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Feather mites (Acariformes: Analgoidea) associated with the hairy woodpecker *Leuconotopicus villosus* (Piciformes: Picidae) in Panama

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ABSTRACT — Two new feather mite species of the superfamily Analgoidea are described from the hairy woodpecker *Leuconotopicus villosus* (Linnaeus, 1766) (Piciformes: Picidae) in Panama: *Pterotrogus panamensis* **n. sp.** (Pteronyssidae) and *Trouessartia hernandesi* **n. sp.** (Trouessartiidae). *Pterotrogus panamensis* belongs to the *simplex* species group and most clearly differs from the other species of this group in having the pregenital sclerite paired in males, and the hysteronotal shields strongly narrowed posteriorly in females. *Trouessartia hernandesi* is close to *T. picumni* Hernandez, 2014, the only previously known species of this genus from woodpeckers, and differs from the latter by having the following features: in both sexes, setae *d1* and *d2* are present and genual setae *cGI*, *cGII* and *mGI* are spiculiform; in males, epimerites IVa are long, bow-shaped and extend to the base of the genital apparatus; in females, the external copulatory tube is long and spiculiform.

KEYWORDS — Acari; Astigmata; Pteronyssidae; Trouessartiidae; *Pterotrogus*; *Trouessartia*; systematics; Picidae; Panama
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INTRODUCTION

Feather mites are a vast group of astigmatan mites (Acari: Astigmata) that are highly specialized ectoparasites and commensals permanently living on birds. These mites currently include over 2500 species arranged, according to the most widely accepted concept, in two superfamilies, Analgoidea and Pterolichoidea. Feather mites are known from all presently recognized orders of birds; most live in various microhabitats of the plumage of their hosts, although representatives of some families live on the skin and even in the nasal cavities (Gaud and

Atyeo 1996; Dabert and Mironov 1999; Proctor 2003; OConnor 2009).

Feather mites distributed in South America have been explored rather incompletely in relation to expected biodiversity and haphazardly regarding countries. To date, records of feather mites have been reviewed and summarized only for Brazil (Valim *et al.* 2011; Pedroso and Hernandez 2016) and Colombia (Barreto *et al.* 2012); for other countries, faunal data on these mites are scattered in taxonomic works and short faunal reports. In Panama, the biodiversity of feather mites has never been purposefully explored. In a total, 31 species represent-

ing 17 genera and 5 families (Alloptidae, Crypturoptidae, Freyanidae, Proctophyllodidae, Pterolichidae, and Pteronyssidae) have been recorded in this country over the past fifty years (Atyeo and Braasch 1966; Peterson 1971; Gaud *et al.* 1973; Atyeo 1979, 1988, 1989a, 1989b, Atyeo *et al.* 1984; Atyeo and Pérez 1990; Park and Atyeo 1972, 1974a, 1974b, 1975; Kudon 1982a, 1982b; Mironov and Dabert 2001; Mironov 2005).

In the present paper, which we intend to be the first of a series of papers on feather mites of Panama, we describe two new species from the hairy woodpecker *Leuconotopicus villosus* (Linnaeus) (Piciformes: Picidae).

MATERIALS AND METHODS

The material used in the present work was collected during our parasitological survey in Las Nubes station in the south-eastern part of La Amistad International Park (Chiriquí Province, Panama) in April of 2016. This field site has an elevation of 2500 – 2800 m and is predominantly covered with a cloud forest. Birds were captured with mist-nets, identified, and checked for the presence of ectosymbionts. Feather mites were taken from live birds under stereomicroscope with a preparation needle or fine forceps and placed in tubes with 96% ethanol. After processing, captured birds were released back to the wild. In the laboratory, feather mites were mounted on slides in Hoyer's medium according to the standard technique for small acariform mites (Krantz and Walter 2009). Investigation of mite specimens and drawings were made using a Leica DM 2500 light microscope equipped with differential interference contrast (DIC) and a camera lucida.

The descriptions of new species and techniques for measuring morphological structures follows the modern formats elaborated for corresponding taxonomic groups of mites (Mironov 2005; Mironov and Wauthy 2005; Hernandez 2012, 2014; Mironov and González-Acuña 2013). General morphological terms and leg and idiosomal chaetotaxy follow Gaud and Atyeo (1996); idiosomal chaetotaxy also follows these authors with minor corrections for

coxal setation by Norton (1998). All measurements are in micrometers (µm).

