



Persian J. Acarol., 2024, Vol. 13, No. 1, pp. 77–92.
<https://doi.org/10.22073/pja.v13i1.79935>
Journal homepage: <http://www.biotaxa.org/pja>



<http://zoobank.org/urn:lsid:zoobank.org:pub:5CABFA87-1F53-4091-8C54-D82B17C97175>

Article

Some raphignathoid mites (Acariformes: Trombidiformes: Prostigmata) in Lorestan Province, with re-description of *Raphignathus evidus* Fan as a new record from Iran

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ABSTRACT

Mites of Raphignathoidea are important natural enemies of some small pests like phytophagous mites and some insects in various ecosystems. Fauna of this superfamily was studied in Lorestan province, Iran, during 2019–2020. In this survey, a total of 20 species belonging to seven genera from three families were collected and identified. Among them, *Raphignathus evidus* Fan is re-described and recorded as new to Iranian mite's fauna.

KEY WORDS: Acari, female, predatory mites, Raphignathoidea, Western Iran.

PAPER INFO.: Received: 10 January 2023, Accepted by *P. Lotfollahi*: 14 March 2023, Published: 15 January 2024

INTRODUCTION

Raphignathoid mites are worldwide in distribution and have been found in aquatic and semiaquatic habitats, foliage, branches, trunks, moss and lichen, litter, soil, animal nests, stored products and even in house dust (Meyer and Ueckermann 1989; Fan and Zhang 2005). This superfamily currently consists of around 1000 valid species, about 70 genera and 12 families (Doğan 2019). Eight families including Stigmaeidae, Raphignathoidea, Caligonellidae, Camerobiidae, Cryptognathidae, Eupalopsellidae, Dytiscacaridae and Barbutiidae have been reported from Iran (Beyzavi *et al.* 2013; Mortazavi *et al.* 2018). The majority of the raphignathoid mites are free-living predators but a few are phytophagous, feeding on moss; some species are parasites or symbionts of insects; they can also feed on pollen (Fan and Zhang 2005; Doğan 2006).

Raphignathidae Kramer, is the third largest family of Raphignathoidea. Members of this family are predators and feed on small arthropods. This family consists of two genera. Genus *Raphignathus* Dugés with about 76 species has a worldwide distribution. Until now, 29 species from this genus have been recorded and described from Iran (Zhang 2011; Nasrollahi *et al.* 2018; Mohammad-Doustaresharaf and Kazemi 2022). Bagheri *et al.* (2013) reported the *R. khorrabadensis* Bagheri from Lorestan province of Iran. Also, Rahmati *et al.* (2015) reported *Favognathus amygdalus* Doğan and Ayyildiz, 2004 and *F. cordylus* Luxton, 1993 (Cryptognathidae) from Lorestan province as two new records for Iran fauna. This study was

How to cite: Hatami, P., Jafari, S. & Ahmad-Hosseini, M. (2024) Some raphignathoid mites (Acariformes: Trombidiformes: Prostigmata) in Lorestan Province, with re-description of *Raphignathus evidus* Fan as a new record from Iran. *Persian Journal of Acarology*, 13(1): 77–92.

carried out to determine the raphignathoid mites in Lorestan province during 2019–2020. In total, 20 species belonging to seven genera from three families were reported and *Raphignathus evidus* Fan was re-described as a first record from Iran.

MATERIALS AND METHODS

Samples were collected during 2019–2020 from soil and litter in the fields and orchards at different regions of Lorestan province, then labeled and taken by plastic bags to the Entomological laboratory of Department of Plant Protection, Faculty of Agriculture, Lorestan University, Iran. Mites were extracted by a Berlese-Tullgren funnel. Collected specimens were mounted directly on permanent slides in Hoyer's medium. The slides were dried in an oven at about 50 °C for 7–10 days, sealed with nail polish and examined with an Olympus BH-2 microscope. A Camera Lucida apparatus was used for the drawings. The terminology and abbreviations used in the description of the *Raphignathus evidus* Fan follows those of Lindquist (1985) and Fan and Zhang (2005). Legs and palp chaetotaxy are from Fan and Yin (2000). All measurements are given in micrometers.

RESULTS

Order Trombidiformes
Suborder Prostigmata
Superfamily Raphignathoidea Kramer, 1877
Family Caligonellidae Grandjean, 1944
Genus *Caligonella* Berlese, 1910

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

Diagnosis (female)

Without shield in dorsum and venter of idiosoma; with simple dorsal striation, anal valves covers with one pair of setae; with three pairs of cupules, genu II without a solenidion; outer solenidion on tibia I about two times longer than inner solenidion; solenidion on tarsus I longer than outer solenidion on tibia I and two times longer than the solenidion on tarsus II; tarsus I with 15(+ ω) setae.

Materials examined

Two females from soil under *Pistacia* sp. (Anacardiaceae), 6 Aug. 2020, Veysian city (33° 29' N, 48° 2' E); and one female from soil under *Prunus armeniaca* (Rosaceae), 6 Aug. 2020, Taf village (33° 17' N, 48° 27' E), Khorramabad county, Lorestan province.

Distribution:

This species was originally described from Germany (Koch 1838). This is a widespread species reported in different countries; it has been reported in Iran by Beyzavi *et al.* (2013), Fakhari *et al.* (2014), Zarei *et al.* (2015), Mohammad-Doustaresharaf and Bagheri (2021). More reports of this species in the world can be found in Doğan (2019) and Beron (2020).

