

## **STIGMAEUS IRANENSIS, A NEW SPECIES OF THE GENUS *STIGMAEUS* KOCH (ACARI: STIGMAEIDAE) FROM NORTHWEST IRAN**

**M. Bagheri<sup>1</sup>, S. S. Gheblealivand<sup>1</sup> and H. Ghorbani<sup>1,2</sup>**

<sup>1</sup> Department of Plant Protection, Faculty of Agriculture, University of Maragheh, Maragheh, Iran; e-mails: mbagheri20022002@yahoo.com, sa.alivand@gmail.com, hg.ghorbani@gmail.com

<sup>2</sup> Young Researchers Club, Islamic Azad University, Maragheh Branch, Maragheh, Iran

**ABSTRACT.** *Stigmaeus iranensis* sp. n. is described and illustrated. The new species was collected from soil in apple orchards in Northwest Iran. A key to the known Iranian species of the genus *Stigmaeus* is provided.

**KEY WORDS:** Acari, Stigmaeidae, *Stigmaeus*, Iran, mite

### **INTRODUCTION**

Stigmaeidae (Acariformes: Raphignathoidea) are small prostigmatan mites that occur in many habitats and form an important component of the acarofauna of soil, litter and plants. It is a large cosmopolitan group that consists of predators feeding on a variety of arthropods, ectoparasites of dipterans and pollen feeders (Summers 1966; Ueckermann and Meyer 1987; Walter et al. 2009). The genus *Stigmaeus* Koch is one of the most famous genera of this family and is known from just eleven species in Iran, namely: *S. alvandis* Khanjani and Ueckermann, 2002; *S. shabestariensis* Haddad, Lotfollahi and Akbari 2010; *S. marandensis* Bagheri and Ueckermann, 2011; *S. pilatus* Kuznetzov, 1978; *S. unicus* Kuznetzov, 1977; *S. malekii* Haddad et al. 2006; *S. boshroyehnsis* Khanjani et al. 2010; *S. shendabadiensis* Haddad, Lotfollahi and Akbari 2010; *S. candidus* Fan and Li, 1993; *S. elongatus* Berlese, 1886 (Khanjani and Ueckermann 2002; Faraji and Ueckermann 2006; Haddad Irani-Nejad et al. 2006, 2010 a and b; Khanjani et al. 2010; Bagheri et al. 2011). In this paper we describe another species of this genus, *S. iranensis* sp. n.

### **MATERIALS AND METHODS**

Mites were extracted from soil using a Berlese funnel. Specimens were cleared in Nesbitt's fluid and mounted in Hoyer's medium. The gnathosoma was measured from the base of the chelicerae to the tip of palptibial claw, the length of idiosoma from the suture between gnathosoma and idiosoma to the posterior margin of suranal shield, the width of idiosoma at the broadest part of the idiosoma and setae were measured from their insertion to tips; distances between setae were measured between their insertions. The terminology and abbreviations are based on Grandjean (1944) and Kethley (1990). All measurements are given in micrometers (µm).

