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Article

A new species of the family Zetomotrichidae (Acari: Oribatida) from Iran

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Abstract

Zetomotrichus persicus **sp. nov.**, a new species of oribatid mites (Acari: Oribatida) of the family Zetomotrichidae, is described from Iran. The new species is recognized by the anteromedial rostral denticulation; long and filiform sensilla with 13 relatively long barbs on outer and four on inner sides; broad and pennate notogastral seta c_2; pyriform organ with two anterolateral tubes; and absence of adanal seta ad_3. An identification key to the known species of *Zetomotrichus* is given.

Key words: Sisakht city, Kohkiluyeh va Boyer Ahmad province, *Zetomotrichus*, adult, key, mite

Introduction

When Grandjean established the family Zetomotrichidae in 1954, he listed five characters of the genus *Zetomotrichus* Grandjean, 1934 on which the family was based: humeral process with large, flattened seta; separated lobes of the posterior tectum of the notogaster; enlarged setae on leg IV (to aid jumping); with humeral sac and pyriform (pear-shaped) organ. *Zetomotrichus* is a small genus of oribatid mites and until now, the genus comprised of five nominal species. This genus was proposed by Grandjean (1934) with the Algerian species, *Z. lacrimans* Grandjean, 1934 as type species. Since then, only four species were added to the genus: *Z. bidentatus* Coetzee, 1993 (previously *Z. lacrimans* var. *bidentata* Hammer, 1977) from Pakistan; *Z. linearis* Tseng, 1982 from Taiwan; *Z. lienhardi* Mahunka, 1989 from Sumatra (Indonesia) and *Z. kenyaensis* Mahunka & Mahunka-Papp, 2009 from Kenya. There are some features such as rostral shape, length of sensillar barbs, shape of notogastral seta c_2, differences in the position of notogastral setae, shape of pyriform organ (with one or two tubes), and number of adanal setae that differentiate species in this genus. This genus is unique among the family Zetomotrichidae in having the following combination of characters: rostral margin denticulate; short lamellae present; sensilla filiform with barbs; dorsosejugal suture absent; humeral region of notogaster with large prominent process; ten pairs of notogastral setae present; notogastral seta c_2 enlarged, inserted on humeral process; lyrifissure *im* transformed into a pear-shaped pyriform organ; notogastral porose areas or sacculi absent; notogastral pores present; epimeral seta *1a* very long; four pairs of genital, one pair of aggenital, two pairs of anal and two or three pairs of adanal setae present; legs tridactylous, leg IV enlarged, with three thick and spin-like setae adapted for jumping.

Only a little information is available on the Zetomotrichidae of Iran and prior to this study there were only two records of the family: *Mabulatrichus iranicus* Akrami & Coetzee, 2007 from Mazandaran province (Akrami & Coetzee 2007) and *Zetomotrichus lacrimans* from Markazi province (Akrami & Bastan, unpublished data).

In the course of our investigations on the systematics of oribatid mites collected from Kohkiluyeh va Boyer Ahmad province, south-western Iran, we found an unknown species belonging to *Zetomotrichus*. In the present paper, we describe the second Iranian species of the family, which is named *Zetomotrichus persicus* **sp. nov.**

Materials and methods

Soil and litter samples were taken from the surface to a soil depth of 10 cm under different plants. Oribatid mites were extracted from soil samples using Berlese-Tullgren funnels set over jars of 75% ethanol. Mites were removed, cleared in lactophenol, and mounted in Hoyer's medium on glass microscope slides. The slides were placed in an oven at 45 °C for two weeks and then the specimens were examined using a light microscope (Zeiss Standard 20). Figures were made using a drawing tube attached to the microscope. All body measurements are presented in micrometers (μm). Body length was measured from the tip of the rostrum to the posterior edge of the notogaster, and body width refers to the maximum width of the notogaster at dorsal aspect. The length of some body setae is given in parentheses.

