

## Article

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### Two new records of the genus *Stigmaeus* (Acari: Trombidiformes: Stigmaeidae) from Turkey

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#### Abstract

*Stigmaeus creber* Barilo, 1986, found only Southern regions of Uzbekistan and *Stigmaeus hashtrudiensis* Bagheri and Maleki, 2014, found only East Azerbaijan province, Iran, are reported from Turkey for the first time.

**Key words:** Acari; Prostigmata; *Stigmaeus creber*; *Stigmaeus hashtrudiensis*; Kütahya; Hakkari.

#### Introduction

Stigmaeidae is a one of the largest family within the superfamily Raphignathoidea. These mites live in or on soil, grass, leaf, mulch, lichen, bark, crevices in rock and leaf cavities, and a few are parasitic on phlebotomine flies (Meyer 1969; Ueckermann and Meyer 1987; Koç and Ayyıldız 1997; Doğan and Ayyıldız 2003 a, b; Akyol and Koç 2007, 2010; Noei *et al.* 2007; Dönel and Doğan 2011; Pahlavan-Yali *et al.* 2011; Uluçay and Koç 2014). Stigmaeidae are predators and feed on a variety of arthropods (Meyer and Ueckermann 1989; Haddad Irani-Nejad *et al.* 2006; Zarei and Bagheri 2012; Bagheri *et al.* 2012a). Currently this family consists of more than 500 species in 32 valid genera (Doğan *et al.* 2011; Bagheri *et al.* 2012b; Nazari *et al.* 2012; Khanjani *et al.* 2014). Up to now, *Agistemus* Summers, *Cheyllostigmaeus* Willmann, *Eustigmaeus* Berlese, *Ledermuelleriopsis* Willmann, *Mediolata* Canestrini, *Stigmaeus* Koch, *Prostigmaeus* Kuznetsov, *Storchia* Oudemans, *Villersia* Oudemans, *Zetzellia* Oudemans and *Eryngiopus* Summers have been reported from Turkey (Doğan 2007; Dönel and Doğan 2011; Yeşilayer and Çobanoğlu 2013; Uluçay 2015). The genus *Stigmaeus* has a worldwide distribution with more than 100 described species and so far 25 species have been reported from Turkey (Akyol and Koç 2007; Doğan 2007; Dönel and Doğan 2011; Özçelik and Doğan 2011). In this article, *Stigmaeus creber* and *S. hashtrudiensis* are recorded for the first time from Turkey. Specimens from Turkey are illustrated in detail.

#### Material and methods

The soil and litter samples taken from various habitats in Gaziantep Province in 2014, Kütahya and Hakkari Provinces in 2013, and were brought to the laboratory in nylon bags, and extracted by Berlese funnels for 5 to 7 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. For the figures and the measurements a Leica DM 4000 B research microscope with special software (Leica Application Suite

Version 3.6.0 – Build: 488) was used. The setal nomenclature follows those of Kethley (1990). The specimens are slide-mounted and deposited in the Acari Collection of Hakkari University, Hakkari, Turkey. All measurements are given in micrometres ( $\mu\text{m}$ ). Minimum and maximum values of all measurements are given. Measurements of legs have been taken from base of femur to tip of tarsal claw.

## Results

### Family Stigmaeidae Oudemans, 1931

#### Genus *Stigmaeus* Koch, 1836

Type species: *Stigmaeus cruentus* Koch, 1836

#### *Stigmaeus creber* Barilo, 1986

*Female* (n = 18) (Fig. 1–2)

Idiosoma oval, length of body (including gnathosoma) 402–436; width of body 174–208.

