



Redescriptions and new host records of chewing lice of the genus *Ricinus* (Phthiraptera: Ricinidae) from the Neotropical Region

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Abstract

Two species of the chewing louse genus *Ricinus* are redescribed and illustrated: *Ricinus dalgleishi* Nelson, 1972 from *Helmitheros vermivorum* (Gmelin, 1789), a new host-louse association, and *Ricinus tanagraepphilus* Eichler, 1956 from *Euphonia laniirostris* d'Orbigny & Lafresnaye, 1837. Also, new host-louse associations are recorded for *Ricinus vireoensis* Nelson, 1972 from *Vireo pallens* Salvin, 1863, and for females of an unidentified species of *Ricinus* sp. from *Corythopsis delalandi* (Lesson, 1831), which are described and illustrated.

Key words: Phthiraptera, Ricinidae, *Ricinus*, chewing lice, passerines, redescriptions, new host-louse associations, Costa Rica, Paraguay, Honduras

Introduction

Specimens of chewing lice belonging to the family Ricinidae are among the largest species of Phthiraptera. They comprise 115 known species placed in three genera, of which only those of the genus *Ricinus* De Geer, 1778 parasitise members of the order Passeriformes (Price *et al.* 2003). *Ricinus* comprises 72 valid species which, with their hosts, have a wide geographical distribution in the New and Old Worlds (Price *et al.* 2003: 246; Valan *et al.* 2016). The majority of the 45 species of New World *Ricinus* were described or redescribed by Nelson (1972), with only 3 new species described later (Mey 1984; Oniki 2000; Oniki *et al.* 2004). Five of the 42 species dealt by Nelson (1972) have the status “*species inquirendae*” and an additional five species are described from female specimens only.

The objective of this study is (1) to redescribe and illustrate two species of *Ricinus* based on both sexes: *Ricinus dalgleishi* Nelson, 1972 and *Ricinus tanagraepphilus* Eichler, 1956, (2) to record additional host-louse associations for *R. dalgleishi* and *Ricinus vireoensis* Nelson, 1972, and (3) to describe and illustrate a species identified as *Ricinus* sp. only—due to lack of a male—but which represents a new host-louse association.

Materials and methods

Lice were collected from birds using the fumigation chamber method and visual examination (Clayton & Drown 2001). All birds examined were captured alive using mist nets, identified, deloused and then released trying to minimize stress. Morphological terminology follows Nelson (1972). Morphological features were coded, and descriptions were then developed using the DELTA system (Dallwitz 2010). All specimens examined were first identified to genus, sexed, and aged under a stereo microscope. Subsequently, adults were slide-mounted as described by Palma (1978). Photographs were taken and morphological features illustrated using Adobe Illustrator. Species descriptions are based on all available adult specimens. Head index (ratio between head length and width multiplied by 100) is used to be consistent with Nelson (1972).

All specimens collected by Ivan Literak are deposited in the Moravian Museum, Brno, Czech Republic (MMBC). Additional specimens examined were available from the United States National Museum of Natural History, Smithsonian Institution, Washington, D.C., U.S.A. (USNM), and the Museum für Naturkunde, Leibniz Institut, Humboldt-Universität zu Berlin, Germany (ZMHU).

Systematics

Phthiraptera Haeckel, 1896

Amblycera Kellogg, 1896

Ricinidae Neumann, 1890

Ricinus De Geer, 1778

Ricinus De Geer, 1778: 69

Type species: *Ricinus fringillae* De Geer, 1778 (by subsequent designation)

Ricinus dalgleishi Nelson, 1972

(Figs 1–6, 19, Table 1)

Ricinus dalgleishi Nelson, 1972: 82, plate 22, figs 1–5.

Ricinus dalgleishi Nelson, 1972; Price *et al.* 2003: 247.

Type host. *Geothlypis trichas* (Linnaeus, 1766)—Common yellowthroat (Passeriformes: Parulidae)

Type locality. State College, Mississippi, United States of America.

