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Raphignathoid mites (Acariformes: Raphignathoidea) in parts of the Azerbaijan provinces of Iran

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ABSTRACT: While performing a faunistic study on the superfamily Raphignathoidea of northwestern Iran, north parts of east Azerbaijan and southwest parts of west Azerbaijan provinces during 2016-2018, a total number of 40 species in 13 genera belonging to the superfamily were collected and identified. Among them, four species: *Stigmaeus luxtoni* Wood, 1981; *Ledermuelleriopsis sezeki* Doğan, 2004; *Eustigmaeus gulingensis* Hu and Chen, 1996 and *Molothrognathus kamili* Doğan, 2003 have been recorded for the first time from Iran.

Keywords: Acari, fauna, predatory, new record, Azerbaijan, northwestern Iran.

Zoobank: <http://zoobank.org/57B66053-9AD1-4C78-ADA6-83AC029A284A>

INTRODUCTION

The predatory mites of the superfamily Raphignathoidea Kramer, 1877 (Acari: Trombidiformes: Prostigmata) are mostly known as biological control agents of small invertebrates such as eriophyid, spider and false spider mites and some small insects. Also, some species of these mites are probably the second most important species of plant mite predators after Phytoseiidae especially when the densities of phytoseiid mites are low (Gerson et al., 2003; Fan and Zhang, 2005; Fan and Flechtman, 2015).

Currently, raphignathoid mites include about 1087 species of 69 genera in 12 families (Beron, 2020). Until now, seven families, 23 genera and 222 species of this group of mites have been described and reported from Iran, namely: Barbutiidae Robaux (one genus, four species); Caligonellidae Grandjean (five genera, 26 species); Camerobiidae Southcott (two genera, 23 species); Cryptognathidae Oudemans (two genera, 19 species); Eupalopsellidae Willmann (one genus, seven species); Raphignathidae Kramer (one genus, 29 species); Stigmaeidae Oudemans (11 genera, 114 species) (Bagheri and Mohammad-Doustaresharaf, 2020; Mohammad-Doustaresharaf and Bagheri, 2021; Pishehvar and Khanjani, 2021; Rostami and Mohammad-Doustaresharaf, 2021).

In this study, a total number of 40 species in 13 genera within the superfamily Raphignathoidea have been collected; four of them: *Stigmaeus luxtoni* Wood, 1981; *Ledermuelleriopsis sezeki* Doğan, 2004; *Eustigmaeus gulingensis* Hu and Chen, 1996 and *Molothrognathus kamili* Doğan, 2003 are new records for the Iranian fauna.

MATERIALS AND METHODS

Sampling procedure

Many samples collected during 2016-2018, from various habitats such as soil and litter, rotten wood, the aerial

parts of the crops, orchards and weeds of different regions of studied area. Mite specimens were extracted using Berlese-Tullgren funnel, preserved in 70% ethanol, cleared in Nesbitt's fluid/lactophenol solution, mounted in Hoyer's medium and studied using BX41 light microscope with phase-contrast device. All examined materials are deposited in the Acarology Laboratory, Plant Protection Department, Agricultural Faculty, University of Maragheh, Iran (UMI).

Study area

The study area is located in north-western Iran and including two provinces: East Azerbaijan and West Azerbaijan. Sampling were taken from different localities in two counties of north parts of East Azerbaijan namely Jolfa and Khoda Afarin and five counties of southwestern parts of West Azerbaijan namely Urmia, Sardasht, Piranshahr, Mahabad, Oshnaviyeh. The locations of the sampled cities are shown in Figure 1.

RESULTS and DISCUSSION

Superfamily Raphignathoidea
Family Caligonellidae Grandjean, 1944
Genus *Caligonella* Berlese, 1910

Caligonella haddadi Bagheri and Maleki, 2013

This species was originally described from leaf litter under walnut (*Juglans* sp.) from Iran (Bagheri et al., 2013b). It was also recorded from Turkey (Yamaç, 2019; Doğan and Doğan, 2020c).

Material examined: Two females, soil and litter, Khoda Afarin (Kalaleh) (38° 56' 42" N, 46° 45' 43" E, 1380 m), 27 August 2018; four females, soil and litter, Khoda Afarin (Abbas Abad) (37° 55' 46" N, 46° 47' 88" E, 1310 m), 4 July 2017; two females, soil, Urmia (Qare Aqaj) (37° 27' 53" N, 45° 09' 19" E, 1302 m), 24 July 2018; coll. M. Mohammad-Doustaresharaf.

