

**A NEW SPECIES OF THE FEATHER MITE GENUS *TROUESSARTIA*
(ACARIFORMES: TROUESSARTIIDAE) FROM THE TRISTRAM'S
BUNTING *EMBERIZA TRISTRAMI* (PASSERIFORMES: EMBERIZIDAE)
IN THE RUSSIAN FAR EAST**

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ABSTRACT: A new feather mite species, *Trouessartia emberizae* sp. n., is described from the Tristram's Bunting, *Emberiza tristrami* Swinhoe (Passeriformes: Emberizidae) in the Primorye Territory (Russian Far East). The new species is close to *T. jedliczkai* (Zimmermann) and *T. motacillae* Dubinin, associated with wagtails (Motacillidae: *Motacilla*) and most clearly differs from them in the following features: in males, the hysteronotal shield is entire and the genital apparatus is narrow, parallel-sided and strongly convex dorsally; in females, the external copulatory tube is stylet-like and extends beyond the level of setae *h*₃, and the head of the spermatheca has a short smooth collar. This is the first description of a *Trouessartia* species from a host of the family of buntings (Emberizidae).

KEY WORDS: Feather mites, Trouessartiidae, systematics, *Emberiza*, Passeriformes, Primorye Territory.

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INTRODUCTION

Most investigations, dealing with the taxonomic diversity and distribution of passerine-associated feather mites in the former USSR and subsequently in Russia, were carried out mainly in the European part of the country (for major references see: Mironov 1996). Investigations of these mites were also carried out, albeit to a lesser extent, in the Asian republics of the former USSR. Chirov and Kharadov (2017) have recently summarized the results of these studies in Asian republics for mites from both passerine and non-passerine hosts. Studies of feather mites associated with passerines in the Asian part of Russia are still quite scanty. The first report was provided by Dubinin (1952) for birds from Wrangel Island. Rubtsov and Yakimenko (2012a–d) published a series of short papers on the diversity and host associations of feather mites from some passerines in Southwestern Siberia (Omsk and Tomsk Regions). Finally, three short taxonomic works were dedicated to these mites from passerines of the Russian Far East (Mironov 2011, 2019; Mironov *et al.* 2012).

The present work continues the study of feather mites associated with passerines in the Russian Far East and provides a description of a new species of the genus *Trouessartia* Canestrini, 1899 (Analgoida: Trouessartiidae) from the Tristram's Bunting, a widely distributed bird in northern and southeastern Asia.

The feather mite genus *Trouessartia*, with nearly 140 species known to date, is the most species-rich in the family (Orwig 1968; Santana

1976; Gaud and Atyeo 1986, 1987; Mironov and González-Acuña 2013; Hernandez 2014, 2017; Hernandez and Valim 2015; Constantinescu *et al.* 2018a; Mironov and Bermúdez 2017; Mironov and Galloway 2019; Mironov and Chandler 2020). Mites of this genus, as all trouessartiids, are typical inhabitants of the flight feathers (remiges and rectrices) and are characterized by a flattened body, extensive and heavily sclerotized dorsal shields, most body setae being strongly reduced in size, and all legs having large sucker-like pretarsi. Representatives of the genus are predominately distributed on passerine birds and most species are highly host specific (Santana 1976; Gaud and Atyeo 1996). The only well-documented host associations outside of passerines are for two species of *Trouessartia* associated with woodpeckers (Hernandez 2014; Mironov and Bermúdez 2017).

Santana (1976) presented a world revision of the genus *Trouessartia*, in which he provided a key to and the redescription of 71 species (almost all species of the genus known at the time). Although this monograph was published over forty years ago, it is still the main manual on the systematics of this genus. One can find additional major references to the taxonomic works on *Trouessartia* species in the following papers, published over the last decade: Mironov and González-Acuña (2013), Hernandez (2014), Hernandez and Valim (2015), Constantinescu *et al.* (2016a, b, 2018a, b), Mironov and Galloway (2019) and Mironov and Chandler (2020). Santana (1976) arranged about two thirds of the

Trouessartia species known at the time into five supposedly natural species groups. Subsequent investigators have established six more species groups (Mironov and Kopij 2000; Mironov and Bermúdez 2017; Mironov and Galloway 2019; Mironov and Chandler 2020). Each group is characterized by a unique combination of common morphological characters, and the “natural” status of these groups is also supported by their restriction to one or several closely related bird families. Although a significant number of known *Trouessartia* species are now arranged into species groups, the phylogenetic relationships within the genus remain almost unexplored. Relationships between a very limited number of species (mainly from European passerines and representing only a few species groups) were recently tested based on molecular data (Doña *et al.* 2017; Constantinescu *et al.* 2018b).

