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RESEARCH ARTICLE

Contributions to the fauna of the Turkish oribatid mites (Acari: Oribatida) from Rize province

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ASBTRACT: In this study, oribatid mites extracted from soil and litter samples taken from different localities of Rize province in 2019 were evaluated. Four oribatid taxa belonging to the families Trhypochthoniidae, Microzetidae, Crotoniidae and Ceratozetidae were identified. One family (Microzetidae), one subgenus (*Latilamellobates*) and four taxa *Trhypochthonius silvestris europaeus*, *Microzetes* (*Microzetes*) *caucasicus*, *Camisia* (*Camisia*) *biverrucata*, *Trichoribates (Latilamellobates) algarvensis* are newly recorded in Türkiye. Diagnostic features, ecology and biogeographical distribution of each taxon are given with the addition of SEM photographs.

Keywords: Distribution, ecology, new record, taxonomy, Türkiye
Zoobank: https://zoobank.org/2793A9B6-4E91-4CEC-8026-17F09F9817F8

INTRODUCTION

Oribatid mites are one of the dominant groups of organisms in forest soils with high organic matter, reaching a density of up to hundreds of thousands of individuals per m^2 (Petersen and Luxton, 1982; Behan-Pelletier and Newton, 1999). Due to their contributions to nutrient cycling, soil formation and the breakdown of organic materials, they play a significant biological and ecological role in soil ecosystems. The number of known species and subspecies belonging to this group in the world is 11628 (Subías, 2004, updated 2024), however the estimated number of species vary from 50000 to 100000 (Colloff and Halliday, 1998; Schatz, 2002). Türkiye has around 300 oribatid species (Özkan et al., 1994; Erman et al., 2007, 2024; Baran et al., 2018).

Rize province has a strong natural vegetation and soil characteristics due to its temperate and rainy climate. There are forested areas starting from the coast up to an altitude of 2200 m and subalpine and alpine meadows from this altitude up to 3200 m (Güner et al., 1987). Because of the suitable climate, strong natural vegetation and habitat heterogeneity, Rize has a rich biodiversity. There are no records in the literature on the oribatid mites in Rize. In this study, four oribatid taxa were identified from Rize. This study aims to contribute to the knowledge of the oribatid mite fauna of Türkiye.

MATERIALS AND METHODS

Soil and litter samples containing oribatid mites were collected from nine localities in Varda plateau and İkizdere district of Rize province, in 2019 (Fig. 1). Each sample was transported to a laboratory and extracted using Berlese-Tullgren funnels in laboratory conditions during 5-7 days. Oribatid mites were separated from the samples under a stereomicroscope (Leica EZ4). For microscopic study, mite specimens were cleared in 60% lactic acid and mounted in Hoyer's medium on glass microscope slides. Observations and measurements of mites were made using a microscope (Olympus BH-2) equipped with a drawing attachment. All measurements are in µm. For scanning electron microscopy (SEM), the mites were air-dried and coated with Au/Pd in a sputter coater and placed on Al-stubs with double-sided sticky carbon tape. Observations and micrographs were made with a ZEISS EVO LS10 scanning electron microscope. Examined materials were transferred into 70% ethanol with glycerol (up to 5%) for the preservation. The morphological terminology follows that of Norton and Behan-Pelletier (2009). The specimens examined are deposited in the Acarological Collection of the Zoological Museum, Erciyes University, Kayseri, Türkiye.

RESULTS

Four oribatid mite taxa belonging to four families were obtained. All of them are first records for Türkiye. The diagnostic features of these species are given below.

Trhypochthoniidae Willmann, 1931

Trhypochthonius Berlese, 1904

***Trhypochthonius silvestris europaeus* Weigmann and Raspotnig, 2009**

Measurements (n=5)*:* Body length: 544-608, body width: 360-400.

