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Article

Raphignathoid mite fauna of fields and orchards of Marand (Northwestern Iran) with two new records from Iran and six new records for East Azerbaijan province

Reza Navaei-Bonab[1], Mohammad Bagheri[2] & Elham Zarei[2]

1 Young Researchers Club, Marand Branch, Islamic Azad University, East Azerbaijan province, Iran; E-mail: reza_kami2005@yahoo.com
2 Department of Plant Protection, Faculty of Agriculture, University of Maragheh, Maragheh, Iran; mbagheri20022002@yahoo.com

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Abstract

A study of the raphignathoid mite fauna of fields and orchards in Marand, Northwestern Iran, revealed two new species for the mite fauna of Iran, namely: *Eustigmaeus ioaniensis* Kapaxidi & Papadoulis, 1999 and *Agistemus industani* Gonzalez-Roodrigez, 1965 and six species for mites new for the fauna of East Azerbaijan province and eight species new for the mite fauna of Marand. Stigmaeidae with 13 species and Barbutiidae and Camerobiidae with one species each had the highest and the lowest number of identified species, respectively. A key to the Iranian families and genera of Raphignathoidea are included.

Introduction

The Raphignathoidea Kramer, 1877 comprises a large cosmopolitan group of families, which are found in various ecosystems: foliage, branches, trunks, moss and lichen, litter, soil, animal nests, stored products, and even in house dust. The majority of the raphignathoid mites are free-living predators but a few are phytophagous, feeding on moss, and some species are parasites or symbionts of insects (Doğan, 2006). Amongst the predators, some are important biological control agents of spider mites, eriophyid mites, and scale insects in agriculture and forestry (Gerson & Smiley, 1990; Walter & Gerson, 1998; Fan & Zhang, 2005). Among them, the genera *Agistemus* Summers and *Zetzellia* Oudemans of the Stigmaeidae Oudemans and *Saniosulus* Summers of the Eupalopsellidae Willmann are well-known biological control agents of plant pests (Fan & Zhang, 2005). They are worldwide in distribution, abundant in most of geographical regions, and are even found in the Antarctic region (Fan & Zhang, 2005).

Up to now, seven families of this superfamily have been reported from Iran, namely: Stigmaeidae, Raphignathidae, Caligonellidae, Camerobiidae, Cryptognathidae, Eupalopsellidae and Barbutiidae (Khanjani & Ueckermann 2002a, b, c, 2008; Ueckermann & Khanjani 2002; Bagheri & Khanjani 2009 and Navaei-Bonab *et al*.,

2010). Taxonomical studies and recordings of members of the superfamily are gradually increasing in Iran [Sepasgozarian (1976); Daneshvar (1977), Nozari (1992); Liang & Zhang (1997); Haddad Irani-Nejad (1996); Jamali Zavvare (2000); Kamali *et al*. (2001); Haddad Irani-Nejad *et al*. (2006); Bagheri *et al*. (2006); Bagheri (2007), Noei *et al*. (2007); Kheradmand *et al*. (2007); Lotfoollahi *et al*. (2010); Khanjani *et al*. (2010); Akbari (2010)] and many other internal specialist.

Material and methods

Samples were collected from field and/or orchards of different regions of Marand and then were taken to the acarological laboratory of Plant Protection Department, Faculty of Agriculture, University of Maragheh. Mites were extracted by a Berlese funnel; specimens were cleared in Nesbitt's fluid, mounted in Hoyer's medium (Walter & Krantz, 2009) and examined under an Olympus Bx40 phase contrast microscope at 1000x magnification. For the re-described species, the length of the idiosoma was measured from the base of the chelicerae to the posterior margin of the body; the width of the idiosoma was measured at the broadest part. Setae were measured from their insertions to their tips; distances between setae were measured between their insertions. The terminology and abbreviations are based on Kethley (1990). All measurements are given in micrometers (μm).

Key to Iran families of Raphignathoidea Kramer, 1877

1. Leg tarsal claws (if present) without tenet hairs; palptibial claw (if present) without a ventral tooth ……..... 2

- Leg tarsal claws with tenent hairs; palptibial claw with a ventral tooth…….. ..... Barbutiidae Robaux

2. Peritremes absent ……...…..3

- Peritremes present……..……...…4

3. Palptarsi elongate; without thump-claw process ...…… Eupalopsellidae Willmann

- Palptarsi not elongate; with thump-claw process …..……...Stigmaeidae Oudemans

4. Gnathosoma retractable; prodorsum forming a hood-like projection…… ……..**..**.....Cryptognathidae Oudemans

- Gnathosoma not retractable; prodorsum without a hood-like projection …...……..5

5. Peritremes situated between chelicerae and prodorsum; coxae II and III contiguous ……..……..……. Raphignathidae Kramer

- Peritremes situated on chelicerae; coxae II and III separate……...…….……..6

6. Palp stout; palptarsus with 1–2 setae……...…….…….. Camerobiidae Southcott

- Palp not stout; palptarsus with more than 2 seta…….Caligonellidae Grandjean

Family Stigmaeidae Oudemans, 1931

Key to genera of Stigmaeidae of Iran

1. Chelicerae free ……..…..……... 2

- Chelicerae partially conjunct ……..... *Cheylostigmaeus* Willmann

2. Terminal eupathidia on palptarsus basally not fused ……...3

- Terminal eupathidia on palptarsus basally fused and split into 3 short prongs 4

