



Chewing lice (Phthiraptera) from buntings, cardinals and tanagers (Passeriformes: Emberizidae, Cardinalidae, Thraupidae) from Costa Rica, with descriptions of two new species of the genus *Myrsidea* (Phthiraptera: Menoponidae)

OLDŘICH SYCHRA¹, IVAN LITERÁK¹, MIROSLAV ČAPEK² & MARTIN HAVLÍČEK³

¹Department of Biology and Wildlife Diseases, Faculty of Veterinary Hygiene and Ecology, University of Veterinary and Pharmaceutical Sciences, Palackého 1–3, 612 42 Brno, Czech Republic. E-mail: sychrao@vfu.cz

²Department of Avian Ecology, Institute of Vertebrate Biology, Academy of Sciences of the Czech Republic, Květná 8, 603 65 Brno, Czech Republic

³Veterinary Teaching Hospital, School of Veterinary Science and Animal Production, University of Queensland, St Lucia, Queensland 4072, Australia

Abstract

Descriptions and illustrations are given for two new species of *Myrsidea* Waterston, 1915 from cardinals and tanagers from Costa Rica. They and their type hosts are: *Myrsidea poliogasteri* ex *Caryothraustes poliogaster* (Cardinalidae) and *M. larvatae* ex *Tangara larvata* (Thraupidae). The male of *Myrsidea mitrospingi* is also described. New host records are *Sporophila corvina* for *Ricinus diffusus*; *Mitrospingus cassinii* for *Menacanthus eurysternus*; *Tachyphonus luctuosus* for *Myrsidea spizae*; *Euphonia gouldi* for *Myrsidea violaceae*; and *Tachyphonus delatirii* for *Machaerilaemus laticorpus*. Records of two other louse species of the genus *Myrsidea* from tanagers are also discussed. This paper includes the first record of *Myrsidea* from members of the passerine family Cardinalidae, and a number of additional new host-lice associations.

Key words: *Myrsidea*, *Menacanthus*, *Machaerilaemus*, *Ricinus*, new host-lice associations

Introduction

Buntings (Emberizidae), cardinals (Cardinalidae) and tanagers (Thraupidae and the ensuing “*Genera Incertae Sedis*”) are among the most speciose families within the Passeriformes (Dickinson 2003). Of the 623 known species within these passerine families, 103 species occur in Costa Rica (Stiles and Skutch 1989). Data concerning the chewing lice of these Costa Rican birds are scarce. To date, only nine species of chewing lice from nine host species have been reported (Carriker 1903; Nelson 1972; Price 1975; Cicchino 1983; Price *et al.* 2002; Price and Dalglish 2006). In addition to the species listed by Price *et al.* (2003), 31 new species of *Myrsidea* Waterston, 1915 from Thraupidae and Emberizidae have been described, nine of these 31 species have been from Costa Rica (Price & Dalglish 2006, 2007). It should be noted that Price *et al.* (2003) followed the avian classification scheme of Howard & Moore (1991) and, by doing so, included species now recognized as members of the Thraupidae and Cardinalidae within the Emberizidae. The aim of this paper is to present new data on the composition and distribution of species of chewing lice found on buntings, cardinals and tanagers in Costa Rica, including descriptions of two new species.

Material and methods

We conducted fieldwork during the 2004 rainy season at two localities in southeastern Costa Rica: (1) Hitoy Cerere Biological Reserve (BR) (9°40'N, 85°05'W) and (2) Barbilla National Park (NP) (9°59'N, 85°27'W). For detailed description of the sites and methods see Sychra *et al.* (2006).

The taxonomy of the birds to the family level follows Dickinson (2003). Identification of the chewing lice was based on papers by Nelson (1972), Price (1977), Price *et al.* (2002), and Price & Dalgleish (2006, 2007).

The nomenclature of the lice follows Price *et al.* (2003). Price & Dalgleish (2006: 2) provided the diagnostic characters that define the genus *Myrsidea* from the Thraupidae. Because these characters are common to all *Myrsidea* species mentioned below, they will not be repeated in the species descriptions. In the following descriptions, all measurements are in millimeters. Abbreviations for dimensions are TW, temple width; HL, head length at midline; PW, prothorax width; MW, metathorax width; AW, abdomen width; TL, total length; ANW, female anus width; GL, male genitalia length; GW, male genitalia width; GSL, genital sac sclerite length. We include the number of specimens from which quantified characters were taken within parentheses after “Male” and “Female” for each description. The new species are attributed to the first author only.

The type specimens of the new species described in this paper are deposited in the National Biodiversity Institute, Santo Domingo de Heredia, Costa Rica (INBio). Other material will be deposited in the Moravian Museum, Brno, Czech Republic (MZM) and in the personal collection of the first author.

Results

A total of 135 individuals of 16 bird species belonging to the families Emberizidae, Cardinalidae and Thraupidae were examined. Forty five birds of 12 species were parasitised with chewing lice. Eleven species of chewing lice were determined (Table 1).

Family Emberizidae

Host: *Arremon aurantiirostris* Lafresnaye – Orange-billed Sparrow

One chewing louse species was found on this host:

Myrsidea aurantiirostris Price & Dalgleish 2007

Myrsidea aurantiirostris Price & Dalgleish, 2007: figs 23–25.

Type host. *Arremon aurantiirostris* Lafresnaye

Material studied. 2 females and 11 males ex *Arremon aurantiirostris*, **COSTA RICA**: Hitoy Cerere BR, Provincia Limón (9°40'N, 85°05'W), 17–27 August 2004, Literák, Čapek & Havlíček coll. Deposited in INBio – O. Sychra CR55–57.

