

The Chewing Lice (Insecta, Phthiraptera) Fauna of the Swainson's Warbler, *Limnothlypis swainsonii* (Aves, Parulidae)

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ABSTRACT We examined Swainson's warblers (*Limnothlypis swainsonii* (Audubon, 1834), Aves: Parulidae) for lice fauna during 2 yr at three study sites in Arkansas, USA. A total of 66 individuals were examined; eight birds (10.6%) were parasitized with 16 lice of two new species belonging to two genera *Myrsidea* Waterson, 1915 (Amblycera: Menoponidae) and *Brueelia* Kéler, 1936 (Ischnocera: Philopteridae). Parasitological parameter data are given on the prevalence of lice on Swainson's warblers. Species descriptions and illustrations are provided for *Myrsidea bensoni* sp. nov. and *Brueelia limnothlypiae* sp. nov.; including a key for females of the genus *Myrsidea* that parasitize Parulidae (Passeriformes).

KEY WORDS *Brueelia*, *Myrsidea*, Swainson's warbler, new species, USA

There are only 18 species of chewing lice described from warblers of the family Parulidae (Aves: Passeriformes) (Price et al. 2003, Kounek et al. 2011). In North America, there are four recognized genera of chewing lice with species described on birds from the family Parulidae: *Brueelia* Kéler, 1936 (Ischnocera, Philopteridae), *Menacanthus* Neumann, 1912, *Myrsidea* Waterson, 1915 (Amblycera, Menoponidae), and *Ricinus* DeGeer, 1778 (Amblycera, Ricinidae) (Price et al. 2003). From these genera, only one species was described in the genus *Brueelia*—*B. interposita* (Kellogg, 1899)—from two species of *Dendroica* (Kellogg 1899, Cicchino 1983) and five species were described in the genus *Myrsidea* from warbler hosts (Palma and Price 2010, Kounek et al. 2011).

The purpose of this paper is to describe two species of chewing lice found on the Swainson's warbler—*Limnothlypis swainsonii* (Audubon, 1834), a monotypic genus of the family Parulidae—composed by two species of the genera *Myrsidea* and *Brueelia*, described below. Up to the present, there are no records of any chewing lice from the Swainson's warbler (Price et al. 2003). We also provide a key for identification of females of species of *Myrsidea* parasitizing Parulidae.

Material and Methods

Study Area. We conducted field work during the spring and summers of 2009 and 2010 at three study sites in Arkansas: Big Island, Saint Francis National Forest, and White River National Wildlife Refuge as part of a broader study evaluating the effects of a flood on the Swainson's warbler (Reiley 2011).

Big Island (33° 53'35.4732" N; 91° 05'32.1469" W) is a large island (9,700 ha) bounded by the White River to the north, the Arkansas River to the west, and the Mississippi River to the east. The island was owned by a forest-products company, Anderson-Tully, which harvested timber there yearly; this resulted in habitat that was a mosaic of different age stands of bottomland hardwood forest. Dominant trees and understory shrubs in areas occupied by Swainson's warblers at Big Island was similar to White River NWR (Benson et al. 2009).

Saint Francis National Forest (34° 36'16.8084" N; 90° 36'40.2357" W) is a 9,100-ha mix of upland forest and bottomland forest located at the southern tip of Crowley's Ridge. It was located in Lee and Phillips counties in southeastern Arkansas and bordered to the east by the St. Francis and Mississippi rivers. Areas occupied by Swainson's warblers in Saint Francis National Forest were along streams in upland areas and in swamps within bottomland hardwood forest (Anich et al. 2009).

White River National Wildlife Refuge (34° 01'12.5148" N; 91° 05'37.4506" W) is one of the largest contiguous tracts (64,800 ha) of remaining bottomland hardwoods in the southeastern United States (Twedt and Loesch 1999). Swainson's warblers at White River National Wildlife Refuge generally occupied relatively higher elevation, less flood-prone areas (Benson et al. 2011, Reiley et al. 2013).

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Capture Technique and Lice Sampling. Birds were captured using targeted mist netting with song playbacks and fitted with a metal United States Geological Survey band as well as a unique combination of three-color bands under master bander permit number #21426. The host common and scientific names follow Dickinson and Christidis (2014). Once a bird was captured and banded, we utilized a dust ruffling technique described by Clayton and Walther (1997). Lice were fixed in a 90% ethanol solution. Each bird was handled no more than 15 min to minimize stress and any bird exhibiting gaping or closed eyes was immediately released to minimize direct mortalities.

Lice Study. The specimens studied are deposited in the Museu de Zoologia da Universidade de São Paulo (MZUSP), with a unique identifier number from the SophiA database for the Phthiraptera collection. Lice were permanently slide-mounted in Canada balsam, following the technique in Palma (1978). Terminology, chaetotaxy, and nomenclatures for each lice family follows that of Clay (1966) and ratified in Valim and Weckstein (2013) for the Menoponidae; and follows that of Clay (1951) and reinterpreted by Mey (1994), as well as Cicchino and Castro (1996), and the head dorsal sensilla after Valim and Silveira (2014) for the Philopteridae.

