

**Chewing lice (Phthiraptera: Amblycera et Ischnocera)  
from wrens (Passeriformes: Troglodytidae),  
with description of a new species of *Myrsidea***

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**Abstract.** A total of 114 individuals of 14 wren species (Aves: Passeriformes: Troglodytidae) were examined. Nineteen birds (17 %) of six species were parasitised with 292 chewing lice (mean intensity = 15.4 lice per bird) belonging to three genera – *Brueelia* Kéler, 1936, *Penenirmus* Clay & Meinertzhagen, 1938 (Ischnocera: Philopteridae) and *Myrsidea* Waterston, 1915 (Amblycera: Menoponidae). Data on the occurrence of chewing lice on wrens, including geographical distributions and some parasitological parameters – such as prevalence and mean intensity – are updated and discussed. A description and illustrations are given for *Myrsidea fasciata* sp. nov. from *Campylorhynchus fasciatus* (Swainson, 1837) from Costa Rica. *Penenirmus albiventris* (Scopoli, 1763) is redescribed from *Troglodytes troglodytes* (Linnaeus, 1758) (from the Czech Republic and Slovakia) and from *T. aedon* Vieillot, 1809 (from Peru). Intraspecific morphological variation of *P. albiventris* is discussed, and detailed figures are given. A portion of the mitochondrial cytochrome oxidase I (*COI*) gene was sequenced from some species of *Myrsidea* and *Penenirmus* in order to assess their relative genetic divergence. An updated list of all species of lice recorded from wrens, including their geographic distribution, and a host-lice list are also given.

**Key words.** Amblycera, Ischnocera, chewing lice, bird parasites, prevalence, mean intensity, geographic distribution, mitochondrial *COI*, phylogeny, taxonomy, new species, *Troglodytes*, wrens, Neotropical Region, Palaearctic Region

## Introduction

This is the next part of our contribution to knowledge of Neotropical chewing lice, especially the genus *Myrsidea* Waterston, 1915. Following up on our previous work (SYCHRA et al. 2006, 2007a,b, 2009, 2010, 2011; KOUNEK et al. 2011a,b, 2013) we present new data on the species composition and distribution of chewing lice found on another family of wild birds – wrens (Troglodytidae).

The wren family (Troglodytidae) comprises 80 species of passerine birds, with the greatest diversity in the Neotropical Region (CLEMENS et al. 2012). To date, 13 species of chewing lice belonging to five genera (*Menacanthus* Neumann, 1912, *Myrsidea*, *Brueelia* Kéler, 1936, *Penenirmus* Clay & Meinertzhagen, 1938 and *Philoaterus* Nitzsch, 1818) have been reported from 11 wren hosts (PRICE et al. 2008a, VALIM & WECKSTEIN 2013). Some of these species were reviewed by CICHINO (1980).

The aims of this paper are (1) to update data on chewing lice from wrens, including their geographical distributions based on our extensive recent collections in South and Central America and central Europe; (2) to analyse their parasitological parameters; (3) to describe and illustrate one new species of the genus *Myrsidea*; (4) to compare sequences of a portion of the mitochondrial cytochrome oxidase I (*COI*) gene obtained from the new *Myrsidea* species against those from other species of *Myrsidea* from Troglodytidae and other Neotropical hosts; (5) to redescribe and illustrate *Penenirmus albiventris* (Scopoli, 1763), as well as to discuss its host and geographical distributions and its genetic variability based on the mitochondrial *COI* gene.

## Material and methods

Between the years 2004 and 2012, at various locations in the Neotropical Region and in central Europe, mist nets were used to trap wild birds which were examined for the presence of chewing lice. Study sites included three locations in **Brazil**: Nova Andradina (22°15'S 53°21'W), Margarida at the foothills of the Serra de Bodoquena (21°30'S 56°40'W), and Ivinhema River (22°31'S 53°30'W), all in Mato Grosso do Sul State; seven locations in **Costa Rica**: Hitoy Cerere Biological Reserve (9°40'N 85°05'W), Barbilla National Park (9°59'N 85°27'W), Tapanti National Park, Sector Tapanti (9°46'N 83°47'W) and Sector Cerro de la Muerte (9°33'N 83°43'W), Rincón de la Vieja National Park (10°46'N 85°18'N), Braulio Carrillo National Park, Sector Barva (10°07'N 84°07'W), and Zona Protectora Las Tablas (8°54'N 82°47'W); three locations in **Paraguay**: San Rafael National Park (26°30'S 55°47'W), Teniente Agripino Enciso National Park (21°12'S 61°39'W), and Los Tres Gigantes Biological Station in the Paraguayan Pantanal (20°04'S 50°09'W); four locations in **Peru**: Refugio de Vida Silvestre Los Pantanos de Villa, Lima (12°13'S 76°59'W), Centro URKU, Tarapoto (6°27'S 76°21'W), Reserva Nacional Allpahuayo Mishana, Iquitos (3°58'S 73°25'W), and Cascay, Huanuco (9°50'S 76°08'W); one location in the **Czech Republic**: Čerták (49°34'N 17°59'E); and one location in **Slovakia**: Gbelce (47°51'N 18°30'E).

Chewing lice were collected by visual examination and using the fumigation chamber method (CLAYTON & DROWN 2001) with visual search on the head. Lice were fixed in 96% ethanol in

the field. Subsequently, they were slide-mounted in Canada balsam as permanent preparations in the laboratory, following the technique by PALMA (1978). Identification of the lice was based on papers by WATERSTON (1915), CLAY & HOPKINS (1951), CICCHINO (1980), PRICE et al. (2008a) and KOUNEK et al. (2011b). The taxonomy of the birds follows that in CLEMENTS et al. (2012).

In the following descriptions the morphological terminology including dorsal head setae names follows that proposed by CLAY (1951) for *Penenirmus* and CLAY (1966) for *Myrsidea*. All measurements are in millimetres. 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; and GSL – genital sac sclerite length. The type specimens of the new species described in this paper are deposited in the Moravian Museum, Brno, Czech Republic (MMBC). Other material will be deposited in the same museum and in the National Biodiversity Institute, Santo Domingo de Heredia, Costa Rica (INBio).

Sequences of a 378–379 bp fragment of the *COI* gene were obtained from *Myrsidea fasciata* sp. nov. (ex *Campylorhynchus fasciatus* from Peru), from *Myrsidea* sp. (ex *Troglodytes aedon* from Costa Rica), and from *Penenirmus albiventris* (ex *Troglodytes aedon* from Peru, and ex *T. troglodytes* from Slovakia) using methods described by JOHNSON et al. (2002a). The sequences (GenBank accession numbers KF614514–KF614519) were aligned using MEGA 5.2.1 (TAMURA et al. 2011). Sequences from all Neotropical species of *Myrsidea* and all *Penenirmus* sequences previously published in the literature and deposited in GenBank (JOHNSON et al. 2001, 2002a,b, 2003; PRICE et al. 2008a,b,c; BUETER et al. 2009; PRICE & JOHNSON 2009; VALIM et al. 2011; VALIM & WECKSTEIN 2013; NAJER et al. 2014) were compared to them to assess their genetic divergence and phylogenetic relationships.

Phylogenetic analysis of the Neotropical *Myrsidea* was performed using the maximum likelihood (ML) method based on the GTR+G model ( $\gamma = 0.5068$ ). We used only Neotropical species because there is an apparent geographic relationship in case of this genus (BUETER et al. 2009). Since we wanted our results to be comparable to other papers (PRICE & JOHNSON 2009, VALIM et al. 2011, VALIM & WECKSTEIN 2013), *Dennyus hirundinis* (Linnaeus, 1761) (Phthiraptera: Amblycera: Menoponidae) was used as an outgroup taxon for rooting. The tree with the best likelihood score was chosen for the best phylogenetic hypothesis. To assess support of the resulting tree topology, 500 bootstrap replicates were performed. Phylogenetic relationships among available *Penenirmus* sequences and those sequenced in this study were analyzed using the same methods as in *Myrsidea* (ML based on GTR+G model;  $\gamma = 0.6223$ ). Since we wanted to compare our results with those by JOHNSON et al. (2001), *Brueelia marginella* (Nitzsch, 1866) (Phthiraptera: Ischnocera: Philopteridae) was used as the outgroup. All phylogenetic analyses, selection of the best-fitting models for them and computation of genetic p-distances were performed in MEGA 5.2.1 (TAMURA et al. 2011).

## Results

A total of 114 individuals of 14 wren species were examined. Nineteen birds (17 %) of 6 species were parasitised with 292 chewing lice (mean intensity = 15.4 lice per bird) belonging to three genera – *Brueelia*, *Myrsidea* and *Penenirmus* (Table 1). Each parasitised bird was

**Table 1.** List of hosts and chewing lice recorded in this study (taxonomy of *Troglodytes aedon* complex follows CLEMENTS et al. 2012). Explanations: P = prevalence as number of birds parasitised/number of birds examined; (A) = Amblycera, family Menoponidae; (I) = Ischnocera, family Philopteridae; \* = new host-lice association.