MATERIALS AND METHODS

The material used in the present work was collected in 2008 at a bird-banding field station (the Institute of Biology and Soil Sciences of the Russian Academy of Sciences) in the Primorye Territory, the most southeastern part of the Russian Far East, during the autumn migratory period. Passerine birds, captured with mist-nets, were identified, banded and checked for the presence of feather mites and other ectoparasites under a stereomicroscope. Feather mites were collected with a preparation needle or fine forceps and fixed in tubes with 96% ethanol. After processing, the birds were released into the wild. In the laboratory, feather mites were mounted on slides in Hoyer's medium according to the standard technique for small mites (Krantz and Walter 2009). Investigations of the mite specimens, as well as the drawings, were made using Leica DM 2500 and DM 5000B microscopes (Leica Microsystems, Inc.) equipped with differential interference contrast illumination (DIC) and a *camera lucida*.

The species description and measuring techniques follow the taxonomic works on feather mites of the family Trouessartiidae (Mironov and González-Acuña 2013; Hernandez 2014, 2017; Constantinescu *et al.* 2016a, b; Mironov and Bermúdez 2017; Mironov and Galloway 2019; Mironov and Chandler 2020). General morphological terms and idiosomal chaetotaxy follow the definitions by Gaud and Atyeo (1996), with minor corrections for chaetotaxy by Norton (1998); leg chaetotaxy is that of Grandjean (1939). All measurements are in micrometres (μm). Scientific

names of birds and supraspecific classification follow Gill *et al.* (2021). The abbreviations for specimen accession numbers and depositories are as follows: 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 emberizae* sp. n.**

(Figs. 1–4)

Type material. Holotype male (ZISP 9334), 20 male and 20 female paratypes from *Emberiza tristrami* Swinhoe, 1870 (Passeriformes: Emberizidae), Russia, Primorye Territory, 9 km NE of Novolitovsk, 42°57'40"N 132°53'12"E, 25 September 2008, coll. S. V. Mironov.

Depositories. Holotype, 15 male and 15 female paratypes—ZISP; remaining paratypes—UMMZ.

Description. MALE (holotype, ranges for 10 paratypes in parentheses) (Figs. 1, 3A–D, 4 A–C). Idiosoma, length \times width, 450 (455–485) \times 230 (230–240), length of hysterosoma 300 (300–325). Prodorsal shield: length along midline 135 (135–150), greatest width posterior to scapular setae 140 (140–155), anterior part at level of trochanters II not narrowed, anterolateral extensions acute, not extending to bases of epimerites Ia between legs I and II, lateral margins not fused with scapular shields, posterior margin straight, surface with weakly distinct reticulate ornamentation. Internal scapular setae *si* spiculiform, 35 (31–35) long, separated by 48 (48–52); external scapular setae *se* separated by 92 (92–100). Setae *c2* spiculiform, 42 (42–50) long, situated in anteromedian angle of humeral shields. Setae *c3* narrowly lanceolate with bidentate apex, 23 (23–25) long (Fig. 4E). Anterior and posterior parts of the hysteronotal shield fused but delimited from each other by narrow lateral incisions extending to bases of setae *e2* and transverse fold between these setae, total length of shield from anterior margin to lobar apices excluding lamellae 285 (285–315) width at anterior margin 145 (145–165). Length of prohysteronotal part along midline 180 (180–195), lateral margins at level of trochanters III shallowly concave, dark-sclerotized patch at these concavities without a well-defined border, median area with barely distinct depressions (lacunae). Dorsal setae *d2*, *e2* present, setae *d1*, *f2* absent. Length of lobar shield