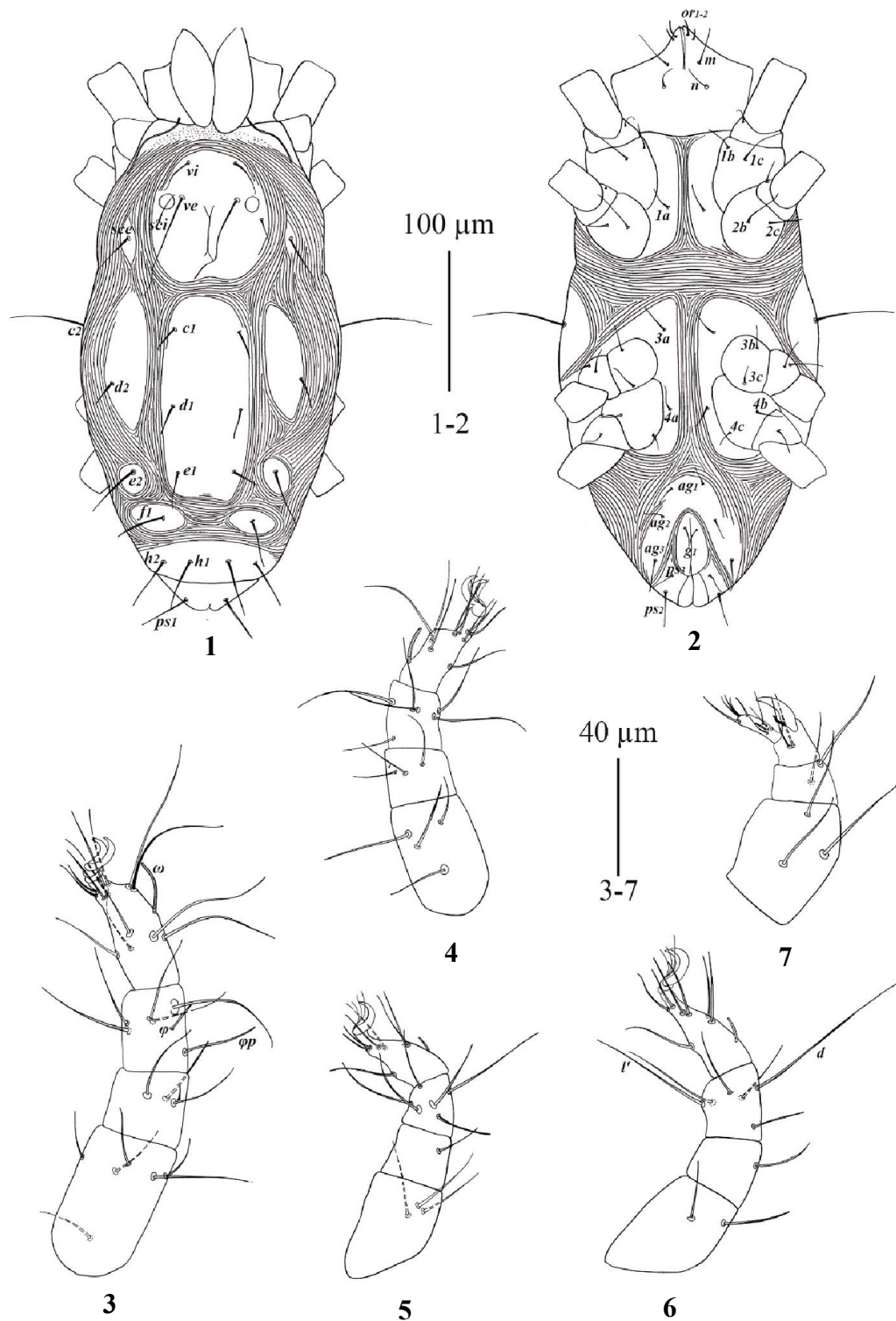
*Gnathosoma* - Length of gnathosoma 68–70; subcapitulum with two pairs of subcapitular setae (*m* and *n*), *m* 25–26, *n* 15–20 and two pairs of adoral setae, *or*<sub>1</sub> and *or*<sub>2</sub>; distances *m-m* 19–21, *n-n* 26–30; palpi five segmented, palp tarsus with five simple setae + one tridentate eupathidium + one solenidion; palp tibia with two setae + one spine-like accessory claw + one well-developed claw; palp genu with two setae; palp femur with three setae; palp trochanter without setae (Fig. 7).

