International Journal of Entomology Vol. 25, no. 1: 56–70 26 April 1983

A REVIEW OF THE GENUS *PSITTACONIRMUS* (MALLOPHAGA: PHILOPTERIDAE) FROM SOUTH PACIFIC PARROTS (PSITTACIFORMES)[1]

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Abstract. Eleven species of *Psittaconirmus* are recognized, 5 having been previously described and 6 representing the following new species: *johnstoniae* (type-host *Trichoglossus johnstoniae*), *hellenthali* (type-host *Psittaculirostris edwardsii*), *zinki* (type-host *Neopsittacus musschenbroekii*), *charmosynae* (type-host *Charmosyna papou*), *chlorocerci* (type-host *Lorius chlorocercus*), and *cardinalis* (type-host *Chalcopsitta cardinalis*). *P. neumanni concii* is placed as a junior synonym of *P. launceloti.* A key is provided for the identification of these species.

The mallophagan genus *Psittaconirmus* Harrison presently contains 6 specific and subspecific taxa (Guimarães 1974). All authenticated records of these taxa have type-hosts among the parrot family Loriidae (Morony et al. 1975). Unfortunately, Guimarães had only 37 louse specimens representing these 6 taxa and 14 additional *Psittaconirmus* lice from 7 other hosts that he chose not to include in his study. While his treatment of *Psittaconirmus* is an excellent one, it suffers from the lack of specimens and limited number of host taxa sampled. We have been able to study 433 specimens of *Psittaconirmus* collected from 15 species of Loriidae and 1 of Psittacidae. Based on these specimens, we redescribe 5 of the currently-recognized taxa, establish a synonymy for the 6th, and describe 6 new species. Our work is summarized in a key for the identification of these 11 species.

All species included in *Psittaconirmus* may be characterized as follows.

Elongate, relatively slender lice (Fig. 1–2). Medioanterior head margin with oval indentation; dorsoanterior plate present, but usually not clearly demarcated; temple margin rounded, temple slightly wider than preantennal region, and with long seta; antenna sexually dimorphic, ♀ with 5 similar segments, ♂ with enlarged segment I and process on segment III. Pronotum with pair of short posterior setae; each side of metanotum with 5–7 medium to long posterior setae often clustered into 2 groups and 2 lateroposterior setae; small mesosternal and large metasternal plate, each with pair of setae. Male abdomen with tergite II (1st apparent segment) divided at midline, tergites III–IX entire; tergite IX with lobed posterior margin (Fig. 3); tergites II–VIII with lateroposterior seta on each side and 4 medioposterior setae; tergites VI–VII with additional long seta on each side; sternites II–VI with 4–6 medium length setae. Female abdomen with tergites II–VIII divided at midline, tergite IX entire, and pair of small lateral sternal plates on III–VII; tergites II–VIII with 1–2 lateroposterior setae and 1 minute

1. Published as Paper No. 12,093 of the Scientific Journal Series of the Minnesota Agricultural Experiment Station on research conducted under Minnesota Agricultural Experiment Station Projects No. Min-17-015 and Min-17-016.

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and 1 long medioposterior seta, tergites VI–VII with additional long seta, and each side of IX with 1 short and 1 long seta; sterna II–VI with 4–6 setae; sternum VII with large median plate with lobes and associated setae (Fig. 5). Male genitalia with variable structures medially, and with prominent parameres each bearing minute apical seta. We agree with Guimarães (1974) that these taxa form ". . . a very homogeneous ensemble of species . . . ."

All measurements are in millimetres. Host identifications and data have been confirmed where possible by Bishop Museum personnel; however, we have used "probably" in conjunction with host names when hosts were discarded in the field before having their identifications verified. In these cases, each host identification represents a careful taxonomic judgment by a vertebrate zoologist based on the collection data. Furthermore, louse identifications from hosts designated "probably" match louse identifications from corresponding verified hosts. Thus, the designation "probably" infers a high degree of likelihood.

In the *specimens examined* sections, BBM-NG and BBM-BSIP refer to Bernice P. Bishop Museum collections from New Guinea and the British Solomon Island Protectorate, respectively. PNG refers to Papua New Guinea. BPBM indicates Bishop Museum as the depository institute. Numbers following abbreviations are host catalog numbers. As numbers of specimens allow, paratypes will be distributed to the Bishop Museum, U.S. National Museum of Natural History, Oklahoma State University, University of Minnesota, and British Museum (Natural History).

Psittaconirmus australis Harrison

Psittaconirmus australis Harrison, 1915, Parasitology **7:** 403. Type-host: *Glossopsitta porphyrocephala* (Dietrichsen).

♂. No specimen examined; only known from lectotype in the British Museum (Natural History). Head, genitalia, and pleural thickenings of abdominal segments I–VI illustrated by Guimarães (1974).

♀. With well-developed pleural thickenings of abdominal segments I–VI as for ♂.

Dimensions. Temple width (TW), ♂ 0.28, ♀ 0.31; prothorax width (PW), ♂ 0.22, ♀ 0.19; metathorax width (MW), ♂ 0.35, ♀ 0.35; abdomen width (AW), ♂ 0.36, ♀ 0.40; head length (HL), ♂ 0.39, ♀ 0.43; total length (TL), ♂ 1.35, ♀ 1.66. Dimensions for ♂ from Guimarães (1974).

Specimens examined. 1♀ (paralectotype of *P. australis*), ex *G. porphyrocephala.* WESTERN AUSTRALIA: Bow Riv, 30.X.1912, L. Harrison.

Remarks. *P. australis* is the type-species of *Psittaconirmus.* The quality of the lectotype male and paralectotype female is not optimal; yet it is sufficient to confirm that this species is distinct, based on the overall small dimensions, well-developed abdominal pleural thickenings, and genitalic details noted by Guimarães (1974).

Psittaconirmus launceloti Eichler Fig. 1–5

Psittaconirmus launceloti Eichler, 1943, Zool. Anz. **141:** 60. Nomen novum for *P. australis* Harrison, 1915, Parasitology **7:** 405 (nec p. 403). Type-host: (*Trichoglossus novae-hollandiae*) = *T. haematodus moluccanus* (Gmelin).

