



## Article

### **Chewing lice of the genus *Myrsidea* (Phthiraptera: Amblycera: Menoponidae) from passerines (Aves: Passeriformes) in South Africa, with descriptions of three new species**

ALI HALAJIAN<sup>1,2</sup>, OLDRICH SYCHRA<sup>3</sup>, WILMIEN LUUS-POWELL<sup>1</sup> & DEREK ENGELBRECHT<sup>1</sup>

<sup>1</sup>Department of Biodiversity (Zoology), University of Limpopo, Turfloop Campus, Private Bag X1106, Sovenga, 0727 Polokwane, South Africa, E-mail: ali\_hal572002@yahoo.com

<sup>2</sup>Department of Parasitology, Faculty of Specialized Veterinary Sciences, Science and Research Branch, Islamic Azad University, Tehran, Iran

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

#### **Abstract**

A total of 144 individuals of 46 bird species belonging to the 20 families were examined for chewing lice in South Africa. Considering only the genus *Myrsidea*, a total of 19 birds of 8 species were parasitised with 8 species of *Myrsidea*. Descriptions and illustrations are given for three new species of *Myrsidea*. The new species and their type hosts are: *Myrsidea aynazae* ex *Phyllastrephus flavostriatus* (Sharpe) (Pycnonotidae), *Myrsidea eslamii* ex *Zoothera gurneyi* (Hartlaub) (Turdidae) and *Myrsidea mariquensis* ex *Bradornis mariquensis* Smith (Muscicapidae). Records of new host-lice associations are: *Phyllastrephus terrestris* Swainson (Pycnonotidae) for *Myrsidea* sp., *Ploceus intermedius* Ruppell (Ploceidae) for *Myrsidea* sp., and *Turdus libonyanus* (Smith) (Turdidae) for *Myrsidea* sp.

**Keywords:** *Myrsidea*, Menoponidae, Amblycera, Phthiraptera, new species, Passeriformes, South Africa, new host-lice associations.

#### **Introduction**

*Myrsidea* Waterston, 1915 is the most speciose menoponid genus, parasitizing mainly passerine birds (Passeriformes). This genus currently contains about 350 described species occurring throughout the world (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).

Among South Africa's nine provinces, Limpopo is the northernmost with about 630 recorded bird species (Lepage, 2012), of which only 20 (belonging to 13 families) are known to be hosts of 17 species of *Myrsidea* (Price *et al.* 2003). Records of chewing lice from birds in the Afrotropical region, including those occurring in South Africa, derive mainly from neighboring countries or from birds migrating from Europe. There are only 6 species of *Myrsidea* (*M. breviterga* Tandan & Clay, 1971; *M. eisentrauti* Klockenhoff, 1982; *M. eurocephali* Klockenhoff & Tendeiro, 1989; *M. queleae* Tendeiro, 1964; *M. seguyi* Tendeiro, 1958; and *M. textoris* Klockenhoff, 1984) recorded from South Africa (Tendeiro, 1958, 1964; Tandan & Clay, 1971; Klockenhoff, 1982, 1984; Klockenhoff & Tendeiro, 1989).

Despite previous reports of *Myrsidea* spp. from South African birds, there has not been any proper study of this louse genus in South Africa. The aim of this paper is to present new data on the distribution of chewing lice of the genus *Myrsidea* found on Passeriformes in South Africa, including description of three new species.

## Material and methods

We conducted fieldwork from November 2011 to March 2012 at five study sites in the Limpopo Province, northern South Africa. These sites included: Golwe camp (22°44'S, 30°45'E; 639 m.a.s.l.), Venda, where 54 birds of 17 species were examined between 10 and 12 November 2011; Polokwane Game Reserve (23°58'S, 29°28'E; 1312 m.a.s.l.), Polokwane, where 60 birds of 21 species were examined between 10 and 11 February 2012; De Loskop (23°30'09"S, 29°18'18"; 1095 m.a.s.l.) where 5 birds of 1 species were examined on 6 and 15 March 2012; Woodbush forest (23°50'16.9"S, 29°59'17.8"E; 1541 m.a.s.l.) where 21 birds of 7 species were examined between 11 and 12 March 2012, and University of Limpopo, Turfloop campus (23°53'21"S, 29°44'25"E; 1341 m.a.s.l.) where 4 birds of 1 species were examined on 21 December 2011.

Birds were captured using mist nets. Every individual bird was identified using the field guide by Newman (2010). The taxonomy of the birds follows Clements *et al.* (2011). Chewing lice were collected by visual examination and using the fumigation chamber method (Clayton and Drown 2001) with visual search of the head. Lice were fixed in 70% ethanol in the field. Subsequently in laboratory, they were slide-mounted in Canada balsam as permanent slides, following the technique by Palma (1978). Identification of the lice was based on papers by Clay (1966), Hellenthal and Price (2003), Johnson and Price (2006), Klockenhoff (1982, 1984), Uchida (1926) and Złotorzycka (1964). Clay (1966) provided the diagnostic characteristics that define the genus *Myrsidea*. Because these characteristics are common to all *Myrsidea* species mentioned below, they will not be repeated in the species descriptions. Numbering of the dorsal head setae are in according with Clay (1969). In the following descriptions of new species, setal counts and dimensions are mentioned as range (minimum–maximum).

The original descriptions 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 are not repeated here. In the following descriptions, all measurements are in millimeters. Abbreviations for dimensions are TW, temple width; POW, preocular width; HL, head length at midline; PW, prothorax width; MW, metathorax width; AW, abdomen width at level of segment IV; LSVII, length of longer inner tergal seta on abdominal segment VII (Fig. 1: arrow); ANW, female anus width; GW, male genitalia width; GL, male genitalia length; GSL, genital sac sclerite length; PAL, parameres length; TL, total 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 Natural History Museum, London, United Kingdom (BMNH) and in the Department of Biodiversity, University of Limpopo, South Africa (DBUL).

