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Article

Description of *Barbutia arasbaraniensis* sp. nov. (Acari: Trombidiformes: Barbutiidae) based on the deutonymph and male specimens from Iran

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ABSTRACT

A new species, *Barbutia arasbaraniensis* sp. nov. (Acari: Barbutiidae), is described and illustrated based on deutonymph and male specimens. Also, the key to all known deutonymph species of *Barbutia* is updated.

KEY WORDS: Acariformes; Arasbaran forests; Prostigmata; rotten woods; updated key.

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INTRODUCTION

Barbutiidae Robaux is a small known family in the superfamily Raphignathoidea and contains only one genus, *Barbutia* Oudemans. This family is unique by having tenent hairs in claw (two pairs) and empodium (three pairs) (Walter *et al.* 2009). The systematic position of this family is discussed by Fan *et al.* (2003). Members of the genus *Barbutia* are found in soil, moss and litter (Fan *et al.* 2003; Bagheri *et al.* 2014; Akgül 2016). Until today Barbutiidae Robaux contains five species namely: *B. anguineus* (Berlese); *B. australia* Fan, Walter & Proctor; *B. iranensis* Bagheri, Navaei & Ueckermann, *B. longinqua* Fan, Walter & Proctor and *B. perretae* Robaux in the world.

During a study of raphignathoid mites inhabiting rotten woods in Arasbaran forest (North East Azerbaijan Province), a new species *Barbutia arasbaraniensis* sp. nov. was found and described. This is the sixth species of this genus globally.

MATERIAL AND METHODS

Samples of rotten woods were taken from Arasbaran forests, East Azerbaijan Province. Mites were extracted from samples using a Berlese-Tullgren funnel. Specimens were cleared in Nesbitt's fluid and mounted in Hoyer's Medium (Walter and Krantz 2009). Illustrations were made with the aid of a drawing tube attached to a phase contrast microscope (Olympus, BX41) and drawings of figures were done with Adobe illustrator software (CC20). The length of the idiosoma was measured from the suture between the gnathosoma and idiosoma to the posterior margin of the idiosoma; the length of

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the body includes length of idiosoma and gnathosoma; the width of the idiosoma was measured at the broadest part of the idiosoma (almost at setae *c2* level) and setae were measured from their insertion to their tips. The terminology of palp and leg chaetotaxy follows that of Grandjean (1944, 1946) and the terminology idiosoma chaetotaxy follows Kethley (1990). All measurements of holotype and paratypes (in parentheses) are given in micrometres (μm).

RESULTS

Barbutiidae Robaux, 1975

Type genus: *Barbutia* Oudemans, 1927.

Diagnosis for the family and genus followed Fan *et al.* (2003).

Genus *Barbutia* Oudemans, 1927

Type species: *Stigmaeus (Macrostigmaeus) anguineus* Berlese, 1910: 208.

Barbutia arasbaraniensis Mohammad-Doustaresharaf and Bagheri sp. nov.

Diagnosis

Deutonymph female: setae *vi* about four times length of *sci* ($vi:sci = 4.4$); setae *ve* longer than *sce* ($ve:sce = 1.7$) but not reaching bases of *c1*; setae *h1* and *h2* are the longest dorsal setae (90–100); aggenital setae with two pairs of seta; setae and solenidia of legs I–IV: coxae 2, 1, 1, 0; trochanters 1, 1, 1, 1; femora 3, 1, 0, 0; genua 3 + κ , 0, 0, 0; tibiae 5 + ϕ , 2 + ϕ , 1, 1; tarsi 10 + 1 ω , 6 + 1 ω , 5 + 1 ω , 5.