All measurements are in millimeters and were taken from digitized images from slide-mounted specimens using the software *Leica Application Suite* (LAS), linked into a *Leica BM500a* microscope. Abbreviations for body features measured in new species description are: AW, abdominal width (at level of segment IV); GL, male genitalia total length; HL, head length (at midline); MTW, metathorax width (at its posterior and widest level); PAW, preantennal width (at level of dorsal head seta 10 in Menoponidae and at preconal seta in Philopteridae); PL, paramere length; PW, prothorax width; TL, total length (including the anal fringe, not its setae, in females of Menoponidae); TW, temporal width (at level of dorsal head seta 29 in Menoponidae and at marginal temporal seta 2 in Philopteridae).

Results

A total of 66 individual Swainson's warblers were examined, with eight individuals (10.6%) parasitized by two new species belonging to each suborder of bird lice, one skin louse (of the genus *Myrsidea*, Amblycera) and one feather-louse (of the genus *Brueelia*, Ischnocera). Both species are described and named below.

The rate of infestation of both lice species was very low (1–10 lice per bird). Eleven specimens of *Myrsidea* were sampled from six birds ($\bar{x} = 1.8 \pm 2.0$, range = 1–6, males = 36%, females = 36%, and immatures = 28%) and five specimens of *Brueelia* were sampled from two birds ($\bar{x} = 2.5 \pm 0.70$, range = 2–3, males = 27%, adults = 100%).

Systematics

Order **PHTHIRAPTERA** Haeckel, 1896

Suborder **AMBLYCERA** Kellogg, 1896

Family **MENOPONIDAE** Mjöberg, 1910

Genus *Myrsidea* Waterston, 1915

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

Myrsidea bensoni sp. nov.

Type host: *Limnothlypis swainsonii* (Audubon, 1834)

Myrsidea bensoni sp. nov. is morphologically close to *M. paleno* Kounek & Sychra, 2011; they are the only species of *Myrsidea* parasitizing Parulidae that present only a small modification on the posterior margin of tergite I. Both sexes can be distinguished by the head shape (Fig. 1A). In addition, females of the new species tend to be smaller and present fewer setae in some segments. The new species have tergites II–V with 7–12 setae each (vs *M. paleno* with 12–14 setae); sternites IV–V with 7–9 setae (vs *M. paleno* with 12–13 setae). And males have the tendency to possess 3 setae on each aster, like in *M. ridulosa* (Kellogg & Chapman, 1899) (females have 4 and males 3 of these setae), their genitalia are quite similar to that present in *M. paleno*, except for the genital sclerite which has a rounded tip (apparently enlarged and grossly bilobed in *M. paleno*).

Type Material. HOLOTYPE: Female (MZUSP #6349), ex host #1911-26228, Big Island, Arkansas, USA, 27 Jun. 2009, B.M. Reiley col. PARATYPES: 1 male (MZUSP #6353), ex host #1601-63324, Big Island, Arkansas, USA, 27 Jun. 2009, B.M. Reiley col. 1 nymph I (MZUSP #6357), same data except, ex host #1601-63326. 2 males, 1 female, 1 nymph I, 1 nymph II, 1 nymph III (MZUSP #6356), ex host #1911-26419, Saint Francis National Forest, Arkansas, USA, 30 Jun. 2009, J. Everitts col. 1 female (MZUSP #6350), same data except, ex host #1911-26630, Saint Francis National Forest, 10 Jun. 2009. 1 female (MZUSP #6351), ex host #1601-63309, White River National Wildlife Refuge, Mellwood, Arkansas, USA, 22 Jun. 2009, B.M. Reiley col.

Female. Species uniformly brownish in color, thorax and abdomen as in Fig. 1B. **Head.** Head as in Fig. 1A (dashed line), with temple short and truncated. Dorsal head seta 10 (*dhs10*), 0.046–0.058 long; *dhs11*, 0.084–0.100 long, ratio *dhs10/11* 0.5–0.6. Hypopharynx fully developed, *ls5* 0.05–0.06, ventrolateral fringe, 10 setae (one specimen with 11 on one side). Gula with 4 setae on each side, most posterior longest. **Thorax.** Metanotum with posterior margin nearly straight, with 6 setae (one specimen with 8) on posterior margin; metapleura with 3 setae (rarely 2 in one side); metasternal plate each side with 2–3 setae. First tibia with 3 and 4 (rarely 5) outer lateral ventral and dorsal setae, respectively. Setae of femoral brush, 12–15 (Fig. 1B). **Abdomen.** Tergite I with small convexity on posterior margin, tergite II only slightly pushed posteriorly (Fig. 1B), tergites III–VIII regular in shape. Spiracles III–VIII with one very small medial pale area conspicuously present and represented in Figs 1B, F as a 'dot', in tergites I and II these areas are less discernible but

