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## Article

### *Stigmaeus exilis*, a new fusiform species of *Stigmaeus* Koch (Acariformes: Stigmaeidae) from Sansa, Turkey

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#### ABSTRACT

A new species of the genus *Stigmaeus* (Stigmaeidae), *S. exilis* **sp. nov.**, is described based on the adult females collected from soil in a dead walnut tree hollow from Sansa Gorge, Turkey. Illustrations and phase contrast microscopic images of the new species are also given here. This species can be distinguished by having thin and slender body, anterior margin of prodorsum microtuberculate, posterior margin of propodosomal shield indenting forward by striae, apodemal marking present, eyes and postocular bodies absent, median zonal shield entire, suranal shield entire and bearing three pairs of setae, and femur II with four setae.

**KEY WORDS:** Description; mite; Raphignathoidea; Sansa; *Stigmaeus*.

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## INTRODUCTION

*Stigmaeus* Koch is the dominant genus in the family Stigmaeidae belonging to the superfamily Raphignathoidea (Acariformes) with 153 valid species, and has a worldwide distribution (Doğan *et al.* 2015, 2017; Khaustov *et al.* 2017; Fan *et al.* 2016, 2019; Mohammad Doustaresharaf & Bagheri 2019; Stathakis *et al.* 2019; Doğan & Doğan 2020a). Most members of the genus live in soil, plant litter, lichen and moss, and a few are parasitic on phlebotomine flies (Fan and Zhang 2005; Khanjani *et al.* 2010; Dönel *et al.* 2012; Khaustov 2016; Majidi *et al.* 2019). 48 species of *Stigmaeus* are known from Turkey to date (Akyol 2019; Doğan 2019b; Doğan & Doğan 2020a, b). An additional *Stigmaeus* species, *S. exilis*, is described here as a new species.

## MATERIAL AND METHODS

The specimens of the new species were collected from Sansa Gorge (Turkey). Methods used for specimen collection, extraction and preparation are as discussed by Walter and Krantz (2009) and Fan and Zhang (2005). Specimens are studied and illustrated with the aid of a Leica DM 4000B

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phase contrast microscope, equipped with a drawing tube. Photographs are made using the same microscope with an integrated digital camera. All measurements are given in micrometers ( $\mu\text{m}$ ) by using Leica Application Suite (LAS) Software Version 4.8 and refer to length of the structure unless otherwise stated. Measurements of the holotype are given first followed by those of paratypes in parentheses. The nomenclature of the dorsal idiosomal shields follows that of Summers (1962). The nomenclature of dorsal idiosomal and leg setae follows those of Kethley (1990) and Grandjean (1944), respectively. Setal abbreviations are as given by Bingöl *et al.* (2017). Setal counts of leg segments are given with solenidia in parentheses. The type specimens are deposited in EBYU (Acarology Laboratory of Erzincan Binali Yıldırım University, Erzincan, Turkey).

## SYSTEMATICS

### Family Stigmaeidae Oudemans

#### Genus *Stigmaeus* Koch

**Type species:** *Stigmaeus cruentus* Koch, 1836.

#### *Stigmaeus exilis* sp. nov. (Figs. 1–7)

<http://zoobank.org/urn:lsid:zoobank.org:act:63B28B22-3D51-4C78-A88A-8B2D3BC18216>