3. Prodorsal shield with 3 pairs of setae; c_1 and d_1 situated on the same shield; endopodal shields I–II and III–IV present ……...…*Prostigmaeus* Kuznetsov

- Prodorsal shield with 2 pairs of setae; c_1 and d_1 situated on separate platelets; endopodal shields I–II and III–IV absent ……..... *Storchia* Oudemans

4. Prodorsum with 3 pairs of setae ……...……5

- Prodorsum with 4 pairs of setae ……..…….…..……7

5. Prodorsal shield entire; seta *sce* absent……..……..…….6

- Prodorsal shield divided; seta *sce* present …..…… *Parastigmaeus* Kuznetsov

6. Setae *d1* and *d2* situated on the same shield……..…….. *Agistemus* Summers

- Setae *d1*and *d2* situated on different shields or platelets...……. *Zetzellia* Oudemans

7. Prodorsum typically with a large shield, bearing 3 pairs of setae (*vi*, *ve* and *sci*) and a pair of platelets bearing setae *sce*……..……. *Stigmaeus* Koch

- Prodorsum typically with a large shield, bearing 4 pairs of setae (*vi*, *ve*, *sci* and *sce*) ……...……...8

8. Dorsum covered with 3 shields (suranals included).....*Eustigmaeus* Berlese

- Dorsum covered with 4 shields (suranals included).....*Ledermuelleriopsis* Willmann

Genus *Zetzellia* Oudemans, 1927

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

Material examined

This species was collected from different regions of Marand, including Bonab Jadid, Zaraghan, Ordaklu, Zonouz, Bangin, Dowlat Abad, Abarghan, Javash, Payam, Koshksaray and Yamchi.

Previous provincial records from Iran: This species was reported from different regions of Iran (Kamali *et al*. 2001).

Differential diagnosis

Prodorsal and median opisthosomal shields reticulate. Setae c_1 on small platelets. Number of setae and solenidia on tibiae and genua: 6(φp)-6(φp)-6(φp)-4 and 3-0-0-0, respectively.

Comments: This is the first record from Marand.

Genus *Stigmaeus* Koch, 1836

***Stigmaeus elongatus* Berlese, 1886**

Material examined

Five females from soil in apple orchards, July 2009; two females from soil in alfalfa fields, October 2009; two females from soil in pear orchards, August 2009.

Previous provincial records from Iran: Hamedan (Khanjani & Ueckermann 2002a; Rostami *et al*., 2010); East Azerbaijan (Bagheri 2007; Lotfollahi *et al*. 2010; Akbari 2010).

Differential diagnosis

This species completely fits the description of *S. luteus* (Summers 1962, synonym of *S. elongatus*) and the redescription of Khanjani & Ueckermann (2002a).

Comments: This is the second record from Marand.

***Stigmaeus marandiensis* Bagheri & Ueckermann, 2011**

Material examined

Two females from soil in apple orchards, August 2009.

Differential diagnosis

This species is very similar to *S. planus* Kuznetzov, 1978 in the shape of dorsal shields but differs from it by prodorsal shield completely smooth vs. reticulated in *S. planus*, *e2* on distinct small platelets vs. on integument in *S. planus*, *ag1–ag4* on one single shield vs. *ag1–ag2* and *ag3–ag4* on separate shields in S. *planus* and genua I–IV with 6-4-1-2 setae vs. with 6-3-0-1 in *S. planus*.

Comments: The type specimens were also collected in Marand (Bagheri *et al*. 2011).

***Stigmaeus pilatus* Kuznetzov, 1978**

Material examined

Three females from soil under *Alhagi* sp., September 2009; one female from soil in apple orchards, July 2009; two females from soil in alfalfa fields, October 2009; five females from soil in wheat fields, April, 2009.

Previous provincial records from Iran: Hamedan (Rostami *et al*. 2010).

Differential diagnosis

Stigmaeus pilatus can be separated by the following characters: lack of reticulation of the shields, eyes present, *pob* large, median zonal and intercalary shields divided, marginal shields large, suranal shield entire.

Comments: This is the first record of this species for East Azerbaijan province.

***Stigmaeus shabestariensis* Haddad, Lotfollahi & Akbari, 2010**

Material examined

Two females from soil in apple orchards, October 2009; one female from soil in alfalfa fields, July 2009.

Previous provincial records from Iran: East Azerbaijan (Haddad Irani-Nejad *et al.* 2010).

Differential diagnosis

This species closely resembles *Stigmaeus pulchellus* Kuznetsov, 1978 and *Stigmaeus purpurascens* Summers, 1962 in the body shape and arrangement of shields, but can be separated from these species by: (1) dorsal setae much shorter, (2) propodosomal shield with an extra isolated shield laterally, (3) an extra bare shield lateral to intercalary shields and two pairs of aggenital shields.

Comments: This is the first record of this species from Marand.

Genus *Eustigmaeus* Berlese, 1910

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

Material examined

Seven females from soil in wheat fields, April 2009; four females from soil in alfalfa fields, August 2009; two females from soil in barely fields, April 2009.

Previous provincial records from Iran: Hamedan (Khanjani & Ueckermann 2002a); East Azerbaijan (Bagheri 2007; Akbari 2010).

Differential diagnosis

This species matches the redescription of *E. segnis* by Khanjani & Ueckermann (2002a).

Comments: This is the first record in of this species from Marand.

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

Material examined

Six females from soil in wheat fields, July 2009; four females from soil in sunflower fields, September 2009; two females from soil in apple orchards, August 2009.