## Results

A total of 144 individuals of 46 bird species belonging to the families Alaudidae, Cisticolidae, Dicruridae, Estrildidae, Eurylaimidae, Macrosphenidae, Malaconotidae, Monarchidae, Muscicapidae, Nectariniidae, Paridae, Passeridae, Phylloscopidae, Platysteiridae, Ploceidae, Pycnonotidae, Sturnidae, Sylviidae, Turdidae, Zosteropidae were examined. Considering only specimens of the genus *Myrsidea*, the topic of this paper, a total of 93 lice (mean intensity = 4.9) belonging to 8 species of *Myrsidea* were found on 19 birds (13 %) of 8 species (Table 1). No species of *Myrsidea* were found on the following species of birds: Alaudidae—*Certhilauda chuana* (Smith, 1836) (1 bird examined), *Eremopterix leucotis* (Stanley, 1814) (5), Calyptomenidae (Eurylaimidae)—*Smithornis capensis* (Smith, 1839) (4), Cisticolidae—*Apalis thoracica* (Shaw, 1811) (4), *Calamonastes fasciolatus* (Smith, 1847) (1), *Camaroptera brachyura brevicaudata* (Cretzschmar, 1830) (3), *Cisticola chiniana* (Smith, 1843) (2), *Cisticola fulvicapilla* (Vieillot, 1817) (2), *Prinia flavicans* (Vieillot, 1821) (3), Dicruridae—*Dicrurus adsimilis* (Bechstein, 1794) (1), Estrildidae—*Estrilda erythronotos* (Vieillot, 1817) (4), *Hypargos margaritatus* (Strickland, 1844) (1), *Pytilia melba* (Linnaeus, 1758) (2), *Granatina granatina* (Linnaeus, 1766) (2), Macrosphenidae—*Sylvietta rufescens* (Vieillot, 1817) (1), Malaconotidae—*Tchagra australis* (Smith, 1836) (1), Monarchidae—*Terpsiphone viridis* (Statius Muller, 1776) (1), Muscicapidae—*Cossypha dichroa* (Gmelin, 1789) (5), *Cossypha heuglini* (Hartlaub, 1866) (1), *Cossypha natalensis* (Smith, 1840) (6), *Cercotrichas leucophrys* (Vieillot, 1817) (1), *Cercotrichas quadrivirgata* (Reichenow, 1879) (4), *Muscicapa caerulescens* (Hartlaub, 1865) (1), *Pogonocichla stellata* (Vieillot, 1818) (2), Nectariniidae—*Cinnyris chalybeus* (Linnaeus, 1766) (3), *Hedydipna collaris* (Vieillot,

1819) (5), Paridae—*Melaniparus cinerascens* (Vieillot, 1818) (2), Passeridae—*Plocepasser mahali* (Smith, 1836) (12), Phylloscopidae—*Phylloscopus trochilus* (Linnaeus, 1758) (5), Platysteiridae—*Batis capensis* (Linnaeus, 1766) (5), *Batis molitor* (Kuster, 1836) (2), Pycnonotidae—*Andropadus importunus* (Vieillot, 1818) (6), *Chlorocichla flaviventris* (Smith, 1834) (3), *Pycnonotus barbatus* (Desfontaines, 1789) (1), Sturnidae—*Acridothores tristis* (Linnaeus, 1766) (4), Sylviidae—*Parisoma subcaeruleum* (Vieillot, 1817) (2), Zosteropidae—*Zosterops pallidus* (Swainson, 1838) (5).

Three records represent new louse-host associations: *Ploceus intermedius* for *Myrsidea* sp., *Phyllastrephus terrestris* for *Myrsidea* sp., and *Turdus libonyanus* for *Myrsidea* sp. These *Myrsidea* were all represented by nymphs only (Table 1), which makes their identification to the species level impossible. Three others records represent new species, which are described below.

**TABLE 1.** List of hosts and their lice

Bird species	P <sup>1</sup>	E <sup>2</sup>	<i>Myrsidea</i> species	♂	♀	Nymphs	Location
<b>Muscicapidae</b>							
<i>Bradornis mariquensis</i> Smith	3	4	<i>M. mariquensis</i> sp. nov.	2	3	1	Polokwane Game Reserve
<b>Ploceidae</b>							
<i>Ploceus intermedius</i> Ruppell	1	1	<i>Myrsidea</i> sp.	0	0	1	Polokwane Game Reserve
<i>Ploceus velatus</i> Vieillot	3	4	<i>M. textoris</i> Klockenhoff, 1984	1	0	6	Polokwane Game Reserve
<i>Sporopipes squamifrons</i> (Smith)	3	7	<i>M. eisentrauti</i> Klockenhoff, 1982	0	2	4	Polokwane Game Reserve
<b>Pycnonotidae</b>							
<i>Phyllastrephus flavostriatus</i> (Sharpe)	3	3	<i>M. aynazae</i> sp. nov.	6	5	16	Woodbush
<i>Phyllastrephus terrestris</i> Swainson	1	7	** <i>Myrsidea</i> sp.	0	0	1	Golwe camp
<b>Turdidae</b>							
<i>Turdus libonyanus</i> (Smith)	1	2	** <i>Myrsidea</i> sp.	0	0	2	Golwe camp
<i>Zoothera gurneyi</i> (Hartlaub)	4	4	<i>M. eslamii</i> sp. nov.	13	15	15	Woodbush

P<sup>1</sup> = number of birds parasitized; E<sup>2</sup> = number of birds examined; \*\* = new louse-host association

### ***Myrsidea aynazae* Halajian and Sychra sp. nov.**

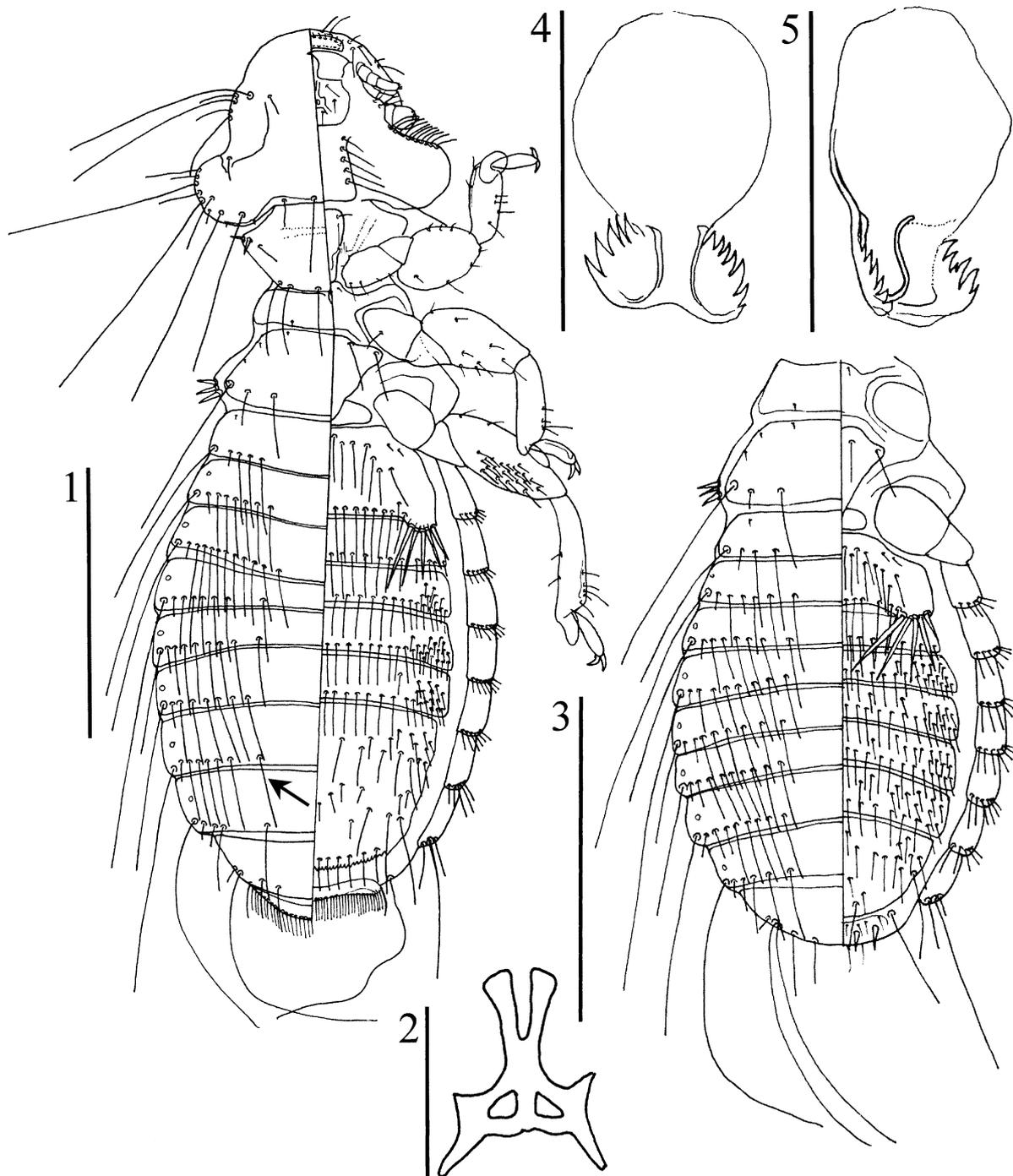
(Figs. 1–5, 13–14)

