

## Article

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### Two new eriophyoid mite species (Acari, Prostigmata, Eriophyidae) on date trees from Iran

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#### Abstract

Two new eriophyoid species belonging to subfamily Phyllocoptinae, namely *Tegonotus larii* **sp. nov.** and *Tetra iranica* **sp. nov.** from *Phoenix dactylifera* L. (Arecaceae) in Lar city, Fars Province, southern Iran, are described and illustrated. Detailed morphological characteristics are given based on adult females. Both new species described herein are vagrants on their host plants. No symptoms were observed.

**Keywords:** Trombidiformes, Eriophyoidea, Arecaceae, Lar city, Fars Province.

#### Introduction

The date palm (*Phoenix dactylifera* L.) is the second most important fruit crop in Iran with more than 185,000 hectares of harvested area, about 875,000 tons of annual production and 120,000 tons of exported fruit. Most of the date palm plantations are located in an area ranging from the south west to the south east of the country. Hormozgan, Kerman, Fars, Sistan and Baluchestan, Bushehr and Khuzestan Provinces provide more than 99 percent of total annual production. The most important commercial date cultivars of Iran include Piarum, Zahidi, Deiri, Sayer, Mordasang, Hallavy, Shahani, Kabkab, Mozafati, Almehtari, Khasoui and Barhee which are well known at a national level. The date trees are infested by several pests that are well adapted to the oasis environment (FAO 2009). Damages caused by some of these pests are considerable and lead to heavy economic losses. Concerning eriophyoid mites, only *Mackiella phoenicis* Keifer, 1939 (Phytoptidae: Sierraphytoptinae: Mackiellini) has been recorded on date palms in Iran (Kamali *et al.* 2001, Xue *et al.* 2009). So far, two further eriophyoid mites, *Tumescoptes phoenixi* Smith Meyer 1992 and *T. dicrus* Smith Meyer, 1992, have been recorded on *P. canariensis* Chabaud, 1882 and *P. reclinata* Jacquin, 1858 respectively, in South Africa (Amrine & Stasny 1994; Hong & Zhang 1996; Moore & Howard 2001). About 100 eriophyoid mite species are known from Iran (Xue *et al.* 2013). Aimed at increasing knowledge on the Iranian fauna of Eriophyoidea, associated also with plants of economic interest, a survey of these mites was carried out in 2011 in a number of palm date areas in Iran.

## Material & methods

A variety of date trees in different localities mainly in Lar, Fars province were randomly investigated and sampled for potential eriophyoid symptoms and presence of mites. Eriophyoid mites were extracted from the plant material directly by examination under an Olympus stereo-microscope (SZH-ILI-B, Japan) at 10× to 60× magnification. Freshly collected mites were placed in a lactophenol solution for 4–6 days at room temperature and then mounted in Hoyer's medium, (Jeppson *et al.* 1975; Amrine & Manson 1996). Specimen were identified, measured and drawn with an Olympus CH2 (Japan) research microscope equipped with a phase contrast system. Identification of the genus was made according to Amrine *et al.* (2003). The morphological terminology used follows Lindquist (1996). The number of measured specimen (n) is given within parentheses in the description, the measurements are given in micrometers (µm) and range values are given in parentheses. Drawings were made according to de Lillo *et al.* (2010) and Amrine *et al.* (2003).

Holotypes and 18 paratypes are deposited in the Department of Plant Protection, Shiraz University, Fars province and 4 paratypes are deposited in the Razavi Khorasan Agricultural and Natural Resources Research Center, Mashhad, Iran.

## Taxonomy

### Tribe Tegenotini Bagdasarjan, 1978

### Genus *Tegonotus* Nalepa, 1890

Type species: *Oxypleurites heptacanthus* Nalepa, 1889

### *Tegonotus larii* sp. nov. (Figs. 1–8)

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### Diagnosis

Body fusiform, light orange. Gnathosoma curved obliquely downward. Prodorsal shield with frontal lobe present, only admedian lines complete, scapular tubercles *sc* ahead of rear shield margin with basal axes longitudinal, directed of *sc* setae inward. Coxigenital plates smooth, all three coxal tubercles present. Legs with normal segments and usual setae, tarsal empodium entire, 4-rayed. Dorsal annuli of opisthosoma smooth, ventral annuli with rounded microtubercles, female genitalia coverflap with one row of ridges.

