

The genus *Myrsidea* Waterston (Phthiraptera: Menoponidae) from the toucans (Piciformes: Ramphastidae), with descriptions of three new species

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Abstract

Six species of *Myrsidea* from toucans are redescribed. Three new species are described and illustrated. They and their type hosts are *M. witti* ex *Ramphastos toco toco* Statius Müller, *M. aleixoi* ex *Pteroglossus beauharnaesii* Wagler, and *M. lanei* ex *P. aracari* (L.). Keys are provided for the identification of males and females of these 9 species.

Key words: chewing lice, *Myrsidea*, Phthiraptera, Menoponidae, toucans, Ramphastidae

Introduction

The chewing lice of the genus *Myrsidea* Waterston from toucans have not been the subject of systematic work for over 40 years. With the acquisition of additional material and the need to reexamine the status of the previously described taxa, we have undertaken a review of this group. There are over 200 recognized species of *Myrsidea*, with the vast majority of these from hosts in the Passeriformes. Fewer species are found on the Ramphastidae of the Piciformes and on the Apodiformes. On hosts within the Ramphastidae, or toucans, there are 14 species-level names associated with *Myrsidea*, with 6 of these originally described in *Ramphasticola* Carriker and 8 placed in what we consider typical *Myrsidea* (see Price et al. 2003). It is our purpose here to redescribe and illustrate the 6 recognized species of *Myrsidea* and to describe and illustrate 3 new species.

In our treatment of the toucan *Myrsidea*, we divide the species into 3 groups with 3, 2, and 4 species, respectively. This separation is based primarily on the state of development

of the female metanotum and abdominal tergites, in combination with the structure of the male genital sac sclerites and lengths of postspiracular setae. For brevity, we do not repeat the generic or group characters in discussing each species.

In the following descriptions, all measurements are in millimeters. Abbreviations are TW, temple width; HL, head length at midline; PW, prothorax width; MW, metathorax width; AWIV, abdomen width at segment IV; ANW, female anus width; TL, total length; GL, male genitalia length. Tergal setal counts include the postspiracular setae and all setae between them; sternal setae on segment II do not include the aster setae. Host classification follows that of Dickinson (2003).

The holotypes of all new species in this study are at the National Museum of Natural History, Smithsonian Institution, Washington, D.C. Paratypes are distributed between that collection and the K. C. Emerson Museum, Oklahoma State University, Stillwater. Abbreviations for the collectors of the lice or the hosts of lice in the material section are: AA (A. Aleixo), JWA (J. W. Armacost), MAC (M. A. Carriker, Jr.), TC (T. Clay), DHC (D. H. Clayton), DLD (D. L. Dittmann), LHD (L. H. Dunn), KE (K. Eckhardt), WE (W. Ehrhardt), JWE (J. W. Eley), MPEG (Museu Paraense Emilio Goeldi), MHH (M. H. Herrera), JH (J. Hill), JLK (J. L. Koederitz), GL (G. Lincoln), MM (M. Marin), JPO (J. P. O'Neill), MSS (M. Sanchez S.) MCT (M. C. Thompson), TV (T. Valqui), JVT (J. Van Tyne), WRW (W. R. Weber), JDW (J. D. Weckstein), and CCW (C. C. Witt).

Genus *Myrsidea* Waterston

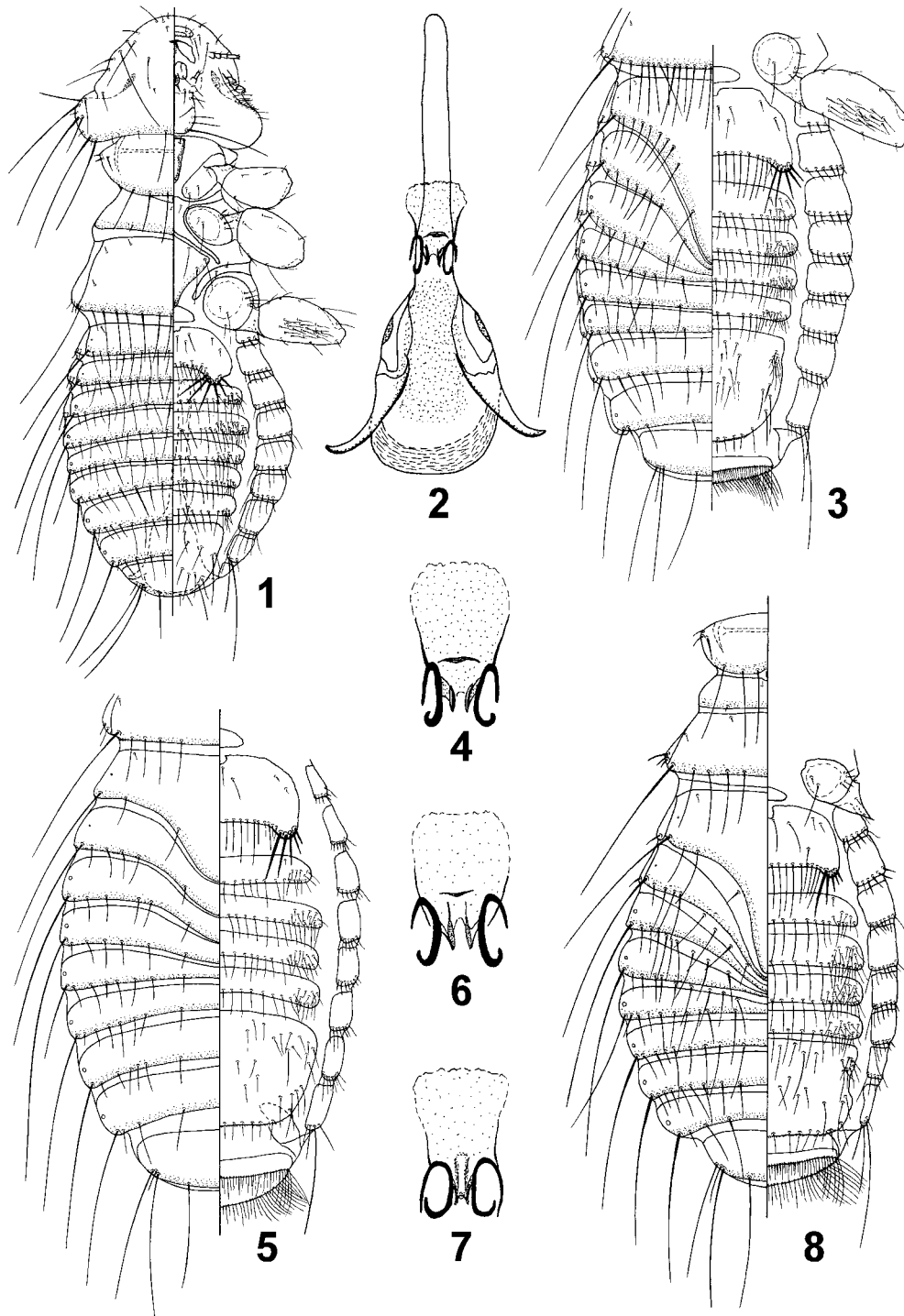
Myrsidea Waterston 1915: 12. Type species: *Myrsidea victrix* Waterston by original designation.

