



Chewing lice of the genus *Myrsidea* (Phthiraptera: Menoponidae) from the Cardinalidae, Emberizidae, Fringillidae and Thraupidae (Aves: Passeriformes) from Costa Rica, with descriptions of four new species

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Abstract

A total of 376 individuals of 35 bird species belonging to the families Cardinalidae, Emberizidae, Fringillidae, and Thraupidae were examined for chewing lice in Costa Rica in 2004, 2009 and 2010. A total of 128 birds of 19 species were parasitised with 17 species of *Myrsidea*. Descriptions and illustrations are given for four new species of *Myrsidea*. These new species and their type hosts are: *Myrsidea bidentata* ex *Piranga bidentata* (Cardinalidae), *M. dolejskiae* ex *Arremon brunneinucha* (Emberizidae), *M. roubalovae* ex *Ramphocelus sanguinolentus* (Thraupidae), and *M. rubica* ex *Habia rubica* (Cardinalidae). Records of new host-lice associations are: *Chlorospingus ophthalmicus* (Emberizidae) and *Euphonia hirundinacea* (Fringillidae) for *M. violaceae*, *Ramphocelus costaricensis* (Thraupidae) for *M. fusca*, and *Tangara dowii* (Thraupidae) for *M. bonariensis*. Records of ten other louse species of the genus *Myrsidea* from birds belonging to these families are also presented and discussed.

Key words: *Myrsidea*, Menoponidae, Amblycera, Phthiraptera, new species, Passeriformes, Costa Rica, grosbeaks, buntings, euphonias, tanagers, new host-lice associations

Introduction

Myrsidea is the most speciose menoponid genus, parasitizing mainly passerines. This genus currently contains 328 recognized species occurring throughout the world, with 309 species recorded from 343 host species in 46 families of Passeriformes (Palma and Price 2010; Sychra 2010). As a consequence of the large number of species, the only practical manner to deal with the taxonomy of such a large genus is to treat lice from each host family as a unit (Price and Dalglish 2007). Because of current taxonomic uncertainties regarding the members of Cardinalidae, Emberizidae, Fringillidae, and Thraupidae, it is ideal to study *Myrsidea* from all four families simultaneously.

At present there are 55 species of the genus *Myrsidea* Waterston recorded from passerine hosts in the families Cardinalidae, Emberizidae, Fringillidae, and Thraupidae (as defined in Clements *et al.* 2010). Of these, 16 species from Thraupidae, 2 from Cardinalidae, 18 from Emberizidae, and 3 from Fringillidae were reviewed by Price and Dalglish (2006, 2007) and Klockenhoff (1984b), respectively. Subsequently 13 species of *Myrsidea* from these host families have been described by Sychra *et al.* (2007), Price *et al.* (2008), Price and Johnson (2009), and Palma and Price (2010). Finally 4 species of *Myrsidea* from Fringillidae are known only from their original descriptions (Carriker 1902; Kellogg and Chapman 1902; Kellogg 1906; Klockenhoff 1984a). It should be noted that Price and Dalglish (2006) and Price and Johnson (2009) included in their treatment of thraupid *Myrsidea* species from hosts that are now recognized as members of the Cardinalidae, Emberizidae, or Fringillidae. Conversely, Price *et al.* (2008) included in their papers on cardinalid *Myrsidea* species from hosts that are now recognized as members of Thraupidae.

The aim of this paper is to follow up on our previous work (Sychra *et al.* 2007, 2009) and present new data on the distribution of chewing lice of the genus *Myrsidea* found on passerines of the families Cardinalidae, Emberizidae, Fringillidae, and Thraupidae in Costa Rica, including descriptions of four new species.

Material and methods

We conducted fieldwork during the 2009 and 2010 rainy seasons at five study sites in Costa Rica. These sites included Tapanti National Park, Sector Tapanti (09°46'N, 83°47'W; 1200m a.s.l.) where 351 birds of 62 species were examined from 31 July to 11 August 2009; Rincon de la Vieja National Park (10°46'N, 85°18'N; 800m a.s.l.) where 308 birds of 53 species were examined from 15 to 24 August 2009; Braulio Carillo National Park, Sector Barva (10°07'N, 84°07'W; 2600m a.s.l.) where 295 birds of 39 species were examined from 30 July 2010 to 8 August 2010; Tapanti National Park, Sector Cerro de la Muerte (9°33'N, 83°43'W; 3100m a.s.l.) where 201 birds of 26 species were examined from 11 to 15 August 2010, and Zona Protectora Las Tablas on the Pacific slope of the Cordillera de Talamanca (8°54'N, 82°47'W; 1300m a.s.l.) where 193 birds of 53 species were examined from 18 to 22 August 2010. For detailed methods see Sychra *et al.* (2006).

The taxonomy of the birds follows Clements *et al.* (2010). Identification of the chewing lice was based on papers by Klockenhoff (1984a, b), Price and Dalglish (2006, 2007), Sychra *et al.* (2007), Price *et al.* (2008), and Price and Johnson (2009). Price and Dalglish (2006) provided the diagnostic characteristics that define the genus *Myrsidea* from the Thraupidae. Because these characteristics are common to all *Myrsidea* species mentioned below, they will not be repeated in the species descriptions. The original descriptions and/or redescrptions of named species differ from some of the *Myrsidea* material studied in this paper, at least in setal counts and dimensions. In those cases we record our data together with those presented in the original publications. Setal counts and dimensions that are fully consistent with original descriptions and/or redescrptions are not repeated here. 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 at level of segment IV; TL, total length; ANW, female anus width; GW, male genitalia width; GL, male genitalia length; GSL, genital sac sclerite length.

The new species are attributed to the first two authors only. Holotypes and paratypes of the new species described in this paper are deposited in the National Biodiversity Institute, Santo Domingo de Heredia, Costa Rica (INBio). When indicated, some paratypes are deposited in the Moravian Museum, Brno, Czech Republic (MZM).

Results

A total of 376 individuals of 35 bird species belonging to the families Cardinalidae, Emberizidae, Fringillidae, and Thraupidae were examined. A total of 128 birds of 19 species were parasitised with 17 species of *Myrsidea* (Table 1). No species of *Myrsidea* were found on the following species of birds: Emberizidae—*Arremon crassirostris* (4 birds examined), *Arremonops rufivirgatus* (4), *Atlapes albinucha* (1), *Chlorospingus pileatus* (32), *Diglossa plumbea* (34), *Haplospiza rustica* (2), *Junco vulcani* (2), *Melospiza leucotis* (3), *Peucaea ruficauda* (1), *Pselliophorus tibialis* (15), *Tiaris olivaceus* (4) and *Zonotrichia capensis* (54); Fringillidae—*Euphonia luteicapilla* (1) and *Spinus xanthogastrus* (1); Thraupidae—*Cyanerpes cyaneus* (1) and *Thraupis palmarum* (1).

Four records represent new louse-host associations: *Chlorospingus ophthalmicus* and *Euphonia hirundinacea* for *Myrsidea violaceae*, *Ramphocelus costaricensis* for *M. fusca*, and *Tangara dowii* for *M. bonariensis*. Four others records represent new species, which are described below.

Myrsidea aurantirostris Price and Dalglish, 2007

Myrsidea aurantirostris Price and Dalglish, 2007: 8, Figs. 23–25. Type host: *Arremon aurantirostris* Lafresnaye—Orange-billed Sparrow

Material studied. 2 females and 11 males ex *Arremon aurantirostris* (Emberizidae), **COSTA RICA:** Hitoy Cerere BR, Provincia Limón (9°40'N, 85°05'W), 17–27 August 2004, Literak leg. Deposited in INBio (O.Sychra

CR55–57); 2 females and 2 males, ex *Arremon aurantirostris*, COSTA RICA: Zona Protectora Las Tablas, La Amistad Lodge (8°54'N, 82°47'W; 1300m), 21 August 2010, Sychra and Literak leg. Deposited in INBio (O.Sychra CR107–108).

Remarks. Our specimens differ from the description of *M. aurantirostris* presented by Price and Dalglish (2007) by setal counts and dimensions as follows [setal counts and dimensions mentioned by Price and Dalglish (2007) are in parentheses]:

Female (n = 4). Length of head seta 10, 0.050; seta 11, 0.100–0.105; ratio10/11, 0.48–0.50.

Metasternal plate with 7–11 (8–11). Tergal setae: II, 26–37 (26–36); III–VI, 32–44 (32–42); VII, 26–35 (26–34). Sternal setae: II, 9–13 (13–17) anterior; IV–VI, 36–50 (37–50); sternites III–VII without medioanterior setae. Dimensions: HL, 0.29–0.30 (0.30–0.32); AW, 0.62–0.66 (0.64–0.66); ANW, 0.22–0.27 (0.22–0.24).