***Caligonella saboorii* Ahmad Hoseini & Khanjani, 2014**

Diagnosis (female)

Length of dorsal setae about 17–26 micrometers; dorsal and venter of idiosoma without shield, with simple dorsal striation, with three pairs of cupules; outer solenidion on tibia I two times longer

than inner one; solenidia on tarsi I and II and outer solenidium on tibia I are equal in length; tarsus I with 15(+ ω) setae.

Materials examined

One female from soil under *Prunus domestica* (Rosaceae), 12 Aug. 2020, Dolatshah village (33° 37' N, 48° 17' E); one female from soil under *Vitis vinifera* (Vitaceae), 12 Aug. 2020, Pyrjd village (33° 19' N, 48° 28' E); one female from soil under *Olea europaea* (Oleaceae), 17 Aug. 2020, Faculty of Agriculture of Lorestan University (33° 26' N, 48° 15' E), Khorramabad county, Lorestan province.

Distribution

This species was originally described from Iran by Ahmad Hoseini *et al.* (2014).

Note: To avoid repeating, geographical coordinates of sampling locations previously presented will not be mentioned again.

***Caligonella urhani* Akyol, 2018**

Diagnosis (female)

Length of dorsal setae about 10–13 micrometers; dorsal and venter of idiosoma without shield; anal covers with one pair of setae; genu II without a solenidium; outer solenidium on tibia I about three times longer than inner solenidium; solenidium on tarsus I obviously longer than solenidium on tarsus II.

Materials examined

Three females from soil under *Pyrus communis* (Rosaceae), 26 Aug. 2020, Dolatshah village, Khorramabad County, Lorestan Province, Iran.

Distribution

This species was originally collected from Turkiye and described by Akyol (2018). This is the first report of this species in Iran.

Genus *Molothrognathus* Summers & Schlinger, 1955

***Molothrognathus shirazicus* Khanjani, Bakhshi & Khanjani, 2016**

Diagnosis (female)

Prodorsum with smooth shield medially; setae *sc2* longer than other dorsal setae; setae *fl* shorter than setae *h*, setae *sc2* and *c2* not equally long; setae *c2* about 2 times longer than *c1*; setae *h3* absent; palptarsus as long as tibial claw of the palpus; palptarsal eupathidium biforked, palp-tibia with three setae; genu II with 5 setae, tibia II I with 2 setae, tarsi I-IV with 15(+ ω)-10(+ ω)-9-9 setae, respectively.

Materials examined

Four females from soil under *Quercus* sp. (Fagaceae), and one female from soil under *Ficus carica* (Moraceae), 12 Aug. 2020, Shorab village (33° 27' N, 48° 41' E); one female from soil under *Solanum melongena* (Solanaceae), 5 Oct. 2020, Sabzvar village (33° 29' N, 48° 12' E), Khorramabad county, Lorestan province.

Distribution

This species was originally described from Iran by Khanjani *et al.* (2016).

***Molothrognathus terrulentus* Meyer & Ueckermann, 1989**

Diagnosis (female)

Prodorsum shield with broken striae; setae *sc2* as long as *c2* and clearly longer than other dorsal setae; setae *c2* about 5 times longer than *c1*; setae *h3* present; tibia claw about as long as palp tarsus; eupathidia on palptarsus stubby and forked distally; genua II with 5 setae, tibia I with 2 solenoidia, tarsi I-IV with 15(+ ω)-10(+ ω)-9-9 respectively.

Materials examined

Qaleh Sangi village (33° 33' N, 48° 17' E): 16 Jul. 2020 (n = 3), 25 Aug. 2019 (n = 1), 25 Nov. 2019 (n = 1), 24 Aug. 2020 (n = 1), 2 Nov. 2019 (n = 1), 18 Sep. 2019 (n = 1), from soil under *Oryza sativa* (Poaceae) and 15 Jul. 2019 (n = 1), from soil under *Prunus domestica* (Rosaceae). Bisheh village (33° 19' N, 52° 17' E): 9 Dec. 2019 (n = 1), from soil under *Quercus* sp. (Fagaceae). Veysian city: 14 Aug. 2020 (n = 1), 7 Sep. 2020 (n = 2), from soil under *Pistacia* sp. (Anacardiaceae) and 16 Aug. 2020 (n = 1), from soil under *Medicago sativa* (Fabaceae). Pyrjd village: 12 Aug. 2020 (n = 2), from soil under *Juglans regia* (Juglandaceae); 12 Aug. 2020 (n = 1), from soil under *Vitis vinifera* (Vitaceae); 24 Jun. 2020 (n = 2), from soil under *Quercus* sp. (Fagaceae) and 12 Aug. 2020 (n = 1), from soil under *Quercus* sp. (Fagaceae). Qaleh Gol village (33° 37' N, 48° 17' E): 4 Jul. 2020 (n = 1), from soil under *Prunus domestica* (Rosaceae). Zahrakar village (33° 29' N, 48° 3' E): 26 Sep. 2019 (n = 1), from soil under *Medicago sativa* (Fabaceae). Teshkan village (33° 40' N, 47° 51' E): 2 Aug. 2020 (n=2), from soil under *Quercus* sp. (Fagaceae). Shorab village: 24 Jul. 2020 (n = 2), from soil under *Quercus* sp. (Fagaceae). Kaka Reza village (33° 43' N, 48° 15' E): 27 Jul. 2020 (n = 1), from soil under *Malus domestica* (Roseaceae).
Note: (n = x) = The numbers of female specimens collected.

