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New species and records of myrmecophile uropodine mites (Acari: Mesostigmata) from Iran

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ABSTRACT

A new macrodinychid mite, *Macrodinychus iranicus* Babaeian & Khalili-Moghadam **sp. nov.**, is described and illustrated based on adult females and males collected in the nest of a *Tetramorium* sp. (Hymenoptera: Formicidae) in Koohrang county (Chaharmahal va Bakhtiari Province), Iran. *Uroobovella similiobovata* Hirschmann & Zirngiebl-Nicol, 1962 and *Microuroobovella olszanowskii* Błoszyk et al., 2020 are also reported for the first time for the fauna of Asia.

<http://www.zoobank.org/urn:lsid:zoobank.org:pub:26AE31BD-68AC-4D12-8F59-BF161AC6C386>

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Uropodina; taxonomy; new species; ant nest; Macrodinychidae; Southwestern Iran

Introduction

The suborder Uropodina (commonly referred to as tortoise mites) includes approximately 300 genera and more than 2000 described species (Wiśniewski and Hirschmann 1993; Halliday 2015, 2016). They are most abundant in forest litter but can also be found in large numbers in moss, on and around the base of tree trunks, in ant nests, nests, and burrows made of vertebrates, under stones, and in dung and carrion. Most species appear to be predators that feed on nematodes or other small invertebrates, but others may feed on living and dead fungi and plant tissue (Lindquist et al. 2009). The suborder has had a very unsettled classification, and a stable system of families and genera has not yet been achieved.

The Macrodinychidae is represented by a single pantropical genus, which comprises nearly 26 species (Kontschán 2011, 2017; Brückner et al. 2017). Different concepts of genera and subgenera have been used by, for example, Vitzthum (1943), Hirschmann and Zirngiebl-Nicol (1961), Hirschmann (1975, 1979).

Little is known about the biology of these groups, but the immature stages of at least four species are parasitoids of ant pupae, while adults are predators of small invertebrates (Lachaud et al. 2016; Brückner et al. 2017; Pérez-Lachaud et al. 2019). Our current knowledge of the Uropodina of Iran is rather limited, due to a lack of both local specialists and field sampling campaigns. So far, one species of *Macrodinychus*, *M. bregetovae* (Hirschmann, 1975), has been reported from Iran. Currently, 54 species of Uropodina have been documented from Iran (Kazemi and Rajaei 2013; Babaeian et al. 2018; Nemati et al. 2018), but most of the records lack detailed information about their identification and distribution. In order to better understand the fauna of this country, a survey was carried out in southwestern Iran.

Materials and methods

The mites were collected over the period of 2013–2021 in Charmahal va Bakhtiari province, southwestern Iran. The mites were extracted from the soil and ant nest by means of a modified Berlese–Tullgren funnel equipped with a 40-Watt bulb and preserved in ethyl alcohol. Before identification, the mites were mounted on permanent microscope slides, using Nesbitt solution mounting medium. The morphology of the mites was studied using a compound microscope (model

BX51, Olympus, Tokyo, Japan) equipped with phase contrast illumination. Measurements were made from slide-mounted specimens. Lengths of idiosoma and shields were measured along their midlines, and widths at their widest point (if not otherwise specified in the description), legs I–IV from coxal base but without the pretarsal ambulacrum. Idiosomal setae were measured from the bases of their insertions to their tips. All measurements are presented in micrometres as ranges (minimum to maximum). All materials were collected by the senior author and deposited in the Acarological Collection, Department of Plant Protection, Faculty of Agriculture, Shahrekord University (APAS), Shahrekord and in the Acarological collection, Jalal Afshar Zoological Museum (JAZM), Department of Plant Protection, Faculty of Agriculture, University of Tehran, Karaj, Iran.

Results

Systematics

Family: Macrodinychidae Kontschán, 2017

Macrodinychus Berlese, 1916

Subgenus: *Macrodinychus* Berlese, 1917

Macrodinychus (M.) iranicus Babaeian & Khalili-Moghadam **sp. nov.**

Description

Female (n = 5) (Figures 1, Figure 2 and Figure 3). Length of idiosoma 788–813 µm, width 490–510 µm.