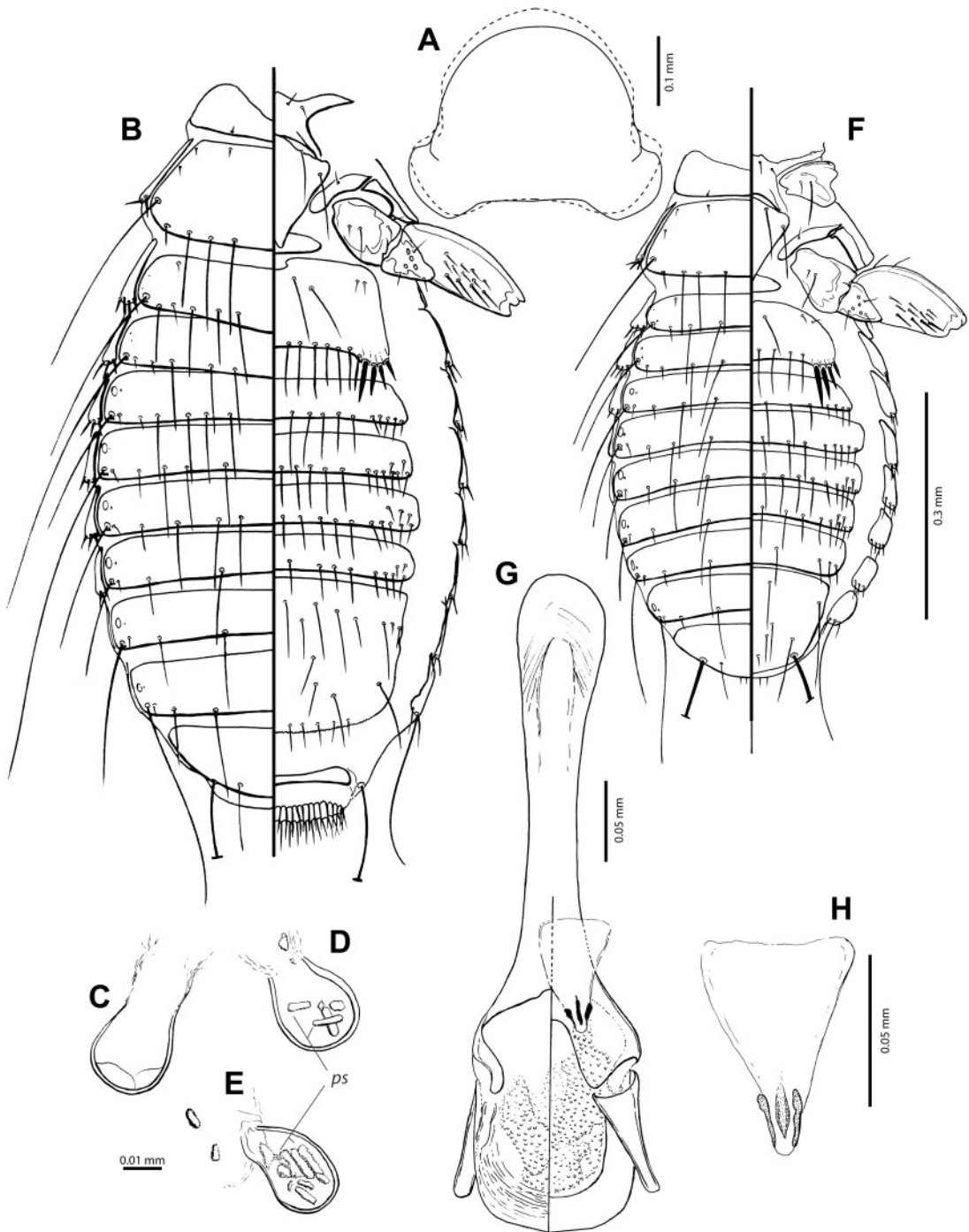


Fig. 1. (A) Head outlines of *Myrsidea bensonisp.* nov. (dashed line) and *Myrsidea paleno* Kounek and Sychra, 2011 (full line); (B) Female meso-metathorax and abdomen in dorso-ventral views; (C–E) Spermatheca of three individuals, *ps*—pellets of spermatozooids; (F) Male meso-metathorax and abdomen in dorso-ventral views; (G) Male genitalia in ventro-dorsal views; (H) Male genital sclerite.

present. With one median gap in each tergal setal row. No anterior setae on tergites, tergal posterior setae: I 10–11, II 9–12, III 8–12, IV 7–9, V 7–8, VI 4–5, VII 4, VIII 4. Postspiracular setae shortest (0.14–0.17) on III,

V and VI; long (0.18–0.24) on I and VII, and very long (0.32–0.48) on II, IV, and VIII. Anterior row of setae absent on sternites, sternal setae: I 0, II each aster of 4 spine-like setae (one specimen with 3 in one side),

posterior margin with 12–14 and anteriorly with 3–4 (one specimen with 1 seta), III 17–25, IV 22–28, V 25–29, VI 20–22, VII 11–14. Pleurites without anterior setae, pleural posterior setae: I 5–6, II 6–9, III 4–7, IV 5–7, V 5–6, VI 4–6, VII 3–4. Tergite IX with inner posterior seta set at level between the long seta and the midline of segment, 0.05–0.08 long. **Genitalia.** Subgenital plate with 7–10 setae; vulvar margin spiculated, and nearly straight and with 7–12 setae. Anus with 32–35 ventral fringe setae, 26–29 dorsal. Spermatheca pear-shaped or spherical with thickened rim (Fig. 1C–E), some individuals with many rod-shaped pellets of spermatozooids inside (Fig. 1D–E).

