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Article

Some cryptognathid mites (Acari: Cryptognathidae) from Kütahya Province (Turkey)

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Abstract

Six cryptognathid mites were collected from Kütahya Province. Of these, three species belong to the genus *Cryptognathus* Kramer, 1879 and three species to the genus *Favognathus* Luxton, 1973. A new species *Cryptoganathus kutahyaensis* **sp. nov**., and the male of *Favognathus cucurbita* Berlese, 1917, from Turkey, are described and illustrated. Keys to all the species of the genus *Cryptognathus* and the *Favognathus* species of the Kütahya Province are provided.

Key words: Acari, Cryptognathidae, *Cryptognathus kutahyaensis* **sp. nov.**, new species, Turkey.

Introduction

Cryptognathids are small, scarlet-red or orange mites, their measurments are from 300 to 400 μm in length. The body is oval and lacks a suture between the propodosoma and the hysterosoma. The dorsal shield is reticulate or punctate (Baker & Wharton 1952; Krisper & Schneider 1998; Luxton 1993). Their mouth parts are often highly protruding (Luxton 1973). Members of the family are generally collected from soil, grass-covered soil, litter, mosses and lichens and they feed on algae, mosses and fungi (Koç & Ayyıldız 1998; Doğan & Ayyıldız 2004; Doğan 2008; Doğan & Dönel 2010; Dönel & Doğan 2011; Luxton 1993; Swift 1996; Swift & Goff 2001).

Cryptognathidae contains three genera: *Cryptognathus* Kramer, 1879, *Favognathus* Luxton, 1973 and *Cryptofavognathus* Doğan & Dönel, 2010. Nineteen species of genus *Cryptognathus* Kramer, 1879 have been so far recorded in the world and four of them are known from Turkey, namely, *C. lagena* Kramer*, C. luteolus* Summers & Chaudhri*, C. ayyildizi* Akyol & Koç and *C. ozkani* Doğan & Ayyıldız (Koç & Ayyıldız 1998; Doğan 2008; Dönel & Doğan 2011).

The genus *Favognathus* Luxton is cosmopolitan in distribution. Up till now, the genus *Favognathus* comprises of 35 species occurring in all zoogeographical regions (Doğan 2008; Khanjani & Ueckermann 2008; Akyol 2011). To date, seven species of *Favognathus – Favognathus acaciae* Doğan & Ayyildiz, *Favognathus amygdalus* Doğan & Ayyildiz, *Favognathus bafranus* Doğan, *Favognathus cucurbita* (Berlese), *Favognathus erzurumensis* Doğan & Ayyildiz, *Favognathus luxtoni* Koç & Ayyildiz,

Favognathus turcicus Koç & Ayyildiz and *Favognathus izmirensis* Akyol – have been reported from Turkey (Koç & Ayyıldız 1999; Doğan & Ayyıldız 2002, 2004; Koç & Akyol 2004; Doğan 2008; Akyol 2011). The genus *Favognathus* is better known than *Cryptognathus*. The most recorded species in the former genus, *Favognathus cucurbita* (Berlese) was reported from the Palearctic, Ethiopian and Oriental regions (Doğan 2008).

In this paper a new species *Cryptognathus kutahyaensis* is described and the male of *Favognathus cucurbita* (Berlese, 1917), the type species of the genus, described for the first time. Keys to the all species of *Cryptognathus* and the *Favognathus* species of the Kütahya Province are also provided.

Materials and Methods

The litter, soil and moss samples taken from mixed habitats in Kütahya province (Turkey) were brought to the laboratory in nylon bags. Mites were extracted in Berlese funnels for five to seven days and preserved in 70% ethanol. Cryptognathid mites were collected from the samples under a stereomicroscope and mounted on slides in Hoyer's medium. Their figures were drawn and measurements performed under a research microscope.

Dorsal setal and leg setal designations follow Kethley (1990) and Grandjean (1944), respectively. Chaetotaxy of leg segments is given with solenidia in parenthesis. All measurements are given in micrometers (µm).

Type material and all other specimens are deposited in the Zoological Museum of Celal Bayar University, Manisa, Turkey.

Results

Family: Cryptognathidae Oudemans, 1902
Type genus: *Cryptognathus* Kramer, 1879

Key to the genera of Cryptognathidae (after Doğan & Dönel, 2010)

1. Prosternal apron dimpled..... *Favognathus* Luxton, 1973
- Prosternal apron not dimpled..... 2
2. Two pairs of genital setae..... *Cryptofavognathus* Doğan & Dönel, 2010
- Three pairs of genital setae..... *Cryptognathus* Kramer, 1879

Genus *Cryptognathus* Kramer

Type species: *Cryptognathus lagena* Kramer, 1879

Diagnosis

This genus is characterized by a transparent, crescent-shaped prosternal apron anterior of the ventral plate and 3 pairs of genital setae.

Key to the known female species of *Cryptognathus*

1. Dorsal and ventral shield without reticulations..... *C. attenuatus* Luxton, 1993
- Dorsal shield with reticulations..... 2
2. Ventral shield partly or completely reticulated 3
- Ventral shield without reticulations 14
3. Peg-like sensillum *k* present on genu II 4
- Peg-like sensillum *k* absent on genu II 12

4. Two proximoventral setae on tarsi III and IV ..... *C. imbricatus* Summers & Chaudhri, 1965
- One proximoventral seta on tarsi III and IV 5
5. Front margin of hood smooth 6
- Front margin of hood denticulate 8
6. Ventral punctation extensive 7
- Ventral punctation restricted to certain narrow zones ..... *C. lateropunctatus* Luxton, 1973
7. Tarsi III and IV without solenidia ..... *C. incertus* Robaux, 1975
- Tarsi III and IV each with a solenidion ..... *C. lagena* Kramer, 1879
8. Sternocoxal area striate 9
- Sternocoxal area smooth 11
9. Dorsal setae very small (less than 10 μm in length) ..... *C. australiensis* Hirst, 1926
- Dorsal setae longer (10 μm or longer than 10 μm in length) 10
10. Ventral reticulations marginally ..... *C. summersi* Robaux, 1975
- Dorsal and ventral shields completely reticulate (similarly ornamented) ..... *C. woodi* Luxton, 1973
11. Each cell of dorsal reticulum with about 17-25 small pores, but 2-3 restricted to periphery ..... *C. scutellatus* Summers & Chaudhri, 1965
- Each cell of dorsal reticulum with numerous pores, 35-50 per cell, about 8-22 centrally ..... *C. luteolus* Summers & Chaudhri, 1965
12. Addorsal setae *tc* on tarsus II dissimilar ... *C. aureatus* Summers & Chaudhri, 1965
- Addorsal setae *tc* on tarsus II similar 13
13. Cells on dorsal reticulum preponderantly longer than wide, some almost twice as long as wide, chelicerae short (av. 79 μm) ..... *C. cucullus* Summers & Chaudhri, 1965
- Cells on dorsal reticulum preponderantly isodiametric, chelicerae long (av. 133 μm) ..... *C. ultrarostratus* Summers & Chaudhri, 1965
14. Front margin of hood smooth 15
- Front margin of hood denticulate or rough 16
15. Ventral hysterosoma without pores behind coxae IV; tarsi III and IV without solenidia ..... *C. striatus* Luxton, 1973
- Ventral hysterosoma with pores behind coxae IV and extending to level of anterior rim of genital valves, and with a patch of pores between *3a* and ag_1; tarsi III and IV each with a solenidion ..... *C. vulgaris* Luxton, 1973
16. Two proximoventral setae on tarsi III and IV ..... *C. kutahyaensis* **sp. nov.**
- One proximoventral seta on tarsi III and IV 17
17. Ventral punctation extensive 18
- Ventral punctation restricted to certain narrow zones .... *C. eurytopus* Luxton, 1973
18. Addorsal setae *tc* on tarsus II dissimilar 19
- Addorsal setae *tc* on tarsus II similar ..... *C. ozkani* Doğan & Ayyıldız, 2001
19. Dorsal shield partly reticulated ..... *C. tenuis* Luxton, 1973
- Dorsal shield completely reticulated ..... *C. ayyildizi* Akyol & Koç, 2010

