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RESEARCH ARTICLE

A new species of the genus *Favognathus* Luxton (Acariformes: Cryptognathidae) from Afyonkarahisar province, Türkiye

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ABSTRACT: A new species is described and illustrated based on adult females viz. *Favognathus concavum* sp. nov., collected from soil and litter under *Prunus spinosa* (Rosaceae) in Afyonkarahisar province, Türkiye. This new species differs from all known *Favognathus* species in that its prosternal apron is concave-shaped. A key is provided to the species of the genus *Favognathus* from Türkiye.

Keywords: Acari, description, species key, Raphignathoidea, *Favognathus concavum* sp. nov.
Zoobank: https://zoobank.org/C0E38205-4505-45D1-9473-944B729EAFBD

INTRODUCTION

Mites of the family Cryptognathidae Oudemans, 1902 are known as predators, sometimes in association with insects and microphytophages in edaphic habitats, moss covered substrates, leaf litter, bark, lichens (Luxton, 1973; Fan and Zhang, 2005; Mohammad Doustaresharaf et al., 2019).

The cryptognathid mite species are generally distinguished on the basis of their body ornamentation and morphology of the prodorsal hood and prosternal apron more than similar palp and leg setal counts (Luxton, 1973; Khanjani et al., 2014). The family Cryptognathidae (Acari: Raphignathoidea) contains 71 species in three valid genera: *Favognathus* Luxton (46 species), *Cryptognathus* Kramer (23 species) and *Cryptofavognathus* Doğan and Dönel (2 species) (Beron, 2020; Akyol, 2021).

Until now, 14 species of *Favognathus* have been recorded from Turkey (Akyol, 2021). In this paper, a new species, *Favognathus concavum* sp. nov., is described and illustrated based on adult females. Key to the species of the genus *Favognathus* from Türkiye is provided based on adult females.

MATERIALS AND METHODS

The specimens were collected from soil and litter under *Prunus spinosa* (Rosaceae) Afyonkarahisar province, Türkiye, and brought to the laboratory in plastic bags and extracted by Berlese-Tullgren funnels for 7 days. Mites were collected in 70% ethanol and mounted on slides in modified Hoyer's medium. The mite specimens were drawn and measured under two research microscopes (Nikon Eclipse E 400 with a drawing attachment and Olympus CX21 with an ocular micrometer). The setal nomenclature follows those of Grandjean (1944) and Kethley (1990). The holotype measurements were given first and followed by range of measurements of paratypes in parentheses. Measurements of legs were taken from the base of the trochanter to the tips of the tarsal claws. All measurements were given in micrometers (μm). The specimens, mounted on slides, are deposited in CBZM, see Zhang (2018) for the abbreviation.

RESULTS AND DISCUSSION

Family Cryptognathidae Oudemans, 1902

Genus *Favognathus* Luxton, 1987

Type species. *Cryptognathus cucurbita* Berlese, 1916, by original designation (Luxton, 1987).

***Favognathus concavum* sp. nov.** (Figures 1 and 2)

Zoobank: https://zoobank.org/48BF30F9-B717-44F3-8058-C3C98D59C9CA

Diagnosis

Anterior margin of hood smooth with 4 or 5 weak visible dimples in each longitudinal row; prosternal apron concave-shaped and with 9 foveolae; dorsal shield has two pairs clusters of five larger pits (between setae *c*, *d* and anterior of setae e_1), one pair of spine-like processes (front of setae *f*); ventral shield has two pairs spine-like processes (opposite setae 2*c*), two pairs clusters of five larger pits (posterolateral of legs IV); tarsi 15(+1*φρ* +1*ω*)-12(+1*φρ* +1*ω*)-9(+1*ω*)-9(+1*ω*); setae *tc* on tarsus II dissimilar.

Description: Female (n=6)

Length of body (excluding gnathosoma) 325 (325-351), width 224 (221-239).

Gnathosoma (Figs 1C, 2E). Gnathosoma extrudable from under hood. Length of gnathosoma (including palps) 364 (333-351); subcapitulum 117 (130); palp 104 (104-109); chelicera 117 (117-130). Subcapitulum with a pair of long setae *m* 34 (31-34) and 2 pairs of rostral setae, or_{1-2} 13 (13). Palpal supracoxal setae (*ep*) small and weakly clavate. Palp trochanter without seta, palp femur with three

setae (*d*, *l'*, *v''*), palp genu with two setae (*d*, *l''*), palp tibia with three setae (*d*, *l'*, *l''*), palp tarsus with four eupathidia (*acmς*, *ul'ς*, *ul''ς*, *sulς*), four simple setae (*ba*, *bp*, *va*, *lp*) and one solenidion *ω* 3(3).