Previous provincial records from Iran: Hamedan (Khanjani & Ueckermann 2002a); East Azerbaijan (Lotfollahi *et al*. 2010).

Differential diagnosis

This species is similar to *E. philipica* (Rimando and Corpuz-Raros, 1997) in general appearance but differs from it in the shape of dorsal setae and presence of an accessory palptibial claw. Also, *E. nasrinae* is close to *E. pectinatus* (Ewing), but differs from it in the endopodal shields which are smooth and most dorsal setae terminate in blunted tips.

Comments: This is the second record of this species from Marand.

***Eustigmaeus ioaniensis* Kapaxidi & Papadoulis, 1999 (Figs. 1−7)**

Female

Lengths of body (including gnathosoma) 480 (460−487), (excluding gnathosoma) 375 (370−383), width 308 (292−302).

Gnathosoma: Subcapitulum with two pairs of subcapitular setae (*m*, *n*), *m* 19 (18−21), *n* 15 (14−15), *m-m* 19 (17−21), *n-n* 30 (25−32), *n-m* 19 (17−18) and two pairs of adoral setae (*or1*, *or2*), *or1* 12 (11−12), *or2* 15 (15−16). Palpal chaetotaxy: tarsus with 1 terminal tridentate eupathidium + 1 solenidion + 5 tactile setae; tibia with 2 tactile setae + 1 well-developed claw + 1 accessory claw; genu with two tactile setae; femur with three serrate setae (Fig. 3).

Dorsum (Fig. 1): Dorsal shields covered with reticulate pattern formed by dimples; dimples bearing about 5−15 pores; prodorsal shield with four pairs of setae (*vi*, *ve*, *sci* and *sce*) and with one pairs of eyes located between setae *ve* and *sci*; opisthosomal shield with six pairs of setae (*c1*, *d1*, *d2*, *e1*, *e2*, *f*); suranal shield with two pairs of setae (*h1*, *h2*); dorsal body setae long and bilaterally spinulate; Dimensions of dorsal setae as follows: *vi* 83 (83−85), *ve* 95 (83−110), *sci* 78 (75−80), *sce* 75 (70−74), c_1 71 (69−70), c_2 68 (59−75), d_1 86 (82−96), d_2 75 (70−75), e_1 90 (89−94), e_2 72 (70−79), *f* 71 (69−71), h_1 47 (33−40), h_2 36 (30−35); Distances between dorsal setae: *vi-vi* 23 (21−30), *ve-ve* 95 (80−92), *vi-ve* 56 (50−59), *ve-sci* 37 (30−35), *sci-sci* 159 (134−141), c_1-c_1 67 (59−60), c_1-d_1 68 (50−65), d_1-d_1 89 (85−91), d_1-d_2 77 (69−75), e_1-d_1 93 (85−87), e_1- e_1 102 (95−100), e_1-e_2 56 (53−60), f_1-e_1 46 (49−50), f_1-f_1 51 (57−58), h_1-h_1 39 (33−37), h_2-h_2 93 (84−94).

Venter (Fig. 2): Humeral shields dimpled and bearing setae c_2 located between coxae II-III; endopodal shields completely fused and with three pairs of setae (*1a*, *3a* and *4a*); measurements of setae: *1a* 15 (14−15), *3a* 17 (15−16), *4a* 16 (16−17); aggential shields and pseudanal covers each with three pairs of setae (*ag1-ag3*, *ps1-ps3*); Lengths of setae: ag_1 13 (12−14), ag_2 15 (15−16), ag_3 15 (14−15), $ps_1$16 (14−15), ps_2 15 (14−15), ps_3 14 (14−15).

Legs (Figs. 4−7): Lengths of legs I-IV: leg I 263 (243−250), leg II 230 (218−221), leg III 228 (217−228), leg IV 255 (238−252). Setal formulae of legs I-IV: coxae 2-2-2-2, trochanters 1-2-1-1, femora 6-4-3-2, genua 4(κ)-4(κ)-1-1, tibiae 7(φ,φp)-6(φp)-6(φp)-6(φp), tarsi 14(*ω*)-10(*ω*)-8(*ω*)-7.

Male: Not observed.

