

FIRST RECORD OF THE MITE GENUS *RACKIA* (ACARI: HETEROSTIGMATINA: NEOPYGMEPHORIDAE) FROM ARCTIC RUSSIA WITH DESCRIPTION OF A NEW SPECIES

Alexander A. Khaustov^{1*} and Olga L. Makarova²

¹Tyumen State University, Tyumen, Russia

²Severtsov Institute for Problems of Ecology and Evolution, Russian Academy of Sciences, Moscow, Russia

*corresponding author; e-mail: alex1973khaustov@gmail.com

ABSTRACT: The genus *Rackia* Mahunka, 1975 (Acari: Pygmephoroida: Neopygmephoridae) is recorded from Russia for the first time. A new species, *Rackia curculionoides* sp. n. is described from soil of the arctic Vaigach Island, the north of Eastern Siberia. A key to species of the genus *Rackia* is provided. It was suggested that the elongated gnathosomal capsule in *Rackia curculionoides* sp. n. and other species of *Rackia* is a result of homoplasy.

KEY WORDS: Acarina, Pygmephoroida, systematics, key, tundra.

DOI: 10.21684/0132-8077.2016.24.1.55.60

INTRODUCTION

The superfamily Pygmephoroida Cross, 1965 includes four families: Pygmephoridae Cross, 1965; Neopygmephoridae Cross, 1965; Microdispidae Cross, 1965, and Scutacaridae Oudemans, 1916 together comprising more than 1200 species (Zhang *et al.* 2011). Probably all pygmephoroid mites are fungivorous (Khaustov 2008), but some species of the family Microdispidae might be parasitoids of insects (Kaliszewski *et al.* 1995). The family Neopygmephoridae includes 20 genera and more than 250 species (Zhang *et al.* 2011; Khaustov and Trach 2012, 2014).

The mite genus *Rackia* Mahunka, 1975 (Acari: Pygmephoroida: Neopygmephoridae) includes 3 described species: *R. miurai* (Sasa, 1961) from Japan (Sasa 1961), *R. sasai* (Mahunka, 1970) from Hungary (Mahunka 1970) and *R. acutifer* Mahunka, 1975 from Slovenia (Mahunka 1975). During the study of mite fauna of Vaygach Island a new species of the genus *Rackia* was revealed. The aim of this paper is to describe a new species and provide the key to species of the genus *Rackia*.

MATERIAL AND METHODS

Mites were collected from soil samples using Berlese funnels and mounted in Hoyer's medium. The terminology of idiosoma and legs follows that of Lindquist (1986); the nomenclature of subcapitular setae and the designation of cheliceral setae are according to Grandjean (1944, 1947), respectively. The system conception of Pygmephoroida follows Khaustov (2004, 2008). All measurements are given in micrometers (µm). For leg chaetotaxy, the number of solenidia is given in parentheses. The type material is deposited in the mite collection

of the Tyumen State University Museum of Zoology, Tyumen, Russia.

SYSTEMATICS

Family Neopygmephoridae Cross, 1965

Genus *Rackia* Mahunka, 1975

Type species: *Rackia acutifer* Mahunka, 1975 by original designation.

Rackia curculionoides sp. n.

Figs. 1–4

Description. Female (Figs. 1–4). Length of idiosoma 325 (320–360), width 160 (155–175). Gnathosoma (Fig. 2B). Gnathosomal capsule extremely long, beak-like. Dorsally with 2 pairs of smooth, subequal setae (*cha*, *chb*) and a pair of postpalpal setae (*pp*), situated posterolaterally to bases of *chb*. Dorsal median apodeme absent. Ventral gnathosoma with one pair of long subcapitular setae (*m*). Palps freely articulated to gnathosomal capsule, with setae *dFe* and *dGe* dorso-laterally. Ventral palp surface with large accessory setigenous structure (*ass*) and small solenidion behind it. Palps without terminal claw. Pharyngeal pumps I–III grouped together on long oesophagus (Fig. 2A). Pharyngeal pumps I and III small; pharyngeal pump II large, about 3 times longer than pharyngeal pump III.

