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MITES OF THE GENERA *ZETZELLIA* AND *EUSTIGMAEUS* FROM IRAN (ACARI: STIGMAEIDAE)

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ABSTRACT: *Zetzellia kamalii* sp. n. (Stigmaeidae) is described from soil in Iran. *Eustigmaeus jiangxiensis* Hu, Chen et Huang (first record for Iran) is redescribed. A key to species of *Zetzellia* and *Eustigmaeus* of Iran is given.

KEY WORDS: Acari, Stigmaeidae, *Zetzellia*, *Eustigmaeus*, Iran.

INTRODUCTION

Stigmaeids live on plants and in the soil feeding on tetranychids, tenuipalpids and eriophyids (Santos and Laing 1985). After phytoseiid mites, stigmaeids, especially the genera *Agistemus* Summers and *Zetzellia* Oudemans, are considered the most important spider mite predators (Santos and Laing 1985; Croft 1994). Members of the genus *Eustigmaeus* Berlese are often found on mosses (Gerson 1972) and some of them on phelebotomine sand flies (Martinez-Ortega et al. 1983, Shehata and Baker 1996, Zhang and Gerson 1995). To date the stigmaeid fauna of Iran includes 14 named species (Sepasgosarian 1977, Kamali et al. 2001, Khanjani and Ueckermann 2002, Faraji and Ueckermann 2006). Among them, only three out of 82 species of the genus *Eustigmaeus* and two out of 26 species of *Zetzellia* are recorded from Iran (Kamali et al. 2001, Khanjani and Ueckermann 2002). In this paper we describe and redescribe two stigmaeid species from Iran, *Zetzellia kamalii* sp.n. and *Eustigmaeus jiangxiensis* Hu, Chen et Huang, respectively. The last species was collected in Iran for the first time.

MATERIAL AND METHODS

Mites were extracted from soil using a Berlese funnel; specimens were cleared in lactophenol and mounted in Hoyer's medium. Measurements were done with an Olympus Soft Imaging System. The gnathosoma was measured from the base of the maxillicoxae to the tip of the palptibial claw, the length of the idiosoma from the suture between the gnathosoma and propodosoma to the posterior margin of the suranal shield, and the idiosomal width was measured at the level of setae c_1. Setae were measured from alveoli to tips and legs from the base of the coxae to the base of tarsal claws. All measurements are in micrometers (μm). Both setae and solenidia are included in the counts for the setal formulae of the legs and palp segments. Dorsal setae and shield designations follow Kethley (1990) and Summers (1962), respectively.

SYSTEMATICS

Family Stigmaeidae Oudemans, 1931

Genus *Zetzellia* Oudemans, 1927

Zetzellia kamalii Kheradmand, Ueckermann et Fathipour sp. n.

