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Two new species of eriophyid mites (Trombidiformes: Eriophyoidea) associated with *Clematis orientalis* (Ranunculaceae) from East Iran

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Abstract

During the field study of eriophyoid mites from *Clematis orientalis* L. (Ranunculaceae) in semi-arid and arid environment in East Iran (Birjand, South Khorasan, Iran, from 2016 to 2017), two new eriophyid mite species (Trombidiformes: Eriophyidae) were collected. They are *Epitrimerus birjandica* **sp. nov.** and *Aculus clemachinensis* **sp. nov.**; they are illustrated and described herein. Both new species seemed to be vagrants on the green parts. The checklist of eriophyid mites associated with Ranunculaceae throughout the world was provided.

Key words: Eriophyidae, Oriental virgins bower, semi-arid and arid environments, noxious weed, survey

Introduction

The plant family Ranunculaceae (buttercup family) consists of 65 genera and 2,377 species mainly herbaceous which are widespread in the Northern hemisphere (Cossard *et al*. 2016; The plant list, 2013). The second largest genus of this flowering plant family is *Clematis* L. including approximately 370 species in the world (Wang 1999; The plant list 2013). Different plant parts of some *Clematis* species are used as traditional and therapeutic medicine (Chawla *et al*. 2012). *Clematis* plants are called 'Golak' or 'Kaf-kafak' in Persian language. *Clematis orientalis* L. is widespread in various localities in Iran (Karimi *et al*. 2018) and this perennial scrambling shrub is classified as noxious weed in the USA (Colorado, Idaho, Nevada, New Mexico and Utah) and Canada (Ontario) (https://plants.sc.egov.usda.gov/java/ accessed on 18 September, 2019).

Until now, 17 species of Eriophyoidea (Trombidiformes) have been reported on Ranunculaceae and 10 species on *Clematis* spp. throughout the world (Table. 1), whereas no eriophyoid species are known associated with *C. orientalis* (Amrine and de Lillo, unpublished data). Concerning Iranian eriophyoid fauna associated with Ranunculaceae, only *Aculops consoregalis* Lotfollahi, de Lillo & Haddad was found on *Consolida regalis* Gray (Lotfollahi *et al.* 2015).

In order to update the fragmentary knowledge on Eriophyoid-fauna in arid and semi-arid environments of Iran, a survey on the Eriophyoids of *Clematis* spp. was carried out in Birjand, South Khorasan, Iran.

TABLE 1. Eriophyid mite species associated to host plant species within the family Ranunculaceae in the world. The list is alphabetically sorted.

Type host plant species	Eriophyid mites
Clematis alpina (L.) Mill.	*Phyllocoptes atragenes* Liro, 1941
Clematis flammula L.	*Epitrimerus flammulae* Gerber, 1901
Clematis orientalis L.	*Epitrimerus birjandica* **sp. nov.**
Clematis orientalis L.	*Aculus clemasinensis* **sp. nov.**
Clematis recta L.	*Cupacarus monochetus* (Nalepa, 1924)*
Clematis recta L.	*Phyllocoptes heterogaster* (Nalepa, 1890)
Clematis recta L	*Phyllocoptes subnotatus* Nalepa, 1924
Clematis sp.	*Calepitrimerus clematisis* Song, Xue & Hong, 2008
Clematis terniflora DC.	*Phyllocoptes terniflores* Dong, Sun & Xue, 2016
Clematis terniflora DC.	*Aculops jilinensis* Dong, Sun & Xue, 2016
Clematis vitalba L.	*Aceria vitalbae* (Canestrini, 1892)
Clematis vitalba L.	*Platyphytoptus vitalbae* Farkas, 1960
Consolida regalis Gray	*Aculops consoregalis* Lotfollahi, de Lillo & Haddad, 2015
Ranunculus acris L.	*Epitrimerus ranunculi* Liro, 1941 **
Ranunculus alpestris L.	*Epitrimerus rhyncothrix* (Nalepa, 1897)
Thalictrum alpinum L.	*Phyllocoptes thalictri* Roivainen, 1950
Thalictrum dunense Dumort.***	*Cecidophyes gibsoni* (Harrison, 1930)
Thalictrum minus L.	*Phyllocoptes jaapi* Nalepa, 1918
Thalictrum sp.	*Phyllocoptes cuihuashani* Xue, Song & Hong 2009

* The genus assignment is doubtful (Amrine & Stasny 1994).
** Liro (1941) described this species without the femoral setae *bv* and it is suspected to belong to the genus *Leipothrix* (Chetverikov, 2005).
*** This name is unresolved.