Idiosomal dorsum (Fig. 1A). Prodorsum not covered by anterior margin of tergite C, with 2 pairs of setae (v_2 , sc_2), one pair of clavate and weakly barbed trichobothria (sc_1) and one pair of round stigmata. All dorsal plates with numerous small dimples. Setae v_2 smooth, other dorsal setae dis-

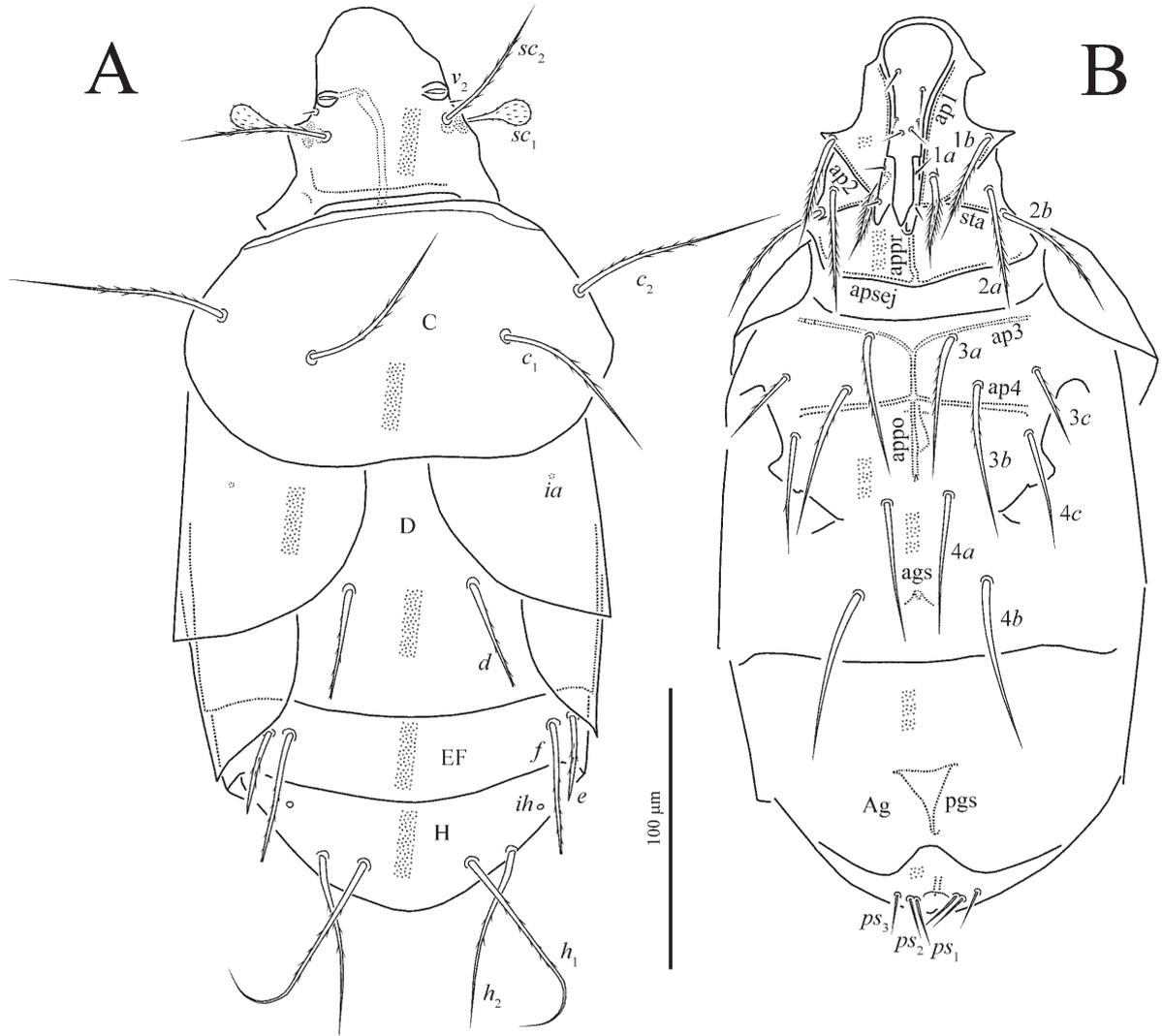


Fig. 1. *Rackia curculionoides* sp. n., female: A, B, dorsum and ventrum of idiosoma respectively.

tinctly barbed; setae v_2 , sc_2 , c_1 , c_2 , h_1 , and h_2 pointed, other dorsal setae blunt-ended. Cupules ia on tergite D and ih on tergite H very small, round. Lengths of dorsal setae: v_2 5 (5–6), sc_2 57 (55–60), c_1 68 (65–70), c_2 79 (72–80), d 41 (39–42), e 31 (30–32), f 50 (46–51), h_1 84 (76–86), h_2 68 (66–72). Distances between setae: v_2 – v_2 48 (48–50), sc_2 – sc_2 46 (45–47), c_1 – c_1 69 (68–71), c_1 – c_2 37 (36–39), d – d 43 (41–45), e – f 8 (7–9), f – f 93 (91–94), h_1 – h_1 39 (39–44), h_1 – h_2 14 (13–14).