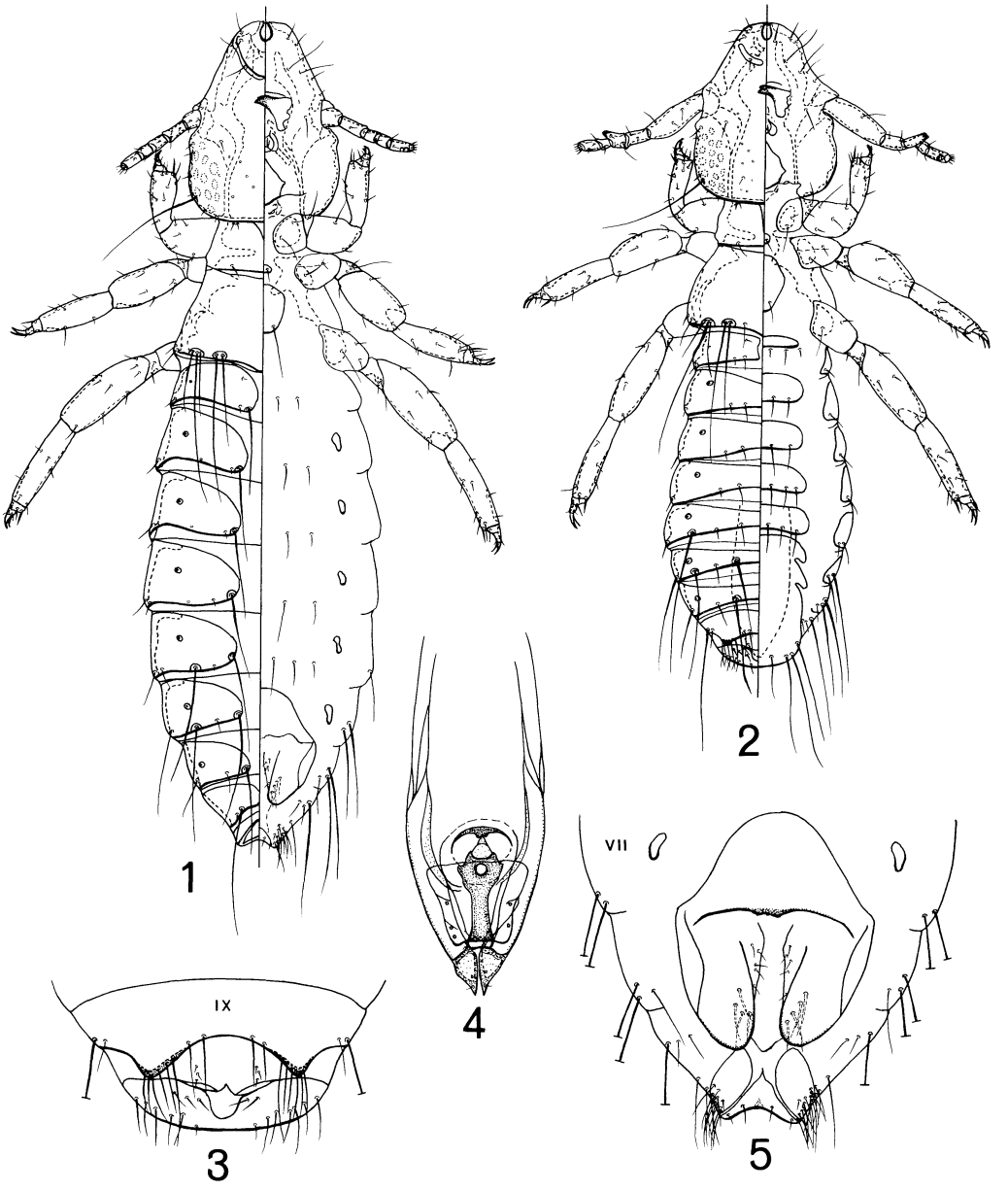

FIG. 1–5. *Psittaconirmus launceloti:* **1,** ♀ dorsal-ventral view; **2,** ♂ dorsal-ventral view; **3,** ♂ dorsal terminalia; **4,** ♂ genitalia; **5,** ♀ ventral terminalia.

Psittaconirmus neumanni concii Guimarães, 1974, Arq. Zool. **25:** 196. Type-host: *Eos b. bornea* (Linnaeus). **New synonymy.**

♂. As in Fig. 2. Tergite VI usually with pair of fine short median setae (11 of 100 specimens examined with 1 long heavy and 1 short fine seta); tergite IX (Fig. 3) with 5–8 subequally long setae along each posterior lobe. Genitalia as in Fig. 4, with circular hole in elongate median sclerite, small triangular bridge connecting latter to posterior projection of semicircular sclerite, and roughly diagonal line of junction between arm of paramere and its tip.

♀. As in Fig. 1. Ventral terminalia as in Fig. 5; plate on segment VII with irregularly straight posterior margin.

Dimensions. TW, ♂ 0.33–0.38, ♀ 0.34–0.40; PW, ♂ 0.24–0.29, ♀ 0.24–0.27; MW, ♂ 0.38–0.44, ♀ 0.39–0.45; AW, ♂ 0.38–0.53, ♀ 0.41–0.66; HL, ♂ 0.41–0.46, ♀ 0.43–0.48; TL, ♂ 1.51–1.72, ♀ 1.78–2.05; ♂ genitalia width (GW), 0.13–0.16.

Specimens examined. 18♂,22♀, ex *T. haematodus.* PNG: Morobe Prov: Mt Missim (BBM-NG 21080), Nakata Ridge (BBM-NG 27774, 28637), Pindiu (BBM-NG 27718, 27719, 27733, 27734), Slate Creek (BBM-NG 20377); Western Prov: Oriomo River (BBM-NG 29384, 29416), Weam (BBM-NG 50860); SOLOMON IS: Choiseul I: Malangona (BBM-BSIP 23533, 23536); Guadalcanal I: Tabalia (BBM-BSIP 23885); Malaina I: Ataa (BBM-BSIP 24209); Vella Lavella I: Pusisama (BBM-BSIP 23248). 15♂,14♀, probably ex *T. haematodus.* PNG: Morobe Prov: Bulolo River (BBM-NG 27850, 27864, 28487), Wau Creek (BBM-NG 20425, 20480), Wau (BBM-NG 56007, 56008), Mumeng (BBM-NG 21230, 21231, 21232); Western Prov: Oriomo Riv (BBM-NG 29495, 50032); Western Highlands Prov: Korgua (BBM-NG 28170); Northern Prov: Amboga Riv (BBM-NG 29919, 29922). 1♀ (paralectotype of *P. launceloti*), ex *T. novae-hollandiae.* AUSTRALIA: New South Wales: Myall Riv, L. Harrison. 19♂,16♀, ex *Lorius lory* (Linnaeus). PNG: Morobe Prov: Bulolo Riv (BBM-NG 28504), Coviak (BBM-NG 28481), Mt Missim (BBM-NG 21012, 21013, 21085), Nakata Ridge, Wau (BBM-NG 27768); Northern Prov: Popondetta (BBM-NG 28660), Popondetta: Jumbora Plantation (BBM-NG 29337); West Sepik Prov: May Riv (BBM-NG 22634, 22659); IRIAN JAYA: Manokwari Div: Oransbari (BBM-NG 22303, 22425). 9♂,15♀, ex *L. hypoinochrous* (Gray). PNG: Northern Prov: Ahola (BBM-NG 29895), Cape Killerton (BBM-NG 29242), Embi Lakes (BBM-NG 29313), Sangara (BBM-NG 29981). 3♂,3♀, probably ex *L. hypoinochrous.* PNG: East New Britain Prov: Gaulim (BBM-NG 20862, 20864, 20874). 31♂,36♀, probably ex *Lorius* sp. (*lory* or *hypoinochrous*). PNG: Northern Prov: Ahola (BBM-NG 29877, 29905), Cape Killerton (BBM-NG 29253, 29254, 29281), Embi Lakes (BBM-NG 29314), Popondetta (BBM-NG 28701), Popondetta: Jumbora Plantation (BBM-NG 28738, 28859), Sangara (BBM-NG 29979), Soputa Riv (BBM-NG 29715, 29717). 1♂ (paratype of *P. neumanni concii*), ex *E. b. bornea.* BORNEO: Amboyna, X.1907, Meinertzhagen 3671.