Dorsal idiosoma (Figure 1). Oblong-shaped. Dorsal shield, hypertrichous covered with numerous alveolar pits. Marginal shield narrow, united with centro-dorsal regions of the dorsal shield anteriorly. Dorsal setae covered with ±530 pairs of, homogeneous in length setae. Dorsal setae narrow with delicately serrated margins (Figure 1), and short (17–20 µm). Pygidial shield 61–78 µm, with ±20 pairs of setae.

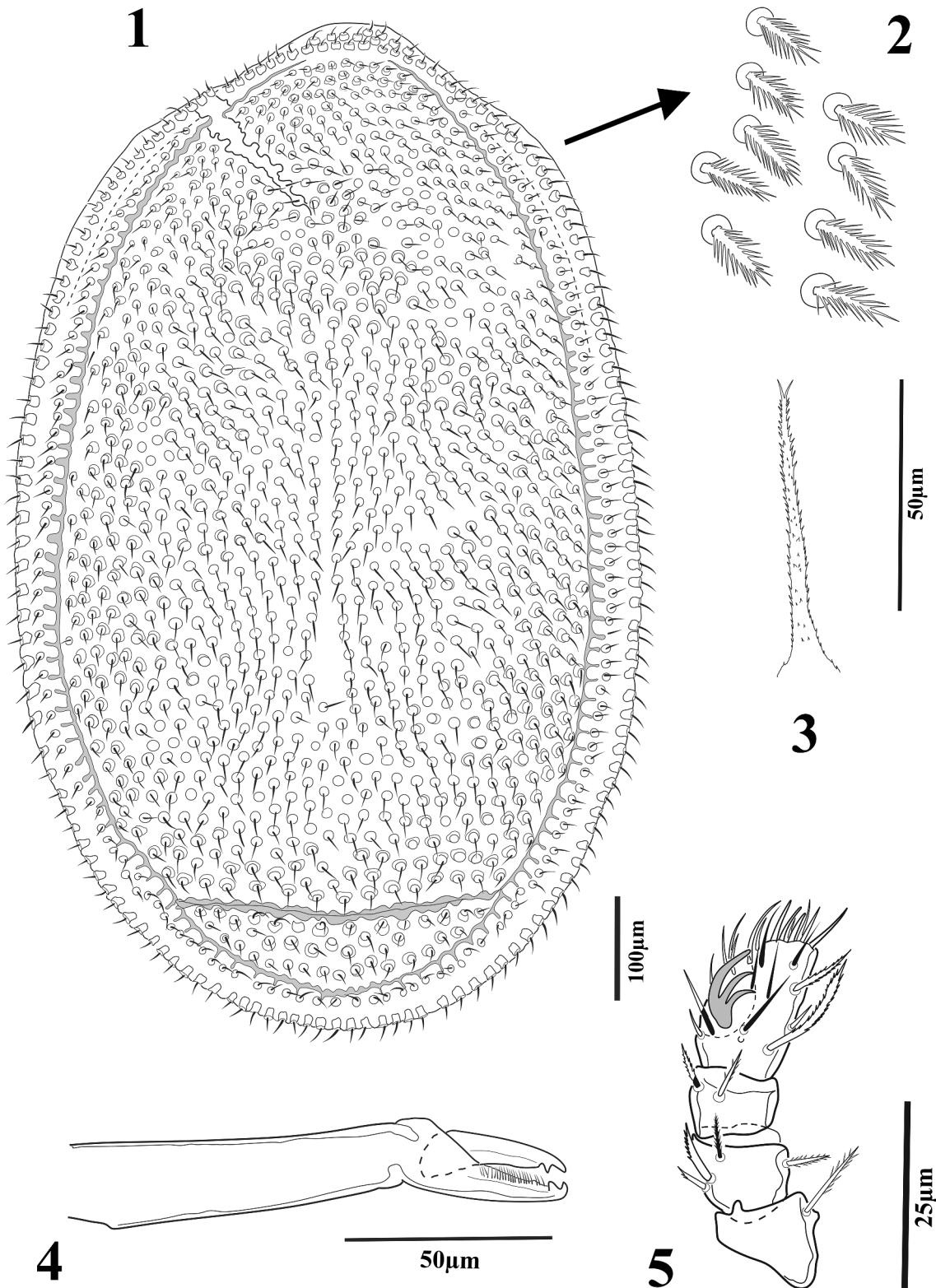


Figure 1. *Macrodinychus (M.) iranicus* Babaiean & Khalili-Moghadam sp. nov., female. 1. Dorsal idiosoma; 2. Enlarged view of a dorsal seta; 3. Epistome; 4. Chelicera; 5. Palp.