Diagnostic features (Fig. 2): Prodorsal setae *ro (rostral)*, *le (lamellar)*, and *in (interlamellar)* strong, barbed, mean 61, 80, and 96 respectively; sensillus fusiform mean 56; fifteen pairs of barbed notogastral setae; c_1 and c_2 very short, mean 10, 14 respectively, c_3 mean 42, d_1, d_2 and d_3 mean 12, 14, and 29 respectively, e_1, e_2, f_2, and h_1 mean 26, 45, 34, and 60 respectively, p_1 the longest about 72, h_3 and p_3 smooth and short; seven pairs of genital setae.

Material examined: Varda plateau, Rize province, Türkiye, 40°44' 08.10"N, 40°28' 30.52" E, 2514 m a.s.l., 15.VII.2019,

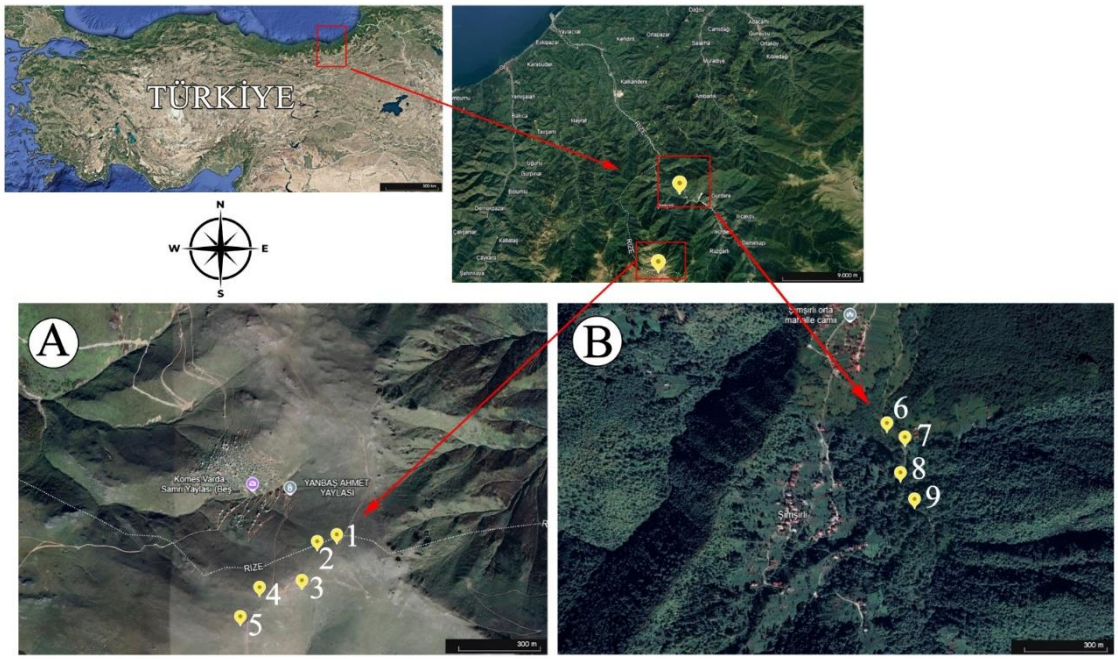

Figure 1. Research areas and sampling localities. **A.** Varda plateau, **B.** İkizdere district.

collected from soil with grass, six specimens (one specimen was used in SEM).

Microzetidae Grandjean, 1936

Microzetes Berlese, 1913

***Microzetes* (*Microzetes*) *caucasicus* (Krivolutsky, 1967)**

Measurements (n=2): Body length: 230-237, body width: 154-160.

Diagnostic features (Fig. 3): Setae *in* minute and thin; lamellar setae setiform, inserted on distal parts of lamellae; sensillus setiform, curved tips, ciliate unilaterally in mediodistal parts; lamellae wide, long and distal parts rounded; anterior margin of notogaster slightly convex; notogaster smooth, pteromorphs small with teeth laterally, notogastral setae short, thin; epimeral setal formula 3-1-3-3; six pairs of genital setae.

Material examined: İkizdere district, Rize province, Türkiye, 40°48'21.10"N 40°29'13.61"E, 439 m a.s.l., 15.VII.2019, collected from soil and litter in mixed woodland, two specimens (one specimen was used in SEM).