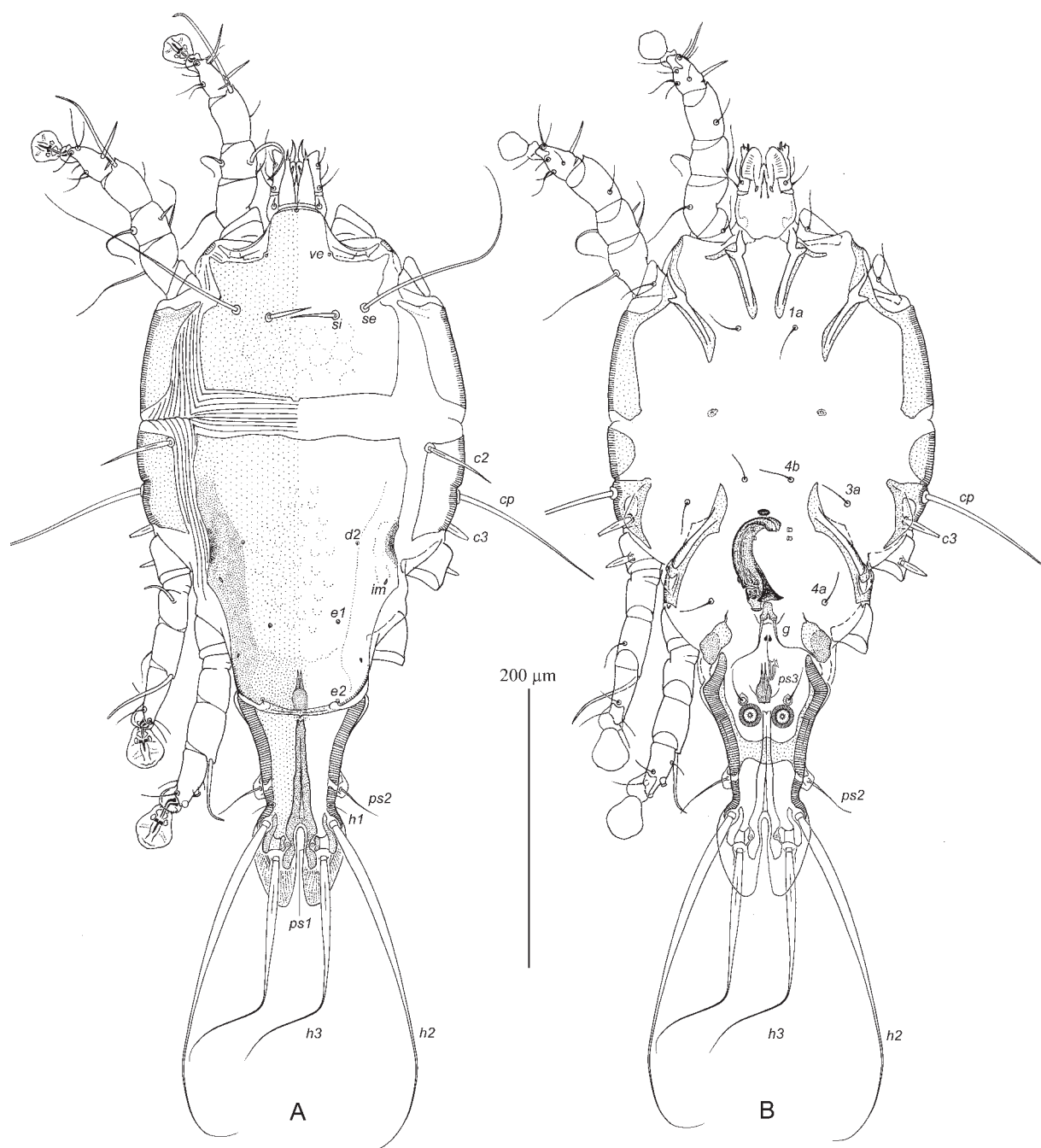


Fig. 1. *Trouessartia emberizae* sp.n., male. A—dorsal view, B—ventral view.

