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A NEW FEATHER MITE SPECIES OF THE GENUS *TROUESSARTIA* CANESTRINI (ACARIFORMES: TROUESSARTIIDAE) FROM THE NORTHERN ROUGH-WINGED SWALLOW *STELGIDOPTERYX SERRIPENNIS* (PASSERIFORMES: HIRUNDINIDAE) IN PENNSYLVANIA

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ABSTRACT: A new feather mite species, *Trouessartia stelgidopteryx* sp. n. (Astigmata: Trouessartiidae), is described from the Northern rough-winged swallow *Stelgidopteryx serripennis* Newton (Passeriformes: Hirundinidae) in Pennsylvania, USA. The new species is close to the *minutipes* species group and differs from its representatives and all other known species of the genus *Trouessartia* in having a unique combination of features in males: the opisthosomal lobes are much longer than wide, they are separated by a large semi-ovate terminal cleft, and their lobar apices bear semi-ovate terminal lamellae with a smooth margin.

KEY WORDS: Feather mites, Acariformes, Trouessartiidae, *Trouessartia*, systematics, Passeriformes, Hirundinidae, North America.

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INTRODUCTION

The feather mite genus *Trouessartia* Canestrini, 1899 (Astigmata: Trouessartiidae) currently includes over 110 species and is the most speciose within the family (Santana 1976; Mironov and González-Acuña 2013; Hernandes and Valim 2015; Constantinescu *et al.* 2016a; Mironov and Palma 2016). As for most trouessartiids, the representatives of this genus have a strongly flattened body with large heavily sclerotized dorsal shields and inhabit feathers with large and firm vanes, such as wing and tail feathers (Mironov 1987; Dabert and Mironov 1999).

The mites of the genus *Trouessartia* live almost exclusively on passerines (Passeriformes), and have been recorded from members of 28 families as classified by Clements *et al.* (2015). The species, *Trouessartia picumni* Hernandes 2014, is reliably associated with woodpeckers of the genus *Picumnus* Temminck (Piciformes: Picidae) (Hernandes 2014). Three single records of *Trouessartia* species on non-passerine hosts of the orders Charadriiformes, Coraciiformes, and Psittaciformes have been suggested as results of contaminations, because they have never been recollected (Orwig 1968; Santana 1976; Gaud and Atyeo 1996). Among the species living on passerines, the greatest majority is associated with oscine passerines, and only five species have so far been recorded from suboscines of the families Tyrannidae and Rhinocryptidae in South America (Mauri and De Alzuet 1968; Mironov and González-Acuña 2013; Hernandes 2014; Hernandes and Valim 2015).

A world revision of this genus provided by Santana (1976) included redescriptions and a key to

71 valid species, known at that time; this monograph still remains the most important taxonomic work on systematics of the genus *Trouessartia*. In the subsequent forty years, over 40 new species of *Trouessartia* have been described from various areas of the World (Mauri and De Alzuet 1968; Černý and Lukoschus 1975; Gaud 1977; Černý 1979; Mironov 1983; Gaud and Atyeo 1986, 1987; Mironov and Kopij 1996, 2000; OConnor *et al.* 2005; Carleton and Proctor 2010; Burdejnaja and Kivganov 2011; Mironov and González-Acuña 2013; Constantinescu *et al.* 2013, 2016a, 2016b; Hernandes 2014; Hernandes and Valim 2015; Mironov and Palma 2016). Among these publications, two papers by Gaud and Atyeo (1986, 1987) provided taxonomic reviews of the *appendiculata* and *minutipes* species groups associated with swallows (Passeriformes: Hirundinidae) of Europe and Africa.

In this paper, we describe a new *Trouessartia* species found on the Northern rough-winged swallow *Stelgidopteryx serripennis* (Passeriformes: Hirundinidae) in Pennsylvania, USA.