***Cryptognathus lagena* Kramer, 1879**

Material examined

Thirty-eight females, Kocayayla Mountain, Domaniç, Kütahya, 29° 52' 34,16" N, 29° 39' 02" E, 1280 m, from soil and litter under *Pinus nigra* and *Carpinus* sp.,

11.09.2010; two females, Küçükköy, Domaniç, 39° 45' 60" N, 29° 33' 23" E, 809 m, from soil under *Phaseolus vulgaris, Zea mays, Beta vulgaris* and *Solanum lycopersicum,* 11.09.2010; one female, Küçükköy, Domaniç, 39° 45' 60" N, 29° 33' 23" E, 809 m, from grass-covered soil under *Prunus persica* and *Juglans regia,* 11.09.2010; one female, Radar region, Kütahya, 39° 24' 14 " N, 29° 52' 35 " E, 1751 m, from soil and litter under *Juniperus* sp., 18.10.2010; ten females, Köpenez Village, Gediz, 39° 07' 34" N, 29° 15' 43" E, 890 m, soil and moss on the rocks and bark, 23 04 2011; forty-eight females, Saraycık, Altıntaş, 38° 00' 25" N, 29° 46' 42" E, 1450 m, from soil and litter under *Juniperus* sp., 29.07.2011; three females, Kurtdere, Hisarcık, 38° 11' 36" N, 29° 10' 03" E, 952 m, from soil and moss under *Quercus* sp., 13 08 2011; thirty females, Değirmendere, Şaphane, 39° 03' 50" N, 29° 12' 41" E, 1430 m, from and litter under *Corylus* sp., 25.09.2011; two females, Değirmendere, Şaphane, 39° 03' 50" N, 29° 12' 41" E, 1430 m, from soil and litter under *Pinus nigra* and *Quercus* sp., 25.09.2011; one female, Hisarcık, 39° 13' 05" N, 29° 11' 05" E, 925 m, from soil and litter under *Pinus nigra,* 22.10.2011; one female, Safaköy, Domaniç, 39° 51' 24" N, 29° 40' 14" E 1340 m, from soil and litter under *Carpinus* sp., 28.04.1012; one female, Kocayayla, Domaniç, 39° 51' 49" N, 29° 39' 06" E 1402 m, from soil and litter under *Carpinus* sp., 28.04.1012; thirteen females, Kocayayla, Domaniç, 39° 51' 49" N, 29° 39' 06" E 1402 m, from soil and litter under *Carpinus* sp., 28.04.2012; three females, Murat Mountain, Gediz, 38° 57' 58" N, 29° 38' 07" E 1522 m, *Juniperus* sp., 01.05.2012; one female, Murat Mountain, Gediz, 38° 58' 08" N, 29° 37' 41" E 1383 m, from soil and litter under *Pinus* sp., 01.05.2012.

Distribution

A.B.D., Germany, Austria, China, Estonia, France, Wales, The Netherlands, England, Ireland, Scotland, Swiss, Italy, Latvia, Lithuanian, Norway, Slovenia and Turkey (Afyonkarahisar, Artvin, Bingöl, Erzincan, Erzurum and Kelkit Valley) (Kramer 1879; Thor 1931; Baker & Wharton 1952; Luxton 1972, 1987; Kuznetsov & Petrov 1984; Bernini et al. 1995; Fan 1997; Kazmierski et al. 1997; Koç & Ayyıldız 1998; Krisper & Schneider 1998; Doğan 2007, 2008; Akyol 2007; Erman et al. 2007; Dönel 2010).

Remarks

This species was determined by Kramer (1879) in Germany.

Palp setal formula (from femur to tarsus) of samples from Afyonkarahisar: 3-2-3+1claw-4+4 eupathidia and of samples from Kelkit Valley 3-2-4-4+1ω+4 eupathidia. In our samples the palp setal formula was found as 3-2-4-4(except ω)+4.

Chaetotaxy (including solenidion) of tarsi in samples of Afyonkarahisar 16-12-10-10 in samples of Kelkit Valley 14-13-10-10 and in samples of Artvin 12-12-12-12. In our samples it was 16-14-10-10.

Our specimens closely resemble the other specimens of this species in general features.

The male of this species described by Koç & Ayyıldız (1998) from was not found during this study.

