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Article

Mites of the Raphignathoidea (Acari: Prostigmata) from Zanjan vicinities and description of male of *Stigmaeus shabestariensis*

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Abstract

Raphignathoid mites are important biological control agents of spider and eriophyid mites, and scale insects in agriculture and forestry. Therefore, a study on the fauna of superfamily Raphignathoidea in Zanjan city was carried out during 2012–2013. In this survey, 23 species belonging to 8 genera from 4 different families were collected and identified. Among them male of *Stigmaeus shabestariensis* Haddad Irani-Nejad, Lotfollahi & Akbari, 2010 was recorded for the first time from Zanjan, Iran and was new report to Acari fauna of the world, and also *S. shabestariensis* Haddad Irani-Nejad Haddad Irani-Nejad, Lotfollahi & Akbari, 2010 was the abundant mite species in Zanjan vicinities in our collected specimens.

Key words: Spider mites, Camerobiidae, Raphignathidae, Eupallopsellidae, Caligonellidae, Stigmaeidae.

Introduction

Many species of the superfamily Raphignathoidea Kramer (Acari: Prostigmata) are predators of spider and eriophyoid mites and scale insects in agriculture and forestry (Gerson *et al.* 2003). They were found in various ecosystems such as foliages, branches, trunks, mosses and lichens, litter, soils, animal nests, stored products and even in house dusts (Doğan 2006). The Raphignathoidea comprises 57 genera in 11 families including Barbutiidae, Caligonellidae, Camerobiidae, Cryptognathidae, Dasythyreidae, Eupalopsellidae, Homocaligidae, Mecognathidae, Raphignathidae, Stigmaeidae and Xenocaligonellididae (Fan & Zhang 2005). In this paper, we have reported 23 raphignathoid mite species belonging to 8 genera from 4 families: Caligonellidae, Camerobiidae, Raphignathidae and Stigmaeidae which were collected from Zanjan vicinity and described the male of *Stigmaeus shabestariensis* Haddad Irani-Nejad, Lotfollahi & Akbari, 2010.

Material and methods

Mites specimens were collected from soil under trees and also aerial parts of plants in Zanjan vicinity and mounted directly in Hoyer's medium. The collected specimens were identified and drawn by means of an Olympus BX_{51} differential interference contrast

microscope under 1000X magnification and equipped with a drawing tube. In the description of male of *S. shabestariensis* body length measurements represent the distance between base of gnathosoma and end of idiosoma; width was measured above coxae III; setae from the setal base to the tip of the setae; distances between setae were measured between setal bases. Legs measurements are from trochanter to tip of pre-tarsus.

The terminology and abbreviations used in the description of the male of *S. shabestariensis* follows that of Kethley (1990). Leg chaetotaxy is adapted from Fan & Zhang (2005). All measurements are given in micrometers.

Results

In this study, totally 8 genera and 23 species recorded from Zanjan, their scientific name as follows:

Taxonomy
Order Trombidiformes
Suborder Prostigmata
Superfamily Raphignathoidea Kramer, 1877
Family Caligonellidae Grandjean, 1944

Genus *Caligonella* Berlese, 1910
***Caligonella humilis* (Koch, 1838)**
Stigmaeus humilis Koch, 1838 (Original designation)

Material examined: One female from soil under *Populus* sp. (Salicaceae), Amin Abad, Zanjan, 21 July 2012.
Iranian records: Hamedan (Ueckermann & Khanjani 2003; Rostami *et al.* 2010a, b), Razavi Khorasan (Rahmdeli *et al.* 2011), Kerman (Changizi *et al.* 2011a, b), East Azarbaijan (Bagheri *et al.* 2011; Gheblealivand *et al.* 2011a; Bagheri & Ahani-Azad 2012; Navaei-Bonab *et al.* 2012).
Habitat: Weeds, soil of plum and apple orchards, soil of alfalfa fields; leaf litter, soil under liquorice and sainfoins.