Crotoniidae Thorell, 1876

Camisia Heyden, 1826

***Camisia* (*Camisia*) *biverrucata* (Koch, 1839)**

Measurements (n=5)*:* Body length: 1052-1094, body width: 440-476.

Diagnostic features (Fig. 4). Body covered with cerotegument; setae *le* inserted on long apophysis extending almost to tips of setae *ro*; setae *le* spinose; setae *in* short; sensillus head elongated and covered in tubercles; dorsal notogastral plate oblong and lateral edges parallel; posterior ridges shaped like inverted 'W'; p_1 setae inserted in a funnel-shaped caudal lobes and relatively close to each other; transverse median ridge absent between setae e_1; nine pairs of genital setae.

Material examined: Varda plateau, Rize province, Türkiye, 40°44'08.10"N 40°28'30.52"E, 2514 m a.s.l., 15.VII.2019, collected from soil with grass, two specimens; İkizdere district, Şimşirli Village, 40°48'21.10"N 40°29'13.61"E, 439 m a.s.l., 15.VI.2019, collected from soil and litter in mixed woodland, four specimens (one specimen was used in SEM).

Ceratozetidae Jacot, 1925

Trichoribates Berlese, 1910

***Trichoribates* (*Latilamellobates*) *algarvensis* (Subías and Gil-Martín, 1990)**

Measurements (n=1): Body length: 421, body width: 277.

Diagnostic features (Fig. 5): Rostrum rounded; setae *ro* long and ciliated, basal part of rostral seta covered by tutorium; lamellae wide and rough, with short translamella; lamellar cusps wide, outer teeth of cusps rounded, setae *la* ciliated and arising from the tip of the lamellar cusps; setae *in* robust, ciliated, not reaching the cusp of lamella, inserted on anterior margin of notogaster; sensillus with short stalk and short clavate head; bothridium hidden under the anterior margin of notogaster; pattern of notogaster reticulate; 10 pairs of notogastral setae; setae c_2 as long as *la,* the c_2 pair being slightly longer than other notogaster setae.

Material examined: Varda plateau, Rize province, Türkiye, 40°44'08.10"N 40°28'30.52"E, 2514 m a.s.l., 15.VII.2019, collected from soil with grass, one specimen (one specimen was used in SEM).

