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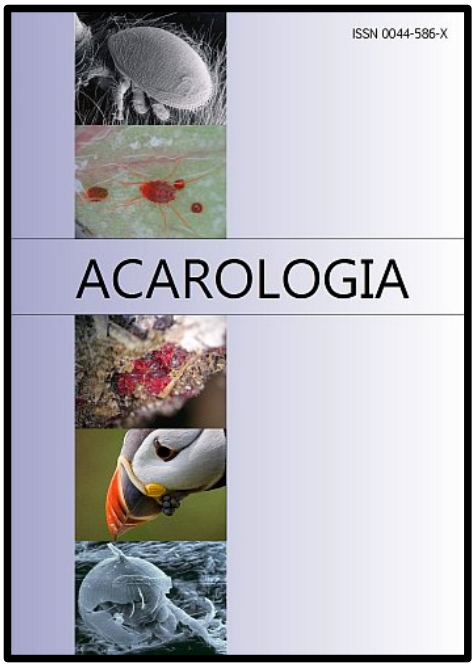

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A RE-DESCRIPTION OF *TYPHLODROMUS* (*ANTHOSEIUS*) *TAMARICIS* (KOLODOCHKA) (MESOSTIGMATA: PHYTOSEIIDAE), A FIRST RECORD FOR IRAN

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ABSTRACT — This paper reports the re-description of a species belonging to the family Phytoseiidae. *Typhlodromus* (*Anthoseius*) *tamaricis* is the first record of the Iranian phytoseiid fauna which was collected on *Tamarix gallica* in the Heiran region, Ardabil province, Iran.

KEYWORDS — predatory mite; Phytoseiidae; *Typhlodromus*; *Anthoseius*; Iran

INTRODUCTION

Predatory mites belong to several families, but among them the family Phytoseiidae is the most important, as it contains effective bio-control agents which are currently used to control mite pests, thrips, and other small soft body insects in various crops all around the world (Chant 1985; Sabelis 1985; Chant and McMurttry 1994; McMutrty and Croft 1997; Walter and Beard 1997). They generally are the only members of the Mesostigmata that have extensively exploited the foliage of higher plants (Chant and McMurtry 2007). They are mostly reported from aerial parts of plants but can also be found soil litter. Although they mostly feed on spider mites and small insects, some of them can also survive on honeydew and pollen (McMurtry and Croft 1997; Van Rijn *et al.* 2002; Nomikou *et al.* 2003). Many phytoseiid mite species are actually generalist predators with only a few being prey specialists, though several have been shown to be host plant specific (Beard and Walter 2001). Currently, there are approximately 340 nominal species in the subgenus *Typhlodromus* (*Anthoseius*) De Leon, 1959 (Denmark and Evans 2011; Hernandes *et al.* 2011), but only 16 species were recorded from Iran (Daneshvar and Denmark 1982; Faraji *et al.* 2007; Ueckermann *et al.* 2009; Jafari *et al.* 2011; Moraes *et al.* 2004).

This sub-genus differs from the subgenus *Typhlodromus* (*Typhlodromus*) by the presence of the dorsal setae *S5* and most species of them have the dorsal setal pattern 12A:8B. *Anthoseius* (*Amblydromellus*) *tamaricis* Kolodochka, 1982 was collected and described at first on Tamarix plants from Turk-