***Cryptognathus kutahyaensis* sp. nov. (Figs. 1–9)**

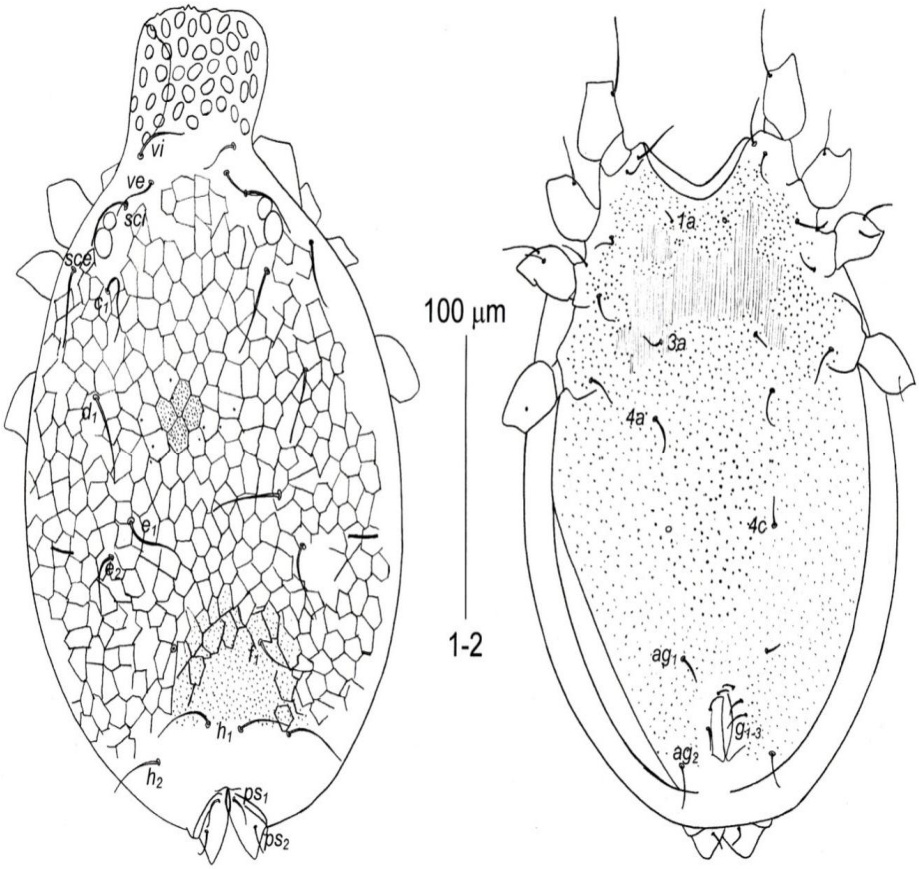
Female

Length of idiosoma (including hood and anal covers) 380 µm, width 225 µm.

Gnathosoma: Gnathosoma extrudable from under hood. Length of palpi 88, length of chelicerae 102. Subcapitulum with a pair of long setae (*m*) and 2 pairs of rostral setae

(*ro*$_{1-2}$). Palp setal formula (from femur to tarsus): 3-2-3+1claw-4+1ω+4 eupathidia.

Dorsum (Fig. 1): Anterior margin of hood with Denticulated. Length of hood 62, 5 dimples in each longitudinal row, dorsal shield with 11 pairs of setae, one pair of simple eyes and one pair of postocular bodies laterally between setae *sci* and *sce*. Dorsal shield reticulated. Polygonal cells with 35-55 pores in each dimple. One pore larger and more distinct than others. Dimensions of dorsal setae as follows: *vi* 22, *ve* 22, *sci* 32, *sce* 43, c_1 40, d_1 26, e_1 40, e_2 35, f_1 33, h_1 32, h_2 20. Distances between setae: *vi-vi* 50, *vi-ve* 10, *ve-ve* 40, *ve-sci* 13, *sci-sci* 67, *sci-*c_1 35, *sce-sce* 140, c_1*-sce* 20, c_1-c_1 92, c_1-d_1 70, d_1-d_1 122, d_1-e_1 55, e_1-e_1 87, e_1-e_2 15, e_2-e_2 110, e_1-f_1 55, f_1-f_1 50, f_1-h_1 35, h_1-$h_1$15, h_1-h_2 30, h_2-h_2 75.



1 **2**

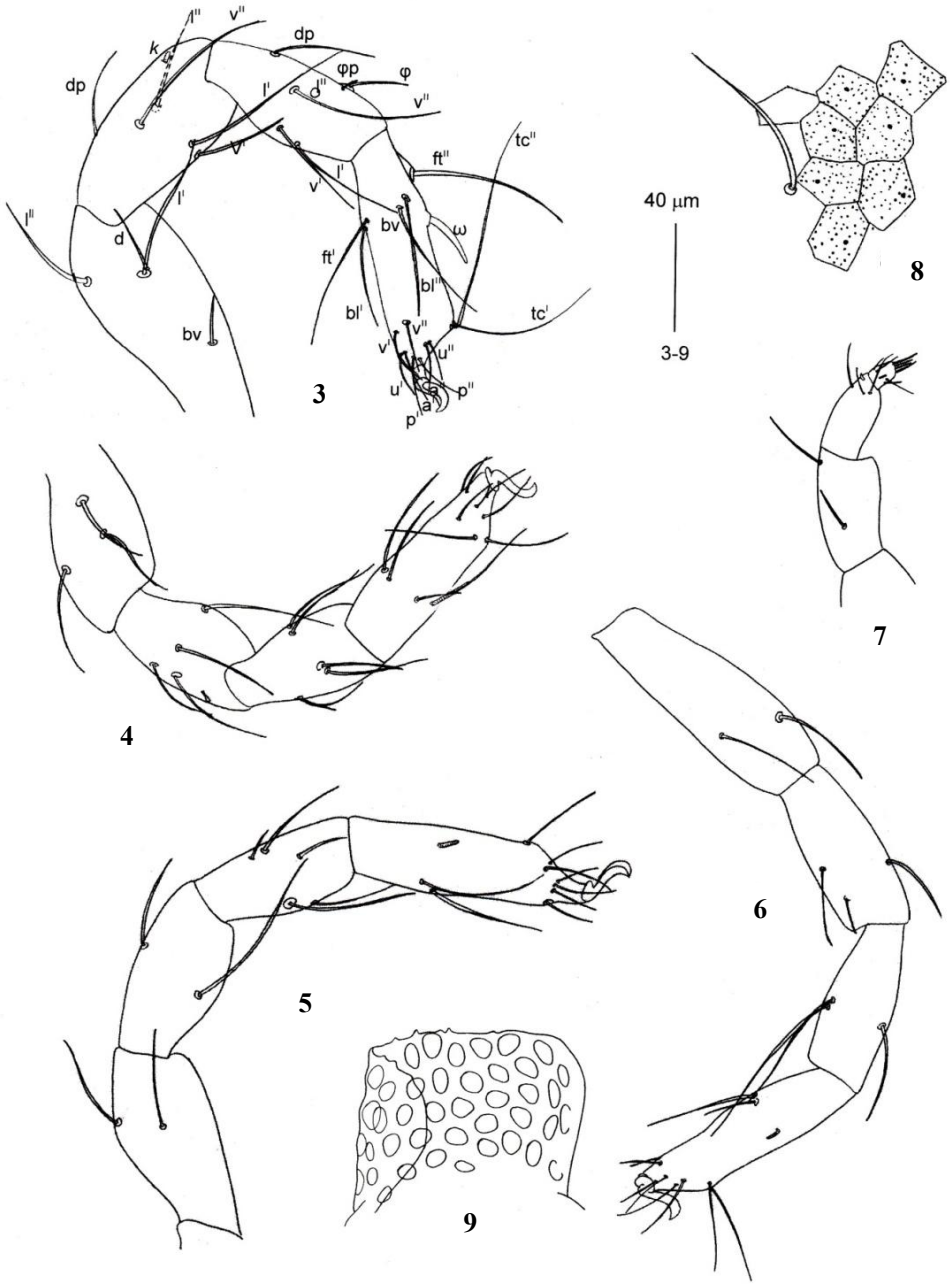
Figure 1–2. *Cryptognathus kutahyaensis* **sp. nov.** (Female). 1. Dorsal view of idiosoma; 2. Ventral view of idiosoma.