105 (105–115). Opisthosoma strongly attenuate posteriorly; opisthosomal lobes fused with each other along midline forming a heavily sclerotized median septum, only apical parts of lobes posterior to level of setae *h2* separated by narrow parallel-sided terminal cleft. Length of terminal cleft from anterior end to lobar apices 28 (28–32); length from anterior end to posterior margins of terminal lamellae 56 (57–60), width 8 (5–8). Terminal lamellae semi-ovate, widely rounded posteriorly, with smooth margins, length from bases of setae *h3* to

lamellar apices 35 (32–35), greatest width 33 (30–34). Distance between dorsal setae: *c2:d2* 65 (65–73), *d2:e2* 105 (103–112), *e2:h2* 85 (82–90), *h2:h3* 25 (25–28), *h2:h2* 50 (47–50), *h3:h3* 35 (35–38), *e1:e2* 53 (52–58), *ps1:h3* 10 (10–15).

Epimerites I free. Rudimentary sclerites rEpIIa small, roughly ovate. Genital apparatus: long and narrow, strongly curved dorsally (in lateral view resembles a question mark), length excluding basal sclerite 60 (58–62), greatest width 15 (15–18); epandrium (pregenital sclerite) roughly ovate;

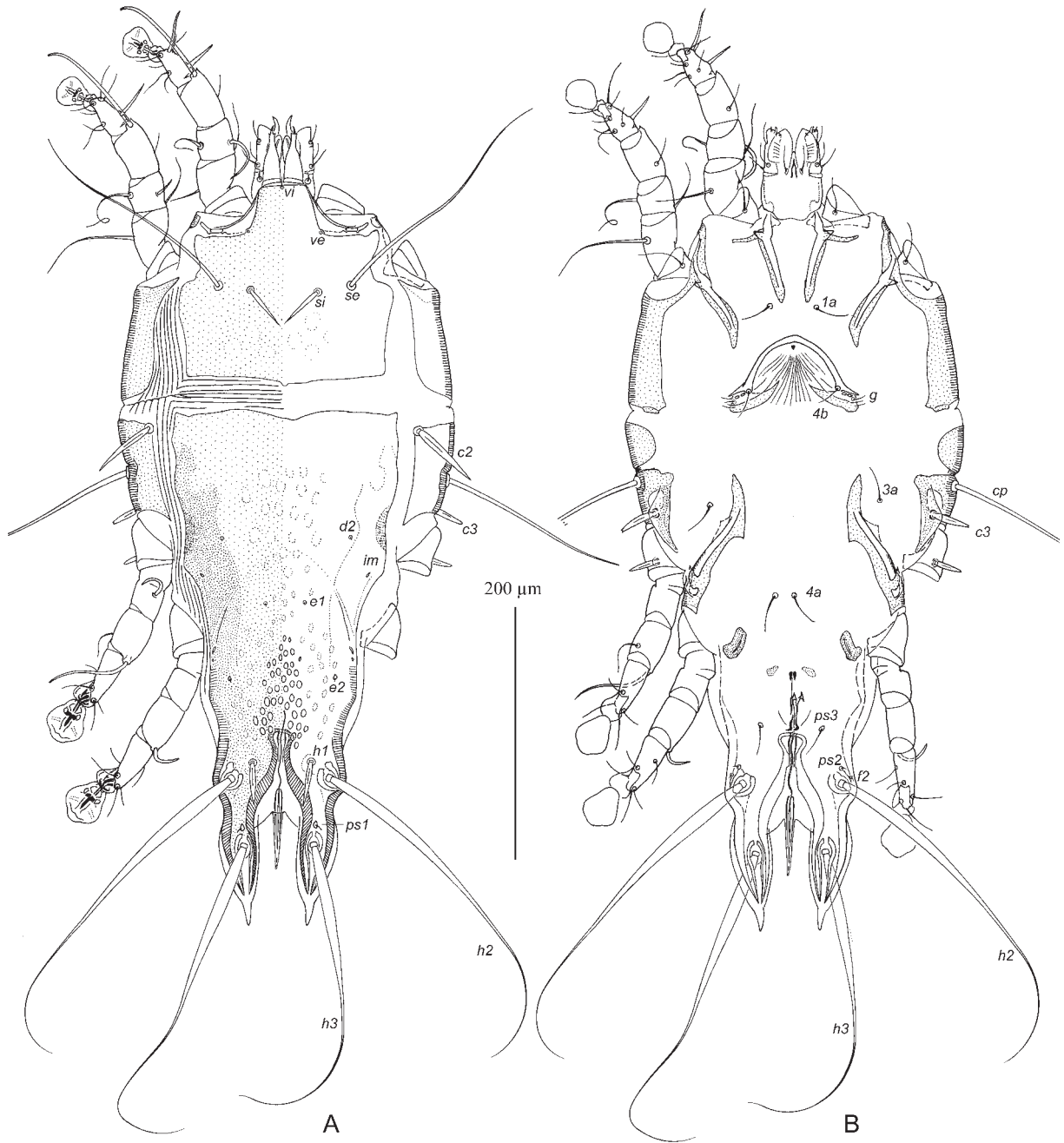


Fig. 2. *Trouessartia emberizae* sp. n., female. A—dorsal view, B—ventral view.

distal ends of parameres without denticles; aedeagus shaped as small cone; latigenital sclerites absent, basal sclerite not extending to level of setae *g* (Fig. 4A, B). Anterior and posterior pairs of genital papillae similar in size, equidistant from midline or anterior papillae separated slightly wider. Genital shield shaped as a small inverted Y. Setae *g* long filiform, about 3/4 the distance between setae *g* and *ps3*, well separated from each other and situated on posterior tips of genital shield. Postgenital plaque (cuticular fold flanking area of genital shield) small trapezoidal, usually with concave posterior margin. Apophyses of adanal

apodemes ridge-shaped, with anterior end forming rectangular spine. Lateral margins of opisthosoma with narrow membranes at level of adanal suckers. Translobar apodeme present. Adanal shields represented by small ovate or teardrop-shaped sclerites around bases of setae *ps3*. Adanal suckers 15 (14–15) in diameter. Inner ends of epimerites IIIa extending to level of setae *4b*, with blunt-angular extensions on inner margins or without them. Epimerites IVa as plates of roughly ovate form, and usually with narrow wavy extension on anterior ends usually extending to level of setae *g*. Setae *4b* situated anterior to level of setae *3a*, both pairs

