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## Article

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# A new species of the genus *Favognathus* Luxton (Acari: Cryptognathidae) from western Azerbaijani, Iran

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### Abstract

A new species of the genus *Favognathus* Luxton is described from Iran, namely: *F. naghii* Hassanzadeh, Khanjani & SafarAlizadeh **sp. nov.**, collected from soil and litter under *Cydonia oblonga* Mill. (Rosaceae), Sardasht vicinity, Western Azerbaijan Province, Iran. Also, a key to all known species of the genus *Favognathus* is presented here.

**Key words**: Plant, terrestrial mite, litter, lichen, mosses.

### Introduction

Members of the family Cryptognathidae Oudemans are small, scarlet-red or orange in life. They can be defined by presence of a protective hood anterior to the propodosoma, an extremely extendable gnathosoma, the pleural circumferential integument with a characteristic pattern and slit-like cupules (Doğan & Ayyildiz 2004; Akyol & Koç 2010). The genus *Favognathus* Luxton is cosmopolitan in distribution and was found all over the world, except the Antarctic regions (Fan & Zhang 2005; Doğan 2008). Mites of this genus are collected from soil, litter, mosses and lichens. They probably feed on the contents of plant cells which they penetrate using their chelicerae (Luxton 1993). Currently, the family contains three genera namely: *Cryptognathus* Kramer, 1879, *Favognathus* Luxton, 1973, and *Cryptofavognathus* Doğan and Donel, 2010. The genus *Favognathus* Luxton has 32 species (Doğan 2008; Khanjani & Ueckermann 2008; Akyol 2011). To date, *F. mirazii* Khanjani & Ueckermann, 2008; *F. pongolensis* Meyer & Ueckermann, 1989; *F. luxtoni* Koç & Ayyildiz, 1999; and *F. distortus* Kuznetsov, 1974 have been reported from Iran (Khanjani & Ueckermann 2008). In this article, a new species, *F. naghii* **sp. nov.**, is described and illustrated.

### Material & Methods

The mite samples were collected from soil and litter under quince tress, *Cydonia oblonga* Mill (Rosaceae), Sardasht vicinity, Western Azerbaijan, Iran. Mites were extracted in Tullgren funnel and mounted in Hoyer's medium, and examined under

1000X magnification of an Olympus BX51 microscope (DIC). All figures were drawn by means of drawing tube. Body length was measured from the base of the hood to the end of the idiosoma; width was measured just behind coxa III. Setae were measured from the setal base to their tip; distances between setae were measured between setal bases. Leg and palp lengths were measured from the coxae to the pretarsus. The terminology and abbreviations used in the species description follow that of Kethley (1990). All measurements are given in micrometers and the measurement of the holotype is followed by the range of the paratypes in parentheses.

**Key to all known species of the genus *Favognathus* Luxton in the world (female)**

1. One pair of aggenital setae……..…….……2
– Two pairs of aggenital setae ……..…….……...……...3
2. Trochanter IV with one setae……..……..……*F. distinctus* Swift
–Trochanter IV without setae……..…….……..*F. variabilis* Swift
3. Genu II without famulus *k*……..…….……4
– Genu II with famulus *k*……..……...……..7
4. Reticulations of dorsal shield confined to lateral margins …….……..…..…5
– Dorsal shield completely reticulated ……...……...……...6
5. Members of $c_1$ 60 µm apart; tarsus II with 12 setae, excluding two solenidia……
……...…….……*F. cucurbitellus* (Meyer & Ryke)
– Members of $c_1$ 33 µm apart; tarsus II with 11 setae…….……
…….……..……*F. latibarrus* Meyer & Ueckermann
6. Sternocoxal region with nonporous areas rest of venter covered with evenly distributed pores…….…….*F. texasensis* (McDaniel & Bolen)
– Sternocoxal region finely striated with few punctations, reticulations posterior to coxae IV……..……..*F. luxtoni* Koç & Ayyildiz
7. Anterior margin of hood denticulated……..…….…….……8
– Anterior margin of hood smooth…….……...……..……16
8. Addorsal setae *tc* similar ……..…….……..….9
– Addorsal setae *tc* dissimilar ……..…….…..10
9. Dorsal shield striate with faint reticulations; sternocoxal area evenly porous without striae..…….……..…*F .favus* (Summers & Chaudhri)
– Dorsal shield without reticulations, porous; venter completely striate with some scattered punctations over coxal fields…….*F. denticulatus* (Luxton)
10. Large, idiosoma 429 µm long; dorsum without reticulations, with some striae between elongated pores; striae more evident between pores on venter; prosternal apron with 25 foveolae; femora, genua and tibiae with ridges distally.……*F. magnus* (Luxton)
– Smaller, idiosoma less than 350 µm long; dorsum with or without reticulations; prosternal apron with 13-18 foveolae ……..…….……...…...11
11. Dorsum and venter without reticulations, dorsum without striae……..……
….....……...*F. ochraceus* (Summers & Chaudhri)
– Dorsum and venter not as above…….…….…….12
12. Venter with or without reticulations……..…….……..……14
– Dorsum and venter with reticulations, fine striae and evenly distributed punctations….
…….……...13
13. Dorsal shield laterally reticulated, sternocoxal area with uninterrupted punctations and fine striations……..……...……..……*F. goffi* Swift

