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Two New Records of Stigmaeid Mites (Acari: Stigmaidae) for the Turkish Fauna

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ABSTRACT

Stigmaeus shabestariensis Haddad Irani-Nejad,Lotfollahi and Akbari, 2010 and *Prostigmaeus khanjanii* Bagheri and Ghorbani, 2010 were determined in Afyonkarahisar and Manisa provinces and identified as new records for the Turkish fauna. Mites taken from soil and litter samples, beneath of *Populus alba*, *Vitexagnus-castus* and *Verbascum* sp. were extracted using Berlese funnels and mounted on slides in a modified Hoyer's medium. Then, the specimens were measured and illustrated using a drawing tube attached microscope. In this study, similarities and differences of two new records species for the Turkish fauna were discussed and compared the other type species in Iran.

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Türkiye Faunası İçin İki Yeni Stigmaeid Akar (Acari: Stigmaidae) Kaydı

ÖZET

Afyonkarahisar ve Manisa illerinden tespit edilen *Stigmaeus shabestariensis* Haddad Irani-Nejad, Lotfollahi and Akbari, 2010 and *Prostigmaeus khanjanii* Bagheri and Ghorbani, 2010 türleri Türkiye faunası için yeni kayıt olarak tanımlanmıştır. *Populus alba*, *Vitex agnus-castus* and *Verbascum* sp. altı toprak ve döküntü örneğinden alınan akarlar, Berlese düzeneğiyle ayrıştırılarak modifiye Hoyer ortamında preparatı hazırlanmıştır. Daha sonra örneklerin çizim tüpü ataşmanlı mikroskop kullanılarak çizimleri ve ölçümleri yapılmıştır. Bu çalışmada,Türkiye faunası için iki yeni kayıt olarak tanımlanan türler, Iran'daki diğer tip örnekleri ile karşılaştırılarak benzerlik ve farklılıkları tartışılmıştır.

Araştırma Makalesi

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Anahtar Kelimeler
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INTRODUCTION

The family Stigmaeidae is the largest, within the superfamily Raphignathoidea, and contains more than 630 species of 34 genera (Fan et al., 2016, 2019; Beron, 2020). Members of the the family are predators and known from about all zoogeographical regions (Fan and Zhang, 2005). *Stigmaeus* is the most diverse genus in the this family containing about 163 species (Fan et al., 2016; Khaustov et al., 2017; Akyol, 2019; Stathakis et al., 2019; Beron, 2020; Doğan and Doğan, 2020). By now, 47 species of the genus *Stigmaeus* are known from Turkey and this genus is dominantly diversed within the family Stigmaeidae (Akyol, 2019; Doğan, 2019a, b; Doğan and Doğan, 2020).

Prostigmaeus Kuznetzov is another genus within the family Stigmaeidae. Members of this genus are beneficial organisms of soil habitats and active in the soil. Worldwide, 6 species of this genus are known, namely *P. amplius* Doğan et al., 2020; *P. integrius* Dönel and Doğan, 2011; *P. khanjanii* Bagheri and Ghorbani, 2010; *P. molaviae* Khanjani, Ashali and Doğan, 2012; *P. tauricus* Kuznetzov, 1984 and *P. vrystaatensis* Ueckermann and Meyer, 1987 (Kuznetzov, 1984; Ueckermann and Meyer, 1987; Bagheri et al., 2010; Dönel and Doğan, 2011; Khanjani et al., 2012, 2015; Doğan et al., 2020). Two species of *Prostigmaeus* are known from Turkey.

In this paper, two new records species for the Turkish fauna, *S. shabestariensis* Haddad Irani-Nejad, Lotfollahi and Akbari, and *P. khanjanii* Bagheri and Ghorbani were identified.

MATERIALS and METHODS

The mite specimens were collected from soil and litter under *Populus alba* (Salicaceae), *Vitex agnus-castus* (Verbenaceae) and *Verbascum* sp. (Scrophulariaceae), in Afyonkarahisar and Manisa provinces (Turkey), and brought to the laboratory and separated by Berlese-Tullgren funnels for seven days.

