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Salih Doğan^a

^a Department of Biology, Kâzım Karabekir Education Faculty , Atatürk University , Erzurum, Turkey

^b Department of Biology, Kâzım Karabekir Education Faculty , Atatürk University , 25240 Erzurum, Turkey E-mail:

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***Eustigmaeus* mites from Turkey (Acari: Stigmaeidae)**

SALİH DOĞAN

Department of Biology, Kâzım Karabekir Education Faculty, Atatürk University, Erzurum, Turkey

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Abstract

Five new species of the genus *Eustigmaeus* from Turkey, *E. absens*, *E. erzincanensis*, *E. erzurumensis*, *E. fani* and *E. vacuus*, are described and illustrated. Adult male of *E. turcicus* Doğan and Ayyıldız, 2003 and deutonymph of *E. schusteri* (Summers and Price, 1961) are described for the first time. Several new records are noted.

Keywords: *Acari*, *Eustigmaeus*, *new records*, *new species*, *Stigmaeidae*, *Turkey*

Introduction

Eustigmaeus species feed and reproduce on mosses (Gerson 1972), but a few are parasitic on sandflies (Chaudhri 1965; Gerson 1972; Flechtman 1985; Zhang and Gerson 1995). The genus *Eustigmaeus* contains more than 85 species worldwide. Ten species have been reported from Turkey, by Koç and Ayyıldız (2000), Doğan and Ayyıldız (2003) and Doğan et al., (2003). This paper deals with five new and three newly recorded species of the genus *Eustigmaeus*. The adult male of *Eustigmaeus turcicus* Doğan and Ayyıldız, 2003 and the deutonymph of *E. schusteri* (Summers and Price, 1961) are herein described and figured for the first time. *Eustigmaeus erciyesiensis* Doğan, Ayyıldız and Fan, 2003 and *E. segnis* (Koch, 1836) are recorded from new localities. The terminology used is based on Grandjean (1944) and Kethley (1990). All measurements are given in micrometres (µm). Type materials and examined specimens are deposited in the Zoological Museum of Atatürk University, Erzurum, Turkey.

Systematics

***Eustigmaeus* Berlese, 1910**

Type species: *Stigmaeus kermesinus* Koch, 1841.

Body globular, dorsum with three unpaired shields, generally ornamented, humeral shields ventrolateral, paragenital shields with one to three pairs of setae, anogenital covers with three pairs of setae, palp with a tridentate, terminal eupathidium.

Correspondence: Salih Doğan, Department of Biology, Kâzım Karabekir Education Faculty, Atatürk University, 25240 Erzurum, Turkey. E-mail: sadogan@atauni.edu.tr

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Eustigmaeus erciyesiensis Doğan, Ayyıldız and Fan, 2003

Eustigmaeus erciyesiensis Doğan, Ayyıldız and Fan 2003, p 132.

Examined materials

Three hundred and fourteen females, five males and seven larvae from moss, Ahmediye, Erzincan, 28 April 2001; two females from moss on bark, Trabzon, 25 September 2002.

Distribution

Turkey (Doğan et al. 2003).

Remarks

This species, collected from moss, at Erciyes Mountain, Kayseri, is common to the Turkish fauna. General features of specimens collected from Trabzon are as in the type species, but the major callosity is larger than that of the type specimens and indented.

Eustigmaeus segnis (Koch, 1836)

(Figure 1)

Figure 1. *Eustigmaeus segnis* (Koch) (female): ventral view.

Caligonus segnis Koch 1836, fasc. 5 (10).

Raphignathus ruber Koch 1842, p 56.

Raphignathus piger: Berlese 1885, fasc. 22 (1).

Ledermülleria: Oudemans 1923, p 150; Feider 1954, p 373.

Ledermuelleria segnis: Summers 1957, p 50; Summers and Price 1961, p 371.

Eustigmaeus segnis: Wood 1973, p 87; Kuznetzov and Petrov 1984, p 103; Meyer and Ueckermann 1989, p 49; Hu, Chen and Huang 1996, p 315; Kazmierski 2000, p 321; Koç and Ayyıldız 2000, p 62; Khanjani and Ueckermann 2002, p 321.

Examined materials

Twenty-four females and one male from moist grass and moss from near the dam, Ahmediye, Erzincan, 28 April 2001; one female from litter under grass, Ahmediye, Erzincan, 28 April 2001; 29 females and six males from moss and lichen on bark, Uzunoluk Forest, Oltu, Erzurum, 15 June 2001; three females and two males from soil and litter under *Pinus sylvestris*, Deve Mountain, İspir, Erzurum, 4 August 2001; seven females and five males from decaying stump, Uzundere, Erzurum, 29 August 2001; nine females and three males from an ant nest, Uzundere, Erzurum, 29 August 2001; 33 females and eight males from under litter and soil under *Quercus* sp., Yozgat, 7 September 2001; 10 females and two males from soil from vineyard, Elazığ, 8 September 2001; 27 females from soil and litter under *Pinus* sp., Kırıkkale, 15 May 2002; 62 females from hollow of an oak tree, Sungurlu, Çorum, 16 May 2002; five females from soil from hollow of *Pinus sylvestris*, Karınca Düzü district, Allahuekber Mountain, Şenkaya, Erzurum, 22 May 2002; six females from grassy soil, Narman, Erzurum, 23 May 2002; 10 females from grass cover under an apple tree, Oltu, Erzurum, 23 May 2002; 13 females from soil and litter under an apple tree, Kelkit, Gümüşhane, 4 June 2002; six females from soil and moss under *Salix* sp., Yukarı Özlüce, Kelkit, Gümüşhane, 4 June 2002; 14 females and two males from litter under *Cupressus* sp., on campus of Uludağ University, Görükle, Bursa, 10 September 2003; eight females from litter under *Pinus* sp., on campus of Uludağ University, Görükle, Bursa, 10 September 2003.