Distribution

This species was originally described from South Africa by Meyer and Ueckermann (1989) and already reported from Iran (Beyzavi *et al.* 2013), South Africa and Türkiye (Beron 2020).

Genus *Neognathus* Willmann, 1952

***Neognathus eupalopus* Meyer & Ueckermann, 1989**

Diagnosis (female)

Dorsal setae small and not reaching to over the base of behind setae; peritremes each with 6–7 links; stylophore without ear-like projection laterally; palp tarsus long and 4 times longer than tibial-claw; Dorsum with 3 pairs of cupules; coxa IV with 1 seta; femora I and II each with 3 setae, genu II with solenidion; genu III with 4 setae, tibia IV with solenidion, tarsi III–IV with 8(1)–8 setae respectively.

Materials examined

Three females and one male from soil under *Vitis vinifera* (Vitaceae), 27 Jul. 2020, Shorab village.

Distribution

This species was described for the first time in South Africa (Meyer and Ueckermann 1989), and its distributions in Iran and Türkiye are mentioned in Beyzavi *et al.* (2013) and Doğan (2019), respectively.

***Neognathus sinaei* Samadpour, Khanjani & Asali Fayaz, 2014**

Diagnosis (female)

Dorsal setae small and not reaching to over the base of behind setae; peritremes each with 7–8 links; stylophore with ear-like projection laterally; palp tarsus as long as tibial claw; dorsum with 3 pairs of cupules; coxa IV with 1 seta; genu II without solenidion; genu III with 3 setae; tibia III with 5(+ ω), tibia IV with solenidion, femora I and II with 4 and 3 setae, respectively; tarsi III–IV with 7(+ ω)–7(+ ω).

Materials examined

One female on 27 Jul. 2020, and two females on 6 Jul. 2020 were collected from soil under *Juglans regia* (Juglandaceae), Taf village (33° 17' N, 48° 27' E), Khorramabad county, Lorestan province.

Distribution

This species was originally described from Iran by Samadpour *et al.* (2014).

***Neognathus terrestris* Summers & Schlinger, 1955**

Diagnosis (female)

Dorsal setae small and not reaching to over the base of behind setae; peritremes each with 4 links; stylophore without ear-like projection laterally; tibial claw of palp about half as long as tarsus of palp; dorsum with 3 pairs of cupules; coxa IV with 1 seta; genu II with a solenidion; genu III with 3 setae; femora I and II each with 3 setae; tibia III with 5(+ ω) setae, tibia IV without solenidion; tarsi III–IV with 9–8 setae, respectively.

Materials examined

Shorab village: 23 Jul. 2020 (n = 2), 16 Jul. 2020 (n = 1), from soil under *Quercus* sp. (Fagaceae). Pyrdj village: 9 Aug. 2020 (n = 1), 19 Jul. 2020 (n = 1), 4 Sep. 2020 (n = 1), 7 Jun. 2020 (n = 1), 3 Jun. 2020 (n = 1), from soil under *Prunus armeniaca* (Rosaceae); 12 Aug. 2020 (n = 2), from soil under *Juglans regia* (Juglandaceae) and 12 Aug. 2020 (n = 1), from soil under *Vitis vinifera* (Vitaceae). Bisheh village: 9 Nov. 2019 (n = 1), from soil under *Prunus domestica* (Rosaceae). Dolatshah village: 26 Aug. 2020 (n = 1), from soil under *Pyrus* sp. (Rosaceae). Qaleh Sangi village: 20 Sep. 2020 (n = 1), from soil under *Oryza sativa* (Poaceae). Veysian city: 14 Aug. 2020 (n = 1), from soil under *Pistacia* sp. (Anacardiaceae).

Distribution

This species was described for the first time from California (USA) (Summers and Schlinger 1955). Also, this species was reported in Iran by Ueckermann and Khanjani (2003), Beyzavi *et al.* (2013), Fakhari *et al.* (2014), Mohammad-Doustaresharaf and Bagheri (2021). More reports of this species in the world can be found in Doğan (2019) and Beron (2020).

Family Stigmaeidae Oudemans, 1931

Genus *Stigmaeus* Koch, 1836

***Stigmaeus malekii* Haddad Irani-Nejad, Bagheri & Khanjani, 2006**

Stigmaeus boshroyehensis Khanjani, Izadi, Asali Fayaz, Raisi, Rostami & Doğan, 2010
Stigmaeus malekii in Mohammad-Doustaresharaf, Bagheri and Lotfallahi (2023).

Diagnosis (female)

Prodorsal shield pentagonal and smooth; opisthosomal dorsum with distinct central and marginal plates; dorsal setae smooth; setae v_2 and c_2 longer than other dorsal setae; eyes present and pob absent suranal shield entire with 2 pairs of setae; median hysterosomal shield with 3 pairs of setae; with one genital setae; aggenital shield entire with 3 pairs of setae; eupathidium in palp tarsi trifold; trochanter III with two setae; genua I–IV with 3(+ κd)-3-1-1 setae; tarsus II with 9 (+ ω) setae.