#### *Description (female, n = 3)*

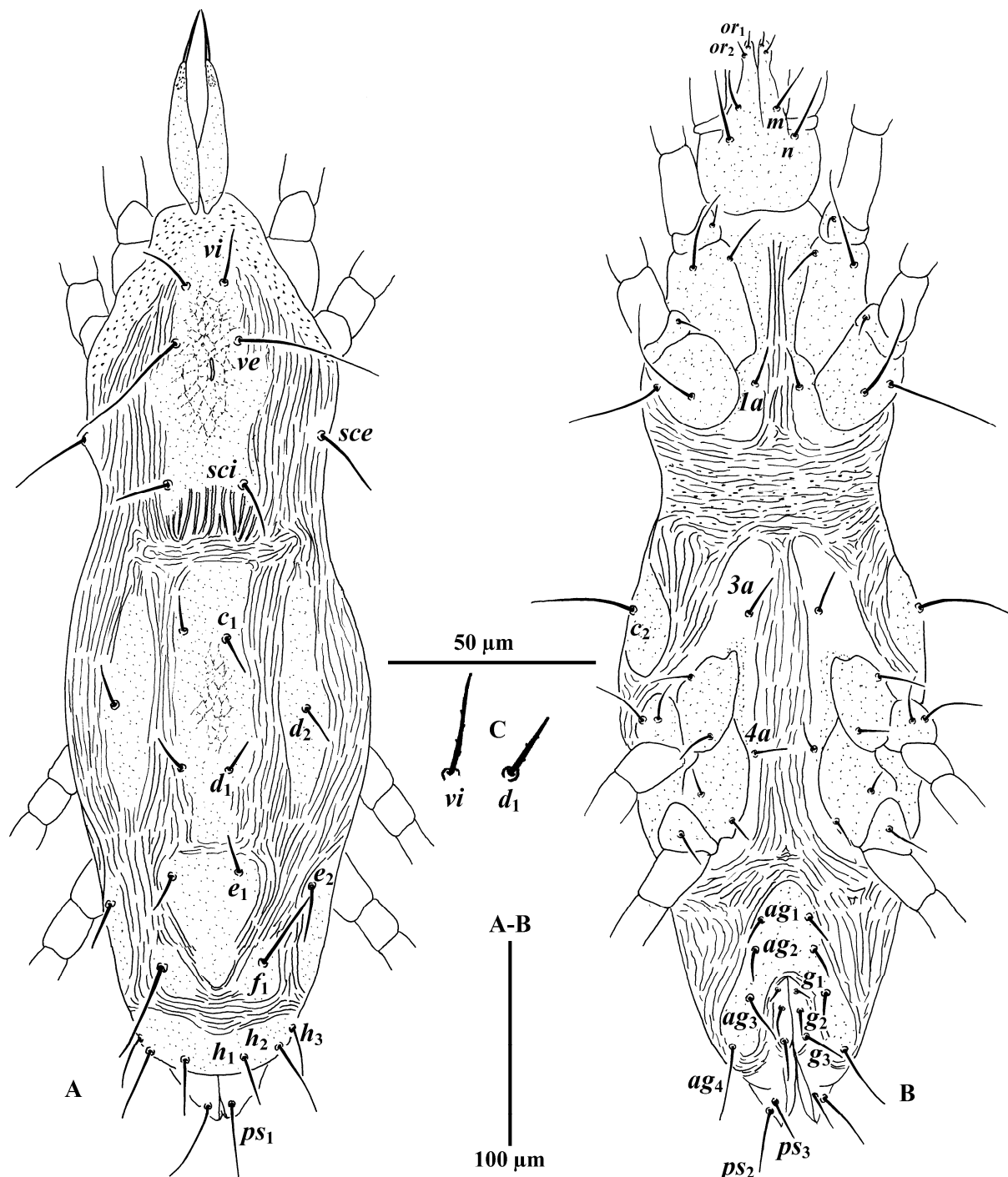
Body fusiform (Figs. 1, 4); length of body 442 (403–426), width 162 (137–154).