Measurements ($n = 4$). HL 0.29–0.31, PAW 0.32–0.34, OW 0.41–0.44, PW 0.25–0.27, PSPL 0.10, MTW 0.35–0.40, MSPL 0.14–0.16, AWTV 0.46–0.55, ANW 0.17–0.18, TL 1.31–1.39.

Male. Coloration as in female, thorax and abdomen as in Fig. 1F. **Head.** Head as in Fig. 1A, with temple short and truncated. Dorsal head seta 10, 0.044–0.049 long; *dhs11*, 0.071–0.094 long, ratio *dhs10/11* 0.5–0.6. Hypopharynx fully developed, *ls5* 0.04–0.05, ventrolateral fringe, 10 setae. Gular plate with 4 setae each side, most posterior the longest. **Thorax.** Metanotum with 4–5 setae on posterior margin; metapleura with 1–3 setae; metasternal plate with 2–3 setae each side (rarely 1 in one side). First tibia with 3 and 4 outer lateral ventral and dorsal setae, respectively. Setae of femoral brush, 10–12. **Abdomen.** No anterior setae on tergites, tergal posterior setae: I 5–6, II 6–7, III 7–8, IV 6–7, V 6, VI 4–5, VII 4, VIII 4. With distinct median gap in each tergal setal row; tergal setae of similar length reaching alveoli of next tergal row, except for those more lateral smaller and never reaching the next row. Postspiracular setae as for female. Pattern of chaetotaxy of tergites and sternites as in Fig. 1F. Sternites without anterior setae, sternal posterior setae: I 0, II each aster of 3 spine-like setae (one specimen with 4 in one side), posterior margin with 8–10 and anteriorly with 1–2, III 16–17, IV 18–22, V 20–25, VI 20–24, VII 9–13. Pleurites without anterior setae, pleural posterior setae: I 3–4, II 4–5, III 5, IV 4–6, V 4–5, VI 4, VII 3–4. Tergite IX with inner posterior seta, 0.05–0.07 long. Anus with 8 internal setae on ventral side, and 4 on dorsal. **Genitalia.** Subgenital plate with 11–12 setae. The entire genitalia in ventro-dorsal views as in Fig. 1G, and details of male genital sclerite in Fig. 1H.

Measurements ($n = 3$). HL 0.27–0.28, PAW 0.29–0.30, OW 0.36–0.38, PW 0.23–0.24, PSPL 0.09, MTW 0.31–0.32, MSPL 0.11–0.12, AWIV 0.39–0.40, GL 0.35–0.37, GSL 0.07, TL 1.07–1.13.

Nymph I. Body entirely whitish, thorax and abdomen as in Fig. 2A. **Head.** Ratio of *dhs10/11* 0.8–0.9. Latero-ventral fringe with 8 setae. Gular plate lacking setae. **Thorax.** Prosternum and mesosternum without setae (except for minute pair antero-lateral, always present in Menoponidae), metasternum with 2 medium long setae. Pronotum with 4 posterior setae, each antero-lateral corner with 1 short seta. Metanotum with one outermost long seta, one short, and one medium long posterior setae each side; three

anterolateral minute setae each side. Metapleura lacking setae. First tibia with 4 dorsal and 3 ventral setae. Femoral brush with 7 setae (rarely 8 in one side). Tergites I–VIII with 4 setae (counting as for adults). **Abdomen.** Tergites I–VIII composed by one longitudinal lateral (short) and one longitudinal medial (medium long) rows of abdominal setae. Sternite I without seta, in sternite II aster absent in lateral corners; chaetotaxy restricted to double pairs of short antero-lateral setae, and one pair of longer setae on anterior portion of segment. Sternites III with 6 setae, IV–VII with 8 setae, VIII–IX with 4. Pleural chaetotaxy: I 1, II 2, III–VII 3. Tergal and sternal chaetotaxy as in Fig. 2A.

Measurements ($n = 2$). HL 0.23–0.25; PAW 0.25; TW 0.29–0.30; PW 0.18–0.19; PTW 0.22–0.25; AW 0.27–0.32; TL 0.79–0.80.