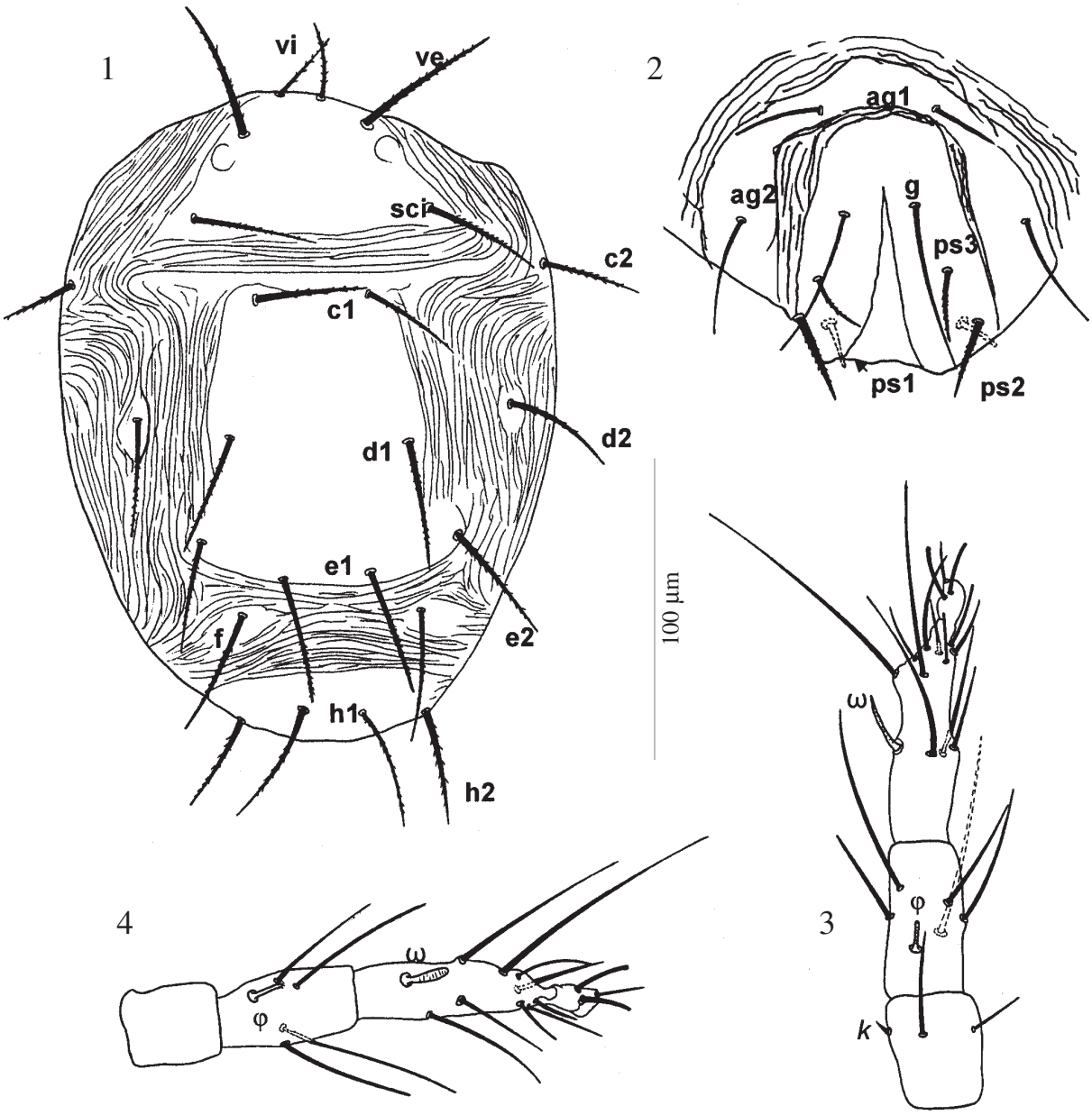
Figs 1–4.

Description. Female (holotype). Body oval, 343 long (including gnathosoma) and 220 wide at level of setae c_{1-2}. Dorsal shield smooth, median opisthosomal shield with four pairs of setae. Dorsal setae long and serrate. Setal lengths: *vi* 28, *ve* 50, *sci* 44, c_1 39, c_2 35, d_1 44, d_2 40, e_1 45, e_2 43, *f* 46, h_1 42, h_2 35. Distances between setae: *vi–vi* 11, *vi–ve* 13, *ve–ve* 36, *ve–sci* 29, *sci–sci* 75, c_1–c_1 34, c_1–d_1 45, c_1–d_2 54, d_1–d_1 56, d_2–d_2 119, d_1–d_2 27, e_1–e_1 26, e_2–e_2 82, e_1–e_2 28, d_1–e_1 46, d_1–e_2 32, d_2–e_2 41, *f–f* 55, e_2–*f* 24, h_1–h_1 14, h_2–h_2 59, h_1–h_2 17. Two eyes present on propodosomal shield.

Venter striate, with 3 pairs of setae (*1a–4a*). Anogenital area with 2 pairs of aggenital setae ag_{1-2} situated on horseshoe-shaped shield. Setae g_1 very long, extending pass setae ps_2, ps_{1-3} serrate with ps_{1-2} stouter.