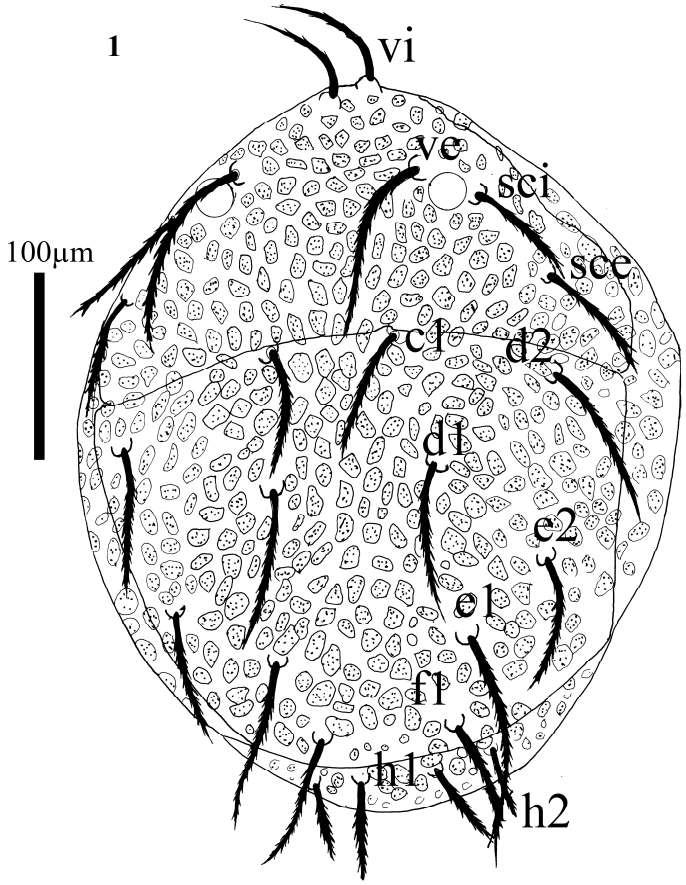


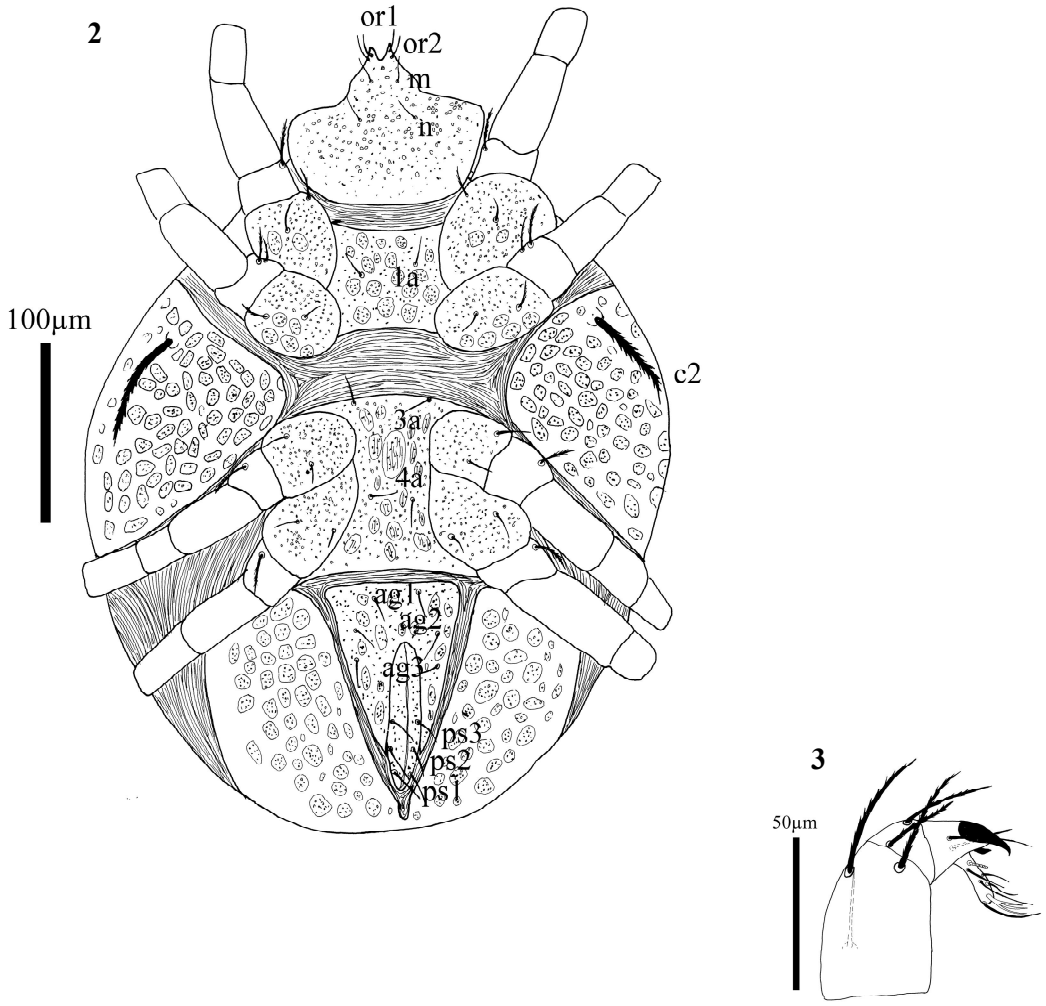
Figure 1. *Eustigmaeus ioaniensis* (Female). Dorsal view of idiosoma.

Material examined

Two females from soil in apple orchards, July 2009; two females from soil in sunflower fields, September 2009; one female from soil in alfalfa fields, September 2009; two females from soil in barely fields, April 2009.

Differential diagnosis

The Iranian specimens are similar to the type species in all aspects, but differ from Turkish specimens (Doğan *et al.* 2003) by the pseudanal setae being serrated and anterior the endopodal, humeral and suranal shields which are reticulated.
Comments: This is the first record of this species from Iran.



Figures 2–3. *Eustigmaeus ioaniensis* (Female). 2. Ventral view of body; 3. Palp.

