

A NEW GENUS AND SPECIES *MYCETINOPUS STRIATIPEDIS* GEN. AND SP.N. (ACARI: ACARIDAE) ASSOCIATED WITH THE HANDSOME FUNGUS BEETLE *MYCETINA MARGINALIS* IN THE EASTERN PALEARCTIC

Pavel B. Klimov^{1,2*}, Vasilii B. Kolesnikov^{1,3} and Aleksander A. Khaustov¹

¹X-BIO Institute, Tyumen State University, Tyumen, Russia

²Purdue University, Lilly Hall of Life Sciences, West Lafayette, Indiana, USA

³All-Russian Research Institute of Plant Protection, Voronezh, Russia

*corresponding author; e-mail: pklimov@purdue.edu

ABSTRACT: We describe unusual heteromorphic deutonymph of *Mycetinopus striatipedis* gen. and sp. n. (Acari: Acaridae) phoretic on the handsome fungus beetle *Mycetina marginalis* (Coleoptera, Endomychidae) in the Eastern Palearctic. These deutonymphs have a unique combination of character states that make them very distinct in the family Acaridae: an unpaired pigmented spot on the anterior propodosoma is present; supracoxal setae *scx* filiform and bifurcate; genu I with two solenidia; tibia-tarsi I–II are distinctly elongated and striated; vertical setae *ve* are present, and tarsal setae *aa* are lacking. Our work emphasizes the importance of continued exploration and documentation of the biodiversity of astigmatid mites associated with invertebrate hosts.

KEY WORDS: astigmatid mites, taxonomy, systematic, phoretic deutonymph, fungus beetle, Endomychidae, Russia

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INTRODUCTION

Acaridae is a large family of Astigmata, with more than 80 genera and over 500 species (OConnor 2009). Many genera of Acaridae were described from phoretic deutonymphs (a dispersal stage), while their feeding stages (adults, nymphs and larvae) are unknown. As part of our survey of acarid mites in the Russian Far East, heteromorphic deutonymphs phoretic on the handsome fungus beetle *Mycetina marginalis* (Coleoptera, Endomychidae) were collected. These deutonymphs have a unique combination of character states that make them very distinct in the family Acaridae: an unpaired pigmented spot on the anterior propodosoma is present; supracoxal setae *scx* filiform and bifurcate; genu I with two solenidia, tibia-tarsi I–II are distinctly elongated and striated; vertical setae *ve* are present, and tarsal setae *aa* are lacking. Here we describe them in a new genus and species, *Mycetinopus striatipedis* sp. n.

MATERIALS AND METHODS

Beetles were manually collected from polypore fungi and inspected for mites. Phoretic mites were removed and mounted in Berlese medium. The terminology of idiosomal chaetotaxy follows Griffiths *et al.* (1990) and the terminology of the palp and leg chaetotaxy follows that of Grandjean (1939) and Griffiths (1970). The terminology of coxisternal setae follows Norton (1998). All measurements are given in micrometers (μm).

SYSTEMATICS

Genus *Mycetinopus* Klimov and Kolesnikov, gen. n.

Type species *Mycetinopus striatipedis* sp. n.

Description. Body ovoid, not greatly widened posteriorly, smooth (finely punctate). Subcapitular remnant of gnathosoma about 3 times as long as wide, not cleft into a V-shape. Palps with two segments. Vertical setae *vi* and *ve* present. Setae *vi* near anterior apex propodosoma, subterminal, inserted on ventral surface of propodosoma. Internal vertical setae (*vi*) elongate, at least 4 times longer than external verticals (*ve*). Propodosomal sclerite normally developed, bearing external and internal scapular setae (*se* and *si*). External scapular setae (*se*) no more than 3 times longer than internal scapular setae (*si*). Supracoxal seta of leg I (*scx*) thin, bifurcate at about 1/2 of its length. Single ocellus present on apex of propodosoma, represented by pigment spot, lenses absent. Propodosomal and hysterosomal dorsal sclerites smooth. Hysterosoma with 12 setae: *c*₁, *c*₂, *c*₃, *c*_p, *d*₁, *d*₂, *e*₁, *e*₂, *f*₁, *h*₁, *h*₃, *h*₃. Of them, setae *c*₃ ventral, situated slightly anterior to level of opisthonotal gland openings. Other setae dorsal. Opisthonotal gland openings situated laterally at level of setae *c*_p. Posterior hysterosomal sclerite without longitudinal apodemes. Dorsal opisthosomal setae simple, medium-sized, smooth. Coxal fields not as heavily sclerotized, simply punctate; coxal apodemes dis-

