TÜBİTAK

Turkish Journal of Zoology

http://journals.tubitak.gov.tr/zoology/

Research Article

Turk J Zool
(2015) 39: 768-780
© TÜBİTAK
doi:10.3906/zoo-1409-14

The genus *Macrocheles* Latreille (Acari: Mesostigmata: Macrochelidae) from Kelkit Valley (Turkey), with three newly recorded mite species

Hasan Hüseyin ÖZBEK[1,*], Durmuş Ali BAL[2], Salih DOĞAN[1]
[1]Department of Biology, Faculty of Science and Arts, Erzincan University, Erzincan, Turkey
[2]Faculty of Education, Erzincan University, Erzincan, Turkey

Received: 08.09.2014 • **Accepted/Published Online:** 16.12.2014 • **Printed:** 30.09.2015

Abstract: This survey was carried out on the genus *Macrocheles* in Kelkit Valley, Turkey, during 2007–2012. Seven species, *M. muscaedomesticae* (Scopoli, 1772); *M. glaber* (Müller, 1860); *M. perglaber* Filipponi & Pegazzano, 1962; *M. scutatus* (Berlese, 1904); *M. merdarius* (Berlese, 1889); *M. subbadius* (Berlese, 1904); and *M. robustulus* (Berlese, 1904), were recorded from the valley. *M. perglaber*, *M. scutatus*, and *M. subbadius* are first records for the Turkish fauna. Original drawings and diagnoses for all known species of the genus from the valley are included. In addition, an identification key to the Turkish species of *Macrocheles* is provided here.

Key words: Acari, Macrochelidae, *Macrocheles*, new records, Kelkit Valley, Turkey

1. Introduction

The family Macrochelidae includes a large number of species of mites that are found in organic matter, especially dung, carrion, compost, and leaf litter. Macrochelid mites feed on small arthropods, especially the eggs and larvae of flies in these habitats (Halliday, 2000; Mašán, 2003). The family includes 20 genera and about 480 species worldwide (Emberson, 2010; Özbek et al., 2013), but the macrochelid fauna of Turkey is poorly known, with only 21 species (Özbek and Bal, 2014; Özbek et al., 2015).

The Kelkit Valley is in a geographic transitional zone between the Middle Black Sea and Inner Anatolia regions in northeastern Turkey, and it is also a transitional zone between the Euro-Siberian and Irano-Turanian phytogeographic regions (Karaer and Kılınç, 2001). Previously, 4 genera and 13 species of Macrochelidae have been recorded from Kelkit Valley. The papers in this series deal with *Longicheles* Berlese (Özbek and Bal, 2012; Özbek et al., 2013), *Nothrholaspis* Berlese (Özbek and Bal, 2013), *Geholaspis* Berlese (Özbek and Bal, 2014), and *Glyptholaspis* Filipponi & Pegazzano (Özbek et al., 2015).

Macrocheles is the largest cosmopolitan genus of Macrochelidae, with about 320 species distributed worldwide (Emberson, 2010). We recorded 7 species of the genus from the valley. From these species, *M. muscaedomesticae*, *M. glaber*, *M. merdarius*, and *M. robustulus* have previously been reported from Turkey; *M. perglaber*, *M. subbadius*, and *M. scutatus* are new records for the Turkish fauna. The aim of this study is to add new records and more details to the Turkish mite fauna, and to provide a key to the Turkish species of the genus *Macrocheles*.

2. Materials and methods

Mites were individually collected or were collected by quantitative methods and extracted using Berlese funnels. Mites were mounted in Hoyer's medium. Specimens were examined, illustrated, and measured using a Leica DM 4000 B phase-contrast microscope. Examined specimens were deposited in the Acarology Laboratory of Erzincan University, Turkey. The terminology of the dorsal and ventral chaetotactic pattern used in this paper follows Lindquist and Evans (1965), Walter and Krantz (1986), and Halliday (1986a, 1987).

3. Results

Family Macrochelidae Vitzhum 1930
Genus *Macrocheles* Latreille, 1829
***Macrocheles muscaedomesticae* (Scopoli, 1772)**
Acarus muscae domesticae Scopoli, 1772: 125.

Diagnosis. Female: Dorsal shield 1010 µm long, 670 µm wide at the level of setae *r4* (n: 1), widely oval, reticulated with punctations and bearing 28 pairs of setae; dorsal setae *j1* distally pilose, *J5* slightly pilose, *j2*, *j5*, *j6*, *z1*, *z5*, *z6*, and *J2* smooth and needle-like, other setae pilose (Figure 1A); ventral shields typically ornamented with sculptural pattern and punctations (Figure 1B).

* Correspondence: hozbek@erzincan.edu.tr

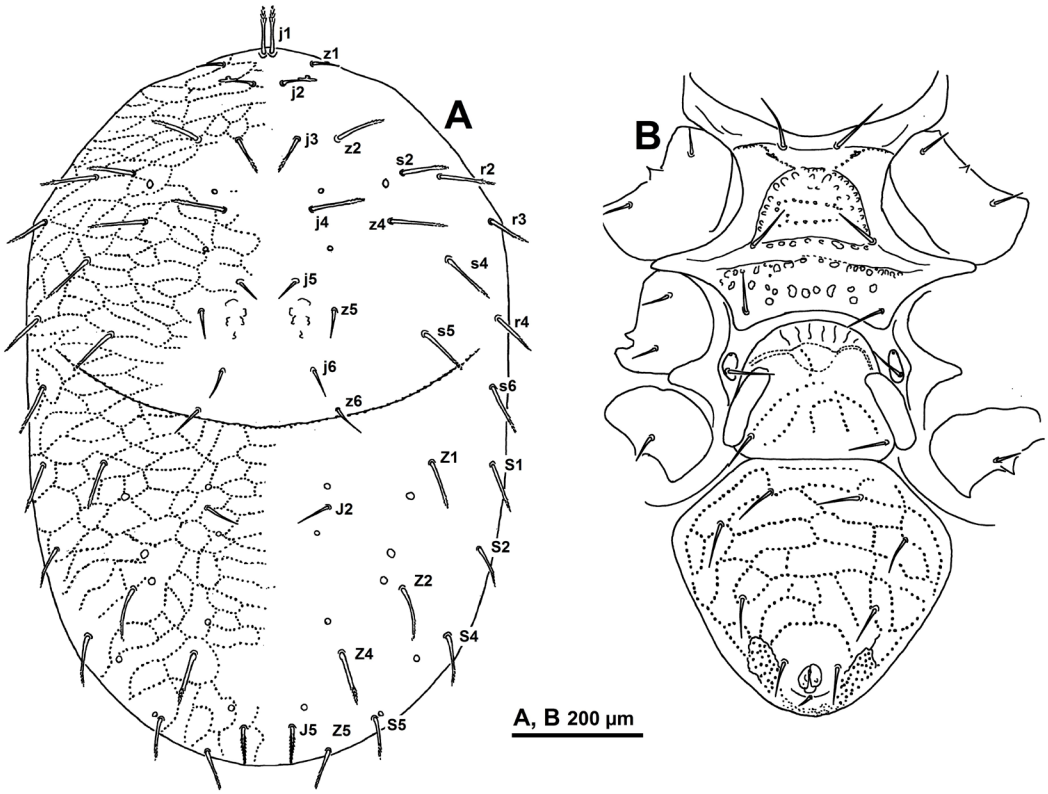


Figure 1. *Macrocheles muscaedomesticae* (female): **A.** Dorsal view, **B.** Ventral view.

Specimen examined: One female, Sivas, Gölova, Yeniköy, 40°03′54″N, 38°30′19″E, 1258 m a.s.l., 19 June 2011, in dung.

Distribution: It is widely distributed in the world (Mašán, 2003).

Notes: This species was previously recorded from Turkey as phoretic on insects (Göksu and Güler, 1968; Çiçek et al., 2008). It has been found in dung from the valley at an elevation of 1258 m a.s.l.

***Macrocheles glaber* (Müller, 1860)**

Holostaspis glabra Müller, 1860: 178.

Diagnosis. Female: Dorsal shield 815–915 µm long, 490–570 µm wide at the level of setae *r4* (n: 15), oval, ornamented with net-like punctations, and bearing 28 pairs of mostly smooth and needle-like setae; dorsal setae *j1*, *j4*, *z4* distally pilose, *J5* slightly pilose, other setae smooth and needle-like (Figure 2A); sternal shield typically ornamented with sculptural patterns, and having 1 linea arcuata (Figure 2B).