Venter (Fig. 2): Venter smooth entirely pores. Sternocoxal area with faint longitudinal striae and pores. Prosternal apron hyaline, front margin deeply concave. Venter with four pairs of setae (*1a, 3a, 4a, 4c*); three pairs of genital setae (*ps*$_{1-3}$) set adjacent to genital valves; two pairs of aggenital setae (*ag*$_{1-2}$) and; anal opening terminal, with three pairs of pseudanal setae.

Legs (Fig. 3-6): Length of legs I-IV (from base of femur to tip of tarsal claw): 202, 150, 157, 185, respectively. Number of setae on leg segments I-IV (sensillae in parentheses): coxae 2–1–2–1, trochanter 1–1–2–1, femora 4–3–2–2, genua 6(*k*)–5(*k*)–2–

3, tibiae 7(φ,φp)–6(φp)–5(φp)–3, tarsi 16(ω,φp)–13(ω,φp)–10(ω)–11(ω). Each leg tarsus with two claws and an empodium, addorsal setae *tc* of tarsi II similar; genua I and II with setae *k*. Two proximoventral setae on tarsi III and IV.

Male and other immature stages: Unknown.



Figures 3–9. *Cryptognathus kutahyaensis* **sp. nov.** (Female). 3. Leg I; 4. Leg II; 5. Leg III; 6. Leg IV; 7. Palp; 8. Seta d_1; 9. Hood.

Table 1. Differences between *Cryptognathus kutahyaensis* **sp. nov.** and other species of *Cryptognathus*

	Peglike sensillum *k* on genu II	Reticulation on venter	Front margin of hood	Similarity between addorsal setae *tc* on tarsus II	Striation on sternocoxal area	Proximoventral seta on tarsi III and IV
Cryptognathus lagena Kramer, 1879	+	+	smooth	-	-	1
Cryptognathus attenuatus Luxton, 1993	+	-	smooth	?	?	1
Cryptognathus ayyildizi Akyol, Koç 2008	+	-	denticles	-	+	1
Cryptognathus aureatus Summers & Chaudhri, 1965	-	+	smooth	-	-	1
Cryptognathus australiensis Hirst, 1926	+	+	denticles	-	+	1
Cryptognathus cucullus Summers & Chaudhri, 1965	-	+	denticles	+	+	1
Cryptognathus eurytopus Luxton, 1973	+	-	denticles	-	?	1
Cryptognathus imbricatus Summers & Chaudhri, 1965	+	+	denticles	-	-	2
Cryptognathus incertus Robaux, 1975	+	+	smooth	?	+	1
Cryptognathus lateropunctatus Luxton, 1973	+	+	smooth	-	?	1
Cryptognathus luteolus Summers & Chaudhri, 1965	+	+	denticles	-	?	1
Cryptognathus ozkani Doğan & Ayyildiz, 2001	+	-	rough	+	+	1
Cryptognathus scutellattus Summers & Chaudhri, 1965	+	+	denticles	-	-	1
Cryptognathus striatus Luxton, 1973	+	-	smooth	-	+	1
Cryptognathus summersi Robaux, 1975	+	+	denticles	-	+	1
Cryptognathus tenuis Luxton, 1973	+	-	denticles	-	+	1
Cryptognathus ultrarostratus Summers & Chaudhri, 1965	-	+	?	+	+	1
Cryptognathus vulgaris Luxton, 1973	+	-	smooth	-	+	1
Cryptognathus woodi Luxton, 1973	+	+	denticles	-	+	1
Cryptognathus kutahyaenesis sp. nov.	+	-	denticles	+	+	2

+ present/yes, - absent/no, ? / unknown.

Etymology

The name *kutahyaensis* refers to the type locality, Kütahya.

Type Material

Holotype female from litter, grass-covered soil under *Rubus canescens,* Eğdemir, Simav, Kütahya, 39°18'37" N, 28°58'28" E, 699 m, Turkey, 13.08.2011.

Remarks

This new species differs from all the other species of this genus in the following combination character: Two proximoventral setae on tarsi III and IV; peg-like sensillum *k* on genua I and II; addorsal setae *tc* on tarsus II similar; front margin of hood denticulate; ventral shield without striae or reticulations, only punctations (Table 1).

Cryptognathus ayyildizi Akyol & Koç, 2010

Material examined

Two female, Simav, Kütahya, 39° 09' 22" N, 29° 04' 34" E, 1373 m, from soil and litter under *Qercus* sp., 21.11.2010; one female, Hamurköy, Dumlupınar, 38° 56' 38" N, 30° 07' 25" E 1225 m, soil and litter under *Qercus* sp., 07.06.2012.

Distribution

Turkey (Afyonkarahisar) (Akyol & Koç 2010).

Remarks

In type specimens 19-27 pores are present in each polygonal cells of dorsum and tarsus of leg I with 15 (φp, ω) setae (Akyol & Koç 2008). However, in our samples 6-15 pores are present and tarsus of leg I with 16 (φp, ω) setae. Our specimens closely resemble type specimen in general features.

Genus *Favognathus* Luxton

Type species: *Cryptognathus cucurbita* Berlese, 1917

Diagnosis

This genus is defined as follows: Prosternal apron ventrally at base of gnathosoma, wedge-shaped and dimpled and two pairs of genital setae present.

Key to species of *Favognathus* from the Kütahya Province

1. Dorsal shield completely or partly reticulated 2
– Dorsal shield not reticulated, covered with pores ..... *F. kamili* Dönel, 2010
2. Dorsum with rosette patterns ..... *F. amygdalus* Doğan and Ayyıldız, 2004
– Dorsum without rosette patterns ..... *F. cucurbita* (Berlese, 1917)

Favognathus kamili Dönel & Doğan, 2011

Material Examined

One female, Cevizderesi, Emet, Kütahya 39° 25' 10" N, 29° 18' 60" E, 1088 m, from soil and litter under *Juniperus* sp. and *Mrytus* sp., 14 08 2010; three females, Muhacir Village, Domaniç, 39° 40' 57" N, 29° 30' 18" E, 676 m, from soil and litter under *Populus* sp., 11.09.2010; four females, Kocayayla Mountain, Çatalalıç locality, Domaniç, 39° 52'

