



First record of the genus *Leonardiella* (Acari: Trachyuropodidae) from Turkey

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ABSTRACT: Specimens of *Leonardiella riccardiana* (Leonardi, 1895) are found for the first time in Turkey. One female and one male specimens are collected from oak and willow habitats in Sansa Gorge, Eastern Anatolia Region. Description and global distribution of the species are given, also habitus of the specimens are presented.

Keywords: Mesostigmata, mite, new occurrence, *Leonardiella riccardiana*, Eastern Anatolia Region.

Zoobank: <https://zoobank.org/390A54E4-076A-406C-B231-1228DBED5441>

INTRODUCTION

Mites of the family Trachyuropodidae Berlese, 1917 belongs to the superfamily Uropodoidea, subcohort Uropodidae, cohort Uropodina, suborder Monogynaspida, order Mesostigmata and superorder Parasitiformes (Lindquist et al., 2009). Members of this family generally have large idiosoma which are strongly sclerotized, covered by furrows and ridges. As a distinctive feature, T-shaped setae can be found on idiosoma of the majority of Trachyuropodidae species (Kontschán, 2021).

The genus *Leonardiella* Berlese, 1904 is an easily distinguishable taxon within the family Trachyuropodidae by the following morphological characters: idiosoma similar to triangular or pentagonal shape, enlarged marginal shields in the anterior region of idiosoma, and the presence of a pair of deep depressions in the opisthogastric region of ventral idiosoma (Kontschán, 2015, 2021; Kazemi et al., 2016). This genus currently includes fourteen species (*L. athiasae*, *L. canestriniana*, *L. cistulata*, *L. constricta*, *L. cubana*, *L. harteni*, *L. koreana*, *L. machadoi*, *L. matsuurai*, *L. pappi*, *L. riccardiana*, *L. septentrionalis*, *L. similiathiasae* and *L. whitkombi*) around the world, mostly described from tropical realms (Kontschán, 2021).

During a faunistic and taxonomic study on the soil mites in Sansa Gorge, Eastern Anatolia Region of Turkey, several soil, litter, moss and lichen materials were examined. Among them, two materials included specimens of *L. riccardiana*. In the present work, based on these specimens, the description, illustration and microscopic micrographs of *L. riccardiana*, recorded for the first time from Turkey, have been provided. Also, this is the first occurrence of the genus *Leonardiella* in Turkey.

MATERIALS AND METHODS

Different materials which include mite specimens were extracted using a Berlese-Tullgren funnel with 25 Watt fluorescent bulb for one week. One female and one male specimens of *L. riccardiana* were sorted using a stereo microscope, then cleared in 60% lactic acid and transferred to glycerine medium. Identification of *Leonardiella*

specimens was done by using a light microscope and the Olympus DP25 camera was used to transfer living images to the computer system. The DP2-BSW (ver.2.1) software was used for taking measurement of various idiosomal parts of the specimens. All measurements, including scale bars of the figures are given in micrometers (μm).

Female specimen was stored 70% ethanol and male specimen was mounted on slide in Hoyer's medium using the standard method (Walter and Krantz, 2009). Both specimens were deposited in the Acarology Laboratory of Pamukkale University (PAU).

RESULTS

Family **Trachyuropodidae** Berlese, 1917

Genus *Leonardiella* Berlese, 1904

Trachyuropoda (*Leonardiella*) Berlese, 1904: 367.

Type species: *Uropoda canestriniana* Berlese, 1891: 4, by original designation.

Diagnosis.

Idiosoma as triangular or pentagonal shaped. Dorsal shield have straight, undulate or ring-like grooves, strongly sclerotized and ends laterally at the level of coxae IV. One pair of deep depressions present in the opisthogastric region of ventral idiosoma. Claws present on the apical parts of first legs (Kontschán, 2021).

Leonardiella riccardiana (Leonardi, 1895)

Uropoda riccardiana Leonardi, 1895: 318.

Glyphopsis riccardiana Trouessart, 1902: 40.