Male: Dorsal shield 600–650 µm long, 370–410 µm wide at the level of setae *r4* (n: 10), and bearing 28 pairs of mostly needle-like setae; dorsal setae *j1*, *j4*, *z4*, *s5*, *Z4*, and *Z5* distally pilose, *J5* and *S5* slightly pilose (Figure 3A); sternogenital and ventrianal shields ornamented with sculptural patterns; anterolateral margins of ventrianal shield convex (Figure 3B); chelicera as in Figure 3C.

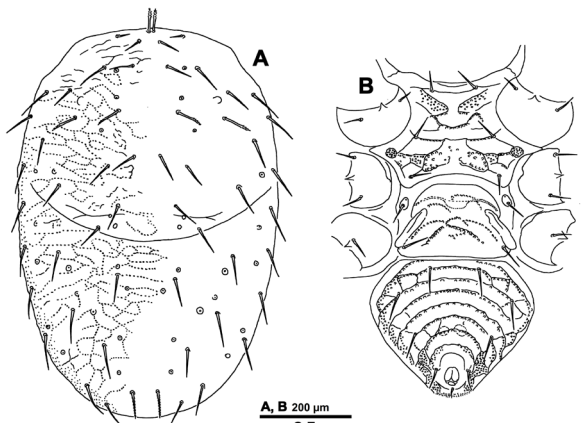


Figure 2. *Macrocheles glaber* (female): **A.** Dorsal view, **B.** Ventral view.

Specimens examined: 15 females and 5 males, Tokat, Reşadiye, 40°20′30″N, 37°30′35″E, 572 m a.s.l., 30 May 2008, in dung; 23 females and 2 males, Niksar, Eryaba, 40°34′48″N, 36°47′39″E, 735 m a.s.l., 30 September 2008, in or on moss, lichen, and bark; 5 females and 3 males, between Erbaa and Niksar, 40°34′55″N, 36°50′58″E, 278 m a.s.l., 30 September 2008, in straw; 17 females and 7 males, Alucra, 40°19′20″N, 38°39′38″E, 1425 m a.s.l., 27 June 2008, in soil and moss; 17 females and 3 males,

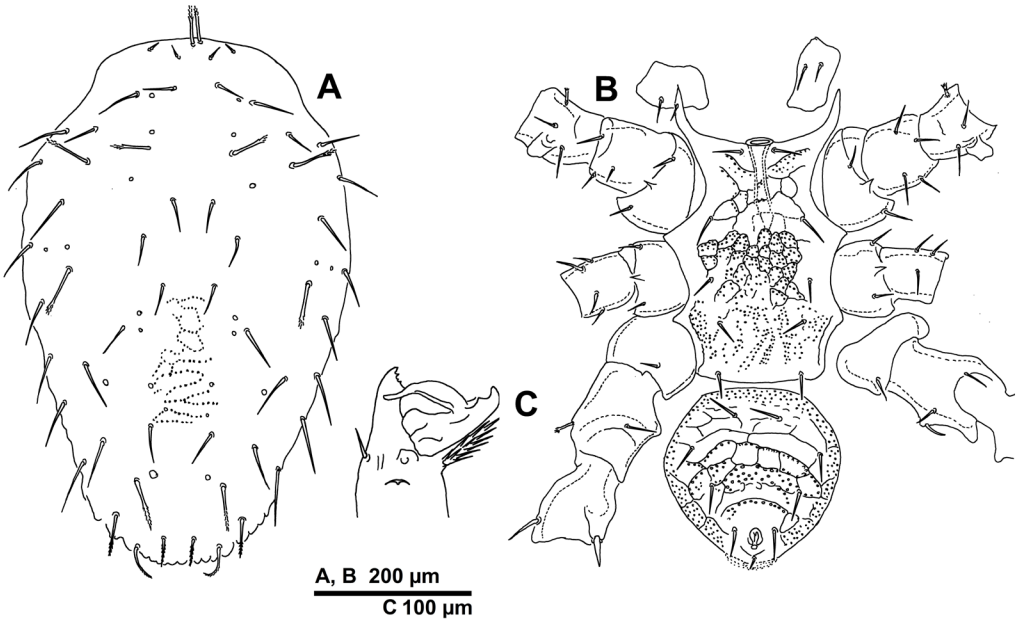


Figure 3. *Macrocheles glaber* (male): **A.** Dorsal view, **B.** Ventral view, **C.** Chelicera.

between Erbaa and Alucra, 40°39′56″N, 36°41′32″E, 228 m a.s.l., 09 November 2008, from litter under *Pinus* sp.; 10 females and 5 males, between Erbaa and Alucra, 40°35′53″N, 36°49′36″E, 256 m a.s.l., 09 November 2008, from weeds; 15 females and 5 males, Tokat, Niksar, Derindere, 40°30′12″N, 36°55′01″E, 347 m a.s.l., 09 April 2011, from litter under *Salix* sp.; 12 females and 7 males, Tokat, Niksar, Derindere, 40°31′31″N, 36°54′30″E, 311 m a.s.l., 09 April 2011, in dung; 8 females and 3 males, Tokat, Reşadiye, Yenitaraç, 40°25′08″N, 37°13′30″E, 541 m a.s.l., 27 April 2011, from rotten wood; 15 females and 5 males, Tokat, Niksar, 40°31′54″N, 36°54′25″E, 327 m a.s.l., 14 May 2011, in dung; 16 females and 5 males, Sivas, Gölova, Yeniköy, 40°02′92″N, 38°30′70″E, 1409 m a.s.l., 19 June 2011, from litter under *Pyrus* sp.; 35 females and 15 males, Sivas, Gölova, Yeniköy, 40°03′54″N, 38°30′19″E, 1258 m a.s.l., 19 June 2011, in dung; 25 females and 5 males, Gümüşhane, Köse, 40°16′40″N, 39°38′38″E, 1856 m a.s.l., 26 June 2011, in dung; Tokat, Reşadiye, Zinav Lake, 40°26′66″N, 37°14′53″E, 888 m a.s.l., 14 April 2012, litter under *Quercus* sp.; 5 females, Tokat, Reşadiye, Çevrecik, 40°24′60″N, 37°14′41″E, 525 m a.s.l., 14 April 2012, from moss; 19 females and 7 males, Tokat, Reşadiye, Çevrecik, 40°25′35″N, 37°09′97″E, 431 m a.s.l., 14 April 2012, from litter under *Juglans* sp.; 15 females, Gümüşhane, Köse, 40°18′93″N, 39°38′83″E, 1810 m a.s.l., 13 June 2012, in dung.

Distribution: It is widely distributed in the world (Mašán, 2003).

Notes: This species was previously recorded from Turkey as phoretic on insects (Çobanoğlu and Kırgız, 2001). It is a common species, with specimens found in large numbers throughout the valley.

***Macrocheles perglaber* Filipponi & Pegazzano, 1962**

Macrocheles perglaber Filipponi & Pegazzano, 1962: 221.

Diagnosis. Female: Dorsal shield 830–1000 µm long, 500–560 µm wide at the level of setae *r4* (n: 12), oval, reticulated, and bearing 28 pairs of mostly needle-like setae; dorsal setae *j1*, *j4*, *z4*, *r2*, *r3*, *s5*, *z5*, *S4*, and *S5* distally pilose, *J5* slightly pilose, others smooth and needle-like (Figure 4A); sternal shield typically ornamented with sculptural patterns, and having 2 linea arcuatae (Figure 4B).

Male: Dorsal shield 700–830 µm long, 460–490 µm wide at the level of setae *r4* (n: 8), and bearing 28 pairs of mostly pilose setae; dorsal setae *j5*, *j6*, *z1*, *z5*, *z6*, and *J2* smooth and needle-like, *J5* slightly pilose, others distally pilose (Figure 5A); sternogenital and ventrianal shields ornamented with sculptural patterns; anterolateral margins of ventrianal shield convex (Figure 5B).