Remarks. Five of seven birds examined were parasitised by *M. aurantiirostris*.

Host: *Sporophila corvina* (Sclater) – Variable Seedeater

One chewing louse species was found on this host:

Ricinus diffusus (Kellogg, 1896)

Physostomum diffusus Kellogg, 1896

Type host. *Passerculus sandwichensis* (Gmelin)

Material studied. 2 females ex *Sporophila corvina*, **COSTA RICA**: Hitoy Cerere BR, Provincia Limón (9°40'N, 85°05'W), 20 August 2004, Literák, Čapek & Havlíček coll. Deposited in INBio – O. Sychra CR71.

Remarks. One of 29 birds examined was parasitised by *R. diffusus*. This is the first record of a chewing louse species from *Sporophila corvina*.

TABLE 1. List of hosts and their lice.

** denotes a new host-louse record

Family Emberizidae

Arremon aurantirostris Lafresnaye

Myrsidea aurantirostris Price & Dalglish, 2007

Sporophila corvina (Sclater)

** *Ricinus diffusus* (Kellogg, 1896)

Family Cardinalidae

Caryothraustes poliogaster (Du Bus de Gisignies)

Myrsidea poliogasteri Sychra, **n. sp.**

Cyanocompsa cyanooides (Lafresnaye)

** *Myrsidea* sp.1

Saltator maximus (Müller)

** *Myrsidea* sp.2

Family Thraupidae

Tangara larvata (Du Bus de Gisignies)

Myrsidea larvatae Sychra, **n. sp.**

Euphonia gouldi Sclater

** *Myrsidea violaceae* Price & Dalglish, 2006

Habia fuscicauda (Cabanis)

Myrsidea fuscicaudae Price & Dalglish, 2006

Ramphocelus passerinii Bonaparte

Myrsidea fusca (Carraker, 1903)

Tachyphonus luctuosus d'Orbigny & Lafresnaye

** *Myrsidea spizae* Price & Dalglish, 2006

** *Ricinus* sp.

Tachyphonus delatirii Lafresnaye

** *Myrsidea* sp.3

** *Machaerilaemus laticorpus* (Carraker, 1903)

Mitrospingus cassinii (Lawrence)

** *Menacanthus eurysternus* (Burmeister, 1838)

Myrsidea mitrospingi Price & Dalglish, 2006

** *Ricinus* sp.

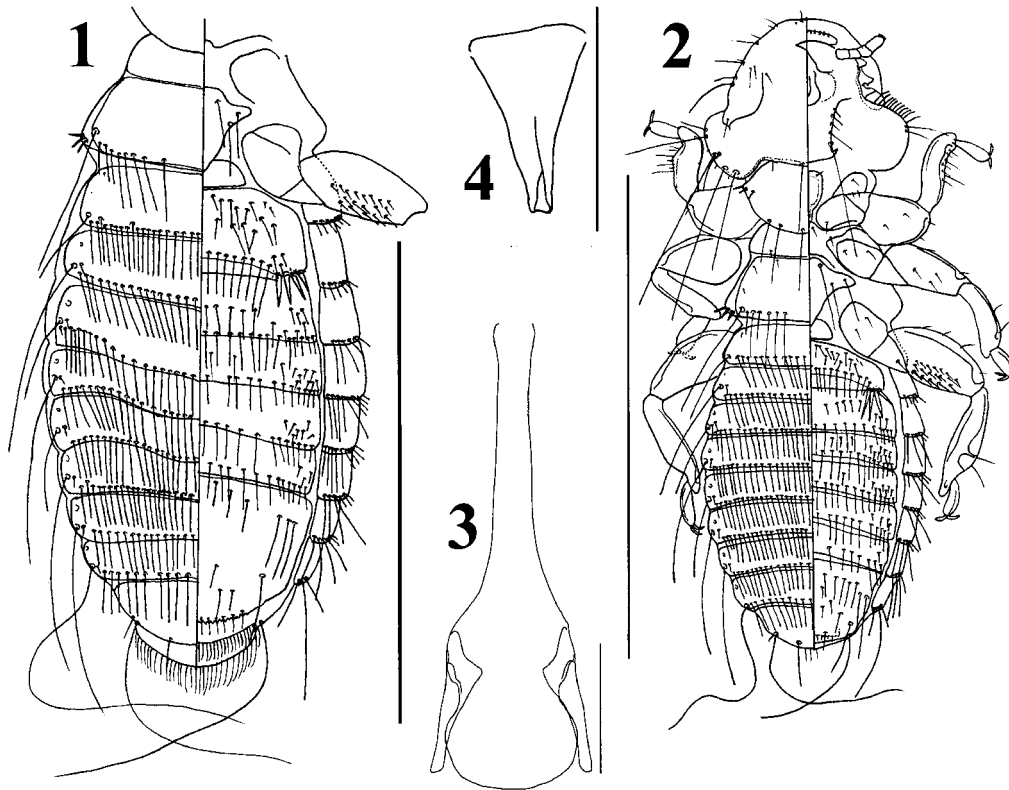
Family Cardinalidae

Host: *Caryothraustes poliogaster* (Du Bus de Gisignies) – Black-faced Grosbeak

One chewing louse species was found on this host:

Myrsidea poliogasteri Sychra, new species (Figs. 1–4)

Female (6). Hypopharyngeal sclerites strongly developed. Mean length of head seta 10, 0.045 (n=4); seta 11, 0.110 (n=4); ratio10/11, 0.41. Gula with 5 setae on each side, most posterior much heavier and longer than others. Pronotum with 3 short spiniform setae of the same length on each lateral corner. Metanotum not enlarged, with very long corner setae (not included in setal count) and 11–17 setae on posterior margin. Metasternal plate large, triangular, with 6–8 long setae. First tibia with 3 outer lateral ventral and 4 dorsal setae; femur III with 14–17 setae in ventral brush.



