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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; McMurtty 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 McMurry 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)**


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 RI, 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), j2 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), RI 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 [S1–1 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 JVS 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


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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-s2 ................................7
   — Peritreme not reaching seta beyond s2 ...........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

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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)


12. Z5 66 long, movable digit of chelicerae with three teeth; S4 shorter than Z4 (about half) . T. (A.) vulgaris Ebara
    — 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 Arutjunjan [= 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 Arutjunjan
    — 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. Macrosetae 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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