The taxonomic system and scientific names of birds follow Gill and Donsker (2017). Abbreviations used in collection numbers and type material depositories are as follows: BMOC and UMMZ – Museum of Zoology of the University of Michigan, Ann Arbor, USA; ZISP – Zoological Institute of the Russian Academy of Sciences, Saint-Petersburg, Russia.

SYSTEMATICS

Family Pteronyssidae Oudemans, 1941 Genus *Pterotrogus* Gaud, 1981

Type species: *Pteronyssus simplex* Haller, 1882, by original designation.

The feather mite genus *Pterotrogus* Gaud (in: Facini and Atyeo 1981) was originally established for the species *Pterotrogus simplex* (Haller, 1882) from *Melanerpes erythrocephalus* (Linnaeus) (Piciformes, Picidae). This genus is one of 12 pteronyssid genera restricted in their host associations to birds of the order Piciformes (Mironov 2003). To date, the genus *Pterotrogus* has included 17 species; all of them are associated with woodpeckers of the New World (Mironov 2005; Mironov *et al.* 2005; Hernandez 2012). Phylogenetic analysis of relationships within this genus, based on morphological characters, and a key to species were provided by Mironov (2005). All presently known species are arranged in four species groups: *iron*, *lanceolatus*, *sinusoidus*, and *simplex*. Representatives of this genus inhabit the ventral side of vanes of wing feathers (primaries, secondaries and tertiaries), where they are located in corridors.

Two species, *P. iron* Mironov, 2005 and *P. macrosinusoidus* Mironov, 2005, were previously recorded from *Campephilus guatemalensis* (Hartlaub) in Panama (Mironov 2005).

***Pterotrogus panamensis* n. sp.**
(Figures 1–3)

Zoobank: 8045E708-460B-499B-947D-C5A4C5744DE6

Type material — Holotype male (BMOC 17-0211-001), 15 male and 15 female paratypes from *Leuconotopicus villosus* (Linnaeus, 1766) (Pici-formes: Pici-dae), Panama, Chiriquí Province, La Amistad International Park, Las Nubes Ranger Station, 8°53'38"N, 82°36'54"W, 30 April 2016, coll. S.V. Mironov.

Depository — Holotype, 8 male and 8 female paratypes — UMMZ, remaining paratypes — ZISP.

Description — **Male** (holotype, ranges for 10 paratypes in parentheses) (Figures 1, 3A–E) — Length of idiosoma from anterior end to lobar apices 275 (260 – 280), greatest width of idiosoma 150 (145 – 155). Idiosoma covered with entire dorsal shield, transverse trace between fused prodorsal and hysteronotal shields barely detectable, inner borders of scapular and humeral shields indistinct; (Fig. 1); lateral margins of prodorsal shield with small incisions around external scapular setae *se*; dorsal surface without ornamentation. Bases of setae *se* separated by 72 (68 – 75). Length of hysterosoma from level of setae *c2* to lobar apices 170 (155 – 170). Setae *c3* lanceolate, with acute apex, 18 (15 – 18) long, 6 (5 – 6) wide). Hysterosoma distinctly narrowed posterior to level of trochanters III, opisthosoma approximately half as wide as greatest body width; opisthosomal lobes short and widely rounded, with short truncate extensions bearing bases of setae *h2*, *h3*, and *ps2*; terminal cleft small semicircular, 12 (8 – 12) long. Dorsal setae *e1* situated anterior to the levels of lateral setae *e2* and hysteronotal gland openings *gl*. Macrosetae *h2* and *h3* with enlargement in basal part. Setae *ps1*, *f2* filiform, setae *ps2* slightly thickened basally; length of setae: *ps1* 15 (15 – 18), *ps2* 33 (32 – 34), *f2* 17 (15 – 18). Dorsal measurements: *c2:d2* 85 (78 – 85), *d2:e2* 50 (45 – 50), *e2:h3* 40 (38 – 40), *d1:d2* 38 (34 – 38), *e1:gl* 15 (13 – 15), *d2:gl* 32 (22 – 35), *h2:h2* 32 (32 – 35), *h3:h3* 23 (23 – 24), *ps1:ps1* 10 (10 – 12), *ps2:ps2* 42 (42 – 45).