**Dorsum (Figs. 1A, 4A, 5–7A)** – Anterior margin of prodorsum microtuberculate, other parts of integument striated except shields. Propodosomal shield with an apodemal marking centrally and bearing three pairs of setae (*vi*, *ve* and *sci*). Posterior margin of propodosomal shield indenting forward and dual striated. Eyes and postocular bodies absent. Auxiliary shields not ornamented and bearing setae *sce*. Central shield with two pairs of setae (*c*<sub>1</sub> and *d*<sub>1</sub>). Median zonal shield entire, elongated between intercalary shields and bearing setae *e*<sub>1</sub>. Marginal shields elongate, nearly as long as central shield and bearing setae *d*<sub>2</sub>. Lateral zonal shields elongate, nearly extend to suranal shield and bearing setae *e*<sub>2</sub>. Intercalary shields divided, with setae *f*<sub>1</sub>. Suranal shield entire, with three pairs of setae (*h*<sub>1–3</sub>). Propodosomal and central shields punctated and faintly reticulated in the middle, other dorsal shields punctated but without reticulations. Dimensions of setae as follows: *vi* 24 (20–21), *ve* 67 (56–61), *sci* 28 (24–25), *sce* 40 (34–36), *c*<sub>1</sub> 19 (15–16), *c*<sub>2</sub> 56 (48–49), *d*<sub>1</sub> 18 (13–14), *d*<sub>2</sub> 18 (17–18), *e*<sub>1</sub> 17 (15–16), *e*<sub>2</sub> 21 (17–18), *f*<sub>1</sub> 46 (41–44), *h*<sub>1</sub> 28 (26–27), *h*<sub>2</sub> 37 (32–33), *h*<sub>3</sub> 25 (21–23). Distances between setae: *vi*–*vi* 17 (15–16), *ve*–*ve* 22 (22–24), *vi*–*ve* 25 (19–22), *sci*–*sci* 35 (32–33), *ve*–*sci* 67 (56–64), *sci*–*sce* 43 (37–42), *sce*–*sce* 110 (96–108), *c*<sub>1</sub>–*c*<sub>1</sub> 17 (17–18), *d*<sub>1</sub>–*d*<sub>1</sub> 17 (16–17), *d*<sub>2</sub>–*d*<sub>2</sub> 93 (85–86), *c*<sub>1</sub>–*d*<sub>1</sub> 64 (55–56), *c*<sub>1</sub>–*d*<sub>2</sub> 48 (42–48), *d*<sub>1</sub>–*d*<sub>2</sub> 46 (37–41), *e*<sub>1</sub>–*e*<sub>1</sub> 29 (25–28), *d*<sub>1</sub>–*e*<sub>1</sub> 45 (46–48), *d*<sub>1</sub>–*e*<sub>2</sub> 62 (57–65), *e*<sub>2</sub>–*e*<sub>2</sub> 93 (78–86), *e*<sub>1</sub>–*e*<sub>2</sub> 33 (21–27), *e*<sub>2</sub>–*d*<sub>2</sub> 83 (77–78), *f*<sub>1</sub>–*f*<sub>1</sub> 44 (39–41), *e*<sub>1</sub>–*f*<sub>1</sub> 41 (37–38), *e*<sub>2</sub>–*f*<sub>1</sub> 44 (35–37), *h*<sub>1</sub>–*h*<sub>1</sub> 26 (20–22), *h*<sub>2</sub>–*h*<sub>2</sub> 56 (48–49), *h*<sub>1</sub>–*h*<sub>2</sub> 11 (11–12), *h*<sub>3</sub>–*h*<sub>3</sub> 69 (65–69). Setae *ve* and *c*<sub>2</sub> smooth, others faintly barbed.

**Venter (Figs. 1B, 4B, 7B, C)** – Setae *c*<sub>2</sub> placed on humeral shields. Coxisternal shields separated, bearing three pairs of setae (1*a*, 3*a* and 4*a*). Aggenital shield entire and with four pairs of setae (*ag*<sub>1–4</sub>). Genital shields bearing three pairs of setae (*g*<sub>1–3</sub>). Pseudanal shields bearing three pairs of setae (*ps*<sub>1–3</sub>). Humeral, coxisternal and aggenital shields punctated. Area between propodosoma and hysterosoma microtuberculate as in anterior margin of prodorsum. Dimensions and distances of ventral setae as follows: 1*a* 18 (13–16), 3*a* 18 (16–17), 4*a* 13 (9–12), 1*a*–1*a* 20 (15–16), 3*a*–3*a* 30 (24–28), 4*a*–4*a* 28 (20–23), *ag*<sub>1</sub> 11 (11–12), *ag*<sub>2</sub> 13 (13–14), *ag*<sub>3</sub> 19 (16–18), *ag*<sub>4</sub> 23 (19–20), *g*<sub>1</sub> 6 (6–7), *g*<sub>2</sub> 8 (9–12), *g*<sub>3</sub> 14 (13–17), *ps*<sub>1</sub> 30 (33–34), *ps*<sub>2</sub> 26 (26–27), *ps*<sub>3</sub> 9 (10–11).

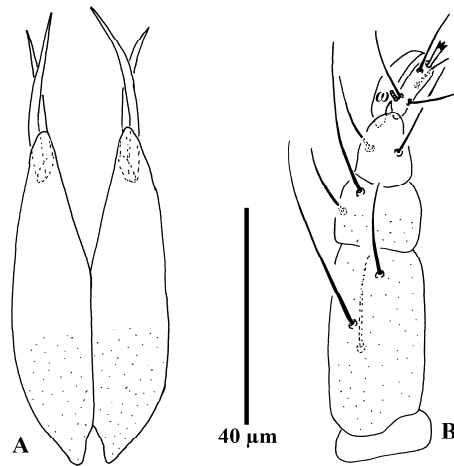
**Legs (Fig. 3)** – Leg segments punctated. Leg I 154 (145–147), leg II 118 (109–111), leg III 112 (107–108), leg IV 133 (131–132). Chaetotaxy of leg segments as follows: coxae 2–2–2–2, trochanters 1–1–2–1, femora 6–4–3–2, genua 5(+1 $\kappa$ )–5–3–3, tibiae 5(+1 $\phi$ +1 $\phi\phi$ )–5(+1 $\phi\phi$ )–5(+1 $\phi\phi$ )

–5(+1φρ), tarsi 13(+1ω)–9(+1ω)–7(+1ω)–7(+1ω). Leg supracoxal setae (*elcp*) pudgy. Solenidion κ on genu I setiform. All tarsi with solenidion ω.