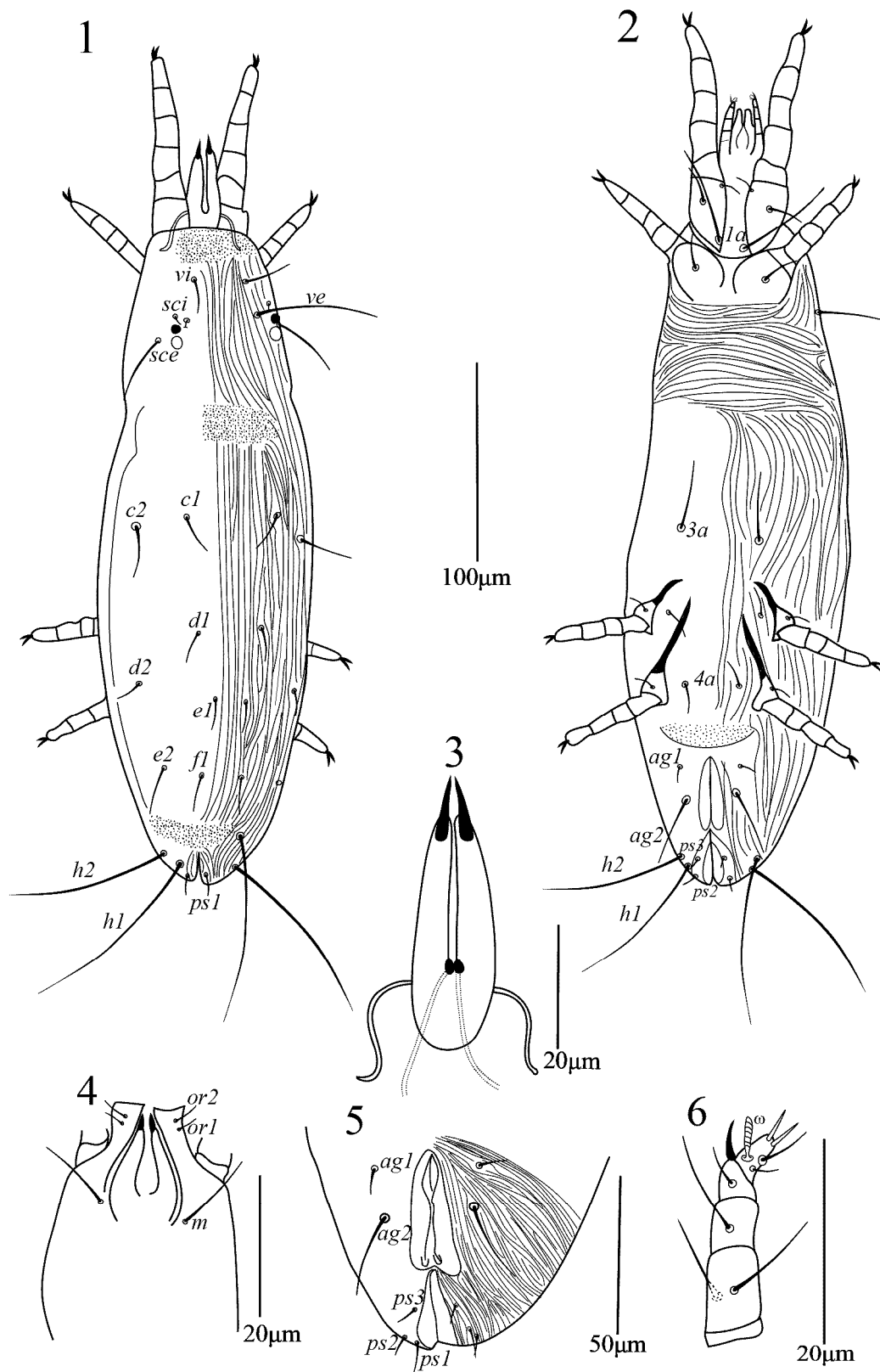
Description

Deutonymph female ($n = 2$) (Figs. 1–10, 21)

Length of body 400 (403); length of Idiosoma 337 (334); width of body 100 (105); leg I 112 (115); leg II 88 (85); leg III 75 (71); leg IV 75 (72).