FIGURES 1–4. *Myrsidea poliogasteri*. 1, Female dorsoventral metathorax and abdomen. 2, Male. 3, Male genitalia. 4, Male genital sac sclerite.

All abdominal segments with continuous row of tergal setae across each segment without well-defined median gap in these rows. Abdomen with tergites I–III enlarged; tergite I with straight posterior margin, II with gently curved posterior margin, III–V with slight medioposterior convexity (Fig. 1). Tergal setae (including postspiracular setae and all setae between them): I, 28–43; II, 36–45; III, 33–43; IV, 39–47; V, 40–52; VI, 42–49; VII, 35–41; VIII, 21–27. Postspiracular setae extremely long only on VIII (0.40–0.43), long on II, IV and VI–VII (0.20–0.27), and shorter on I, III and V (0.15–0.17). Abdomen without anterior tergal or pleural setae; margin of pleurites I–II with only short spiniform setae, pleurites III–VII also with 3–5 much longer finer setae; margin of pleurite VIII with median long seta flanked on each side by shorter seta. Sternite I without setae. Sternite II with 18–30 medioanterior; 18–21 marginal and aster of 4–5 robust setae on each side. Sternal setae counts include marginal and lateral anterior as well as medioanterior setae together in one setal count as in Price & Dalglish (2006). Sternal setae: III, 47–65; IV, 45–53; V, 36–44; VI, 28–33; VII, 14–19; VIII–IX, 22–30 (including 10–16 marginal setae); with 8–17 medioanterior setae on III, rarely with 2–4 on IV. Subgenital plate formed by fusion of sternites VII–IX, with posterior margin finely serrated. Anal fringe of 44–48 dorsal and 33–45 ventral setae. *Dimensions*: TW, 0.48–0.50; HL, 0.31–0.33; PW, 0.32–0.34; MW, 0.50–0.53; AWIV, 0.64–0.67; TL, 1.56–1.66; ANW, 0.25–0.26.

Male (8). Fig. 2. Mean length of head seta 10, 0.039 (n=5); seta 11, 0.105 (n=5); ratio10/11, 0.37. Metanotum with 10–13 setae on posterior margin. Femur III with 15–22 setae in ventral brush.

Tergal setae: I, 29–35; II, 36–41; III, 39–46; IV, 43–49; V, 41–48; VI, 40–46; VII, 34–40; VIII, 23–27. Sternite II with 19–23 medioanterior; 14–19 marginal and aster of 3–4 robust setae on each side. Sternal setae: III, 38–55; IV, 46–55; V, 40–49; VI, 32–42; VII, 24–29; VIII, 15–23; remainder of plate, 11–16; with 5–10 medioanterior setae on III and 1–5 on IV–VI. Sternite VII separate from subgenital plate of fused VIII–IX; with 8 internal anal setae. Genitalia and genital sac sclerite as in Figs. 3 and 4, respectively. *Dimensions*: TW,

0.43–0.45; HL, 0.27–0.30; PW, 0.29–0.32; MW, 0.39–0.42; AWIV, 0.47–0.51; TL, 1.32–1.37; GL, 0.41–0.43; GW, 0.11–0.12; GSL, 0.08.

Type material. Female holotype, ex *Caryothraustes poliogaster*, **COSTA RICA**: Barbilla NP, Provincia Limón (9°59'N, 85°27'W), 8 September 2004, Literák, Čapek & Havlíček coll. Paratypes: 5 females and 8 males with same data as holotype. Deposited in INBio – O. Sychra CR58–59.

Remarks. Both sexes of *M. poliogasteri* are readily characterised by a unique combination of characters as follows: (1) abdominal segments with a continuous row of tergal setae, (2) presence of medioanterior setae on sternites III–VI, (3) relative lengths of the postspiracular setae, especially the extremely long seta only on tergite VIII, (4) large number of setae on tergites IV–VI, (5) female by its abdominal tergal configuration. Four birds were examined and all were parasitised by *M. poliogasteri*. This is the first record of a chewing louse species from *Caryothraustes poliogaster*.

Etymology. The species name is derived from the specific name of the type host.

Host: *Cyanocopsa cyanoides* (Lafresnaye) – Blue-black Grosbeak

One chewing lice species was found on this host:

Myrsidea sp. 1

Material studied. 3 males and 2 nymphs ex *Cyanocopsa cyanoides*, **COSTA RICA**: Hitoy Cerere BR, Provincia Limón (9°40'N, 85°05'W), 19–25 August 2004, Literák, Čapek & Havlíček coll. Deposited in INBio – O. Sychra CR61, 2 nymphs ex *C. cyanoides*, Barbilla NP, Provincia Limón (9°59'N, 85°27'W), 2 September 2004, Literák, Čapek & Havlíček coll. Deposited in INBio – O. Sychra CR61.

Remarks. Unlike *Myrsidea poliogasteri*, *Myrsidea* sp. 1 from *C. cyanoides* is characterised by a well-defined median gap in the rows of tergal setae. Our specimens are practically inseparable from that of *M. zonotriciae* Price & Dalglish 2007 described from *Zonotrichia capensis* (Emberizidae). Unfortunately, having no female specimens is insufficient for an adequate confirming *Myrsidea* sp. 1 either as a different new species or a new host-lice association for *M. zonotriciae*. Four of 12 birds examined were parasitised by *Myrsidea* sp. 1. This is the first record of chewing lice from *Cyanocopsa cyanoides*.