Trachyuropoda riccardiana Berlese, 1904: 370-372; Hirschmann & Zirngiebl-Nicol, 1964: 22, 1965: 30, 1969: 131; Zirngiebl-Nicol, 1973: 34; Karg, 1989: 153; Mašán, 2001: 238; Kontschán, 2002a: 51, 2002b: 347, 2003: 55; Constantinescu, Ivan,

Călugăr & Markó, 2011: 329; Arjomandi & Kazemi, 2014: 248.

Leonardiella riccardiana Kontschán, 2007: 50, 2021: 83; Kontschán & Ujvári, 2013: 45; Kazemi, Mohammad-Dustar-Sharaf & Saberi, 2016: 210.

Materials examined: One female: soil samples under willow tree (*Salix* sp.), 39°33'48.20" N, 40°10'9.50" E, 1594 m a.s.l., Sansa Gorge, Turkey, 25 July 2020. One male: soil samples under oak tree (*Quercus* sp.) and moss and lichen samples from stony land, 39°33'32.10" N, 40°1'49.10" E, 1363 m a.s.l., Sansa Gorge, Turkey, 11 May 2020.

Description.

Female (Figs 1-2, 5-10). Length 620, width 429 (n=1).

Shape oval and pentagonal, two pairs of rounded horns present at anterior margin of idiosoma, one pair of incisions located below coxae IV, posterior margin of idiosoma rounded, colour brown.

Dorsal idiosoma (Figs 1, 5). Along whole inner line of the idiosoma, marginal shield is completely separated from dorsal shield by a distinct structural line (Fig. 1). Dorsal shield with one elongated and well sclerotised line. Dorsal setae T-shaped (anchor shaped), mostly placed around middle and posterior parts of idiosoma. The posterior part of the idiosoma is significantly narrowed with deep lateral and marginal incisions are located below level of coxae IV. The inner part of the idiosoma has V-shaped supported marginal furrows. The dorsal shield of idiosoma covered by oval pits in various sizes. Marginal shield large, without any setation or sculptural pattern, and the outer edge of marginal shield is wavy with several small cavities (Fig. 5).

Ventral idiosoma (Figs 2, 6-7). Sternal shield smooth (Fig. 2). Three pairs of T-shaped sternal setae are situated around genital opening. Genital shield has shallowed pits and is almost oval with a relatively thin front. One pair of deep lateral and marginal incisions are located below level of coxae IV. Posterior part of ventral shield covered with oval pits, remaining parts smooth. Anal opening small (Fig. 6). Peritreme with two loops and not clearly visible. Base of tritosternum narrow, tritosternal laciniae subdivided into four branches, two central branches apically pilose and two lateral branches marginally pilose (Fig. 7).