Results

Family Zetomotrichidae Grandjean, 1954
Genus *Zetomotrichus* Grandjean, 1934

Zetomotrichus persicus sp. nov. (Figs. 1–7)

Type material

Three adult specimens (males). Holotype: Sisakht, Kohkiluyeh va Boyer Ahmad province, Iran, from soil of *Astragalus* sp. (Fabaceae), 30° 52' N, 51° 27' E, 2300 m above sea level, 29 August 2008, M. Behmanesh leg.; two paratypes: same data as holotype. The holotype and one paratype are deposited in the Acarological Collection of the Department of Plant Protection, College of Agriculture, Shiraz University, Shiraz, Iran and one paratype in the Acarological Collection, Acarological Society of Iran.

Diagnosis

Body size 320 × 192. Rostrum anteriorly dentate with wide lateral indentations on each side; pyriform organ with two tubes anterolaterally; long, filiform sensillus with 13 relatively long barbs on outer and four on inner sides; short lamella present; humeral seta c_2 long, thick and bilaterally barbed; two pairs of adanal setae present; body surface punctate.

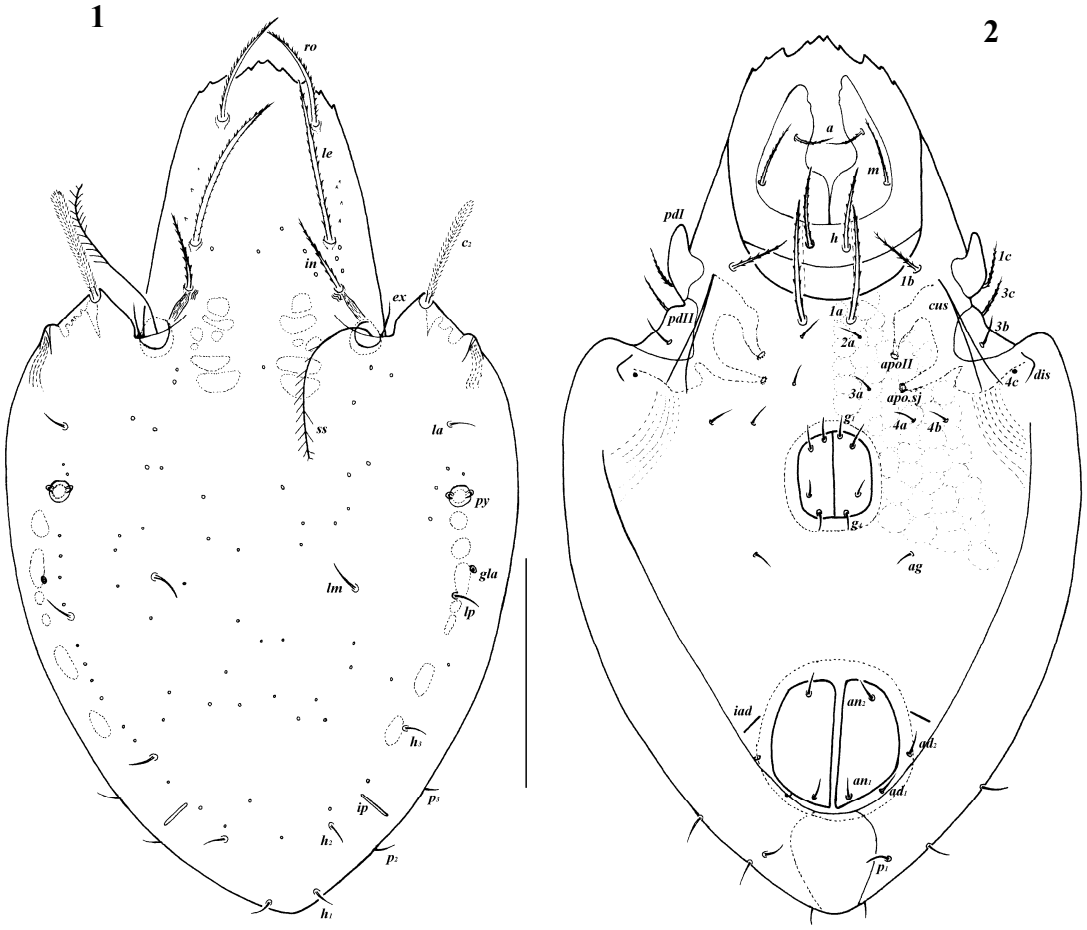
Description

Integument. Light brown in color. Cerotegument finely punctate.

