

# New records of eriophyoid mites (Acari: Trombidiformes, Eriophyidae) from Golestan province of Iran

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Four Eriophyoid mite species are reported from Golestan province of Iran as new records. They are *Tetra salixis* (Xue, Song & Hong, 2006) on *Salix caprea* Kilmarnock (Saliaceae); *Tegonotus depressus* (Nalepa, 1894) on *Corylus avellana* Contorta (Betulaceae); *Aceria salviae* (Nalepa, 1891) on *Salvia* sp. (Lamiaceae) and *Epitrimerus gibbosus* (Nalepa, 1892) on *Rubus fruticosus* L. (Rosaceae). Morphological diagnostic characters and geographical distribution of the collected species are briefly discussed.

**Key words:** Host, Prostigmata, Fauna, *Tetra*, *Tegonotus*, *Aceria*, *Epitrimerus*.

## INTRODUCTION

Eriophyoid mite species are highly host specific (Skoracka *et al.* 2010) and one of the most diverse groups among plant-feeding arthropods (Jočić and Petanovic, 2012). These mites are important due to their feeding on plants and their ability in transmitting plant viruses (Oldfield & Proeseler, 1996; Westphal & Manson, 1996). Their identification is difficult because of their small size (80 to nearly 500 µm) and unclear taxonomic characters (Denizhan, 2011). It is estimated that world fauna of eriophyoid mites may account to more than 50,000 species (Amrine *et al.*, 1996). Reviewing taxonomic related literature (e.g., Xue *et al.*, 2009; Kamali & Jalaeian, 2011; Xue *et al.*, 2011; Lotfolahi *et al.*, 2012; Xue *et al.*, 2012; Kamali & Jalaeian, 2013; Xue *et al.*, 2013) showed that the knowledge of Iranian eriophyoids is still limited. So far, about 160 eriophyoid species have been reported from Iran. This research was carried out in Aliabad-e Katul city, Golestan Province, northeast Iran where there was no previous faunistic study of eriophyoid mites. The objective of this study is to provide an initial taxonomic and fauni

## MATERIAL AND METHODS

During seasonal growth of 2013, a field survey was conducted in Aliabad-e Katul, Golestan province of Iran. A variety of plant species in the study area were randomly investigated and sampled for potential eriophyoid symptoms and presence of mites. The infested plant materials were placed in plastic bags and transferred to the laboratory. The specimens were recovered from plant materials by means of direct observations under a dissecting microscope. Collected mites were preserved in 70 % ethyl alcohol and later mounted. Specimens were placed in lactophenol solution for one week in room temperature then mounted in Hoyer's medium for further study under an Olympus BH2 microscope at 40× and 100× objectives. Specimens were measured following de Lillo *et al.* (2010). Morphological terminology used here follows Lindquist (1996) and the generic classification is made

according to Amrine *et al.* (2003). All measurements are in micrometers ( $\mu\text{m}$ ). Specimens identified by Xiao-Feng Xue, Department of Entomology, Nanjing Agricultural University, China. Drawing and measurements done by the first author. Voucher specimens were deposited as slide mounted specimens at the Department of Plant Protection, Faculty of Agriculture, Ferdowsi University of Mashhad. Also, some specimens are held at Department of Entomology, Nanjing Agricultural University, China.

## RESULTS

### *Tetra salixis* (Xue, Song & Hong, 2006)

(Fig. 1)

Complete description of this species is available in Xue *et al.* (2006). However some small differences between materials collected in Iran and of the original ones is given in Table1.