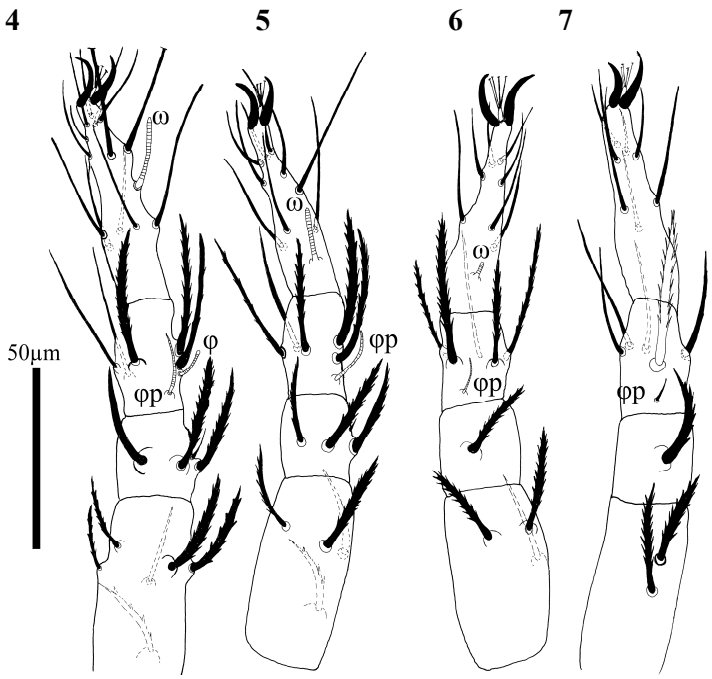


Figure 4−7. *Eustigmaeus ioaniensis* (Female). 4. Leg I; 5. Leg II; 6. Leg III; 7. Leg IV.

Genus *Agistemus* Summers, 1960

***Agistemus industani* Gonzalez-Roodrigez, 1965. (Figs. 8−14)**

Female

Lengths of body (including gnathosoma) 450 (442), (excluding gnathosoma) 330 (338), width 253 (248).

Gnathosoma: Subcapitulum with two pairs of subcapitular setae (*m*, *n*), *m* 38 (35), *n* 45 (47); *m-m* 44 (46), *n-n* 30 (32), *n-m* 8 (10) and two pairs of adoral setae (*or1*, *or2*), *or1* 15 (16), *or2* 18 (17). Palpal chaetotaxy: tarsus with 1 subterminal spine-like eupathidium + 3 terminal tridentate eupathidium + 1 solenidion + 4 simple setae; tibia with 2 simple setae + 1 claw + 1 accessory claw; genu with 1 simple setae; femur with 3 simple setae (Fig. 10).

Dorsum (Fig. 8): Prodorsum with a large shield bearing 3 pairs of setae (*vi*, *ve* and *sci*); *sce* absent; eyes and *pob* located between setae *ve* and *sci*; dorsal hysterosomal area C-F medially covered with a hexagonal shield, bearing five pairs of setae (c_1, d_1, d_2, e_1 and e_2); humeral shield vestigial, dorsocentral, with setae c_2; intercalary shields, divided along midline, bearing setae f_1; suranal shield entire and with two pairs of setae (h_1 and h_2); Dimensions of dorsal setae are as follows: *vi* 54 (56), *ve* 82 (83), *sci* 60 (59), c_1 73 (75), c_2 44 (46), d_1 69 (67), d_2 64 (63), e_1 76 (75), *e2* 75 (73), *f* 69 (71), h_1 46 (45), h_2 35 (36). Distances between dorsal setae: *vi-vi* 29 (28), *ve-ve* 80 (83), *vi-ve* 35 (39), *ve-sci* 63 (60), *sci-sci* 170 (161), c_1-c_1 52 (56), c_1-

d_1 71 (75), d_1-d_1 110 (101), d_1-d_2 28 (30), e_1-d_1 70 (73), e_1-e_1 50 (52), e_1-e_2 49 (51), f_1-e_1 25 (27), f_1-f_1 75 (72), h_1-h_1 23 (20), h_2-h_2 72 (69).

Venter (Fig. 9): Endopodal shields absent, with ventral setae *1a*, *3a* and *4a*. measurements of setae: *1a* 37 (38), *3a* 38 (37), *4a* 30 (39); distance of ventral setae: 1*a*-1*a* 35 (38), 3*a*-3*a* 54 (51), 4*a*-4*a* 40 (43); aggential shields with two pairs of aggential setae, anogenital valves with one pair of genital setae and three pairs of pseudanal setae. Lengths of setae: *ag1* 18 (19), *ag2* 21 (20), *g1* 30 (32), *ps1*15 (16), *ps2* 22 (24), *ps3* 22 (23).

