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Article

A new record for the Turkish fauna: *Eustigmaeus dogani* (Acari: Stigmaeidae)

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Abstract

In this study, on the basis of specimens collected from Kütahya, the characteristics and distribution of *Eustigmaeus dogani*, which is a new record for the Turkish fauna, are given.

Keywords: Trombidiformes, Prostigmata, female, taxonomy, Raphignathoidea.

Introduction

Stigmaeidae is a family within the superfamily Raphignathoidea. These mites live in or on soil, grass, leaf, mulch, lichen, bark trees, crevices in rock and leaf cavities, and a few of them are parasitic on phlebotomine flies (Ueckermann & Meyer 1987; Noei *et al*. 2007; Doğan & Ayyıldız 2003; Akyol & Koç 2007; Dönel & Doğan 2011). Currently this family consists of 32 valid genera (Doğan *et al*. 2011; Bagheri *et al.* 2012). *Eustigmaeus* is one of the largest genera in this family (Fan & Zhang 2005; Doğan 2005; Faraji *et al*. 2007; Cheng & Fan 2008; Dönel & Doğan 2011). Up to now, 21 species have been reported from Turkey (Doğan 2007; Doğan *et al*. 2011; Dönel & Doğan 2011).

This paper presents new distribution and adds a species to the Acari fauna of Turkey.

Materials and methods

The litter, soil and moss samples were taken from mixed habitats in Kütahya province (Turkey) and brought to the laboratory in nylon bags, and extracted in Berlese-Tullgren funnels for five to seven days. Mites were collected in 70% ethanol. Stigmaeid mites were picked from the samples under a stereomicroscope and mounted on slides in Hoyer's medium. Their figures were drawn and measured under a research microscope. Dorsal setae and leg setae 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). For body measurements, average value has been given. Maximum and minimum values are in parentheses. Specimens are

preserved as slide mounted specimens and deposited in the Acari collection of Hakkari University, Hakkari, Turkey.

Results

Family Stigmaeidae Oudemans

Type genus: *Stigmaeus* Koch, 1836.

Genus: *Eustigmaeus* Berlese, 1910

Type Species: *Stigmaeus kermesinus* (Koch, 1841)

Palptibial claw subequal to palptarsus. Palpal tarsus with a tridentate terminal eupathidium. Number of setae and solenidia on palp trochanter to tarsus: 0-3-2-2+1 claw+1 accessory claw-4+1ω+1 subterminal spine-like eupathidium+1 tridentate eupathidium. Subcapitulum with two pairs of subcapitular setae. Three unpaired dorsal shields: the propodosomal, hysterosomal and suranal. Eyes present or absent, post-ocular bodies absent. Humeral shields situated ventro-laterally, with setae c_2. Humeral callosities absent or present. Aggenital shield with one to three pairs of setae. Genital setae absent. Anogenital covers with three or four pairs of setae.

Eustigmaeus dogani Khanjani, Asali Fayaz, Mirmoayedi & Ghaedi, 2011

Female (Fig. 1)

Length of body (including gnathosoma) 330 (290–395), width 214 (180–237). Length of gnathosoma 56 (50–67), with two pairs of subcapitular setae *n* 9 (7-10), *m* 13 (13–13) and two pairs of rostral setae (ro_{1-2}). Palp setal formula (from femur to tarsus): 3-2-2+1 claw+1accessory claw-5+1ω+1 tridentate eupathidium.

