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A NEW FEATHER MITE SPECIES OF THE GENUS *LORIPROTOLICHUS* MIRONOV ET DABERT, 2007 (ACARIFORMES: PTEROLICHIDAE) FROM THE ULTRAMARINE LORIKEET *VINI ULTRAMARINA* (AVES: PSITTACIFORMES)

S. V. Mironov[1], J. Dabert[2], R. Ehrnsberger[3]

[1] Zoological Institute, Russian Academy of Sciences, Universitetskaya quay 1, 199034, Saint Petersburg, Russia; e-mail: acari@zin.ru
[2] Department of Animal Morphology, Faculty of Biology, A. Mickiewicz University, Umultowska 89, 61-614, Poznań, Poland; e-mail: dabert@amu.edu.pl
[3] Institute of Nature Conservation and Environmental Education, University of Vechta, Driverstrasse 22, D-49377, Vechta, Germany; e-mail: rainer.ehrnsberger@uni-vechta.de

ABSTRACT: A new feather mite species *Loriprotolichus vini* sp. n. (Pterolichidae: Pterolichinae) is described from the ultramarine lorikeet *Vini ultramarina* (Kuhl, 1920) (Psittacidae: Loriinae), an endemic parrot of the Marquesas Islands. A key to known species of the genus *Loriprotolichus* Mironov et Dabert, 2007 is provided.

KEY WORDS: Astigmata, feather mites, Pterolichidae, *Loriprotolichus*, systematics, Psittacidae

INTRODUCTION

The present paper is a continuation of our systematic investigations of feather mites of the *Protolichus* generic group (Astigmata: Pterolichidae) living on parrots in the Old World (Mironov et al. 2003a, 2003b; Dabert et al. 2006, 2008; Mironov and Dabert 2007, 2010).

Within the feather mite superfamily Pterolichoidea, the Pterolichidae is the most species-rich and widely distributed family, currently including over 400 species in 120 genera and occurring on hosts from 12 non-passeriform avian orders (Gaud and Atyeo 1996; Proctor 2003).

All pterolichid mites restricted to parrots (Psittaciformes: Psittacidae) belong to the subfamily Pterolichinae and constitute three morphologically distinct groupings, referred to as the *Protolichus, Psittophagus* and *Rhytidelasma* generic groups (Gaud and Atyeo 1996; Mironov and Pérez 2003; Mironov et al. 2003a, 2003b, 2005; Dabert et al. 2004, 2008). Among them, the *Protolichus* group with about 75 currently described species in 24 genera is the most species-rich and morphologically diverse grouping of pterolichids associated with parrots.

After a revision of the genus *Protolichus* Trouessart 1884 at the very beginning of 20th century (Favette and Trouessart 1904), when this genus incorporated all mites recently referred to this group, these mites did not attract much attention from systematists for a long time. Investigations of these mites started again only in the second half of the 20th century. Mites of the *Protolichus* group have been examined most extensively in the New World by Atyeo and coauthors (for major reference see: Atyeo and Pérez 1990; Gaud and Atyeo 1996) and in Africa (Gaud and Mouchet 1959; Gaud 1980), while just a few papers were dedicated to these mites from other areas of the Old World (Atyeo and Gaud 1987; Atyeo and Pérez 1982). In our previous works we tried to fill this gap in investigations of parrot-associated pterolichids and revised almost all genera of the *Protolichus* group from parrots in the Australian and Indo-Malayan regions, in particular the genera *Apexolichus* Gaud et Atyeo, 1996, *Protolichus,* and *Titanolichus* Gaud et Atyeo, 1996 (Mironov et al. 2003b; Dabert et al. 2006, 2008; Mironov and Dabert 2007, 2010).

Mites of the *Protolichus* group are mainly large-sized pterolichids, with body lengths of 400–700 μm and with large and well sclerotized dorsal shields. Males in most genera have their two anterior pairs of legs variously modified in size and form of segmental processes and setae, while females of different genera look rather similar. Therefore, diagnosis of genera using females, when males are not found, is sometimes quite difficult. Mites of this group inhabit mainly primaries and secondaries of their hosts' wings.