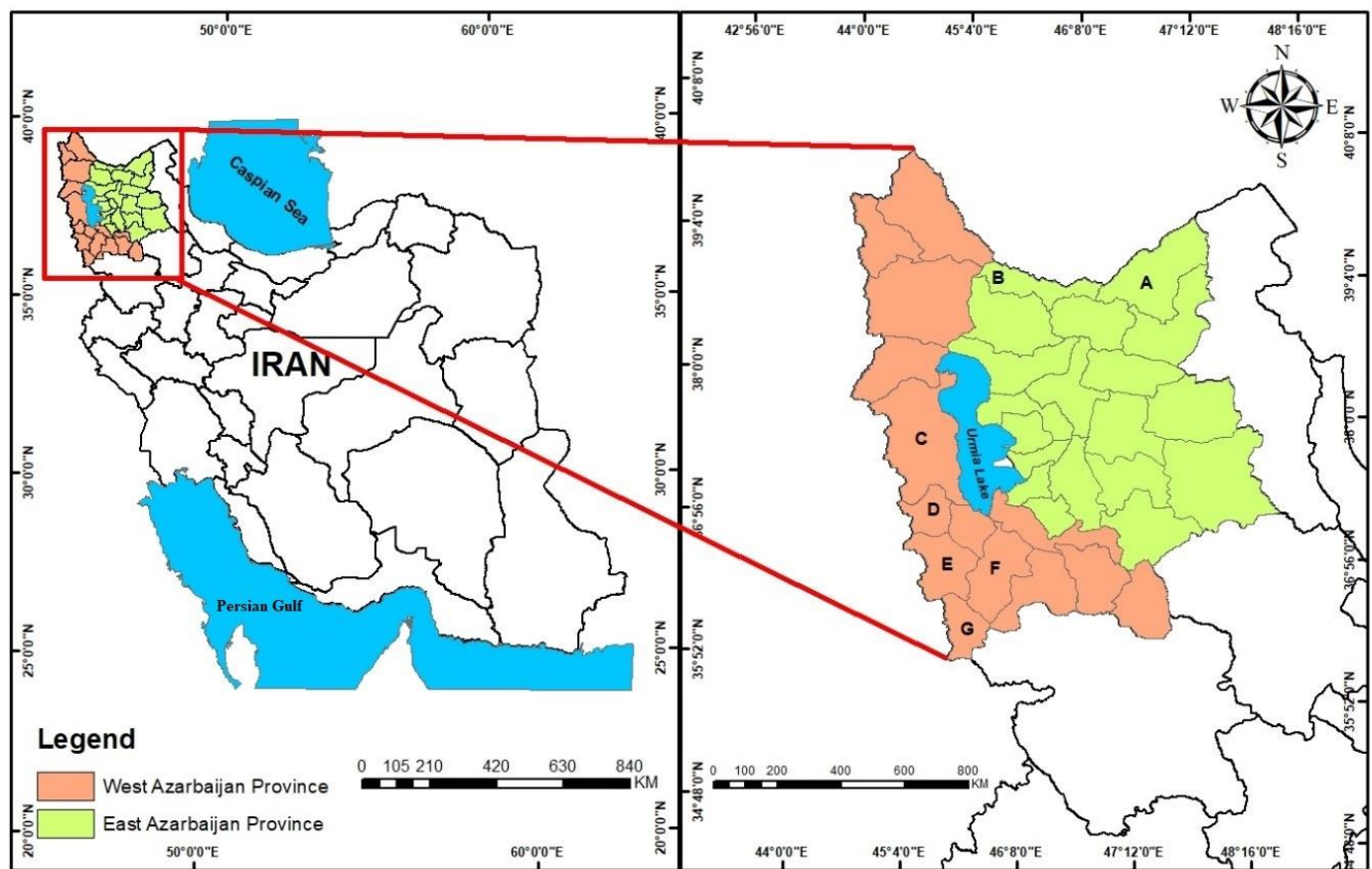


Figure 1. The location of the sampled cities. A: Jolfa, B: Khoda Afarin, C: Urmia, D: Oshnaviyeh, E: Piranshahr, F: Mahabad, G: Sardasht.

***Caligonella humilis* (Koch, 1838)**

This species is widely distributed in 14 countries and originally described from Germany (Beron, 2020). It was also previously recorded from different part of Iran (Beyzavi et al., 2013).

Material examined: Two females, soil and litter under pear tree (*Pyrus* sp.), Urmia (Marmisho) (37° 59' 97" N, 45° 04' 67" E, 1297 m), 7 September 2017; six females, soil under apple trees (*Malus* sp.), Urmia (Balanej) (37° 24' 35" N, 45° 09' 11" E, 1312 m), 17 September 2018; four females, soil under oak tree (*Quercus* sp.), Mahabad (Kavelan) (36° 23' 34" N, 45° 39' 59" E, 1631 m), 19 September 2017; coll. M. Mohammad-Doustaresharaf.

Genus *Molothrognathus* Summers and Schlinger, 1955

***Molothrognathus bahariensis* Ueckermann and Khanjani, 2003**

This species was originally described from Iran where it was found from different habitats (Ueckermann and Khanjani, 2003). Recently it was also recorded from Turkey (Doğan and Doğan, 2020a).

Material examined: Two females, soil, Jolfa (Asiyab Kharabeh) (38° 51' 25" N, 45° 51' 21" E, 1743 m), 17 July 2018; four females, soil and litter, Khoda Afarin (Kalaleh) (38° 56' 42" N, 46° 45' 43" E, 1380 m), 27 August 2018; one female, soil under apple trees (*Malus* sp.), Urmia (Balanej) (37° 24' 35" N, 45° 09' 11" E, 1312 m), 17 Septem-

ber 2018; five females, soil, Urmia (Ali Beygloo) (37° 74' 09" N, 45° 07' 90" E, 1324 m), 11 August 2017; coll. M. Mohammad-Doustaresharaf.

***Molothrognathus kamili* Doğan, 2003**

This species was originally described from soil under *Astragalus* sp. from Turkey (Doğan, 2003b).

This is a new record for the Iranian fauna.

Material examined: Four females, soil, Urmia (Shalmakan) (37° 27' 34" N, 44° 59' 59" E, 1800 m), 16 August 2018; two females, soil, Urmia (Dalamber) (37° 10' 41" N, 44° 53' 37" E, 1890 m), 4 August 2016; coll. M. Mohammad-Doustaresharaf.

***Molothrognathus mehrnejadi* Liang and Zhang, 1997**

This species is currently known only from Iran where it was found in pistachio (*Pistacia* sp.) collar soil and bark stem (Liang and Zhang, 1997).

Material examined: Seven females, soil and litter, Khoda Afarin (Abbas Abad) (37° 55' 46" N, 46° 47' 88" E, 1310 m), 4 July 2017; two females, soil under oak tree (*Quercus* sp.), Sardasht (Alvatan) (36° 24' 22" N, 45° 21' 23" E, 1526 m), 30 September 2016; five females, soil under oak tree (*Quercus* sp.), Piranshahr (Mirabad) (36° 26' 08" N, 45° 21' 07" E, 1294 m), 1 October 2016; coll. M. Mohammad-Doustaresharaf.

Genus *Neognathus* Willmann, 1952

Neognathus terrestris (Summers and Schlinger, 1955)

This species was described from California, USA (Summers and Schlinger, 1955). It was also recorded from Canada, Crimea, Hungary, Turkey and Iran (Beron, 2020).

Material examined: Four females, soil, Urmia (Marmisho) (37° 59' 97" N, 45° 04' 67" E, 1297 m), 7 September 2017; one female, soil, Urmia (Dalamper) (37° 10' 41" N, 44° 53' 37" E, 1890 m), 4 August 2016; two females, soil, Urmia (Dolama) (37° 21' 23" N, 45° 14' 51" E, 1293 m), 16 August 2018; coll. M. Mohammad-Doustaresharaf.

Neognathus ueckermanni Bagheri, Doğan and Haddad, 2010

This species was originally described from soil under *Medicago sativa* L. from Iran (Bagheri et al., 2010a). Recently it was recorded from Turkey (Doğan, 2019).

Material examined: Two females, soil under azarole tree (*Crataegus azarolus*), Piranshahr (Mirabad) (36° 26' 08" N, 45° 21' 07" E, 1294 m), 1 October 2016; three females, soil and litter under pear tree (*Pyrus* sp.), Urmia (Marmisho) (37° 59' 97" N, 45° 04' 67" E, 1297 m), 7 September 2017; four females, soil under oak tree (*Quercus* sp.), Oshnaviyeh (Miraveh) (36° 58' 48" N, 45° 01' 30" E, 1694 m), 1 July 2017; coll. M. Mohammad-Doustaresharaf.

Family Cryptognathidae Oudemans, 1902

Genus *Cryptognathus* Kramer, 1879

Cryptognathus lagena Kramer, 1879

This species is widely distributed and originally described from Germany (Beron, 2020). It was also previously recorded from Iran (Khanjani et al., 2014).

Material examined: Six females, soil and litter, Khoda Afarin (Kalaleh) (38° 56' 42" N, 46° 45' 43" E, 1380 m), 27 August 2018; one female, soil, Khoda Afarin (Aynaloo) (38° 53' 03" N, 46° 47' 38" E, 1700 m), 18 July 2018; two females, soil, Khoda Afarin (Garmanab) (38° 54' 26" N, 46° 47' 19" E, 1520 m), 4 October 2017; coll. M. Mohammad-Doustaresharaf.

Genus *Favognathus* Luxton, 1973

Favognathus kamili Dönel and Doğan, 2011

This species was originally described from Turkey (Dönel and Doğan, 2011; Doğan, 2019) and it was also recorded from Iran (Bagheri et al., 2015; Doğan and Doğan, 2020b).