Dorsum (Fig. 1) – Body elongated, integument of dorsum (except anterior area of prodorsum, along sejugal furrow and in front of suranal shield with punctuation) with longitudinal striations and small spots along striae. Eyes 5 (5) diameter and postocular bodies 9 (9) diameter. All dorsal setae smooth and setiform. Setae *ve* longer than *sce* but not reaching bases of *c1*; seta *sci* 5 (5) the shortest dorsal setae and is about 1/4 of *fl* 20 (15). Dorsal idiosomal setae measurements: *vi* 22 (25), *ve* 60 (65), *sci* 5 (5), *sce* 35 (40), *c1* 20 (24), *c2* 25 (25), *d1* 15 (12), *d2* 16 (18), *e1* 15 (13), *e2* 27 (25), *fl* 20 (15), *h1* 100 (94), *h2* 92 (90). Distances between dorsal setae: *vi*–*vi* 29 (30), *vi*–*ve* 18, *ve*–*ve* 38 (38), *ve*–*sci* 8 (10), *ve*–*sce* 19 (19), *sce*–*sce* 67 (70), *sci*–*sci* 50 (50), *sci*–*sce* 14 (15), *c1*–*c1* 51 (56), *c1*–*d1* 62 (65), *d1*–*d1* 36 (43), *d2*–*d2* 82 (82), *d1*–*d2* 40 (38), *d1*–*e1* 35 (39), *e1*–*e1* 18 (20), *e1*–*e2* 43 (38), *e1*–*fl* 41 (35), *fl*–*fl* 20 (19), *h1*–*h1* 35 (28), *h1*–*h2* 10 (10). Ratio $vi:sci = 4.4$, $ve:sce = 1.7$, $c1:c2 = 0.8$, $c1:d1:e1:fl = 1.3:1.0:1.0:1.3$, $vi:vi-vi = 0.7$, $ve:vi-ve = 3.3$, $c1:c1-c1 = 0.3$, $c1-c1:d1-d1:e1-e1:fl-fl = 2.8:2.0:1.0:1.1$.

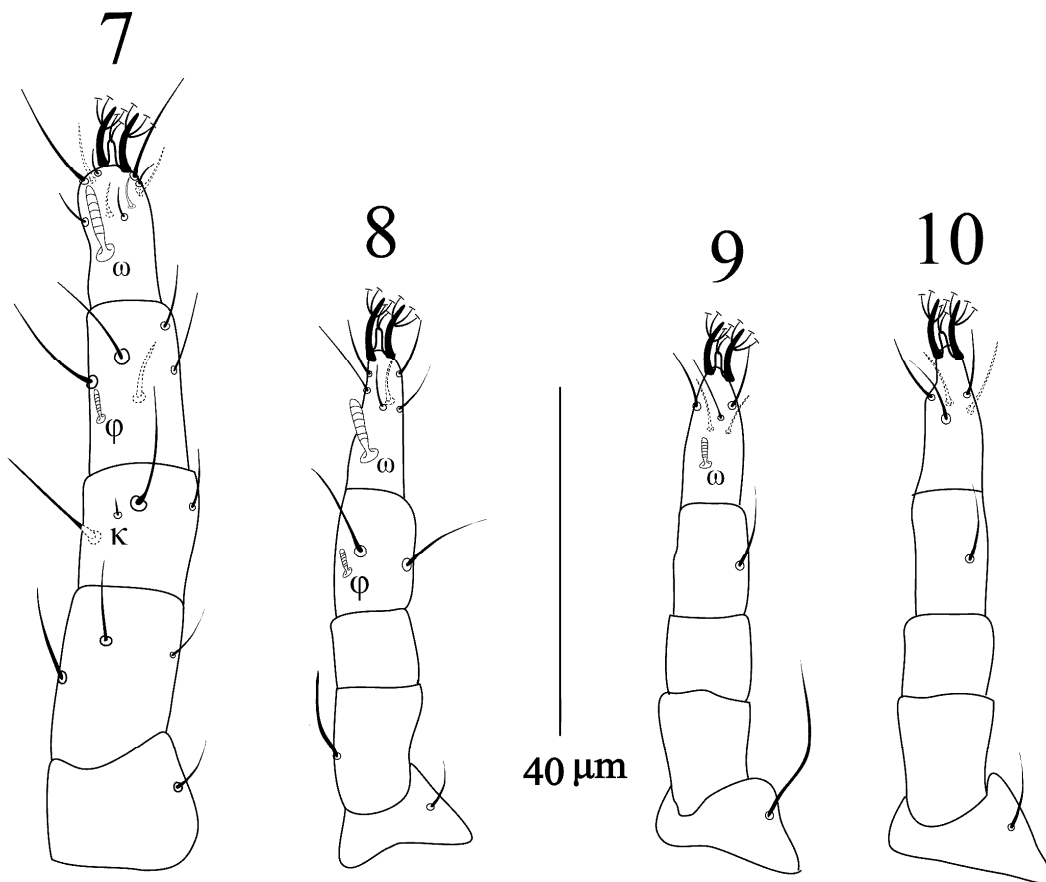
Venter (Figs. 2, 21) – Ventral integument and coxisternal area striated, ventral setae *1a* longest (60) and *4a* shortest (15), *1a* close to coxae I, *3a* (40) situated in front of coxae III and *4a* between coxae IV; $1a:3a:4a = 4.0:2.6:1.0$; genital and anal openings separated (Figs. 2, 5); genital shields without setae; aggenital area with 2 pairs of setae, *ag2* longer than other; *ag1* 10 (8), *ag2* 33 (30); pseudanal opening with 3 pairs of setae (*ps1*–*3*); *ps1* = *ps2* 10 (9), *ps3* 8 (7).