Within the *Protolichus* generic group, mites of the genus *Loriprotolichus* Mironov et Dabert, 2007 are relatively small representatives of this group. Up to now, this genus included only two species known from the subfamily Loriinae in Australia and Oceania: *Loriprotolichus falculiger* (Trouessart, 1884) from the musk lorikeet *Glossopsitta concinna* (Shaw, 1791) in Australia, and *L. charmosynae* Mironov et Dabert, 2007 from the Papuan lorikeet *Charmosyna papou* (Scopoli, 1786) in New Guinea (Trouessart 1884; Mironov and Dabert 2007). The genus *Loriprotolichus* is clearly distinguishable from other known genera

of the group by the following combinations of features: in both sexes the prodorsal shield is widened posteriorly and has long and acute posterior angles, the bases of epimerites I, II are simple (without sclerotized inflations); in males, epimerites I are fused into a Y, opisthosomal lobes are short and rounded apically, setae *ps1* are filiform, setae *e1* scythe-shaped, setae *d, e* of tarsus IV are reduced to weakly sclerotized patches situated on spine-like apical extensions of this segment; in females, the hysteronotal shield is entire. The structure of the prodorsal shield having long and acute posterior angles in both sexes (Figs. 1A, 2A) and scythe-like setae *e1* in males (Figs. 3 D–F) are unique features of this genus within the *Protolichus* group.

In the present paper we describe one more *Loriprotolichus* species from the Loriinae found on the ultramarine parakeet *Vini ultramarina* (Kuhl, 1820), an endemic and recently endangered parrot species from the Marquesas Islands, and provide a key to all known species of *Loriprotolichus*.

MATERIAL AND METHODS

The material used in this work was collected in the course of gathering of feather mites from parrot specimens in the Übersee Museum (Bremen, Germany). Mites were collected from dry museum skins by the ruffling technique (Gaud, Atyeo, 1996) and placed in 70% ethanol. For making permanent slides, mite specimens were processed in 15% lactic acid (at +45 C°, 2–3 days) and then mounted in Hoyer's medium according to the standard technique (Evans 1992).

Drawings were made by means of a light microscope (Olympus BX-50) with camera lucida. General morphological terms and the leg and idiosomal chaetotaxy follow Gaud and Atyeo (1996). The description is given in the current format used for pterolichid mites of the group in question (Mironov and Dabert 2007, 2010). All measurements are in micrometers (μm). Length of idiosoma in both sexes was measured as the distance from anterior margin of the body to bases of setae *h3*; distance between different pairs of setae was taken as the shortest distance between the transverse levels formed by setae of respective pairs.

Abbreviations used in accession collection numbers and for indicating depositories of specimens: AMU — A. Mickiewicz University (Poznań, Poland), UMB — Übersee Museum (Bremen, Germany); ZISP — the Zoological Institute of the Russian Academy of Sciences (Saint Petersburg, Russia). Taxonomic system and Latin names of hosts used in the present study follow del Hoyo et al. (1997).

SYSTEMATICS

Family Pterolichidae Trouessart et Mégnin, 1884

Subfamily Pterolichinae Trouessart et Mégnin, 1884

Genus *Loriprotolichus* Mironov et Dabert, 2007

Loriprotolichus vini sp. n.

Figs. 1, 2, 3A–D

Type material. Male holotype (ZISP 4573), 4 male and 4 female paratypes from the ultramarine lorikeet *Vini ultramarina* (Kuhl, 1820) (Psittacidae: Loriinae) (UMB # 1717), Marquesas Islands, Nukahiva, 1861, coll. Parzudaki. Holotype, 2 male and 2 female paratypes — ZISP, 1 male and 1 female paratypes — AMU, 1 male and 1 female paratypes — UMB.

Description. Male (holotype, 4 paratypes). Idiosoma: 455 (475–480) long, 298 (300–312) wide at level of humeral shields. Subcapitulum: length including palps 78 (78–80), width at base 74 (72–75), ventral side with pair of oblique crests. Prodorsal shield: lateral margins with incisions extending to bases of setae *se* and with clear angular extensions anterior to level of scapular setae, surface of shield uniformly punctate with few transverse wavy striae near posterior margin, total length 125 (120–130), greatest width anterior to scapular setae 53 (55–60), width of posterior part 203 (205–220). Setae *si* spiculiform, 57 (55–69) long. Distance between scapular setae: *se:se* 92 (80–85), *si:si* 34 (34–36). Scapular shields not fused with posterior angles of prodorsal shield. Length of hysterosoma from level of sejugal furrow on lateral margins to lobar apices 320 (330–340). Hysteronotal shield: length from anterior margin to lobar apices excluding membranes 335 (345–355), width at anterior margin 235 (245–255), surface uniformly punctate. Opisthosomal lobes slightly curved medially, with rounded apex. Terminal cleft: length 59 (70–72), greatest width 47 (47–50) (Fig. 1A); interlobar membrane wide on inner margins of lobes anterior to setae *e1* and narrow on anterior margin of cleft. Supranal concavity absent. Subhumeral setae *c3* filiform, about 65 long. Lateral setae: *c2* spiculiform, 80 (80–82) long; *d2* filiform about 70 long, *e2* (broken in all specimens) based on size of bases likely macrosetae as in other known species (Figs. 3E, F). Setae *f2* filiform, without membranous enlargement in basal part. Setae *e1* scythe-like (L-shaped), their bases situated approximately at midlevel of opisthosomal lobes near inner margins