*Dorsum* (Fig. 1) - Body elongated. Dorsum with 13 pairs of setae; all dorsal shields smooth; propodosomal shield with three pairs of setae (*vi*, *ve* and *sci*); one pair of eyes located between setae *ve* and *sci*; postocular bodies absent. Apodemal marking on propodosomal shield. Setae *sce* located on small auxiliary shields. Central shield with three pairs of setae (*c*<sub>1</sub>, *d*<sub>1</sub> and *e*<sub>1</sub>). Setae *c*<sub>2</sub> placed on humeral shields. Setae *d*<sub>2</sub> located on marginal shields and setae *e*<sub>2</sub> located on lateral zonal shields. Intercalary shield divided, with setae *f*<sub>1</sub>. There is not a pair of small shields between the lateral zonal and the intercalary shields. Suranal shield entire, with two pairs of setae (*h*<sub>1</sub>, *h*<sub>2</sub>). Dorsal body setae faintly serrated. Dimensions of setae as follows: *vi* 24–25, *ve* 79–86, *sci* 17–20, *sce* 44–50, *c*<sub>1</sub> 21–22, *c*<sub>2</sub> 66–73, *d*<sub>1</sub> 21–23, *d*<sub>2</sub> 20–22, *e*<sub>1</sub> 22–23, *e*<sub>2</sub> 37–45, *f*<sub>1</sub> 32–34, *h*<sub>1</sub> 35–40, *h*<sub>2</sub> 40–45; distances between dorsal setae: *vi-vi* 28–30, *ve-ve* 37–40, *vi-ve* 23–24, *ve-sci* 20–22, *sci-sci* 70–73, *sce-sce* 106–116, *sci-sce* 19–24, *c*<sub>1-c</sub><sub>1</sub> 42–47, *c*<sub>1-d</sub><sub>1</sub> 53–57, *d*<sub>1-d</sub><sub>1</sub> 47–52, *d*<sub>1-d</sub><sub>2</sub> 41–50, *d*<sub>1-e</sub><sub>1</sub> 45–55, *e*<sub>1-e</sub><sub>1</sub> 37–42, *e*<sub>1-e</sub><sub>2</sub> 25–34, *e*<sub>1-e</sub><sub>2</sub> 25–34, *e*<sub>2-e</sub><sub>2</sub> 95–119, *f*<sub>1-f</sub><sub>1</sub> 57–62, *e*<sub>1-f</sub><sub>1</sub> 28–37, *f*<sub>1-h</sub><sub>1</sub> 30–37, *h*<sub>1-h</sub><sub>1</sub> 24–25, *h*<sub>1-h</sub><sub>2</sub> 17–19, *h*<sub>2-h</sub><sub>2</sub> 58–65; ratios *ve/vi* 3.1–3.5, *ve/sci* 4.2–4.5 and *c*<sub>2/c</sub><sub>1</sub> 3–3.5.

*Venter* (Figure 2) - Coxisternal shields separated, with three pairs of setae *1a*, *3a* and *4a*. Lengths of setae *1a* 20–23, *1b* 16–17, *1c* 37–40, *2b* 32–40, *2c* 16–22, *3a* 21–23, *3b* 18–22, *3c* 14–16, *4a* 20–24, *4b* 13–17 and *4c* 12–14 and ratio *1a:3a:4a* 0.9–1:0.9–1.1:1. Three pairs of aggenital setae (*ag*<sub>1–3</sub>) located on the same shield; genital cover bearing one pair of setae (*g*<sub>1</sub>); anal cover bearing three pairs of setae (*ps*<sub>1–3</sub>). Measurements of setae *ag*<sub>1</sub> 17–21, *ag*<sub>2</sub> 18–22, *ag*<sub>3</sub> 20–24, *g*<sub>1</sub> 13–16, *ps*<sub>1</sub> 36–43, *ps*<sub>2</sub> 27–29 and *ps*<sub>3</sub> 16–17.

*Legs* (Figs. 3–6) - Length of legs I–IV : Leg I 155–161; leg II 123–127; leg III 110–121; leg IV 133–144; number of setae (solenidia and setae  $\kappa$  included) of legs I–IV: coxae 2, 2, 2, 2; trochanters 1, 1, 2, 1; femora 6, 4, 3, 2; genua 3+ $\kappa$ , 3+ $\kappa$ , 1, 1; tibiae 7

( $\varphi$ ,  $\varphi\varphi$ ), 6 ( $\varphi\varphi$ ), 6 ( $\varphi\varphi$ ), 6 ( $\varphi\varphi$ ); tarsi 14 ( $\omega$ ), 10 ( $\omega$ ), 8 ( $\omega$ ), 8 ( $\omega$ ). The length of macroseta  $d$  62–70 and setae  $l'$  40–45 on tibia IV and the ratio setae  $d/l'$  1.5–1.6.



**Figures 1–7.** *Stigmaeus creber* Barilo, 1986 (female) - 1. Dorsal view of body; 2. Ventral view of body; 3. Leg I; 4. Leg II; 5. Leg III; 6. Leg IV; 7. Palp.