Specimens examined: 3 females and 3 males, Tokat, between Erbaa and Niksar, 40°34′55″N, 36°50′58″E, 278 m a.s.l., 30 September 2008, from straw; 5 females and 2 males, Tokat, between Erbaa and Niksar, 40°35′53″N, 36°49′36″E, 256 m a.s.l., 09 November 2008, from weeds; 7 females and 3 males, Tokat, Niksar, Derindere, 40°31′31″N, 36°54′30″E, 311 m a.s.l., 09 April 2011, in dung; 5 females and 3 males, Tokat, Niksar, 40°31′54″N, 36°54′25″E, 327 m a.s.l., 14 May 2011, in dung; 11 females and 7 males, Sivas, Gölova, Yeniköy, 40°03′54″N, 38°30′19″E, 1258 m a.s.l., 19 June 2011, in dung; 2 females and 1 male, Gümüşhane, Köse, 40°16′40″N, 39°38′38″E, 1856 m a.s.l., 26 June 2011,

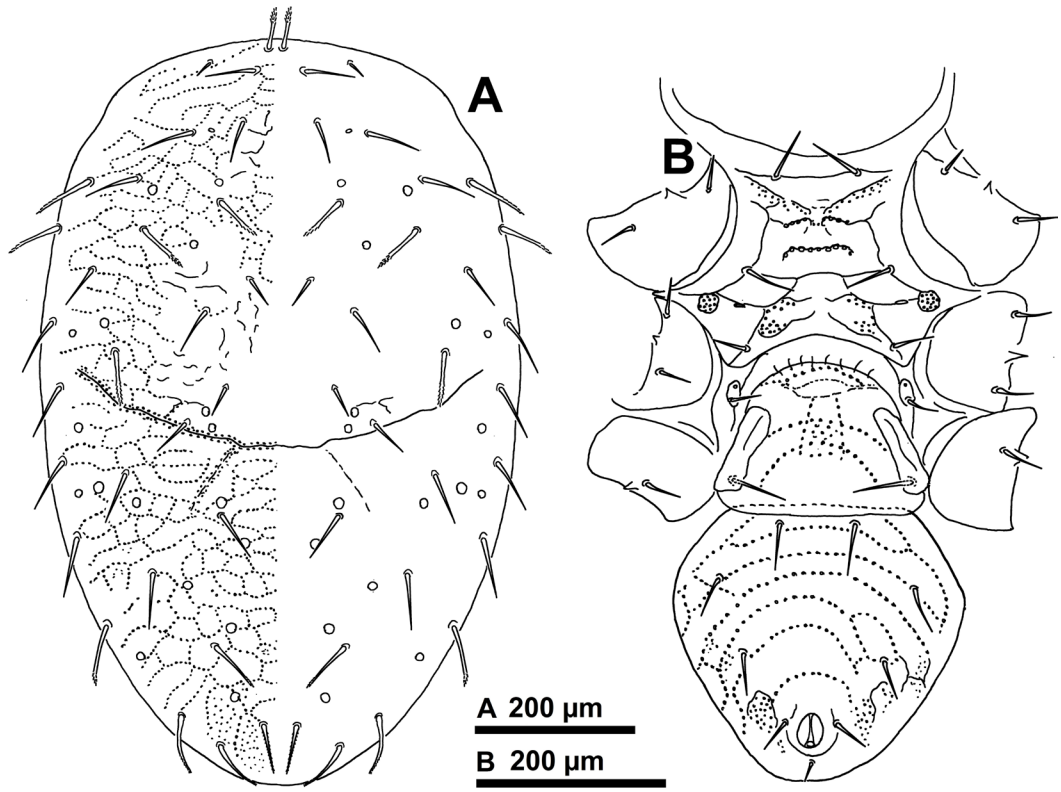


Figure 4. *Macrocheles perglaber* (female): **A.** Dorsal view, **B.** Ventral view.

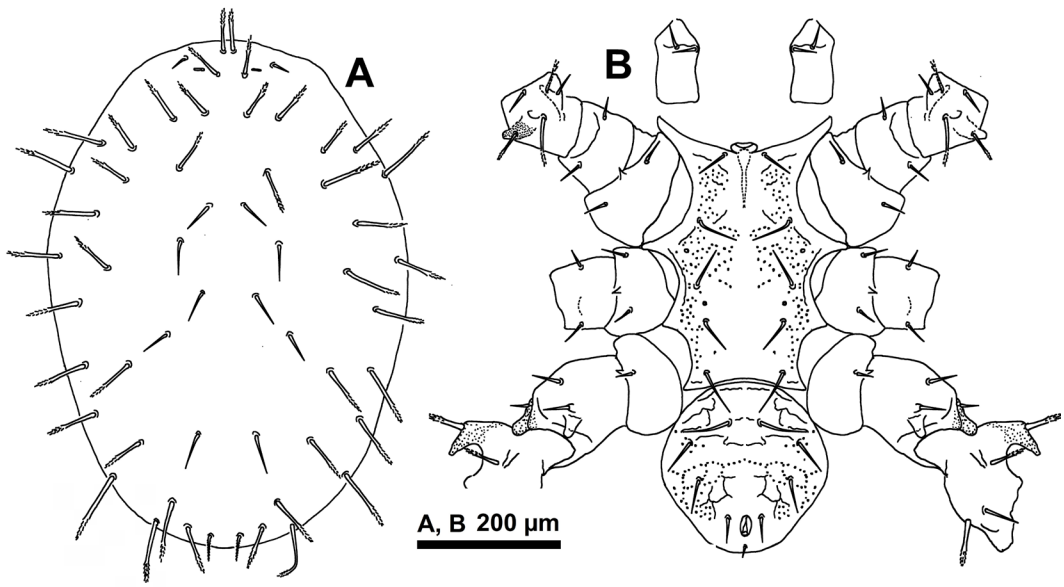


Figure 5. *Macrocheles perglaber* (male): **A.** Dorsal view, **B.** Ventral view.

in dung; 1 female, Tokat, Reşadiye, Darıdar, 40°25′19″N, 37°09′95″E, 478 m a.s.l., 14 April 2012, in dung; 3 females and 1 male, Tokat, between Şiran and Alucra, 40°09′96″N, 39°00′17″E, 1309 m a.s.l., 23 April 2012, in dung; 4 females and 2 males, Tokat, between Şiran and Alucra, 40°09′97″N, 39°00′17″E, 1309 m a.s.l., 23 April 2012, in dung; 3 females and 2 males, Tokat, between Şiran and Alucra, 40°15′52″N, 38°57′90″E, 1570 m a.s.l., 23 April 2012, in dung.

Distribution: It is widely distributed in the world (Mašán, 2003). New record for the Turkish fauna.

Notes: *M. glaber* and *M. perglaber* are very similar and broadly sympatric species and cannot reliably be distinguished from each other based on the morphological characters of females (Halliday, 1986b; Mašán, 2003), but Filipponi and Pegazzano (1962) separated the females of both species as follows: *M. glaber*—dorsal setae *s5* smooth and needle-like, ventrianal shield longer than wide, sternal shield with 1 linea arcuata; *M. perglaber*—dorsal setae *s5* pilose, ventrianal shield wider than long, sternal shield with 2 linea arcuatae. These distinguishing characters are useable for Turkish specimens of both species; however, the 2 similar species are more reliably distinguished from each other using the morphologic features of males.

***Macrocheles scutatus* (Berlese, 1904)**

Holostaspis subbadius var. *scutatus* Berlese, 1904: 264.

Diagnosis. Female: Dorsal shield 550–650 µm long, 320–380 µm wide at the level of setae *r4* (n: 12), reticulated and bearing 28 pairs of mostly needle-like setae; dorsal setae *j1*, *j4*, *z4*, *Z5*, and *S5* distally pilose, *J5* slightly pilose, others smooth and needle-like (Figure 6A); ventral shields typically ornamented with sculptural patterns; linea arcuata long and strongly concave (Figure 6B).

Male: Dorsal shield 430–470 µm long, 300–320 µm wide at the level of setae *r4* (n: 8), and bearing 28 pairs of mostly needle-like setae; dorsal setae *j1*, *j4*, *z4*, *r2*, *r3*, *Z4*, *Z5*, *S4*, and *S5* pilose, *J5* slightly pilose, others smooth and needle-like (Figure 7A); sternogenital and ventrianal shields ornamented with sculptural patterns; anterolateral margins of ventrianal shield slightly concave (Figure 7B).

