Three eriophyoid mite species (Acari: Eriophyoidea: Eriophyidae) from Iran

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Abstract

Three mite species of the family Eriophyidae from Iran are described and illustrated. They are: Tegolophus marrubiumer sp. nov. on Marrubium vulgare L. (Lamiaceae); Phyllocoptes sp. cf. balasi Farkas, 1962 on Sanguisorba minor Scop. subsp. minor (Rosaceae) and Aceria fasciculifolis sp. nov. on Astragalus fasciculifolius Boiss. (Fabaceae). Both new species described herein are vagrants on their respective host plants.

Key words: Prostigmata, taxonomy, Tegolophus, Phyllocoptes, Aceria, new species

Introduction

The fauna of eriophyoid mites in Iran has been increasingly surveyed in recent years. Xue et al. (2009) summarized 89 species to occur there. After that 25 new species and more than 19 new records were recently reported (Guo et al., 2015b; Honarmand & Sadeghi, 2016; Lotfollahi et al., 2012, 2013, 2014a, 2014b, 2014c, 2015a, 2015b; Rahim-Panah & Sadeghi-Namaghi, 2014; Xue et al., 2011, 2012, 2013).

To gain a better understanding of species diversity of eriophyoid mites, field surveys were conducted by the second and third authors in some localities in South Khorasan province where faunistic information on eriophyoid mites is limited. Different plant parts and a variety of plant species were carefully observed and sampled for the potential presence of eriophyoid mites. Slide mounted specimens were later sent to Dr. Xiao-Feng Xue for identification. Two species were found to be new to science.

Material and methods

Eriophyoid specimens collected from plant materials were prepared and slide mounted according to the methods of Keifer (1975). The morphological terminology used herein follows Lindquist (1996) and the generic classification is made according to Amrine et al. (2003). Specimens were measured following de Lillo et al. (2010). Specimens were examined with the aid of a Zeiss A2 (Germany) research microscope with phase contrast and semi-schematic drawings were made. Micrographs were taken with a Zeiss A2 (microphoto camera AxioCam MRC) research microscope with phase contrast using x10 eyepieces at x100 oil magnification, connected to a computer using Axiovision image analysis software. It was not possible to provide illustrations of the lateral view for some of the species described herein because of the mounting position on microscope slides. For each species, the holotype female measurement precedes the corresponding range for paratypes (given in parentheses). All measurements are in micrometres (μm) and are lengths when not otherwise specified. The two holotypes and four paratypes are deposited in the Arthropod/Mite Collection of the Department of Entomology, Nanjing Agricultural University (NJAU), Jiangsu Province, China. In addition, 19 paratypes are deposited in the Department of Plant Protection, Ferdowsi University of Mashhad (FUM), Iran.
Taxonomy

Subfamily Phyllocoptinae Nalepa, 1892

Tribe Anthocoptini Amrine & Stasny, 1994

Genus *Tegolophus* Keifer, 1961

*Tegolophus marrubiumer* sp. nov.  
(Fig. 1)

**Description.** FEMALE: (n=10, dorsal view). Body fusiform, 230 (215–230), 63 (60–63) wide; light yellow. Gnathosoma 20 (20–21), projecting obliquely downwards, pedipalp coxal seta (ep) 2 (2–3), dorsal pedipalp genual seta (d) 10 (10–11), cheliceral styles 17 (17–20). **Prodorsal shield** 46 (35–46), 50 (48–50) wide, sub quadrangular, median line absent, admedian lines complete and connected with submedian lines at anterior 1/4; anterior shield lobe broad. Scapular tubercles on rear shield margin, 35 (28–35) apart, scapular setae (sc) 27 (27–28), projecting posteriorly. **Coxal plates** with short lines and granules, anterolateral setae on coxisternum І (1b) 12 (12–13), 10 (10–11) apart, proximal setae on coxisternum І (1a) 37 (35–38), 7 (7–8) apart, proximal setae on coxisternum ІІ (2a) 42 (40–48), 22 (22–23) apart. Prosternal apodeme 10 (8–10). **Legs** with usual series of setae. **Leg І** 35 (35–36), femur 11 (11–12), basiventral femoral seta (bv) 15 (15–16); genu 5 (4–5), antaxial genual seta (l'') 25 (25–28); tibia 8 (7–8), paraxial tibial seta (l') 10 (8–10), located at 1/3 from dorsal base; tarsus 6 (5–6), seta ft' 18 (18–22), seta ft'' 27 (25–27), seta u' 7 (6–7); tarsal empodium (em) 10 (9–10), simple, 7-rayed, tarsal solenidion (ω) 8 (8–9), rod-like. **Leg ІІ** 30 (30–33), femur 9 (8–9), basiventral femoral seta (bv) 18 (16–18); genu 4 (4–5), antaxial genual seta (l'') 12 (11–12); tibia 7 (6–7); tarsus 6 (5–6), seta ft' 13 (13–15), seta ft'' 26 (26–27), seta u' 6 (5–6); tarsal empodium (em) 12 (10–12), simple, 7-rayed, tarsal solenidion (ω) 8 (8–9), rod-like. **Opisthosoma** dorsally with 74 (68–74) annuli, with small round microtubercles at lateral, ventrally with 79 (79–82) annuli, with round microtubercles. Setae c2 43 (43–45) on ventral annulus 9 (9–10), 52 (44–52) apart; setae d 61 (50–61) on ventral annulus 25 (23–25), 37 (35–37) apart; setae e 32 (30–33) on ventral annulus 42 (40–42), 17 (16–17) apart, setae f3 36 (35–36) on 5th ventral annulus from rear, 22 (22–23) apart. Setae h1 5 (5–6), h2 48 (48–52). **Female genitalia** 12 (12–14), 22 (20–22) wide, coverflap with 12 longitudinal ridges, setae 3a 31 (28–31), 12 (12–15) apart.