Materials and methods

Plants of *C. orientalis* were sampled in the vicinity of Birjand (South Khorasan, East Iran) during the summer of 2016. Mite specimens were collected under a dissecting stereomicroscope directly from the surface of plant parts and from sediments obtained by washing plant parts according to the method developed by Monfreda *et al*. (2007). About half of recovered specimens were preserved in 70% ethanol and the remaining in Oudemans' solution (Krantz & Walter 2009). Clearing and mounting process was done by Keifer's media (Keifer 1975). Some kapok fibers were added in the mounting medium on the slide in order to avoid squashing of the mites by the cover slip. This slide preparation procedure may also allow rotations of the mite making measurements and drawings easier (de Lillo *et al*. 2010). The morphological terminology and setal notations followed Lindquist (1996). The genera were identified with the generic key of Amrine *et al.* (2003). All morphological measurements were taken using a phase contrast microscope Olympus BX50 according to Amrine and Manson (1996) as modified by de Lillo *et al*. (2010), and are given in micrometers (μm). The holotypes' measurements were followed by the range values of the paratypes in parentheses. Measurements are rounded off to the nearest integer, regarding the length of the morphological traits unless otherwise specified. Drawing tube mounted on a phase contrast microscope Olympus BX50 was used for line drawings following de Lillo *et al*. (2010). Abbreviations used in the drawings follow Amrine *et al.* (2003). The host plant, *C. orientalis*, was identified by Mohammad Reza Joharchi, botanist at the Plant Science Research Institute, Ferdowsi University of Mashhad, Iran.

The new species were compared with all *Epitrimerus* spp. and *Aculus* spp. Three paratypes of each new species are deposited at the Entomological and Zoological Section, Department of Soil, Plant and Food Sciences (DiSSPA), University of Bari Aldo Moro, Italy (UNIBA), formerly indicated as UBI by Zhang (2018). The remaining paratype specimens and the holotypes are deposited in the collection of the Acarology Laboratory, Department of Plant Protection, Faculty of Agriculture, Ferdowsi University of Mashhad, Iran (FUM).

Results

Epitrimerus birjandica sp. nov. (Fig. 1)

Description

FEMALE (n = 9). Body fusiform, 210 (170–210, including gnathosoma), 79 (65–79) wide, 60 (57–68) thick. **Gnathosoma** 21 (21–23) projecting downwards, pedipalp coxal setae *ep* 3 (3–4), dorsal pedipalp genual setae *d* 6 (no range), unbranched, palp tarsus setae *v* 1 (1–2), cheliceral stylets 20 (20–22). **Prodorsal shield** 49 (48–50), including frontal lobe, 69 (65–70) wide; frontal lobe 8 (8–10) over gnathosomal base, anteriorly rounded in dorsal view. Median, admedian and submedian lines absent and prodorsal shield pattern ornamented with several and dense short dashes. Tubercles of scapular setae *sc* 4 (3–5) ahead of the rear shield margin, 16 (16–18) apart, scapular setae *sc* 5 (5–6), convergent forward. **Leg I** 29 (28–30), femur 10 (9–10), genu 5 (4–5), tibia 6 (6–7), tarsus 5 (5–7), solenidion *ω* 6 (no range), curved down, distally simple, empodium 5 (4–5), simple, 4-rayed; femoral setae *bv* 11 (10–11), genual setae *l″* 21 (20–21), tibial setae *l′* 3 (no range), tarsal setae *ft′* 15 (15–16), setae *ft″* 21 (20–22). **Leg II** 28 (28–30), femur 9 (9–10), genu 4 (4–5), tibia 6 (5–6), tarsus 6 (6–7), solenidion *ω* 7 (6–7), curved down, distally simple, empodium 4 (no range), simple 4-rayed; femoral setae *bv* 9 (9–11), genual setae *l″* 4 (4–5), tarsal setae *ft′* 4 (4–5), setae *ft″* 21 (20–21). **Coxae I and coxae II** with dashes; setae *1b* 8 (7–9), tubercles *1b* 13 (13–14) apart, setae *1a* 41 (37–41), tubercles *1a* 10 (9–10) apart, setae *2a* 50 (48–55), tubercles *2a* 25 (25–27) apart, prosternal apodeme 5 (5–7). **Opisthosoma** dorsally arched with 52 (50–55) dorsal semiannuli, with elliptical microtubercles, dorsal longitudinal ridges narrowing to rear; 78 (74–79) ventral semiannuli, with rounded microtubercles close to rear margin; 10 (10–11) semiannuli with fine microtubercles between coxae and genital coverflap; last 4 (no range) ventral and dorsal semiannuli with elongated microtubercles. Setae *c2* 22 (22–26), on ventral semiannulus 16 (14–16); setae *d* 59 (57–69), on ventral semiannulus 31 (27–31); setae *e* 14 (14–16), on ventral semiannulus 51 (48–52); setae *f* 24 (24–26), on ventral semiannulus 74 (70–75), 4 annuli after setae *f*. setae *h2* 75 (70–85), setae *h1* 2 (no range). **Genital coverflap** 12 (11–12), 21 (21–22) wide, coverflap with 10 (9–10) longitudinal striae, setae *3a* 20 (20–22), 14 (13–14) apart; close rows of strong granulated lines at genital coverflap base.