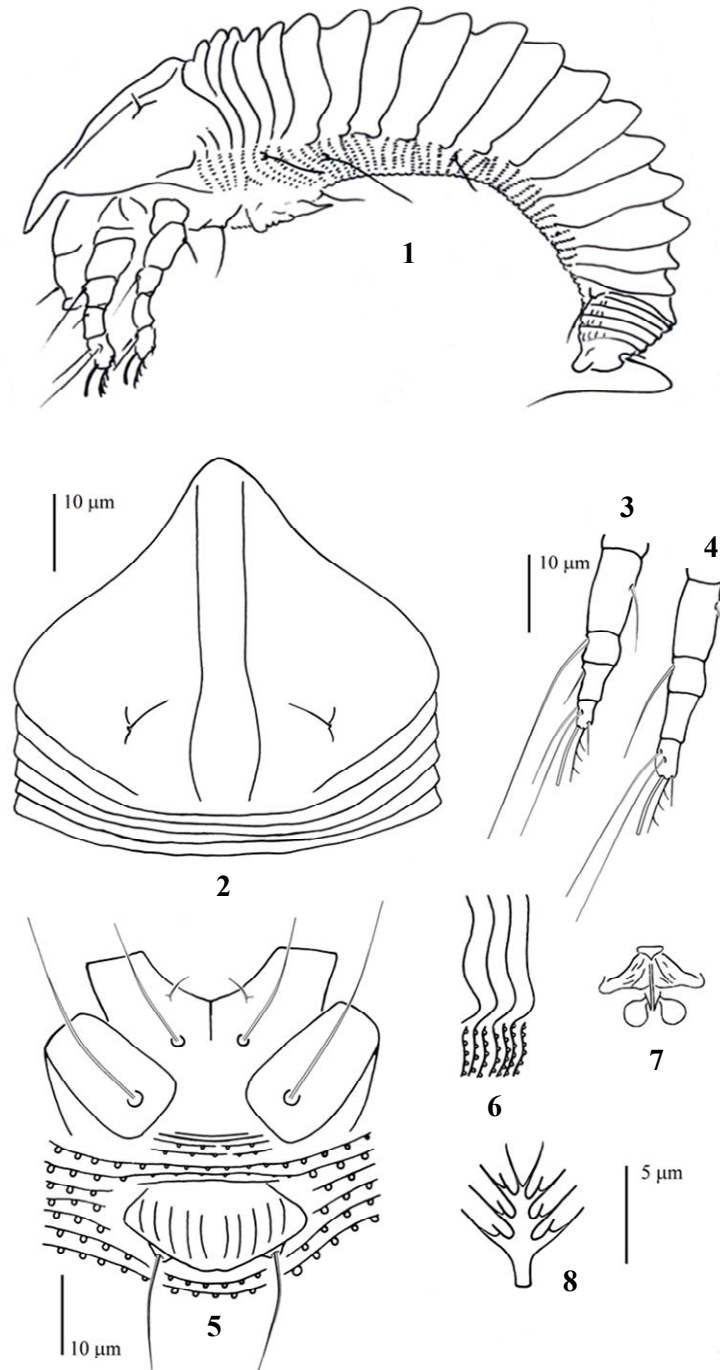
### Description

*Female* (n= 10). Body fusiform, light yellow; 126 (124–130) long, 56 (54–59) wide. Gnathosoma 22 (21–24) long, projecting obliquely down, suboral plate present, pedipalp coxal seta (*ep*) 3 (2–4), dorsal pedipalp genual seta (*d*) 5 (5–6), cheliceral stylets 19 (18–20) long.

*Prodorsal shield*. Subtriangular in shape; frontal lobe present, 45 (41–46) long (including the frontal lobe), 54 (53–55) wide; median line absent, admedian lines arising from sides of frontal lobe curve and joined at rear shield; scapular tubercles *sc* ahead of rear shield margin with basal axes longitudinal; scapular setae *sc* 4 (4–5) long, 25 (23–25) apart, directed upward and inward.