tinct. Coxal fields I–II open (anterior apodemes I–II end free); coxal fields III–IV closed. Coxal apodemes I fused into a sternal apodeme. Sternal apodeme ending freely far anterior to ends of anterior coxal apodemes II. Posterior apodemes II well separated from anterior apodemes IV. Coxal fields III closed, not fused to each other medially, nearly contiguous medially. Coxal fields III not distinctly narrowing medially, longer than wide. Coxal fields IV fused to each other medially, forming a posterior median ventral apodeme. Coxal setae *1a*, *3a*, *4a* absent, coxal setae *4b* present, filiform. Genital valves with one pair of genital setae (*g*), represented by vestigial alveoli. Genital papillae broadly rounded apically. Genital region terminal situated between legs IV. Attachment organ well-developed, wider than long, positioned near posterior end of body, with anterior (*ad*₃) suckers, median suckers (*ad*₁₊₂), and conoids *ps*₁ and *ps*₂ well-developed. Median suckers (*ad*₁₊₂) well-developed. Conoids *ps*₁ and *ps*₂ in a concave pattern; external conoids (*ps*₁) distinctly anterior to internal conoids (*ps*₂); external conoids (*ps*₂) lateral to median suckers (*ad*₁₊₂) and not completely posterior to median suckers (*ad*₁₊₂). Posterior lateral cuticular suckers of attachment organ normally positioned between conoidal setae *ps*₁ and *ps*₂.

Legs III–IV with all segments separate; in repose directed posteriorly. Leg IV generally similar in form to leg III. Tibiae I–II subequal to corresponding genua. Ventral setae of tibiae III–IV simple, not in the form of strongly toothed combs. Setae *mG* I–II, *cG* II, *nG* III, and *kT* III slightly barbed. Genu-tarsus I–II are finely striated. Genu I with two dorsal solenidia, σ' (long) and σ'' (short); genu II with one dorsal solenidion (σ); genu III without a solenidion. Genua III–IV subequal to tibiae III–IV; tarsi III–IV not projecting at an angle from tibiae III–IV. Tibiae I–II with 1 ventral setae *gT* (*hT* I–II absent); setae *gT* I–II smooth. Tarsi I–II attenuate, very long, tarsus I at least 6 times longer than basal width; tarsus II about 5 times longer than basal width. Tarsus I with 6 setae (*d*, *e*, *f*, *wa*, *ra*, *la*), 2 solenidia (ω_1 , ω_3), and famulus ε . Tarsus II with 7 setae (*ba*, *d*, *e*, *f*, *wa*, *ra*, *la*) and solenidion ω_1 . Tarsi III and IV each with 7 setae (*d*, *e*, *f*, *w*, *r*, *p*, *q*). Tarsal setae *d* I situated nearly at midtarsus; setae *d* II situated in 1/3 of tarsal apex. Tarsal setae *e* I–II slightly foliate at tips. Tarsus I with solenidia ω_1 and ω_3 closely associated, situated in the basal half of the tarsus. Solenidion ω_2 of tarsus I absent. Tarsi III and IV each with one

seta (*d* IV) longer than their respective legs. Pretarsal ambulacrum and empodial claw present on legs I–IV. Empodial claws I–IV borne on condylophores, small and claw-like, arising directly from tarsal apices, similar in form. Condylophores restricted to tarsal apices, symmetrical.