Figures 1–6. *Barbutia arasbaraniensis* sp. nov. (Deutonymph female) – 1. Dorsum of body; 2. Venter of body; 3. Dorsal view of chelicerae; 4. Subcapitulum; 5. Ventral view of ano-genital area; 6. Palp.

Gnathosoma (Figs. 3, 4, 6) – Subcapitulum (Fig. 4) smooth, one pairs of subcapitular (*m*) and two pairs of adoral setae (*orl-2*). All subcapitular setae smooth and pointed. Lengths and distances of subcapitular setae *m* 19 (17), *m-m* 10. Chelicera (Fig. 3) slender, fixed digit 50 (45), movable digit 12 (11), palp (Fig. 6) 20 (19) long; palpfemur with 2 setae, palpgenua with one seta, palptibia with one seta, palptibial claw as long as palptarsal solenidion, missed ventral tooth and almost spine-like, palptarsus with one solenidion, 2 simple setae and 2 terminal eupathidia. All palpal setae smooth and pointed.

Legs (Figs. 7–10) – Setae and solenidia of legs I–IV as follows: coxae 2, 1, 1, 0; trochanters 1, 1, 1, 1; femora 3, 1, 0, 0; genua 3 + κ , 0, 0, 0; tibiae 5 + ϕ , 2 + ϕ , 1, 1; tarsi 10 + 1ω , 6 + 1ω , 5 + 1ω , 5.



