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RE-DESCRIPTION OF
TYPHLODROMUS (ANTHOSEIUS) KHOSROVENESIS
ARUTUNJAN,
FIRST RECORD FOR IRAN
(ACARI: PHYTOSEIIDAE)

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SUMMARY: Typhlodromus (Anthoseius) khosrovensis Arutunjan is re-described from Malus domestica, Alavijeh, Isfahan, Iran. It is a first record for Iran. A key to the Iranian species of Typhlodromus is given.

INTRODUCTION

To date 18 Iranian species of Typhlodromus (Anthoseius) are known from Iran (FARAJI, et al., 2007). KHALIL-MANESH (1973) reported T. (A.) rhe-nanus Oudemans on Malus sp. at Tehran. McMURTRY (1977) described T. (A.) persianus from citrus at Minab and reported T. (A.) bagdasarjani Wainstein & Arutunjani (=T. (A.) kettanehi Dosse) from citrus at Kazerun. He also conducted tests to determine the fecundity rates of this species on different foods and found that the highest rate occurred on a combination of Tetranychus pacificus McGregor eggs and larvae plus Malephora crocea (Jacq.) pollen. DANESHVAR (1980) reported T. (A.) kazachstanicus Wainstein from Malus sp. at Damavand and Orooomiyeh. DANESHVAR & DENMARK (1982) described four new species. DANESHVAR (1987) added another new species and recorded T. (A.) kerkeriae Swirski & Ragusa for the first time from Iran. FARAJI et al. (2007) ordered the Iranian phytoseiids with their extensive key to the phytoseiids of Iran. Typhlodromus (Anthoseius) khosrovensis is re-described here which bring the total of T. (Anthoseius) species known from Iran to 19.

The present study was conducted during 2001 to 2003, by the second author, in the western region of Isfahan Province, to determine the phytoseiid species present in fruit orchards for the purpose of selecting beneficial species that might be included in pest management programs. DANESHVAR (1987) recorded the Neoseiulus zwoelferi (Dosse) from a Prunus sp from Dorche, Isfahan, apparently the only phytoseiid known from this province to date in spite of many

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Figs. 1-5. *Typhlodromus (Anthoseius) khosrovensis* Arutunjan. Female. 1.— Dorsum. 2.— Venter. 3.— Chelicera. 4.— Spermatheca. 5.— Leg IV.
surveys conducted all over Iran (Sepasgozarian, 1977, Khalil-Manesh, 1973, Daneshvar & Denmark, 1982 and Daneshvar, 1987).

The key of Faraji et al. (2007) are used here to compare T. (A.) khosrovensis with the known Iranian species.

We followed the setal notations of Rowell et al. (1978) and the classification system of Chant & McMurtry (1994) and all measurements are in micrometer (µm). First measurement is that of the holotype (Arutunjan, 1971- where available), those in brackets are the range, followed by the mean.

**Material and Methods**

Samples were taken at ten-day intervals during spring to early autumn from soil, leaves, fruit and ground cover (weeds amongst trees) from five orchards. Five trees in each orchard were selected randomly. Mites from the leave, fruit, weed and soil samples were extracted by means of a Berlese funnel and collected in 70% ethanol. Lactophenol and Nesis’s solution were used to clear the mites and subsequently mounted in Hoyers.

*Typhlodromus (Anthoseius) khosrovensis* Arutunjan (Figs. 1-5)

*Typhlodromus khosrovensis* Arutunjan, 1971: 306

**Diagnosis.** — The following combination of characters seems to be unique for T. (A.) khosrovensis: Dorsal shield ornamented and with four pairs of large pores (gd2, gd6, gd8 and gd9), all dorsal setae smooth except for setae Z4 and Z5 which are serrated; peritremes extend to level of setae z4; sternal shield smooth with two pairs of setae, with ST3-4 on small platelets; ventrianal shield is slightly creased with four pairs of pre-anal setae but lacks pre-anal pores; fixed cheliceral digit with four teeth and movable digit with one tooth; calyx of spermatheca cup-shaped with atrium incorporated in calyx; geni I with eight setae and leg IV with one knobbed macroseta.

**Female** (Specimens measures: five):

*Dorsum* (Fig. 1) — Dorsal shield 322 (308-340) 325 long and 150 (152-170) 159 wide, elongate-oval and reticulated. With 18 pairs of smooth setae, except for Z4 and Z5 which are serrated and four pairs of large pores (gd2, gd6, gd8 and gd9) and five pairs of small pores. Female idiosomal setal pattern 12A:8A/JV:ZV.

**Setal lengths:** j1 21 (20-25) 23, j3 29 (30-36) 32, j4 19 (16-20) 18, j5 19 (18-19) 18, j6 23 (23-26) 25, j2 28 (25-29) 27, J5 5 (4-5) 4, z2 23 (22-26) 23, z3 26 (29-32) 31, z4 26 (25-28) 28, z5 19 (14-22) 19, Z4 49 (40-45) 43, Z5 63 (55-60) 57, s4 31 (34-35) 35, s6 36 (35-40) 38, S2 37 (35-41) 38, S4 35 (33-36) 35, S5 17 (18-22) 20, r3? (27-30) 29 and RI? (31-34) 32.

