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Source: Systematic and Applied Acarology, 17(3) : 254-260

Published By: Systematic and Applied Acarology Society

URL: https://doi.org/10.11158/saa.17.3.5

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Systematic & Applied Acarology 17(3): 254–260. ISSN 1362-1971

Article

First description of the male of *Transeius avetianae* (Arutunjan & Ohandjanian) (Mesostigmata: Phytoseiidae) and redescription of the female

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Abstract

The male of *Transeius avetianae* (Arutunjan & Ohandjanian), collected in Zanjan Province, Iran is described for the first time. The female is re-described from a collection large enough (n = 67) to examine morphometric variations. The measurements of female morphological characters collected from Iran are compared with those given in the original description from Armenia. A key to the species of *Transeius* recorded from Iran is also given.

Key words: Iran, Male, Phytoseiidae, Re-description, *Transeius avetianae*

Introduction

Phytoseiid mites are predators of spider mites and other small mites and insects. Some species also feed on nematodes, fungal spores, pollen and exudates from plants, but rarely plant tissue (Chant 1985, 1992; Overmeer 1985). Several members of this family are of great importance in the biological control of spider mites and thrips in greenhouse crop production (Gerson *et al.* 2003; Zhang 2003). The Phytoseiidae is a large family with worldwide distribution. About 2300 species belonging to over 90 genera are known in the world (Beaulieu *et al.* 2011; Chant & McMurtry 2007). From Iran, more than 70 species of Phytoseiidae have been reported as new species or new records (Khalil-Manesh 1973; McMurtry 1977; Sepasgosarian 1977; Daneshvar 1980, 1987; Daneshvar & Denmark 1982; Hajizadeh *et al.* 2002; Kolodochka *et al.* 2003; Faraji *et al.* 2007; Rahmani *et al.* 2010). The genus *Transeius* Chant and McMurtry of the subfamily Amblyseiinae (Mesostigmata: Phytoseiidae) has 43 nominal species. Three species, belonging to the genus, are recorded from Iran (Faraji *et al*., 2007; Rahmani *et al*., 2010). Chant and McMurtry (2004) created this genus for those amblyseiine species having the following morphological characters: ratio of seta s_4 more than three times longer than Z_1, seta ratio s_4:S_2< 2.7:1, setae S_5 present, setae z_2, z_4, S_4, S_5 and dorsocentral setae short to minute, and setae s_4, Z_4 and Z_5 prominent. All the species have the female idiosomal setal pattern 10A:9B/JV –3: ZV, with 33 pairs of setae. Most species in the genus were collected in the Northern Hemisphere (Chant & McMurtry 2007).

During a survey to determine the diversity of Phytoseiidae species in Zanjan county of Iran, in 2010–2011, the species *Transeius avetianae* Arutunjan and Ohandjanian (1972) was collected from the habitats of rotten wood, leaf litter, soil under fruit trees and fungi. *Transeius avetianae* was

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originally collected in Armenia (Khosrov, Ararat) in leaf litter and was described based on three female specimens (Arutunjan & Ohandjanian 1972). It was also recorded in Ukraine by Kolodochka and Sklyar (1981) and mentioned by Arutunjan (1977) and Beglyarov (1981). This species was recorded from Iran by Pakyari *et al.* (2007) without providing any morphological characteristics. In this paper, we re-describe the female of *T. avetianae* from numerous specimens and describe the male of this species for the first time. We also compare the morphology of specimens found in Iran with those given in the original description by Arutunjan and Ohandjanian (1972).

Materials and methods

Mites were extracted from samples of plant foliage, litter, wood fungi and soil using a Berlese/Tullgren funnel or by direct examination under a stereomicroscope. Samples were taken weekly from various areas and habitats in Zanjan county, Iran. The samples were collected mainly from unsprayed areas during the growing seasons of 2010–2011. More than 700 phytoseiid specimens were sorted out and preserved in 70% ethanol. Mites were cleared in lactophenol solution and mounted in Hoyer's medium on microscope slides. Mites were identified according to Chant and McMurtry (2004). Setal nomenclature follows Lindquist and Evans (1965) and Rowell *et al.* (1978). All measurements are given in micrometers (μm). The voucher slide mounted material is deposited in the mite collection of the Department of Plant Protection, Faculty of Agriculture, University of Zanjan, Iran and in the Acari collection of MITOX Consultants, Amsterdam, The Netherlands.