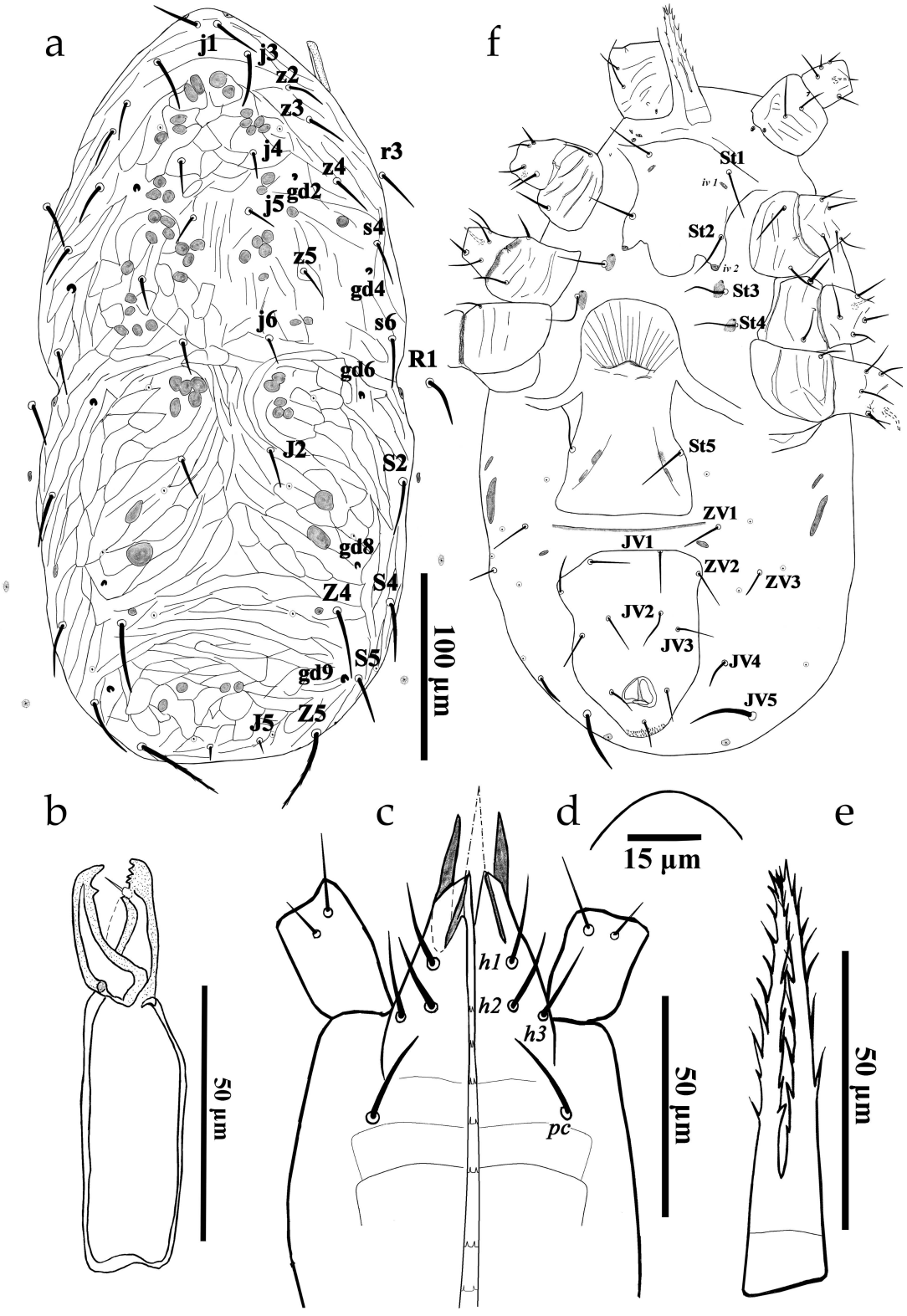

FIGURE 1: *Typhlodromus* (*Anthoseius*) *tamaricis* (female): a – Dorsal shield; b – Chelicerae; c – Hypostome; d – Tectum; e – Tritosternum; f – Ventral view of idiosoma.

menistan. Later, it has been re-described as *Typhlodromus* (*Anthoseius*) *tamaricis* (Kolodochka) by Kasap and Çobanoğlu (2009) on the same plant host from Turkey. This paper provides more information on intraspecific variations and comparative characters among the original and Turkish species and constitutes the 17th species of this subgenus recorded from the Iranian phytoseiid fauna and also an identification key to the species of *Typhlodromus* (*Anthoseius*) known from Iran.

MATERIALS AND METHODS

Mites were collected from leaves of Salt cedar tree, *Tamarix gallica* L. (Tamaricaceae), using a stereomicroscope. The mites were then directly mounted on slides microscope in Hoyer's medium (Walter and Krantz 2009). The slides were dried in an oven at about 50 °C and examined under an Olympus BX51 microscope (Differential Interference Contrast). A camera Lucida apparatus was used for the drawings. The classification system used follows that of Chant and McMurtry (2007). The setal notations follow the nomenclature proposed by Rowell *et al.* (1978) and dorsal setal pattern according to Chant and Yoshida-Shaul (1989); Organotaxy follow the nomenclature proposed by Athias-Henriot (1975). At last, terminology for spermatheca shape and morphology follows that of Wainstein (1973). All measurements are presented in micrometers (μm). Also a key to Iranian *Anthoseius* species mites are presented.

RESULTS

Re-description of *Typhlodromus* (*Anthoseius*) *tamaricis* (Kolodochka)

Family Phytoseiidae Berlese, 1916: 33. *Typhlodromus* Scheuten, 1857: 111. Sub-genus *Anthoseius* De Leon 1959: 258. Type species – *Anthoseius hebetis* De Leon 1959: 258. *Typhlodromus* (*A.*) *tamaricis* (Kolodochka, 1982).

