

Article

Redescription of four species of phytoseiid mites (Acari: Mesostigmata) associated with alfalfa farms in western Iran

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Abstract

Four phytoseiid species, *Amblyseius obtusus*, *Neoseiulus marginatus*, *N. sugonjaevi* and *N. zwoelferi* were recorded and redescribed from alfalfa, *Medicago sativa*, in western Iran. *Neoseiulus zwoelferi* was determined as the abundant and widespread species in this region.

Key words: Predatory mite, *Amblyseius obtusus*, *Neoseiulus marginatus*, *N. sugonjaevi*, *N. zwoelferi*, biodiversity, *Medicago sativa*

Introduction

Alfalfa, *Medicago sativa* L. (Fabaceae), is one the most important forage in the world, including Iran. In 2008–2009 it was cultivated in this latter country in more than 617,512 hectares, with a total yield of 4,828,146 tons (Anonymous, 2009). Alfalfa has a rich diversity of different arthropods, with members of the family Phytoseiidae as one of them. Members of this family are well-known for their control of phytophagous mites and small insects (*i.e.* Chant 1985; Chant & McMurtry 2007; Asali Fayaz *et al.* 2011). In the catalogue of Moraes *et al.* (2004) only one species, *Proprioseiopsis eurynotus* (Van der Merwe 1968), from South Africa from alfalfa farms is listed as new species (Van der Merwe 1968). In the present study, four phytoseiid species, *Amblyseius obtusus* (Koch, 1839), *Neoseiulus marginatus* (Wainstein, 1961), *N. sugonjaevi* (Wainstein & Abbasova, 1974) and *N. zwoelferi* (Dosse, 1957) were recorded from alfalfa farms in western Iran. Through redescrptions and detailed illustrations of these species are presented based on specimens collected during this study.

Material and Methods

The specimens were collected by beating and extracting mites from soil and litter using a Berlese's funnel, from alfalfa fields in three provinces (Hamedan, Kermanshah and Kurdistan) which are in close proximity of the Zagros mountains. Phytoseiid mites were mounted on microscope slides in Hoyer's medium. All specimens were examined under an Olympus BX51 microscope (Differential Interference Contrast). The classification system used follows that of Chant and McMurtry (2007). Setal nomenclature and idiosomal setal pattern used are those of Lindquist and Evans (1965), as adapted by

Rowell *et al.* (1978) and Chant and Yoshida–Shaul (1992), respectively. Organotaxy follow the nomenclature proposed by Athias–Henriot (1975) and spermatheca terminology is according to Denmark and Edland (2002). Measurements are provided to allow comparisons with specimens of the same species from other parts of the world (these comparisons are based on literature and not on the observations of type material or on specimens that have been observed by the authors themselves); they are expressed in micrometers (μm). A camera lucida apparatus attached to the microscope was used for detailed illustrations of the specimens collected. Number of teeth of each cheliceral digit does not include the apical tooth. The different localities and part of sampling is provided in Table 1. All specimens were collected by Bahman Asali Fayaz; they have been deposited in the Collection of the Acarology Laboratory, University of Bu–Ali Sina (CALBS), Hamedan, Iran.

Table 1. Locality and collecting status

Locality	Part of sampling	Species
Hamedan	A.	<i>N. sugonjaevi</i> , <i>N. zwoelferi</i>
	S.	<i>A. obtusus</i> , <i>N. marginatus</i> , <i>N. zwoelferi</i>
Kermanshah	A.	<i>N. sugonjaevi</i>
	S.	<i>N. marginatus</i> , <i>N. sugonjaevi</i>
Kurdistan	A.	<i>N. sugonjaevi</i> , <i>N. zwoelferi</i>
	S.	<i>N. sugonjaevi</i> , <i>N. zwoelferi</i>

A. = Aerial; S. = Soil and litter

Results

Amblyseius obtusus (Koch, 1839) (Figs. 1–12)

Syn.: *Zercon obtusus* Koch, 1839

Female (n= 2)