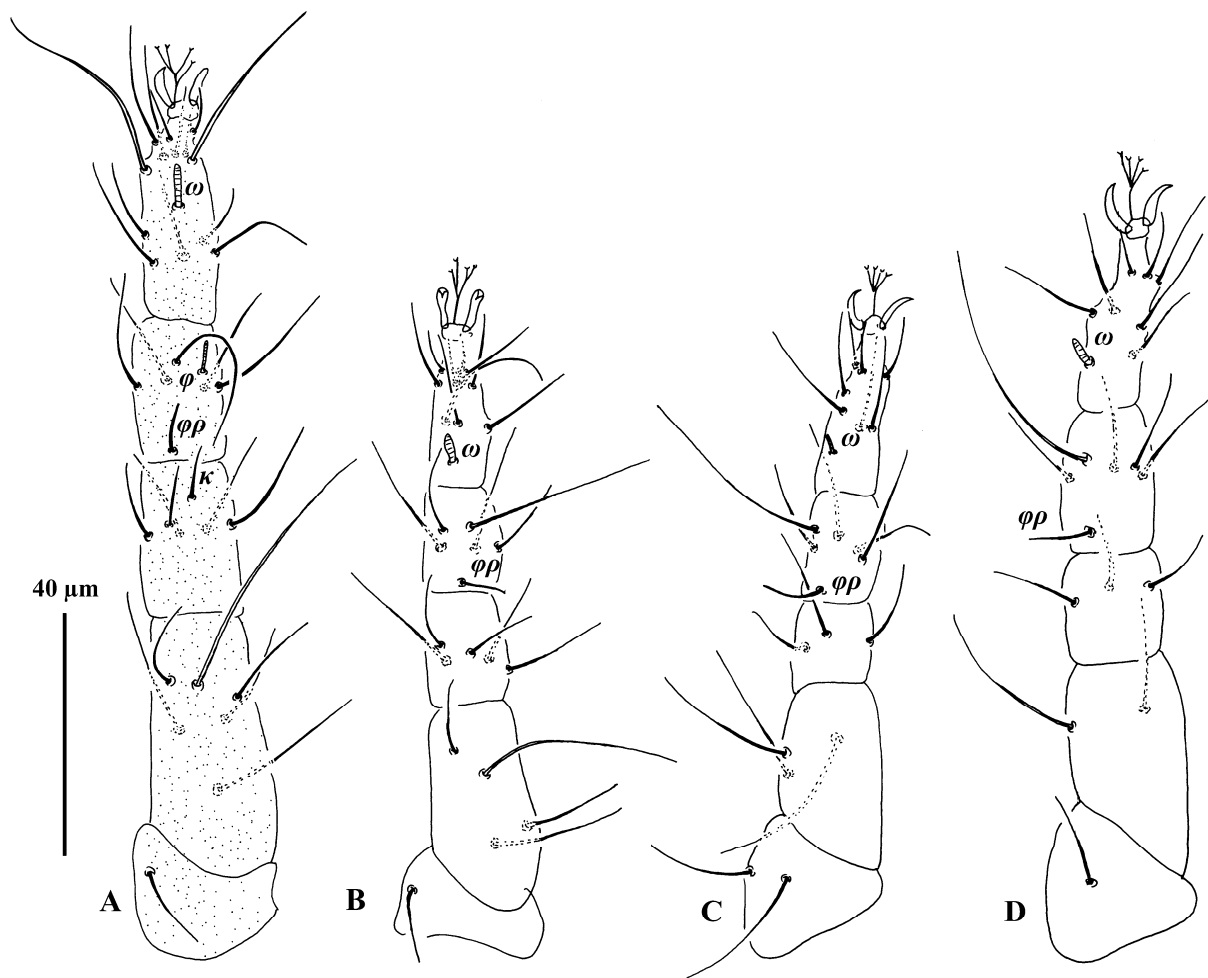


**Figure 1.** Illustrations of *Stigmaeus exilis* sp. nov. (Holotype female) – A. Dorsum of body; B. Venter of body; C. Setae *vi* and *d*<sub>1</sub>.