Host	Species of chewing lice	P	♂	♀	Nymphs	Location
<i>Campylorhynchus fasciatus</i> (Swainson, 1837)	* <i>Myrsidea fasciata</i> sp. nov. (A)	5/6	6	8	7	Cascay, Peru
<i>Cyphorhinus phaeocephalus</i> (Sclater, 1860)	* <i>Myrsidea</i> sp. (A)	1/1	0	0	1	Hitoy Cerere, Costa Rica
<i>Cantorchilus nigricapillus</i> (Sclater, 1860)	* <i>Myrsidea</i> sp. (A)	1/6	0	0	1	Hitoy Cerere, Costa Rica
<i>Troglodytes aedon intermedius</i> Cabanis, 1861	* <i>Myrsidea myiobori</i> Kounek & Sychra, 2011 (A)	1/3	2	1	4	Tapanti, Costa Rica
	<i>Myrsidea</i> sp. (A)	0/7	–	–	–	Barva, Costa Rica
<i>Troglodytes aedon musculus</i> J. F. Naumann, 1823	<i>Brueelia anamariae</i> Cicchino, 1980 (I)	0/6	–	–	–	Brazil
		1/1	2	5	11	Agripino Enciso, Paraguay
		0/1	–	–	–	San Rafael, Paraguay
		0/6	–	–	–	Tres Gigantes, Paraguay
<i>Troglodytes aedon audax</i> Tschudi, 1844	<i>Penenirmus albiventris</i> (Scopoli, 1763) (I)	4/7	34	46	118	Pantanos de Villa, Lima, Peru
<i>Troglodytes troglodytes</i> (Linnaeus, 1758)	<i>Penenirmus albiventris</i> (Scopoli, 1763) (I)	4/14	3	6	28	Čerták, Czech Republic
		1/1	1	0	7	Gbelce, Slovakia

infested with a single louse species. Louse prevalences ranged between 17 % and 83 % (three cases where only one parasitised bird was examined are not included). Ischnoceran lice of the genus *Penenirmus* were the most abundant, with mean intensity ranging from 9 in the Czech Republic and Slovakia (n = 5; intensity range 6–14 lice) to 50 in Peru (n = 4; intensity range 35–67 lice). Amblyceran lice of the genus *Myrsidea* were less frequent, with mean intensity 3.4 lice per bird in Costa Rica and Peru (n = 9; intensity range 1–7 lice). Ischnoceran lice of the genus *Brueelia* were found only on one bird in Paraguay (Table 1).

No lice were found on *Cantorchilus modestus* (Cabanis, 1860) (7 birds examined), *C. thora-cicus* (Salvin, 1865) (1), *Henicorhina leucophrys* (Tschudi, 1844) (11), *H. leucosticta* (Cabanis, 1847) (7), *Pheugopedius atrogularis* (Salvin, 1865) (2), *Thryophilus rufalbus* Lafresnaye, 1845 (15), *Thryorchilus browni* (Bangs, 1902) (5), *Troglodytes ochraceus* Ridgway, 1882 (1), all from Costa Rica; nor on *Cantorchilus guarayanus* (d'Orbigny & Lafresnaye, 1837) (2), from Paraguay.

A total of seven host-lice associations were found. Two ischnoceran lice species were identified as previously described species – *Brueelia anamariae* Cicchino, 1980 and *Penenir-mus albiventris* (Scopoli, 1763). Contrary to Cicchino (1980) we were able to compare

*P. albiventris* from both hosts – *Troglodytes troglodytes* (Linnaeus, 1758) and *Troglodytes aedon* Vieillot, 1809. Differences between *P. albiventris* from these two hosts are described below. Four wren-*Myrsidea* associations were found: *M. myiobori* Kounek & Sychra, 2011 previously described from *Myioborus miniatus* (Swainson, 1827) from family Parulidae is redescribed from *Troglodytes aedon*; another *Myrsidea* represents new species which is described below; and two other were determined at the generic level only, because they were represented by nymphs only.

## Species descriptions

### *Myrsidea fasciata* Sychra & Kounek sp. nov.

(Figs 1, 2A–B)

**Type host.** *Campylorhynchus fasciatus* (Swainson, 1838) – Fasciated cactus-wren.

**Type locality.** Peru, Cascay near Huanuco, 1845 m a.s.l., 9°50'S, 76°80'W.

**Type material.** HOLOTYPE: ♀ (MMBC), labelled 'O. Sychra PE01 / *Myrsidea fasciata* / Sychra & Kounek sp. nov. / HOLOTYPE (red) // *Campylorhynchus fasciatus* / PERÚ: Cascay / near Huanuco / 20.viii.2011 / Literák leg.'. PARATYPES: 3 ♀♀ 3 ♂♂, same label data as holotype except 'O. Sychra PE01–05'.

**Description. Female** (n = 4). As in Figs 1A and 2A. Hypopharyngeal sclerites weakly developed (Fig. 1B). Length of dorsal head seta (DHS) 10, 0.070–0.090; DHS 11, 0.095–0.100; ratio DHS 10/11, 0.70–0.90. Gula with 5–6 setae on each side. Metasternal plate with 5–6 setae; metanotum not enlarged, with 11–12 marginal setae (all setae are counted). First tibia with 3 outer lateral ventral and 4 dorsal setae. Femur III with 19–20 setae in ventral setal brush.

Tergites not enlarged, tergites II–IV with a slightly convex medioposterior margin each (Fig. 1C). Tergal setae with median gap in each row, and setal numbers as follows (postspiracular setae and short associated setae are included): tergite I, 12–15; II, 17–19; III, 17–18; IV, 16–19; V, 18–20; VI, 17–20; VII, 14–16; VIII, 8–9. Postspiracular setae very long on II, IV, VII and VIII (0.45–0.50); long on VI (0.33–0.43) as well as on I and III (0.26–0.32); short on V (0.13–0.19). Sternal setae: II, 5–6 in each aster, 16–20 marginal setae between asters, 4–6 anterior; III, 25–31; IV, 39–43; V, 35–41; VI, 26–34; VII, 17–20; VIII–IX, 22–27 including 11–14 setae on deeply serrated vulval margin; without medioanterior setae on sternites III–VII. Inner posterior seta of last tergum not longer than anal fringe setae with length 0.06–0.08; length of short lateral marginal seta of last tergum, 0.04–0.05. Anal fringe formed by 36–40 setae on both dorsal and ventral side. Dimensions: TW, 0.45–0.49; HL, 0.29–0.32; PW, 0.32–0.33; MW, 0.45–0.51; AW, 0.73–0.74; ANW, 0.29; TL, 1.59–1.74.

**Male** (n = 3). As in Fig. 2B. Length of DHS 10, 0.070–0.080; DHS 11, 0.100; ratio DHS 10/11, 0.70–0.80. Gula with 5–7 setae on each side. Metanotum with 7–9 setae on posterior margin. Femur III with 14–18 setae in ventral setal brush.

Tergal setae with median gap in each row, and setal numbers as follows: tergite I, 11–12; II, 16; III, 16–17; IV, 17–19; V 17–20; VI 16–18; VII, 14–19; VIII, 10–11. Postspiracular setae very long on II, IV (0.45–0.48); long on VII (0.40); shorter on I, III and VI (0.21–0.26); and short on V (0.11–0.14). Sternal setae: II, 5–6 in each aster, 16–18 marginal setae between asters, 6–8 anterior; III, 23–27; IV, 31–36; V, 39–40; VI, 30–31; VII, 20; VIII, 10–11, without medioanterior setae. Genital sac sclerite with a slender subapical projection on each side, a

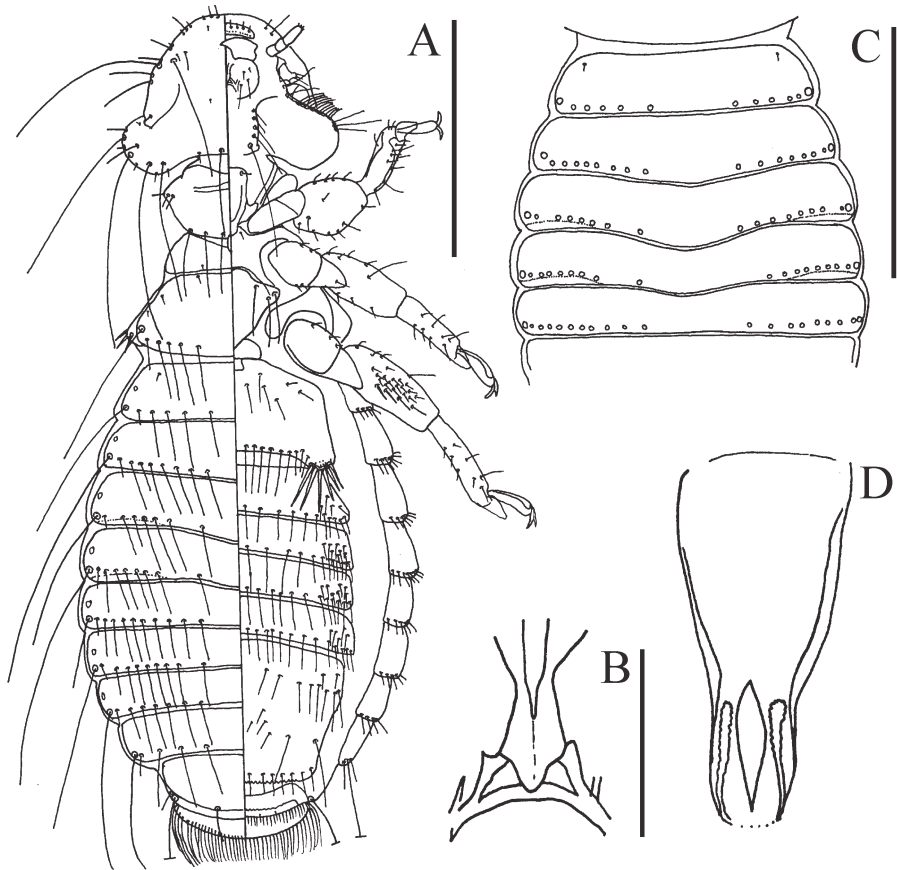


Fig. 1. *Myrsidea fasciata* Sychra & Kounek, sp. nov.: A – dorso-ventral view of female; B – hypopharyngeal sclerites; C – dorsal view of tergites I–V of female; D – male genital sac sclerite. Scales: A, C = 0.50 mm; D = 0.10 mm; B = 0.05 mm.

straight or slightly convex posterior margin (not well visible on all males examined), and with a short, dark medioposterior line (Fig. 1D). Dimensions: TW, 0.43–0.45; HL, 0.27–0.29; PW, 0.29–0.31; MW, 0.39–0.41; AW, 0.56–0.58; TL, 1.39–1.48; GW, 0.13; GSL, 0.10–0.11.