MALE (n = 1). Body fusiform, 180 (including gnathosoma), 70 wide, 45 thick. **Gnathosoma** 20 projecting downwards, chelicerae 19, palp coxal setae *ep* 3, palp genual setae *d* 6, unbranched, palp tarsus setae *v* 1. **Prodorsal shield** 45, including frontal lobe, 60 wide, frontal lobe 8. Shield pattern similar to that of female. Tubercles of scapular setae *sc* 3 ahead of the rear shield margin, 15 apart, scapular setae *sc* 5, convergent forward. **Leg I** 25, femur 9, genu 4, tibia 6, tarsus 5, solenidion *ω* 6, curved down, distally simple, empodium 4, simple, 4-rayed; femoral setae *bv* 10, genual setae *l″* 20, tibial setae *l′* 3, tarsal setae *ft′* 14, setae *ft″* 21. **Leg II** 24, femur 9, genu 4, tibia 5, tarsus 6, solenidion *ω* 6, curved down, distally simple, empodium 4, simple, 4-rayed; femoral setae *bv* 10, genual setae *l″* 4, tarsal setae *ft′* 4, setae *ft″* 20. **Coxae** similar to those of female; setae *1b* 8, tubercles *1b* 12 apart, setae *1a* 38, tubercles *1a* 9 apart, setae *2a* 49, tubercles *2a* 22 apart, prosternal apodeme 5. **Opisthosoma** dorsally arched with 49 semiannuli; 74 ventral semiannuli; 10 semiannuli between

coxae and genital region. Setae *c2* 24 on ventral semiannulus 14, setae *d* 65 on ventral semiannulus 27; setae *e* 14 on ventral semiannulus 50; setae *f* 24 on ventral semiannulus 70, 4 annuli after setae *f*. Setae *h2* 72; setae *h1* 1; setae *3a* 19, 13 apart.