The mites that accumulate in the collection bottles

with 70% alcohol in the bottom of the funnel were removed from the soil under a dissecting microscope (stereo microscope) and left to be bleached in petri dishes containing lactophenol (lactic acid 50 ml, phenol 25 ml, pure water 25 ml) and then put on slides in Hoyer's medium (50 ml of pure water, gum arabic 50g, chloral hydrate 125 g, glycerin 30 ml).

The specimens were measured and illustrated using a drawing tube attached microscope (Nikon Eclipse E 400). The setal nomenclature follows those of Grandjean (1944) and Kethley (1990). All measurements were given in micrometres (µm). The specimens slide were deposited in the Zoological Research Laboratory of Manisa Celal Bayar University, Manisa, Turkey.

RESULTS and DISCUSSION

Results

Family: Stigmaeidae Oudemans, 1931

Genus: *Stigmaeus* Koch, 1836

Stigmaeus shabestariensis Haddad, Lotfollahi and Akbari, 2010

Female (n=2). Length of body (minimum and maximum measurements) (excluding gnathosoma) 390–395, width 198–213 (Figure1).

Gnathosoma. Chelicerae 68–70 long (Fig. 1A) Palp 117–120 long. Number of setae and solenidion on palpi (femur-tarsus): 3 serrate setae, 1 tactile setae, 2 tactile setae + 1 claw +1 spine-like claw, 5 tactile setae +1 solenidion + 1 tridentate eupathidium (Fig.1G). Subcapitulum with adoral setae ($or_{1\text{-}2}$) and subcapitular setae *m* 18, *n* 26 (Fig.1B).

Idiosoma, dorsum (Fig.1A). Dorsal shields reticulated. Propodosomal shield with three pairs of setae (*vi*, *ve*, *sci*),and a pair of auxillary shields with setae *sce*, eyes and post-ocular bodies absent. Setae *sce* on minute platelets. Opisthosoma with an elongate central shield bearing two pairs of setae *c*1 and *d*1, a pair of elongate-oval lateral (marginal) shield bearing setae *d*2 , a pair of median zonal shields bearing setae *e*1, setae *e*2 located on minute platelets, a pair of intercalary shield bearing setae *f*1 and a pair of no-setae bearing small platelets. Suranal shield entire with three pairs of setae (*h*1–3). Humeral shield ventero-lateral with setae *c*2. Lengths and distances of dorsal idiosomal setae as follows: *vi* 16, *ve* 18, *sci* 18, *sce* 21, *c*113, *c*2 18–21, *d*1 13, *d*2 13, *e*1 13, *e*2 13, *f*1 16, *h*1 21, *h*2 26–29, *h*3 18, *vi–vi* 34–39, *ve–ve* 47–52, *vi–ve* 21–23, *sci–sci* 75–78, *ve–sci* 39–42, *sce–sce* 130–135, *sci–sce* 26–31, *sce–c*1 68–78,*c*1–*c*1 42–44, *c*1–*c*2 83–91, *c*1–*d*1 60–62, *d*1–*d*1 42–44, *d*1–*e*1 57, *e*1–*e*1 39–44, *e*1–*e*2 42–47, *e*2–*e*2 112–130, *e*1–*f*1 29–31, *f*1–*f*1 60–62, *f*1–*h*1 47–49, *h*1–*h*1 23–26, *h*1–*h*2 18–21, *h*2–*h*2 62–65, *h*2–*h*3 16–18, *h*3–*h*3 94–96.

Idiosoma,venter (Fig. 1B). Venter striated; coxisternal shields (coxae I–II and III–IV) smooth and with three pairs of setae (*1a* =*3a*=*4a* 21–23). Aggenital area with 4pairs of setae(*ag*1 and *ag*2 on same platelet and *ag*3 and *ag*4 on same platelet, *ag*1= *ag*2= *ag*3= *ag*4 18); anogenital area with 2 pairs of genital setae(*g*1=*g*2 13–16), and 3 pairs of pseudanal setae(*ps*1=*ps*2=*ps*3 21–23).