Distribution

China, Germany, Iran, Italy, Poland, Russia, Somalia, Turkey, and USA (Koch 1836; Berlese 1885; Summers 1957; Summers and Price 1961; Wood 1973; Kuznetzov 1977; Kuznetzov and Petrov 1984; Meyer and Ueckermann 1989; Hu et al. 1996; Kazmierski et al. 1997; Khaustov and Kuznetzov 1997; Kazmierski 2000; Koç and Ayyıldız 2000; Khanjani and Ueckermann 2002).

Remarks

This species can be distinguished from other species by the following characters: dimples on dorsal shields uniform in size, dorsal body setae long, falciform with marginal spinules, dorsal setae c_1 widely spaced. Most of our specimens have completely fused coxisternal shields, but others collected from the same habitat with deep incision in posterior margin of coxisternal shields as Figure 1. Coxisternal shields reticulate with punctations, except for central region of posterior coxisternal (metasternal) shield which has only punctations and

a few with several striae. Length of body 280–337, width 170–213, distance between setae c_1 – c_1 : 77–96.

Eustigmaeus jiangxiensis Hu, Chen and Huang, 1996

(Figures 2, 3)

Eustigmaeus jiangxiensis Hu, Chen and Huang 1996, p 319.

Examined materials

Six females from moss and lichen on bark, Uzunoluk Forest, Oltu, Erzurum, 15 June 2001;
50 females from forest litter, Uzunoluk, Oltu, Erzurum, 25 September 2001.

Female

Length of body (excluding gnathosoma) 463, width 310.

Figure 2. *Eustigmaeus jiangxiensis* Hu, Chen and Huang (female): (A) dorsal view; (B) ventral view; (C, D) dorsal setae.

Figure 3. *Eustigmaeus jiangxiensis* Hu, Chen and Huang (female): (A) leg I; (B) leg IV.

Dorsum

Reticulations covering dorsal shields consist of polygonal dimples. No visible fossettes on dorsal shields. Propodosomal shield with four pairs of setae and one pair of eyes. Hysterosomal shield with six pairs of setae, suranal shield with two pairs of setae. Dorsal body setae fusiform, apically pointed, slightly spinulated, with axial core and thin hyaline sheath. Setae h_1 and h_2 dissimilar to other dorsal body setae, with more spinules, without axial core and sheath. Dimensions of setae as follows: vi 33, ve 47, sci 20, $sce=c_1$ 33, c_2 24, d_1 33, d_2 30, $e_1=e_2$ 33, f_1 53, h_1 40, h_2 37. Distance between setae: $vi-vi$ 33, $ve-ve$ 133, $vi-ve$ 73, $sci-sci$ 220, $ve-sci$ 57, $sce-sce$ 270, $sci-sce$ 53, c_1-c_1 97, d_1-d_1 163, c_1-d_2 123, c_1-d_1 110,

d_2-d_2 300, d_1-d_2 83, e_1-e_1 130, e_2-e_2 238, e_1-e_2 67, $d_1-e_1=d_2-e_2$ 110, d_1-e_2 77, f_1-f_1 80, e_1-f_1 43, e_2-f_1 117, h_1-h_1 37, h_2-h_2 97, h_1-h_2 30.

Venter

Setae c_2 similar to other dorsals, placed on humeral shields ornamented with dimples. Humeral regions without callosities. Coxisternal shields completely divided, with polygonal dimples and bearing setae $1a$ and $3a$, but $4a$ absent. Surface on coxae with polygonal dimples. Aggenital shield with polygonal dimples, two pairs of setae, ag_1 slightly shorter than ag_2 . Pseudanal covers with three pairs of setae, ps_3 and ps_2 subequal in length, but ps_1 longer than others, rod-like and with minute spinules.

Legs

Leg I 310, leg II 263, leg III 267, leg IV 290. Number of setae (solenidia in parentheses) on leg segments (I–IV) as follows: tarsi $14(\omega)$ - $10(\omega)$ - $8(\omega)$ -7, tibiae $7(\phi, \phi p)$ - $6(\phi p)$ - $6(\phi p)$ - $6(\phi p)$, genua $4(k)$ - $4(k)$ -1-1, femora 6-5-3-2, trochanters 1-1-2-1, coxae 2-2-2-2. $\omega_1 > \omega_2 > \omega_3$, ω_4 absent.

Distribution

China (Hu et al. 1996).

Remarks

This species is similar to *E. brevisetosa* (Wood, 1966), from which it can be distinguished by the postocular setae *sci* which are not very diminutive. General features and details of leg chaetotaxy of Turkish specimens are as in the type species, given by Hu et al. (1996), but the first pair of pseudanal setae (ps_1) with minute spinules. This species is a new record for the Turkish fauna.

Eustigmaeus kentingensis Tseng, 1982

(Figure 4)

Eustigmaeus kentingensis Tseng 1982, p 25.

Examined materials

Three females from soil and litter under *Populus* sp., Kaledibi, Olur, Erzurum, 9 October 1999; one female from moss and lichen on stone, Aziziye Redoubt, Erzurum, 28 April 2001; two females from soil from vineyard, Elazığ, 8 September 2001; 14 females from soil and litter under *Pinus* sp., Kırıkkale, 15 May 2002; six females from litter under *Pinus* sp., Erbaa, Tokat, 15 May 2002; one female from grassy soil, Narman, Erzurum, 23 May 2002; six females from grassy soil under an apple tree, Oltu, Erzurum, 23 May 2002.