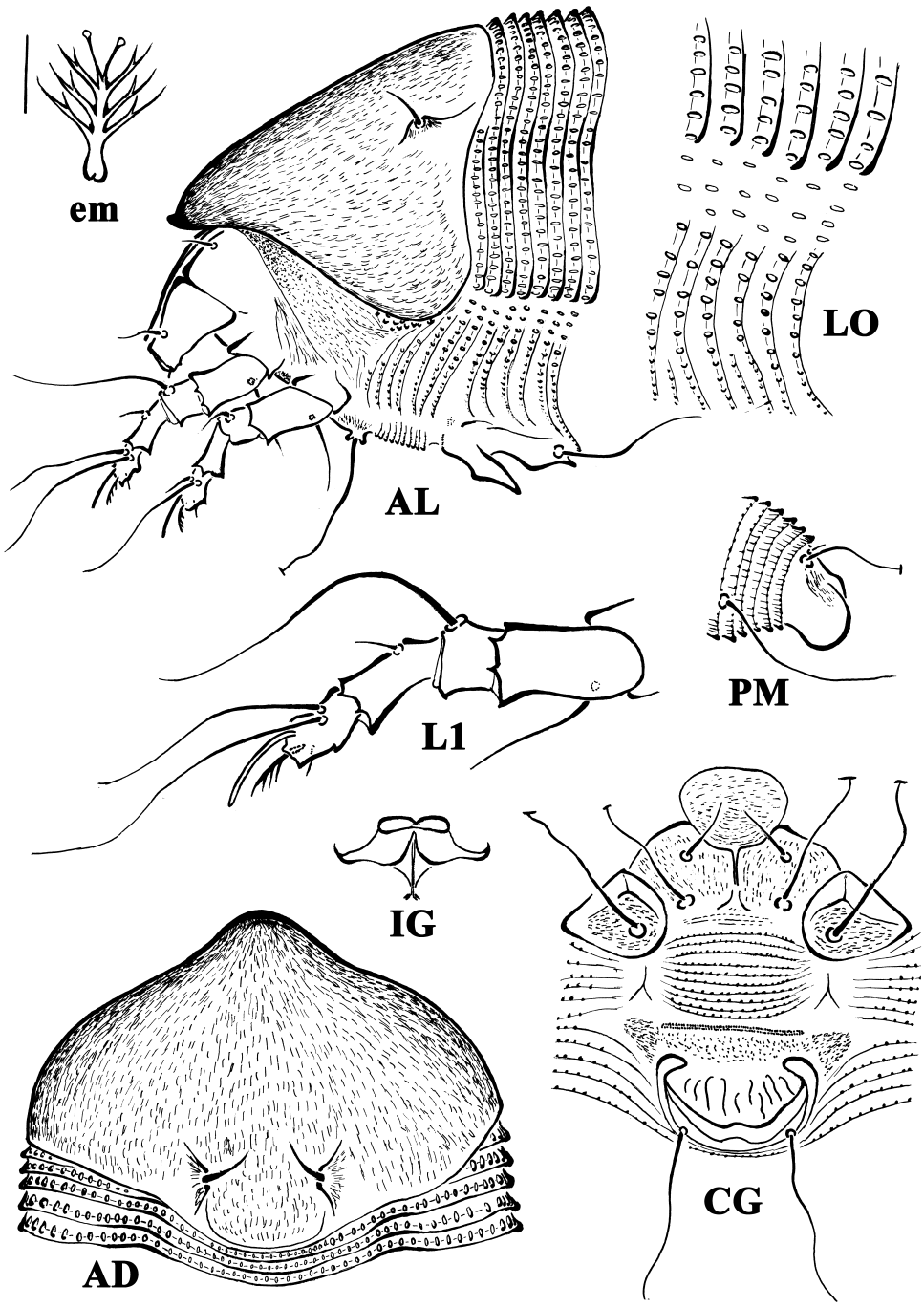

FIGURE 1. Line drawings of *Epitrimerus birjandica* **sp. nov.**: **AD**. Prodorsal shield; **AL**. Lateral view of anterior body region; **CG**. Female coxigenital region; **em**. Empodium; **IG**. Internal female genitalia; **LO**. Lateral view of annuli; **L1**. Leg I; **PM**. Lateral view of posterior opisthosoma. Scale bar: 10 µm for **AD**, **AL**, **CG**, **IG**, **PM**; 5 µm for **LO**, **L1**; 2.5 µm for **em**.

Type host plant

Clematis orientalis; Oriental virgins bower, Chinese clematis, orange peel, organe peel clematis.

Relation to the host plant

Vagrant on leaves, stems and fruits. No apparent symptom was observed.

Type locality

Kooch village, Birjand, Iran. 32°42'57.96" N, 59°26'2.929" E, 1,976 m above sea level; 12 June 2016, coll. Arash Honarmand.

Type material

Holotype: female on a microscope slide (AH95-1-1); paratypes: 10 females, 1 male mounted on separate microscope slides.

Other material

Mites preserved in 70% ethanol and in Oudemans' solution extracted from the same sample as the type specimens.

Etymology

The specific designation is derived from the type locality city name, Birjand in South Khorasan, where the mites were collected.

Diagnosis

The new species has the following discriminating characters: sub-rhomboidal prodorsal shield provided with dense short dashes, broad and robust frontal lobe, and very short scapular setae *sc*, anteriorly convergent. Coxae ornamented and empodia 4-rayed. Opisthosoma with about 50 dorsal and 75 ventral semiannuli. Coverflap striated.

Differential diagnosis

The prodorsal shield of *E. birjandica* **sp. nov.** is not provided with normal line configuration, on the contrary that of *E. flammulae* Gerber (reported on *Clematis flammula* L.), *E. ranunculi* Liro (known on *Ranunculus acris* L. and *R. repens* L.) and *E. rhyncothrix* (Nalepa) (associated to *R. alpestris* L. and *R. acris* L.) have a distinct line pattern (Nalepa 1897; Gerber 1901; Liro 1941). There are some similarities between *E. birjandica* **sp. nov.** and *E. dendranthemae* Xue, Song & Hong, which was reported from *Dendranthema indicum* (L.) Des Moul. (*Chrysanthemum indicum* L. is its junior synonym) (Compositae) (Xue *et al.* 2007) and, later, on *Lonicera maackii* (Rupr.) Maxim. (Compositae) (Xue *et al.* 2013). The two species shows the same number of the empodial rays (4-rayed), median line and admedian lines of prodorsal shield are absent, have similar scapular setae *sc* length and body length. The new species can be differentiated from *E. dendranthemae* by prodorsal shield design (several short dashes in *E. birjandica versus* some granules in *E. dendranthemae*), coxal ornamentation (dashes in *E. birjandica* are denser than in *E. dendranthemae*), dorsal semiannuli number (52 in *E. birjandica versus* 46 in *E. dendranthemae*), length of setae *1a* (41 in *E. birjandica versus* 16 in *E. dendranthemae*) and setae *2a* (50 in *E. birjandica versus* 38 in *E. dendranthemae*).