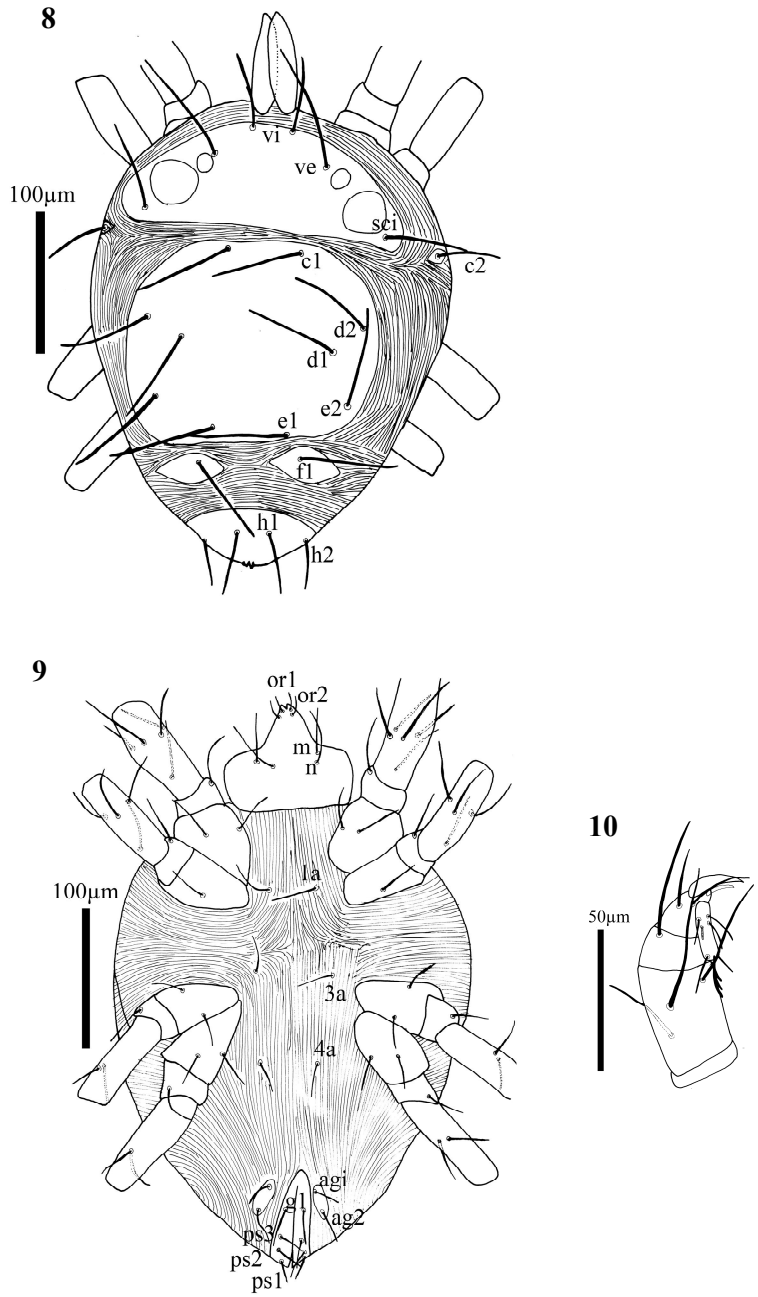


Figure 8−10. *Agistemus industani* (Female). 8. Dorsal view of body; 9. Ventral view of body; 10. Palp.

Legs (Figs. 11-14): Lengths of legs I-IV: leg I 313 (300), leg II 275 (269), leg III 282 (279), leg IV 315 (307); Setal formulae of legs I-IV: coxae 2-1-2-2, trochanters 1-1-1-1, femora 5-4-2-2, genua 4(κ)-1-0-0, tibiae 6(φp)-6(φp)-6(φp)-6(φp), tarsi 13(*ω*)-10(*ω*)-8(*ω*)-7.

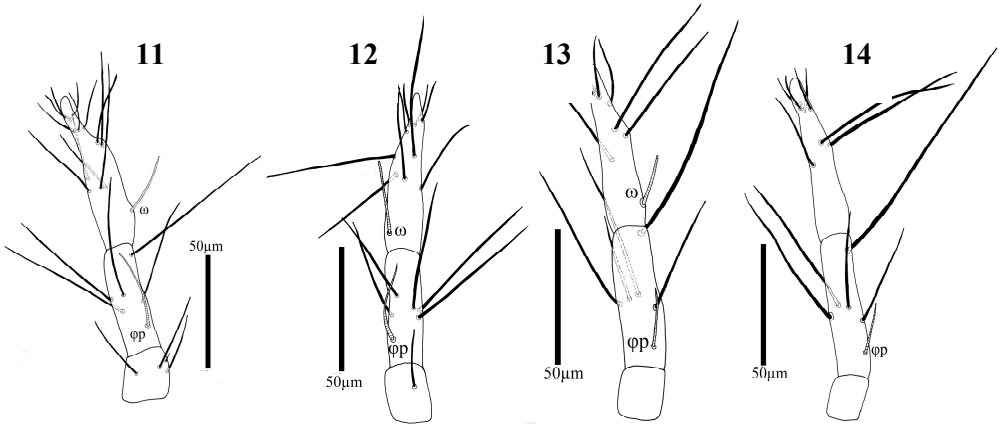


Figure 11−14. *Agistemus industani* (Female). 11. Leg I; 12. Leg II; 13. Leg III; 14. Leg IV.

Male: Not observed.

Material examined

One female from leaves of *Lagenaria* sp., April 2009; two females from apple leaves, July 2009.

Differential diagnosis

Agistemus industani is very close to *A. macrommatus* Gonzalez, 1965, in the shape of dorsal shields but can be separated from it by setae on legs stout vs. simple in *A. macrommatus*; setae ag_1 and ag_2 on fused shield vs. separated shield in *A. macromatus*; length of setae g_1 much longer from *ps2* and *ps3* vs. as long as in *A. macromatus*.

Comments: This is the first record of this species in Iran.

***Cheylostigmaeus* Wilmann, 1951**

***Cheylostigmaeus iranensis* Khanjani & Ueckermann, 2002**

Material examined

Two males from soil in apple orchards, September 2009.

*Previous provincial records from Iran***:** Hamedan (Khanjani & Ueckermann 2002a); East Azerbaijan (Bagheri 2007; Lotfollahi *et al*. 2010).

Differential diagnosis

The Marandian specimens match the description of *Cheylostigmaeus iranensis* Khanjani & Ueckermann, 2002 and collected specimens by Bagheri (2007).

Comments: This species is the second record for Marand.