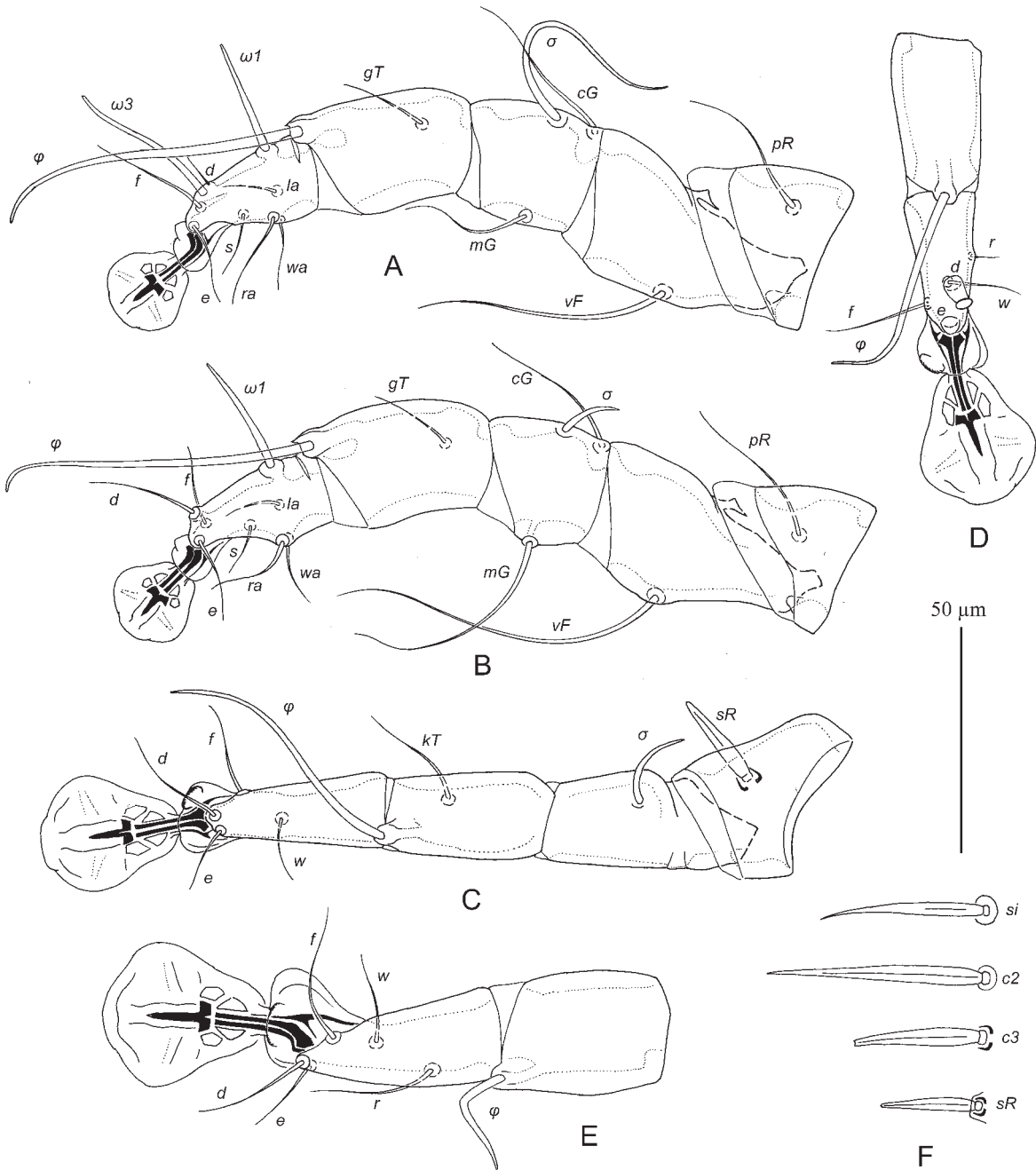


Fig. 3. *Trouessartia emberizae* sp.n., legs. A–C—legs I–III of male; D—tibia and tarsus IV of male; E— tibia and tarsus IV of female; F—setae *si*, *c2*, *c3*, and *sRIII* of male.

anterior to genital apparatus apex; setae *g* posterior to level of setae *4a*. Distance between ventral setae: *4b:3a* 15 (14–16), *4b:g* 98 (92–105), *4a:g* 18 (12–18), *g:ps3* 52 (52–55), *ps3: h3* 100 (100–110), *g:g* 8 (8–9).

Legs. Setae *cG*, *mG* of genua I, II filiform. Genual solenidia σI and σII situated at midlength of corresponding genu (Fig. 3A, B). Trochanteral setae *sRIII* narrowly lanceolate, with acute apex, 20 (19–21) long. Legs IV with ambulacral disc almost extending to level of setae *h3*. Tarsus IV 35

(35–38) long; modified setae *d* barrel-shaped, with discoid cap, situated in distal one third of this segment; modified setae *e* hemispheroid, without cap, situated apically (Fig. 3D). Length of solenidia: σI 55 (50–58), σII 10 (10–14), σIII 23 (22–25), φIV 48 (45–50).

FEMALE (range for 10 paratypes) (Figs. 2, 3E, 4C, D). Idiosoma, length \times width, 530–555 \times 240–260, length of hysterosoma 365–385. Prodorsal shield: shaped as in male, 150–160 \times 150–170 wide, surface with barely discernible ovate depres-

