, Canada. 30 ♂, 48 ♀, ex *Cyanocitta cristata*, 23 collections from USA, Canada. 8 ♂, 30 ♀, ex *C. stelleri* (Gmelin), 10 collections from USA, Mexico. 9 ♂, 22 ♀, ex *Aphelocoma coerulescens* (Bosc), 3 collections from USA, Mexico. 6 ♂, 3 ♀, ex *A. ultramarina* Bonaparte, 1 collection from USA. 14 ♂, 14 ♀, ex *Dendrocitta vagabunda* (Latham), 2 collections from India, Nepal.

Remarks. This species is very close to *P. garruli* Boisduval and Lacordaire, the females being inseparable and the males tenuously separated on the basis of the deeply incised lateral margin of the subgenital plate and the presence of only 2–3 setae on the sternite VII portion of this plate.

When Malcomson (1929) described *P. cristata*, he only compared his material with *P. thryptocephalus*, a species that we agree is quite different from *P. cristata*. However, he failed to grasp the similarity of his material to that of the widespread *P. crassipes*. Ansari (1955) provided no comparison of *P. vagabunda* with any other taxa, other than to state it differed from other corvid *Philopterus*. Apparently, he was relying completely on its being from a unique host.

Philopterus garruli Boisduval & Lacordaire
(Figs. 55–58)

Philopterus garruli Boisduval and Lacordaire 1835: 120. Type host: "Geai" = *Garrulus glandarius* (L.).

Docophorus fulvus Burmeister 1838: 425. Type host: "Corv. glandarius" = *G. glandarius*.

Nirmus glandarii Denny 1852: 8. Type host: "Jay" = *G. glandarius*. Nom. nov. for *D. fulvus* Burmeister.

Description. Very close to *P. crassipes*, except as follows. Head as in Fig. 57. Lateral sternite on VI 0.05–0.06 wide. Male terminalia as in Fig. 56. Tergal setae: II 17–20, III-VII 20–24, VIII 11–12. Sternal setae: II 8–10, III-VI 8–12, VII 4. Genitalia as in Fig. 58. Female terminalia as in Fig. 55. Sternal setae: II 7–9, III-VI 8–15.

Material. 3 ♂, 10 ♀, ex *Garrulus glandarius*, 4 collections from Poland, Korea, Taiwan.

Remarks. As stated under *P. crassipes*, these 2 species are very close, the females inseparable and the males recognized only by *P. garruli* having the subgenital plate without deep lateral incisions and with 4 setae in region of sternite VII.

Philopterus martinezi Rodriguez Caabeiro et al. (Fig. 59)

Philopterus martinezi Rodriguez Caabeiro, Jimenez Gonzalez & Martin Mateo 1982: 217. Type host: *Cyanopica cyana cooki* (Bonaparte).

Description. Like *P. crassipes*, except as follows. Lateral sternite on VI 0.08–0.10 wide. Male sternal setae: III-V 10–13. Genitalia as in Fig. 59, with small clearly defined V-shaped structure in mesosome. Female sternal setae: III-VI 9–14.

Measurements of Male. DHPL 0.20–0.21, TMPW 0.51–0.54, LACL 0.06–0.07, PRCL 0.19–0.20, HDL 0.53–0.54.

Measurements of Female. DHPL 0.19–0.27, TMPW 0.57–0.62, LACL 0.07–0.08, PRCL 0.19–0.24, HDL 0.56–0.61.

Material. 2 ♂, 8 ♀, ex *Cyanopica cyana* (Pallas), 3 collections from Korea.

Remarks. Very close to the other 3 species of the group, specimens of *P. martinezi* are tenuously separable by a combination of lateral sternite on VI at least 0.08 wide, shorter head and dorsal head plate, lateral head carina length not >0.08, and details of the male genitalia.

Philopterus phillipi Emerson (Figs. 60–62)

Philopterus phillipi Emerson 1953: 132. Type host: "Cyanocephalus cyanocephalus" = *Gymnorhinus cyanocephalus* (Wied).

Description. Like *P. crassipes*, except as follows. Lateral sternite on VI 0.05–0.08 wide. Male terminalia as in Fig. 60, or with deep incision partially to completely separating sternite VII from VIII. Tergal setae: V-VI 20–26, VII 16–20, VIII 11–12. Sternal setae: III-IV 10–13, V-VI 9–10. Genitalia as in Fig. 61. Female terminalia as in Fig. 62. Tergal setae: VII 15–20, VIII 10–13. Sternal setae: III-VI 9–14.

Measurements of Male. DHPL 0.21–0.24, LACL 0.08–0.10.

Measurements of Female. DHPL 0.24–0.28, LACL 0.09–0.11.

