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## Article

### A new species and a new record of Caligonellidae (Acari: Raphignathoidea) from Russia

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#### ABSTRACT

Female of *Neognathus beshtaiensis* **sp. nov.** (Acari: Caligonellidae) is described from soil sample collected from the Beshtau mountain in Stavropol Krai of Northern Caucasus. *Molothrognathus venustus* (Khaustov & Kuznetsov) is recorded from Russia for the first time and its female and male are redescribed based on materials from the Tyumen Oblast of Russia.

**KEYWORDS:** Mites, morphology, *Molothrognathus*, *Neognathus*, Prostigmata, systematics.

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#### INTRODUCTION

The family Caligonellidae is a small group of predatory prostigmatid mites, which comprises five genera and about 60 species distributed almost worldwide, except Australia and Antarctica (Beron 2020; Khaustov 2022). The caligonellid mites of Russia are poorly studied. Only two species, *Molothrognathus altaicus* Khaustov, 2022 and *Neognathus sibiricus* Khaustov, 2022, have been reported from Asian Part of Russia (Khaustov 2022). Nothing known about caligonellid mites from Stavropol Krai and Northern Caucasus of Russia. The genus *Neognathus* Willmann, 1952 comprises 16 described species (see Khaustov 2022).

During the study of predatory mites of Russia, a new species, *Neognathus beshtaiensis* **sp. nov.** was collected from the soil sample from Northern Caucasus (Beshtau mountain) in Stavropol Krai. *Molothrognathus venustus* (Khaustov & Kuznetsov) is recorded from Russia for the first time and its female and male are redescribed based on materials from the Tyumen Oblast of Russia. The aim of this paper is to describe the new species and redescribe *M. venustus*.

#### MATERIAL AND METHODS

Mites were collected from the soil samples by Berlese funnels. Collected mites were mounted in Hoyer's medium. Notation applied to the body and leg setae follow that of Grandjean's system, overviewed by Kethley (1990) and Norton (1977) applied to Caligonellidae by Swift (2001); palpal setation follows Grandjean (1946). Mite morphology was studied using an Axio Imager A2

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compound microscope (Carl Zeiss, Germany) with phase-contrast and differential interference contrast (DIC) illumination. All measurements are given in micrometers ( $\mu\text{m}$ ) for holotype and available paratypes (in parentheses); the range of measurements is provided for the redescribed species. For leg chaetotaxy, the number of solenidia is is given in parentheses.

**Systematics**  
**Family Caligonellidae Grandjean**  
**Genus *Neognathus* Willmann, 1952**

**Type species:** *Neognathus insolitus* Willmann, 1952, by original designation

***Neognathus beshtaiensis* sp. nov. (Figs. 1–3)**

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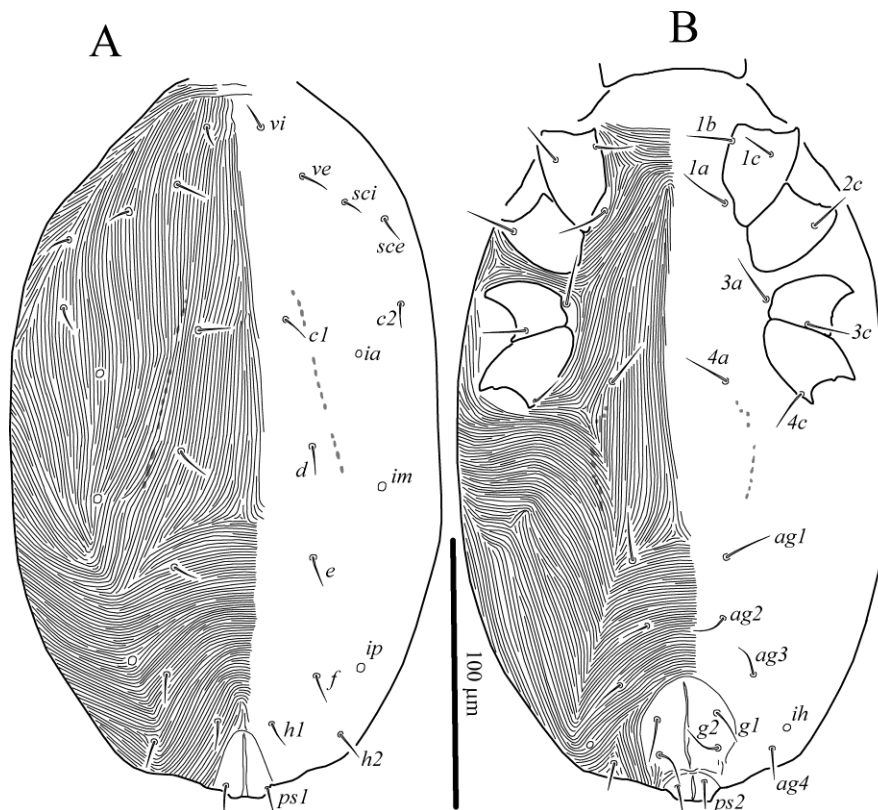
*Diagnosis*

**Female** – Cupuli *ia* well developed, tarsi III and IV with eight setae each (*vs* present), genua III and IV with two setae each, tarsus IV without solenidion, tibia IV without solenidion, palpgenu with one seta, stylophore without lateral projections, peritremes with 5–6 pairs of segments, two pairs of pseudanal setae.