Specimens examined: 5 females and 3 males, Tokat, between Erbaa and Niksar, 40°34′55″N, 36°50′58″E, 278 m a.s.l., 30 September 2008, in straw; 15 females and 5 males, Tokat, between Erbaa and Niksar, 40°35′53″N, 36°49′36″E, 256 m a.s.l., 09 November 2008, from weeds; Tokat, Niksar, Derindere, 40°31′31″N, 36°54′30″E, 311 m a.s.l., 09 April 2011, in dung; 5 females and 2 males, Tokat, Niksar, 40°31′54″N, 36°54′25″E, 327 m a.s.l., 14 May 2011, in dung; 13 females, Sivas, Gölova, Yeniköy, 40°03′54″N, 38°30′19″E, 1258 m a.s.l., 19 June 2011, in dung; 14 females and 5 males, Gümüşhane, Köse, 40°16′40″N, 39°38′38″E, 1856 m a.s.l., 26 June 2011, in dung; 7 females and 4 males, Tokat, Reşadiye, Darıdar, 40°25′19″N,

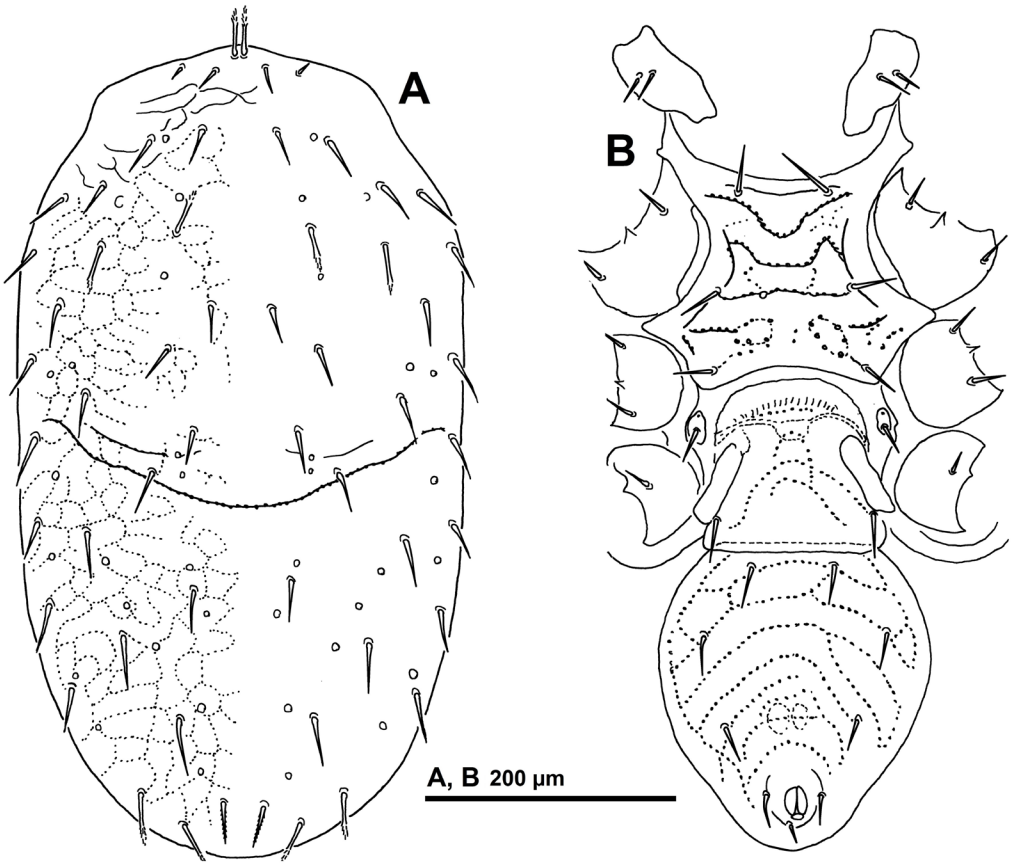


Figure 6. *Macrocheles scutatus* (female): **A.** Dorsal view, **B.** Ventral view.

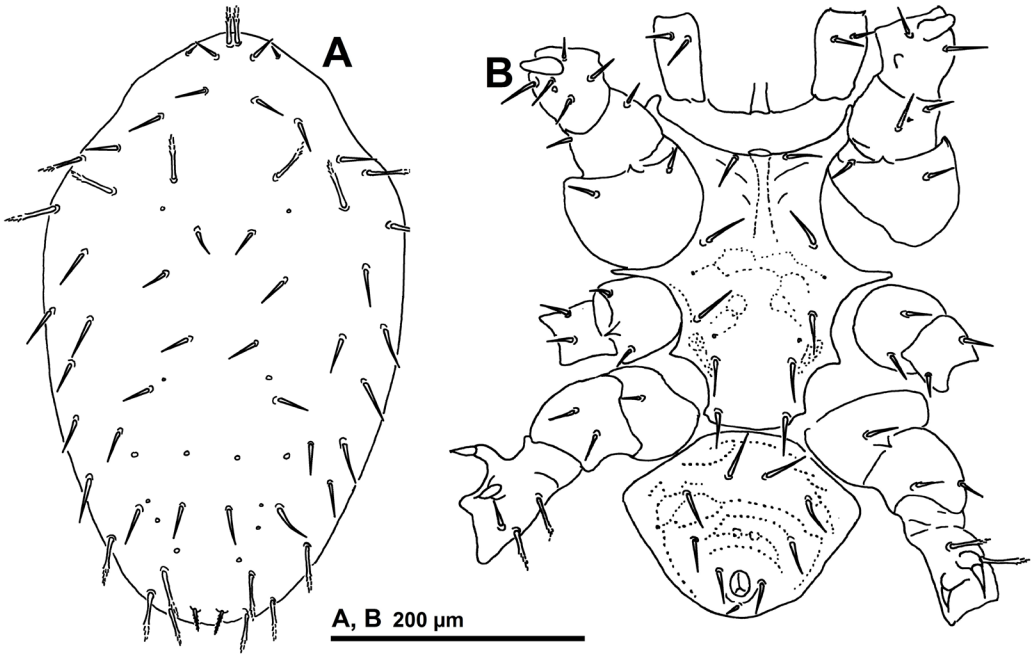


Figure 7. *Macrocheles scutatus* (male): **A.** Dorsal view, **B.** Ventral view.

37°09′95″E, 478 m a.s.l., 14 April 2012, in dung; 13 females and 7 males, Gümüşhane, between Şiran and Alucra, 40°09′96″N, 39°00′17″E, 1309 m a.s.l., 23 April 2012, in dung; 15 females and 5 males, Gümüşhane, between Şiran and Alucra, 40°09′97″N, 39°00′17″E, 1309 m a.s.l., 23 April 2012, in dung; 10 females and 5 males, Gümüşhane, between Şiran and Alucra, 40°15′52″N, 38°57′90″E, 1570 m a.s.l., 23 April 2012, in dung.

Distribution: *M. scutatus* is distributed in Asia, Europe, North Africa, and New Zealand (Mašán, 2003). New record for the Turkish fauna.

Notes: This species is quite common; specimens are found in large numbers throughout Kelkit Valley. It has been mostly found in dung, straw, and weeds at elevations between 256 and 1856 m a.s.l. in the valley.

***Macrocheles merdarius* (Berlese, 1889)**

Holostaspis merdarius Berlese, 1889: 1.

Diagnosis. Female: Dorsal shield 450–530 µm long, 230–290 µm wide at the level of setae *r4* (n: 12), reticulated, and bearing 28 pairs of setae; dorsal seta *J5* slightly pilose, others smooth and needle-like (Figure 8A); genu IV with 6 setae; ventral shields typically ornamented with sculptural pattern (Figure 8B).

Specimens examined: 15 females, Tokat, Niksar, Gürçeşme, 40°35′39″N, 36°50′02″E, 285 m a.s.l., 24 July 2007, in dung; 50 females, Tokat, between Erbaa and Niksar, 40°35′53″N, 36°49′36″E, 256 m a.s.l., 09 September 2008, from weeds; 25 females, Tokat, Erbaa, 40°40′12″N, 36°39′46″E, 239 m a.s.l., 14 December 2008, in dung; 100 females, Tokat, Niksar, Derindere, 40°31′31″N, 36°54′30″E, 311 m a.s.l., 09 April 2011, in dung; 31 females, Tokat, Reşadiye, Zinav Lake, 40°27′10″N, 37°16′42″E, 954 m a.s.l., 27 April 2011, from litter under *Quercus* sp.; 25 females, Gümüşhane, Şiran, Sarıca, 40°09′70″N, 39°04′32″E, 1368 m a.s.l., 29 May 2011, from litter under *Juniperus* sp.; 100 females, Tokat, Reşadiye, Zinav Lake, 40°27′07″N, 37°16′33″E, 970 m a.s.l., from litter; 7 females, Sivas, Gölova, Yeniköy, 40°03′54″N, 38°30′19″E, 1258 m a.s.l., 19 June 2011, in dung; Tokat, Reşadiye, Darıdar, 40°25′19″N, 37°09′95″E, 478 m a.s.l., 14 April 2012, in dung; 20 females, Gümüşhane, between Şiran and Alucra, 40°15′52″N, 38°57′90″E, 1570 m a.s.l., 23 April 2012, in dung; 12 females, Giresun, between Şebinkarahisar and Suşehri, 40°17′56”N, 38°12′50″E, 927 m a.s.l., 23 April 2012, in dung.