*Remarks*

*Stigmaeus creber* Barilo was found by Barilo (1986) in the southern regions of Uzbekistan. It can be distinguished from the other known species by the dorsum with 13 pairs of setae; prodorsal shield smooth; three pairs of setae on the central shield; presence of apodemal marking on propodosomal shield and one pair of eyes, postocular bodies absent; most of dorsal body setae faintly serrated; aggenital shield entire; *ve/sci* 3.6–4; *ve/vi* 3.3, *c<sub>2</sub>/c<sub>1</sub>* 2.9–3.2; genua I-II 3+κ-3, tarsi I-II 14(ω)-10 (ω); the ratio setae *d/l'* 1.6 on tibia IV (Barilo 1986).

Our specimens differ from the type specimens in that *ve/sci* 4.2–4.5; genua I-II 3+κ-3+κ (in type specimens *ve/sci* 3.6–4; genua I-II 3+κ-3). Apart from these, our specimen resembles to type specimens in all respects.

*Material examined*

Eighteen females, Gaziantep, 37° 04' 26" N, 37° 22' 07" E, 845 m a.s.l., from soil and litter under *Juniperus* sp., 25.04.2014.

***Stigmaeus hashtrudiensis* Bagheri and Maleki, 2014***Female* (n = 5) (Figs. 8–9)

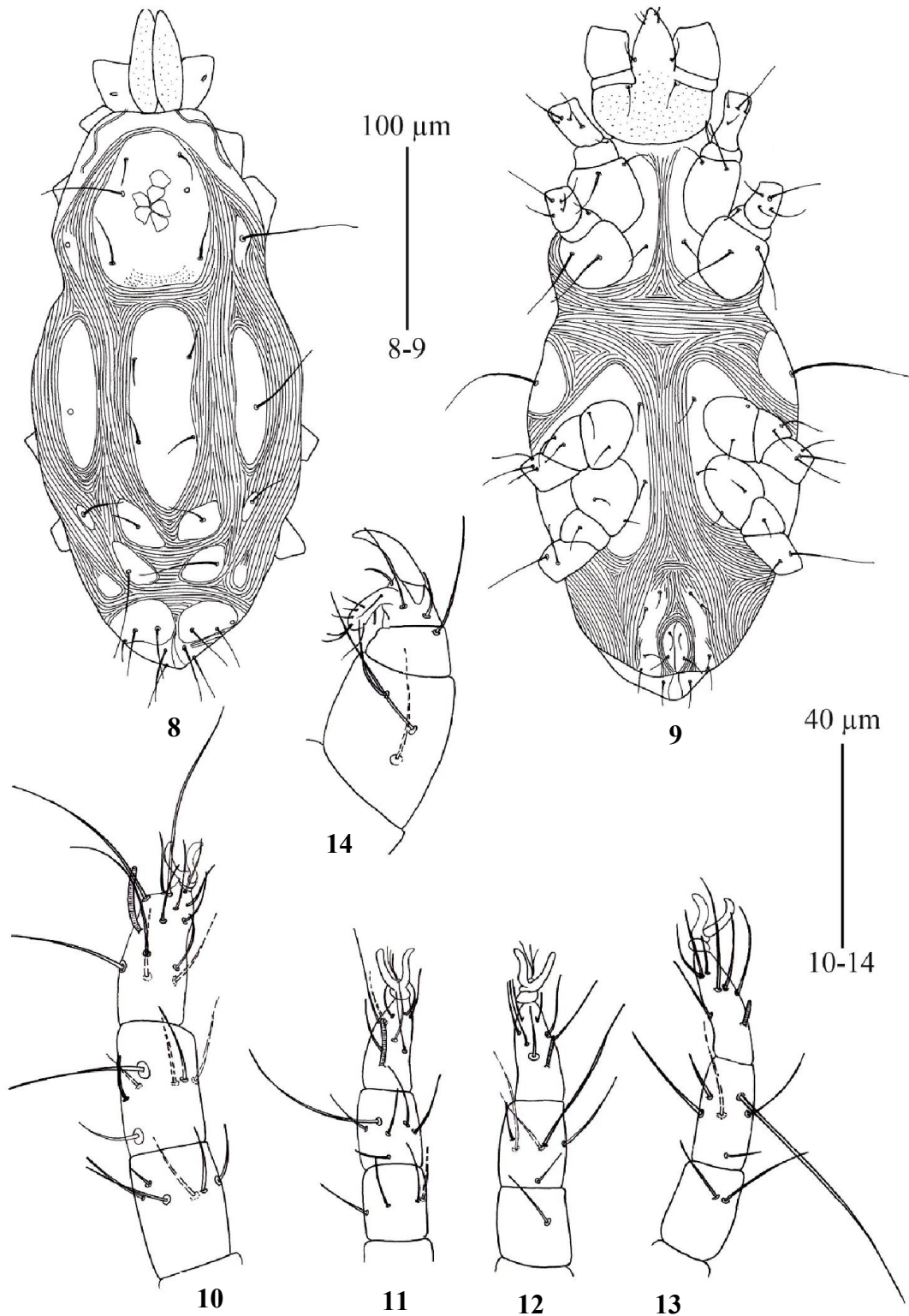
Length of body (including gnathosoma) 364–394; width of body 150–182.