– Dorsal shield laterally reticulated, sternocoxal area without uninterrupted punctations and fine striations ……..…….…….……23
14. Dorsum without punctations, ventral shield with reticulations.……...……15
– Dorsum with evenly distributed pores, without striations and reticulations, ventral shield without reticulations.…….……..…..17
15. Trochanters without pores, hood has 5–6 foveolae…….……*F.izmirensis* Akyol
– Trochanter with numerous pores, hood has 7–8 foveolae……
…….…..*F. dakotaensis* (Mc Daniel & Bolen)
16. Addorsal setae *tc* on tarsus II dissimilar ……...…*F. orbiculatus* (Livshitz)
– Addorsal setae *tc* on tarsus II similar…….. ……..…...*F. kamili* Donel & Doğan
17. Dorsal shield completely reticulated…….....…….…..……18
– Dorsal shield not as above……..…….…….……19
18. Addorsal setae *tc* similar…….……..……*F. gersoni* Luxton
– Addorsal setae *tc* dissimilar…….……..……..……*F. bafranus* Doğan
19. Dorsum with rosette patterns (clusters of closely set punctuation near $c_1$ and *d*…...20
– Dorsum without rosette patterns…..……..……..…….22
20. Setal formula of tarsi 17-14-10-10……...……*F. observabilis* (Kuznetzov)
– Setal formula of tarsi not as above…….…….…….……21
21. Femur II with three setae…….…..……..*F.amygdalus* Doğan & Ayyildiz
– Femur II with two setae…….……...……*F. turcicus* Koç & Ayyildiz
22. Setal formula of tarsi I-IV 17-13-10-10……..…….*F. rugosus* (Livshitz)
– Setal formula of tarsi I-IV 13-12-9-9…….*F. erzrumensis* Doğan & Ayyildiz
23. Sternocoxal region without angular condyles……...…….……24
– Sternocoxal region with a pair of angular condyles…….…..…*F. cordylus* Luxton
24 Cluster of closely set punctations near setae *d*…..……...……...*F. insularis* Luxton
– No closely set puntations near setae *d*……..……..……..25
25. Dorsum with punctations closely associated in groups of three to five, resembeling spots of a leopard, gradually fading laterally……...*F. leopardus* (Luxton)
– Punctations not arranged like this on dorsum……..……..……...26
26. Setal formula of tarsi 16-14-12-8….…….……*F. pictus* (Summers & Chaudhri)
– Setal formula of tarsi 15-12-9-9…….....…….……27
27. Dorsal shield completely reticulated……..……*F. distortus* (Kuznetzov)
– Dorsal shield only reticulated laterally……..…..……..28
28. Venteral reticulations indinstinct or absent, hood wider than long……...
…….……*F. barrasi* (Smiley & Moser)
– Venteral reticulations present, hood slightly narrower than long.…..……...…….....29
29. Sternocoxal rgion reticulated and punctated, venter medially punctated and striated, reticular cells with punctation……..……..…..……*F. naghii* **sp. nov.**
– Sternocoxal rgion nonporous and almost smooth...…..……..…..……30
30. Single longitudinal row of pores separate nonporous area of sternocoxal region…….
…….....…..……*F. pongolensis* Meyer & Ueckermann
– Broad band of pores separating nonporous area of srenocoxal region……..…...31
31. Setal formula of tarsi I-IV 15-12-9-9, trochanter I and II with large punctations…....
……..……...…..……..*F. mirazii* Khanjani & Ueckermann
– Setal formula of tarsi I-IV 16-14-10-10, trochanter I and II without large punctations...
…….....……..……32
32. Prosternal apron with 17–20 dimples…….……...…..*F. cucurbita* Berlese
– Prosternal apron with 14 dimples……..…..…..*F. acaciae* Doğan & Ayyildiz