Diagnosis. Based on the absence of tarsal setae *aa*, *Mycetinopus* probably belongs to the subfamily Rhizoglyphinae (exclusively of the *Sancassania* and related genera). *Mycetinopus* can be distinguished from all other astigmatid genera by a combination of the following character states: an unpaired, well-developed eyespot is present on the apical propodosoma; external vertical setae *ve* are present; supracoxal setae of leg I (*scx*) is bifurcate at about 1/2 of its length; tarsal setae *aa* absent; genu-tarsus I–II are finely longitudinally striated; genu I with 2 dorsal solenidia, solenidion σ'' more than 5 times shorter than σ' ; tarsi I–II are attenuate, with tarsus I at least 6 times longer than its basal width. In the family Acaridae, only a single genus—*Ipsoglyphus* Klimov and Khaustov, 2018—has both two solenidia on genu I and an unpaired eyespot without distinct lenses (Klimov and Khaustov 2018). However, *Ipsoglyphus* has tarsal setae *aa*. Three other acarid genera also have two solenidia on genu I, but lack eyespots: *Thectochloracar* Fain, Engel, Flechtmann and OConnor, 1999; *Schulzea* Zachvatkin, 1941; and *Halictacar* Mahunka, 1975 (Zachvatkin 1941; Mahunka 1975; Fain *et al.* 1999). However, these three genera also have tarsal setae *aa*. The genera *Horstia* Oudemans, 1900, *Fagacar* Fain and Norton, 1979 and *Lasioacar* Kadzhaya and Sevastianov, 1969 lack tarsal setae *aa* and have bifurcated supracoxal setae of leg I (Fain and Norton 1979; Fain 1984; Fain and Chmielewski 1987); however, these setae are flattened and have an apical bifurcation (vs. filiform, bifurcate at about 1/2 of its length in *Mycetinopus*). Among the described rhizoglyphine genera that lack tarsal setae *aa* and have external vertical setae *ve* and an eyespot, *Mycetinopus* may be distantly related to *Capillaroglyphus* Klimov, 1998 (Klimov 1998). However, *Mycetinopus* has a single eyespot (vs. paired in *Capillaroglyphus*), genu I with 2 dorsal solenidia (vs. single solenidion in *Capillaroglyphus*), and bifurcated *scx* vs. (simple in *Capillaroglyphus*).

Etymology. The new generic name is a compound word derived from *Mycetina* (the host generic name) and *poús* (Greek, *foot*, *leg*; this stem is a contraction of *Hypopus*, which was formerly

considered as a valid genus in Astigmata, but it is currently commonly used to form generic names in deutonymphal Astigmata). Gender masculine.

***Mycetinopus striatipedis* Klimov
and Kolesnikov, sp. n.**

gen. n. sp. n. ex *Lycoperdina mandarinea* Klimov, Tolstikov, 2011: 259

(Figs. 1–3)

Material. Holotype: heteromorphic deutonymph—Russia: Primorsky Krai, Kaymanovka,

bank of the Barsukovka River, ex *Mycetina marginalis* Gebler, 1830 (Coleoptera, Endomychidae), 25 May 1998, P. Klimov. Paratype: 7 heteromorphic deutonymphs—same data. Additional material: 1 heteromorphic deutonymph—Russia: Primorsky Krai, Lazovsky District, kordon Benevskogo [Benevskoe], valley, deciduous forest, ex *Lycoperdina mandarinea* Gerstäcker (Coleoptera, Endomychidae), 7 Aug 1981, G.O. Krivolutsкая.

Type deposition. Holotype and paratypes are deposited in Zoological Institute, Russian Academy of Sciences, Saint Petersburg, Russia (ZISP). Ad-