Male (n = 13). Metanotal marginal setae, 9–13 (10–13). Tergal setae: I, 20–27 (20–25); II, 25–33 (25–32); III, 29–36 (29–34); IV, 26–38 (26–35); V, 31–39 (31–38); VI, 27–36 (27–33); VII, 24–32 (24–28); VIII, 22–24 (17–21). Sternal setae: II, 10–19 (16–19) anterior; III, 23–34 (23–29); IV, 26–42 (26–37); V–VI, 32–43 (32–41); VII, 26–35 (26–32); VIII, 10–22 (9–18); sternites III–VII without medioanterior setae. Dimensions: TW, 0.41–0.45 (0.43); HL, 0.25–0.30 (0.28–0.30); PW, 0.26–0.29 (0.27–0.29); MW, 0.35–0.39 (0.36–0.39); AW, 0.47–0.50 (0.48–0.51); TL, 1.20–1.33 (1.22–1.26).

TABLE 1. List of hosts and their lice.

Bird species	P ¹	E ²	<i>Myrsidea</i> species	♂	♀	nymphs	Location
Cardinalidae							
<i>Cyanocompsa cyanoides</i> (Lafresnaye)	1	4	<i>M. johnklickai</i> Price, Johnson & Dalglish, 2008	0	1	5	Rincon de la Vieja NP
<i>Habia rubica</i> (Vieillot)	3	4	**<i>M. rubica</i> sp. nov.	4	4	6	Rincon de la Vieja NP
<< " " " >>	0	2		-	-	-	Zona Protectora Las Tablas
<i>Piranga bidentata</i> (Swainson)	2	2	**<i>M. bidentata</i> sp. nov.	3	8	7	Zona Protectora Las Tablas
Emberizidae							
<i>Arremon aurantirostris</i> Lafresnaye	5	8	<i>M. aurantirostris</i> Price & Dalglish, 2007	12	6	12	Zona Protectora Las Tablas
<i>Arremon brunneinucha</i> (Lafresnaye)	3	3	<i>M. brunneinuchi</i> Price & Dalglish, 2007	22	11	16	Tapanti NP, Sector Tapanti
<< " " " >>	6	7	**<i>M. dolejskai</i> sp. nov.	17	17	12	Braulio Carillo NP, Sector Barva
<i>Chorospingus ophthalmicus</i> (Du Bus)	5	20	**<i>M. violaceae</i> Price & Dalglish, 2006	7	5	22	Tapanti NP, Sector Tapanti
<< " " " >>	0	14		-	-	-	Braulio Carillo NP, Sector Barva
<i>Pezopetes capitalis</i> Cabanis	6	6	<i>M. marini</i> Price & Dalglish, 2007	21	22	43	Braulio Carillo NP, Sector Barva
<< " " " >>	5	8	<i>M. marini</i> Price & Dalglish, 2007	14	18	17	Tapanti NP, Sector Cerro de la Muerte
Fringillidae							
<i>Euphonia anaeae</i> Cassin	3	18	<i>M. valimi</i> Price & Johnson, 2009	2	2	7	Tapanti NP, Sector Tapanti
<i>Euphonia hirundinacea</i> Bonaparte	2	2	**<i>M. violaceae</i> Price & Dalglish, 2006	1	2	6	Rincon de la Vieja NP
<i>Euphonia laniirostris</i> d'Orbigny & Lafresnaye	17	26	<i>M. rozsai</i> Price & Johnson, 2009	18	20	39	Zona Protectora Las Tablas

continued next page

TABLE 1. (continued)

Bird species	P ¹	E ²	<i>Myrsidea</i> species	♂	♀	nymphs	Location
Thraupidae							
<i>Eucometis penicillata</i> (Spix)	2	5	<i>M. patersoni</i> Price & Johnson, 2009	2	0	3	Rincon de la Vieja NP
<< " " ">>	3	11	<i>M. patersoni</i> Price & Johnson, 2009	1	1	2	Zona Protectora Las Tablas
<i>Ramphocelus costaricensis</i> Cherrie	3	4	** <i>M. fusca</i> (Carriker, 1903)	6	2	10	Zona Protectora Las Tablas
<i>Ramphocelus passerinii</i> Bonaparte	5	5	<i>M. fusca</i> (Carriker, 1903)	12	8	22	Tapanti NP, Sector Tapanti
<i>Ramphocelus sanguinolentus</i> (Lesson)	2	2	** <i>M. robalovae</i> sp. nov.	10	3	20	Tapanti NP, Sector Tapanti
<i>Tangara dowii</i> (Salvin)	1	1	** <i>M. bonariensis</i> Malcomson, 1929	3	3	5	Tapanti NP, Sector Tapanti
<< " " ">>	22	23	** <i>M. bonariensis</i> Malcomson, 1929	32	45	66	Braulio Carillo NP, Sector Barva
<i>Tangara gyrola</i> (Linnaeus)	1	1	<i>M. bonariensis</i> Malcomson, 1929	2	2	6	Zona Protectora Las Tablas
<< " " ">>	2	2	<i>M. bonariensis</i> Malcomson, 1929	2	0	14	Tapanti NP, Sector Tapanti
<i>Tangara icterocephala</i> (Bonaparte)	15	19	<i>M. icterophalae</i> Price & Dalgleish, 2006	29	27	66	Tapanti NP, Sector Tapanti
<< " " ">>	3	6	<i>M. icterophalae</i> Price & Dalgleish, 2006	10	10	10	Zona Protectora Las Tablas
<i>Tangara larvata</i> (Du Bus)	4	4	<i>M. larvatae</i> Sychra, 2007	4	13	13	Zona Protectora Las Tablas
<i>Tharupis episcopus</i> (Linnaeus)	7	9	<i>M. seminuda</i> Eichler, 1951	28	24	35	Zona Protectora Las Tablas

¹= number of birds parasitized; ²= number of birds examined; ** = new louse-host association

***Myrsidea bidentata* Kounek and Sychra sp. nov.**

(Figs. 1–3)

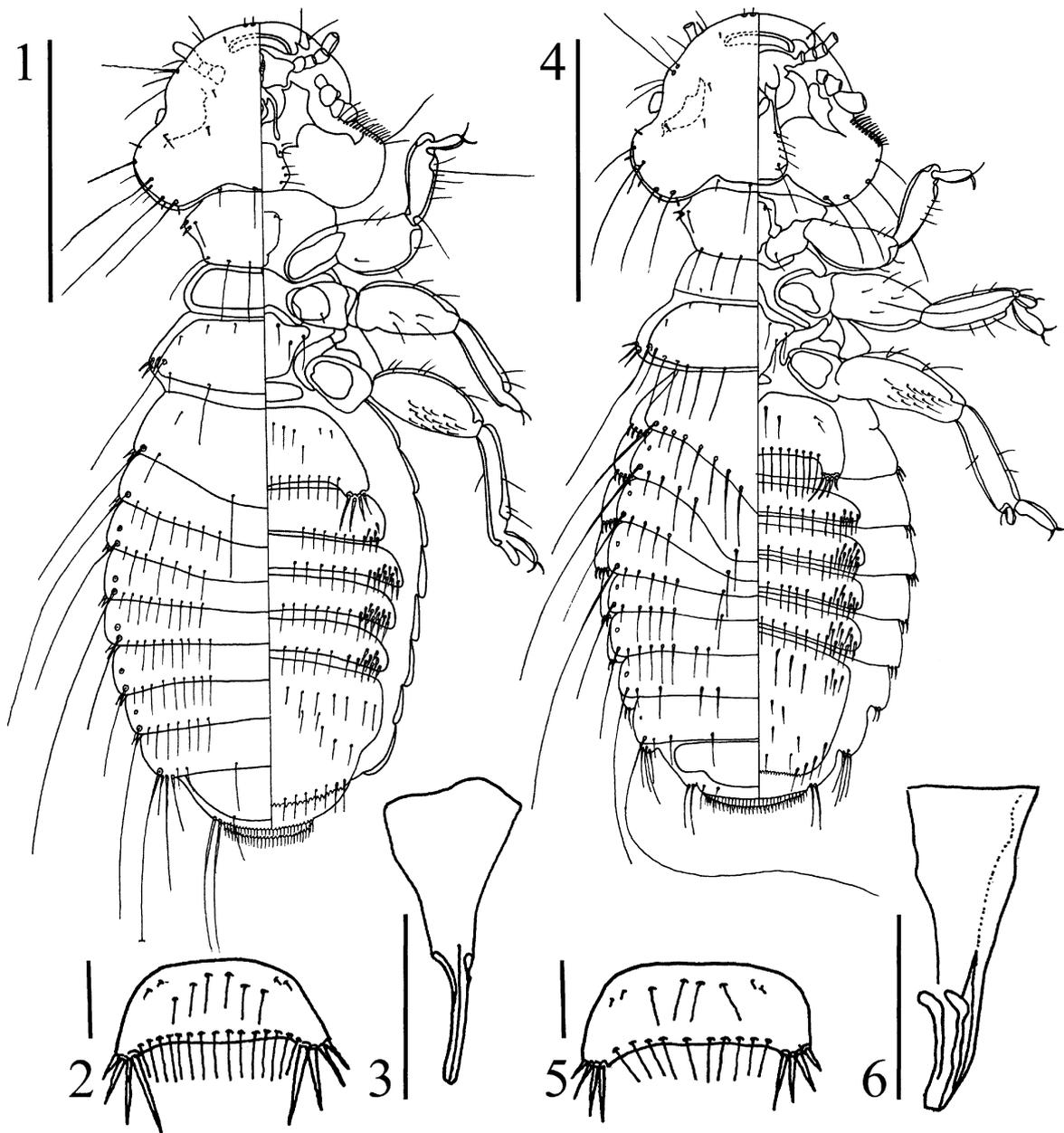
Type host. *Piranga bidentata* (Swainson)—Flame-colored Tanager

Female (n = 5). This species belongs to the *fusca* species group (sensu Price and Dalgleish 2006). Length of head seta 10, 0.070–0.075; seta 11, 0.100–0.105; ratio10/11, 0.67–0.75. Gula with 5 setae on each side. Metasternal plate with 6 setae, Metanotum not enlarged, with 13–14 marginal setae.