Dorsum: Dorsal shields with oval and polygonal dimples, each dimple generally contains 6–25 vacuoles. Dorsal body setae wide, coarsely ciliated and with opaque hyaline sheath distally. Prodorsal shields with 4 pairs of setae *vi, ve, sci, sce* and 1 pair of eyes located between setae *ve* and *sci*. Opisthosomal shield with 6 pair of setae c_1, d_1, d_2, e_1, e_2, f_1, suranal shield with 2 pairs of setae h_1 and h_2. Dimensions of setae as follows: *vi* 27 (25–30), *ve* 33 (30–37), *sci* 30 (25–33), *sce* 29 (25–32), c_1 28 (25–31), c_2 35 (32–37), d_1 29 (25–32), d_2 31 (27–32), e_1 35 (33–40), e_2 34 (30–38), f_1 49 (47–52), h_1 37 (35–40), h_2 36 (31–40). Distance between dorsal setae: *vi-vi* 26 (22–33), *vi-ve* 26 (22–32), *ve-ve* 59 (55–63), *ve-sci* 25 (20–30), *sci-sci* 111 (105–122), *sci-sce* 26 (23–30), *sce-sce* 146 (135–158), *sce-*c_1 58 (50–73), c_1-c_1 42 (38–47), c_2-c_2 177 (158–197), , d_1-d_1 44 (38–50), d_1-d_2 57 (50–62), d_1-e_1 54 (47–58), e_1-e_1 67 (60–75), e_1-e_2 38 (35–43), e_1-f_1 27 (25–30), f_1-f_1 46 (40–52), h_1-h_1 19 (15–25), h_1-h_2 22 (18–27), h_2-h_2 72 (18–27). *vi*/ *vi-vi* 1.03; c_1/ c_1-c_1 0.67; d_1/ d_1-d_1 0.66; e_1/ e_1-e_1 0.52; f_1/ f_1-f_1 1.07; h_1/ h_1-h_1 1.95; h_2/ h_2-h_2 0.5; h_1/ h_2 1.03; c_1-c_1: d_1-d_1: e_1-e_1: f_1-f_1 0.91: 0.96: 1.46: 1.0.

Venter: Humeral shields triangular and large. Humeral setae (c_2 35) similar to other dorsal setae. Coxisternal shields completely fused and smooth, with three pairs of setae (*1a* 12, *3a* 10 and *4a* 10). Aggenital shield smooth and with three pairs of setae (ag_1 9, ag_2 9, ag_3 12), genitoanal covers with three pairs of pseudanal setae (ps_{1-3} 12), without genital setae. Suranal and humeral shields are similar in that having dorsal pattern. Suranal shield U-shaped surrounding anal covers posteriorly and bearing h_1 and h_2.

Legs: Length of legs I-IV (from base of femur to tip of tarsal claw): 132, 113, 108, 128, respectively. Number of setae on leg segments I-IV (including solenidia and seta *k*)

as follows: coxae 2-2-2-2, trochanters 1-1-2-1, femora 6-5-3-2, genua 4(*k*)-4(*k*)-1-1, tibiae 7(φ, φp)-6(φp)-6(φp)-6(φp), tarsi 14(ω)-10(ω)-8(ω)-7. Length of solenidia $\omega_1 > \omega_2 > \omega_3$ respectively.