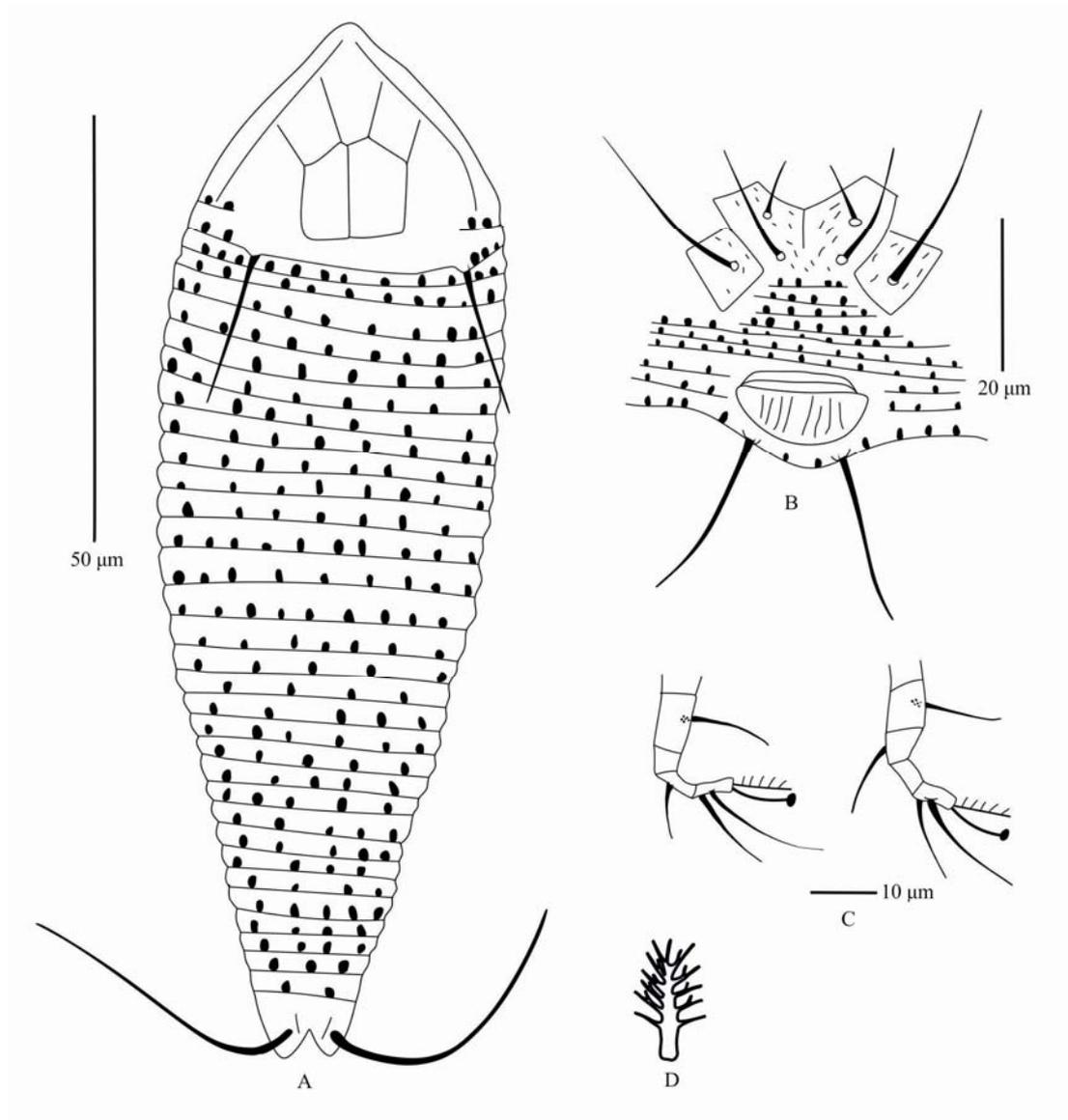
TABLE 1. Comparable measurements of females *Tetra salixis* from Iran and China ( $\mu\text{m}$ )