Abdomen with tergites I–II strongly enlarged (Fig. 1); tergite I with pronounced tapered medioposterior convexity, II with pronounced medioposterior enlargement, but with almost straight central part of posterior margin, tergites III–V compressed by enlarged tergites I–II with gently curved posterior margin. Tergal setae, with median gap in each row: I, 14–16; II, 10–12; III, 12–14; IV, 11–13; V, 13–15; VI, 14–18; VII, 10–12; VIII, 7–8. Postspiracular setae extremely long (0.48–0.51) on II, IV and VIII; long (0.30–0.38) on I and VII and short (0.15–0.20) on III, V and VI. Sternal setae: II, 4 in each aster, 14–16 marginal between asters, 4–5 anterior; III, 21–23; IV, 29–33; V, 34; VI, 31–34; VII, 12–15; VIII–IX, 17; without medioanterior setae. Dimensions: TW, 0.45–0.49; HL, 0.31–0.33; PW, 0.28; MW, 0.43–0.46; AW, 0.57–0.62; TL, 1.44–1.56; ANW, 0.20–0.22.

Male (n = 2). Length of head seta 10, 0.060–0.075; seta 11, 0.095–0.100; ratio10/11, 0.60–0.79. Gula with 4–5 setae on each side. Metasternal plate with 5–6 setae. Metanotum with 6 marginal setae.

Tergal setae: I, 8–10; II, 10–11; III, 10–12; IV, 12; V, 12; VI, 12; VII, 10; VIII, 8. Postspiracular setae as for female. Sternal setae: II, 4 in each aster, 10–16 marginal between asters, 4–6 anterior (Fig. 2); III, 19; IV, 25–27; V, 28–29; VI, 25–27; VII, 13–14; VIII, 12; without medioanterior setae. Genital sac sclerite with subapical projection on each side (Fig. 3). Dimensions: TW, 0.43; HL, 0.29–0.31; PW, 0.26–0.27; MW, 0.33–0.37; AW, 0.46–0.48; TL, 1.26–1.27; GW, 0.10–0.11; GL, 0.40–0.42; GSL, 0.10.



FIGURES 1–6. 1–3. *Myrsidea bidentata* **sp. nov.** 1, Female (dorsal side on the left, ventral side on the right). 2, Male sternite II. 3, Male genital sac sclerite. 4–6. *Myrsidea dolejskiae* **sp. nov.** 4, Female (dorsal side on the left, ventral side on the right). 5, Male sternite II. 6, Male genital sac sclerite. Scales 0.50 mm (Figs. 1, 4), 0.10 mm (Figs. 2, 5), 0.05 mm (Figs. 3, 6).

Type material. Female holotype (O.Sychra CR105), ex *Piranga bidentata* (Cardinalidae), **COSTA RICA:** Zona Protectora Las Tablas, La Amistad Lodge (8°54'N, 82°47'W; 1300m), 19 August 2010, Sychra and Literak leg. Paratypes: 2 females and 2 males with the same data as holotype (O.Sychra CR105–106). Deposited in INBio. Other specimens deposited in MZM.

Remarks. The female of *M. bidentata* **sp. nov.** is easily separated from other cardinalid, thraupid, or fringillid *Myrsidea* by following characteristics: (1) tergite I much enlarged with pronounced tapered medioposterior convexity and with >13 setae; (2) tergites with median gap in each row of setae and with small number of setae (especially tergites II–VI with not >16 setae) and (3) metanotum not enlarged with almost straight posterior margin with not >15 setae. The male of *M. bidentata* **sp. nov.** is characterized by: (1) Genital sac sclerite with subapical projection on each side (Fig. 3); (2) small number of setae on tergites (especially tergites I–VI each with not >13 setae and VIII with not >8 setae); (3) sternite VIII with >10 setae.

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

***Myrsidea bonariensis* Malcomson, 1929**

Myrsidea bonariensis Malcomson, 1929: 728. Type host: “*Molothrus bonariensis* (Cabanis)” —error

Myrsidea bonariensis; Price and Dalglish, 2006: 6, Figs. 8–9. Redescription. Host: *Tangara gyrola* (Linnaeus) —Bay-headed Tanager.

Material studied. 1 female and 2 males, ex *Tangara gyrola* (Thraupidae), **COSTA RICA**: Tapanti National Park, Sector Tapanti (09°46'N, 83°47'W; 1200m), 5 August 2009, Sychra and Literak leg.; 1 female and 1 male, ex *Tangara gyrola*, **COSTA RICA**: Zona Protectora Las Tablas, La Amistad Lodge (8°54'N, 82°47'W; 1300m), 20 August 2010, Sychra and Literak leg. Deposited in INBio (O.Sychra CR156–158); 2 females and 2 males, ex *Tangara dowii* —Spangle-cheeked Tanager (Thraupidae). **COSTA RICA**: Tapanti National Park, Sector Tapanti (09°46'N, 83°47'W; 1200m), 9 August 2009, Sychra and Literak leg.; 6 females and 8 males, ex *Tangara dowii*, **COSTA RICA**: Braulio Carillo National Park, Sector Barva (10°07'N, 84°07'W; 2600m), 6 August 2010, Sychra and Literak leg. Deposited in INBio (O.Sychra CR147–153) and MZM (O.Sychra CR154–155).

Remarks. Although Bueter *et al.* (2009) mentioned *Myrsidea* sp. from *T. dowii*, this is the first determination of any species of a chewing louse from this host. Our specimens differ from the redescription of *M. bonariensis* presented by Price and Dalglish (2006) by setal counts and dimensions as follows [setal counts and dimensions mentioned by Price and Dalglish (2006) are in parentheses]:

From *T. gyrola*:

Female (n = 2). Length of head seta 10, 0.040; seta 11, 0.100; ratio10/11, 0.40. Tergal setae: VIII 24 (18–23). Sternal setae: II, 33 (34–41); VIII–IX, 26 (20–23); sternites III–VII without medioanterior setae. Dimensions: PW, 0.27–0.29 (0.28–0.31); MW, 0.46 (0.40–0.45); AW, 0.54–0.55 (0.55–0.59); ANW, 0.22–0.23 (0.20–0.21).

Male (n = 3). Tergal setae: II, 36–38 (28–33); VI, 42–43 (30–39); VII, 35–36 (26–32). Sternal setae: III, 34 (22–32); IV–V, 42 (31–39); VI, 37–42 (30–35); VII, 27–30 (18–24); sternite III with 1–2 medioanterior setae (one male without seta), other sternites without medioanterior setae. Dimensions: TL, 1.23 (1.13–1.21).

From *T. dowii*:

Female (n = 8). Length of head seta 10, 0.045–0.050; seta 11, 0.100–0.110; ratio10/11, 0.41–0.50. Sternal setae: II, 23–30 (34–41); VIII–IX, 26 (20–23); sternites III–VII without medioanterior setae. Dimensions: TW, 0.41 (0.43–0.45); HL, 0.26–0.27 (0.28–0.31); PW, 0.24–0.27 (0.28–0.31); AW, 0.52–0.54 (0.55–0.59); TL, 1.35–1.39 (1.38–1.51); ANW, 0.16–0.20 (0.20–0.21).

Male (n = 10). Tergal setae: I, 18–19 (20–26); II, 26–27 (28–33). Sternal setae: II, 23–25 (28–34); VII, 26–27 (18–24); VIII, 14–19 (7–13); sternite III with 0–1 medioanterior seta (3 males without seta, 3 males with one seta), other sternites without medioanterior setae. Dimensions: TW, 0.38–0.39 (0.39–0.41); HL, 0.25–0.26 (0.27–0.29); PW, 0.23–0.25 (0.26–0.28); MW, 0.33–0.34 (0.34–0.36).

***Myrsidea brunneinuchi* Price and Dalglish, 2007**

Myrsidea brunneinuchi Price and Dalglish, 2007: 8, Figs. 26–30. Type host: *Arremon brunneinucha* (Lafresnaye) —Chestnut-capped Brush-Finch

Material studied. 5 females and 5 males, ex *Arremon brunneinucha* (Emberizidae), **COSTA RICA**: Tapanti National Park, Sector Tapanti (09°46'N, 83°47'W; 1200m), 3 August 2009, Sychra and Literak leg. Deposited in INBio (O.Sychra CR109–111) and MZM (O.Sychra CR112–113).

Remarks. Our specimens differ from the description of *M. brunneinuchi* presented by Price and Dalglish (2007) by setal counts and dimensions as follows [setal counts and dimensions mentioned by Price and Dalglish (2007) are in parentheses]:

Female (n = 5). Length of head seta 10, 0.030–0.035; seta 11, 0.110–0.125; ratio10/11, 0.24–0.32.