*Gnathosoma* - Length of gnathosoma 66–69; subcapitulum with two pairs of subcapitular setae (*m* and *n*), *m* 20–24, *n* 24–27 and two pairs of adoral setae, *or<sub>1</sub>* and *or<sub>2</sub>*; ratio *n:m* 1–1.3; palpi five segmented, palp tarsus with five simple setae + one bifurcate eupathidium + one solenidium; palp tibia with two setae + one seta-like accessory claw + one well-developed claw; palp genu with one seta; palp femora with 3 setae; palp trochanter without setae (Fig. 14).

*Dorsum* (Fig. 8) - Prodorsal shield reticulated centrally with three pairs of setae (*vi*, *ve* and *sci*), eyes and post-ocular bodies absent; setae *sce* located on small auxiliary shields; central shield smooth and with two pairs of setae *c<sub>1</sub>* and *d<sub>1</sub>*; setae *c<sub>2</sub>* on humeral shield ventrolateral; median zonal shields with one pair of setae *e<sub>1</sub>*; marginal shields with setae *d<sub>2</sub>*; lateral zonal shields with setae *e<sub>2</sub>*; intercalary shields divided, with setae *f<sub>1</sub>*. A pair of additional small shield without setae next to intercalary shield. Suranal shield divided, with three pairs of setae *h<sub>1</sub>*, *h<sub>2</sub>* and *h<sub>3</sub>*. Seta *c<sub>2</sub>* is the longest dorsal seta, ratio *c<sub>2</sub>>sce>ve*. Lengths of setae as follows: *vi* 16–17, *ve* 53–62, *sci* 20–24, *sce* 61–73, *c<sub>1</sub>* 18–21, *c<sub>2</sub>* 66–77, *d<sub>1</sub>* 19–22, *d<sub>2</sub>* 47–55, *e<sub>1</sub>* 22, *e<sub>2</sub>* 25–30, *f<sub>1</sub>* 50–57, *h<sub>1</sub>* 28–32, *h<sub>2</sub>* 28–32, *h<sub>3</sub>* 19–20; distances between dorsal setae: *vi-vi* 25–29, *ve-ve* 32–36, *vi-ve* 17–20, *sci-sci* 46–52, *sce-sce* 93–107, *ve-sci* 33–35, *vi-sci* 55–59, *sci-sce* 23–27, *c<sub>1</sub>-c<sub>1</sub>* 28–33, *sci-sci* 46–52, *c<sub>1</sub>-d<sub>1</sub>* 43–44, *d<sub>1</sub>-d<sub>1</sub>* 27–31, *d<sub>1</sub>-d<sub>1</sub>* 27–31, *c<sub>1</sub>-d<sub>2</sub>* 42–52, *d<sub>1</sub>-e<sub>1</sub>* 44–49, *d<sub>1</sub>-e<sub>2</sub>* 53–58, *d<sub>2</sub>-d<sub>2</sub>* 100–128, *e<sub>1</sub>-e<sub>1</sub>* 33–40, *e<sub>1</sub>-e<sub>2</sub>* 27–34, *e<sub>1</sub>-f<sub>1</sub>* 23–25, *e<sub>2</sub>-f<sub>1</sub>* 35–40, *f<sub>1</sub>-f<sub>1</sub>* 45–50, *f<sub>1</sub>-h<sub>1</sub>* 35–39, *f<sub>1</sub>-h<sub>2</sub>* 34–38, *h<sub>1</sub>-h<sub>1</sub>* 17–21, *h<sub>1</sub>-h<sub>2</sub>* 10–12, *h<sub>2</sub>-h<sub>2</sub>* 43–49, *h<sub>2</sub>-h<sub>3</sub>* 6–8, *h<sub>3</sub>-h<sub>3</sub>* 51–62; ratio: *ve:sci* 2.2–2.9, *c<sub>2</sub>:c<sub>1</sub>* 3.5–3.9, *d<sub>2</sub>/e<sub>2</sub>* 1.8–1.9. *vi*: *vi-vi* 0.6–0.7, *c<sub>1</sub>*: *c<sub>1</sub>-c<sub>1</sub>* 0.6–0.7, *d<sub>1</sub>*: *d<sub>1</sub>-d<sub>1</sub>* 0.7–0.8, *e<sub>1</sub>*: *e<sub>1</sub>-e<sub>1</sub>* 0.6–0.7, *f<sub>1</sub>*: *f<sub>1</sub>-f<sub>1</sub>* 1–1.2, *h<sub>1</sub>*: *h<sub>2</sub>* 1–1.1, *c<sub>1</sub>-c<sub>1</sub>:d<sub>1</sub>-d<sub>1</sub>:e<sub>1</sub>-e<sub>1</sub>:f<sub>1</sub>-f<sub>1</sub>* 1–1.1:1.1–1.4:1.5–1.8.

