Re-descriptions of *Amblyseius meghriensis* Arutunjan and *Typhlodromus haiastanius* (Arutunjan) with discussion on using preanal pores as a character in the subgenus *Anthoseius* (Mesostigmata: Phytoseiidae)

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RE-DESCRIPTIONS OF *AMBLYSEIUS MEGHRIENSIS* ARUTUNJAN AND *TYPHLODROMUS HAIASTANIUS* (ARUTUNJAN) WITH DISCUSSION ON USING PREANAL PORES AS A CHARACTER IN THE SUBGENUS *ANTHOSEIUS* (MESOSTIGMATA: PHYTOSEIIDAE)

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ABSTRACT – *Amblyseius meghriensis* Arutunjan (1968), collected in Lorestan Province, is a new species record for the Iranian phytoseiid fauna. The female is re-described and the male is described for the first time. The morphological characters of the female specimens collected from Iran compared with those given in the original description from Armenia. Illustrations and measurements are also given for the *Typhlodromus* (*Anthoseius*) *haiastanius* (Arutunjan), another new species record for Iran. We have found that the presence of preanal pores can be variable in *T. (A.)* *khosrovensis* Arutunjan. The significance of this morphological character in the taxonomy of the subgenus *Anthoseius* is discussed. A key to the species of *Amblyseius* recorded from Iran is also given.

Key words – Re-description, Phytoseiidae, preanal pores, *Amblyseius*, subgenus *Anthoseius*, Iran.

INTRODUCTION

Phytoseiid mites are well known natural enemies of phytophagous arthropods on cultivated and non-cultivated plants. This is one of the main reasons that numerous studies have been conducted on the ecology and taxonomy of this group. More than 70 species Phytoseiid mites have been reported from Iran (McMurtry, 1977; Sepasgosarian, 1977; Daneshvar, 1978, 1980, 1987; Daneshvar and Denmark, 1982; Hajizadeh et al., 2002; Kolodochka et al., 2003; Faruji et al., 2007; Shirdel et al., 2008; Shirdel et al., 2009; Ueckermann et al., 2009) and among them only 6 species from Lorestan Province were known: *Neoseiulus zweelferi* (Dosse), *N. bicaudus* (Wainstein), *N. sugonjaevi* (Wainstein and Abbassova), *N. imbricatus* (Corpuz-Raros and Rimando) and *N. astutus* (Beglyarov) recorded by Sadat-Shojai (2007) and *Typhlodromus* (*Anthoseius*) *bagdasarjani* Wainstein and Arutunjan by Daneshvar (1993). During a survey to determine and evaluate phytoseiid mites native to Lorestan Province of Iran, in 2008–2009, *Amblyseius meghriensis* Arutunjan (1968) was collected on cucumber leaves. This species was only known in Armenia and described by Arutunjan (1968) as a new species based on females. In this paper, we describe the male and re-describe the female of *A. meghriensis* based on the Iranian specimens. We also provide the morphological characters and morphometric data of the specimens found in Iran, those given in the original description from Armenia by Arutunjan (1968), those of *A. swirskii* Athias-Henriot (1962) and *A. rykei* Pritchard and Baker (1962) (a junior synonym of *A. swirskii*, synonymy according to Zannou et al., 2007) in a table for comparison. *Typhlodromus* (*Anthoseius*) *haiastanius* (Arutunjan, 1977), a new species record for Iran, is also re-described to give a better illustration and to show the variability of the number of preanal setae. Presence or absence of preanal pores is variable in another collected species of the
subgenus *Anthoseius*, *T.* (*A.*) *khosrovensis* Arutunjan (1971), of which the figures of the ventrianal shields are also given.

**MATERIALS AND METHODS**

The specimens were collected from plant leaves by direct examination under a dissecting microscope. The mites were cleared in Nesbitt’s solution and were mounted in Hoyer’s medium on microscope slides. The notations used for dorsal and ventral setations follow Rowell et al. (1978) and Chant and Yoshida-Shaul (1991) respectively. All measurements are given in micrometers (µm). The classification systems follow those of Chant and McMurtry (1994, 2004) for Typhlodrominae and Amblyseini, respectively. Unfortunately, one of us (F. Faraji) was not successful to loan any type material of the species described by Arutunjan deposited in Academy of Sciences of Armenia in many occasions. Therefore, the comparisons made in this paper are only based on the descriptions and not examining the type material. The voucher material of species were preserved as slide mounted specimens and deposited in the collection of the Faculty Agriculture, Tarbiat Modares University, Tehran, Iran.