Gnathosoma 124 long, rostrum reaching anterior margin of palpfemur. Rostral setae or_{1-2} and subcapitular setae *n* and *m* long. Palp chaetotaxy from trochanter to tarsus: 0–3–1–2 + claw + accessory claw. Position of tarsus made a setal count impossible. Accessory claw of tibia represented by small spine.

Length of legs: I 188, II 170, III 170, IV 177. Number of setae, solenidia on leg segments: Tarsi



Figs. 1–4. *Zetzellia kamalii* n. sp., female: 1 — dorsal view; 2 — anogenital area; 3 — leg I, dorsal view; 4 — leg II, dorsal view.

12 (*ω*)–10 (*ω*)–8 (*ω*)–7, tibia 6 (*φ*)–6 (*φ*)–6 (*φ*)–4, genua 3 (*k*)–0–0–0, femora 4–4–2–2, trochanters 1–1–1–1, coxae 2–1–2–1. Length of solenidia: *ω I* 10, *ω II* 8, *φ I* 6, *φ II* 5, *φ III* 5. Empodia arolia-like (figs 3–4).

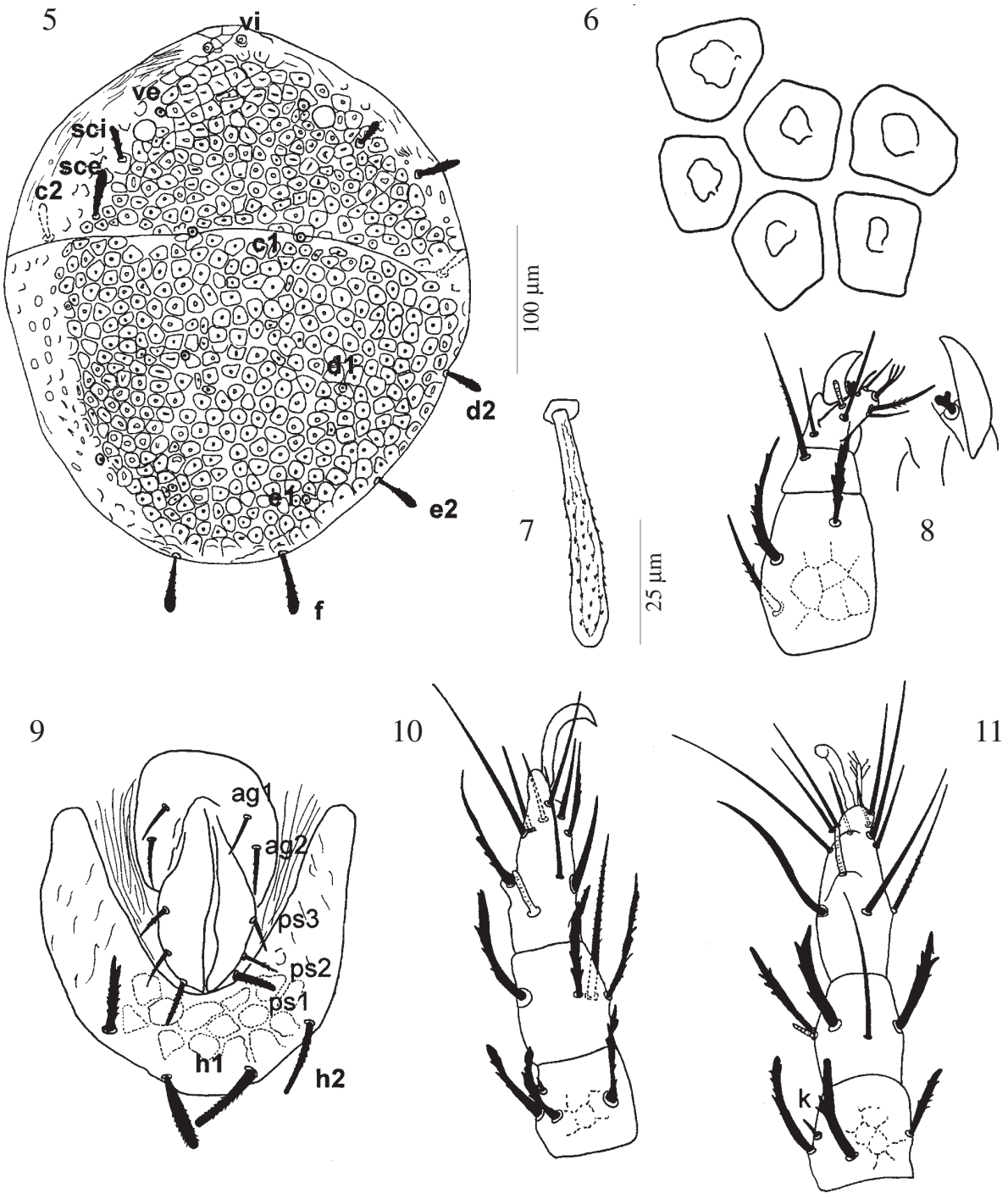
Male. Unknown.