<i>Tetra salixis</i>	Iran	China
Length of body	132 (132–162)	200 (195–207)
Width of body	38 (38–51)	55 (53–57)
Length of gnathosoma	18 (18–22)	21 (20–23)
Length of prodorsal shield	27 (27–37)	37 (36–38)
Width of prodorsal shield	30 (30–38)	45 (43–47)
Length of setae <i>sc</i>	17 (17–19)	27 (25–30)
No. of dorsal annuli	31 (31–37)	31 (29–32)
No. of ventral annuli	65 (65–67)	67 (65–70)
Length of setae <i>c2</i>	13 (13–14)	16 (13–18)
No. of annuli of setae <i>c2</i>	12 (12–16)	12 (11–12)
Length of setae <i>d</i>	35 (33–38)	40 (35–44)
No. of annuli of setae <i>d</i>	25 (25–28)	24 (22–24)
Length of setae <i>e</i>	27 (27–29)	27 (23–30)
No. of annuli of setae <i>e</i>	40(40–43)	43 (41–44)
Length of setae <i>f</i>	29 (27–29)	30 (28–32)
No. of annuli of setae <i>f</i> from rear	6	6
Length of setae <i>h1</i>	3 (3–4)	4 (3–4)
Length of external genitalia	10 (10–12)	13 (13–14)
Width of external genitalia	17 (16–18)	20 (19–22)
Length of setae <i>3a</i>	19 (17–19)	21 (19–23)
No. of ridges on genital coverflap	7	8
Length of setae <i>1b</i>	8 (8–9)	8 (7–9)
Length of setae <i>1a</i>	18 (15–19)	20 (19–22)
Length of setae <i>2a</i>	26 (26–29)	32 (30–35)
Length of leg I	29 (29–31)	31 (29–33)
Length of femur I	10 (9–10)	9 (8–9)
Length of setae <i>bv</i> I	11 (10–11)	10 (9–11)
Length of genu I	5 (5–6)	5 (5–6)
Length of setae <i>1'1</i>	27 (25–27)	18 (17–19)
Length of tibia I	7 (7–8)	9 (8–9)
Length of setae <i>1'1</i>	10 (10–11)	6 (5–7)
Length of tarsus I	7 (6–7)	6 (5–6)
Length of leg II	23 (23–25)	25 (23–27)
Length of femur II	7 (6–8)	7 (6–8)
Length of setae <i>bv</i> II	11 (10–11)	10 (10–11)
Length of genu II	4 (4–5)	5 (4–5)
Length of setae <i>1'1</i>	10 (9–10)	9 (8–10)
Length of tibia II	5 (5–6)	6 (5–6)
Length of tarsus II	6 (5–6)	5 (5–6)

**Material examined:** Three adult females from North east Iran, Golestan Province, Aliabad-e Katul region (36°54'N; 54°53'E), altitude 140 m, ex *Salix caprea* Kilmarnock (Saliaceae), 23 July 2013, A. Gol coll.

**Relation to host:** Mites are vagrant on leaf surface.

**Distribution:** China (Xue *et al.*, 2006) & Iran (this study).



**FIGURE 1.** *Tetra salixis* Xue, Song & Hong, 2006: A) dorsal view of female; B) coxae and female genitalia; C) Leg I (left) & Leg II (right); D) empodium (Figs. original).

***Tegonotus depressus* (Nalepa, 1894)***Oxypleurites depressus* (Nalepa, 1894)

(Fig. 2)

**Description:** Female: (n=3) Body fusiform, 154 (151–159) long, 51 (49–54) wide; light yellow. Gnathosoma 14 (13–14), projecting obliquely down. Prodorsal shield 41 (38–41) long, 48 (46–48) wide; anterior shield lobe broad; Scapular tubercles ahead of rear shield margin, 14 (13–14) apart, scapular setae (*sc*) 6 (5–6) projecting centrad. Coxal area with short lines; anterolateral setae on coxisternum I (*1b*) 5 (4–5), proximal setae on coxisternum I (*1a*) 19 (17–19), proximal setae on coxisternum II (*2a*) 25 (22–25). Prosternal apodeme present. Legs with usual series of setae. Leg I 24 (23–24), femur 8 (8–9), setae *bv* 9 (9–10); genu 3 (3–4), setae (*l''*) 18 (17–19); tibia 4 (4–5), setae (*l'*) 6 (5–6); tarsus 5 (5–6); seta *ft'* 13 (13–14), seta *ft''* 19 (18–19), tarsal empodium (*em*) 4 (4–5), simple, 4-rayed, tarsal solenidion ( $\omega$ ) 7 (6–7), knobbed. Leg II 19 (19–20), femur 8 (7–8), setae (*bv*) 10 (10–11); genu 3 (3–4), (*l''*) 5 (5–6); tibia 4 (4–5); tarsus 4 (4–5); seta *ft'* 5(5–6), seta *ft''* 15 (14–16), tarsal empodium (*em*) 4 (4–5), simple, 4-rayed, tarsal solenidion ( $\omega$ ) 6 (5–6), knobbed. Opisthosoma: dorsal opisthosoma with 16 (15–16) broad annuli, smooth, ventrally with 62 (62–66) with rounded microtubercles. Setae *c*2 11 (10–11) on ventral annulus 14 (14–16); setae *d* 28 (25–28) on ventral annulus 24 (24–26); setae *e* 11 (11–12) on ventral annulus 38 (38–40), setae *f* 12 (11–12) on 7th ventral annulus from rear. Setae *b*1 5 (4–5), *b*2 36 (34–36). Female genitalia 9 (9–10) long, 17 (16–18) wide, genital coverflap with 8 longitudinal ridges, proximal setae on coxisternum III (*3a*) 12 (11–12).