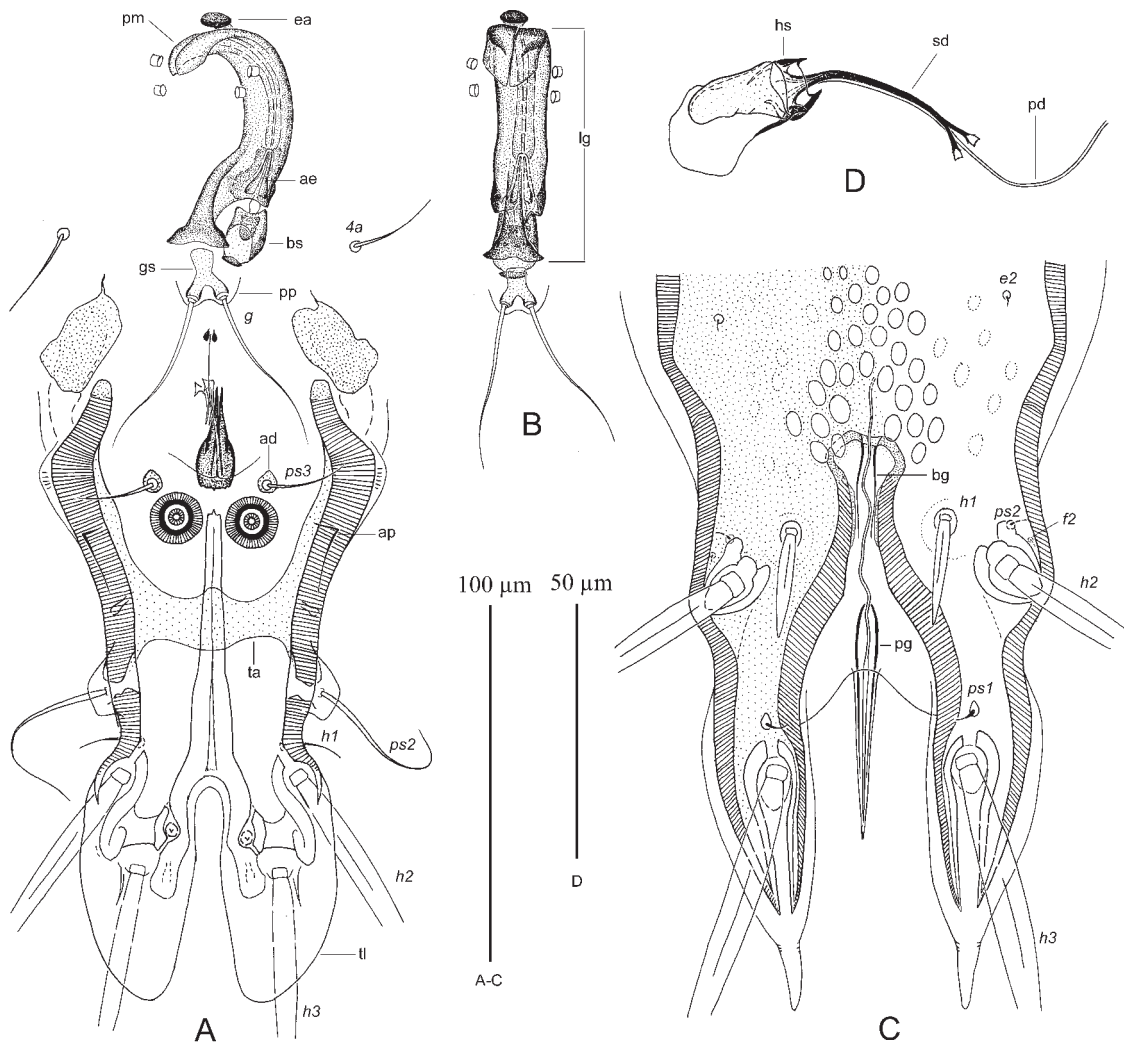


Fig. 4. *Trouessartia emberizae* sp. n., details. A—genital apparatus and opisthosoma of male, ventral view; B—genital apparatus of male, normal position; C—opisthosoma of female, dorsal view; D—spermatheca and spermatheca. Abbreviations: ae—acedeagus, ad—adanal shield, ap—apophysis of adanal apodeme, bg—basal guide of external copulatory tube, bs—basal sclerite, ea—epiandrum, gs—genital shield, hs—head of spermatheca, lg—measured length of genital apparatus, pd—primary spermatheca, pg—primary spermatheca guide, pm—paramere of genital apparatus, pp—postgenital plaque, sd—secondary spermatheca, ta—translobar apodeme, tl—terminal lamella.