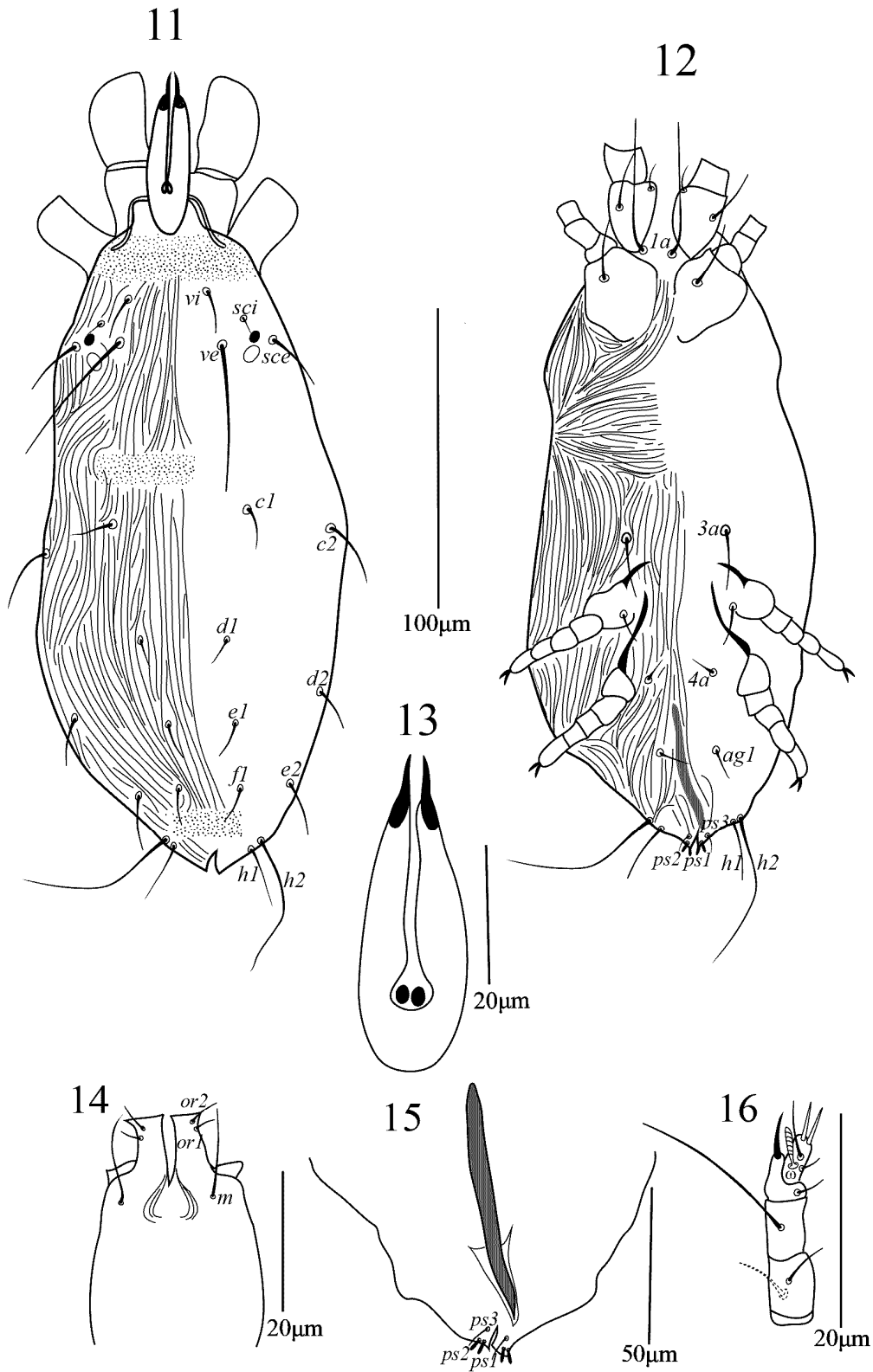
Figures 7–10. *Barbutia arasbaraniensis* sp. nov. (Deutonymph female) – 7. Leg I; 8. Leg II; 9. Leg III; 10. Leg IV.

Adult male (*n* = 2) (Figs. 11–20)