A thorough characterization of this genus is given in Clay (1966). We will give here only features that are significant in defining the genus as it pertains to toucan lice.

Head (Fig. 1) anteriorly rounded; without lateral notch or slit; inner occipital setae long, outer minute; without ventral sclerotized processes; each side of gula with heavier longer posterior seta; hypopharyngeal sclerites well developed.

Thorax with pronotum lacking central setae near transverse carina; with 3 short setae at each lateral angle. Mesonotum well defined, with 2 minute setae adjacent to postnotum and 2 at posterior margin. Metanotum without central setae. Prosternal plate well developed, elongate, with 2 short anterior setae; mesothorax with notum, pleura, and sternum fused to form strongly sclerotized ring; metasternum large, diamond shaped, usually with 6 setae, much less often 4, 5, 7, or 8; venter of femur III with setal brush.

Abdomen with undivided tergites, without anterior setae except for very small corner seta on each side of tergite I; sternite I small, without setae; sternite II enlarged, with aster of 4–6 heavy setae at each lateroposterior corner. Female anus oval, without inner setae; subgenital plate of fused sternites VII–IX, with lightly serrated posterior margin. Male subgenital plate of fused sternites VIII–IX; genitalia of characteristic shape (Fig. 2), with spinous sac having small associated sclerites.



FIGURES 1–8. 1–4, *Myrsidea victrix*. 1, Dorsal male. 2, Male genitalia. 3, Female metanotum and dorsal abdomen. 4, Male genital sac sclerites, *M. victrix* and *M. abbreviata*. 5–6, *M. ceciliae*. 5, Female metanotal margin and dorsal abdomen. 6, Male genital sac sclerites. 7–8, *M. witti*. 7, Male genital sac sclerites. 8, Female dorsal thorax and dorsal abdomen.

Sexual dimorphism is limited to males having smaller dimensions, sparser abdominal chaetotaxy, and differences associated with genitalic features of the posterior abdomen. Some females may have a gross enlargement of the metanotum (Figs. 9, 13) or abdominal tergite I (Figs. 3, 5, 8), and corresponding reduction of some anterior tergites. Male segments are unmodified (Figs. 1, 12).

victrix species group

The 3 species of this group are characterized as follows. Female with enlarged abdominal tergite I, with medial compression of tergites II–IV or II–V (Figs. 3, 5, 8). Male genitalia (Fig. 2) with sac sclerites as in Figs. 4, 6, or 7. Both sexes with very long postspiracular setae on tergites I–IV and VI–VIII, usually much shorter on V; without anterior pleural setae.

Myrsidea victrix Waterston (Figs. 1–4)

Myrsidea victrix Waterston 1915: 13. Type host: “Yellow and black-billed toucan” = *Ramphastos swainsonii* Gould.

Myrsidea victrix waterstoni Carriker [and Diaz-Ungria] 1961: 14. Type host: *R. swainsonii*.

Female. As in Fig. 3. Posterior pronotal margin with 6 setae, metanotal margin with 20–28. Tergal setae: I, 18–24; II, 15–21; III, 18–23; IV, 17–24; V, 16–19; VI–VII, 15–20; VIII, usually 8, much less often 10. Very long inner posterior marginal setae on IX. Sternal setae: II, 25–32; III, 36–43; IV–V, 43–59; VI, 32–49; VII, 18–25; subgenital plate, 26–33. Anus with 56–68 ventral fringe setae, 45–49 dorsal. Dimensions: TW, 0.59–0.66; HL, 0.37–0.41; PW, 0.37–0.43; MW, 0.68–0.77; AWIV, 0.82–0.93; ANW, 0.35–0.40; TL, 2.13–2.24.

Male. As in Fig. 1. Posterior pronotal margin usually with 6, less often 8 setae; metanotal margin with 14–17. Tergal setae: I, 20–23; II–III, 22–26; IV–V, 19–25; VI–VII, 16–23; VIII, 11–13. Medium inner posterior marginal setae on IX. Sternal setae: II, 27–34; III, 33–38; IV–V, 42–54; VI, 41–47; VII, 20–25; VIII, 9–12. Genitalia as in Fig. 2; sac sclerites as in Fig. 4, with modest interruption in each lateral portion and with thin transverse sclerite medioanterior to them. Dimensions: TW, 0.51–0.59; HL, 0.35–0.39; PW, 0.32–0.38; MW, 0.50–0.57; AWIV, 0.61–0.69; GL, 0.59–0.65; TL, 1.69–1.84.

Material. Ex “Yellow and black-billed toucan”, 4 female, 3 male paratypes of *M. victrix*, **COLOMBIA**: Atrato River Valley, Boca da Arguia (1914). Ex *R. swainsonii*, female holotype, male allotype, 2 male paratypes of *M. v. waterstoni*, **COLOMBIA**: La Guayacana, Narino (MAC-635; 6 May 1958); 1 female, 1 male paratypes, same except (MAC-28072; 3 May 1958). Ex *R. brevis* de Schauensee, 7 females, 1 male, **COLOMBIA**: Nuqui, Chocó (MAC-19360; 1951).

Remarks. The genus *Myrsidea* was described by Waterston (1915) monotypical for the new species *M. victrix*. This louse species is easily discerned from the other 2 of this species group by its having both sexes with a larger number of marginal metanotal setae. The type host for *M. victrix* was given only as a “Yellow and black-billed toucan” from the locality cited above. Hopkins and Clay (1952) interpreted this as *R. swainsonii* and this action generally has been followed by others. Carriker [and Diaz-Ungria] (1961) considered “*R. swainsonii*” as an error, with the correct host “*R. ambiguus brevis* d’Schauense” = *R. brevis*. He then described *M. v. waterstoni* from *R. swainsonii*. We find this subspecies inseparable from the nominate form and conclude that both *R. swainsonii* and *R. brevis* harbor *M. victrix*.

Myrsidea ceciliae Carriker (Figs. 5–6)

Myrsidea victrix ceciliae Carriker [and Diaz-Ungria] 1961: 14. Type host: *Ramphastos vitellinus vitellinus* M. H. K. Lichtenstein.

Myrsidea victrix brevicarinatus Carriker [and Diaz-Ungria] 1961: 16. Type host: *Ramphastos sulfuratus brevicarinatus* Gould.

Female. Posterior pronotal margin with 6, rarely 7, setae, metanotal margin with 8–14. Tergal development much as in Fig. 5. Tergal setae: I, 6–9; II, 10–17; III, 12–19; IV–V, 14–22; VI, 14–23; VII, 11–19; VIII, 8–10. Very long inner posterior setae on IX. Sternal setae: II, 20–30; III, 29–47; IV–VI, 39–70; VII, 19–36; subgenital plate, 27–36. Anus with 54–64 ventral fringe setae, 44–55 dorsal. Dimensions: TW, 0.63–0.68; HL, 0.40–0.43; PW, 0.40–0.45; MW, 0.62–0.67; AWIV, 0.89–1.01; ANW, 0.42–0.45; TL, 2.19–2.46.

