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Article

One new *Aceria* species (Acari: Eriophyoidea) from Jolfa, Iran

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ABSTRACT
During the survey on the eriophyoid mite fauna of Jolfa county, East Azerbaijan, Iran, one new eriophyid species, *Aceria jolfae* Lotfollahi **sp. nov.** was found and described. This species was vagrant on its host plant *Artemisia fragrans* Willd. (Asteraceae) without any observed alteration and was the first record of eriophyoid mites on this host plant species.

KEYWORDS: *Artemisia*, Aceriini, Asteraceae, Eriophyidae, Eriophyinae.

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INTRODUCTION

Artemisia fragrans Willd. (Asteraceae), commonly known as Chao, is spread in Armenia, Iran, Russia, and neighboring areas. It is perennial and grows wild in the Azerbaijan, Mazandaran, Qazvin, and Tehran provinces of Iran (Rechinger 1986). It has a characteristic scent or taste and antibacterial properties (Shafaghat *et al*. 2009) which made it widely applied in folk medicine. In addition, this plant's sections, extracts and essential oils are used as spices for flavoring various food products, in the preparation of pharmaceuticals and cosmetics, and in food preservation (Perazzo *et al*. 2003).

Up to now, 118 *Aceria* species were found in Iran, 25 *Aceria* were found on Asteraceae plants and four of them were reported from *Artemisia* spp. (Kamali 2011; Honarmand *et al*. 2020) as follows:
– *A. artemisiae* (Canestrini, 1891) from *Ar. vulgaris* L. in North Khorasan province;
– *A. gallartae* Honarmand, Sadeghi & de Lillo, 2020 from *Ar. sieberi* Besser. in South Khorasan province;
- *A. khaniensis* Honarmand, Sadeghi & de Lillo, 2020 from *Ar. tournefortiana* Rchb. in South Khorasan province;
– *A. alghoorii* Honarmand, Sadeghi & de Lillo, 2020 from *Ar. scoparia* Waldst. & Kitam. in South Khorasan province.

To further our study of eriophyoid mites in Iran, a survey was carried out in Jolfa county of East Azerbaijan province on summer 2023 as a result of which a new species was discovered on *Artemisia* plants and described.

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MATERIAL AND METHODS

In order to study the eriophyoid fauna of Jolfa county (East Azerbaijan, Iran) a sampling was done on *Ar. fragrans* in Aras riverside of Jolfa city.

Eriophyoid mites were recovered from the plant material by means of a washing method developed by Monfreda *et al.* (2007) with some modifications: plant material was cut into smaller pieces and submerged in a bucket filled with a washing solution. The size of the plant pieces should be such that they can be stirred inside the solution. The solution was prepared with 99% tap water plus 1% household detergent. After 10–15 minutes, the plant pieces were stirred in the suspension manually using a rod, then left for another 10–15 minutes and finally stirred again. Then, the plant material was removed from the suspension and mites were collected by pouring the suspension onto two sieves: one kitchen sieve on top and stainless lab steel sieve no. 400 (38 μm) on bottom. Small plant pieces remained in the kitchen sieve, while mites and any small insects passed through the kitchen sieve, but were trapped in the lab sieve, and the washing solution came out. More tap water was passed from the lab sieve for washing remaining detergent. Finally, the lab sieve was held obliquely and with the aid of a Piset full of Oudeman's solution (or any other solution suitable for preserving mites), the sediments (including mites) inside the lab sieve were transferred into a container and kept for later use.

The collected specimens were slide mounted according to Baker *et al.* (1996) with some modifications: specimens were placed in a modified Hoyer's medium (50 ml distilled water, 30 g Arabic gum, 200 g chloral hydrate, 20 ml glycerol, 1 g Potassium iodine, 2 g Iodine) without previous clarification. Slide mounted specimens were kept at about 90 ℃ for a few minutes in an oven in order to promote mite clarification. Then, slides were dried for about four weeks at about 47 ℃. The terminology and the setal notation in the morphological description of the mite mainly follow Lindquist (1996).