Materials examined

Qaleh Sangi village: 24 Aug. 2020 (n = 1), 14 Sep. 2020 (n = 2), 20 Sep. 2020 (n = 2), from rice field (*Oryza sativa*); 24 Aug. 2020 (n = 1), 4 Oct. 2020 (n = 2), from soil under *Juglans regia* (Juglandaceae) and 24 Aug. 2020 (n = 2), from soil under *Morus* sp. (Moraceae). Gelvaran village (33° 27' N, 48° 19' E): 6 Jun. 2020 (n = 2), 4 Jul. 2020 (n = 3), from soil under *Juglans regia* (Juglandaceae); 24 Aug. 2020 (n = 2), 7 Oct. 2020 (n = 2), from soil under *Morus* sp. (Moraceae). Taf village: 31 Jul. 2020 (n = 3), from soil under *Prunus armeniaca* (Rosaceae). Shorab village: 23 Jul. 2020 (n = 1), from soil under *Quercus* sp. (Fagaceae). Dolatshah village: 21 Jul. 2020 (n = 2), 16 Sep. 2020 (n = 4), 22 Sep. 2020 (n = 2), 27 Oct. 2020 (n = 1), from soil under *Prunus domestica* (Rosaceae); 8 Jul. 2020 (n = 16), 27 Aug. 2020 (n = 1), from soil under *Juglans regia* (Juglandaceae); 23 May. 2020 (n = 1), from soil under *Hordeum vulgare* (Poaceae); 23 May 2020 (n = 1), from soil under *Solanum melongena* (Solanaceae).

Distribution

This species has only been reported from Iran (Irani-Nejad *et al.* 2006; Khanjani *et al.* 2010; Beyzavi *et al.* 2013; Fakhari *et al.* 2014; Zarei *et al.* 2015; Mohammad-Doustaresharaf *et al.* 2023).

Stigmaeus cariae* Khanjani, Pishehvar, Mirmoayedi & Khanjani, 2012Diagnosis (female)*

Prodorsal shield reticulated; median hysterosomal shield smooth and with 2 pairs of setae; dorsum with 14 pairs of smooth setae (h_3 present); intercalary, zoanal and suranal shields separated; eyes and post-ocular bodies absent; genital setae two pairs; aggenital setae four pairs; eupathidium in palp tarsi bifurcate; genua 5(+ 1κ)-2-0-1; tarsus II with 8(+ ω) setae.

Materials examined

Two females were collected on 31 Jul. 2020 from soil under *Prunus armeniaca* (Rosaceae), Taf village; and one female in 16 Sep. 2020 was collected from rice field (*Oryza sativa*), Qaleh Sangi village, Lorestan province.

Distribution

This species was described for the first time from Hamedan (Iran) by Khanjani *et al.* (2012), also Mohammad-Doustaresharaf and Bagheri (2021) reported it from Azerbaijan (Iran).

Genus *Storchia* Oudemans, 1923***Storchia robustus* (Berlese, 1885)***Diagnosis (female)*

Prodorsal shield faintly reticulated; suranal shield divided along midline and bearing 3 pairs of setae (h_3 present); genital covers with three pairs of genital setae; trochanters III–IV each with one

seta; femora IV with two setae; tibia I with one solenidion; coxae IV with two setae; genua I–III with 4 + 1 κ , 4, 2; tarsus IV with 8 + 1 ω .

Materials examined

Pyrjd village: 24 Jun. 2020 (n = 1), from soil under *Ficus carica* (Moraceae); 12 Aug. 2020 (n = 1), from soil under *Juglans regia* (Juglandaceae); 8 Sep. 2020 (n = 1) from soil under *Morus* sp. (Moraceae).

Distribution

This species was originally reported from Germany by Berlese (1885); so far reported in about 25 countries (Beron 2020) including Iran (Beyzavi *et al.* 2013).

Genus *Eustigmaeus* Berlese, 1910

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

Diagnosis (female)

Dorsal shields ornamented with irregularly shaped dimples with vacuoles; dorsal body setae long and serrate; eyes present in prodorsal shield; ventral setae 4a present; coxisternal shields fused and reticulated; trochanter III with two setae; femur II with five setae; genua II with three setae; tarsus II with 8(+ ω); tarsus IV with 7 setae.

Materials examined

Two females were collected from soil under *Prunus armeniaca* (Rosaceae) 9 Aug. 2020, Pyrjd village, Lorestan province.

Distribution

This species was originally described from Germany, and up to now reported from more than 20 countries (Beron 2020).

***Eustigmaeus spathatus* Ueckermann & Meyer, 1987**

Diagnosis (female)

Dorsal shields evenly covered with irregularly shaped dimples with vacuoles; dorsal body setae blunt tipped; eyes present; setae on endopodal shields smooth; suranal shield ornamented and dimples on suranal shield bearing vacuoles; trochanter III with two setae; femur II with four setae.

Materials examined

Dolatshah village: 24 Jun. 2020 (n = 4), from soil under *Hordeum vulgare* (Poaceae) and 9 Jul. 2020 (n = 2), from soil under *Prunus armeniaca* (Rosaceae). Veysian city: 15 Jun. 2020 (n = 1), from soil under *Medicago sativa* (Fabaceae) and 15 Jun. 2020 (n = 1), from soil under *Solanum tuberosum* (Solanaceae). Faculty of Agriculture of Lorestan University 18 Aug. 2020 (n = 1), from soil under *Olea europaea* (Oleaceae). Pyrjd village: 18 Aug. 2020 (n = 1), from soil under *Vitis vinifera* (Vitaceae) and (n = 2), from soil under *Prunus armeniaca* (Rosaceae). Taf village: 5 Oct. 2020 (n = 1), from soil under *Prunus armeniaca* (Rosaceae). Bisheh village: 9 Nov. 2019 (n = 1), from soil under *Prunus domestica* (Rosaceae).