Type host: *Phyllastrephus flavostriatus* (Sharpe)—Yellow-streaked Greenbul

**Female (n = 5).** As in Figs. 1 and 13. Hypopharyngeal sclerites weakly developed (Fig. 2). Length of dorsal head seta (DHS) 10, 0.050–0.060; DHS 11, 0.100–0.110; ratio DHS 10/11, 0.45–0.60. Dorsal head seta 15 long with length more than 0.30. Gula with 4–6 setae on each side. Metasternal plate with 4–5 setae, metanotum not enlarged, with 6 marginal setae. Femur III with 18–24 setae in ventral setal brush.

Abdominal tergites as in Fig. 1 with tergites I–III somewhat enlarged and convex. Tergal setae, with median gap in each row: I, 9–11; II, 15–17; III, 16–21; IV, 15–16; V, 15–18; VI, 16; VII, 12–15; VIII, 9–10. Postspiracular setae extremely long (0.40–0.51) on II, IV and VIII; long (0.27–0.40) on I, III, VI and VII and short (0.20–0.25) on V. Sternal setae: II, 5–6 in each aster, 14–18 marginal between asters, 11–17 anterior; III, 15–21; IV, 41–44; V, 42–52; VI, 42–52; VII, 24–31; VIII–IX, 10–14 marginal and 12–26 anterior; sternites III–VII without medioanterior setae. Anal fringe of 34–37 dorsal and 37–43 ventral setae. Dimensions: TW, 0.45–0.47; POW, 0.31–0.32; HL,

0.30–0.31; PW, 0.30–0.31; MW, 0.44–0.46; AW, 0.63–0.66; LSVII, 0.100–0.115; ANW, 0.24–0.26; TL, 1.57–1.67. **Male (n = 6).** As in Figs. 3 and 14. Length of DHS 10, 0.050–0.065; DHS 11, 0.100–0.110; ratio DHS 10/11, 0.48–0.65. Dorsal head seta 15 long (0.30–0.32). Gula with 4–6 setae on each side. Metasternal plate with 4 setae. Metanotum with 6–7 marginal setae. Femur III with 16–20 setae in ventral setal brush.



**FIGURES 1–5.** *Myrsidea aynazae* sp. nov. 1. Female, dorsal-ventral view. 2. Hypopharyngeal sclerite. 3. Male dorso-ventral pterothorax and abdomen. 4. Male genital sac sclerite. 5. Distorted male genital sac sclerite. Scales 0.50 mm (Figs. 1, 3), 0.10 mm (Figs. 4, 5), 0.05 mm (Fig. 2).

Tergal setae: I, 7–8; II, 10–15; III, 14–18; IV, 13–20; V, 16–19; VI, 11–20; VII, 12–19; VIII, 10–12. Postspiracular setae as for female. Sternal setae: II, 4–6 in each aster, 13–20 marginal between asters, 15–18 anterior (Fig. 3); III, 15–17; IV, 37–40; V, 40–51; VI, 43–49; VII, 35–41; VIII, 19–26; sternites III–VII without

medioanterior setae. Four spine-like setae posteriorly to the row of internal anal setae (Fig. 3). Genital sac sclerite as in Figs. 4 and 5. Dimensions: TW, 0.41–0.44; POW, 0.28–0.29; HL, 0.27–0.29; PW, 0.28–0.29; MW, 0.37–0.40; AW, 0.50–0.52; LSVII, 0.100; GW, 0.10–0.11; GL, 0.45–0.47; GSL, 0.08–0.10; PAL, 0.06–0.09; TL, 1.32–1.35.

**Type material.** Holotype female (A. Halajian SA01) ex *Phyllastrephus flavostriatus* (Pycnonotidae), South Africa: Woodbush forest, Limpopo Province (23°50'16.9"S, 29°59'17.8"E), 11 March 2012, Halajian leg. Paratypes: 4 females and 6 males with the same data as holotype (A. Halajian SA02–06), all deposited in BMNH. Paratypes: 1 female and 1 male with the same data as holotype (A. Halajian SA07) deposited in DBUL.

**Remarks.** The weakly developed hypopharyngeal sclerites place *Myrsidea aynazae* sp. nov. close to *M. wombeyi* Johnson and Price 2006 and *M. marksi* Johnson and Price 2006. Hellenenthal and Price (2003) divided *Myrsidea* from bulbuls into three species groups: *pycnonoti*, *plumosi* and *palmai*. The three aforementioned species can be placed into a fourth group that is easily separated from the remainder by the reduction of the hypopharyngeal sclerites. We suggest the name *wombeyi* for this species group.

*Myrsidea aynazae* sp. nov. can be distinguished from *M. wombeyi* and *M. marksi* by the following characteristics: (1) larger number of setae on tergites I and II of female (9–11 vs. 6 and 15–17 vs. 8–13, respectively); (2) postspiracular seta V shorter than those on VI (against *M. marksi*); (3) smaller dimension, especially TW (against *M. wombeyi*) and (4) male genital sac sclerite (Fig. 4 vs. Fig. 15 [in Johnson and Price 2006]).