Female

Length of body (excluding gnathosoma) 277, width 183.

Figure 4. *Eustigmaeus kentingensis* Tseng (female): (A) dorsal view; (B) ventral view.

Dorsum

Dorsal shields with oval and polygonal dimples, each dimple generally contains 16–25 vacuoles, a few with eight vacuoles. Fossettes on dorsal shields as illustrated. Propodosomal shield pointed anteriorly, with four pairs of setae and one pair of eyes. Hysterosomal shield with six pairs of setae, suranal shield with two pairs of setae. Dorsal body setae short, recurved and bushy. Dimensions of setae as follows: $vi=ve=sci$ 23, $sce=c_1$ 20, c_2 27, $d_1=d_2$ 23, $e_1=e_2$ 27, f_1 40, $h_1=h_2$ 30. Distance between setae: $vi-vi$ 33, $ve-ve$ 70, $vi-ve$ 33, $sci-sci$ 133, $ve-sci$ 37, $sce-sce$ 167, $sci-sce$ 37, c_1-c_1 70, d_1-d_1 60, c_1-d_1 63, c_1-d_1 50, d_2-d_2 177, d_1-d_2 60, e_1-e_1 67, e_2-e_2 143, e_1-e_2 50, d_1-e_2 53, d_2-e_2 57, f_1-f_1 70, e_1-f_1 30, e_2-f_1 73, h_1-h_1 37, h_2-h_2 73, h_1-h_2 17.

Venter

Humeral setae c_2 similar to other dorsals. Humeral regions without callosities. Humeral and suranal shields with similar patterns. Coxisternal shields completely fused, reticulate with punctations, except central region of posterior coxisternal shield which has only punctations. Coxisternal shields bearing $1a$, $3a$ and $4a$. Aggenital shield without dimples, with three pairs of setae, ag_2 and ag_3 subequal in length, but ag_1 slightly shorter than others. Pseudanal covers with three pairs of setae, subequal in length, ps_1 with spinules.

Legs

Leg I 177, leg II 160, leg III 153, leg IV 167. Number of setae (solenidia in parentheses) on leg segments (I–IV) as follows: tarsi 14(ω)-10(ω)-8(ω)-7, tibiae 7(ϕ , ϕ p)-6(ϕ p)-6(ϕ p), genua 4(k)-4(k)-1-1, femora 6-4-3-2, trochanters 1-1-2-1, coxae 2-2-2-2. $\omega_1 > \omega_2 > \omega_3$, ω_4 absent, femur II with four setae.

Male

Not observed.

Distribution

Taiwan (Tseng 1982).

Remarks

Oval, rectangular and triangular dorsal dimples, bushy dorsal body setae, and femur II with four setae are diagnostic characters of *E. kentingensis*. This species closely resembles *E. anauniensis* (Canestrini, 1889), but can be distinguished from the latter by the shape of dimples on dorsum, *E. anauniensis* with polygonal dimples. In the Turkish specimens, the coxisternal shields are also reticulate with punctations, as in the type species, except for central region of posterior coxisternal shield where there are only punctations. This species is a new record for the Turkish fauna.

Eustigmaeus schusteri (Summers and Price, 1961)

(Figures 5, 6)

Ledermuelleria schusteri Summers and Price 1961, p 379.

Ledermuelleria schusteri: Gerson 1972, p 330.

Eustigmaeus schusteri: Tseng 1982, p 37.

Examined materials

Sixty-seven females and one deutonymph from moss and lichen on grassy soil, Beğendik Village, Olur, Erzurum, 29 August 2001.

Female

Length of body (excluding gnathosoma) 307–333, width 200–217.

Dorsum

Dorsal shields covered with dimples and bearing fine punctations. Dorsal dimples nearly round, of uniform diameter except smaller around eyes and bases of setae. Surface between dimples with fine punctations. The margins of the dorsal shields and anterior surface of hysterosomal shield weakly sclerotized, faintly punctated, without dimples. Fossettes on dorsal shields as illustrated, indistinct in many specimens. Propodosomal shield with four pairs of setae and one pair of eyes. Hysterosomal shield with six pairs of setae. Suranal shield tucked under body with two pairs of setae. Dorsal body setae notched, with thin

Figure 5. *Eustigmaeus schusteri* (Summers and Price) (female): (A) dorsal view; (B) ventral view; (C) dorsal ornamentation; (D) lateral view; (E) dorsal setae.

hyaline sheaths and pointed tips. Postocular setae *sci* very short. Setae h_1 and h_2 differ from other dorsal body setae, with spinules, but without sheaths. Dimensions of setae as follows: *vi* 47, *ve* 72, *sci* 13, *sce* 47, c_1 53, c_2 38, d_1 70, d_2 53, e_1 97, e_2 80, f_1 64, h_1 47, h_2 40. Distance between setae: *vi-vi* 30, *ve-ve* 83, *vi-ve* 43, *sci-sci* 147, *ve-sci* 36, *sce-sce* 183, *sci-sce* 36, c_1-c_1 80, d_1-d_1 83, c_1-d_1 60, c_1-d_1 53, d_2-d_2 190, d_1-d_2 67, e_1-e_1 103, e_2-e_2 157, e_1-e_2 40, d_1-e_1 83, d_1-e_2 64, d_2-e_2 70, f_1-f_1 73, e_1-f_1 30, e_2-f_1 73, h_1-h_1 30, h_2-h_2 77, h_1-h_2 24.