Questionable records. 3♂,4♀, ex *Charmosyna papou* (Scopoli). PNG: Morobe Prov: Mumeng (BBM-NG 20413, 21227); Western Highlands Prov: Tambul (BBM-NG 27953). 1♂, ex *Neopsittacus musschenbroekii* (Schlegel). PNG: Morobe Prov: Mumeng (BBM-NG 27870). 1♂,2♀, ex *Pseudeos fuscata* (Blyth). PNG: Morobe Prov: Mumeng, Marpos Vill (BBM-NG 20353). 1♀, ex *Trichoglossus goldiei* Sharpe. PNG: Morobe Prov: Mt Missim (BBM-NG 21149).

Remarks. Harrison (1915) noted differences between 2 females from *T. haematodus moluccanus* (=*T. novae-hollandiae*) and a female *P. australis* from *G. porphyrocephala*; Eichler (1943) provided the new name *P. launceloti* for the first 2 specimens. After examination of males from *T. haematodus* (Linnaeus), we agree that *P. launceloti* is separable from *P. australis,* since both sexes of the former are larger than the latter and have less well-developed abdominal pleural thickenings. Furthermore, the *P. australis* male genitalia illustrated by Guimarães (1974) are different from *P. launceloti* male genitalia (Fig. 4); confirmation of this difference, however, awaits the collection and subsequent examination of more male *P. australis* specimens. We cannot com-

ment on potential differences of female ventral terminalia because we are unable to discern details of the female *P. australis* specimen.

We find no differences between the paratype male of *P. n. concii* and male *P. launceloti,* and there are no features in the description by Guimarães (1974) that show differences for either sex. While we are unable to account for the appearance of the same louse taxon on hosts that are so widely geographically separated, we are confident that this synonymy is justified.

Psittaconirmus harrisoni Uchida

Psittaconirmus harrisoni Uchida, 1918, Annot. Zool. Jpn. **9:** 484. Type-host: *Trichoglossus rubiginosus* (Bonaparte).

Unfortunately, we could not locate any of the 5 specimens from *T. rubiginosus* that Guimarães (1974) used to redescribe *P. harrisoni,* nor could we obtain any other material from the type-host. However, Guimarães chose this species for full illustration, giving entire male and female drawings plus the male genitalia and female ventral terminalia; dimensions are given for both sexes, these being near to those of *P. neumanni* Guimarães. These show an evident similarity to *P. launceloti* in all respects except the male of *P. harrisoni* illustrated by Guimarães (1974) shows a much longer heavier median seta on tergite VI. Guimarães did not have a male of *P. launceloti,* but he suspected the similarity of *P. launceloti* and *P. harrisoni.* While our male *P. launceloti* specimens usually have both setae of this median pair short and fine, occasionally 1 is long and heavy, thereby causing a problem in our evaluation of this character. Furthermore, we can only assume from Guimarães' divided illustration that both setae of the median pair are long and heavy. On the basis of the assumed different chaetotaxy of male tergite VI, the different hosts involved, the geographic separation of these hosts, and the absence of any *T. rubiginosus* specimens for study, we believe it best to continue recognizing *P. harrisoni* as separate.

Psittaconirmus neumanni Guimarães Fig. 6

Psittaconirmus neumanni neumanni Guimarães, 1974, Arq. Zool. **25:** 194. Type-host: *Lorius lory salvadorii* (A. B. Meyer)—possible error, perhaps *Chalcopsitta sintillata* (Temminck).

♂. As for *P. launceloti,* except for larger dimensions and genitalia as in Fig. 6, with broad semicircular hole surrounding faint circular hole in elongate median sclerite, large triangular bridge connecting this sclerite to anterior semicircular sclerite lacking button at juncture point, and horizontal line of junction between arm of paramere and its tip.

♀. As for *P. launceloti,* except tendency for larger dimensions.

Dimensions. TW, ♂ 0.37–0.41, ♀ 0.37–0.43; PW, ♂ 0.26–0.31, ♀ 0.27–0.31; MW, ♂ 0.42–0.50, ♀ 0.44–0.50; AW, ♂ 0.49–0.59, ♀ 0.55–0.70; HL, ♂ 0.43–0.48, ♀ 0.46–0.51; TL, ♂ 1.73–1.93, ♀ 1.96–2.25; ♂ GW, 0.16–0.19.

Specimens examined. 9♂,4♀, ex *C. sintillata.* PNG: Western Prov: Oriomo Riv (BBM-NG 29415, 29475, 50040), Weam (BBM-NG 50847). 2♀, probably ex *C. sintillata.* PNG: Western Prov: Oriomo Riv (BBM-NG 29474, 50039). 2♂,6♀, ex *Pseudeos fuscata.* PNG: Morobe Prov: Bulolo (BBM-NG 56239), Nakata