All morphological measurements were taken using an Olympus BX53 microscope, through a phase contrast 100× oil immersion objective at 1,000 magnification, according to Amrine and Manson (1996) as modified by de Lillo *et al*. (2010). Slight clarifications should be added as follows: dorsal semiannuli were counted from the first semiannulus behind the rear margin of the prodorsal shield; ventral semiannuli were counted from first complete annulus after coxae II; coxigenital semiannuli were counted medially from the coxal region to the anterior margin of the external genitalia and were not included in the ventral semiannuli count. Measurements and means are rounded off to the nearest integer when required, except for characters with very short length. Measurements refer to the length of the morphological trait unless otherwise specified and are in micrometers (μm). In the female description, the holotype measurements are followed by range values of the studied population (*i.e.* holotype and paratypes) set between parentheses; only the range values are given for males and immature stages. The mean values of the paratypes are reported in a few cases; when measurements of the holotype could not be taken, due to the slide mounting position of the specimens, these are marked by an asterisk (*).

Line drawings were hand-drawn through a *camera lucida* according to de Lillo *et al*. (2010). Abbreviations labelling schematic drawings in figures mainly follow Amrine *et al.* (2003). Plates were edited with Adobe Photoshop® CC 2017.

The genus classification follows Amrine *et al.* (2003) and comparisons were also made with new genera described since that publication. Host plant names and their synonymies are in accordance with "*The World Flora Online*" (2023).

Type materials are deposited at the Acarology Laboratory, Department of Plant Protection, Faculty of Agriculture, Azarbaijan Shahid Madani University, Tabriz (Iran) except one paratype which is deposited in the Acarological Collection, Jalal Afshar Zoological Museum (JAZM), Faculty of Agriculture, University of Tehran, Karaj, Iran.

RESULTS

Family Eriophyidae Nalepa
Subfamily Eriophyinae Nalepa
Tribe Aceriini Amrine & Stasny
Genus *Aceria* Keifer

Aceria jolfae Lotfollahi sp. nov.