Idiosomal venter (Fig. 1B). All ventral plates with numerous small dimples. Setae $4a$, $4b$, $4c$, ps_1 – ps_3 smooth, sometimes $4c$ with 1 or 2 barbs. Apodemes 1 (ap_1) well developed in distal part and indistinct proximally, not joined with prosternal apodeme ($appr$); apodemes 2 (ap_2) well developed, joined with $appr$; prosternal and sejugal (ap_{sej}) apodemes well developed; secondary transverse

apodemes (sta) consist of 2 oblique parts joined with ap_2 ; apodemes 3 (ap_3) long, straight, fused with poststernal apodeme ($appo$); apodemes 4 (ap_4) well sclerotized and long, also fused with poststernal apodeme; apodemes 5 absent. Posterior margin of posterior sternal plate slightly convex in middle part. Posterior margin of aggenital plate deeply concave. Anterior genital sclerite (ags) bell-shaped, posterior genital sclerite (pgs) triangular. Lengths of ventral setae: $1a$ 32 (32–39), $1b$ 41 (40–47), $2a$ 42 (42–54), $2b$ 58 (52–59), $3a$ 51 (50–54), $3b$ 57 (57–60), $3c$ 29 (28–32), $4a$ 51 (50–54), $4b$ 63 (63–72), $4c$ 40 (39–43), ps_1 18 (16–20), ps_2 16 (14–17), ps_3 13 (12–14).

Legs (Figs. 3, 4). Leg I (Fig. 3A) slightly longer than leg II. Leg setation: 1–3–4–16(4). Tibiotarsus not thickened, with terminal claw situated on distinct pretarsus, claw tip thin. Lengths of solenidia:

