

Article

Additional description of *Oribella fujikawae* Mahunka (Acari, Oribatida) collected from Iran, with a key to world *Oribella* species

Mansoureh Ahaniazad^{1*}, Mohammad Bagheri¹ and Mohammad Ali Akrami²

1. Department of Plant Protection, Faculty of Agriculture, University of Maragheh, Maragheh, Iran; E-mails: man.ahaniazad@yahoo.com, mbagheri20022002@yahoo.com

2. Department of Plant Protection, College of Agriculture, Shiraz University, Shiraz, Iran; E-mail: akrami@shirazu.ac.ir

* Corresponding author

Abstract

An additional description of *Oribella fujikawae* Mahunka, 1982 is provided based on specimens collected from the northwest of Iran. An identification key to the known species of the genus *Oribella* is given.

Key words: Mite; new record; *Oribella*; redescription; Sarcoptiformes; taxonomy.

Introduction

Until today, 380 species belonging to 191 genera and 86 families of oribatid mites were recorded from Iran (Akrami 2015). Recently, in the course of a faunistic survey of oribatid mites of Maragheh, East Azerbaijan Province, northwest Iran, the species *Oribella fujikawae* Mahunka, 1982 was collected. It is the first record of *Oribella* from Iran. The genus *Oribella* was erected by Berlese (1908) with the type species *Notaspis pectinata* Michael, 1885 and currently includes six species. Members of this genus are characterized by 1) smooth body surface; 2) well-developed lamellar costulae; 3) 10 pairs of notogastral setae; 4) ventral plate without neotrichy; and 5) trochanter IV with projection. This genus belongs to the family Thyrisomidae, according to Weigmann (2006), and Norton and Behan-Pelletier (2009). The family Thyrisomidae was instituted by Grandjean in 1954. Later, Kunst (1971) split up this taxon into three families (Banksinomidae, Oribellidae and Pantelozetidae). Subías (2004; online version 2016) adheres to Kunst's division by retaining of the families Thyrisomidae and Oribellidae as two separate families, but Weigmann (2006), and Norton and Behan-Pelletier (2009) accepted the original classification of Grandjean. Mahunka and Mahunka-Papp (2010) supported Grandjean's classification and suggested the genus *Infernobates* Karppinen and Poltavskaja, 1990 as a synonym of *Oribella* Berlese, 1908. The goal of the present work is to give an additional description and illustrate the morphology of *Oribella fujikawae*, a species until now known only from Greece (Subías, 2004; online version 2016), and to present an identification key to all known species of the genus. Prior to this study, there was only one record for this family from Iran: *Banksinoma exobothridialis* Bayartogtokh, 1997 (Akrami 2015).

Materials and methods

Mites were collected from soil and litter samples in 2015, extracted using a Berlese funnel apparatus and stored in 75% ethanol. Specimens were cleared in lactophenol and mounted in Hoyer's medium on glass microscope slides for identification. The slides were placed in an oven at 45 °C for 20–40 days. Specimens were examined using a phase-contrast Olympus BX41 microscope. All measurements are given in micrometers (μm).

The body length was measured from the tip of the rostrum to the posterior edge of the ventral plate. Notogastral width refers to the maximum width in dorsal aspect. Formulas for leg setation are given in parentheses according to the sequence trochanter-femur-genu-tibia-tarsus (femulus included). Formulas for leg solenidia are given in square brackets according to the sequence genu-tibia-tarsus. Terminology used in this paper mostly follows that summarized by Grandjean (1965), and Norton and Behan-Pelletier (2009).

Oribella fujikawae Mahunka, 1982 (Figs. 1–13)

Additional description

Measurements – Body length: 357–378; width of notogaster: 196–220.