Male. Posterior pronotal margin with 6 setae, metanotal margin with 8–12. Tergal setae: I, 12–16; II, 14–17; III–IV, 14–22; V–VI, 15–24; VII, 15–20; VIII, 8–12. Very long inner posterior marginal setae on IX. Sternal setae: II, 20–29; III, 27–35; IV, 32–49; V–VI, 39–57; VII, 24–35; VIII, 9–14. Genitalia as for *M. victrix*, but sac sclerites as in Fig. 6, with wider gap in each lateral portion. Dimensions: TW, 0.56–0.61; HL, 0.37–0.42; PW, 0.37–0.41; MW, 0.52–0.56; AWIV, 0.66–0.73; GL, 0.59–0.66; TL, 1.70–1.94.

Material. Ex *R. v. vitellinus*, female holotype, male allotype, 2 female paratypes of *M. v. ceciliae*, **VENEZUELA**: Rio Mocho, Rio Caura (MAC-5725; 1909); 1 female, **TRINIDAD**: Sangre Grande (TC-11; 1961). Ex *R. v. culminatus* Gould, 3 females, 3 males, **BRAZIL**: Amazonas, S bank Rio Solimões, 13.5 km E São Paulo de Olivença (AA-713 and 714; 2000). Ex *R. v. ariel* > *R. v. culminatus*, 2 females, 2 males, **BRAZIL**: Pará, ca 139 km SSW Santarem, W of Rio Tapajós, Rio Maró, 02°44.41' S, 55°41.45' W (JDW-455; 2000); 3 females, 1 male, **BRAZIL**: Mato Grosso, W bank Rio Teles Pres, 33 km NE Alta Floresta, 09°39'36" S, 55°54'58" W (JDW-257; 1999). Ex *R. v. ariel* Vigors, 4 females, 2 males, **BRAZIL**: Pará, Fazenda Morelândia, ca 30 km NE Belém, 01°12'40" S, 48°14'42" W (AA-620; 2000); 1 male, **BRAZIL**: Belém (1968); 2 females, **BRAZIL**: São

Paulo, ca 40 km SW Sete Barras, 24°14.28' S, 48°04.94' W (JDW-435; 2000). Ex *R. s. brevicarinatus*, female holotype, male allotype of *M. v. brevicarinatus*, **PANAMA**: Canal Zone, Barro Colo (JVT-104; 1926); 1 female paratype of *M. v. brevicarinatus*, same except (JVT-382; 1927); 1 female, same but not type material (JVT-358; 1927); 1 male, same but not type material (JVT-104; 1926); 1 female, **PANAMA**: Canal Zone, Rio Indio (1911); 4 females, **COSTA RICA**: Guacino (MAC; 1908); 1 female, 1 male, **PANAMA**: Colón Prov. (JDW-107; 1997); 1 female, **PANAMA** (1976). Ex *R. s. sulfuratus* Lesson, all in **MEXICO**: 1 female, Rio do las Playas, Chiapas (WRW; 1943); 1 female, Tres Zapotes (MAC-357; 1940); 1 female, 1 male, Catemaco, Veracruz (MCT-1329; 1959).

Remarks. *Myrsidea v. ceciliae* and *M. v. brevicarinatus* both were placed in synonymy with *M. victrix* by Price et al. (2003), but this study has shown that, while synonymous with each other, they are distinctly different from *M. victrix*. Both sexes of *M. ceciliae* have consistently fewer marginal metanotal and tergal I–III setae than *M. victrix*. Carriker [and Diaz-Ungria] (1961) recognized these differences, but felt they merited only subspecific status. Our study of type materials has suggested that these differences are of a magnitude deserving specific recognition. Other features given by Carriker as potential differences generally are a function of distortion in mounting or improper clearing of specimens. In none of Carriker's descriptions of toucan *Myrsidea* did he make special note of the conspicuous male genital sac sclerites. We agree with Carriker [and Diaz-Ungria] (1961) that *M. v. brevicarinata* is “most closely related to *M. v. ceciliae*.” He adds “At best, it is not an outstanding race, but seems worthy of recognition.” None of the features enumerated in his description enable separation.

Myrsidea witti Price, Hellenthal and Weckstein, new species (Figs. 7–8)

Type host. *Ramphastos toco toco* Stadius Müller.

Female. As in Fig. 8. Posterior pronotal margin with 6 setae, metanotal margin with 10–13. Tergite I with narrow elongate medioposterior tapering. Tergal setae: I, 6–8; II, 14–18; III, 16–20; IV, 18–23; V, 16–21; VI–VII, 15–19; VIII, 8–13. Postspiracular setae on V very long, only slightly shorter than others. Very long inner posterior marginal setae on IX. Sternal setae on II, 26–29; III, 31–37; IV, 56–63; V, 63–68; VI, 47–53; VII, 21–25; subgenital plate with 28–36 setae. Anus with 64–70 ventral fringe setae, 52–55 dorsal. Dimensions: TW, 0.68–0.70; HL, 0.43–0.45; PW, 0.43–0.45; MW, 0.63–0.70; AWIV, 0.87–0.98; ANW, 0.40–0.45; TL, 2.36–2.42.

Male. Posterior pronotal margin with 6 setae, metanotal margin with 8–10. Tergal setae: I, 10–13; II–III, 14–17; IV–VI, 16–20; VII, 15–17; VIII, 8. Postspiracular setae as for female. Sternal setae: II, 22–29; III, 27–32; IV, 44–51; V, 49–61; VI, 43–55; VII, 20–21; VIII, 6–9. Genital sac sclerites as in Fig. 7; with ends of lateral portions overlapping to form oval; lacking distinct thin medioanterior transverse sclerite. Dimensions: TW, 0.62–0.63; HL, 0.41–0.42; PW, 0.39–0.41; MW, 0.53–0.54; AWIV, 0.70–0.73; GL, 0.64–0.69; TL, 1.93–2.01.

Type material. Female holotype, ex *R. t. toco*, **BRAZIL**: Amapá, Macapa, Campus experimental da Embraba, BR-156 km 48, MPEG 46440; 1 female paratype, same data as holotype; 1 male paratype, ex *R. t. toco*, **BRAZIL**: Pará, Mun. de Chaves, Ilha Mexiana, Fazenda Santana, MPEG 50293; 2 female, 1 male paratypes, ex *R. toco albogularis* Cabanis, **BOLIVIA**, Santa Cruz, E Stania Cambaras, 38 km SSW San Matias, 16°40' S, 58°30' W (CCW-946; 1999); 1 male paratype, same, except (CCW-981).

Remarks. The very long postspiracular setae on V for both sexes and the configuration of the male genital sac sclerites set *M. witti* apart from the other 2 species of the *victrix* group.