*Description*

**Female (Figs. 1–3)** – Length of idiosoma 265 (240–250), width 160 (135–140).

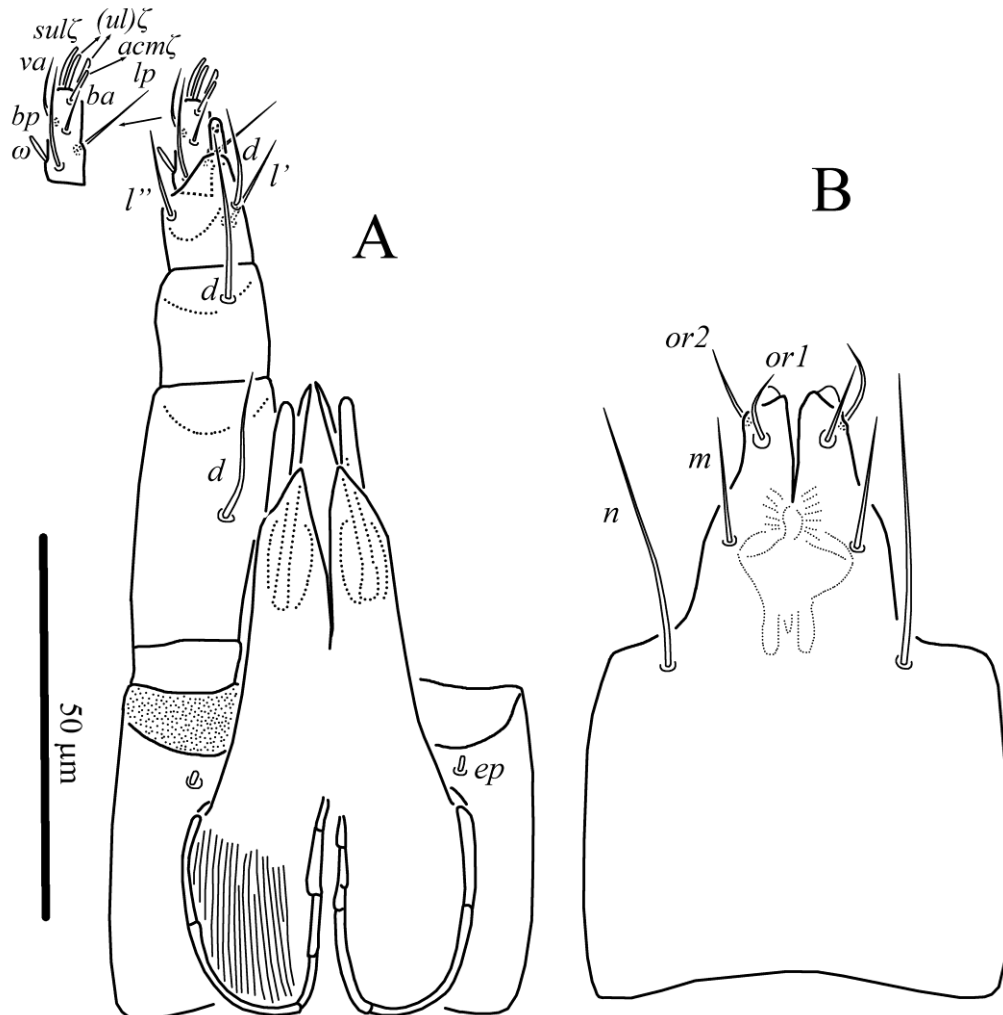
**Idiosomal dorsum (Fig. 1A)** – Ovate. Dorsal idiosomal striae thin. Dorsal setae smooth, pointed. Cupules *ia*, *im* and *ip* large, almost round; *ia* located posterolaterad *c1*, *im* posterolaterad *d*, and *ip* anterolaterad *f*. Lengths of dorsal setae: *vi* 8 (8–9), *ve* 12 (12), *sci* 13 (13–14), *sce* 12 (12–13), *c1* 12 (12), *c2* 12 (11–12), *d* 14 (13–14), *e* 13 (12–13), *f* 13 (11–12), *h1* 11 (10–11), *h2* 13 (11–12).



**Figure 1.** *Neognathus beshtaiensis* sp. nov. (female) – **A.** Idiosomal dorsum; **B.** Idiosomal venter.

**Idiosomal venter (Fig. 1B)** – All ventral setae smooth and pointed. Four pairs of aggenital and two pair of genital setae; cupuli *ih* located anterolaterad *ag4*. Anal valves with two pairs of pseudanal setae. Two longitudinal groups of tiny sclerites situated between setae *4a* and *ag1*. Lengths of ventral setae: *1a* 20 (20–22), *1b* 15 (15–18), *1c* 16 (16–18), *2c* 19 (19–20), *3a* 20 (20–23), *3c* 16 (16–20), *4a* 19 (19–20), *4c* 16 (14–16), *ag1* 16 (16–18), *ag2* 15 (15–18), *ag3* 13 (13–18), *ag4* 11 (11–13), *g1* 15 (15–17), *g2* 15 (15–16), *ps1* 11 (11), *ps2* 11 (11–13).