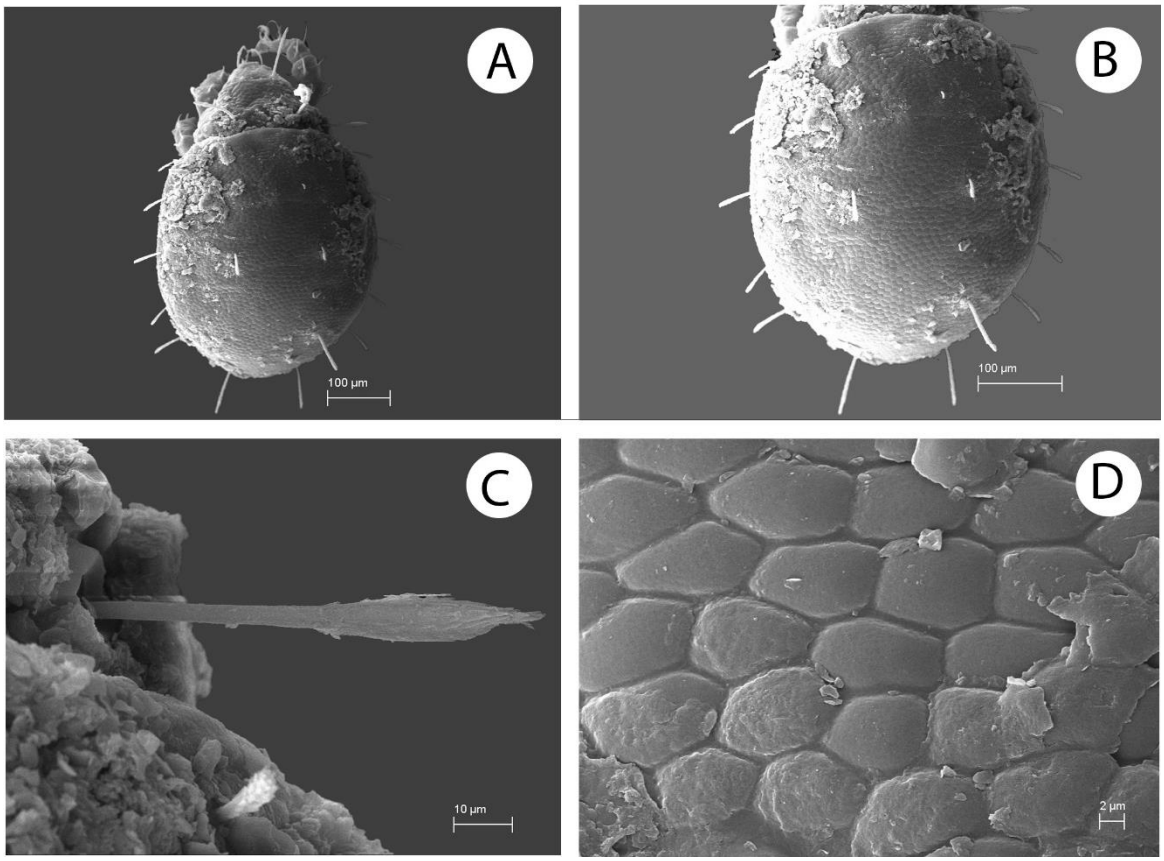

Figure 2. *Trhypochthonius silvestris europaeus* Weigmann and Raspotnig, 2009. **A.** Dorsal view, **B.** Notogaster, **C.** Sensillus, **D.** Pattern in central part of notogaster.