**Genus *Favognathus* Luxton, 1973**
*Favognathus* Luxton, 1987: 113.
Type species: *Cryptognathus cucurbita* Berlese, 1916, by original designation.
*Cryptognathus* (*Favognathus*) Luxton, 1973: 62.
Type species: *Cryptognathus cucurbita* Berlese, 1916, raised to genus by Luxton (1987)

**Genus diagnosis** (According Khanjani & Ueckermann, 2008): This genus can be distinguished by its foveolated, wedged-shaped prosternal apron, anterior to the ventral plate and two pairs of aggenital setae. However, Swift (1996) described two species with only one pair of aggenital setae.

*Favognathus naghii* Hassanzadeh, Khanjani & SafarAlizadeh **sp. nov.** (Figs. 1–9)
http://www.zoobank.org/urn:lsid:zoobank.org:act:0CFFD130-17A8-41C9-875F-1AB8DD0B7505
*Diagnosis*

Palp tibial claw absent. Ratio $c_1$–$c_1$: $d_1$–$d_1$: $e_1$–$e_1$: $f_1$–$f_1$ = 1.15(1.3): 1.84 (2.05): 1.70 (1.58): 1.0 (1.0). Dorsal shield reticulate laterally, hood with 7–8 faveolae in each longitudinal row; venter reticulated laterally and with striations and punctations. Sternocoxal region with reticulations and punctuations. Tarsi III and IV each with a solenidion; tibiae IV without $\varphi$; Number of setae and solenidia on tibiae I–IV: 5(+1φ, 1φρ)-5(+1φ)-4(+1φρ)-3; on tarsi: 15(1ω+1φρ)-12(1ω+1φρ)-9(+1ω)-9(+1ω).

*Material examined*

Two females, collected from soil and litter under quince trees, *Cydonia oblonga* Mill. (Rosaceae), at Western Azerbaijan Province, Sardasht (36°16' N, 45°46' E, 1466 m a.s.l.), Iran; 17 November 2012, by M. Hassanzadeh. The holotype female is deposited in the Collection of the Acarology Laboratory, Bu–Ali Sina University, Hamadan, Iran and paratype female will be deposited in the National Collection of Arachnida, Plant Protection Research Institute, Pretoria, South Africa.