Legs (Fig.1C–F). Length of legs (from base of femur to tip of tarsal claw): Leg I 198–213, leg II 138–140, leg III 130, leg IV 161. Coxae 2–2–2–2; trochanters 1–1–2–1; femora 4–4–3–2, genua 5+1κ–5–2–2; tibiae 5+1φ+1$\varphi\rho$–5+1$\varphi\rho$–5+1$\varphi\rho$–5+1$\varphi\rho$; tarsi 13+1ω–9+1ω–7+1ω–7+1ω.

Male and immature stages: Unknown.

Studied material and habitat: Two females from soil and litter under the *Populus alba*, 990 m a.s.l., Çobanlar, Afyonkarahisar, 09.VI. 2019, Turkey, coll. M. Akyol.

Distribution: Iran (Haddad et al., 2010).

Genus:*Prostigmaeus* Kuznetsov, 1984

Prostigmaeus khanjanii Bagheri and Ghorbani, 2010

Female (n = 2): Body length (minimum and maximum measurements) (excluding gnathosoma) 429–455, width 200–218 (Figure 2).

Gnathosoma. Subcapitulum with setae, *m* 13–16 and *n* 13–16, setae, $or_{1\text{-}2}$ (Fig.2B). Palp tarsus with four setae + onesolenidion (ω), four subterminal eupathidia; palp tibia with three setae + one claw; palp genu with two setae and palp femur with three setae (Fig.2G).

Idiosoma, dorsum (Fig.2A). Prodorsal shield reticulated and with setae *vi*, *ve* and *sci*; setae *sce* on integument lateral prodorsal shield; opisthosoma with a narrow, longitudinal reticulated mesonotal shield with setae c_1 and d_1; setae c_2 on individual platelets lateroventrally; setae e_1 and f_1 on separate small, reticulate shields; setae d_2 and e_2 in striated integument lateral mesonotal shield; h_1, h_2 and h_3 on entire and reticulate suranal shield; dorsal body setae slightly serrated. Length and distances between dorsal setae: *vi* 13–16, *ve* 21, *sci* 21, *sce* 18, $c_1$10–13, c_2 26, d_1 10–13, d_2 10–16, e_1 13, e_2 13, f_1 16, h_1 18–21, h_2 21–23 and h_3 18, *vi–vi* 31, *vi–ve* 21–26, *ve–ve* 42, *ve–sci* 47, *sci–sci* 52, *sci–sce* 34, *sce–sce* 120, *sce–*c_1 86, c_1–c_1 31–34, c_1–c_2 99,c_1–d_1 52–55, d_1–d_1 34–39, d_1–e_1 52–65, e_1–e_1 39–52, e_1–f_1 39, f_1–f_1 49–52, f_1–h_1 42–49, h_1–h_1 23–29, h_1–h_2 13–16, h_2–h_2 52–62, h_2–h_3 13, h_3–h_3 62.

Idiosoma, venter (Fig.1B). Endopodal shields (coxae I-II, coxae III-IV) with three pairs of setae *1a* 13–16, *3a* 23–26 and *4a* 18–21; venter with three pairs of genital (g_1= g_2=g_3 13) and four pairs of aggenital setae (ag_1=ag_2=ag_3=ag_4 16); setae ag_1 on platelets, ag_{2-4} on longitudinal plates lateral genital area; anal plates with three pairs of pseudanal setae(ps_1=ps_2=ps_3 16–18) *Legs* (Fig.2C–F). Length of legs (femur-tarsal claw):