**Gnathosoma** (Figs. 1, 2, 5) – Subcapitulum 78 (72–73) long and punctated, with two pairs of adoral setae (*ro*<sub>1,2</sub>) and two pairs of subcapitular setae (*m* and *n*), dimensions and distances between setae, *m* 11 (10–12), *n* 17 (16–17), *m*–*m* 13 (12–13), *n*–*n* 26 (22–24), *m*–*n* 14 (13–14). Chelicerae punctated, 89 (81–83) long. Palp punctated, 79 (74–75) long. Numbers of setae and solenidia from palpfemur to palptarsus: 3, 2, 2 + 1 claw + 1 accessory claw, 4 + 1 solenidion ω + 1 tridentate eupathidium. Palp supracoxal setae (*elcp*) pudgy.



**Figure 2.** Illustrations of *Stigmaeus exilis* sp. nov. (Holotype female) – A. Chelicerae; B. Palp.



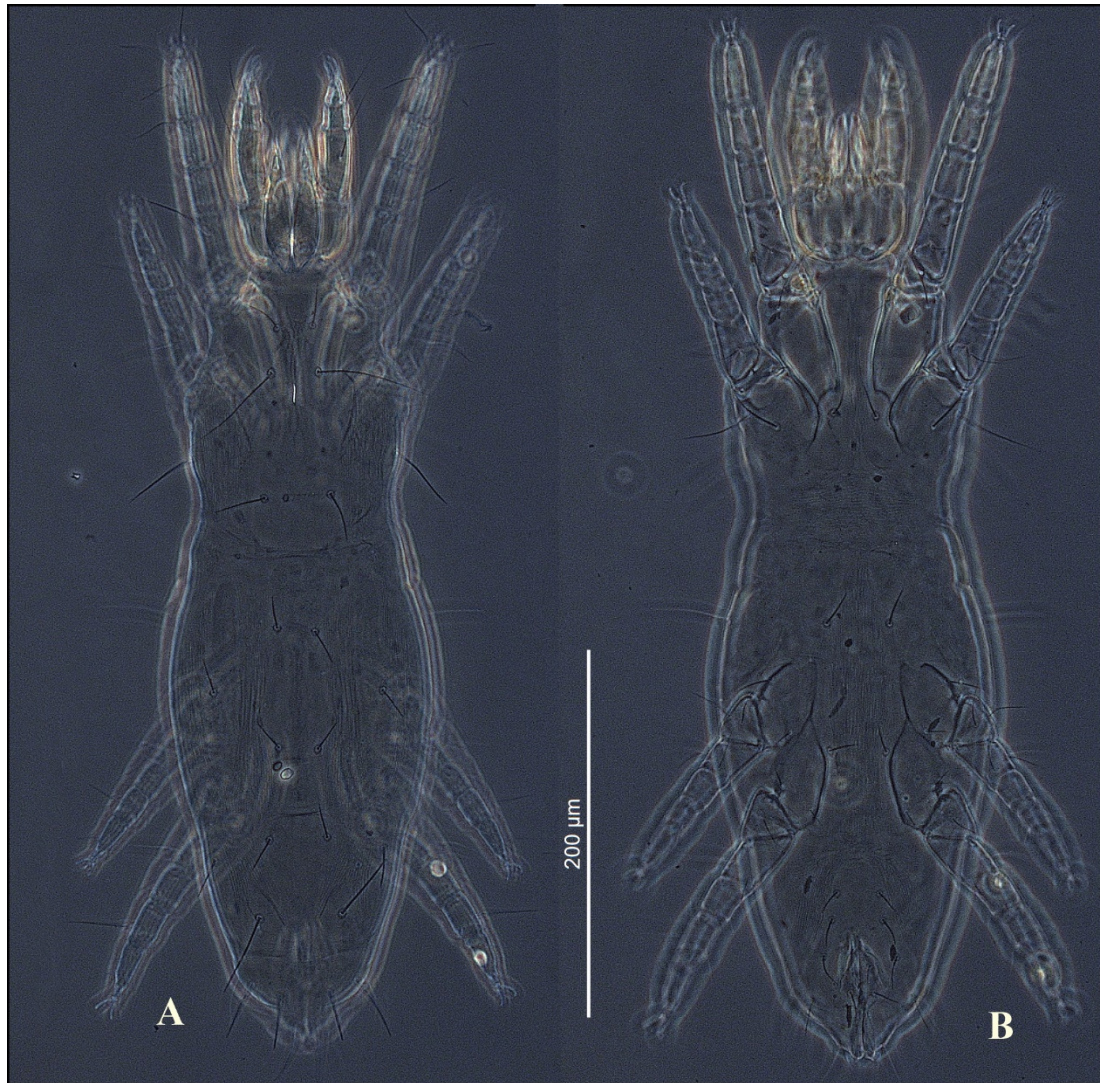
**Figure 3.** Illustrations of *Stigmaeus exilis* sp. nov. (Holotype female) – A. Leg I; B. Leg II; C. Leg III; D. Leg IV.