Dorsum of idiosoma (Fig. 1A). Anterior margin of hood smooth with 4 or 5 weak visible dimples in each longitudinal row. One pair of eyes and one pair of postocular bodies laterally between setae *sci* and *sce*. Dorsal shield with light and small punctated reticulations in lateral, and with dense and large punctations in median, two pairs of slit-like cupules (*ia*, *im*), two pairs clusters with five large pits (between setae c_1 and *d*, lateral to setae e_1) and one pairs of the spine-like process (anterior to setae *f*) present. Dorsal shield with 11 pairs of simple setae.

Lengths and distances of dorsal setae as follows: *vi* 21 (21), *ve* 31 (31), *sci* 31 (27-31), *sce* 31 (31-34), *c* 36 (34-36), *d* 34 (34), e_1 34 (34), e_2 34 (34-36), *f* 34 (34-36), h_1 34 (34), h_2 27 (26-27), *vi–vi* 34 (34-36), *vi–ve* 16 (16), *ve–ve* 39 (34-39), *ve–sci* 10 (9-10), *sci–sci* 57 (49-57), *sci–sce* 27 (27-31), *sce–sce* 107 (101-107), *sce–c* 16 (16), *c–c* 75 (73-75), *c–d* 55 (52-55), *d–d* 117 (114-117), *d–*e_1 18 (18-21), e_1–e_1 83 (78-86), e_1–e_2 18 (18-21), e_2–e_2 109 (109), e_1–*f* 47 (47-52), *f–f* 34 (34-34), *f*–h_1 34 (27-34), h_1–h_1 18 (18-21), h_1–h_2 31 (31), h_2–h_2 78 (78-83).

Venter of idiosoma (Fig. 1B). Prosternal apron concave-shaped and with 9 foveolae. Ventral shield with pores, has two pairs spine-like process (opposite to setae 2*c*), two pairs of clusters with five large pits (posterior of the legs IV). Ventral seta smooth, lengths: 1*a* 18 (16-18), 3*a* 10 (10-13), 4*a* 10 (10-13. aggenital setae ag_1 10 (10-13), ag_2 10 (10-13) and genital shield with two pairs of setae g_1 13 (13-16), g_2 13 (13-16) adjacent to genital opening. Coxal setae 3*b* thicker than other coxal setae. Anal shield with three pairs of setae ps_1 16 (16-18), ps_2 13 (13-16), ps_3 10 (10-13).

Legs (Figs 2A-D). Length of legs (from base of trochanter to tip of tarsal claw): leg I 226 (224-242), leg II 172 (172-192), leg III 182 (182-192), leg IV 216 (213-218). Leg I setation (Fig. 2A): Tr 1 (*v'*), Fe 4 (*d, l', l'', bv''*), Ge 5(1) (*dp*, *l'*, *l''*, *v'*, *v''*, *κ*, Ti 5(2) (*dp*, *l'*, *l''*, *v'*, *v''*, *φ*, *φp*), Ta 15(2) (*ft'*, *ft''*, *tc'ς*, *tc''ς*, *p'ς*, *p''ς*, *a'*, *a''*, *u'*, *u''*, *v'ς*, v''ς, *pv'*, *pv''*, *pl'*, *ω*, *φp*). Tarsus I solenidion *ω* 13 (13); solenidion *φp* 16 (16); tibia I solenidion *φ* 9 (9-10); solenidion *φp* 18 (16-18); genu I famulus *κ* 5 (5). Leg II setation (Fig. 2B): Tr 1 (*v'*), Fe 2 (*d*, *l'*, *bv''*), Ge 4(1) (*d*, *l'*, *l''*, *v'*, *κ*), Ti 5(1) (*d*, *l'*, *l''*, *v'*, *v''*, *φp*), Ta 12(2) (*bv'*, *bl'*, *bl''*, *tc'ς*, *tc''ς*, *p'ς*, *p''ς*, *a'*, *a''*, *u'*, *u''*, *v'ς*, *ω*, *φp*). Tarsus II solenidion *ω* 10 (9-10); solenidion *φp* 9 (9) attenuated, setae *tc* dissimilar; tibia II solenidion *φp* 13 (10-13); famulus *κ* 5 (5). Leg III setation (Fig. 2C): Tr 2 (*l'*, *v'*), Fe 2 (*d*, *ev'*), Ge 2 (*dp*, *v'*), Ti 4(1) (*dp*, *l''*, *v'*, *v''*, *φp*), Ta 9(1) (*bv'*, *tc'ς*, *tc''ς*, *p'ς*, *p''ς*, *a'*, *a''*, *u'*, *u''*, *ω*); solenidion *ω* 5 (5); *φp* 13 (13). Leg IV setation (Fig. 2D): Tr 1 (*v'*), Fe 2 (*d*, *ev'*), Ge 3 (*dp*, *l''*, *v'*), Ti 3 (*dp*, *v'*, *v''*), Ta 9(1) (*bv'*, *tc'ς*, *tc''ς*, *p'ς*, *p''ς*, *a'*, *a''*, *u'*, *u''*, *ω*). Solenidion *ω* 10 (10). All setae simple setae smooth, solenidion (*ω*) on tarsi I-IV baculiform, solenidia *φ* and *φp* on tibiae I-III attenuated and famulus *κ* on genua I-II slightly bulbous at tip.