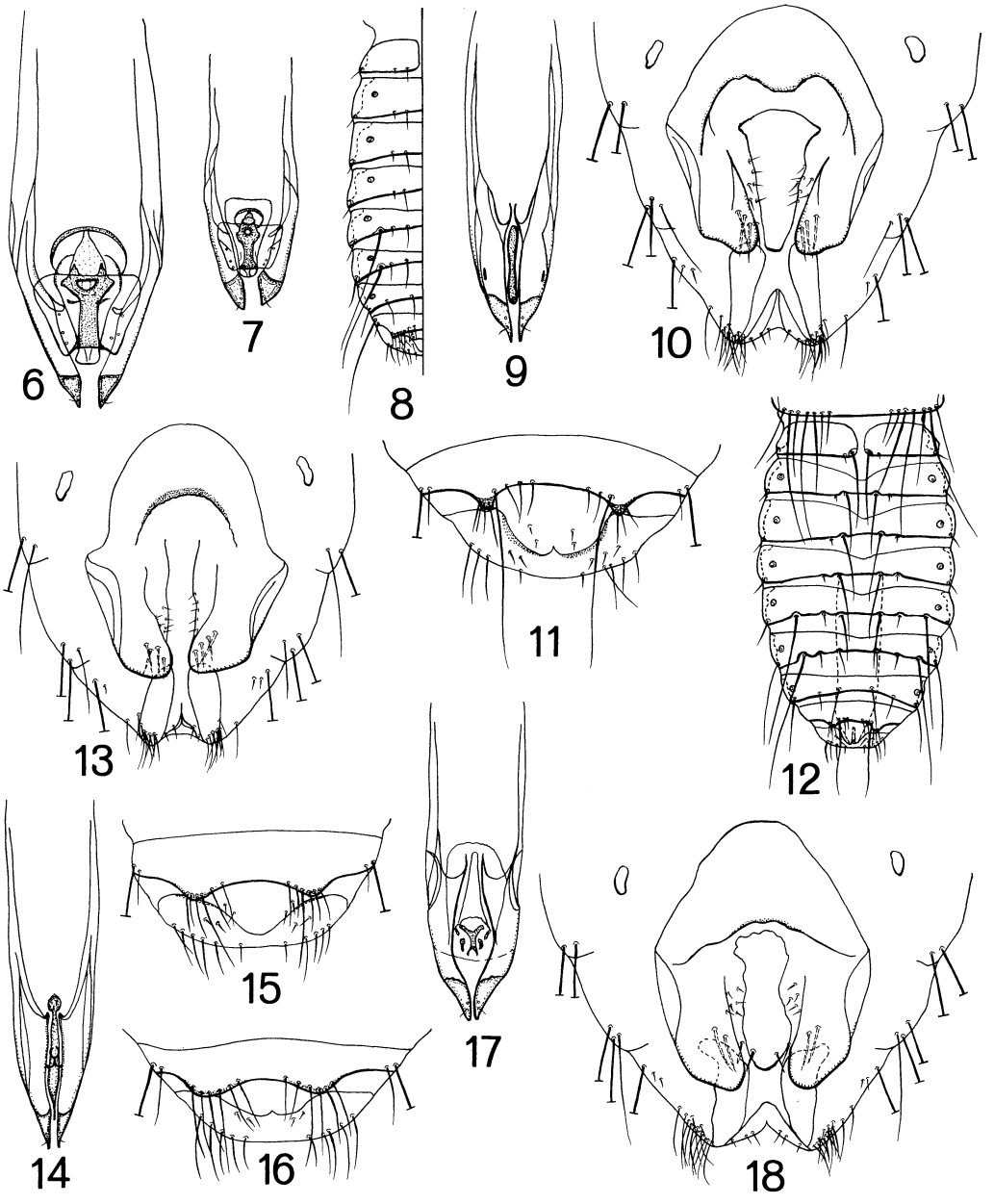

FIG. 6–18. **6,** *Psittaconirmus neumanni,* ♂ genitalia. **7–8,** *P. johnstoniae:* **7,** ♂ genitalia; **8,** ♂ dorsal abdomen. **9–12,** *P. hellenthali:* **9,** ♂ genitalia; **10,** ♀ ventral terminalia; **11,** ♂ dorsal terminalia; **12,** ♂ dorsal abdomen and metathorax margin. **13–15,** *P. zinki:* **13,** ♀ ventral terminalia; **14,** ♂ genitalia; **15,** ♂ dorsal terminalia. **16–18,** *P. charmosynae:* **16,** ♂ dorsal terminalia; **17,** ♂ genitalia; **18,** ♀ ventral terminalia.

Ridge, Wau (BBM-NG 27769); Northern Prov: Cape Killerton (BBM-NG 29237, 29282, 29283), Soputa Riv (BBM-NG 29733).

Questionable record. 1♂,2♀ (paratypes of *P. n. neumanni*), ex *Lorius lory salvadorii.* NG, Meinertzhagen 13492.

Remarks. *P. neumanni* is very similar to *P. launceloti*; however, both sexes of the former tend to be larger than the latter in most dimensions and the male genitalia are different. With the exception of the type-series, none of the many specimens of lice from *Lorius lory* are *P. neumanni.* Therefore, we suspect that the type-host is in error and suggest that it be replaced with *Chalcopsitta sintillata,* since all specimens collected from the latter are *P. neumanni.*

Psittaconirmus johnstoniae Price & Clayton, **new species** Fig. 7–8

Type-host: *Trichoglossus johnstoniae* Hartert.

♂. Much as for *P. launceloti,* except dorsal abdomen (Fig. 8) having tergite VII with only 1 long seta on each side and tergite VIII without any long setae; somewhat smaller dimensions; and genitalia (Fig. 7) smaller, with less tapered paramere tip.

♀. Unknown.

Dimensions of ♂. TW 0.33; PW 0.22; MW 0.35; AW 0.40; HL 0.41; TL 1.49; GW 0.12.

Holotype ♂, ex *T. johnstoniae,* PHILIPPINE IS: Mindanao: Cotabato: Tupi: Kablon: Mt Matutum, 16.VI.1966, N. Wilson 2582 (BPBM 12,807).

Remarks. *P. johnstoniae* is distinguished by its small dimensions, genitalia, and the chaetotaxy of tergites VII–VIII.

Psittaconirmus hellenthali Price & Clayton, **new species** Fig. 9–12

Type-host: *Psittaculirostris edwardsii* (Oustalet).

♂. Much as for *P. launceloti,* except as follows. Dorsal abdomen and metanotal margin as in Fig. 12; without evident clustering of metanotal setae; with long heavy median pair of setae on tergites II–VI, short and fine on VII, and medium on VIII; tergite IX (Fig. 11) with pigmented lobe on each side bearing 3–5 short setae, and single very long and 2–3 short setae mediad to lobe. Genitalia (Fig. 9) markedly different, with elongate narrow median sclerite having suggestion of hole posteriorly and lacking other median structures shown in Fig. 4.

♀. Much as for *P. launceloti,* except ventral terminalia as in Fig. 10; plate on segment VII shorter, with posterior margin as illustrated; posterior pair of lobes not evenly rounded; and anterior margin of median plate very well defined.