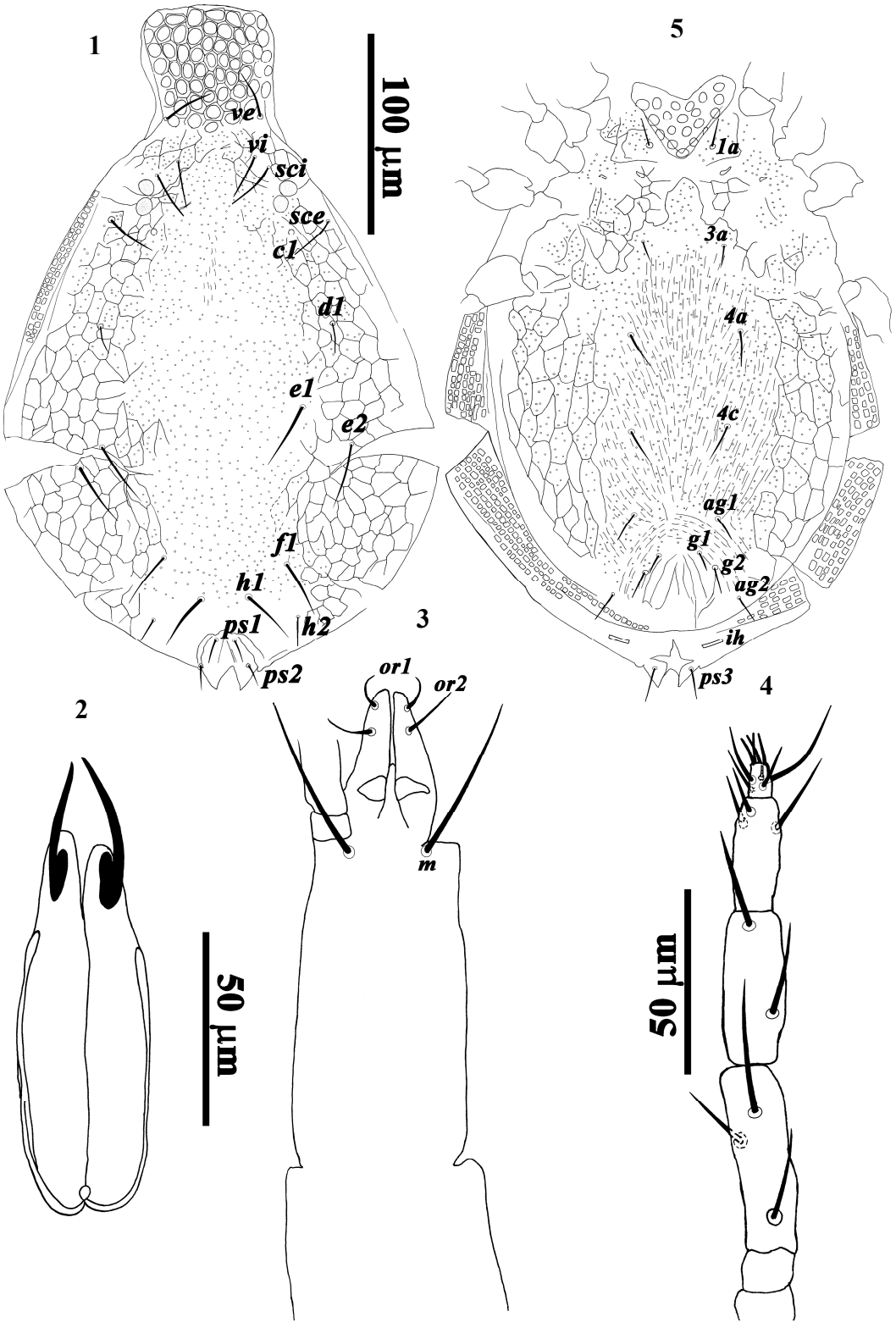
*Description*

*Female* (n= 2). Colour red in life. Length of body (including hood and anal covers) 343 (315), width 182 (168), leg I 240 (206), leg II 180 (155), leg III 175 (160), leg IV 203 (194).

*Dorsum* (Fig. 1). Length of hood 80 (74), anterior margin of hood smooth and with 7–8 foveolae in each longitudinal row, lateral margins of dorsum reticulated, with punctations medially.