Measurements. Body length 320, width 192 (holotype and paratypes).

Prodorsum (Figs. 1 & 4). Rostrum anteriorly dentate with wide lateral indentations on each side, lateral sides with small dentations. Rostral seta *ro* (31–44) long,

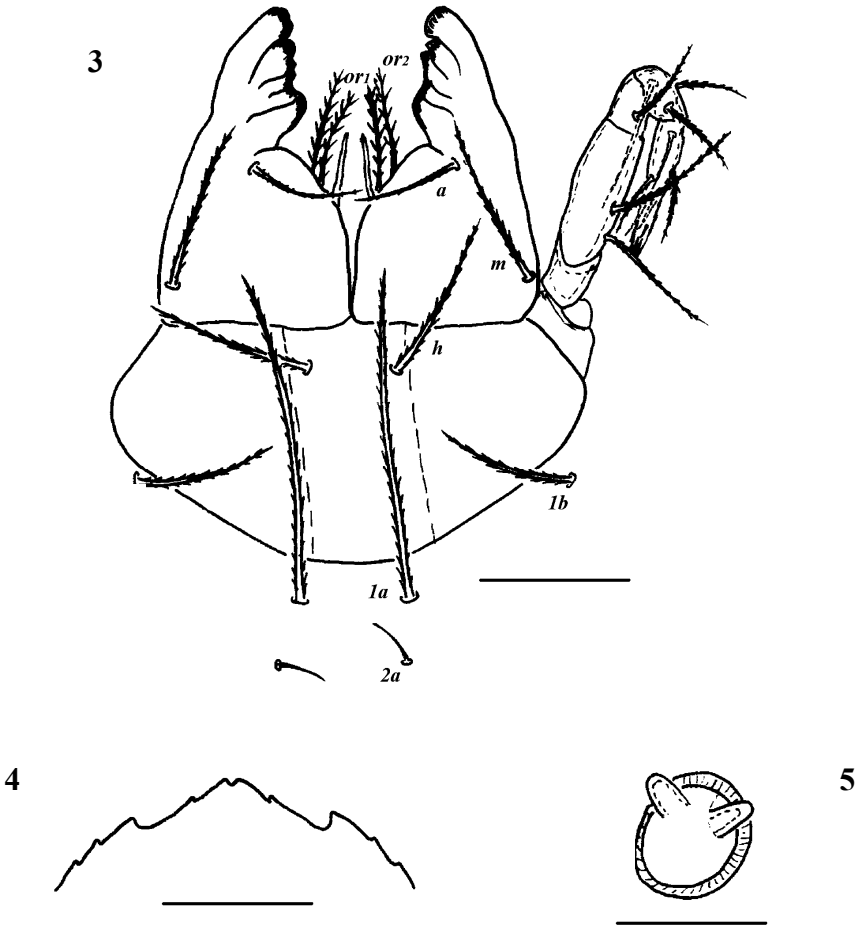
unilaterally finely barbed, extending far beyond tip of rostrum. Lamellar seta *le* (50–63) very long, about 1.5 times as long as seta *ro*, reaching rostral tip, thick and minutely barbed bilaterally. Interlamellar seta *in* (28–33) more or less half as long as seta *le*, inserted on lamellar apices, reaching past insertions of lamellar seta, finely barbed bilaterally. Exobothridial seta *ex* (15–17) short and fine, inserted laterally to bothridium, its alveolus situated under anterior part of notogaster. Short lamella present, reaching between bothridium and base of interlamellar seta. Sensillus *ss* (76–84) long, filiform, with 13 relatively long barbs on outer side and 4 barbs on inner side. Bothridium large, posteriorly covered by notogaster. Prodorsal surface with few irregularly scattered pores. Some large muscle sigillae present in the interbothridial region.