### **FAMILY STIGMAEIDAE OUDEMANS, 1931**

Type genus: *Stigmaeus* Koch, 1836

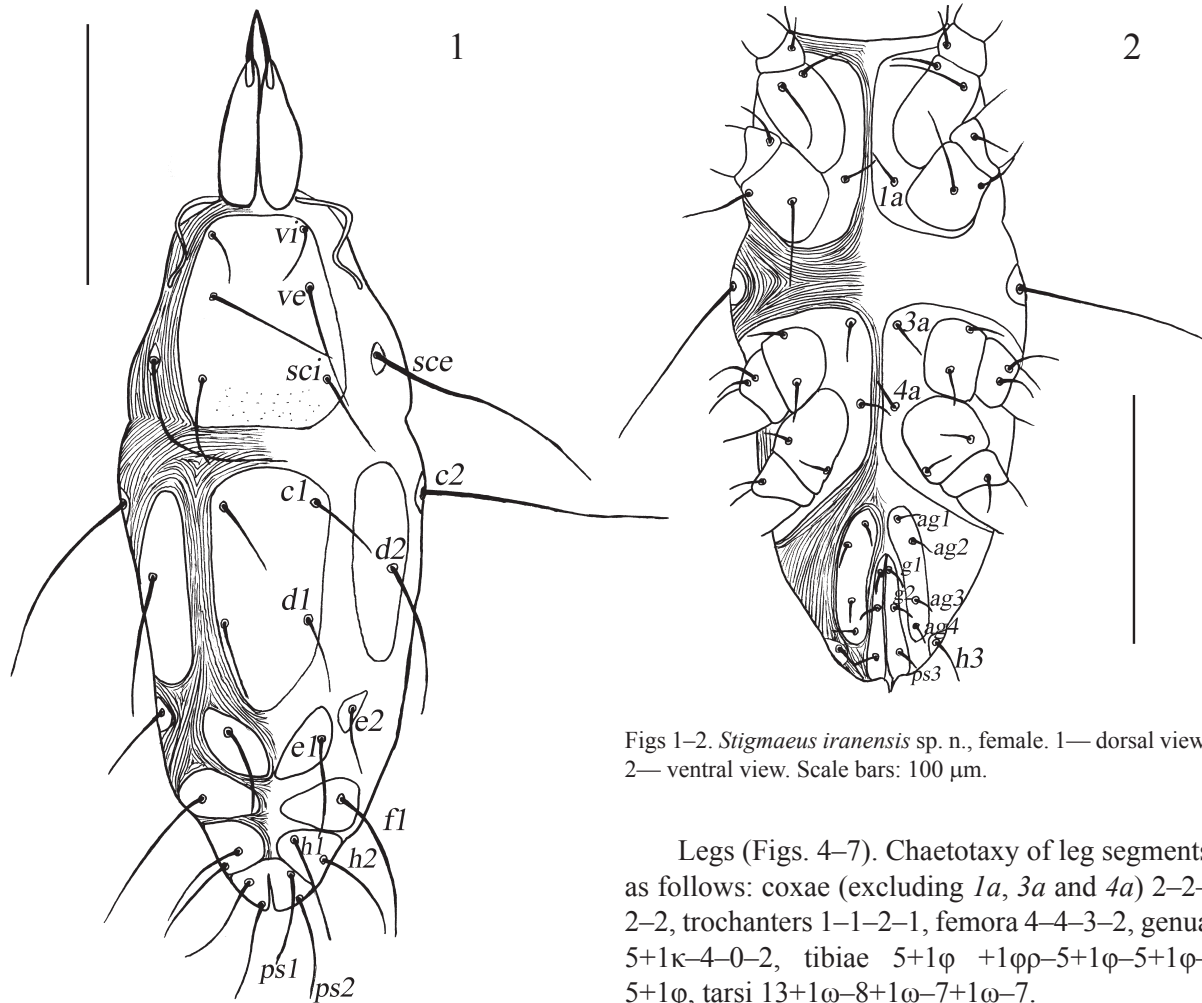
***Stigmaeus iranensis*  
Bagheri and Gheblealivand sp. n.**

Figs 1–7

**Diagnosis.** With 16 smooth dorsal shields; setae *ve*, *sce*, *c2*, *d2*, and *fl* longer than other dorsal setae; all dorsal setae smooth; suranal shield divided; genital and anal shields fused; setae *ag1–ag4* on single shields flanking anogenital area; genua III without setae; solenidion on tarsi IV absent.

**Description.** Female (holotype and 2 paratypes). Length of idiosoma 260 (236–240 in 2 paratypes); length of gnathosoma 100 (86–90); width of idiosoma 125 (92–110). Length of legs I–IV, respectively (from base of femora to tip of tarsal claw): 115 (105–110), 80 (80–83), 85 (85–90), and 110 (105–108).

Dorsum (Fig. 1). Dorsum covered with 16 smooth shields; prodorsal shielded with 3 pairs of setae (*vi*, *ve*, and *si*); *se* located on lateral platelets; no eyes and postocular bodies observable; opisthosoma with central shield bearing setae *c1* and *d1*; setae *d2* located on longitudinal lateral shields; humeral shields bearing setae *c2* and situated latero-ventrally; median zonal shields separated, each with one seta (*e1*), lateral shields each with setae *e2*; intercalary shields bearing setae *fl*; suranal shield divided and with 3 pairs of setae (*h1–h3*); all dorsal setae smooth; length of dorsal setae: *vi* 17 (17–19); *ve* 50 (56–60); *sci* 25 (26–28); *sce* 68 (68–70); *c1* 30 (30–32); *c2* 55 (60–66); *d1* 33 (31–33); *d2* 55 (53–55); *e1* 30 (30–32); *e2* 30 (30–33); *fl* 55 (55–58); *h1* 35 (33–36); *h2* 35 (34–39); *h3* 18 (18–20); distances between dorsal setae: *vi–vi* 32 (29–31); *ve–ve* 40 (37–39); *vi–ve* 22 (22–25); *ve–sci* 40 (32–34); *vi–sci* 60 (53–55); *sci–sci* 50 (50–53); *sci–sce* 23 (20–21); *sce–sce* 90 (65–67); *c1–c1* 35 (30–33); *c1–d1* 45 (40–44); *c1–d2* 40



Figs 1–2. *Stigmaeus iranensis* sp. n., female. 1—dorsal view, 2—ventral view. Scale bars: 100  $\mu$ m.