Epimerites I, II with narrow sclerotized areas. Inner ends of epimerites IIIa shaped as an oblique L. Setae *3a* and *4b* approximately at the same transverse level. Genital arch 15 (15 – 16) long, 10 (10

– 11) wide, aedeagus about one third the length of arch. Epiandrum present, minute. Pregenital sclerites present, represented by a pair of small longitudinal sclerites. Coxal setae *4a* approximately at level of genital arch apex. Genital shield and adanal shields absent. Diameter of anal discs 13 (11 – 13).

Tarsus I slightly longer than wide. Genua I, II without crests, femora I, II with ventral crest. Tarsus III 30 (28 – 30) long, with small subapical claw, seta *r* short, about half the length of this segment. Legs IV with ambulacral disc extending beyond level of lobar apices. Tarsus IV 15 (14 – 15) long, modified setae *d*, *e* spiniform. Length of solenidia: σ II 8 (6 – 8), σ II 5 (3 – 5), σ III 6 (5 – 6), φ IV 20 (20 – 22).

Female (ranges for 10 paratypes) (Figures 2, 3F, G) — Length of idiosoma 390 – 400, greatest width of idiosoma 160 – 170. Length of hysterosoma from level of setae *c2* to posterior end 275 – 285. Transverse trace between fused prodorsal and hysteronotal shields barely detectable, scapular shields fused with prodorsal shield, lateral margins of prodorsal shield with deep triangular incisions around setal bases *se* and *si*, bases of setae *se* separated by 80 – 85. Lateral borders of hysteronotal shield irregularly jagged with edges indistinct; posterior end of hysteronotal shield strongly narrowed and sclerotized much more heavily than remaining area of this shield. Lateral areas of hysterosoma dotted, without striae, sclerotized more weakly than dorsal shields. Setae *c3* lanceolate with acute apex, 16 – 20 long, 6 – 7 wide. Posterior margin of opisthosoma rounded, without lobes. Setae *d1* posterior to level of setae *cp*, setae *e1* anterior to levels of setae *e2* and openings *gl*. External copulatory tube as small weakly sclerotized cone-like extension. Macrosetae *h2*, *h3* whip-like, without lanceolate basal enlargement. Setae *ps1*, *ps2* and *f2* filiform; length of setae: *ps1* 10 – 12, *ps2* 18 – 25, *f2* 12 – 15. Dorsal measurements: *c2:d2* 115 – 120, *d2:e2* 75 – 88, *d2:gl* 65 – 70, *gl:e1* 12 – 13, *e2:h3* 75 – 85, *d1:d2* 40 – 57, *e1:e2* 25 – 33, *h2:h2* 45 – 53, *h3:h3* 30 – 32, *ps1:ps1* 32 – 36.

Epimerites I, II as in the male. Epimerites III, IV with small triangular sclerotized areas. Epigynum shaped as long arch, with tips extending beyond level of setae *g*, without lateral extensions, 60 – 65 long, 70 – 78 wide; sclerotized folds of oviporus ex-

FIGURE 1: *Pterotrogus panamensis* n. sp., male: A – dorsal view, B – ventral view.

FIGURE 2: *Pterotrogus panamensis* n. sp., female: A – dorsal view, B – ventral view.

FIGURE 3: *Pterotrogus panamensis* n. sp., details: A–E – male, F, G – female. A, B – leg I and II of male, respectively, C – genu, tibia and tarsus III of male, D – tibia and tarsus IV of male, E – male opisthosoma, dorsal view, F, G – tibia and tarsus III and IV of female. Abbreviations: vm – ventral membrane of tarsus I.

tending to midlevel of epimerites IV. Adanal sclerites absent.

Legs I, II as in male. Tarsus III 25 – 30, tarsus IV 30 – 33 long. Length of solenidia: σ II 7 – 10, σ II 4 – 5, σ III 4 – 5, φ III 42 – 45, φ IV 8 – 10.