31" N, 29° 39' 08" E, 1251 m, from soil and litter under *Pinus nigra* and *Rosa canina,* 11.09.2010; one female, Radar locaity, Kütahya, 39° 24' 10" N, 29° 52' 37" E, 1704 m, from soil and litter under *Cirsium arvense,* 18.10.2010; two females, Simav, 39° 05' 11" N, 28° 57' 59" E, 883 m, from soil and litter under *Juniperus* sp., 21.11.2010; two females, Mecidiye Village, Altıntaş, 38° 59' 32" N, 30° 07' 02" E, 1063 m, from soil and litter under *Astragalus* sp., 17.01.2011; four females, Kutluhallar Village, Hisarcık, 39° 12' 32" N, 29° 13' 03" E, 953 m, from soil and litter under *Juniperus* sp., 17 03 2011; four females, Hamamköy, Hisarcık, 39° 13' 01" N, 29° 16' 12" E, 850 m, from soil and litter under *Myrtus communis*, 17.03.2011; five females, Hamamköy, Hisarcık, 39° 13' 01" N, 29° 16' 12" E, 850 m, from soil and litter under *Quercus* sp. 17.03.2011; one female, Şaphane, 39° 00' 44" N, 29° 12' 53" E, 933 m, from soil and litter under *Prunus avium,* 23.04.2011; six females, Pazarlar, 38° 59' 04" N, 29° 07' 11" E, 909 m, from soil and litter under *Juglans regia* and *Prunus persica,* 23.04.2011; two females, Yağmurlu, Tavşanlı, 39° 28' 04" N, 29° 36' 09" E, 862 m, from soil and litter under *Quercus* sp., 21.05.2011; three females, Esatlar, Emet, 39° 20' 11" N, 29° 36' 51" E, 1011 m, from soil and litter under *Verbascum* sp., 21.05.2011; ten females, Esatlar, Emet. 39° 20' 11" N, 29° 36' 51" E, 1011 m, from soil and litter under *Pinus* sp. and *Juniperus* sp., 21.05.2011; five females, Esatlar, Emet. 39° 20' 11" N, 29° 36' 51" E, 1011 m, from soil and litter under *Pinus* sp. and *Juniperus* sp., 21.05.2011; three females, Afşar Village, Çavdarhisar, 39° 12' 59" N, 29° 42' 48" E, 1040 m, from soil, litter and moss under *Juniperus* sp., 21.05.2011; one female, Aizanoi, Çavdarhisar, 39° 12' 53" N, 29° 35' 58" E, 1009 m, from soil and litter under *Prunus* sp., 21.05.2011; two females, Sarayköy, Aslanapa, 39° 20' 53" N, 29° 41' 35" E, 1317 m, from litter under *Pinus* sp. and bark, 25.06.2011; five females, Altıntaş, 39° 02' 55" N, 30° 04' 52" E, 1045 m, from soil and litter under *Juniperus* sp., 29.07.2011; six females, Pınarcık, Altıntaş, 39° 02' 00" N, 30° 59' 54" E, 1041 m, from soil and litter under *Cupressus* sp., 29.07.2011; four females, Saraycık, Altıntaş, 38° 00' 09" N, 29° 49' 21" E, 1290 m, from soil and litter under *Pinus* sp., 29.07.2011; five females, Hamzabey, Simav, 39° 13' 45" N, 28° 57' 11" E, 752 m, from soil and litter under *Pinus* sp., 13.08.2011; tree females, Gılmanlar, Simav, 39° 25' 58" N, 29° 01' 32" E, 966 m, from soil and litter under *Quercus* sp., 13.08.2011; ten females, Yakuplar, Pazarlar, 38° 56' 37" N, 29° 08' 31" E, 948 m, from soil and litter under *Quercus* sp., 25.09.2011; four females, Sofular, Pazarlar, 38° 57' 13" N, 29° 09' 51" E, 976 m, from soil and litter under *Malus domestica,* 25.09.2011; 10 females, Soğuksu, Gediz, 39° 07' 37 " N, 29° 18' 56" E, 972 m, from soil and litter under *Astragalus* sp., 21.10.2011; four females, Espey, Emet, 39° 21' 28" N, 29° 16' 10" E, 946 m, from soil and litter under *Pinus* sp., 22.10.2011; thirteen females, Kutluhallar, Hisarcık, 39° 12' 34" N, 29° 13' 03" E, 963 m, from soil and litter under *Myrtus* sp., 22.10.2011; six females, Kutluhallar Hisarcık, 39° 11' 49" N, 29° 13' 04" E, 1091 m, from soil and litter under *Quercus* sp., 22.10.2011; tree females, Dereli, Emet, 39° 27' 33" N, 29° 15' 56" E, 671 m, from soil and litter under *Pinus* sp. 12.11.2011; 11 females, Köprücek, Emet, 39° 20' 20" N, 29° 17' 35" E, 997 m, from soil and litter under *Quercus* sp., 12.11.2011; five females, Soğuksu, Gediz, 39° 07' 37" N, 29° 19' 02" E, 978 m, from soil and litter under *Juniperus* sp., 13.11.2011; tree females, Akçaköy, Tavşanlı, 39° 25' 53" N, 29° 36' 15" E, 960 m, from soil and litter under *Juniperus* sp., 19.12.2011; one female, Balıköy, Tavşanlı, 39° 31' 41" N, 29° 06' 50" E, 444 m, from soil and litter under *Juniperus* sp., 17.12.2011; two females, Akpınar, Kütahya, 39° 34' 13" N, 30° 07' 16" E 937 m, from soil and litter under *Juniperus* sp., 31.03.2012; two females, Türkmen Mountain, Kütahya, 39° 24' 41" N, 30° 18' 38" E 1426 m, from soil and litter under *Pinus* sp., 31.03.2012; six females, Sakaçiftliği, Kütahya, 39° 21' 31" N,

30° 09' 44" E 981 m, from soil and litter under *Pinus* sp., 31.03.2012; six females, Murat Mountain, Gediz, 38° 57' 34" N, 29° 37' 43" E 1518 m, from soil and litter under *Apiaceae* sp. and *Urtica* sp., 01.05.2012; four females, Akçaalan, Gediz, 39° 04' 46" N, 29° 23' 58" E 946 m, from soil and litter under *Anthemis* sp., 01.05.2012; six females, Dumlupınar, 39° 50' 35" N, 29° 57' 53" E 1246 m, from soil and litter under *Rosa canina* and *Cupressus* sp., 07.06.2012; four females, Dumlupınar, 38° 51' 01" N, 30° 01' 03" E 1219 m, from soil and litter under *Juniperus* sp. and *Pinus* sp., 07.06.2012; two females, Yayla Village, Altıntaş, 38° 57' 29" N, 30° 07' 05" E 1225 m, from soil and litter under *Cupressus* sp., 07 06 2012.

Distribution

Turkey: Afyonkarahisar, Artvin, Erzurum, Erzincan, Kelkit Valley (Koç & Ayyıldız 1999; Doğan & Ayyıldız 2004; Akyol 2007; Dönel & Doğan 2011).

Remarks

Prosternal apron in the samples of Arvin, Erzincan and Erzurum with 14-18 dimples (Koç 1995; Koç & Ayyıldız 1999); prosternal apron in the samples of Afyonkarahisar with 15 dimples (Akyol 2007). In our samples the number of dimples is 15 – 22.