Nymph II. Body entirely whitish, thorax and abdomen as in Fig. 2B. **Head.** Ratio of *dhs10/11* 0.8. Latero-ventral fringe with 8 setae in each side. Gular plate with 3+2 setae, posterior pair longer. **Thorax.** Prosternum and mesosternum without setae, metasternum with 2. Pronotum with 6 posterior setae, each lateral corner with 3 short setae. Metanotum as in first nymph. Metapleura with 2 short spiniform setae. First tibia with 4 dorsal and 3 ventral setae. Femoral brush with 9–10 setae. **Abdomen.** Tergal chaetotaxy as in first nymph. Sternite I without seta, in sternite II aster rudimentary in lateral corners; composed by two spiniform setae; posterior margin with 5 medium long setae, plus one anterior seta. Sternites III–VI with 12, VII 9, VIII–IX 4 setae. Pleural chaetotaxy as in first nymph, except for segment I with 2 setae. Tergal and sternal chaetotaxy as in Fig. 2B.

Measurements ($n = 1$). HL 0.23; PAW 0.26; TW 0.30; PW 0.20; MTW 0.27; AW 0.36; TL 0.90.

Nymph III. Body entirely whitish, thorax and abdomen as in Fig. 2C. **Head.** Ratio of *dhs10/11* 0.6. Latero-ventral fringe with 8 setae. Gular plate with 4+3 setae, posterior pair longer. **Thorax.** Prosternum and mesosternum without setae, metasternum with 4. Pronotum as in nymph II. Metanotum chaetotaxy as in first nymph. Metapleura with 2 spiniform setae. First tibia with 4 dorsal and 3 ventral setae. Femoral brush with 11 setae. **Abdomen.** Tergal chaetotaxy: all tergites with 4 setae, except tergites II and III with 5 and 6 setae, respectively. Sternite I without seta, in sternite II aster rudimentary in each lateral corner, with 3 spine-like setae; posterior margin with 7 setae and one single anterior seta present. Sternites III 12, IV 15, V 17, VI 14, VII 8, VIII–IX 4 setae. Pleural chaetotaxy: I 3, II–VI, 4, VII 3. Tergal and sternal chaetotaxy as in Fig. 2C.

Measurements ($n = 1$). HL 0.24; PAW 0.28; TW 0.35; PW 0.22; MTW 0.30; AW 0.40; TL 1.00.

Etymology. In recognition of his mentorship to B. Reiley and important work with the Swainson's warbler, this species is named in honor of Thomas J. Benson (Illinois Natural History Survey, USA).

Discussion. With the description of complete nymphal series of *M. bensoni* sp. nov., we are able to confirm some morphological evidence about the

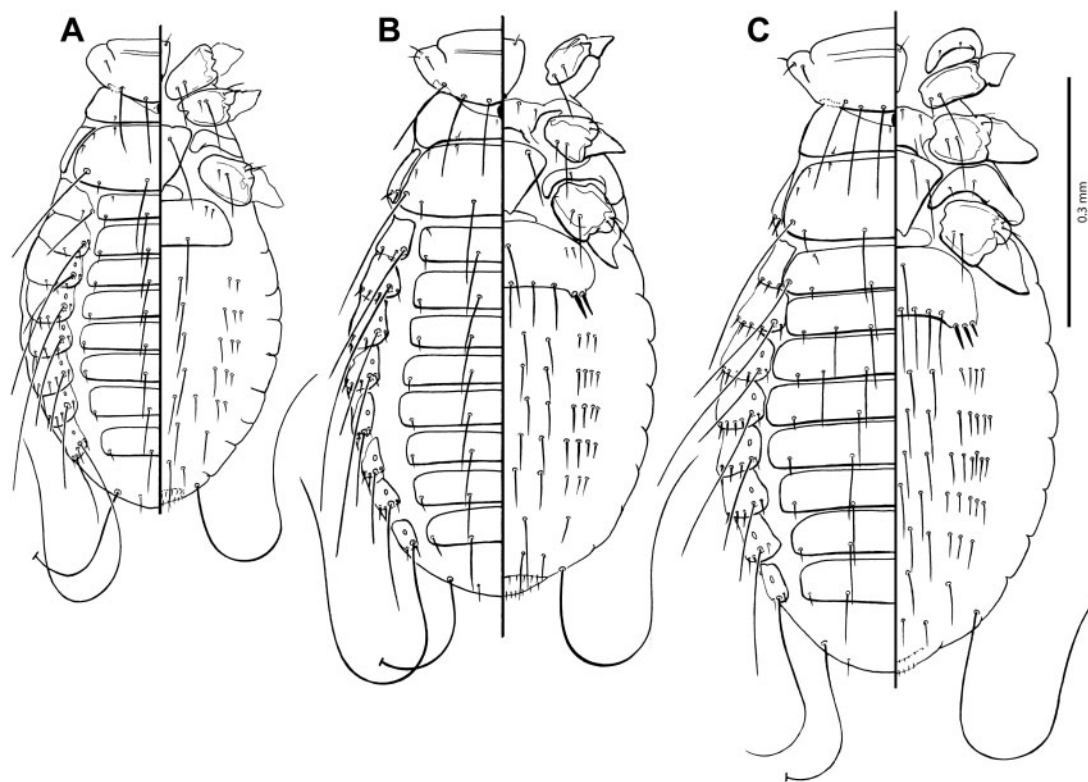


Fig. 2. Nymphs of *Myrsidea bensoni* sp. nov. (A) Nymph I, meso-metathorax and abdomen in dorso ventral views; (B) Nymph II, meso-metathorax and abdomen in dorso ventral views; (C) Nymph III, meso-metathorax and abdomen in dorso ventral views.