Material examined: Two females, soil under oak tree (*Quercus* sp.), Sardasht (Alvatan) (36° 24' 22" N, 45° 21' 23" E, 1526 m), 30 September 2016; two females, soil, Jolfa (Asiyab Kharabeh) (38° 51' 25" N, 45° 51' 21" E, 1743 m), 17 July 2018; two females, soil under apple trees (*Malus* sp.), Urmia (Marmisho) (37° 59' 97" N, 45° 04' 67" E, 1297 m), 7 September 2017; coll. M. Mohammad-Doustaresharaf.

Favognathus mirazii Khanjani and Ueckermann, 2008

This species is currently known only from Iran where it was found from soil under pear tree (*Pyrus* sp.) (Khanjani and Ueckermann, 2008b).

Material examined: One female, soil under apple trees (*Malus* sp.), Urmia (Gasemloo valley) (37° 17' 58" N, 45° 07' 16" E, 1750 m), 5 July 2017; three females, soil, Urmia (Qare Aqaj) (37° 27' 53" N, 45° 09' 19" E, 1302 m), 24 July 2018; two females, soil, Urmia (Qare Aqaj) (37° 27' 53" N, 45° 09' 19" E, 1302 m), 25 July 2018; coll. M. Mohammad-Doustaresharaf.

Family Eupalopsellidae Willmann, 1952

Genus *Eupalopsellus* Sellnick, 1949

Eupalopsellus deformatus Fan, 2004

This species was originally described from leaves of an unidentified grass, China (Fan, 2004). It was also recorded from Turkey and Iran (Bagheri et al., 2014; Doğan, 2019).

Material examined: One female, soil, Urmia (Qare Aqaj) (37° 27' 53" N, 45° 09' 19" E, 1302 m), 24 July 2018; coll. M. Mohammad-Doustaresharaf.

Eupalopsellus prasadi Bagheri and Khanjani, 2009

This species was described from soil under apple trees (*Malus* sp.) from Iran (Bagheri and Khanjani, 2009). It was also recorded from Turkey (Kasap et al., 2013).

Material examined: Two deutonymphs, Hornbeam tree foliage, Khoda Afarin (Kalaleh) (38° 56' 42" N, 46° 45' 43" E, 1380 m), 18 July 2017; one female, raspberry foliage (*Rubus* sp.), Khoda Afarin (Kalaleh) (38° 56' 42" N, 46° 45' 43" E, 1380 m), 2 September 2017; one female, rose hip foliage (*Rosa* sp.), Urmia (Marmisho) (37° 59' 97" N, 45° 04' 67" E, 1297 m), 7 September 2017; coll. M. Mohammad-Doustaresharaf.

Family Raphignathidae Kramer, 1877

Genus *Raphignathus* Dugés, 1834

Raphignathus azarshahriensis Ahaniazad and Bagheri, 2012

This species is currently known only from Iran where it was found from soil of black cherry (*Prunus* sp.), walnut (*Juglans* sp.) and almond orchards (Ahaniazad et al., 2012).

Material examined: Three females, soil under *Astragalus* sp., Urmia (Dalamper) (37° 10' 41" N, 44° 53' 37" E, 1890 m), 8 July 2018; seven females, soil under pear tree (*Pyrus* sp.), Urmia (Marmisho) (37° 59' 97" N, 45° 04' 67" E, 1297 m), 7 September 2017; coll. M. Mohammad-Doustaresharaf.

***Raphignathus giselae* Meyer and Ueckermann, 1989**

This species was originally described from Zimbabwe (Meyer and Ueckermann, 1989). It was also recorded from South Africa, Turkey, Yemen and Iran (Beron, 2020).

Material examined: Twelve females, soil under oak tree (*Quercus* sp.), Sardasht (Alvatan) (36° 24' 22" N, 45° 21' 23" E, 1526 m), 30 September 2016; three females, soil under azarole tree (*Crataegus azarolus*), Piranshahr (Mirabad) (36° 26' 08" N, 45° 21' 07" E, 1294 m), 1 October 2016; coll. M. Mohammad-Doustaresharaf.

***Raphignathus gracilis* (Rack, 1962)**

This species is widely distributed in 17 countries and originally described from Germany (Rack, 1962; Beron, 2020). It was also previously recorded from different part of Iran (Beyzavi et al., 2013; Mohammad-Doustaresharaf and Bagheri, 2018).

Material examined: Three females, soil, Khoda Afarin (Vaygan) (38° 55' 07" N, 46° 46' 58" E, 1350 m), 14 July 2016; four females, soil under oak tree (*Quercus* sp.), Oshnaviyeh (Miraveh) (36° 58' 48" N, 45° 01' 30" E, 1694 m), 1 July 2017; coll. M. Mohammad-Doustaresharaf.

***Raphignathus hecmatanaensis* Khanjani and Ueckermann, 2003**

This species originally was described from grass from Iran (Khanjani and Ueckermann, 2003). It was also recorded from different part of Turkey (Doğan, 2019).

Material examined: Five females, soil and litter, Khoda Afarin (Kalaleh) (38° 56' 42" N, 46° 45' 43" E, 1380 m), 27 August 2018; five females, soil, Khoda Afarin (Aynaloo) (38° 53' 03" N, 46° 47' 38" E, 1700 m), 18 July 2018; four females, soil, Khoda Afarin (Garmanab) (38° 54' 26" N, 46° 47' 19" E, 1520 m), 4 October 2017; coll. M. Mohammad-Doustaresharaf.

***Raphignathus khorramabadensis* Bagheri, 2013**

This species was originally described from soil from Iran (Bagheri et al., 2013a). It was also recorded from Turkey (Uluçay et al., 2016).

Material examined: Four females, soil, Khoda Afarin (Garmanab) (38° 54' 26" N, 46° 47' 19" E, 1520 m), 4 October 2017; 12 females, soil and litter, Khoda Afarin (Kalaleh) (38° 56' 42" N, 46° 45' 43" E, 1380 m), 27 August 2018; four females, soil and litter, Khoda Afarin (Kalaleh) (38° 56' 42" N, 46° 45' 43" E, 1380 m), 4 August 2018; coll. M. Mohammad-Doustaresharaf.

***Raphignathus orientalis* Fan and Li, 1993**

This species was originally described from China (Fan and Li, 1993). It was also recorded from Iran (Mohammad-Doustaresharaf and Bagheri, 2018).

Material examined: Two females, soil, Khoda Afarin (Kalaleh) (38° 56' 42" N, 46° 45' 43" E, 1380 m), 27 August 2018; coll. M. Mohammad-Doustaresharaf.

***Raphignathus zhaoi* Hu, Jing and Liang, 1995**

This species originally was described from China (Hu et al., 1995). It was also recorded from different part of Turkey and Iran (Beyzavi et al., 2013; Doğan, 2019).

Material examined: Three females, soil and litter, Khoda Afarin (Kalaleh) (38° 56' 42" N, 46° 45' 43" E, 1380 m), 27 August 2018; two females, soil, Urmia (Ali Beygloo) (37° 74' 09" N, 45° 07' 90" E, 1324 m), 11 August 2017; one female, soil, Urmia (Dolama) (37° 21' 23" N, 45° 14' 51" E, 1293 m), 16 August 2018; coll. M. Mohammad-Doustaresharaf.

Family Stigmaeidae Oudemans, 1931

Genus *Eustigmaeus* Berlese, 1910

***Eustigmaeus anauniensis* (Canestrini, 1889)**

This species is widely distributed in 20 countries and originally described from Italy (Fan et al., 2016; Beron, 2020). It was also previously recorded from different part of Iran (Beyzavi et al., 2013).