Distribution: It is widely distributed in the world (Bregetova and Koroleva, 1960; Mašán, 2003).

Notes: This species was previously recorded from Turkey by Kılıç et al. (2012). It is a common species; specimens are found in large numbers throughout Kelkit Valley.

***Macrocheles subbadius* (Berlese, 1904)**

Holostaspis subbadius Berlese, 1904: 264.

Diagnosis. Female: Dorsal shield 630–690 µm long, 360–410 µm wide at the level of setae *r4* (n: 10), oblong, reticulated, and bearing 28 pairs of smooth and needle-like setae; setae *j1* short (Figure 9A); genu IV with 7 setae; ventral shield typically ornamented with sculptural pattern and punctations (Figure 9B).

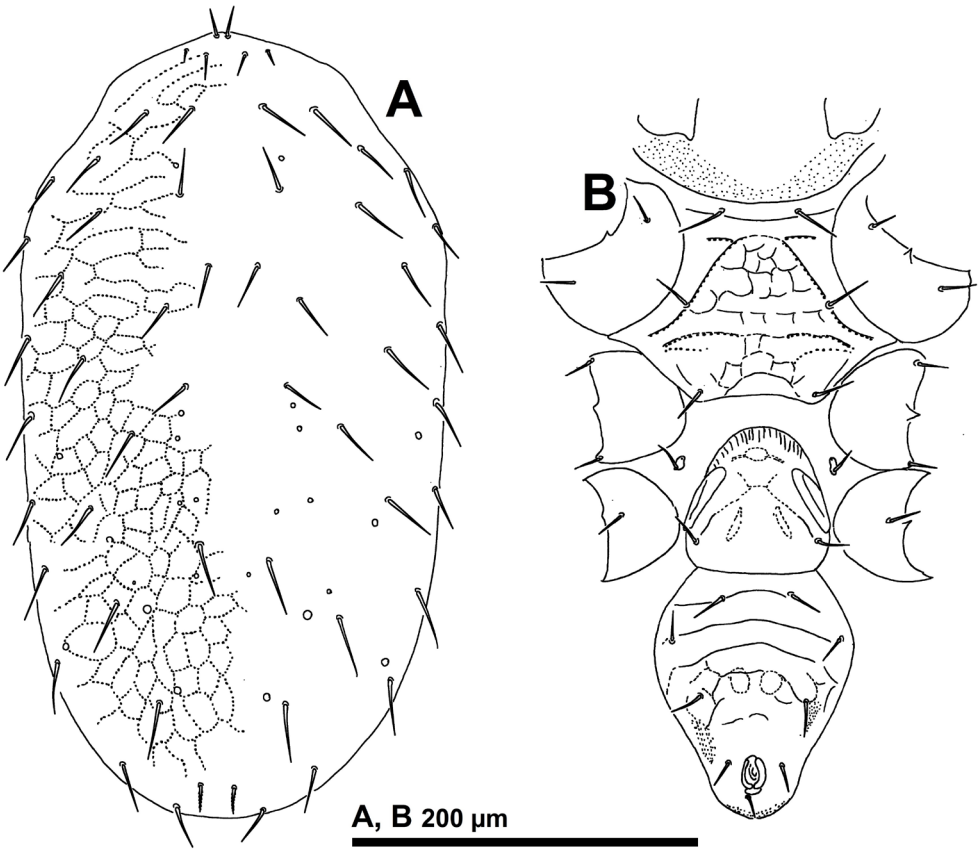


Figure 8. *Macrocheles merdarius* (female): **A.** Dorsal view, **B.** Ventral view.

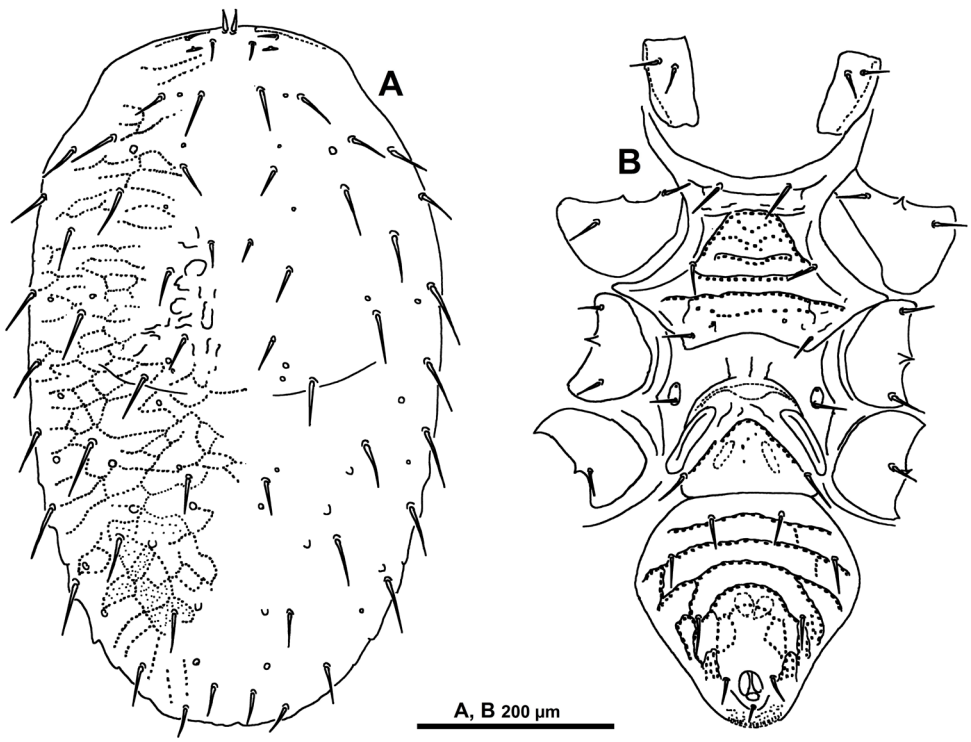


Figure 9. *Macrocheles subbadius* (female): **A.** Dorsal view, **B.** Ventral view.

Male: Dorsal shield 480–510 µm long, 300–330 µm wide at the level of setae *r4* (n: 8), posteriorly narrowed and bearing 28 pairs of mostly needle-like setae; dorsal setae *j4* and *z4* distally pilose, others smooth and needle-like; dorsal shield posteriorly bearing 3 pairs of distinct outgrowths (Figure 10A); holoventral shield ornamented with sculptural patterns (Figure 10B); chelicera as in Figure 10C.

Specimens examined: 15 females and 10 males, Tokat, Niksar, Gürçeşme, 40°35′39″N, 36°50′02″E, 285 m a.s.l., 24 July 2007, in dung; 50 females and 30 males, Tokat, between Erbaa and Niksar, 40°35′53″N, 36°49′36″E, 256 m a.s.l., 09 November 2008, from weeds; 25 females and 15 males, Tokat, Erbaa, 40°40′12″N, 36°39′46″E, 239 m a.s.l., 14 December 2008, in dung; 25 females and 10 males, Tokat, Niksar, Derindere, 40°31′31″N, 36°54′30″E, 311 m a.s.l., 09 Nisan 2011, in dung; 10 females and 15 males, Tokat, Niksar, 40°31′54″N, 36°54′25″E, 327 m a.s.l., 14 May 2011, in dung; 40 females and 30 males, Sivas, Gölova, Yeniköy, 40°03′54″N, 38°30′19″E, 1258 m a.s.l., 19 June 2011, in dung; 40 females and 30 males, Gümüşhane, Köse, 40°16′40″N, 39°38′38″E, 1856 m a.s.l., 26 June 2011, in dung; 20 females and 15 males, Tokat, Reşadiye, Darıdar, 40°25′19″N, 37°09′95″E, 478 m a.s.l., 14 April 2012, in dung; 20 females and 10 males, Gümüşhane, between Şiran and Alucra, 40°09′96″N, 39°00′17″E, 1309 m a.s.l., 23 April 2012, in dung; 15 females and 5 males, Gümüşhane, between Şiran and Alucra, 40°09′97″N, 39°00′17″E, 1309 m a.s.l., 23 April 2012, in dung; 20 females and 10 males, Gümüşhane, between Şiran and Alucra, 40°15′52″N, 38°57′90″E, 1570 m a.s.l., 23 April 2012, in dung; Giresun, between Şebinkarahisar and Suşehri, 40°17′56″N, 38°12′50″E, 927 m a.s.l., 23 April 2012, in dung.