Distribution

This species has been reported from South Africa originally (Ueckermann and Meyer 1987) and also reported from Iran (Beyzavi *et al.* 2013).

***Eustigmaeus nasrinae* Khanjani & Ueckermann, 2002**

Diagnosis (female)

Dorsal shields ornamented with irregularly shaped dimples which vary from small, with 5 vacuoles, to large with more than 10 vacuoles; dorsal body setae blunt tipped; eyes present; endopedal shield smooth and entire; setae on endopedal shields barbed; suranal shield ornamented and dimples on suranal shield vague and without vacuoles; trochanter III with two setae; genua II with 3(+ κ) setae; femur II with four setae; tarsus II with 9(+ ω); tarsus IV with 7 setae.

Materials examined

Two females were collected from soil under *Pyrus communis* (Rosaceae) 26 Aug. 2020, Dolatshah village, Lorestan province.

Distribution

This species has only been reported from Iran (Beyzavi *et al.* 2013; Mohammadi *et al.* 2013; Fakhari *et al.* 2014; Rahmati *et al.* 2015).

Family Raphignathidae Kramer, 1877

Genus *Raphignathus* Dugés, 1834

***Raphignathus hecmatanensis* Khanjani & Ueckermann, 2003**

Diagnosis (female)

Median prodorsal shield spherical anteriorly and narrow posteriorly; small shields present posterolateral to median prodorsal shields; palpfemur with three setae; interscutal membrane with 2 pairs of setae; opisthosomal shield with 4 setae and *fl* close to anterior margin; all dorsal shields punctated; with three pairs of genital setae; femur IV with 3 setae; endopedal shields present around coxae I-IV.

Materials examined

Bisheh village – 26 Oct. 2019 (n = 1), 19 Nov. 2019 (n = 1), from soil under *Juglans regia* (Juglandaceae); Veysian city: 9 Sep. 2019 (n = 1), 4 Sep. 2020 (n = 2), from soil under *Pistacia* sp. (Anacardiaceae). Taf village: 4 Aug. 2020 (n = 2), from soil under *Juglans regia* (Juglandaceae); 20 Sep. 2020 (n = 2), from soil under *Vitis vinifera* (Vitaceae). Qaleh Sangi village: 16 Sep. 2020 (n = 9), from soil under *Oryza sativa* (Poaceae) and 24 Aug. 2020 (n = 2), from soil under *Morus* sp. (Moraceae). Kamalvand village (33° 26' N, 48° 26' E): 24 Sep. 2020 (n = 1), from soil under *Zea mays* (Poaceae). Dolatshah village: 22 Sep. 2019 (n = 2), from soil under *Prunus domestica* (Rosaceae). Faculty of Agriculture of Lorestan University: 3 Jul. 2020 (n = 6), from soil under *Buxus* sp. (Buxaceae). Shorab village: 7 Jun. 2020 (n = 2) and 23 Jul. 2020 (n = 2), from soil under *Quercus* sp. (Fagaceae). Pyrjd village: 10 Aug. 2020 (n = 1), from soil under *Prunus armeniaca* (Rosaceae). Araban village (33° 27' N, 48° 19' E): 29 Jun. 2020 (n = 6), from soil under *Alhagi persarum* (Fabaceae).

Distribution

This species was originally described from Iran (Khanjani and Ueckermann 2003), and also reported from Crimea, Syria and Turkiye (Beyzavi *et al.* 2013; Fakhari *et al.* 2014; Zarei *et al.* 2015; Doğan 2019; Beron 2020; Mohammad-Doustaresharaf and Bagheri 2021).

Raphignathus zhaoi* Hu, Jing & Liang, 1995Diagnosis (female)*

Interscutal membrane dorsomedially with one pair of setae; all dorsal setae long and thick; small shields present posterolateral to median prodorsal shields; opisthosomal shield with 5 pairs of setae; palpfemur with 2 setae; femur IV with 2 setae; with three pairs of genital setae; with endopodal shields around coxae I-II and coxae III-IV.

Materials examined

One female was collected on 27 Jul. 2020, from rice field (*Oryza sativa*), Qaleh Sangi village, Lorestan province.

Distribution

This species was originally described from China (Hu *et al.* 1995), and also reported from Iran and Türkiye (Beyzavi *et al.* 2013; Fakhari *et al.* 2014; Zarei *et al.* 2015; Doğan 2019; Mohammad-Doustaresharaf and Bagheri 2021).

Raphignathus collegiatus* Atyeo, Baker & Crossley, 1961Diagnosis (female)*

Interscutal membrane dorsomedially with one pair of setae; palpfemur with three setae; podosoma bearing a pair of small shields behind median prodorsal shield; dorsal body setae short and narrow; all dorsal shields punctuated but not striated; with three pairs of genital setae; Femur IV with four setae; endopodal shields present in coxa I-IV.

Materials examined

Two females were collected on 22 Sep. 2020, from soil under *Prunus domestica* (Rosaceae), Dolatshah village, Lorestan province.

Distribution

This species was originally described from China (Hu *et al.* 1995), and also reported from Iran and several other countries, more details on the distribution of this species are given in Khanjani and Ueckermann (2002), Beyzavi *et al.* (2013), Doğan (2019) and Beron (2020).