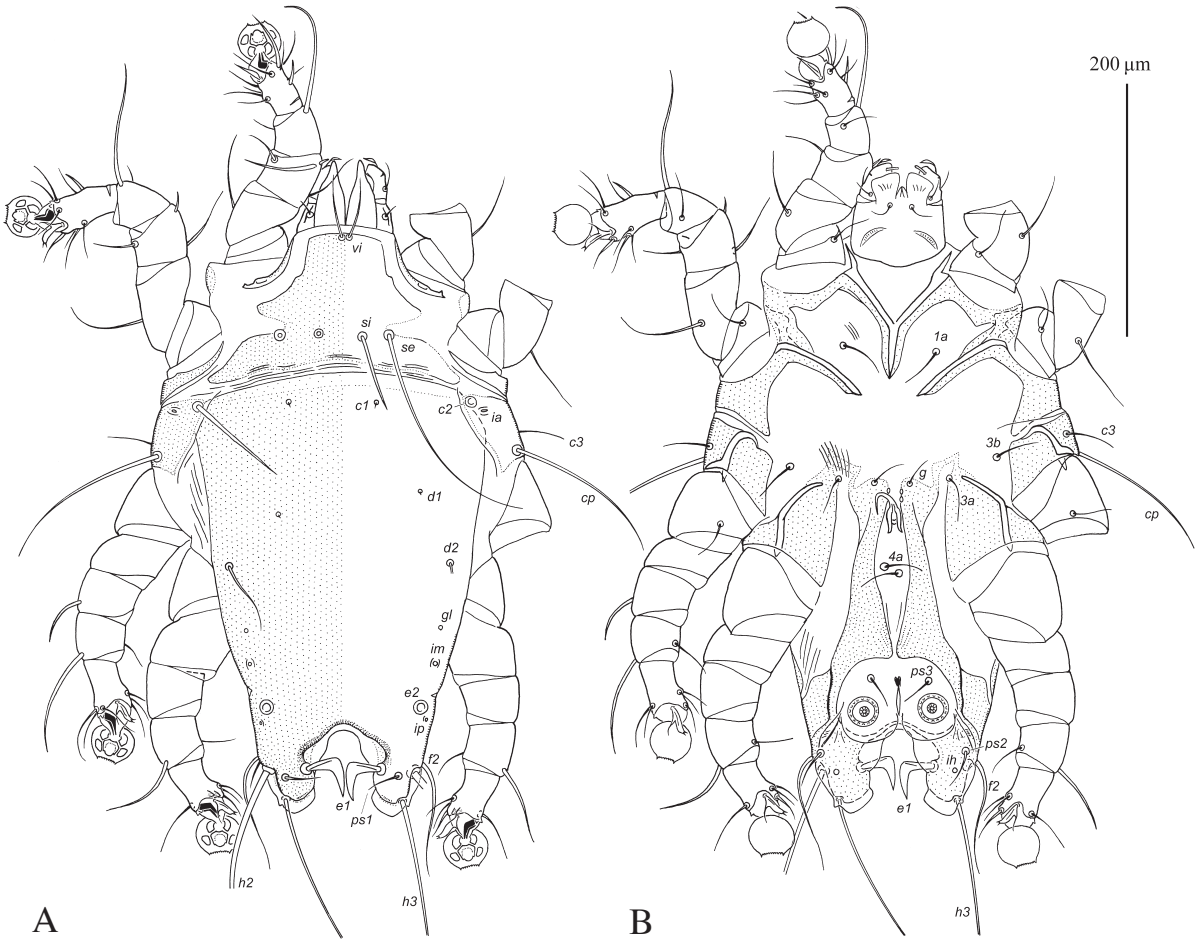

Fig. 1. *Loriprotolichus vini* sp. n., male. A — dorsal view, B — ventral view.