Distribution: This species is widely distributed in the world (Mašán, 2003; Halliday, 2000). New record for Turkish fauna.

Notes: *M. subbadius* is a very common species, with specimens found in large numbers throughout the valley. It has been mostly found in dung at elevations between 239 and 1856 m a.s.l.

***Macrocheles robustulus* (Berlese, 1904)**

Holostaspis subbadius var. *robustulus* Berlese, 1904: 264.

Diagnosis. Female: Dorsal shield 680–790 µm long, 400–440 wide at the level of setae *r4* (n: 10), oblong, reticulated, and bearing 28 pairs of mostly needle-like setae; dorsal setae *j1*, *j4*, *z4*, *r2*, *Z4*, *Z5* distally pilose, *J5* slightly pilose, others smooth and needle-like; *z4* and *r2* distinctly longer than other dorsal setae (Figure 11A); sternal shield without sculptural lines, ornamented, and punctuated (Figure 11B).

Male: Dorsal shield 570–660 µm long, 350–430 µm wide at the level of setae *r4* (n: 5), and bearing 30 pairs of mostly needle-like setae (Figure 12A); holoventral shield with ornamented sculptural patterns (Figure 12B); chelicera as in Figure 12C.

Specimens examined: 7 females and 2 males, Tokat, Niksar, 40°31′54″N, 36°54′25″E, 327 m a.s.l., 14 May 2011, in dung; Tokat, between Niksar and Erbaa, 40°38′54″N, 36°43′68″E, 303 m a.s.l., 14 May 2011, in moss; 7 females

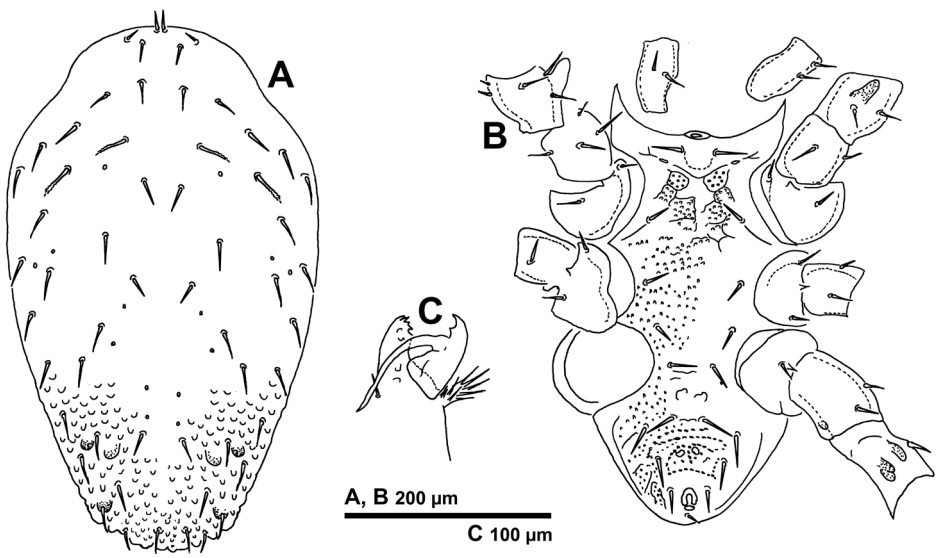


Figure 10. *Macrocheles subbadius* (male): **A.** Dorsal view, **B.** Ventral view, **C.** Chelicera.

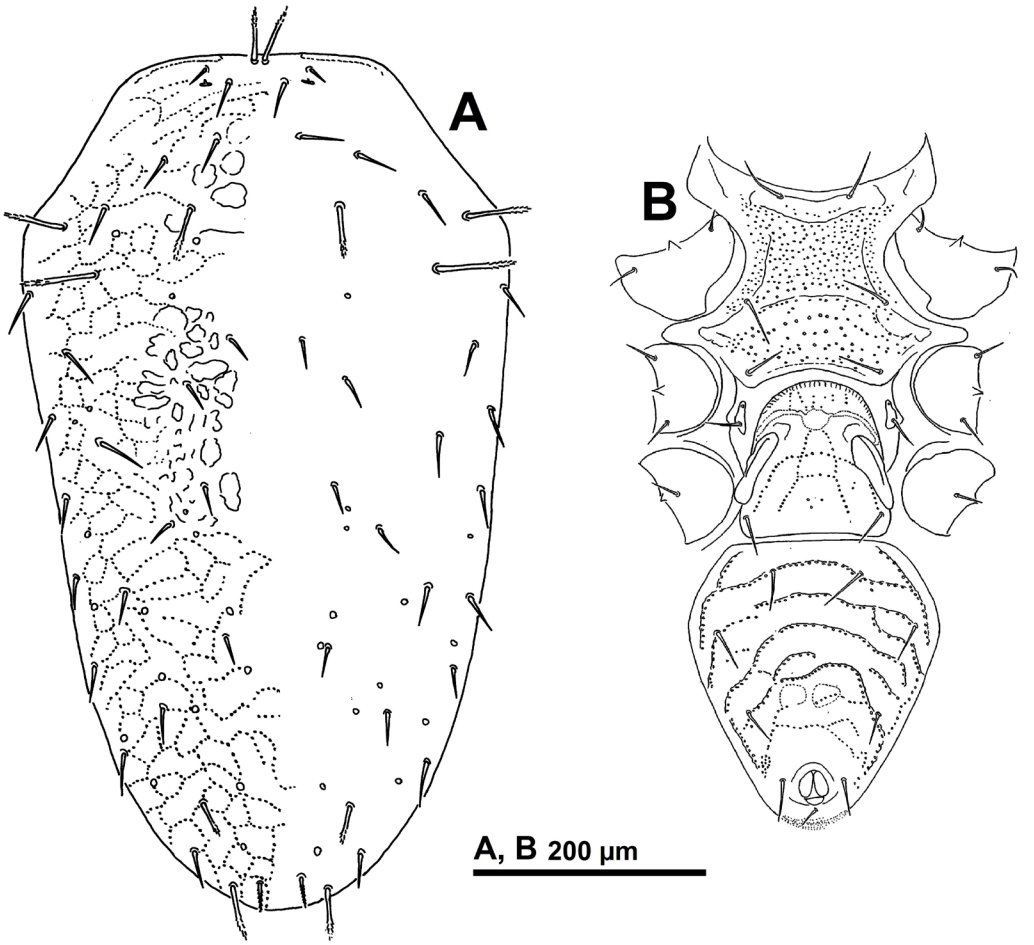


Figure 11. *Macrocheles robustulus* (female): **A.** Dorsal view, **B.** Ventral view.

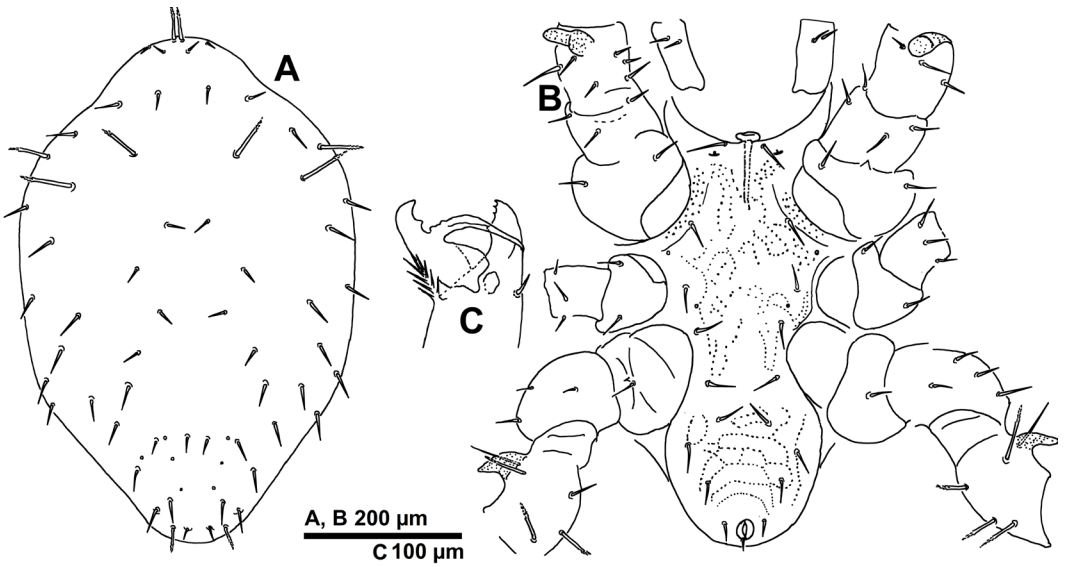


Figure 12. *Macrocheles robustulus* (male): **A.** Dorsal view, **B.** Ventral view, **C.** Chelicera.

and 3 males, Tokat, Reşadiye, 40°23′62″N, 37°17′14″E, 508 m a.s.l., 14 May 2011, litter under *Quercus* sp.; 7 females, Gümüşhane, Şiran, 40°09′85″N, 38°57′10″E, 1457 m a.s.l., litter under *Pyrus* sp.