MATERIAL AND METHODS

The material used in the present work has been collected by RO off a fresh-dead salvaged Northern rough-winged swallow adjacent to the Raystown Branch Juniata River near Saxton, Bedford County, Pennsylvania, USA, in 2001. The feather mites detected on birds were removed from feathers with the help of fine forceps or a fine red sable spotting brush and placed into tubes with 70% ethanol. Then mite specimens were mounted on microslides in

Hoyer's medium according to the standard technique for this group of mites (Krantz and Walter 2009). Slide-mounted mites were studied using a Leica DM2500 microscope (Leica Microsystems Inc.) with differential interference contrast (DIC) and a camera lucida.

The description follows the standard format and measuring techniques recently proposed for species of the family Trouessartiidae (Mironov and González-Acuña 2013; Hernandez 2014; Hernandez and Valim 2015). General morphological terms and leg chaetotaxy follow the definitions by Gaud and Atyeo (1996) as well as idiosomal chaetotaxy, with minor corrections by Norton (1998); terms specifically concerning the family Trouessartiidae follow those by Orwig (1968) and Santana (1976). All measurements are in micrometers (μm).

The abbreviations used in accession specimen numbers and depositories: BMOc and UMMZ—Museum of Zoology of the University of Michigan (Ann Arbor, MI, USA); ZISP—Zoological Institute of the Russian Academy of Sciences (Saint Petersburg, Russia).

SYSTEMATICS

Family Trouessartiidae Gaud, 1957

Genus *Trouessartia* Canestrini, 1899

Trouessartia stelgidopteryx Mironov et Overstreet, sp. n.

Figs. 1–3

Type material. Holotype male (BMOc 16-0825-29) and 5 male and 6 female paratypes from *Stelgidopteryx serripennis* Newton, 1865 (Passeriformes: Hirundinidae), USA, Pennsylvania, Bedford County, Raystown Branch Juniata River near Saxton, 40°12'1.80"N, 78°16'28.24"W, 6 May 2001, coll. R. M. Overstreet.

Repositories. Holotype, 2 male and 3 female paratypes—UMMZ, 3 male and 3 female paratypes—ZISP (7115–7120).

Description. Male (holotype, ranges for 5 paratypes in parentheses) (Figs. 1, 3A–F). Length of idiosoma from anterior end to lobar apices excluding lamellae 390 (380–420), width of idiosoma at level of humeral shields 165 (160–180). Length of hysterosoma from level of sejugal furrow to lobar apices 265 (260–285). Prodorsal shield: length along midline 117 (115–135), greatest width posterior to level of scapular setae 135 (130–150), anterior part at level of trochanters II not narrowed, anterolateral extensions not fused with epimerites

Ia between legs I and II, lateral margins not fused with scapular shields, posterior margin straight, surface without ornamentation (Fig. 1A). Internal scapular setae *si* narrowly lanceolate, 20 (20–24) long, separated by 47 (45–52); external scapular setae *se* separated by 90 (90–100). Setae *c2* thin needle-like, 21 (21–27) long, situated in antero-medial angle of humeral shields. Setae *c3* narrowly lanceolate, with acute apex, 16 (15–17) long. Hysteronotal shield completely separated into prohysteronotal and lobar parts, total length from anterior margin to lobar apices excluding lamellae 270 (250–290). Prohysteronotal shield: length along midline 165 (160–175), width at anterior margin 140 (135–160), lateral margins without incisions, dorsal hysterosomal apertures (DHA) present, central area with scarcely distinct network patterns, supranal concavity area with heavily sclerotized ovate patch. Dorsal setae *d1* present. Length of lobar shield excluding terminal lamellae 97 (95–110), greatest width 85 (85–100), anterior part with a pair of heavily sclerotized seed-shaped patches. Opisthosomal lobes several times longer than wide, widely separated by semi-ovate terminal cleft; length of cleft from anterior end to apices of terminal lamellae 67 (65–75), greatest width at level of lobar apices 54 (50–55). Terminal lamellae semi-ovate, with smooth margins, length from bases of setae *h3* to lamellar apices 23 (23–25), greatest width 28 (25–35). Distance between dorsal setae: *c2:d2* 67 (65–74), *d2:e2* 85 (85–98), *e2:h2* 80 (80–95), *h2:h3* 18 (16–18), *h2:h2* 92 (90–95), *h3:h3* 80 (72–82), *d1:d2* 42 (40–50), *e1:e2* 40 (40–52), *h1:h2* 10 (10–12), *ps1:h3* 8 (7–10).