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

Interscutal membrane dorsomedially with two pairs of setae; opisthosomal shield with four pairs of setae; palpfemur with 2 setae; femur IV with 3 setae; median prodorsal shield adjacent to peritremes interiorly; dorsal setae *e1* reach to opisthosomal shield, *f1* faraway of anterior margin of opisthosomal shield; endopodal shield associated with coxae III-IV.

Materials examined

One female was collected on 24 Aug. 2020 from rice field (*Oryza sativa*), Qaleh Sangi village; and two females on 26 Aug. 2020 were collected from soil under *Pyrus communis* (Rosaceae), Dolatshah village, Lorestan province.

Distribution

This species was originally described from Germany (Rack 1962), and also reported from Iran and many other countries, more details on the distribution of this species are given in Beyzavi *et al.*

(2013), Doğan (2019), Beron (2020) and Mohammad-Doustaresharaf and Kazemi (2022).

***Raphignathus giselae* Meyer & Ueckermann, 1989**

Diagnosis (female)

Median prodorsal shield widely separated from peritremes interiorly; interscutal membrane dorsomedially with two pairs of setae; opisthosomal shield with four pairs of setae; palpfemur with 2 setae; femur IV with 3 setae; dorsal setae *e1* don't reach to anterior margin of opisthosomal shield, *f1* on anterior margin of opisthosomal shield; endopodal shield associated with coxae III-IV.

Materials examined

Two females from soil under *Juglans regia* (Juglandaceae), Dolatshah village, 8 Jul. 2020 and one female was collected on 24 Sep. 2020 from soil under *Vitis vinifera* (Vitaceae), Kamalvand village, Lorestan province.

Distribution

This species was originally described from Zimbabwe (Meyer and Ueckermann 1989), and also reported from Iran, South Africa, Türkiye, and Yemen (Beyzavi *et al.* 2013; Zarei *et al.* 2015; Doğan 2019; Beron 2020; Mohammad-Doustaresharaf and Bagheri 2021).

***Raphignathus evidus* Fan, 2000 (Figs. 1–8)**

Raphignathus evidus Fan – Fan and Yin (2000): 94; Beron (2020): 124.

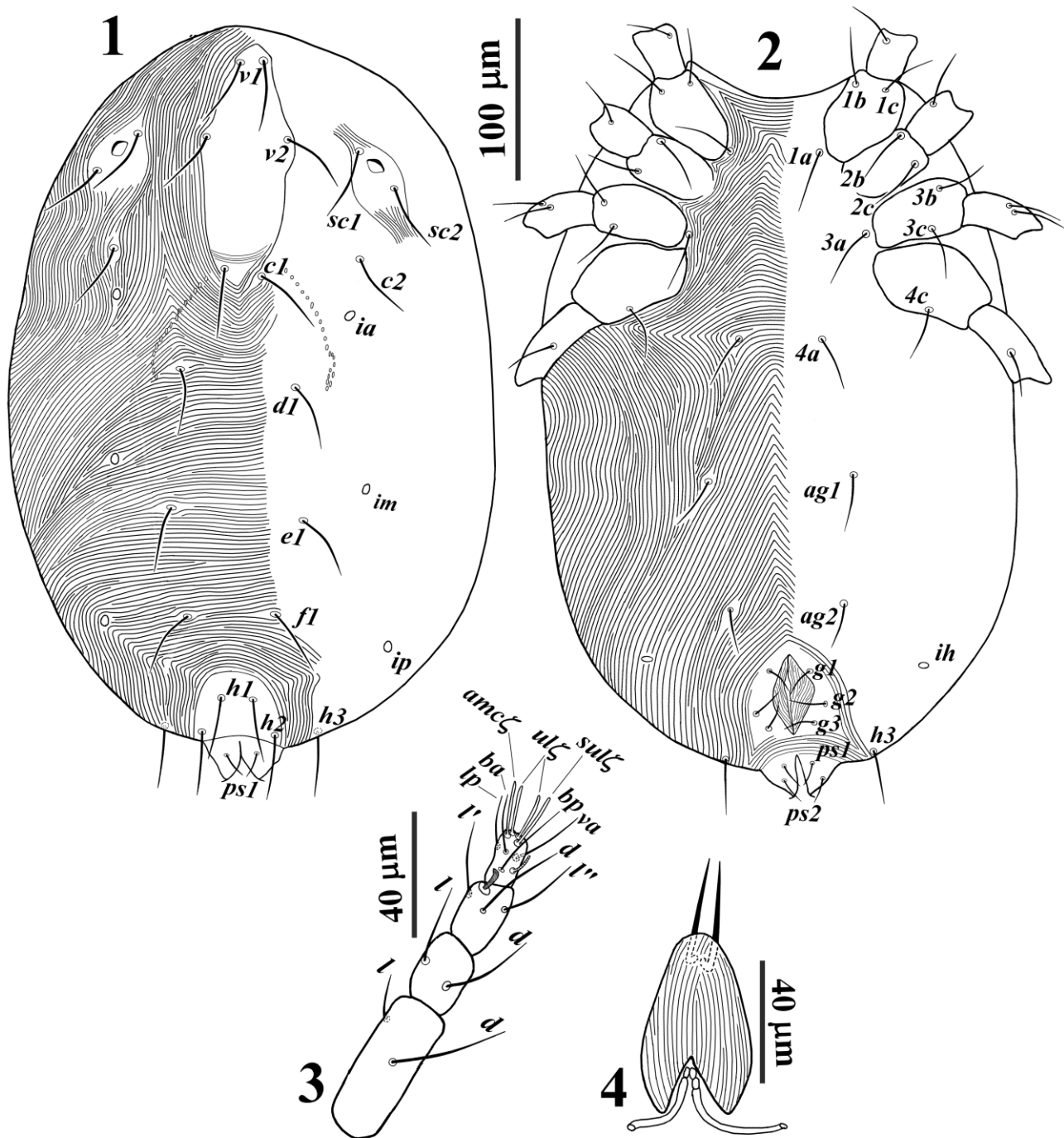
Diagnosis (female)