*Male and immature stages*  
Unknown.

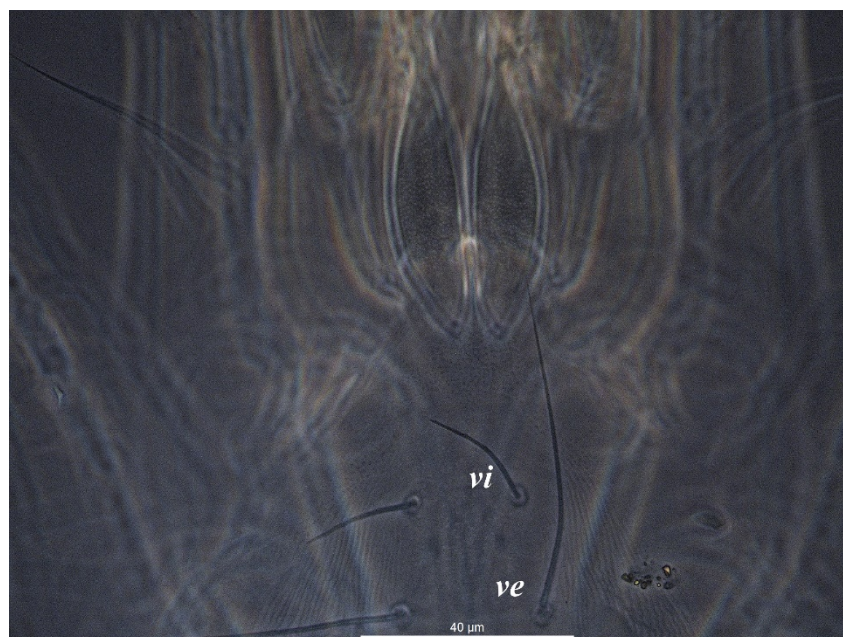
#### *Etymology*

The specific name “*exilis*” is a Latin adjective, means thin, slim or slender, referring to the thin and slender body.