Genus *Molothrognathus* Summers & Schlinger, 1955

***Molothrognathus bahariensis* Ueckermann & Khanjani, 2003**

Material examined: Two females from soil under *Helianthus* sp. (Asteraceae), 27 August 2012, Valarood village, Zanjan.
Iranian records: East Azarbaijan (Bagheri *et al.* 2006a, 2011; Lotfollahi *et al.* 2010; Bagheri & Ahani-Azad 2012; Navaei-Bonab *et al.* 2012), Kermanshah (Babakfard *et al.* 2008), Hamedan (Ueckermann & Khanjani 2003), Razavi Khorasan (Rahmdeli *et al.* 2011), Kerman (Changizi *et al.* 2011a, b).
Habitat: Field and also trees, weeds, clover, soil sample, common bean, black locust, grass, alfalfa fields, camelthorn, soil of apple and pear orchards and squash fields.

Genus *Neognathus* Willmann, 1952

1**. *Neognathus rijabicus* Nazari, Khanjani & Kamali, 2013**

Material examined: Three females from soil under *Populus* sp. (Salicaceae), Kazabar

village, Zanjan, 6 October 2012; one female from soil under *Elaeagnus angustifolia* (Elaeagnaceae), Homayon village, Zanjan, 12 November 2012.
Iranian records: Kermanshah **(**Nazari *et al*. 2013)
Habitat: Wheat litter in wheat farm.

2**.** ***N. terrestris*** **Summers & Schlinger, 1955**
Stigmagnathus terrestris Summers & Schlinger, 1955 (Original designation)

Material examined: Three females from soil under *Cydonia* sp. (Rosaceae), 16 September 2012, Dizaj, Zanjan; two females from soil under *Astragalus* sp. **(**Leguminosae**)**, Saremsaghlo, Zanjan, 30 June 2012; three female from soil under *Prunus armeniaca* (Rosaceae), Chayerloo village, Zanjan, 20 September 2012; two females from soil under *Prunus persica*, Esfajin village, Zanjan, 10 July 2012; four females from soil under *Populus* sp. (Salicaceae), Andabadolia village, Zanjan, 25 September 2012; two females from soil under *Euonymus japonicas* (Celastraceae), Amirkabir park, Zanjan, 27 June 2012; three females from soil under *Vitis vinifera* (Vitaceae), Ganavand village, Zanjan, 9 October 2012; two females from soil under *Astragalus* sp. (Fabaceae), Nikpey, Zanjan, 13 October 2012; three females from soil under *Populus* sp. (Salicaceae), Kazabar village, Zanjan, 6 October 2012; one female from soil under *Cydonia* sp. (Rosaceae), Nimavar village, Zanjan,16 September 2012.
Iranian records: Hamedan (Ueckermann & Khanjani 2003; Rostami *et al.* 2010a, b), West Azarbaijan (Haddad Irani-Nejad *et al.* 2005; Zarei *et al.* 2011), Razavi Khorasan (Rahmdeli *et al.* 2011), Kerman (Changizi *et al.* 2011a, b), East Azarbaijan (Bagheri *et al.* 2011; Gheblealivand *et al.* 2011a; Bagheri & Ahani-Azad 2012; Navaei-Bonab *et al.* 2012), Golestan (Shirinbeik Mohajer *et al.* 2012).
Habitat: Crops, weeds, pear orchards, soil of alfalfa fields, sugar beet, soil under pagoda tree and soil samples from plum orchards.

Family Camerobiidae Southcott, 1957

Genus *Neophyllobius* Berlese, 1886

1**.** ***Neophyllobius asalii*** **Khanjani & Ueckermann, 2006**

Material examined: Five females from soil under *Prunus domestica* (Rosaceae), Taham village, Zanjan, 12 November 2012.
Iranian records: Lorestan, Kermanshah, Markazi (Ahmad Hoseini & Khanjani, 2013)
Habitat: Soil under gum, hawthorn tree, plum tree, walnut tree and alfalfa plant.

2**.** ***N. edwardi*** **Ahmad Hoseini & Khanjani, 2013**

Material examined: Two females from soil under *Populus* sp. (Salicaceae), Kazabar village, Zanjan, 5 November 2012.
Iranian records: Fars (Ahmad Hoseini & Khanjani 2013)
Habitat: from soil and rotten leaves under oak trees.