**Etymology.** This species is named after the first author's daughter, Aynaz.

### ***Myrsidea eisentrauti* Klockenhoff, 1982**

*Myrsidea eisentrauti* Klockenhoff, 1982: *Bonn. Zool. Beitr.* 33: 407. Type host: *Sporopipes squamifrons* (Smith)

**Material studied.** 2 females (A. Halajian SA08–09), ex *Sporopipes squamifrons* (Ploceidae), South Africa: Polokwane Game Reserve, Polokwane, Limpopo Province (23°58'S, 29°28'E; 1312 m.a.s.l.), 10–11 February 2012, Halajian leg. Deposited in DBUL.

**Remarks.** Our specimens differ from the original description presented by Klockenhoff (1982) by setal counts and dimensions as follows [setal counts and dimensions mentioned by Klockenhoff (1982) are in parentheses]:

**Female (n = 2).** Length of DHS 10, 0.050–0.055; DHS 11, 0.095; ratio10/11, 0.53–0.58.

Tergal setae, with median gap in each row (quite small on tergites I–III). However, in the original drawing by Klockenhoff (1982: fig 1), there are no gaps in the rows of setae in the tergites. Tergite I: 14 (16–19). Postspiracular setae extremely long, 0.45–0.52, on II, IV, VI, VII and VIII and long, 0.30–0.40, on I, III and V. Sternal setae: II, 3 (7–11) anterior; III, 37–48 (47–76); IV, 45–69 (52–96); VII, 7–8 (8–11); VIII–IX, 9–10 (14–18); including 1–2 medioanterior setae on sternites IV–VI. Dimensions: TW, 0.46–0.47 (0.47–0.50); POW, 0.35–0.36; HL, 0.34 (0.37–0.40); MW, 0.48–0.50 (0.52–0.55); AW, 0.79–0.80 (0.82–0.91); ANW, 0.16–0.17; TL, 2.15–2.20 (2.30–2.47).

### ***Myrsidea eslamii* Halajian and Sychra sp. nov.**

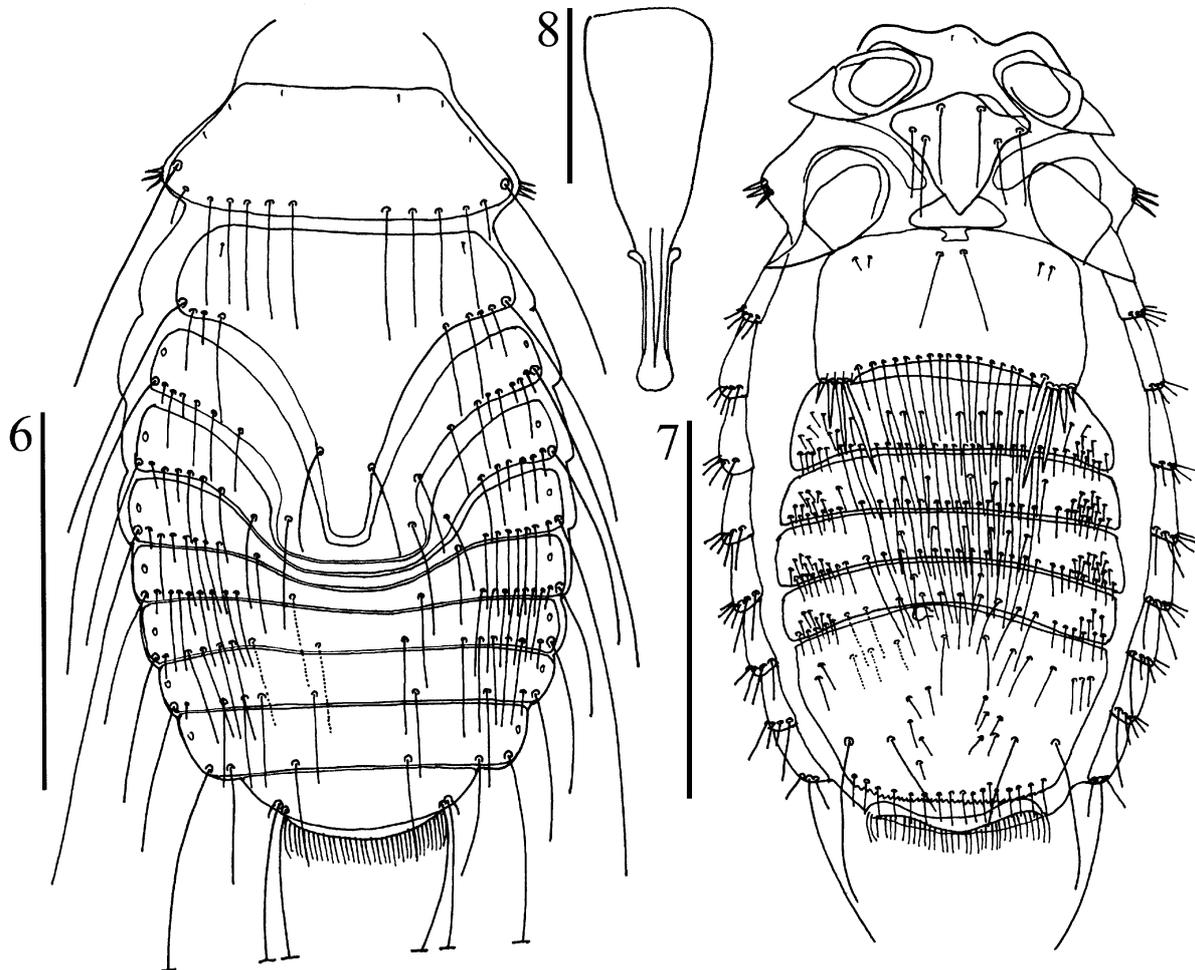
(Figs. 6–8, 15–16)

Type host: *Zoothera gurneyi* (Hartlaub)—Orange Ground-Thrush

**Female (n = 6).** As in Fig. 15. Hypopharyngeal sclerites strongly developed (as in Fig. 10). Length of DHS 10, 0.060–0.075; DHS 11, 0.100–0.115; ratio DHS 10/11, 0.56–0.75. Gula with 4–6 setae on each side. Metasternal plate with 4–5 setae, metanotum not enlarged, with 12–15 marginal setae. Femur III with 22–26 setae in ventral setal brush.