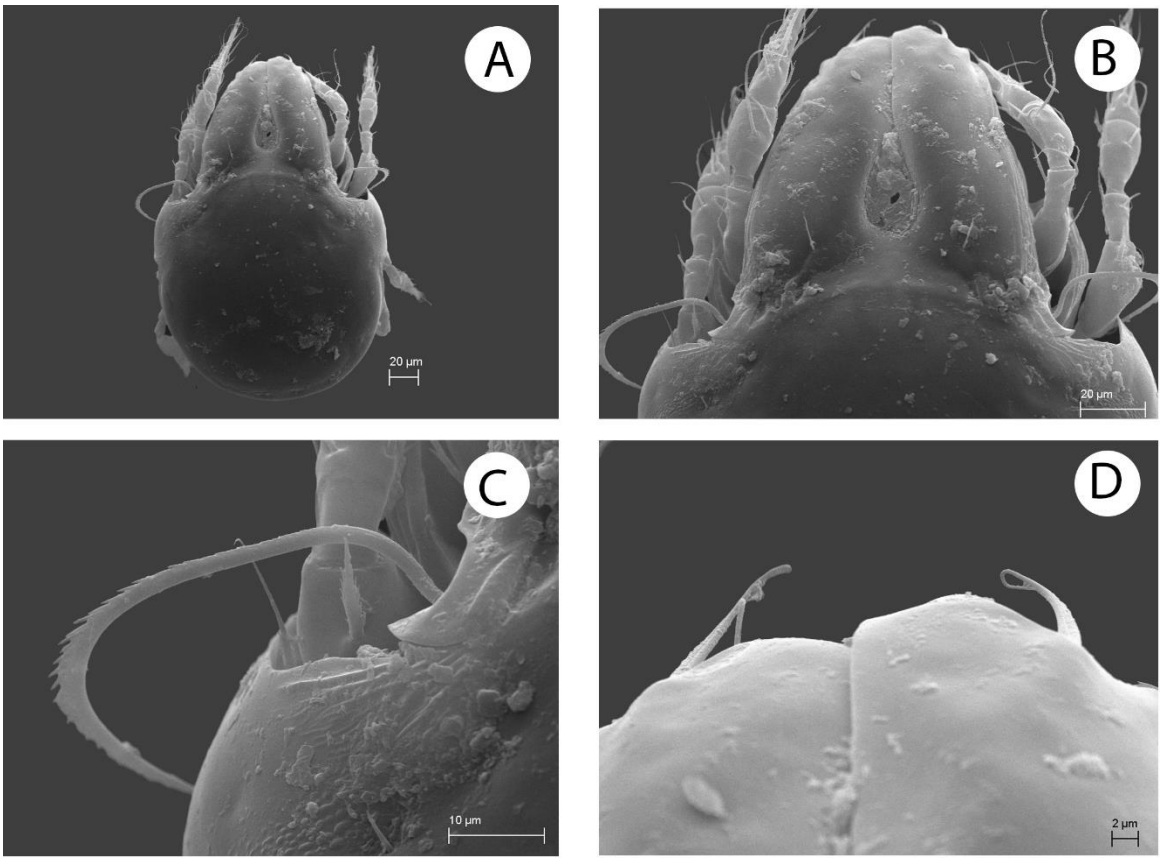

Figure 3. *Microzetes* (*M.*) *caucasicus* (Krivolutsky, 1967). **A.** Dorsal view, **B.** Prodorsum, **C.** Sensillus, **D.** Anterior region of lamella and lamellar setae.