ontogenetic development of the species of the genus *Myrsidea*. Recently, Valim and Cicchino (2015) described the first complete series of nymphs for one species of this genus, *M. daleclaytoni* Valim and Cicchino, 2015, and thus this species will be used as a basis of morphological comparison with our *M. bensoni* sp. nov. Based on the immature stages of these two species we can conclude—

Characters Exclusive of First Nymph. —1) no setae on gula; 2) pronotum with only four long setae on its posterior margin; 3) absence of two small antero-lateral setae on each side of pronotum; 4) no setae on metapleura in thorax; 5) no aster on sternite II; 6) one pair of long setae on sternite II (reminiscent for those of posterior margin).

Characters Exclusive of Second Nymph. —1) only two setae on each side of aster on sternite II.

Characters Exclusive of Third Nymph. —1) three setae on each side of aster on sternite II; 2) presence of the intermediate longitudinal rows of setae on first tergites (I–IV).

Characters Exclusive of First and Second Nymphs. —1) one longitudinal medial row of long setae, plus one longitudinal lateral row of short of setae.

Characters Exclusive of Second and Third Nymphs. —1) gula with setae; 2) presence of the two small antero-lateral setae on each side of pronotum; 3)

presence of setae on metapleura of thorax; 4) anterior setae on sternite II.

Characters Exclusive of all Nymphs. —1) metathoracic chaetotaxy composed each side by one lateral long seta, one small sublateral, plus one medium long sized seta set near midline of metathorax (see Fig. 2A–C, and also Valim and Cicchino 2015: Figs. 50–52).

Identification Key for Females of *Myrsidea* (Menoponidae) Parasitic on Parulidae (Aves, Passeriformes)

- 1a Thorax with metanotum not enlarged; posterior margin of abdominal tergite I roughly straight..... 2
- 1b Thorax with metanotum posteriorly enlarged; posterior margin of abdominal tergite I conspicuously tapered medially..... ***M. zeledoni* Kounek & Sychra, 2011**
- 2a Margin posterior of abdominal tergites II and III roughly straight, or at most with a slightly and non-pronounced convexity..... 3
- 2b Margin posterior of abdominal tergites II and III with pronounced medioposterior convexity.... ***M. myiobori* Kounek & Sychra, 2011**
- 3a Abdominal tergites I–II unmodified 4

- 3b Abdominal tergites I–II with slightly convexity on posterior margin 5
- 4a Post-spiracular seta on segments V–VII shorter than on IV, sub equal in length; sternite II with ≥ 9 setae anteriorly; vulvar margin with 12 setae ***M. ridulosa* (Kellogg & Chapman, 1899)**
- 4b Post-spiracular seta on segment VII longer than on V–VI; sternite II with ≤ 5 setae anteriorly; vulvar margin with 7–8 setae ***M. basileuteri* Kounek & Sychra, 2011**
- 5a Head shape as in Fig. 1 (dashed line); tergite IV and V with 7–9 setae ***M. bensoni* sp. nov.**
- 5b Head shape as in Fig. 1 (full line); tergite IV and V with 12–13 setae ***M. paleno* Kounek & Sychra, 2011**

Suborder **ISCHNOCERA** Kellogg, 1896

Family **PHILOPTERIDAE** Burmeister, 1838

Brueelia Kéler, 1936

Type species: *Brueelia rossittensis* Kéler, 1936 (= *Nirmus brachythorax* Giebel, 1874), by original designation.

***Brueelia limnothlypiae* sp. nov.**

Type host: *Limnothlypis swainsonii* (Audubon, 1834)

There is only one species of *Brueelia* described in Parulidae; it is *Brueelia interposita* (Kellogg, 1899). Females differ by their general habitus, being slender in *B. limnothlypiae* sp. nov. (body index 4.4) and stouter in *B. interposita* (body index 3.4). In addition, the preantennal shape of *Brueelia limnothlypiae* sp. nov. is diagnostic and differs grossly from that of *B. interposita*, the preantennal region is triangular in the new species (cephalic index 1.7, see Fig. 3C, dashed line), while in *B. interposita* it is roughly rounded (cephalic index 0.9, see Fig. 3C, full line).

The entirely brownish body habitus makes *B. limnothlypiae* sp. nov. promptly distinct from other species of *Brueelia* with slender bodies and that live on other passerines than warblers (e.g., Cicchino and Castro 1996, Valim and Palma 2006, Palma and Peck 2013).