Male and immature stages: Unknown.

Etymology

The name of this new species is derived from Latin '*concavum*' meaning "*concave*" and refers to the prosternal apron concave-shaped.

Type materials

Holotype female and five paratype females from litter and soil under *Prunus spinosa* (Rosaceae) 1350 m a.s.l., Emirdağı mountains, B. Karabağ village, Bolvadin district, Afyonkarahisar province, Türkiye, 16 May 2015; coll. M. Akyol.

Favognathus concavum sp. nov. resembles *F. karabagiensis* Akyol, *F. cucurbita* (Berlese) and *F. acaciae* Doğan and Ayyıldız in that the dorsal and ventral shield is partly reticulated laterally, anterior margin of hood smooth, dorsum without rosette patterns and addorsal setae *tc* on tarsi II dissimilar (Luxton and Lee, 1969; Doğan and Ayyıldız, 2004; Akyol, 2021). However, it can be easily differentiated from them by the following characters: (1) prosternal apron concave-shaped in the new species, whereas prosternal apron wedge-shaped in *F. karabagiensis*, *F. cucurbita* and *F. acaciae*, (2) dorsal shield with clusters with five large pits and one pairs of spine-like process, venter with two pairs of the clusters with five large pits and two pairs of spine-like process in the new species opposed to dorsal shield with clusters of five pairs of five-six spine-like processes and venter with clusters of five pairs of three-four spine-like processes in *F. karabagiensis*, these are absent in *F. cucurbita* and *F. acaciae*, (3) prosternal apron with 9 faveolae versus 19 in *F. karabagiensis*, 17 in *F. cucurbita* and 14 in *F. acaciae*, (4) tarsus I 15(+1*φρ* +1ω) in the new species, instead, 14(+1*φρ* +1*ω*) in *F. cucurbita* and *F. acaciae*, (5) tarsus II 12(+1*φρ* +1ω) in the new species, instead, 11(+1*φρ* +1*ω*) in *F. cucurbita* and *F. karabagiensis*.

Key to the Turkish species of the genus *Favognathus* (modified from Akyol, 2021).