**Male:** (n = 1) 135 long, 45 wide; genitalia 9, 13 wide, proximal setae on coxisternum III (*3a*) 7.

**Material examined :** Three adult females and one adult male from North East Iran, Golestan Province, Aliabad-e Katul region (36°54'N ; 54°53'E), altitude 140 m, ex *Corylus avellana* Contorta (Betulaceae) ,11September 2013, A. Golcoll.

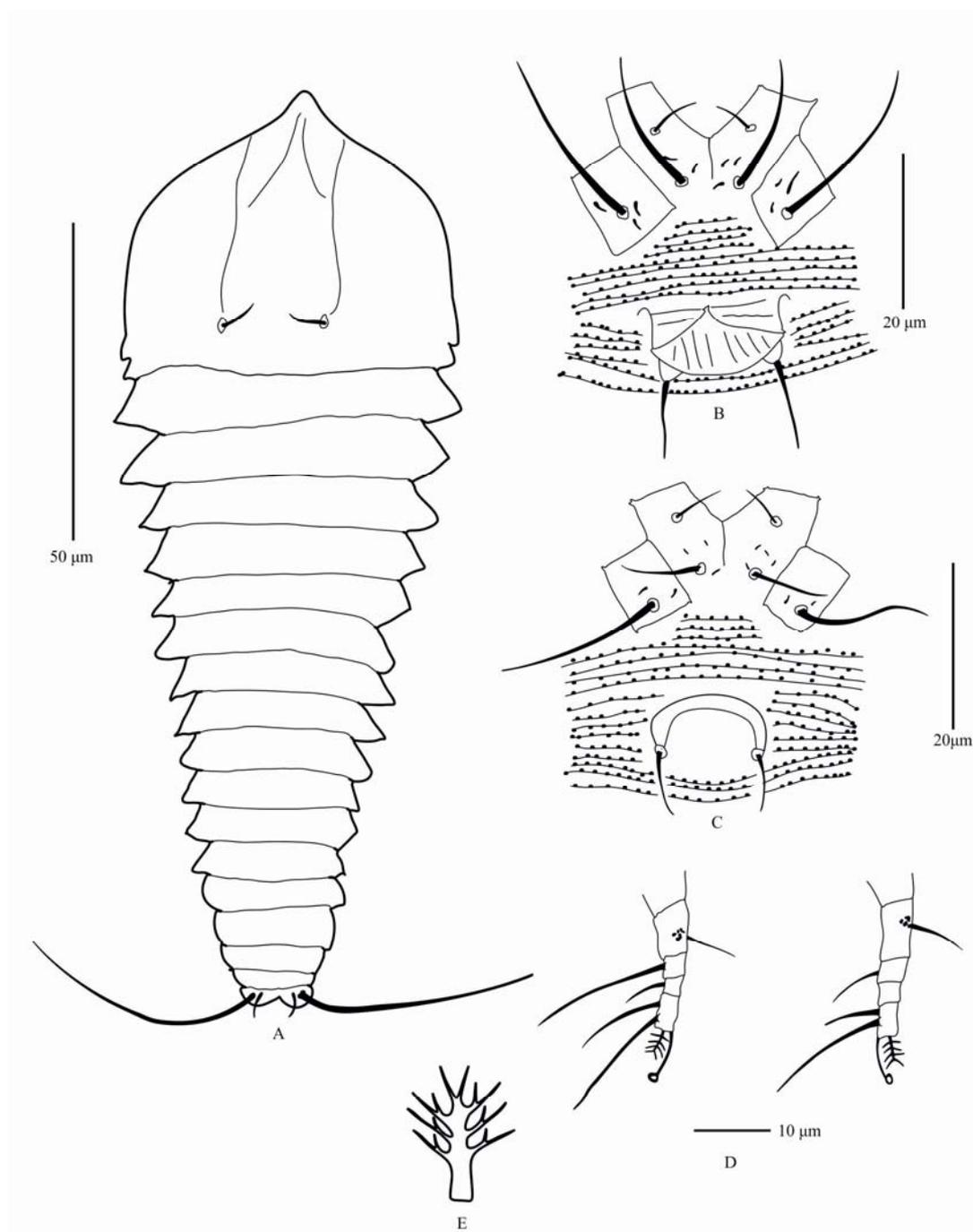
**Relation to host:** Mites are vagrant on leaf surface.