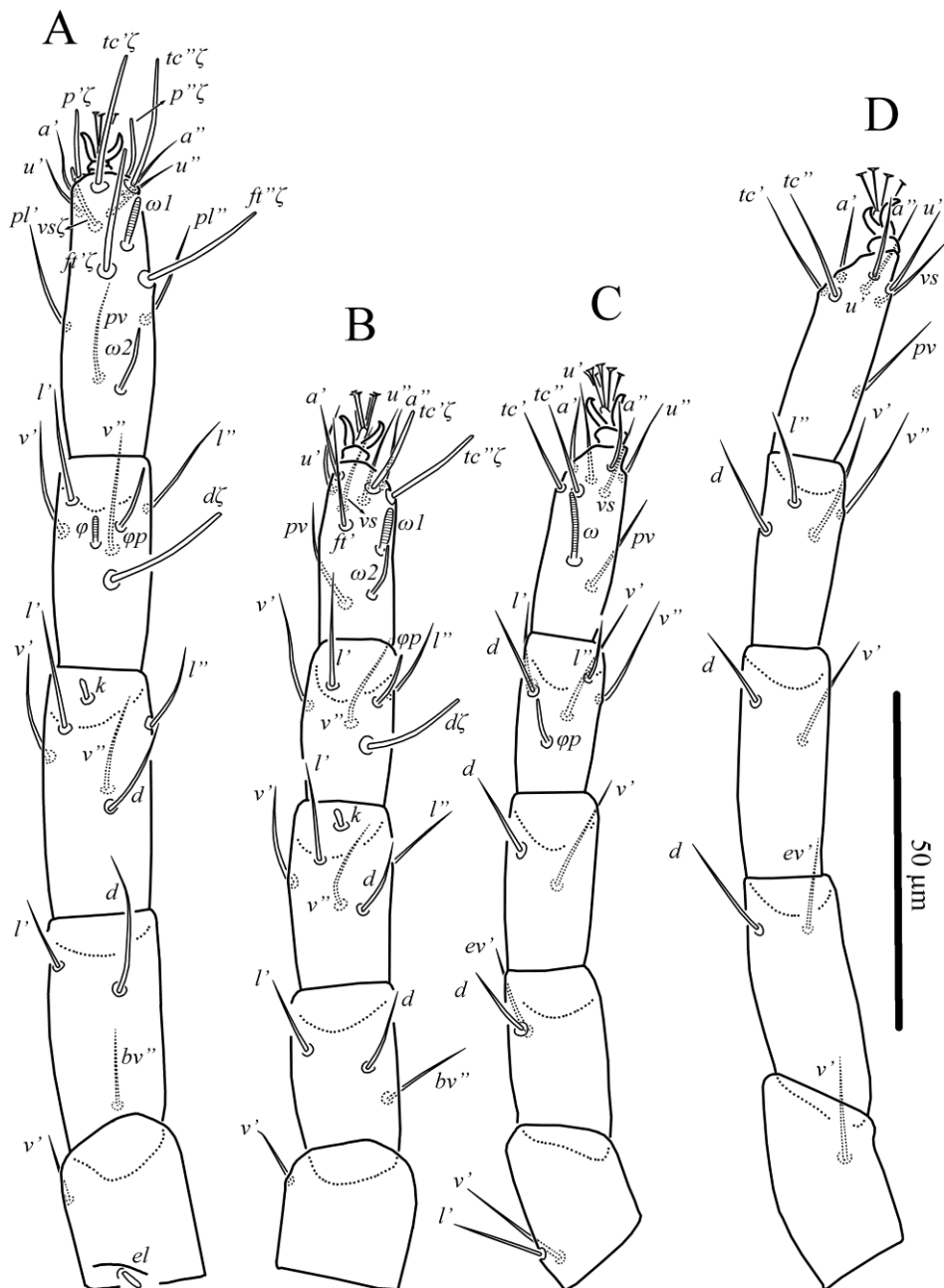
**Gnathosoma (Fig. 2)** – Stylophore width 38 (38–40); peritremes with 5–6 pairs of segments; cheliceral stylets 30 (30–31), slightly curved; cheliceral levers poorly visible, about three times shorter than cheliceral stylets. Palpal supracoxal setae (*ep*) short, peg-like; palpal chaetotaxy: Tr 0, Fe 1 (*d*), Ge 1 (*d*), Ti 3 (*d*, *l'*, *l''*), Ta 8(1) (*ba*, *bp*, *lp*, *va*, *acmζ*, *ul'ζ*, *ul''ζ*, *sulζ*, *ω*); tibial claw well developed, slightly hooked; all palpal setae smooth, eupathidia *acmζ*, *ul'ζ*, *ul''ζ*, *sulζ* blunt-tipped, other palpal setae pointed. Subcapitulum with delicate striae in basal part; all subcapitular setae smooth and pointed; lengths of subcapitular setae: *m* 16 (16–18), *n* 37 (37–38), *or1* 11 (11–12), *or2* 11 (11–12), length of palptarsal solenidion *ω* 4 (4).