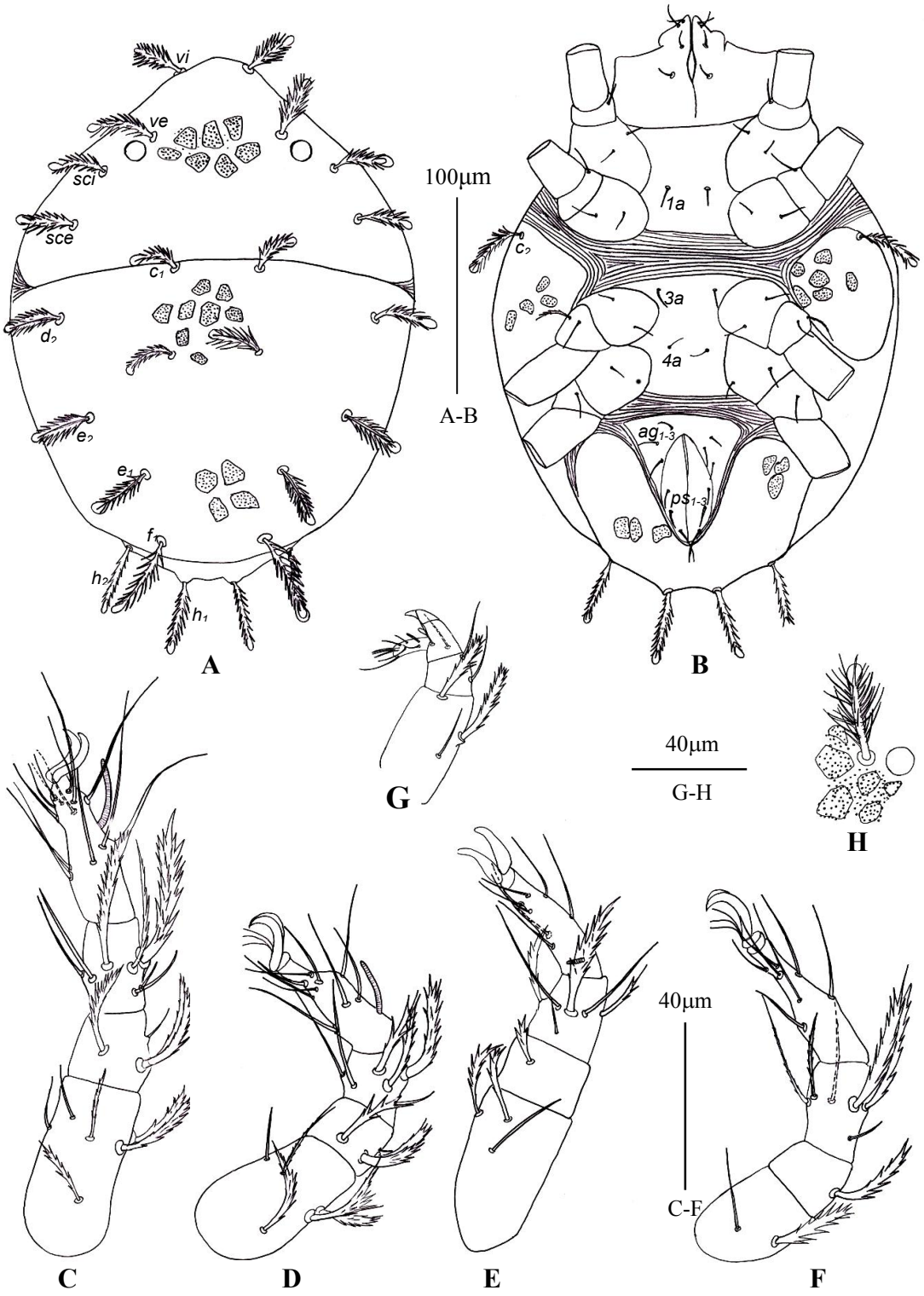

Figure 1. *Eustigmaeus dogani* (Female). A. Dorsal view of idiosoma; B. Ventral view of idiosoma; C. Leg I; D. Leg II; E. Leg III; F. Leg IV; G. Palpus; H. Setae *ve*, eye and ornamentation.