Favognathus amygdalus **Doğan & Ayyıldız, 2004**

Material examined

One female and one male, Kızıldere, Emet, Kütahya, 39° 20' 16" N, 29° 17' 39" E, 987 m, from soil and litter under *Quercus* sp. and *Pinus nigra,* 13.08.2010; one male, Eynal, Simav, 39° 07' 23" N, 29° 59' 29" E, 800 m, from soil and litter under *Malva* sp., 21.11.2010; one female, Simav, 39° 09' 22" N, 29° 04' 34 " E, 1373 m, from soil and litter under, *Myrtus communis,* 21.11.2010; one male and two females, Eynal, Simav, 39° 07' 23" N, 29° 59' 28" E, 801 m, from soil and litter under *Rubus canescens,* 13.08.2011; two males, Yeşilova, Simav, 39° 07' 44" N, 29° 58' 12" E, 797 m, from soil and litter under *Juglans regia,* 13.08.2011; one male and one female, Örencik, Simav, 39° 26' 54" N, 29° 04' 15" E, 961 m, from soil and litter under *Pinus* sp., 13.08.2011; one male, Çivcekorusu, Emet, 39° 18' 57" N, 29° 16' 57" E, 1002 m, from soil and litter under *Pinus* sp., 04.11.2011; one female, Çivcekorusu, Emet, 39° 18' 49" N, 29° 17' 01" E, 1015 m, from soil and litter under *Pinus* sp. and *Juniperus* sp., 04.11.2011; one male, Çivcekorusu, Emet, 39° 18' 47" N, 29° 16' 60" E, 1013 m, from soil and litter under *Pinus* sp. and *Juniperus* sp., 14.09.2011; one male, Köpenez, Şaphane, 39° 07' 31" N, 29° 15' 31" E, 901, from soil and litter under *Juniperus* sp. and *Quercus* sp., 25.09.2011; one female, Köpenez, Şaphane, 39° 06' 35" N, 29° 13' 51" E, 969 m, from soil and litter under *Pinus* sp. and *Pteridium* sp., 25.09.2011; one female, Ilıca, Şaphane, 38° 56' 38" N, 29° 15' 15" E, 731 m, from soil and litter under *Pinus* sp. and *Juniperus* sp., 25.09.2011; one female, Gediz, 38° 50' 14" N, 29° 16' 12" E, 622 m, from soil and litter under *Pinus* sp., 21.10.2011; one female, Kızılçukur, Hisarcık, 39° 09' 39" N, 29° 12' 03" E, 1403 m, from soil and litter under *Astragalus* sp., 22.10.2011; one female, Hisarcık, 39° 12' 18" N, 29° 10' 30" E, 980 m, from soil and litter under *Pinus* sp., 22.10.2011.

Distribution

Turkey (Adana, Afyonkarahisar, Erzurum, Gümüşhane, İzmir, İzmit and Yozgat) (Doğan & Ayyıldız 2004; Akyol 2007; Doğan 2007, 2008; Erman et al. 2007; Dönel

2010).

Remarks

Prosternal apron in the samples of type specimen with 14 dimples (Doğan & Ayyıldız 2004). Prosternal apron in the samples of Kelkit Valley with 11 – 14 (Dönel 2010). However, our samples with 13 – 17.

Boundaries of the cells in the rosette in males not evident (Doğan 2008). In samples of Kelkit Valley and of our samples, boundaries of the cells in the rosette evident (Dönel 2010).

***Favognathus cucurbita* Berlese, 1917 (Figures 10–19)**

Male

Length of idiosoma (including hood and anal covers) 262(250-280), width 160(133–177).

Gnathosoma (Fig. 18): Gnathosoma extrudable from under hood. Length of palpi 76 (63-80), length of chelicerae 94 (80-112). Subcapitulum with a pair of long setae (*m*) and 2 pairs of pilose adoral setae ($ad_{1\text{-}2}$). Palp setal formula (from femur to tarsus): 3-2-3-4+1ω+4 eupathidia.

Dorsum (Fig. 10): Length of hood 57 (45–67), anterior margin of hood smooth and with five or seven dimples in each longitudinal row. Dorsum covered with punctations and faint striae. Dorsal shield with 11 pairs of simple setae. One pair of simple eyes and one pair of postocular bodies laterally between setae *sce* and c_2. Setae f_1, h_1 and h_2 are situated near each other and shorter than other dorsal setae. Dimensions of dorsal setae as follows: *vi* 21, *ve* 22, *sci* 23, *sce* 27, c_1 26, d_1 26, e_1 22, e_2 22, f_1 10, h_1 9, h_2 9. Distances between setae: *vi-vi* 35, *vi-ve* 8, *ve-ve* 31, *ve-sci* 7, *sci-sci* 43, *sci*-c_1 23, *sce-sce* 87, c_1-*sce* 13, c_1-c_1 57, c_1-d_1 40, d_1-d_1 94, d_1-e_1 38, e_1-e_1 67, e_1-e_2 20, e_2-e_2 97, e_1-f_1 43, f_1-f_1 25, f_1-h_1 10, h_1-h_1 33, h_1-h_2 6, h_2-h_2 21.