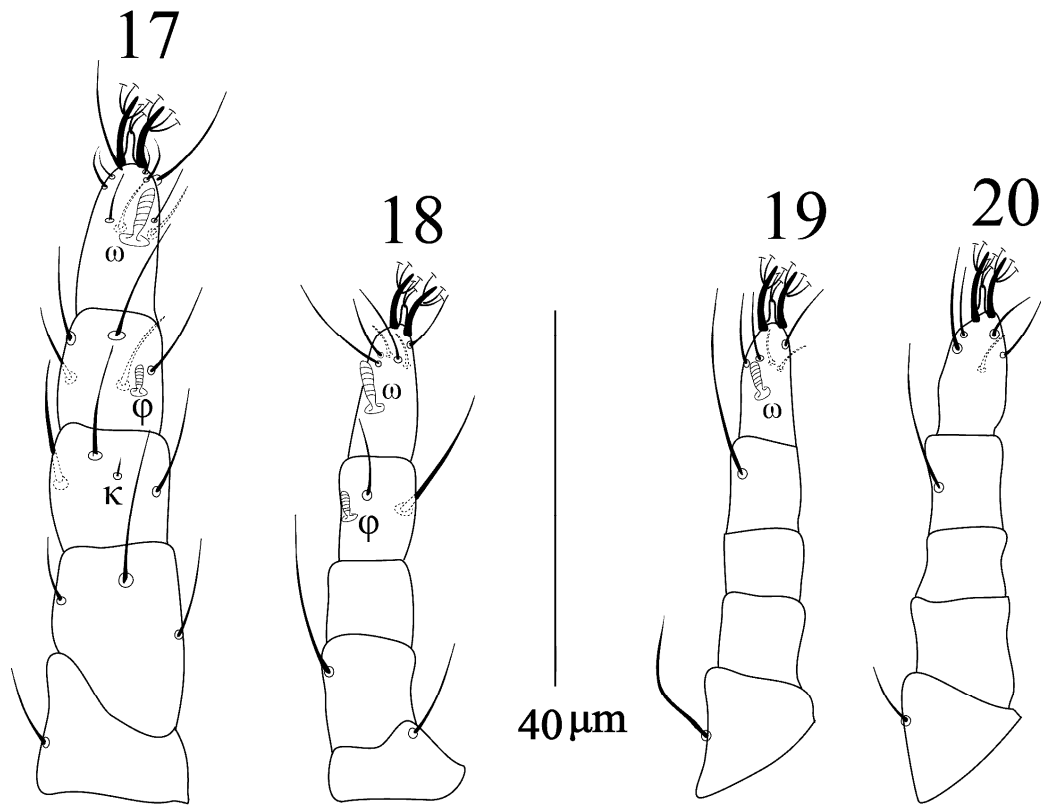
Length of body (276–295); Length of idiosoma (223–237); width of body (82–91); leg I (85–95); leg II (60–67); leg III (62–63); leg IV (62–63).

Dorsum (Fig. 11) – Body and integument of dorsum same as in deutonymphs. Eyes 4 (4) diameter and postocular bodies 8 (7) diameter. All dorsal setae smooth and setiform. Setae *ve* longer than *sce* but not reaching bases of *cl*; *sci* 4 (5) the shortest dorsal setae. Dorsal idiosomal setae measurements: *vi* 18–20, *ve* 50–53, *sci* 5 (5), *sce* 35–36, *cl* 15–17, *c2* 22–25, *d1* 10–11, *d2* 17–18, *e1* 11–12, *e2* 20–21, *fl* 11–12, *hl* 21–22, *h2* 36–38. Distances between dorsal setae: *vi-vi* 26–29, *vi-ve* 16–18, *ve-ve* 35–40, *ve-sci* 9–10, *ve-sce* 15–18, *sce-sce* 50–56, *sci-sci* 48–51, *sci-sce* 10–12, *cl-cl* 49–51, *cl-d1* 45–47, *d1-d1* 33–37, *d2-d2* 76–80, *d1-d2* 33–35, *d1-e1* 34–36, *e1-e1* 21–24, *e1-*

$e2$ 29–31, $e1-f1$ 22–25, $f1-f1$ 21–22, $h1-h1$ 27–29, $h1-h2$ 4–5. Ratio $vi:sci = 1.9$, $ve:sce = 1.4$; $c1:c2 = 0.6$, $c1:d1:e1:f1 = 1.5:1.0:1.0:1.1$, $vi:vi-vi = 0.7$, $ve:vi-ve = 3.1$, $c1-c1:d1-d1:e1-e1:f1-f1 = 2.3:1.6:1.0:1.1$.