(Figs. 1A, 3D). Setae *ps1* filiform, situated slightly posterior to level of setae *h2*and *e1*. Dorsal measurements: *c2:d2* 130 (140–145), *d2:e2* 113 (115–120), *e2:h3* 71 (70–75), *e2:e1* 49 (48–50), *e2:e2* 130 (130–135), *e1:e1* 60 (62–66), *ps1:ps1* 90 (95–99), *h2:h2* 118 (120–126), *h3:h3* 94 (100–105). Cupules *im* posterior to level of openings *gl*. Bases of epimerites II without ball-like inflations. Genital apparatus at level of trochanters III, length of genital arch from base to bending of aedeagus 34 (36–42), width at base 14 (15–24). Both pairs of genital papillae at level of apex of genital apparatus. Paragenital apodemes: anterior tips extended to level of setae *g* and connected to inner tips of epimerites IIIa by narrow and poorly sclerotized zigzag-like bands; inner margin of apodemes with sclerotized area almost touching each other at midline (fused in 1 paratype) encircling ovate anal field (Fig. 1B). Distances between ventral setae: *3b:3a* 10 (10–18), *3a:g* 6 (10–14), *g:4a* 68 (67–72), *4a:ps3* 89 (90–93). Cupules *ih* at level of setae *h2*. Diameter of anal suckers 24 (24–25), corolla with 15–17 teeth. Segments of legs I, II without any apophyses (Figs. 3A, B). Setae *d, e* of tarsi IV as weakly sclerotized patches on pair of apical spines of this segment, length of tarsus IV 40 (40–45) (Fig. 3C).

Female (6 paratypes). Idiosoma: length 420–475, width 235–275. Subcapitulum almost rectangular, 83–92 long, 83–85 wide, without ventral crests. Prodorsal shield: form and position of scapular setae as in male, entire surface uniformly punctate, length along midline 113–125, greatest width anterior to scapular setae 120–130, width of posterior part 204–210. Setae *si* spiculiform, 34–36 long. Setae *se* missing in all specimens. Distance between scapular setae: *se:se* 80–83, *si:si* 35–38. Scapular shields as in male. Hysterosoma 315–327 long. Hysteronotal shield entire, length 305–317, width of anterior part 200–218, anterior margin straight, surface with faint reticulate ornamentation (Fig. 2A). Setae *c3* filiform, about 40–45 long. Setae *c2*, *d2, f2* filiform, *e2* spiculiform; length of lateral hysteronotal setae: *c2* 29–35, *d2* 22–25, *e2* 22–24, *f2* 11. Distance between dorsal setae: *c2:d2* 130–140, *d2:e2* 115–125, *e2:h3* 50–58, *e2:e2* 135–140, *h2:h2* 75–80, *h3:h3* 51–58. Cupules *im* either closes to bases of setae *e2* than to gland openings *gl* or equidistant between *e2* and *gl*.