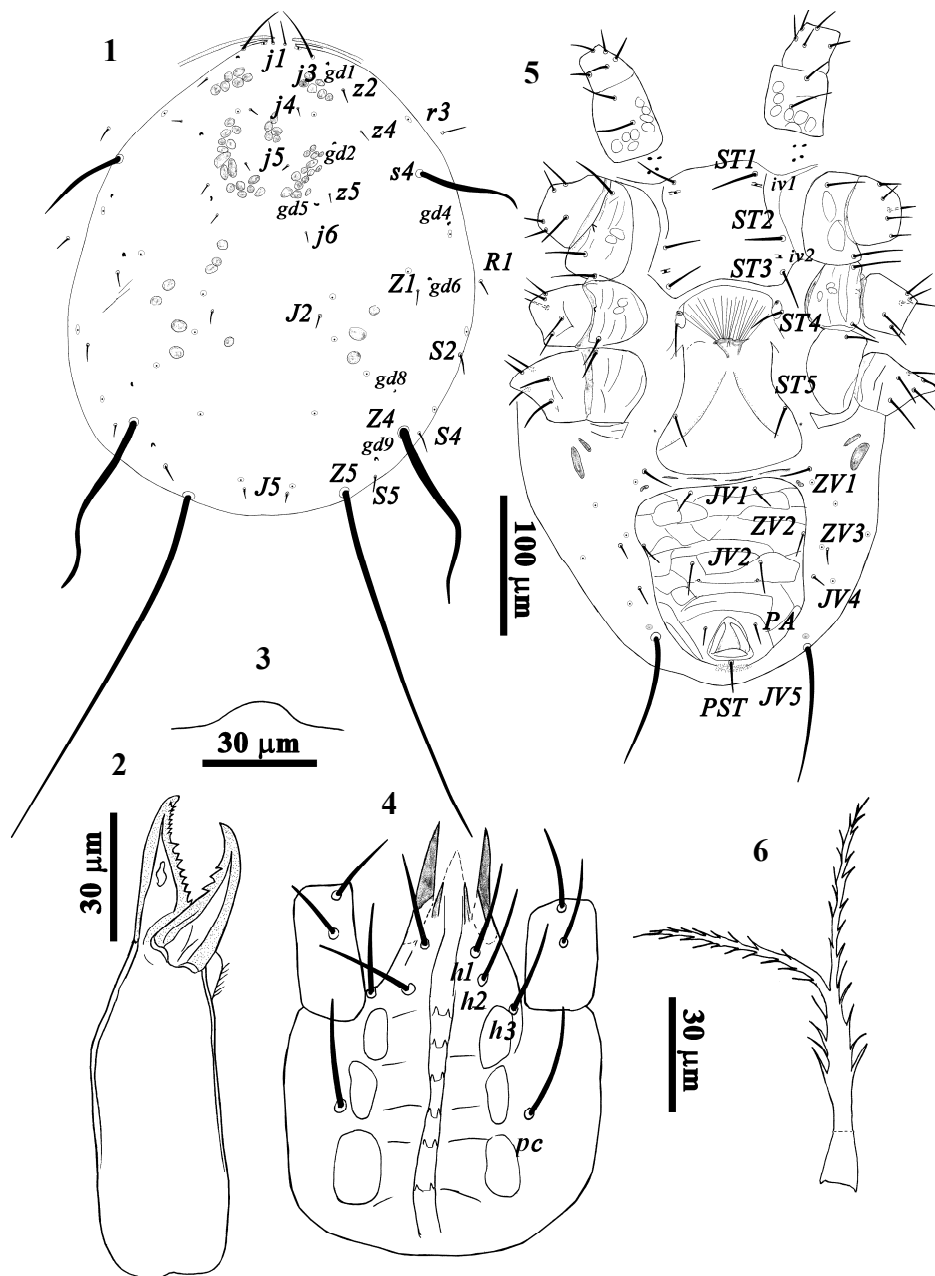
Idiosoma oval. Length of body (excluding palp) 437 (375–500); (including palp) 648 (595–700); width 335 (310–360). Idiosomal setal pattern: 10A:9B/JV–3: ZV. All idiosomal and leg setae smooth.