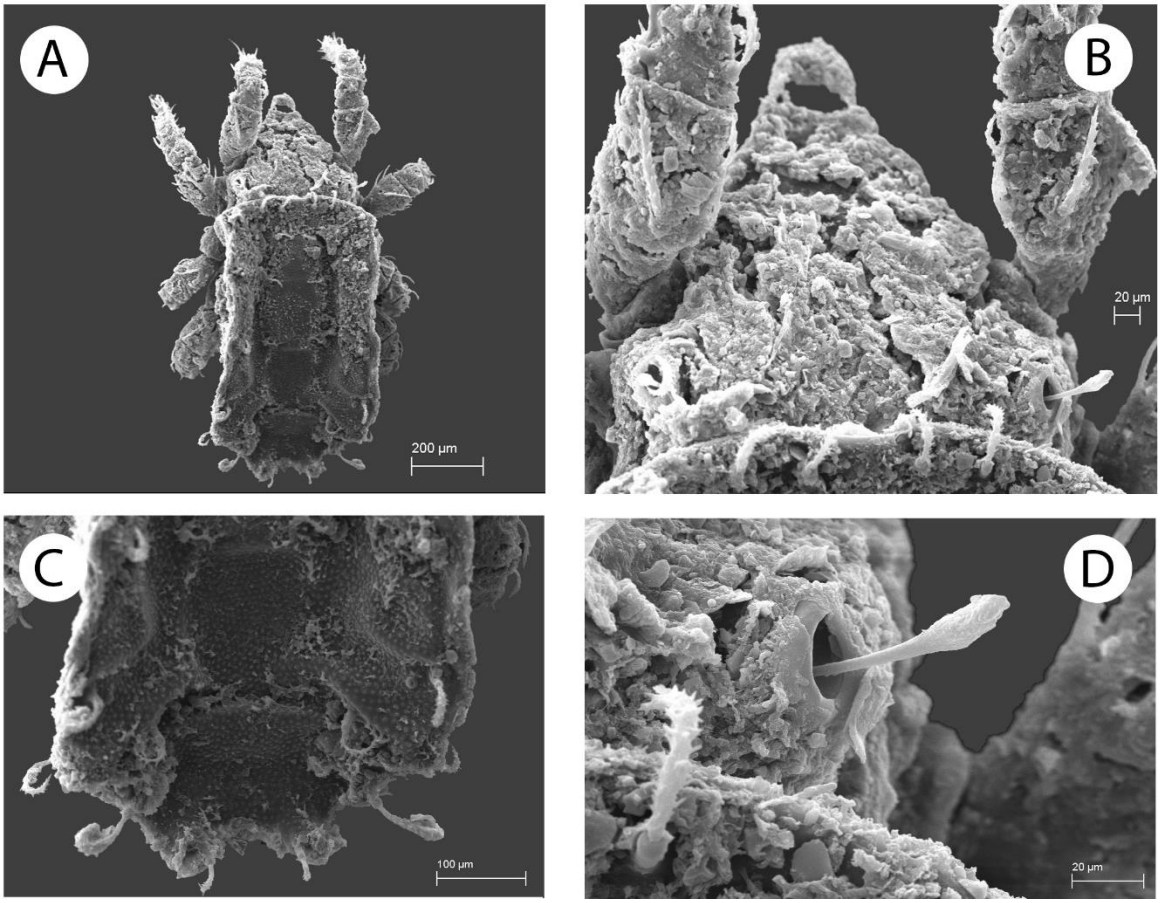

Figure 4. *Camisia biverrucata* (Koch, 1839). **A.** Dorsal view, **B.** Prodorsum, **C.** Posterior region of notogaster, **D.** Sensillus.

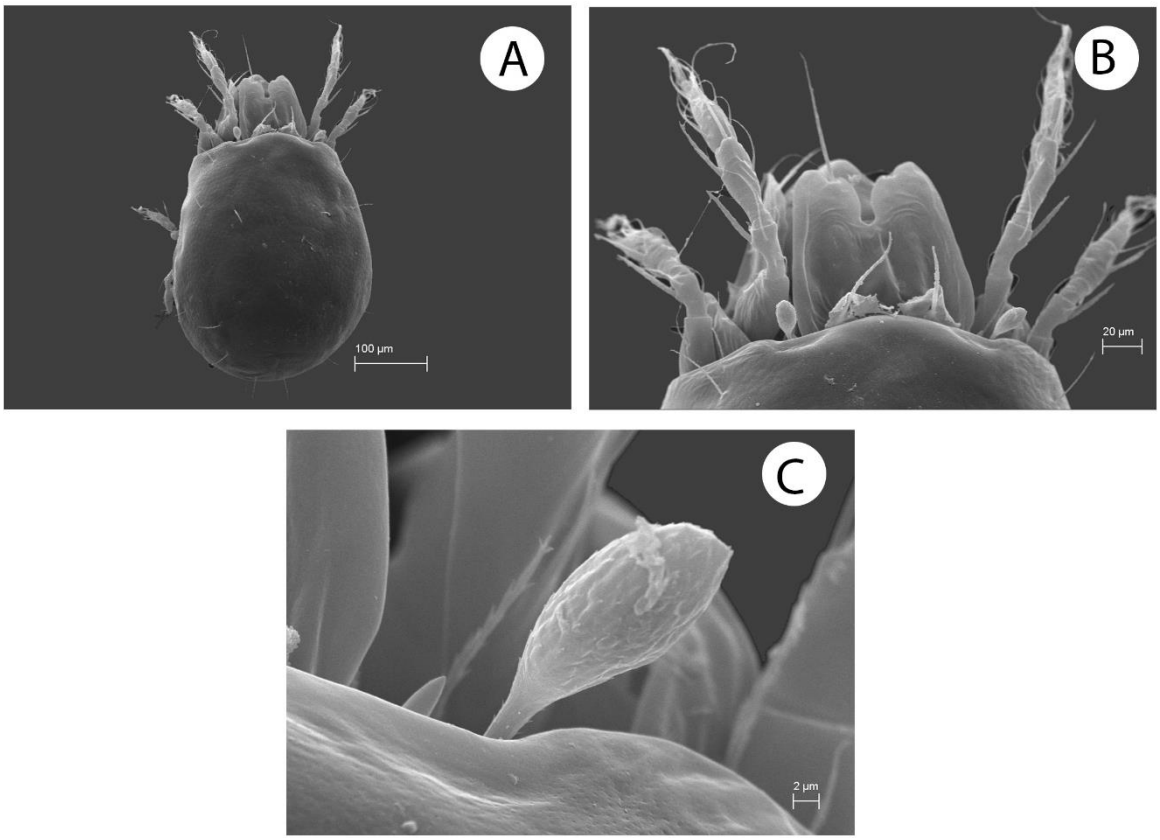

Figure 5. *Trichoribates* (*Latilamellobates*) *algarvensis* (Subías and Gil-Martín, 1990). **A.** Dorsal view, **B.** Prodorsum, **C.** Sensillus.