Prodorsum (Figs. 1, 3, 5, 6, 8) – Rostrum rounded. Costulae distinctly visible, longer than half of prodorsum length, basal part wide and narrowed at insertional points of lamellar setae. Rostral setae (*ro*: 48–52) setiform, barbed, inserted laterally on small tubercles (Fig. 5). Lamellar setae (*le*: 33–36) setiform, thinner than rostral setae, barbed (Fig. 8). Interlamellar setae (*in*: 69–73) long, barbed (Fig. 6). Exobothridial setae (*ex*: 46–49) setiform, barbed. Interbothridial region with one pair of small muscle sigillae (located between interlamellar setae). Bothridial setae (*ss*: 98–104) spindle-form with narrowed apex, barbed bilaterally (Fig. 3). Lateral surface of prodorsum with clear sculpture (presence of longitudinal striation and reticulation).

Notogaster (Figs. 1, 4) – Surface of notogaster without ornamentation; dorsosejugal furrow arched; 10 pairs of notogastral setae setiform, completely barbed. Setal measurements as follows: *c*₂ 53–56, *lm* 66–76 (Fig. 4), *la* 72–80, *lp* 68–77, *h*₁ 43–45, *h*₂ 69–72, *h*₃ 71–75, *p*₁ 37–39, *p*₂ 51–57, *p*₃ 48–52. Lyrifissures *ia*, *im* and *ip* distinct.

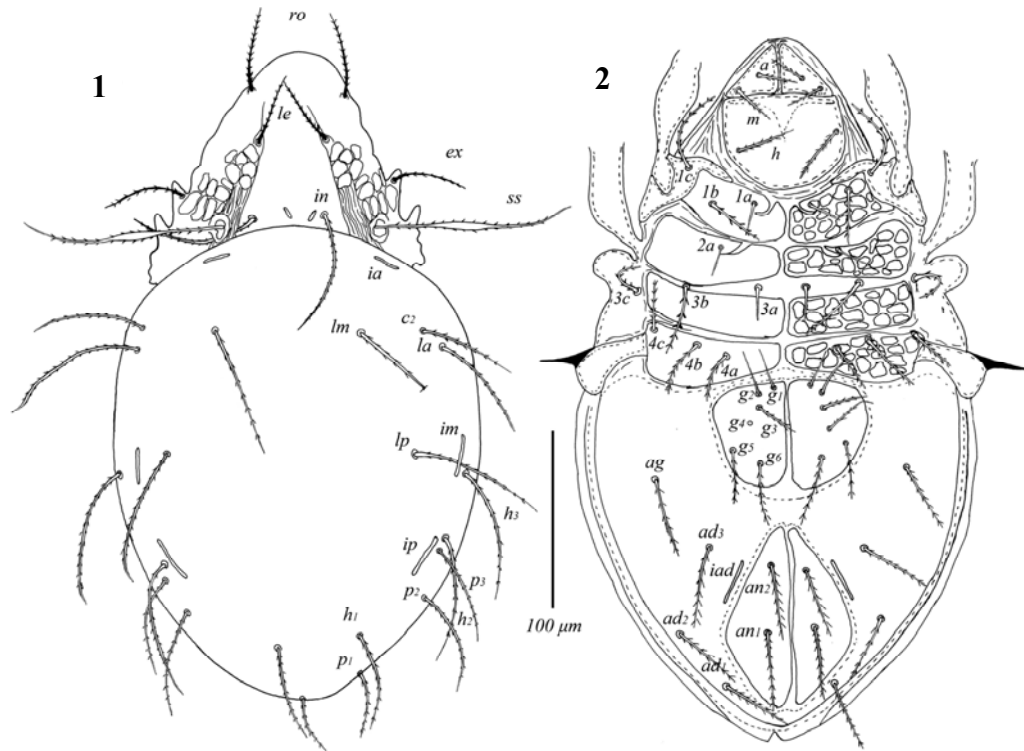
Gnathosoma (Figs. 2, 9) – Subcapitulum longer than wide: 79 × 64. Subcapitular setae setiform and distinctly barbed; *a* 21–24, *m* 19–22, *h* 30–33. Palps (length 60) with setation 0-2-1-3-9(+ ω). Solenidion thickened, blunt, pressed to the palptarsus in medio-basal part of the segment (Fig. 9). Chelicerae with two setiform and barbed setae; *cha* (27–30) longer than *chb* (19–22).