**Male:** Not seen.

**Type material.** Holotype female (slide number IR93-AH7, marked holotype), from *Marrubium vulgare* L. (Lamiaceae), Chahardeh (32°51’58’’N, 59°13’16’’E), Birjand, South Khorasan province, Iran, 15 April 2014, coll. A. Honarmand and H. Sadeghi, deposited as a slide mounted specimen in the Arthropod/Mite Collection of the Department of Entomology, NJAU, Jiangsu Province, China. Paratypes 2 females (slide number IR93-AH7), from *Marrubium vulgare* L. (Lamiaceae), Chahardeh (32°51’58’’N, 59°13’16’’E), Birjand, South Khorasan province, Iran, 15 April 2014, coll. A. Honarmand and H. Sadeghi, deposited in the Arthropod/Mite Collection of the Department of Entomology, NJAU, Jiangsu Province, China; 7 females on seven slides (slide number IR93-AH7) from *Marrubium vulgare* L. (Lamiaceae), Chahardeh (32°51’58’’N, 59°13’16’’E), Birjand, South Khorasan province, Iran, 15 April 2014, coll. A. Honarmand and H. Sadeghi, deposited in the Department of Plant Protection, FUM, Iran.

**Relation to host.** This species is vagrant on both sides of the leaf surfaces. No damage to the host plant was observed.

**Etymology.** The specific designation *marrubiumer* is derived from the generic name of the host plant, *Marrubium*; masculine in gender.

**Differential diagnosis.** The new species is different from all others in the genus, except for the species *Tegolophus glochidionis* Kuang & Lin, 2001, *T. braziliensis* Keifer, 1969 and *T. pfaffiae* Keifer, 1963, because it has dorsal annuli with round microtubercles, coxal plates with short lines or granules, seta h1 present, tarsal solenidion rod-like and median line absent from prodorsal shield. The new species can be separated from these three species in the following manner: having the admedian lines separated (admedian lines connected in *T. glochidionis*); V-shaped mark absent between admedian lines (V-shaped mark present in *T. braziliensis*); and empodium 7-rayed (empodium 5-rayed in *T. pfaffiae*).
FIGURE 1. *Tegolophus marrubiumer* sp. nov.: AD. Dorsal view of anterior part; CG. Coxae and female genitalia; em. Empodium; L1. Leg I; IG. Internal genitalia.