Material examined

1 female from litter and soil under *Cornus* sp., 39° 40' 57" N, 29° 30' 18" E, 676 m, Muhacir, Domaniç, Kütahya, 11 IX 2010; 1 female from litter and soil under *Rosa* sp., 39° 28' 54" N, 29° 53' 58" E, 1022 m a.s.l., Dumlupınar University Campus, Kütahya, 18 X 2010; 4 female from litter and soil under *Quercus* sp., 39° 28' 04" N, 29° 36' 09" E, 862 m a.s.l., Yağmurlu, Tavşanlı, 21 V 2011; 1 female from litter and soil under *Rumex* sp., 39° 11' 39" N, 29° 37' 22" E, 1001 m a.s.l., Çavdarhisar, 21 V 2011; 4 female from litter and soil under *Quercus* sp., 39° 10' 45" N, 29° 41' 31" E, 1034 m a.s.l., Hacımahmut, Çavdarhisar, 21 V 2011; 7 female from litter and soil under *Verbascum* sp., 39° 29' 12" N, 29° 04' 23" E, 808 m a.s.l., Avcılar, Tavşanlı, 13 VIII 2011; 1 female from litter and soil under *Quercus* sp., 39° 00' 32" N, 29° 11' 52" E, 945 m a.s.l., Şaphane, 25 IX 2011; 1 female from litter and soil under *Rubus canescens,* 38° 57' 46" N, 29° 06' 44" E, 889 m a.s.l., Pazarlar, 25 IX 2011; 4 female from litter and soil under *Cydonia oblonga,* 38° 56' 59" N, 29° 09' 15" E, 954 m a.s.l., Örey, Pazarlar, 25 IX 2011; 1 female from litter and soil under *Rosa canina,* 38° 56' 60" N, 29° 09' 15" N, 954 m a.s.l., Örey, Pazarlar, 25 IX 2011; 1 female from litter and soil under *Rubus canescens,* 38° 57' 13" N, 29° 09' 51" E, 976 m a.s.l., Sofular, Pazarlar, 25 IX 2011; 14 female from litter and soil under *Rubus canescens,* 38° 58' 00" N, 29° 13' 08" E, 757m a.s.l., Gaipler, Şaphane, 25 IX 2011; 1 female from litter and soil under *Juniperus* sp., 39° 07' 37" N, 29° 18' 56" E, 972 m a.s.l., Soğuksu, Gediz, 21 X 2011; 3 female from litter and soil under *Prunus* sp. and *Rosa canina,* 39° 12' 10" N, 29° 13' 20" E, 1043 m a.s.l., Kutluhallar, Hisarcık, 22 X 2011; 1 female from moss on rocks 39° 11' 49" N, 29° 13' 04" E, 1091 m a.s.l., Kutluhallar, Hisarcık, 22 X 2011; 2 female from litter and soil under *Juniperus* sp., 39° 14' 24" N, 29° 12' 08" E, 840 m a.s.l., Hisarcık, 22 X 2011; 2 female from litter and soil under *Quercus* sp., 39° 14' 24" N, 29° 12' 08" E, 840 m a.s.l., Hisarcık, 22 X 2011; 9 female from litter and soil under *Juniperus* sp., 39° 14' 15" N, 29° 14' 28" E, 769 m a.s.l., Hisarcık, 22 X 2011; 2 female from litter and soil under *Celtis* sp., 39° 21' 03" N, 29° 13' 22" E, 724 m a.s.l., Yağcık, Emet, 12 XI 2011; 12 female from litter and soil under *Rubus canescens,* 39° 21' 03" N, 29° 13' 22" E, 724 m a.s.l., Yağcık, Emet, 12 XI 2011; female from litter and soil under *Rubus canescens,* 39° 23' 08" N, 29° 13' 57" E, 675 m a.s.l., Eğrigöz, Emet, 12 XI 2011; 1 female from litter and soil under *Juniperus* sp., 39° 25' 53" N, 29° 36' 15" E, 960 m a.s.l., Akçaköy, Tavşanlı, 16 XII 2011; 2 female from litter and soil under *Rubus canescens,* 39° 28' 47" N, 29° 34' 44" E, 872 m a.s.l., Yağmurlu, Tavşanlı, 16 XII 2011; 1 female from litter and soil under *Quercus* sp., 39° 28' 47" N, 29° 34' 44" E, 872 m a.s.l., Yağmurlu, Tavşanlı, 16 XII 2011; 5 female from litter and soil under *Juniperus* sp., 39° 30' 44" N, 29° 23' 54" E, 880 m a.s.l., Karaköy, Tavşanlı, 17 XII 2011; 12 female from litter, moss and soil under *Rubus canescens,* 39° 29' 59" N, 29° 07' 18" E, 549 m a.s.l., Soluganlar, Tavşanlı, 17 XII 2011; 1 female from grassy soil, 39° 13' 01" N, 29° 35' 38" E 1017 m a.s.l., Yağdığın, Çavdarhisar, 25 II 2012; 1 female from litter and soil under *Verbascum* sp., 39° 13' 01" N, 29° 35' 38" E 1017 m a.s.l., Yağdığın, Çavdarhisar, 25 II 2012; 5 female from litter and soil under *Verbascum* sp., 39° 13' 01" N, 29° 35' 38" E 1017 m a.s.l., Yağdığın, Çavdarhisar, 25 II 2012; 1 female from litter and soil under *Pinus* sp., 39° 18' 37" N, 29° 24' 27" E 1180 m a.s.l., Yarış, Emet, 25 II 2012; 1 female from litter and soil under *Juniperus* sp., 39° 27' 36" N, 30° 10' 30" E 1071 m a.s.l., 31 III 2012; 1 female from litter and soil under *Pinus* sp., 39° 23' 01" N, 30° 17' 10" E 1605 m a.s.l., Türkmen Mountain, Kütahya, 31 III 2012; 1 female from decomposed log *Carpinus* sp., 39° 51' 49" N, 29° 39' 06" E 1402 m a.s.l., Kocayayla, Domaniç, 28 IV 2012; 20 female