Dimensions. TW, ♂ 0.36–0.40, ♀ 0.38–0.43; PW, ♂ 0.24–0.28, ♀ 0.29–0.32; MW, ♂ 0.39–0.42, ♀ 0.44–0.49; AW, ♂ 0.42–0.48, ♀ 0.49–0.62; HL, ♂ 0.42–0.45, ♀ 0.46–0.50; TL, ♂ 1.44–1.59, ♀ 1.72–2.11; ♂ GW, 0.11–0.12.

Holotype ♂, probably ex *P. edwardsii,* PNG: Morobe Prov: Finschhafen (BBM-NG 27683), 15.IV.1963, H. Clissold (BPBM 12,808). Paratypes, probably ex *P. edwardsii*: 5♂,19♀, same as holotype; 4♂,3♀, same, except BBM-NG 27688; 1♂,2♀, same, except BBM-NG 27689; 1♂,3♀, same, except BBM-NG 27692. Paratypes, ex *P. edwardsii*: 1♂,1♀, same, except BBM-NG 27656, 12.IV.1963; 1♂,1♀, same, except BBM-NG 27685, 15.IV.1963.

Remarks. The male of *P. hellenthali* is separable from those of other known species by its long median setae on tergites II–VI and its unique genitalia; the female is recognized by the shape of plates associated with the ventral terminalia.

This species is named for Dr Ronald A. Hellenthal, University of Notre Dame, in recognition of his extensive collaboration with RDP on Mallophaga research.

Psittaconirmus zinki Price & Clayton, **new species** Fig. 13–15

Type-host: *Neopsittacus musschenbroekii* (Schlegel).

♂. Much like *P. launceloti,* except as follows. Dorsal terminalia as in Fig. 15, with posterior lobes of tergite IX less pronounced and each bearing a single long seta among shorter ones. Genitalia (Fig. 14) similar to those of *P. hellenthali,* but more slender, with narrow space between parameres, this containing attenuate sclerite.

♀. Much as for *P. launceloti,* except ventral terminalia (Fig. 13) with plate on segment VII having concave posterior margin, well separated from indistinct median plate.

Dimensions. TW, ♂ 0.34–0.36, ♀ 0.36–0.39; PW, ♂ 0.24–0.26, ♀ 0.25–0.28; MW, ♂ 0.36–0.43, ♀ 0.39–0.45; AW, ♂ 0.37–0.49, ♀ 0.55–0.62; HL, ♂ 0.41–0.44, ♀ 0.45–0.47; TL, ♂ 1.49–1.64, ♀ 1.89–2.03; ♂ GW, 0.09–0.10.

Holotype ♂, ex *N. musschenbroekii,* PNG: Morobe Prov: Bulldog Road (BBM-NG 56034), 27.V.1962, H. Clissold (BPBM 12,809). Paratypes, ex *N. musschenbroekii*: 3♂,5♀, same data as holotype; 1♂, same, except BBM-NG 56031; 3♂,3♀, same, except 12.VIII.1963, BBM-NG 28911; 2♀, Wau: Nakata Ridge (BBM-NG 28520), 28.VI.1963, P.J. Shanahan; 4♂,7♀, same, except BBM-NG 28521; 1♂,2♀, same, except 1.VII.1963, BBM-NG 28524; 2♀, same, except BBM-NG 28525; 3♂,1♀, same, except BBM-NG 28526; 1♂,4♀, Wau: McAdam Reserve (BBM-NG 28441), 13.VI.1963, Shanahan; 1♂, Western Highlands Prov: Tambul (BBM-NG 29755), 30.V.1963, Clissold; 2♂,4♀, same, except 7.VI.1963, BBM-NG 28039; 1♂,2♀, same, except 21.VI.1963, J.H. Sedlacek, BBM-NG 20300.

Other specimens. 4♀, ex *N. pullicauda* (Hartert). PNG: Western Highlands Prov: Kepilam (BBM-NG 20299), Tambul (BBM-NG 20035). 2♂,3♀, probably ex *Neopsittacus* sp. (*musschenbroekii* or *pullicauda*). PNG: Morobe Prov: Bulldog Road (BBM-NG 28914, 28925); IRIAN JAYA: Paniai Div: Enarotali (BBM-NG 21462, 21514).

Remarks. The male of *P. zinki* is recognized by the combination of dorsal abdominal chaetotaxy like that of *P. launceloti* and genitalia resembling those of *P. hellenthali.* The female is recognized by the shape of plates associated with the ventral terminalia.

This species is named for Dr Robert M. Zink, University of California, Berkeley, in recognition of his interest in the use of Mallophaga for avian systematics.

Psittaconirmus charmosynae Price & Clayton, **new species** Fig. 16–18

Type-host: *Charmosyna papou* (Scopoli).

♂. Much as for *P. launceloti,* except with median pair of setae on tergite VII shorter, not extending beyond segment VIII; posterior lobes on tergite IX rounded (Fig. 16); and genitalia (Fig. 17) with wide space between parameres, this containing Y-shaped sclerite and small pieces on each side.

♀. Much as for *P. launceloti,* except median pair of setae on tergite VIII not extending to end of abdomen, only reaching ½ to ¾ of distance to end of body; ventral terminalia as in Fig. 18, showing plate on segment VII with concave posterior margin well separated from median plate and several setae exposed between posterior ends of paired lobes.

Dimensions. TW, ♂ 0.37, ♀ 0.37–0.43; PW, ♂ 0.27, ♀ 0.27–0.29; MW, ♂ 0.40, ♀ 0.45–0.50; AW, ♂ 0.44, ♀ 0.60–0.74; HL, ♂ 0.44, ♀ 0.48–0.51; TL, ♂ 1.56, ♀ 1.95–2.05; ♂ GW, 0.12.

Holotype ♂, probably ex *C. papou,* IRIAN JAYA: Paniai Div: Enarotali (BBM-NG 21416), 21.VII.1962, H. Clissold (BPBM 12,810). Paratypes, probably ex *C. papou*: 1♀, same data as holotype; 2♀, PNG: Western Highlands Prov: Murmur (BBM-NG 28085), 11.VI.1963, Clissold.

Remarks. *P. charmosynae* is separated from other members of the genus by general structure of the male genitalia, including shapes of the median pieces, and by details of the female ventral terminalia.

Psittaconirmus chlorocerci Price & Clayton, **new species** Fig. 19–20

Type-host: *Lorius chlorocercus* Gould.

♂. Much as for *P. launceloti,* but structure of tergite IX like that of *P. zinki* and genitalia as in Fig. 20, with elongate median sclerite plus horseshoe-shaped sclerite surrounding hole, the latter variously situated anteriorly or posteriorly of position illustrated.

♀. Much as for *P. launceloti,* but ventral terminalia as in Fig. 19, with median plate fused to anterior plate located on segment VII, thereby interrupting posterior margin of anterior plate.