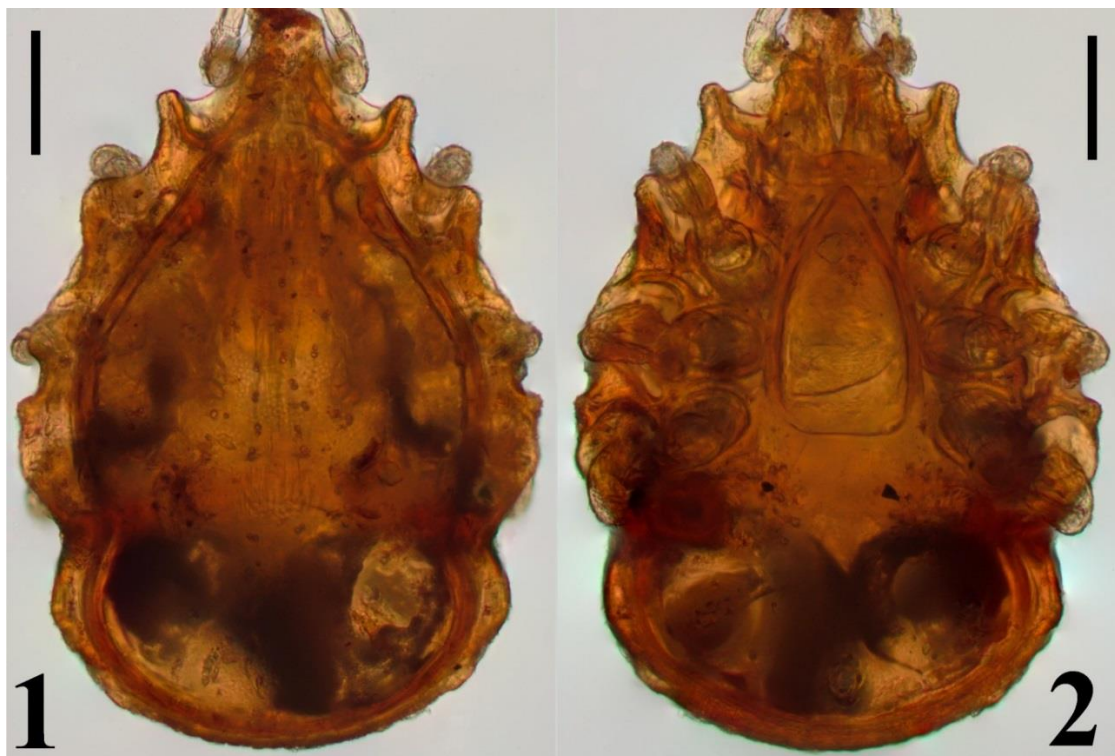
Gnathosoma (Figs 8-10). Corniculi short and horn-like shaped. Internal malae subdivided into several smooth branches. Hypostomal setae about in equal lengths, *h1* smooth and located the anterior margin of gnathosoma, setae *h2-h4* marginally serrate (Fig. 8). Epistome triangular shaped and pilose (Fig. 9). Movable digit of chelicera shorter than fixed digit (Fig. 10).

Male (Figures 3-4, 11). Length 686, width 470 (n=1).

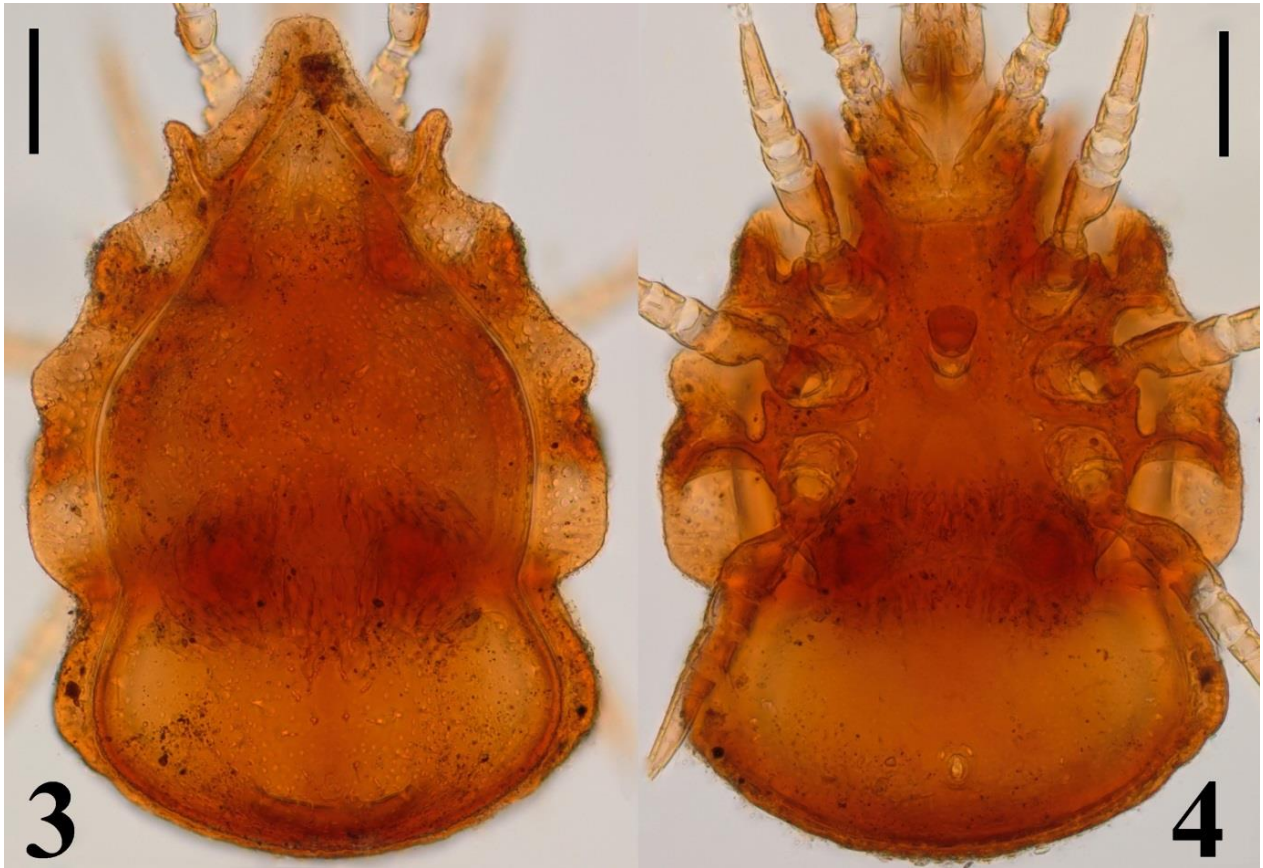
Marginal shield wide, with many oval pits unlike female specimen. Ornamentation and chaetotaxy of dorsal shield (Figs. 3-4) as in female specimen. Sternal shield covered by oval pits are mostly placed around anterior and lateral parts of genital opening. Genital shield oval and located between coxae II (Fig. 11).