(30–32);  $d1-d1$  35 (30–32);  $d1-d2$  37 (30–34);  $d2-d2$  95 (85–87);  $d1-e1$  46 (40–42);  $d1-e2$  43 (38–40);  $e1-e1$  35 (31–34);  $e1-e2$  20 (20–23);  $e1-f1$  22 (22–25);  $e2-f1$  33 (30–33);  $f1-f1$  53 (49–52);  $f1-h1$  25 (25–28);  $f1-h2$  23 (21–23);  $f1-h3$  25 (24–25);  $h1-h1$  20 (20–21);  $h1-h2$  20 (17–18);  $h2-h2$  43 (41–42);  $h2-h3$  10 (6–9);  $h3-h3$  45 (41–43); ratios:  $vi/vi-vi$  0.53;  $c1/c1-c1$  0.87;  $d1/d1-d1$  0.94;  $e1/e1-e1$  0.85;  $f1/f1-f1$  0.1.03;  $h1/h1-h1$  0.1.75;  $h2/h2-h2$  0.81;  $h3/h3-h3$  0.4;  $c1-c1:d1-d1:e1-e1:f1-f1=1:1.05:1:1.51$ .

Venter (Fig. 2). Endopodal shields divided and smooth; aggenital area with 4 pairs of aggenital setae ( $ag1-ag4$ ); genital and anal shields fused and with 2 pairs of genital setae ( $g1-g2$ ) and 3 pairs of pseudanal setae ( $ps1-ps3$ ); length of ventral setae as follows:  $1a$  15 (13–16);  $3a$  15 (13–14);  $4a$  13 (13–14);  $ag1$  12 (12–13);  $ag2$  12 (12–14);  $ag3$  12 (12–14);  $ag4$  15 (15–16);  $g1$  12 (13–14);  $g2$  15 (15–17);  $ps1$  32 (33–35);  $ps2$  28 (26–28);  $ps3$  17 (19–21). Subcapitulum smooth; length of subcapitular and oral setae as follows:  $m$  19 (18–19),  $n$  26 (24–26)  $or1$  5 (5–7),  $or2$  6 (6–7).

Legs (Figs. 4–7). Chaetotaxy of leg segments as follows: coxae (excluding  $1a$ ,  $3a$  and  $4a$ ) 2–2–2–2, trochanters 1–1–2–1, femora 4–4–3–2, genua 5+1 $\kappa$ –4–0–2, tibiae 5+1 $\phi$  +1 $\phi\rho$ –5+1 $\phi$ –5+1 $\phi$ –5+1 $\phi$ , tarsi 13+1 $\omega$ –8+1 $\omega$ –7+1 $\omega$ –7.

**Male and immature stages.** Unknown

**Type material.** Holotype and 2 paratypes females of *Stigmaeus iranensis* sp. n. were collected from the soil of apple orchards, IRAN: East Azarbaijan province, Bonab, 15 July 2010, coll. Saeede Sadat Gheblealivand.

**Type depositories.** Holotype and 1 female paratype are deposited at the Arachnida Collection of the Plant Protection Research Institute, Pretoria, South Africa; 1 female paratype is deposited in the Acarological Collection, Department of Plant Protection, Faculty of Agriculture, University of Maragheh, Maragheh, Iran.

**Etymology.** This species is named after the country, Iran, where it was collected.

**Remarks.** *Stigmaeus iranensis* sp. n. is very close to *S. marandensis* Bagheri and Ueckermann, 2011 in the shape of the dorsal shields but can be distinguished from the later by following characters: (1) dorsal setae are smooth vs. slightly serrated in *S. marandensis* (Bagheri et al. 2011); (2) setae  $sce$ ,  $c1$ ,  $d1$ ,  $d2$  and  $f$  in this species are more longer than those in *S. marandensis* (68, 30, 33, 55 and 55 vs. 46, 20, 18, 23 and 28 respectively);



Figs 3–7. *Stigmaeus iranensis* sp. n., female. 3 — dorsal view of palp, 4–7 — legs I–IV, respectively in dorsal view. Scale bars: 3 = 25  $\mu$ m, 4–7 = 50  $\mu$ m.