Distribution: It is widespread in the world (Hyatt and Emberson, 1988; Mašán, 2003).

Notes: This species was previously recorded from Turkey as phoretic on insects (Bayram and Çobanoğlu, 2005). Additionally, it has been found in the valley in dung, moss, and litter under *Quercus* sp. and *Pyrus* sp., at elevations between 303 and 1457 m a.s.l.

4. Discussion

This survey shows that *Macrocheles* species are abundant in Kelkit Valley, where they can be easily found in organic matter, especially dung. The morphology of females of the *Macrocheles* species is similar to each other; therefore, ornamentations of ventral shields are important diagnostic features in the genus. Species of the genus are distinguishable from each other by the ornamentations on the sternal shield of the females (Figure 13) and morphological features of males (Figure 14). For this reason, we have provided photographs of the ventral view for all known species of the genus from the valley.

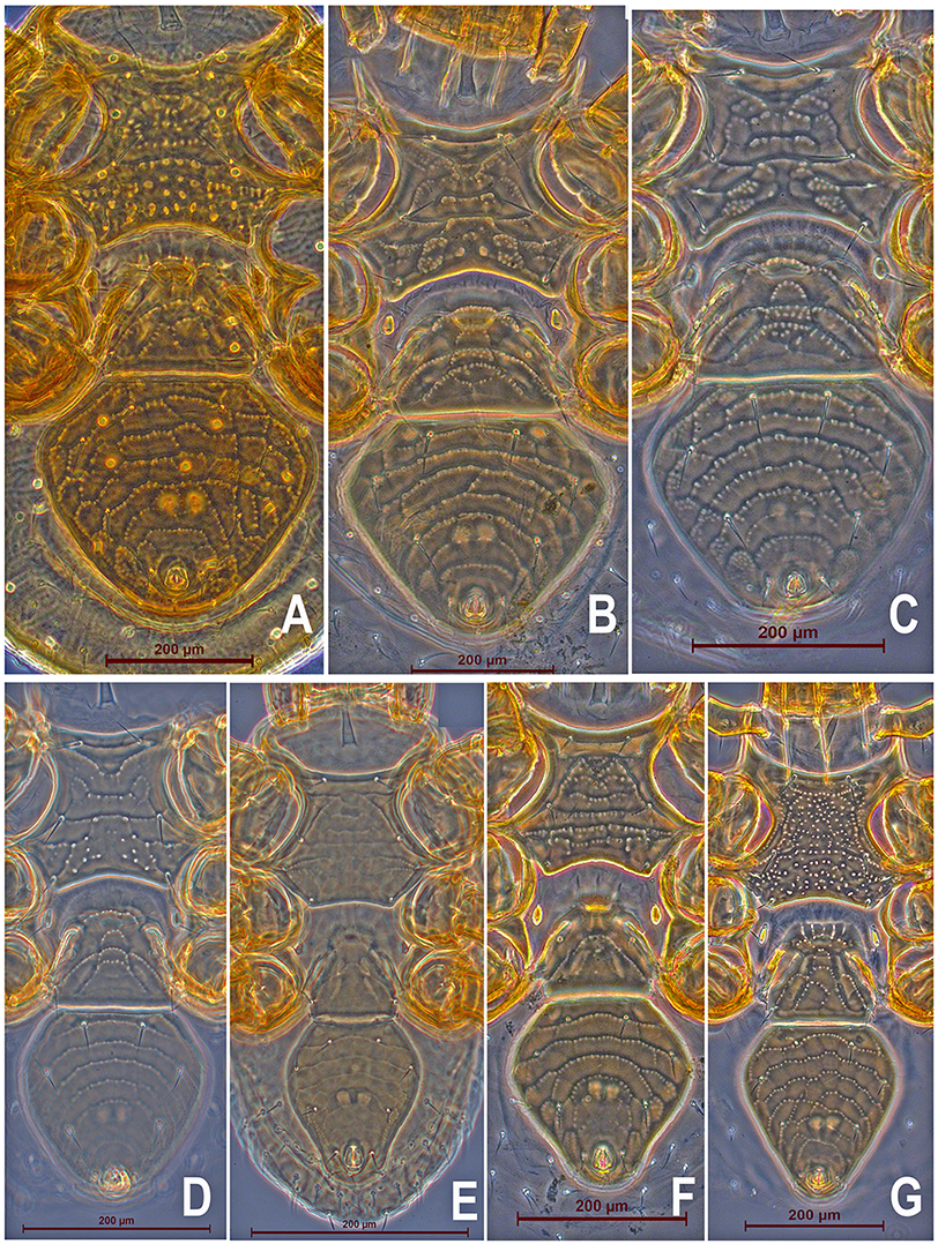


Figure 13. Ventral views of females of the species of *Macrocheles* from Kelkit Valley: **A.** *M. muscaedomesticae*; **B.** *M. glaber*; **C.** *M. perglaber*; **D.** *M. scutatus*; **E.** *M. merdarius*; **F.** *M. subbadius*; **G.** *M. robustulus*.