***Aceria salviae* (Nalepa, 1891)***Phytoptus salviae* (Nalepa, 1891)

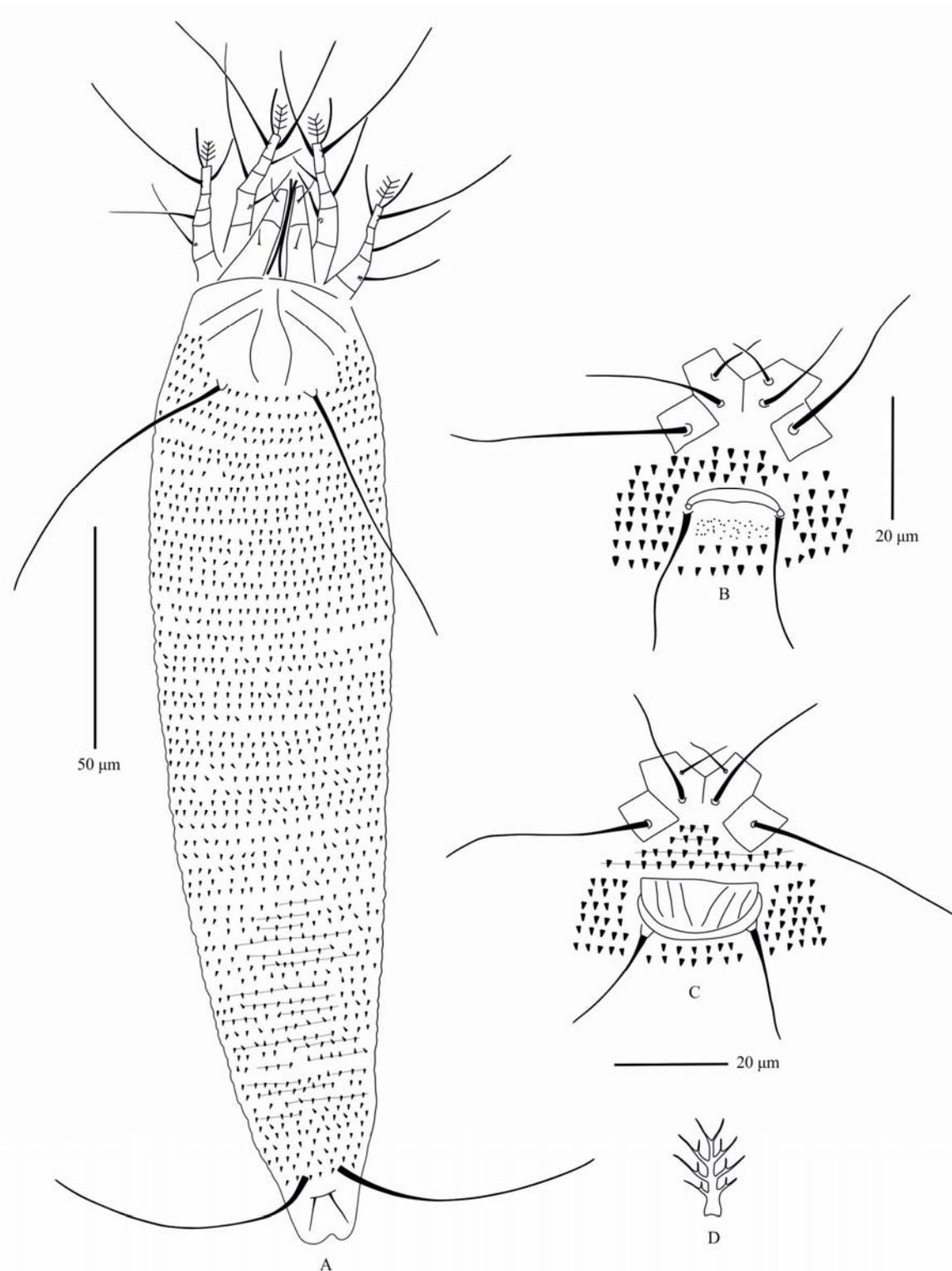
(Fig. 3)