Material examined: Five females, soil and litter, Khoda Afarin (Abbas Abad) (37° 55' 46" N, 46° 47' 88" E, 1310 m), 4 July 2017; three females, soil, Khoda Afarin (Vaygan) (38° 55' 07" N, 46° 46' 58" E, 1350 m), 14 July 2016; two females and one male, soil and litter, Khoda Afarin (Kalaleh) (38° 56' 42" N, 46° 45' 43" E, 1380 m), 27 August 2018; four females, soil and litter, Khoda Afarin (Kalaleh) (38° 56' 42" N, 46° 45' 43" E, 1380 m), 29 August 2018; coll. M. Mohammad-Doustaresharaf.

***Eustigmaeus gulingensis* Hu and Chen, 1996**

This species is currently known only from China where it was found from soil (Hu et al., 1996).

This is a new record for the fauna of Iran.

Material examined: Two females and one deutonymph, soil under *Astragalus* sp., Urmia (Dalamper) (37° 10' 41" N, 44° 53' 37" E, 1890 m), 8 July 2018; One female, soil, Urmia (Dalamper) (37° 10' 41" N, 44° 53' 37" E, 1890 m), 4 August 2018; coll. M. Mohammad-Doustaresharaf.

***Eustigmaeus pinnatus* (Kuznetsov, 1977)**

This species was originally described from soil from Russia (Kuznetsov, 1977). It was also recorded from Crimea, Greece, Hungary, Moldavia, Russia, Poland, Slovakia, Turkey, Ukraine and Iran (Fan et al., 2016; Beron, 2020).

Material examined: One female, soil, Khoda Afarin (Vaygan) (38° 55' 07" N, 46° 46' 58" E, 1350 m), 14 July 2016; two females, soil, Urmia (Qare Aqaj) (37° 27' 53" N, 45° 09' 19" E, 1302 m), 24 July 2018; one female, soil under azarole tree (*Crataegus azarolus*), Oshnaviyeh (Miraveh) (36° 58' 48" N, 45° 01' 30" E, 1694 m), 1 July 2017; two females, soil under apple trees (*Malus* sp.), Urmia (Balanej) (37° 24' 35" N, 45° 09' 11" E, 1312 m), 17 September 2018; coll. M. Mohammad-Doustaresharaf.

***Eustigmaeus plumifer* (Halbert, 1923)**

This species was originally described from Ireland under a stone (Halbert, 1923). It was also recorded from Austria, Denmark, Greece, Ireland, Russia, Slovakia, Spain, USA and Iran (Fan et al., 2016; Beron, 2020).

Material examined: Four females, soil, Urmia (Dalamper) (37° 10' 41" N, 44° 53' 37" E, 1890 m), 4 August 2018; four females, rotten woods, Sardasht (Alvatan) (36° 24' 22" N, 45° 21' 23" E, 1526 m), 30 September 2016; two females, soil, Urmia (Shalmakan) (37° 27' 34" N, 44° 59' 59" E, 1800 m), 16 August 2018; coll. M. Mohammad-Doustaresharaf.

***Eustigmaeus segnis* (Koch, 1836)**

Cosmopolitan species. This species is widely distributed in 21 countries and originally described from moss from Germany (Fan et al., 2016; Beron, 2020).

Material examined: 15 females, four deutonymphs and two males soil and litter, Khoda Afarin (Kalaleh) (38° 56' 42" N, 46° 45' 43" E, 1380 m), 27 August 2018; three females, soil, Khoda Afarin (Aynaloo) (38° 53' 03" N, 46° 47' 38" E, 1700 m), 18 July 2018; 12 females and two deutonymphs, soil, Khoda Afarin (Garmanab) (38° 54' 26" N, 46° 47' 19" E, 1520 m), 4 October 2017; six females, soil and litter, Khoda Afarin (Abbas Abad) (37° 55' 46" N, 46° 47' 88" E, 1310 m), 4 July 2017; four females, soil, Urmia (Qare Aqaj) (37° 27' 53" N, 45° 09' 19" E, 1302 m), 24 July 2018; one female, soil under oak tree (*Quercus* sp.), Sardasht (Alvatan) (36° 24' 22" N, 45° 21' 23" E, 1526 m), 30 September 2016; one female, soil under azarole tree (*Crataegus azarolus*), Piranshahr (Mirabad) (36° 26' 08" N, 45° 21' 07" E, 1294 m), 1 October 2016; two females, soil and litter under pear tree (*Pyrus* sp.), Urmia (Marmisho) (37° 59' 97" N, 45° 04' 67" E, 1297 m), 7 September 2017; two females, soil under oak tree (*Quercus* sp.), Oshnaviyeh (Miraveh) (36° 58' 48" N, 45° 01' 30" E, 1694 m), 1 July 2017; five females, three deutonymphs and one larva, soil under *Astragalus* sp., Urmia (Dalamper) (37° 10' 41" N, 44° 53' 37" E, 1890 m), 8 July 2018; two females, soil, Jolfa (Asiyab Kharabeh) (38° 51' 25" N, 45° 51' 21" E, 1743 m), 17 July 2018; coll. M. Mohammad-Doustaresharaf.

***Eustigmaeus setiferus* Bagheri, Saber, Ueckermann, Ghorbani and Navaei-Bonab, 2011**

This species is currently known only from Iran where it was found from soil in apple trees (*Malus* sp.) orchard (Bagheri et al., 2011b).

Material examined: One female, litter, Khoda Afarin (Kalaleh) (38° 56' 42" N, 46° 45' 43" E, 1380 m), 27 August 2018; four females, soil under oak tree (*Quercus* sp.), Oshnaviyeh (Miraveh) (36° 58' 48" N, 45° 01' 30" E, 1694 m), 1 July 2017; six females, soil under apple trees (*Malus* sp.), Urmia (Balanej) (37° 24' 35" N, 45° 09' 11" E, 1312 m), 17 September 2018; one female, soil under *Astragalus* sp., Urmia (Soladokal) (37° 10' 27" N, 44° 51' 51" E, 2035 m), 5 August 2018; coll. M. Mohammad-Doustaresharaf.

***Eustigmaeus ueckermanni* Bagheri and Beyzavi, 2013**

This species is currently known only from Iran where it was found from humus under oak trees (*Quercus brantii*) (Bagheri and Beyzavi, 2013).

Material examined: Four females, soil and litter under oak tree (*Quercus* sp.), Mahabad (Kavelan) (36° 23' 34" N, 45° 39' 59" E, 1631 m), 19 September 2017; one female, rotten wood, Urmia (Marmisho) (37° 59' 97" N, 45° 04' 67" E, 1297 m), 7 September 2017; coll. M. Mohammad-Doustaresharaf.

Genus *Ledermuelleriopsis* Willmann, 1953

***Ledermuelleriopsis sezeeki* Doğan, 2004**

This species is currently known only from Turkey where it was found from decayed stump and ant (Formicidae) nest (Doğan, 2004).

This is a new record for the Iranian fauna.

Material examined: Two females, soil under oak tree (*Quercus* sp.), Oshnaviyeh (Miraveh) (36° 58' 48" N, 45° 01' 30" E, 1694 m), 1 July 2017; coll. M. Mohammad-Doustaresharaf.