sions (lacunae). Setae *si* spiculiform, 32–38 long, separated by 50–55; setae *se* separated by 95–105. Setae *c2* spiculiform, 50–53 long, situated in anteromedial angle of humeral shields. Setae *c3* narrowly lanceolate, with bidentate or acute apex, 25–27 long. Hysteronotal shield: length from anterior margin to posterior tips 340–360, width at anterior margin 160–175; lateral margins at level of trochanters III shallowly concave, dark-sclerotized patch at these concavities without a well-defined border; anterior part of the shield with weakly distinct large ovate lacunae; median area of posterior part (from level of setae *c3* to supranal concavity) with well outlined small ovate lacunae arranged in a patch shaped as an inverted Y, lat-

eral areas of this part with sparsely disposed and weakly outlined small ovate lacunae or without them (Fig. 4C). Dorsal setae *d2*, *e2* present, *d1* absent. Setae *h1* narrowly lanceolate, 30–36 long, situated anteromesal from setae *h2*, 23–27 from corresponding lateral margins of hysteronotal shield. Width of opisthosoma at level of setae *h2* 93–107. Setae *ps1* situated dorsally, equidistant from margins of opisthosomal lobes. Supranal concavity open posteriorly into terminal cleft. Length of terminal cleft from anterior end of supranal concavity to lobar apices 140–155, length from free margin of interlobar membrane to apices 87–98, greatest width of cleft 32–35. Interlobar membrane occupying anterior 1/3rd of terminal

cleft. External copulatory tube stylet-like, situated on free margin of interlobar membrane, 45–48 long; basal guides of copulatory tube and primary spermatiduct guide well developed, not fused to each other (Fig. 4C). Distance between dorsal setae: *c2:d2* 75–80, *d2:e2* 92–105, *e2:h2* 73–75, *h2:h3* 70–82, *h2:h2* 70–82, *h3:h3* 47–53, *e1:e2* 48–55, *h1:h2* 10–13, *h1:h1* 40–45, *ps1:h3* 14–15.

Epimerites I free. Epigynum 38–45 long, 92–105 wide. Inner margins of epimerites IIIa with blunt-angular extension. Epimerites IVa present. Adanal sclerites present. Setae *f2*, *ps2* present. Head of spermatheca with a pair of short spine-like extensions, collar between them smooth; primary spermatiduct without enlargements; secondary spermatiducts 35–40 long (Fig. 4D).

Legs I, II as in males (Fig. 3A, B). Trochanteral setae *sRIII* narrowly lanceolate, with bidentate or simple acute apex, 20–23 long. Legs IV with ambulacral disc extending to setae *h3*. Length of solenidia: σ I 54–56, σ II 13–15, σ III 23–25.

Differential diagnosis. Among currently described species, *Trouessartia emberizae* sp.n. is most similar to *T. jedliczkai* (Zimmermann, 1894) and *T. motacillae* Dubinin, 1952, both from wagtails (Motacillidae: *Motacilla*), in the following: in both sexes, setae *d1* absent and lateral margins of the hysteronotal shield are shallowly concave; in males, the postgenital plaque is well developed, genital shield is shaped as an inverted Y, setae *g* are long, and the apophyses of the adanal apodemes are represented by longitudinal ridges; in females, the external copulatory tube is long, stylet-like and setae *h1* are lanceolate. *Trouessartia emberizae* differs from the above two species in the following features: in males, the hysteronotal shield is entire and its parts are demarked from each other by narrow lateral incisions, the genital apparatus is almost parallel-sided and about 4 times longer than wide, and the postgenital plaque is roughly trapezoidal with slightly concave posterior margin; in females, the external copulatory tube extends beyond the level of setae *h3*, and the collar of the head of spermatheca is short and smooth. In males of the two previously described *Trouessartia* species, the hysteronotal shield is either completely split into the prohysteronotal and lobar parts (in *T. motacillae*) or these parts are connected by a narrow median bridge (in *T. jedliczkai*), the genital apparatus is noticeably widened at the base (about 3 times longer than wide), and the postgenital plaque is semicircular; in females, the external copulatory tube does not extend even to the level of setae *ps1*,

and the collar of the head of the spermatheca is shaped as a comb with numerous denticles (Santana 1976).

Etymology. The specific epithet is derived from the generic name of the type host.

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