1a. Genu II with famulus *κ* 3

1b. Genu II without famulus *κ* 2

2a. Genu I with famulus *κ*, genu IV with two setae ..... *F. luxtoni*

2b. Genu I without famulus κ, genu IV with three setae ..... *F. erzurumensis*

3a. Anterior margin of hood smooth or rough 4

3b. Anterior margin of hood denticulate ..... *F. izmirensis*

4a. Dorsal shield partly or completely reticulated 6

4b. Dorsal shield without reticulations, completely punctated 5

5a. Ventral shield partly reticulated ..... *F. dakotaensis*

5b. Ventral shield without reticulations ..... *F. kamili*

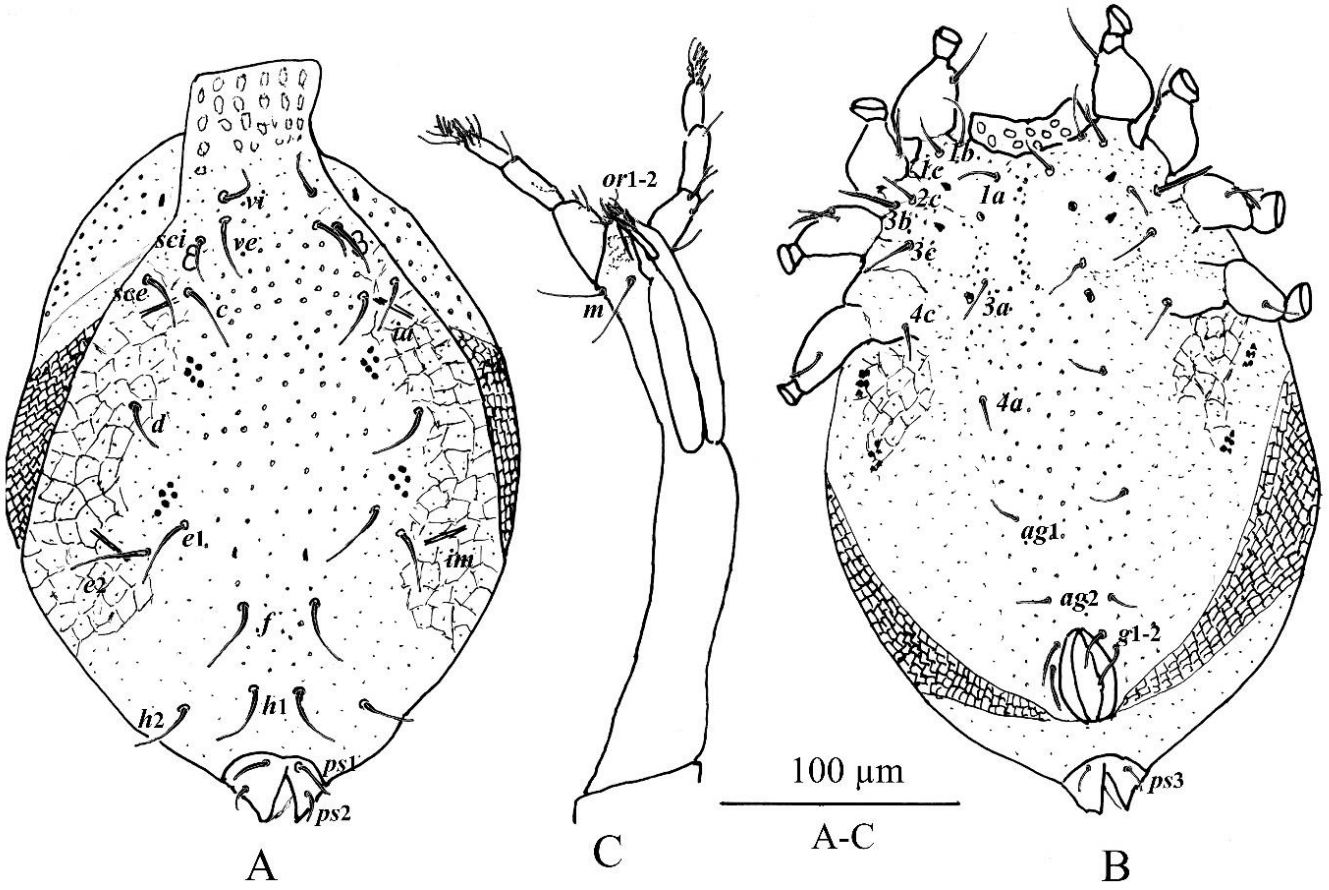

Figure 1. *Favognathus concavum* sp. nov. (female). **A.** Dorsal view of idiosoma, **B.** Ventral view of idiosoma, **C.** Gnathosoma.