Dimensions. TW, ♂ 0.37–0.38, ♀ 0.38–0.42; PW, ♂ 0.25–0.27, ♀ 0.28–0.30; MW, ♂ 0.40–0.42, ♀ 0.44–0.47; AW, ♂ 0.41–0.47, ♀ 0.46–0.66; HL, ♂ 0.45–0.46, ♀ 0.47–0.50; TL, ♂ 1.58–1.63, ♀ 1.80–2.06; ♂ GW, 0.10.

Holotype ♂, ex *L. chlorocercus,* SOLOMON IS: Guadalcanal I: Tabalia (BBM-BSIP 23897), 27.V.1964, P.J. Shanahan (BPBM 12,811). Paratypes, ex *L. chlorocercus*: 4♂,6♀, same data as holotype; 1♀, probably ex *L. chlorocercus,* same data, except Malaita I: Ataa (BBM-BSIP 24163), 15.VII.1964.

Remarks. The structure of the male genitalia and the fusion of the anterior and median plates of the female ventral terminalia readily distinguish *P. chlorocerci* from other known species of the genus.

Psittaconirmus comis Guimarães Fig. 21–22

Psittaconirmus comis Guimarães, 1974, Arq. Zool. **25:** 197. Type-host: *Trichoglossus versicolor* Lear.

♂. Much as for *P. launceloti,* except pair of median setae on abdominal tergites II–VIII long and genitalia as in Fig. 22, with somewhat rectangular complex of median sclerites.

♀. Much as for *P. launceloti,* but ventral terminalia as in Fig. 21, with large clearly defined hole at juncture of anterior and median plates and with evenly rounded posterior lobes.

Dimensions. TW, ♂ 0.32, ♀ 0.31–0.36; PW, ♂ 0.23, ♀ 0.21–0.24; MW, ♂ 0.36, ♀ 0.37–0.41; AW, ♂ 0.42, ♀ 0.43–0.49; HL, ♂ 0.41, ♀ 0.41–0.46; TL, ♂ undetermined, ♀ 1.75–1.95; ♂ GW, 0.10.

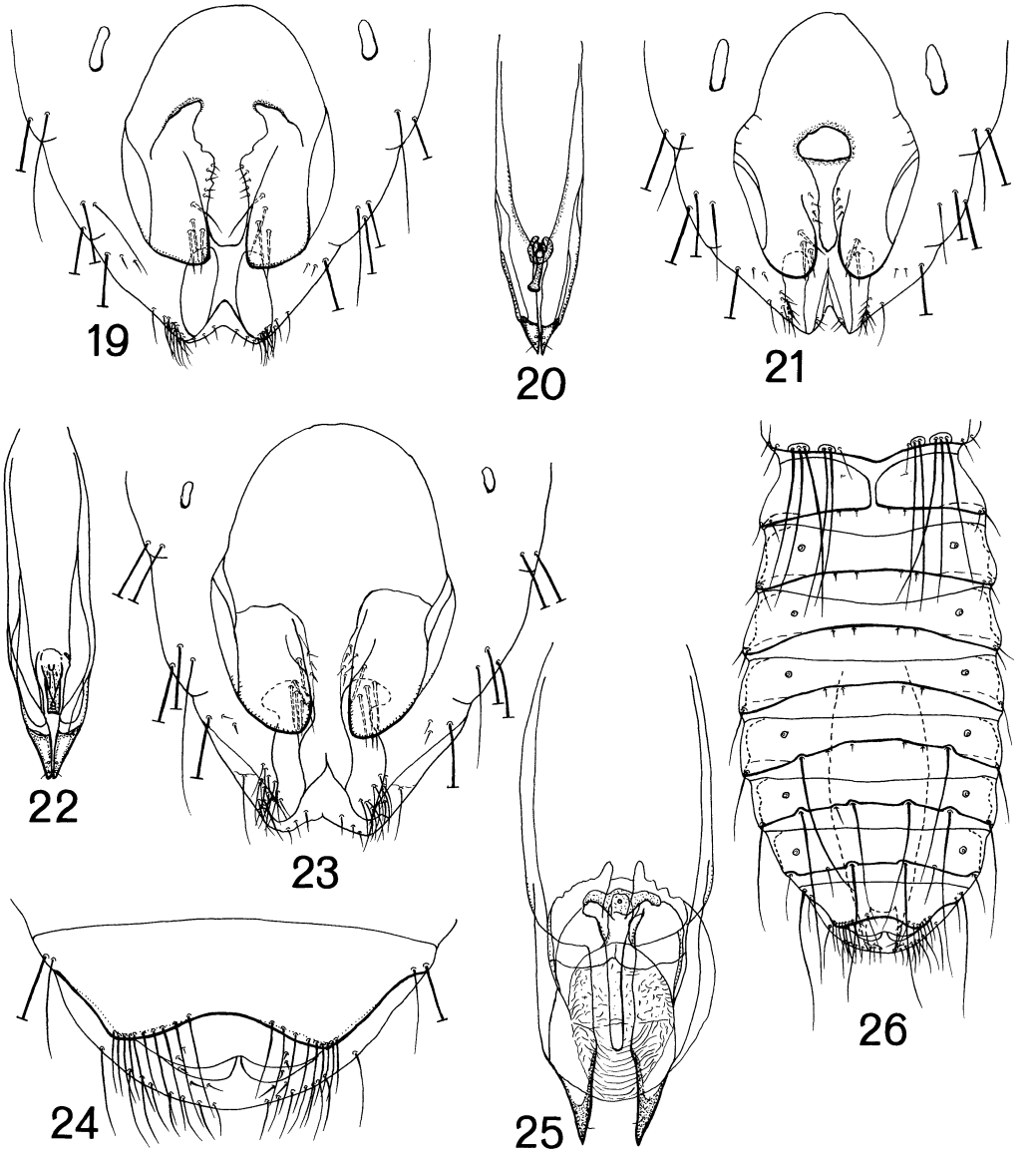

FIG. 19–26. **19–20,** *Psittaconirmus chlorocerci:* **19,** ♀ ventral terminalia; **20,** ♂ genitalia. **21–22,** *P. comis:* **21,** ♀ ventral terminalia; **22,** ♂ genitalia. **23–26,** *P. cardinalis:* **23,** ♀ ventral terminalia; **24,** ♂ dorsal terminalia; **25,** ♂ genitalia; **26,** ♂ dorsal abdomen and metathorax margin.

Specimens examined. 1♂,3♀ (paratypes of *P. comis*), ex *T. versicolor.* AUSTRALIA, Meinertzhagen 8000.