Nymphs and larvae. Not found.

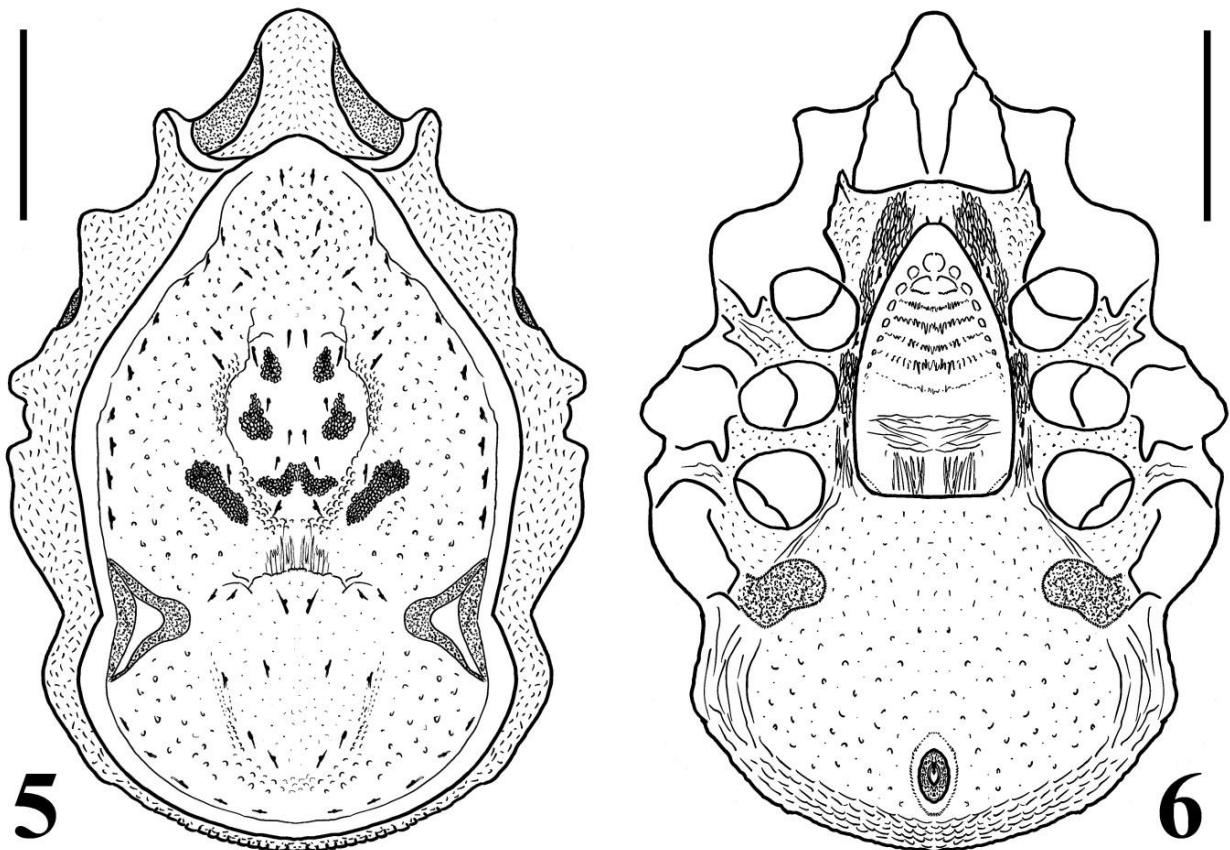
Distribution: Austria, Czechia, Hungary, Iran, Italia, Romania, Slovakia (Kontschán, 2021), Turkey (present study).