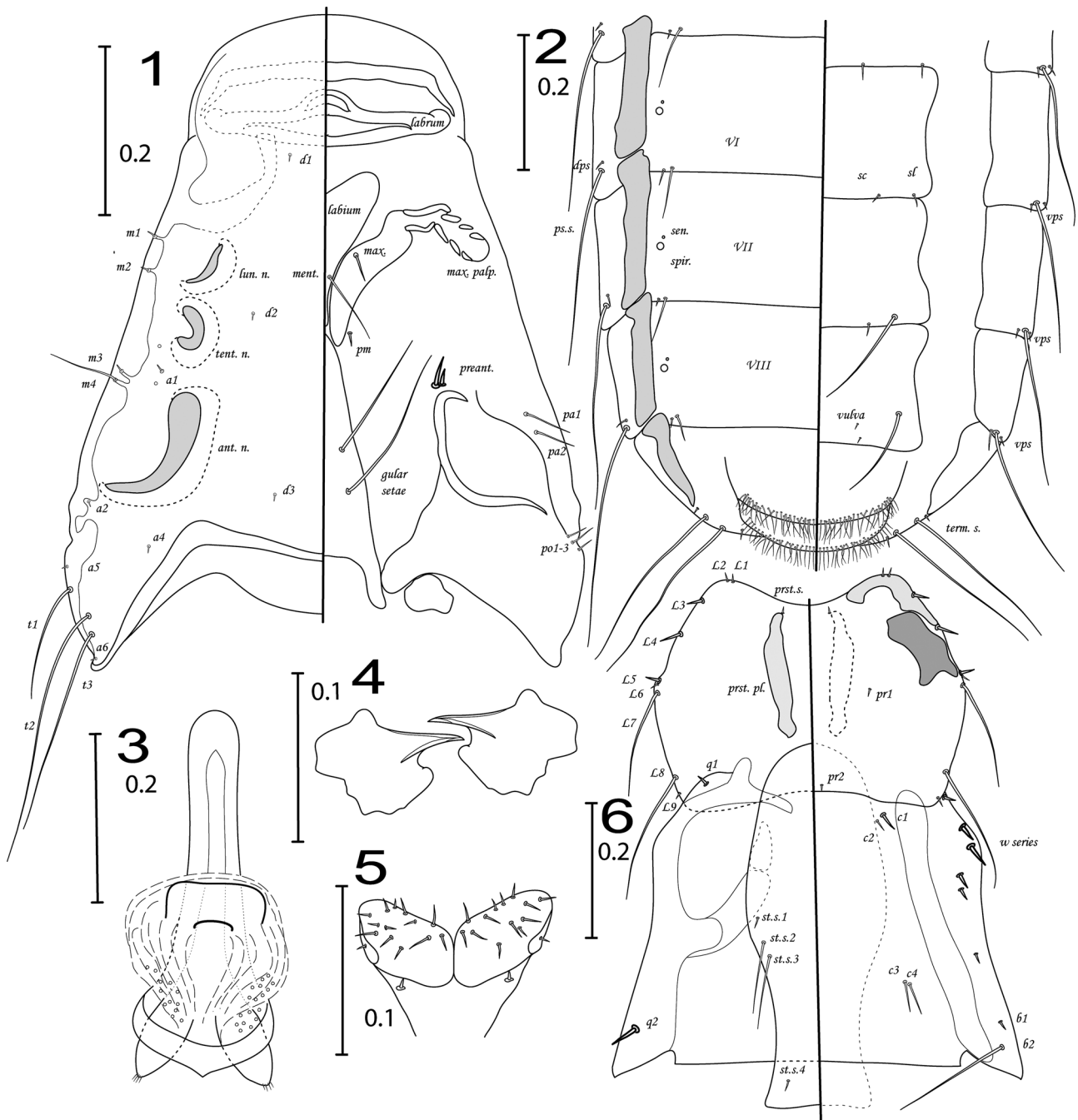
Diagnosis. This species belongs to the *marginatus* species-group (Nelson 1972) by having lunar nodi, no ovoid sclerite evident, and mandibles without finger-like extension. By having 4 setae on the paramere apices, *R. dalgleishi* is distinguished from *Ricinus marginatus* (Children, 1836), *Ricinus pallens* (Kellogg, 1899), and *Ricinus emersoni* Nelson, 1972, which have 3 setae. Further, it differs from *Ricinus dendroicae* Nelson, 1972, *Ricinus picturatus* (Carriker, 1902) and *Ricinus frenatus* (Burmeister, 1838) in having setae *a6*, and from *Ricinus flavicans* Carriker, 1964, *Ricinus seiuri* Nelson, 1972 and *Ricinus polioptilus* Carriker, 1964 in having temple apices hooked outside.

Description. *Head* subconical, with straight lateral margins. Frons narrowly convex; lateral margins convergent in the front and rounded; not continuous with head lateral margin. Temple apices acute, hooked outside. Occipital margin nearly straight. Eyes protruded. Transverse carina present; nearly straight. Lunar nodi present; tentorial nodi present; and lunar nodi nearly equal to tentorial. Mandibles monomorphic; blades long, thin and sharp needle-like; tips not notched; galea not evident; basal lobe without finger-like process. Maxillary plates sickle shaped (sausage-like); pigment pattern absent; palpi geniculate; not reaching the margin of head. Ovoid sclerite not evident. Gula with 2 pairs of setae; top of gular plate sclerite truncate; medial part with concavity; posterior projections present; directing posteriorly. Anterior margin of labium concave.

The *cf* series composed of 10 setae; *df* series present; *f1* evidently longer than *f2*; *a1* far shorter than *m4*; with two associated sensilla; *a3* absent; *a4* present; *a6* present; *m1–m3* equal; *m2* off the marginal carinae; *m4* evidently longer than *pa*. Labium with 13 pairs of setae. Mental setae positioned laterally to each other. Preantennal setae strongly spinose. Setae along the antennal lappets 12–13. Three pilose, subequal postocular setae.

Thorax. Prothorax hexagonal; anterior margin distinctly concave; lateral margins slightly notched; posterior margin concave. Posterolateral angles of prothorax slightly pointed. Prosternal sclerites thin, parallel, not joined. Anterior margin of sternal plate rounded, without lateral depression; posterior angles acute. *L3* present; *L6* present; *L5* nearly equal to *L4* and *L6*; *L9* evidently shorter than *L7* and *L8*; *c4* present; *c1* twice or more longer than *c2*; *c2* pilose; *c3* twice or more longer than *c4*; *w* series composed of 6 setae; anterior setae unequal. Long sternal setae situated medially on pterothorax 3; *q* series composed of 2 spines; *q2* strongly spinose; *q2* not shorter than *w* series;

b1 evidently shorter than *b2*. Coxa I with 2 tactile setae; femur I with 2 tactile setae; femur II and III with present tactile setae.



FIGURES 1–6. *Ricinus dalgleishi*. 1, dorso-ventral views of head. 2, dorso-ventral views of abdomen. 3, male genitalia. 4, mandibles. 5, labium. 6, ventro-dorsal views of thorax.

Abbreviations: *a*, dorsal setae on temples; *ant. n.*, antennal nodi; *b*, dorsal setae on posterior margin; *c*, 4 pairs of dorsal setae on pterothorax; *d*, dorsal setae on head; *dps*, dorsal pleural setae; *L*, lateral prothoracic setae; *lun. n.*, lunar nodi; *m*, dorso-ventral setae on marginal carinae; *max. palp.*, maxillary palpi; *max.*, maxillary setae; *ment.*, mental setae; *pa*, paraantennal setae; *pm*, paramental setae; *po*, postocular setae; *pr*, dorsal prothoracic setae; *preant.*, preantennal setae; *prst. pl.*, prosternal plate; *prst. s.*, prosternal plate setae; *ps. s.*, postspiracular setae; *q*, ventral and submarginal setae on pterothorax; *sc*, sternal central setae; *sen.*, sensilla; *sl*, sternal lateral setae; *spir.*, spiracle; *st. s.*, sternal setae; *t*, dorso-lateral setae on temples; *tent. n.*, tentorial nodi; *term. s.*, terminal setae of tergite IX; *VI–VIII*, tergites; *vps*, ventral pleural setae; *w*, series of lateral setae on pterothorax. Scale bars are in mm. Note: Complete anal fringes are drawn as in Nelson (1972).