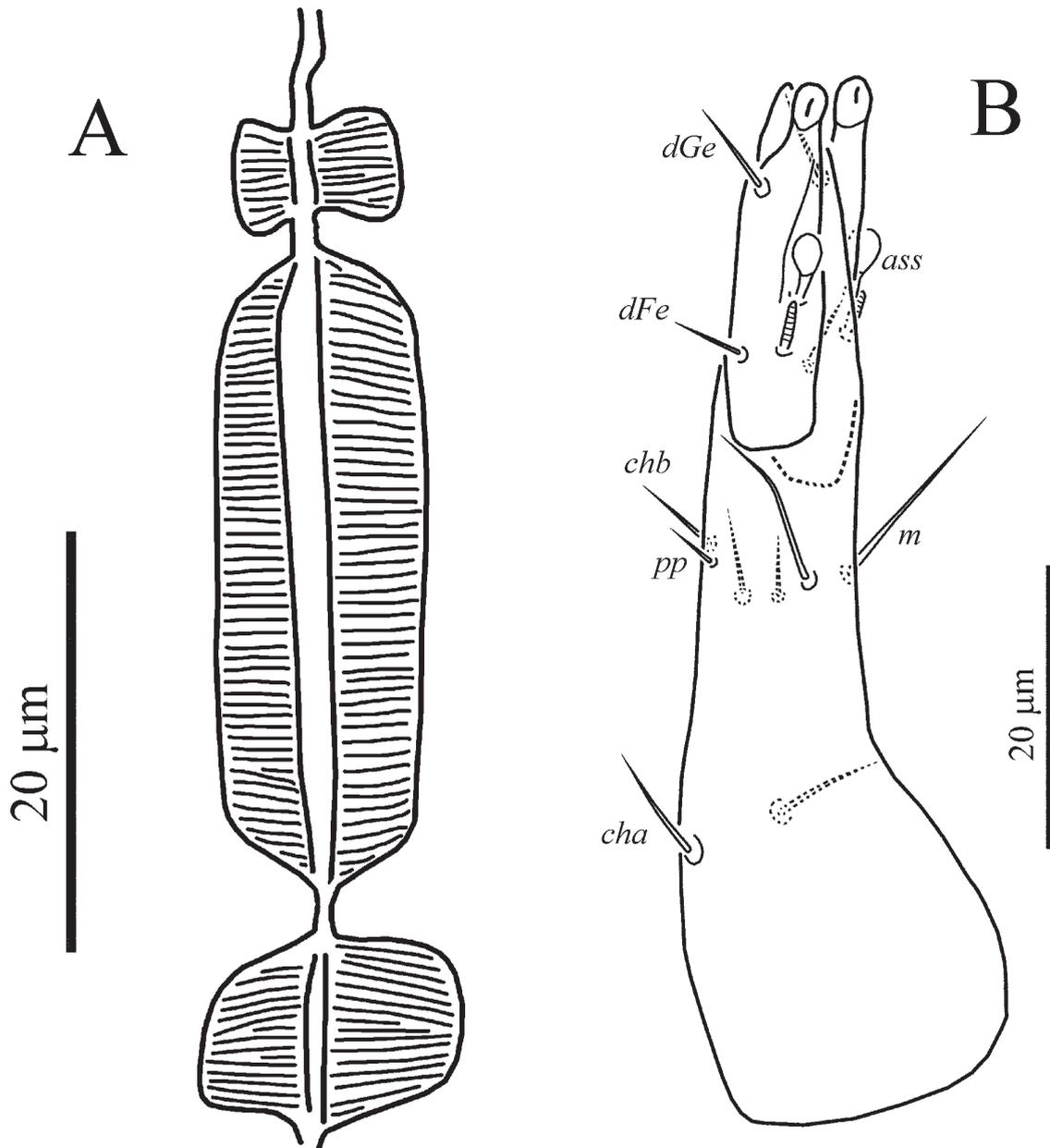


Fig. 2. *Rackia curculionoides* sp. n., female: A, pharynx; B, gnathosoma, ventrolateral aspect.

ω_1 25 (23–27) > ω_2 22 (21–23) > φ_1 10 (10–11) < φ_2 16 (16–20); ω_2 and φ_2 uniformly thin, curved, ω_1 and φ_1 finger-shaped. Setae *dFe* broadened, hook-like. Seta *l'Fe* smooth, blunt-ended. Leg II (Fig. 3B). Leg setation: 1–3–3–4(1)–6(1). Tarsus with sickle-like, padded claws and relatively small empodium. Solenidion ω 20 (19–21), finger-shaped, solenidion φ 7 (7–8) finger-shaped. Setae *u'* blunt-ended and barbed in distal part. Leg III (Fig. 4A). Leg setation: 1–2–2–4(1)–6. Claws of same shape as on tarsus II. Solenidion φ 6 (6–7) finger-shaped. Setae *u'* blunt-ended and barbed in distal part. Leg IV (Fig. 4B) much longer than other legs. Leg setation: 1–2–1–4(1)–6. Tarsus

relatively short, pretarsus short, with two small simple claws and small empodium. Solenidion φ 4 (4–5), weakly clavate. Setae *v'Ge* and *v''Ti* blunt-ended. Setae *v''Ti* smooth.

Male and larva unknown.

Type material. Female holotype, slide no OM220810, Russia: Nenets Autonomous Region, Vaygach Island, environs of Bolvanskaya Mt., 70°12'941'' N, 59°16'614'' E, dwarf shrub-lichen stony tundra, in soil between hummocks, 22.08.2010, coll. B. Filippov, N. Zubrii. Paratypes: 17 females, same data as holotype.