Abdominal tergites as in Fig. 6 with enlarged tergites I–IV. Medial part of tergite I in form of narrow processus. Medial part of tergite II–IV very narrow with conspicuously convex posterior margin. Tergal setae, with median gap in each row: I, 10–13; II, 16–19; III, 16–19; IV, 16–20; V, 17–22; VI, 17–21; VII, 10–13; VIII, 8. Postspiracular setae extremely long (0.42–0.53) on II, IV and VIII; long (0.33–0.40) on I and VII and short (0.18–0.25) on III, V and VI (in 2 females 0.31 and 0.32 on one side of tergite III). Sternal setae (Fig. 7): II, 4–5 in each

aster, 17–21 marginal between asters, 2–3 anterior; III, 45–55; IV, 54–67; V, 48–61; VI, 31–45; VII, 12–18; VIII–IX, 14–19 marginal and 11–17 anterior; including medioanterior setae on sternites III–VI: III, 7–12; IV, 5–11; V, 3–8; VI, 2–6. Anal fringe of 35–38 dorsal and 33–41 ventral setae. Dimensions: TW, 0.49–0.51; POW, 0.36–0.38; HL, 0.30–0.33; PW, 0.30–0.32; MW, 0.47–0.53; AW, 0.62–0.68; LSVII, 0.075–0.085; ANW, 0.23–0.25; TL, 1.55–1.72.



**FIGURES 6–8.** *Myrsidea eslamii* sp. nov. 6. Female dorsal pterothorax and abdomen. 7. Female ventral pterothorax and abdomen. 8. Male genital sac sclerite. Scales 0.50 mm (Figs. 6, 7), 0.05 mm (Fig. 8).

**Male (n = 7).** As in Fig. 16. Length of DHS 10, 0.060–0.070; DHS 11, 0.095–0.115; ratio DHS 10/11, 0.56–0.68. Gula with 5–7 setae on each side. Metasternal plate with 5–7 setae. Metanotum with 8–13 marginal setae. Femur III with 13–19 setae in ventral setal brush.

Tergal setae: I, 7–10; II, 12–16; III, 11–16; IV, 11–15; V, 12–15; VI, 10–16; VII, 8–11; VIII, 7–8. Postspiracular setae as for female. Sternal setae: II, 3–4 in each aster, 14–17 marginal between asters, 1–2 anterior; III, 28–40; IV, 35–41; V, 34–38; VI, 28–33; VII, 10–16; VIII, 4–10; including medioanterior setae on sternites III–IV: III, 2–6; IV, 0–3; one male also with 2 and 1 medioanterior setae on sternites V and VI, respectively. Genital sac sclerite as in Fig. 8. Dimensions: TW, 0.44–0.49; POW, 0.33–0.35; HL, 0.28–0.30; PW, 0.26–0.29; MW, 0.35–0.43; AW, 0.45–0.49; LSVII, 0.110–0.115; GW, 0.09–0.11; GL, 0.39–0.45; GSL, 0.10–0.11; PAL, 0.06–0.08; TL, 1.20–1.35.

**Type material.** Holotype female (A. Halajian SA11) ex *Zoothera gurneyi* (Turdidae), South Africa: Woodbush forest, Limpopo Province (23°50'16.9"S, 29°59'17.8"E), 11–12 March 2012, Halajian leg. Paratypes: 5 females and 7 males with the same data as holotype (A. Halajian SA10, 12–15), all deposited in BMNH. Paratypes: 1 female and 1 male with the same data as holotype (A. Halajian SA16), deposited in DBUL.

**Remarks.** Although Ledger (1980: 64) mentioned some *Myrsidea* from *Turdus gurney* (= *Zoothera gurney*) from the Transvaal (= South Africa), this is the first determination of the species of *Myrsidea* from this host in South Africa. This is the second species of *Myrsidea* from *Zoothera gurney*. It conspicuously differs from *M. montana* Clay, 1966 described from the same host from Tanganyika (Tanzania) (Clay 1966) by having non-divided tergites II–IV and smaller number of setae on tergites I (10–13 vs. 21) and VIII (8 vs. 12). The shape of the tergites in the female is almost the same as for those of *M. abidaae* Ansari, 1956 described from *Turdus fumigatus aquilonalis* (Cherrie) from Venezuela and *T. f. fumigatus* Lischtenstein from British Guiana (Ansari 1956, Clay 1966). The female of *M. eslamii* sp. nov. differs from those of *M. abidaae* by (1) smaller number of setae on tergites, especially on tergite VII (10–13 vs. 15–18), (2) larger number of setae on sternites III–V (each with 45–67 vs. 26–35), (3) smaller dimensions, especially TW (0.49–0.51 vs. 0.54) and (4) postspiracular seta VII as short as those on V and VI.

However, the male of *M. eslamii* sp. nov. has the same shape of genital sac sclerite, differing from males of *M. montana* by a smaller number of setae on tergite I (7–10 vs. 12–16) and larger number of setae on sternites IV and V (each with 34–41 vs. 22–32), and from those of *M. abidaae* by a smaller number of setae on tergites III–VI (each with 10–16 vs. 18–22).

**Etymology.** This species is named in honour of Prof. Ali Eslami, Iranian Veterinary Parasitologist (University of Tehran).

### *Myrsidea mariquensis* Halajian and Sychra sp. nov.

(Figs. 9–11, 17–18)

Type host: *Bradornis mariquensis* Smith—Mariqua Flycatcher

**Female (n = 2).** As in Figs. 9 and 17. Hypopharyngeal sclerites strongly developed (Fig. 10). Length of DHS 10, 0.050–0.065; DHS 11, 0.085–0.100; ratio DHS 10/11, 0.59–0.65. Gula with 4–5 setae on each side. Metasternal plate with 6 setae, metanotum not enlarged, with 6 marginal setae. Femur III with 22–25 setae in ventral setal brush.

Abdomen with unenlarged tergites with almost straight posterior margin, only tergites II–III with very slight medioposterior convexity (Fig. 9). Tergal setae, with median gap in each row: I, 5–6; II, 8; III, 10–12; IV, 10–13; V, 9; VI, 8–9; VII, 8–9; VIII, 4–6. Postspiracular setae extremely long (0.38–0.43) on II, IV, VII and VIII; long (0.27–0.30) on I and VI and short (0.16–0.23) on III and V. Sternal setae: II, 4–5 in each aster, 13–15 marginal between asters, 8–12 anterior; III, 20–22; IV, 45–48; V, 43; VI, 31; VII, 9; VIII–IX, 7–10 marginal and 10 anterior; sternites III–VII without medioanterior setae. Anal fringe of 37–38 dorsal and 35–36 ventral setae. Dimensions: TW, 0.45–0.46; POW, 0.35; HL, 0.31–0.34; PW, 0.28; MW, 0.42–0.45; AW, 0.62; LSVII, 0.18; ANW, 0.19–0.20; TL, 1.55.

**Male (n = 1).** As in Fig. 11 and 18. Length of DHS 10, 0.055; DHS 11, 0.080; ratio DHS 10/11, 0.69. Gula with 5–6 setae on each side. Metasternal plate with 6 setae. Metanotum with 6 marginal setae. Femur III with 21–23 setae in ventral setal brush.