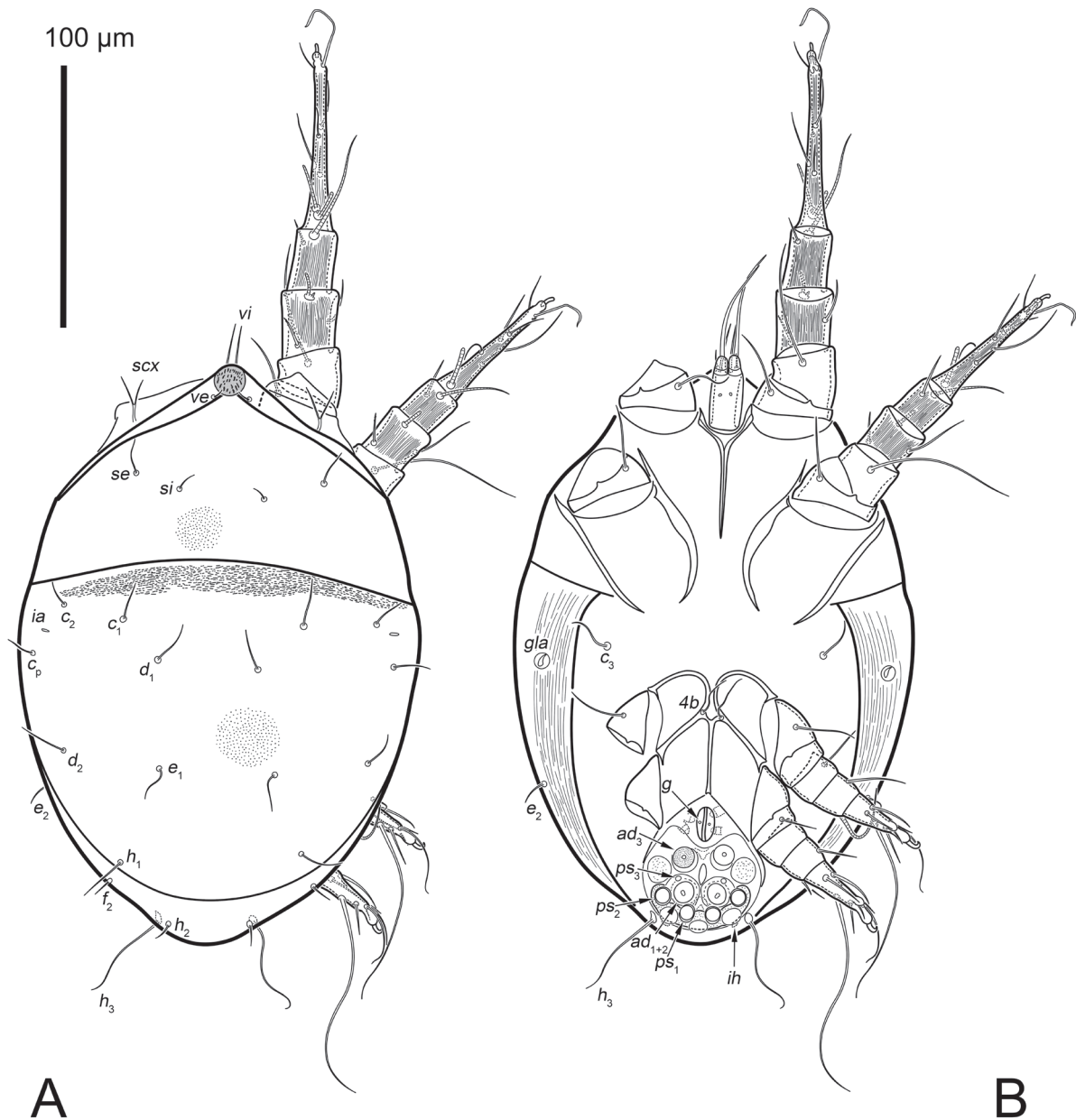


Fig. 1. *Mycetinopus striatipedis* gen. n. and sp. n., heteromorphic deutonymph: A—dorsal view; B—ventral view.