Epimerites I free. Rudimentary sclerites rE-pIIa semi-ovate. Genital apparatus (Fig. 3E) situated between levels of trochanters III and IV, length excluding basal sclerite 40 (38–45), width at base 30 (30–36). Epiandrum (pregenital sclerite) present. Anterior and posterior genital papillae equal in size and situated almost equidistant from midline. Setae *g1* filiform, with bases distinctly separated. Postgenital plaque absent. Adanal apodemes heavily sclerotized, with anterior ends extending to level of trochanters IV and slightly divergent, with long lateral membranes, without apophyses. Translobar apodemes absent. Adanal shields bearing setae *ps3* shaped as small longitudinal sclerites with acute anterior end. Adanal suckers 15 (15–17) in diameter. Inner ends of epimerites IIIa with apices extending to level of humeral setae *cp*. Epimerites IVa absent. Setae *4b* situated slightly posterior to level of setae *3a*; setae *g* slightly pos-

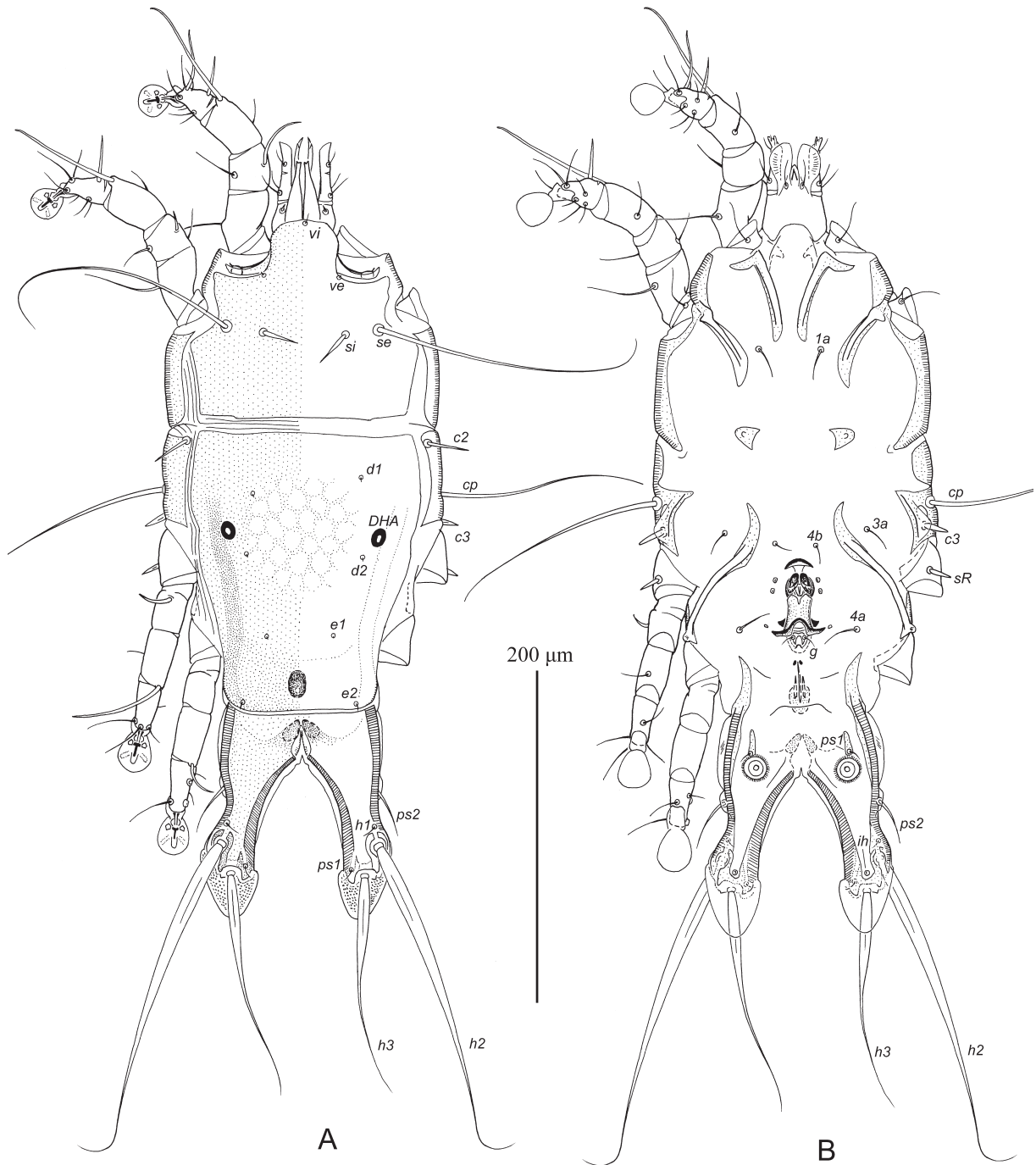