***Aculus clemachinensis* sp. nov. (Fig. 2)**

Description

FEMALE (n = 10). Body vermiform, 230 (200–240, including gnathosoma), 71 (59–61) wide, 65 (63–70) thick. **Gnathosoma** 25 (23–25) projecting downwards, pedipalp coxal setae *ep* not detectable, dorsal pedipalp genual setae *d* 7 (6–7), unbranched, palp tarsus setae *v* 1 (no range), cheliceral stylets 21 (20–21). **Prodorsal shield** 40 (39–41), including frontal lobe, 42 (40–42) wide; subtriangular and rounded frontal lobe, 7 (6–7) over gnathosomal base. Shield pattern composed of median line on the posterior 2/3, admedian lines complete and slightly diverging close to rear shield margin. Inner pair of submedian lines not reaching rear shield margin and sinuate, outer submedian lines short and arched; a few dashes and granules on posterior of shield between tubercles; numerous granules on lateral sides of prodorsal shield. Tubercles of scapular setae *sc* on rear shield margin, 21 (20–21) apart, scapular setae *sc* 16 (16–17), directed upwards divergently. **Leg I** 34 (33–35), femur 10 (no range), genu 5 (5–6), tibia 9 (8–9), tarsus 7 (no range), solenidion ω 7 (7–8), curved down, distally simple, empodium 5 (no range), simple, 4-rayed; femoral setae *bv* 13 (13–14), genual setae *l″* 32 (31–34), tibial setae *l′* 7 (5–8), tarsal setae *ft′* 11 (10–12), setae *ft″* 27 (25–27). **Leg II** 31 (31–33), femur 10 (no range), genu 5 (no range), tibia 7 (7–8), tarsus 7 (6–7), solenidion ω 8 (no range), curved down, distally simple, empodium 5 (no range), simple 4-rayed; femoral setae *bv* 12 (11–12), genual setae *l″* 13 (13–14), tarsal setae *ft′* 8 (7–8), setae *ft″* 26 (26–28). **Coxae I and coxae II** ornamented with some short lines; setae *1b* 10 (10–11), tubercles *1b* 12 (11–12) apart, setae *1a* 35 (32–37), tubercles *1a* 8 (8–9) apart, setae *2a* 49 (47–55), tubercles *2a* 27 (25–27) apart, prosternal apodeme 6 (no range). **Opisthosoma** dorsally arched; 64 (64–70) dorsal semiannuli, with rounded microtubercles, and 86 (81–86) ventral semiannuli, with rounded microtubercles on rear margin; 11 (10–11) semiannuli with fine microtubercles between coxae and genital coverflap; last 6 (6–7) ventral and dorsal semiannuli with elongated microtubercles. Setae *c2* 40 (34–40), on ventral semiannulus 15 (14–15); setae *d* 82 (68–82), on ventral semiannulus 29 (27–29); setae *e* 16 (15–18), on ventral semiannulus 52 (49–53); setae *f* 42 (37–42), on ventral semiannulus 80 (77–81), 6 (6–7) annuli after setae *f*. Setae *h2* 100 (83–100), setae *h1* 3 (3–4). **Genital coverflap** 18 (16–18), 25 (24–26) wide, coverflap with 14 longitudinal striae, setae *3a* 60 (54–60), 16 (15–17) apart.

MALE (n = 1). Body vermiform, 100 (including gnathosoma), smaller than female, 60 wide, 55 thick. **Gnathosoma** 22 projecting downwards, chelicerae 19, palp coxal setae *ep* not detectable, palp genual setae *d* 6, unbranched, palp tarsus setae *v* 1. **Prodorsal shield** 37, including frontal lobe, 39 wide, frontal lobe 6. Shield pattern similar to that of female. Tubercles of scapular setae *sc* on rear shield margin, 19 apart, scapular setae *sc* 14, directed upwards divergently. **Leg I** 30, femur 9, genu 5, tibia 7, tarsus 7, solenidion ω 7, curved down, distally simple, empodium 4, simple, 4-rayed; femoral setae *bv* 11, genual setae *l″* 26, tibial setae *l′* 6, tarsal setae *ft′* 9, setae *ft″* 23. **Leg II** 28, femur 9, genu 5, tibia 7, tarsus 6, solenidion ω 7, curved down, distally simple, empodium 4, simple, 4-rayed; femoral setae *bv* 10, genual setae *l″* 10, tarsal setae *ft′* 5, setae *ft″* 24. **Coxae** similar to those of female; setae *1b* 9, tubercles *1b* 12 apart, setae *1a* 28, tubercles *1a* 7 apart, setae *2a* 45, tubercles *2a* 23 apart, prosternal apodeme 5. **Opisthosoma** dorsally arched with 58 semiannuli; 71 ventral semiannuli; 10 semiannuli between coxae and genital region. Setae *c2* 32 on ventral semiannulus 13, setae *d* 65 on ventral semiannulus 25; setae *e* 18 on ventral semiannulus 65; setae *f* 32 on ventral semiannulus 65, 6 annuli after setae *f*. Setae *h2* 70; setae *h1* 3; setae *3a* 45, 15 apart.