Ventral idiosoma (Figure 2). Tritosternum with a short base, 20–27 μm long and two finely pilose lacinia, 35–40 μm long. Intercoxal region, sternal, and ventral shields fused, covered with alveolar pits ornamentation and numerous setae. Genital shield (epigynium) smooth, between coxae II–III, 85–95 μm long, and 68–73 μm width, with rounded anterior and lateral margins and a straight posterior margin. All ventral setae serrate (Figure 2). The Pedofossae of legs I–IV narrowed and rounded. Marginal setae similar in shape to the dorsal setae, 17–19 μm long. Peritremes short, prestigmatal part S-shaped, and poststigmatal part short. Stigmatal opening is situated on the level of coxae II and III.

Gnathosoma (Figures 1 and 2). Epistome narrow, with denticulate margins (Figure 1). Corniculi horn-like, bordered by salivary styli. Hypostomal setae $h1$ smooth c. 18 μm length, slightly longer than barbed $h2$ 10–12, $h3$ c. 15 μm long, barbed, palpcoxal setae pc c. 12 μm length, thickened and barbed. Deutosternal groove smooth, with a few denticles. The second cheliceral segment 129–134 μm length (from base to the apex of the fixed digit), fixed digit 41–44 μm length (from base of nodus), with a larger subapical tooth and a smaller median one; movable digit 34–36 μm length (from base to apex), with a large subapical tooth and without conspicuous arthrodial process, dorsal cheliceral setae absent