Venter

Setae c_2 similar to other dorsal setae, placed on dimpled humeral shields. A pair of callosities associated with humeral shields. The callosities covered with dimples, some

Figure 6. *Eustigmaeus schusteri* (Summers and Price) (deutonymph): (A) dorsal view; (B) lateral view.

arranged like strung beads on central area, some arranged like pomegranate seeds. Coxisternal shields completely divided, with polygonal dimples and bearing *1a*, *3a* and *4a*. Surface on coxae densely punctated. Aggenital shield with polygonal dimples, two pairs of setae. Pseudanal shield covered with fine punctations, three pairs of subequal setae. Suranal shield “V”-shaped. Humeral and suranal shields with similar patterns.

Legs

Leg I 253, leg II 203, leg III 220, leg IV 240. Number of setae (solenidia in parentheses) on leg segments (I–IV) as follows: tarsi 14(ω)-10(ω)-8(ω)-8(ω), tibiae 7(ϕ , ϕ p)-6(ϕ p)-6(ϕ p)-6(ϕ p), genua 4(*k*)-4(*k*)-1-1, femora 6-5-3-2, trochanters 1-1-2-1, coxae 2-2-2-2. All tarsi with solenidion ω . Lengths of solenidia on tarsi: ω_1 27, ω_2 20, ω_3 10, ω_4 7. Lengths of solenidia on tibiae: ϕ 11, ϕ p₁ 20, ϕ p₂ 17, ϕ p₃ 13, ϕ p₄ 12.

Male

Not observed.

Deutonymph

Length of body (excluding gnathosoma) 250, width 170.

Dorsum

Dorsal shields covered with dimples and bearing fine punctations. Dorsal dimples as in female, but less sclerotized. Fossettes on dorsal shields indiscernible. Dorsal body setae as in female. Hysterosomal shield incompletely divided. Setae *h*₁ and *h*₂ dissimilar to other dorsal body setae, with spinules, without sheath. Dimensions of setae as follows: *vi* 33, *ve* 57, *sci* 10, *sce* 40, *c*₁ 43, *c*₂ 33, *d*₁ 50, *d*₂ 50, *e*₁ 80, *e*₂ 77, *f*₁ 47, *h*₁ 37, *h*₂ 33. Distance between setae: *vi-vi* 30, *ve-ve* 70, *vi-ve* 40, *sci-sci* 113, *ve-sci* 23, *sce-sce* 150, *sci-sce* 33, *c*₁-*c*₁ 60, *d*₁-*d*₁ 50, *c*₁-*d*₂ 53, *c*₁-*d*₁ 40, *d*₂-*d*₂ 157, *d*₁-*d*₂ 57, *e*₁-*e*₁ 73, *e*₂-*e*₂ 120, *e*₁-*e*₂ 33, *f*₁-*f*₁ 50, *e*₁-*f*₁ 23, *e*₂-*f*₁ 57, *h*₁-*h*₁ 20, *h*₂-*h*₂ 56, *h*₁-*h*₂ 23.

Venter

Ventral setae and features as in female, but dimples on humeral and coxisternal shields shallower, dimples on suranal and aggenital shields indiscernible. Ventral setae *4a* present, aggenital shield with two pairs of setae.

Legs

Leg I 210, leg II 170, leg III 157, leg IV 177. Number of setae (solenidia in parentheses) on leg segments (I–IV) as follows: tarsi 14(ω)-10(ω)-8(ω)-8(ω), tibiae 7(ϕ , ϕ p)-6(ϕ p)-6(ϕ p)-6(ϕ p), genua 4(*k*)-3(*k*)-0-0, femora 6-5-3-2, trochanters 1-1-2-0, coxae 2-2-2-2. Lengths of solenidia on tarsi: ω_1 20, ω_2 13, $\omega_3=\omega_4=5$.

Distribution

Canada, Taiwan and USA (Summers and Price 1961; Gerson 1972; Tseng 1982).

Remarks

This species was described and illustrated by Summers and Price (1961), and was also recorded by Gerson (1972) from Canada and Tseng (1982) from Taiwan. General features and details of leg chaetotaxy of Turkish specimens are the same as in the type species given by Summers and Price (1961). The deutonymph of this species, which is a new record for the Turkish fauna, is described for the first time.

***Eustigmaeus turcicus* Doğan and Ayyıldız, 2003**

(Figure 7)

Eustigmaeus turcicus Doğan and Ayyıldız 2003, p 2115.

Examined materials

Allotype male and seven females from litter under *Pinus* sp., Yozgat, 7 September 2001; three females from soil and litter under *Quercus* sp., Karaçubuk village, Adaklı, Bingöl, 30 September 2001.

Figure 7. *Eustigmaeus turcicus* Doğan and Ayyıldız (male): (A) dorsal view; (B) ventral view.

Male

Allotype: length of body (excluding gnathosoma) 257, width 150.

Dorsum

Dorsal ornamentation as in female, fossettes on dorsal shields as illustrated. Propodosomal shield with four pairs of setae and one pair of eyes. Hysterosomal shield undivided, with six pairs of setae, suranal shield with two pairs of setae. Dorsal body setae long, unsheathed, with axial core, bilaterally spinulate. Setae h_1 and h_2 much shorter than others, with small spinules but without axial core. Dimensions of setae as follows: vi 60, ve 67, $sci=sce$ 50, c_1 47, c_2 37, d_1 60, d_2 50, $e_1=e_2$ 37, f_1 53, h_1 26, h_2 20. Distance between setae: $vi-vi$ 23, $ve-ve$ 63, $vi-ve$ 30, $sci-sci$ 107, $ve-sci$ 26, $sce-sce$ 137, $sci-sce$ 33, c_1-c_1 43, d_1-d_1 53, c_1-d_1 37, c_1-d_2 50, d_2-d_2 140, d_1-d_2 47, e_1-e_1 63, e_2-e_2 117, e_1-e_2 30, d_1-e_1 48, d_1-e_2 40, d_2-e_2 50, f_1-f_1 37, e_1-f_1 28, e_2-f_1 60, h_1-h_1 17, h_2-h_2 37, h_1-h_2 8.