http://zoobank.org/urn:lsid:zoobank.org:act:0ADEA25C-7C68-4EFB-886C-40E4FCDF5727

Description

Female (Fig. 1; n = 6) – **Body** vermiform, 148 (136–160, excluding gnathosoma), 45* (43–46) thick, 44 (40–45) wide. **Gnathosoma** projecting obliquely downwards, cheliceral stylets 20 (18–21), palp 18 (18–22), palp coxal setae *ep* 3* (2–3), dorsal palp genual setae *d* 5 (4–5), unbranched. Suboral plate rounded anteriorly, ornamented with some dots and dashes. **Prodorsal shield** 26 (24–26) including frontal lobe, 30 (28–32) wide, sub-triangular; with a short blunt frontal lobe, 4 (3–4) over gnathosomal base. Shield pattern distinct, consisting of complete median line, but not reaching the frontal lobe, complete admedian lines, complete inner submedian lines, short outer submedian lines in shape of parenthesis on the anterior half of prodorsal shield and many distinct short lines on shield lateral sides. Several small granules and microtubercles between lateral side of prodorsal shield and coxal region in lateral view. Median, admedian and inner submedian lines distinctly faint respective to other ornamentations of the shield. Tubercles of scapular setae *sc* on rear shield margin, 18 (17–19) apart, setae *sc* 40 (40–43), directed posterior. **Legs** with all usual segments and setae. Leg I 26 (26–27), trochanter 3 (3–5), femur 8 (no variation), genu 4 (3–4), tibia 5 (5–6), tarsus 6 (no variation), tarsal solenidion *ω* 10 (9–10), lightly curved down, distally enlarged and tapered, empodium simple, 5 (no variation), 6-rayed; femoral setae *bv* 8 (8–10), genual setae *l″* 24 (21–27), paraxial tibial setae *l′* 6 (6–7), located at basal third of tibia, paraxial fastigial tarsal setae *ft*' 14 (12–14), antaxial fastigial tarsal setae *ft″* 24 (23–24), paraxial unguinal tarsal setae *u′* 4 (no variation). Leg II 21 (21–23), trochanter 2 (2–3), femur 7 (7–8), genu 4 (no variation), tibia 4 (no variation), tarsus 5 (no variation), tarsal solenidion *ω* 11 (10–12), lightly curved down, distally tapered, empodium simple, 5 (5–6), 6-rayed; femoral setae *bv* 8 (7–11), genual setae *l″* 9 (9–10), paraxial fastigial tarsal setae *ft′* 5 (no variation), antaxial fastigial tarsal setae *ft″* 27 (24–28), paraxial unguinal tarsal setae *u′* 3 (3–4). **Coxisternal region:** Prosternal apodeme 5 (no variation), entire, anterior setae on coxisternum I *1b* 8 (8–9), 6 (6–7) apart; proximal setae on coxisternum I *1a* 30 (29–32), 6 (5–6) apart; proximal setae on coxisternum II *2a* 45 (45–50), 17 (15–19) apart; 6 (5–6) microtuberculate semiannuli between coxae and genital coverflap plus 3 (2–3) transversal rows of lined granules at the base of the coverflap. Coxae with dense sparse and lines dashes. **External genitalia** 11 (10–11), 20 (18–20) wide, coverflap with one rank of 11 (11–16) longitudinal striae; setae *3a* 23 (21–26), 13 (12–14) apart. **Internal genitalia:** spermathecae ovoid, oriented posterolaterad; spermathecal tubes relatively short; transverse genital apodeme trapezoidal, distally folded. **Opisthosoma** dorsally evenly rounded, with 69 (63–71) dorsal semiannuli, 63 (62–66) ventral semiannuli. **Microtubercles** circular, on posterior part of dorsal and ventral semiannuli; 6 (6–7) dorsal semiannuli smooth, starting from dorsal semiannuli 61 (55–61) up to 67 (61–68); spiny on the rear margin of the last 2 (2–3) dorsal semiannuli and elongated and linear on last 5 (5–6) ventral semiannuli. Setae *c2* 22 (21–24) on ventral semiannulus 11 (11–12), setae *d* 60 (56–66) on ventral semiannulus 23 (23–24); setae *e* 19 (18–21) on ventral semiannulus 38 (38–39); setae *f* 20 (19–21) on ventral semiannulus 58 (57–61); 5 (no variation) annuli posterior to setae *f*. Setae *h2* 95 (95–104) apically very fine, *h1* 3 (3–5).

Male (Fig. 1GM; n = 1). Similar in shape and prodorsal shield arrangement to female. Body smaller than female, 105, 39 wide; palp genual setae *d* 4; prodorsal shield 22, 27 wide; setae *sc* 35, 17 apart. Opisthosoma with 55 dorsal semiannuli and 56 ventral semiannuli; 6 semiannuli between

coxae and genitalia, with microtubercles similar to that of female. Setae: *1b* 8, 7 apart; *1a* 27, 5 apart; *2a* 42, 14 apart; *c2* 20, on ventral semiannulus 11; *d* 48, on ventral semiannulus 21; *e* 17, on ventral semiannulus 33; *f* 17, on ventral semiannulus 51; *h1* 3, *h2* 77. Male genitalia 15 wide, setae *3a* 18, 11 apart. Legs I and II empodium 5-rayed.