Metasternal plate with 9–10 (11–13) setae; metanotal marginal setae, 13–19 (14–16). Tergal setae: I, 21–25 (16–19); II, 21–25 (17–20); III, 31–37 (24–29); IV, 36–37 (29–33); V, 41–42 (34–40); VI, 37–43 (33–36); VII, 43 (35–39); VIII, 29 (25–27). Sternal setae: II, 23 (19–22) marginal between asters, 25–26 (27–31) anterior; IV, 40–41 (31–38); V, 46 (37–43); VII, 40 (32–38); VIII–IX, 50 (36–48); without medioanterior setae.

Male (n = 5). Metasternal plate with 8 (10–12) setae; metanotal marginal setae, 13 (15–20). Tergal setae: I, 22–26 (22–25); II, 28–29 (26–27); V, 35–36 (28–34); VI, 38 (28–34); VIII, 17–26 (19–24). Sternal setae: II, 16–19

(18–21) marginal between asters, 23–25 (24–30) anterior; III, 33–45 (37–47); IV, 39–45 (42–53); V, 38–51 (44–59); VI, 42–44 (49–51); VII, 36–42 (42–46); VIII, 27–29 (29–35); including medioanterior setae: III, 4–9; IV, 2–8; V, 2–12; VI, 5–8; VII, 10. Dimensions: TW, 0.43–0.44 (0.44–0.45); HL, 0.28–0.31 (0.29–0.32); PW, 0.27–0.30 (0.27–0.29); MW, 0.37–0.40 (0.37–0.39); TL, 1.24–1.25 (1.28–1.34).

***Myrsidea dolejskae* Kounek and Sychra sp. nov.**

(Figs. 4–6)

Type host. *Arremon brunneinucha* (Lafresnaye)—Chestnut-capped Brush-Finch

Female (n = 5). This species belongs to the *taciturni* species group (sensu Price and Dalglish 2007). Length of head seta 10, 0.035–0.040; seta 11, 0.110–0.115; ratio10/11, 0.30–0.36. Gula with 5 setae on each side. Metasternal plate with 8–10 setae; metanotum conspicuously enlarged, with 8–11 marginal setae.

Abdomen with tergites I–II strongly enlarged (Fig. 4); tergite I with pronounced medioposterior convexity, II with widely rounded posterior margin, tergites III–V compressed by enlarged tergites I–II. Tergal setae, with median gap in each row: I, 33–35; II, 36–39; III, 35; IV, 31–37; V, 30–33; VI, 30; VII, 28–30; VIII, 23–25. Postspiracular setae extremely long (0.38–0.45) on II, IV and VIII; long (0.22–0.25) on I, III and VII and somewhat shorter (0.16–0.21) on V and VI. Sternal setae: II, 4 in each aster, 23–24 marginal between asters, 9–14 anterior; III, 21–25; IV, 28–33; V, 36–37; VI, 28–32; VII, 11–14; VIII–IX, 31–33; without medioanterior setae. Dimensions: TW, 0.47–0.50; HL, 0.30; PW, 0.30; MW, 0.48–0.49; AW, 0.63–0.65; TL, 1.50–1.53; ANW, 0.23–0.25.

Male (n = 5). Metasternal plate with 8–11 setae; metanotum with 12–15 marginal setae.

Tergal setae: I, 27–30; II, 29–36; III, 31–33; IV, 30–33; V, 30–32; VI, 29–31; VII, 29; VIII, 24–28.

Postspiracular setae extremely long (0.35–0.45) on II, IV and VIII; long (0.23–0.24) VII and shorter (0.15–0.20) on I, III, V and VI. Sternite II slender strongly arched (Fig. 5). Sternal setae: II, 3–4 in each aster, 19–20 marginal between asters, 16–20 anterior; III, 37–44; IV, 42–49; V, 41–49; VI, 39–48; VII, 37–43; VIII, 25–29; including medioanterior setae: III, 8–13; IV, 8–9; V, 5–9; VI, 5–10; VII, 8–12. Genital sac sclerite with very small pale and almost invisible subapical projection on each side (Fig. 6). Dimensions: TW, 0.45; HL, 0.29; PW, 0.29–0.31; MW, 0.38–0.41; AW, 0.48–0.50; TL, 1.35–1.40; GW, 0.12; GL, 0.45–0.48; GSL, 0.08.

Type material. Female holotype (O.Sychra CR114), ex *Arremon brunneinucha* (Emberizidae), **COSTA RICA**: Braulio Carillo National Park, Sector Barva (10°07'N, 84°07'W; 2600m), 8 August 2010, Sychra and Literak leg. Paratypes: 4 females and 5 males with the same data as holotype, except the date: 2–8 August 2010. Deposited in INBio (O.Sychra CR114–116) and MZM (O.Sychra CR117–119).

Remarks. This is the second species of *Myrsidea* from *Arremon brunneinucha*. The female conspicuously differs from that of *M. brunneinuchi* described from Costa Rica and Venezuela (Price and Dalglish 2007) by a conspicuously enlarged metanotum and tergite I with pronounced medioposterior convexity. These characteristics place *M. dolejskae* sp. nov. close to *M. campestris* Price and Dalglish, 2007 from *Euneornis campestris* and *M. marini* Price and Dalglish, 2007 from *Pezopetes capitalis* (both from Emberizidae). Both sexes of *M. dolejskae* sp. nov. are easily separated from those of aforementioned species by presence of continuous row of setae on each tergite (without well-developed median gap). The male of *M. dolejskae* sp. nov. is characterized by large number of setae on tergite VIII and sternite III. These characteristics place it very close to those of *M. brunneinuchi* but the male of *M. dolejskae* sp. nov. can be separated by larger number of setae on tergite I (27–30 vs. 22–26).

Etymology. This species is named in honor of Monika Dolejska, our colleague and friend, in recognition of her friendship.

***Myrsidea fusca* (Carriker, 1903)**

Menopon thoracicum fuscum Carriker, 1903: 187. Type host: *Ramphocelus passerini* Bonaparte —Passerini's Tanager. *Myrsidea fusca*; Price and Dalglish, 2006: 14, Figs. 16–17. Redescription, from type host.

Material studied. 2 females and 2 males, ex *Ramphocelus costaricensis* Cherrie—Cherrie's Tanager (Thraupidae). **COSTA RICA**: Zona Protectora Las Tablas, La Amistad Lodge (8°54'N, 82°47'W; 1300m), 18 and 22 August 2010, Sychra and Literak leg. Deposited in INBio (O.Sychra CR138–139); 4 females and 3 males, ex *Ramphocelus*

passerine (Thraupidae), **COSTA RICA**: Tapanti National Park, Sector Tapanti (09°46'N, 83°47'W; 1200m), 7 August 2009, Sychra and Literak leg. Deposited in INBio (O.Sychra CR140–142) and MZM (O.Sychra CR143).

Remarks. This is the first record of a chewing louse from *Ramphocelus costaricensis*. Our specimens differ from the redescription of *M. fusca* presented by Price and Dalglish (2006) by tergal and sternal setal counts and dimensions as follows [setal counts and dimensions mentioned by Price and Dalglish (2006) are in parentheses]:

From *R. costaricensis*:

Female (n = 2). Length of head seta 10, 0.040–0.045; seta 11, 0.110–0.120; ratio10/11, 0.33–0.41. Tergal setae: III, 17–21 (17–20); sternal setae: III, 26–35 (23–29); IV, 38–46 (30–39); VII, 22–30 (19–26); VIII–IX, 18–22 (16–21); sternites III–VII without medioanterior setae. Dimensions: TW, 0.45 (0.46–0.49); PW, 0.26–0.28 (0.28–0.31); ANW, 0.23–0.25 (0.22–0.24).

Male (n = 2). Metanotum with 11–12 (12–16). Tergal setae: I, 9–11 (10–12); II, 16–17 (15–16); IV, 18–19 (16–18); VI, 17–19 (14–17); VIII, 16 (13–14). Sternite II, 24 (27–29); III, 20–27 (23–24); VII, 26 (22–25); sternites III–VII without medioanterior setae. Dimensions: PW, 0.24–0.25 (0.27–0.30).

From *R. passerini*:

Female (n = 4). Length of head seta 10, 0.035; seta 11, 0.105; ratio10/11, 0.33. Sternal setae: II, 25–26 (27–32).

Male (n = 3). Tergal setae: II, 15–17 (15–16); VII, 18 (14–17). Sternal setae: II, 20 (27–29); III, 22–25 (23–24); VII, 19 (22–25). sternites III–VII without medioanterior setae (only one male with one seta). Dimensions, AW, 0.44 (0.45–0.49).

***Myrsidea icterocephalae* Price and Dalglish, 2006**

Myrsidea icterocephalae Price and Dalglish, 2006: 9, Fig. 11. Type host: *Tangara icterocephala* (Bonaparte)—Silver-throated Tanager.