Fig. 1. *Trouessartia stelgidopteryx* sp. n., male. A—dorsal view, B—ventral view. Abbreviations: rEpIIa—rudimentary sclerite of epimerites IIa, ta—translobar apodeme.

terior to level of setae 4a. Distance between ventral setae: 4b:3a 7 (7–8), 4b:g 52 (50–58), 4a:g 5 (5–7), g:ps3 67 (65–75), ps3:h3 62 (60–85).

Setae cGI and mG of genua I and II filiform. Legs IV with ambulacral disc extending beyond level of setae h2. Trochanteral seta sRIII narrowly lanceolate, with acute apex, 12 (12–15) long. Tarsus IV 28 (28–30) long; modified setae d button-like, situated slightly closer to base of tarsus; modified setae e barrel-shaped, without discoid cap,

situated apically (Fig. 3D). Length of solenidia: σ II 38 (35–40), σ II 10 (10–12), σ III 18 (15–18), ϕ IV 35 (32–38).

Female (range for 6 paratypes) (Figs. 2, 3G). Length of idiosoma from anterior end to apices of hyaline lobar processes 430–465, width at level of humeral shields 170–190. Length of hysterosoma from level of sejugal furrow to apices of lobar processes 300–325. Prodorsal shield: shaped as in male, 120–130 long, 140–150 wide, surface with-