*Venter* (Figures 9) - Coxisternal shields separated, with three pairs of setae *1a*, *3a* and *4a*. Lengths of setae: *1a* 16–17, *3a* 16–20, and *4a* 13–14 and ratio *1a:3a:4a* 1.1–1.3:1.2–1.4:1. Aggenital area with four pairs of setae, *ag<sub>1</sub>* 11–13, *ag<sub>2</sub>* 11–13, *ag<sub>3</sub>* 14–16 and *ag<sub>4</sub>* 14–16; anogenital valves with two pairs of genital setae and three pairs of

pseudanal setae. Measurements of setae  $g_1$  11–14,  $g_2$  16–18,  $ps_1$  30–34,  $ps_2$  30–32 and  $ps_3$  18–20.



**Figures 8–14.** *Stigmaeus hashtrudiensis* Bagheri & Maleki, 2014 (female) - 8. Dorsal view of body; 9. Ventral view of body; 10. Leg I; 11. Leg II; 12. Leg III; 13. Leg IV; 14. Palp.

*Legs* (Figs. 10–13) - Length of legs: leg I 113–129, leg II 81–96, leg III 82–96, leg IV 94–110. Setal formulae of leg segments as follows: coxae 2, 2, 2, 2; trochanters 1, 1, 2, 1; femora 4, 4, 3, 2; genua 6( $\kappa$ ), 4, 1, 2, tibiae 7( $\phi$ , $\phi$ p), 6( $\phi$ p), 6( $\phi$ p), 6( $\phi$ p); tarsi 14( $\omega$ ), 9( $\omega$ ), 8( $\omega$ ), 8( $\omega$ ).

#### Remarks

This species can be distinguished from other known species in that prodorsal shield is reticulated; hysterosomal shields completely smooth; suranal shield divided and with three pairs of setae (setae  $h_3$  present); setae  $ve$ ,  $sce$ ,  $c_2$ ,  $d_2$  and  $f_1$  longer than other dorsal setae; genua I-IV with (6)  $\kappa$ -4-1-2 setae; femora I-IV with 4-4-3-2 setae; median hysterosomal shield with two pairs of setae; eyes and post-ocular bodies absent; ventral opisthosoma with two pairs of genital and four pairs of aggenital setae; palp tarsal eupathidium bifurcate (Bagheri *et al.* 2014).

Our specimens differ from the type specimens in that setae  $sce$  located on small auxiliary shields; with a pair of additional small shields without setae next to intercalary shield. Apart from these, our specimens resemble the type specimens in all respects.

#### Material examined

Four female, Aslanapa, Kütahya, 39° 10' 39" N, 29° 50' 50" E, 1064 m, from soil and litter under *Cupressus* sp. 25 06 2013; one female, Yüksekova, Hakkari, 37° 41' 947" N, 44° 23' 728" E, 2185 m, from soil and litter under *Ranunculus* sp. 27.04.2013.

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دو گزارش جدید از جنس *Stigmaeus* (Acari: Trombidiformes: Stigmaeidae) از ترکیه

اسماعیل اولوچای

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چکیده

گونه *Stigmaeus creber* Barilo, 1986 یافت شده تنها از مناطق جنوبی ترکیه و گونه *Stigmaeus hashtrudiensis* Bagheri and Maleki, 2014 یافت شده تنها از استان آذربایجان شرقی ایران برای نخستین بار از ترکیه گزارش می شوند. واژگان کلیدی: زیررده کنه‌ها؛ پیش‌استیگمایان؛ *Stigmaeus creber*؛ *Stigmaeus hashtrudiensis*؛ کوتاهیا؛ هکری.

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