**SYSTEMATICS**

**Family PHYTOSEIIDAE** Berlese, 1916  
**Genus Amblyseius** Berlese, 1914  
**Amblyseius meghriensis** Arutunjan, 1968  
(Figs. 1–3/Figs. 7–12)

**FEMALE** (*n* = 7) (Figs. 1–3/Figs. 7–8) – (measurements: mean followed by their respective ranges).

**Dorsum** (Fig. 1) – Dorsal setal pattern: 10A:9B. Dorsal shield oval and smooth with a few striae anterolaterally, length of dorsal shield 368 (362–372), width at level of Z1 216 (212–220), with 19 pairs of dorsal setae (including j1 and R1) and 14 pairs of pores (7 pairs solenostomes gd1, gd2 gd4, gd5, gd6, gd7 and gd8, the rest poroides); j3, s4, Z4 and Z5 are long and j4, j5, J2, J4 and z5 short; setae Z4 and Z5 slightly serrated. Length of dorsal and sublateral setae are as follows: j1 30 (28–31), j2 32 (52–54), j4 41 (10–12), j5 40 (9–11), j6 14 (13–15), J2 11 (10–12), j5 12 (11–13), z2 21 (19–22), z4 23 (22–25), z5 9 (8–10), Z1 15 (14–16), Z4 70 (68–71), Z5 151 (147–152), s4 78 (77–80), S2 19 (18–20), S4 15 (14–16), S5 13 (12–14); setae r3 25 (23–27) and R1 21 (20–22) on lateral integument.

**Peritreme** – Extending forward to the level of j1.

**Venter** (Fig. 2) – Ventral setal pattern: JV-3:ZV. Sternal shield smooth, 85 (82–88) long and 80 (78–81) wide at level of seta ST2; with two pairs of pores and 3 pairs of setae, ST1 37 (36–39), ST2 33 (32–34) and ST3 28 (27–30); ST1-ST1 58 (56–60), ST2-ST2 70 (68–71) and ST1-ST3 68 (66–69); metasternal shield 15 (14–16) long and 6 (5–7) wide, with a pore and a seta ST4 34 (33–35); genital shield smooth, width (at level of seta ST5) 74 (72–76); ST3 24 (23–25) long and ST3-ST5 68 (67–70); ventrianal shield pentagonal, striated with 3 pairs of preanal setae JV1 24 (23–25), JV2 20 (19–22) and ZV2 21 (20–22) in addition to paranal and postanal setae; ventrianal shield with 1 pair of elliptical pores posteromades to JV2; ventrianal shield 128 (127–130) long and 92 (90–94) wide at the level of setae ZV2; ZV1 22 (20–23), ZV3 14 (13–15), JV4 18 (17–19) and JV5 66 (65–68); two pairs of metapodal shields on soft opisthogastric cuticle.

**Spermatheca** (Fig. 3) – Spermatheca with calyx cup or V-shaped 10 (9–11) long and atrium nodular.

**Chelicera** (Fig. 7) – Fixed digit of chelicerae 42 (40–43) long, with 7–8 teeth and pilus dentilis. Movable digit 37 (36–38) long, with 2 teeth.

**Legs** (Fig. 8) – Genua and tibiae I–II–III–IV with 10–7-7-7 and 10–7-7-6 setae, respectively; Sge I 30 (28–31), Sge II 32 (31–33), Sge III 39 (38–40), Sti III 33 (32–34), Sge IV 69 (67–70), Sti IV 57 (56–59) and St IV 75 (74–76) long.