Type host plant

Clematis orientalis.

Relation to the host plant

Vagrant on leaves, stems and fruits. No apparent symptom was observed.

Type locality

Kooch village, Birjand, Iran. 32°42'57.96" N, 59°26'2.929" E, 1,976 m above sea level; 12 June 2016, coll. Arash Honarmand.

Type material

Holotype: 1 female on a microscope slide (AH95-1-2); paratypes: 10 females, 1 male mounted on separate microscope slides.

Other material

Mites preserved in 70% ethanol and in Oudemans' solution extracted from the same sample as the type specimens.

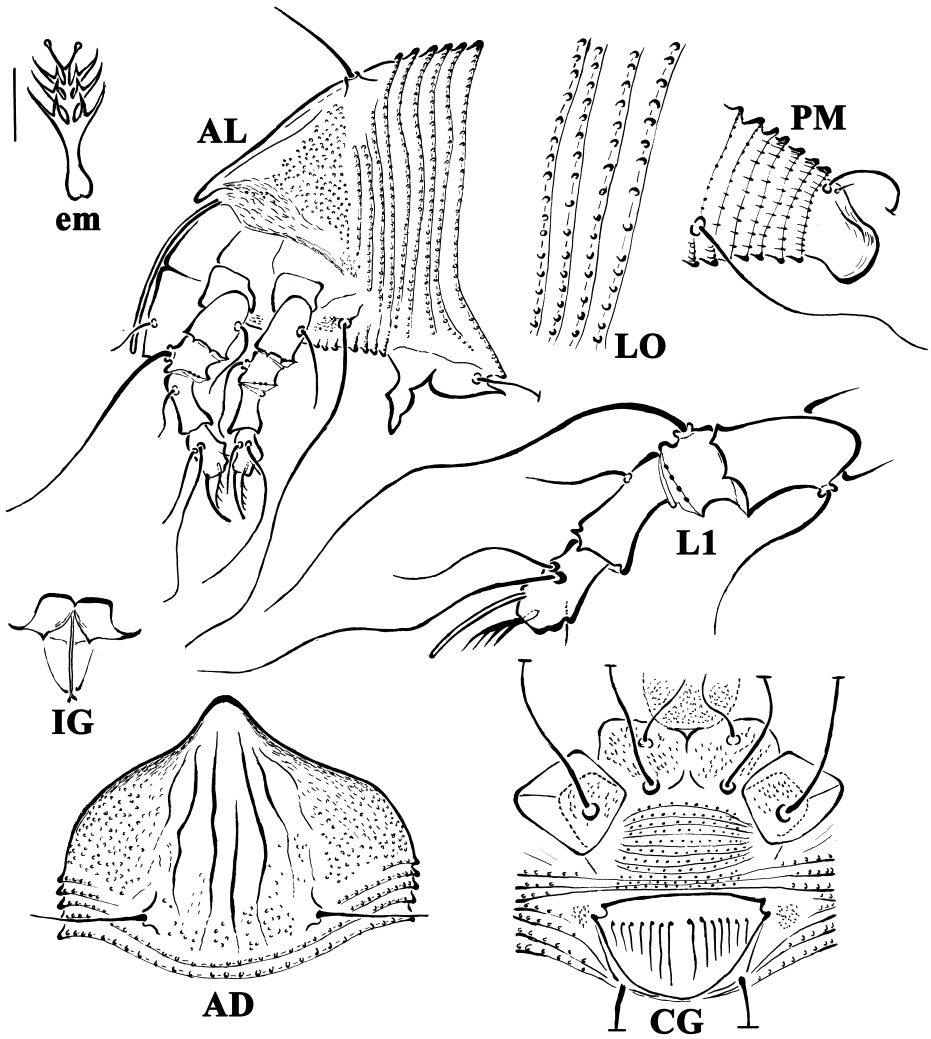

FIGURE 2. Line drawings of *Aculus clemasinensis* **sp. nov.**: **AD**. Prodorsal shield; **AL**. Lateral view of anterior body region; **CG**. Female coxigenital region; **em**. Empodium; **IG**. Internal female genitalia; **LO**. Lateral view of annuli; **L1**. Leg I; **PM**. Lateral view of posterior opisthosoma. Scale bar: 10 µm for **AD**, **AL**, **CG**, **IG**, **PM**; 5 µm for **LO**, **L1**; 2.5 µm for **em**.