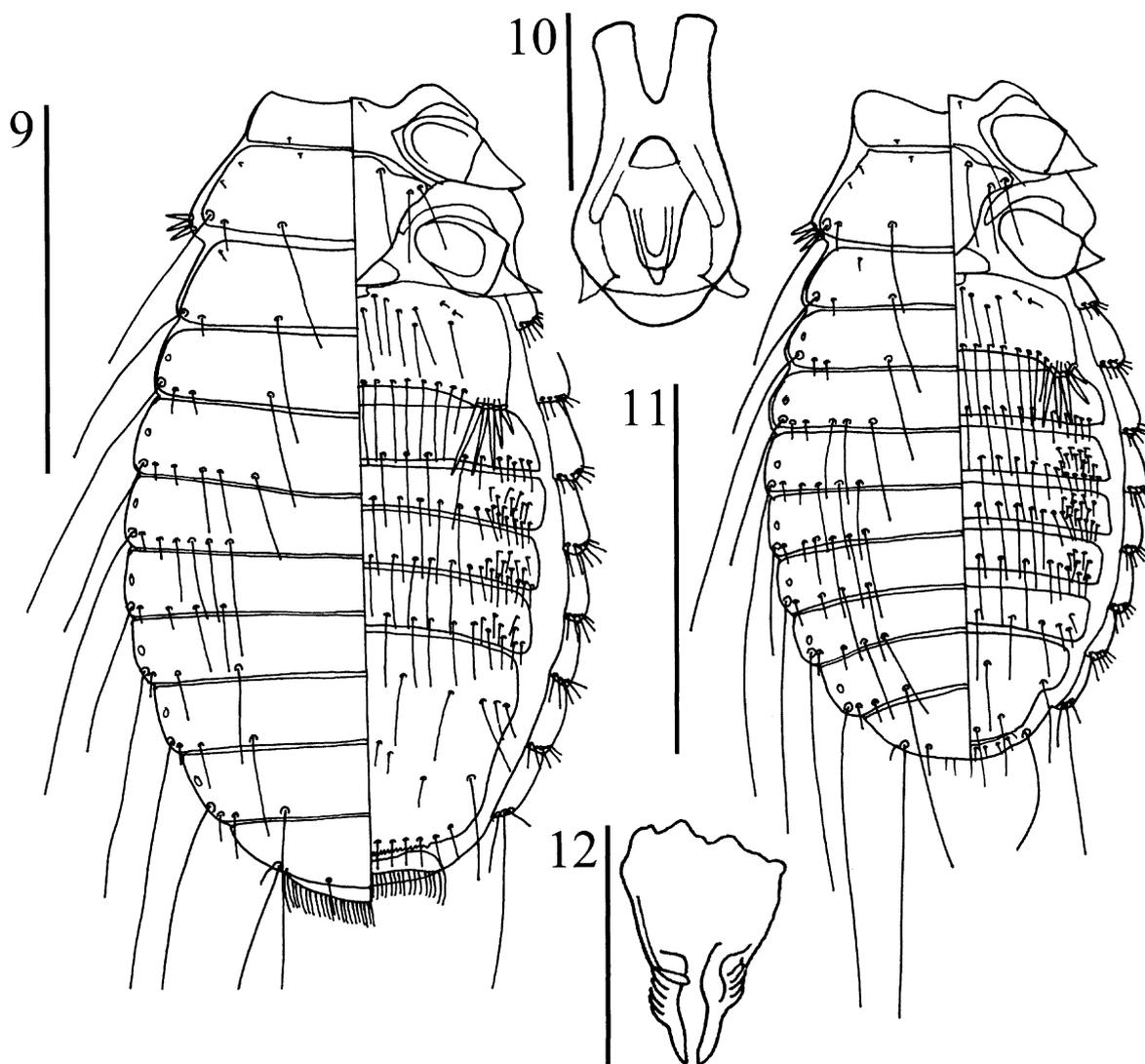
Tergal setae: I, 6; II, 8; III, 12; IV, 12; V, 13; VI, 10; VII, 9; VIII, 8. Postspiracular setae as for female. Sternal setae: II, 3–4 in each aster, 10 marginal between asters, 6 anterior (Fig. 11); III, 17; IV, 25; V, 29; VI, 21; VII, 13; VIII, 10; sternites III–VII without medioanterior setae. Genital sac sclerite as in Fig. 12. Dimensions: TW, 0.44; POW, 0.33; HL, 0.31; PW, 0.26; MW, 0.37; AW, 0.51; LSVII, 0.14; GW, 0.11; GL, 0.46; GSL, 0.055; PAL, 0.06; TL, 1.32.

**Type material.** Holotype female (A. Halajian SA17) ex *Bradornis mariquensis* (Muscicapidae), South Africa: Polokwane Game Reserve, Polokwane, Limpopo Province (23°58'S, 29°28'E; 1312 m.a.s.l.), 10–11 February 2012, Halajian leg. Paratypes: 1 female and 1 male with the same data as holotype (A. Halajian SA18). Deposited in BMNH.

**Remarks.** Until now, there were only two species of *Myrsidea* described on flycatchers (Muscicapidae):—*M. subdissimilis* Uchida, 1926 from *Cyanoptila cyanomelana* (Temminck, 1829) in Japan (Uchida 1926) and *M. proterva* Złotorzycka, 1964 from *Muscicapa striata* (Pallas, 1764) in Poland (Złotorzycka 1964). *Myrsidea mariquensis* sp. nov. is well separated from both aforementioned species by a smaller number of tergal setae in the female, especially on tergite I (5–6 vs. more than 10) and tergites II–IV (each not more than 13 vs. each at least

with 14). While the male of *M. proterva* is unknown, the male of *M. mariquensis* differs from that of *M. subdissimilis* by larger dimensions, especially TW (0.44 vs. 0.40–0.41).

**Etymology.** The species name is derived from the specific name of the type host, a noun in apposition.



**FIGURES 9–12.** *Myrsidea mariquensis* sp. nov. 9. Female dorso-ventral pterothorax and abdomen. 10. Hypopharyngeal sclerite. 11. Male dorso-ventral pterothorax and abdomen. 12. Male genital sac sclerite. Scales 0.50 mm (Figs. 9, 11), 0.05 mm (Figs. 10, 12).