Type material: Holotype female from soil, IRAN: Tehran, 35°40′19″ N, 51°25′28″ E, 18 May 2002, coll. K. Kheradmand.

Type depository. The holotype is deposited in the collection of the Karadj Agricultural College, Iran.

Etymology. This species is named after Prof. Karim Kamali of the Department of Entomology, Faculty of Agriculture, Tarbiat Modares University.

Differential diagnosis. In having a large median shield with 3–4 pairs of setae, this species resembles *Z. quasagistemus* Hernandes and Feres, 2005; *Z. agistzellia* Hernandes and Feres, 2005; *Z. buxi* Ueckermann and Meyer, 1987; *Z. lushanensis* Hu and Chen, 1992; *Z. beijingensis* Wang and Xu, 1986; *Z. crassirostris* Wood, 1973; *Z. methlalgi* Oudemans, 1927 (sensu Gonzalez 1965); *Z. languida* Gonzalez, 1965 and *Z. mali* (Ewing, 1917). However, it differs from all of them by substantially longer dorsal setae and in by the chaetotaxy of the tibiae, 6(*φ*)–6(*φ*)–6(*φ*)–4, genua 3(*k*)–0–0–0 and femora 4–4–2–2. Only *Z. mali* has the same leg chaetotaxy as *Z. kamalii*, but it differs from the latter by the reticulated dorsal



Figs. 5–11. *Eustigmaeus jiangxiensis* Hu, Chen et Huang, female: 5 — dorsal view; 6 —dorsal reticulations; 7 — seta *f*; 8 — palp with enlargement of accessory claw, dorsal view; 9 — anogenital area; 10 — leg I, dorsal view; 11 — leg II, dorsal view.

shields and by setae c_1 being situated off the median opisthosomal shield.

Genus *Eustigmaeus* Berlese, 1910

Eustigmaeus jiangxiensis Hu, Chen et Huang, 1996

Figs 5–11.

Eustigmaeus jiangxiensis Hu, Chen and Huang 1996: 319, figs. 9, 10, 18–21; Dogan 2005: 838.

Redescription: Female (n=1)**.** Body broadly oval, 495 long (including gnathosoma) and 342 wide of level of c_{1-2}. Reticulations polygonal. Setae spatulate with small spicules and hyaline sheaths. Setae c_2 ventrolateral, situated on large reticulate, triangular shields. Length of setae: *sci* 32, *sce* 41, c_2 33, d_2 35, e_2 39, *f* 52, h_1 35, h_2 33 (remaining setae are missing). Distances between setae*: vi–vi* 21, *vi–ve* 63, *ve–ve* 110, *ve–sci* 44, *sci–sci* 189, *sce–sce*

238, *sci–sce* 46, c_1–c_1 83, c_1–d_1 97, c_1–d_2 113, d_1–d_1 127, d_2–d_2 278, d_1–d_2 80, e_1–e_1 78, d_1–e_2 79, d_2–e_2 100, *f–f* 87, e_2–*f* 96, h_1–h_1 31, h_2–h_2 84, h_1–h_2 22. Two eyes present.