3. ***N. persiensis*** **Khanjani & Ueckermann, 2002**

Material examined: Four females from soil under *Populus* sp. (Salicaceae), Kazabar village, Zanjan, 6 October 2012; two females from soil under *Populus* sp. (Salicaceae), Andabadolia village, Zanjan, 25 September 2012; three females from soil under

Astragalus sp. (Fabaceae), Zanjan University Campus, 26 May 2012.
Iranian records: Hamedan (Khanjani & Ueckermann 2002a), Kerman (Changizi *et al.* 2011a, b), East Azarbaijan (Bagheri *et al.* 2011; Gheblealivand *et al.* 2011a; Navaei-Bonab *et al.* 2012), West Azarbaijan (Zarei *et al.* 2011); Hamedan, Markazi (Ahmad Hoseini & Khanjani 2013).
Habitat: Samples of litter near road and litter under sophore plant, orchards and crop fields, weeds, soil of apple orchards, soil of alfalfa fields, soil of gum, soil of gladiolus.

4. ***N. zolfigolii*** **Khanjani, Asali-Fayaz & Ghanbalani, 2010**

Material examined: Four females from soil under *Elaeagnus angustifolia* (Elaeagnaceae), Gavazang village, Zanjan, 23 October 2012.
Iranian records: Hamedan (Khanjani *et al.* 2010a), Razavi Khorasan (Salarzehi *et al.* 2012), Lorestan (Ahmad Hoseini & Khanjani 2013).
Habitat: Soil under wild rose bush and vineyards.

Family Raphignathidae Kramer, 1877

Genus *Raphignathus* Dugès, 1834

1. ***Raphignathus hecmataniensis*** **Khanjani & Ueckermann, 2003**

Material examined: Nine females from litter, Hesar village, Zanjan, 23 September 2012; four females from soil under *Populus* sp. (Salicaceae), Andabadolia village, Zanjan, 25 September 2012; two females from soil under *Juglans regia* (Juglandaceae), Tazekand village, Zanjan, 9 October 2012; seven females from soil under *Populus* sp. (Salicaceae), Soltan Abad village, Zanjan, 8 October 2012.
Iranian records: Fars (Khademi *et al.* 2006; Sahraeian *et al.* 2006; Majidi & Akrami 2011; Beyzavi & Ostovan 2012), Guilan (Noei *et al.* 2008), Hamedan (Khanjani & Ueckermann 2003; Rostami *et al.* 2010b; Masoudian & Khanjani 2013), East Azarbaijan (Ghorbani *et al.* 2010, 2013; Gheblealivand *et al.* 2011a; Bagheri *et al.* 2011; Ahani-Azad *et al.* 2012; Navaei-Bonab *et al.* 2012), Tehran (Kamali *et al.* 2006), Kermanshah (Khanjani & Ueckermann 2003), Kerman (Changizi *et al.* 2011a, b; Dehghan-Dolati *et al.* 2011), West Azarbaijan (Zarei *et al.* 2011).
Habitat: Date palm, stored rice, crop fields, soil samples, weeds, fruit orchards, citrus orchards, sample of grasses, soil covered with wheat, sample of tragacanth, pagoda tree and liquorice plants, leaves, fruits and trunk fiber of date palms, soil of apple orchards, soil of alfalfa fields, soil of plum orchards, soil and humus under oak trees and Echinops plant.

2. ***R. ensiplopsis*** **Meyer & Ueckermann, 1989**

Material examined: Three females from soil under *Cydonia* sp. (Rosaceae), Hesar village, Zanjan, 23 September 2012.
Iranian records: Hamedan and Lorestan (Khanjani *et al*., 2013).
Habitat: from soil of plum tree, soil of gum bushes and pine tree.

3. ***R. protaspus*** **Khanjani & Ueckermann, 2002**

Material examined: Eight females from soil under *Cydonia* sp. (Rosaceae), Golijak village, Zanjan, 27 September 2012; two females from soil under *Juglans regia*

(Juglandaceae), Nikpey village, Zanjan, 10 July 2012.
Iranian records: Hamedan (Khanjani & Ueckermann 2003; Rostami *et al.* 2010a, b), East Azarbaijan (Ghorbani *et al.* 2010; Bagheri *et al.* 2011; Navaei-Bonab *et al.* 2012), Fars (Beyzavi & Ostovan 2012).
Habitat: Crop fields, weeds, fruit orchards, soil of alfalfa fields, pagoda tree, soil of barly fields, black locust, wheat, grass and soil and humus under oak trees.