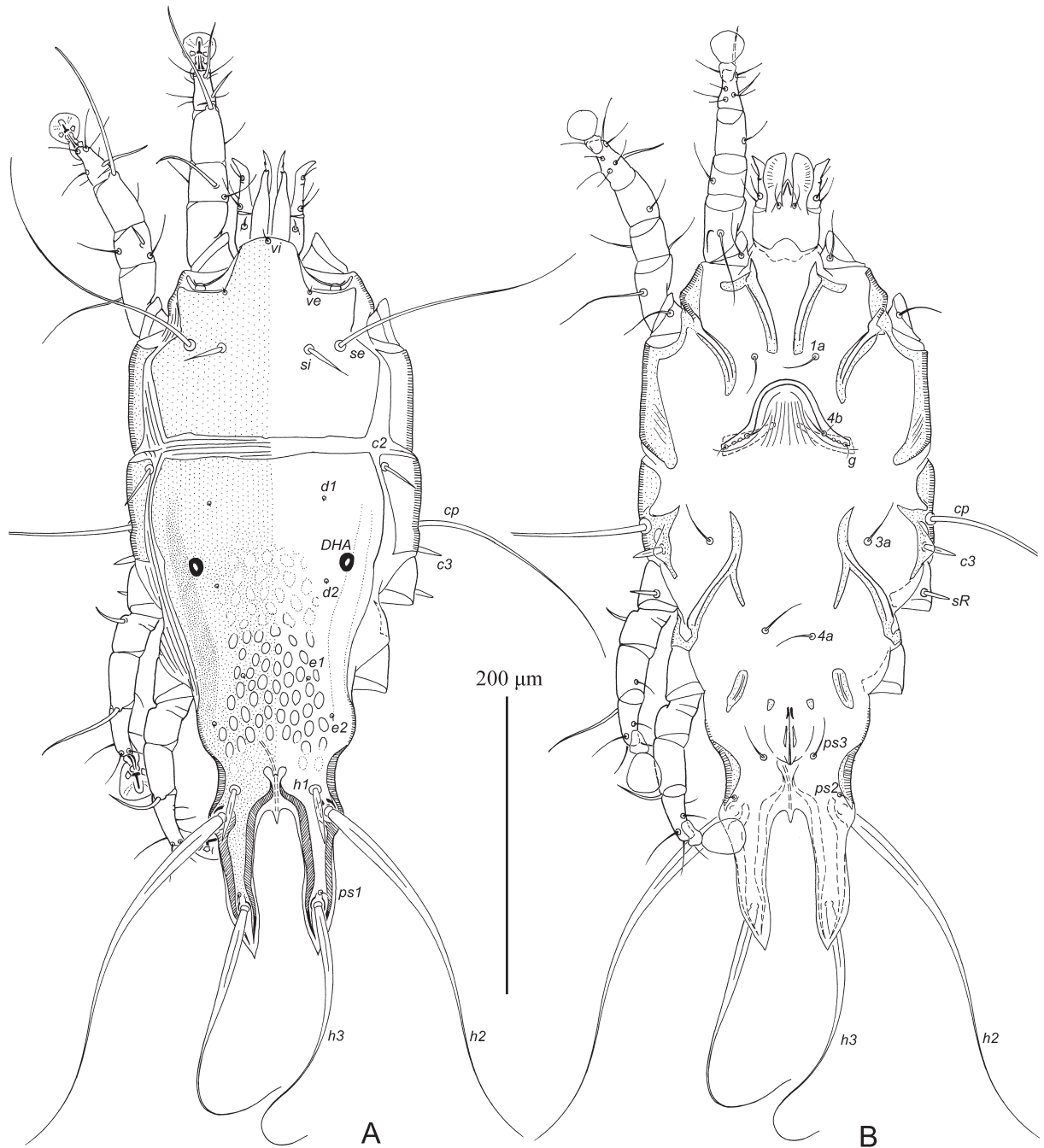


Fig. 2. *Trouessartia stelgidopteryx* sp. n., female. A—dorsal view, B—ventral view. Abbreviation: co—copulatory opening.

out ornamentation. Setae *si* narrowly lanceolate, 24–30 long, separated by 47–57; setae *se* separated by 90–105. Setae *c2* spiculiform, 20–25 long, situated in antero-mesal angle of humeral shields. Setae *c3* narrowly lanceolate, with acute apex, 17–19 long. Hysteronotal shield: length from anterior margin to bases of setae *h3* 280–295, width at anterior margin 145–150, lateral margins without incisions, DHA present, area from level of trochanters IV to setae *h2* with numerous ovate lacunae (Fig. 2A). Dorsal setae *d1* present. Setae *f2* absent.