Dorsum (Fig. 1). Dorsal shield smooth, 408 (365–450) long, 313 (305–320) wide at level of setae *R1*, with 17 pairs of smooth setae and 12 pairs of lyrifissures and seven pairs of solenostomes (*gd1*, *gd2*, *gd4*, *gd5*, *gd6*, *gd8*, *gd9*). Lengths of dorsal setae as follows: *j1* 24 (20–28), *j3* 49 (48–50), *j4* 7 (6–7), *j5* 7 (6–7), *j6* 7, *J2* 11, *J5* 12 (11–12), *z2* 9 (7–10), *z4* 11 (10–11), *z5* 8 (7–9), *Z1* 14 (13–15), *Z4* 163 (160–170), *Z5* 297 (290–304), *s4* 98 (94–101); *S2* 14 (13–15), *S4* 13(12–13); *S5* 14 (12–15); *r3* 14 (13–15); *R1* 12 (11–13).

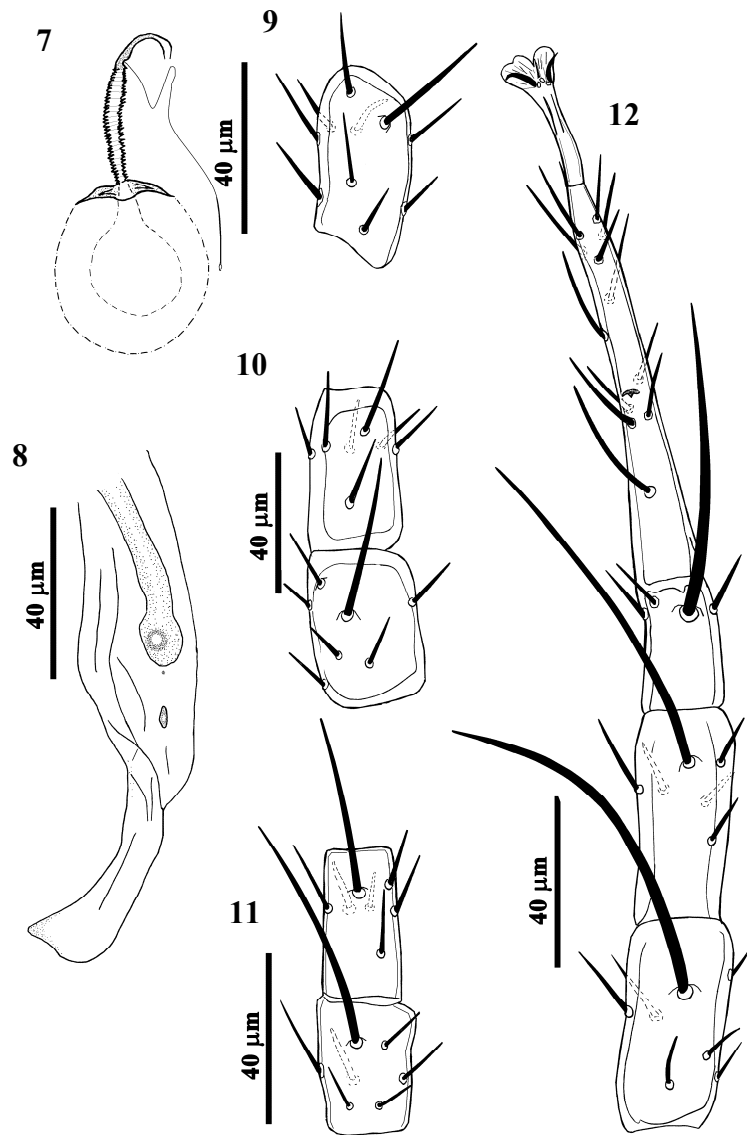
Gnathosoma (Figs. 2–4). Three pairs of smooth hypostomal setae, *h1* 23 (21–25), *h2* 26 (25–27) and *h3* 25 long and palp coxa with a pair of smooth setae, *pc* 28 (26–30). Hypostomal groove with six rows of denticles, each with two denticles, corniculi distally pointed (Fig. 4); fixed digit of chelicera 36 (35–36) long, with eight large basal teeth plus eight small distal teeth, movable digit 30 (27–33) long and with three teeth (Fig. 2); tectum convex 44 (44–45) wide (Fig. 3).