Results

***Transeius avetianae* (Arutunjan & Ohandjanian)**
Amblyseius avetianae Arutunjan & Ohandjanian, 1972
Amblyseius (*Amblyseius*) *avetianae*.—Arutunjan, 1977
Typhlodromips avetianae.—Moraes *et al.*, 2004
Transeius avetianae.—Chant & McMurtry, 2004
(Figures 1–8)

FEMALE (n=67) (Figures 1–5)—(measurements: mean followed by their respective ranges).

Dorsal idiosoma (Figure 1)—Dorsal setal pattern: 10A: 9B. Dorsal shield oval slightly reticulated, length of dorsal shield 327 (310–370), width at level of j_6 190 (170–213), with 19 pairs of dorsal setae (including r_3 and R_1) and 21 pairs of pores (7 pairs solenostomes gd_1, gd_2, gd_4, gd_5, gd_6, gd_8 and gd_9, 14 poroids); Setae s_4, S_2, S_4, z_4, Z_4 and Z_5 are relatively longer and j_4, j_5, j_6, J_2, J_5 and z_5 are shorter; dorsal setae smooth, except for Z_4 and Z_5, serrate. Length of dorsal setae : j_1 24 (23–28), j_3 31 (27–46), j_4 13 (12–15), j_5 12 (9–16), j_6 18 (13–24), J_2 17 (12–22), J_5 11 (10–14), z_2 32 (20–40), z_4 38 (33–44), z_5 11 (9–13), Z_1 20 (13–28), Z_4 69 (60–78), Z_5 85 (70–99), s_4 62 (51–70), S_2 60 (50–67), S_4 35 (28–43), S_5 23 (16–29); Setae r_3 18 (14–25) and R_1 18 (15–24) on lateral integument.

Peritreme—Extending forward to level of j_1.