Abdomen. Lateral margin of abdomen nearly straight. Segment IX nearly equal to VIII. Pleural nodi on segment IX present, relatively wide, margins smooth; lateral part of abdominal pleurites lightly pigmented.

Second ventral pleurite with 3 setae; *II vps1–3* large spinose; *III vps1–2* small spinose; *III vps3* small spine; *IV vps1* large spine; *IV vps2* long pilose; *IV vps3* large spine; *V vps1* small spine; *V vps3* small pilose; *VI vps1,3* small pilose; *VII vps1,3* small pilose; *VIII vps1* small pilose; *VIII vps3* moderately long pilose. Two pairs of setae on tergite VIII. Sternolateral setae equal to sternocentral on II–VI sternites. Vulva with 4 setae. Abdominal segment IX with 2 long terminal setae.

Male genitalia. Symmetrical, basal plate narrow anteriorly and lateral margin slightly concave. Parameres triangular, with blunt endings. Mesosomal plate pigmented, lightly pointed and without medial extension. Four setae on the distal tips of the parameres.

Dimensions. *Female* (n = 8). Head length 0.66–0.67; width 0.59–0.60; head index 110–113. Labrum width 0.28–0.29. Prothoracic length 0.31–0.32. width 0.52–0.53, ratio 0.59–0.60. Distance between prosternal setae 0.063–0.072. Abdominal width 0.82–0.85. Total length 3.20–3.35. Ratio of total length and abdomen width 3.90–3.94.

Male (n = 6). Head length 0.60–0.62; head width 0.54–0.55; head index 111–113. Labrum width 0.24–0.25. Prothoracic length 0.29–0.31, width 0.46–0.47, ratio 0.63–0.66. Distance between prosternal setae 0.058–0.065. Abdominal width 0.73–0.74. Total length 2.95–3.00. Ratio of total length and abdomen width 4.04–4.05. Length of male genitalia 0.41–0.43. Width of mesosomal plate 0.160–0.168.

Material examined. Paratypes. Ex *Geothlypis trichas*: 2♀, Pearlington, Mississippi, U.S.A., 3 Jun. 1910, G.G. Rohwer, slide Bish-29874 (Lot 40-14138); 1♀, Damarest, New Jersey, U.S.A., 20 May 1926, B.S. Bowdish; 5♀, Elmhurst, New York, U.S.A., 9 May 1932, M.V. Beals, slide Bish-19646; 2♀, Groton, Massachusetts, U.S.A., 21 May 1933, W.P. Wharton, slide Bish-21187; 1♀, New London, North Carolina, U.S.A., 4 Apr. 1945, R.C. Simpson. [Note: all these paratypes are held in the USNM].

Non types. Ex *Helmitheros vermivorum* (Gmelin, 1789)—Worm-eating warbler (Passeriformes: Parulidae): 2♂, 2♀, Utila Island, Islas de la Bahía, Honduras (16°06' N, 86°54' W), 23 Aug. 2014, I. Literak, slides UT22a–b [also 3♂, 2♀, 6N in alcohol]; 1♀, same collecting data as previous sample, 26 Aug. 2014, slide UT65; 1♂, 1♀, 2N, Marshall's Pen, Mandeville, Jamaica, Feb. 1981, R. Dalgleish, slide 814 (USNM); 2♀ same collecting data as previous sample, 24–30 Dec. 1982 (USNM).

Remarks. *Ricinus dalgleishi* was described by Nelson (1972) from females only. Our comparison of female paratypes of this species against females from *Helmitheros vermivorum* has shown that those from *H. vermivorum* are only slightly smaller, but without significant morphological differences. Therefore, we regard samples from both hosts as belonging to the same species.

Considering that we have examined adult lice of both sexes and nymphs from two host individuals of *H. vermivorum* collected in two different localities, and that these specimens share the same morphological and morphometric characteristics, we confirm *H. vermivorum* as a natural and regular host for *R. dalgleishi* and establish it as new host-parasite association. Also, we record and describe the male of *R. dalgleishi* for the first time.