Venter

Setae c_2 on triangular humeral shields. Humeral regions without callosities. Coxisternal shields completely fused, $1a$, $3a$ and $4a$ present. Venter of ophistosoma with one pair of aggenital setae on aggenital shield. Pseudanal covers with three pairs of setae (ps_1 , 2 , 3).

Legs

Leg I 223, leg II 183, leg III 187, leg IV 203. Number of setae (solenidia in parentheses) on leg segments (I–IV) as follows: tarsi $15(\omega, \omega\delta)-11(\omega, \omega\delta)-9(\omega, \omega\delta)-8(\omega\delta)$; tibiae $7(\phi, \phi p)-6(\phi p)-6(\phi p)-6(\phi p)$; genua $4(k)-4(k)-1-1$; femora $6-4-3-2$; trochanters $1-1-2-1$; coxae $2-2-2-2$.

Distribution

Turkey (Doğan and Ayyıldız 2003).

Remarks

Adult male of *E. turcicus* was not known before. The male can be distinguished from female by the following features: dorsal body setae unsheathed, anogenital covers on posterior margin of idiosoma, with only one pair of aggenital setae, all tarsi with solenidion $\omega\delta$ and body smaller.

***Eustigmaeus absens* n. sp.**
(Figures 8, 9)

Type materials

Holotype female and 94 paratype females from moss and lichen on grassy soil, Beğendik Village, Olur, Erzurum, 29 August 2001.

Female

Holotype: length of body (excluding gnathosoma) 417, width 320.

Figure 8. *Eustigmaeus absens* n. sp. (female): (A) dorsal view; (B) dorsal ornamentation; (C) dorsal setae.

Dorsum

Dorsal shields polygonally dimpled, dimples bearing fine punctations. Surface between dimples with a few fine punctations. Margins of dorsal shields and anterior edge of hysterosomal shield less sclerotized. Fossettes on dorsal shields as illustrated. Prodorsal shield with four pairs of setae and one pair of eyes. Hysterosomal shield with five pairs of setae, *e*₂ absent. Suranal shield with two pairs of setae. Dorsal body setae notched, with axial core. Postocular setae *sci* small. Setae *h*₁ and *h*₂ dissimilar to other dorsal body setae, densely notched, *h*₁ with core but *h*₂ without core. Dimensions of setae as follows: *vi* 70, *ve* 7, *sci* 77, *sce* 52, *c*₁ 87, *c*₂ 23, *d*₁ 90, *d*₂ 56, *e*₁ 91, *f*₁ 83, *h*₁ 50, *h*₂ 23. Distance between setae: *vi*–*vi* 28, *ve*–*ve* 127, *vi*–*ve* 67, *sci*–*sci* 207, *ve*–*sci* 50, *sce*–*sce* 297, *sci*–*sce* 73, *c*₁–*c*₁ 100, *d*₁–*d*₁ 190, *c*₁–*d*₂ 117, *c*₁–*d*₁ 110, *c*₁–*f*₁ 237, *d*₂–*d*₂ 300, *d*₁–*d*₂ 70, *e*₁–*e*₁ 157, *d*₁–*e*₁ 87, *d*₁–*f*₁ 133, *f*₁–*f*₁ 107, *e*₁–*f*₁ 41, *h*₁–*h*₁ 43, *h*₂–*h*₂ 95, *h*₁–*h*₂ 36.

Figure 9. *Eustigmaeus absens* n. sp. (female): (A) ventral view; (B) lateral view.

Venter

Setae c_2 similar to *sci*, humeral shields with dimples. Humeral regions with major and minor callosities covered by dimples, incorporated in the margins of the dorsal shields. Coxisternal shields completely divided with polygonal dimples and bearing *1a*, *3a* and *4a*. Surface on coxae densely punctated and with faint reticulations. Aggenital shield with faint reticulations, two pairs of subequal setae. Pseudanal covers with fine punctations, three pairs of setae, subequal in length. Suranal shield “V”-shaped with dimples.

Legs

Leg I 320, leg II 247, leg III 250, leg IV 300. Number of setae (solenidia in parentheses) on leg segments (I–IV) as follows: tarsi 14(ω)-10(ω)-8(ω)-8(ω), tibiae 7(ϕ , ϕ p)-6(ϕ p)-6(ϕ p)-6(ϕ p), genua 4(k)-4(k)-1-1, femora 6-5-3-2, trochanters 1-1-1-1, coxae 2-2-2-2. All tarsi with solenidion ω . Lengths of solenidia on tarsi: ω_1 23, ω_2 17, ω_3 6, ω_4 4. Lengths of solenidia on tibiae: ϕ 8, ϕ p₁ 16, ϕ p₂ 13, ϕ p₃= ϕ p₄ 7.

Male

Unknown.

Etymology

The name of this new species, *absens*, refers to the absence of setae e_2 .

Remarks

This species is unique in that the hysterosomal shield bears five pairs of setae and trochanter III bears one seta. It may belong to a new genus, as numbers and positions of dorsal body setae are considered as generic significance. However, it seems prudent to await the descriptions of more species lacking setae e_2 , thus strengthening the generic significance of their character.