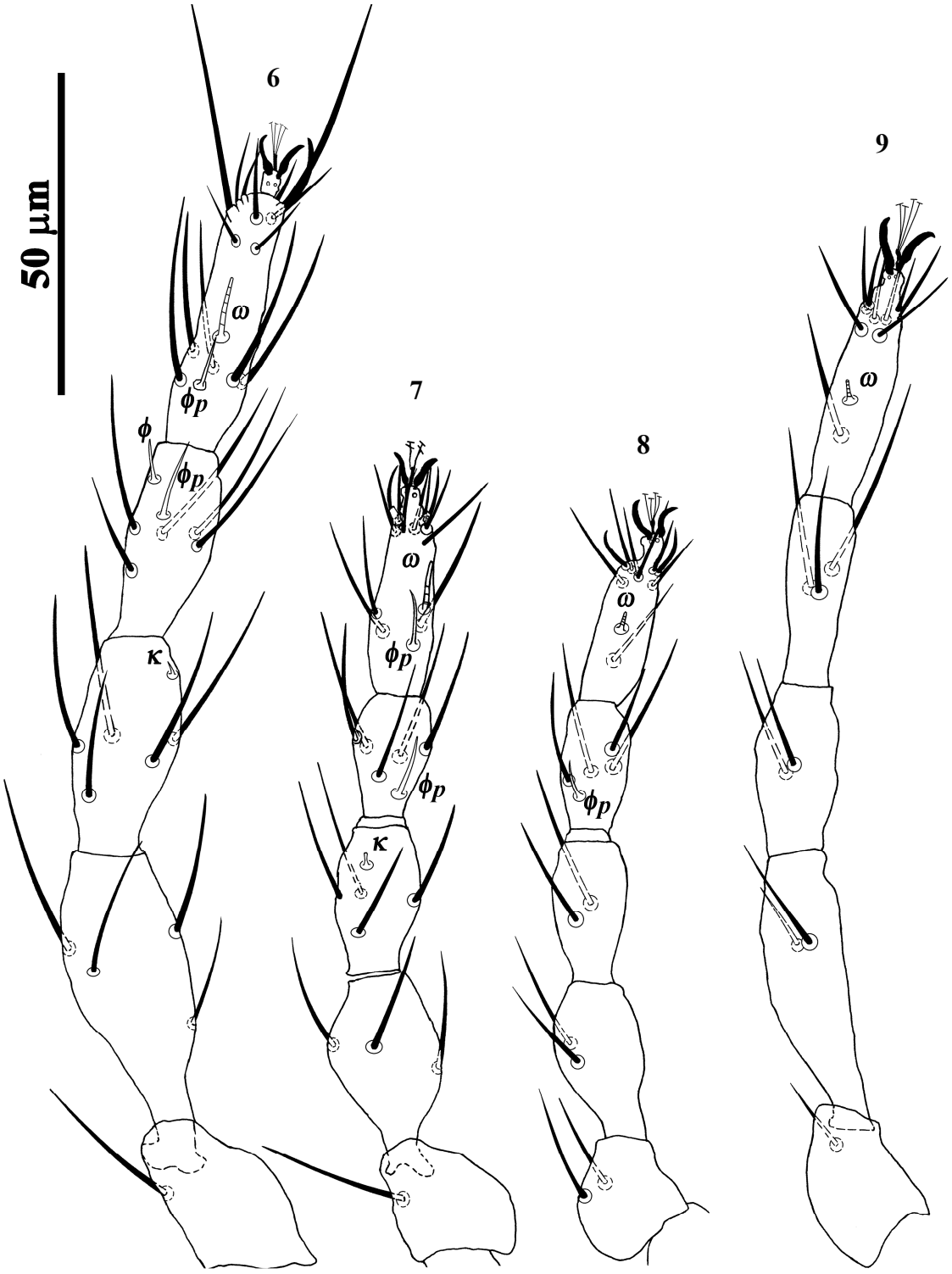
Dorsal shield with 11 pairs of simple setae. One pair of simple eyes and one pair of postocular bodies laterally between setae *sci* and *sce*. Dimension of dorsal setae as follows: $v_1$ 23(22), $v_2$ 25(21), $sc_1$ 24(24), $sc_2$ 25(30), $c_1$ (broken off), $d_1$ 15 (15), $e_1$ 32 (30), $e_2$ 31 (30), $f_1$ 27 (26), $h_1$ 23 (22), $h_2$ 15 (23). Distances between dorsal setae: $v_1$–$v_1$ 39 (45), $v_2$–$v_2$ 45 (38), $sc_1$–$sc_1$ 54 (50), $sc_2$–$sc_2$ 111 (110), $c_1$–$c_1$ 71 (66), $d_1$–$d_1$ 120 (105), $e_1$–$e_1$ 105 (87), $e_2$–$e_2$ 138 (121), $f_1$–$f_1$ 62 (51), $h_1$–$h_1$ 22 (14), $h_2$–$h_2$ 72 (59), $v_1$–$v_2$ 17 (10), $v_2$–$sc_1$ 11 (9), $sc_1$–$sc_2$ 36 (36), $sc_2$–$c_1$ 21 (21), $c_1$–$d_1$ 51 (44), $d_1$–$e_1$ 56 (45), $e_1$–$e_2$ 23 (14), $e_1$– $f_1$ 66 (60), $f_1$–$h_1$ 25 (26), $h_1$–$h_2$ 26 (24).