Epimeral region (Figs. 2, 7) – Epimeral plates foveolate; apodemes I-IV and sejugal apodeme distinct. Sternal apodeme weak, not reaching the insertion of genital aperture. Apodemes II and sejugal apodemes with thorn-like structures (Fig. 2). Epimeral setal formula: 3-1-3-3; epimeral setae *1a*, *2a* and *3a* setiform and smooth; other epimeral setae setiform and ciliated. Setal measurements as follows: *1a* 17–18, *1b* 25–27, *1c* 46–49, *2a* 13–14, *3a* 17–19, *3b* 29–31, *3c* 24–25, *4a* 20 (Fig. 7), *4b* 32–36, *4c* 32.

Anogenital region (Fig. 2) – Six pairs of genital (*g*₁–*g*₆), one pair of aggenital (*ag*), two pairs of anal (*an*₁, *an*₂) and three pairs of adanal (*ad*₁–*ad*₃) setae present. Setae *g*₁ and *g*₂ smooth, *g*₃–*g*₆ ciliate; aggenital, anal and adanal setae setiform, extended and

barbed. Lyrifissures *iad* distinct, located parallel to anal aperture. Setal measurements as follows: g_1-g_6 19–29, ag_1 38–40, ad_1-ad_3 37–40; ad_1 in postanal position.

Legs (Figs. 10–13) – All legs monodactylous, claw thick and smooth; trochanter IV with projection. Formulae of leg setation and solenidia: I (1-5-3-4-18) [1-2-2], II (1-5-3-4-15) [1-1-2], III (2-3-1-3-15) [1-1-0], IV (1-2-2-3-12) [0-1-0].



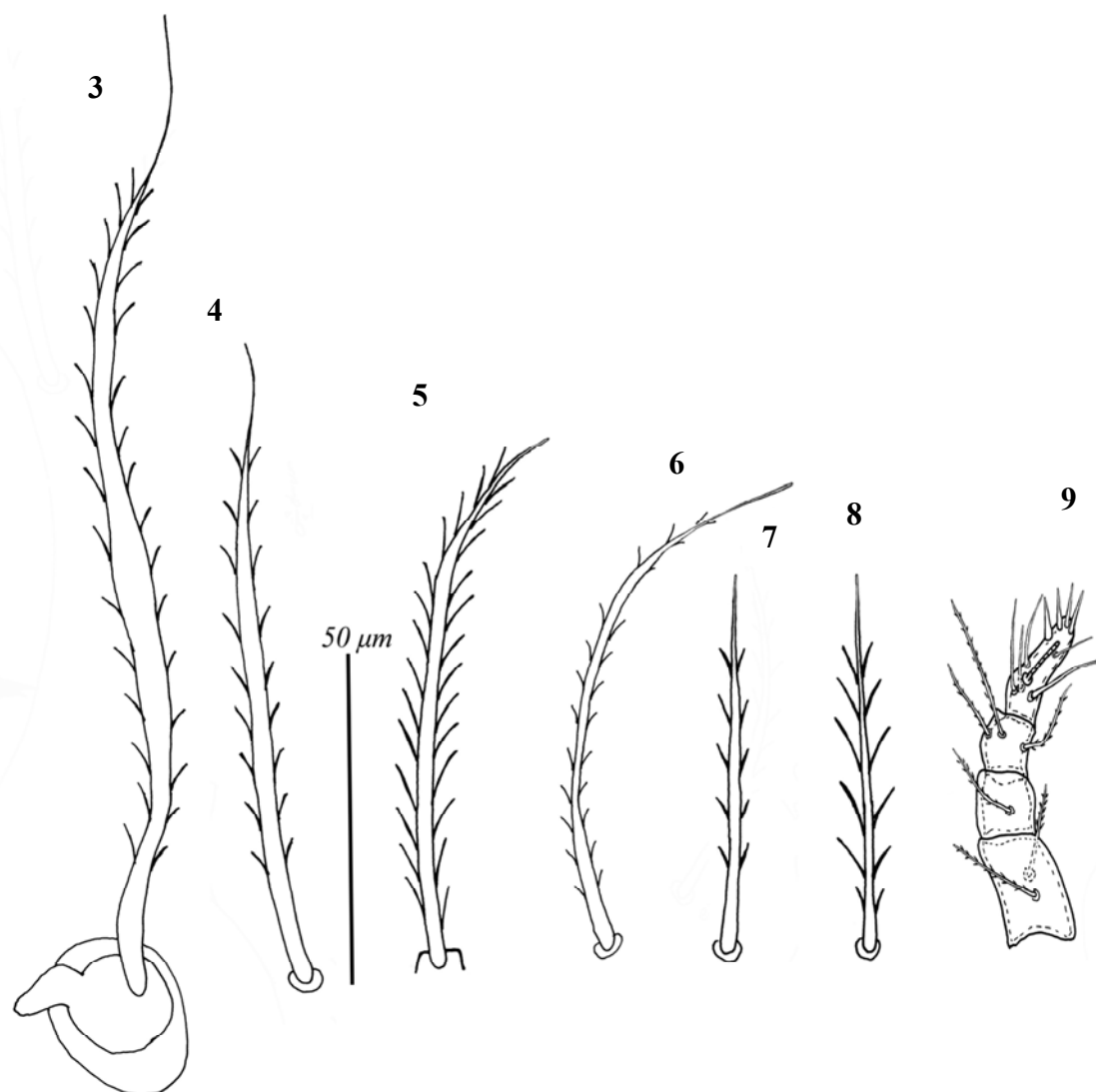
Figures 1–2. *Oribella fujikawae* (female) – 1. Dorsal view of body; 2. Ventral view of body.