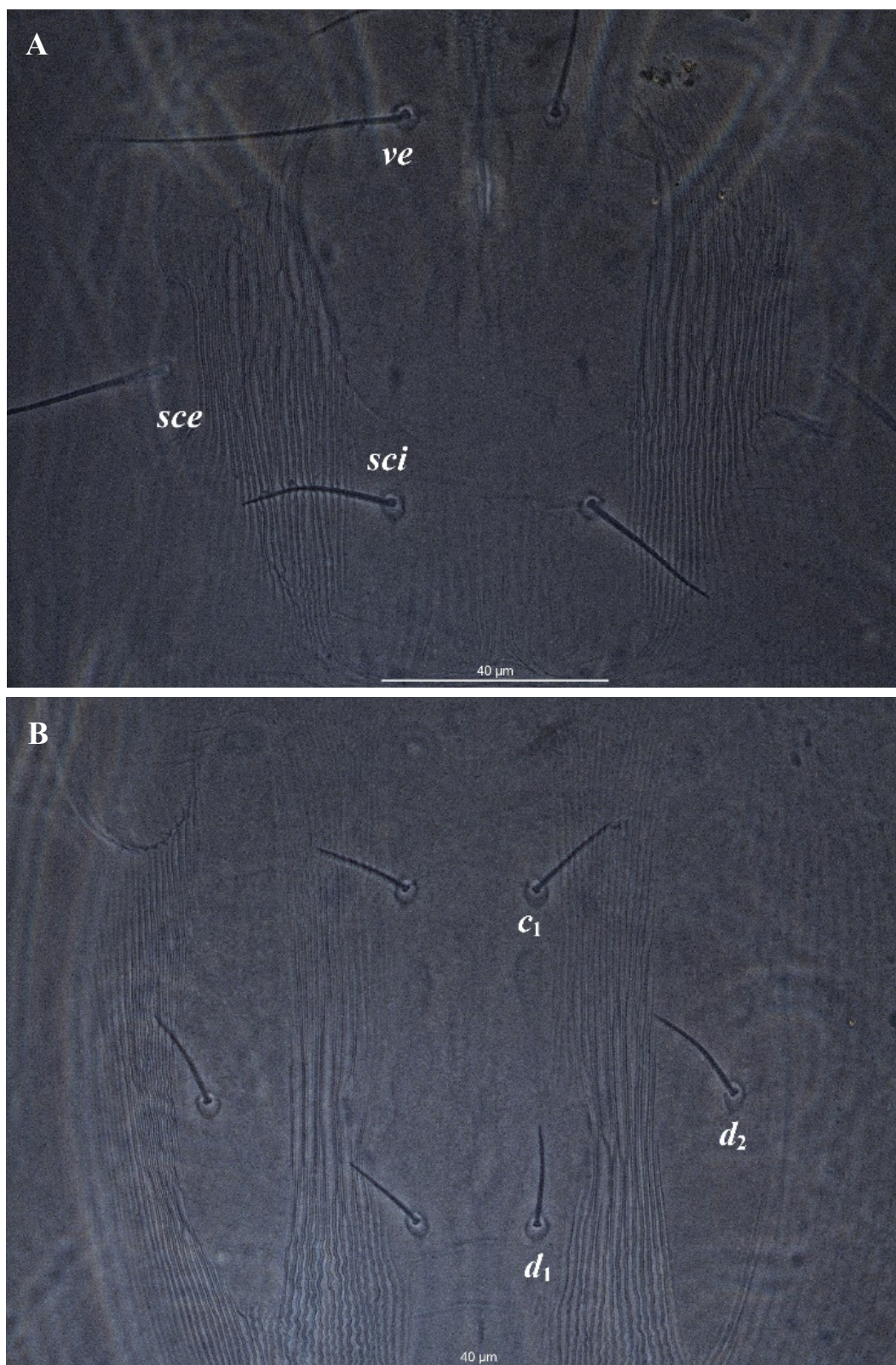


**Figure 4.** Microscopic images of *Stigmaeus exilis* **sp. nov.** (Holotype female) – **A.** Dorsum of body; **B.** Venter of body.



**Figure 5.** Microscopic image of *Stigmaeus exilis* **sp. nov.** (Paratype female) – Anterior of idiosoma and chelicerae.