Etymology. This species is named for Christopher C. Witt, Louisiana State University, in recognition of his interest in lice and dedication to collecting them. He was also the collector of lice used for this description.

extranea species group

The 2 species of this group are characterized as follows. Female with enlarged metanotum and pronounced reduction of anterior abdominal tergites (Figs. 9, 13). Male genitalia (Fig. 10) with sac sclerites as in Figs. 11 or 14. Both sexes with very long postspiracular setae on II, IV, VII–VIII or II–IV, VII–VIII, much shorter on V–VI (Figs. 9, 12, 13); with or without sparse anterior pleural setae on IV–VIII.

Myrsidea extranea (Carriker) (Figs. 9–12)

Colpocephalum extraneum Carriker 1903: 173. Type host: *Nyctidromas albicollis* – error.

Female. As in Fig. 9. Posterior pronotal margin with 8, much less often 9–10, setae; metanotal margin with 8, less often 6–7. Tergal setae: I, 10–17; II, 14–28; III, 16–28; IV–V, 16–26; VI–VII, 16–24; VIII, 10–14. Postspiracular setae on III much shorter than those on II or IV; with sparse anterior pleural setae on IV–VIII. Medium inner posterior marginal setae on IX. Sternal setae: II, 22–36; III, 35–51; IV–VI, 44–66; VII, 27–39; subgenital plate, 29–46. Anus with 52–59 ventral fringe setae, 42–49 dorsal. Dimensions: TW, 0.62–0.66; HL, 0.40–0.43; PW, 0.40–0.45; MW, 0.66–0.79; AWIV, 0.73–0.89; ANW, 0.34–0.40; TL, 2.09–2.40.

Male. As in Fig. 12. Posterior pronotal margin with 7–9 setae, metanotal margin with 6–9. Tergal setae: I, 15–22; II–V, 21–31; VI, 22–28; VII, 19–28; VIII, 11–17. Postspiracular, pleural, and inner IX marginal setae as for female. Sternal setae: II, 19–33; III, 37–47; IV, 42–51; V–VI, 43–55; VII, 29–44; VIII, 15–24. Genitalia as in Fig. 10 and sac sclerites much as in Fig. 11, with only narrow separation for each lateral portion and without evidence of thin transverse sclerite medioanterior to them. Dimensions: TW, 0.53–

0.57; HL, 0.35–0.39; PW, 0.35–0.37; MW, 0.47–0.54; AWIV, 0.54–0.63; GL, 0.53–0.64; TL, 1.66–1.88.

Material. Ex *Nyctidromus a. albicollis* – error, female holotype of *C. extraneum*, **COSTA RICA**: Pozo Azul (MAC;1902). Ex *R. swainsonii*, male “allotype”, 1 male “paratype”, and 2 females of *C. extraneum*, **COSTA RICA**: Guapilas (MAC-515; 1903); 1 female, 1 male, **COLOMBIA**: San Alberto (33472; 1961); 2 females, **COLOMBIA**: Regeneracion (MAC-12592; 1948); 2 females, **COLOMBIA**: Pto. Muchimbo, Rio San Juan (MAC-19162; 1950); 1 female, **COLOMBIA**: La Raya (MAC-12242; 1948); 4 females, **PANAMA**: Canal Zone, Barro Colo (JVT, JVT-362, & JVT-379; 1927); 4 females, 2 males, **ECUADOR**: Prov. Manabi, 45 km NW El Carum, Chindul Mts. (MM; 1991); 2 females, 2 males, **PANAMA**: Prov. Colon, Achiote Road at Rio Providencia, 25m (DLD-5968); 3 females, 1 male, **PANAMA**: Camp Pital (LHD; 1928). Ex *R. v. citreolaemus*, 3 females, 2 males, **COLOMBIA**: La Raya (MAC-12248; 1948). Ex *R. t. tucanus* L., all from **GUYANA**: 2 females, 2 males, Kanuku Mts. (TC-153; 1961); 2 females, 2 males, Wineperu (GL-30; 1967); 1 male, Kartago Pt. (JH; 1984). Ex *R. t. cuvieri* Wagler, 1 female, 1 male, **PERU**: Dpto. Loreto, 7 km SW Jeberos, 05°18'48" S, 76°16'32" W (KE-112; 2001); 1 female, **PERU**: Dpto. Loreto, 86 km SE Juanjui, on E bank Upper Rio Pauya, 07°35'10" S, 75°56'01" W (TV-233; 2000); 5 females, 3 males, **BRAZIL**: Amazonas, S bank Rio Solimões, Fazenda Toshiba, 03°47' S, 60°17' W (JDW-476; 2000); 1 female, **BRAZIL**: Mato Grosso, S bank Rio Cristalino, 0.80 km up river from confluence with Rio Teles Pires, 33 km NE Alta Floresta, 09°37'51" S, 55°55'26" W (JDW-231; 1999); 3 females, 1 male, same except (JDW-244). Ex *R. ambiguus* Swainson, 2 females, **PERU**: Dpto. Huanuco, Divisoria in Cordillera Azul (JPO-2879; 1967); 1 male, **PERU**: Dpto. Loreto, 3 road km NE Abra Divisor on Pucullpa Hwy 12 (JWE-129; 1977).

Remarks. Carriker (1903) described *C. extraneum* from a single female associated with an erroneous host, with the correct host interpreted to be *R. swainsonii*. Subsequently, Carriker [and Diaz-Ungria] (1961) designated and described an allotype and paratype male, an action counter to accepted nomenclatorial practice. His illustrations and descriptive details are consistent with what we recognize here as *M. extranea*.

Myrsidea peruviana Eichler (Figs. 13–14)

Myrsidea extranea peruviana Eichler 1951: 50. Type host: *Ramphastos tucanus inca* Gould – questionable host from “Sivia, Süd-Peru, 520 m, 26.v.1936, Titschach-Expedition.”

Female. Dorsal aspect as in Fig. 13. Posterior pronotal margin with 12–14 setae, metanotal margin with 8–12. Tergal setae: I, 14–20; II–III, 24–28; IV–VI, 20–24; VII, 15–18; VIII, 10–11. Postspiracular setae on III very long, similar to those on II and IV; usually without anterior pleural setae. Medium inner posterior marginal setae on IX. Sternal setae: II, 28–29; III, 40–47; IV, 48–51; V, 53–56; VI, 51; VII, 20; subgenital plate, 27.

Anus with 61–74 ventral fringe setae, 45–59 dorsal. Dimensions: TW, 0.65–0.70; HL, 0.40–0.44; PW, 0.43–0.47; MW, 0.70–0.81; AWIV, 0.77–0.96; ANW, 0.44–0.48; TL, 2.07–2.40.