Differential diagnosis — The new species, *Pterotrogus panamensis* n. sp., belongs to the *simplex* species group (Mironov 2005) in having, in both sexes, simple filiform setae on the posterior margin of the body (f_2 , h_2 , h_3 , ps_1 , and ps_2) and by the absence of dorsal crests on segments of legs I, II. Among seven previously known species of this group (Mironov 2005; Hernandez 2012), the new

species is most similar to *P. colapti* Mironov, 2005 from *Colaptes punctigula guttatus* (von Spix) (Pici-formes: Picidae) in having setae c_3 lanceolate and setae e_1 situated between levels of setae d_2 and e_2 in both sexes, and rounded incisions around bases of setae se in males. *Pterotrogus panamensis* n. sp. differs from this species by the following features: in males, a pair of small pregenital sclerites are present anterior to the genital arch, bases of setae h_2 and h_3 are slightly flattened and enlarged; in females, the posterior end of the hysteronotal shield is strongly narrowed (about 1/3 the width of the main body of the shield) and heavily sclerotized. In males of *P. colapti* and other species of the *simplex* group, the

pregenital sclerites are absent or represented by a single median band (*P. veniliornis* Mironov, 2005), setae *h2* and *h3* are simple whip-like; in females, the posterior end of the hysteronotal shield is widely rounded and without strong sclerotization.

Etymology — The specific epithet is derived from the country name where this species was found.

Family Trouessartiidae Gaud, 1957
Genus Trouessartia Canestrini, 1899

Type species: *Dermaleichus corvinus* Koch, 1841, by subsequent designation.

With 112 described species, the feather mite genus *Trouessartia* Canestrini, 1899 is the most species-rich within the family (Santana 1976; Gaud and Atyeo 1986, 1987; Constantinescu et al. 2013, 2016a; Mironov and González-Acuña 2013; Hernandez 2014; Mironov and Palma 2016; Mironov and Overstreet 2016). A world revision of this genus, including uniform (re)descriptions and a key to 71 valid species recognized at that time, was provided by Santana (1976). This monograph is still the main publication on systematics of this genus. Major references to taxonomic papers on *Trouessartia* published after this work were provided by Mironov and González-Acuña (2013), Constantinescu et al. (2013, 2016a, 2016b), Hernandez (2014), Hernandez and Valim (2015) and Mironov and Palma (2016).

The genus *Trouessartia* is distributed worldwide. Its representatives are predominately associated with passerines and have been recorded from members of 28 families as classified by Gill and Donsker (2017). Among the species living on passerines, almost all are associated with oscines, and only five species have so far been recorded from suboscines of the families Tyrannidae and Rhinocryptidae in South America. Three single records of *Trouessartia* species on non-passerines hosts of the orders Charadriiformes, Coraciiformes, and Psittaciformes were considered as the result of accidental contaminations, since they have never been recollected from the same hosts (Orwig 1968; Santana 1976; Gaud and Atyeo 1996). The only species reliably known from non-passerine hosts is recently described *Trouessartia picumni* Hernandez, 2014 from

the tawny piculet *Picumnus fulvescens* (Stager) (Piformes: Picidae) in Brazil (Hernandes 2014). Within the plumage of their hosts, mites of the genus *Trouessartia* are mainly located on the wing feathers (secondaries, tertiaries, and greater upper coverts) and the rectrices (Mironov and González-Acuña 2013).

A new *Trouessartia* species described below is the first record of this genus in Panama.

***Trouessartia hernandesi* n. sp.**
(Figures 4–6)

Zoobank: [04C29960-47E2-4D2F-A8CF-4B4EC79EDAD2](https://zoobank.org/04C29960-47E2-4D2F-A8CF-4B4EC79EDAD2)

Type material — Holotype male (BMOC 17-0211-002), 15 male and 15 female paratypes from *Leuconotopicus villosus* (Linnaeus, 1766) (Piformes: Picidae), Panama, Chiriquí Province, La Amistad International Park, Las Nubes Ranger Station, 8°53'38"N, 82°36'54"W, 30 April 2016, coll. S.V. Mironov.

Depository — Holotype, 8 male and 8 female paratypes — UMMZ, remaining paratypes — ZISP.