**Description:** Female: (n = 3) Body vermiform, 238 (209–238) long, 50 (47–50) wide, 45 (40–45) thick; light yellow. Gnathosoma 22 (18–22), projecting obliquely downwards. Prodorsal shield 27 (25–27) long, 33 (31–33) wide; Scapular tubercles near rear margin, 19 (19–20) apart, scapular setae (*sc*) 68 (66–68) projecting posterior. Coxal area smooth; anterolateral setae on coxisternum I (*1b*) 11 (8–11), proximal setae on coxisternum I (*1a*) 29 (27–29), proximal setae on coxisternum II (*2a*) 40 (38–40). Prosternal apodeme present. Legs with usual series of setae. Leg I 34 (32–34), femur 9 (8–9), setae *bv* 13 (11–13); genu 4 (4–5), setae (*l''*) 28 (26–28); tibia 5 (4–5), setae (*l'*) 28 (27–29); tarsus 7 (6–7); seta *ft'* 24 (22–24), seta *ft''* 38 (36–39), tarsal empodium (*em*) 6 (5–6), simple, 4-rayed, tarsal solenidion ( $\omega$ ) 9 (8–9), tapered. Leg II 28 (27–28), femur 7 (6–8), setae *bv* 18 (17–18); genu 4 (4–5), setae (*l''*) 19 (18–19); tibia 4 (4–5); tarsus 6 (5–6); seta *ft'* 12 (11–13), seta *ft''* 31 (29–31), tarsal empodium (*em*) 6 (5–6), simple, 4-rayed, tarsal solenidion ( $\omega$ ) 9 (8–9), tapered. Opisthosoma: dorsal opisthosoma with 65 (62–66) annuli, with spiny microtubercles, ventrally with 64 (57–66) spiny microtubercles. Setae *c*2 19 (16–19) on ventral annulus 8 (6–8); setae *d* 43 (40–41) on ventral annulus 19 (16–19); setae *e* 12 (11–13) on ventral annulus 33(33–35), setae *f* 22 (19–22) on 7th ventral annulus from rear. Setae *b*1 6 (5–6), *b*2 59 (57–62). Female genitalia 10 (10–11) long, 19 (19–20) wide, genital cover flap with 6 longitudinal ridges, proximal setae on coxisternum III (*3a*) 18 (17–18).

Male: (n = 1) 201 long, 46 wide; genitalia 5, 14 wide, proximal setae on coxisternum III (*3a*) 20.



**FIGURE 2.** *Tegenotus depressus* (Nalepa, 1894): A) dorsal view of female; B) coxae and female genitalia; C) coxae and male genitalia; D) Leg I (left) & Leg II (right); E) empodium (Figs. original).



**FIGURE 3.** *Aceria salviae* (Nalepa, 1891): A) dorsal view of female; B) coxae and male genitalia; C) coxae and female genitalia; D) empodium (Figs. original).