Type Material. HOLOTYPE: Male (MZUSP #6358), host #1601-63327, Big Island, Arkansas, USA, 29 Jun. 2009, B.M. Reiley col. PARATYPES: 2 females (MZUSP #6359–60), same data as holotype. 1 male, 1 female (MZUSP #6361–62), host #1601-63312, Big Island, Arkansas, USA, 25 Jun. 2009, B.M. Reiley col.

Male. General habitus as in Fig. 3A, very slender with body index 4.1. **Head.** Conic shaped (Figs 13 and 14, dashed line), almost twice as long as wide (cephalic index 1.6–1.7), temporal margin nearly rounded (Fig. 3B). Preantennal margin straight and convergent; marginal carina thickened with its inner edge weakly sinuate and dark brownish pigmented. Frontoclypeal suture entirely brownish. Gular platerhombic in silhouette, uniformly brownish pigmented. Marginal temporal carina pigmented up to level of marginal temporal setae 4 (*mts4*). Head setae quite short: anterior dorsal

seta, preconal seta, preantennal seta, anterior setae 1–2 (*as1*–2), ocular seta, preocular setae, *mts1*–2, and *mts4*–5. Posttemporal setae sensiliform but present, *s1*–*s3* present, and both *as3* and postnodal setae absent. Head dorso-ventral chaetotaxy as in Fig. 3B. **Thorax.** Pro- and pterothoracic apodema deeply pigmented, brownish. Meso- and metasternal plates sub-pyiform, longer than wide, weakly pigmented. Posterior margin of pterothorax lacking pigmentary margination, with 5 setae interspersing one longer and one smaller each side (in addition to one spine-like and one trichoid setae, each side). **Abdomen.** Terga II–VIII lightly and uniformly pigmented, except for lateral parts corresponding to pleurites. Paratergal chaetotaxy: II–III 0, IV–VII 1 (rarely 2 in one side of IV or VII). Sternites on III–VI and subgenital plate entirely brownish and uniformly pigmented. Tergal chaetotaxy, each side: postspiracular long present on VI–VII (rarely on V in one side); smaller and thinner accessory setae also present on VI–VII; 1–3 small posterior tergal setae on VII–VIII, and one small sutural seta on V–VIII. **Genitalia.** Basal plate not greatly developed, with irregular lateral borders, straight and long subtriangular paramera (Fig. 3D); lateral sclerites of endomer complex with their posterior edge tapered and corrugated, with 1–2 sensillae each side; rounded sclerotized ring of gonopore with its posterior tips distinctly pointed (Fig. 3D).

Measurements ($n = 2$). HL 0.31–0.33, PAW 0.19–0.20, TW 0.24, PW 0.15–0.16, MTW 0.21–0.22, AW 0.31–0.32, TL 1.27, GL 0.13, PL 0.03.

Female. General habitus as in Fig. 3E, with body index 4.4. Structures and pigmentation of head, thorax and abdomen much as for male, differing in body size, abdominal terminalia, and tergal chaetotaxy. One long postspiracular seta on VI–VII. Tergite VIII with trichoid lateral seta and 2 pleural setae. Pleural chaetotaxy as for male. Tergal plate IX+X with uniformly pigmented, brownish, and tergites XI unpigmented. **Genitalia.** Subgenital plate uniformly pigmented, with “cross-piece” entirely fused with sternite IX, and 1–3 small setae each side (Fig. 3F). Gonapophysis commonly with 3 setae (one aberrant female with 1+4) (Fig. 3F). Vulvar margin with 7–10 short and spiniform setae and 5–8 longer and finer (Fig. 3F).

Measurements ($n = 3$). HL 0.32–0.36, PAW 0.19–0.21, TW 0.24–0.26, PW 0.16–0.18, MTW 0.21–0.24, AW 0.31–0.35, TL 1.35–1.47.

Etymology. The specific epithet is taken from the generic name of the host; it is a noun in the genitive case.

Discussion. The type series for *B. interposita* is composed by 3 females syntypes (Kellogg, 1899), from *Dendroica petechia aequatorialis* Sundeval (fide Carriker, 1957). Although it was confirmed by Carriker (1957), this same author writes after such confirmation, choose “the best male on slide No. 470a ...” while designating the lectotype for this species (Palma and Peck, 2013). In this same paper Carriker, (1957) said that the condition of specimens prevented a good study of the head in detail, but he did not say anything about distortion on preparations. In fact, some of the Kellogg’s specimens need to be remounted because they were not