*Coxigenital plates*. Coxigenital plates smooth, all three coxal tubercles present, setae 1b 5 (4–5) long, 12 (12–13) apart; setae 1a 18 (17–19) long, 10 (9–10) apart; setae 2a 29 (26–30) long, 20 (19–22) apart; first coxal tubercles slightly wider apart than

second coxal tubercles, second coxal tubercles ahead of third coxal tubercles.



**Figures 1–8.** *Tegenotus larii* sp. nov. 1. Lateral view of idiosoma; 2. Prodorsal shield; 3. Leg I; 4. Leg II; 5. Coxae & female genitalia; 6. Lateral opisthosoma; 7. Female internal genitalia; 8. Empodium.

*Legs.* Segments normal. Leg I 24 (22–24) long, femur 11(10–12) long, setae *bv* 9 (8–9) long; genu 4 (4–5) long, setae *l* 28 (24–29) long; tibia 5 (5) long, setae *l'* 5 (5) long; tarsus 4 (4–5) long, setae *ft'* 12 (11–15) long, *ft* 18 (17–21) long, setae *u'* 5 (5) long, tarsal solenidion 9 (7–9) long; tarsal empodium 7 (6–7) long, simple with 4 rays. Legs II 27 (25–28) long; femora 10 (8–11) long, setae *bv* 7 (6–7) long; genua 5 (4–5) long, setae *l* 14 (14–17) long; tibiae 6 (5–6) long; tarsi 6 (5–6) long, setae *ft'* 23 (21–23) long, setae *ft* 25 (23–26) long, setae *u'* 4 (4) long; tarsal solenidion 8 (7–8) long; tarsal empodium 7 (7–8) long, simple with 4 rays.

*Opisthosoma.* Dorsal annuli 23 (22–24), smooth; ventral annuli 46 (44–47) with rounded microtubercles; dorsal annuli broad, projecting laterally as broad clear rounded processes; first five mid-dorsal annuli are compressed; setae *c2* 37 (35–39) long, on ventral annulus 7 (5–7); setae *d* 44 (40–45) long, 35 (34–37) apart on ventral annulus 13 (12–15); setae *e* 33 (31–36) long, 19 (18–20) apart on ventral annulus 26 (25–28); setae *f* 32 (31–33) long, 20 (19–20) apart, on 5th ventral annulus from rear; caudal setae *h2* 47 (46–51) long, setae *h1* 5 (5) long.

*Female genitalia.* Genital coverflap basally smooth and posteriorly ornamented with 10 (8–10) longitudinal ridges, 13 (12–15) long, 23 (21–24) wide; setae *3a* 15 (14–16) long, 16 (15–16) apart.

*Male.* Unknown.

#### *Type material*

Holotype, female (slide number LarDateA5, marked Holotype), from *Phoenix dactylifera* L. (Arecaceae), Lar, Fars Province, Iran, 27° 39' 35" N, 54° 21' 13" E, elevation 808 m a.s.l., 07.VI.2011, coll. M. Majidi. Paratypes, 9 females with the same data as holotype.

#### *Etymology*

The name *larii* refer to the type locality.

#### *Biology*

The mites were collected vagrants on lower offshoots causing no apparent damage.

#### *Remarks*

This new species is similar to *T. caryophylatus* Huang and Cheng, 2005, but they can be easily separated as follows: in *T. larii*, direction of scapular setae is inward, tarsal empodium is 4-rayed and infesting *Phoenix dactylifera* (Arecaceae) whereas in *T. caryophylatus*, direction of scapular setae is outward, tarsal empodium is 6-rayed and infesting *Eugenia caryophyllata* (Myrtaceae) (Huang & Cheng 2005).