from grassy soil under *Medicago* sp. and *Capsella* sp., 39° 07' 43" N, 29° 17' 57" E 958 m, Kayaköy, Gediz, 3 female from litter and soil under *Elaeagus angustifolia, Cornus* sp. and *Pyrus* sp., 38° 57' 30" N, 29° 26' 37" E 734 m a.s.l., Dedeköy, Gediz, 01 V 2012; 9 female from litter and soil under *Juniperus* sp. and *Pinus* sp. 38° 55' 31" N, 30° 07' 09" E 1175 m a.s.l., Hamurköy, Dumlupınar, 07 VI 2012.

Remarks

Iranian specimens were collected from alfalfa (*Medicago* sp.) soil from and lichen and soil under wild walnut trees (*Juglans* sp.). Our specimens mostly were collected from litter and soil under *Cornus* sp., *Rosa* sp., *Quercus* sp., *Rumex* sp., *Juniperus* sp., *Verbascum* sp., *Prunus* sp., *Medicago* sp., *Rosa canina* and *Rubus canescens*.

In the type specimens obtained from Iran body size is 303 (302–335)/238 (138–245) excluding gnathosoma (Khanjani *et al.* 2011) whereas in our specimens the size is 330 (290–395)/214(180–237). So our specimens are bigger than type specimen. In type specimen tarsus I has 13 setae (including ω) and endopodal shield has reticulation patterns (Khanjani *et al.* 2011) whereas in our specimens tarsus I has 14 setae (including ω) and coxisternal shield has no reticulation patterns. Each dimple of dorsal reticulation patterns in type specimen generally contains 6–13 vacuoles but in our specimens 6–25 (Table 1). Our specimens closely resemble the type specimens with other general features. These differences have been evaluated as intraspecific variation.

Table 1. Comparison analysis of type specimen and Turkish specimens

Character	*E. dogani* (type specimen)	*E. dogani* (Turkish specimens)
Dorsal setae with hyaline sheath	+	+
Femur II setae	5	5
Tarsus I setae	13(ω)	14(ω)
Setae c_2	c_2 setae similar to dorsal setae with hyaline sheath	c_2 setae similar to dorsal setae with hyaline sheath
Length of c_2 and f_1	37-54	35-49
c_2 / f_1	0.68	0.71
Coxisternal plate pattern	Reticulate	Smooth
c_1-c_1: d_1-d_1: e_1-e_1: f_1-f_1	0.87: 1.03: 1.37: 1.0	0.91: 0.96: 1.46: 1.0.
Number of vacuoles in each dimple of reticular pattern	6–13	6–25

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گزارشی جدید برای فون ترکیه: ***Eustigmaeus dogani*** **(Acari: Sigmaeidae)**

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چکیده

در این بررسی، بر اساس نمونه‌های جمع‌آوری شده از کوتاهیا، ویژگی‌ها و پراکندگی *Eustigmaeus dogani* که گزارشی جدید برای فون ترکیه است، ارایه می‌شود.

واژگان کلیدی: Trombidiformes، Prostigmata، ماده، رده‌بندی، Raphignathoidea.

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