Figures 11–16. *Barbutia arasbaraniensis* sp. nov. (Adult male) – 11. Dorsum of body; 12. Venter of body; 13. Dorsal view of chelicerae; 14. Subcapitulum; 15. Detailed view of pseudanal area; 16. Palp.



Figures 17–20. *Barbutia arasbaraniensis* sp. nov. (Adult male) – 17. Leg I; 18. Leg II; 19. Leg III; 20. Leg IV.

Venter (Fig. 12) – Ventral and coxisternal area integument same as in the deutonymph; ventral setae *1a* longest 42–45 and *4a* shortest 12–13, *1a* close to coxae I, *3a* 34–35 situated in front of coxae III and *4a* between coxae IV; $1a:3a:4a = 3.5:2.8:1.0$; aggenital area with 1 pair of setae (Figs. 12, 15) *agl* 10–12; genital setae absent; pseudanal opening with 3 pairs of setae (*ps1*–3); *ps1* and *ps2* peg-like but *ps3* seta like, *ps1* = *ps2* 2, *ps3* 5. Genitalia shaft-like (depicted in Fig. 15).

Gnathosoma (Figs. 13, 14, 16) – As in the deutonymph. Lengths and distances of subcapitular setae *m* 17–18, *m–m* 9–10. Chelicera (Fig. 13), fixed digit 40–42, moveable digit 9–10. Palp (Fig. 16) 17–19 long.

Legs (Figures 17–20) – Chaetotaxy of leg segments is similar to the deutonymph.

Adult female and other immature stages – Unknown.

Type materials

Holotype deutonymph female, one paratype deutonymph female and two adult males, from rotten woods, Abbasabad region, Arasbaran Forest, Khoda Afarin county, North East Azerbaijan province, Iran, 38° 55' 46" N, 46° 47' 88" E, 1310 m a.s.l., 3 September 2017, by Mojtaba Mohammad-Doustaresharaf.

Type deposition

The holotype deutonymph female and one paratype male are deposited in the Acarological Collection, Department of Plant Protection, Faculty of Agriculture, University of Maragheh, Maragheh, Iran (UMI); one paratype deutonymph female, one paratype male will be deposited in the Acarological Collection, Jalal Afshar Zoological Museum, Department of Plant Protection, Faculty

of Agriculture, University of Tehran, Karaj, Iran (JAZM).