**Figure 2.** *Neognathus beshtaiensis* sp. nov., female – **A.** Gnathosoma, dorsal aspect; **B.** Subcapitulum.

**Legs (Fig. 3)** – Lengths of legs: I 165 (170–180), II 125 (125–130), III 125 (125–130), IV 155 (155–160). Leg I (Fig. 3A). Leg setation: Tr 1 (*v'*), Fe 3 (*d*, *l'*, *bv''*), Ge 6 (*d*, *l'*, *l''*, *v'*, *v''*, *k*), Ti 5(2) (*dζ*, *l'*, *l''*, *v'*, *v''*, *φ*, *φp*), Ta 14(2) (*ft'ζ*, *ft''ζ*, *tc'ζ*, *tc''ζ*, *p'ζ*, *p''ζ*, *a'*, *a''*, *u'*, *u''*, *vsζ*, *pv'*, *pl'*, *pl''*, *ω1*, *ω2*). Supracoxal seta of leg I (*el*) peg-like; all leg setae smooth; setae *d* of tibia, (*ft*), (*tc*),

(*p*) and *vs* of tarsus eupathid-like, blunt-tipped; other leg setae pointed; solenidion  $\omega 1$  8 (8) digitiform, solenidion  $\omega 2$  11 (11) baculiform and curved, solenidion  $\phi$  4 (4) digitiform, solenidion  $\phi p$  8 (8–9) baculiform and curved, seta *k* 3 (3). Leg II (Fig. 3B). Leg setation: Tr 1 (*v'*), Fe 3 (*d*, *l'*, *bv''*), Ge 6 (*d*, *l'*, *l''*, *v'*, *v''*, *k*), Ti 5(1) (*d\zeta*, *l'*, *l''*, *v'*, *v''*,  $\phi p$ ), Ta 9(2) (*ft'*, *tc'\zeta*, *tc''\zeta*, *a'*, *a''*, *u'*, *u''*, *pv*, *vs*,  $\omega 1$ ,  $\omega 2$ ). All leg setae smooth; setae *d* of tibia and (*tc*) of tarsus eupathid-like, blunt-tipped; other leg setae pointed; solenidion  $\omega 1$  7 (6–7) digitiform, solenidion  $\omega 2$  8 (8) baculiform and curved, solenidion  $\phi p$  9 (7) baculiform, seta *k* 3 (3). Leg III (Fig. 3C). Leg setation: Tr 2 (*l'*, *v'*), Fe 2 (*d*, *ev'*), Ge 2 (*d*, *v'*), Ti 4(1) (*d*, *l''*, *v'*, *v''*,  $\phi p$ ), Ta 8(1) (*tc'*, *tc''*, *a'*, *a''*, *u'*, *u''*, *pv*, *vs*,  $\omega$ ). Solenidion  $\omega$  10 (9) digitiform, solenidion  $\phi p$  9 (8) baculiform. All leg setae smooth and pointed. Seta *l''* of genu absent. Leg IV (Fig. 3D). Leg setation: Tr 1 (*v'*), Fe 2 (*d*, *ev'*), Ge 3 (*d*, *v'*), Ti 4 (*d*, *l''*, *v'*, *v''*), Ta 8 (*tc'*, *tc''*, *a'*, *a''*, *u'*, *u''*, *pv*, *vs*). Solenidia  $\omega$  and  $\phi p$  absent. All leg setae smooth and pointed.



**Figure 3.** *Neognathus beshtaiensis* sp. nov. (female) – A–D. Right legs I–IV respectively, dorsal aspect.

Male and immatures unknown

*Type material*

Female holotype, slide ZISP T-Cal-05, Russia, Stavropol Krai, Beshtau mountain, 44° 06' 13.1" N, 43° 01' 13.0" E, 30 July 2023, in soil on the meadow, 1180 m a.s.l., coll. A.A. Khaustov. Paratypes: 2 females, same data.

*Type deposition*

The holotype and one female paratype of the new species are deposited in the acarological collection of the Zoological Institute of RAS, St. Petersburg, Russia; one paratype is deposited in the mite collection of the Tyumen State University Museum of Zoology, Tyumen, Russia.

*Etymology*

The name of the new species refers to its distribution in Beshtau mountain.

*Differential diagnosis*

The female of the new species is very similar to *Neognathus sibiriensis* in having large palptibial claw, absence of solenidion  $\omega$  on tarsus IV, absence of lateral projections on stylophore, presence of two pairs of pseudanal setae, presence of well-developed cupuli *ia*, presence of three setae on femur I, presence of seta *k* on genu II, presence of two setae on genu III, presence of only one seta on palpgenu, and presence of seta *vs* on tarsi III and IV. The new species differs from *N. sibiriensis* by the absence of solenidion on tibia IV (solenidion on tibia IV present in *N. sibiriensis*), presence of two setae on genu IV (three setae in *N. sibiriensis*), and in having 5–6 pairs of segments in peritremes (four pairs in *N. sibiriensis*).