Figures 1–2. *Zetomotrichus persicus* **sp. nov**. 1. Dorsal view of body; 2. Ventral view of body. Scale bar 100 µm.

Notogaster (Figs. 1 & 5). Notogaster oval, anteriorly broad, conspicuously narrowing posteriorly. Dorsosejugal suture absent. Humeral process large, triangular, bearing notogastral seta c_2 on apex, accompanied by blunt triangular projection. Fine wrinkles present on humeral process. Ten pairs of notogastral setae present, humeral seta c_2 (43–47) long, broad, pennate, remaining nine pairs of notogastral setae short, fine and smooth, seta *lm* situated almost on same level as *lp*. Pyriform organ *py* circular, with two anterolateral tubes, situated posterior to seta *la*. Notogastral lyrifissures *ih* and

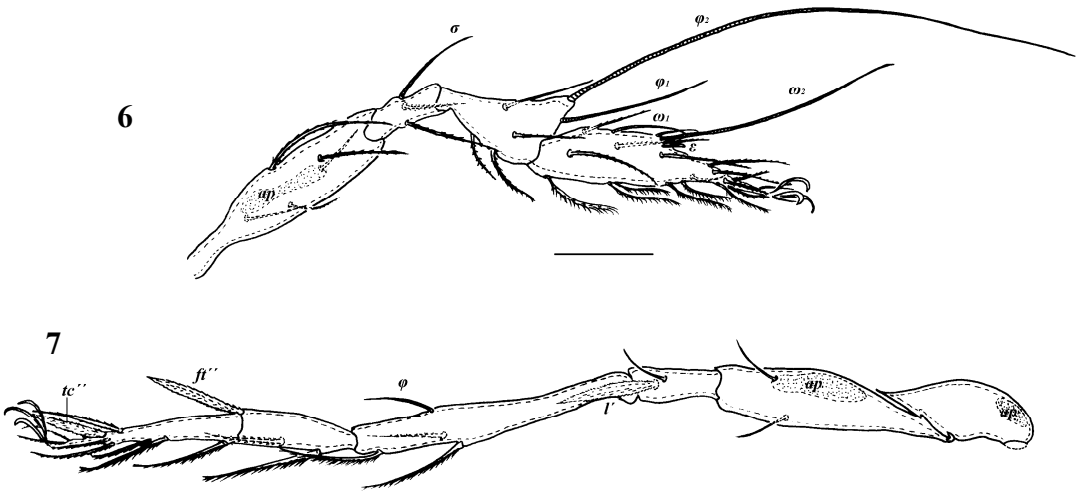
ips not visible at dorsal aspect, lyrifissure *ip* long, situated anterolateral to seta h_2. Opening of opisthonotal gland *gla* small, situated anterolaterally to seta *lp*. Numerous pores scattered irregularly on notogastral surface. Posterior tectum of notogaster with overlapping lobes.



Figures 3–5: *Zetomotrichus persicus* **sp. nov.** 3. Subcapitulum and anterior part of epimeral region (right palp not shown); 4. Rostrum; 5. Pyriform organ. Scale bar 25 μm (Figs. 3 & 4), 12 μm (Fig. 5).

Ventral region (Figs. 2–3). Subcapitular mentum wider than long. Hypostomal seta *a* short, slightly curved, directed medially, setae *m* and *h* long, straight, directed anteriorly, seta *m* slightly longer than *h*, all finely barbed. Epimeral surface with many muscle sigillae, epimeral setal formula 3-1-3-3, epimeral seta *1a* (46–54) very long, reaching over the insertion of hypostomal seta *h*, rigid, distinctly barbed bilaterally; setae *1b*, *1c* and *3c* relatively long, finely barbed, *1b* about 1.5 times as long as setae *1c* and *3c*, rest of epimeral setae short, fine, smooth. Pedotectum I *pdI* large, bearing seta *1c*, pedotectum II *pdII* much smaller, bearing seta *3c*, discidium *dis* clearly visible, bearing seta *4c*. Apodemata *apoII* and *apo.sj* discernible, but short. Custodium *cus* long, sharply pointed. Fine wrinkles present posterior to discidium. Genital plates smaller than anal plates. Anogenital region with four pairs of genital, one pair of aggenital, two pairs of anal and two pairs of adanal setae; all short, thin and smooth. Adanal lyrifissure *iad* situated obliquely at level posterior to anal seta an_2.