Genus *Storchia* Oudemans, 1923

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

Material examined

Three females from soil in apple orchards, July 2009; one female from soil in wheat fields, April 2009; one female from soil in sunflower fields, September 2009.

Previous provincial records from Iran: Ardabil (Haddad Irani-Nejad 1996); Hamedan (Khanjani 1996); East Azerbaijan (Bagheri 2007; Akbari 2010).

Differential diagnosis

This species can be recognized by the following characters: dorsum with 14 pairs of setae and a reticulated and club shaped prodorsal shield. Genital covers with three pairs of genital setae. Tibia I with one solenidion; genua I and II with 5 and 4 setae, respectively; trochanter III with one seta and coxae IV with two setae.

Comments: This species is the first record for Marand.

Genus *Ledermuelleriopsis* Wilmann, 1953

***Ledermuelleriopsis zahiri* Khanjani & Ueckermann, 2002**

Material examined

Seven females from soil in wheat fields, April 2009; one female from soil in apple orchards, October 2009.

Previous provincial records from Iran: Hamedan (Khanjani & Ueckermann 2002a; Rostami *et al*. 2010); East Azerbaijan (Bagheri 2007; Lotfollahi *et al*. 2010; Akbari 2010).

Differential diagnosis

This species is similar to *L. plumosa* Willmann, but differs from it in that seta c_2 is clavate and strongly serrated like the dorsal setae while in *L. plumosa* seta c_2 is long, slender and has a few short serrations. Dorsomedially, *L. zahiri* is distinctly covered with vacuoles and laterally with dimples and vacuoles whereas *L. plumosa* is more punctate dorsomedially and with dimples laterally.

Comments: This is the second record of this species in Marand.

***Ledermuelleriopsis plumosa* Willmann, 1950**

Material examined

Two females from soil in wheat fields, April 2009; one female from soil in alfalfa fields, April 2009; one female from soil in barely fields, April 2009.

Previous provincial records from Iran: Hamedan (Khanjani & Ueckermann 2002a); East Azerbaijan (Bagheri 2007; Lotfollahi *et al*. 2010).

Differential diagnosis

The Marandian specimens completely resembles specimens collected by Bagheri (2007) and specimens from Hamedan (Khanjani & Ueckermann 2002a) except in having a shield between metapodosoma and podosoma and in having one solenidion on tarsus III.

Comments: This is the second record of this species from Marand.

Raphignathidae Kramer, 1877

Genus *Raphignathus* Duges, 1833

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

Material examined

One female from soil in apple orchards, July 2009; one female from soil in sunflower fields, September 2009; four females from soil in apple orchards, August 2009.

Previous provincial records from Iran: Ardabil (Haddad Irani-Nejad 1996); East Azerbaijan (Bagheri 2007); Isfahan (Jalaeian *et al*. 2005).

Differential diagnosis

Raphignathus giselae Meyer & Ueckermann, 1989 is very close to *R. gracilis* (Rack) but it can be separated from the latter by the median prodorsal shield, which is widely separated from the peritremes anteriorly, and dorsal setae e_1, which do not reach the anterior margin of the opisthosomal shield.

Comments: This is the first record of this species from Marand.

***Raphignathus hecmatanaensis* Khanjani & Ueckermann, 2002**

Material examined

Three females from soil in apple orchards, September 2009; two females from soil in alfalfa fields, April 2009.

Previous provincial records from Iran: Hamedan (Khanjani & Ueckermann 2002c).

Differential diagnosis

Raphignathus hecmatanaensis is very close to *R. gracilis* (Rack) but differs from it in that the legs are shorter, and leg IV is shorter than the body vs. as long as or longer than the body in *R. gracilis*. Also, in *R. hecmatanaensis* the dorsal setae are shorter and one pair of small shields are usually present posteriorly between median and lateral prodorsal shields while these are absent in *R. gracilis*.

Comments: This species is the first record for East Azerbaijan province.

***Raphignathus protaspus* Khanjani & Ueckermann, 2002**

Material examined

One female from soil in alfalfa fields, April 2009; two females from soil in barely fields, August 2009.

Previous provincial records from Iran: Hamedan (Khanjani & Ueckermann 2002c).

Differential diagnosis

This species is close to *R. collegiathus* Atyeo *et al*., but can be distinguished from it by setae *e* well behind anterior margin of opisthosomal shield with cupule *im* on the shield; small shields posterolateral to median prodorsal shield present and endopodal III-IV slightly longer than *R. collegiathus.*

Comments: This is the first record of this species from East Azerbaijan province.

***Raphignathus gracilis* Rack, 1962**

Material examined

One female from soil in alfalfa fields, July 2009; two females from soil in wheat fields, April 2009; three females from soil in apple orchards, September 2009.

Previous provincial records from Iran: East Azerbaijan (Akbari 2010).

Differential diagnosis

This species is very close to *Raphignathus giselae* Meyer and Ueckermann, 1989 but can be distinguished from the latter by the median prodorsal shield which is close to the peritremes anteriorly and dorsal setae e_1 which reach to the anterior margin of the opisthosomal shield.

Comments: This species is the first record for Marand.

Camerobiidae Southcott, 1957

Genus *Neophyllobius* Berlese, 1886

***Neophyllobius persiaensis* Khanjani & Ueckermann, 2002**

Material examined

Two females from soil in apple orchards, April 2009; one female from soil in alfalfa fields, April 2009.

Previous provincial records from Iran: Hamedan (Khanjani & Ueckermann 2002b).