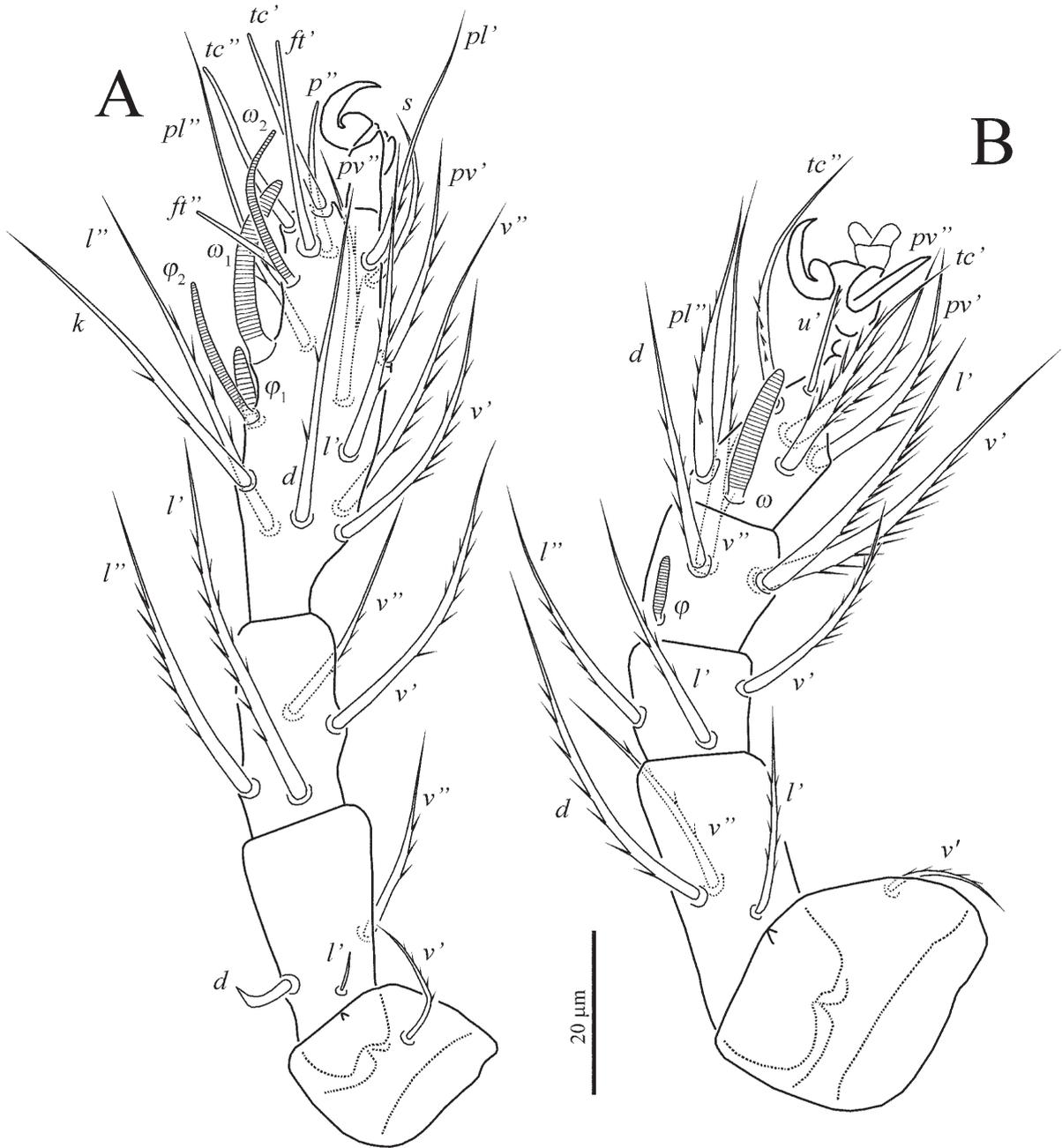


Fig. 3. *Rackia curculionoides* sp. n., female: A, B, legs I and II, respectively.

Etymology. The name of the new species referring to similarity of female gnathosoma to long and narrow head capsule of the curculionid beetles.

Differential diagnosis. The new species differs from all known *Rackia*-species by very short and smooth pseudanal setae (vs. at least ps_1 long and distinctly barbed in other species) and by relatively short and thick tarsus IV (vs. long and thin in other species).

Key to species of the genus *Rackia* (females)

1. At least one of pseudanal setae long and distinctly barbed, tarsus IV long and thin.....2
 — Pseudanal setae very short and smooth, tarsus IV short and thick..... *R. curculionoides* sp. n.
2. All pseudanal setae subequal in length3
 — Pseudanal setae ps_1 about 2 times longer than ps_{2-3} *R. miurai* (Sasa, 1961)
3. Dorsal setae *d* distinctly shorter than *f*.....
*R. acutifer* Mahunka, 1975