**Differential diagnosis.** Its weakly developed hypopharyngeal sclerites place *M. fasciata* close to *M. whitemani* Price, Johnson & Dalgleish, 2008a from *Campylorhynchus rufinucha* (Lesson, 1838) and *M. faccioae* Valim & Weckstein, 2013 from *Cyphorhynchus arada* (Hermann, 1783). Females of *M. fasciata* can be separated from those of *M. whitemani* by their smaller number of setae on tergites VI–VII (together 31–36 vs. 39–42) and sternites IV–V (together 74–84 vs. 99–111), shorter postspiracular seta V (0.13–0.19 vs. 0.35) and smaller temple width (0.45–0.49 vs. 0.51–0.53). Males of *M. fasciata* can be separated from those of *M. whitemani* by their larger number of setae on tergite VIII (10–11 vs. 8), smaller number of setae on sternite IV (31–36 vs. 40–42) and smaller temple width (0.43–0.45 vs. 0.46–0.47).

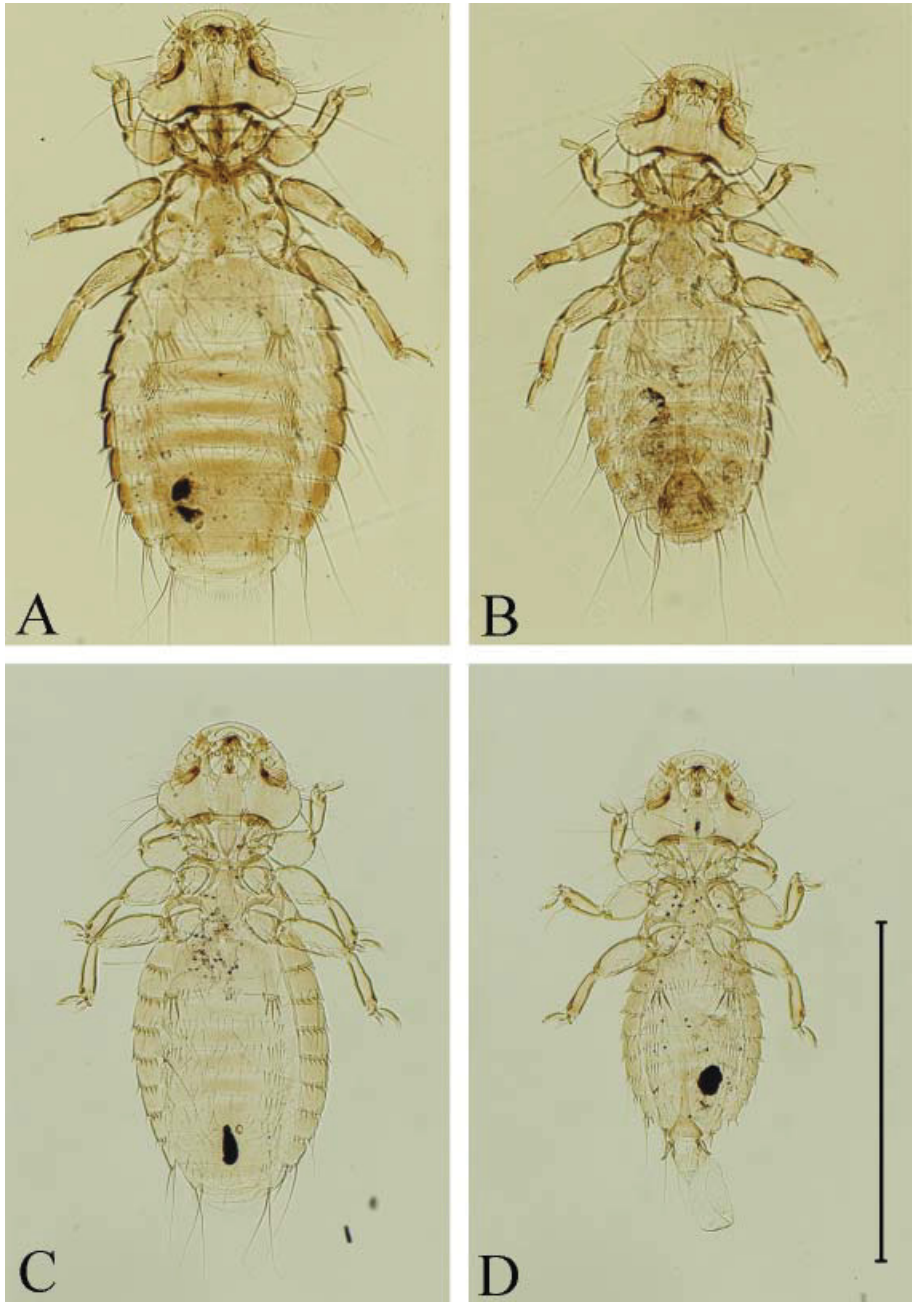


Fig. 2. A–B – *Myrsidea fasciata* Sychra & Kounek, sp. nov. (A – holotype female; B – paratype male). C–D – *Myrsidea myiobori* Kounek & Sychra, 2011 from *Troglodytes aedon* (C – female; D – male). Scale bar: 1 mm.

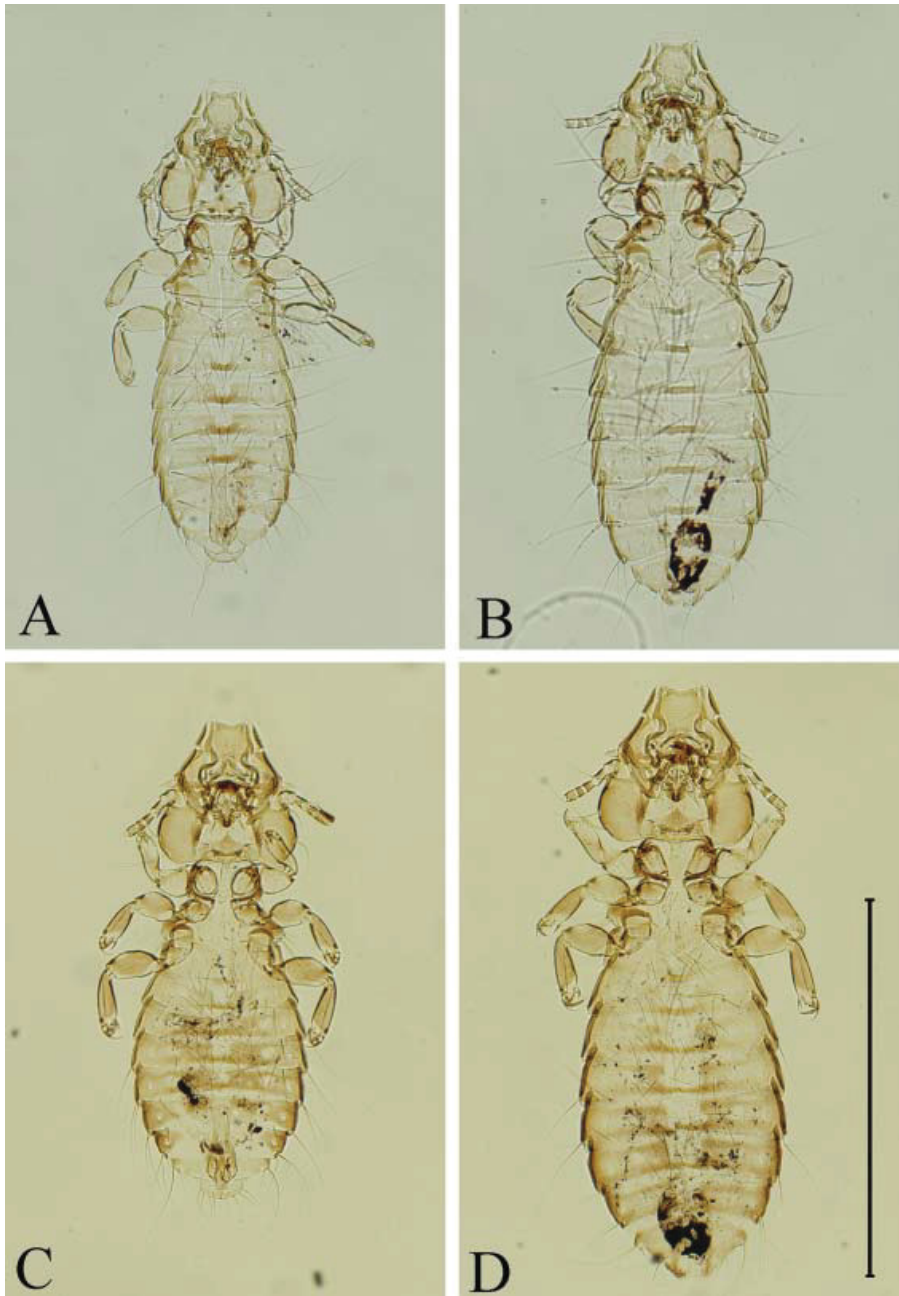


Fig. 3. A–B – *Penenirmus albiventris* (Scopoli, 1763) from *Troglodytes troglodytes* from Slovakia (A – male; B – female). C–D – *P. albiventris* (Scopoli, 1763) from *T. aedon audax* from Peru (C – male; D – female). Scale bar: 1 mm.



Females of *M. fasciata* can be separated from those of *M. faccioae* by their tergites III–IV having a slightly convex medioposterior margin (vs. straight in *M. faccioae*), larger DHS 10/11 ratio (0.70–0.80 vs. 0.42–0.46), smaller number of setae on tergite III–IV (together 33–37 vs. 40–41, including postspiracular setae and short associated setae) and sternite VII (17–20 vs. 29). Males of *M. fasciata* can be separated from those of *M. faccioae* by their smaller number of setae on tergite V (17–20 vs. 22–23) and sternite VII (20 vs. 29), as well as by a larger temple width (0.43–0.45 vs. 0.41).

A portion of the mitochondrial cytochrome oxidase I (*COI*) gene of *Myrsidea fasciata* was sequenced, indicating that the species is highly differentiated (p-distance exceeding 17.5 % in all cases) from other Neotropical *Myrsidea*.