Differential diagnosis

The Marandian species matches the description of *Neophyllobius persiaensis* (Khanjani & Ueckermann, 2002b).

Comments: This species is the first record for East Azerbaijan province.

Caligonellidae Grandjean, 1944

Key to genera of Caligonellidae from Marand

1. Peritremes W-shaped and looped on laterobasal margins of stylophore.....
.....*Neognathus* Willmann

- Peritremes not like this ……..……....2

2. Peritremes arising anteriorly on stylophore….……..…*Caligonella* Berlese

- Peritremes arising medially on stylophore.....
..... *Molothrognathus* Summers & Schilinger

Genus *Molothrognathus* Summers & Schilinger, 1995

***Molothrognathus bahariensis* Ueckermann & Khanjani, 2002**

Material examined

Two females from soil in apple orchards, April 2009; one female from soil in squash fields, July 2009; two females from soil in pear orchards, August 2009.

Previous provincial records from Iran: Hamedan (Ueckermann & Khanjani 2002); East Azerbaijan (Bagheri 2007; Lotfollahi, *et al*. 2010).

Differential diagnosis

This species resembles *M. dilucidus* Kuznetzov in that setae *sce*, c_2, h_1 and h_2 are longer than the other dorsal setae. Howewer, *M. bahariensis* differs from *M. dilucidus* by following characters: seta *f* long, extending more than half its length past the posterior margin of the opisthosoma, as opposed to reaching only to the

posterior margin in *M. dilucidus*, ventral setae longer than those of *M. dilucidus*, prodorsal shield absent but present in *M. dilucidus*.

Comments: This is the first record of this species for Marand.

***Molothrognathus mehrnejadi* Liang & Zhang, 1997**

Material examined

One female from soil in alfalfa fields, April 2009; two females from soil in plum orchards, August 2009.

Previous provincial records from Iran: Kerman (Liang & Zhang 1997); Isfahan (Jalaeian *et al*. 2005); Hamedan (Ueckermann & Khanjani 2002).

Differential diagnosis

This species is similar to *M. phytocolus* Meyer & Ueckermann, but differs from it in having relatively longer dorsal setae.

Comments: This is the first record for East Azerbaijan province.

Genus *Caligonella* Berlese, 1910

***Caligonella humilis* (Koch, 1938)**

Material examined

Five females from soil in apple orchards, August 2009; two females from soil in alfalfa fields, September 2009.

Previous provincial records from Iran: Hamedan (Ueckermann & Khanjani 2002).

Differential diagnosis

This species is similar to *C. afroensis* Meyer & Ueckermann but can be distinguished from it by the following characters: the peritremes are shorter than those of *C. afroensis*; opisthosomal striae reaching past setae *d*; solenidion φp on tibia I is three times longer than φ, while in *C. afroensis* it is a third or twice longer than φ.

Comments: This is the first record of this species for East Azerbaijan province.

Genus *Neognathus* Willmann, 1952

***Neognathus terrestris* Summers & Schilinger, 1955**

Material examined

One female from soil in alfalfa fields, April 2009; three females from soil in pear orchards, August 2009.

Previous provincial records from Iran: Hamedan (Khanjani 1996; Rostami *et al*. 2010); West Azerbaijan (Hajiqanbar 2001); East Azerbaijan (Bagheri 2007).

Differential diagnosis

This species can be recognized by the following characters: peritremes with three to four nodes, outer ascending arms terminate on small rounded lobes on lateral margin of stylophore; opisthosoma with three pairs of cupules and setae *m* located on subcapitulum, twice as far apart as setae *n*; eyes absent; all dorsal and ventral setae smooth; tarsus IV without solenidion.

Comments: This is the second record of this species for Marand.

Family Barbutiidae Robaux, 1975

Genus *Barbutia* Oudemans, 1927

***Barbutia iranensis* Bagheri, Navaei & Ueckermann, 2010**

Material examined

Two deutonymph females from soil in apple orchards, July 2009.

Previous provincial records from Iran: East Azerbaijan (Bagheri *et al.* 2010).

Differential diagnosis

The deutonymphs of this species closely resembles the deutonymphs of *B. australia* in general appearance, ratio of dorsal setae and leg chaetotaxy of most leg segments, but differs from it by having one and two setae on femur II and III, respectively, lacking solenidia on tarsus IV and having ag_2 about three times the length of ag_3. This species is also similar to *B. perretae* Robaux in leg chaetotaxy but differs from the latter by having a solenidion on tibia II and having 10 + 2ω setae on tarsus I (7+2ω in *B. perretae*).

Comments: This species was described by Bagheri *et al.* (2010) from Marand.

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چکیده

فون کنه‌های raphignathoid مزارع و باغ‌های شهرستان مرند در شمال غربی ایران مطالعه و بررسی شد. در این مطالعه مشخص شد که دو گونه به نام های *Eustigmaeus ioaniensis* Kapaxidi & Papadoulis, 1999 و *Agistemus industani* Gonzalez-Roodrigez, 1965 برای فون کنه‌های ایران جدیدند. هم‌چنین شش گونه برای فون استان آذربایجان شرقی و هشت گونه برای فون مرند نیز جدید بودند. از نظر تعداد گونه‌ها، خانواده Stigmaeidae با ۱۳ گونه و خانواده‌های Barbutiidae و Camerobiidae با داشتن یک گونه به ترتیب بیشترین و کمترین تعداد گونه ها را به خود اختصاص دادند.