4. ***R. zhaoi*** **Hu, Jing & Liang, 1995**

Material examined: Four females from soil under *Cydonia* sp. (Rosaceae), Hesar village, Zanjan, 23 September 2012.
Iranian records: East Azarbaijan (Ghorbani *et al.* 2010, 2013; Gheblealivand *et al.* 2011a; Bagheri *et al.* 2011; Ahani-Azad *et al.* 2012), Fars (Khademi *et al.* 2006; Beyzavi & Ostovan 2012), Kerman (Changizi *et al.* 2011a, b; Mahdavi & Asadi 2011), West Azarbaijan (Zarei *et al.* 2011), Golestan (Shirinbeik Mohajer *et al.* 2012), Razavi Khorasan (Paktinat Saeej *et al.* 2012a), Sistan and Baluchestan (Sayadi *et al.* 2012).
Habitat: Soil of pomegranate orchards, citrus and apple trees, crop fields, weeds, soil and humus under oak trees and stored product.

Family Stigmaeidae Oudemans, 1931

Genus *Eustigmaeus* Berlese 1910

1. ***Eustigmaeus dogani*** **Khanjani, Asali Fayaz & Mirmoayedi, 2011**

Material examined: Fifteen females from soil under *Populus* sp. (Salicaceae), Kazabar village, Zanjan, 6 October 2012; two females from soil under *Populus* sp. (Salicaceae), Zanjan, 19 July 2012.
Iranian records: Kurdistan and Kermanshah (Khanjani *et al.* 2011).
Habitat: Soil samples of alfalfa, samples of lichen and soil under wild walnut trees.

2. ***E. nasrinae*** **Khanjani & Ueckermann, 2002**

Material examined: Three females from soil under *Populus* sp. (Salicaceae), Zanjan, 19 July 2012.
Iranian records: Hamedan (Khanjani & Ueckermann 2002b), West Azarbaijan (Bagheri *et al.* 2011), East Azarbaijan (Lotfollahi *et al.* 2010; Gheblealivand *et al.* 2011a, b; Navaei-Bonab *et al.* 2012), Golestan (Shirinbeik Mohajer *et al.* 2012), Fars (Beyzavi & Ostovan 2012).
Habitat: Soil under European pear, orchards and weeds, soil samples of orchards, alfalfa fields, soil of wheat and sunflower fields, soil of apple orchards, soil and humus under oak trees.

3. ***E. segnis*** **(Koch, 1836)**
Caligonus segnis Koch, 1836 (Original designation).

Material examined: Sixteen females from soil under *Populus* sp. (Salicaceae), Kazabar, Zanjan, 6 October 2012; six females from soil under *Populus* sp. (Salicaceae), Yengijeh village, Zanjan, 6 October 2012; five females from soil under *Populus* sp. (Salicaceae), Nikpey village, Zanjan, 8 October 2012; nineteen females from soil under *Elaeagnus angustifolia* (Elaeagnaceae), Homayon village, Zanjan 12 November 2012;

sixteen females from soil under *Vitis vinifera* (Vitaceae), Do Asb, Zanjan, 2 October 2012.
Iranian records: East Azarbaijan (Bagheri *et al.* 2006b; Akbari *et al.* 2010; Gheblealivand *et al.* 2011a, b; Navaei-Bonab *et al.* 2012), Hamedan (Khanjani & Ueckermann 2002), West Azarbaijan (Bagheri *et al.* 2011; Zarei *et al.* 2011), Zanjan (Rahmani *et al.* 2011), Kerman (Izadi *et al.* 2010b), Kermanshah (Darbemamieh *et al.* 2008), Golestan (Shirinbeik Mohajer *et al.* 2012), Fars (Beyzavi & Ostovan 2012).
Habitat: Crop foliages, weeds, soil samples of orchards and field crops, soil under sainfoins, soil and leaves of crops, soil of citrus, palm and pomegranate orchards, soil of fig orchards, soil of wheat fields, soil of alfalfa fields, soil of barly fields, soil and humus under oak trees.

Genus *Ledermuelleriopsis* Willmann, 1953

1. ***Ledermulleriopsis punicae* Khanjani, Mohammadi & Ghiasi, 2012**

Material examined: One female from soil under *Juglans* sp. (Juglandaceae), Nikpey village, Zanjan, 10 July 2012.
Iranian record: Kerman (Khanjani *et al*. 2012f).
Habitat: Soil under pomegranate trees.