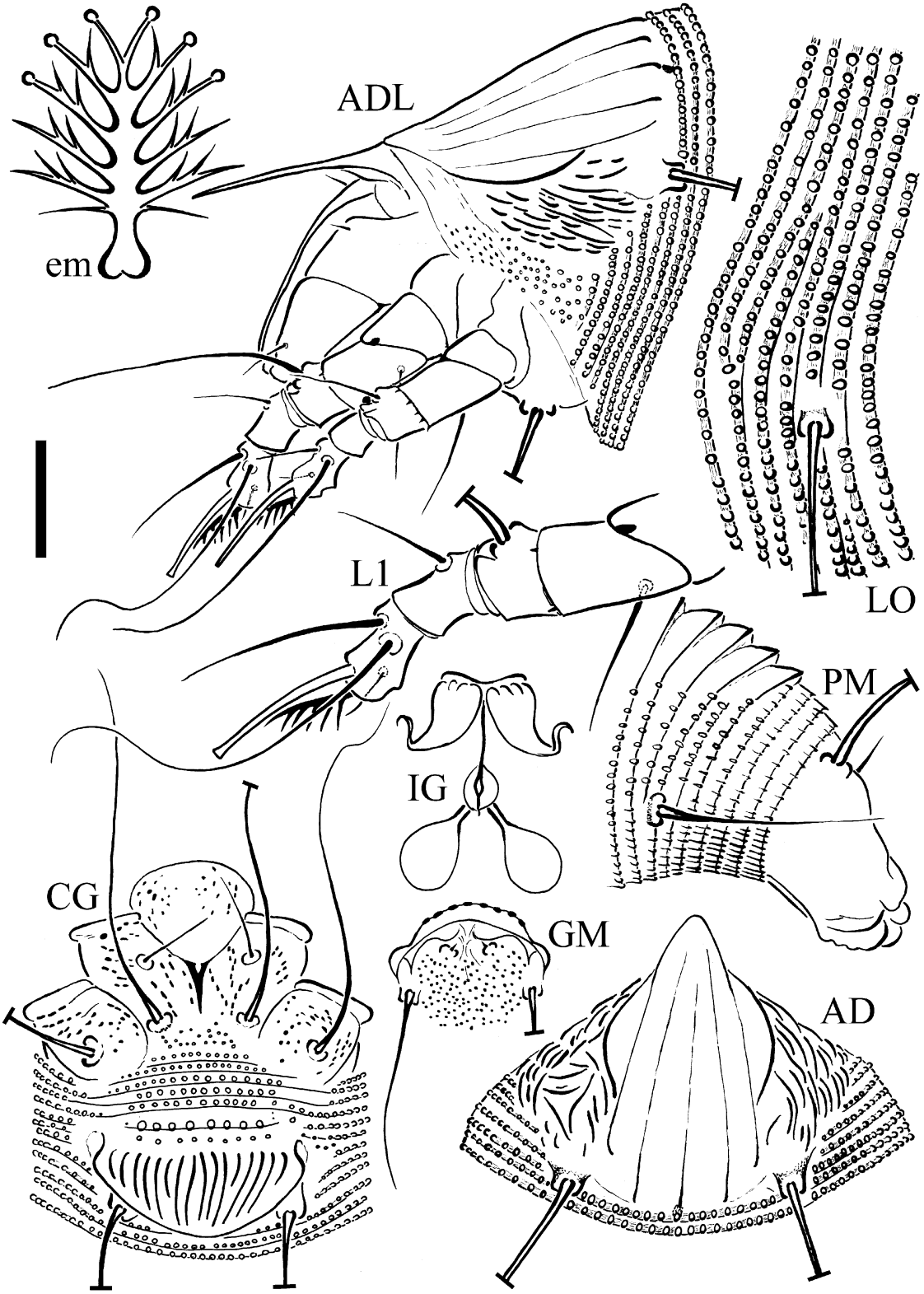

Figure 1. Schematic drawings of *Aceria jolfae* Lotfollahi **sp. nov.** – **ADL.** Dorso-lateral view of female anterior body region; **AL.** Lateral view of anterior body region; **CG.** Female coxigenital region; **em.** Empodium; **GM.** Male genital region; **IG.** Internal female genitalia; **LO.** Lateral view of annuli; **L1.** Leg I; **PM.** Lateral view of posterior opisthosoma. **Scale bar:** 10 µm for ADL, AL, CG, GM, IG, PM; 7.5 µm for LO, L1; 2.5 µm for em.

Type host plant

Artemisia fragrans Willd. (Asteraceae), Chao; Dermane in Persian.

Type locality

Aras riverside, Jolfa city, East Azerbaijan province, Iran (38° 56' 40.56" N, 45° 38' 31.10" E), 700 m above sea level, coll. P. Lotfollahi, 16 August 2023.