Median prodorsal shield almost smooth; lateral prodorsal shields with 2 setae, setae *c2* situated on membrane; without small shields behind prodorsal shield; interscutal membrane with three pairs of setae; opisthosomal shield reduced with two pairs of setae (*h1* and *h2*); palp femur with 2 setae; leg femora I-IV 6-5-3-3; tarsi I-IV 19(+ ω 1+ ω 2)-15(+ ω)-13(+ ω)-13.

Female (n = 1) – Idiosoma oval, length of body (including gnathosoma) 625, (excluding gnathosoma) 445, width of body 280 at level of setae *d1*.

Dorsum (Fig. 1) – Prodorsum covered by one median shield with three pairs of setae (*v1*, *v2* and *c1*) and two reduced lateral shields with two pairs of setae *sc1* and *sc2* (setae *c2* located on the membrane) and one pair of eyes. Interscutal membrane with three pairs of setae (*d1*, *e1* and *f1*) and three pairs of cupules (*ia*, *im* and *ip*). Opisthosomal shield obviously reduced with two pairs of setae (*h1* and *h2*); setae *h3* situated on membrane. All dorsal shields without vacuoles. Dorsal setae simple, lengths of dorsal setae as follows: *v1* 44, *v2* 43, *sc1* 43, *sc2* 42, *c1* 45, *c2* 40, *d1* 41, *e1* 39, *f1* 42, *h1* 37, *h2* 35, *h3* 33. Distances between dorsal setae: *v1-v1* 13, *v1-v2* 47, *v2-v2* 48, *v2-sc1* 41, *v2-sc2* 65, *sc1-sc1* 130, *sc1-sc2* 30, *sc1-c1* 95, *sc2-sc2* 173, *sc2-c1* 90, *c1-c1* 16, *c1-c2* 70, *c2-c2* 140, *c1-d1* 65, *d1-d1* 68, *d1-e1* 77, *e1-e1* 75, *e1-f1* 68, *f1-f1* 50, *f1-h1* 50, *h1-h1* 17, *h1-h2* 23, *h1-h3* 40, *h2-h2* 41, *h2-h3* 23, *h3-h3* 87.

Venter (Fig. 2) – Ventral cuticle striated; coxae I-IV smooth and without endopodal shields; aggenital plate with two pairs of setae (*ag1-2*), genital plate with three pairs of setae (*g1-3*). Anal opening dorsoventrally, with three pairs of setae (*ps1-3*), *ps1* dorsally and *ps2-ps3* ventrally; one pair of cupules (*ih*) located laterally to genital shields. Length of ventral setae: *1a* 40, *1b* 38, *1c* 37, *2b* 35, *2c* 32, *3a* 37, *3b* 34, *3c* 32, *4a* 35, *4c* 37, *ag1* 32, *ag2* 27, *g1* 22, *g2* 23, *g3* 22, *ps1* 16, *ps2* 19, *ps3* 18. Distances between ventral setae: *4a-4a* 45, *ag-ag1* 85, *ag1-ag2* 73, *ag2-ag2* 65, *ag2-g1* 45, *g1-g1* 22, *g1-g2* 20, *g2-g2* 37, *g2-g3* 10, *g3-g3* 25, *ps1-ps1* 25, *ps2-ps2* 23, *ps3-ps3* 18.