Host: *Saltator maximus* (Müller) – Buff-throated Saltator

One chewing lice species was found on this host:

Myrsidea sp. 2

Material studied. 2 males, 5 nymphs ex *Saltator maximus*, **COSTA RICA**: Hitoy Cerere BR, Provincia Limón (9°40'N, 85°05'W), 21 August 2004, Literák, Čapek & Havlíček coll., 1 nymph ex *S. maximus*, Barbilla NP, Provincia Limón (9°59'N, 85°27'W), 2 September 2004, Literák, Čapek & Havlíček coll. Deposited in INBio – O. Sychra CR62.

Remarks. Although the male *Myrsidea* sp. 2 from *S. maximus* is similar to the male of *Myrsidea* sp. 1 from *C. cyanoides*, it probably represents a different species. It is characterised by tergite I with a continuous row of tergal setae, and postspiracular setae on VII distinctly shorter than those on II, IV and VIII. Unfortunately, having only male specimens is insufficient for an adequate description of a new species. Two of four birds examined were parasitised by *Myrsidea* sp. 2. This is the first record of chewing lice from *Saltator maximus*.

Family Thraupidae

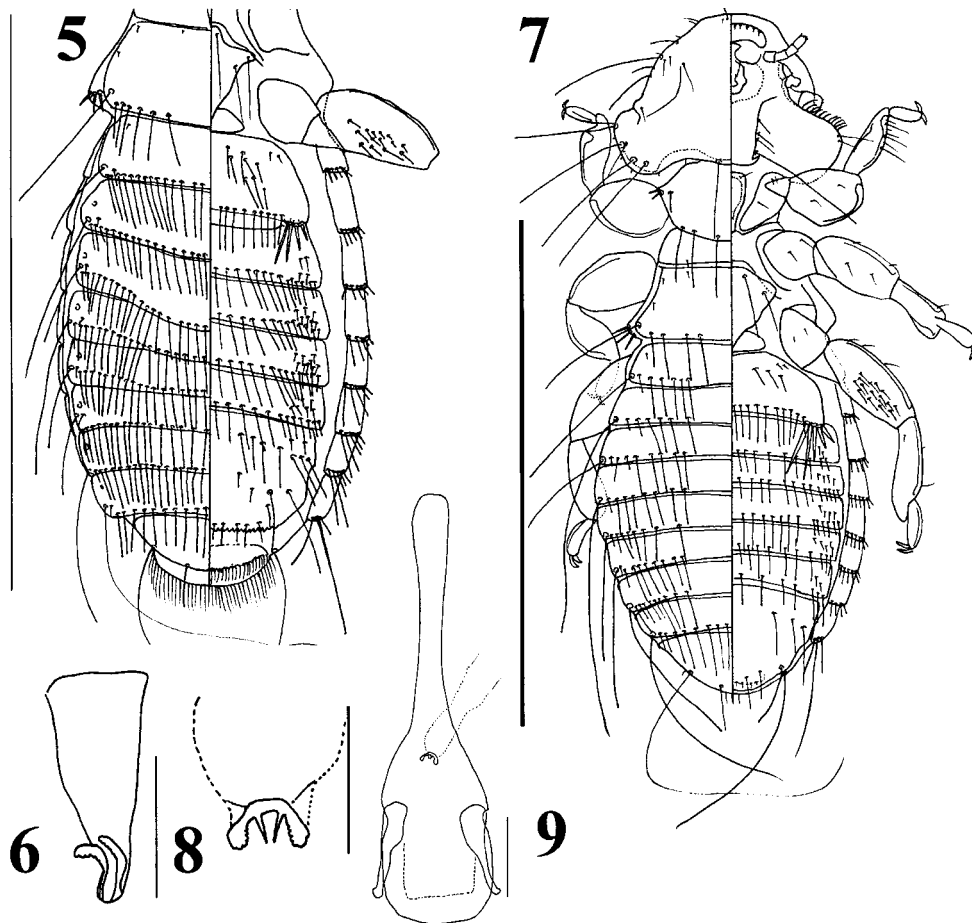
Host: *Tangara larvata* (Du Bus de Gisignies) – Golden-hooded Tanager

One chewing louse species was found on this host:

Myrsidea larvatae Sychra, new species (Figs 5–6)

Female (4). Species is in the *bonariensis* species group (sensu Price & Dalglish 2006). Mean length of head seta 10, only 0.041 (n=7); seta 11, 0.100 (n=7); ratio10/11, 0.41. Gula with 5 setae on each side. Pronotum with 3 short spiniform setae of same length on each lateral corner. Metanotum not enlarged, with 10–13 setae on posterior margin. Metasternal plate with 6 (rarely 7) long setae. Femur III with 15–17 setae in ventral brush.

Abdomen with tergites I–III enlarged; tergite I with straight posterior margin, II with slight medioposterior convexity, III with conspicuous medioposterior convexity and IV–V with gently curved posterior margin (Fig. 5). Tergal setae: I, 30–36; II, 34–36, III, 35–38; IV, 39–40; V, 35–43; VI, 34–39; VII, 33–36; VIII, 25–27. Postspiracular setae extremely long only on VIII (0.38–0.47), long on II, IV and VII (0.23–0.30), and shorter on I, III and V–VI (0.15–0.20). Margin of pleurites III–VII with 2–3 finer setae much longer than other pleural spiniform setae. Sternite II with 15–18 medioanterior; 16–21 marginal and aster of 4 (less often 3) robust setae on each side. Sternal setae: III, 28–35; IV, 35–44; V, 37–43; VI, 32–36; VII, 17–18; VIII–IX, 18–21 (including 10–13 marginal setae); without medioanterior setae. *Dimensions*: TW, 0.42–0.43; HL, 0.29–0.30; PW, 0.27–0.30; MW, 0.43–0.46; AWIV, 0.58–0.59; TL, 1.45–1.49; ANW, 0.21–0.22.