### **Tribe Anthocoptini Amrine & Stasny, 1994**

#### **Genus *Tetra* Keifer, 1944**

Type species: *T. concave* Keifer, 1939

#### *Tetra iranica* sp. nov. (Figs. 9–17)

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#### *Diagnosis*

Body fusiform, yellow. Gnathosoma curved obliquely downward. Prodorsal shield smooth, with frontal lobe present. Scaular tubercles on rear shield margin with basal

axes transverse, direction of *sc* setae backward. Coxigenital plate I ornamented with fine granules, coxae II smooth; coxigenital annuli 5. Legs segments normal, tarsal empodium simple, 4- rayed. Dorsal opisthosoma with median furrow, dorsal and ventral annuli microtuberculated. Female genitalia coverflap with 10 longitudinal ridges.

#### *Description*

*Female* (n= 12). Body fusiform, yellow, 149 (143–152) long, 58 (56–59) wide. Gnathosoma 23 (21–23) long, projecting obliquely down, suboral plate present, pedipalp coxal seta (*ep*) 4 (3–4) long, dorsal pedipalp genual seta (*d*) 9 (9–10), cheliceral stylets 20 (19–20) long.

*Prodorsal shield*. Prodorsal shield 50 (48–51) long (including frontal lobe), 45 (44–45) wide. Subtriangular in shape, scapular tubercles near rear shield margin with basal axes transverse, 3 (2–4) long, 24 (23–24) apart; scapular setae *sc* 18 (16–18) long, projecting posteriorly.

*Coxigenital plates*. Coxigenital plates with 5 (4–6) annuli. Coxigenital plate I ornamented with fine granules, coxigenital plate II smooth; anterolateral setae on coxisternum I (*lb*) 8 (7–8) long, 11 (11–13) apart; setae *la* 15 (14–16) long, 9 (8–9) apart; proximal setae on coxisternum II *2a* 21 (20–21) long, 23 (21–23) apart. Prosternal apodeme combined, 8 (6–8).

*Legs*. Segments normal. Leg I 30 (28–30) long; femur 12 (11–12) long, setae *bv* 7 (6–8) long; genu 5 (5–6) long, setae *l* 31 (29–31) long; tibia 8 (8–9) long, setae *l'* 5 (5) long, located at 1/3 from dorsal base; tarsus 7 (6–7) long, setae *ft'* 17 (15–19) long, setae *ft* 21 (20–25) long; setae *u'* 5 (4–5) long; tarsal solenidion 6 (6–7) long; tarsal empodium 8 (7–10) long, simple, with 4 rays. Leg II 32 (29–32) long; femur 11 (10–12), setae *bv* 7 (6–7) long; genu 6 (5–6) long, setae *l* 7 (6–8) long, tibia 8 (8–10) long; tarsus 7 (7–8) long, setae *ft'* 8 (8–11) long, setae *ft''* 19 (17–21) long, seta *u'* 4 (4–5) long; tarsal solenidion 6 (6–7) long; tarsal empodium 8 (7–10) long, simple, with 4 rays.

*Opisthosoma*. Dorsally with 31 (31–33) wavy annuli, with filamentous microtubercles, ventral annulus 58 (55–59) annuli, with round microtubercles. Setae *c2* 19 (18–21) long, on ventral annulus 10 (8–10); setae *d* 8 (6–9) long, on ventral annulus 21 (19–21), 41 (39–41) apart; setae *e* 22 (21–24) long, on ventral annulus 35 (35–37), 24 (23–24) apart; Setae *f* 15 (14–15) long, 7 (6–7) apart, on ventral annulus 5th ventral annulus from rear; setae *hl* 5 (5–6) long, Setae *h2* 55 (52–57) long.

*Female genitalia*. Female genitalia 12 (11–12) long, 22 (20–23) wide, coverflap with 10 (8–10) longitudinal ridges; setae *3a* 15 (14–17) long, 16 (15–16) apart.