***Eustigmaeus erzincanensis* n. sp.**

(Figure 10)

Type materials

Holotype female and three paratype females from moss, Ahmediye, Erzincan, 28 April 2001.

Female

Holotype: length of body (excluding gnathosoma) 447, width 310.

Dorsum

Dorsal shields covered with circular dimples bearing vacuoles, some vacuoles more distinct than others, faint punctations between dimples. Fossettes on dorsal shown as Figure 10A.

Figure 10. *Eustigmaeus erzincanensis* n. sp. (female): (A) dorsal view; (B) ventral view; (C) dorsal ornamentation; (D) lateral view.

Propodosomal shield with four pairs of setae and one pair of eyes. Hysterosomal shield with six pairs of setae, suranal shield with two pairs of setae. Dorsal body setae smooth, sword-shaped, with axial core and thin hyaline sheath, setae f_1 with a few fine and short spinules, setae h_1 similar to other dorsal setae but without core and with spinules, setae h_2 unsheathed, very short and spinulate. Dimensions of setae as follows: vi 72, ve 100, sci 23, sce 87, c_1 83, c_2 39, d_1 97, d_2 83, e_1 113, e_2 100, f_1 93, h_1 57, h_2 43. Setae sci shorter than c_2 .

Distance between setae: *vi-vi* 32, *ve-ve* 133, *vi-ve* 54, *sci-sci* 230, *ve-sci* 63, *sce-sce* 263, *sci-sce* 40, *c₁-c₁* 110, *d₁-d₁* 87, *c₁-d₂* 117, *c₁-d₁* 93, *d₂-d₂* 273, *d₁-d₂* 100, *e₁-e₁* 153, *e₂-e₂* 250, *e₁-e₂* 67, *d₁-e₁* 130, *d₁-e₂* 107, *d₂-e₂* 90, *f₁-f₁* 112, *e₁-f₁* 40, *e₂-f₁* 113, *h₁-h₁* 43, *h₂-h₂* 104, *h₁-h₂* 33.

Venter

Setae *c₂* placed on triangular dimpled humeral shields. Humeral regions with major callosities, covered with pores, not conjunct to margins of dorsal shields, minor callosities absent. Surface on coxae faintly reticulate and densely punctate. Coxisternal shields completely divided with polygonal dimples and bearing *1a*, *3a* and *4a*. Aggenital shield with polygonal dimples, two pairs of subequal setae. Pseudanal covers with three pairs of subequal setae. Humeral and suranal shields with similar patterns as that of dorsum.

Legs

Leg I 333, leg II 263, leg III 260, leg IV 327. Number of setae (solenidia in parentheses) on leg segments (I–IV) as follows: tarsi 14(*ω*)-10(*ω*)-8(*ω*)-8(*ω*), tibiae 7(*φ*,*φp*)-6(*φp*)-6(*φp*)-6(*φp*), genua 4(*k*)-4(*k*)-1-1, femora 6-5-3-2, trochanters 1-1-2-1, coxae 2-2-2-2. Lengths of solenidia on tarsi: *ω*₁ 28, *ω*₂ 18, *ω*₃=*ω*₄ 6.

Etymology

The new species name *erzincanensis* refers to the type locality, Erzincan.

Remarks

The new species is similar to *E. erciyesiensis* Doğan, Ayyıldız and Fan, 2003. However, it can be distinguished from the latter by having setae *4a* on the metasternal shield and postocular setae *sci* shorter than humeral setae *c₂*.

Eustigmaeus erzurumensis n. sp.

(Figure 11)

Type materials

Holotype female and four paratype females from soil and moss under *Ostrya carpinifolia*, Köprüköy Village, İspir, Erzurum, 4 August 2001; 13 paratype females from moss, Uzunoluk Forest, Oltu, Erzurum, 15 June 2001; two paratype females from moss and lichen on decayed stump, Uzunoluk Forest, Oltu, Erzurum, 15 June 2001.

Female

Holotype: length of body (excluding gnathosoma) 367, width 253.

Dorsum

Dorsal shields with almost circular dimples, each dimple consists of 9–12 irregularly scattered vacuoles, a few with four or 15 vacuoles. Surface between dimples with fine

Figure 11. *Eustigmaeus erzurumensis* n. sp. (female): (A) dorsal view; (B) ventral view.

punctations. Fossettes on dorsal shields as illustrated. Propodosomal shield with four pairs of setae and one pair of eyes. Hysterosomal shield with six pairs of setae, suranal shield with two pairs of setae. Dorsal body setae short, subspatulate-spinulate. Dimensions of setae as follows: vi 33, $ve=sci$ 30, sce 36, c_1 27, c_2 35, d_1 27, d_2 30, e_1 30, e_2 33, f_1 50, $h_1=h_2$ 40. Distance between setae: $vi-vi$ 43, $ve-ve$ 113, $vi-ve$ 43, $sci-sci$ 180, $ve-sci$ 43, $sce-sce$ 223, $sci-sce$ 50, c_1-c_1 97, d_1-d_1 90, c_1-d_2 77, c_1-d_1 60, d_2-d_2 247, $d_1-d_2=e_1-e_1$ 77, e_2-e_2 197, $e_1-e_2=d_1-e_2$ 67, $d_1-e_1=d_2-e_2$ 73, f_1-f_1 107, e_1-f_1 43, e_2-f_1 80, h_1-h_1 47, h_2-h_2 90, h_1-h_2 20.