Material. 11 ♂, 14 ♀ (including 2 ♂, 2 ♀ paratypes (OSU) of *P. phillipi*), ex *Gymnorhinus cyanocephalus*, 5 collections from the United States.

Remarks. This species is separated from *P. crassipes* and *P. garruli* by both sexes with a shorter dorsal head plate, female tergum VII with not > 20 setae, and male with unique genitalia and often severe separation of sternite VII from remainder of subgenital plate. It is differentiated from *P. martinezi* by its greater lateral head carina length and smaller lateral sternite on VI, in addition to differences in the male genitalia and subgenital plate.

The description by Emerson (1953) is so generalized that it could be applied to many other *Philopterus* species. The illustrations of the dorsal male and male genitalia add little to clarify the species. Unfortunately, the specimens of the type series are so poorly prepared as to make precise observation difficult. We were able, however, to obtain additional type host material and formulate our description from that.

Nomen Dubium

Docophorus fuscatus Nitzsch [In Giebel] 1866: 359. Type host: *Cyanocorax cristatellus* (Temminck).

We are unable to render an opinion on this species in the absence of any identified material or lice from the type host.

Key to Species of *Philopterus* from the Corvidae

1. With prominent large lateral sternites on VI, at least 0.14 wide, and all abdominal tergites uniformly dark (Figs. 44 and 45) 2
   Lateral sternites on VI smaller, <0.14 wide or absent, or posterior abdominal tergites with extensive clear area (Fig. 29) 4
2. Postconal seta minute to absent (Fig. 57) . . . . . *palmai* n. sp.
   Postconal seta at least 0.04 long and similar to preconal seta (Fig. 43) 3
3. Female temple width >0.66; all males . . . . . *extraneus* (Piaget)
   Female temple width <0.66 . . . . . *cubensis* n. sp. (in part, female only)
4. Preconal and postconal setae >0.25, and dorsal head plate well pigmented anteriorly, faint posteriorly (Figs. 2 and 9) 5
   One or both of these setae <0.19; dorsal head plate well pigmented posteriorly 7
5. Head (Fig. 2) with broader shorter preantennal region; abdominal tergites uniformly pigmented (Figs. 3 and 4). Male genitalia often (>70%) as in Fig. 5, otherwise as in Fig. 8 . . . . . *corvi* (L.)
   Head (Fig. 9) with narrower more elongate preantennal region; at least posterior abdominal tergites with extensive clear area and strongly pigmented anterior margin (Figs. 6 and 7). Male genitalia usually (>75%) as in Fig. 8, less often as in Fig. 5 6
6. Female tergum VI with <38 setae (mean = 30.4). Male tergum V with <36 setae (mean = 30.4). . . . . *albidus* (Piaget)
   Female tergum VI with >34 setae (mean = 38.0). Male tergum V with >36 setae (mean = 39.4). . . . . *leptomelas* (Nitzsch)
7. Postconal seta >0.20 (Figs. 10 and 13) 8
   Postconal seta <0.18 10
8. Dorsal head plate length >0.27 (Fig. 10); preconal head length >0.26 . . . . *atratus* (Nitzsch)
   Dorsal head plate length <0.24 (Fig. 13); preconal head length <0.27 9
9 Female temple width <0.58; subgenital plate width <0.41; terga III-V with <17 setae. Male temple width <0.55; terga III-VI with <16 setae; tergite IX medially undivided (Fig. 15). . . . . *ptilostomi* n. sp.

Female temple width >0.62; subgenital plate width >0.43; terga III-V with >18 setae. Male temple width >0.55; terga III-VI with at least 16 setae; tergite IX medially divided (Fig. 12). . . . . *clayae* n. sp.

10. Preconal seta >0.25; head and dorsal plate as in Fig. 16 . . *thryptocephalus* (Kellogg & Paine).
Preconal seta <0.16; head and dorsal plate otherwise 11

11. Female VI with small median sternite (Fig. 21); head length <0.62. Male VI with broad median and small lateral sternites (Fig. 23); genitalia as in Fig. 22 . . . . . *dumani* n. sp.
Female VI without median sternite; head length variable. Male VI without sternites, or with only wide transverse sternite, or with only lateral sclerites; genitalia otherwise 12

12. Tergite IX with at least 4 (2+2) marginal setae. 13
Tergite IX with only 2 (1+1) or, less often 3 (1+2), marginal setae 16

13. Postconal seta <0.02 (Fig. 24); III-VI without lateral sternites. Female subgenital plate width <0.41. Male VI with median sternite (Fig. 27); genitalia as in Fig. 26 . . . . . *guttatus* (Denny)
Postconal seta >0.04 long; III-VI with well-developed lateral sternites, >0.05 wide on VI. Female subgenital plate width >0.45. Male VI without median sternite (Fig. 41); genitalia as in Fig. 8 or 38 14