*Venter* (Fig. 5). Prosternal apron wedge shaped with 20 foveolae, concave at anterior margin. Venter reticulated laterally and medially with punctations and striations.




**Figures 1–5.** *Favognathus naghi* Hassanzadeh, Khanjani & SafarAlizadeh **sp. nov.** (female). 1. Dorsal view of idiosoma; 2. Chelicerae; 3. Ventral view of gnathosoma; 4. Palp; 5. Ventral view of idiosoma.

Sternocoxoal area with fine striations. Ventral shield bearing six pairs of setae *viz*. *1a*, *3*a, *4*a, *4*c, $ag_1$ and $ag_2$ and with two pairs of genital setae ($g_{1-2}$). Anal opening terminal with three pairs of pseudanal setae ($ps_{1-3}$); one pair of cupules (slit-like) anterolateraled to $ps_3$.




**Figures 6–9.** *Favognathus naghi* Hassanzadeh, Khanjani & SafarAlizadeh **sp. nov.** (female). 6. Leg I; 7. Leg II; 8. Leg III; 9. Leg IV.

*Gnathosoma* (Figs. 2–4). Ventral infracapitulum with seta *m* 37 (37) and two pairs of adoral setae ($or_{1-2}$), $or_1$ 15 (15), $or_2$ 11 (14). Length of palpi 95 (90), chelicerae 102 (100). Palp tarsus with four eupathidia, four setae, one solinidion, tibia with three, genu with two and femur with three setae (Fig. 4).

*Legs*. Length of legs I-IV: 240 (206), 180 (155), 175 (160), 203 (194). Setal formulae of leg segments as follows: coxae 2-1-2-1; trochanters 1-1-2-1; femora 4-3-2-2; genua 5(+1κ)-4(+1κ)-2-2; tibiae 5(+1φ, 1φρ)-5(+1φ)-4(+1φρ)-3; tarsi 14(+1ω,1φρ)-12(+1ω, 1φρ)-9(+1ω)-9(+1ω) (Fig. 6-9).

*Male and immature stages* – Unknown.

*Etymology*

This species is named in honor of Mr. Naghi Hassanzadeh, brother of the senior author, who kindly helped with collecting the mites.

*Remaks*

The new species, *Favognathus naghii* Hassanzadeh, Khanjani & SafarAlizadeh **sp. nov.** closely resembles *F. variabilis* Swift, 1996 in having the same dorso-venteral ornamentations, however differs from the latter by the following features: (1) two pairs of aggenital setae versus one pair in *F. varaibilis*; (2) dorsal integument of trochanters I, II and femur I without large punctations in new species but in *F. varaibilis* trochanter I, II and femur I with large punctations; (3) one pair of cupules (*ih*) instead of three pairs (*ia*, *im*, *ip*) in *F. variabilis*; (4) prosternal apron with 20 dimples versus 15 dimples in *F. variabilis*; (5) trochanters I-IV with 1-1-2-1setae versus 1-1-2-0 in *F. variabilis*; (6) genua I-IV with 5(+1κ)-4(+1κ)-2-2 whereas 6(+1κ)-5(+1κ)-2-3 in *F. variabilis*; (7) tibia I-IV with 5(+1φ, 1φρ)-5(+1φ)-4(+1φρ)-3 versus 7(+1φ, 1φρ)-6(+1φ)-5(+1φρ)-3(+1φρ) in *F. variabilis;* (8) tarsi with 15(+1ω, 1φρ)-12(+1ω, 1φρ)-9(+1ω)-9(+1ω) versus 16 (+1ω, 1φρ)-12(+1ω, 1φρ)-9(+1ω)-10(+1ω) in *F. variabilis*.