Material examined

Five females were collected from the soil of golden delicious apple orchards (*Malus domestica*; Rosaceae), Taze-kand Village, Maragheh, East Azerbaijan Province, Iran; 20 July 2015, by Mansoureh Ahaniazad. Three specimens are deposited in the Acarological Collection, Department of Plant Protection, Faculty of Agriculture, University of Maragheh, Maragheh, Iran; two specimens are deposited in the Acarological Collection, Department of Plant Protection, Faculty of Agriculture, University of Shiraz, Shiraz, Iran.

Remarks

Mahunka (1982) described *Oribella fujikawae* as the second known species of *Oribella* in the family Thyrisomidae from Greece. Later, Kunst (1971) transferred this genus to the family Oribellidae. Subías (2004; online version 2016) followed Kunst, but Weigmann (2006) inserted it again in the family Thyrisomidae. Mahunka's descriptions for this species provide only figures for dorsal and ventral sides of the body; figures for the legs and palps are lacking. Furthermore, the description, especially for the ventral side, is without details. It is therefore warranted to provide an additional description of this species. The following key can be used to identify all known species of *Oribella*.

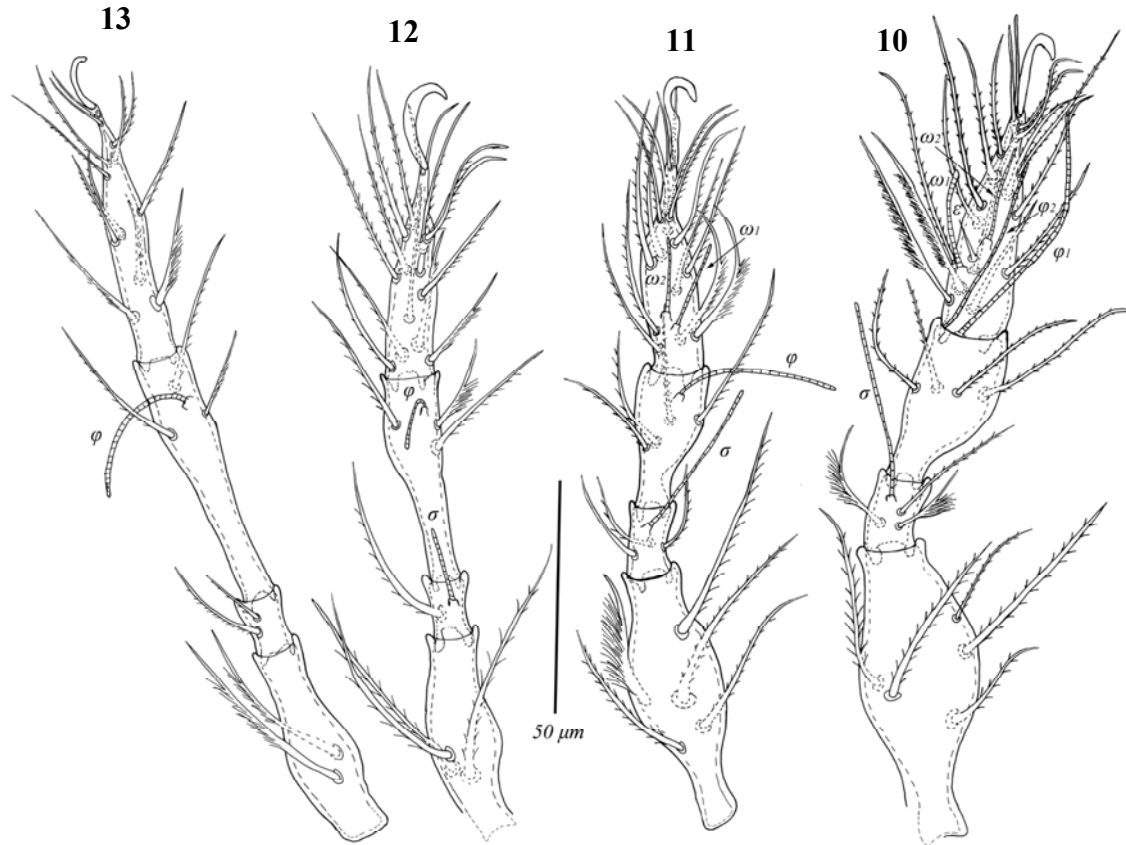