Venter

Humeral shields with dimples bearing vacuoles; setae c_2 dissimilar to other dorsals, slender, acute, with short spinules. Humeral regions without callosities. Coxisternal shields completely fused, reticulate with punctations, posterior coxisternal shield with large circle medially, with punctations and striations. Coxisternal shields bearing $1a$, $3a$ and $4a$. Surface on coxae punctate and faintly reticulate. Aggenital shield with dimples and vacuoles; with three pairs of setae, ag_1 and ag_3 subequal in length, ag_2 slightly shorter than others. Pseudanal covers bearing three pairs of setae, subequal in length, ps_1 thicker than others, with spinules. Humeral, aggenital and suranal shields with similar patterns.

Legs

Leg I 210, leg II 183, leg III 157, leg IV 200. Number of setae (solenidia in parentheses) on leg segments (I–IV) as follows: tarsi 14(ω)-10(ω)-8(ω)-7, tibiae 7(ϕ , ϕp)-6(ϕp)-6(ϕp)-6(ϕp),

genua 4(*k*)-4(*k*)-1-1, femora 6-4-3-2, trochanters 1-1-2-1, coxae 2-2-2-2. Lengths of solenidia on tarsi: ω_1 20, ω_2 13, ω_3 7, ω_4 absent. Femur II with four setae.

Male

Unknown.

Etymology

The species name *erzurumensis* refers to the type locality, Erzurum.

Remarks

This species resembles *E. anauniensis* (Canestrini, 1889) and *E. kentingensis* Tseng, 1982, but differs from them in the dorsal ornamentation and the shape of setae c_2 .

***Eustigmaeus fani* n. sp.** (Figures 12–14)

Type materials

Eleven females from moss on soil, Yukarı Parmaksız, Hınıs, Erzurum, 19 May 2000; six females and two males from soil and litter under *Pinus sylvestris*, Deve Mountain, İspir, Erzurum, 4 August 2001.

Female

Holotype: length of body (excluding gnathosoma) 423, width 277.

Dorsum

Dorsal shields slightly sclerotized, bearing fine punctations and round dimples, uniform in size. Dorsal dimples faint or shallow, only those on marginal area of dorsal shields discernible. No visible fossettes on dorsal shields. Propodosomal shield with four pairs of setae and one pair of eyes. Hysterosomal shield with six pairs of setae, suranal shield with two pairs of setae. Dorsal body setae slightly spinulated, with acute tips, hyaline sheath and very slender axial core, difficult to identify in some specimens. Setae h_1 and h_2 similar to other dorsals, but with more obvious spinules. Dimensions of setae as follows: *vi* 50, *ve* 55, *sci*=*sce* 47, c_1 50, c_2 25, d_1 47, d_2 43, e_1 = f_1 60, e_2 50, h_1 43, h_2 33. Distance between setae: *vi*–*vi* 30, *ve*–*ve* 110, *vi*–*ve* 57, *sci*–*sci* 187, *ve*–*sci* 50, *sce*–*sce* 240, *sci*–*sce* 57, c_1 – c_1 107, d_1 – d_1 163, c_1 – d_2 90, c_1 – d_1 103, d_2 – d_2 267, d_1 – d_2 77, e_1 – e_1 167, e_2 – e_2 240, e_1 – e_2 74, d_1 – e_1 = d_2 – e_2 90, d_1 – e_2 43, f_1 – f_1 117, e_1 – f_1 37, e_2 – f_1 113, h_1 – h_1 33, h_2 – h_2 97, h_1 – h_2 33.

Venter

Humeral shields smooth or with faint round dimples, bearing setae c_2 . Humeral setae approximately half as long as preocular setae *ve*. Humeral regions with major and minor callosities. The callosities finely punctate, not conjunct with margins of dorsal shields.

Figure 12. *Eustigmaeus fani* n. sp. (female): (A) dorsal view; (B) ventral view; (C) lateral view.

Surface of coxae densely punctate, without apparent reticulum. Coxisternal shields completely divided, with polygonal dimples and with *1a*, *3a* and *4a*. Aggenital shield with polygonal dimples and three pairs of subequal setae. Pseudanal covers with three pairs of subequal setae. Suranal shields smooth or weakly dimpled.

Legs

Leg I 267, leg II 217, leg III 217, leg IV 253. Number of setae (solenidia in parentheses) on leg segments (I–IV) as follows: tarsi 14(ω)-10(ω)-8(ω)-8(ω), tibiae 7(ϕ , ϕ p)-6(ϕ p)-6(ϕ p)-6(ϕ p),

Figure 13. *Eustigmaeus fani* n. sp. (female): (A) leg I; (B) leg II; (C) leg III; (D) leg IV.

Figure 14. *Eustigmaeus fani* n. sp. (male): (A) dorsal view; (B) ventral view.

genua 4(*k*)-4(*k*)-1-1, femora 6-5-3-2, trochanters 1-1-2-1, coxae 2-2-2-2. Lengths of solenidia on tarsi: ω_1 23, ω_2 17, ω_3 7, ω_4 4.

Male

Length of body (excluding gnathosoma) 297, width 167.