FIGURES 5–9. *Myrsidea larvatae*. 5, Female dorsoventral metathorax and abdomen. 6, Male genital sac sclerite. 7–9. *M. mitrospingi*. 7, Male. 8, Male genitalia. 9, Male genitalia sac sclerite.

Male (3). Mean length of head seta 10, only 0.040 (n=6); seta 11, 0.096 (n=6); ratio10/11, 0.42. Tergal setae: I, 27–30; II, 31–36; III–IV, 35–40; V–VI, 37–43; VII, 32–38; VIII, 26–27. Sternite II with 12–15 medioanterior; 15–17 marginal and aster of 4 (less often 3) robust setae on each side. Sternal setae: III, 24–28,

IV, 32–34; V, 34–35; VI, 29–33; VII, 21–26; VIII, 9–11; remainder of plate, 9–10; without medioanterior sternal setae. Genital sac sclerite as in Fig. 6. *Dimensions*: TW, 0.39–0.40; HL, 0.27–0.28; PW, 0.26–0.27; MW, 0.35–0.36; AWIV, 0.42–0.44; TL, 1.15–1.17; GL, 0.33–0.35; GW, 0.10–0.11; GSL, 0.07–0.09.

Type material. Female holotype, ex *Tangara larvata*, **COSTA RICA**: Barbilla NP, Provincia Limón (9°59'N, 85°27'W), 4–6 September 2004, Literák, Čapek & Havlíček coll. Paratypes: 3 females and 3 males with same data as holotype. Deposited in INBio – O. Sychra CR63–64.

Remarks. In the key to *Myrsidea* males from Thraupidae (Price & Dalglish 2006: 23), *M. larvatae* n. sp. keys to couplet 11, being closest to *M. bonariensis* Malcomson, 1929. While the male of *M. larvatae* is practically inseparable from that of *M. bonariensis* (except by having distinctly shorter postspiracular setae II, IV and VII), the female is readily distinguished by its different abdominal tergal configuration and its much larger number of setae on tergite I. In addition, in the key to females of *Myrsidea* from thraupid hosts (Price & Dalglish 2006: 22) the female of *M. larvatae* keys to couplet 5, being closest to that of *M. seminuda* Eichler, 1951. The pattern of abdominal tergal development, a larger number of setae on tergite VIII, a postspiracular seta II distinctly shorter than that on VIII but similar to those on IV and VII, and the temple width separate *M. larvatae* from *M. seminuda*. Two birds were examined and both were parasitised by *M. larvatae*.

Etymology. The species name is derived from the specific name of the type host.

Host: *Euphonia gouldi* Sclater – Olive-backed Euphonia

One chewing louse species was found on this host:

Myrsidea violaceae Price & Dalglish, 2006

Myrsidea violaceae Price & Dalglish, 2006: 9.

Type host. *Euphonia violacea* (Linnaeus)

Material studied. 1 female, 4 nymphs ex *Euphonia gouldi*, **COSTA RICA**: Barbilla NP, Provincia Limón (9°59'N, 85°27'W), 10 September 2004, Literák, Čapek & Havlíček coll. Deposited in INBio – O. Sychra CR65.

Remarks. Our female differs a little from original description of *M. violaceae* by having smaller dimensions, especially MW, 0.38; AWIV, 0.46 and TL, 1.33. Two of seven birds examined were parasitised by *M. violaceae*. This is the first record of a chewing louse species from *Euphonia gouldi*.

Host: *Habia fuscicauda* (Cabanis) – Red-throated Ant-Tanager

One chewing louse species was found on this host:

Myrsidea fuscicaudae Price & Dalglish, 2006

Myrsidea fuscicaudae Price & Dalglish, 2006: 14, fig.18.

Type host. *Habia fuscicauda* (Cabanis)

Material studied. 31 males, 30 females and 96 nymphs ex *Habia fuscicauda*, **COSTA RICA**: Hitoy Cerere BR, Provincia Limón (9°40'N, 85°05'W), 18–25 August 2004, Literák, Čapek & Havlíček coll. Deposited in INBio – O. Sychra CR66–67.

Remarks. Ten birds were examined and all were parasitised by *Myrsidea fuscicaudae*. This louse species had the highest intensity of parasitism among all the species dealt with in this paper. Mean intensity was 16, while range of intensity was 2–31 lice per bird (n=10).

Host: *Ramphocelus passerinii* Bonaparte – Passerini's Tanager

One chewing louse species was found on this host:

Myrsidea fusca (Carriker, 1903)

Menopon thoracicum fuscum Carriker, 1903: 187.

Myrsidea fusca; Price & Dalglish, 2006: 14, figs 16–17. Redescription.

Type host. *Ramphocelus passerinii* Bonaparte

Material studied. 1 female and 2 nymphs ex *Ramphocelus passerinii*, **COSTA RICA**: Hitoy Cerere BR, Provincia Limón (9°40'N, 85°05'W), 19 August 2004, Literák, Čapek & Havlíček coll., 3 males, 2 females and 6 nymphs ex *R. passerinii*, **COSTA RICA**: Barbilla NP, Provincia Limón (9°59'N, 85°27'W), 2–6 September 2004, Literák, Čapek & Havlíček coll. Deposited in INBio – O. Sychra CR68.

Remarks. Six of ten birds examined were parasitised by *M. fusca*.

Host: *Tachyphonus luctuosus* d'Orbigny & Lafresnaye – White-shouldered Tanager

Two louse species were found on this host:

Ricinus sp.