Figures 3–9. *Oribella fujikawae* (female) – 3. Sensillus; 4. Seta *lm*; 5. Seta *ro*; 6. Seta *in*; 7. Seta *4a*; 8. Seta *le*; 9. Palp.

Key to the *Oribella* species of the world

1. Sensillus setiform 2
 - Sensillus fusiform or lanceolate 4
2. Notogastral setae smooth *O. canariensis* Pérez-Íñigo, 1986
 - Notogastral setae ciliate 3
3. Large body dimensions (> 450 μm), rostral and lamellar setae smooth; lamellar setae developed (about 72 μm) *O. adelaidae* Golosova and Karppinen, 1985
 - Small body dimensions (< 400 μm), rostral and lamellar setae ciliate; lamellar setae short (about 25 μm) *O. citelli* (Karppinen and Poltavskaja, 1990)
4. Sensillus fusiform; rostrum pointed *O. pectinata* (Michael, 1885)
 - Sensillus lanceolate; rostrum rounded 5
5. Sensillus in distal part narrower (spindle-form), body length 367 μm , median part of costulae thickened and lamellar setae arising on thickened part *O. fujikawae* Mahunka, 1982

- Sensillus indistal part wider, body length 330 μm , costulae narrow and not exceeding from the insertion point of the lamellar setae
 *O. matritensis* Arillo, Bordel and Subías, 1988



Figures 10–13. *Oribella fujikawae* (female) – 10: Leg I (right); 11: Leg II (right); 12: Leg III (left); 13: Leg IV (right).

Acknowledgements

We greatly appreciate the support for this project provided by the Research Divisions of the University of Maragheh, Maragheh, Iran.