***Ricinus* sp.**

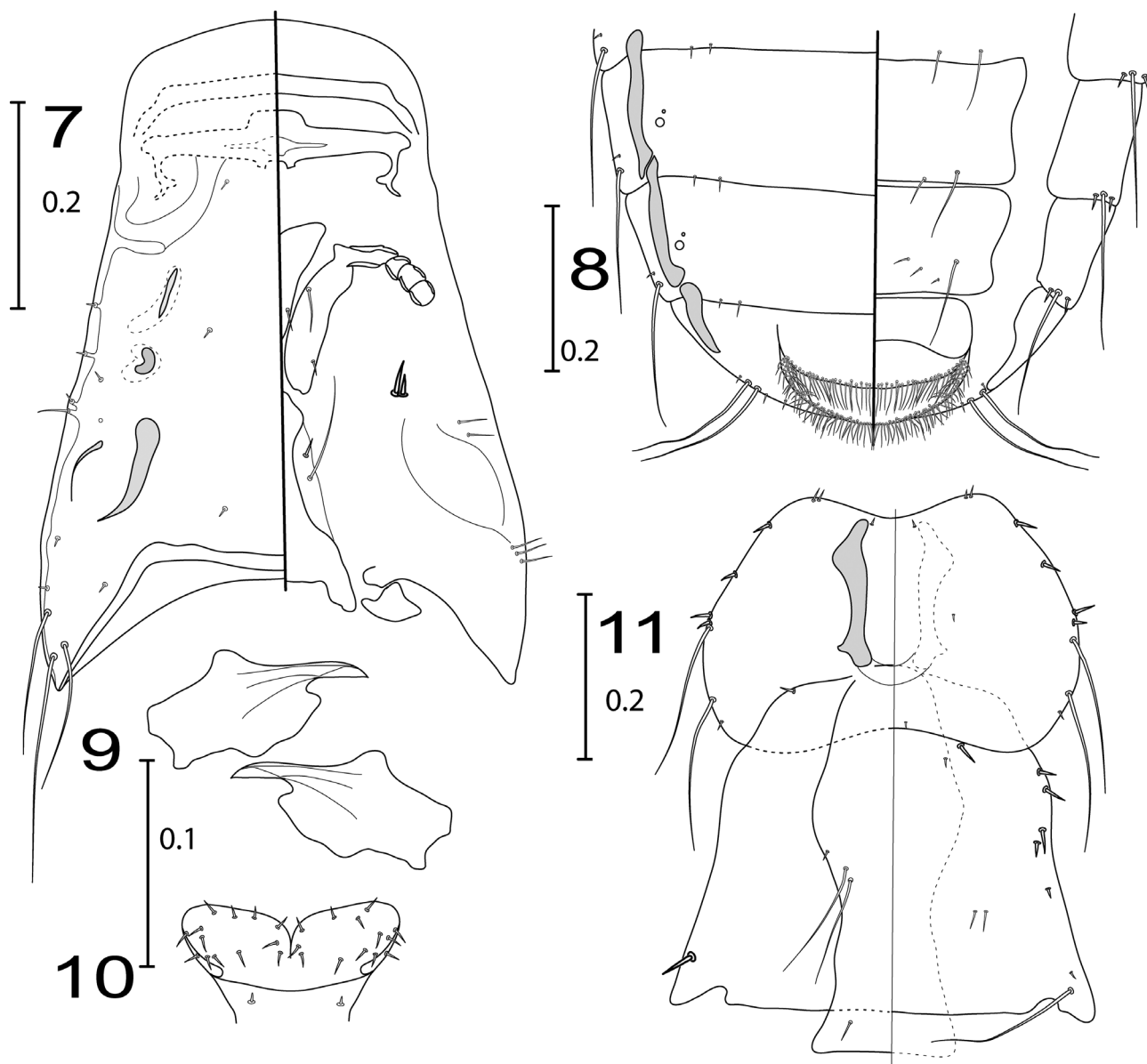
(Figs 7–11, 20, Table 1)

Host. *Corythopsis delalandi* (Lesson, 1831)—Southern antpiper (Passeriformes: Tyrannidae)

Locality. Kanguery Biological Station, San Rafael National Park, Paraguay (26°30' S, 55°47' W, 183 m a.s.l.)

Diagnosis. This *Ricinus* species belongs to the *marginatus* species-group by having three nodi, frontal margin not continuous with lateral margin, monomorphic mandibles without fingerlike articulation, and without evident ovoid sclerite. However, these females are distinguishable from females of all other species of the *marginatus* species-group by the presence of 2 lateral, short equally long setae on tergites II–VIII. Also, they differ from females of *R. dalgleishi*, *R. emersoni*, *R. flavicans*, *R. marginatus*, *R. pallens* and *R. seiuri* by the absence of *ab* setae. Unlike most species of the *marginatus* species-group, which have 14 pairs of setae on the labium, our specimens have 12 pairs of labial setae; therefore, this feature separates them from *R. dalgleishi*, *R. dendroicae*, *R. emersoni*, *R. flavicans*, *R. marginatus*, *R. pallens*, *R. picturatus* and *R. seiuri*. Within the *marginatus* species-group,

R. frenatus is the only species with long *a1* seta and antennal lappets composed of 6 setae, compared to 12–13 setae in our specimens. Considerably smaller antennal lappets are also present in *R. polioptilus*, which in addition has *w* series composed of 7 setae compared to our specimens which have only 5 setae.



FIGURES 7–11. *Ricinus* sp. ex *Corythopsis delalandi*. 7, dorso-ventral views of head. 8, dorso-ventral views of abdomen. 9, mandibles. 10, labium. 11, ventro-dorsal views of thorax. Scale bars in mm. Note: Complete anal fringes are drawn as in Nelson (1972).

Description. Head spatulate with straight lateral margins. Frons narrowly convex; lateral margins nearly parallel, not continuous with head lateral margin. Temple apices arcuate, not hooked outside. Occipital margin with concavity. Eyes not evident or slightly raised. Transverse carina present, convex. Lunar nodi absent, tentorial nodi present. Mandibles monomorphic, blades long, thin and sharp needle-like, tips not notched; galea not evident; basal lobe without finger-like process. Maxillary plates straight, narrow, lintel-like; pigment pattern present; palpi geniculate, not reaching the margin of head. Ovoid sclerite not evident. Gula with 1–2 pairs of setae; top of gular plate sclerite truncate; medial part with concavity; posterior projections present, directing posteriorly. Anterior margin of labium concave.

The *cf* series composed of 10 setae; *df* series present; *f1* evidently longer than *f2*; *a1* far shorter than *m4*; with one associated sensilla; *a3* absent; *a4* present; *a6* absent; *m1–m3* equal; *m2* off the marginal carinae; *m4* evidently longer than *pa*. Labium with 12 pairs of setae. Mental setae positioned laterally to each other. Mental setae shorter

than maxillary. Preantennal setae strongly spinose. Setae along the antennal lappets (11–)12–13(–14). Four to 5 spinose, subequal postocular setae.

Thorax. Prothorax barrel-shaped; anterior margin distinctly concave; lateral margins not notched; posterior margin concave. Posterolateral angles of prothorax evidently rounded. Prosternal sclerites thick, parallel, joined. Anterior margin of sternal plate rounded, with lateral depression and posterior angles acute. *L3* absent; *L6* present; *L5* nearly equal to *L4* and *L6*; *L9* shorter than *L7* and *L8*; *c4* present; *c1* twice or more longer than *c2*; *c2* pilose; *c3* and *c4* nearly equal; *w* series composed of 5 setae; anterior setae all nearly equal. Long sternal setae situated medially on pterothorax 2; *q* series composed of 2 spines; *q2* strongly spinose; *q2* not shorter than *w* series; *b1* evidently shorter than *b2*. Coxa I with 2 tactile setae; femur I with 2 tactile setae; femur II and III without tactile setae.