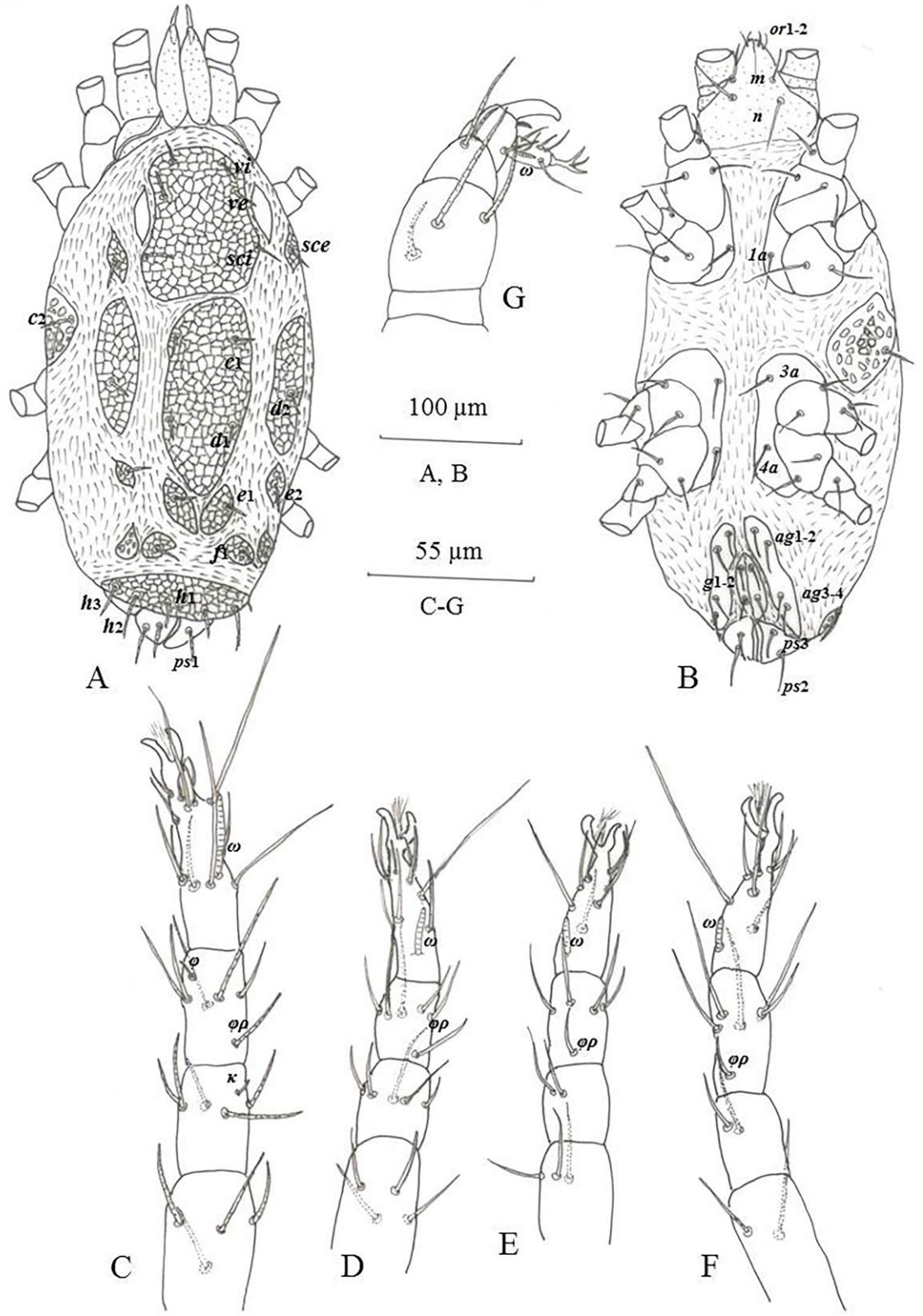

Figure 1. ***Stigmaeus shabestariensis*** (female): A. Idiosoma, dorsal view, B. Idiosoma, ventral view, C. Leg I, D. Leg II, E. Leg III, F. Leg IV, G. Palp.

Şekil 1. Stigmaeus shabestariensis (Dişi): A. Vücut, üstten görünüm, B. Vücut, alttan görünüm, C. I. bacak, D. II. bacak, E. III. bacak, F. IV. bacak, G. Palp.