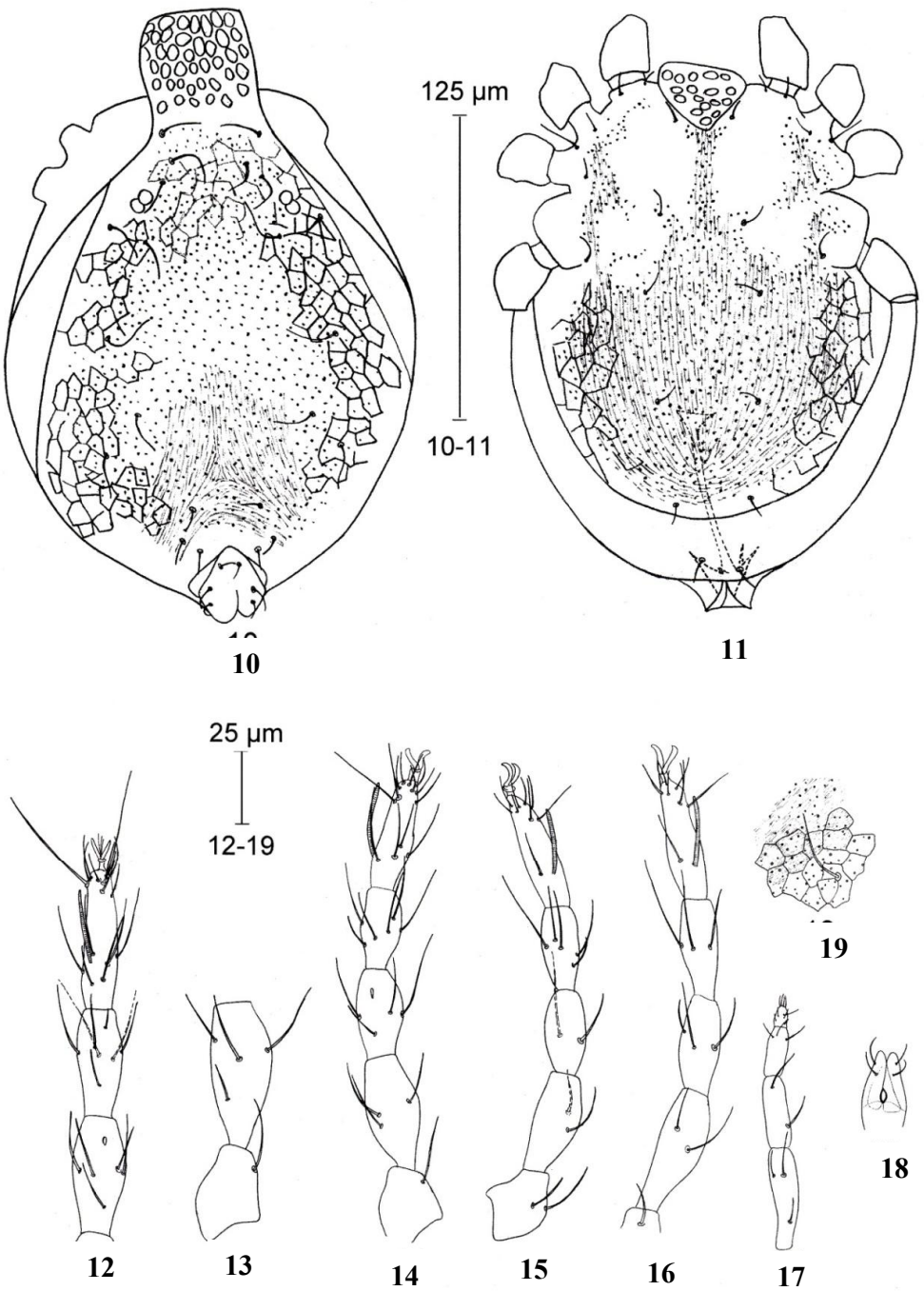
Venter (Fig. 11): Prosternal apron wedge shaped with 17-20 dimples. Venter with same ornamentation as dorsum. No stria and punctations in coxisternal area. Six pair of ventral setae (*1a, 3a, 4a, 4c,* ag_1, ag_2). Aedeagus evident.

Legs (Fig. 12-16): Addorsal setae *tc* of tarsus II dissimilar. Genu I and II each with peg-like sensillum *k.* Length of legs I-IV (from base of femur to tip of tarsal claw): 202, 150, 157, 185, respectively. Setal formula of leg I-IV coxae 2–1–2–1, trochanters 1–1–2–1, femora 4–3–2–2, genua 6(*k*)–5(*k*)–2–3, tibiae 7(φ, φp)-6(φp)-5(φp)-3, tarsi 16(ω, φp)-14(ω, φp)-10(ω)-10(ω). All tarsi with ω solenidia.

Material examined

Nine males from soil, litter and grass-covered soil were collected in Kütahya. Localities: Twelve females, three males, Simav, 39° 05' 11" N, 28° 57' 59" E, 883 m, from soil and litter under *Rosa canina,* 21.11.2010; one male, Altıntaş, 38° 00' 25" N, 29° 46' 42" E, 1450 m, from soil and litter under *Myrtus* sp., 29.07. 2011; one male, Hisarcık, 38° 11' 36" N, 29° 10' 03" E, 952 m, from soil and litter under *Pinus* sp., 13.08.2011; forty-two females, one male, Simav, 39° 09' 21" N, 28° 57' 45" E, 806 m, from soil, grass-covered soil and litter under *Cedrus* sp. 13.08.2011; four females, one male, Emet, 39° 18' 49" N, 29° 17' 01" E, 1015 m, from soil and litter under *Juniperus* sp. and *Pinus* sp., 04.09.2011; twenty-seven females, one male, Şaphane, 38° 58' 12" N, 29° 11' 11" E, 837 m, from soil and litter under *Crataegus* sp. and *Quercus* sp., 25.09.2011; one male Pazarlar, 39° 00'

17" N, 29° 08' 46" E, 998 m, from soil and litter under *Quercus* sp., 25.09.2011.



Figures 10–19. *Favognathus cucurbita* (Male). 10. Dorsal view; 11. Ventral view; 12. Leg I; 13. Leg I trochanter and femur; 14. Leg II; 15. Leg III; 16. Leg IV; 17. Palp; 18. Gnathosoma; 19. Seta d_1.

Distribution

China, Ireland, Italy, Latvia, Sardinia Island, Somalia and Turkey (Afyonkarahisar, Artvin, Elazığ, Erzincan, Erzurum, Istanbul, Kelkit Valley, Kırıkkale and Sinop) (Berlese

1917; Luxton & Lee 1969; Luxton 1973, 1987; Koç 1995; Fan 1997; Krisper & Schneider 1998; Koç & Ayyıldız 1999; Doğan & Ayyıldız 2004; Akyol 2007; Doğan 2007, 2008; Erman et al. 2007; Dönel & Doğan 2011).

Remarks

Favognathus cucurbita was originally described from mosses on Sardine Island by Berlese (1917). Luxton and Lee (1969) re-described this species. This species can be defined as follows: dorsum and venter partly reticulated**;** no porous areas in sternocoxal area, anterior margin of the hood smooth and with five or seven dimples in each longitudinal row; prosternal apron wedge shaped with 17–20 dimples. Adult male of this species is described here for the first time. The males can be distinguished from females by the following features: body is smaller (262/160); aedeagus is evident; f_1, h_1 and h_2 closely associated and these setae are shorter than the others; all tarsi with solenidia ω which are twice longer than the female solenidia.

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References

Akyol, M. (2007) *Afyonkarahisar ili Raphignathoidea (Acari: Actinedida) üst familyasına ait taksonların sistematik yönden incelenmesi (Ph. D. Thesis)*. Celal Bayar Üniversitesi, Fen Bilimleri Enstistüsü, Manisa (In Turkish), 245 pp.

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) Contributions to the raphignathoid fauna of Turkey, with a description of a new species of *Cryptognathus* Kramer (Acari: Actinedida: Raphignathoidea). *Turkish Journal of Zoology*, 34: 159–167.

Baker, E.W. & Wharton, G.W. (1952) *An Introduction to Acarology*. Mac Millan, New York. 465 pp.

Berlese, A. (1917) Centuria seconda di Acari nuovi. *Redia*, 12: 125–177.

Bernini, F., Castagnoli, M. & Nannelli, R., (1995) Arachnida: Acari. *In*: Minelli, A., Ruffo, S., La Posta, S. (eds.), *Checklist delle specie della fauna Italiana*. Bologna (Italy): Calderini. 131 pp.