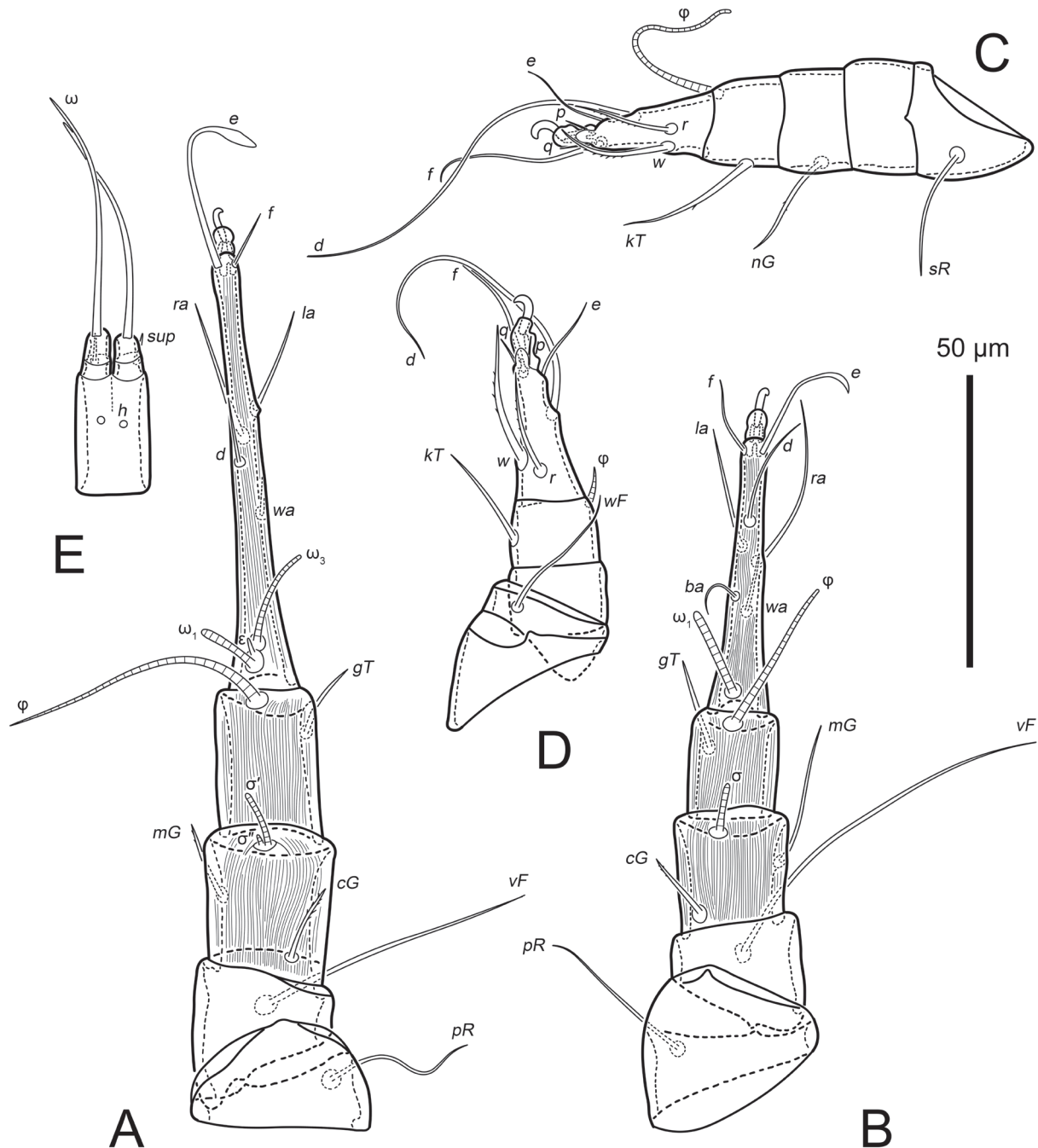


Fig. 2. *Mycetinopus striatipedis* gen.n. and sp.n., heteromorphic deutonymph: A—leg I, dorsal view; B—leg II, dorsal view; C—leg III, ventral view; D—leg IV, ventral view; E—gnathosoma, ventral view.

ditional material is deposited in Tyumen State University, Tyumen, Russia (TSUMZ).

Heteromorphic deutonymph. Body ovoid, 222×154, length/width ratio 1.4. Gnathosoma with elongated subcapitular remnant (longer than wide, 29×12), not widened at base, palps short (slightly longer than wide) with filiform apical palpal solenidia ω (40), and one pair of setae *sup*, setae *h*

absent from subcapitular remnant, their positions marked by somewhat refractile spots.

Dorsal idiosoma finely punctated. Length of hysterosoma (147) / length of propodosoma (75) 1.9. Anterior propodosoma with unpaired rounded pigmented spot; this spot is coarsely punctated. Lenses absent. All dorsal setae filiform and smooth. Setae *vi* 19. Setae *ve* 5, situated posterior ocellus.