**Genus *Molothrognathus* Summers & Schlinger, 1955**

**Type species:** *Molothrognathus leptostylus* Summers & Schlinger, 1955, by original designation

***Molothrognathus venustus* (Khaustov & Kuznetsov, 1997) (Figs. 4–7)**

*Caligonella venusta* Khaustov and Kuznetsov, 1997: 80

*Molothrognathus venusta*: Doğan 2003, 69

*Molothrognathus artvinensis* Koç and Ayyıldız, 1997: 47, synonymy by Doğan 2003, 69

*Molothrognathus venustus*: gender agreement, corrected here under art. 34.2 of ICZN

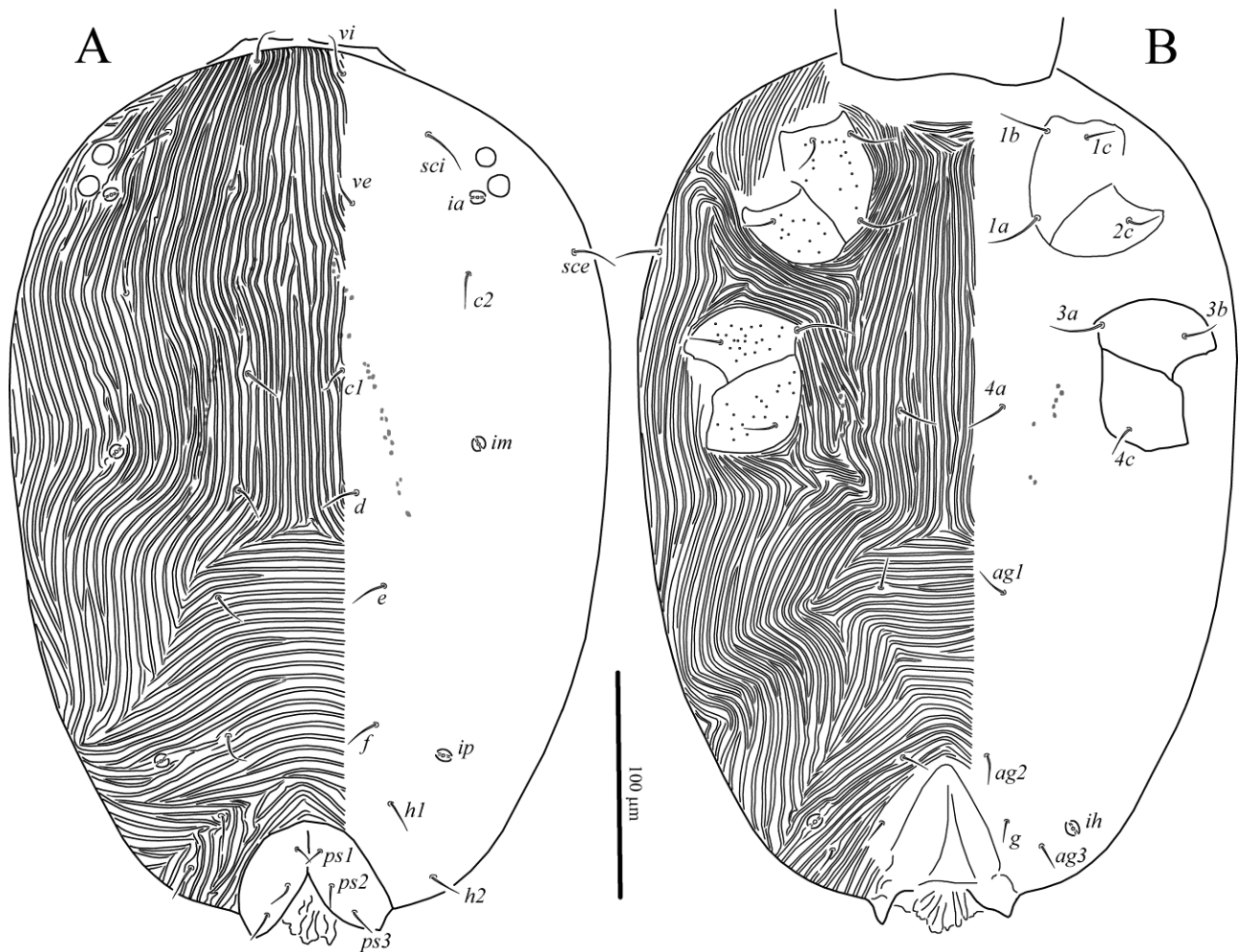
*Diagnosis*

**Female** – Dorsal shield absent; idiosomal striae very thick, double; three pairs of aggenital setae; three pairs of pseudanal setae; dorsal idiosomal setae short, subequal; seta *vs* of tarsus I absent; seta *p*'' of tarsus II absent; tibia I with one solenidion; stylophore elliptical.