Doğan, S. (2007) Checklist of raphignathoid mites (Acari: Raphignathoidea) of Turkey. *Zootaxa*, 1454: 1–26.

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

Doğan, S. & Ayyıldız, N. (2001) A new species of *Cryptognathus* (Acari Cryptognathidae) from Turkey. *International Journal of Acarology*, 27: 217–220.

Doğan, S. & Ayyildiz, N. (2002) A new species of *Favognathus* Luxton, 1973 (Acari: Actinedida) from Turkey. *Acarologia*, 42(4): 371–374.

Doğan, S. & Ayyıldız, N. (2004) Mites of the 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.
Dönel, G. (2010) *Kelkit Vadisi (Türkiye) Rafignatoid akarlarının (Acarı, Actınedıda) sistematik yönden incelenmesi ve mikrofungus florasının belirlenmesi (Ph. D. Thesis)*. Atatürk Üniversitesi, Fen Bilimleri Enstitüsü, Erzurum (In Turkish), 335 pp.
Dönel, G. & Doğan, S. (2011) Kelkit Vadisi'nin (Türkiye) cryptognathid akarları (Acari Cryptognathidae) üzerine sistematik araştırma. *Türkiye Entomoloji Dergisi*, 35(2): 361–380.
Erman, O., Özkan, M., Ayyıldız, N. & Doğan, S. (2007) Checklist of the mites (Arachnida: Acari) of Turkey. Second supplement. *Zootaxa*, 1532: 1–21.
Fan, Q.H. (1997) A new species and three new records of the family Cryptognathidae from China (Acari: Raphignathoidea). *Acta Arachnologica Sinica*, 6(2): 130–136.
Grandjean, F. (1944) Observations sure les Acariens de la famille des Stigmaeidae. *Archives des Sciences physiques et naturelles*, 26: 103–131.
Hirst, S. (1926) On some new mites of the suborder Prostigmata (Trombidioidea). Annals and Magazine of Natural History, (Ser. 9) 18: 609–616.
Kazmierski, A., Bloszyk, J. & Michocka, S. (1997) Stigmaeidae and Cryptognathidae. *In*: Razowkski, J. (ed.) *Checklist of Animals of Poland. Krakow (Poland)*. Polish Academy of Science, 219 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.
Krisper, G. & Schneider, T. (1998) Erstnachweis und Verbreitung der Milbenfamilie Cryptognathidae (Acari, Actinedida, Raphignathoidea) in Österreich und Slowenien. Mitteilungen des Naturwissenschaftlicher Verein für Steiermark, 128: 193–202.
Koç, K. (1995) *Artvin İli Rafignatoidleri ve Keyletoidleri (Acari, Actinedida) üzerine sistematik araştırmalar (Ph. D. Thesis)*. Atatürk Üniversitesi, Fen Bilimleri Enstitüsü, Erzurum (In Turkish).
Koç, K. & Ayyıldız, N. (1998) Türkiye Faunası için yeni iki *Cryptognathus* Kramer (Acari: Actinedida: Cryptognathidae) türü. II. *Kızılırmak Uluslararası Fen Bilimleri Kongresi, 20–22 Mayıs, Kırıkkale*, pp. 383–390.
Koç, K. & Akyol, M. (2004) *Favognathus afyonensis* sp. nov. with notes on *Raphignathus collegiatus* Atyeo, Baker *et* Crossley, 1961 (Acari: Raphignathoidea) from Turkey. *Annales Zoologici*, 54(2): 475–479.
Koç, K. & Ayyıldız, N. (1999) Some species of *Favognathus* Luxton, 1973 (Acari: Actinedida: Cryptognathidae) from Turkey. *Journal of Natural History*, 33: 621–628.
Kuznetzov, N.N. & Petrov. V.M. (1984) *Predacious mites of the Baltic region (Parasitiformes: Phytoseiidae, Acariformes: Prostigmata)*. Zinatne, Riga, 144 pp.
Luxton, M. (1972) A re-description of *Cryptognathus lagena* Kramer 1879 (Acari: Prostigmata: Cryptognathidae). *Acarologia*, 14: 591–594.

Luxton, M. (1973) Mites of the genus *Cryptognathus* from Australia, New Zealand and Niue Island. *Acarologia*, 15(1): 53–75.
Luxton, M. (1987) Mites of the family Cryptognathidae Oudemans, 1902 (Prostigmata) in the British Isles. *Entomologist's Monthly Magazine*, 123: 113–115.
Luxton, M. (1993) New species Cryptognathid mites from Israel (Acari: Prostigmata: Cryptognathidae). *Journal of Natural History*, 27: 1213–1217.
Luxton, M. & Lee, D.C. (1969) A re-description of *Cryptognathus cucurbita* Berlese, 1916 (Acari, Prostigmata, Cryptognathidae). *Acarologia*, 11(2): 222–226.
Oudemans, A.C. (1902) Acari, neue Arten, Klassifikition. *Tijdschrift voor Entomologie*, 45: 50–64.
Robaux, P. (1975) Observations sur quelques Actinedida (= Prostigmates) du sol d'Amérique du nord. III. Description de deux nouvelles especes de *Cryptognathus* (Acari: Raphignathoidea–Cryptognathidae). *Acarologia*, 17 (2): 257–270.
Summers, F.M. & Chaudhri, W.M. (1965) New species of the genus *Cryptognathus* Kramer (Acarina: Cryptognathidae). *Hilgardia*, 36(7): 313–326.
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: 83–99.
Swift, S.F. & Goff, M.L. (2001) Mite (Acari) communities associated with 'Ohi'a, *Metrosideros polymorpha* (Myrtaceae), at Hono O Na˜ Paliand Kui'a Natural Area Reserveson Kaua'i Island, Hawaiian Islands. *Pacific Science*, 55: 23–40.
Thor, S. (1931) Acarina Bdellidae, Nicoletiellidae, Cryptognathidae. *Das Tierreich*, 56: 78–81.

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برخی از کنه‌های کریپتوگناتید (Acari: Cryptognathidae)استان کوتاهیا (ترکیه)

اسماعیل اولکای و کمیل کچ

چکیده

شش گونه کنهٔ کریپتوگناتید از استان کوتاهیا جمع‌آوری شدند. از میان آنها، سه گونه به جنس *Cryptognathus* Kramer, 1879 و سه گونهٔ به جنس *Favognathus* Luxton, 1973 تعلق دارند. گونهٔ جدید *Cryptoganathus kutahyaensis* **sp. nov**. و نر گونهٔ *Favognathus cucurbita* Berlese, 1917 از ترکیه توصیف و ترسیم می‌شوند. کلید گونه‌های جنس *Cryptognathus* جهان و گونه‌های جنس *Favognathus* استان کوتاهیا ارایه شده است.

واژگان کلیدی: زیرردهٔ کنه‌ها، Cryptognathidae ، ***Cryptognathus kutahyaensis* sp. nov.**، گونهٔ جدید، ترکیه.

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