Male. Posterior pronotal margin with 10–16 setae, metanotal margin with 8–10. Tergal setae: I, 17–22; II, 24–25; III, 22–28; IV, 21–30; V, 22–26; VI, 19–23; VII, 16–18; VIII, 10–12. Postspiracular, pleural, and IX inner posterior marginal setae as for female. Sternal setae: II–III (obscured); IV, 46–48; V, 54; VI, 47; VII, 30; VIII (obscured). Genital sac sclerites as in Fig. 14. Dimensions: TW, 0.60–0.61; HL, 0.39–0.41; PW, 0.39–0.41; MW, 0.53–0.58; AWIV, 0.64–0.68; GL, 0.59–0.63; TL, 1.73–1.97.

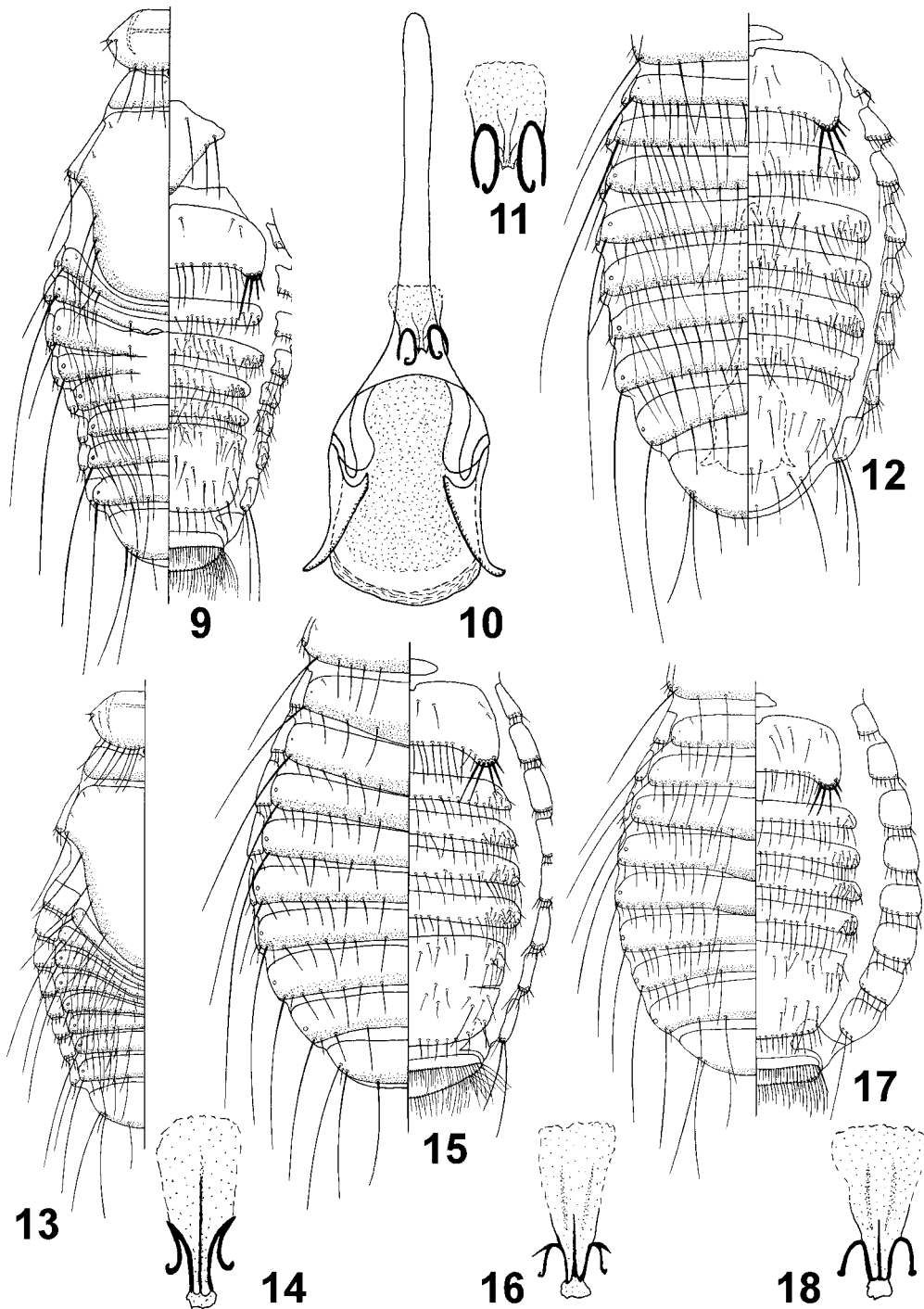
Material. Ex *R. t. cuvieri*, 4 females, 7 males (including male “allotype”, 5 male “paratypes” of *M. peruviana*), **VENEZUELA**: Atures, Amazonas (MAC-1177; 1955); 2 females, **PERU**: Loreto, 7 km SW Jeberos, 05°18'48" S, 76°16'32" W (KE-112; 2001); 2 females, **PERU**: Loreto, ca 54 km NNW mouth Rio Morona on W bank, 04°16'51" S, 79°14'16" W (KE-184; 2001). Ex *R. t. tucanus*, 1 female, 1 male, **VENEZUELA**: Comp. Cecilia, Rio Caura (MAC-2539; 1957); 5 females, 6 males, **GUYANA**: Karthbo Pt. (JH; 1984).

Remarks. Although we have seen no *M. peruviana* specimens from *R. t. inca*, the supposed type host, we have series from both *R. t. cuvieri* and *R. t. tucanus*. We are convinced that they represent this louse taxon. Eichler (1951), while providing a generally useless description, does give a good photograph of an entire female. Carriker [and Diaz-Ungria] (1961) suggested that the *R. t. inca* given by Eichler (1951) was a misidentification of *R. t. cuvieri*. Carriker identified most of the *M. peruviana* material we have seen and we concur with his opinion. The shape of the female metanotal and tergal modifications, the unique male genital sac sclerites (Fig. 14), and the large number of posterior pronotal margin setae (Fig. 13) clearly separate this species from all other known toucan *Myrsidea*.

Since Eichler (1951) had based his description on a single female, Carriker [and Diaz-Ungria] (1961) described and designated a male allotype and 8 male paratypes for *M. peruviana*. In spite of his good intentions to fill the void of the absence of a male description, designation of an allotype and paratypes in this way is improper taxonomic practice and the specimens should not carry these designations.

***abbreviata* species group**

The 4 species of this group are characterized as follows. Female without enlarged metanotum or highly modified abdominal tergites (Figs. 15, 17). Male genitalia with sac sclerites as in Figs. 4, 16, or 18. Both sexes with posterior pronotal margin with 6 setae; postspiracular setae very long at least on II, IV, and VI–VIII; without anterior pleural setae.



FIGURES 9–18. 9–12, *Myrsidea extranea*. 9, Female dorsal thorax, metasternum, and dorsoventral abdomen. 10, Male genitalia. 11, Male genital sac sclerites. 12, Male metanotum and dorsoventral abdomen. 13–14, *M. peruviana*. 13, Female dorsal thorax and abdomen. 14, Male genital sac sclerites. 15, *M. abbreviata* female metanotum and dorsoventral abdomen. 16, *M. dorotheae* male genital sac sclerites. 17–18, *M. lanei*. 17, Female metanotum and dorsoventral abdomen. 18, Male genital sac sclerites.