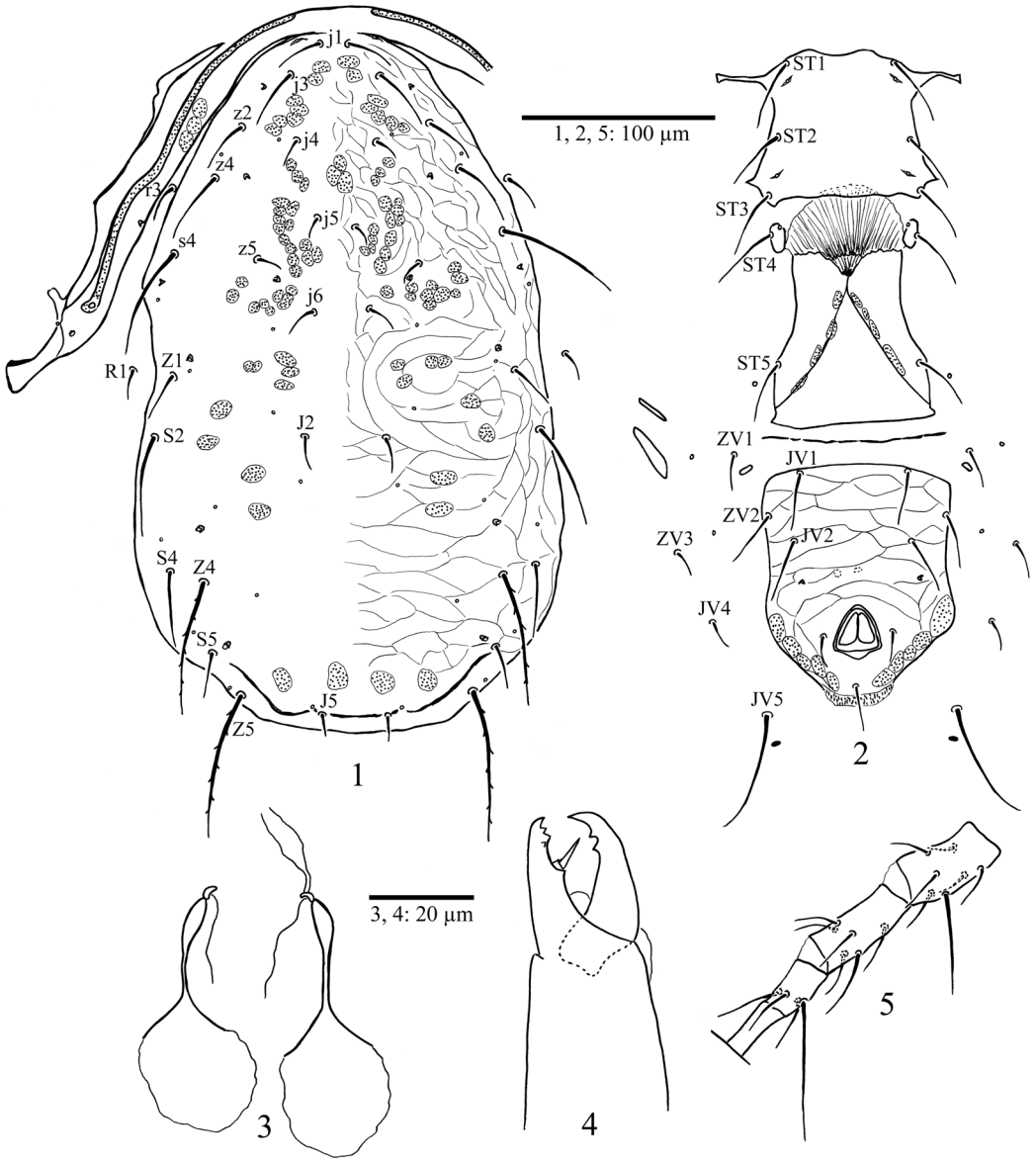
Ventral idiosoma (Figure 2)—Ventral setal pattern: JV–3: ZV. Sternal shield smooth, 69 (65–75) long and 75 (73–78) wide at level of seta ST_2; with 2 pairs of pores and 3 pairs of setae, ST_1 28 (23–33), ST_2 25 (23–28) and ST_3 24 (23–25); ST_1–ST_1 55 (53–56), ST_2–ST_2 69 (65–70) and ST_1–ST_3 67 (65–69); metasternal shield 14 (13–15) long and 7 (6–8) wide, with a pore and a seta ST_4 27 (25–28); genital shield smooth, width (at level of seta ST_5) 74 (70–75); ST_5 35 (32–37) long and ST_5–ST_5 72 (68–73); ventrianal shield pentagonal, striated with 3 pairs of preanal setae JV_1 23 (19–

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25), JV_2 25 (23–30) and ZV_2 26 (23–30); ventrianal shield with 1 pair of preanal pores posterior to JV_2, distance between these pores 27 (25-30); length of ventrianal shield 113 (93–133), width at ZV_2 level 84 (60–95); ZV_1 25 (24–25), ZV_3 13 (10–15), JV_4 18 (15–20) and JV_5 64 (52–68); 2 pairs of moderately large metapodal shields, primary 33 (30-37) long and accessory 18 (15-20) long.

Spermatheca (Figure 3, Plate 1B)—Spermatheca with calyx elongate and bladder like, swollen basally then narrowing and flaring distally, 31 (28–35) long, atrium kidney-shaped.

Legs (Figure 5, Plate 1C)—Genua and tibiae I–II–III–IV with 10–8–7–7 and 10–7–7–6 setae, respectively; SgeIII 23 (19–25), SgeIV 38 (30–50), StiIV 35 (30–45) and StIV 55 (40–75) long.



FIGURES 1–5. *Transeius avetianae* (Arutunjan & Ohandjanian), female, 1. Dorsal view, 2. Ventral view, 3. Spermathecae, 4. Chelicera, 5. Genu, tibia and basitarsus IV.