14. Female with large pale area on tergite IX and subgenital plate (Fig. 40); >23 marginal tergal setae on II, >28 on IV-V. Male tergum II with >21 marginal setae, III-V > 25, VI >24; genitalia as in Fig. 38 . . . *ocellatus* (Scopoli)
Female uniformly dark on tergite IX and subgenital plate (Fig. 42); <23 marginal tergal setae on II, <29 on IV-V. Male tergum II with <23 marginal setae, III-V <27, VI <25; genitalia near Fig. 8 15

15. Female dorsal head plate width >0.17; temple width >0.74; subgenital plate width >0.52. Male dorsal head plate length at least 0.27; total length >1.95 . . . . . *dalgleishi* n. sp.
Female dorsal head plate width <0.18; temple width <0.71; subgenital plate width <0.52. Male dorsal head plate length not >0.27; total length <1.90 . . . . . *craigi* n. sp.

16. Without lateral or medial sternites on III-VI. Male genitalia as in Fig. 35 17
With lateral or medial sternites on some to all of III-VI. Male genitalia otherwise 18

17. Female terga III-V with <20 setae; tergites on VII close together, separated by <width of tergite (Fig. 33). Male terga III-IV with <18 setae; tergum IX with short marginal setae (Fig. 34) . . . . . *urocissae* n. sp.
Female terga III-V with >22 setae; tergites on VII widely separated by > width of tergite. Male terga III-IV with >17 setae; tergum IX with longer marginal setae (Fig. 37) . . . . . *emersoni* n. sp.

18. Head and dorsal plate as in Fig. 46, with conus <0.09 long. Female terminalia as in Fig. 47. Male terminalia as in Fig. 48, genitalia as in Fig. 49 . . . . . *stegmanni* Clay
Head and dorsal plate otherwise, with conus >0.08 long. Female terminalia, male terminalia and genitalia otherwise 19

19. Postconal seta >0.03, subequal to preconal seta length 20
Postconal seta not >0.01, preconal seta much longer 24

20. Male with median sternite only on VI (Fig. 32). . . . . *cubensis* n.sp. (in part, male only)
All females. Male with median sternite on IV-VI or V-VI (Fig. 28), or with only lateral sternites (Figs. 50 and 53) 21

21. Abdominal tergites with extensive clear areas bordered by dark pigmentation (Figs. 28 and 29). Male with median sternite on IV-VI or V-VI (Fig. 28) . . . . . *lahorensis* Ansari
Abdominal tergites uniformly dark (except area around spiracles). Male without median sternite on any of IV-VI 22

22. Female VI with lateral sternites <0.09 wide; tergites on VII with wide space between them > width of tergite; head with lateral carina length <0.11. Male VI with lateral sternites <0.08 wide; head with lateral carina length <0.10 . . . . . *picae* (Denny)
Female VI with lateral sternites >0.08 wide; tergites on VII close together with space between them <width of tergite; head with lateral carina length >0.09. Male VI with lateral sternites >0.08 wide; head with lateral carina length >0.09 23

23. Female temple width <0.68; metathorax width <0.59; dorsal head plate width <0.16. Male temple width <0.60; dorsal head plate width <0.15; tergum III with <21 setae . . . . . *underwoodi* (Carriker)
Female temple width >0.67; metathorax width >0.59; dorsal head plate width >0.16. Male temple width >0.61; dorsal head plate width >0.14; tergum III with >20 setae . . . . . *osborni* Edwards

24. Head lateral carina length <0.09 and width of lateral sternites on VI >0.07. Male genitalia as in Fig. 59. . . . . *martinezi* Rodriguez Caabeiro et al.
Head lateral carina length >0.08 or, if shorter, width of lateral sternites on VI <0.08. Male genitalia as in Fig. 58 or 61 25

25. Female dorsal head plate length <0.29 and tergum VII with <21 setae. Male genitalia as in Fig. 61; dorsal head plate length <0.24; subgenital plate with sternite VII as in Fig. 60, or deeply incised, almost to entirely separated from VIII . . . . . *phillipi* Emerson

Female dorsal head plate length >0.28 or, if shorter, tergum VII with >21 setae. Male genitalia as in Fig. 58; dorsal head plate length often >0.24; subgenital plate as in Fig. 54 or 56 26

26. Female inseparable. Male subgenital plate not deeply incised laterally, with 4 setae on sternite VII (Fig. 56) . . . . . *garruli* Boisduval & Lacordaire

Male subgenital plate deeply incised laterally, with only 2–3 setae on sternite VII (Fig. 54). . . . . *crassipes* (Burmeister)

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