Type material

Holotype female along with one paratype female mounted on a microscope slide (AF-I-EA-JA-23-L-1), two paratype females mounted on a microscope slide (AF-I-EA-JA-23-L-2), two paratype females mounted singly on two microscope slides (AF-I-EA-JA-23-L-3–4) and one paratype male mounted singly on a microscope slides (AF-I-EA-JA-23-L-5).

Other materials

Mites preserved in a vial (AF-I-EA-JA-23-L) of Oudemans' fluid (Walter and Krantz, 2009) as extracted from the same sample as the type specimens.

Relation to the host plant

Vagrant; no symptoms were observed.

Etymology

The specific epithet, *jolfae* refers to the type locality, Jolfa city.

Differential diagnosis

The new species was compared with the *Aceria* species associated to *Artemisia* plants worldwide and *Aceria* species associated to Asteraceae in Iran. Similarities were found between the new species and two species:

***Aceria marginemvolvens* (Corti, 1910) –** This species originally was drawn and described by Corti (1910) on *Artemisia vulgaris* L. in Valtellina, Lombardia, Italy. Corti drew this species with distinct complete median, admedian and inner submedian lines, short outer submedian lines and some short lateral lines. The new species has the same ornamentation but faint median, admedian and inner submedian lines. The new species differs from Corti's description in empodium rays number (5 in Corti's description *versus* 6 in the new species) and setae *sc* length (50 in Corti's description *versus* 40–43 in the new species). This species was described and drawn by Petanović (1985), too. Petanović didn’t draw the median line for this species, while the new species has this line. In addition, the new species differs from Petanović's description in dorsal semiannuli number (73 in Petanović's description *versus* 63–71 in the new species), empodium rays number 5 in Petanović's description *versus* 6 in the new species) and setae *sc* length (52 in Petanović's description *versus* 40–43 in the new species).

***Aceria onopordi* Lotfollahi & Hemmatzadeh, 2023 –** This species was described on *Onopordum acanthium* L. in Alikahriz village rangelands, Meshginshahr, Ardabil province, Iran (Hemmatzadeh-Khorshidabadi *et al.* 2023). *Aceria onopordi* has complete median and admedian lines, faint short inner submedian lines extended on shield anterior half, complete sinusoidal outer submedian lines and many distinct dashes on shield lateral parts. Median and admedian lines of *A. onopordi* are faint on the anterior 2/3 of shield, while median and admedian lines of the new species have similar length, but they are entirely faint. The new species has complete inner submedian lines and short lines on shield lateral parts. Moreover, the two species are different in the number of dorsal (63–71 in the new species *versus* 74–80 in *A. onopordi*) and ventral (62–66 in the new species *versus* 74–78 in *A. onopordi*) semiannuli and length of setae *sc* (40–43 in the new species *versus* 57–62 in

A. onopordi), *c2* (21–24 in the new species *versus* 39–47 in *A. onopordi*) and *e* (18–21 in the new species *versus* 30–32 in *A. onopordi*).

Remarks

This is the first record of eriophyoid mites on the host plant *Artemisia fragrans*.

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گونهٔ جدید *Aceria* (Acari: Eriophyoidea) از جلفا، ایران

پریسا لطف‌الهی* و سهیلا مسعودی‌راد

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چکیده

طی بررسی فون کنه‌های اریوفیوئید در شهرستان جلفا، آذربایجان شرقی، ایران، یک گونهٔ جدید اریوفید به نام *Aceria jolfae* Lotfollahi **sp. nov.** پیدا و توصیف شد. این گونه روی گیاه میزبان خود *Artemisia fragrans* Wild (Asteraceae) بدون هیچ گونه تغییر مشاهده شده آزاد بوده و نخستین کنه اریوفیوئید ثبت شده روی این گونه گیاهی میزبان بود.

واژگان کلیدی: *Artemisia*، قبیلهٔ Aceriini، خانوادهٔ Asteraceae، خانوادهٔ Eriophyidae، زیرخانوادهٔ Eriophyinae.

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