References

- Akrami, M.A. (2015) An annotated checklist of oribatid mites (Acari: Oribatida) of Iran. *Zootaxa*, 3963(4): 451–501.
 Berlese, A. (1908) Elenco di generic e specie nuove di Acari. *Redia*, 5: 1–15.
 Grandjean, F. (1954) Essai de classification des oribates (acariens). *Bulletin de la Société Zoologique de France*, 78: 421–446.
 Grandjean, F. (1965) Complément a mon travail de 1953 sur la classification des Oribates. *Acarologia*, 7: 713–734.
 Kunst, M. (1971) Nadkohorta Pancirnini – Oribatei. In: Daniel, M. & Cerny, V. (Eds.), *Klic Zvireni CSSR IV. Academia, Praha*, pp. 531–580.


- Mahunka, S. (1982) Neue und interessante Milben aus dem Genfer Museum XXXIX. Fifth contribution to the oribatid fauna of Greece (Acari: Oribatida). *Revue Suisse de Zoologie*, 89(2): 479–515.
- Mahunka, S. & Mahunka-Papp, L. (2010) New and little known oribatid mites from the Carpathian Basin and the Balkan Peninsula (Acari: Oribatida). *Acta Zoologica Academiae Scientiarum Hungaricae*, 56(3): 211–234.
- Norton, R.A. & Behan-Pelletier, V.M. (2009) Oribatida. In: Krantz, G.W. & Walter, D.E. (Eds.), *A Manual of Acarology*. 3rd Edition. Lubbock, Texas Tech University Press, pp. 430–564.
- Subías, L.S. (2004) Listado sistemático, sinonímico y biogeográfico de los ácaros-oribátidos (Acariformes: Oribatida) del mundo (except fósiles). *Graellsia*, 60 (número extraordinario), 3–305. Online version accessed in February 2016, 593 pp.; http://escalera.bio.ucm.es/usuarios/bba/cont/docs/RO_1.pdf
- Weigmann, G. (2006) Hornmilben (Oribatida). Die Tierwelt Deutschlands. *Teil 76. Keltern, Goecke and Evers*, 520 pp.

Received: 8 June 2016

Accepted: 29 July 2016

Published: 15 October 2016

COPYRIGHT

 Ahaniazad *et al.* Persian Journal of Acarology is under free license. This open-access article is distributed under the terms of the Creative Commons-BY-NC-ND which permits unrestricted non-commercial use, distribution, and reproduction in any medium, provided the original author and source are credited.

توصیف تکمیلی گونه *Oribella fujikawae* Mahunka (Acari, Oribatida) جمع‌آوری شده از ایران همراه با کلید شناسایی گونه‌های *Oribella* جهان

منصوره آهنی‌آزاد^{۱*}، محمد باقری^۱ و محمدعلی اکرمی^۲

۱. گروه گیاهپزشکی، دانشکده کشاورزی، دانشگاه مراغه، مراغه، ایران؛ رایانامه:

mbagheri20022002@yahoo.com , man.ahaniazad@yahoo.com

۲ بخش گیاهپزشکی، دانشکده کشاورزی، دانشگاه شیراز، شیراز، ایران؛ رایانامه:

akrami@shirazu.ac.ir

* نویسنده مسئول

چکیده

توصیف تکمیلی گونه *Oribella fujikawae* Mahunka, 1982 با استناد به نمونه‌های جمع‌آوری شده از شمال غرب ایران ارائه شده است. کلید شناسایی برای گونه‌های جنس *Oribella* فراهم شده است.

واژگان کلیدی: کنه، گزارش جدید؛ *Oribella*؛ بازتوصیف؛ Sarcoptiformes؛ آرایه‌شناسی.

تاریخ دریافت: ۱۳۹۵/۳/۱۹

تاریخ پذیرش: ۱۳۹۵/۵/۸

تاریخ چاپ: ۱۳۹۵/۷/۲۴