**Peritreme** — Extending to level of setae z4.

**Venter** (Fig. 2) — All ventral setae smooth. Distances between ST1 – ST3 (63-67) 65, ST2 – ST2 (50-55) 52 and ST5 – ST5 (48-52) 50. Two pairs of metapodal shields with primary shield long and slender. Opisthogastric cuticle with four pairs of setae, seven pairs of small platelets and a slender platelet between genital and ventrianal shields. Setae JV5 long and smooth. Sternal shield with two pairs of setae and two pairs of small pores. Posterior margin of sternal shield with a medial lobe. Setae ST3 and ST4 on small platelets. Third pair of sternal pores associated with ST4. Sternal and genital shields smooth. Ventrianal shield (103-111) 107 long, (71-77) 75 wide at level of setae ZV2 and (67-73) 70 at anal level. Ventrianal shield slightly creased. Para-anal setae close to anterior margin of anal opening. Pre-anal pores absent. Setae Jv1-3 and Zv2 on ventrianal shield and setae Zv1, Zv3, Jv4 and JV5 on surrounding membrane.

**Chelicera** (Fig. 3) — Movable digit (25-26) 25 long, with one tooth and fixed digit (22-25) 24 long, with four teeth and a pilus dentilis.

**Spermatheca** (Fig. 4) — Calyx (8-13) 10 long, cup or bell-shaped. Atrium incorporated in calyx.

**Legs** (Fig. 5) — Only one knobbed macroseta on basatarsus IV, 49 (44-47) 45 long. Chaetotaxy of genu II: 2-2/1, 2/0-1 and genu III: 1-2/1, 2/0-1.

**Remarks.** — The Iranian specimens correspond with the description of T. (A.) khosrovensis in all respects. However, the peritreme of the Iranian specimens extends to the level of z4 but in the Russian specimens it reaches the level of setae s4. The shape
of the ventrianal shield also differs with the anterior margin straight in the Russian specimens but straight only between setae JV1 in the Iranian specimens.

**Material examined** — Six females from *Malus domestica*, Alavijeh (Isfahan), August 2003, M. Jalaeian. The specimens will be deposited in the museum of the University of Tehran (Karaj), Iran and one female in the National Collection of Arachnida. ARC-Plant Protection Research Institute. Pretoria, South Africa.

**Key to the Iranian species of Typhlodromus (Anthoseius) species based on the key of Faraji et al. (2007).**

1. Seta S5 present.............. subgenus *Anthoseius* De Leon=2
2. Seta S5 absent................ subgenus *Typhlodromus* Scheuten=15
3. Ventrianal shield with three pairs of preanal setae........ 3
4. Ventrianal shield with four pairs of preanal setae........ 4
5. Ventrianal shield with a pair of pores; macroseta on basitarsus IV 35 long; posterior margin of sternal shield convex........... *T. (A.) intercalaris* Livshitz & Kuznetsov
6. Ventrianal shield without any pores; macroseta on basitarsus IV 50 long; posterior margin with a median lobe. ........ *T. (A.) rodriguizi* (Denmark & Daneshvar)
7. Seta Z5 knobbed apically................... 5
8. Seta Z5 pointed apically ..................... 6
9. Calyx of spermatheca tubular and narrow; movable digit of chelicera with one tooth; Z5 45 long............................................. *T. (A.) caudiglans* Schuster
10. Calyx of spermatheca puculiform; movable digit of chelicera with two teeth; Z5 58 long............................................. *T. (A.) persianus* McMurtry
11. Peritreme reaching seta /l or level between /j3 and /j1........ 7
12. Dorsal shield heavily sclerotized; distal half of calyx membranous............... *T. (A.) bakeri* (Garman)
13. Dorsal shield not heavily sclerotized; calyx without membranous part .................. 8
14. Movable digit of chelicerae with one tooth ........... 9
15. Movable digit of chelicerae with more than one tooth ................. 10
18. Z5 66 long; movable digit of chelicerae with 3 teeth; S4 shorter than Z4 (about half)........ *T. (A.) vulgaris* Ehara
19. Z5 55 long; movable digit of chelicerae with 2 teeth; S4 subequal to Z4 .......... *T. (A.) dalfardicus* (Daneshvar)
20. Dorsal shield with 5 pairs of large pores; movable digit of chelicerae smooth .............. *T. (A.) bagdasarjani* Wainstein & Arutunian
21. Dorsal shield with 4 pairs of large pores; movable digit of chelicerae with one tooth ............ 12
22. Dorsal shield with 3 pairs of large pores; ventrianal shield with or without preanal pores; spermatheca sacular or fundibular; macroseta on basitarsus knobbed or pointed .................. 13
23. Dorsal shield with 4 pairs of large pores; ventrianal shield without pre-anal pores; spermatheca pucular; macroseta with small knob ........................................ *T. (A.) khosroensis* Arutunian.
24. Ventrianal shield with a pair of pores............................... *T. (A.) neysahbouris* (Denmark & Daneshvar)
25. Ventrianal shield without any pores............................. 14
26. Macroseta on basitarsus leg IV with pointed tip............... *T. (A.) torbatejamae* (Denmark & Daneshvar)
27. Macroseta on basitarsus leg IV with knobbed tip.................. *T. (A.) iraniensis* (Denmark & Daneshvar) suspected junior synonym of *T. (A.) kazachstanicus* Wainstein
28. Ventrianal shield with three pairs of preanal setae; setae on dorsal shield short................................. *T. (A.) leptodactylus* (Denmark & Daneshvar)
29. Ventrianal shield with four pairs of preanal setae; setae on dorsal shield longer......................... 16
30. Dorsal shield with three pairs of prominent pores 77.................. *T. (T) cotoneastri* Wainstein
31. Dorsal shield with four pairs of prominent pores........... 17
32. Calyx of spermatheca cup-shaped with neck long; seta JV5 equal to Z4 .......... *T. (T) cotonenastri* Wainstein
33. Calyx of spermatheca without neck; seta JV5 longer than Z4 .......... *T. (T) athiasae* Porath & Swirski *f=* *T. (T) peribus* Wainstein & Arutunian
34. Calyx of spermatheca shorter than 20 I-lm; Z4 27 long................ *T. (T) laurae* Arutunian

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