Setae *h1* short lanceolate, 35–38 long, situated antero-mesal to bases of setae *h2*, 12–14 from corresponding lateral margins of hysteronotal shield. Width of opisthosoma at level of setae *h2* 75–85. Setae *ps1* positioned dorsal, equidistant from outer and inner margins of opisthosomal lobes. Supranal concavity opened posteriorly into terminal cleft. Length of terminal cleft from anterior margin to lobar apices 92–105, width of cleft at level of setae *h3* 32–35. Interlobar membrane narrow occupying approximately anterior 1/6th of

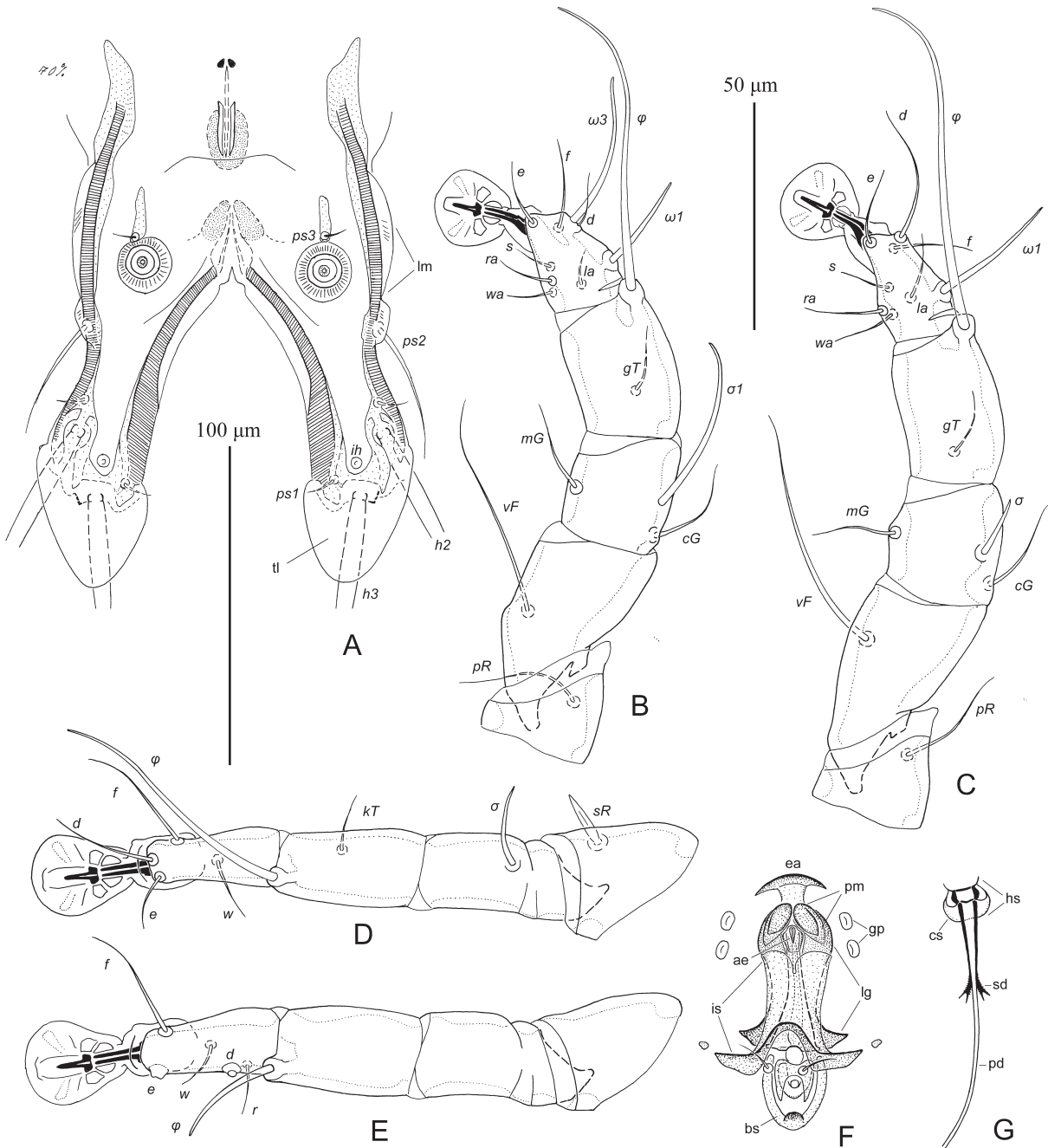


Fig. 3. *Trouessartia stelgidopteryx* sp. n. A—opisthosoma of male, ventral view, B–E—legs I–IV of male, respectively, F—genital apparatus of male, G—spermatheca and spermaducts. Abbreviations: ae—aeedeagus, bs—basal sclerite, cs—collar of spermatheca, ea—epiandrum, is—intermedial sclerite, gp—genital papillae, hs—head of spermatheca, lg—latigenital apodemes, lm—lateral membrane, pd—primary spermaduct, pm—parameres, sd—secondary spermaducts, tl—terminal lamella. Scale bars: 100 µm—A, 50 µm—B–G.