*Redescription*

**Female (Figs. 4–6)** – Length of idiosoma 390–410, width 205–210.

**Idiosomal dorsum (Fig. 4A)** – Ovate. Dorsal idiosomal striae thick, usually double; dorsal shield absent. Two pairs of subequal ocelli located posterolaterad setae *sci*. Cupuli *ia*, *im* and *ip* large, almost round; *ia* located just posteromesad posterior ocellus, *im* anterolaterad *d*, and *ip* posterolaterad *f*. All dorsal idiosomal setae short, subequal, smooth and pointed. Anal valves located dorsoterminal, with three pairs of pseudanal setae; setae *ps3* located dorsally. A pair of longitudinal, oblique rows of tiny subcuticular sclerites situated laterad setae *c1* and *d*. Lengths of dorsal setae: *vi* 19–20, *ve* 17–18, *sci* 19–23, *sce* 20–21, *c1* 18–19, *c2* 19–20, *d* 17–18, *e* 17, *f* 15–16, *h1* 15–17, *h2* 16, *ps1* 8, *ps2* 12, *ps3* 13.

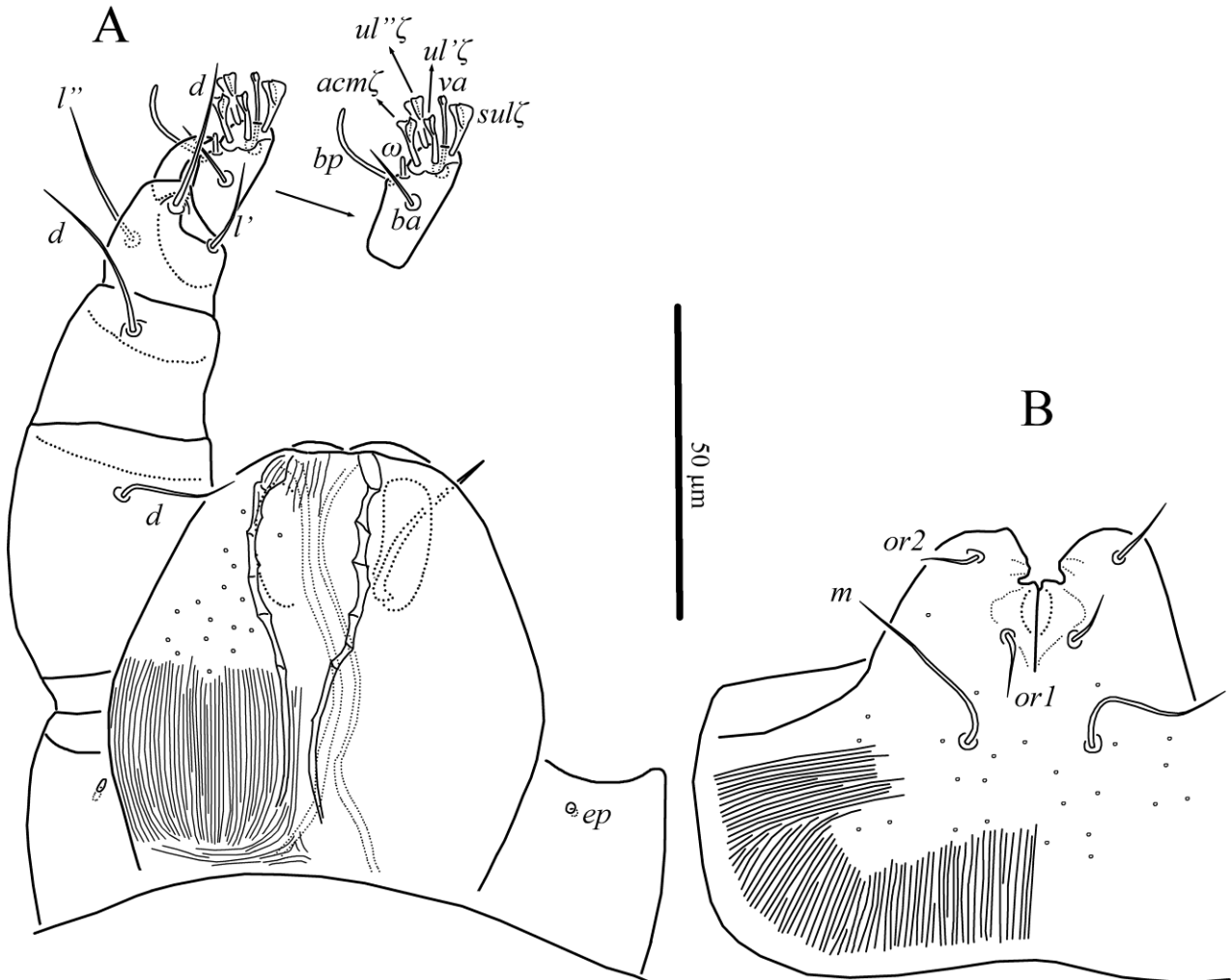


**Figure 4.** *Molothrognathus venustus* (Khaustov & Kuznetsov, 1997) (female) – **A.** Idiosomal dorsum; **B.** Idiosomal venter.