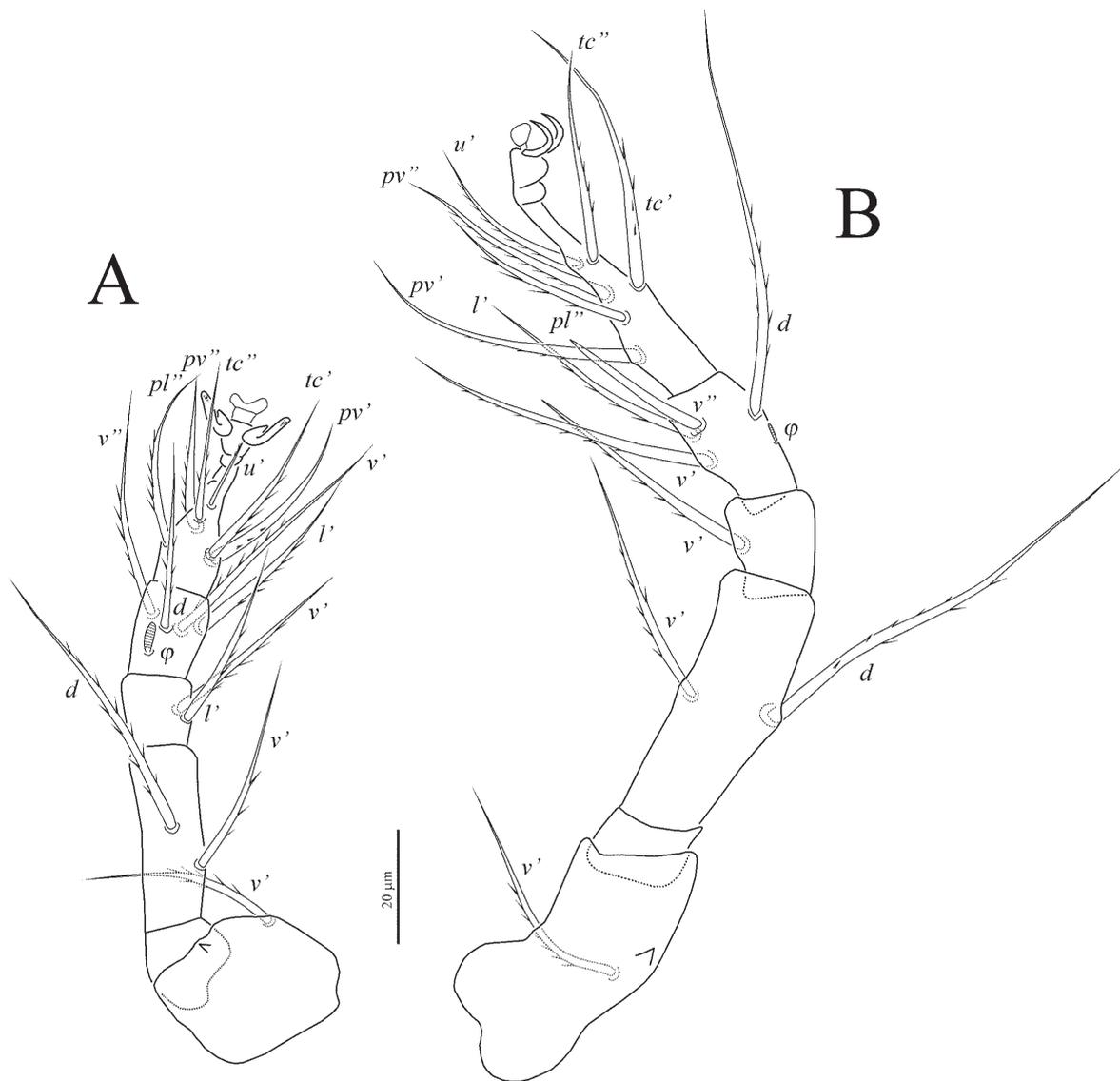


Fig. 4. *Rackia curculionoides* sp. n., female: A, B, legs III and IV, respectively.

— Dorsal setae *d* distinctly longer than *f*.....
 *R. sasai* (Mahunka, 1970)

DISCUSSION

The genus *Rackia* is characterized by the extremely long gnathosomal capsule of females. Similar elongation of gnathosomal capsule is known in many pygmephoroid genera, such as *Rhynopygmephorus* Kurosa, 2001 (Neopygmephoridae), *Perperipes* Cross, 1965, *Glyphydomastax* Cross, 1965 (Microdispidae), *Rhynchodispus* Mahunka, 1969, and *Nasutiscutacarus* Beer and Cross, 1960 (Scutacaridae). Undoubtedly, this structure is derived from the short and wide gnathosomal capsule independently in different lineages of Pygmephor-

oidea. The purpose of such elongation of the gnathosomal capsule is unknown, but probably it is a result of high specialization to feeding by particular fungi. By the complex of other characters: the short and smooth pseudanal setae, relatively short and thick tarsus IV, very long femur IV, well developed oblique apodeme *sta*, the new species *Rackia curculionoides* sp. n. is more similar to species of the *delaneyi*-group of the genus *Bakerdania* Sasa, 1961 than to other species of the genus *Rackia*. With very high probability the elongated gnathosomal capsule in *Rackia curculionoides* sp. n. and other species of *Rackia* is a result of homoplasy. However, we retain new species within the genus *Rackia* given the phylogenetic relationships in the family Neopyg-

mephoridae as well as inside all known genera of this family remain unstudied.