**Etymology.** From Latin adjective *fasciatus* (-a, -um) = banded. The species name is derived from the species name of the type host.

**Host.** *Myrsidea fasciata* sp. nov. is the first louse species recorded from *Campylorhynchus fasciatus*.

### *Myrsidea myiobori* Kounek & Sychra, 2011

(Figs 2C–D)

*Myrsidea myiobori* Kounek & Sychra, 2011b: 58, Figs 5–8.

**Type host.** *Myioborus miniatus* (Swainson, 1827) – Slate-throated redstart

**Material examined.** 1 ♀ 1 ♂, ‘O.Sychra CR225 / *Myrsidea myiobori* / Kounek & Sychra, 2011 / det. O.Sychra // *Troglodytes aedon intermedius* / COSTA RICA / Tapanti National Park / Sector Tapanti / 11.viii.2009 / Literák & Sychra leg.’

**Variability.** Our specimens differ slightly from the description of *M. myiobori* in KOUNEK et al. (2011b) by setal counts and dimensions as follows [setal counts and dimensions in KOUNEK et al. (2011b) are in parentheses: setal counts and dimensions that are fully consistent with this description are not repeated here]:

**Female** (n = 1). As in Fig. 2C. Length of DHS 11, 0.100–0.110 (0.110); ratio DHS 10/11, 0.27–0.30 (0.27). First tibia with 3 (3) outer lateral ventral and 4 (4) dorsal setae (setal counts on legs are not mentioned in the description of *M. myiobori*, hence we added here the same numbers). Femur III with 14 (15–17) setae in ventral setal brush.

Tergal setae counts: I, 9 (10); II, 15 (17); III, 19 (18); IV, 20 (18); V, 21 (19); VI, 18 (19); VII, 18 (15); VIII, 14 (11). Postspiracular setae very long, 0.46–0.48 (0.37–0.43) on II, IV and VIII; long, 0.21–0.23 (0.16) on VII; short, 0.15–0.18 (0.12–0.13) on III, V and VI. Postspiracular setae I are missing. Sternal setae: III, 24 (21); IV, 30 (32); V, 32 (35); VI, 31 (33); VIII–IX, 22 (21) including 13 (12) setae on deeply serrated vulval margin. Inner posterior seta of last tergum not longer than anal fringe setae with length 0.05–0.06 (0.04–0.05). Anal fringe formed by 41 (40) dorsal and 38 (37) ventral setae. Dimensions: TW, 0.44 (0.45); PW, 0.29 (0.28); MW, 0.44 (0.42); AW, 0.60 (0.54); ANW, 0.22 (0.24); TL, 1.50 (1.46).

**Male** (n = 1). As in Fig. 2D. Length of DHS 10, 0.035 (0.030); ratio DHS 10/11, 0.35 (0.30). Metasternal plate with 7 (6) setae; metanotum with 9 (10) setae on posterior margin. Femur III with 12–14 (10–12) setae in ventral setal brush.

Tergal setae counts: I, 8 (11); II, 16 (16–17); III, 15 (18); IV, 16 (17–18); V 17 (18); VI 17 (16–17); VII, 12 (14–15); VIII, 11 (11–12). Postspiracular seta I 0.20 long (0.22–0.24).

Sternal setae: III, 21 (20); IV, 24 (23–24); V, 30 (27); VI, 28 (22–26); VII, 15 (18); VIII, 8 (7). Genital sac sclerite distorted, but it appears to be of the same type as that of *M. myiobori*, although the genital sac sclerite of the single paratype male of this species is also distorted (KOUNEK et al. 2011b: Fig. 8) Dimensions: TW, 0.40 (0.39–0.40); AW, 0.44 (0.42–0.43); GW, 0.11 (0.10); GSL, 0.10 (0.07).

**Bionomics.** Although CICCINO (1980) mentioned *Myrsidea* sp. from *T. aedon* from Argentina, this is the first species determination of a *Myrsidea* from this host. This louse was originally described from *Myioborus miniatius* (Swainson, 1827) belonging to family Parulidae from Costa Rica (KOUNEK et al. 2011b). Our finding represents interesting case of natural host switching and another record of one species of *Myrsidea* from two unrelated host families.

### *Penenirmus albiventris* (Scopoli, 1763)

(Figs 3–5)

*Pediculus albiventris* Scopoli, 1763: 385.

*Docophorus troglodytis* Waterston, 1915: 27, fig. F.

*Degeeriella longuliceps* Blagoveshtchensky, 1940: 65, fig. 19.

*Penenirmus albiventris* (Scopoli, 1763); CLAY & HOPKINS (1951): 28, figs 38–40.

**Type host.** *Troglodytes troglodytes* (Linnaeus, 1758) – Eurasian wren

**Material examined:** 6 ♀♀ 3 ♂♂ (O. Sychra CZ110–112), ex *Troglodytes troglodytes troglodytes*, CZECH REPUBLIC: Čerták (49°34'N, 17°59' E, 400 m a.s.l.); 3. and 15.v.2007, Sychra and Literák leg. (MMBC); 10 ♀♀, 10 ♂♂, (O.Sychra PE06–15), ex *Troglodytes aedon audax*, PERU: Pantanos de Villa, Lima (12°13' S, 76°59' W; at sea level), 20–22.vii.2011, Literák leg. (MMBC).

**Variability.** WATERSTON (1915) provided a very detailed description of this species under the name *Docophorus troglodytis* from *Troglodytes troglodytes borealis* Fischer, 1861 from the Faroe Islands, including four figures. Subsequently, CLAY & HOPKINS (1951) briefly reviewed the main characters of the species described as *Pediculus albiventris* by SCOPOLI (1763), added three more figures, including male genitalia, and designated a neotype. Recently, CICCINO (1980) reported this species on one *T. aedon bonariae* Hellmayr, 1919 in Argentina. He wrote that his material was similar to the description by CLAY & HOPKINS (1951) and presented only a figure of male genitalia.

We contribute detailed figures of this species (Figs 3–5). We found two minor differences between samples from different host species: (1) number of setae on the metanotum, 14 on specimens from *T. troglodytes* and 16–17 on specimens from *T. aedon*; (2) number of posterocentral setae on the female tergite VIII, 4 on specimens from *T. troglodytes* but only 2 on specimens from *T. aedon*. Also, our specimens differ slightly from the description and redescription of *P. albiventris* presented by WATERSTON (1915) and CLAY & HOPKINS (1951) respectively, thus increasing knowledge of the intraspecific morphological variability of this species from different geographic areas. Our setal counts and dimensions are as follows [setal counts and dimensions mentioned by WATERSTON (1915) and CLAY & HOPKINS (1951) are given in parentheses and separated by a semicolon, respectively. The nomenclature of head setae follows that proposed by CLAY (1951)]:

**Czech Republic. Male** (n = 3). As in Figs 3A and 4A. Head with postantennal suture, with one post-nodal and three post-temporal setae on each side, all of them short and spine-like (Fig. 5A). Marginal temporal setae 1 and 3 long, other marginal temporal setae short.

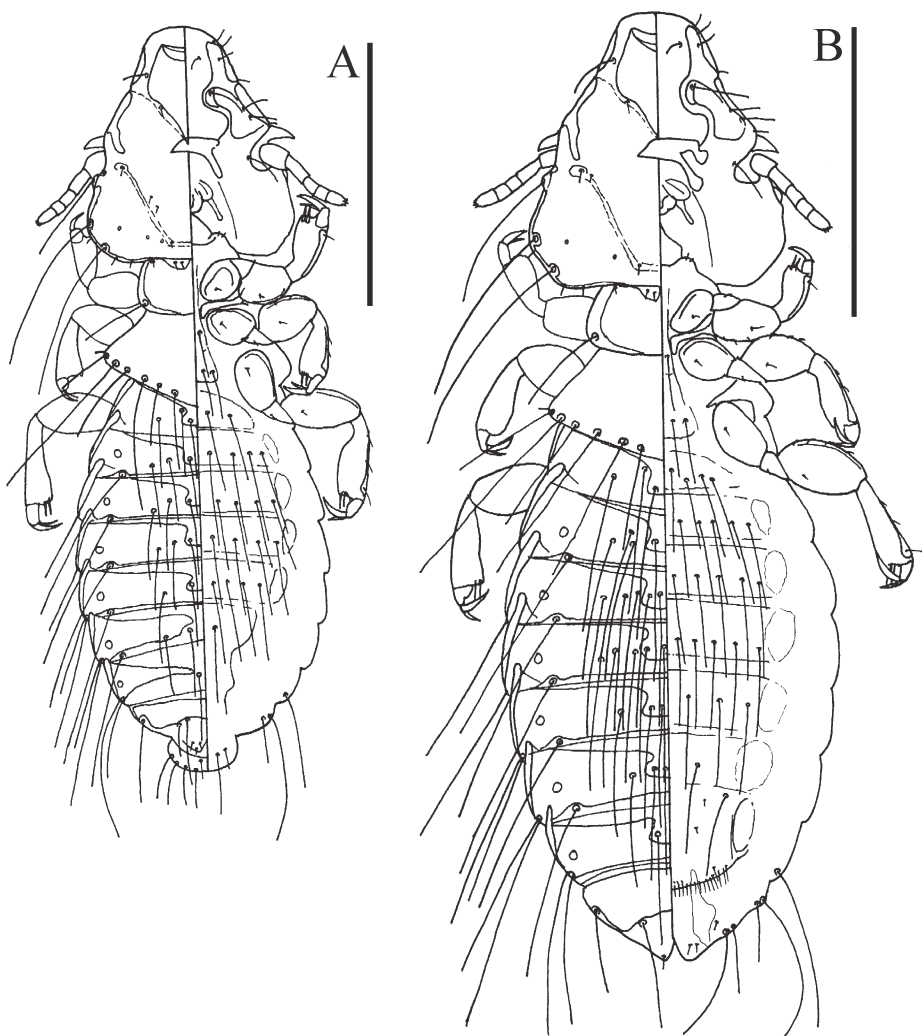


Fig. 4. *Penenirmus albiventris* (Scopoli, 1763). A – male; B – female. Scales: A, B = 0.50 mm.