**Idiosomal venter (Fig. 4B)** – Ventral idiosoma striated, without plates. All ventral setae smooth and pointed. Setae *3a* located on the margin of coxisternal fields III. Coxisternal fields I–IV sparsely punctate. Three pairs of aggenital and one pair of genital setae; cupuli *ih* located anterolaterad *ag3*. A pair of almost parallel rows of small subcuticular sclerites situated laterad setae *4a*. Lengths of ventral setae: *1a* 25, *1b* 22–23, *1c* 13–14, *2c* 13–14, *3a* 25–26, *3b* 14–15, *4a* 18–19, *4c* 13–14, *ag1* 15–16, *ag2* 12–13, *ag3* 11–13, *g* 12.

**Gnathosoma (Fig. 5)** – Stylophore short and wide, elliptical in shape; longitudinally striated in basal half and punctate in distal one, its width 67–69; peritremes tubular, typical for the genus, their anterior ends situated near anterior margin of stylophore; peritremes inside with fine striae; cheliceral levers large, bean-shaped, about 1.5 times shorter than cheliceral stylets. Palpal supracoxal setae (*ep*) very small and located in deep depression with terminal pore; palpal chaetotaxy: Tr 0, Fe 1 (*d*), Ge 1 (*d*), Ti 3 (*d*, *l'*, *l''*), Ta 7(1) (*ba*, *bp*, *va*, *acm* $\zeta$ , *ul'* $\zeta$ , *ul''* $\zeta$ , *sul* $\zeta$ ,  $\omega$ ); tibial claw large, slightly hooked; all palpal setae smooth, eupathidia *acm* $\zeta$ , *ul'* $\zeta$ , *ul''* $\zeta$ , and *sul* $\zeta$  distinctly widened distally, with four subapical flat lobes; seta *va* usually blunt-tipped, sometimes distinctly widened distally, with four subapical flat lobes (Fig. 2A); seta *bp* slightly flattened and blunt-tipped distally; seta *ba* pointed; solenidion  $\omega$  very small, rod-shaped. Subcapitulum striated in basal half and punctate in distal one; all subcapitular setae smooth and pointed. Rostrum of subcapitulum short and wide, almost V-shaped split between setae *or2*. Lengths of subcapitular

setae: *m* 30–32, *or1* 11–12, *or2* 11–12, length of palptarsal solenidion  $\omega$  3, length of cheliceral stylet 28.

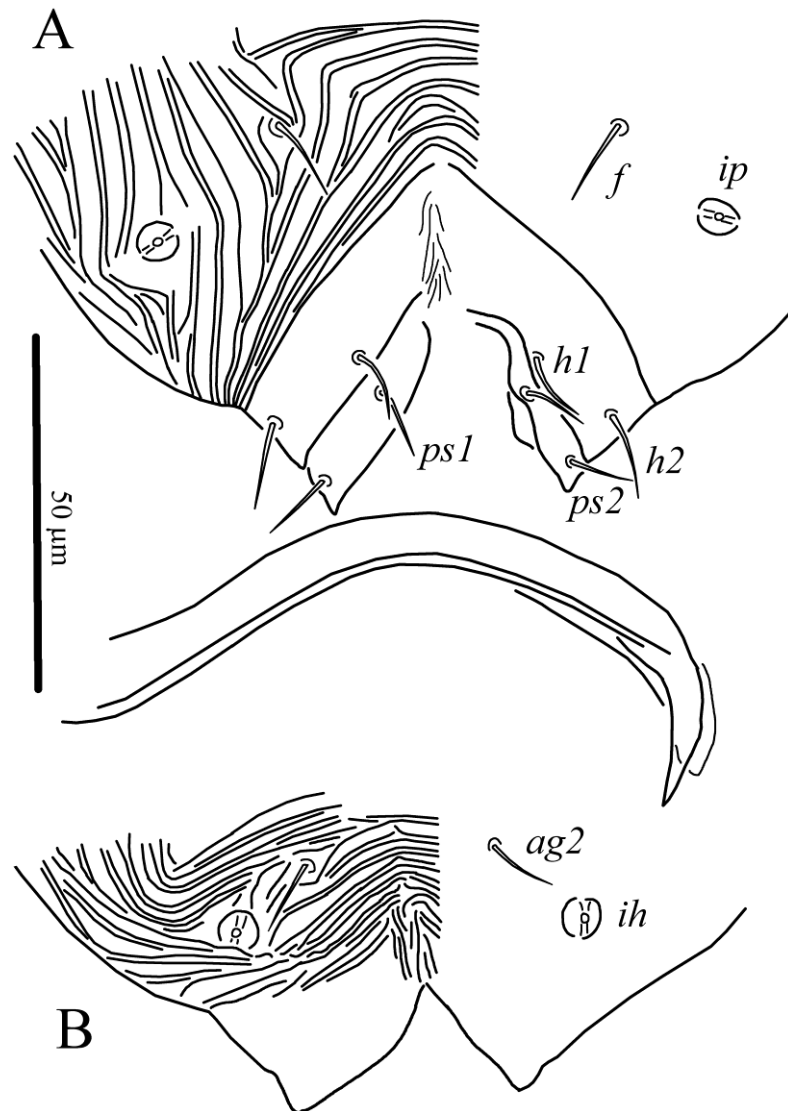


**Figure 5.** *Molothrognathus venustus* (Khaustov & Kuznetsov, 1997) (female) – **A.** Gnathosoma, dorsal aspect; **B.** Subcapitulum.