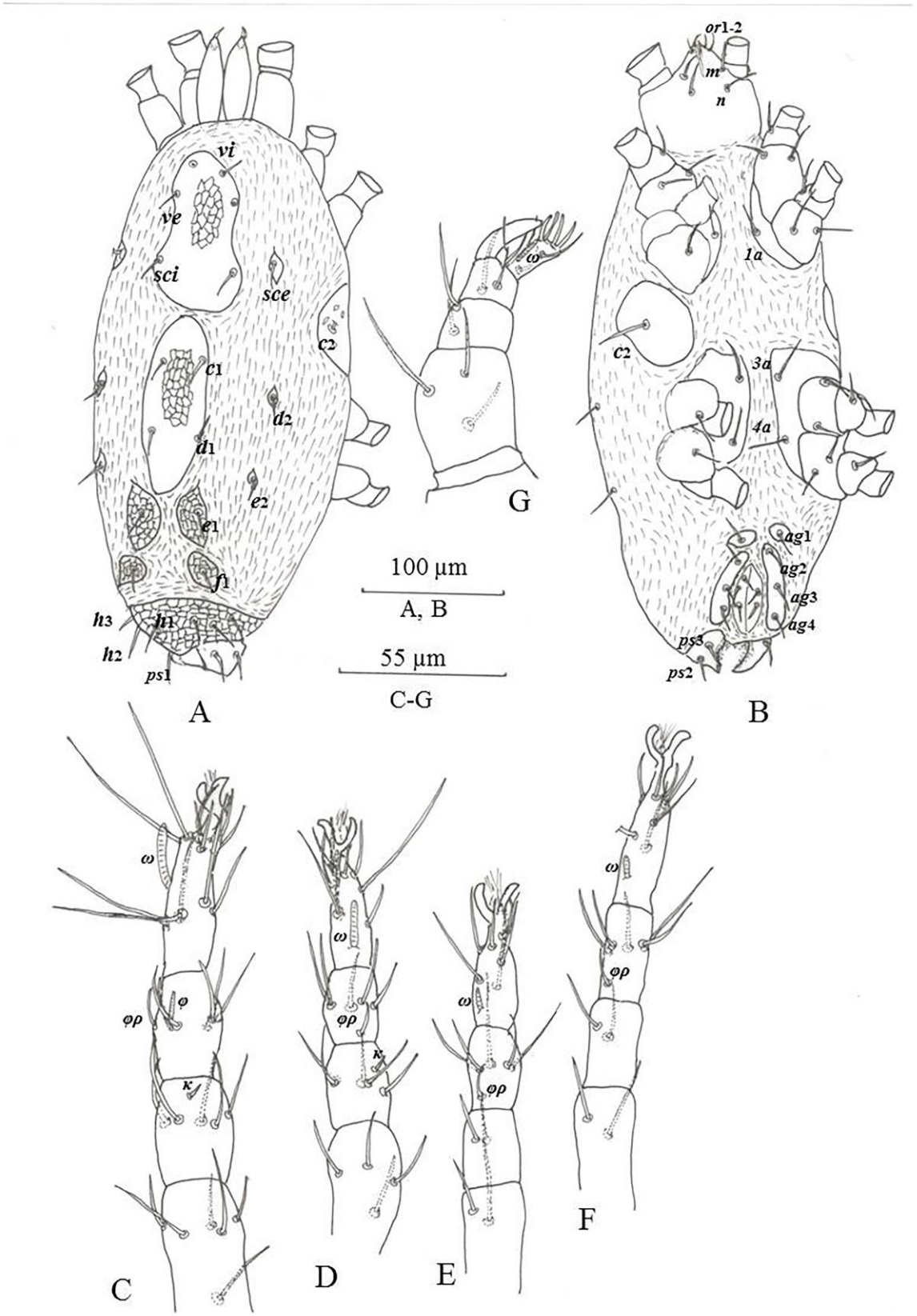

Figure 2. ***Prostigmaeus khanjanii*** (female): A. Idiosoma, dorsal view, B. Idiosoma, ventral view, C. Leg I, D. Leg II, E. Leg III, F. Leg IV, G. Palp.

Şekil 2. Prostigmaeus khanjanii (Dişi). A. Vücut, üstten görünüm, B. Vücut, alttan görünüm, C. I. bacak, D. II. bacak, E. III. bacak, F. IV. bacak, G. Palp.