**MALE** (*n* = 2) (Figs. 9–12) – (measurements: mean followed by their respective ranges).

**Dorsum** (Fig. 9) – Dorsal shield pattern as in female, oval and smooth with a few anterolateral striae, 279 (278–281) long, 160 (157–161) wide at level of Z1, with 19 pairs of dorsal setae and 14 pairs of pores as in female, only setae Z4 and Z5 slightly serrated, the other setae smooth; setae j1, s4, Z4 and Z5 longer than the other setae. j4, j5, J5 and z5 short. The length of dorsal setae as follows: j1 27 (26–28), j2 41 (40–42), j4 10 (9–11), J5 10 (9–11), j6 15 (14–16), J6 13 (12–14), J5 9 (8–10), z2 15 (14–16), z4 24 (23–25), z5 9 (8–10), Z1 15 (14–16), Z4 51 (49–52), Z5 84 (82–86), s4 57 (56–59), S4 20 (19–21), S5 16 (15–17), S5 14 (13–15), r3 21 (20–22) and R1 19 (18–20).

**Peritreme** – Extending to the level of between j1 and j3.

**Venter** (Fig. 10) – Sterno-genital shield smooth 121 (119–124) long and 69 (67–70) wide at level of seta ST2, with 5 pairs of setae ST1 27 (26–28), ST2 24 (23–25), ST3 24 (22–25), ST4 21 (20–23) and ST5 22 (20–23) and two pair of pores. Distance between ST1-ST1 48 (46–50), ST1-ST2 108 (106–110); ventrianal shield subtriangular, striated, 109 (107–112) long and 117 (116–117) wide at level of seta ZV2 and 149 (149–150) at the widest point, with a pair of elliptical pores

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Figs. 1–8. *Amblyseius meghriensis* Arutunjan, female – 1. dorsal view of idiosoma; 2. ventral view of idiosoma; 3. Spermathecae; 7. Chelicera; 8. Genu, tibia and basitarsus leg IV. Spermatheca, *A. andersoni* (Chant): Fig. 4. Collected from South-west France, Fig. 5. Collected from The Netherlands, Fig. 6. *A. swirskii* Athias-Henriot.
posterior esmand to JV₂ and three pairs of small pores; ventrianal shield with three pairs of preanal setae JV₁ 17 (17–18), JV₂ 20 (19–21) and ZV₂ 18 (17–19); seta JV₃ 35 (33–36) on soft cuticle.

Legs (Fig. 11) – Measurements of legs (from base of leg to end of pretarsus) as follows: leg I 325 (322–329), leg II 280 (276–283), leg III 286 (284–288) and leg IV 365 (360–369) long respectively. Sge I 22 (21–23), Sge II 24 (23–25), Sge III 30 (29–32), Sti III 24 (23–25), Sge IV 51 (49–52), Sti IV 45 (44–46), and St IV 57 (56–58); genua and tibiae I-III-IV with 10-7-7-7 setae, respectively.

Chelicera (Fig. 12) – Fixed digit 32 (31–33) long, with 6 teeth and pilus dentilis; movable digit 24 (23–25) long, with 1 tooth; spermatodactyl as shown in Fig. 12.


Remarks – The female specimens of A. meghriensis collected in Iran resemble the holotype female in many respects. However, the Iranian specimens have longer z₂ and z₄ setae (21 and 23 vs. 15). We consider this as an intraspecific morphological variation. Based on the morphological characters and measurements, Chant and Yoshida-Shaul (1990) questioned the identity of A. meghriensis, which fit those of A. andersoni (Chant, 1957) very closely. However, the shape and size of calyx and atrium of spermatheca in these two species are distinctively different.

Key to the Iranian species of Amblyseius: adult female

1. The length of seta z₄ about or longer than 2/3 distance between insertions of seta z₄ and s₄ ........ 2
   – The length of seta z₄ shorter than half distance between insertions of seta z₄ and s₄ ........ 3

2. Calyx of spermatheca elongate, slightly swollen basally; fixed digit of chelicera with about 15 small teeth. A. azerbajianicus Abbassava
   – Calyx of spermatheca shorter and V-shaped, fixed digit of chelicera with 7–8 teeth. A. meghriensis Arutjunjan

3. Ventrianal shield vase-shaped .................. 4
   – Ventrianal shield not vase-shaped ........... 5

4. Calyx fundibular, flared distally ................ A. herbiculosus (Chant)
   – Calyx tubular, not flared distally ............ A. largoensis (Muma)

5. Seta Z₅ longer than width of dorsal shield, spermatheca with calyx having annulated stalk, flared distally A. obtusus Koch
   – Seta Z₅ shorter than width of dorsal shield, spermatheca without calyx annulated .......... 6