Abdomen. Lateral margin of abdomen convex. Segment IX nearly equal to VIII. Pleural nodi on segment IX present, relatively wide, margins smooth; lateral part of abdominal pleurites heavily pigmented. Second ventral pleurite with two setae; *II vps1–2* large spinose; *III vps1–2* large spinose; *III vps3* large spine; *IV vps1* large spine; *IV vps2* long pilose; *IV vps3* large spine; *V vps1,3* small spine; *VI vps1,3* small spine; *VII vps1,3* small spine; *VIII vps1,3* small spine. Two pairs of setae on tergite VIII. Sternolateral setae equal to sternocentral on sternites II–VI. Vulva with 8–9 setae. Abdominal segment IX with 2 long terminal setae.

Dimensions. *Female* ($n = 2$). Head length 0.72–0.75; width 0.61–0.64; head index 117–118. Labrum width 0.34–0.35. Prothoracic length 0.35–0.36; width 0.60–0.61; ratio 0.58–0.59. Distance between prosternal setae 0.070–0.076. Abdominal width 0.91–0.94. Total length 3.10–3.20. Ratio of total length and abdomen width 3.40–3.41.

Material examined. Ex *Corythopsis delalandi* (Lesson, 1831)—Southern Antpipit (Passeriformes: Tyrannidae): 2♀, Kanguery Biological Station, San Rafael National Park, Paraguay (26°30'S, 55°47'W, 183 m a.s.l.), 20 Aug. 2012, I. Literak, slide PG107 [also 2N in alcohol].

Remarks. This is the first record of *Ricinus* lice from *Corythopsis delalandi*. Although our specimens are distinguishable from females of all other species belonging to the *marginatus* species-group, we have decided against naming them as a new species until males are collected and examined.

***Ricinus tanagraepphilus* Eichler, 1956**

(Figs 12–18, 22–23, Table 1)

Ricinus tanagraepphilus Eichler, 1956: 133.

Ricinus tanagraepphilus Eichler, 1956; Nelson 1972: 111. *Species inquirendae*.

Ricinus tanagraepphilus Eichler, 1956; Price *et al.* 2003: 251.

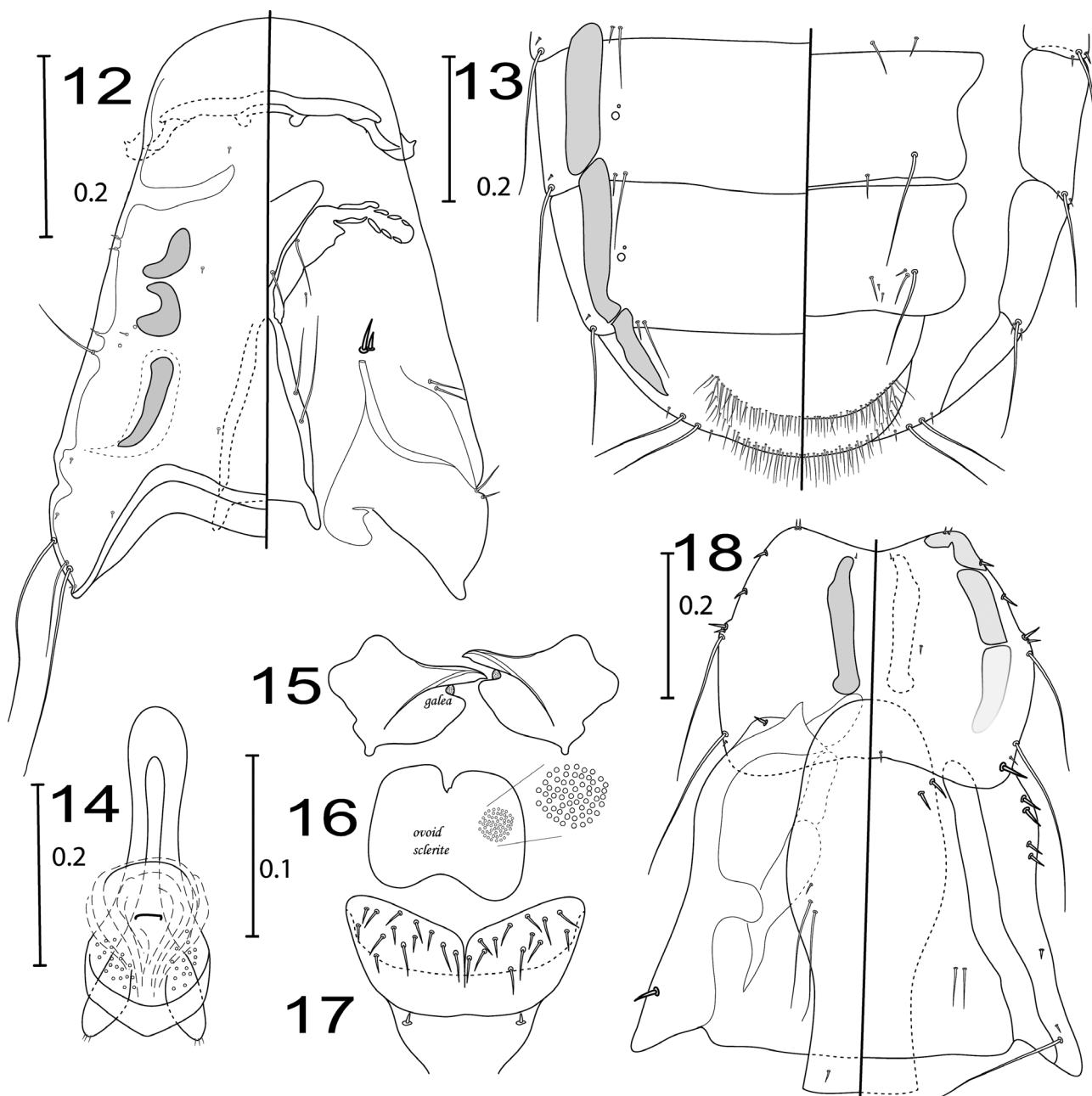
Type host. *Euphonia laniirostris hypoxantha* von Berlepsch & Taczanowski, 1884—Thick-billed euphonia (Passeriformes: Fringillidae)

Type locality. Peru.