Female (Figs. 1, 2) (n= 2) — Idiosoma oval. Length of body (excluding palp) 391 (388 – 394); (including palp) 559 (550 – 568). Idiosomal setal pattern: 12A:8A/JV:ZV. All idiosomal and leg setae smooth excluding *Z5*.

Dorsum (Fig. 1a) — Dorsal shield reticulated, 347 (335 – 358) long, 169 (168 – 170) wide at level of setae *R1*, with 17 pairs of smooth setae and 12 pairs of lyrifissures and five pairs of gland pores [solenostomes (*gd2, gd4, gd6, gd8, gd9*)]. Length of setae: Lengths of setae: *j1* 21 (20 – 22), *j3* 24 (23 – 25), *j4* 14 (12 – 16), *j5* 15 (14 – 15), *j6* 17 (16 – 17), *J2* 19 (18 – 20), *J5* 7 (5 – 8), *z2* 17 (16 – 17), *z3* 18 (17 – 19), *z4* 21 (19 – 22), *z5* 14 (13 – 15), *Z4* 33 (30 – 35), *Z5* 46 (42 – 49), *s4* 19 (18 – 19), *s6* 24 (22 – 25), *S2* 27 (25 – 29), *S4* 29 (28 – 29), *S5* 24 (22 – 25), *r3* 21 (20 – 22), *R1* 22 (20 – 23). All setae smooth excluding *Z5*.

Gnathosoma (Figs. 1b-d) — Three pairs of smooth hypostomal setae, *h1* 21(20 – 21), *h2* 18 (16 – 20), *h3* 19 (18 – 20) long and palp coxa with a pair of smooth setae, *pc* 23 (21 – 25). Hypostomal groove with seven rows of denticles, each with two denticles, corniculi distally pointed (Fig. 1c); fixed digit of chelicera 28 long, with four teeth plus a pilus dentilis 4 long, movable digit 27 (26 – 27) long and with a tooth (Fig. 1b); tectum convex 33 (32 – 33) wide (Fig. 1d).

Venter (Figs. 1e-f) — Tritosternum 76 (74 – 77) long, with two barbed laciniae (Fig. 1e). Venter of idiosoma with 8 pairs of opisthogastric setae. Sternal shield smooth, posterior margin with a median lobe and with two pairs of setae of similar lengths [*St1-2* 24 (21-26)] and two pairs of lyrifissures (*iv1-2*); setae *St3-4* set on small metasternal shields, each with one small lyrifissure. Genital shield 114 long, 75 (72 – 78) wide at level of base and with a pair of setae, *St5* 26 (24 – 27) long. Two pairs of elongate metapodal shields, primary shield almost twice as long as secondary shield [27 (26 – 28), 14 (13 – 14)]. Ventrianal shield smooth, 108 (105 – 110) long and 87 (85 – 88) widest region, four pairs of pre-anal setae *JV1* 20, *JV2* 20, *JV3* 19, *ZV2* 20 long and without pre-anal pores; para-anal setae *PA* 17 and postanal seta *PST* 16 (15 – 17) long. Opisthogastric cuticle bearing four pairs of setae on cuticle *ZV1* 21 (20 – 21), *ZV3* 13 (12 – 14), *JV4* 17 (16 – 17) and *JV5* 37 (33 – 40) long, all smooth; five pairs of lyrifissures and one pair of platelet and one elongate and slender transverse platelet between genital and ventrianal