Anterior dorsal setae of forehead shorter than the distance between them. Dorsal anterior head plate as in Fig. 5A.

Metanotum and metapleurite with an almost continuous row of 7 evenly spaced setae on each side (outmost lateral short metapleural seta included). Mesosternal plate with 2 setae, metasternal plate with 4 setae.

Tergites II–VI with anterior median notches, joined by a narrow posterior pigmented strip. Postspiracular setae on tergites III–VII long (0.28–0.33). Posteroventral tergal setae: II, 5–6 (6); III, 6–7 (8); IV, 6–7 (7–8); V, 6–7 (6–7); VI, 4–5 (5–7); VII, 2–3 (4); VIII, 2 (2); IX, 4–6

(6). Sternites lightly sclerotized with almost inconspicuous lateral plates. Sternal setae: II, 5–6 (6; 6); III, 9 (8–12; 8); IV, 10 (8–12; 8); V, 8–9 (8–12; 8); VI, 7–8 (8–12; 6); VII, 2 (2; 2). Paratergal setae: II–III, 0 (0); IV–V, 1 (1); VI–VII, 2 (2); VIII–IX, 3 (3). Genitalia as in Fig. 5C with basal sclerites on the penis.

Dimensions: TW, 0.35–0.37 (0.371; 0.37); HL, 0.39–0.40 (0.414; 0.42); PW, 0.20 (0.214; 0.20); MW, 0.32 (0.328; 0.33); AW, 0.41 (0.471; 0.45); TL, 1.35–1.39 (1.24–1.33; 1.33).

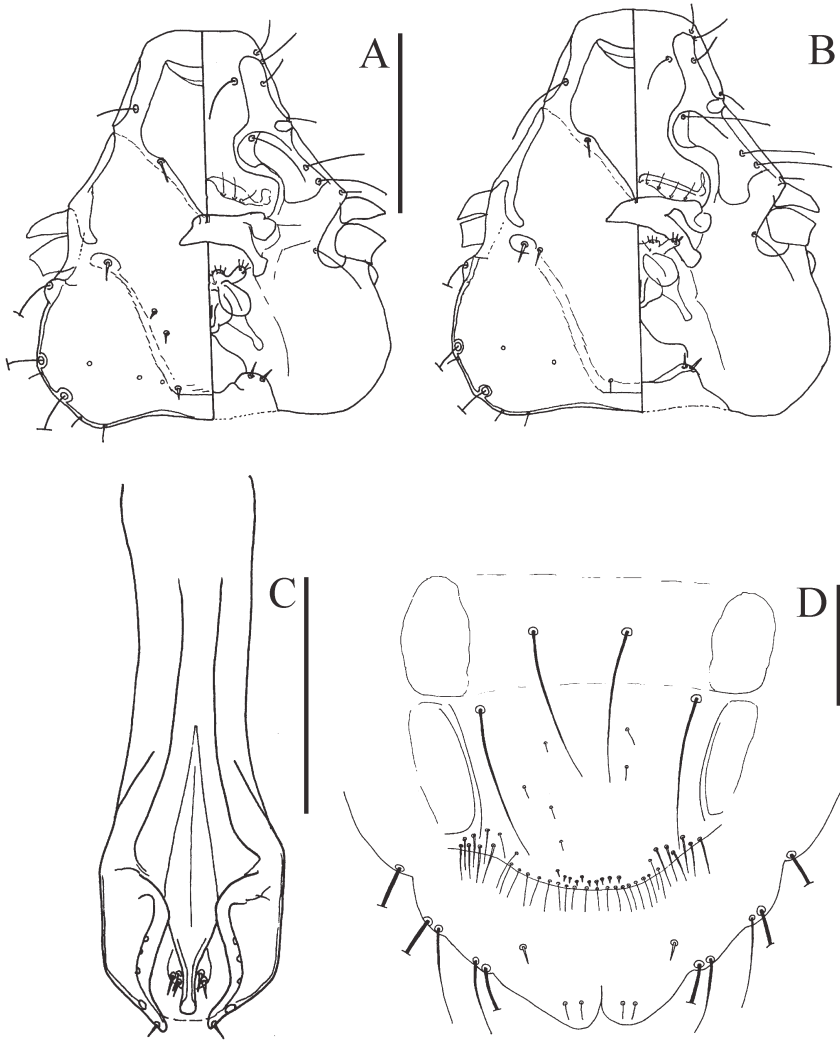


Fig. 5. *Penenirmus albiventris* (Scopoli, 1763). A – dorso-ventral view of head of male; B – dorso-ventral view of head of female; C – male genitalia; D – ventral view of female terminalia. Scales: A, B = 0.20 mm, C, D = 0.10 mm.

**Female** (n = 6). As in Figs 3B and 4B. As for male, except as follows: Head with only one short spine-like post-temporal setae on each side (Fig. 5B).

Tergites II–VIII with anterior median notches. Postspiracular setae 0.31–0.37 long. Postero-central tergal setae: II, 6 (6; 8); III, 5–8 (6–7; 10); IV, 7–10 (6–7; 10); V, 6–9 (6–7; 10); VI, 6–8 (6–7; 8); VII, 6–7 (6–7; 6); VIII, 4 (4; 4); IX, 2 (6; 2). Sternal setae: II, 6 (6); III, 7–10 (8–12); IV, 8–11 (8–12); V, 8–9 (8–12); VI, 7–9 (8–12); VII, 2 (0); VIII, 2 (0). Subvulval sclerites well-developed. Ventral terminalia as in Fig. 5D; subgenital plate wide and slightly convex posteriorly, with 25–30 fine and 8–10 very short spine-like setae.

Dimensions: TW, 0.38–0.39 (0.407; 0.45); HL, 0.41–0.42 (0.471; 0.48); PW, 0.20–0.21 (0.228; 0.25); MW, 0.43 (0.371; 0.40); AW, 0.50–0.51 (0.585; 0.63); TL, 1.58–1.61 (1.6; 1.85).

**Peru. Male** (n = 10). As in Fig. 3C. Identical to specimens from the Czech Republic except as follows: Metanotum and metapleurite with an almost continuous row of 8 evenly spaced setae on each side (less often 9 on one side). The most lateral short metapleural seta is also included. Metasternal plate with 4–6 setae.

Postspiracular setae 0.30–0.38 long. Postero-central tergal setae: II, 6–7 (6); III, 6–7 (8); IV, 6–7 (7–8); V, 6–7 (6–7); VI, 4–6 (5–7); VII, 2–4 (4); VIII, 2 (2); IX, 2–4 (6). Sternal setae: II, 4–7 (6; 6); III, 8–11 (8–12; 8); IV, 8–10 (8–12; 8); V, 7–9 (8–12; 8); VI, 6–8 (8–12; 6); VII, 2 (2; 2).

Dimensions: TW, 0.38–0.39 (0.371; 0.37); HL, 0.42–0.43 (0.414; 0.42); PW, 0.21–0.22 (0.214; 0.20); MW, 0.34–0.35 (0.328; 0.33); AW, 0.49 (0.471; 0.45); TL, 1.34–1.35 (1.24–1.33; 1.33).

**Female** (n = 10). As in Fig. 3D. Postspiracular setae 0.37–0.40 long. Postero-central tergal setae: II, 6–8 (6; 8); III, 7–9 (6–7; 10); IV, 7–10 (6–7; 10); V, 6–9 (6–7; 10); VI, 6–8 (6–7; 8); VII, 4–7 (6–7; 6); VIII, 2 (4; 4); IX, 2 (6; 2). Sternal setae: II, 6–8 (6); III, 8–10 (8–12); IV, 8–11 (8–12); V, 8–11 (8–12); VI, 7–10 (8–12); VII, 2 (0); VIII, 2 (0). Subgenital plate with 33–37 fine and 10–13 very short spine-like setae.

Dimensions: TW, 0.38–0.45 (0.407; 0.45); HL, 0.45–0.46 (0.471; 0.48); PW, 0.23 (0.228; 0.25); MW, 0.43–0.44 (0.371; 0.40); AW, 0.57–0.59 (0.585; 0.63); TL, 1.63–1.68 (1.6; 1.85).

## Discussion

The Troglodytidae (wrens) is essentially a New World family, most diverse in Central America and north-western South America, with only one species, the Eurasian Wren (*Troglodytes troglodytes*), having escaped to the Old World (KROODSMA & BREWER 2005). To date, five genera of chewing lice have been reported from members of the Troglodytidae: *Brueelia*, *Menacanthus*, *Myrsidea*, *Penenirmus* and *Philopterus*. Each genus shows an interesting geographic distribution (Appendix 1).

The most diverse genus is *Myrsidea*, with six species described from seven species of wrens occurring in the Neotropical Region (see Key to species and Appendix 1, below). The only exception is *Myrsidea troglodyti* (Denny, 1842), described from *Troglodytes troglodytes* from Britain. However, as shown by PRICE et al. (2008a), the type series used by DENNY (1842) for

*M. troglodyti* is composed of just four immatures. In our opinion, it is questionable whether this is really a valid species and even whether *T. troglodytes* is a true host of this louse, because there exists no other reliable evidence of the presence of any *Myrsidea* on this host except for the original description of *M. troglodyti*, even though this bird is widely distributed in the Palearctic Region and has been examined for lice by a number of phthirapterists (WATERSTON 1915; BLAGOVESHCHENSKY 1940, 1951; BALÁT 1958, 1977; PRICE 1977; ŻŁOTORZYCKA 1977; RÉKASI 1993; HACKMAN 1994; KRAVTSOVA 1998; MEY 2004; PALMA & JENSEN 2005; ADAM 2008; DIK et al. 2011; LYAKHOVA & KOTTI 2011). On the other hand, our results show, in agreement with PRICE et al. (2008a), that both the intensity of infestation as well as the prevalence of *Myrsidea* on wrens are usually low.