Legs (Figs. 6–7). All legs tridactylous, medial claw shorter and thicker than lateral ones. Large porose areas *ap* present on all femora, smaller porose areas present on trochanters III and IV. Tibia I with very large dorsodistal projection. Setae on ventral side of tarsi robustly barbed. On tarsus I solenidion ω_2 very long, approximately 3 times as long as solenidion ω_1, famulus ε short, blunt-ended, situated anterior to solenidion ω_2. On tibia I solenidion φ_2 thick, extremely long, about 3.5 times as long as solenidion φ_1 situated on the projection. Leg IV much enlarged, adapted for jumping, three setae (*l′* on genu; *ft″* and *tc″* on tarsus) enlarged to form thick, barbed spines, trochanter with large and pointed dorsal process, directed distally. Chaetotaxy: Leg I (including famulus) 5-2-4-20; Leg II 5-2-4-16; Leg III 1-3-1-3-15; Leg IV 0-2-2-3-12. Solenidiotaxy: Leg I 1-2-2; Leg II 1-1-2; Leg III 1-1-0; Leg IV 0-1-0.



Figures 6–7: *Zetomotrichus persicus* **sp. nov.** 6. Leg I (left); 7. Leg IV (left). Scale bar 25 μm.

Etymology

The specific name "*persicus*" refers to the type locality, Persia, the old name of Iran.

Remarks

Zetomotrichus persicus **sp. nov.** is easily distinguishable from other known species of *Zetomotrichus* by the form of the rostrum (presence of four dentations in medial part of rostrum). Most of the known species of *Zetomotrichus* have pyriform organ with one tube. Among them, only *Zetomotrichus lienhardi* has two tubes as in the present new species. However, the tubes of the pyriform organ in the Indonesian species are situated anteriorly, while the tubes of the pyriform organ in the new species are situated anterolaterally. Moreover, *Z. lienhardi* differs from *Z. persicus* **sp. nov.** in having sensilla with bilaterally short and dense barbs, longer interlamellar and lamellar setae, position of notogastral seta *lm* far anterior to seta *lp*, presence of adanal seta ad_3 and larger body length (345–390).

Key to the known species of *Zetomotrichus* of the world (adult)

1. Pyriform organ with two tubes……..……...…… 2
- Pyriform organ with one tube ……..... 3
2. Median part of rostrum without teeth; adanal seta ad_3 present …….. *Z. lienhardi*
- Median part of rostrum dentate, with four teeth; adanal seta ad_3 absent……...
……. *Z. persicus* **sp. nov.**
3. Rostrum dentate throughout, with five pairs of equal teeth ……..…..……*Z. linearis*
- Rostrum medially rounded, with or without lateral teeth ……..…4
4. Median part of rostral margin with lateral teeth; seta c_2 not pennate ……. *Z. bidentata*
- Median part of rostral margin without lateral teeth; seta c_2 pennate ……... *Z. lacrimans*

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گونهٔ جدیدی از خانوادهٔ Zetomotrichidae (Acari: Oribatida) از ایران

چکیده

گونهٔ جدیدی از کنه‌های اریباتید خانوادهٔ Zetomotrichidae با نام *Zetomotrichus persicus* از ایران توصیف می‌شود. این گونهٔ جدید با داشتن دندانه در قسمت جلویی- میانی خرطوم، سنسیلوس دراز و نخ‌وش با داشتن ۱۳ مژک به نسبت بلند در سمت خارج و چهار عدد در سمت داخل، موی نوتوگاستری پهن و پروش c_2، اندام گلابی‌شکل با داشتن دو مجرا در قسمت جلویی- کناری و نداشتن موی کنار مخرجی ad_3 مشخص می‌شود. کلید شناسایی گونه‌های جنس *Zetomotrichus* ارایه شده است.

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