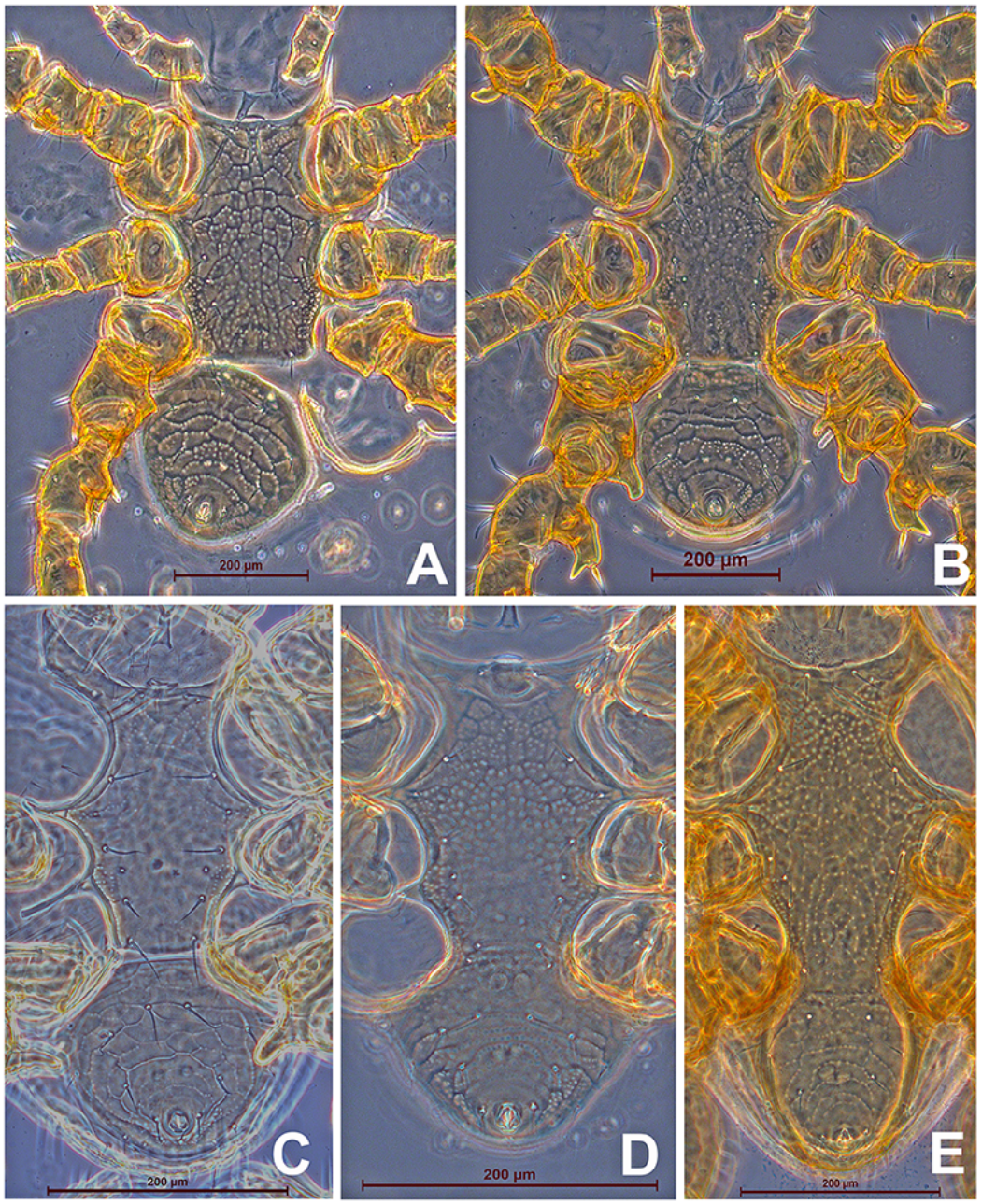


Figure 14. Ventral views to males of the species of *Macrocheles* from Kelkit Valley: **A.** *M. glaber*; **B.** *M. perglaber*; **C.** *M. scutatus*; **D.** *M. subbadius*; **E.** *M. robustulus*.

Key to the females of the species of the genus *Macrocheles* known from Turkey

1 All setae on dorsal shield smooth and needle-like, *J5* may be slightly pilose.....2
- Some dorsal setae pilose.....3
2 Genu IV with 7 setae.....*M. subbadius*
- Genu IV with 6 setae.....*M. merdarius*
3 Sternal shield without sculptural lines.....*M. robustulus*
- Sternal shield with sculptural lines.....4
4 Dorsal setae mostly pilose, except for *j5*, *j6*, *z5*, *z6*, and *J2* .....*M. muscaedomesticae*
- Dorsal setae mostly smooth and needle-like.....5
5 Sternal shield without distinct ornamentation, only linea media transversa distinctly sculptured.....*M. vernalis*
- Sternal shield with ornamentations, and all lines distinctly sculptured.....6

6 Sternal shield with weakly sculpture lines, having well developed punctures, linea arcuata long and strongly concave.....*M. scutatus*
- Sternal shield with strongly sculptured lines, having micropunctate, linea arcuata short, straight, and lightly concave.....7
7 Dorsal setae *j5* smooth and needle-like, sternal shield with 1 linea arcuata.....*M. glaber*
- Dorsal setae *j5* pilose, sternal shield with 2 linea arcuat ae.....*M. perglaber*

Key to the males of the species of the genus *Macrocheles* known from Turkey

1 Sternogenital and ventrianal shields fused to each other 2
- Sternal and ventrianal shield not fused…….....3
2 Dorsal shield bearing 28 pairs of setae and with posteriorly 3 pairs of distinct outgrowths...*M. subbadius*
- Dorsal shield bearing 30 pairs of setae and without outgrowths..... *M. robustulus*
3 Dorsal setae *s5* smooth and needle-like; anterolateral margins of ventrianal shield slightly concave....*M. scutatus*
- Dorsal setae *s5* pilose; anterolateral margins of ventrianal shield convex.....4
4 Most of dorsal setae smooth and needle-like...*M. glaber*
- Most of dorsal setae pilose.....*M. perglaber*

Acknowledgements

We are very grateful to Bruce Halliday (Australia) for his help with references, and to the anonymous reviewers for valuable corrections to the manuscript. This work was produced mainly from the material from the work supported by Scientific Research Project (BAP) Number 11BAP18 (Scientific Research Department of Erzincan University) and project number 107T183 of TÜBİTAK (Scientific and Technological Research Council of Turkey). This study was a part of the first author's PhD thesis, and some species were presented in a short summary at the 21st National Biology Congress in İzmir, Turkey (3–7 September 2012), and at the 1st National Zoology Congress in Nevşehir, Turkey (28–31 August 2013).

References

Bayram Ş, Çobanoğlu S (2005). Mesostigmata (Acari) of bulbaceous ornamental plants in Turkey. Acarologia 45: 257–265.

Bregetova NG, Koroleva EV (1960). The macrochelid mites (Gamasoidea, Macrochelidae) in the USSR. Parazit Sbornik 19: 32–154.

Çiçek H, Stanyukovich M, Yağcı S, Aktaş M, Karaer Z (2008). Gamasine mite (Parasitiformes: Mesostigmata) infestations of small mammals (Mammalia: Rodentia, Insectivora) in Turkey. Türkiye Parazitol Derg 32: 65–70.

Çobanoğlu S, Kırgız T (2001). Observations on the phoretic mites (Acari) associated with Scarabaeidae (Col.) in Turkey. Entomol Mon Mag 137: 85–90.

Emberson RM (2010). A reappraisal of some basal lineages of the family Macrochelidae, with the description of a new genus. Zootaxa 2501: 37–53.

Filipponi A, Pegazzano F (1962). Specie Italiana del gruppo-*glaber* (Acarina, Mesostigmata, Macrochelidae, Macrocheles). Redia 47: 211–238 (in Italian).

Göksu M, Güler S (1968). Yurdumuzda ilk defa müşahede edilen bir *Macrocheles muscaedomesticae* Scopoli, 1772 (Acarina: Mesostigmata) olayı. Ankara, Turkey: A.Ü. Veteriner Fakültesi Protozooloji, Tıbbi Artropodoloji ve Paraziter Hastalıklarla Savaş Kürsüsü (in Turkish).

Halliday RB (1986a). On the systems of notation used for the dorsal setae in the family Macrochelidae (Acarina). Internat J Acarol 12: 27–35.

Halliday RB (1986b). Mites of the *Macrocheles glaber* group in Australia (Acarina: Macrochelidae). Aust J Zool 24: 733–752.

Halliday RB (1987). Further observations on the dorsal idiosomal chaetotaxy in the Macrochelidae (Acarina). Int J Acarol 13: 51–53.

Halliday RB (2000). The Australian species of *Macrocheles* (Acarina: Macrochelidae). Invertebr Taxon 14: 273–26.

Hyatt KH, Emberson RM (1988). A review of the Macrochelidae (Acari: Mesostigmata) of the British Isles. Bull Brit Mus (Nat Hist) Zool 54: 63–125.

Karaer F, Kılınç M (2001). The flora of Kelkit Valley. Turk J Bot 25: 195–237.

Kılıç T, Çobanoğlu S, Yoldaş Z, Madanlar N (2012). İzmir ilinde taze soğan tarlalarında bulunan akar (Acari) türleri. Türk Entomol Derg 36: 401–411 (in Turkish).

Lindquist EE, Evans GO (1965). Taxonomic concepts in the Ascidae, with a modified setal nomenclature for the idiosoma of the Gamasina (Acarina: Mesostigmata). Mem Entomol Soc Can 47: 1–64.

Mašán P (2003). Macrochelid Mites of Slovakia (Acari, Mesostigmata, Macrochelidae). Bratislava, Slovakia: Institute of Zoology, Slovak Academy of Sciences.

Özbek HH, Bal DA (2012). Kelkit Vadisi'nden Türkiye faunası için yeni iki makrokelid türü (Acari: Mesostigmata: Macrochelidae). EUFBED 5: 247–261 (in Turkish).

Özbek HH, Bal DA (2013). Three new species of the genus *Nothrholaspis* (Acari: Macrochelidae) from the Kelkit Valley, Turkey. Zootaxa 3635: 40–50.

Özbek HH, Bal DA (2014). New species of the genus *Geholaspis* Berlese, 1918 (Acari: Mesostigmata: Macrochelidae) for Turkish fauna from Kelkit Valley. Mun Ent Zool 9: 468–472.

Özbek HH, Bal DA, Doğan S (2013). Two new species of the genus *Longicheles* Valle, 1953 from the Kelkit Valley, Turkey, with redescription *Longicheles lagrecai* (Valle, 1963) (Acari: Macrochelidae). Zootaxa 3709: 461–472.

Özbek HH, Bal DA, Doğan S (2015). The genus *Glyptholaspis* Filipponi and Pegazzano (Acari: Macrochelidae) of Kelkit Valley (Turkey), with first description of male of the species *G. saprophila* Mašán. Turk J Zool 39: 119–125.

Walter DE, Krantz GW (1986). A review of the *glaber*-group, (s. str.) species of the genus *Macrocheles* (Acari: Macrochelidae), and a discussion of species complexes. Acarologia 27: 277–294.