***Ledermuelleriopsis zahiri* Khanjani and Ueckermann, 2002**

This species was originally described from soil under *Pyrus communis* from Iran and currently known only from different part of Iran (Khanjani and Ueckermann, 2002; Fan et al., 2016).

Material examined: Three females, soil, Khoda Afarin (Garmanab) (38° 54' 26" N, 46° 47' 19" E, 1520 m), 4 October 2017; 11 females, soil and litter, Khoda Afarin (Kalaleh) (38° 56' 42" N, 46° 45' 43" E, 1380 m), 27 August 2018; seven females and two deutonymphs, soil and litter, Khoda Afarin (Abbas Abad) (37° 55' 46" N, 46° 47' 88" E, 1310 m), 4 July 2017; four females, soil, Urmia (Qare Aqaj) (37° 27' 53" N, 45° 09' 19" E, 1302 m), 24 July 2018; two females, soil and litter under oak tree (*Quercus* sp.), Piranshahr (KhidirAabad) (36° 26' 08" N, 45° 21' 07" E, 1294 m), 31 July 2017; three females and two males, soil under azarole tree (*Crataegus azarolus*), Piranshahr (Mirabad) (36° 26' 08" N, 45° 21' 07" E, 1294 m), 1 October 2016; five females, soil under pear tree (*Pyrus* sp.), Urmia (Marmisho) (37° 59' 97" N, 45° 04' 67" E, 1297 m), 7 September 2017; two females and one deutonymph, soil, Jolfa (Asiyab Kharabeh) (38° 51' 25" N, 45° 51' 21" E, 1743 m), 17 July 2018; coll. M. Mohammad-Doustaresharaf.

Genus *Prostigmaeus* Kuznetsov, 1984

***Prostigmaeus khanjanii* Bagheri and Ghorbani, 2010**

This species was originally described from soil from Iran (Bagheri et al., 2010b). Recently it was also recorded from Turkey (Akyol, 2021).

Material examined: Two females and one male, soil and litter, Khoda Afarin (Abbas Abad) (37° 55' 46" N, 46° 47' 88" E, 1310 m), 4 July 2017; three females, soil, Khoda Afarin (Vaygan) (38° 55' 07" N, 46° 46' 58" E, 1350 m), 14 July 2016; coll. M. Mohammad-Doustaresharaf.

Genus *Stigmaeus* Koch, 1836

***Stigmaeus angustus* Dönel and Doğan, 2011**

This species was described from grassy soil from Turkey (Dönel and Doğan, 2011). It was also recorded from Iran (Bagheri and Mohammad-Doustaresharaf, 2020).

Material examined: Five females and three deutonymphs, soil, Urmia (Qare Aqaj) (37° 27' 53" N, 45° 09' 19" E, 1302 m), 24 July 2018; seven females and two males, soil, Urmia (Qare Aqaj) (37° 27' 53" N, 45° 09' 19" E, 1302 m), 12 September 2017; six females, soil, Urmia (Balanej) (37° 24' 35" N, 45° 09' 11" E, 1312 m), 17 September 2018; one female, and one deutonymph soil, Urmia (Dolama) (37° 21' 23" N, 45° 14' 51" E, 1293 m), 16 August 2018; two females, soil and litter under pear tree (*Pyrus* sp.), Urmia (Marmisho) (37° 59' 97" N, 45° 04' 67" E, 1297 m), 7 September 2017; coll. M. Mohammad-Doustaresharaf.

***Stigmaeus cariae* Khanjani, Pishehvar, Mirmoayedi and Khanjani, 2012**

This species is currently known only from Iran where it was found in soil under walnut trees *Juglans* sp. (Khanjani et al., 2012).

Material examined: Two females, soil under apricot tree (*Prunus armeniaca*), Urmia (Gasemloo valley) (37° 17' 58" N, 45° 07' 16" E, 1750 m), 5 July 2017; three females, soil, Urmia (Marmisho) (37° 59' 97" N, 45° 04' 67" E, 1297 m), 7 September 2017; coll. M. Mohammad-Doustaresharaf.

***Stigmaeus elongatus* Berlese, 1886**

This species is widely distributed in 11 countries and originally described from Italy (Fan et al., 2016; Beron, 2020). It was also previously recorded from different part of Iran (Beyzavi et al., 2013).

Material examined: Three females and one male, soil under oak tree (*Quercus* sp.), Oshnaviyeh (Miraveh) (36° 58' 48" N, 45° 01' 30" E, 1694 m), 1 July 2017; five females, soil, Urmia (Balanej) (37° 24' 35" N, 45° 09' 11" E, 1312 m), 17 September 2018; two females and two deutonymphs, soil and litter, Khoda Afarin (Aynaloo) (38° 53' 03" N, 46° 47' 38" E, 1700 m), 18 July 2018; coll. M. Mohammad-Doustaresharaf.

***Stigmaeus glypticus* Summers, 1962**

This species was originally described from stump from USA (Summers, 1962). It was also recorded from Canada, Crimea, Ukraine and Iran (Fan et al., 2016; Mohammad-Doustaresharaf and Bagheri, 2018; Beron, 2020).

Material examined: Twelve females and two males, moss, Khoda Afarin (Garmanab) (38° 54' 26" N, 46° 47' 19" E,

1520 m), 4 October 2017; five females and three deutonymphs, rotten wood, Khoda Afarin (Garmanab) (38° 54' 26" N, 46° 47' 19" E, 1520 m), 11 September 2017; four females, one male and two deutonymphs, litter, Khoda Afarin (Garmanab) (38° 54' 26" N, 46° 47' 19" E, 1520 m), 17 September 2017; coll. M. Mohammad-Doustaresharaf.

***Stigmaeus luxtoni* Wood, 1981**

This species was originally described from New Zealand by Wood (1981) and later given from Turkey as *Stigmaeus turcica* by Doğan (2003a), synonymized by Faraji and Ueckermann (2006).

This is a new record for the fauna of Iran.

Material examined: Two females and one deutonymph, soil under *Carpinus* sp., Khoda Afarin (Garmanab) (38° 56' 42" N, 46° 45' 43" E, 1302 m), 27 August 2018; coll. M. Mohammad-Doustaresharaf.

***Stigmaeus miandoabiensis* Bagheri and Zarei, 2012**

This species was described from soil in apple trees (*Malus* sp.) from Iran (Bagheri and Zarei, 2012). It was also recorded from Turkey (Bingül et al., 2017).

Material examined: Three females, soil, Urmia (Qarah Hasanlu) (37° 59' 97" N, 45° 04' 67" E, 1297 m), 23 August 2016; four females, soil, Urmia (Ali Beygloo) (37° 74' 09" N, 45° 07' 90" E, 1324 m), 11 August 2017; one female, soil under apricot tree (*Prunus armeniaca*), Urmia (Gasemloo valley) (37° 17' 58" N, 45° 07' 16" E, 1750 m), 5 July 2017; one females, soil under apple trees (*Malus* sp.), Urmia (Balanej) (37° 24' 35" N, 45° 09' 11" E, 1312 m), 17 September 2018; coll. M. Mohammad-Doustaresharaf.