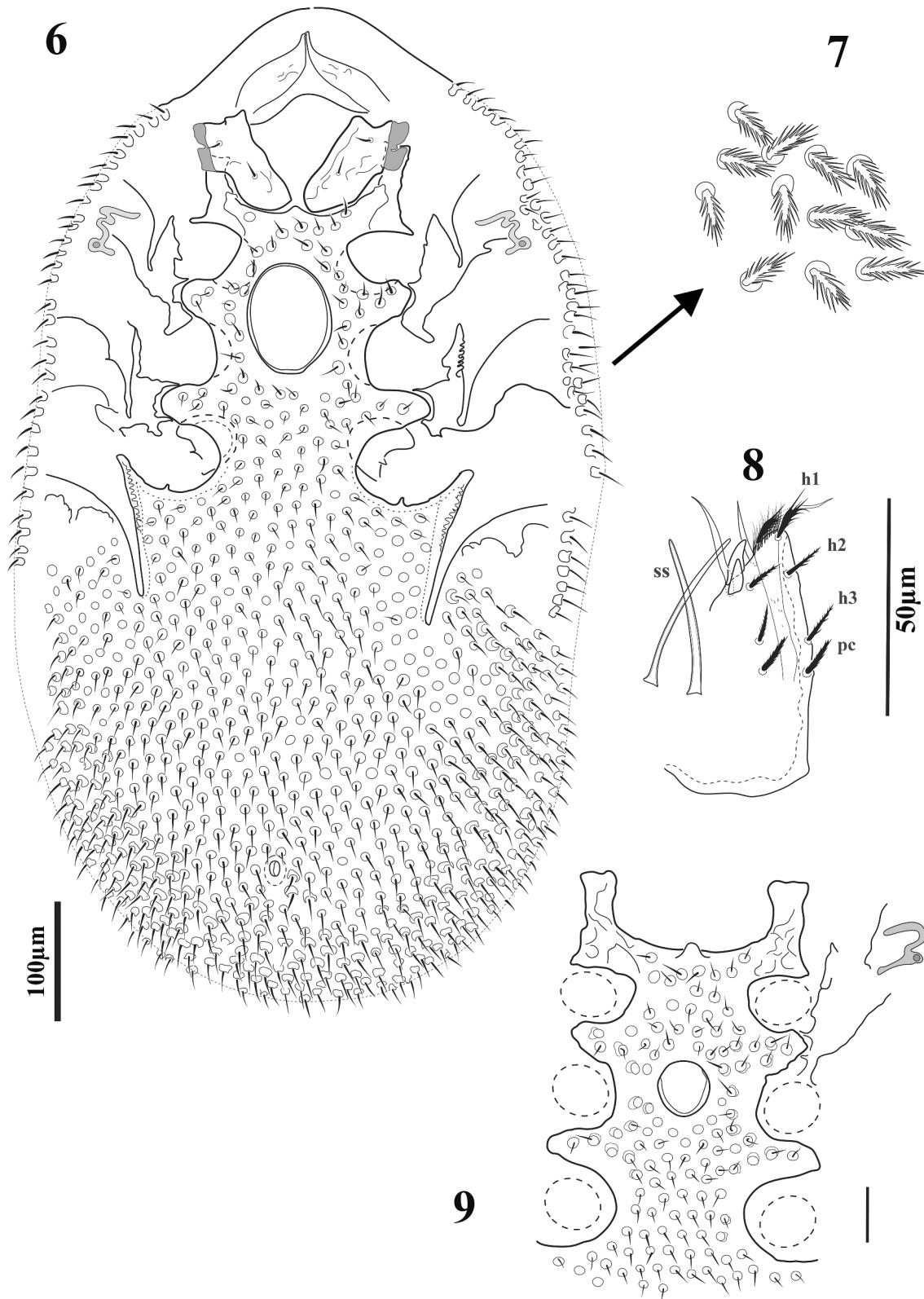


Figure 2. *Macrodyinychus (M.) iranicus* Babaeian & Khalili-Moghadam sp. nov., female. 6. Ventral idiosoma; 7. Enlarged view of a ventral seta; 8. Hypostome; 9. Sterno-genital view.

(Figure 1). Palp chaetotaxy as "Uropoda-type": trochanter 2 (inner setae barbed and 1.5 times longer than smooth external seta), femur 4, genu 5, tibia 14, tarsus 15. Palp-claw three-tined, basal tine small (Figure 1).

Legs (Figure 3). Claw on tarsus I absent. Lengths, excluding ambulacrum, I 276–329, II 263–305, III 283–280, IV 299–314 µm. Most leg setae with delicate serrate margins.

Male (n = 4). Length of idiosoma 784–882 µm, width 480–548 µm.

Dorsal idiosoma. Sculpture and setation of dorsal as in female.

Ventral idiosoma. The intercoxal region along with ventral covered with numerous alveolar pits. Ventral setae tree-like and same as female (Figure 2). Peritrema S-form. Operculum small and oval-form, 46–54 µm length and 43–49 µm width, without ornamentation and located in the area between coxae 2 and 3.