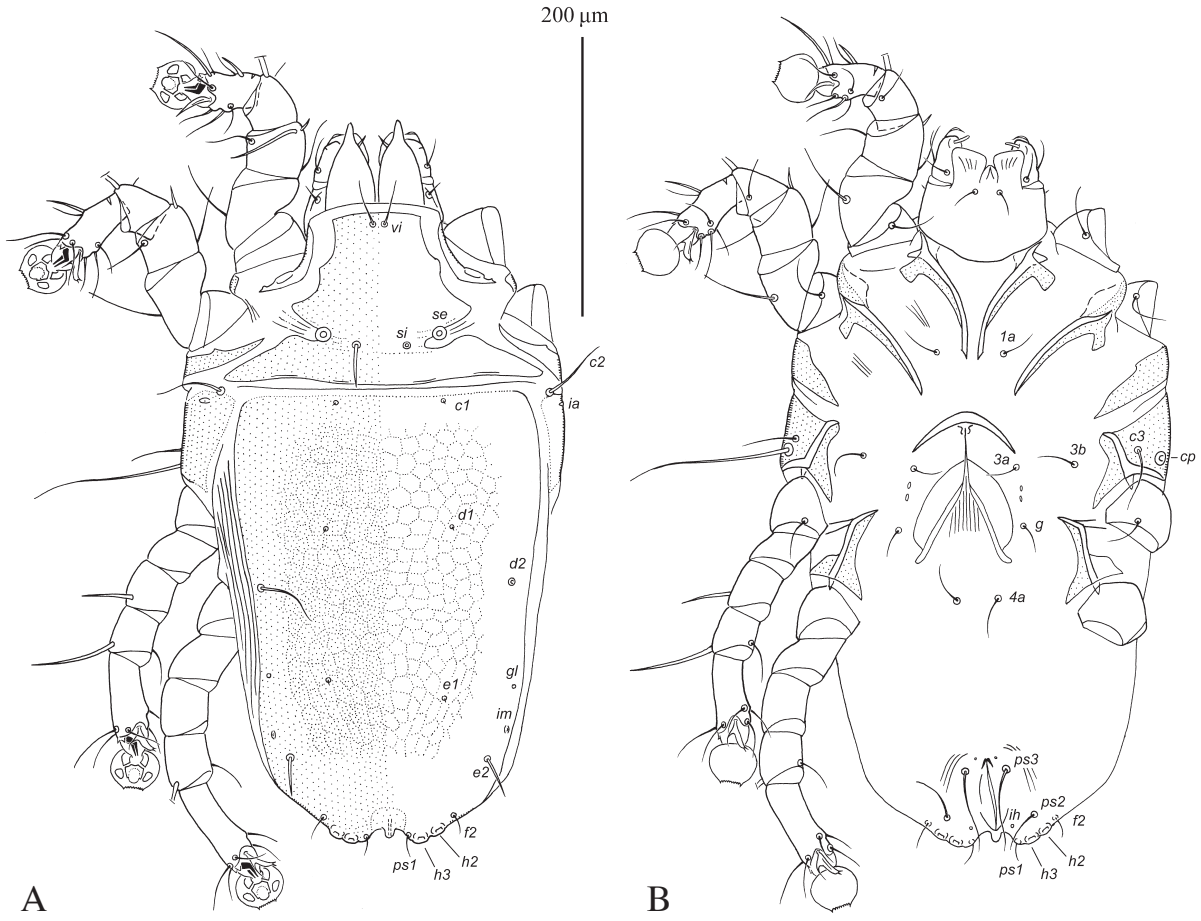

Fig. 2. *Loriprotolichus vini* sp. n., female. A — dorsal view, B — ventral view.

Bases of epimerites II without inflations. Epigynum bow-shaped 26–30 × 59–74 (Fig. 2B). Genital papillae situated between levels of setae *3a* and *g*. Cupules *ih* postero-mesal to bases of setae *ps2*. Copulatory opening on small terminal protrusion.

Differential diagnosis. Of the two perviously known species, males of *Loriprotolichus vini* sp. n. are most similar to those of *L. falculiger* by the position of the scythe-like setae *e1* on opisthosomal lobes (Figs. 3D, E). Males of the new species are distinguished from *L. falculiger* by the following features: the prodorsal and hysteronotal shields are uniformly punctate, lateral margins of prodorsal shield with angular extensions anterior to the row of scapular setae, and the idiosoma length is 455–480. In males of *L. falculiger,* the posterior part of prodorsal shield and anterior two thirds of hysteronotal shield are ornamented with numerous transverse striae, lateral margins of prodorsal shield anterior to scapular setae are parallel-sided, and the length of idiosoma is about 580 (Mironov and Dabert, 2007).

Since females of *L. falculiger* are unknown, females of *L. vini* can be compared only with those of *L. charmosynae*. The females of the new species differ from females of *L. charmosynae* by having the prodorsal shield with lateral extensions anterior to the level of scapular setae, filiform setae *c2,* and cupules *im* situated close to setae *e2* or equidistant from these setae and openings *gl* (Fig. 2A). In females of *L. charmosynae*, the prodorsal shield lacks extensions just anterior to the scapular setae, setae *c2* are spiculiform, and cupules *im* are very close to bases of openings *gl*.

Etymology. The specific epithet derives from the specific epithet of the host and is a noun in apposition.

Key to *Loriprotolichus* species (Males)

1. Scythe-shaped setae *e1* situated on inner margins of opisthosomal lobes (Figs. 3D, E) 2
— Scythe-shaped setae *e1* situated much anterior to bases of opisthosomal lobes (Fig. 3F) .... *L. charmosynae* Mironov et Dabert, 2007
2. Hysteronotal shield without striae, lateral margins of prodorsal shield with angular extension immediately anterior to bases of setae *se* (Fig. 1A) ..... *L. vini* sp. n.