terminal cleft, distance from free margin of this membrane to lobar apices 85–90. External copulatory tube short cone-like, situated on free margin of interlobar membrane. Distance between dorsal setae: *c2:d2* 65–75, *d2:e2* 82–88, *e2:h2* 55–62, *h2:h3* 56–60, *h2:h2* 65–68, *h3:h3* 48–50, *d1:d2* 46–50, *e1:e2* 23–26, *h1:h2* 13–15, *h1:h1* 52–55, *ps1:h3* 10–12.

Epimerites I free. Epigynum 37–40 long, 65–77 wide (Fig. 2B). Head of spermatheca with short non-indented collar (Fig. 3H), primary spermaduct without enlargements, secondary spermaducts about 5 long. Inner margins of epimerites IIIa with narrow finger-like extensions directed posteromesal. Epimerites IVa present, roughly ovate, with longitudinal groove. Anal opening with a pair of

small adanal sclerites situated at level of its anterior margin.

Legs I, II as in males (Fig. 3A–B). Trochanteral setae *s*RIII narrowly lanceolate, with acute apex, 13–15 long (Fig. 3F). Legs IV with ambulacral disc extending to midlevel between setae *h*2 and *h*3 (Fig. 3G). Length of solenidia: σ I 38–45, σ II 12–13, σ III 15–20, ϕ IV 40–45.

Differential diagnosis. The new species, *Trouessartia stelgidopteryx* sp. n., demonstrates a unique combination of features in males: the opisthosomal lobes are uncommonly long and widely separated by the terminal cleft, and the terminal lamellae of semi-ovate form have smooth margin (Fig. 1). Among the presently known species in the genus *Trouessartia*, only the representatives of the *estrildae* species group (Santana 1976) have a similar shape of opisthosomal lobes, but the terminal lamellae are indented by numerous rounded festoons. In spite of the specific appearance of males, the new species seems to be closely related to the *minutipes* species group (Gaud and Atyeo, 1987) in having the following features: in both sexes, the dorsal hysteronotal apertures (DHA) are present and heavily sclerotized; in males, the terminal lamellae are semi-ovate and with a smooth margin, there is an ovate sclerotized patch in the area of supranal concavity, the translobar apodemes are absent, and the modified tarsal seta *e* lacks an apical discoid cap.

Trouessartia stelgidopteryx readily differs from *T. minutipes* (Berlese, 1886) and all other representatives of the *minutipes* group in having the following characters. In both sexes, idiosomal setae *d*2 are present, setae *c*2 are spiculiform, and trochanteral setae *s*RIII are narrowly lanceolate; in males, the opisthosomal lobes are nearly three times longer than wide and separated by a large semi-ovate terminal cleft (at the level of lobar apices is twice as wide as the lobes), and epimerites IVa are absent; in females, setae *h*1 are lanceolate. In both sexes of all species of the *minutipes* group, setae *d*2 are absent, setae *c*2 are lanceolate with a bluntly rounded apex, and trochanteral setae *s*RIII are filiform or bristle-like; in males, the opisthosoma is nearly triangular in shape, the opisthosomal lobes are represented by very short extensions bearing macrosetae *h*2 and *h*3, the terminal cleft is short and narrow, almost touching lateral margins and with the anterior end extending slightly beyond the level of macrosetae *h*2, and epimerites IVa extend to the base of the genital apparatus; in females, setae *h*1 are filiform.

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