Dorsum

Dorsal ornamentation as in female but dorsal dimples indiscernible. Dorsal body setae different from those of female, subspatulate distally. Dimensions of setae as follows: *vi*=*sce* 33, *ve* 37, *sci* 27, *c*₁ 30, *c*₂ 20, *d*₁=*d*₂ 33, *e*₁ 27, *e*₂ 30, *f*₁ 37, *h*₁ 14, *h*₂ 33. Distance between setae: *vi*-*vi* 23, *ve*-*ve* 75, *vi*-*ve* 40, *sci*-*sci* 127, *ve*-*sci* 30, *sce*-*sce* 157, *sci*-*sce* 37, *c*₁-*c*₁ 77, *d*₁-*d*₁ 90, *c*₁-*d*₁ 60, *c*₁-*d*₂ 47, *d*₂-*d*₂ 160, *d*₁-*d*₂ 50, *e*₁-*e*₁ 67, *e*₂-*e*₂ 110, *e*₁-*e*₂ 33, *d*₁-*e*₁ 53, *d*₂-*e*₂ 70, *d*₁-*e*₂ 27, *f*₁-*f*₁ 60, *e*₁-*f*₁ 13, *h*₁-*h*₁ 27, *h*₂-*h*₂ 50, *h*₁-*h*₂ 13.

Venter

As in female but ophistosoma with two pairs of aggenital setae. Pseudanal covers with three pairs setae, *ps*_{1, 2} peg-like.

Legs

Leg I 250, leg II 207, leg III 187, leg IV 217. Number of setae (solenidia in parentheses) on leg segments (I–IV) as follows: tarsi 15($\omega, \omega\delta$)-11($\omega, \omega\delta$)-9($\omega, \omega\delta$)-9($\omega, \omega\delta$), tibiae 7($\phi, \phi p$)-6(ϕp)-6(ϕp)-6(ϕp), genua 4(k)-4(k)-1-1, femora 6-5-3-2, trochanters 1-1-2-1, coxae 2-2-2-2. All tarsi with solenidia ω and $\omega\delta$.

Etymology

This species is named in honour of Dr Qing-Hai Fan, Fujian Agricultural and Forestry University, China.

Remarks

This new species closely resembles *E. ottavii* Berlese, 1910 in that dimples on the dorsal shields are very shallow and indiscernible mid-dorsally. However, it differs from the latter species in length of the dorsal body setae, in the humeral setae c_2 being approximately half as long as preocular setae ve , and fossettes on dorsal shields indistinct. Dorsal body setae of *Eustigmaeus fani* have many minute spinules, but those of *E. ottavii* have five to eight spinules. This species also resembles *E. manapouriensis* (Wood, 1966), but can be easily distinguished from it by having major and minor callosities and three pairs of aggenital setae.

***Eustigmaeus vacuus* n. sp.**

(Figure 15)

Type materials

Holotype female from moss under *Quercus* sp., Erciyes Mountain, Kayseri, 16 May 2002; one paratype female from dung hill, Erzincan, 30 March 2001.

Female

Holotype: length of body (excluding gnathosoma) 297, width 173.

Dorsum

Dorsal shields with shallow dimples, each dimple with about 10–16 circular or oval vacuoles, some of them bean-shaped, majority peripherally disposed, very few scattered centrally or irregularly dispersed. Fossettes on dorsal shields as illustrated. Propodosomal shield with four pairs of setae and one pair of eyes. Hysterosomal shield with six pairs of setae, suranal shield with two pairs of setae. Dorsal body setae short, fan-shaped with numerous spinules, except for setae f_1 which are longer and club-shaped. Dimensions of setae as follows: vi 20, ve 18, $sci=sce=c_1$ 17, c_2 20, $d_1=d_2=e_1=e_2$ 17, f_1 30, $h_1=h_2$ 20. Distance between setae: $vi-vi$ 30, $ve-ve$ 70, $vi-ve$ 37, $sci-sci$ 120, $ve-sci$ 27, $sce-sce$ 147, $sci-sce$ 33, c_1-c_1 60, d_1-d_1 64, c_1-d_1 57, c_1-d_2 53, d_2-d_2 157, d_1-d_2 52, e_1-e_1 53, e_2-e_2 123, $e_1-e_2=d_1-e_2$ 40, d_1-e_1 54, d_2-e_2 64, f_1-f_1 53, e_1-f_1 37, e_2-f_1 70, h_1-h_1 30, h_2-h_2 67, h_1-h_2 17.

Figure 15. *Eustigmaeus vacuus* n. sp. (female): (A) dorsal view; (B) ventral view; (C) leg I; (D) leg II; (E) leg III; (F) leg IV.

Venter

Humeral shields triangular, setae c_2 , similar to other dorsals. Humeral regions without callosities. Humeral and suranal shields with similar patterns as dorsum. Coxisternal shields completely fused, with vacuoles, except for a central circular region on posterior coxisternal shield which is faintly punctate. Coxisternal shields bearing $1a$, $3a$ and $4a$. Aggenital shield with three pairs of setae, ag_2 and ag_3 subequal in length, ag_1

slightly shorter than others. Pseudanal covers with three pairs of setae, subequal in length, ps_1 with spinules. Coxae, anal covers, coxisternal and aggenital shields with similar patterns.

Legs

Leg I 197, leg II 163, leg III 157, leg IV 190. Number of setae (solenidia in parentheses) on leg segments (I–IV) as follows: tarsi 14(ω)-10(ω)-8(ω)-7, tibiae 7(ϕ , ϕp)-6(ϕp)-6(ϕp)-6(ϕp), genua 4(k)-4(k)-1-1, femora 6-4-3-2, trochanters 1-1-2-1, coxae 2-2-2-2. Lengths of solenidia on tarsi: ω_1 18, ω_2 10, ω_3 4, femur II with four setae.

Male

Unknown.

Etymology

The name of this new species, *vacuus*, refers to the ornamentation of the dorsal and ventral shields.

Remarks

This species is similar to *E. erzurumensis* n. sp., *E. anauniensis* (Canestrini, 1889) and *E. kentingensis* Tseng, 1982, in the number of setae on femur II. However, it can be distinguished from these species by the shape of the dorsal dimples and the ventral shields.

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