Description — **Male** (holotype, ranges for 10 paratypes in parentheses) (Figures 4, 6A–E) — Length of idiosoma from anterior end to lobar apices excluding lamellae 400 (395 – 430), width of idiosoma at level of humeral shields 200 (195 – 215). Length of hysterosoma from level of sejugal furrow to lobar apices 255 (255 – 275). Prodorsal shield: covering almost all prodorsum, length along midline 145 (140 – 155), greatest width posterior to level of scapular setae 160 (155 – 165), anterior part at level of trochanters II not narrowed, anterolateral extensions rounded, lateral margins immediately posterior to level of scapular setae fused with anterior ends of scapular shields, posterior margin slightly convex, surface without ornamentation. Internal scapular setae *si* filiform, 23 (15 – 24) long, separated by 55 (55 – 60); external scapular setae *se* separated by 95 (92 – 102). Scapular shields with poorly sclerotized inner margin and with oblique heavily sclerotized ridges on outer margin. Setae *c2* thin needle-like, 35 (30 – 35) long, situated on anterior margins of humeral shields. Setae *c3* narrowly lanceolate, with acute apex, 20 (20 – 22) long. Hysteronotal shield entire, prohysteronotal and lobar parts connected by wide median band and delimited from each other by narrow lateral incisions and a small

FIGURE 4: *Trouessartia hernandesi* n. sp., male: A – dorsal view, B – ventral view.

FIGURE 5: *Trouessartia hernandesi* n. sp., female: A – dorsal view, B – ventral view.

FIGURE 6: *Trouessartia hernandesi* n. sp., details: A–C – legs I–III of male, respectively, D – tibia and tarsus IV of male, E – genital apparatus and opisthosoma of male, ventral view, F, G – tibia and tarsus III and IV of female, respectively, H – spermatheca and spermaducts. Abbreviations: ad – adanal apodeme, ae – aedeagus, as – adanal shield, bs – basal sclerite, cs – collar of spermatheca, ea – epiandrum, eplIV – epimerites IVa, gp – genital papillae, is – intermedial sclerite, hs – head of spermatheca, pd – primary spermaduct, pm – parameres, sd – secondary spermaduct, ta – translobar apodeme, tl – terminal lamella.

median unsclerotized patch, total length from anterior margin to lobar apices excluding lamellae 255 (250 – 265). Prohysteronotal part: length along midline 180 (170 – 185), width at anterior margin 165 (160 – 170), anterior angles fused with humeral shields, lateral margins without incisions, dorsal hysterosomal apertures (DHA) absent, surface without ornamentation, supranal concavity area with heavily sclerotized semi-ovate patch. Dorsal setae *d1*, *d2*, *e1* and *e2* present. Length of lobar shield excluding terminal lamellae 75 (75 – 82), greatest width 82 (82 – 92). Apical parts of opisthosomal lobes approximate, separated by narrow U-shaped terminal cleft extending to level of setae *h2*; length of cleft from anterior end to lobar apices 25 (24 – 26), length from anterior end to apices of terminal lamellae 50 (50 – 58), width at midlevel 13 (12 – 13). Terminal lamellae semi-ovate, with smooth margins, length from bases of setae *h3* to lamellar apices 28 (28 – 32), greatest width 28 (25 – 28). Distance between dorsal setae: *c2:d2* 66 (65 – 75), *d2:e2* 93 (86 – 95), *e2:h2* 66 (63 – 68), *h2:h3* 18 (18 – 20), *h2:h2* 50 (50–55), *h3:h3* 38 (38 – 40), *d1:d2* 40 (38 – 50), *e1:e2* 35 (33 – 40), *h1:h2* 11 (8 – 11), *ps1:h3* 5 (5 – 7).

Epimerites I free. Rudimentary sclerites rEpIIa small, roughly ovate. Genital apparatus base situated at levels of anterior margin of trochanters IV, length excluding epiandrum and basal sclerite 40 (38 – 40), width at base 24 (24 – 26). Epiandrum (pregenital sclerite) present. Anterior and posterior genital papillae equal in size and situated equidistant from midline. Setae *g* filiform, with bases touching each other. Postgenital shield absent. Adanal apodemes thick, heavily sclerotized, with anterior ends slightly convergent and almost extending to level of trochanters IV, with narrow and barely detectable lateral membranes, without apophyses. Translobar apodeme present. Adanal shields bearing setae *ps3* shaped as small triangles. Adanal suckers 13 (13 – 14) in diameter. Inner ends of epimerites IIIa with apices extending to level of humeral setae *cp*. Epimerites IVa long, bow-shaped, with anterior ends extending to almost midlevel of genital apparatus. Setae *4b* situated anterior to level of setae *3a*, approximately at level of epimerites IIIa tips; setae *g* and *4a* at same transverse level. Dis-