2. ***L. zahirii* Khanjani & Ueckermann, 2002**

Material examined: Fourteen females from soil under *Berberis vulgaris* (Berberidaceae), Aghjebear village, Zanjan, 7 November 2012; eight females from soil under *Cydonia* sp. (Rosaceae), Golijak village, Zanjan, 27 September 2012; five females from soil under *Pinus* sp. (Pinaceae), Zanjan University Campus, 12 May 2012.
Iranian records: Kermanshah (Babakfard *et al.* 2008), East Azarbaijan (Bagheri *et al.* 2006b, 2011; Akbari *et al.* 2010; Lotfollahi *et al.* 2010; Gheblealivand *et al.* 2011a, b; Navaei-Bonab *et al.* 2012), Hamedan (Khanjani & Ueckermann 2002b; Rostami *et al.* 2010a, b) Fars (Khademi *et al.* 2006), West Azarbaijan (Bagheri *et al.* 2011; Zarei *et al.* 2011), Razavi Khorasan (Paktinat Saeej *et al.* 2012a).
Habitat: Fruit orchards, soil samples of plum orchards, weeds, crop foliages, citrus orchards, soil under European pear, soil underneath tragacanth plant, soil under liquorice, soil and leaves of crops, alfalfa fields, soil of wheat fields, soil of apple and pomegranate orchards.

Genus *Stigmaeus* Koch, 1836

1. ***Stigmaeus boshroyehensis* Khanjani, Izadi & Asali Fayaz, 2010**

Material examined: Seven females from litter, Hesar village, Zanjan, 23 September 2012; four females from soil under *Juglans* sp. (Juglandaceae), Nikpey village, Zanjan, 10 July 2012.
Iranian records: South Khorasan (Khanjani *et al.* 2010c), Kerman (Changizi *et al.* 2011a, b), East Azarbaijan (Gheblealivand *et al.* 2011a).
Habitat: Soil under pistachio trees, soil samples of orchards and field crops.

2. ***S. elongatus* Berlese, 1886**
Stigmaeus luteus Summers, 1962 (Synonymized by Wood, 1973).

Material examined: Three females from soil under *Cydonia* sp. (Rosaceae), Hesar

village, Zanjan, 23 September 2012; four females from soil under *Pinus* sp. (Pinaceae), Zanjan University, 12 May 2012.
Iranian records: Fars (Khademi *et al.* 2006; Sahraeian *et al.* 2006), Guilan (Noei *et al.* 2007), East Azarbaijan (Bagheri *et al.* 2006b, 2011; Akbari *et al.* 2010; Lotfollahi *et al.* 2010; Gheblealivand *et al.* 2011a, b; Navaei-Bonab *et al.*, 2012), Hamedan (Khanjani & Ueckermann 2002b; Rostami *et al.* 2010a, b), West Azarbaijan (Bagheri *et al.* 2011; Zarei *et al.* 2011), Kerman (Izadi *et al.* 2010b; Changizi *et al.* 2011a, b), Zanjan (Rahmani *et al.* 2011), Razavi Khorasan (Paktinat Saeej *et al.* 2012a, b).
Habitat: Date palm, stored rice, crops, soil samples of plum orchards, weeds, fruit orchards, crop foliages, citrus orchards, pomegranate and palms, alfalfa fields, soil under camelthorn plant, decayed rice bran, soil and leaves of crops, rice bran, soil of apple orchards, soil of pear and quince orchards.

3. ***S. haddadi*** **Bagheri & Zarei, 2012**

Material examined: One female and one male from litter 23 September 2012.
Iranian records: West Azarbaijan (Bagheri & Zarei 2012).
Habitat: Soil of apple orchards.

4. ***S. pilatus*** **Kuznetzov, 1978**

Material examind: Sixteen females and one male from Ash, Aghche Bid village, Zanjan; Seven femals, Zanjan University Campus from soil of pine, 12 May 2012, two females from soil of *Populus* sp. (Salicaceae), 21 July 2012.
Iranian records: Hamedan (Rostami *et al.* 2010a, b; Khanjani *et al.* 2010c, 2012d; Masoudian & Khanjani, 2013), Kerman (Changizi *et al.* 2011a, b), East Azarbaijan (Bagheri *et al.* 2011; Navaei-Bonab *et al.* 2012).
Habitat: Crops, soil under camelthorn, weeds, fruit orchards, soil under plum and apple trees, soil of alfalfa fields, soil of wheat fields, chicory, soil under sour cherry trees.