**Material examined:** Three adult females and one adult male from North Iran, Golestan Province, Aliabad-e Katul region (36°54'N; 54°53'E), altitude 140 m, ex *Salvia* sp. (Lamiaceae), 16 July 2013, coll. A. Gol.

**Relation to host:** Mites cause mostly numerous, irregular, hairy epiphyllous pustules, at their underside covered by a white erineum consisting of simple or branched hairs.

**Distribution:** Austria, Bosnia and Herzegovina, Bulgaria, Croatia, Cyprus, French, Greece, Hungary, Italia, Romania, Slovenia, Yugoslavia, North Africa (last update 29 Aug 2013. Available from URL: <http://www.fau-naeur.org>) and Iran (this study).

### ***Epitrimerus gibbosus* (Nalepa, 1892)**

(Fig. 4)

**Description:** Female: (n = 3) Body vermiform, 121 (116–121) long, 41 (39–41) wide, 31 (27–31) thick; light yellow. Gnathosoma 17 (16–17), projecting obliquely down. Prodorsal shield 29 (26–29) long, 34 (31–34) wide; anterior shield lobe broad. Scapular tubercles ahead of rear shield margin, 16 (15–16) apart, scapular setae (*sc*) 16 (16–18) projecting centrad. Coxal area with short lines; anterolateral setae on coxisternum I (*1b*) 7 (7–8), proximal setae on coxisternum I (*1a*) 19 (17–19), proximal setae on coxisternum II (*2a*) 36 (35–36). Prosternal apodeme present. Legs with usual series of setae. Leg I 28 (26–28), femur 10 (9–10), setae *bv* 16 (14–16); genu 5 (5–6), setae *l''* 22 (20–22); tibia 6 (5–6), setae (*l'*) 10 (9–10); tarsus 5 (4–5); seta *ft'* 17 (17–18), seta *ft''* 24 (23–25), tarsal empodium (*em*) 7 (6–7), simple, 5-rayed, tarsal solenidium ( $\omega$ ) 9 (8–9), knobbed. Leg II 23 (21–23), femur 9 (8–9), setae *bv* 12 (11–12); genu 5 (4–5), setae *l''* 13 (11–13); tibia 4 (4–5); tarsus 5 (4–5); seta *ft'* 9 (9–10), seta *ft''* 21 (20–22), tarsal empodium (*em*) 6 (5–6), simple, 5-rayed, tarsal solenidium ( $\omega$ ) 9 (9–10), knobbed. Opisthosoma: dorsal opisthosoma with 68 (66–69) annuli, with round microtubercles, ventrally with 86 (75–86) annuli, with round microtubercles. Setae *c*2 14 (12–14) on ventral annulus 14 (13–14); setae *d* 35 (33–35) on ventral annulus 28 (26–28); setae *e* 15 (14–15) on annulus 54 (47–54), setae *f* 16 (16–17) on 7th ventral annulus from rear. Setae *b*1 4 (3–4), *b*2 29 (29–30). Female genitalia 9 (8–9) long, 15 (15–16) wide, genital cover flap with 10 longitudinal ridges, proximal setae on coxisternum III (*3a*) 12 (11–12).