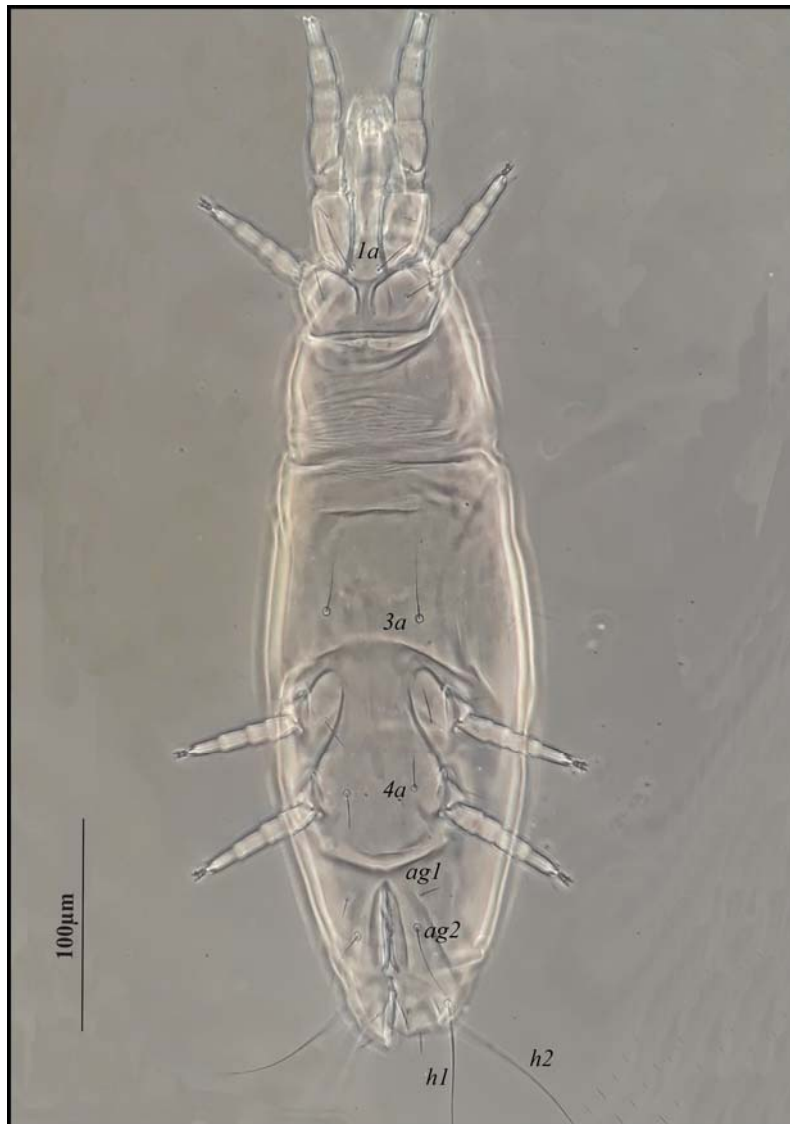


Figure 21. Phase-contrast micrograph of *Barbutia arasbaraniensis* **sp. nov.** (Deutonymph female) – Venter of body.

Etymology

The species is named after the region of its origin, Arasbaran Forest, Khoda Afarin County, North East Azerbaijan Province, Northwest of Iran.

Differential diagnosis

Barbutia arasbaraniensis **sp. nov.** is easily separated from other species of the genus *Barbutia* with combination of following characters: 1) with 2 pairs (*vs.* 3 pairs) of aggenital setae, 2) tarsus I with 1 (instead 2) solenidion, 3) femur I with 3 (*vs.* 4) setae, and 4) genu I with 3 + κ (*vs.* 5 + κ).

Key to deutonymph female of *Barbutia* (except *B. longinqua*)

- 1. Setae *ve* more than 2 times longer than of setae *sce* and reaching bases of setae *c1* *B. anguineus* (Berlese)
- Setae *ve* smaller and not reaching base of setae *c1* 2

2. Tarsus I with one solenidion, 2 pairs of aggenital setae..... *B. arasbaraniensis* **sp. nov.**
 – Tarsus I with two solenidia, 3 pairs of aggenital setae 3
3. Tarsus I with 7 + 2 ω , tibia II without solenidion *B. perretae* Robaux
 – Tarsus I with 10 + 2 ω , tibia II with one solenidion 4
4. Tarsus IV without solenidion, femora II and III with 2 and one setae, respectively
 *B. iranensis* Bagheri, Navaei & Ueckermann
 – Tarsus IV with one solenidion, femora II and III with 3 and 2 setae respectively
 *B. australia* Fan, Walter & Proctor

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توصیف گونه جدید (Acari: Trombidiformes: *Barbutia arasbaraniensis* sp. nov. (Acari: Trombidiformes: Barbutiidae) بر اساس نمونه‌های پوره سن دوم و نر از ایران

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چکیده

گونه جدید (*Barbutia arasbaraniensis* sp. nov. (Acari: Barbutiidae)، بر اساس نمونه‌های پوره سن دوم و نر توصیف و ترسیم شد. همچنین کلید گونه‌های پوره‌های سن دوم جنس *Barbutia* به‌روزرسانی شد.

واژگان کلیدی: بالاراسته Acariformes؛ جنگل‌های ارسباران، راسته پیش‌استیگمایان؛ چوب‌های پوسیده؛ کلید به‌روز شده.

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