***Myrsidea abbreviata* Eichler (Fig. 15)**

Myrsidea abbreviata Eichler 1951: 50. Type host: “*Ramphastos discolorus*” = *R. discolorus* L.

Female. As in Fig. 15. Metanotal margin with 10 setae. Tergites I–III with slight medio-posterior convexity intruding to following tergite. Tergal setae: I, 7–10; II, 14–15; III, 16–19; IV–VI, 15–22; VII, 14–21; VIII, 8. Postspiracular setae on V much shorter than others. Very long inner posterior marginal setae on IX. Sternal setae: II, 25–29; III, 34–42; IV, 46–57; V–VI, 52–66; VII, 30–35; subgenital plate, 28–33. Anus with 57–62 ventral fringe setae, 46–52 dorsal. Dimensions: TW, 0.65–0.68; HL, 0.41–0.44; PW, 0.43–0.44; MW, 0.66–0.70; AWIV, 0.94–1.02; ANW, 0.42–0.44; TL, 2.33–2.39.

Male. As for female, except as follows. Metanotal margin with 6–9 setae. Tergites I–III unmodified. Tergal setae: I, 9–13; II, 15–20; III, 16–22; IV, 19–21; V, 18–25; VI, 20–22; VII, 15–20; VIII, 8–12. Sternal setae: II, 25–27; III, 31–38; IV, 41–49; V, 51–58; VI, 47–57; VII, 0.27–0.34; VIII, 12–15. Genital sac sclerites much as in Fig. 4. Dimensions: TW, 0.59–0.60; HL, 0.38–0.41; PW, 0.37–0.40; MW, 0.49–0.56; AWIV, 0.70–0.73; GL, 0.63–0.69; TL, 1.74–1.90.

Material. Ex *R. discolorus*, 9 females, 5 males, **BRAZIL**: Nuevo Teutonia (MAC; 1938); 7 females, **BRAZIL**: Catel (MAC; 1938); 1 female, 1 male, Joinville, Humboldt, S. America (WE; 1913).

Remarks. The description by Eichler (1951) provides a few generally valueless details, unaccompanied by illustrations. Carriker [and Diaz-Ungria] (1961) stated that *M. abbreviata* is “...certainly conspecific with *M. victrix* Waterston” and placed it as a subspecies of *M. victrix*. He noted, however, that the female has all transverse tergites, none highly modified as for *M. victrix*. That Carrkier placed no importance on this tergal state is counter to his usual practice of employing minor features to justify recognition of new taxa.

The lengths of the postspiracular setae for both sexes, along with the configuration of the male genital sac sclerites and slight enlargement of female tergites I–III, separate *M. abbreviata* from the others of this group. The male genital sac sclerites are essentially identical to those of *M. victrix*, and are quite different from those of other males in the *abbreviata* species group.

***Myrsidea dorotheae* Eichler (Fig. 16)**

Myrsidea dorotheae Eichler 1953: 301. Type host: *Pteroglossus azara mariae* Gould.

Female. Much as in Fig. 17. Metanotal margin with 8–10 setae. Tergites III–V with slight medioposterior convexity intruding into the following tergite. Tergal setae: I, 13–15; II, 15–20; III, 19–21; IV–VI, 18–22; VII, 16–17; VIII, 8–10. Postspiracular setae on III and V much shorter than others. Medium inner posterior marginal setae on IX. Sternal

setae: II, 29–33; III, 34–38; IV, 40–45; V, 43–49; VI, 35–39; VII, 15–17; subgenital plate, 38–47. Anus with 38–45 ventral fringe setae, 43–47 dorsal. Dimensions: TW, 0.62–0.64; HL, 0.38–0.39; PW, 0.37–0.42; MW, 0.61–0.64; AWIV, 0.90–0.96; ANW, 0.35–0.37; TL, 2.07–2.21.

Male. Metanotal margin with 6–8 setae. Tergal setae: I, 10–14; II, 16–19; III–VI, 18–25; VII, 15–18; VIII, 8–11. Medium inner posterior marginal setae on IX, much as in Fig. 1. Postspiracular setae on III and V shorter than others. Sternal setae: II, 27–36; III, 29–34; IV, 36–42; V, 36–43; VI, 35–39; VII, 19–24; VIII, 10–15. Genital sac sclerites as in Fig. 16, with bifurcation on each side. Dimensions: TW, 0.56–0.58; HL, 0.35–0.37; PW, 0.35–0.38; MW, 0.50–0.52; AWIV, 0.63–0.67; GL, 0.54–0.58; TL, 1.73–1.86.

Material. Ex *P. a. mariae*, 4 males, **PERU**: Dept. Madre de Dios, Hda. Amazonia, near Atalaya Ridge 330 m. above Hda. (DHC-85-058; 1985); 2 females, **PERU**: Loreto, 86 km SE Juanjui on E bank upper Rio Pauya, 07°38'40" S, 75°54'58" W (MSS-3666; 2000). Ex *P. inscriptus humboldti* Wagler, 2 female, 2 males, **PERU**: Loreto, 36 km SE Juanjui on E bank upper Rio Pauya, 07°35'10" S, 75°56'01" W (JLK-219; 2001); 1 male, **PERU**: Dpto. Loreto (JWA-80; 2000); 1 male, **BRAZIL**: Amazonas, N bank Rio Solimões, ca 4.5 km NE São Paulo de Olivença, 03°25' S, 68°57' W (AA-680; 2000).

Remarks. Eichler (1953) gave a brief essentially useless description of this species based on a single female and accompanied by a meaningless illustration of the prosternal plate. Both sexes of *M. dorotheae* differ from *M. abbreviata* by their shorter postspiracular setae on III and fewer sternal setae on IV–VI. Males also are distinguished by their unique genital sac sclerites (Fig. 16).

***Myrsidea aleixoi* Price, Hellenthal and Weckstein, new species**

Type host. *Pteroglossus beauharnaesii* Wagler.

Female. Much as in Fig. 17. Metanotal margin with 11–14 setae, much less often 10. Tergites III–V with slight medioposterior convexity intruding into following tergite. Tergal setae: I, 13–18; II, 18–20; III, 20–23; IV–VI, 18–22; VII, 14–17; VIII, 8–10. Postspiracular setae on III and V much shorter than others. Medium inner posterior marginal setae on IX. Sternal setae: II, 31–39; III, 30–35; IV, 42–47; V, 44–50; VI, 37–43; VII, 15–19; subgenital plate, 33–46. Anus with 41–49 ventral fringe setae, 42–52 dorsal. Dimensions: TW, 0.66–0.69; HL, 0.40–0.43; PW, 0.42–0.46; MW, 0.65–0.70; AWIV, 0.94–0.98; ANW, 0.35–0.41; TL, 2.31–2.40.