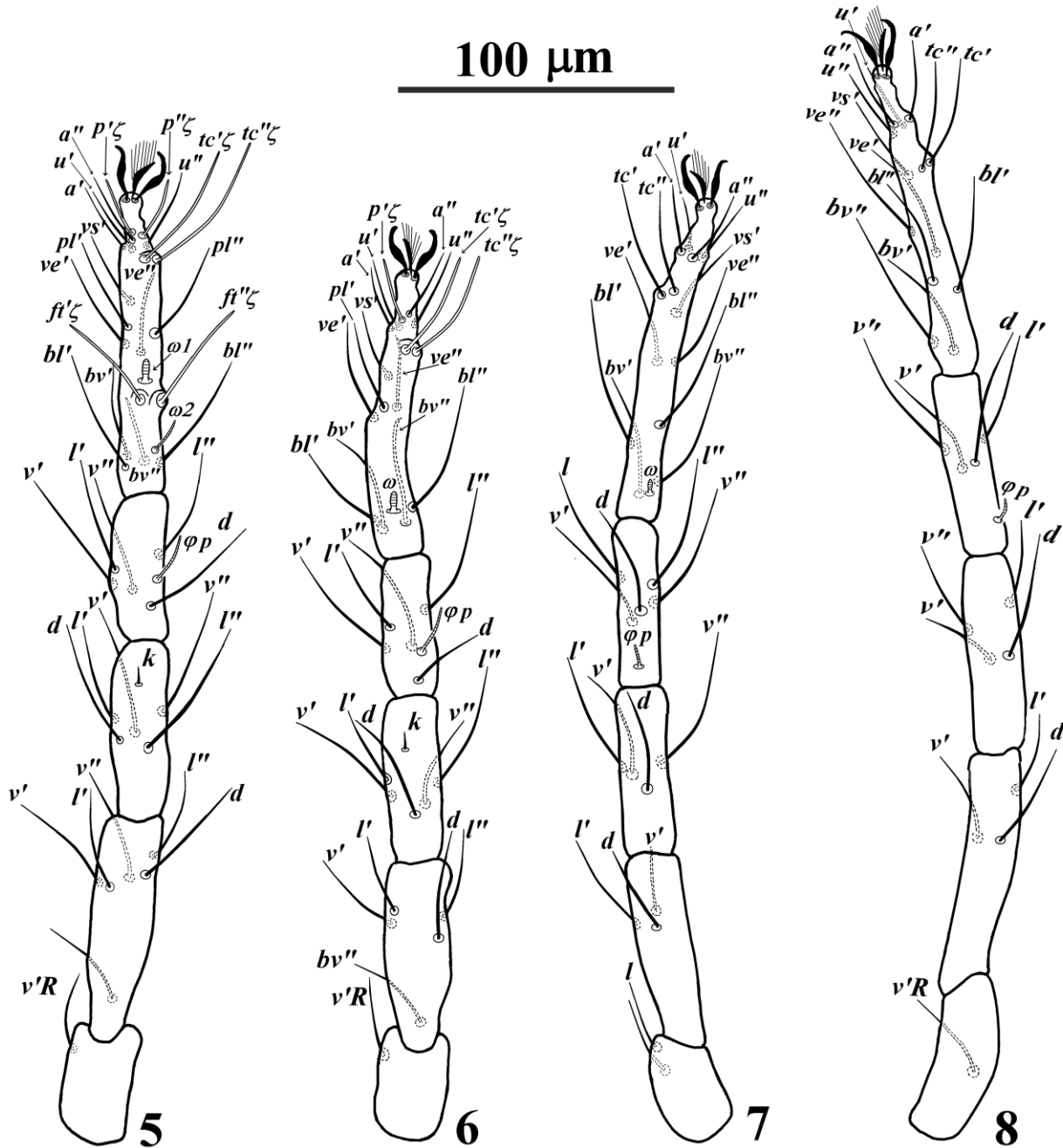


Figures 1–4. *Raphignathus evidus* Fan (Female) – 1. Dorsal view of idiosoma; 2. Ventral view of idiosoma; 3. Palp; 4. Chelicerae.

Gnathosoma (Figs. 3, 4) – Subcapitulum smooth with two pairs of subcapitular setae *m* 41, *n* 37 and two pairs of adoral setae *or1* 13, *or2* 15; stylophore conical 60 long with vertical striation, movable digit 38 long (Fig. 4). Palp five-segmented, palp chaetotaxy from trochanter to tarsus: 0, 2, 2, 3+1claw, 4+1 ω +4 eupathidia (Fig. 3).

Legs (Figs. 5–8) – Legs measurements from trochanter to tarsus (including pretarsus): leg I 365; leg II 305; leg III 350, leg IV 400; setal formulae of leg segments (solenidia in parentheses and not included in setal counts) as follows: coxae 2-2-2-1; trochanters 1-1-2-1; femora 6-5-3-3; genua

5(+κ)-5(+κ)-4-4; tibiae 5(+φ,-)-5(+φp)-5(+φp)-4(+φp); tarsi 19(+ω1,+ω2)-15(+ω)-13(+ω)-13.
 Length of solenidia: I κ 5, Iφ 15, IIφp 13, IIIφp 10, IVφp 10, Iω1 11, Iω2 7, IIω 5, IIIω 3.



Figures 5–8. *Raphignathus evidus* Fan (Female) – 5. Leg I; 6. Leg II; 7. Leg III; 8. Leg IV.

Male and immature stages – Unknown.

Remarks

This re-description resembles the original description of this species from China by Fan and Yin (2000) in having same chaetotaxy for palp and legs as well as similar dorsal shields. However, it differs by: length of dorsal setae 35 to 45, median prodorsal shield almost smooth, setae *h1* is far

[10.1080/01647950408684380](https://doi.org/10.1080/01647950408684380)

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Raphignathoidea (Acariformes: Trombidiformes: Prostigmata) در استان لرستان و بازتوصیف گونه *Raphignathus evidus* Fan به عنوان گزارشی جدید برای ایران

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چکیده

کنه‌های متعلق به بالاخانواده *Raphignathoidea* از دشمنان طبیعی مهم آفات گیاه‌خوار و حشرات در زیست بوم‌های مختلف‌اند. در طول سال‌های ۲۰۱۹-۲۰۲۰، فون کنه‌های این بالاخانواده در استان لرستان مورد بررسی قرار گرفت. در این بررسی، ۲۰ گونه متعلق به سه خانواده و هفت جنس جمع‌آوری و شناسایی شدند. از بین آن‌ها، گونه *Raphignathus evidus* Fan به‌عنوان گزارش جدید برای فون کنه‌های ایران بازتوصیف شد.

واژگان کلیدی: کنه‌ها، ماده، کنه‌های شکارگر، *Raphignathoidea*، غرب ایران.

اطلاعات مقاله: تاریخ دریافت: ۱۴۰۱/۱۰/۲۰، تاریخ پذیرش توسط پ. لطف‌اللهی: ۱۴۰۱/۱۲/۲۳، تاریخ چاپ: ۱۴۰۲/۱۰/۲۵