To date, mitochondrial *COI* genes for three of the six species of *Myrsidea* from wrens have been analysed (PRICE et al. 2008a, VALIM & WECKSTEIN 2013, this paper). Analyses of partial sequences of the mitochondrial *COI* gene indicate that each of those three species is highly differentiated from the others as well as from other species of Neotropical *Myrsidea* that have been sequenced (Fig. 6). Genetic divergences measured by p-distances between each of those three species and other Neotropical species of *Myrsidea* exceeded 17.5 % in all cases.

The phylogenetic relationships among species of *Myrsidea* do not reflect host phylogeny (Fig. 6), but there is an apparent geographic relationship (BUETER et al. 2009, PRICE & JOHNSON 2009, VALIM et al. 2011, VALIM & WECKSTEIN 2013). As shown by the case of *M. myiobori* from *Troglodytes aedon* from Tapanti, Costa Rica, host-switching between different host species is possible at one location between birds with similar behaviour and ecology (see also WECKSTEIN 2004). *Troglodytes aedon* as well as *Myioborus miniatus*, the type host of *M. myiobori*, build their nests on or near the ground, often in a cavity or sunk into a steep embankment (KROODSMA & BREWER 2005, CURSON 2010). An open question remains about the original host of *M. myiobori* because, in both cases, only one bird was found parasitised with adult lice: *Troglodytes aedon* on 7 August 2009 with 2 males, 1 female and 4 nymphs, and *Myioborus miniatus* on 11 August 2009 with 2 males, 1 female and 2 nymphs (KOUNEK et al. 2011b). Since these birds were examined in two different days, and also nymphs were found on them, we believe this is a true case of natural host-switching. Unfortunately, the male of *Myrsidea* from *T. aedon* from Las Tablas was used for molecular analysis and was destroyed during the process. This specimen, named as *Myrsidea* sp. in this study, is genetically similar to *M. oleaginei* Price, Hellenthal & Dalgleish, 2005 from *Mionectes oleagineus* (Lichtenstein, 1823) (VALIM & WECKSTEIN 2013), suggesting a possible conspecificity (Fig. 6, p-distance = 5.1 %). We examined only one *M. oleagineus* in Las Tablas (bird no. LT48) and found no lice, but it was on the same day when we collected the aforementioned male of *Myrsidea* sp. as the only louse from *T. aedon* (bird no. LT51). Therefore, we cannot be sure if the single male collected from *T. aedon* is either the result of contamination while collecting or another example of natural host-switching from *M. oleagineus*.

In the genus *Brueelia*, there is only one species described from wrens: *B. anamariae* Cicchino, 1980. To date, this species is known only from *Troglodytes aedon* from Argentina (CICCHINO 1980) and Paraguay (Table 1).

By contrast, chewing lice of the genus *Menacanthus* are known mainly from wrens in the Nearctic Region (Appendix 1) with only one species (*M. tenuifrons* Blagoveshtchensky,



Fig. 6. Phylogenetic tree of the Neotropical *Myrsidea* species based on partial *COI* sequences. The tree was inferred using the maximum likelihood method based on the GTR+G model. The tree with the highest log likelihood is shown. Bootstrap support is shown next to the branches (values <50 % not shown). The tree is drawn to scale, with branch lengths measured in the number of substitutions per site. *Myrsidea* from the troglodytid birds are labelled with a black square.

1940) having escaped supposedly to the Old World with its host, *Troglodytes troglodytes*. There is a record of this louse from Azerbaijan (BLAGOVESHCHENSKY 1940), one from the Shetland Islands, a subarctic archipelago off Scotland (PRICE 1977), and another from the Faroe Islands (PALMA & JENSEN 2005).

The distribution of *Philopterus* species from wrens is similar to that of *Menacanthus*, with one species, *P. mirus* (Kellogg & Chapman, 1899), recorded in the Nearctic Region (KELLOGG & CHAPMAN 1899, PETERS 1936) and another species, *P. troglodytis* Fedorenko, 1986, recorded in the eastern part of the Palaearctic Region (FEDORENKO 1986). However, the descriptions of those two species are poor and a revision of their status is necessary.

A remarkably disjunct distribution is observed in the case of *Penenirmus albiventris*. It is the most common louse on *T. troglodytes*, especially in the western Palaearctic Region (Appendix 1) and, unlike *Myrsidea*, it shows a high prevalence. For example, BALÁT (1955) recorded a prevalence of about 30 %, and we measured a prevalence of 29–57 % and a mean intensity

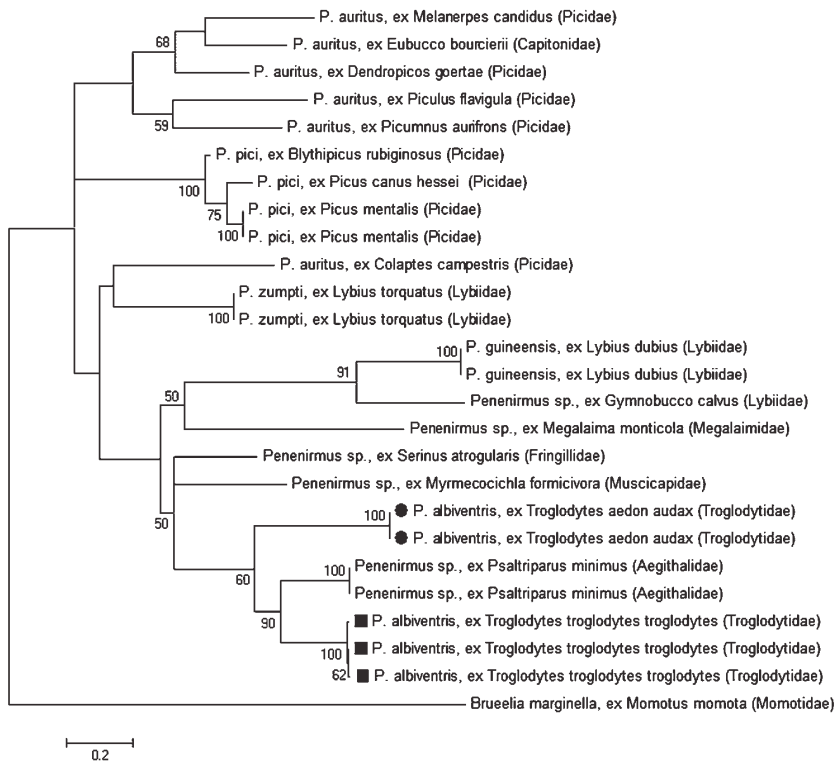


Fig. 7. Phylogenetic tree of the *Penenirmus* species based on partial *COI* sequences, inferred using the maximum likelihood method based on the GTR+G model. The tree with the highest log likelihood is shown. Bootstrap support is shown next to the branches (values < 50 % not shown). The tree is drawn to scale, with branch lengths measured in the number of substitutions per site. *Penenirmus albiventris* sequences from Slovakia are marked with black squares, and *P. albiventris* sequences from Peru are marked with black circles.



9–49.5 lice per bird. Also, *P. albiventris* was found in the Neotropical Region on *T. aedon* in Argentina (CICCHINO 1980) and Peru (this paper). Moreover, CARRIKER (1956) mentioned a *Penenirmus* from *T. aedon* from Colombia as being very similar to *P. albiventris*.

Sequences of a 378 bp portion of the mitochondrial *COI* gene (GenBank accession numbers KF614516–KF614519) were obtained for three specimens of *P. albiventris* from *T. troglodytes* from Slovakia and two specimens from *T. aedon* from Peru. The Peruvian sequences were identical, while the divergence among the Slovakian samples ranged from 1.1 % to 1.9 %. The net average distance between these two lineages was 18.8 %. In comparison with other known sequences of *Penenirmus*, the closest was *Penenirmus* sp. from *Psaltriparus minimus* (Townsend, 1837) from the United States (JOHNSON et al. 2002a) at 16.1 % (Slovakia) and 21.7 % (Peru) (Fig. 7). Despite these relatively large genetic divergences, the morphological similarity of the specimens justifies the conspecific status of *Penenirmus* from the two different species of wren. This is in agreement with JOHNSON et al. (2001), who found that individuals of the same species of *Penenirmus* from different host species showed remarkable levels of divergence in *COI* sequences (7.6–28.7 %). Therefore, considering the distances given above, the *Penenirmus* sp. from *Psaltriparus minimus* should be identified as *P. albiventris* as well.

Phylogenetic tree of *Penenirmus* (Fig. 7) clearly documents the divergence of *P. albiventris* from two different hosts. Furthermore, it confirmed the results of JOHNSON et al. (2001) that the species from passerines form a monophyletic group.

*Troglodytes troglodytes* and *T. aedon* probably inherited *P. albiventris* from their common ancestor at least 13 MY BP in the Nearctic Region, where they are still sympatric (DROVETSKI et al. 2004, KROODSMA & BREWER 2005). *Penenirmus* lice would have transferred to the Old World with its host ca. 1 MY BP (DROVETSKI et al. 2004). If that scenario is correct, it is remarkable that there is no record of *P. albiventris* from the Nearctic Region yet. While MALCOMSON (1960) and EMERSON (1972) listed *P. albiventris* only as possible species because of the occurrence of its host in the Nearctic Region, KEIRANS (1967) wrote that there are no data on this species and that he had been unable to find any records in United States collections. On the other hand, there are some records of *Philopterus subflavescens* (Geoffroy, 1762) from *T. aedon* from Canada and the United States (PETERS 1936, BROWN & WILK 1944) that may in fact refer to *P. albiventris* (see Remarks under this species in Appendix 1). Our records agree with JOHNSON et al. (2001), who showed that some species of *Penenirmus* occur on several host species throughout the world. Alternatively, records of lice from wrens of the genus *Troglodytes* show that different subspecies of a widespread host can harbour different species of lice (see Appendix 2).