Remarks. The abdominal chaetotaxy of male *P. comis* is much like that of *P. hellenthali,* and the structure of *P. comis* male genitalia is close to those of *P. hellenthali, P. zinki,* and *P. chlorocerci.* However, the complex of median sclerites of the male genitalia is sufficiently distinct to allow easy separation of *P. comis.* Likewise, the central hole in the ventral terminalia of female *P. comis* is unique among known species of the genus.

Psittaconirmus cardinalis Price & Clayton, **new species** Fig. 23–26

Type-host: *Chalcopsitta cardinalis* Gray.

♂. Grossly as for *P. launceloti,* but 10 very long setae on metanotal margin (Fig. 26); abdominal tergites II–VI with minute pair of median setae on each side (Fig. 26); tergite IX with very broad posterior lobes, each bearing 8–10 subequally long setae (Fig. 24); and genitalia much as in Fig. 25, very large and with complex median structures.

♀. Much as for *P. launceloti,* but ventral terminalia as in Fig. 23, with large rounded anterior plate on segment VII, this fused to median plate.

Dimensions. TW, ♂ 0.41–0.45, ♀ 0.43–0.46; PW, ♂ 0.30-0.35, ♀ 0.31–0.33; MW, ♂ 0.50–0.55, ♀ 0.50–0.55; AW, ♂ 0.51–0.64, ♀ 0.63–0.75; HL, ♂ 0.49–0.52, ♀ 0.52–0.53; TL, ♂ 1.95–2.16, ♀ 2.32–2.45; ♂ GW, 0.20–0.22.

Holotype ♂, ex *C. cardinalis,* SOLOMON IS: Santa Isabel I: Boala (BBM-BSIP 24232), 17.VIII.1964, P.J. Shanahan (BPBM 12,812). Paratypes, ex *C. cardinalis*: 1♂,4♀, same as holotype; 6♀, same, except 23.VIII.1964, BBM-BSIP 24270; 3♂,7♀, same, except Choiseul I: Malangona (BBM-BSIP 23572), 3.III.1964, P. Temple; 15♂,12♀, same, except 5.III.1964, BBM-BSIP 23590; 2♂,1♀, same, except Guadalcanal I: Tabalia (BBM-BSIP 23928), 1.VI.1964, Shanahan; 4♂,3♀, same, except Kolombangara I: Pepele (BBM-BSIP 23523), 12.II.1964, Temple; probably ex *C. cardinalis*: 4♂,1♀, SOLOMON IS: Florida I: Haleta (BBM-BSIP 24462), 14.X.1962, Shanahan; 1♀, same, except Kolombangara I: Pepele (BBM-BSIP 23525), 12.II.1964, Temple.

Remarks. The large size and complexity of the male genitalia of *P. cardinalis,* along with the 4 minute median setae on abdominal tergites II–VI, readily separate this species from all others. The female of *P. cardinalis* is recognized by the shape of the ventral terminalia plates.

Psittaconirmus forficuloides (Neumann)

Lipeurus forficuloides Neumann, 1890, Bull. Soc. Hist. Nat. Toulouse **24:** 65. Type-host: (*Platycercus multicolor*) = *Psephotus v. varius* Clark.

We agree with Guimarães (1974) that this name cannot be satisfactorily placed. *P. forficuloides* is the only *Psittaconirmus* other than *P. hellenthali* reported from a host not in the family Loriidae (see below for further comment on *P. hellenthali* distribution). We suspect that *Psephotus varius* is not the correct host; unfortunately, Neumann's original material is probably lost. Until further material is collected from *P. varius,* we feel *P. forficuloides* must be considered a nomen dubium.

TABLE 1. Host-parasite list (hosts according to Morony et al. 1975).

PSITTACIFORM HOST SPECIES	MALLOPHAGA GENERA		
	Psittaconirmus	*Eomenopon*	*Pacifimenopon*
Loriidae			
Chalcopsitta sintillata	*neumanni*	*sintillatae*	
cardinalis	*cardinalis*	*cardinalis*	*nelsoni*
Pseudeos fuscata	*neumanni*	*spinimentum*	*fuscatae*
Trichoglossus haematodus	*launceloti*	*denticulatum*	
rubiginosus	*harrisoni*	*denticulatum*	
johnstoniae	*johnstoniae*	*ryani*	
versicolor	*comis*		
Lorius hypoinochrous	*launceloti*	*beeri*	*gressitti*
lory	*launceloti*	*beeri*	*gressitti*
chlorocercus	*chlorocerci*	*chlorocerci*	*gressitti*
Glossopsitta concinna		*concinnae*	
porphyrocephala	*australis*	*patoni*	
Charmosyna wilhelminae		*mirzai*	
placentis		*placentis*	
pulchella		*pulchellae*	
papou	*charmosynae*	*clissoldi*	*shanahani*
Neopsittacus musschenbroekii	*zinki*	*semilunare*	
pullicauda	*zinki*	*semilunare*	
Psittacidae			
Psittaculirostris edwardsii	*hellenthali*	*wilsoni*	

DISCUSSION

Parrots in the family Loriidae are host to 3 of the 22 genera and subgenera of Mallophaga parasitizing the Psittaciformes. Of the 3, *Psittaconirmus* is in the family Philopteridae; *Eomenopon* Harrison and *Pacifimenopon* Price, which are quite similar to each other morphologically, are in the family Menoponidae (Table 1). These 3 genera are restricted to parrots in the Loriidae with 1 exception: 2 louse species are parasites of *Psittaculirostris edwardsii* that, though placed by Peters (1937) with the current species of Loriidae, is more recently listed in the Psittacidae by Morony et al. (1975) and other workers.

Collectively, the members of *Psittaconirmus, Eomenopon,* and *Pacifimenopon* comprise a list of 30 louse species; however, this list is almost certainly incomplete, since many species of Loriidae have not yet been examined for lice. Patterns of host-parasite specificity in the incomplete list (Table 1) are discussed below.

Psittaconirmus species parasitizing the hosts *Chalcopsitta sintillata, Pseudeos fuscata, Trichoglossus haematodus, T. rubiginosus, T. johnstoniae, Lorius hypoinochrous,* and *L. lory* exhibit male genitalia that are morphologically similar to each other but quite different from those of other *Psittaconirmus.* However, the species of *Eomenopon* on these hosts are not clearly distinct as a group from other *Eomenopon.*

The louse parasitizing *Trichoglossus versicolor* is morphologically unlike congeners parasitizing the other 3 *Trichoglossus* species sampled. This is interesting, since Peters (1937) lists *T. versicolor* in a different genus, *Psitteuteles.*

The 4 species of *Charmosyna* sampled are host to 4 species of *Eomenopon* that form a morphologically distinct species group designated the *clissoldi* group by Price (1966). Furthermore, *Eomenopon* is the only genus found on 3 of the *Charmosyna* species; the 4th species, *Charmosyna papou,* is host to all 3 louse genera.