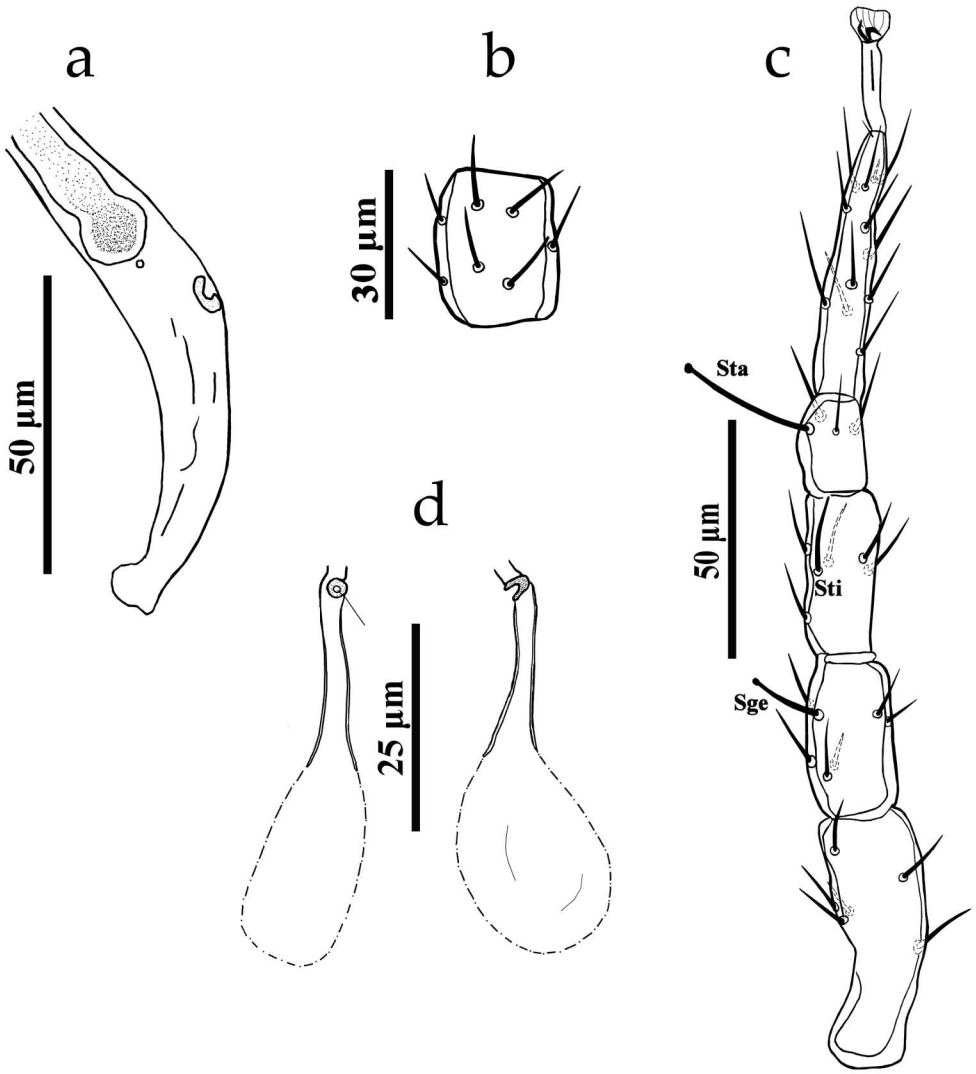

FIGURE 2: *Typhlodromus* (*Anthoseius*) *tamaricis* (female): a – Peritreme; b – Genu II; c – Leg IV; d – Spermatheca.

shields (Fig. 1f).

Spermatheca (Fig. 2d) — Calyx tube-like 18 – 21 long and gradually flares towards vesicle; atrium completely occupied by lips, without neck between calyx and atrium, C shaped (Fig. 2d).

Peritreme (Figs. 1a, 2a) — Stippled; extending to level of setae *j3*, 208 (195 – 220) long.

Legs (Figs. 2b-c) — Length of legs (including pretarsus) as follows: Leg I 265, leg II 233 (230 – 235), leg III 238 (235 – 240) and leg IV 312 (307 – 317). Length of macrosetae as follows: Sge IV 18 (15 – 21), knobbed; Sti IV 22 (21 – 22), pointed; Sta IV 39 (36 – 41), knobbed. Genua I-IV with 10-7-7-7 setae (Figs. 2b-c).

Material examined — The specimens were collected from the Salt cedar tree, *Tamarix gallica* L.: Tamaricaceae, in the Heiran region (38° 26′ N, 48° 35′ E, 1474 m a. s. l.), 28 ix 2008, Ardabil province, Iran, by B. Asali Fayaz. They have been deposited in the Collection of the Acarology Laboratory, University of Bu-Ali Sina, Hamedan, Iran.

Remarks — The Iranian specimens closely resemble the original description by Kolodochka (1982) from Turkmenistan and re-description of Kasap and Çobanoğlu (2009) from Turkey. However, we can note some morphological variation as follows: the posterior part of the sternal shield bears a median lobe in one out of the two Iranian specimens but is absent in Turkmen (personal communication) and Turkish specimens; sternal setae *St3* is inserted on separate platelets in the former as on the soft cuticle of the body in the original description and Turkish re-description; a slender transversal linear plates between the genital and ventrianal shields in the Iranian specimen whereas four and five small linear plates are observed on the Turkmen and Turkish specimens, respectively; seta *Z4* and *JV5* smooth in the present re-description whereas they are serrated in the Turkish specimens; primary metapodal shield more elongate in the Iranian and Turkmen specimens; measurement of dorsal setae: *j3* 23 – 25 and *S5* 22 – 25 Vs. 15 and 15 in the original description.