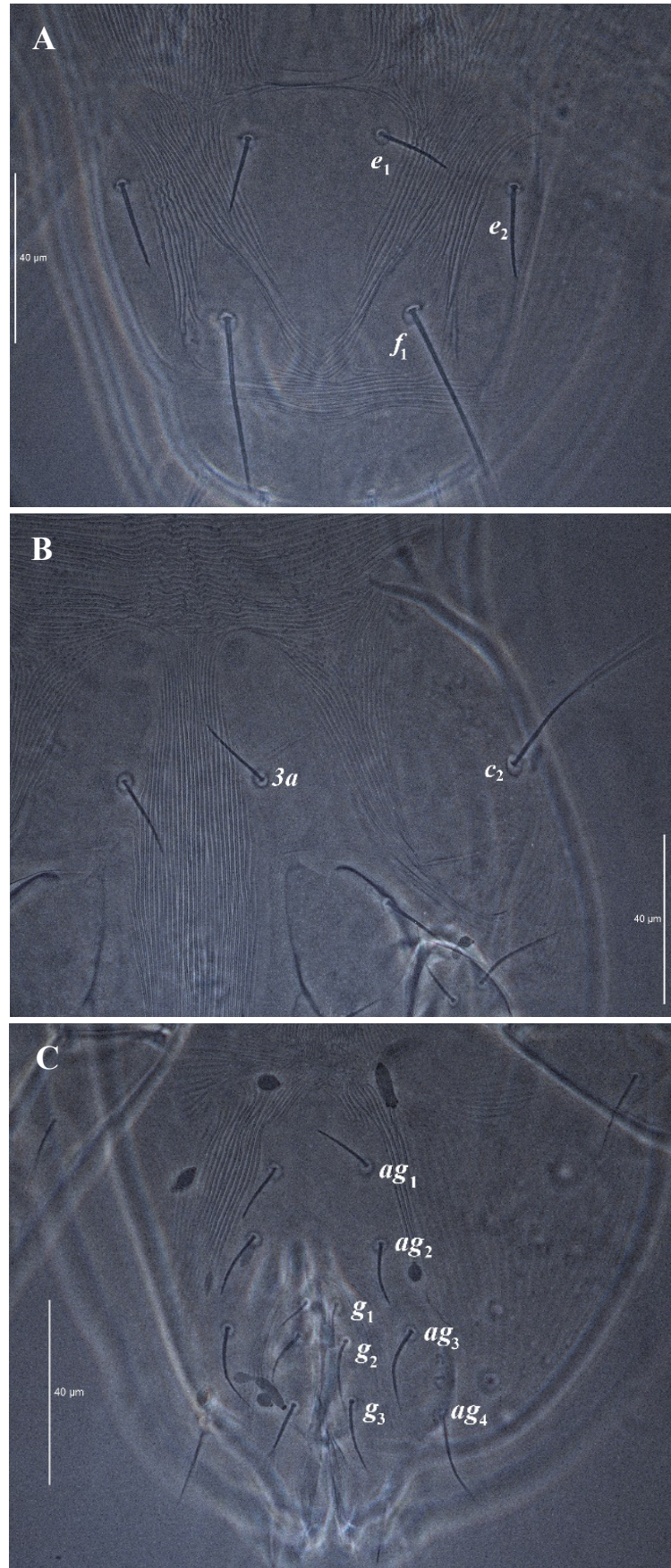


**Figures 6.** Microscopic image of *Stigmaeus exilis* sp. nov. (paratype female) – **A.** Prodorsum; **B.** Central and marginal shields.

#### *Type material*

Holotype: ♀, Paratypes: 2♀♀, from soil in a dead walnut tree hollow, Sansa Gorge–TURKEY, 39° 33' 58.6" N, 40° 06' 31.3" E, 1477 m a.s.l., 11 May 2020; leg. Salih Doğan.





**Figure 7.** Microscopic image of *Stigmaeus exilis* sp. nov. (paratype female) – **A.** Median zonal, lateral zonal, intercalary and suranal shields; **B.** Coxisternal and humeral shields; **C.** Aggenital, genital and anal shields.

### Remarks

*Stigmaeus exilis* **sp. nov.** closely resembles *Stigmaeus gracilimus* Summers in that having thin and slender body and entire median zonal shield; however, it differs from the latter by: the presence of reticulate patterns on the propodosomal shield, posterior margin of the propodosomal shield indenting forward by striae and four setae on femur II. In *S. gracilimus* there is no reticulations on propodosomal shield, posterior margin of propodosomal shield is smooth and femur II bears five setae (Summers 1962). In addition, idiosoma of the new species is longer than that of *S. gracilimus*: length of body 442 (403–426) in the new species whereas 296 in the latter (Summers 1962).

*Stigmaeus exilis* **sp. nov.** is also similar to *Stigmaeus amasyanus* Dönel, Doğan, Sevsay & Bal. However, the new species can be easily distinguished from the latter in that marginal and lateral zonal shields of the new species are longer than those of *S. amasyanus*. Marginal shields elongate, nearly as long as central shield in the new species whereas relatively short in *S. amasyanus*; lateral zonal shields elongate, nearly extend to suranal shield in the new species whereas very small and no extend to suranal shield in the latter. Extra distinctive characters for more easily separating these two species can also be mentioned. Distance between  $d_1-d_1$  17 (16–17) in the new species whereas 30 (35) in *S. amasyanus*;  $d_1-d_1 < e_1-e_1$  in the new species whereas  $d_1-d_1 \approx e_1-e_1$  in the latter. In addition, dorsal shields punctated in the new species versus no dorsal punctations in the latter (Dönel *et al.* 2012).

Moreover, *Stigmaeus exilis* **sp. nov.** can be thought to be closely related to *Stigmaeus indivisus* Doğan in bearing a single median zonal shield. It can be separated from *S. indivisus* by: marginal and lateral zonal shields present whereas absent in *S. indivisus*, four setae on femur II versus six setae in *S. indivisus*, aggenital shield entire but divided in *S. indivisus* (Doğan 2019a).

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## *Stigmaeus* Koch (Acariformes: *Stigmaeus exilis* گونه جدید دوکی شکل (Stigmaeidae) از سانس، ترکیه

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### چکیده

گونه جدیدی از *S. exilis* sp. nov. *Stigmaeus* (Stigmaeidae) بر اساس نمونه‌های ماده بالغ از خاک درون سوراخ تنه درخت گردوی پوسیده از تنگه سانس، ترکیه توصیف شده است. شکل‌های ترسیمی و تصاویر میکروسکوپی فازکتر است از گونه جدید نیز در اینجا آورده شده است. این گونه را می‌توان با داشتن بدن نازک و باریک، حاشیه جلویی پرودورسوم دارای برجستگی‌های ریز، حاشیه عقبی صفحه پرودوزومایی خمیده به جلو با خطوط، وجود نقوش آپودمی، بدون چشم و اجسام پس چشمی، صفحه کامل ناحیه میانی، صفحه کامل سوراخال و داشتن سه جفت مو روی آن، و ران پای دوم با چهار مو تشخیص داد.

واژگان کلیدی: توصیف؛ کنه؛ بالاخانواده Raphignathoidea؛ سانس؛ جنس *Stigmaeus*.

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