DISCUSSION

Trhypochthonius silvestris europaeus Weigmann and Raspotnig, 2009

This subspecies is distributed in Central Europe (Austria, Germany, South Sweden) (Subías, 2004, updated 2024; Weigmann and Raspotnig, 2009). The body length of the type specimen is given as 540-620 by Weigmann and Raspotnig (2009). The Turkish specimens (544-608 x 360-400) are within the range of the species' known size. The other main characters of Turkish specimens match Weigmann and Raspotnig's (2009) original description. The holotype of *T. silvestris europaeus* was found in Austria in litter and moss in a Pinus stands. In Germany, it was collected from the same habitats (Weigmann and Raspotnig, 2009). We found it in low numbers in soil with grass.

Microzetes (*Microzetes*) *caucasicus* (Krivolutsky, 1967)

This species is distributed in Caucasus (Murvanidze and Mumladze, 2016). The body size of this species is given as 240-154 (Krivolutsky, 1967). The Turkish specimens (230-237 x 154-160) are smaller than the dimension the species' known size. The other main characters of Turkish specimens match the orginal description. It was found in mixed forest, 900 m a.s.l. at Krasnodar region located in the North Caucasus (Shtanchaeva et al., 2018). This species is known to inhabit humid forest soils and meadows (Murvanidze and Mumladze, 2016). We collected only few individuals from soil and litter in mixed forest.

Camisia (*Camisia*) *biverrucata* (Koch, 1839)

This species is distributed in Holarctic (frequent in Palearctic) and Nepal (Subías, 2004, updated 2024). The body length of the species is given as 1040-1150 by Weigmann (2006) and 930-1097 by Colloff (1993). The Turkish specimens (1052-1094 x 440-476) are within the range of the species' known size. The other main characters of the Turkish specimens match the descriptions given by the various authors (Colloff, 1993; Weigmann, 2006). *C. biverrucata* lives in drier meadows and in the area from the shrubland to the mountain pine zone (Weigmann, 2006). It is not common species, its ecology still remains unclear (Weigmann et al., 2015). We found it in soil and litter.

Trichoribates (*Latilamellobates*) *algarvensis* (Subías and Gil-Martín, 1990)

This species is distributed in Southwest Europe (Spain, Portugal) (Subías and Gil-Martín, 1990, 1995; Subías, 2004, updated 2024). The body length for the holotype of the species is given as 426 -273 by Subías and Gil-Martín (1990) and for Spanish specimens 450-470 x 295 by Subías and Gil-Martín (1995). The Turkish specimen (421 x 277) are within the range of the species' known size. The other main characters of the Turkish specimen match Subías and Gil-Martín's (1990) original descriptions. In Portugal, only one specimen of this species (holotype) was found on the ground of creeping bushes (Subías and Gil-Martín, 1990). We found only one specimen in soil with grass.

Authors' contributions

Ayşe Toluk: Conceptualization, supervision, validation, writing-original draft, writing-review and editing. **Mehmet Taşkıran:** Investigation, validation, visualization, writing-original draft, writing-review and editing.

Statement of ethics approval

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Conflict of interest

The authors declare that there are no conflicts of interest.

REFERENCES

Baran, Ş., Bezci, T. and Ayyıldız, N. 2018. Supplementary checklist of oribatid mites (Acari) from Turkey. Munis Entomology and Zoology, 13 (1): 91-97.

Behan-Pelletier, V.M. and Newton, G. 1999. Computers in Biology: Linking soil biodiversity and ecosystem function: The taxonomic dilemma. Bioscience, 49 (2): 149-153.
doi: 10.2307/1313540

Colloff, M.J. 1993. A taxonomic revision of the oribatid mite genus *Camisia* (Acari: Oribatida). Journal of National History, 27: 1325-1408.
doi: 10.1080/00222939300770761

Colloff, M.J. and Halliday, R.B. 1998. Oribatid mites: a catalogue of the Australian genera and species. Monographs on invertebrate taxonomy, Vol. 6, CSIRO Publishing, Collingwood, Melbourne, Australia, 224 pp.
doi: 10.1071/9780643105201