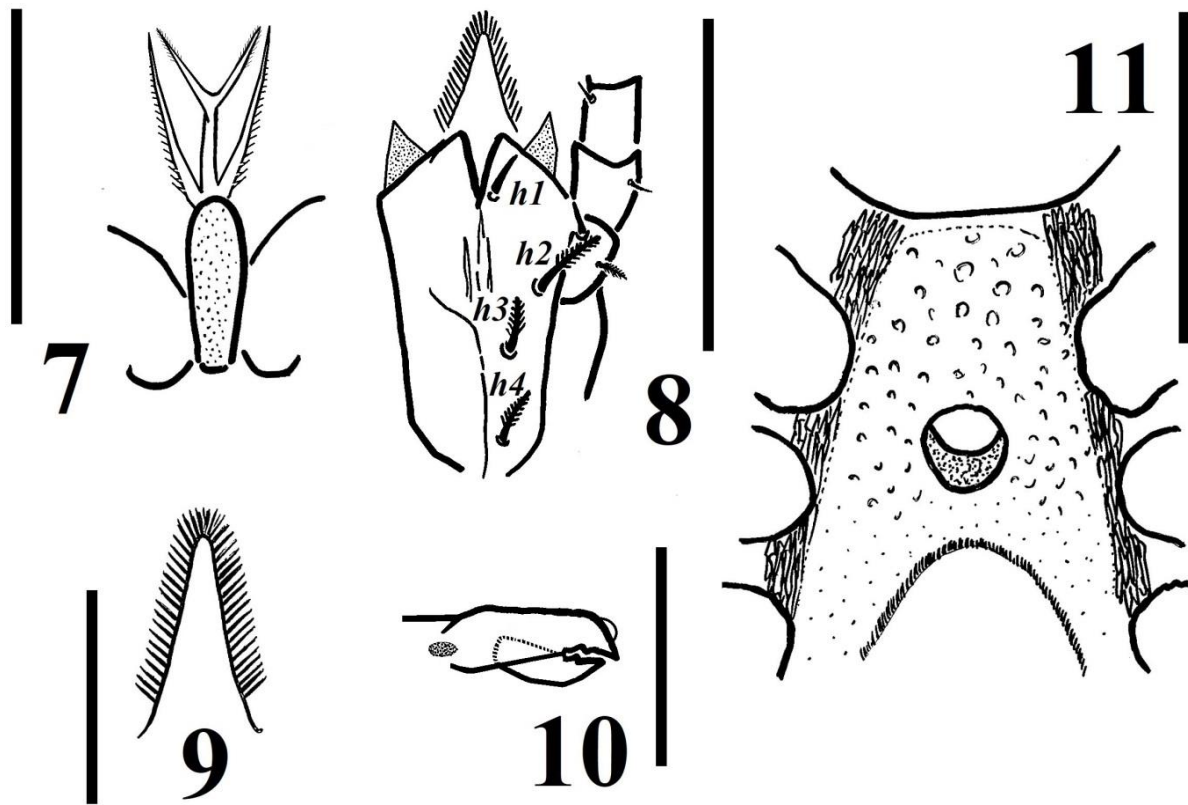
Figures 1-2. Habitus of *Leonardiella riccardiana* (female). 1. Dorsum of idiosoma, 2. Venter of idiosoma. Scale bars 100