Material studied. 2 females and 2 males, ex *Tangara icterocephala* (Thraupidae), **COSTA RICA**: Tapanti National Park, Sector Tapanti (09°46'N, 83°47'W; 1200m), 9 August 2009, Sychra and Literak leg.; 1 female and 1 male, ex *Tangara icterocephala*, **COSTA RICA**: Zona Protectora Las Tablas, La Amistad Lodge (8°54'N, 82°47'W; 1300m), 19 August 2010, Sychra and Literak leg. Deposited in INBio (O.Sychra CR159–161).

Remarks. Our specimens differ from the description of *M. icterocephalae* presented by Price and Dalglish (2006) by setal counts and dimensions as follows [setal counts and dimensions mentioned by Price and Dalglish (2006) are in parentheses]:

Female (n = 3). Length of head seta 10, 0.030–0.040; seta 11, 0.085–0.090; ratio10/11, 0.33–0.47. Sternites III–VII without medioanterior setae.

Dimensions: MW, 0.40–0.43 (0.39–0.42); TL, 1.36–1.37 (1.40–1.49)

Male (n = 3). Sternites III–VII without medioanterior setae. Dimensions: TW, 0.38–0.39 (0.39–0.41).

***Myrsidea johnklickai* Price, Johnson and Dalglish, 2008**

Myrsidea johnklickai Price, Johnson and Dalglish, 2008: 4, Figs. 5–7. Type host: *Cyanocopsa cyanoides* (Lafresnaye)—Blue-black Grosbeak.

Material studied. 1 female, ex *Cyanocopsa cyanoides* (Cardinalidae), **COSTA RICA**: Rincon de la Vieja National Park, Sector Santa Maria, Sendero del Padre (10°46'N, 85°18'N; 800m), 21 August 2009, Sychra and Literak leg. Deposited in INBio (O.Sychra CR102); 3 males ex *Cyanocopsa cyanoides*, **COSTA RICA**: Hitoy Cerere BR, Provincia Limón (9°40'N, 85°05'W), 19–25 August 2004, Literak leg. (O.Sychra CR61).

Remarks. The characteristics of the female studied are completely consistent with the description of *M. johnklickai* presented by Price *et al.* (2008). On the other hand, the characteristics of three males collected from *Cyanocopsa cyanoides* in 2004 (Sychra *et al.* 2007) were somewhat different from their description. They have a smaller number of metanotal and tergal setae and smaller dimensions as follows [setal counts and dimensions mentioned by Price *et al.* (2008) are in parentheses]:

Male (n = 3). Mean length of head seta 10, 0.054 (n=4); seta 11, 0.094 (n=4); ratio10/11, 0.58. Metanotum with 6–9 (8–9) setae on posterior margin, metasternal plate large with 6–7 (5) setae. Tergal setae: I, 9–12 (10–12); II–V, 13–16 (II 13–14, III 12–15, V 11–14); VIII, 10–11 (8–10). Sternal setae: II, 10–13 (11–15) marginal between asters, 4–7 (9–14) anterior; sternites III–VII without medioanterior setae. *Dimensions:* TW, 0.41–0.43 (0.42–0.43); HL, 0.28–0.29 (0.29–0.31); TL, 1.20–1.26 (1.24–1.33); GW, 0.10–0.12; GSL, 0.10.

***Myrsidea larvatae* Sychra, 2007**

Myrsidea larvatae Sychra [in Sychra *et al.*, 2007]: 62, Figs. 5–6. Type host: *Tangara larvata* (Du Bus)—Golden-hooded Tanager.

Material studied. 4 females and 3 males, ex *Tangara larvata* (Thraupidae), **COSTA RICA:** Zona Protectora Las Tablas, La Amistad Lodge (8°54'N, 82°47'W; 1300m), 20 August 2010, Sychra and Literak leg. Deposited in INBio (O.Sychra CR162–163) and MZM (O.Sychra CR164).

Remarks. Our specimens differ from the description of *M. larvatae* presented by Sychra *et al.* (2007) by setal counts and dimensions as follows [setal counts and dimensions mentioned by Sychra *et al.* (2007) are in parentheses]:

Female (n = 4). Length of head seta 10, 0.045; seta 11, 0.100; ratio10/11, 0.45. Tergal setae: I, 27 (30–36); II, 28–31 (34–36); III, 28–33 (35–38); IV, 28–29 (39–40); V, 30–33 (35–43); VI, 33–34 (34–39); VII, 30–33 (33–36); VIII, 21–24 (25–27). Sternal setae: V, 35–38 (37–43); VI, 31 (32–36); sternites III–VII without medioanterior setae. *Dimensions,* TW, 0.41 (0.42–0.43); MW, 0.42 (0.43–0.46); TL, 1.43 (1.45–1.49).

Male (n = 3). Tergal setae: III, 34 (35–40); IV, 34 (35–40); V, 35–36 (37–43); VI, 33–36 (37–43); VII, 30–32 (32–38); VIII, 24–25 (26–27). Sternal setae: III, 31 (24–28); IV, 35 (32–34); V, 33 (34–35); VIII, 12 (9–11); sternite III with one medioanterior seta, other sternites without medioanterior setae. *Dimensions:* TW, 0.38–0.39 (0.39–0.40); HL, 0.26–0.27 (0.27–0.28); MW, 0.33 (0.35–0.36); AW, 0.40 (0.42–0.44).

***Myrsidea lightae* Price, Johnson and Dalglish, 2008**

Myrsidea lightae Price, Johnson and Dalglish, 2008: 2, Figs. 1–4. Type host: *Saltator maximus* (Müller)—Buff-throated Saltator

Material studied. 2 males ex *Saltator maximus*, **COSTA RICA:** Hitoy Cerere BR, Provincia Limón (9°40'N, 85°05'W), 21 August 2004, Literak leg. (O.Sychra CR62). Deposited in INBio.

Remarks. As we predicted in our previous paper (Sychra *et al.* 2007) *Myrsidea* lice from this host represented a unique species that was subsequently described as new by Price *et al.* (2008). Since our specimens collected from the type host differ a little from the original description of *M. lightae*, we mention these differences here [setal counts and dimensions mentioned by Price *et al.* (2008) are in parentheses]:

Male (n = 2). Mean length of head seta 10, 0.055 (n=3); seta 11, 0.107 (n=3); ratio10/11, 0.52. Metanotal margin with 11–13 (13–19) setae. Tergal setae: I with a continuous row of setae, all other tergites with a well-defined median gap in the rows of setae; III, 17–22 (18–22); IV, 17–22 (16–20); VI, 17–22 (16–20); VII, 17–22 (15–20). Sternal setae: II 7–8 (9–14) anterior; IV, 38 (39–46); VI, 24–28 (36–41); without medioanterior setae. *Dimensions:* HL, 0.28–0.31 (0.31–0.33); GL, 0.49–0.50 (0.46–0.49); GW, 0.13; GSL, 0.09.

***Myrsidea marini* Price and Dalglish, 2007**

Myrsidea marini Price and Dalglish, 2007: 12, Figs. 37–38. Type host: *Pezopetes capitalis* Cabanis—Large-footed Finch

Material studied. 2 females and 2 males, ex *Pezopetes capitalis* (Emberizidae), **COSTA RICA:** Braulio Carillo National Park, Sector Barva (10°07'N, 84°07'W; 2600m), 6 August 2010; 2 females and 2 males, Tapanti National Park, Sector Cerro de la Muerte (9°33'N, 83°43'W; 3100m), 15 August 2010, Sychra and Literak leg. Deposited in INBio (O.Sychra CR123–125) and MZM (O.Sychra CR126).

Remarks. Our specimens differ from the description of *M. marini* presented by Price and Dalgleish (2007) by setal counts and dimensions as follows [setal counts and dimensions mentioned by Price and Dalgleish (2007) are in parentheses]:

Female (n = 4). Length of head seta 10, 0.040–0.050; seta 11, 0.110–0.120; ratio10/11, 0.33–0.45. Gula 4–6 (5) setae on each side. Metasternal plate with 8 (9) setae. Tergal setae: I, 31–37 (27); II, 28–30 (27); III, 26–29 (24–25); IV, 27 (24–25); V, 27 (24–25); VI, 23–24 (22), VII, 22–23 (19–20), VIII, 12–16 (19–20). Sternal setae: II, 19–23 (20) marginal between asters, 11–17 (10) anterior; III, 26 (28); VI, 25–29 (33–35); VII, 17–18 (22); VIII–IX, 29–32 (31); with 7 medioanterior setae on sternite III. Dimensions: TW, 0.48 (0.45); PW, 0.32 (0.31); MW, 0.50 (0.49); AW, 0.66 (0.60); TL, 1.50–1.63 (1.56).

Male (n = 4). Tergal setae: I, 22–24 (23); II, 20–22 (25); III, 25 (22–24); VI, 21–25 (22–24), VII, 22–23 (25), VIII, 19–23 (22). Sternal setae: II, 18–19 (16) marginal between asters, 14–16 (17) anterior; III, 30–32 (31); IV, 42 (36–39); V, 40 (36–39); VI, 41 (36–39); VII, 30–31 (34); VIII, 29 (25); including medioanterior setae: III, 8–9; IV, 8; V, 5; VI, 9; VII, 5–8. Dimensions: TL, 1.33–1.35 (1.39).