#### ***Myrsidea textoris* Klockenhoff, 1984**

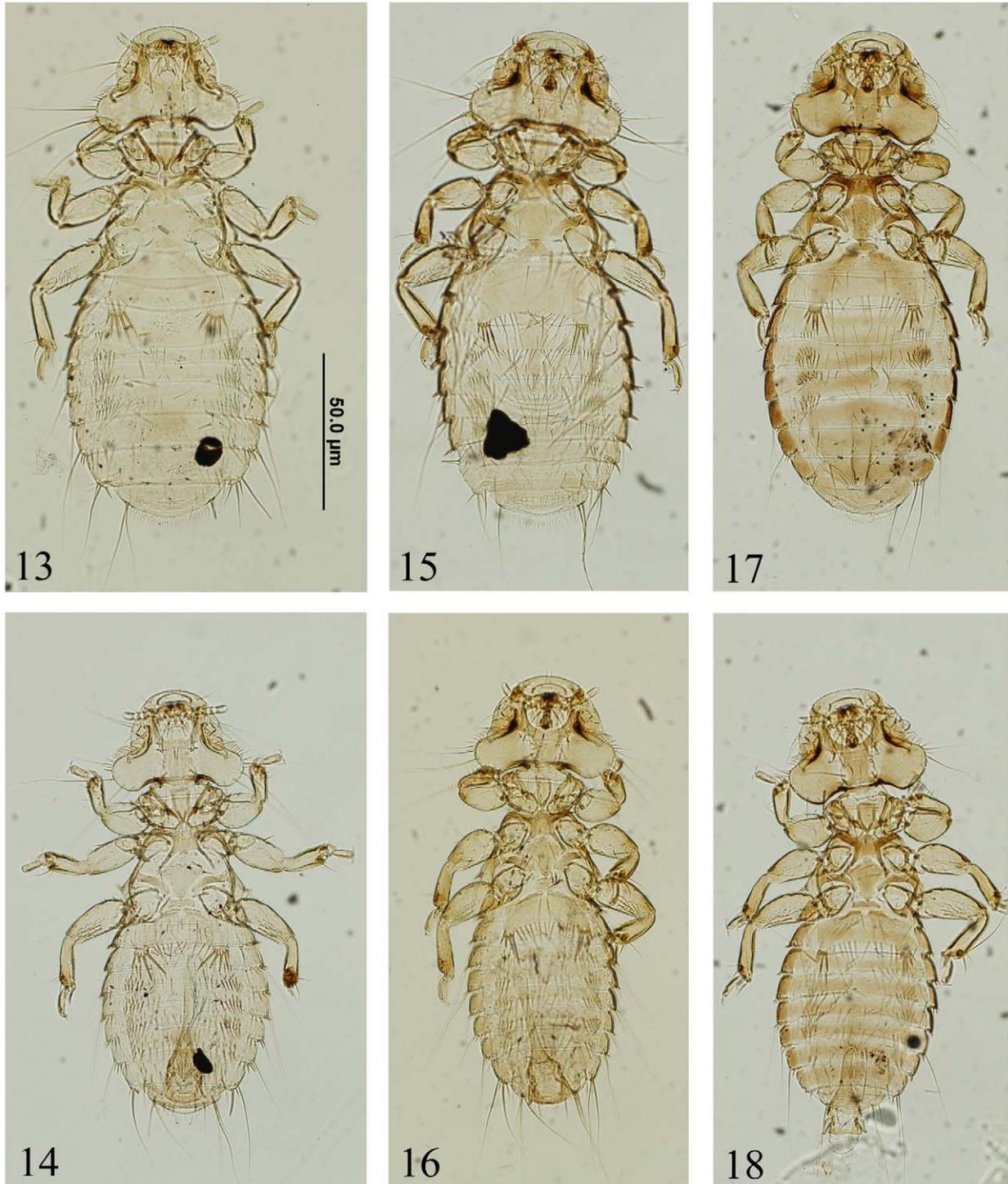
*Myrsidea textoris* Klockenhoff, 1984: *Bonn. Zool. Beitr.* 35: 270. Type host: *Ploceus cucullatus cucullatus* (Muller)

**Material studied.** 1 male (A. Halajian SA19), ex *Ploceus velatus* (Ploceidae), South Africa: Polokwane Game Reserve, Polokwane, Limpopo Province (23°58'S, 29°28'E; 1312 m.a.s.l.), 11 February 2012, Halajian leg. Deposited in DBUL.

**Remarks.** Our specimen differs from the original description by Klockenhoff (1984) by setal counts and dimensions as follows [setal counts and dimensions mentioned by Klockenhoff (1984) are in parentheses]:

**Male (n = 1).** Length of DHS 10, 0.055–0.060; DHS 11, 0.085; ratio DHS 10/11, 0.65–0.71.

Tergal setae: I, 12 (14–20); III, 18 (19–24). Postspiracular setae extremely long, 0.35–0.40, on II, IV, VIII; long, 0.33, on VII and short, 0.11–0.13, on I, III, V and VI. Sternal setae: II, 6 (10–14) anterior; III, 17 (18–24); VII, 13 (14–19); VIII, 10 (19–23); without medioanterior setae. Dimensions: POW, 0.28; HL, 0.24 (0.28–0.30); MW, 0.33 (0.34–0.38); AW, 0.41 (0.46–0.50); GW, 0.09; GL, 0.40; PAL, 0.05; TL, 1.12 (1.26–1.38).



**FIGURES 13–18.** *Myrsidea aynazae*. 13. Holotype female. 14. Paratype male. *Myrsidea eslamii*. 15. Holotype female. 16. Paratype male. *Myrsidea mariquensis*. 17. Holotype female. 18. Paratype male.

## Discussion

This paper includes first records of chewing lice from four bird species examined, i.e. *Bradornis mariquensis* (Muscicapidae), *Phyllastrephus flavostriatus* and *P. terrestris* (Pycnonotidae), and *Turdus libonyanus* (Turdidae).

Among the species of *Myrsidea* studied in this paper, the material of 2 species previously described—*M. eisentrauti* from *Sporopipes squamifrons* and *M. textoris* from *Ploceus velatus*—differed in some characters, particularly in setal counts and dimensions, from the original descriptions. Our data increase the knowledge of intraspecific morphological variability of those species. Both aforementioned species of *Myrsidea*, as well as *Myrsidea* sp. from *Ploceus intermedius* (all three hosts belong to Ploceidae), were previously reported from the area of South Africa (Klockenhoff 1982, 1984; Lindholm *et al.* 1998).

Finding of a new species of *Myrsidea* on *Phyllastrephus flavostriatus* (Pycnonotidae) supports a high degree of host specificity for this genus. This is in accordance with Johnson and Price (2006) who predicted that more louse species remain to be discovered from this group of birds. Similarly, the new species of *Myrsidea* from *Bradornis mariquensis* (Muscicapidae)—found on another very diverse and widespread passerine family with only two species of *Myrsidea* described until now—shows that more species are likely to be discovered.