**Tribe Phyllocoptini Nalepa, 1892**

**Genus Phyllocoptes** Nalepa, 1892
**Phyllocoptes sp. cf. balasi** Farkas, 1962
(Figs 2 & 3)

**Description.** FEMALE: (n=7). Body fusiform, 236 (236–265), 65 (65–68) wide; light yellow. **Gnathosoma** 20 (20–25), projecting obliquely downwards, pedipalp coxal seta (ep) 3 (2–3), dorsal pedipalp genual seta (d) 7 (5–7), cheliceral stylets 18 (18–20). **Prodorsal shield** 37 (35–37), 45 (45–48) wide, sub quadrangular, median line incomplete and present posterior 2/3, admedian and submedian lines complete; anterior shield lobe broad. Scapular tubercles ahead of rear shield margin, 15 (15–18) apart, scapular setae (sc) 11 (11–12), projecting centrally. **Coxal plates** with short lines and granules, anterolateral setae on coxisternum I (1b) 8 (8–11), 12 (11–12) apart, proximal setae on coxisternum I (1a) 23 (22–25), 10 (10–11) apart, proximal setae on coxisternum II (2a) 41 (41–46), 26 (26–28) apart. Prosternal apodeme 8 (7–8). **Legs** with usual series of setae. **Leg I** 32 (32–35), femur 10 (10–11), basiventral femoral seta (bv) 11 (11–12); genu 5 (4–5), antaxial genual seta (l'') 23 (22–23); tibia 6 (5–6), paraxial tibial seta (l') 7 (5–7), located at 1/3 from dorsal base; tarsus 6 (6–7), seta ft' 12 (12–20), seta ft'' 20 (20–21), seta u' 4 (4–5); tarsal empodium (em) 8 (7–8), simple, 5-rayed, tarsal solenidion (ω) 5 (5–7), rod-like. **Leg II** 27 (27–30), femur 8 (8–9), basiventral femoral seta (bv) 10 (10–11); genu 4 (4–5), antaxial genual seta (l'') 8 (7–8); tibia 5 (5–6); tarsus 7 (6–7), seta ft' 6 (6–8), seta ft'' 23 (23–24), seta u' 5 (5–6); tarsal empodium (em) 7 (6–7), simple, 5-rayed, tarsal solenidion (ω) 7 (7–8), rod-like. **Opisthosoma** dorsally with 79 (66–79) annuli, with elliptical microtubercles except posterior six annuli, ventrally with 75 (66–75) annuli, with round microtubercles except posterior seven annuli. Setae c2 15 (15–20) on ventral annulus 12 (12–13), 61 (60–61) apart; setae d 50 (41–50) on ventral annulus 26 (24–26), 36 (36–40) apart; setae e 37 (30–37) on ventral annulus 44 (44–45), 25 (25–26) apart, setae f 22 (22–25) on 6th ventral annulus from rear, 22 (22–25) apart. Setae h1 6 (5–6), h2 65 (60–65). **Female genitalia** 17 (15–17), 25 (20–25) wide, coverflap with two transverse lines at base and 8 longitudinal ridges, setae 3a 15 (15–20), 17 (17–18) apart.

**Material examined.** 3 females (slide number IR93-AH6), from Sanguisorba minor Scop. subsp. minor (Rosaceae), Chahardeh (32°51'58''N, 59°13'16''E), Birjand, South Khorasan province, Iran, 15 April 2014, coll. A. Honarmand and H. Sadeghi, deposited in the Arthropod/Mite Collection of the Department of Entomology, NJAU, Jiangsu Province, China; 4 females on 4 slides (slide number IR93-AH6) from Sanguisorba minor Scop. subsp. minor (Rosaceae), Chahardeh (32°51'58''N, 59°13'16''E), Birjand, South Khorasan province, Iran, 15 April 2014, coll. A. Honarmand and H. Sadeghi, deposited in the Department of Plant Protection, FUM, Iran.

**Relation to host.** This species is vagrant on both sides of the leaf surfaces. No damage to the host was observed.

**Note.** Most eriophyoid mites have been reported as having high host specificity (Skoracka et al., 2010). Up to now, only one Phyllocoptes species, P. balasi Farkas, 1962, was reported infesting Sanguisorba minor Scop. (Rosaceae) in Hungary. During field surveys of S. minor in Iran, we found one Phyllocoptes species which is mostly similar to P. balasi, except the prodorsal shield has a median and two admedian lines (absent in P. balasi), the dorsal annuli have elliptical microtubercles (smooth in P. balasi), the dorsal opisthosoma has more annuli (66–79 dorsal annuli) than that in P. balasi (54 dorsal annuli), and the coxal plates have short lines and granules (smooth in P. balasi). Some eriophyoid mites have two forms, the protogyne and deutogyne (Baker et al., 1996). We hypothesize that Farkas (1962) described the deutogyne of P. balasi, while we collected and described the protogyne of P. balasi in Iran. To test this, more field collections and methods, e.g. DNA barcoding (Guo et al., 2015a), are needed to confirm the status of our specimens of P. balasi.

**Subfamily Eriophyinae Nalepa, 1898**

**Tribe Aceriini Amrine & Stasny, 1994**

**Genus Aceria** Keifer, 1944
FIGURE 4. Aceria fasciculifolis sp. nov.: AL. Lateral view of anterior part; LO. Lateral microtubercles; PM. Lateral view of posterior opisthosoma; CG. Coxae and female genitalia; PD. Prodorsal shield; L1. Leg 1; IG. Internal genitalia; em. Empodium.
FIGURE 5. *Aceria fasciculifolis* sp. nov.: A. Dorsal view of female; B. Ventral view of female; C. Prodorsal shield; D. Coxae of female; E. Dorsal microtubercles; F. Ventral microtubercles; G. Dorsal view of posterior part; H. Ventral view of posterior part.
**Aceria fasciculifolis** sp. nov.  
(Figs 4 & 5)