Myrsidea patersoni Price and Johnson, 2009

Myrsidea patersoni Price and Johnson, 2009: 64, Figs. 3–4. Type host: *Eucometis penicillata* (Spix)—Gray-headed Tanager

Material studied. 1 male, ex *Eucometis penicillata* (Thraupidae), **COSTA RICA:** Rincon de la Vieja National Park, Sector Santa Maria, Sendero del Padre (10°46'N, 85°18'N; 800m), 22 August 2009, Sychra and Literak leg.; 1 female and 1 male, ex *Eucometis penicillata*, **COSTA RICA:** Zona Protectora Las Tablas, La Amistad Lodge (8°54'N, 82°47'W; 1300m), 20 August 2010, Sychra and Literak leg. Deposited in INBio (O.Sychra CR136–137).

Remarks. This is the first record of this species of *Myrsidea* from Costa Rica. Our specimens differ from the description of *M. patersoni* presented by Price and Johnson (2009) by sternal setal counts and dimensions as follows [setal counts and dimensions mentioned by Price and Johnson (2009) are in parentheses]:

Female (n = 1). Sternal setae: IV, 29 (33–36); V, 34 (35–42); VI, 30 (32–34); VII, 15 (16–20); VIII–IX, 17 (19–24); sternites III–VII without medioanterior setae. Dimensions: HL, 0.31 (0.32–0.33); PW, 0.28 (0.29–0.31); AW, 0.62 (0.65–0.69); TL, 1.52 (1.62–1.65); ANW, 0.20 (0.23–0.24).

Male (n = 2). Length of head seta 10, 0.035; seta 11, 0.100; ratio10/11, 0.35. Sternal setae: II, 19 (14–16) marginal between asters, 7 (8–10) anterior; IV, 34 (26–29); V, 29 (31–33); VI, 26 (27–31); sternites III–VII without medioanterior setae. Dimensions: TW, 0.43–0.44 (0.44–0.45); HL, 0.27–0.29 (0.30–0.31); PW, 0.27 (0.28–0.30); AW, 0.48–0.49 (0.50–0.52).

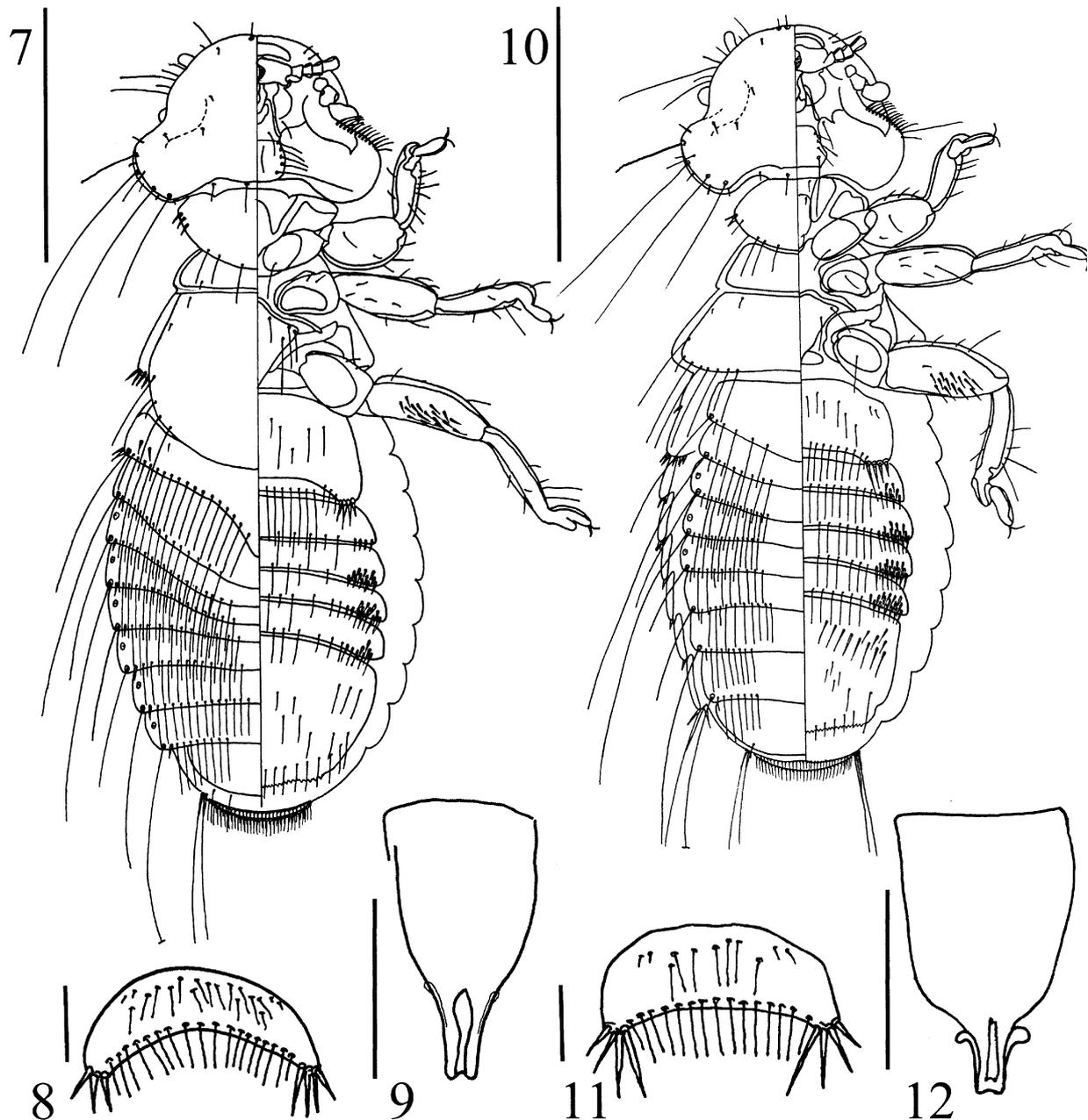
Myrsidea roubalovae Kounek and Sychra sp. nov.

(Figs. 7–9)

Type host. *Ramphocelus sanguinolentus* (Lesson)—Crimson-collared Tanager

Female (n = 3). This species belongs to the *fusca* species group (sensu Price and Dalgleish 2006). Length of head seta 10, 0.035; seta 11, 0.100–0.105; ratio10/11, 0.33–0.35. Gula with 5 setae on each side. Metasternal plate with 6 setae, metanotum not enlarged with almost straight posterior margin, with 17–22 marginal setae.

Abdomen very similar to *M. rubica* with tergite I largest with strongly convex posterior margin, II–IV with slight mediopestric convexity (Fig. 7). Tergal setae, with median gap in each row: I, 6 (one female with 11); II, 19; III, 24–25; IV, 25–27; V, 22–27; VI, 22–24; VII, 18–23; VIII, 14–16. Postspiracular setae extremely long (>0.50) on II, IV and VIII; very long (0.40) on VII; long (0.27) on I and short (0.18–0.21) on III, V and VI. Sternal setae: II, 4 in each aster, 17–19 marginal between asters, 10–11 anterior; III, 33; VI, 38–47; V, 44–57; VI, 41–42; VII, 23; VIII–IX, 20–22; without medioanterior setae. Dimensions: TW, 0.46–0.47; HL, 0.29–0.30; PW, 0.28–0.29; MW, 0.45–0.49; AW, 0.58–0.60; TL, 1.47–1.55; ANW, 0.24–0.25.



FIGURES 7–12. 7–9. *Myrsidea roubalovae* sp. nov. 7, Female (dorsal side on the left, ventral side on the right). 8, Male sternite II. 9, Male genital sac sclerite. 10–12. *Myrsidea rubica* sp. nov. 10, Female (dorsal side on the left, ventral side on the right). 11, Male sternite II. 12, Male genital sac sclerite. Scales 0.50 mm (Figs. 7, 10), 0.10 mm (Figs. 8, 11), 0.05 mm (Figs. 9, 12).

Male (n = 9). Length of head seta 10, 0.035–0.040; seta 11, 0.095–0.105; ratio10/11, 0.33–0.42. Metanotum with 13–15 marginal setae. Tergal setae: I, 11–14; II, 18–22; III, 20–25; IV, 20–23; V, 19–24; VI, 18–23; VII, 15–21; VIII, 13–15. Postspiracular setae extremely long (0.50–0.55) on II, IV and VIII; very long (0.40) on VII; long (0.25–0.27) on I and short (0.15–0.18) on III, V and VI. Sternal setae: II, 4 in each aster, 15–17 marginal between asters, 7–9 anterior (Fig. 8); III, 23–31; IV, 33–40; V, 35–41; VI, 32–39; VII, 21–25; VIII, 8–10; without medioanterior setae. Genital sac sclerite with slight apical indentation and distinct subapical lateral projections (Fig. 9). Dimensions: TW, 0.42–0.43; HL, 0.26–0.29; PW, 0.26–0.27; MW, 0.34–0.36; AW, 0.45–0.47; TL, 1.18–1.30; GW, 0.11; GL, 0.42–0.44; GSL, 0.08.

Type material. Female holotype (O.Sychra CR144), ex *Ramphocelus sanguinolentus* (Thraupidae), **COSTA RICA:** Tapanti National Park, Sector Tapanti (09°46'N, 83°47'W; 1200m), 8 August 2009, Sychra and Literak leg.