5. ***S. shabestariensis*** **Haddad Irani-Nejad, Lotfollahi & Akbari, 2010**

Material examined: ninety-four females and three males from soil under *Populus* sp. (Salicaceae), Kazabar village, Zanjan, 6 October 2012.
Iranian records: East Azarbaijan (Haddad Irani-Nejad *et al.* 2010; Navaei-Bonab *et al.* 2012), West Azarbaijan (Bagheri *et al.* 2011; Zarei *et al.* 2011).
Habitat: Soil samples of apple orchards, soil and leaves of crops, orchards and weeds, and soil of alfalfa fields.

Stigmaeus shabestariensis **Haddad Irani-Nejad *et al*., 2010 (Figs. 1–7)**.

Diagnosis

Female. Prodorsum with large, reticulated shield medially and 2 small and smooth shields laterally; eyes and *pob* absent; median opisthosomal shield with two setae (c_1, d_1), opisthosomal shields completely reticulated, each cell of dorsal reticulation with large vacuole; suranal shield entire, bearig 3 pairs of setae (h_{1-3}). All dorsal setae serrated. Endopodal shields smooth; aggenital shield with 4 setae (ag_{1-4}); genital plate with 2 setae (g_{1-2}). Palp genu with 1 seta; palp tarsus with 1 tridentae eupathidiun. Leg setal formulae as follows: coxae 2-2-2-2; trochanters 1-1-2-1; femora 4-4-3-2, genua 5+1κ-5-2-2; tibiae 5+1φ+1$\varphi\rho$-5+1$\varphi\rho$-5+1$\varphi\rho$-5+1$\varphi\rho$; tarsi 13+1ω-9+1ω-7+1ω-7+1ω.

Ratio: c_1/c_1-c_1 0.26–0.36, d_1/d_1-d_1 0.30–0.39, e_1/e_1-e_1 0.33–0.34, $f1/f_1$-f_1 0.28–0.31, c_1-c_1: d_1-d_1: e_1-e_1: f_1-f_1 : 1.00: 1.05–1.07: 1.07–1.17: 1.50–1.51.

Male. As in female but: ratio: c_1/c_1-c_1 0.27–0.32, d_1/d_1-d_1 0.30–0.36, e_1/e_1-e_1 0.37–0.42, $f1/f_1$-f_1 0.31–0.33, c_1-c_1: d_1-d_1: e_1-e_1: f_1-f_1 : 1.00: 0.80–0.82: 0.75–0.88: 1.12–1.19. Tarsi I-IV with two solenidia.

Material examined

Three males collected from soil under *Populus* sp. (Salicaceae), Iran: Zanjan province, Kazabar village, 6 October 2012, coll. N. Fakhari. The males are deposited as slide-mounted specimens in the Collection of the Acarology Laboratory, University of Bu-Ali Sina, Hamedan, Iran.

Description

Male (n= 3). Color in life red; idiosoma oval. Length of body (excluding gnathosoma) 366, (including gnathosoma) 488; width 219; length of leg I 191; leg II 149; leg III 171, leg IV 180.

Dorsum (Fig. 1): Dorsal shields completely reticulated, each cell with a vacuole; prodorsum bearing four pairs of setae (*vi, ve*, *sci, sce*); post ocular bodies (*pob*) and eyes absent; propdorsum with a large, median shields and two small lateral shields. Humeral shields ventero-laterally, with setae c_2. All dorsal setae slightly serrated. Lengths of dorsal setae: *vi* 13–15, *ve* 16–19, *sci* 13–17, *sce* 16–18, c_1 11–13, c_2 15–22, d_1 10–12, d_2 12–14, e_1 11–15, e_2 12–14, f_1 14–16, h_1 15–17, h_2 21–27. Distances between dorsal setae: *vi-vi* 30–35, *ve-ve* 42–44, *vi-ve* 18–23, *sci-sci* 68–74, *sce-sce* 110–136, *ve-sci* 38–43, *sci-sce* 18–24, c_1-c_1 40–41, c_1-c_2 58–80, c_2-c_2 111–168, c_1-d_1 55–63, d_1-d_1 33, d_1-d_2 51–63, d_1-e_1 48–51, e_1-f_1 21–29, f_1-h_1 29–39, d_2-d_2 105–122, e_1-e_1 30–36, e_2-e_2 83–92, e_1-e_2 40, e_1–f_1 34, f_1-f_1 45–49, f_1-h_1 35, h_1-h_1 23–27, h_2-h_2 46–52, h_1-h_2 12–14; ratio: c_1/c_1-c_1 0.27–0.32, d_1/d_1-d_1 0.30–0.36, e_1/e_1-e_1 0.37–0.42, $f1/f_1$-f_1 0.31–0.33, c_1-c_1: d_1-d_1: e_1-e_1: f_1-f_1 : 1.00: 0.80–0.0.82: 0.75–0.88: 1.12–1.19.