***Stigmaeus pilatus* Kuznetsov, 1978**

This species was described from soil from Crimea (Kuznetsov, 1977). It was also recorded from Azerbaijan, Greece, Latvia, Poland, Slovakia, Spain, Turkey, Ukraine, Asian Russia and Iran (Stathakis et al., 2019; Khaustov, 2020).

Material examined: Four females, soil and litter under oak tree (*Quercus* sp.), Piranshahr (KhidirAabad) (36° 26' 08" N, 45° 21' 07" E, 1294 m), 31 July 2017; three females, soil and litter under pear tree (*Pyrus* sp.), Urmia (Marmisho) (37° 59' 97" N, 45° 04' 67" E, 1297 m), 7 September 2017; four females, soil under oak tree (*Quercus* sp.), Oshnaviyeh (Miraveh) (36° 58' 48" N, 45° 01' 30" E, 1694 m), 1 July 2017; coll. M. Mohammad-Doustaresharaf.

Genus *Storchia* Oudemans, 1923

***Storchia robusta* (Berlese, 1885)**

Cosmopolitan species. Recorded from Eurasia, North America, Africa, New Zealand (Dönel and Doğan, 2011; Khaustov and Sergeyenko, 2014; Fan et al., 2016).

Material examined: Five females and two males, soil under oak tree (*Quercus* sp.), Mahabad (Kavelan) (36° 23' 34" N, 45° 39' 59" E, 1631 m), 19 September 2017; two females and two deutonymphs, soil and litter, Khoda Afarin (Aynaloo) (38° 53' 03" N, 46° 47' 38" E, 1700 m), 18 July 2018; one female, soil under oak tree (*Quercus* sp.), Sardasht (Alvatan) (36° 24' 22" N, 45° 21' 23" E, 1526 m), 30 September 2016; one female, soil, Jolfa (Asiyab Kharabeh) (38° 51' 25" N, 45° 51' 21" E, 1743 m), 17 July 2018; two females and one male, soil, Urmia (Dallamper) (37° 10' 41" N, 44° 53' 37" E, 1890 m), 4 August 2016; one female, soil, Khoda Afarin (Tatar) (39° 03' 10" N, 46° 46' 34" E, 308 m), 27 August 2018; one female, soil under *Astragalus* sp., Urmia (Soladokal) (37° 10' 27" N, 44° 51' 51" E, 2035 m), 5 August 2018; three females, soil, Urmia (Qarah Hasanlu) (37° 59' 97" N, 45° 04' 67" E, 1297 m), 23 August 2016; coll. M. Mohammad-Doustaresharaf.

***Storchia yazdaniani* Bagheri, 2011**

This species is currently known only from Iran where it was found on the soil and moss (Bagheri et al., 2011a).

Material examined: Six females, soil and litter, Khoda Afarin (Abbas Abad) (37° 55' 46" N, 46° 47' 88" E, 1310 m), 5 September 2017; five females, litter, Khoda Afarin (Kalaleh) (38° 56' 42" N, 46° 45' 43" E, 1380 m), 27 August 2018; one female, soil, Khoda Afarin (Tatar) (39° 03' 10" N, 46° 46' 34" E, 308 m), 27 August 2018; coll. M. Mohammad-Doustaresharaf.

Genus *Zetzellia* Oudemans, 1927

***Zetzellia mali* (Ewing, 1917)**

Cosmopolitan species. This species is widely distributed in 28 countries and originally described from Hillsboro, Oregon, USA (Fan et al., 2016; Beron, 2020). It was also previously recorded from different part of Iran (Beyzavi et al., 2013; Bagheri and Mohammad-Doustaresharaf, 2020).

Material examined: Two females and two deutonymphs, *Carpinus* sp., foliage, Khoda Afarin (Aynaloo) (38° 53' 03" N, 46° 47' 38" E, 1700 m), 18 July 2018; one female, *Carpinus* sp., foliage, Khoda Afarin (Kalaleh) (38° 56' 42" N, 46° 45' 43" E, 1380 m), 27 August 2018; coll. M. Mohammad-Doustaresharaf.

***Zetzellia pourmirzai* Khanjani and Ueckermann, 2008**

This species is currently known only from Iran where it was found on the plum leaves with *Eutetranychus orientalis* (Khanjani and Ueckermann, 2008a).

Material examined: Five females and one deutonymph, *Carpinus* sp., foliage, Khoda Afarin (Aynaloo) (38° 53' 03" N, 46° 47' 38" E, 1700 m), 18 July 2018; two females and one deutonymph, azarole foliage (*Crataegus azarolus*), Urmia (Dallamper) (37° 10' 41" N, 44° 53' 37" E, 1890 m), 4 August 2016; coll. M. Mohammad-Doustaresharaf.

Authors' contributions

Mojtaba Mohammad-Doustaresharaf: Investigation, resources, collection of the samples, assemble data, writing the original manuscript and identification of specimens. **Mohammad Bagheri:** Supervision, validation, editing, modify and revise.

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Conflict of interest

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REFERENCES

- Ahaniazad, M., Bagheri, M., Gharakhani, G. and Zarei, E. 2012. *Raphignathus azarshahriensis* n. sp. (Acari: Trombidiformes: Raphignathidae) from northwest Iran. *Acarologia*, 52 (4): 367-372.
[doi: 10.1051/acarologia/20122065](https://doi.org/10.1051/acarologia/20122065)
- Akyol, M. 2021. Two new records stigmatid mites (Acari: Stigmatidae) for the Turkish fauna. *KSU Journal of Agriculture and Nature*, 24 (2): 430-434.
[doi: 10.18016/ksutarimdogan.vi.774206](https://doi.org/10.18016/ksutarimdogan.vi.774206)
- Bagheri, M. and Beyzavi, G. 2013. *Eustigmatius ueckermanni*, a new species of the genus *Eustigmatius* Berlese (Acari: Stigmatidae) from central Iran. *Systematic and Applied Acarology*, 18 (1): 30-34.
[doi: 10.11158/saa.18.1.3](https://doi.org/10.11158/saa.18.1.3)
- Bagheri, M. and Khanjani, M. 2009. A new species of the genus *Eupalopsellus* Sellnick (Acari: Prostigmata, Eupalopsellidae) from West of Iran. *International Journal of Acarology*, 35 (1): 319-322.
[doi: 10.1080/01647950902731549](https://doi.org/10.1080/01647950902731549)
- Bagheri, M. and Mohammad-Doustaresharaf, M. 2020. Identification guide for predatory mites of the superfamily Raphignathoidea of Iran. University of Maragheh, 394 pp. [In Persian]
- Bagheri, M. and Zarei, E. 2012. *Stigmatius miandoabiensis* sp. nov. (Acari: Trombidiformes: Stigmatidae), with