Figures 3-4. Habitus of *Leonardiella riccardiana* (male). 3. Dorsum of idiosoma, 4. Venter of idiosoma. Scale bars 100.



Figures 5-6. *Leonardiella riccardiana* (female). 5. Dorsal view, 6. Ventral view. Scale bars 100.



Figures 7-11. *Leonardiella riccardiana*. **7.** Tritosternum of female, **8.** Ventral view of gnathosoma of female, **9.** Epistome of female, **10.** Chelicerae of female, **11.** Intercoxal region of male. Scale bars: 25 for 7; 50 for 9-10, 100 for 8, 11.

DISCUSSION

L. riccardiana was previously considered in the genus *Trachyuropoda* by many different authors. However, this species is currently evaluated in the genus *Leonardiella* (Kontschán, 2015).

Many characters of Turkish *L. riccardiana* specimens match those of European specimens. On the other hand, some characters (e.g. the ring-like strongly sclerotized furrow on dorsal shield) are not same as in a case *L. riccardiana* collected in Europe. However, the fact that the examined specimens were limited to only one female and one male does not enable a more detailed examination. Therefore, *Leonardiella* specimens reported from Turkey were evaluated as *L. riccardiana* in this study. In the future, a healthier decision can be reached as a result of more detailed sampling from the same localities where the specimens in this study are gathered. Even, Turkish *Leonardiella* specimens can be considered as a new species or subspecies after new data are obtained.

Comparison of idiosomal sizes of *L. riccardiana*, among the Turkish specimens and literature records as in follow (first and second numbers are the length and width of idiosoma, respectively): Hirschmann and Zirngiebl-Nicol (1969) reported 715 × 455 (female), 680 × 420 (male) and 655 × 415 (deutonymph) for Austrian and Italian specimens. Mašán (2001) reported 715 (female), 680 (male) and 655 (deutonymph) lengths for Slovakian specimens. Kontschán (2002) reported 715 (female) and 680 (male) lengths for Hungarian specimens. Kontschán (2007) reported 680-720 × 420-450 ranges to the female

specimens from Hungary. According to these data, Turkish specimens are slightly smaller than European specimens in terms of idiosomal size. In addition, contrary to the literature data, it was understood that male specimen was longer than female specimen in this study.

In the light of literature records, specimens of *L. riccardiana* myrmecophile (associated with ants) mites. So far, specimens have been found in various ant nests and the presence records of *L. riccardiana* were given from the following Formicidae nests: *Formica* sp., *Lasius* sp., *Myrmica* sp., *Solenopsis* sp., *Tapinoma* sp., *Tetramorium* sp. (Štorkán, 1940; Bernard, 1968) and *Camponotus* sp. (Mašán, 2001). Also, "stenotopic" and "accidental occurrence" words are used for this species in the grassland areas of the Palaearctic European and Mediterranean countries (Constantinescu et al., 2011).

Considering the distribution records of this species, middle and southern parts of Central Europe are remarkable. However, the fact that the species was reported from Iran in 2016 and from Turkey in this study suggests that the distribution area of *L. riccardiana* may be wider than known. When current distribution records are examined, it is likely that this species will be reported from Armenia, Azerbaijan, Croatia, France, Georgia, Germany, Moldova, Poland, Russia, Serbia, Slovenia, Switzerland and Ukraine in the near future.

Statement of ethics approval

Not applicable.

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Conflict of interest

No potential conflict of interest was reported by the author.

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