Venter (Fig. 2). Ventral cuticle striate transversely between coxisternal regions II–III and posterior of legs IV; coxisternal regions I–II and III–IV are surrounded covered with longitudinal striae (Fig. 2). Lengths of setae *1a* 22–27, *1b* 22–27, *1c* 32–44, *2b* 42–44, *2c* 20–26, *3a* 23–28, *3b* 16–22, *3c* 16–20, *4a* 21–23 and *4b* 14–19,*4c* 14–19, ag_1 19–21, ag_2 19–21, ag_3 19–23, ag_4 17–21, g_1 6–8, g_2 9–10, ps_1 15–19. Aggenital plate smooth, with 4 setae (ag_{1-4}); setae ag_1 as long as setae ag_{2-4}.

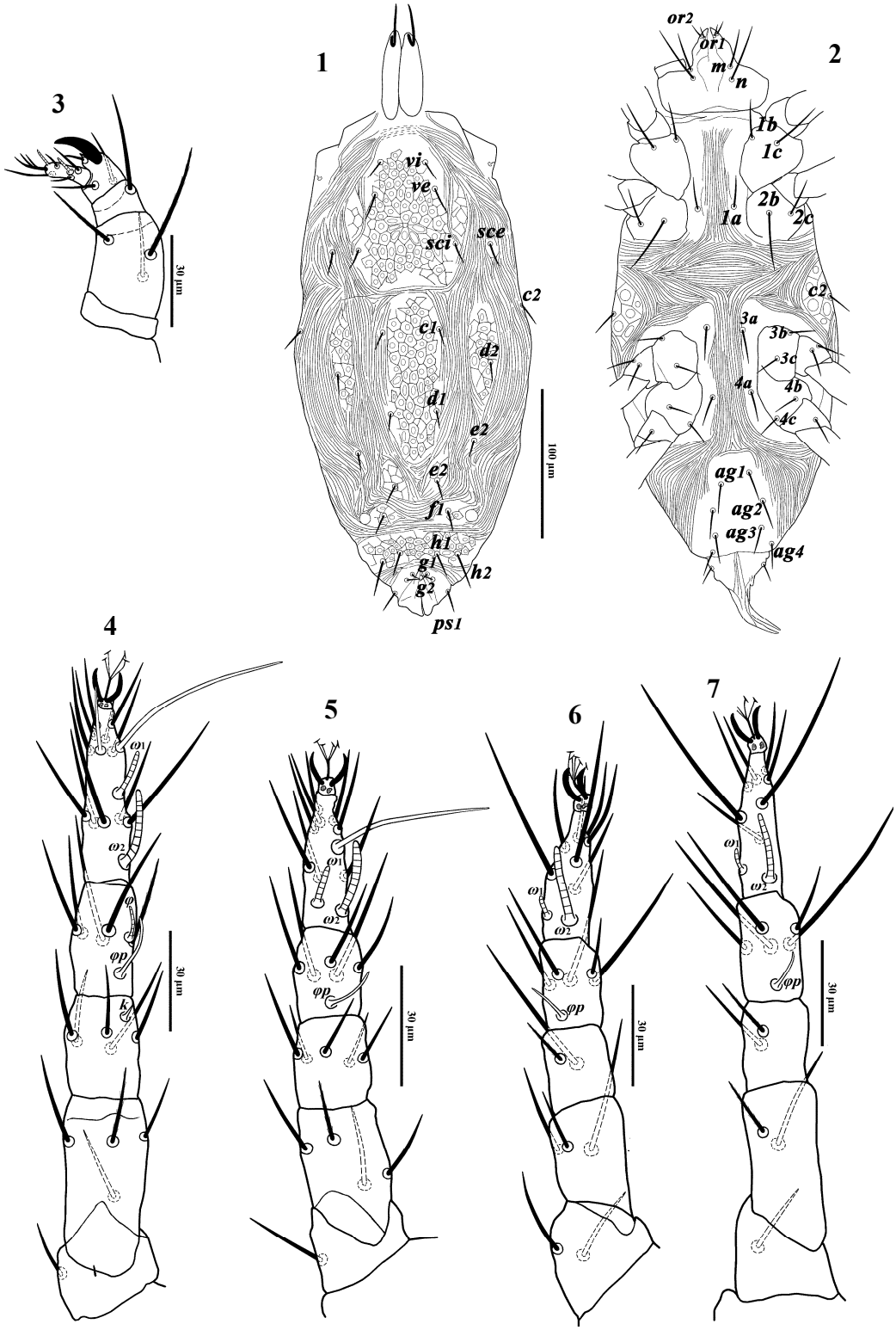
Gnathosoma (Fig. 3). Ventral infracapitulum with two pairs of subcapitular setae, *m* 22–27 and *n* 23–37, two pairs of adoral setae, or_1 7–9 or_2 8–9. Chelicerae free 61–70, movable digit 38–47 (Fig. 2). Palp five segmented, palp tarsus with 4 simple setae + 1 simple eupathidium + 1 solenidion (ω) + 1 tridentate eupathidiun, palp tibia with 2 setae + 1 well developed claw + 1 seta-like accessory claw, palp genu with 1 seta and palp femur with 3 setae (Fig. 3).