- redescription of *S. siculus* (Berlese, 1883) from Iran. Systematic and Applied Acarology, 17 (4): 441-447.
doi: 10.11158/saa.17.4.13
- Bagheri, M., Ahaniazad, M. and Paktinat-Saeed, S. 2014. Predatory prostigmatic mites (Acari: Trombidiformes) fauna in East Azerbaijan province, Iran. In: Proceeding of the 21th Iranian Plant Protection Congress, Urmia, Iran p. 979. [In Persian]
- Bagheri, M., Doğan, S., Irani-Nejad, K.H., Kamali, K., Khanjani, M. and Saboori, A. 2010a. A new species of the genus *Neognathus* Willmann (Acari: Prostigmata: Caligonellidae) from Northwestern Iran. Systematic and Applied Acarology, 15 (1): 65-68.
doi: 10.11158/saa.15.1.8
- Bagheri, M., Ghorbani, H., Navaei Bonab, R., Saber, M., Mehrvar, A. and Ueckermann, E.A. 2010b. *Prostigmaeus khanjani* (Acari: Stigmaeidae), a new species from Northwest Iran. Systematic and Applied Acarology, 15 (2): 123-128.
doi: 10.11158/saa.15.2.6
- Bagheri, M., Jafari, S. and Paktinat-Saeed, S. 2013a. A new species of the genus *Raphignathus* (Acari: Raphignathidae) from western Iran. Persian Journal of Acarology, 2 (3): 481-486.
doi: 10.22073/pja.v2i3.10044
- Bagheri, M., Maleki, N. and Changizi, M. 2013b. On caligonellid mites (Acari: Trombidiformes: Caligonellidae) of Iran: description of two new species. International Journal of Acarology, 39 (8): 632-637.
doi: 10.1080/01647954.2013.864331
- Bagheri, M., Mohajer, S.S., Saboori, A., Asadeh, G. and Ueckermann, E.A. 2011a. *Storchia yazdani* n. sp., a new species of the genus *Storchia* Oudemans, 1923 (Acari: Prostigmata: Stigmaeidae) from Northern Iran. Acarologia, 51 (1): 87-91.
doi: 10.1051/acarologia/20111993
- Bagheri, M., Saber, M., Ueckermann, E.A., Ghorbani, H. and Navaei-Bonab, R. 2011b. *Eustigmaeus setiferus*, n. sp. (Acari: Stigmaeidae) from Iran. International Journal of Acarology, 37 (1): 212-215.
doi: 10.1080/01647954.2011.553201
- Bagheri, M., Yousefi, A., Seilsepour, N., Saber, M. and Gha-rekhani, G. 2015. Redescription of *Neophyllobius astragalusi* and *Favognathus orbiculatus* with *F. acaciae* (Acari: Raphignathoidea) as a new record from Iran. Persian Journal of Acarology, 4 (1): 43-55.
doi: 10.22073/pja.v4i1.10186
- Beron, P. 2020. Acarorum catalogus VII. Trombidiformes, Prostigmata, Raphignathoidea. Fam. Barbutiidae, Caligonellidae, Camerobiidae, Cryptognathidae, Dasythyreidae, Dytiscacaridae, Eupalopsellidae, Homocaligidae, Mecognathidae, Raphignathidae, Stigmaeidae, Xenocaligonellidae. Pensoft & National Museum of Natural History, Sofia, Bulgaria, 306 pp.
- Beyzavi, G., Ueckermann, E.A., Faraji, F. and Ostovan, H. 2013. A catalog of Iranian prostigmatic mites of super-families Raphignathoidea & Tetranychoidae (Acari). Persian Journal of Acarology, 2 (3): 389-474.
doi: 10.22073/pja.v2i3.10042
- Bingöl, M., Doğan, S. and Dilkaraoğlu, S. 2017. Contributions to the knowledge of the mite genus *Stigmaeus* Koch, 1836 (Acari, Stigmaeidae) of Turkey. European Journal of Taxonomy, 307: 1-16.
doi: 10.5852/ejt.2017.307
- Doğan, S. 2003a. A new species and two new records of the genus *Stigmaeus* (Acari: Stigmaeidae) from Turkey. International Journal of Acarology, 29 (4): 381-387.
doi: 10.1080/01647950308684355
- Doğan, S. 2003b. On caligonellid mites from Turkey (Acari: Caligonellidae). Archives des Sciences, 56 (2): 63-77.
doi: 10.5169/seals-740431
- Doğan, S. 2004. Three new species and a new record of the genus *Ledermuelleriopsis* (Acari, Stigmaeidae) from Turkey. Biologia, Bratislava, 59 (2): 141-151.
- Doğan, S. 2019. Raphignathoidea (Acari: Trombidiformes) of Turkey: A review of progress on the systematics, with an updated checklist. Acarological Studies, 1 (2): 129-151.
- Doğan, S. and Doğan, S. 2020a. A new record for the acarofauna of Turkey *Molothrognathus bahariensis* Ueckermann and Khanjani (Acari Caligonellidae). Journal of the Institute of Science and Technology, 10 (3): 1551-1558. [In Turkish]
doi: 10.21597/jist.692883
- Doğan, S. and Doğan, S. 2020b. A new species of the genus *Favognathus* (Acariformes: Cryptognathidae) from Turkey, with some taxonomic comments on other members of the genus. Acarological Studies, 2 (2): 69-76. [In Turkish]
doi: 10.47121/acarolstud.708856
- Doğan, S. and Doğan, S. 2020c. First descriptions of the adult male, protonymph and larval stages of the species *Caligonella haddadi* Bagheri & Maleki (Acari: Trombidiformes: Caligonellidae). Erzincan University Journal of Science and Technology, 13 (2): 465-476. [In Turkish]
doi: 10.18185/erzifbed.704612
- Dönel, G. and Doğan, S. 2011. The stigmaeid mites (Acari: Stigmaeidae) of Kelkit Valley (Turkey). Zootaxa, 2942: 1-56.
doi: 10.11646/zootaxa.2942.1.1
- Fan, Q.-H. 2004. A catalogue of the genus *Eupalopsellus* Sellnick (Acari: Prostigmata: Eupalopsellidae) with the description of a new species from China. Biologia, Bratislava, 59 (5): 533-546.