Key to female Iranian *Typhlodromus* (*Anthoseius*) De Leon (Modified from Faraji *et al.* 2007).

1. Ventrianal shield with three pairs of preanal setae..... 2
— Ventrianal shield with four pairs of preanal setae..... 4

2. Ventrianal shield with a pair of pores 3
— Ventrianal shield without any pore..... ..... *T.* (*A.*) *rodriguezi* (Denmark and Daneshvar)

3. Ventrianal shield with seta *JV3*, seta *JV1* inserted out of Ventrianal shield, macroseta basitarsus IV 35 long ..... *T.* (*A.*) *intercalaris* Livshitz and Kuznetsov
— Ventrianal shield without seta *JV3*, seta *JV1* inserted on Ventrianal shield, macroseta basitarsus IV 52 long ..... *T.* (*A.*) *haiastanius* (Arutunjan)

4. Posterior opisthosomal seta *Z5* knobbed apically.....5
— Posterior opisthosomal seta *Z5* pointed apically.....6

5. Calyx of spermatheca tubular and narrow; movable digit of chelicera with one tooth; *Z5* 45 long; posterior margin of sternal shield concave..... ..... *T.* (*A.*) *caudiglans* Schuster
— Calyx of spermatheca poculiform; movable digit of chelicera with two teeth; *Z5* 58 long; posterior margin of sternal shield with a median lobe..... ..... *T.* (*A.*) *persianus* McMurtry

6. Peritreme reaching seta *j1* or level between *j1-j3* or *j3-z2*.....7
— Peritreme not reaching seta beyond *z2*.....13

7. Dorsal shield heavily sclerotized; neck of spermatheca membranous ..... *T.* (*A.*) *bakeri* (Garman)
— Dorsal shield not heavily sclerotized; spermatheca without membranous part.....8

8. Movable digit of chelicerae with one tooth 9
— Movable digit of chelicerae with more than one tooth.....12

9. Ventrianal shield without pore; two knobbed macrosetae on basitarsus and genu IV..... .....*T.* (*A.*) *tamaricis* (Kolodochka)
— Ventrianal shield with a pair of pores, with one pointed macrosetae (setiform) on basitarsus IV, genu IV without macrosetae 10

10. Calyx of spermatheca with a length: width ratio of 1-1.5:1.....11
— Calyx of spermatheca with a length: width ratio of 2-2.5:1.....*T.* (*A.*) *rhenanus* (Oudemans)

11. Sternal shield with two pairs of setae..... .....*T.* (*A.*) *kerkirae* Swirski and Ragusa
— Sternal shield with three pairs of setae..... .....*T.* (*A.*) *georgicus* Wainstein

12. *Z5* 66 long, movable digit of chelicerae with three teeth; *S4* shorter than *Z4* (about half) .. *T.* (*A.*) *vulgaris* Ehara
— *Z5* 55 long, movable digit of chelicerae with two teeth; *S4* subequal to *Z4* ..... *T.* (*A.*) *dalfardicus* (Daneshvar)

13. Dorsal shield with 5 pairs of large pores (*gd2, gd4, gd6, gd8, gd9*); movable digit of chelicerae edentate..... .....*T.* (*A.*) *bagdasarjani* Wainstein and Arutunjan [= *T.* (*A.*) *kettanehi* Dosse]
— Dorsal shield with less than 5 pairs of large pores; movable digit of chelicerae with one tooth 14

14. Dorsal shield with 4 pairs of large pores (*gd2, gd6, gd8, gd9*).....*T.* (*A.*) *khosrovensis* Arutunjan
— Dorsal shield with 3 pairs of large pores (*gd2, gd6, gd9*) 15

15. Ventrianal shield with a pair of pores..... .....*T.* (*A.*) *neyshabouris* (Denmark and Daneshvar)
— Ventrianal shield without any pores 16

16. Macroseta on basitarsus of leg IV with pointed tip (setiform)..... .....*T.* (*A.*) *torbatejamae* (Denmark and Daneshvar)
— Macroseta on basitarsus of leg IV with knobbed tip.....*T.* (*A.*) *iranensis* (Denmark and Daneshvar),suspected junior synonym of *T.* (*A.*) *kazachstanicus* Wainstein.

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