Material studied. 2 females and 1 nymph ex *Tachyphonus luctuosus*, **COSTA RICA**: Barbilla NP, Provincia Limón (9°59'N, 85°27'W), 5 September 2004, Literák, Čapek & Havlíček coll. Deposited in INBio – O. Sychra CR73–74.

Remarks. One of two birds examined was parasitised by *Ricinus* sp. This and the next species are the first records of chewing lice from *Tachyphonus luctuosus*.

Myrsidea spizae Price & Dalgleish, 2006

Myrsidea spizae Price & Dalgleish, 2006: 20, figs 28–29.

Type host. *Chlorophanes spiza* (Linnaeus)

Female (2). Mean length of head seta 10, 0.041 (n=3); seta 11, 0.092 (n=3); ratio10/11, 0.45. Metasternal plate with 6 setae. Tergal setae: I, 11–12; II, 13–15; III, 13–16; IV, 14; V, 11–13; VI, 10–11; VII, 11; VIII, 9. Postspiracular setae extremely long on II, IV, VII and VIII (0.40–0.46), long on I (0.27) and shorter on III and V–VI (0.16–0.20). Sternal setae: II, 4–5 medioanterior, 14 marginal and aster of 3–4 robust setae on each side; III, 22–26; IV, 32–35; V, 35–37; VI, 30–31; VII, 13–15; VIII–IX, 19–22. *Dimensions*: TW, 0.46–0.47; HL, 0.31–0.32; PW, 0.27–0.29; MW, 0.43–0.44; AWIV, 0.55–0.59; TL, 1.41–1.47; ANW, 0.22–0.23.

Material studied. 2 females and 2 nymphs ex *Tachyphonus luctuosus*, **COSTA RICA**: Barbilla NP, Provincia Limón (9°59'N, 85°27'W), 11 September 2004, Literák, Čapek & Havlíček coll. Deposited in INBio – O. Sychra CR69.

Remarks. One of two birds examined was parasitised by *M. spizae*.

Host: *Tachyphonus delatrii* Lafresnaye – Tawny-crested Tanager

Two louse species were found on this host:

Myrsidea sp. 3

Material studied. 2 females, 13 nymphs ex *Tachyphonus delatrii*, **COSTA RICA**: Barbilla NP, Provincia Limón (9°59'N, 85°27'W), 5–6 September 2004, Literák, Čapek & Havlíček coll. Deposited in INBio – O. Sychra CR70.

Remarks. *Myrsidea* sp. 3 from *T. delatrii* is closest to those of *M. spizae* and *M. mitrospingi* Price & Dalgleish, 2006. Price & Dalgleish (2006: 21) described *M. mitrospingi* based on a single female, and *M. spizae* from three females and two males. Although we have two females of *Myrsidea* sp. 3 collected from one host individual, we believe that, at present, it is unwise to name yet another new species. Further collections of *Myrsidea* from both the type hosts of *M. spizae* and *M. mitrospingi* as well as from *Tachyphonus delatrii* are needed to study further the intra-specific and inter-specific variation of these lice. Such study may show whether the differences between these species lie within the range of variability of *M. spizae* or *M. mitrospingi*, or lie outside such ranges, thus confirming *Myrsidea* sp. 3 as a different new species. Four of 22 birds examined were parasitised by *Myrsidea* sp. 3. This is the first record of chewing lice from *Tachyphonus delatrii*.

Machaerilaemus laticorpus (Carriker, 1903)

Menopon laticorpus Carriker, 1903: 190, pl. 7, fig. 5.

Type host. *Thamnophilus doliatus* (Linnaeus)

Material studied. 1 male and 1 nymph ex *Tachyphonus delatrii*, **COSTA RICA**: Barbilla NP, Provincia Limón (9°59'N, 85°27'W), 5 September 2004, Literák, Čapek & Havlíček coll. Deposited in INBio – O. Sychra CR76.

Remarks. One of 22 birds examined was parasitised by *M. laticorpus*. This is the first record of *M. laticorpus* from *Tachyphonus delatrii*.

Host: *Mitrospingus cassinii* (Lawrence) – Dusky-faced Tanager

Three louse species were found on this host:

Menacanthus eurysternus (Burmeister, 1838)

Menopon eurysternum Burmeister, 1838: 439.

Type host. *Pica pica* (Linnaeus)

Material studied. 1 male, 2 females and 6 nymphs ex *Mitrospingus cassinii*, **COSTA RICA**: Barbilla NP, Provincia Limón (9°59'N, 85°27'W), 6 September 2004, Literák, Čapek & Havlíček coll. Deposited in INBio – O. Sychra CR77.

Remarks. One of four birds examined was parasitised by *M. eurysternus*. This is the first record of *M. eurysternus* from *Mitrospingus cassinii*.

Myrsidea mitrospingi Price & Dalglish, 2006

(Figs 7–9)

Myrsidea mitrospingi Price & Dalglish, 2006: 21, fig. 30. Female only.

Type host. *Mitrospingus cassinii* (Lawrence)

Male (2). This species belongs to the *fusca* species group (sensu Price & Dalglish 2006: 12). Mean length of head seta 10, 0.044 (n=4); seta 11, 0.099 (n=4); ratio10/11, 0.45. Gula with 4 setae on each side. Pronotum with 2 short spiniform setae and 1 finer longer one on each lateral corner. Metanotum not enlarged, with 7–8 setae on posterior margin. Metasternal plate with 4–5 long setae. Femur III with 14–17 setae in ventral setal brush.