tance between ventral setae: *4b:3a* 20 (18 – 22), *4b:g* 75 (72 – 82), *g:ps3* 56 (56 – 60), *ps3:h3* 80 (80–85).

Setae *cG* of genua I, II spiculiform, approximately equal in length to these segments, seta *mGI* spiculiform, approximately half the length of genu I, seta *mGII* filiform. Legs IV with ambulacral disc extending to level of setae *h3*. Trochanteral seta *sRIII* thick filiform, 30 (30 – 34) long. Tarsus IV 33 (30 – 33) long; modified setae *d*, barrel-shaped with discoid cap, situated closer to apex of tarsus; modified setae *e* hemispherical, situated apically. Length of solenidia: σ II 25 (24 – 27), σ II 13 (12 – 15), σ III 15 (14 – 16), φ IV 38 (35 – 40).

Female (range for 10 paratypes) (Figures 5, 6F–H) — Length of idiosoma from anterior end to apices of hyaline lobar processes 495 – 520, width at level of humeral shields 205 – 220. Length of hysterosoma from level of sejugal furrow to apices of lobar processes 345 – 360. Prodorsal shield: generally shaped as in males, 155 – 165 long, 165 – 175 wide, surface without ornamentation. Setae *si* filiform, 17 – 19 long, separated by 60 – 65; setae *se* separated by 100 – 105. Setae *c2* thin spiculiform, 26 – 27 long, situated on anterior margin of humeral shields. Setae *c3* narrowly lanceolate, with acute apex, 19 – 20 long. Hysteronotal shield: length from anterior margin to level of acute posterior ends 300 – 325, width at anterior margin 165 – 175, lateral margins without incisions, DHA absent, area from level of trochanters IV to setae *h2* with several longitudinal dash-like lacunae. Dorsal setae *d1*, *d2*, *e1*, *e2* present. Setae *f2* absent. Setae *h1* short filiform, about 10 long, situated anteromesal to bases of setae *h2*, 10 – 12 from corresponding lateral margins of hysteronotal shield. Width of opisthosoma at level of setae *h2* 100 – 105. Setae *ps1* situated closer to level of setae *h2* than to setae *h3*. Supranal concavity opened posteriorly into terminal cleft. Length of terminal cleft from anterior margin to lobar apices 125 – 130, width of cleft at level of setae *h3* 42 – 44. Interlobar membrane narrow, developed only at anterior end of terminal cleft, distance from free margin of this membrane to lobar apices 105 – 110. External copulatory tube thick spiculiform, slightly curved, with base situated on free margin of interlobar membrane. Distance between dorsal setae: *c2:d2* 90 – 95,

d2:e2 90 – 95, *e2:h2* 65 – 68, *h2:h3* 82 – 85, *h2:h2* 82 – 85, *h3:h3* 62 – 68, *d1:d2* 42 – 45, *e1:e2* 38 – 43, *h1:h2* 19 – 20, *h1:h1* 63 – 65, *ps1:h3* 38 – 40.

Epimerites I free. Epigynum 38 – 40 long, 90 – 95 wide. Head of spermatheca with short collar, primary spermaduct without enlargements, secondary spermaducts about 5 long with c-shaped ends. Inner margins of epimerites IIIa with narrow and acute extension directed rearward. Epimerites IVa long, with longitudinal groove. Anal opening without adanal sclerites.

Legs I, II as in males. Trochanteral setae *sRIII* filiform, 30 – 32 long. Legs IV with ambulacral disc extending to midlevel between setae *h2* and *h3*. Length of solenidia: σ II 24 – 26, σ II 10 – 12, σ III 15 – 17, ϕ IV 40 – 45.