6. Calyx of spermatheca tubular .................... A. mcmurtryi Muma
   – Calyx of spermatheca cup or V-shaped ........ 7

7. Dorsal shield completely reticulated .......... A. rademacheri Dosse
   – Dorsal shield mainly smooth .................. 8

8. Seta Z₅ shorter than 140 μm ..................... A. swirskii Athis-Henriot*
   – Seta Z₅ longer than 150 μm ................... 9

9. Movable digit of chelicerae smooth or with 1 tooth; seta Z₅ long (175–250) .................. A. meridionalis Berlese
   – Movable digit of chelicerae with 2 teeth; seta Z₅ shorter (157–174). . . . . . A. ampullosus Wu and Lan

*This species is considered exotic and was recently used as a biological control agent in some greenhouses in Iran (personal communication of Dr. M. Khanjani with F. Faraji).

Genus Typhlodromus Scheuten, 1857
Subgenus Anthoseius De Leon, 1959

Typhlodromus (Anthoseius) haisianus (Arutjunan, 1977)
Table 1. Comparison of some morphological characters of *Amblyseius meghriensis* collected in Iran with those given in the original description and *A. swirskii* a closely related species (measurement in micrometers).

<table>
<thead>
<tr>
<th>Character</th>
<th><em>Amblyseius meghriensis</em></th>
<th><em>A. swirskii</em></th>
</tr>
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<tr>
<td></td>
<td>Iran</td>
<td>Holotype*</td>
</tr>
<tr>
<td></td>
<td>Female</td>
<td>Male</td>
</tr>
<tr>
<td>Dorsal shield width</td>
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<td>160</td>
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<tr>
<td>j₁</td>
<td>30</td>
<td>27</td>
</tr>
<tr>
<td>j₃</td>
<td>53</td>
<td>41</td>
</tr>
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<td>j₄</td>
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<td>J₂</td>
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<td>Ventrianal shield length</td>
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<td>109</td>
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<tr>
<td>Ventrianal shield width</td>
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<td>117</td>
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<tr>
<td>JV₅</td>
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<td>Sti IV</td>
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<tr>
<td>St IV</td>
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<td>48</td>
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<tr>
<td>Teeth of fixed digit</td>
<td>7–8</td>
<td>6</td>
</tr>
<tr>
<td>Z₅/Z₄</td>
<td>2.25</td>
<td>1.57</td>
</tr>
</tbody>
</table>

*From original description (Arutunjan 1968); **From Athias-Henriot (1962); ***From Porath and Swirski (1965); ****A junior synonym of *Amblyseius swirskii* (data taken from Zannou et al., 2007); *****From Zannou et al., 2007.
Anthoseius (Amblydromellus) invectus haiastanius
Arutunjan, 1977

**FEMALE** ($n = 6$) (Figs. 13–18) – (measurements: mean followed by their respective ranges).

**Dorsum** (Fig. 13) – Dorsal setal pattern: 12A: 8A; length of dorsal shield 368 (366–370), width at level of $J_2$ 188 (186–190), oval and reticulated, with 20 pairs of dorsal setae (including $r_3$ and $R_1$) and 17 pairs of pores, three pairs of them large solenostomes ($gd_2$, $gd_6$, $gd_9$) and the rest poroides; dorsal setae smooth except $Z_4$ and $Z_5$ serrated; length of dorsal and sublateral setae as follows: $j_1$ 26 (25–27), $j_3$ 32 (31–33), $j_4$ 17 (16–18), $j_5$ 21 (20–22), $j_6$ 23 (22–23), $J_2$ 28 (27–29), $J_3$ 5 (5–6), $z_2$ 25 (23–28), $z_3$ 29 (27–31), $z_4$ 29 (28–29), $z_5$ 20 (19–21), $Z_4$ 46 (44–48), $Z_5$ 58 (56–59), $s_4$ 32 (31–33), $s_6$ 39 (37–40), $S_4$ 40 (39–41), $S_6$ 36 (35–37), $S_5$ 35 (32–36); setae $r_5$ 31 (30–32) and $R_1$ 32 (31–33) on lateral integument.