Male. Metanotal margin with 6–7 setae. Tergal setae: I, 11–13; II–III, 17–20; IV–VI, 18–21; VII, 14–15; VIII, 7–8. Medium inner posterior marginal setae on IX, much as in Fig. 1. Postspiracular setae on III and V shorter than others. Sternal setae: II, 30–34; III, 28–34; IV, 39–41; V, 37–43; VI, 38–39; VII, 16–21; VIII, 10–14. Genital sac sclerites as in Fig. 16, with bifurcation on each side. Dimensions: TW, 0.62; HL, 0.38; PW, 0.41–0.42; MW, 0.50–0.56; AWIV, 0.73–0.77; GL, 0.63–0.70; TL, 1.93–2.03.

Type material. Female holotype, ex *P. beauharnaesii*, **BRAZIL**: Mato Grosso, S bank Rio Cristalino, 1.3 km up river from confluence with Rio Teles Pires, 34 km NE Alta Floresta, 09°37'25" S, 55°55'40" W, 1 Aug. 1999, JDW-283; 3 female, 2 male paratypes, same data as holotype.

Other material. Ex *P. castanotis* Gould, 3 females, 1 male, **BOLIVIA**: Dpto. Santa Cruz, Mina Don Mario, 126 km ENE San Jose de Chiquitos, 17°20' S, 59°41' W (MHH-31; 1999).

Remarks. This new species is morphologically close to *M. dorotheae*, but is separable by its consistently larger dimensions for both sexes and most females with at least 11 marginal metanotal setae.

Etymology. This species is named for Alexandre Aleixo, Museu Paraense Emilio Goeldi, in recognition of his valuable assistance in collecting specimens vital to this and other studies of lice.

Myrsidea lanei Price, Hellenthal and Weckstein, new species (Figs. 17–18)

Type host. *Pteroglossus aracari* (L.).

Female. As in Fig. 17. Metanotal margin with 6 setae. Tergites III–V with slight medioposterior convexity. Tergal setae: I, 15; II, 20; III–VI, 23–26; VII, 15; VIII, 8. Postspiracular setae very long on I–VIII. Medium inner posterior marginal setae on IX. Sternal setae: II, 31; III, 37; IV–VI, 42–49; VII, 22; subgenital plate, 36. Anus with 44–45 setae in each fringe. Dimensions: TW, 0.69; HL, 0.41; PW, 0.45; MW, 0.69; AWIV, 1.05; ANW, 0.43; TL, 2.38.

Male. As for female, except as follows. Tergites III–V unmodified. Tergal setae: I, 12–13; III, 22; IV, 21–23; V–VI, 22–24; VII, 14–16. Sternal setae: V, 42–48; VI, 35–43; VII, 21–28; VIII, 10–14. Genital sac sclerites as in Fig. 18. Dimensions: TW, 0.61–0.64; HL, 0.38; PW, 0.43; MW, 0.58–0.60; AWIV, 0.74–0.79; GL, 0.62–0.63; TL, 1.97.

Type material. Female holotype, ex *P. aracari*, **BRAZIL**: Pará, 30 km NE Belém, Fazenda Morelândia, 01°12'40" S, 48°14'47" W, 14 Aug. 1999, JDW (MO-004); 2 male paratypes, same data as holotype.

Remarks. The very long postspiracular setae on III and V, the consistently larger dimensions, the male genital sac sclerites without a lateral bifurcation (Fig. 18 vs. Fig. 16), and the female metanotal margin with only 6 setae allow separation of *M. lanei* from *M. dorotheae* and *M. aleixoi*.

Etymology. This species is named for Daniel F. Lane, Louisiana State University, in recognition of his help in collecting many valuable louse specimens used in this and other studies of lice.

Discussion

The organization of the 9 toucan *Myrsidea* species into 3 groups is not without its shortcomings. Based essentially on the female having an enlarged tergite I or metanotum, or neither conspicuously enlarged, the number of species in each are, respectively, 3, 2, and 4. However, it is evident that this introduces a degree of heterogeneity within 2 of these groups. In the *victrix* species group, 2 of the 3 included species have male genital sac sclerites with a thin transverse sclerite medioanterior to them. The third species, *M. witti*, does not have this sclerite, the sclerites appearing much as those in the *extranea* species group, for which the 2 included species seem to be fairly homogeneous. In the *abbreviata* species group, 3 of the species are found on hosts in the genus *Pteroglossus* and the fourth, *M. abbreviata*, is on *Ramphastos dicolorus*. There is a pronounced difference between the male genital sac sclerites for the *Pteroglossus* lice from those on *Ramphastos*. The sac sclerites of *M. abbreviata* have a close affinity with those of other louse species from *Ramphastos* and appear inseparable from those of *M. victrix*. Yet, the 4 species of this group are united by the female without conspicuously modified metanotum or tergites.

Reference to Table I gives an overview of the distribution of the *Myrsidea* on the toucan taxa. The sequence of hosts in the table is from Dickinson (2003). The host associations of toucan *Myrsidea* are particularly interesting. Phylogenetic reconstructions of *Ramphastos* toucans using mtDNA sequences suggest that *R. v. vitellinus*, *R. v. culminatus*, *R. v. ariel*, *R. brevis*, *R. dicolorus*, and *R. sulfuratus* form a monophyletic group as do *R. t. tucanus*, *R. t. cuvieri*, *R. swainsonii*, and *R. ambiguus* (Weckstein 2003). *Ramphastos toco* is basal to all *Ramphastos* toucans and is genetically relatively distant from them (Weckstein 2003). The host associations of *Myrsidea* species suggest that toucan *Myrsidea* may be somewhat host specific. *Myrsidea ceciliae* is found on *R. s. sulfuratus*, *R. s. brevicarinatus*, *R. v. vitellinus*, *R. v. culminatus*, and *R. v. ariel* hosts which, as noted above, are members of a monophyletic group. *Myrsidea peruviana* also is found only on 2 subspecies of *R. tucanus*. *Myrsidea witti* is found only on *R. toco*. *Myrsidea extranea*, except for one record from *R. v. citreolaemus*, is restricted to a monophyletic group of *Ramphastos* (*R. t. tucanus*, *R. t. cuvieri*, *R. swainsonii*, and *R. ambiguus*). Finally, 3 of 4 members of the *abbreviata* species group (*M. dorotheae*, *M. aleixoi*, and *M. lanei*) are found only on aracarís, which are small toucans in the genus *Pteroglossus*.

Myrsidea from toucans apparently are more host specific than ischnoceran *Austrophilopterus* Ewing toucan lice. A recent comparison of the *Ramphastos* toucan phylogeny to the phylogeny of their *Austrophilopterus* lice revealed that relatively distantly related toucans from the same geographic locality carried the same *Austrophilopterus* species (Weckstein 2004). This suggests that *Austrophilopterus* lice are capable of host-switching between sympatric hosts (Weckstein 2004). *Myrsidea* species are shared among relatively closely related hosts in different geographic regions; however, relatively distantly related sympatric pairs of *Ramphastos* hosts apparently do not carry the same species of *Myrsidea*. This suggests that *Myrsidea* may not disperse between toucan hosts as easily as do

Austrophilopterus lice. These differences in dispersal ability might be explained by life history characteristics of these genera. For example, *Austrophilopterus* might disperse via phoresis on hippoboscids flies, whereas *Myrsidea* may be unable to disperse in this manner. Comparisons among the phylogenies of *Ramphastos*, *Austrophilopterus*, and *Myrsidea* based on larger numbers of host and louse taxa may clarify the relative dispersal abilities of the lice.