Etymology

The specific epithet, *clemachinensis*, comes from the common name of the host plant in the plural genitive case.

Remarks

This is first report of a species belonging to the genus *Aculus* in association with a plant of the family Ranunculaceae.

Diagnosis

The new species has the following discriminating characters: sub-elliptical prodorsal shield provided with a median line on posterior 2/3, complete admedian lines, two submedian lines, and a sub-triangular and pointed frontal lobe. Coxae ornamented and empodia 4-rayed. Opisthosoma arched, with about 70 dorsal and 85 ventral semiannuli. Coverflap striated.

Differential diagnosis

Currently, more than 300 species are known within the genus *Aculus*. *Aculus schmardae* (Nalepa), on *Campanula rapunculoides* L. (Campanulaceae) as type host species, seems to be the closest to *A. clemachinensis* **sp. nov.** They differ in the prodorsal shield pattern (median line on the posterior 2/3 and several dashes among the lines and on the lateral sides for *A. clemachinensis* **sp. nov.** *versus* complete median line and few dashes for *A. schmardae*), number of the empodial rays (4-rayed in *A. clemachinensis* **sp. nov.** *versus* 5-rayed in *A. schmardae*), length and direction of the scapular setae *sc* (about half of the prodorsal shield length and directed upwards divergently in *A. clemachinensis* **sp. nov.** *versus* as long as the prodorsal shield and directed backwards in *A. schmardae*) (Nalepa, 1889).

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References

Amrine, J.W.Jr. & Manson, D.C.M. (1996) Preparation, mounting and descriptive study of eriophyoid mites. *In*: Lindquist, E.E., Sabelis, M.W. & Bruin, J. (eds.) *Eriophyoid Mites - Their biology, natural enemies and control.* World Crop Pests, 6. The Netherlands, Elsevier, Amsterdam, pp. 383–396. https://doi.org/10.1016/S1572-4379(96)80023-6

Amrine, J.W.Jr., Stasny, T.A.H. & Flechtmann, C.H.W. (2003) *Revised keys to world genera of Eriophyoidea (Acari: Prostigmata).* West Bloomfield, Michigan, USA, Indira Publishing House, 244 pp.

Canestrini, G. (1892) Sopra due nuove specie di *Phytoptus* (Settima serie). *Bollettino della Societá Veneto-Trentina di Scienze Naturali*, 5(2), 79–80.

Chawla, R., Kumar, S. & Sharma, A. (2012) The genus *Clematis* (Ranunculaceae): Chemical and pharmacological perspectives. *Journal of Ethnopharmacology*, 143(1), 116–150. https://doi.org/10.1016/j.jep.2012.06.014

Chetverikov, P.E. (2005) Eriophyid mites (Acari, Eriophyoidea: Eriophyidae) of the genus *Leipothrix* Keifer, 1966 from sedges (Cyperaceae). *Acarina*, 13(2), 145–154.

Cossard, G., Sannier, J., Sauquet, H., Damerval, C., de Craene, L.R., Jabbour, F. & Nadot, S. (2016) Subfamilial and tribal relationships of Ranunculaceae: evidence from eight molecular markers. *Plant Systematics and Evolution*, 302(4), 419–431. https://doi.org/10.1007/s00606-015-1270-6

de Lillo, E., Craemer, C., Amrine, J.W.Jr. & Nuzzaci, G. (2010) Recommended procedures and techniques for morphological studies of Eriophyoidea (Acari: Prostigmata). *Experimental and Applied Acarology*, 51(1-3), 283–307.
https://doi.org/10.1007/978-90-481-9562-6_15

Dong, Y., Sun, Y.-M., & Xue, X.-F. (2016) Two new eriophyid mite species associated with *Clematis terniflora* var. *mandshurica* in China (Acari, Eriophyidae). *ZooKeys*, 621, 1–14.
http://doi.org/10.3897/zookeys.621.9443

Farkas, H.K. (1960) Uber die Eriophyiden (Acarina) Ungarns. I. Beschreibung neuer und wenig bekannter Arten. *Acta Zoologica. Academiae Scientiarum Hungaricae*, 6, 315–339.

Gerber, C. (1901) Zoocécidies Provençales. *Comptes Rendus Assoc. Franc. Avanc. Sci.,* Congres Ajaccio, 1901, 524–550.

Harrison, J.W.H. (1930) Two new species of eriophyid mites. *Proceeding of Durham University Philosophy Society*, 8(3), 168–170.

Karimi, E., Ghorbani Nohooji, M., Habibi, M., Ebrahimi, M., Mehrafarin, A. & Khalighi-Sigaroodi, F. (2018) Antioxidant potential assessment of phenolic and flavonoid rich fractions of *Clematis orientalis* and *Clematis ispahanica* (Ranunculaceae). *Natural Product Research*, 32(16), 1991–1995.
https://doi.org/10.1080/14786419.2017.1359171

Krantz, G.W. & Walter, D.E. (2009) *A manual of acarology*. 3rd Edition. Lubbock, Texas Tech University Press, 807 pp.