**Peritreme** – Extending to the level of between $z_4$ and $s_4$.

**Venter** (Fig. 14) – Ventral setal pattern: JV-3-ZV; sternal shield smooth, 80 (79–81) long and 79 (78–79) wide at level of seta $ST_2$, with 2 pairs of pores and 2 pairs of setae, $ST_3$ 32 (31–34) and $ST_2$ 33 (32–34), $ST_3$ 33 (32–34) and $ST_4$ 30 (30–31), $ST_3$ and $ST_4$ on separate shields, $ST_4$ associated with a pore; distance between $ST_1$-$ST_1$ 52 (51–53), $ST_2$-$ST_2$ 57 (55–58) and $ST_1$-$ST_2$ 36 (35–36). Genital shield smooth, length of genital shield 104 (103–105); width (at level of seta $ST_5$) 64 (63–65), $ST_3$ 30 (29–31) long and distance between $ST_5$-$ST_3$ 62 (61–62); ventrianal shield striated and lightly creased, 116 (112–120) long and 67 (64–72) wide at the level of setae $ZV_2$ with 3 pairs of preanal setae, in one specimen ventrianal shield with 2 pairs of preanal setae (Fig. 15), round preanal pores posterior to and longitudinally aligned with $JV_2$; $JV_1$ 25 (24–25), $JV_2$ 24 (23–24) and $ZV_2$ 25 (23–25) in addition to paranal and postanal setae on ventrianal shield; $ZV_1$ 25 (24–26), $ZV_3$ 12 (12–14), $JV_4$ 25 (24–26) and $JV_5$ 60 (60–61).

**Spermatheca** (Fig. 17) – Calyx cup-shaped and atrium c-shaped 20 (19–22) long and 12 (10–14) wide.

**Legs** (Fig. 16) – Genua and tibiae I-II-III-IV with 10-7-7-7 and 10-7-7-6 setae, respectively; macroseta of basitarsus IV is longer (about 50 μm) in haiastanius while invectus has a shorter macroseta (about 35). Daneshvar and Denmark (1982) described a species from Iran, which closely resembles *T. (A.) haiastanius*, namely, *Typhlodromus (Anthoseius) rodriguezi*. We were not able to reexamine the type material of these two species to confirm the validity of *T. (A.) rodriguezi*. At this point, based on the original descriptions, *T. rodriguezi* can be distinguished from *T. (A.) haiastanius* by having a small neck between atrium and calyx of spermatheca and not having preanal pores.

A few of the collected specimens also show a variation in the number of preanal setae by having only 2 pairs of setae ($ZV_2$ off the ventrianal shield, Fig. 15).

**Typhlodromus (Anthoseius) khosrovensis** Arutunjan, 1971

**Material examined** – Nineteen females and 6 males collected from *Prunus domestica*, Iran: Lorestan Province, Norabad, July 2009, coll. S. Jafari.

**Remarks** – The presence of 4 pairs of large solenostomes ($gd_2$, $gd_6$, $gd_8$, $gd_9$) on the dorsal shield clearly distinguishes *T. (A.) khosrovensis* from the other species of the subgenus *Anthoseius* in Iran. The other closely related species having 4 pairs of large solenostomes is *T. (A.) psyllakisi* Swirski and Ragusa (1976) known from Greece. The main difference between these two species is the length of peritreme, which is much shorter in *T. khosrovensis*. An examination of 10 female specimens of *T. (A.) khosrovensis* showed a remarkable variation in the number of preanal pores: six specimens without any pores (Fig. 19A), 2 with only one pore (Fig. 19B) and 2 with a pair of pores (Fig. 19C). The preanal pores were not depicted in the original description (Arutunjan, 1971) and mentioned as absent in the re-description by Ueckermann et al. (2009). Some authors like Karg (1993) consider this character important to distinguish between species of the subgenus *Anthoseius*. However, our observations clearly show that it can vary and thus is not a reliable character. Unreliability of this character is also supported by the absence of preanal pores.
Fig. 19. *Typhlodromus* (*Anthoseius*) *khosrovensis* Arutunjan, three types of ventrianal shield – A. absence of preanal pores; B. with one preanal pore; C. with a pair of preanal pores.

In the original description of *T. (A.) recki* Wainstein (1958) and re-description by Livshitz and Kuznetsov (1972), but reported as present by Swirski *et al.*, (1998) and Papadoulis *et al.*, (2009).

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**REFERENCES**