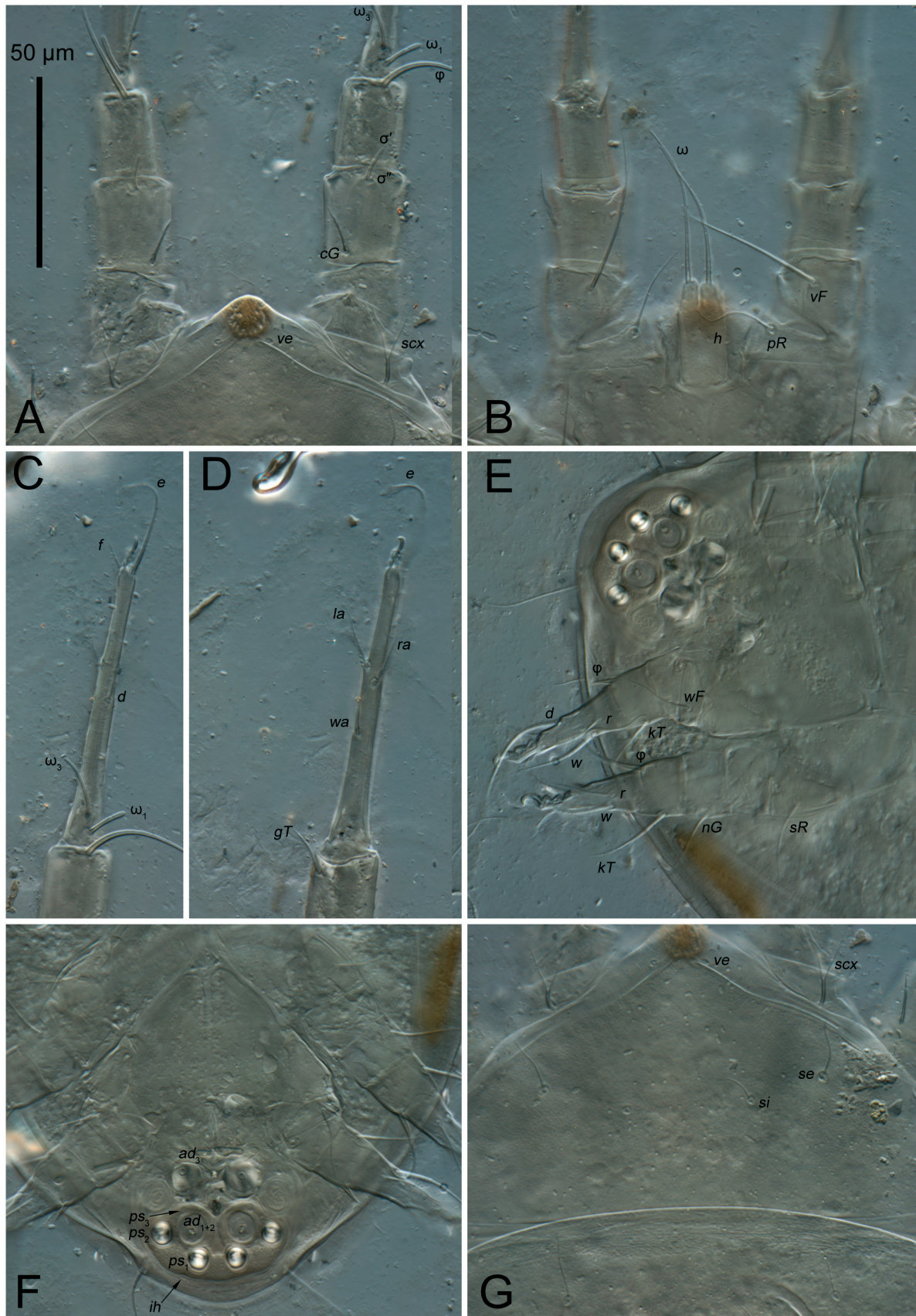


Fig. 3. *Mycetinopus striatipedis* gen.n. and sp.n., heteromorphic deutonymph, DIC photomicrographs: A—anterior part of propodosoma and legs I, dorsal view; B—same, ventral view; C—tarsus I, dorsal view; D—same, ventral view; E—legs III and IV, ventral view; F—attachment disk, ventral view; G—propodosoma, dorsal view.

Setae *se* (14) longer than *si* (7), *se* anterior *si*. Setae *scx* (18) bifurcated at $\frac{1}{2}$ of its length. Hysterosomal setae c_1 (15), d_1 (17), e_1 (15), d_1 (17), d_2 (18) and h_1 (19) longer than c_2 (11), c_p (11), e_2 (11), f_2 (11) and h_2 (11); setae h_3 (37) longer than all other dorsal setae. Distance c_1 - c_1 longer than d_1 - d_1 or e_1 - e_1 . Opisthonotal gland openings situated lateral to c_3 . Cupules *ia* present, situated posterior to c_2 .