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**References**

Akyol, M. (2011) A new species of *Favognathus* Luxton, 1973 (Acari: Cryptognathidae) from the Aegean Coast of Turkey. *International Journal of Acarology*, 37 (1): 206–211.

Akyol, M. & Koç, K. (2010) Contribution to the raphignathoid fauna of Turkey, with description of a new species of *Cryptognathus* Kramer (Acari: Actinedida: Raphignathoidea). *Turkish Journal of Zoology*, 34: 159–167.

Berlese, A. (1916) Centuria seconda di Acari nuovi. *Redia*, 12: 125–177.

Doğan, S. (2008) A catalogue of cryptognathid mites (Acari: Prostigmata, Cryptognathidae) with the descriptions of a new species of *Favognathus* Luxton and a newly discovered male of *F. amygdalus* Doğan and Ayyıldız from Turkey. *Journal of Natural History*, 42(23–24): 1665–1686.

Doğan, S. & Ayyildiz, N. (2004) Mites of genus *Favognathus* (Acari: Cryptognathidae) from Erzurum Province, Turkey. *International Journal of Acarology*, 30: 123–130.
Doğan, S. & Dönel G. (2010) *Cryptofavognathus*, a new genus of the family Cryptognathidae Oudemans (Acari: Raphignathoidea), with the description of a new species from Turkey. *Zootaxa*, 2533: 36–42.
Fan, Q.-H. & Zhang, Z.-Q. (2005) *Raphignathoidea (Acari: Prostigmata). Fauna of New Zealand, Number 52*. Manaaki Whenua Press, Lincoln, 400 pp.
Kethley, J. (1990) Acarina: Prostigmata (Actinedida). *In*: Dindal, D.L. (Ed.) *Soil biology guide*. John Wiley & Sons, New York, pp. 667–756.
Khanjani, M. & Ueckermann, E.A. (2008) New species of the genus *Favognathus* Luxton (Acari; Cryptognathidae) from Iran. Acarologia, 48 (3–4): 177–186.
Kramer, P. (1879) Ueber die milbengattungen *Leptognathus* Hodge; *Raphignathus* Dug.; *Caligonus* Koch, und die neue Gattung *Cryptognathus*. *Archivs für Naturgeschichte, Neue Folge*, 45 (1): 142–157.
Luxton, M. (1973) Mites of the genus *Cryptognathus* from Australia, New Zealand and Niue Island. *Acarologia*, 15 (1): 53–57.
Luxton, M. (1987) Mites of the family Cryptognathidae Oudemans, 1902 (Acari: Prostigmata) in the British Isles. *Entomologist Monthly Magazine*, 123: 113–115.
Luxton, M. (1993) New species of cryptognathid mites from Israel (Acari: Prostigmata: Cryptognathidae). *Journal of Natural History*, 27: 1213–1217.
Swift, S.F. (1996) Hawaiian Raphignathoidea: Family Cryptognathidae (Acariformes: Prostigmata), with descriptions of three new species of the genus *Favognathus*. *International Journal of Acarology*, 22 (2): 83–99.

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# گونهٔ جدیدی از جنس *Favognathus* Luxton (Acari: Cryptognathidae) از آذربایجان غربی ایران

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## چکیده

گونهٔ جدیدی از جنس *Favognathus* Luxton از خاک به، *Cydonia oblonga* Mill. (Rosaceae)، با نام *F. naghii* Hassanzadeh, Khanjani & SafarAlizadeh **sp. nov**. از اطراف شهر سردشت استان آذربایجان غربی توصیف می‌شود. همچنین کلیدی برای گونه‌های شناخته شده جنس *Favognathus* ارایه شده است.

**واژگان کلیدی**: گیاه، کنه خاکزی، خاکبرگ، گلسنگ، خزه.

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