**Legs (Fig. 6)** – Lengths of legs (excluding claws): I 235, II 180–185, III 200–210, IV 225–230. Leg I (Fig. 6A) longer than other legs. Leg setation: Tr 1 (*v'*), Fe 2 (*d*, *bv''*), Ge 6 (*d*, *l'*, *l''*, *v'*, *v''*, *k*), Ti 5(1) (*d*, *l'*, *l''*, *v'*, *v''*,  $\varphi p$ ), Ta 14(1) (*ft'*, *ft''*, *tc'ζ*, *tc''ζ*, *p'ζ*, *p''ζ*, *a'*, *a''*, *u'*, *u''*, *pv'*, *pv''*, *pl'*, *pl''*,  $\omega$ ). Supracoxal seta of leg I (*el*) located in deep depression with terminal pore; all leg setae smooth; seta *vs* absent, setae (*tc*) and (*p*) eupathid-like, blunt-tipped, with very small subapical projections, other leg setae pointed; solenidion  $\omega$  8 digitiform, solenidion  $\varphi p$  10–11 baculiform; seta *k* 3 weakly clavate. Leg II (Fig. 6B). Leg setation: Tr 1 (*v'*), Fe 2 (*d*, *bv''*), Ge 4 (*d*, *l'*, *l''*, *v'*), Ti 5 (*d*, *l'*, *l''*, *v'*, *v''*), Ta 9(1) (*ft'*, *tc'*, *tc''*, *a'*, *a''*, *u'*, *u''*, *pv'*, *pv''*,  $\omega$ ). All leg setae smooth and pointed; seta *p''ζ* absent; solenidion  $\omega$  6–7 digitiform. Leg III (Fig. 6C). Leg setation: Tr 1 (*v'*), Fe 2 (*d*, *ev'*), Ge 2 (*d*, *v'*), Ti 4 (*d*, *l''*, *v'*, *v''*), Ta 8 (*tc'*, *tc''*, *a'*, *a''*, *u'*, *u''*, *pv'*, *pv''*). All leg setae smooth and pointed. Leg IV (Fig. 6D). Leg setation: Tr 1 (*v'*), Fe 2 (*d*, *ev'*), Ge 2 (*d*, *v'*), Ti 4 (*d*, *l''*, *v'*, *v''*), Ta 8 (*tc'*, *tc''*, *a'*, *a''*, *u'*, *u''*, *pv'*, *pv''*). All leg setae smooth and pointed.



**Legs** as in female, except absence of seta *v'* on trochanters I–IV. Lengths of legs: I 195, II 155, III 165, IV 185. Solenidion  $\omega$ I 5,  $\phi$ p 7,  $\omega$ II 5, seta *kl* 3.



**Figure 7.** *Molothrognathus venustus* (Khaustov & Kuznetsov, 1997) (male) – **A.** Opisthosoma, dorsal aspect; **B.** Opisthosoma, ventral aspect.

Immatures unknown.

#### Material examined

Two females, one male, Russia, Tyumen Oblast, city of Tyumen, Gagarin Park, moss on soil, 57° 10' N, 65° 36' E, 28 March 2023, collected by A.A. Khaustov.

#### Remarks

*Molothrognathus venustus* was described from Ukraine (Khaustov and Kuznetsov 1997). Doğan (2003) synonymized *M. artvinensis* Koç and Ayyıldız, 1997, described from Turkey, under *M. venustus*. The original description of *M. venustus* as well as description of *M. artvinensis* lacking detailed illustrations of some gnathosomal structures and legs. Male was not depicted. The comparison of specimens collected in Western Siberia with the type material of *M. venustus*

confirms their identity. Using DIC revealed an unusual shape of some setae on palptarsus, which were missed in original description.

### ACKNOWLEDGEMENTS

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## گونه جدید و گزارش جدید از *Caligonellidae* (Acari: Raphignathoidea) از روسیه

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### چکیده

ماده (Acari: Caligonellidae) *Neognathus beshtaiensis* sp. nov. از نمونه خاک جمع‌آوری شده از کوه بشتائو در استاوروپل کرای قفقاز شمالی توصیف می‌شود. گونه *Molothrognathus venustus* (Khaustov & Kuznetsov) برای اولین بار از روسیه گزارش می‌شود و ماده و نر این گونه بر اساس نمونه‌های تیومن اُبلاست روسیه بازتوصیف می‌شوند.

واژگان کلیدی: هرناها، ریخت‌شناسی، *Neognathus Molothrognathus*، پیش‌استیگمایان، رده‌بندی.

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