ACKNOWLEDGEMENTS

The research of O.L. Makarova was supported by the Russian Foundation for Basic Research (no 14-04-01114). The authors are grateful to B.Yu. Filippov and N. Zubrii (North Arctic Federal University, Arkhangelsk) for sampling mite specimens. Preparation of these data for publication was conducted in the framework of the project “Mainstreaming the biodiversity and conservation into Russia’s energy sector policies and operations” (no 00077026) of the United Nations Development Programme / Global Environment Facility—Minprirody of Russia (2014–2016).

REFERENCES

- Grandjean, F. 1944. Observations sur les Acariens de la famille des Stigmaeidae. *Archives des Sciences physiques et naturelles*, 26: 103–131.
- Grandjean, F. 1947. L’origine pileuse des mors et la chaetotaxie de la mandibule chez les Acariens actinochitineux. *Comptes rendus des séances de l’Académie des Sciences*, 224: 1251–1254.
- Kaliszewski, M., Athias-Binche, F. and Lindquist, E.E. 1995. Parasitism and parasitoidism in Tarsonemina (Acari: Heterostigmata) and evolutionary considerations. *Advances in Parasitology*, 35: 335–367.
- Khaustov, A.A. 2004. [Mites of the family Neopygmephoridae Cross, 1965 stat. n. and their position in Heterostigmata]. In: Y.S. Balashov (Ed.). *VIII Russian Acarological Conference, St.-Petersburg. Zoological Institute of RAS, St.-Petersburg*, p. 137. [in Russian]
- Khaustov, A.A. 2008. *Mites of the Family Scutacaridae of Eastern Palaearctic*. Akademperiodyka, Kiev, 291 pp.
- Khaustov, A.A. and Trach, V.A. 2012. A new genus and species of the family Neopygmephoridae (Acari: Heterostigmata: Pygmephoridae) associated with *Geotrupes spiniger* (Coleoptera: Geotrupidae) from Ukraine. *Acarina*, 20: 3–7.
- Khaustov, A.A. and Trach, V.A. 2014. Mites of the superfamily Pygmephoridae (Acari: Heterostigmata: Neopygmephoridae, Pygmephoridae) associated with *Trox cadaverinus* (Coleoptera: Trogidae) from the Far East of Russia, with description of a new genus and two new species. *Zootaxa*, 3754: 86–96.
- Lindquist, E.E. 1986. The world genera of Tarsonemidae (Acari: Heterostigmata): a morphological, phylogenetic, and systematic revision, with a reclassification of family-group taxa in the Heterostigmata. *Memoirs of Entomological Society of Canada*, 136: 1–517.
- Mahunka, S. 1970. Considerations on the systematics of the Tarsonemina and the description of new European taxa (Acari: Trombidiformes). *Acta Zoologica Academiae Scientiarum Hungaricae*, 16: 137–174.
- Mahunka, S. 1975. Beiträge zur Kenntnis der Tarsonemiden (Acari) von Kleinsäugernestern aus der Umgebung von Ljubljana (Jugoslawien). *Parasitologia Hungarica*, 8: 75–83.
- Sasa, M. 1961. New mites of the genus *Pygmephorus* from small mammals in Japan (Acarina: Pyemotidae). *Japanese Journal of Experimental Medicine*, 31: 191–208.
- Zhang, Z.-Q., Fan, Q.-H., Pesic, V., Smit, H., Bochkov, A.V., Khaustov, A.A., Baker, A., Wohltmann, A., Wen, T.-H., Amrine, J.W., Beron, P., Lin, J.-Z., Gabrys, G. and Husband, R. 2011. Order Trombidiformes Reuter, 1909. In: Zhang, Z.-Q. (ed.) *Animal biodiversity: an outline of higher-level classification and survey of taxonomic richness*. *Zootaxa*, 3148: 129–138.