- Fan, Q.-H. and Li, L. 1993. Descriptions of three new species of superfamily Raphignathoidea (Acari: Ac-tinedida). Journal of Fujian Agricultural University, 22 (3): 321-324. [In Chinese]
- Fan, Q.-H. and Zhang, Z.-Q. 2005. Raphignathoidea (Acari: Prostigmata). Fauna of New Zealand, 52. Manaaki Whenua Press, Lincoln, Canterbury, New Zealand, 400 pp.
- Fan, Q.-H., Flechtmann, C.H. and De Moraes, G.J. 2016. An-notated catalogue of Stigmaeidae (Acari: Prostigmata), with a pictorial key to genera. Zootaxa, 4176: 1-199.
doi:10.11646/zootaxa.4176.1.1
- Fan, Q.-H. and Flechtmann, C.H.W. 2015. Chapter 7. Stig-maeidae. In: Prospects for biological control of plant feeding mites and other harmful organisms. Carrillo, D., Moraes, G.J. de and Peña, J. (Eds). Springer, NY, Switzerland, 185-206.
doi: 10.1007/978-3-319-15042-0_7
- Faraji, F. and Ueckermann, E.A. 2006. A new species of *Stigmaeus* Koch from Iran (Acari: Stigmaeidae). Sys-tematic and Applied Acarology, 11: 69-72.
doi: 10.11158/saa.11.1.9
- Gerson, U., Smiley, R.L. and Ochoa, R. 2003. Mites (Acari) for pest control. Blackwell Science, Oxford, UK, 539 pp.
doi: 10.1002/9780470750995
- Halbert, J.N. 1923. Notes on Acari, with descriptions of new species. Zoological Journal of the Linnean Society, London, 35: 363-392.
doi: 10.1111/j.1096-3642.1923.tb01732.x
- Hu, C.-Y., Jing, Z.-Q. and Liang, L.-R. 1995. Two new species and one new record of the genus *Raphignathus* Dugés (Acari: Raphignathidae). Journal of Suzhou Railway Teachers College, 12 (3): 21-26.
- Hu, S.-Q., Chen, X.-W. and Huang, L. 1996. Mites of the genus *Eustigmaeus* from Jiangxi Province (Acari: Stig-maeidae). Entomologia Sinica, 3 (4): 314-322.
- Kasap, İ., Çobanoğlu, S., Pehlivan, S. and Kök, Ş. 2013. *Eupalopsellus prasadi* Bagheri & Khanjani 2009 (Acari: Eupalopsellidae), a new record for the mite fauna of Turkey. Turkish Bulletin of Entomology, 3 (1): 3-6. [In Turkish]
- Khanjani, M. and Ueckermann, E.A. 2002. The stigmaeid mites of Iran (Acari: Stigmaeidae). International Jour-nal of Acarology, 28 (4): 317-339.
doi: 10.1080/01647950208684309
- Khanjani, M. and Ueckermann, E.A. 2003. Two new spe-cies of the genus *Raphignathus* Dugés (Acari: Raphignathidae) from Iran. Acarologia, 43 (3): 299-306.
- Khanjani, M. and Ueckermann, E.A. 2008a. A new species of *Zetzellia* Oudemans (Acari: Stigmaeidae) from west Iran. International Journal of Acarology, 34 (3): 237-241.
doi: 10.1080/01647950808684536
- Khanjani, M. and Ueckermann, E.A. 2008b. New species of the genus *Favognathus* Luxton (Acari: Cryptognathi-dae) from Iran. Acarologia, 48 (3-4): 177-186.
- Khanjani, M., Khanjani, M., Rafeian Najaf-Abadi, P. and Seeman, O.D. 2014. Three new species of the genus *Favognathus* Luxton (Acari: Cryptognathidae) and re-description of *Cryptognathus lagena* Kramer from Iran. International Journal of Acarology, 40: 370-383.
doi:10.1080/01647954.2014.924993
- Khanjani, M., Pishehvar, S., Mirmoayedi, A.N. and Khanja-ni, M. 2012. Two new eyeless mite species of the genus *Stigmaeus* Koch (Acari: Stigmaeidae) from western provinces of Iran and description of the male *Stigmae-us pilatus* Kuznetsov. International Journal of Acarolo-gy, 38 (6): 504-513.
doi: 10.1080/01647954.2012.703690
- Khaustov, A.A. 2020. New records of predatory mites of the genus *Stigmaeus* (Acari: Prostigmata: Stigmaeidae) from Western Siberia with the redescrptions of *S. dig-nus* Kuznetsov and *S. uzunolukensis* Özçelik and Doğan. Acarina, 28 (2): 177-191.
doi: 10.21684/0132-8077-2020-28-2-177-191
- Khaustov, A.A. and Sergeyenko, A.L. 2014. Raphignathoid mites (Acari: Raphignathoidea) of the Cape Martyan Nature Reserve, Crimea. Systematic and Applied Aca-rology, 19 (3): 363-372.
doi: 10.11158/saa.19.3.9
- Kuznetsov, N.N. 1977. New species of the family Stigmae-idae from Crimea. Zoologicheskii Zhurnal, 56: 635-638. [In Russian]
- Liang, L. and Zhang, Z.-Q. 1997. Key to species of the ge-nus *Molothrognathus* (Prostigmata: Caligonellidae) with description of a new species from Iran. Systemat-ic and Applied Acarology, Special Publication, 1: 19-24.
- Meyer, M.K.P. and Ueckermann, E.A. 1989. African Raphignathoidea. Entomology Memoir Department of Agriculture and Water Supply, Republic of South Afri-ca, 74: 1-58.
- Mohammad-Doustasharaf, M. and Bagheri, M. 2018. Mites fauna of the genera *Stigmaeus* and *Raphignathus* (Acari: Stigmaeidae, Raphignathidae) from Arasbaran forest. In: Proceedings of the 23rd Iranian Plant Protec-tion Congress, 27-30 August, Gorgan University of Ag-ricultural Sciences and Natural Resources, p. 1616. [In Persian]
- Mohammad-Doustasharaf, M. and Bagheri, M. 2021. Description of *Barbutia arasbaraniensis* n. sp. (Acari: Trombidiformes: Barbutiidae) based on the deu-tonymph and male specimens from Iran. Persian Jour-nal of Acarology, 10 (1): 9-17.
doi: 10.22073/pja.v10i1.64012

- Pishehvar, Sh. and Khanjani, M. 2021. Two new species of the genus *Raphignathus* (Acari: Raphignathidae) from Hamedan, Iran, with a key to the known species. Systematic and Applied Acarology, 26(1): 185-198.
doi: 10.11158/saa.26.1.11
- Rack, G. 1962. Milben aus Taubennestern mit Beschreibung einer neuen Art, *Acheles gracilis* (Acarina, Raphignathidae). Zoologischer Anzeiger, 168 (7-10): 275-292. [In German]
- Rostami, A. and Mohammad-Doustasharaf, M. 2021. Description of *Stigmaeus bagherii* n. sp. (Acari: Stigmaeidae), with a key to the known species of *Stigmaeus* from Iran. International Journal of Acarology, 47(3): 222-232.
doi: 10.1080/01647954.2021.1887933
- Stathakis, T.I., Kapaxidi, E.V. and Papadoulis, G.Th. 2019. The genus *Stigmaeus* Koch (Acari: Stigmaeidae) from Greece. Systematic and Applied Acarology, 24 (11): 2010-2093.
doi:10.11158/saa.24.11.4
- Summers, F.M. 1962. The genus *Stigmaeus* (Acarina: Stigmaeidae). Hilgardia, 33 (10): 491-537.
doi: 10.3733/hilg.v33n10p491
- Summers, F.M. and Schlinger, E.I. 1955. Mites of family Caligonellidae (Acarina). Hilgardia, 23: 539-561.
- Ueckermann, E.A. and Khanjani, M. 2003. Iranian Caligonellidae (Acari: Prostigmata), with descriptions of two new species and re-description of *Molothrog-nathus fulgidus* Summers and Schlinger, with a key to genera and species. Acarologia, 43 (3): 291-298.
- Uluçay, İ., Akyol, M. and Koç, K. 2016. Türkiye faunası için yeni bir kayıt: *Raphignathus khorramabadensis* (Acari: Raphignathoidea). 23. National Biology Congress, 5-9 September, 2016, Gaziantep, Turkey, p. 422. [In Turkish]
- Wood, T.G. 1981. New species and records of Stigmaeidae (Acari: Prostigmata) from New Zealand. III. Genus *Stigmaeus* Koch. New Zealand Journal of Zoology, 8: 369-377.
doi:10.1080/03014223.1981.10430615
- Yamaç, S.Ç., Doğan, S. and Doğan, S. 2019. *Caligonella had-dadi* Bagheri and Maleki (Acari, Caligonellidae): A new member of the acarofauna in Turkey. Zeugma II. International Congress on Multidisciplinary Studies, 18-20 January 2019, Gaziantep, Turkey, 256-266.

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