Paratypes: 1 female and 4 males with the same data as holotype (O.Sychra CR144–146). Deposited in INBio. Other specimens deposited in MZM.

Remarks. This is the first record of a chewing louse from *Ramphocelus sanguinolentus*. The female of *M. roubalovae* **sp. nov.** is very similar to *M. rubica* **sp. nov.**, but can easily be separated by its large number of metanotal setae (13–22 vs. 6 setae). This characteristic together with a large number of tergal setae places *M. roubalovae* **sp. nov.** close to *M. fuscicaudae*. However, females of *M. roubalovae* **sp. nov.** can be separated from those of *M. fuscicaudae* by a larger number of setae on tergite VIII (14–16 vs. 9–10) and sternites VI (44–57 vs. 32–34) and VII (23 vs. 14–15). Also, *M. roubalovae* **sp. nov.** is very similar to *M. fusca*—from *Ramphocelus passerini*, a closely related tanager to the type host—but has a smaller number of both metanotal (12–16 vs. 17–22) and tergal setae (especially tergites III–IV each with not >21 setae vs. at least 24 setae). On the other hand, the of male *M. roubalovae* **sp. nov.** has the same type of genital sac sclerite as that of *M. fusca*, but *M. fuscicaudae* has a different genital sac sclerite (compare Fig. 9 vs. Fig. 12). Males of *M. roubalovae* **sp. nov.** can be separated from those of *M. fusca* by larger number of tergal setae, especially on tergites III–IV (20–25 vs. 16–19) and II (18–22 vs. 15–17).

Etymology. This species is named in honor of Eva Roubalova, our colleague and friend, in recognition of her friendship.

Myrsidea rozsai Price and Johnson, 2009

Myrsidea rozsai Price and Johnson, 2009: 62, Figs. 5–7. Type host: *Euphonia laniirostris* d’Orbigny et Lafresnaye—Thick-billed Euphonia

Material studied. 5 female and 5 male, ex *Euphonia laniirostris* (Fringillidae), COSTA RICA: Zona Protectora Las Tablas, La Amistad lodge (8°54’N, 82°47’W; 1300m), 18 August 2010, Sychra and Literak leg. Deposited in INBio (O.Sychra CR131–133) and MZM (O.Sychra CR134–135).

Remarks. This is the first record of this species of *Myrsidea* from Costa Rica. Our specimens differ from the description of *M. rozsai* presented by Price and Johnson (2009) by setal counts and dimensions as follows [setal counts and dimensions mentioned by Price and Johnson (2009) are in parentheses]:

Female (n = 5). Length of head seta 10, 0.030; seta 11, 0.100; ratio10/11, 0.30. Tergal setae: II, 21 (23–26); III, 26 (27–32). Sternal setae: II, 15 (16–19) marginal between asters; III, 26 (21–25); sternites III–VII without medioanterior setae. Dimensions: AW, 0.57 (0.59–0.61).

Male (n = 5). Sternite III with 3–4 medioanterior setae, other sternites without medioanterior setae. Dimensions: HL, 0.27 (0.28); PW, 0.25 (0.27–0.28); MW, 0.33 (0.35); TL, 1.30 (1.22–1.24).

Myrsidea rubica Kounek and Sychra **sp. nov.**

(Figs. 10–12)

Type host. *Habia rubica* (Vieillot)—Red-crowned Ant-Tanager

Female (n = 4). This species belongs to the *fusca* species group (sensu Price and Dalglish 2006). Length of head seta 10, 0.045–0.050; seta 11, 0.115–0.120; ratio10/11, 0.38–0.43. Gula with 4–5 setae on each side. Metasternal plate with 6 setae, metanotum not enlarged with almost straight posterior margin, with only 6 marginal setae.

Abdomen with tergite I largest with strongly convex posterior margin, II–IV with slight mediopestric convexity (Fig. 10). Tergal setae, with median gap in each row: I, 6–7; II, 15–16; III, 17–18; IV, 18–19; V, 18–22; VI, 18–20; VII, 14–17; VIII, 8–10. Postspiracular setae extremely long (0.45–0.55) on II, IV and VIII; long (0.28–0.39) on I, III and VII and short (0.15–0.19) on V and VI. Sternal setae: II, 4 in each aster, 18 marginal between asters, 6–9 anterior; III, 27–29; IV, 34–42; V, 38–39; VI, 26–28; VII, 12–15; VIII–IX, 18–21; without medioanterior setae. Dimensions: TW, 0.45–0.49; HL, 0.31–0.32; PW, 0.27–0.30; MW, 0.40–0.45; AW, 0.53–0.59; TL, 1.38–1.51; ANW, 0.22.

Male (n = 2). Length of head seta 10, 0.040; seta 11, 0.100–0.105; ratio10/11, 0.38–0.40. Metasternal plate with 5–7 setae, metanotum with only 6 marginal setae. Tergal setae, with median gap in each row: I, 14; II, 18; III, 20; IV, 17–18; V, 17–19; VI, 15–18; VII, 12–13; VIII, 6–7. Postspiracular setae extremely long (0.45–0.47) on II, IV and VIII; long (0.23–0.30) on I, III and VII and short (0.14–0.16) on V and VI. Sternal setae: II, 4 in each aster,

15 marginal between asters, 6 anterior (Fig. 11); III, 24–27; IV, 28–29; V, 29–31; VI, 24–25; VII, 13–14; VIII, 6–7; without medioanterior setae. Genital sac sclerite slender with very small subapical projection on each side (Fig. 12). Dimensions: TW, 0.41–0.42; HL, 0.28–0.29; PW, 0.25; MW, 0.35–0.36; AW, 0.42–0.44; TL, 1.20–1.21; GW, 0.10; GL, 0.39; GSL, 0.07–0.09.

Type material. Female holotype (O.Sychra CR103), ex *Habia rubica* (Cardinalidae), **COSTA RICA**: Rincon de la Vieja National Park, Sector Santa Maria, Sendero del Padre (10°46'N, 85°18'N; 800m), 20 August 2009, Sychra and Literak leg. Paratypes: 1 female and 2 males with the same data as holotype (O.Sychra CR103–104). Deposited in INBio. Other specimens deposited in MZM.

Remarks. This is the second species of *Myrsidea* from *Habia rubica*. It conspicuously differs from *M. lacini-aesternata* Eichler, 1956 described from the same host from Bolivia and Trinidad and Tobago (Eichler 1956; Price and Dalgleish 2006) by having a non-enlarged metanotum and a median gap in each row of tergal setae.

The female of *M. rubica* **sp. nov.** is characterized by following characteristics: (1) metanotum not enlarged with almost straight posterior margin; (2) well-developed median gap in the rows of tergal setae; and (3) tergite I much enlarged, especially in relation to other tergites, with strongly convex posterior margin and with not >7 setae. These characteristics place *M. rubica* **sp. nov.** very close to *M. fusca* Carriker, 1903 from *Ramphocelus passerini* (Thraupidae) and *M. fuscicaudae* Price and Dalgleish, 2006 from *Habia fuscicauda* (Cardinalidae). The male of *M. rubica* **sp. nov.** is characterized by following features: (1) genital sac sclerite with only very small subapical projection on each side and (2) large number of setae on tergites (especially tergite III with at least 19 setae and tergite V with at least 17 setae). These characteristics place *M. rubica* **sp. nov.** very closely only to *M. fuscicaudae*—male of *M. fusca* has genital sac sclerite with slight apical indentation and distinct subapical lateral projections (see Fig. 9). Both sexes of *M. rubica* **sp. nov.** can easily be separated from both aforementioned species by metanotal margin with only 6 setae (female of *M. fusca* and *M. fuscicaudae* has 12–16 and 19 metanotal setae, respectively; male of *M. fusca* and *M. fuscicaudae* has 12–16 and 14–15 metanotal setae, respectively).

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

Myrsidea seminuda Eichler, 1951

Myrsidea seminuda Eichler, 1951: 53, Fig. 8. Type host: *Thraupis palmarum melanoptera* (Sclater)

Myrsidea seminuda; Price and Dalgleish, 2006: 11, Figs. 13–14. Redescription. Hosts: *Thraupis palmarum* (Wied)—Palm Tanager and *T. episcopus* (Linnaeus)—Blue-gray Tanager.

Material studied. 6 females and 6 males, ex *Thraupis episcopus* (Thraupidae), **COSTA RICA**: Zona Protectora Las Tablas, La Amistad Lodge (8°54'N, 82°47'W; 1300m), 19 August 2010, Sychra and Literak leg. Deposited in INBio (O.Sychra CR165–168) and MZM (O.Sychra CR169–170).

Remarks. Our specimens differ a little from the redescription of *M. seminuda* presented by Price and Dalgleish (2006) by setal counts and dimensions as follows [setal counts and dimensions mentioned by Price and Dalgleish (2006) are in parentheses]:

Female (n = 6). Length of head seta 10, 0.035–0.050; seta 11, 0.085–0.115; ratio 10/11, 0.30–0.59. Metanotum 11 (12–14) marginal setae. Tergal setae: V, 43 (33–39). Sternal setae: II, 32 (38–44); sternite III with 3–10 medioanterior setae, other sternites without medioanterior setae. Dimensions: HL, 0.30 (0.31–0.32).