The new species of *Myrsidea* on *Zoothera gurney* (Turdidae) is of interest because this bird species also hosts *Myrsidea montana*, described by Clay (1966) from birds from Tanzania. Up to now, only three species of birds belonging to the Turdidae had been found as hosts of two different species of *Myrsidea*: *Turdus fumigatus* harbouring *M. abidae* (from Venezuela) and *M. atiqua* (from Trinidad and Tobago), *Turdus grayi* harbouring *M. atiqua* (from Mexico) and *M. carrikeri* (from Costa Rica), and *Turdus nudigenis* harbouring *M. aitkeni* and *M. regius* (both from Trinidad and Tobago) Clay (1966). 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 carrying known species of *Myrsidea*.

## Acknowledgments

We would like to thank Johan Theron for helping to check the mynahs at the University of Limpopo.

We owe special thanks to Marek Wanat (Museum of Natural History, Wroclaw University, Poland) for the loan of the type specimen of *Myrsidea proterva* (slide no. 16/a/6) and to Ricardo Palma (Museum of New Zealand Te Papa Tongarewa, Wellington, N.Z.) for his review and improvement of the English of our first draft. The laboratory section of this study was funded by the project IGA VFU No. 74/2011/FVHE from the University of Veterinary and Pharmaceutical Sciences Brno.

## Literatures cited

- Ansari, M.A.R. (1956) A contribution to our knowledge of *Myrsidea* (Mallophaga: Amblycera) occurring on Turdidae (sens. lat.). *Pakistan Journal of Health*, 5, 163–177.
- Clay, T. (1966) Contributions towards a revision of *Myrsidea* Waterston. I (Menoponidae: Mallophaga). *Bulletin of the British Museum (Natural History) Entomology*, 17, 327–395.
- Clay, T. (1969) A key to the genera of the Menoponidae (Amblycera: Mallophaga: Insecta). *Bulletin of the British Museum (Natural History) Entomology*, 24, 3–26.
- Clayton, D.H. & Drown D.M. (2001) Critical evaluation of five methods for quantifying chewing lice (Insecta: Phthiraptera). *Journal of Parasitology*, 87, 1291–1300.
- Clements J.F., Schulenberg T.S., Iliff M.J., Sullivan B.L., Wood C.L. & Roberson D. (2011) The Clements checklist of birds of the world: Version 6.6. Available from <http://www.birds.cornell.edu/clementschecklist/downloadable-clements-checklist>. (accessed 11 May 2012)
- Hellenthal, R.A. & Price, R.D. (2003) The genus *Myrsidea* Waterston (Phthiraptera: Menoponidae) from bulbuls (Passeriformes: Pycnonotidae), with descriptions of 16 new species. *Zootaxa*, 354, 1–20.
- Johnson, K.P. & Clayton, D.H. (2003) Coevolutionary history of ecological replicates: Comparing phylogenies of wing and body lice to columbiform hosts. In: Page R.D.M. (Ed.), *Tangled trees: Phylogeny, cospeciation, and coevolution*. The University of Chicago Press, Chicago, pp. 262–286.
- Johnson, K.P. & Price, R.D. (2006) Five new species of *Myrsidea* Waterston (Phthiraptera: Menoponidae) from bristlebills and

- greenbuls (Passeriformes: Pycnonotidae) in Ghana. *Zootaxa*, 1177, 27–37.
- Klockenhoff, H.F. (1982) Mallophagen der gattung *Myrsidea* Waterston, 1915 von afrikanischen Webervogeln (Ploceidae) I *Myrsidea eisentrauti* n. sp. *Bonner Zoologische Beiträge*, 33, 407–411.
- Klockenhoff, H.F. (1984) Mallophagen der gattung *Myrsidea* Waterston, 1915 von afrikanischen Webervogeln (Ploceidae)– II. *Bonner Zoologische Beiträge*, 35, 269–284.
- Klockenhoff, H.F. & Tendeiro, J. (1989) Three new species of the genus *Myrsidea* Waterston (Mallophaga, Menoponidae) parasitic on African shrikes (Aves, Laniidae). *Bonner Zoologische Beiträge*, 40, 273–283.
- Ledger, J.A. (1980) *The Arthropod parasites of vertebrates in Africa South of the Sahara, Vol. IV, Phthiraptera (Insecta). Publication of the South African Institute for Medical Research No. 56.* South African Institute for Medical Research, Johannesburg, 327 pp.
- Lepage, D. (2012) Avibase – Bird Checklists of the World: Limpopo Province. Available from <http://avibase.bsc-eoc.org/checklist.jsp?region=zalp&list=clements> (accessed 11 May 2012)
- Lindholm, A.K., Venter, G.J. & Ueckermann, E.A. (1998) Persistence of passerine ectoparasites on the diderik cuckoo *Chrysococcyx caprius*. *Journal of Zoology (London)*, 244, 145–153.
- Newman, K. (2010) *Kenneth Newman's Birds of Southern Africa*. Struik Nature, 10<sup>th</sup> edition, Cape Town, 528 pp.
- Palma, R.L. (1978) Slide mounting of lice: a description of the canada balsam technique. *New Zealand Entomologist*, 6, 432–436.
- Price, R.D. & Dalglish, R.C. (2007) *Myrsidea* Waterston (Phthiraptera: Menoponidae) from the Emberizidae (Passeriformes), with descriptions of 13 new species. *Zootaxa*, 1467, 1–18.
- Price, R.D., Hellenenthal, R.A. & Palma, R.L. (2003) World checklist of chewing lice with host associations and keys to families and genera. In: Price, R.D., Hellenenthal, R.A., Palma, R.L., Johnson, K.P. & Clayton, D.H., *The Chewing Lice: World Checklist and Biological Overview*. Illinois Natural History Survey Special Publication 24, pp. 1–448.
- Sychra, O. (2010) *Myrsidea* Waterston 1915 (Amblycera: Menoponidae). Abstracts from the Fourth International Conference on Phthiraptera (ICP4), Urgup, Turkey. *Turkiye Parazitoloji Dergisi*, 34, Supplement 1, 34.
- Tandan B.K. & Clay, T. (1971) Contributions towards a revision of *Myrsidea* Waterston. VI. (Phthiraptera, Amblycera: Menoponidae). *Transactions of the Royal Entomological Society of London*, 123, 209–246.
- Tendeiro, J. (1958) Études sur les Mallophages. Sur une petite collection de Mallophages prélevée au Mozambique. *Garcia de Orta*, 6, 223–240.
- Tendeiro, J. (1964) Mallophaga. *Annales du Musée Royal de l'Afrique Centrale (Tervuren, Belgique)*, 132, 161–216.
- Uchida, S. (1926) Studies on amblycerous Mallophaga of Japan. *Journal of the College of Agriculture*, 9, 1–56.
- Złotorzycka, J. (1964) Mallophaga parasitizing Passeriformes and Pici I. Subfamilies Dennyinae, Machaerilaeminae, Colpocephalinae. *Acta Parasitologica Polonica*, 12, 165–192.