The parrots *Lorius hypoinochrous* and *L. lory* represent a host pair sharing the same species of lice in the 3 genera parasitizing Loriidae. This is not surprising, since these 2 parrots are sympatric with overlapping habitats in southeastern New Guinea. Furthermore, Forshaw (1973) comments ". . . [*L. hypoinochrous*] in habits resembles the more familiar Black-capped Lory (*L. lory*)." On the other hand, *L. chlorocercus,* which does not overlap *L. hypoinochrous* or *L. lory* in range, shares only 1 species of louse with them. Another parrot, *Trichoglossus haematodus,* also shares a species of louse with the *Lorius* host pair. This relationship seems surprising at first, since it is 1 of only 2 cases given in Table 1 where members of different host genera are parasitized by the same louse species. More specifically, *T. haematodus* is the only parrot of the 4 *Trichoglossus* species sampled that is parasitized by a louse found on the *Lorius* host pair. However, *T. haematodus* is also the only parrot of these 4 that is sympatric with the *Lorius* pair. According to the range maps in Forshaw (1973), *T. haematodus* has the widest geographic distribution of any parrot in the family Loriidae; in New Guinea, it lives in the same habitat as the *Lorius* pair and is, according to Forshaw ". . . very common and widespread . . . ." The other case in Table 1 of members of different host genera parasitized by the same species of louse involves the parrots *Chalcopsitta sintillata* and *Pseudeos fuscata.* As in the previous case, both species are found on New Guinea in the same habitat; however, a 3rd species, *Chalcopsitta cardinalis,* is not found on New Guinea and is host to a different species of louse.

Another host pair, similar to the *Lorius* pair, is formed by *Neopsittacus musschenbroekii* and *N. pullicauda,* which share the same species of lice in the 2 genera collected from these hosts. Forshaw (1973) again sets the stage for an explanation ". . . their ranges overlap considerably and both species may be found in the same area [habitat]." In conclusion, we wish to note that, although we have pointed out examples of sympatric hosts sharing the same species of Mallophaga, sympatry does not infer such sharing.

Key to species of *Psittaconirmus*

1. Small specimen, ♂ TW under 0.29, ♀ TW under 0.32 . . . ex *Glossopsitta porphyrocephala* . . . . . **australis**
   Larger specimen, ♂ TW over 0.30, ♀ TW over 0.32 2
2. ♂ with large complex genitalia (Fig. 25) and abdominal tergites II–VI with 4 minute median setae (Fig. 26); ♀ ventral terminalia as in Fig. 23 . . . . . **cardinalis, n. sp.**
   ♂ with smaller less complex genitalia and abdominal tergites II–VI with pair of

median setae longer than outer pair (Fig. 2 or 12); ♀ ventral terminalia otherwise 3

3. ♂ with genitalia as in Fig. 4, 6, or 7, with median elongate sclerite having distinct anterior hole and connection anteriorly to crescentic sclerite; ♀ with ventral terminalia much as in Fig. 5 4
   ♂ with genitalia otherwise (Fig. 9, 14, 17, 20, or 22); ♀ with ventral terminalia not as above (Fig. 10, 13, 18, 19, or 21) 7
4. ♂ with median pair of setae on tergites II–VIII all comparable in size (Fig. 8) and genitalia as in Fig. 7; ♀ unknown . . . ex *Trichoglossus johnstoniae* . . . **johnstoniae, n. sp.**
   ♂ with median pair of setae on tergites VI–VIII or VII–VIII much longer than corresponding setae on tergites II–V (Fig. 2) and genitalia as in Fig. 4 or 6; ♀ .. 5
5. ♂ with long heavy median pair of setae on tergite VI, comparable in size to corresponding setae on tergites VII–VIII; ♀ TW over 0.42 . . . ex *Trichoglossus rubigi-nosus* ..... **harrisoni**
   ♂ usually with short fine median pair of setae on tergite VI (Fig. 2) (occasionally 1 of these longer, heavier); ♀ TW usually less than 0.42 6
6. ♂ with median sclerite of genitalia having small essentially circular anterior hole (Fig. 4) and with GW 0.16 or less; ♀ TW 0.40 or less ..... **launceloti**
   ♂ with median sclerite of genitalia having broad semicircular anterior hole (Fig. 6) and with GW 0.16 or more; ♀ TW variable ..... **neumanni**
7. ♂ with very long median pair of setae on tergites II–VI (Fig. 12), extending beyond following segment; ♀ ventral terminalia with large anterior plate fused with median plate resulting in hole (Fig. 21) or arched anterior plate clearly delineated from well-defined median plate (Fig. 10) 8
   ♂ with much shorter median pair of setae on tergites II–VI (Fig. 2), not extending beyond following segment; ♀ ventral terminalia otherwise (Fig. 13, 18, or 19) .. 9
8. ♂ genitalia with essentially rectangular complex of median sclerites (Fig. 22); ♀ ventral terminalia with distinct circular hole formed by fusion of anterior and median plates (Fig. 21) ..... **comis**
   ♂ genitalia with elongate narrow median sclerite (Fig. 9); ♀ ventral terminalia with arched anterior plate clearly separated from median plate (Fig. 10) ..... **hellenthali, n. sp.**
9. ♂ genitalia with combination of elongate and horseshoe-shaped sclerites (Fig. 20); ♀ ventral terminalia with anterior plate fused with median plate (Fig. 19) ..... **chlorocerci, n. sp.**
   ♂ genitalia as in Fig. 14 or 17; ♀ ventral terminalia with clearly delineated posterior margin of anterior plate, not fused with median plate (Fig. 13 or 18) 10
10. ♂ genitalia (Fig. 14) with narrow space between parameres, this containing median sclerites as shown; ♀ ventral terminalia with deeply concave posterior margin of anterior plate, median plate not well defined (Fig. 13) ..... **zinki, n. sp.**
    ♂ genitalia (Fig. 17) with much wider space between parameres, this containing median sclerites as shown; ♀ ventral terminalia with shallowly concave posterior margin of anterior plate, median plate well defined (Fig. 18) .. **charmosynae, n. sp.**

Acknowledgments. We thank Dr K.C. Emerson, Sanibel, Florida, USA, for his assistance in the preparation of this manuscript; Mr Christopher H.C. Lyal, British Museum (Natural History), for the loan of a number of important specimens; and Drs JoAnn M. Tenorio and Alan C. Ziegler, Bishop Museum, for their time in helping us clarify our host identifications and collection data.

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