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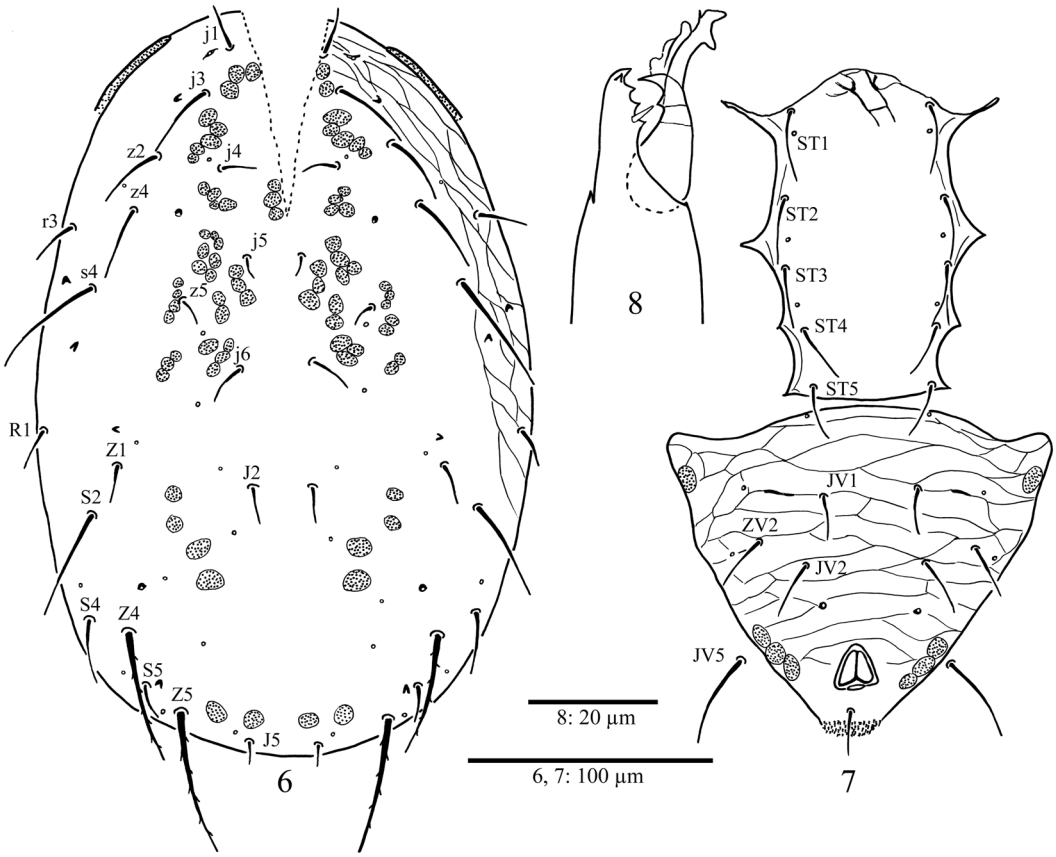
Chelicera (Figure 4, Plate 1A)—Fixed digit 31 (30–33) long, with 4 teeth (one of the teeth is tiny and offset) and pilus dentilis. Movable digit 29 (28–30) long, with 2 teeth.

MALE (Figures 6–8) (n=6)—(measurements: mean followed by their respective ranges).

Dorsal idiosoma (Figure 6)—Dorsal shield oval, smooth with few anterolateral striae, 272 (260–290) long, 168 (160–175) wide at level of j_6, with 19 pairs of dorsal setae and 21 pairs of pores as in female, only setae Z_4 and Z_5 serrated, the other setae smooth; setae j_3, s_4, S_2, z_2, z_4, Z_4 and Z_5 are relatively longer than the other setae. The length of dorsal setae : j_1 22 (19–25), j_3 30 (28–31), j_4 11 (10–14), j_5 10 (10–11), j_6 15 (13–18), J_2 14 (13–18), J_5 10 (10–11), z_2 23 (21–26), z_4 30 (28–33), z_5 10 (9–10), Z_1 14 (13–15), Z_4 50 (46–53), Z_5 57 (54–60), s_4 47 (44–52), S_2 41 (40–42), S_4 29 (28–33), S_5 15 (11–19), r_3 16 (13–20) and R_1 16 (15–18).