### Key to the species of *Myrsidea* parasitic on Neotropical wrens

1. Hypopharyngeal sclerites weakly developed (Fig. 1B). ..... 2
- Hypopharyngeal sclerites well-developed or only slightly reduced. .... 4
2. Postspiracular seta VI at least 0.35 long. *Female*: TW at least 0.51, tergites VI–VII together with at least 39 setae, sternites IV–V together with at least 99 setae. *Male*: TW at least 0.46, tergite VIII with only 8 setae, sternite IV with at least 40 setae. ....
- ..... *Myrsidea whitemani* Price, Johnson & Dalglish, 2008

- Postspiracular seta VI less than 0.26 long. *Female*: TW less than 0.49, tergites VI–VII together with less than 36 setae, sternites IV–V together with less than 84 setae. *Male*: TW less than 0.45, tergite VIII with at least 10 setae, sternite IV with less than 36 setae. .... 3
- 3. Ratio DHS 10/11 less than 0.50, sternite VII with 29 setae. *Female*: tergites III–IV with straight posterior margin, tergites III–IV together with at least 41 setae. *Male*: TW 0.41, tergite V with at least 22 setae. .... *Myrsidea faccioae* Valim & Weckstein, 2013
- Ratio DHS 10/11 at least 0.70, sternite VII with less than 20 setae. *Female*: tergites III–IV with slightly convex medioposterior margin (Fig. 1C), tergites III–IV together with less than 37 setae. *Male*: TW at least 0.43, tergite V with less than 20 setae. .... *Myrsidea fasciata* Sychra & Kounek **sp. nov.**
- 4. Tergites VII–VIII together with less than 18 setae; female with tergite I enlarged, medio-posteriorly convex. .... *Myrsidea bessae* Price, Johnson & Dalgleish, 2008
- Tergites VII–VIII together with at least 25 setae; female tergites different. .... 5
- 5. *Male*: TW less than 0.40, postspiracular seta VII short, as long as V and VI (less than 0.18). *Female* with tergites II and III with a pronounced medioposterior convexity. .... *Myrsidea myiobori* Kounek & Sychra, 2011
- *Male*: TW 0.43, postspiracular seta VII extremely long, as long as VIII (at least 0.40). *Female* unknown. .... *Myrsidea vincesmithi* Price, Johnson & Dalgleish, 2008

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**APPENDIX 1.**  
**Updated list of chewing lice from wrens (Troglodytidae)**  
**with their geographic distribution.**

Numbers in square brackets [ ] indicate reports. The taxonomy of *Troglodytes aedon* complex follows that in CLEMENTS et al. (2012).

**Suborder Amblycera Kellogg, 1896**  
 Family Menoponidae Mjöberg, 1910

**Genus *Menacanthus* Neumann, 1912**

***Menacanthus aedonis* Price, 1977**

**Reports.** [1] PETERS (1936: 20); [2] BROWN & WILK (1944: 127); [3] PRICE (1977: 215).

**Hosts.** *Thryomanes bewickii* (Audubon, 1827) – Mexico [3], USA [3]; *Troglodytes aedon* Vieillot, 1809 [*aedon* group] – Canada [3]: Alberta [2], USA: Maryland [3], New York [1, 3].

**Remarks.** PETERS (1936) and BROWN & WILK (1944) mentioned *Menopon* sp. and *Menacanthus* sp., respectively. In our opinion, these records refer most likely to *M. aedonis*, but an examination of specimens is necessary to make a definite identification.

***Menacanthus obsoleti* Price, 1977**

**Report.** [1] PRICE (1977: 215).

**Host.** *Salpinctes obsoletus* (Say, 1823) – USA: Idaho, Utah [1].

***Menacanthus tenuifrons* Blagoveshtchensky, 1940**

**Reports.** [1] BLAGOVESHCHENSKY (1940: 37); [2] PRICE (1977: 217); [3] PALMA & JENSEN (2005: 53); [4] RÉKASI (1993: 87); [5] ADAM (2008: 366).

**Hosts.** *Cistothorus palustris* (Wilson, 1810) – USA [2]; *C. platensis* (Latham, 1790) – USA [2]; *Troglodytes troglodytes borealis* Fischer, 1861 – Faroe Islands [3]; *T. t. hyrcanus* Zarudny & Loudon, 1908 – Azerbaijan: Talysh [1]; *T. t. troglodytes* (Linnaeus, 1758) – Hungary [4]; Romania [5]; *T. t. zetlandicus* Hartert, 1910 – Shetland Islands [2].

***Menacanthus distinctus* Kellogg & Chapman, 1899**

**Reports.** [1] KELLOGG & CHAPMAN (1899: 126); [2] MALCOMSON (1960: 195).

**Host.** *Campylorhynchus brunneicapillus* (Lafresnaye, 1835) – USA [2]: California [1].

**Remarks.** KELLOGG & CHAPMAN (1899) designated *Heleodytes brunneicapillus* (= *Campylorhynchus brunneicapillus*) as one of type hosts of this louse together with *Myiarchus cinerascens* (Lawrence, 1851) of the family Tyrannidae. As shown by PRICE (1977: 213), *M. cinerascens* is the natural host of *M. distinctus*, a species that has been subsequently recorded from other six birds of the family Tyrannidae. The status of “*M. distinctus*” from *C. brunneicapillus* is unclear, but we assume that Kellogg & Chapman’s specimens are most likely stragglers. Nevertheless, examination of further specimens from *C. brunneicapillus* is necessary to resolve this doubtful host-louse association.

## Genus *Myrsidea* Waterston, 1915

### *Myrsidea bessae* Price, Johnson & Dalglish, 2008

**Report.** [1] PRICE et al. (2008a: 61).

**Hosts.** *Cantorchilus semibadius* (Salvin, 1870) – Panama [1]; *Pheugopedius fasciatoventris* Lafresnaye, 1845 – Panama [1].

### *Myrsidea faccioae* Valim & Weckstein, 2013

**Report.** [1] VALIM & WECKSTEIN (2013: 392).

**Host.** *Cyphorhinus arada* (Hermann, 1783) – Brazil [1].

### *Myrsidea fasciata* Sychra & Kounek, sp. nov.

**Report.** [1] this paper.

**Host.** *Campylorhynchus fasciatus* (Swainson, 1838) – Peru [1].

### *Myrsidea myiobori* Kounek & Sychra, 2011

**Report.** [1] this paper.

**Host.** *Troglodytes aedon intermedius* Cabanis, 1860 [*musculus* group] – Costa Rica [1].

### *Myrsidea troglodyti* (Denny, 1842)

**Reports.** [1] DENNY (1842: 200); [2] MANILLA & GELSUMINI (1988: 4); [3] PRICE et al. (2008a: 63).

**Host.** *Troglodytes troglodytes* (Linnaeus, 1758) – Britain [1, 3], Italy [2].

**Remarks.** As discussed above, this species may not be a valid species and/or *T. troglodytes* may not be a host for this louse. MANILLA & GELSUMINI (1988) listed *M. troglodyti* from Italy following a note by SIMONETTA (1882), who had recorded *Menopon troglodyti* as deposited in the Museo Zoologico della R. Università di Pavia. We were unable to examine these lice, but we regard Simonetta's note as doubtful until the specimens cited in it are found and examined.

### *Myrsidea vicesmithi* Price, Johnson & Dalglish, 2008

**Report.** [1] PRICE et al. (2008a: 63).

**Host.** *Pheugopedius rutilus* (Vieillot, 1819) – Trinidad [1].

### *Myrsidea whitemani* Price, Johnson & Dalglish, 2008

**Report.** [1] PRICE et al. (2008a: 60).

**Host.** *Campylorhynchus rufinucha* (Lesson, 1838) – Costa Rica [1].

### *Myrsidea* sp. (not identified to species)

**Reports.** [1] CICCHINO (1980: 9); [2] this paper.

**Hosts.** *Cantorchilus nigricapillus* (Sclater, 1860) – Costa Rica [2]. *Cyphorhinus phaeocephalus* (Sclater, 1860) – Costa Rica [2]. *Troglodytes aedon bonariae* Hellmayr, 1919 [*musculus* group] – Argentina [1].



**Suborder Ischnocera Kellogg, 1896**  
**Family Philopteridae Burmeister, 1838**

**Genus *Brueelia* Kéler, 1936**

***Brueelia anamariae* Cicchino, 1980**

**Reports.** [1] CICCHINO (1980: 5); [2] this paper.

**Hosts.** *Troglodytes aedon bonariae* Hellmayr, 1919 [*musculus* group] – **Argentina** [1]; *T. a. musculus* J. F. Naumann, 1823 [*musculus* group] – **Paraguay** [2].

**Genus *Penenirmus* Clay & Meinertzhagen, 1938**

***Penenirmus albiventris* (Scopoli, 1763)**

**Reports.** [1] ADAM (2008: 366); [2] BALÁT (1958: 403); [3] BALÁT (1977: 51); [4] BLAGOVESHCHENSKY (1940: 65); [5] BLAGOVESHCHENSKY (1951: 296); [6] BROWN & WILK (1944: 128); [7] CARRIKER (1956: 34); [8] CICCHINO (1980: 7); [9] CLAY & HOPKINS (1951: 29); [10] HACKMAN (1994: 56); [11] KRAVTSOVA (1998); [12] LYAKHOVA & KOTTI (2011: 373); [13] MEY (2004: 105); [14] OVERGAARD (1942: 15); [15] PALMA & JENSEN (2005: 56); [16] PETERS (1936: 20); [17] RÉKASI (1993: 87); [18] TEBUEVA (2011); [19] TIMMERMANN (1950: 2); [20] WATERSTON (1915: 32); [21] ZŁOTORZYCKA (1977: 72); [22] this paper.