Diagnosis. *Ricinus tanagraepphilus* belongs to the *subangulatus* species-group (Nelson 1972) by having lunar nodi, monomorphic mandibles, evident ovoid sclerite with pit-like depressions, and pattern on terminal tergite of female illi x illi, but can be distinguished from *Ricinus subangulatus* (Carriker, 1903), *Ricinus complicatus* Carriker, 1964, *Ricinus ramphoceli* Nelson, 1972 and *Ricinus volatiniae* Nelson, 1972 by having setae *a6* and 13 labial setae. Also, it differs from *R. vireoensis* and *Ricinus wolffi* Nelson, 1972 by having 3 setae on the parameres. Further, *R. tanagraepphilus* differs from *Ricinus subhastatus* (Durrant, 1906) by having setae *a6*, and inner setae on pleurites VI–VIII small and pilose.

Description. *Head* subconical, with straight lateral margins. Frons broadly convex; lateral margins divergent, not continuous with head lateral margin. Temple apices acute, hooked outside. Occipital margin nearly straight. Eyes not evident or slightly raised. Transverse carina present, convex. Lunar nodi present; tentorial nodi present, and lunar nodi nearly equal to tentorial. Mandibles monomorphic, blades long, thin and sharp needle-like, with tips notched; galea evident; basal lobe without finger-like process. Maxillary plates sausage-like; pigment pattern present; palpi geniculate, reaching the head margin. Ovoid sclerite evident, ornamentation deeply pitted. Gula with 2–3 pairs of setae; top of gular plate sclerite truncate; medial part without concavity; posterior projections present, directing posteriorly. Anterior margin of labium concave.

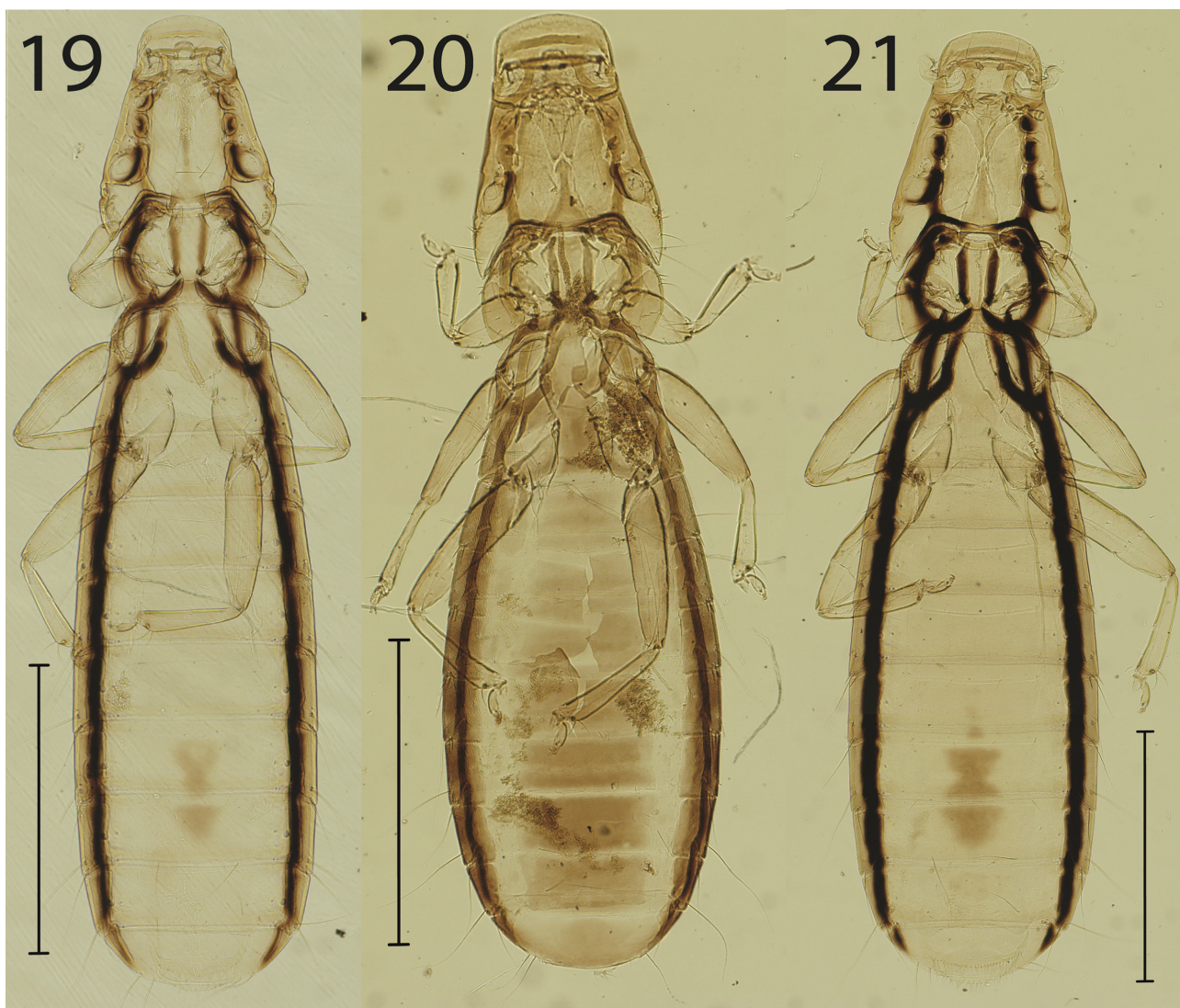
The *cf* series composed of 10 setae; *df* series present; *f1* evidently longer than *f2*; *a1* far shorter than *m4*; with two associated sensilla; *a3* absent; *a4* present; *a6* present; *m1–m3* equal; *m2* off the marginal carinae; *m4* evidently longer than *pa*. Labium with 13 pairs of setae. Mental setae positioned laterally to each other. Mental setae shorter than maxillary. Preantennal setae strongly spinose. Setae along the antennal lappets 11–13. Two spinose and subequal postocular setae.