Peritreme—Extending to the level of j_1.

Ventral idiosoma (Figure 7)—Sterno-genital shield smooth 131 (125–141) long and 67 (65–70) wide at level of seta ST_2, with 5 pairs of setae ST_1 18, ST_2 18, ST_3 18, ST_4 17 (17–18) and ST_5 18 and 3 pair of pores. Distance between ST_1– ST_1 53 (54–55), ST_1–ST_5 109 (103–114); ventrianal shield subtriangular, striated, 133 (120–148) long and 126 (120–133) wide at level of seta ZV_2 and 150 (138–163) at the widest point, with a pair of round preanal pores posteromesad of JV_2 and 3 pairs of small pores; ventrianal shield with 3 pairs of preanal setae JV_1 16 (15–18), JV_2 17 (15–18) and ZV_2 17 (15–18); seta JV_5 32 (30–37) on soft cuticle.



FIGURES 6–8. *Transeius avetianae* (Arutunjan & Ohandjanian), male, 6. Dorsal view, 7. Ventral view, 8. Chelicera.

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Legs—Measurements of legs (from base of leg to end of pretarsus) as follows: leg I 338 (328–360), leg II 247 (225–260), leg III 244 (220–260) and leg IV 338 (322–350) long, respectively. SgeIII 21 (20–23), SgeIV 28 (21–35), StiIV 28 (27–32), and StIV 52 (46–60); genua and tibiae I–II–III–IV with 10–8–7–7 and 10–7–7–6 setae, respectively.

Chelicera (Figure 8)—Fixed digit 25 (24–28) long, with 4 teeth (1 subapical) and pilus dentilis; movable digit 22 (22–25) long, with 1 tooth; spermatodactyl 30 (28-34) long and as shown in Figure 8.

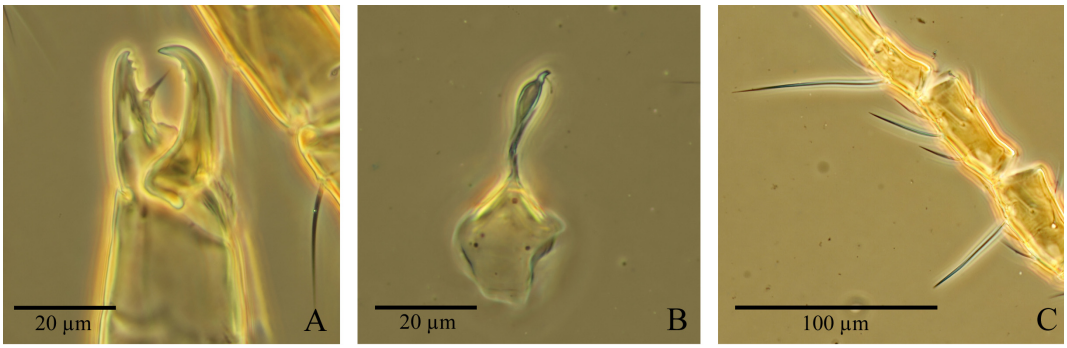


PLATE 1. *Transeius avetianae* (Arutunjan & Ohandjanian), female, A. Chelicera, B. Spermatheca, C. Genu, tibia and basitarsus IV.