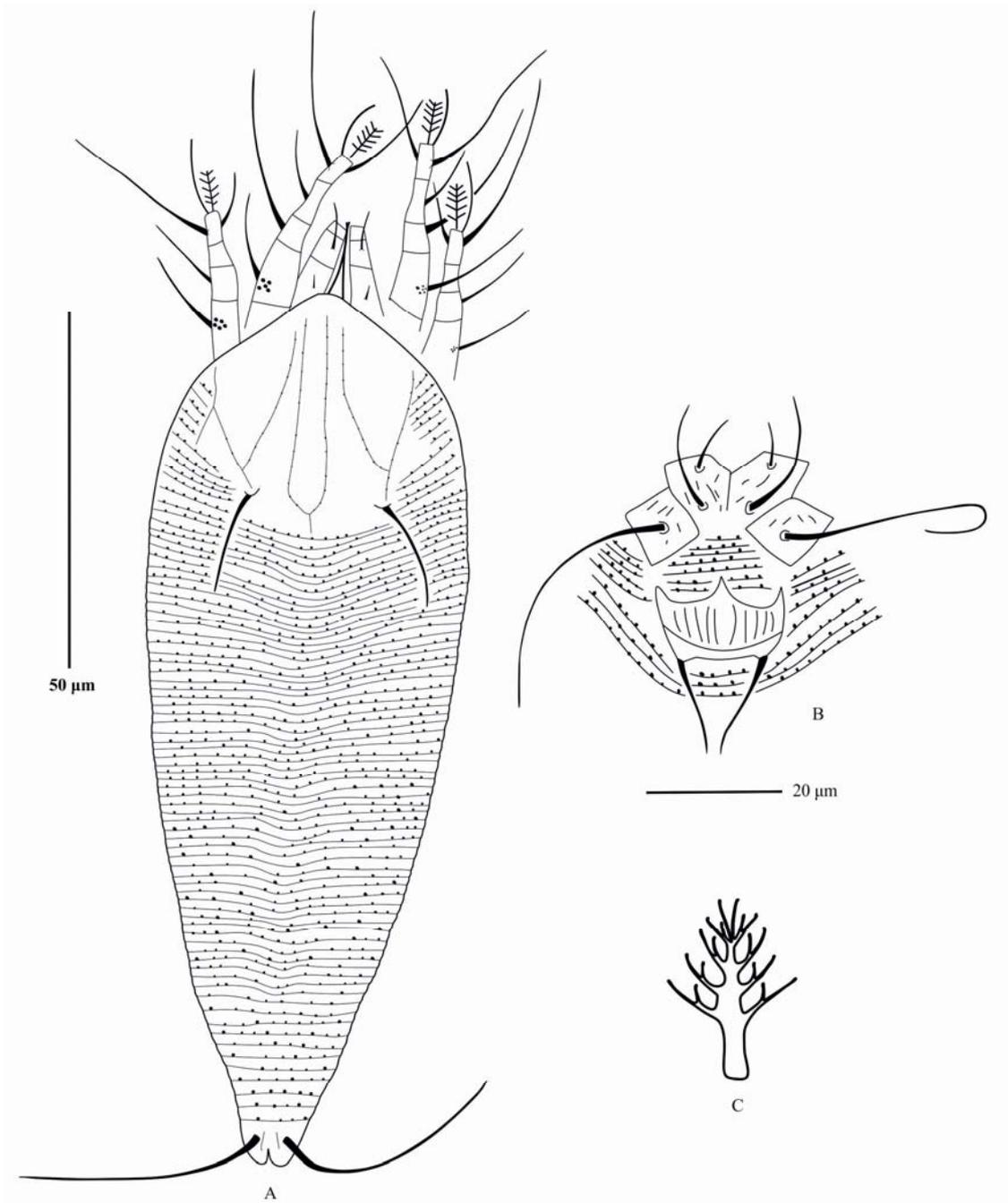
**Material examined:** Three adult females from North Iran, Golestan Province, Aliabad-e Katul region (36°54' N; 54°53' E), altitude 140 m, ex *Rubus fruticosus* L (Rosaceae), 28 September 2013, coll. A. Gol.

**Relation to host:** Mites are vagrant on leaf surface.

**Distribution:** Austria, Denmark, France, Germany, Hungary, Ireland, Italia, Poland, Russia Northwest, Yugoslavia, Near East, Oriental region (last update 29 Aug 2013. Available from URL: <http://www.fau-naeur.org>) and Iran (this study).

### **DISCUSSION**

In the first survey of Eriophyoidea in a small part of the Golestan province of Iran, Aliabad-e Katul region, four eriophyoid species belonging to four genera were collected and identified. Considering the high host specificity in many of Eriophyoidea, also, the presence of high vegetation in the province, and having unique flora, it is expected that further research will add more species to the fauna of Iran, and even to the world.



**FIGURE 4.** *Epitrimerus gibbosus* (Nalepa, 1892): A) dorsal view of female; B) coxae and female genitalia; C) empodium (Figs. original).

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