Legs (Figs. 4–7). Legs about half length of body. Leg setal formulae as follows: coxae 2-2-2-2; trochanters 1-1-2-1; femora 4-4-3-2, genua 5+1κ-5-2-2; tibiae 5+1φ+1$\varphi\rho$-5+1$\varphi\rho$-5+1$\varphi\rho$-5+1$\varphi\rho$; tarsi 13+2ω-9+2ω-7+2ω-7+2ω. Length of solenidia: ω_1 I 12–17, ω_2 I 22–26, ω_1 II 11–13, ω_2 II 19–24, ω_1 III 5–7, ω_2 III 21–24, ω_1 IV 5–7, ω_2 IV 17–25; $\varphi\rho$ I17–18, φ I 9–10, $\varphi\rho$ II 11–14, $\varphi\rho$ III 10–13, $\varphi\rho$ IV 10–12; κ I 4–5.

Remarks

Males of this species exhibit similar features of the female descriptions, except that

the tarsi I–IV in male have two solenidia instead of one solenidion in female and also ratio of some parts of body is different.



Figures 1–7. *Stigmaeus shabestariensis* Haddad Irani-Nejad, Lotfollahi & Akbari, 2010 (male). 1. Dorsal view of idiosoma; 2. Ventral view of idiosoma; 3. Palp; 4. Leg I; 5. Leg II; 6. Leg III; 7. Leg IV.

Immature stages: Unknown.

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کنه‌های بالاخانواده Raphignathoidea (Acari: Prostigmata) شهر زنجان و توصیف کنهٔ نر گونه *Stigmaeus shabestariensis*

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چکیده

کنه‌های رافیگناتوئید عوامل کنترل بیولوژیک مهم کنه‌های تارتن و اریوفید، و شپشک‌های نباتی در اکوسیستم‌های کشاورزی و جنگلی هستند. به همین دلیل، فون کنه‌های این بالاخانواده در اطراف زنجان در طول سال‌های ۲۰۱۲– ۲۰۱۳ مورد مطالعه قرارگرفت. در این مطالعه، ۲۳ گونه متعلق ۸ جنس از ۴ خانوادهٔ مختلف جمع‌آوری و شناسایی شدند. در بین آن‌ها جنس نر کنه *Stigmaeus shabestariensis* Haddad Irani-Nejad, Lotfollahi & Akbari, 2010 برای نخستین بار از این منطقه جمع‌آوری و توصیف می‌شود. این گزارش برای فون کنه‌های دنیا جدید محسوب می‌شود و در بین نمونه‌های جمع‌آوری شده به فراوانی یافت شد.

واژگان کلیدی: کنه‌های تارتن، Camerobiidae، Raphignathidae، Eupallopsellidae، Caligonellidae، Stigmaeidae.

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