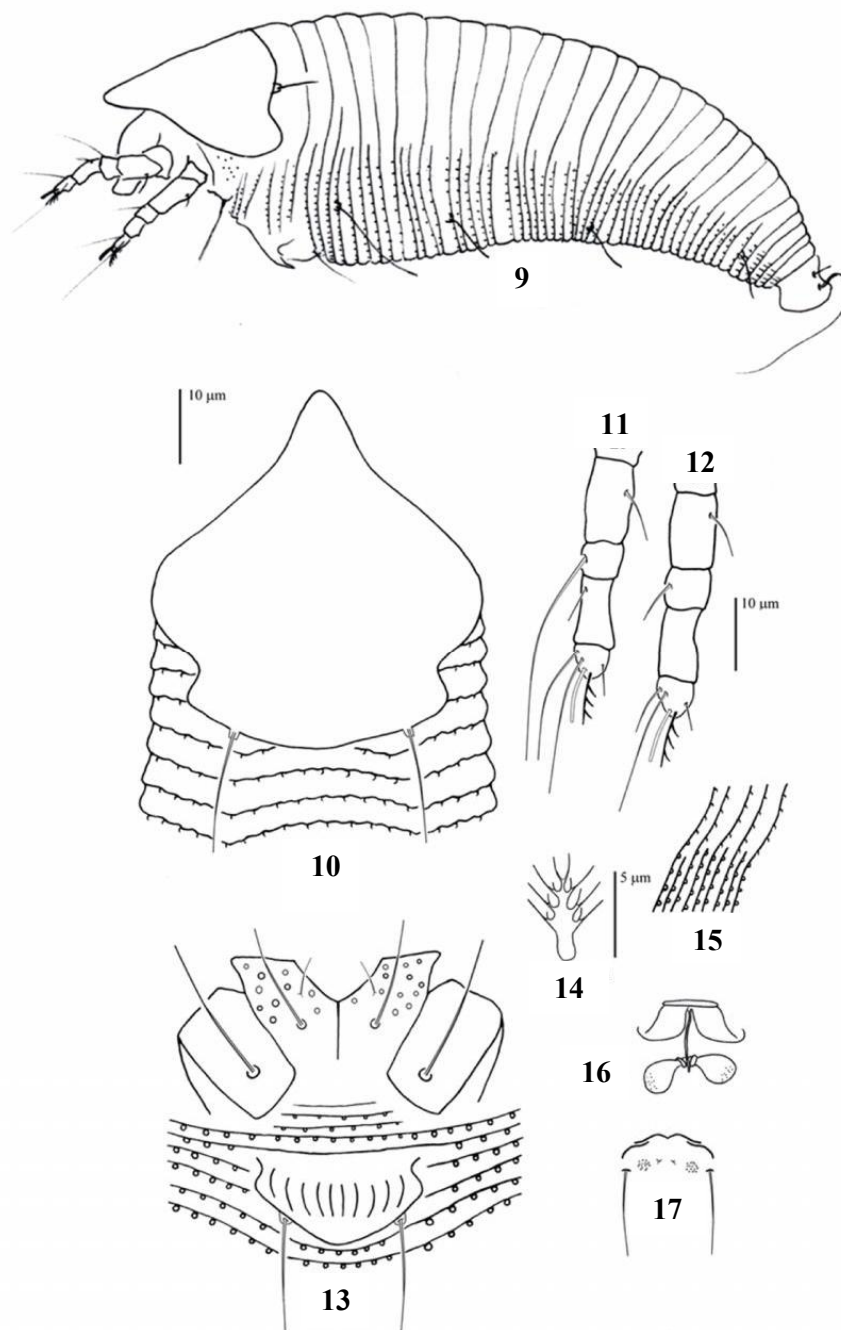
*Male* (n = 4). Similar to female, Body fusiform, 144 (137–145) long, 55 (51–56) wide.

*Gnathosoma*. Projecting down, chelicerae 20 (19–20) long, setae *d* 8 (7–9).

*Prodorsal shield*. Subtriangular in shape, smooth 46 (42–48) long (including the frontal lobe), 43 (42–47) wide, ornamentation same as female. Scapular tubercles on rear shield margin, 21 (22–24) apart; setae *sc* 15 (14–17) long, directed backward.