Abdominal segments with a well-defined median gap in rows of tergal setae except tergite VIII with continuous row of tergal setae (Fig. 7). Tergal setae: I, 14–15; II, 15–16; III, 16–18; IV–VIII, 17–21. Postspiracular setae extremely long on II, IV and VIII (0.45–0.47), long on I, III and VII (0.30–0.35) and shorter but still quite long on V–VI (0.25–0.27). Margin of pleurites III–VII with 2–3 finer setae as long as other pleural spiniform setae. Sternal setae: II, 3–6 medioanterior, 16–17 marginal and aster of 5–6 robust setae on each side; III, 20–21, IV–V, 29–33; VI, 27–29; VII, 19; VIII, 6–7; remainder of plate, 5–6. Without medioanterior sternal setae. Genitalia and genital sac sclerite as in Figs. 8 and 9 respectively. *Dimensions*: TW, 0.46–0.47; HL, 0.29; PW, 0.29–0.30; MW, 0.43; AWIV, 0.54–0.56; TL, 1.34–1.36; GL, 0.54–0.56; GW, 0.15–0.16.

Material studied. 2 males ex *Mitrospingus cassinii*, **COSTA RICA**: Barbilla NP, Provincia Limón (9°59'N, 85°27'W), 6 September 2004, Literák, Čapek & Havlíček coll. Deposited in INBio – O. Sychra CR71.

Remarks. This is the first description of the male of *Myrsidea mitrospingi*. In the key to *Myrsidea* males from Thraupidae (Price & Dalglish 2006: 23), *M. mitrospingi* keys to couplet 19, being similar to the male of *M. rufi* Price & Dalglish, 2006. However, males of *M. mitrospingi* are distinguished from those of *M. rufi* by having larger number of setae on tergites VI–VIII, tergite VIII with a continuous row of tergal setae, and especially by the configuration of the male genital sac sclerite (compare Fig. 16 in this paper with Fig. 23 in Price & Dalglish 2006). One of four birds examined was parasitised by *M. mitrospingi*.

Ricinus sp.

Material studied. 1 female ex *Mitrospingus cassinii*, COSTA RICA: Barbilla NP, Provincia Limón (9°59'N, 85°27'W), 6 September 2004, Literák, Čapek & Havlíček coll. Deposited in INBio – O. Sychra CR75.

Remarks. One of four birds examined was parasitised by *Ricinus* sp. This is the first record of *Ricinus* from *Mitrospingus cassinii*.

Discussion

In the course of this study, species of four louse genera – *Myrsidea*, *Menacanthus*, *Machaerilaemus* and *Ricinus* — were identified from birds of the families Emberizidae, Cardinalidae and Thraupidae. This paper includes first records of chewing lice from seven of the 12 bird species examined, i.e. *Sporophila corvina*, *Caryothraustes poliogaster*, *Cyanocompsa cyanoidea*, *Saltator maximus*, *Euphonia gouldi*, *Tachyphonus luctuosus* and *Tachyphonus delatrii*, as well as ten new host-lice associations (see above and Table 1). In addition, the species of *Myrsidea* described in this paper represent the first records of this louse genus from the Cardinalidae. With regard to similarity of the structure of the male genital sac sclerite, as we supposed, *Myrsidea* from the Cardinalidae are anatomically close to those from Thraupidae and Emberizidae. It is especially evident in the case of the male of *Myrsidea* sp.1 from *C. cyanoidea* which is practically inseparable from that of *M. zonotriciae* Price & Dalglish 2007 described from *Zonotrichia capensis* (Emberizidae).

Price & Dalglish (2006) reviewed the species of *Myrsidea* parasitic on birds belonging to the family Thraupidae, and included separate male and female keys to their identification. In order to add to those keys the new species and other material described in this paper, the following alterations should be made:

(1) In the key to females, change couplet 5 as follows:

- 5 Tergite I with >26 setae5a
- Tergite I with <24 setae 6
- 5a Tergite VIII <23 setae; temple at least 0.45 wide *seminuda* Eichler
- Tergite VIII at least 25 setae; temple <0.43 wide *larvatae* n. sp.

(2) In the key to males, change couplet 11 as follows:

- 11 Sternite VI with not >29 setae; genital sac sclerite as in Fig. 23 [in Price & Dalglish 2006]
..... *tangarae* Price & Dalglish
- Sternite VI with at least 30 setae; genital sac sclerite as in Fig. 6 11a
- 11a Postspiracular setae on II, IV and VII very long, and as long as on VIII *bonariensis* Malcomson
- Postspiracular setae on II, IV and VII much shorter than on VIII *larvatae* n. sp.

(3) In the key to males, change couplet 19 as follows:

- 19 Sternite VIII with only 3 setae *phoenicii* Price & Dalglish
- Sternite VIII with 5–9 setae 20
- 20 Tergites V–VIII with <17 setae; genital sac sclerite as in Fig. 23 [in Price & Dalglish 2006]
..... *rufi* Price & Dalglish
- Tergites V–VIII with at least 18 setae; genital sac sclerite as in Fig. 9 *mitrospingi* Price & Dalglish

At present only one species of thraupid *Myrsidea* had been found parasitising two hosts, i.e. *M. seminuda* from two tanagers of the genus *Thraupis* (Price & Dalglish 2006: 11). In this paper, there are two further species of *Myrsidea* from Thraupidae parasitising two hosts, i.e. *M. violaceae* which appears to be restricted to tanagers of the genus *Euphonia*, and *M. spizae*, originally described from *Chlorophanes spiza*, which was found on *Tachyphonus luctuosus*.