TABLE I. Host list¹ for the toucan *Myrsidea*.

| Host genus | Host species | Host subspecies | Louse species | Louse species group |
|---------------------|----------------------|-----------------------|-------------------|---------------------|
| <i>Pteroglossus</i> | <i>inscriptus</i> | <i>humboldti</i> | <i>dorotheae</i> | <i>abbreviata</i> |
| | <i>azara</i> | <i>mariae</i> | <i>dorotheae</i> | <i>abbreviata</i> |
| | <i>aracari</i> | | <i>lanei</i> | <i>abbreviata</i> |
| | <i>castanotis</i> | | <i>aleixoi</i> | <i>abbreviata</i> |
| | <i>beauharnaesii</i> | | <i>aleixoi</i> | <i>abbreviata</i> |
| <i>Ramphastos</i> | <i>dicolorus</i> | | <i>abbreviata</i> | <i>abbreviata</i> |
| | <i>vitellinus</i> | <i>culminatus</i> | <i>ceciliae</i> | <i>victrix</i> |
| | | <i>citreolaemus</i> | <i>extranea</i> | <i>extranea</i> |
| | | <i>vitellinus</i> | <i>ceciliae</i> | <i>victrix</i> |
| | | <i>ariel</i> | <i>ceciliae</i> | <i>victrix</i> |
| | <i>brevis</i> | | <i>victrix</i> | <i>victrix</i> |
| | <i>sulfuratus</i> | <i>sulfuratus</i> | <i>ceciliae</i> | <i>victrix</i> |
| | | <i>brevicarinatus</i> | <i>ceciliae</i> | <i>victrix</i> |
| | <i>toco</i> | | <i>witti</i> | <i>victrix</i> |
| | <i>tucanus</i> | <i>tucanus</i> | <i>peruviana</i> | <i>extranea</i> |
| | | | <i>extranea</i> | <i>extranea</i> |
| | | <i>cuvieri</i> | <i>peruviana</i> | <i>extranea</i> |
| | | | <i>extranea</i> | <i>extranea</i> |
| | <i>swainsonii</i> | | <i>victrix</i> | <i>victrix</i> |
| | <i>ambiguus</i> | | <i>extranea</i> | <i>extranea</i> |
| | | <i>extranea</i> | <i>extranea</i> | |

¹Host names and sequence from Dickinson (2003)

Several species of *Myrsidea*, in particular, *M. extranea* and *M. ceciliae*, are widespread in their geographic and host distribution. Among single morphospecies of lice associated with multiple hosts, Johnson et al. (2002) found dramatic genetic structuring, which is indicative of cryptic louse species. Population genetic analysis of the widespread *Myrsidea* species is needed to assess whether populations found on particular host species represent host-associated louse races or cryptic species. For example, *M. extranea* and *M. peruviana* were collected from the same individual *R. t. cuvieri* (KE-112) in Peru. Similar double infestations have been found on an individual *R. t. tucanus* from Venezuela, which

had 2 *Ramphasticola* species (Carriker and Diaz-Ungria), and on one dove, which had 2 *Columbicola* species (Johnson et al. 2002). Toucan hosts at other localities within the Amazon also may carry multiple species of *Myrsidea*. However, more sampling is needed, because cross-contamination of lice among hosts collected by workers such as Carriker is not unknown and preparation of lice for identification often is less than satisfactory. Further sampling and proper slide-mounting may help establish geographic distribution, host associations, and the history of speciation within and between *Myrsidea* taxa.

Key to the species of *Myrsidea* from the toucans

Female

- 1 With much enlarged metanotum or tergite I (Figs. 3, 5, 8, 9, 13) 2
 - With essentially unmodified metanotum or tergite I (Figs. 15, 17) 6
- 2 With enlarged metanotum (Figs. 9, 13) 3
 - With enlarged tergite I (Figs. 3, 5, 8) 4
- 3 Posterior pronotal margin with >11 setae (Fig. 13)..... *peruviana* Eichler
 - Posterior pronotal margin with <11 setae (Fig. 9) *extranea* (Carriker)
- 4 Metanotal margin with >19 setae (Fig. 3) *victrix* Waterston
 - Metanotal margin with <15 setae 5
- 5 Postspiracular setae very long on V (Fig. 8); temple width >0.68 *witti* **n. sp.**
 - Postspiracular setae on V much shorter (Fig. 5); temple width <0.69 *ceciliae* Carriker
- 6 Postspiracular setae on III distinctly shorter than on II and IV 7
 - Postspiracular setae on III very long, similar to those on II and IV 8
- 7 Temple width >0.65; head length >0.39; metanotal margin with at least 10 setae
 - *aleixoi* **n. sp.**
 - Temple width <0.65; head length <0.40; metanotal margin with <11 setae
 - *dorotheae* Eichler
- 8 Postspiracular setae on V shorter than those on IV or VI; tergites I–III with slight medioposterior convexity (Fig. 15) *abbreviata* Eichler
 - Postspiracular setae on V similar to those on IV and VI; tergites III–V with slight medioposterior convexity (Fig. 17) *lanei* **n. sp.**

Male

- 1 Genital sac sclerites as in Fig. 16 or 18 2
 - Genital sac sclerites otherwise 4
- 2 Genital sac sclerites as in Fig. 18 *lanei* **n. sp.**
 - Genital sac sclerites as in Fig. 16 3
- 3 Temple width and genitalia length >0.60 *aleixoi* **n. sp.**

- Temple width and genitalia length <0.60 *dorotheae* Eichler
- 4 Metanotal margin with >13 setae (Fig. 1) *victrix* Waterston
- Metanotal margin with <13 setae 5
- 5 Posterior pronotal margin with >9 setae; genital sac sclerites as in Fig. 14
..... *peruviana* Eichler
- Posterior pronotal margin with <10 setae; genital sac sclerites otherwise 6
- 6 Posterior pronotal margin with 8, less often 7 or 9, setae *extranea* (Carriker)
- Posterior pronotal margin with only 6 setae 7
- 7 Postspiracular setae very long on V; genital sac sclerites as in Fig. 7; ex *R. toco*
..... *witti* n. sp.
- Postspiracular setae shorter on V than on IV or VI; genital sac sclerites as in Figs 4 or 6
..... 8
- 8 Genital sac sclerites as in Fig. 4; ex *R. dicolorus* *abbreviata* Eichler
- Genital sac sclerites as in Fig. 6; ex *R. vitellinus* or *R. sulfuratus* *ceciliae* Carriker

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