*Legs*. Leg I 28 (27–30) long; femur 11 (10–12) long, setae *bv* 6 (6–9) long; genu 5 (5–6) long, setae *l* 28 (27–33) long; tibia 8 (7–8) long, setae *l'* 5 (5) long; tarsus 6 (5–6) long, setae *ft'* 15 (15–17) long, setae *ft* 7 (6–9) long; setae *u'* 5 (4–5) long; tarsal solenidion 7 (7–10) long, tarsal empodium 6 (6–8) long, entire with 4 rays. Leg II 29 (29–31) long; femora 11 (10–11) long, setae *bv* 6 (6–7) long; genu 6 (5–6) long, setae

1 6 (6–7) long; tibia 8 (7–8) long; tarsus 5 (5–6) long, setae *ft'* 7 (5–9) long, setae *ft* 17 (17–20) long; setae *u'* 4 (4–5) long; tarsal solenidion 7 (6–7) long; tarsal empodium 6 (6–8) long, simple with 4 rays. Coxigenital plates ornamented as in female. Setae *1b* 7 (6–8) long, 10 (10–11) apart; setae *1a* 13 (12–16) long, 9 (8–10) apart; setae *2a* 19 (18–21) long, 21 (19–23) apart.



**Figures 9–17.** *Tetra iranica* sp. nov. 9. Lateral view of idiosoma; 10. Prodorsal shield; 11. Leg I; 12. Leg II; 13. Coxae & female genitalia; 14. Empodium, 15. Lateral opisthosoma; 16. Female internal genitalia; 17. Male genitalia.

*Opisthosoma*. Dorsal opisthosoma with median furrow, opisthosoma with 30 (30–32) dorsal annuli with round microtubercles and 55 (54–57) ventral annuli. Setae *c2* 18 (16–21) long, on annulus 8 (5–8); setae *d* 8 (7–8) long, on annulus 19 (18–20), 40 (37–41) apart; setae *e* 22 (20–28), on annulus 34 (31–34), 20 (20–23) apart; setae *f* 14 (12–16) long, 8 (7–8) apart, on ventral annuli 5th ventral annulus from rear. Setae *h2* 53 (53–59) long; setae *h1* 5 (5–6) long.

*Male genitalia*. Genitalia area ornamented with fine granules, 12 (12–13) wide. Setae 3a 12 (12–13) long.

#### *Type material*

Holotype, female (slide number LarDateB2, marked Holotype), from *Phoenix dactylifera* L. (Arecaceae), Lar, Fars Province, Iran, 27° 39' 35" N, 54° 21' 13" E, elevation 808 m a.s.l., 07.VI.2011, coll. M. Majidi. Paratypes, 9 females and 4 males with the same date as hohotype.

#### *Etymology*

The specific designation is derived from the name of Iran.

#### *Biology*

Vagrant on leaf lower surface. No damage to the host was observed.

#### *Remarks*

The new species is similar to *Tetra pruniana* Li, Xue & Hong, 2012, but it can be distinguished as follows: in *T. iranica*, smooth dorsal shield design, Coxigenital plate I ornamented with fine granules and infesting *Phoenix dactylifera* (Arecaceae) whereas in *T. pruniana*, dorsal shield differently designed, coxigenital plate I smooth and infesting *Prunus tomentosa* Thuunb. (Rosaceae) (Li *et al.* 2012).

#### **Acknowledgment**

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## دو گونه جدید کنه اریوفید (Acari, Prostigmata, Eriophyidae) از درختان خرمای ایران

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### چکیده

دو گونه جدید کنه اریوفید متعلق به زیرخانواده Phyllocoptinae به نام‌های *Tegonotus larii* sp. nov. و *Tetra iranica* sp. nov. از روی درخت خرما، (*Phoenix dactylifera* L. (Arecaceae))، از شهر لار، استان فارس، ایران توصیف و ترسیم می‌شود. جزئیات ویژگی‌های ریخت‌شناسی بر اساس افراد ماده بالغ داده شده است. دو گونه جدید توصیف شده روی میزبان سرگردان بودند و نشانه‌ای از خسارت آنها مشاهده نشد.

واژگان کلیدی: Arecaceae، Eriophyoidea، Trombidiformes، استان فارس، شهر لار.

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