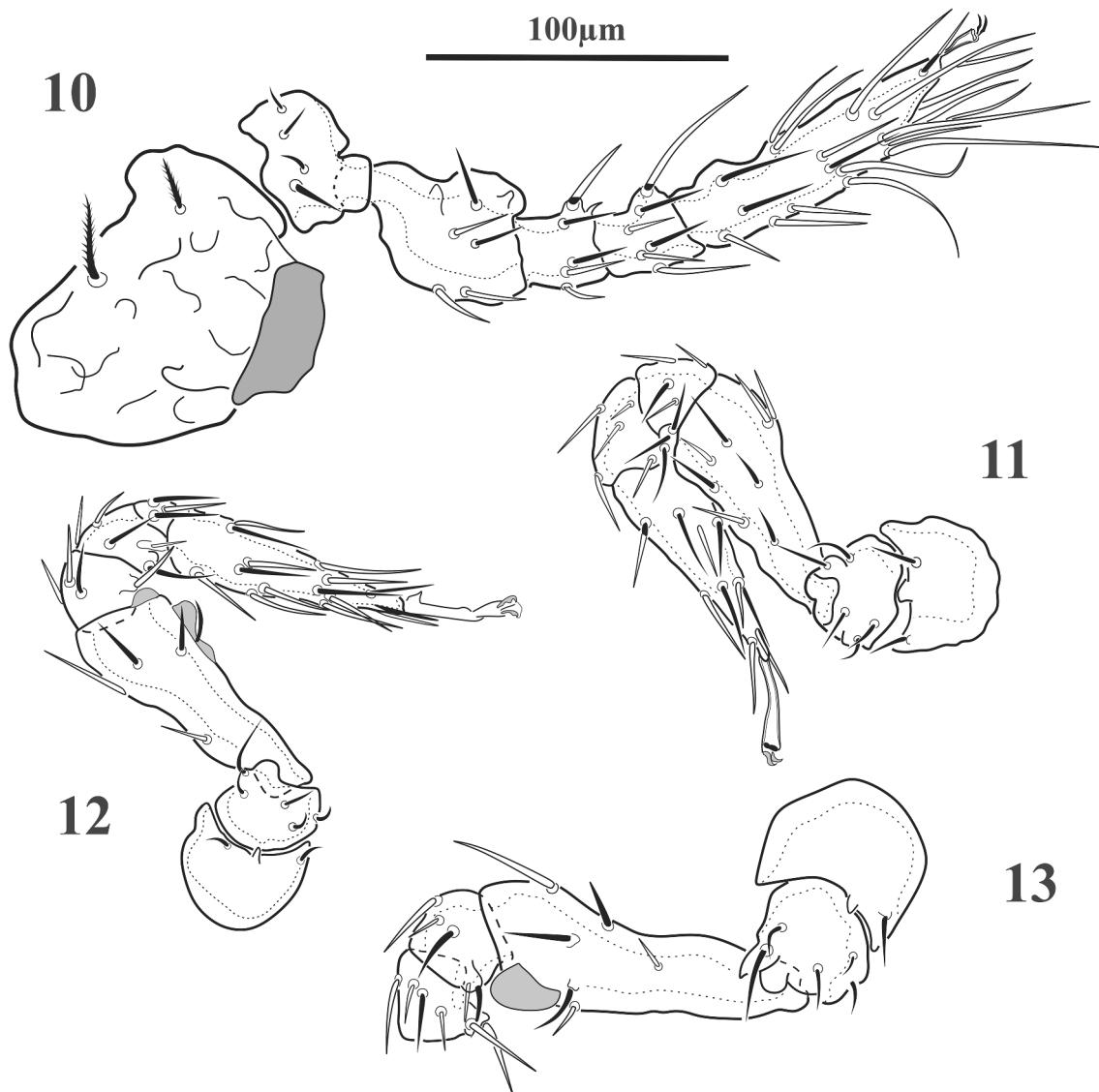


Figure 3. *Macrodyinychus (M.) iranicus* Babaeian & Khalili-Moghadam **sp. nov.**, 10. Leg I; 11. Leg II; 12. Leg III; 13. Leg IV (coxa to tibia).

Gnathosoma. Same as female.

Legs

Short as in female. Lengths, excluding ambulacrum, I 266–319, II 240–269, III 279–286, IV 288–305.

Type material

Holotype, female, Samsami region (Dejdaran valley) (32° 10' 56"N 50° 12' 34"E, altitude 2324 m a.s.l.) Chaharmahal va Bakhtiari Province, from nest of *Tetramorium* sp. in soil under rock, coll., A. Khalili-Moghadam, 23 March 2021 (in APAS). Paratypes: four females and four male same data as holotype (in APAS and JAZM).

Etymology

The species name refers to the country (Iran), where the type materials were collected.

Differential diagnosis

Macrodyinychus (M.) iranicus Babaeian & Khalili-Moghadam **sp. nov.** similar to *Macrodyinychus (M.) hutuae* Hirschmann (1975), *Macrodyinychus (M.) multispinosus* Sellnick (1973), and *Macrodyinychus (M.) malayicus* Kontschán (2011) in general appearance but may be distinguished from them by the following combination of characters: dorsal and ventral idiosoma densely

covered with tree-like setae bearing alveolar pits at their base, pygidial shield present and with numerous setae and S-shaped peritreme.

Family Urodinychidae Berlese, 1917

Genus *Microuroobovella* Błoszyk et al., 2020

Type species. *Microuroobovella olszanowskii* Błoszyk et al., 2020

Microuroobovella olszanowskii Błoszyk et al., 2020

Studied materials

Chaharmahal va Bakhtiari Province, Lordegan County (Oureh) (31° 30' 17"N 50° 30' 02"E, altitude 1735 m a.s.l.), in nest of *Tapinoma karavaievi* Emery, 1925, in rooting wood, two females, coll., A. Khalili-Moghadam, 11 April 2017.