FIGURES 12–18. *Ricinus tanagraepphilus*: 12, dorso-ventral views of head. 13, dorso-ventral views of abdomen. 14, male genitalia. 15, mandibles. 16, ovoid sclerite. 17, labium. 18, ventro-dorsal views of thorax. Scale bars in mm. Note: Complete anal fringes are drawn as in Nelson (1972).

Thorax. Prothorax hexagonal; anterior margin distinctly concave; lateral margins slightly notched; posterior margin concave. Posterolateral angles of prothorax evidently rounded. Prosternal sclerites thin, parallel, not joined. Anterior margin of sternal plate concave, without lateral depression; posterior angles straight. *L3* present; *L6* present; *L5* larger than *L4* and *L6*; *L9* evidently shorter than *L7* and *L8*; *c4* present; *c1* and *c2* nearly equal; *c2* spinose; *c3* and *c4* nearly equal; *w* series composed of 6 setae; anterior setae unequal. Long sternal setae situated medially on pterothorax 1; *q* series composed of 2 spines; *q2* strongly spinose; *q2* not shorter than *w* series; *b1*

evidently shorter than *b*₂. Coxa I with 2 tactile setae; femur I with 2 tactile setae; femur II and III with present tactile setae.



FIGURES 19–21. Females: **19**, *Ricinus dalgleishi*. **20**, *Ricinus* sp. ex *Corythopis delalandi*. **21**, *Ricinus vireoensis*.

Abdomen. Lateral margin of abdomen nearly straight. Segment IX nearly equal to VIII. Pleural nodi on segment IX present; relatively wide; margins smooth; lateral part of abdominal pleurites lightly pigmented. Second ventral pleurite with 3 setae; *II vps*1–3 large spinose; *III vps*1–2 small spinose; *III vps*3 small spine; *IV vps*1 large spine; *IV vps*2 long pilose; *IV vps*3 large spine; *V vps*1 small spine; *V vps*3 small pilose; *VI vps*1,3 small pilose; *VII vps*1,3 small pilose; *VIII vps*1 small pilose; *VIII vps*3 small to medium pilose. Two pairs of setae on tergite VIII. Sternolateral setae not equal to sternocentral on sternites II–VI. Vulva with 11 setae. Abdominal segment IX with 2 long terminal setae.

Male genitalia symmetrical; basal plate not narrow anteriorly; lateral margin slightly concave. Parameres triangular, with blunt endings. Mesosomal plate pigmented, lightly pointed and without medial extension. Three setae on the distal tips of the parameres.

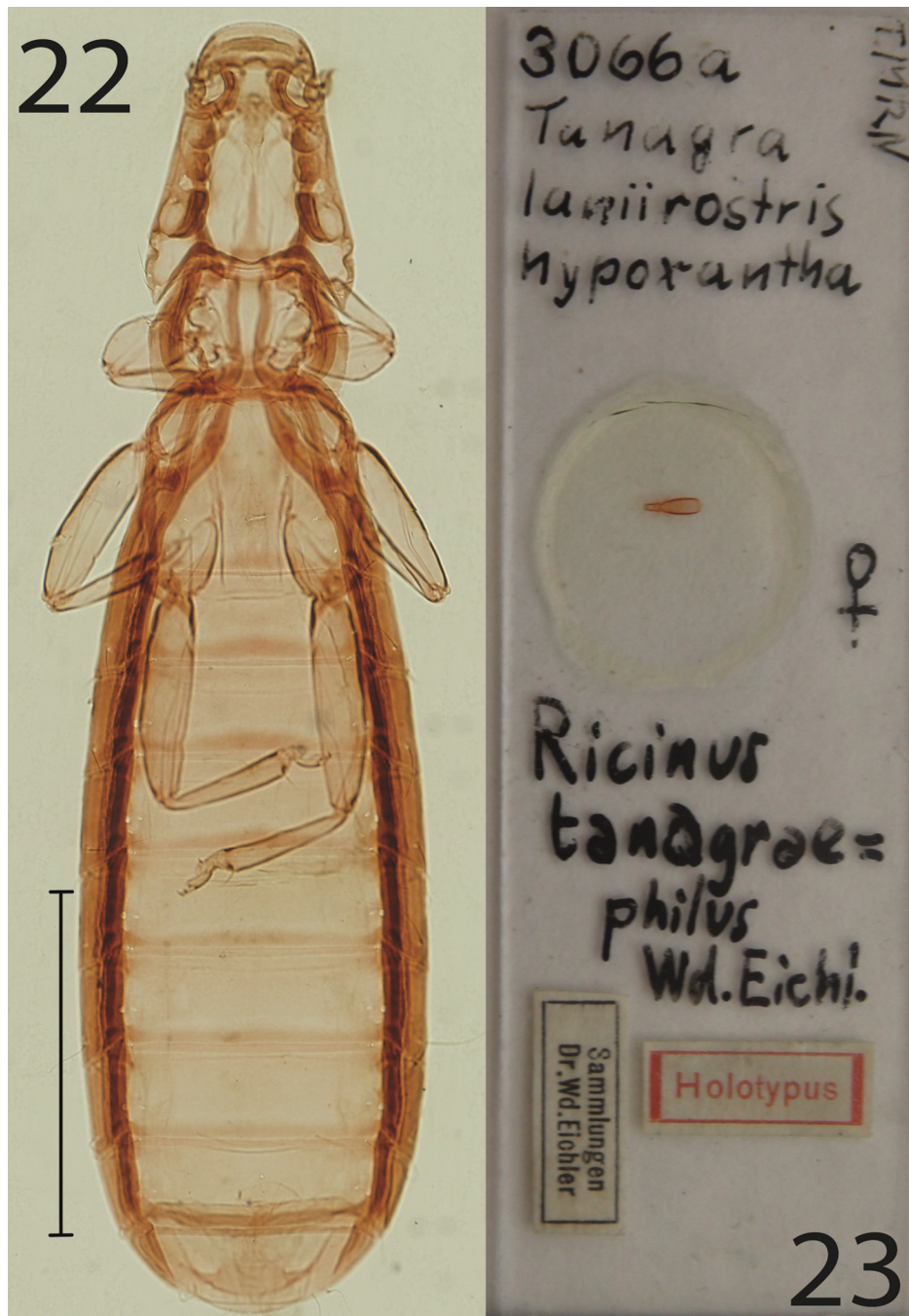
Dimensions. *Female* (n = 15). Head length 0.75–0.77; width 0.61–0.63; head index 120–124. Labrum width 0.30–0.32. Prothoracic length 0.37–0.38; width 0.58–0.59; ratio 0.63–0.66. Distance between prosternal setae 0.059–0.062. Abdominal width 1.01–1.05. Total length 3.70–3.78. Ratio of total length and abdomen width 3.60–3.66.