(3) genua I–IV are with 6–4–0–2 vs. 6–4–1–2 in *S. marandiensis*; (4) tarsi IV are without solenidion vs. with solenidion in *S. marandiensis*. The new species is also close to *S. planus* Kuznetsov, 1978 in the shape of the dorsal shields but can be separated by following characters: (1) the prodorsal shield is completely smooth vs. reticulated in *S. planus* (Kuznetsov 1978); (2) *e*2 are on the distinct small platelets vs. on integument in *S. planus*; (3) *ag*1–*ag*4 are located on a single shield vs. *ag*1–*ag*2 and *ag*3–*ag*4 located on different shields in *S. planus*; (4) genua I–IV are with 6–4–0–2 setae vs. 6–3–0–1 in *S. planus*.

**Key to the Iranian species of the genus *Stigmaeus* Koch, female**

1. Opisthosoma without a distinct central shield ... 9
- Opisthosoma with distinct central shield ..... 2
2. Central hysterosomal shield with 3 pairs of setae ..... 8
- Central hysterosomal shield with 2 pairs of setae ..... 3
3. Eyes present ..... 7
- Eyes absent ..... 4
4. Median prodorsal shield with polygonal cells ... 5

- Median prodorsal shield smooth ..... 6  
 5. Trochanters III with 1 setae ..... *S. alvandis*  
 — Trochanters III with 2 setae .....  
 ..... *S. shabestariensis*  
 6. Tarsi IV with 1 solenidion ..... *S. marandiensis*  
 — Tarsi IV without solenidion .....  
 ..... *S. iranensis* sp. n.  
 7. Setae *h3* on suranal shield present .... *S. pilatus*  
 — Setae *h3* on suranal shield absent ..... *S. unicus*  
 8. Tibia II with 1 solenidion ..... *S. malekii*  
 — Tibia II with 2 solenidia ..... *S. boshroyehnsis*  
 9. Suranal shield divided ..... *S. shendabadiensis*  
 — Suranal shield entire ..... 10  
 10. Genua III without setae ..... *S. candidus*  
 — Genua III with 3 setae ..... *S. elongatus*

#### ACKNOWLEDGEMENTS

We greatly appreciated the support for this project provided by the research division of University of Maragheh, Maragheh, Iran.

#### REFERENCES

Bagheri, M., Navaei-Bonab, R., Ueckermann, E.A., Ghorbani, H., Mehrvar, A., and Saber, M. 2011. Description of a new species of the genus *Stigmaeus* Koch (Acari: Prostigmata: Stigmaeidae) from East Azerbaijan Province, Iran. *Systematic and Applied Acarology*, 16: 181–186.

Grandjean, F. 1944. Observations sur les acariens de la famille des Stigmaeidae. *Archives des Sciences physiques et naturelles*, 26: 103–131.

Haddad Irani-Nejad, K., Bagheri, M., Khanjani, M., Kamali, K., and Saboori, A. 2006. A new species of *Stigmaeus* Koch (Acari: Stigmaeidae) from Northwest of Iran. *Zootaxa*, 1354: 57–61.

Haddad Irani-Nejad, K., Lotfollahi, P., Akbari, A., Bagheri, M., and Ueckermann, E.A. 2010a. A new species of stigmaeid mites from east Azarbaijan, Iran (Acari: Prostigmata: Stigmaeidae). *Munis Entomology and Zoolology*, 5 (2): 369–373.

Haddad Irani-Nejad, K., Lotfollahi, P., Akbari, A., Bagheri, M., and Ueckermann, E.A. 2010b. *Stigmaeus shendabadiensis* (Acari: Prostigmata: Stigmaeidae) n. sp. from Northwest of Iran. *Systematic and Applied Acarology*, 15: 118–122.

Kethley, J. 1990. [Acarina: Prostigmata (Actinedida)]. In: D.L. Dindal (Ed.). *Soil Biology Guide*. John Wiley and Sons, New York, p. 667–756.

Khanjani, M. and Ueckermann, E.A. 2002. The stigmaeid mites of Iran (Acari: Stigmaeidae). *International Journal of Acarology*, 28 (4): 317–339.

Khanjani, M., Izadi, H., Asalifayaz, B., Raisi, H., Ros-tami, E. and Doğan, S. 2010. *Stigmaeus boshroyehnsis* sp. nov. (Acari: Stigmaeidae) from eastern Iran, with re-description of *Stigmaeus pilatus* Kuznetsov. *Zootaxa*, 2727: 34–44.

Kuznetsov, N.N. 1978. [Revision of the genus *Stigmaeus* (Acariformes, Stigmaeidae).] *Zoologichesky Zhurnal*, 57 (5): 682–694. [In Russian]