**Hosts. PALAEARCTIC REGION: EUROPE:** *Troglodytes troglodytes borealis* Fischer, 1861 – **Faroe Islands** [15, 20]; *T. t. indigenus* Clancey, 1937 – **British Isles** [9, 20]; *T. t. islandicus* Hartert, 1907 – **Iceland** [14, 19]; *T. t. troglodytes* (Linnaeus, 1758) – **Bulgaria** [2], **Czech Republic** [3, 22], **Finland** [10], **Germany** [13, 20], **Hungary** [17], **Poland** [21], **Romania** [1], **Slovakia** [3, 20]; *T. t. zetlandicus* Hartert, 1910 – **Shetland Islands** [20]. **ASIA:** *Troglodytes troglodytes hyrcanus* Zarudny & Loudon, 1905 – **Azerbaijan:** Talysh [4], **Russia:** Ciscaucasia [12], North-Caucasus – Stavropol Region [18]; *T. t. tianschanicus* Sharpe, 1882 – **Kyrgyzstan** [11], **Tajikistan** [5].

**NEARCTIC REGION:** *Troglodytes aedon* Vieillot, 1809 [*aedon* group] – **Canada:** Alberta [6], **USA:** New York [16]; *Salpinctes obsoletus* (Say, 1823) – **Canada:** Alberta [6].

**NEOTROPICAL REGION:** *Troglodytes aedon audax* Tschudi, 1844 [*musculus* group] – **Peru** [22]; *T. a. bonariae* Hellmayr, 1919 [*musculus* group] – **Argentina** [8], *T. a. striatulus* (Lafresnaye, 1845) [*musculus* group] – **Colombia** [7].

**Remarks.** OVERGAARD (1942) reported *Nirmus* sp. from *Troglodytes troglodytes islandicus* from Iceland. We agree with TIMMERMANN (1950) that this record most likely refers to *Penenirmus albiventris*.

PETERS (1936) and BROWN & WILK (1944) reported *Philopterus subflavescens* (Geoffroy, 1762) from *Salpinctes obsoletus* and *Troglodytes aedon* from New York (USA) and Alberta (Canada), respectively. However, as explained by CLAY & HOPKINS (1950: 269), the names used by GEOFFROY (1762) are not binominal, being rather descriptive phrases, and therefore they are invalid. Nevertheless, the name *P. subflavescens* has been incorrectly used as a valid species commonly occurring on passerines (e.g. PETERS 1936, SÉGUY 1944), including *Penenirmus albiventris* from *Troglodytes troglodytes* named as “*Philopterus subflavescens albiventris*” by EICHLER (1937). In our opinion, the lice reported by PETERS (1936) and BROWN & WILK (1944) may also represent *Penenirmus albiventris*.

CARRIKER (1956) reported *Penenirmus* sp. from *Troglodytes aedon striatulus* from Colombia as “very similar to *albiventris*”. In our opinion, this record also refers to *P. albiventris*. However, examination of the specimens referred to by OVERGAARD (1942),

PETERS (1936), BROWN & WILK (1944) and CARRIKER (1956) is necessary to confirm our tentative identifications.

BLAGOVESHCHENSKY (1940: 65) described the new species *Degeeriella longuliceps* giving two species as type hosts: *Troglodytes troglodytes hyrcanus* from Azerbaijan and *Cettia cetti* (Temminck, 1820) of the family Cettiidae. Subsequently, the same author listed the same two bird species from Tajikistan as hosts of *P. albiventris*, placing *Degeeriella longuliceps* as a junior synonym (BLAGOVESHCHENSKY 1951: 296). We agree with BLAGOVESHCHENSKY (1951) and EMERSON (1972: 112) in that *D. longuliceps* from *T. troglodytes* is synonymous with *P. albiventris*. However, the true identity of the lice from *Cettia cetti* will remain uncertain until the specimens studied by BLAGOVESHCHENSKY (1940, 1951) are re-examined.

## Genus *Philopterus* Nitzsch, 1818

### *Philopterus mirus* (Kellogg & Chapman, 1899)

**Reports.** [1] KELLOGG & CHAPMAN (1899: 67); [2] PETERS (1936: 20); [3] FORRESTER et al. (1995: 38).

**Hosts.** *Thryomanes bewickii* (Audubon, 1827) – USA: California [1]; *Thryothorus ludovicianus miamensis* Ridgway, 1875 – USA: Florida [2, 3].

**Remarks.** FORRESTER et al. (1995) listed *Philopterus* sp. referring to PETERS (1936). In our opinion, this record is most likely *P. mirus*.

### *Philopterus troglodytis* Fedorenko, 1986

**Report.** [1] FEDORENKO (1986: 5).

**Host.** *Troglodytes troglodytes dauricus* Dybowski & Taczanowski, 1884 – Russia: Khabarovsk Krai [1].

**Note.** There are also other records of lice from wrens that undoubtedly resulted from either contaminations from other birds or incorrect determinations. These are: *Brueelia vulgata* (Kellogg, 1896) recorded by BROWN & WILK (1944: 128) from *Troglodytes aedon* Vieillot, 1809 [*aedon* group] from Alberta (Canada); *Degeeriella* sp. recorded by PETERS (1936: 20) from *Thryothorus ludovicianus ludovicianus* (Latham, 1790) from South Carolina (USA); and *Degeeriella gulosa* (Nitzsch, 1866) from *Troglodytes troglodytes* mentioned by SÉGUY (1944: 317) from Italy.

Furthermore, there are records of some species of wrens having been examined for lice but without any collected. For example, ENOUT (2009: 73) mentioned *Cantorchilus leucotis* (Lafresnaye, 1845) (6 birds examined) and *Pheugopedius genibarbis* (Swainson, 1838) (4 birds) from Brazil, while DİK et al. (2011: 569) mentioned one louse-negative *Troglodytes troglodytes* from Turkey.

## APPENDIX 2.

## Updated list of wrens (Troglodytidae) and their chewing lice

The taxonomy of the birds follows that in CLEMENTS et al. (2012).

***Campylorhynchus fasciatus* (Swainson, 1837)**

*Myrsidea fasciata* Sychra & Kounek, sp. nov.

***Campylorhynchus rufinucha* (Lesson, 1838)**

*Myrsidea whitemani* Price, Johnson & Dalgleish, 2008

***Cantorchilus nigricapillus* (Sclater, 1860)**

*Myrsidea* sp.

*Cantorchilus semibadius* Salvin, 1870

*Myrsidea bessae* Price, Johnson & Dalgleish, 2008

***Cistothorus palustris* (Wilson, 1810)**

*Menacanthus tenuifrons* Blagoveshtchensky, 1940

***Cistothorus platensis* (Latham, 1790)**

*Menacanthus tenuifrons* Blagoveshtchensky, 1940

***Cyphorhinus arada* (Hermann, 1783)**

*Myrsidea faccioae* Valim & Weckstein, 2013

***Cyphorhinus phaeocephalus* Sclater, 1860**

*Myrsidea* sp.

***Pheugopedius fasciatoventris* (Lafresnaye, 1845)**

*Myrsidea bessae* Price, Johnson & Dalgleish, 2008

***Pheugopedius rutilus* (Vieillot, 1819)**

*Myrsidea vincesmithi* Price, Johnson & Dalgleish, 2008

***Salpinctes obsoletus* (Say, 1823)**

*Menacanthus obsoleti* Price, 1977

*Penenirmus albiventris* (Scopoli, 1763)

***Thryomanes bewickii* (Audubon, 1827)**

*Menacanthus aedonis* Price, 1977

*Philopterus mirus* (Kellogg & Chapman, 1899)

***Thryothorus ludovicianus miamensis* Ridgway, 1875**

*Philopterus mirus* (Kellogg & Chapman, 1899)

***Troglodytes aedon* Vieillot, 1809 [*aedon* group]**

*Menacanthus aedonis* Price, 1977

*Penenirmus albiventris* (Scopoli, 1763)

***Troglodytes aedon* Vieillot, 1809 [*musculus* group]**

*Troglodytes aedon audax* Tschudi, 1844 [*musculus* group]

*Penenirmus albiventris* (Scopoli, 1763)

***Troglodytes aedon bonariae* Hellmayr, 1919 [*musculus* group]**

*Brueelia anamariae* Cicchino, 1980

*Myrsidea* sp.

*Penenirmus albiventris* (Scopoli, 1763)

- Troglodytes aedon intermedius* Cabanis, 1860 [*musculus* group]  
*Myrsidea myiobori* Kounek & Sychra, 2011
- Troglodytes aedon musculus* J. F. Naumann, 1823 [*musculus* group]  
*Brueelia anamariae* Cicchino, 1980
- Troglodytes aedon striatulus* (Lafresnaye, 1845) [*musculus* group]  
*Penenirmus albiventris* (Scopoli, 1763)
- Troglodytes troglodytes* (Linnaeus, 1758)**
- Troglodytes troglodytes borealis* Fischer, 1861  
*Menacanthus tenuifrons* Blagoveshtchensky, 1940  
*Penenirmus albiventris* (Scopoli, 1763)
- Troglodytes troglodytes dauricus* Dybowski & Taczanowski, 1884  
*Philopterus troglodytis* Fedorenko, 1986
- Troglodytes troglodytes hyrcanus* Zarudny & Loudon, 1905  
*Menacanthus tenuifrons* Blagoveshtchensky, 1940  
*Penenirmus albiventris* (Scopoli, 1763)
- Troglodytes troglodytes indigenus* Clancey, 1937  
*Penenirmus albiventris* (Scopoli, 1763)
- Troglodytes troglodytes islandicus* Hartert, 1907  
*Penenirmus albiventris* (Scopoli, 1763)
- Troglodytes troglodytes tianschanicus* Sharpe, 1882  
*Penenirmus albiventris* (Scopoli, 1763)
- Troglodytes troglodytes troglodytes* (Linnaeus, 1758)  
*Penenirmus albiventris* (Scopoli, 1763)  
*Myrsidea troglodyti* (Denny, 1842)
- Troglodytes troglodytes zetlandicus* Hartert, 1910  
*Menacanthus tenuifrons* Blagoveshtchensky, 1940  
*Penenirmus albiventris* (Scopoli, 1763)