Leg I 156–169; leg II 130; leg III 117–125; leg V 143–156. Coxae 2–2–2–2; trochanters 1–1–2–1; femora 6–4–3–2, genua 5+(1*κ*)–5+(1*κ*)–2–2; tibiae 5+(1*φρ*+1*φ*)–5+(1*φρ*)–5+(1*φρ*)–5+(1*φρ*); tarsi 13+(1*ω*)–9+(1*ω*)–7+(1*ω*)–7+(1*ω*).

Male: Known

Studied material and habitat: One female from soil and litter under *Verbascum* sp., 1600 m.a.s.l., Emirdağları mountain, B. Karabağ, Bolvadin, Afyonkarahisar, 4.IX. 2017; one female from soil and litter under *Vitex agnus-castus*, 80 m.a.s.l., Muradiye, Yunusemre, Manisa, Turkey, 21.XI. 2019, coll. M. Akyol.

Distribution: Iran (Bagheri et al. 2010).

DISCUSSION

Stigmaeus shabestariensis Haddad Irani-Nejad, Lotfollahi and Akbari, 2010 was described by Haddad Irani- Nejad et al., from soil of an apple orchard at Shabestar (Shendabad), East Azarbaijan, Iran (Haddad Irani- Nejad et al., 2010). The samples in this study were found from soil and litter under *Populus alba* from Afyonkarahisar province in Turkey. This species was differed from similar species of *Stigmaeus* with extra isolated shields.

Body size of *S. shabestariensis* is 361 (354–373) and width 165 (165–185), but 390–395 long and 198–213 wide in the Turkish specimens. Turkish specimens are therefore bigger than the type specimen. Turkish specimens like that given by Akbari et al., 2010, but some measurements length of body setae (*m* 18, *n* 26; *1a* =*3a*=*4a* 21–23; *g*1=*g*2 13–16 in Turkish specimens) different than Iran specimens (*m* 25, *n* 38–41; *1a* 24–27, *3a* 24–27, *4a* 24–29; *g*119–23, *g*2 20–25 in Iran specimens).

Prostigmaeus khanjanii Bagheri and Ghorbani, 2010 was described by Bagheri et al., from soil in East Azarbaijan province, Iran (Bagheri et al., 2010). The samples in this study were found from soil and litter under *Verbascum* sp., and *Vitex agnus-castus* from Afyonkarahisar and Manisa provinces in Turkey. This species is differ from similar species of *Prostigmaeus* in with 6 setae on genu I and II, and suranal shield entire and reticulated.

Body size of *P. khanjanii* is 437 (421–440) and width 225 (220–227), 429–455 long and 200–218 wide in the Turkish specimens. Body size of Turkish specimens are almost similar with the type specimen. Turkish specimens like that given by Bagheri et al., 2010, but some measurements length of body setae (c_1 10–13, c_2 26, d_1 10–13, e_1 13, e_2 13, f_1 16, h_1 18–21, h_2 21–23 and h_3 18 in Turkish specimens) different than Iran specimens (c_1 16–19, c_2 31–35, d_1 15–17, e_1 15–17, e_2 15–17, f_1 20, h_1 25–26, h_2 25–27 and h_3 22–23 in Iran specimens).

Competing Interests

The author declare that there are not any competing interests.

REFERENCES

Akyol M 2019. A new species of the genus *Stigmaeus* Koch (Acari: Stigmaeidae) from the Aegean region of Turkey. Systematic & Applied Acarology 24 (4): 581-586. doi: 10.11158/saa.24.4.5

Bagheri M, Ghorbani H, NavaeiBonab R, Saber M, Mehrvar A, Ueckermann EA 2010. *Prostigmaeus khanjanii* (Acari: Stigmaeidae), a new species from Northwest Iran. Systematic & Applied Acarology15: 123-128. doi: 10.11158/saa.15.2.6

Beron P 2020. Acarorum Catalogus VII. Trombidiformes, Prostigmata, Raphignathoidea. Fam. Barbutiidae, Caligonellidae, Camerobiidae, Cryptognathidae, Dasythyreidae, Dytiscacaridae, Eupalopsellidae, Homocaligidae, Mecognathidae, Raphignathidae, Stigmaeidae, Xenocali gonellididae. Pensoft & Natn. Mus. Nat. Hist., Sofia, 306 pp.