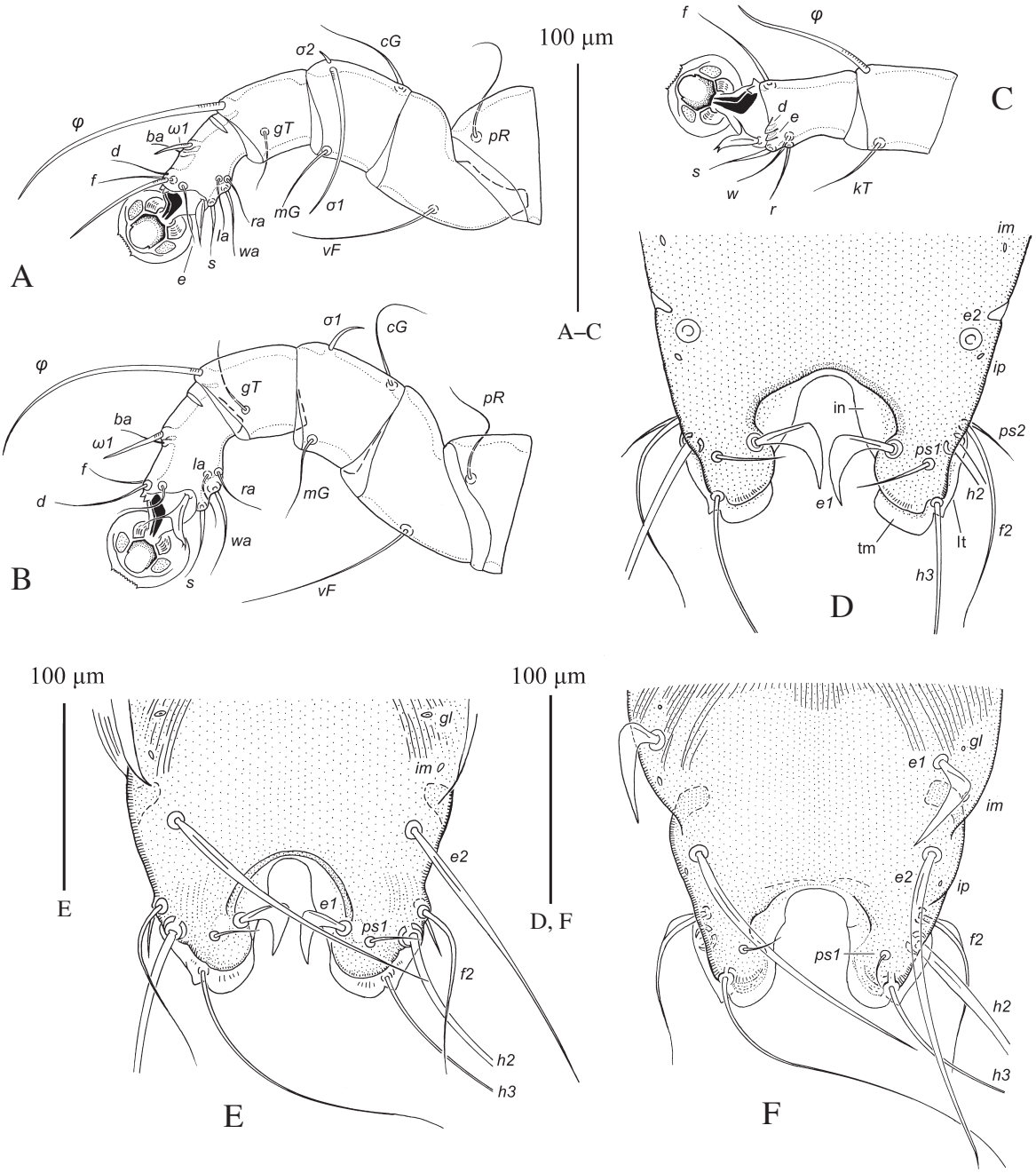

Fig. 3. Details of *Loriprotolichus* males. A–D — *Loriprotolichus vini* sp. n. A — leg I, B — leg II, C — tibia and tarsus IV, D — dorsal view of opisthosoma; E — *L. falculiger* (Trouessart, 1884), dorsal view of opisthosoma; F — *L. charmosynae* Dabert et Mironov, 2007, dorsal view of opisthosoma. Membranes on opisthosomal lobes: in — interlobar, lt — lateral, tm — terminal. E, F — after Mironov and Dabert (2007), modified.

— Anterior two thirds of hysteronotal shield with numerous striae, lateral margins of prodorsal shield anterior to bases of setae *se* parallel-sided ..... *L. falculiger* (Trouessart, 1884)

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