Erman, O., Özkan, M., Ayyıldız, N and Doğan, S. 2007. Checklist of the mites (Arachnida: Acari) of Turkey. Second supplement. Zootaxa, 1532 (1): 1-21.
doi: 10.11646/zootaxa.1532.1.1

Erman, O., Doğan, S., Ayyıldız, N. and Özkan, M. 2024. Checklist of the mites (Acari) of Türkiye. Third supplement. Acarological studies, 6 (2): 81-111.
doi: 10.47121/acarolstud.1500691

Güner, A., Vural, M. and Sorkun, K. 1987. Rize florası, vejetasyonu ve yöre ballarının polen analizi, TÜBİTAK Matematik, Fizik ve Biyolojik Bilimler Araştırma Grubu, Project No: TBAG-650, Ankara, Türkiye. 269 pp. [In Turkish]

Krivolutsky, D.A. 1967. Neue arten des hornmilben (Acariformes, Oribatei) aus dem Kaukasus und Transkaukasien. Zoologischer Anzeiger, 178 (3-4): 185-190. [In German]

Murvanidze, M. and Mumladze, L. 2016. Annotated checklist of Georgian oribatid mites. Zootaxa, 4089 (1): 1-81.

doi: 10.11646/zootaxa.4089.1.1

Norton, R.A. and Behan-Pelletier, V.M. 2009. Suborder Oribatida. In: A manual of acarology. Third edition. Krantz, G.W. and Walter, D.E. (Eds). Texas Tech University Press, Lubbock, Texas, USA, 430-564.

Özkan, M., Ayyıldız, N. and Erman, O. 1994. Checklist of the Acari of the Turkey. First supplement. EURAAC News Letter, 7 (1): 4-12.

Petersen, H. and Luxton, M. 1982. A comparative analysis of soil fauna populations and their role in decomposition processes. Oikos, 39: 287-388.
doi: 10.2307/3544689

Schatz, H. 2002. Die Oribatidenliteratur und die beschriebenen Oribatidenarten (1758-2001)-Eine Analyse. Abhandlungen und Berichte des Naturkunde Museums Görlitz, 74: 37-45. [In German]

Shtanchaeva, U.Ya., Subías, L.S. and Kremenitsa, A.M. 2018. New data about the fauna of oribatid mites (Oribatida) of the North Caucasus. Ecology of Animals, 13 (2): 52-63. [In Russian]
doi: 10.18470/1992-1098-2018-2-52-63

Subías, L.S. 2004. Systematic, synonimical and biogeographical check-list of the world's oribatid mites (Acariformes, Oribatida) (1758-2002). Graellsia, 60 (1): 3-305, updated 2024. [In Spanish]
doi: 10.3989/graellsia.2004.v60.iExtra.218

Subías, L.S. and Gil-Martin, J. 1990. Tres nuevas especies de oribátidos (Acari: Oribatida) de Portugal. Boletin de la Real Sociedad Espanola de Historia Natural, 86 (1-4): 195-202. [In Spanish]

Subías, L.S. and Gil-Martin, J. 1995. Nuevas citas oribatológicas (Acari, Oribatida) para la Fauna española. Boletín de la Asociación española de Entomología, 19 (1-2): 25-51. [In Spanish]

Weigmann, G. 2006. Hornmilben (Oribatida). Die Tierwelt Deutschlands, Begründet 1925 von Friedrich Dahl, Teil 76, Goecke & Evers, Keltern, 520 pp. [In German]

Weigmann, G. and Raspotnig, G. 2009. Comparative morphological and biometrical studies on *Trhypochthonius* species of the tectorum species group (Acari: Oribatida: Trhypochthoniidae). Zootaxa, 2269: 1-31.
doi: 10.11646/zootaxa.2269.1.1

Weigmann, G., Horak, F., Franke, K. and Christian, A. 2015. Acarofauna Germanica-Oribatida. Verbreitung und Ökologie der Hornmilben (Oribatida) in Deutschland. Senckenberg, Museum Für Naturkunde, Peckiana, Görlitz, Germany, 171 pp. [In German]

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