**Description.** FEMALE: (n=11). Body vermiform, 195 (190–195), 50 (50–55) wide, 55 (55–57) thick; light yellow.  
**Gnathosoma** 18 (17–20), projecting obliquely downwards, pedipalp coxal seta (ep) 2 (1–2), dorsal pedipalp genual seta (d) 4 (4–5), cheliceral stylets 16 (15–16). **Prodorsal shield** 30 (30–32), 35 (35–36) wide, sub triangular, median and admedian lines absent, submedian lines incomplete. Scapular tubercles on rear shield margin, 17 (17–18) apart, scapular setae (sc) 26 (26–28), projecting posteriorly. **Coxal plates** with granules, anterolateral setae on coxisternum І 6 (6–7), 9 (9–10) apart, proximal setae on coxisternum І 16 (16–18), 6 (6–7) apart, proximal setae on coxisternum II (2a) 30 (30–35), 19 (19–20) apart. Prosternal apodeme 5 (5–6). **Legs** with usual series of setae. **Leg І** 30 (30–33), femur 9 (9–10), basiventral femoral seta (bv) 8 (8–10); genu 5 (5–6), antaxial genual seta (l') 18 (18–20); tibia 7 (7–8), paraxial tibial seta (l') 5 (5–6), located at 1/3 from dorsal base; tarsus 7 (6–7), seta ft' 15 (15–16), seta ft'' 20 (20–23), seta u' 4 (4–5); tarsal empodium (em) 5 (5–6), simple, 4-rayed, tarsal solenidion (ω) 7 (7–8), rod-like. **Leg ІІ** 25 (25–28), femur 6 (6–7), basiventral femoral seta (bv) 6 (6–7); genu 3 (3–4), antaxial genual seta (l') 7 (7–8); tibia 3 (3–4); tarsus 5 (5–6), seta ft' 5 (5–6), seta ft'' 18 (18–20), seta u' 4 (4–5); tarsal empodium (em) 5 (5–6), simple, 4-rayed, tarsal solenidion (ω) 7 (7–8), rod-like. **Opisthosoma** dorsally with 63 (63–65) annuli, with round microtubercles, except for posterior seven annuli, ventrally with 58 (55–60) annuli, with round microtubercles, except for posterior eight annuli. Setae c2 17 (17–20) on ventral annulus 7 (7–8), 42 (42–45) apart; setae d 37 (37–40) on ventral annulus 18 (18–20), 31 (31–33) apart; setae e 7 (7–8) on ventral annulus 33 (33–35), 15 (15–18) apart, setae f 15 (15–17) on 6th ventral annulus from rear, 15 (15–18) apart. Setae h1 5 (4–5), h2 72 (68–72). **Female genitalia** 13 (13–15), 18 (18–20) wide, coverflap with 10 longitudinal ridges, setae 3a 11 (11–13), 14 (14–15) apart.  
**MALE:** Not seen.

**Type material.** Holotype female (slide number IR93-HS10, marked holotype), from *Astragalus fasciculifolius* Boiss. (Fabaceae), Cheshmeh Mortazaali (33°36'12''N, 56°55'56''E), Tabas, South Khorasan province, Iran, 25 April 2014, coll. A. Honarmand and H. Sadeghi, deposited as a slide mounted specimen in the Arthropod/Mite Collection of the Department of Entomology, NJAU, Jiangsu Province, China. **Paratypes** 2 females (slide number IR93-HS10, marked paratype), from *Astragalus fasciculifolius* Boiss. (Fabaceae), Cheshmeh Mortazaali (33°36'12''N, 56°55'56''E), Tabas, South Khorasan province, Iran, 25 April 2014, coll. A. Honarmand and H. Sadeghi, deposited in the Arthropod/Mite Collection of the Department of Entomology, NJAU, Jiangsu Province, China; 8 females on eight slides (slide number Iran50.2–50.8) from *Astragalus fasciculifolius* Boiss. (Fabaceae), Cheshmeh Mortazaali (33°36'12''N, 56°55'56''E), Tabas, South Khorasan province, Iran, 25 April 2014, coll. A. Honarmand and H. Sadeghi, deposited in the Department of Plant Protection, FUM, Iran.  
**Relation to host.** This species is vagrant on both sides of the leaf surfaces. No damage to the host was observed.  
**Etymology.** The specific designation *fasciculifolis* is from the species name of host plant, *fasciculifolius*; feminine in gender.  
**Differential diagnosis.** This species is similar to *Aceria astragali* (Liro, 1940) [from *Astragalus alpinus* L. (Fabaceae)], but can be differentiated from the latter by lacking the median and admedian lines on the prodorsal shield (median and admedian lines present in *A. astragali*).  

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**References**