Surface of coxal fields without any well-developed pattern. Anterior apodemes of coxal fields I fused, forming a sternum. Sternum not bifurcated, not reaching ends of anterior apodemes II; distance between end of sternum and coxal fields III longer than length of sternum. Coxal fields II open, posterior apodemes II and anterior apodemes III clearly separated (this distance is equal to $\frac{1}{2}$ the length of posterior apodemes II). Coxal field III closed. Anterior apodemes of coxal fields III fused with each other and form a median sclerite. Anterior apodemes of coxal fields IV fused to each other and connected to median sclerite of coxal fields III, without projections. Median sclerite reaching anus. Setae c_3 (18) filiform, ventral, situated between transverse levels of trochanters II–III. Setae *4b* (20) present, filiform. Setae *1a*, *3a*, *4a* and their alveoli absent, genital setae *g* absent (represented by alveoli). Attachment organ (40×45) wide (length/width ratio 0.8), situated near posterior edge of the body. Anterior, posterior and unpaired paired cuticular suckers of anal disk present. Setae ps_1 and ps_2 conoidal; ps_2 situated posterior to midline of ad_{1+2} and anterior to ps_1 ; sclerites of ps_1 and ps_2 not elongated. Pair of small refractile spots (ps_3) present anterolaterad of median suckers (ad_{1+2}). Suckers ad_3 round; suckers ad_{1+2} slightly larger than ad_3 , consisting of large sclerotized margins and surrounding paired vestigial alveoli (partially fused).

Legs I long (140), longer than half the body length; leg II (115) slightly longer than half the body length; legs III (73) and IV (72) shorter than half the body length; all segments free. Tarsus I long, its length equal to combined length of trochanter-tibia I. Tarsus II slightly shorter than combined length of genua-tibia II. Genua-tarsi I and II with fine longitudinal striations. Leg setation: trochanters 1–1–1–0, femora 1–1–0–1, genua 2(2)–2(1)–1–0, tibiae 1(1)–1(1)–1(1)–1(1), tarsi 6(2+ε)–7(1)–7–7. Trochanters I–III each with filiform seta (*pR* I–II, *sR* III). Femoral setae *vF* I–II and *wF* IV filiform. Genua setae *mG* I–II, *cG* I–II and *nG* III filiform, finely barbed, *mG* II twice as long as *cG* II. Tibial setae *gT* I–II and *kT* IV filiform,

smooth, *kT* III filiform, with few fine barbs; setae *hT* I–II and their alveoli absent. All pretarsi with hooked empodial claws arising from tarsal apices and connected to short, paired condylophores. Tarsus I with 5 filiform setae (*d*, *la*, *ra*, *f* and *wa*) and 1 foliate setae *e*; setae *d* I situated approximately in the middle of the tarsus; setae *p* and *q* absent. Tarsus II similar to tarsus I, except setae *ba* present (filiform), setae *d* and *ra* longer than tarsus I and seta *d* is closer to apical part of tarsus. Tarsi III and IV with 5 longer filiform setae (*d*, *e*, *f*, *w* and *r*) and 2 shorter, thin, filiform setae *p* and *q*; setae *d* longer than other setae (its length subequal to the length of leg III); setae *f* longer than *e*; setae *w* and *r* finely bared, other setae smooth. Solenidia ω_1 I–II on tarsi I–II cylindrical, with rounded expanded apices, situated in basal part of tarsus; solenidium ω_3 situated close to ω_1 , longer than ω_1 , cylindrical; solenidium ω_2 absent. Famulus spiniform, elongated, adjacent to solenidium ω_1 . Solenidia ϕ I and II tapering, shorter than tarsi; ϕ III longer than tarsus III; ϕ IV short, tapering. Genua I with 2 cylindrical solenidia (σ' and σ''), σ'' very short, more than 5 times shorter than σ' ; genua II with single cylindrical solenidium σ ; σ of genu III absent.

Distribution. Russia: Primorsky Krai.

Biology. Phoretic on *Mycetina marginalis* (Coleoptera: Endomychidae). Only a single specimen was found on *Lycoperdina mandarinea* (Endomychidae), and we consider this association accidental.

Etymology. The species epithet is a compound word derived from the Latin adjective *striatus* (grooved, furrowed) and the noun *pēs* (foot; genitive sing. *pedis*), referring to the finely striated legs I–II of the new species.

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