Coxisternal shields reticulate, separate; setae *4a* absent. Anogenital area with two pairs of aggenital setae (*ag*$_1$ *18, ag*$_2$ *24*), 3 pairs of pseudanal setae (*ps*$_1$ *19, ps*$_2$ *18, ps*$_3$ *21*); all these setae slightly serrated, with *ps*$_1$ stout. Suranal shield horseshoe-shaped, reticulate, bearing setae $h_{1–2}$. One seta h_2 bifid distally.

Gnathosoma 94 long, rostrum extends palptrochanter. Venter of subcapitulum reticulate. Setae $or_{1–2}$ and *n* and *m* long, slightly serrate. Palp chaetotaxy from trochanter to tarsus: 0–3–2–2 + claw + accessory claw- 7 (*ω*). Eupathidium on tarsus tridentate. Accessory claw of tibia unique, bilobed.

Length of legs: I 296, II 243, III 271, IV 291. Number of setae and solenidia on leg segments: tarsi 14 (*ω*)–10 (*ω*)–8 (*ω*)–7, tibia 7 (*φ, φρ*), 6 (*φρ*)–6 (*φρ*)–6 (*φρ*), genua 4 (*k*)–4 (*k*)–1–1, femora 6–5–3–2, trochanters 1–1–2–1, coxae 2–2–2–2. Length of solenidia: *ω* I 19, *ω* II 14, *φρ* I 10, and *φρ* II 11. Coxae and some leg segments reticulated.

Male. Unknown.

Material examined. One female from soil, IRAN: Northern Iran, Mazandaran Province, Noor, 36°15′00″ N, 52°20′00″ E, 26 April 2003, coll. K. Kheradmand.

Voucher depository. The examined specimen is deposited in the collection of the Karadj Agricultural College, Iran.

Distribution. This species was described from China. Dogan (2005) recorded it from Turkey.

Remarks. The following combination of features distinguishes this species: the dorsal setae spatulate, with sheaths, covered with small spicules; setae *sci* long, more than half of the length of *sce*; tarsus IV without a solenidion; genu II with seta *k* present, and the accessory claw of the palptibia is bilobed. The Iranian specimen resembles the description of *E. jiangxiensis* in all respects. Even the unique shape of the accessory claw of the palptibia, though not depicted by Hu *et al.*, is similar (Dr. F. Faraji — personal communication). This is a new record for Iran.

Key to Species of the Genera *Zezellia* Oudemans, 1927 and *Eustigmaeus* Berlese, 1910 of Iran

Females

1. Dorsum almost completely covered by 3 shields (propodosomal, opisthosomal and suranal) (***Eustigmaeus*** Berlese) 3
— Dorsum covered by more than three shields (***Zetzellia*** Oudemans) 2
2. Dorsal shields reticulated, setae c_1 on separate platelets, setae d_1 not reaching bases of seta e_2 ..... ***Z. mali*** (Ewing)
— Dorsal shields smooth, setae c_1 on large median shield, setae d_1 longer than distance to seta e_2 ..... ***Z. kamalii*** n. sp.
3. Dorsal setae long, lanceolate and serrate 4
— Dorsal setae short, smooth or serrate and spatulate 5
4. Coxisternal shields smooth and separate; aggenital shield smooth and small, anterior to anogenital area ..... ***E. ornatus*** Ueckermann and Meyer
— Coxisternal shields reticulated and fused, aggenital shield large, reticulate, and surrounding anogenital area ..... ***E. segnis*** (Koch)
5. 3 pairs of *ag* setae; femur II with 4 setae ..... ***E. spathatus*** Ueckermann and Meyer
— 2 pairs of *ag* setae; femur II with 5 setae ..... ***E. jiangxiensis*** Hu et al.

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