Prior to Price & Dalglish (2006), only one known *Myrsidea* species was known from tanagers: *M. laciniaesternata* Eichler (1956) from *Habia rubica* (Vieillot). Price & Dalglish (2006: 5) mentioned that they have not been able to examine type material of this louse species. Unlike them, we have borrowed the holotype of *M. laciniaesternata* for comparison with our specimens. We can confirm, that this specimen agrees in all characters to the description by Price & Dalglish (2006: 3). Our records also include new louse-host associations for *Menacanthus eurysternus*, *Machaerilaemus laticorpus* and *Ricinus diffusus* (see Table 1). Lice of genus *Ricinus* found on *Tachyphonus luctuosus* and *Mitrospingus cassinii* the most probably belong to the species *R. complicatus* Carriker, 1964. This louse species is closely related to *R. ramphoceli* Nelson, 1972. The main diagnostic character separating these two louse species is the number of labial setae. Unfortunately, Nelson (1972) gave reversed numbers of setae in his descriptions (13 pairs of setae for *R. ramphoceli* and 14 pairs of setae for *R. complicatus*) and in his key (13 pairs of setae for *R. complicatus* and 14 pairs of setae for *R. ramphoceli*). Regardless of this Nelson (1972) error, we believe that this character is not useful because some of our specimens have 13 pairs of setae on one side of the labium, but 14 pairs of setae on the opposite side of the labium. It is probable that *R. ramphoceli* is a junior synonym *R. complicatus*. Obviously, more specimens and a more rigorous review of these two *Ricinus* species are needed before further material can be identified with certainty.

Acknowledgments

We are grateful to the Ministerio del Ambiente y Energía de Costa Rica for permission to conduct our study in Hitoy Cerere BR and Barbilla NP (permission No. 106-2004-OFAU). We appreciate the effort of all the staff of the reserve and park field stations who kindly provided logistic support and access to their laboratories. We owe special thanks to Bernardo Calvo Rodríguez for his friendship and permanent help in many ways, to Jürgen Deckert (Museum für Naturkunde, Humboldt-Universität Berlin, Germany) for loan of the type specimen of *Myrsidea laciniaesternata* (slide no. WEC 3898b) and to Ricardo L. Palma (Museum of New Zealand Te Papa Tongarewa, Wellington, New Zealand) for his review and improvement of our first draft. Miroslav Čapek was granted funds for this project by the Academy of Sciences of the Czech Republic (AV0Z60930519).

Literature cited

- Carriker, M.A., Jr. (1903) Mallophaga from birds of Costa Rica, Central America. *University of Nebraska Studies*, 3(2), 123–197, 9 pls.
- Cicchino, A.C. (1983) Especies nuevas o poco conocidas del genero *Brueelia* Keler, 1936 (Mallophaga: Philopteridae) parasitas de Passeriformes, Piciformes y Trogoniformes (Aves) Americanos. *Revista de la Sociedad Entomologica Argentina*, 42(1–4), 283–303.
- Dickinson, E.C. (Ed.) (2003) *The Howard & Moore Complete Checklist of the Birds of the World*. 3rd edition. Christopher Helm, London, 1039 pp.
- Eichler, W. (1956) Mallophaga. In *Zur Vogelwelt Boliviens (Teil II: Passeres)*, ed. G. Niethammer, 84–150. Bonner Zoologische Beiträge, Bonn, Germany
- Howard, R. & Moore, A. (1991) *A Complete Checklist of the Birds of the World*, 2nd Edition. Academic Press, London, xxxiv + 622 pp.
- Nelson, B.C. (1972) A revision of the New World species of *Ricinus* (Mallophaga) occurring on Passeriformes (Aves).

University of California Publications in Entomology, 68, 1–175.

- Price, R.D. (1975) The *Menacanthus eurysternus* complex (Mallophaga: Menoponidae) of the Passeriformes and Pici-formes (Aves). *Annals of the Entomological Society of America*, 68(4), 617–622.
- Price, R.D. (1977) The *Menacanthus* (Mallophaga: Menoponidae) of the Passeriformes (Aves). *Journal of Medical Entomology*, 14(2), 207–220.
- Price, R.D. & Dagleish, R.C. (2006) *Myrsidea* Waterston (Phthiraptera: Menoponidae) from tanagers (Passeriformes: Thraupidae), with descriptions of 18 new species. *Zootaxa*, 1174, 1–25.
- Price, R.D. & Dagleish, R. C. (2007) *Myrsidea* Waterston (Phthiraptera: Menoponidae) from the Emberizidae (Passeriformes), with descriptions of 13 new species. *Zootaxa*, 1467, 1–18
- Price, R.D., Hellenthal, R.A. & Dagleish, R.C. (2002) A review of *Machaerilaemus* (Phthiraptera: Amblycera: Menoponidae) from the Passeriformes (Aves), with the description of five new species. *American Midland Naturalist*, 148, 61–74.
- Price, R.D., Hellenthal, R.A. & Palma, R.L. (2003) World checklist of chewing lice with host associations and keys to families and genera, pp. 1–448. In: Price, R.D., Hellenthal, R.A., Palma, R.L., Johnson, K.P. & Clayton, D.H. *The Chewing Lice: World Checklist and Biological Overview*. Illinois Natural History Survey Special Publication 24. x + 501 pp.
- Stiles, F.G. & Skutch, A. (1989) *A Guide to the Birds of Costa Rica*. Christopher Helm, London. 511 pp.
- Sychra, O., Literák, I., Čapek, M. & Havlíček, M. (2006) Chewing lice (Phthiraptera) from typical antbirds and ground antbirds (Passeriformes: Thamnophilidae, Formicariidae) from Costa Rica, with descriptions of three new species of the genera *Formicaphagus* and *Myrsidea*. *Zootaxa*, 1206, 47–61.