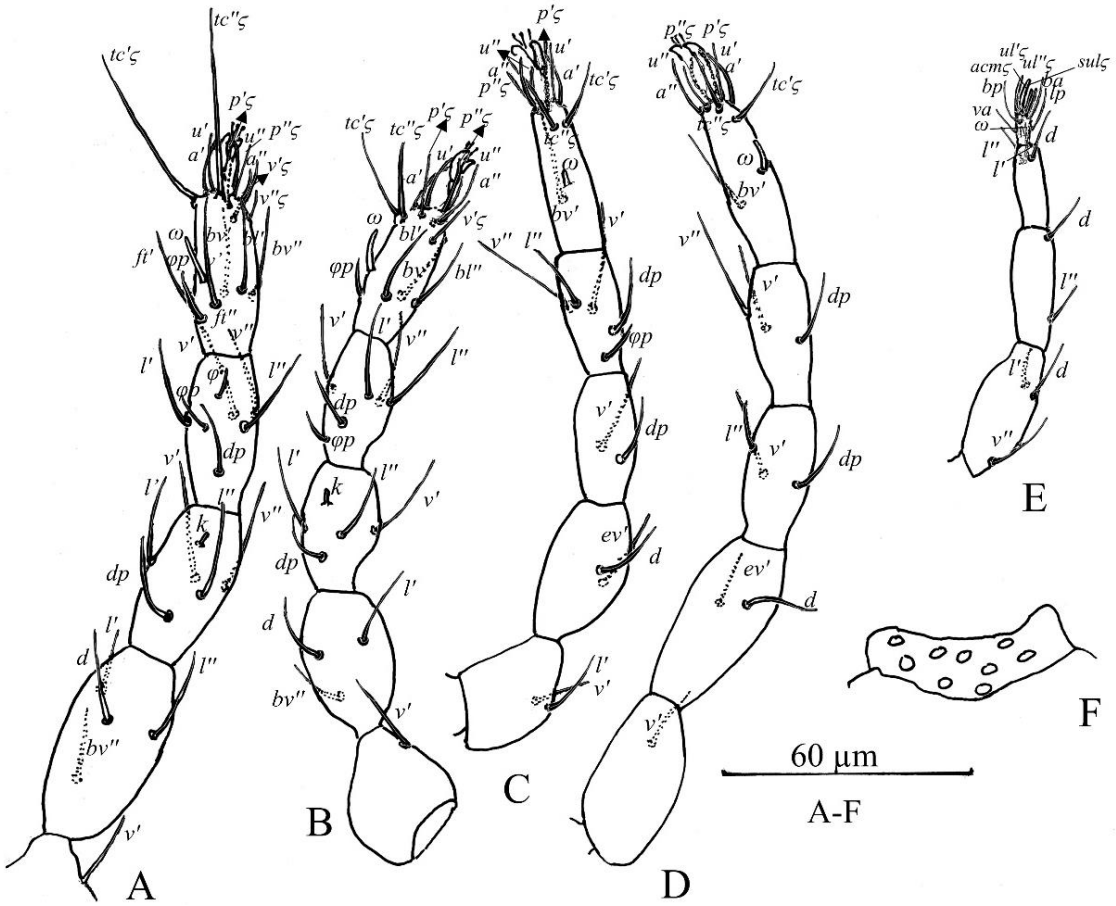

Figure 2. *Favognathus concavum* sp. nov. (female). **A.** Leg I, **B.** Leg II, **C.** Leg III, **D.** Leg IV, **E.** Palp, **F.** Prosternal apron.

6a. Dorsal shield partly reticulated 7

6b. Dorsal shield completely reticulated 12

7a. Dorsum with rosette patterns 8

7b. Dorsum without rosette patterns 9

8a. Femur II with two setae.....*F. turcicus*

8b. Femur II with three setae .....*F. amygdalus*

9a. Dorsal shield with clusters of strong pits or spine-like processes 10

9b. Dorsal shield without clusters of strong pits or spine-like processes 11

10a. Dorsal shield with clusters of five pairs of five-six spine-like processes, prosternal apron wedge-shaped ....*F. karabagiensis*

10b. Dorsal shield with clusters of two pairs of five strong pits, prosternal apron concave-shaped ....*F. concavum* sp. nov.

11a. Prosternal apron with 14 dimples .....*F. acaciae*

11b. Prosternal apron with 17 dimples.....*F. cucurbita*

12a. Dorsum with two pairs of rosette patterns.....13

12b. Dorsum with one pair of rosette patterns. *F. rosulatus*

13a. Setal formula of tarsi 16–12–10–10, hood with 5-6 dimples in each longitudinal row, prosternal apron with 11 faveolae .....*F. bafranus*

13b. Setal formula of tarsi 17–14–10–10, hood with 6-8 dimples in each longitudinal row, prosternal apron with 12-17 faveolae 14

14a. Dorsal body completely punctated and striated..... .....*F. manisaensis*

14b. Dorsal body partly punctated and without striae ....*F. distortus*

Statement of ethics approval

Not applicable.

Conflict of interest

The author declares no conflict of interest.

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