Material examined—67 females and 6 males collected from Zanjan county as follows. 14♀♀, 1♂, Genavand village, soil under poplar trees, 12.VII.2011; 2♀♀, Gojeh-ghia village, litters of willow trees, 21.VII.2011; 1♀, Bughda-kandi village, 21.VII.2011; 3♀♀, Chiyar village, soil under apple trees, 22.VII.2011; 3♀♀, Chiyar village, soil under maple trees, 22.VII.2011; 1♀, Bonab village, soil under poplar trees, 18.VII.2011; 2♀♀, Bonab village, soil under willow trees, 18.VII.2011; 1♀, Dizej-abad village, litter of walnut, 19.VII.2011; 2♀♀, And abad-olia village, litter of willow, 26.VII.2011; 1♀, near of Darreh lik village, tomato, 25.VII.2011; 2♀♀, And abad-olia village, soil under elm trees, 26.VII.2011; 2♀♀, Kavand village, litter of willow trees, 21.VII.2011; 1♀, Chiyar village, soil under willow trees, 22.VII.2011; 1♀, Zanjan University, fungus, 23.VIII.2011; 1♀, 1♂, Yeng-jeh village, litter of service trees, 21.VIII.2011; 1♀, Bonab village, alfalfa, 18.VII.2011; 1♀, Yeng-jeh village, rotten wood, 21.VIII.2011; 4♀♀, Morvarid village, litter of service trees, 18.VIII.2011; 3♀, Dolanab village, soil under willow trees, 2.VIII.2011; 1♀, 1♂, Mirjan village, soil under plum trees, 14.VII.2011; 5♀♀, 1♂, Chiyar village, soil under apple trees, 16.VII.2011; 2♀♀, Zanjan University, soil under cypress trees, 18.XI.2010 and 21.XI.2010; 3♀♀, Zanjan University, soil under plantain trees, 5.I.2011; 2♀♀, Zanjan University, soil under cypress trees, 10.I.2011; 4♀♀, Zanjan University, soil under plantain trees, 15.IV.2011; 2♀♀, Zanjan University, litters of poplar trees, 5.VI.2011; 1♀, Zanjan University, soil under apple trees, 18.VI.2011; 1♀, Zanjan University, rotten wood, 21.VI.2011; 1♂, Khosh-rood village, rotten wood, 16.VIII.2011; 1♂, Esfenaj village, litter of willow trees, 1.VIII.2011.

Distribution—Armenia, Ukraine and Iran.

Remarks—By having a relatively longer z_4 seta and elongate spermathecal calyx with a swollen base, *T. avetianae* belongs in the *ablusus* species group and *priximus* subgroup as proposed by Chant and McMurtry (2004). Due to examination of sufficient specimens collected in this study, we provided a wider range of variation in morphological characters of *T. avetianae* than that of the original description. The measurements provided by Arutunjan & Ohandjanian (1972) in the original description on three females fit well within our data (Table 1). This species was collected from humid parts of litter, soil, rotten wood and fungi mainly from the places close to the Zanjanrood River.

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TABLE 1. Comparison of some morphological characters of *Transeius avetianae* collected in Iran with those given in the original description (measurements in micrometers)

Character	Iran		Original description
	Female	Male	Female
Dorsal shield length	310–370	260–290	360
Dorsal shield width	170–213	160–175	210
j1	19–25	19–25	27
j3	27–46	28–31	36
j4	12–15	10–14	15
j5	9–16	10–11	15
j6	13–24	13–18	15
J2	12–22	13–18	17
J5	10–14	10–11	12
z2	20–40	21–26	30
z4	33–44	28–33	42
z5	9–13	9–10	12
Z1	13–28	13–15	15
Z4	60–78	46–53	70
Z5	70–99	54–60	85
s4	51–70	44–52	63
S2	50–67	40–42	60
S4	28–43	28–33	36
S5	16–29	11–19	21
SgeIV	30–49	21	48
StiIV	30–45	27–29	39
StIV	40–66	46–53	63
Teeth of fixed digit	4	4	4
Teeth of movable digit	2	1	2

Key to the Iranian species of *Transeius*: adult female

1. Ventrianal shield without preanal solenostomes . . . . . *T. herbarius* (Wainstein)
– Ventrianal shield with preanal solenostomes 2
2. Calyx of spermatheca elongate, length more than 25 μm . . . . . *T. avetianae* (Arutunjan & Ohandjanian)
– Calyx of spermatheca short and cup-shaped, length less than 10 μm . . . . . *T. wainsteini* (Gomelauri)

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Accepted by Owen Seeman: 31 Jul. 2012; published 31 Aug. 2012

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