Differential diagnosis — The new species, *Trouessartia hernandesi* n. sp., is close to *T. picumni* Hernandez, 2014 from *Picumnus fulvescens* (Stager) (Piciformes, Picidae). These two species constitute a distinct species group, which we refer here the *picumni* group, characterized by the following common features: in both sexes, the prodorsal shield is fused with anterior ends of scapular shields, and the hysteronotal shield is fused with anterior ends of the humeral shields, trochanteral setae *sRIII* are long filiform; in females, setae *ps1* are situated closer to setae *h2* than to *h3*. *Trouessartia hernandesi* differs from *T. picumni* by the following features: in both sexes, setae *d1* and *d2* are present, the lateral margins of the hysteronotal shield lack any incisions, genual setae *cGI*, *cGII* and *mGI* are spiculiform; in males, epimerites IVa are long, bow-shaped and extend to the base of the genital apparatus; in females, the external copulatory tube is long spiculiform. In both sexes of *T. picumni*, setae *d1* and *d2* are absent, the lateral margins of the hysteronotal shields have a notch-like incision at level of trochanters III, setae *cGI*, *cGII* and *mGI* are filiform; in males, epimerites IVa are short and barely extend to the level of setae *g*; in females, the external copulatory tube is absent, the copulatory opening is in the anterior end of the terminal cleft.

Etymology — The species is named after Dr. Fabio A. Hernandez (Universidade Estadual

Paulista, Rio Claro, São Paulo, Brazil), a prominent Brazilian expert on feather mites.

DISCUSSION

The hairy woodpecker, *Leuconotopicus villosus* (Linnaeus), has a very broad distribution throughout North and Central America (del Hoyo *et al.* 2002). The most southern part of its range extends to western Panama, where this bird is represented by a subspecies *L. v. extimus* (Bangs) (Gill and Donsker 2017). The feather mite fauna of the hairy woodpecker has been previously explored in Canada (Mironov & Galloway 2006; Galloway *et al.* 2014), with four species reported: *Neopteronysus pici* (Scopoli, 1763), *Pteronyssus brevipes* (Berlese, 1884), *P. picoides* Černý & Schumilo, 1973 (Pteronyssidae), and *Picalgoides picimajoris* (Buchholz, 1869) (Psoroptoididae). All these mite species are rather common on woodpeckers of the genera *Dendrocopos* Koch, *Leuconotopicus* Malherbe and *Picoides* Lacépède in northern Eurasia and North America (Mironov 1989, 2003, 2004; Mironov and Galloway 2006). Although several individuals of *L. villosus* were examined in Canada over the course of that study, none of the new mite species described herein was found. Similarly, none of the four species occurring on *L. villosus* in Canada have been found in Panama.

The most reasonable explanation of this discordance in the feather mite faunas is that the mites associated with the hairy woodpecker in Panama, *Pterotrogus panamensis* and *Trouessartia hernandesi*, might be of a secondary origin on this host. In other words, the ancestors of these mite species may have been transferred from unrelated and presently unknown host species. The mite genus *Pterotrogus* is widely distributed on New World woodpeckers, particularly the species-rich genera *Campephilus* Gray, *Colaptes* Vigors and *Veniliornis* Bonaparte in Central and South America. A few species of *Pterotrogus* species are also known from single host species from the genera *Dryocopus* Boie, *Leuconotopicus*, and *Melanerpes* Swainson in North America (Mironov 2005; Mironov *et al.* 2005; Hernandez 2012). We suggest that the ancestor of *P. panamensis* has shifted from a woodpecker species of the gen-

era *Colaptes* or *Veniliornis* harboring species of the *simplex* group (Mironov 2005).

The genus *Trouessartia*, currently including over 110 species and the richest genus within the family, is associated almost exclusively with passerines (Santana 1976; Mironov and González-Acuña 2013; Hernandez and Valim 2015, Mironov and Palma 2016). *Trouessartia picumni* Hernandez, 2014, described from piculets of the genus *Picumnus* Temminck (Picidae: Picumninae) in Brazil, is the only species previously known to be associated with piciform hosts (Hernandez 2014). Since *T. hernandesi* and *T. picumni* are closely related species, but associated with woodpeckers from very distant phylogenetic lineages (different subfamilies), we suggest that the ancestors of both mite species have been transferred from probably related passerine hosts.

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