Dorsal idiosoma oval, finely sculptured, 351–368 long and 244–256 wide, setae delicate and long, two more posterior setae serrated. Sternal region with four pairs setae (st1-st4: 12, 14–17, 19–21, and 20 long, respectively). Tritosternum base 20 and pilose lacinia 45 long, genital shield ovate, 102–109 long and 53–56 wide, with smooth surface and a roundly pointed front edge, posterior margin straight. Ventral shield smooth with a long and delicate setae 34–39 long. Peritreme short and with hook-like pre-stigmatic sections. Ventral setae delicately longer than other ventral setae. Hypostomal setae: smooth setae h1 26–29, h2 12–14, h3 19–20

long and serrate pc 14–17 long. Fixed digit: 22–24 and movable digit 20 long. Legs I–IV: 183–207, 141–151, 129–153, and 150–154 long, respectively.

Distribution

Italy (Błoszyk et al. 2020) and Iran (present study).

Notes

Previously, this species was collected in San Vincenzo Park, Italy, from rotten wood of cork oak. In Iran, the specimen was collected from the nest of *Tapinoma karavaievi*, in rooting wood. This is a new record for the genus *Microuroobovella* and the species from the acarofauna of Asia (Iran).

Genus *Uroobovella* Berlese, 1905

Type species. *Uropoda obovata* Canestrini & Berlese, 1884

Uroobovella similiobovata Hirschmann & Zirngiebl-Nicol, 1962

Studied materials

Chaharmahal va Bakhtiari Province, Saman county: Kahkesh village ($32^{\circ} 28' 45''N$, $50^{\circ} 55' 10''E$, altitude 1839 m. a.s.l.), Markadeh village ($32^{\circ} 40' 49''N$ $50^{\circ} 48' 59''E$, altitude 1952 m a.s.l.), Gharagoosh village ($32^{\circ} 31' 39''N$ $50^{\circ} 48' 06''E$, altitude 1965 m a.s.l.), Garmdareh village ($32^{\circ} 41' 20''N$ $50^{\circ} 48' 34''E$, altitude 1957 m a.s.l.), in the nest of (*Lasius neglectus* Van Loon, Boomsma & Andrasfalvy, 1990) in rooting wood, 3F, 7DN, 6M, 30 June 2013 and 31 July 2017; Koohrang county (Dashte Laleh) ($32^{\circ} 35' 15''N$ $50^{\circ} 12' 01''E$, altitude 2391 m a.s.l.) in the nest of (*Cataglyphis fritillariae* Khalili-Moghadam et al., 2021) in soil under rock, 1DN, 25 April 2017; Shahrekord County (Daneshgah) ($32^{\circ} 21' 44''N$ $50^{\circ} 49' 16''E$, altitude 2151 m a.s.l.), in the nest of (*Lasius neglectus*) in rooting wood, 2F, 5 May 2017; Nafch County ($32^{\circ} 23' 52''N$ $50^{\circ} 47' 17''E$, altitude 2095 m a.s.l.), in nest of (*Lasius neglectus*) in rooting wood, 1F, 5DN, 2M, 16 June 2017; and Ben county (Bradeh) ($32^{\circ} 33' 46''N$ $50^{\circ} 32' 01''E$, altitude 2382 m a.s.l.), in the nest of (*Cataglyphis kurdistica* Pisarski, 1965) in rooting wood, 2F, 13 July 2017.

Dorsal idiosoma oval, smooth, and without sculptures, 666–684 long and 500–520 wide. Setae needle-like and smooth. Marginal setae long. Genital shield ovate, 180–195 long and 120–130 wide, with a smooth surface and a rounded front edge. Peritreme short and with hook-like pre-stigmatic sections. Ventral setae V6 and V8 19–21 long and similar in length to other ventral setae. Hypostomal setae: setae h1 32–40 smooth, h2 19–24 thickened and with 3–4 spikes, h3 56–61 long and smooth, pc 22–25 long, thickened, and serrated. Movable digit 48 and fixed digit 56 long. Legs I–IV: 305–324, 251–273, 218–244, and 250–268 long, respectively.

Distribution

Germany, Romania (Hirschmann and Zirngiebl-Nicol 1962), Slovakia (Mašán 2001), and Iran (present study).

Notes

Hirschmann and Zirngiebl-Nicol (1962) described the species from wood substrates in Germany and Romania. Mašán (2001) found it in the nest of *Lasius flavus*, soil detritus, and forest leaf-litter. The Iranian specimens were found in a nest of *Lasius neglectus* in rotting wood. This species is considered a new record for the Asian and Iranian mite fauna.

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Disclosure statement

No potential conflict of interest was reported by the author(s).

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