Keifer H.H. (1975) Eriophyoidea Nalepa. Injurious eriophyoid mites. *In*: Jeppson L.R., Keifer H.H. & Baker E.W. (eds.), *Mites injurious to economic plants*. Berkeley, California, USA, University California Press, 327–533.

Lindquist, E.E. (1996) External anatomy and notation of structures. *In*: Lindquist, E.E., Sabelis, M.W. & Bruin, J. (eds), *Eriophyoid Mites - Their biology, natural enemies and control.* World Crop Pests, 6. The Netherlands, Elsevier, Amsterdam, pp. 3–31.
https://doi.org/10.1016/S1572-4379(96)80003-0

Liro, J.I. (1941) Neue und seltene Eriophyiden (Acarine). *Annales Zoologici Societatis Zooogicae-Botanicae Fennica Vanamo*, 8(7), 1–54.

Lotfollahi, P., de Lillo, E., & Irani-Nejad, K.H. (2015) Three new *Aculops* species (Acari: Trombidiformes: Eriophyidae) from Iran. *Systematic and Applied Acarology*, 20(4), 410–423.
https://doi.org/10.11158/saa.20.4.6

Monfreda, R., Nuzzaci, G. & de Lillo, E. (2007) Detection, extraction, and collection of eriophyoid mites. *Zootaxa*, 1662, 35–43.
http://dx.doi.org/10.11646/zootaxa.1662.1.4

Nalepa, A. (1889) Beiträge zur Systematik der Phytopten. *Sitzungsberichte der Kaiserlichen Akademie der Wissenschaften. Mathematische-naturwissenschaftlichen Klasse*, Wien, 98(1), 112-156 + 9 pls.

Nalepa, A. (1924) Polymorphe Eriophyiden. *Marcellia*, 20(4–6), 87–96.

Nalepa, A. (1891) Neue Gallmilben. *Nova Acta der Academiae Caesareae Leopoldino-Carolinae Germanicae Naturae Curiosorum Verhandlungen der kaiserlichen Leopoldinische-Carolinische Deutschen Akademie der Naturforscher*, 55(6), 362–395 + 4 pls.

Nalepa, A. (1897) Neue Gallmilben. (15. Fort.) *Anzeiger der Kaiserlichen Akademie Wissenschaften. Mathematische-naturwissenschaftliche Klasse*, Wien, 34(23), 231.

Nalepa, A. (1918) Neue Gallmilben. (36. Fort.) *Anzeiger der Kaiserlichen Akademie Wissenschaften. Mathematische-naturwissenschaftliche Klasse*, Wien, 55(26), 351–353.

Roivainen, H. (1950) Eriophyid news from Sweden. *Acta Entomologica Fennica*, 7, 1–51.

Song, Z.-W., Xue, X.-F. & Hong, X.-Y. (2008) Eriophyoid mite fauna (Acari: Eriophyoidea) of Gansu Province, northwestern China with descriptions of twelve new species. *Zootaxa*, 1756(1), 1–48.
http://dx.doi.org/10.11646/zootaxa.1756.1.1

The Plant List (2013) Version 1.1. Published on the Internet; http://www.theplantlist.org (accessed 1st January 2019).

Wang, R. (1999) Notes on the genus *Clematis* L. (Ranunculaceae) of China. *Journal of Tropical and Subtropical Botany*, 7(1), 26–28.

Xue, X.-F., Song, Z.-W. & Hong, X.-Y. (2007) Seven new species of the genus *Epitrimerus* Nalepa (Acari: Eriophyidae: Phyllocoptinae) from China. *Zootaxa*, 1406(1), 1–15.
http://dx.doi.org/10.11646/zootaxa.1406.1.1

Xue, X.-F., Song, Z.-W. & Hong, X.-Y. (2009) Five new species of *Phyllocoptes* from China (Acari: Eriophyidae). *International Journal of Acarology*, 35(2), 133–147.
https://doi.org/10.1080/01647950902934234

Xue X.-F., Guo J.F. & Hong X.-Y. (2013) Eriophyoid mites from Northeast China (Acari: Eriophyoidea). *Zootaxa*, 3689(1), 1–123.
http://dx.doi.org/10.11646/zootaxa.3689.1.1

Zhang, Z.-Q. (2018) Repositories for mite and tick specimens: acronyms and their nomenclature. *Systematic & Applied Acarology*, 23(12), 2432–2447.
http://dx.doi.org/10.11158/saa.23.12.12

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