Male (n = 6). Tergal setae: VII, 25 (31–33); VIII, 20 (21–22). Sternal setae: II, 25 (32–37); IV, 30 (32–41); V, 31 (32–38); sternite III with 5–11 medioanterior setae, other sternites without medioanterior setae. Dimensions: AW, 0.48 (0.44–0.46); TL, 1.29 (1.24–1.28).

Myrsidea valimi Price and Johnson, 2009

Myrsidea valimi Price and Johnson, 2009: 65, Figs. 5–6. Type host: *Euphonia anaeae* Cassin—Tawny-capped Euphonia.

Material studied. 2 females and 1 male, ex *Euphonia anaeae* (Fringillidae), **COSTA RICA**: Tapanti National Park, Sector Tapanti (09°46'N, 83°47'W; 1200m), 5 August 2009, Sychra and Literak leg. Deposited in INBio (O.Sychra CR127–128).

Remarks. This is the first record of this species of *Myrsidea* from Costa Rica. Specimens studied differ from the description of *M. valimi* presented by Price and Johnson (2009) by setal counts and dimensions as follows [setal counts and dimensions mentioned by Price and Johnson (2009) are in parentheses]:

Female (n = 2). Length of head seta 10, 0.040; seta 11, 0.95–0.100; ratio10/11, 0.40–0.42.

Metanotum 10 (9) marginal setae, metasternum 7 (6) setae. Tergal setae: I, 15 (12–13); II, 19 (16); V, 18 (13–16). Sternal setae: III, 22 (23–25); IV, 34 (23–28); V, 34 (29–31); VI, 29 (21–24); VII, 15 (12–13); sternites III–VII without medioanterior setae. Dimensions: TW, 0.42 (0.40–0.41).

Male (n = 1). Sternal setae: III, 17 (19–20); IV, 26 (21–25), V, 26 (21–25); VI, 28 (21–25); VII, 19 (12–13). Sternites III–VII without medioanterior setae.

***Myrsidea violaceae* Price and Dalglish, 2006**

Myrsidea violaceae Price and Dalglish, 2006: 9. Type host: *Euphonia violacea* (Linnaeus)—Violaceous Euphonia.

Material studied. 3 female and 3 males, ex *Chlorospingus ophthalmicus*, Common Bush-Tanager (Emberizidae).

COSTA RICA: Tapanti National Park, Sector Tapanti (09°46'N, 83°47'W; 1200m), 8 August 2009, Sychra and Literak leg. Deposited in INBio (O.Sychra CR120–121) and MZM (O.Sychra CR122); 2 females and 1 male, ex *Euphonia hirundinacea*, Yellow-crowned Euphonia (Fringillidae). **COSTA RICA:** Rincon de la Vieja National Park, Miravieja Lodge (10°43'N, 85°18'N; 600m), 19 August 2009, Sychra and Literak leg. Deposited in INBio (O.Sychra CR129–130).

Remarks. This is the first record of this species of *Myrsidea* from *Chlorospingus ophthalmicus* and the first record of a chewing louse from *Euphonia hirundinacea*. Our specimens differ from the description of *M. violaceae* presented by Price and Dalglish (2006) by setal counts and dimensions as follows [setal counts and dimensions mentioned by Price and Dalglish (2006) are in parentheses]:

From *C. ophthalmicus*:

Female (n = 3). Length of head seta 10, 0.040; seta 11, 0.105–0.110; ratio10/11, 0.36–0.38. Metanotum 12–14 (9–11) marginal setae. Tergal setae: I, 10–11 (11–13). Sternal setae: II, 23 (26–32); III, 25–29 (19–23); IV, 33 (25–32); sternites III–VII without medioanterior setae. Dimensions: TW, 0.42–0.43 (0.40–0.42); TL, 1.36 (1.39–1.48); ANW, 0.22–0.24 (0.18–0.21).

Male (n = 3). Metanotum 12 (9–11) marginal setae. Tergal setae with median gap on I–II: I, 15 (16–20). Sternal setae: III, 26 (19–25); IV, 31 (21–29); V, 32 (26–30); VI, 29 (23–28); sternites III–VII without medioanterior setae.

From *E. hirundinacea*:

Female (n = 2). Length of head seta 10, 0.035–0.040; seta 11, 0.95–0.100; ratio10/11, 0.35–0.42. Tergal setae: I, 15 (11–13); VIII, 19 (14–18). Sternal setae: III, 24 (19–23); IV, 34 (25–32); sternites III–VII without medioanterior setae.

Male (n = 1). Tergal setae: III, 24 (25–30). Sternal setae: II, 21 (26–32); VIII, 14 (7–11); sternite III with one medioanterior seta, other sternites without medioanterior setae. Dimensions: AW, 0.38 (0.39–0.43).

Discussion

This paper includes first records of chewing lice from three of the 35 bird species examined, i.e. *Ramphocelus costaricensis*, *Ramphocelus sanguinolentus* and *Euphonia hirundinacea*. Three species of *Myrsidea*—*M. patersoni*, *M. rozsai* and *M. valimi*—are recorded for the first time from Costa Rica.

Among the species of *Myrsidea* studied in this paper, the material of 13 species previously described differed in various degrees, particularly in setal counts and dimensions, from the original descriptions and redescriptions. Our data increase the knowledge of intraspecific morphological variability of those species.

Up to now, about ten species of *Myrsidea* from birds belonging to the Cardinalidae, Emberizidae, Fringillidae, and Thraupidae have been found each parasitizing at least two hosts. (Klockenhoff 1984b; Price and Dalglish 2006, 2007; Sychra *et al.* 2007, 2009; Price *et al.* 2008; Palma and Price 2010). In this paper, there are four new host-louse associations for previously known species of *Myrsidea*, i.e. *M. bonariensis*, *M. fusca* and *M. violaceae*.

Price *et al.* (2003) cited Clay (1968: 236) for the association of *M. bonariensis* with *Tangara mexicana*, *T. gyrola*, and *Euphonia violacea*. Price and Dalgleish (2006) examined large number of specimens from those three species of birds and found that the descriptions of *M. bonariensis* by Malcomson (1929) and Clay (1968) agree with their material from *T. gyrola*. Further, Price and Dalgleish (2006) described *M. tangarae* from *T. mexicana* and *M. violaceae* from *E. violacea*. Here we record a new association of *M. bonariensis* with *Tangara dowii*.

Myrsidea fusca originally described by Carriker (1903) and subsequently redescribed by Price and Dalgleish (2006) from *Ramphocelus passerini* was also found on *R. costaricensis*. The latter host species was formerly regarded as a subspecies of *R. passerini*. Since 1996, they have been recognised as two full species (Hackett 1996). Here we find *Myrsidea* from *R. costaricensis* is conspecific with those from *R. passerini*.

Myrsidea violaceae, originally described from *Euphonia violacea* (Price and Dalgleish 2006) and subsequently recorded from *E. gouldi* (Sychra *et al.* 2007), was found on *E. hirundinacea*. It would appear that this louse species is restricted to birds of the genus *Euphonia* (Fringillidae), but we also found it on *Chlorospingus ophthalmicus*, a host that was recently placed into the family Emberizidae (Clements *et al.* 2010). Sympatry and similar habitat preferences of the hosts might explain the lack of host-specificity (Bueter *et al.* 2009).

Furthermore, the host-louse association between *Myrsidea violaceae* and *Chlorospingus ophthalmicus* is of interest because this bird species also hosts *Myrsidea ophthalmici*, described by Price and Dalgleish (2006) from birds from Venezuela. Up to now, only two species of birds belonging to the Cardinalidae, Emberizidae, Fringillidae, and Thraupidae had been found as hosts of two different species of *Myrsidea*. Both examples are reported by Price *et al.* (2008): *Cyanocompsa cyanoides* (Cardinalidae) harbours *M. johnklickai* and *M. sychrai*, while *Saltator striatipectus* (Thraupidae) harbours *M. lightae* and *M. pittendrighi*. In this paper, there are three further examples of hosts with double *Myrsidea* infestations: *Arremon brunneinucha*, *Chlorospingus ophthalmicus* (Emberizidae) and *Habia rubica* (Cardinalidae). The pairs of *Myrsidea* species parasitising *C. ophthalmicus* and *H. rubica* have different geographical distributions—*M. ophthalmici* and *M. violaceae* from *C. ophthalmicus* were from Venezuela and Costa Rica, respectively, while *M. laciniaesternata* and *M. rubica* **sp. nov.** from *H. rubica* were collected on birds from Bolivia and Trinidad and Tobago, and Costa Rica, respectively (Eichler 1956; Price and Dalgleish 2006). Conversely, the type series of *M. dolejskiae* **sp. nov.** from *A. brunneinucha* was collected in Costa Rica at a site quite close to where the type series of *M. brunneinuchi* was collected. This is consistent with Price *et al.* (2008) mentioning one case of co-occurrence of two different species of *Myrsidea* on the same individual bird. These results suggest that either a recent successful host-switching event or a duplication event occurred on these hosts (Johnson and Clayton 2003). Furthermore, these results highlight the need to carefully examine each louse specimen when identifying new samples, even if they were collected from birds that harbour known species of lice.

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