Doğan S 2019a. A new species of the genus *Stigmaeus* Koch (Acari: Stigmaeidae) from Turkey. International Journal of Acarology 45 (3): 141-147. doi: 10.1080/01647954.2018.1549097

Doğan S 2019b. Raphignathoidea (Acari: Trombidiformes) of Turkey: A review of progress on the systematics, with an updated checklist. Acarological Studies 45 (3): 141-147.

Doğan S, Doğan S 2020. Pülümür Vadisi'nden (Türkiye) yeni bir *Stigmaeus* Koch (Acari, Stigmaeidae) Türü. Acarological Studies 2 (1): 41-45.

Doğan S, Doğan S, Türk Bingül M 2020. A new species of the genus *Prostigmaeus* Kuznetzov (Trombidiformes: Stigmaeidae) from Turkey. Systematic & Applied Acarology 25(6): 1075-1084. doi:10.11158/saa.25.6.10

Dönel G, Doğan S 2011. The stigmaeid mites (Acari: Stigmaeidae) of Kelkit Valley (Turkey). Zootaxa 2942: 1-56. doi:10.11646/zootaxa.2942.1.1

Fan Q-H, Zhang Z-Q 2005. Raphignathoidea (Acari: Prostigmata). Fauna of New Zealand, Manaaki Whenua Press, Lincoln, Catenbury, New Zealand, 400 pp.

Fan Q-H, Flechtmann CHW, De Moraes GJ 2016. Annotated catalogue of Stigmaeidae (Acari: Prostigmata), with a pictorial key to genera. Zootaxa 4176: 1-199. doi: 10.11646/ zootaxa.4176.1.1.

Fan Q-H, Flechtmann CHW, De Moraes GJ 2019. Emendations and updates to "Annotated catalogue of Stigmaeidae (Acari: Prostigmata), with a pictorial key to genera". Zootaxa 4647 (1): 88-103.

doi: 10.11646/zootaxa.4647.1.9

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, Lotfollahi P, Akbari A, Bagheri M, Ueckermann EA 2010. A new species of stigmaeid mites from East Azarbaijan, Iran (Acari: Prostigmata: Stigmaeidae). Munis Entomology and Zoology 5(2): 369-373.

Kethley J 1990. Acarina: Prostigmata (Actinedida). In: Dindal D.L. (Ed.) Soil Biology Guide. John Wiley and Sons, New York, USA, 667-756.

Khanjani M, Asali Fayaz B, Doğan S 2012. A newspecies of the genus *Prostigmaeus* Kuznetzov (Acari: Stigmaeidae) from western Iran. North-Western Journal of Zoology 8(1): 27-30.

Khanjani M, Amini F, Khanjani M 2015. A new species of the genus *Stigmaeus* Koch (Acari: Stigmaeidae) from Kurdistan province, Iran and description of male of *Prostigmaeus khanjanii* Bagheri and Ghorbani. Acarologia 55(1): 49–60. doi: 10.1051/acarologia/20152153

Khaustov AA, Ueckermann EA, Theron PD 2017. A new species of *Stigmaeus* (Acari: Prostigmata: Stigmaeidae) from South Africa. Systematic & Applied Acarology 22: 1413-1421. doi:10.11158/saa.22.9.8

Kuznetzov NN 1984. Two new genera of the family Stigmaeidae (Acariformes). Zoologicheskii Zhurnal 63(7): 1105-1107. [in Russian].

Stathakis TI, Kapaxidi EV, Papadoulis G Th 2019. The genus *Stigmaeus* Koch (Acari: Stigmaeidae) from Greece. Systematic & Applied Acarology 24 (11): 2010-2093

Ueckermann EA, Meyer (Smith) MKP 1987. Afrotropical Stigmaeidae (Acari: Prostigmata). Phytophylactica19: 371-397.