Male (n = 1). Head length 0.70; head width 0.59; head index 119. Labrum width 0.29. Prothoracic length 0.34; width 0.53; ratio 0.64. Distance between prosternal setae 0.062. Abdominal width 0.84. Total length 3.325. Ratio of total length and abdomen width 3.96. Length of male genitalia 0.48; width of mesosomal plate 0.188.

Material examined. Holotype ♀, Perú, date unknown, von Koepcke Coll., slide WEC3066a (ZMHU).

Non-types. Ex *Euphonia laniirostris* d'Orbigny & Lafresnaye, 1837: 1♂, 4♀, La Amistad Lodge, Las Tablas, Costa Rica (8°54' N, 82°47' W; 1300 m a.s.l.) 18–19 Aug. 2010, I. Literak, slides LT15a–b, LT65 [also 10♀, 9N in alcohol].

Remarks. Eichler's (1956) brief description of *R. tanagraephilus* was based on one female only. Carriker (1964: 50) subsequently redescribed this species, but Nelson (1972: 111) examined the specimen from *Euphonia laniirostris* studied by Carriker (1964) and recognized it as a distorted specimen of *R. marginatus*. For that reason, Nelson (1972) designated *R. tanagraephilus* as a *species inquirendae*. We also examined Carriker's specimen and we are able to confirm Nelson's (1972) identification.



FIGURES 22–23. *Ricinus tanagraephilus*. 22, holotype female. 23, holotype slide.

Although our samples originated from a different country than the type locality of *R. tanagraephilus* and, therefore, also from a different subspecies of *E. laniirostris* than the type host, our comparison against the holotype

of this louse species allowed us to confirm that this is a distinct and valid species of *Ricinus*. Also, we record and describe the male of *R. tanagraepphilus* for the first time.

Ricinus vireoensis Nelson, 1972

(Fig. 21, Table 1)

Ricinus vireoensis Nelson, 1972: 95, plate 33, figs 1–6.

Ricinus vireoensis Nelson, 1972; Price *et al.* 2003: 251.

Type host. *Vireo griseus* (Boddaert, 1783)—White-eyed vireo (Passeriformes: Vireonidae)

Type locality. Leon County, Florida, United States of America.

Material examined. Ex *Vireo pallens* Salvin, 1863—Mangrove vireo (Passeriformes: Vireonidae): 2♀, Utila Island, Islas de la Bahía, Honduras (16°06' N, 86°54' W) 27 Aug. 2014, I. Literak, slide UT87 [also 2♀, 4N in alcohol].

Ex *Vireo olivaceus* (Linnaeus, 1766) Red-eyed vireo (Passeriformes: Vireonidae): 3♀, Utila Island, Islas de la Bahía, Honduras (16°06' N, 86°54' W), 24 Aug. 2014, I. Literak, slide UT43 [also 7N in alcohol].

Remarks. *Vireo pallens* is an additional host species for *R. vireoensis* (see Price *et al.* 2003: 251), bringing the total number of known hosts for this louse species to eight.

TABLE 1. Summary of hosts, countries, species of *Ricinus*, and parasitological parameters of samples collected by I. Literak (P^A = ratio birds parasitized/examined; % = prevalence; ♀ = numbers of females; ♂ = numbers of males; N = numbers of nymphs; * = new host-louse association)

Bird family	Bird species	Country	P ^A	%	Louse species	♀	♂	N	Totals
Parulidae	<i>Helmitheros vermivorum</i>	Honduras	2/9	22.2	<i>Ricinus dalgleishi</i> *	5	5	6	16
Tyrannidae	<i>Corythopsis delalandi</i>	Paraguay	1/10	10.0	<i>Ricinus</i> sp.*	2	-	2	4
Fringillidae	<i>Euphonia laniirostris</i>	Costa Rica	2/26	7.7	<i>Ricinus tanagraepphilus</i>	14	1	9	24
Vireonidae	<i>Vireo pallens</i>	Honduras	1/9	11.1	<i>Ricinus vireoensis</i> *	4	-	4	8
	<i>Vireo olivaceus</i>	Honduras	1/12	8.3	<i>Ricinus vireoensis</i>	3	-	7	10

Acknowledgments

We thank Stanislav Kolenčík and Alberto Andres Velasquez Castillo for their help in the field in Honduras. Many thanks go to Floyd Shockley and David Floyd for their help during a visit by M.V. to the USNM, and to Jürgen Deckert for lending us the holotype of *Ricinus tanagraepphilus* held at the ZMHU. M.V. was supported with project IMA 2014-FVHE-16 for his stay at the USNM. We are also immensely grateful to editors Ricardo L. Palma and Jason D. Weckstein, as well as to two anonymous reviewers for their comments on earlier versions of the manuscript.

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