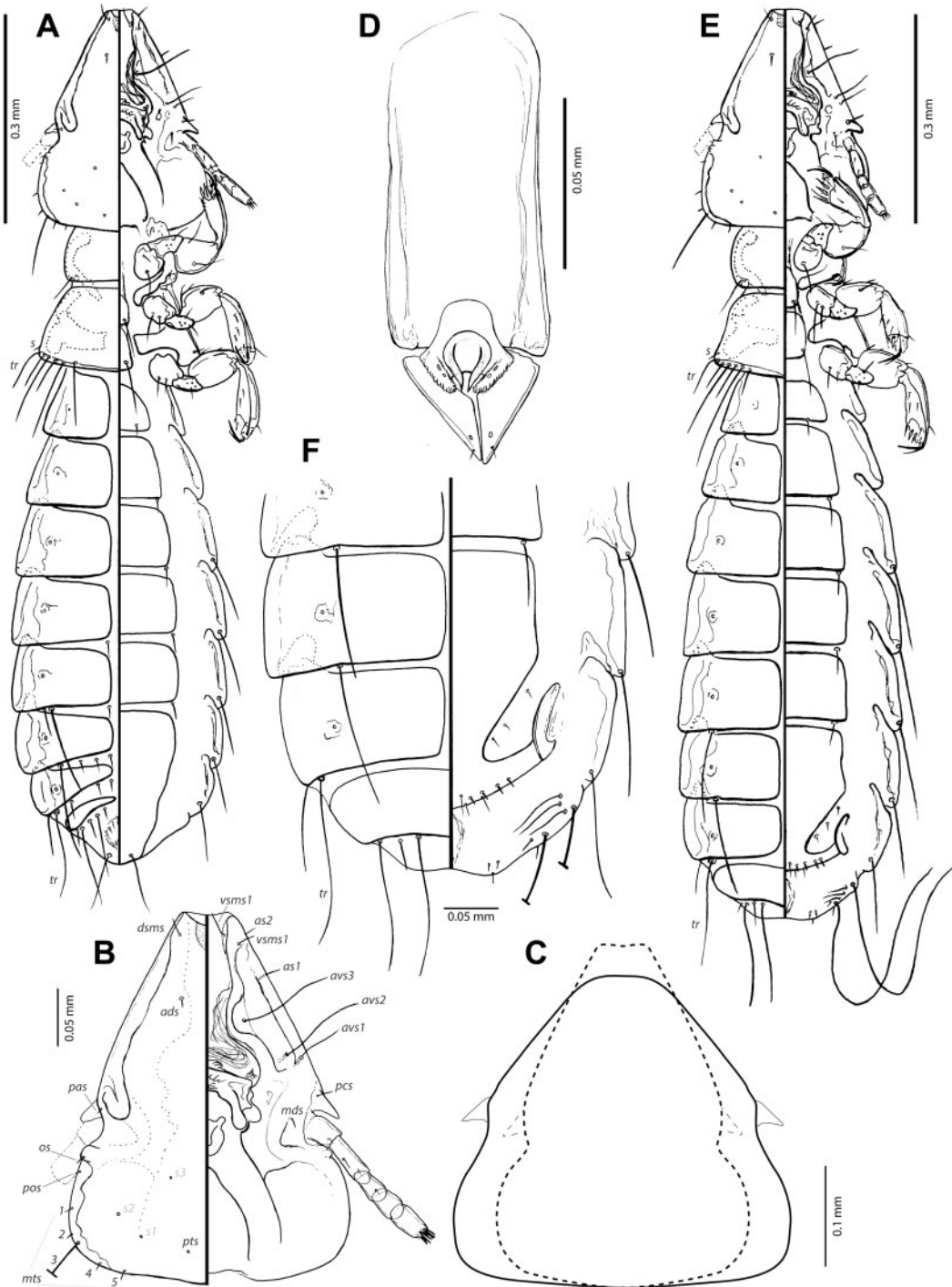


Fig. 3. *Brueelia lynnothlypiae* sp. nov. (A) Male habitus in dorso-ventral views; (B) Male head in dorso-ventral views; (C) Head outlines of *Brueelia lynnothlypiae* sp. nov. (dashed line) and *Brueelia interposita* (Kellogg, 1899) (full line); (D) Male genitalia in dorsal view; (E) Female habitus in dorso-ventral views; (F) Female terminalia in dorso-ventral views.

macerated, but are still in reasonable shape (M. P. Valim personal observation), which could be the case of types for *B. interposita*. Due to this, we are certain of the outline of the habitus, including its head, for the purpose of

our comparison. In addition, is not surprising for us to find two species of *Brueelia* with such distinct head shapes (slender vs stouter) on Parulidae. We have seen the same thing in samples (M. P. Valim, unpublished

data) from South American warblers, including individual hosts with both species occurring in synoxenism.

Regarding the data presented by **Cicchino (1983)**, we agree with that author and accept with reservation the name *B. interposita* for the specimens from *Setophaga pensylvanica* (L.) (Parulidae). Additionally *B. interposita* has also been found on at least nine host species, most of them passerines of the family Emberizidae, in an island environment (see **Palma and Peck, 2013**), but after **Cicchino (1983)** no morphological work has dealt with this species. The chaetotaxy presented by **Kellogg (1899)** does not fit with those specimens studied by **Cicchino (1983)**. On the other hand, the preantennal region depicted for "*B. interposita*" by **Cicchino (1983)** agrees much more with that presented by **Kellogg (1899)** than as presented in both sexes of *B. Limnotheryptae* sp. nov.

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