Venter (Figs. 5–6). Tritosternum 100 long, with two barbed laciniae (Fig. 6). Venter of idiosoma with seven pairs of opisthogastric setae. Sternal shield smooth, posterior margin concave and with three pairs of setae of similar lengths [*St1*–3 29 (28–30)] and two pairs of lyrifissures (*iv1*–2); seta *St4* set on small metasternal shields, each with one

small lyrifissure. Genital shield 130 long, 135 (130–135) wide at level of base and with a pair of setae, *St5* 26 long. Two pairs of elongate metapodal shields, primary shield almost twice as long as secondary shield [24 (24–25), 13 (12–14)]. Ventrianal shield reticulated, 133 (130–135) long and 124 (123–125) widest part, three pairs of pre-anal setae *JV1* 16, *ZV2* 20, *JV2* 22 long and a pair of preanal pores, posterior to setae *JV2* and 38 (35–42) apart; para-anal setae *PA* 20 (20–21) and postanal seta *PST* 24 (24–25) long. Opisthogastric cuticle bearing four pairs of setae on cuticle *ZV1* 19 (17–20), *ZV3* 12 (11–13), *JV4* 12 (11–12) and *JV5* 98 (95–100) long, all smooth; five pairs of lyrifissures and two pairs of platelets flanked genital and ventrianal shields with four slender transverse platelets between genital and ventrianal shields (Fig. 5).



Figures 1–6. *Amblyseius obtusus* (Koch) (Female). 1. Dorsal view of idiosoma; 2. Chelicera; 3. Tectum; 4. Hypostome; 5. Ventral view of idiosoma; 6. Tritosternum.



Figures 7–12. *Amblyseius obtusus* (Koch) (Female). 7. Spermatheca; 8. Peritreme; 9. Genu I; 10. Genu and Tibia II; 11. Genu and Tibia III; 12. Leg IV.

Spermatheca (Fig. 7). Calyx shaped as a shallow cup followed by an annulated stalk, 19 (19–20) long and 14 (12–16) wide at junction with vesicle.

Peritreme (Figs. 1 & 8). Stippled; extending to level of setae *jl*, 245 (230–260) long.

Legs (Figs. 9–12). Lengths of legs (including pretarsus) as follows: Leg I 387 (370–405), leg II 313 (310–315), leg III 335 (320–350) and leg IV 422 (415–430). Lengths of macrosetae as follows: Sge I 43, Sge II 48 (46–50), Sge III 70 (68–72), Sge IV 115 (105–125), Sti III 68 (67–70), Sti IV 103 (98–110) and St IV 83 (76–90). Genua I–IV with 10–7–7–7 setae (Figs. 9–12).

Specimens examined

Sarabe Gamasiab in Nahavand vicinity of Hamedan province (34° 02' N, 48° 22' E, 1822 m a.s.l.), 24 September 2009, 2 (♀♀), soil and litter of alfalfa.

Remarks

This redescription is similar to the redescriptions of Denmark & Edland (2002), Chant and McMurtry (2007), Papadoulis *et al.* (2009). However, it differs from them in: fixed digit of chelicera with eight big teeth plus eight small teeth vs. eight big teeth plus four small teeth; four narrow shields between genital and ventrianal shields in the Iranian specimens but a single narrow shield in Greek specimens; calyx annulated along entire length vs. not in others. Also, some of the measurements of the Iranian specimens are larger than those of Russian specimens studied by Livshitz & Kuznetsov (1972): *j3* 33, *Z4* 145, *Sti IV* 90.

Neoseiulus marginatus (Wainstein, 1961) (Figs. 13–22)

Syn.: *Typhlodromus marginatus* Wainstein, 1961

Female (n = 4)

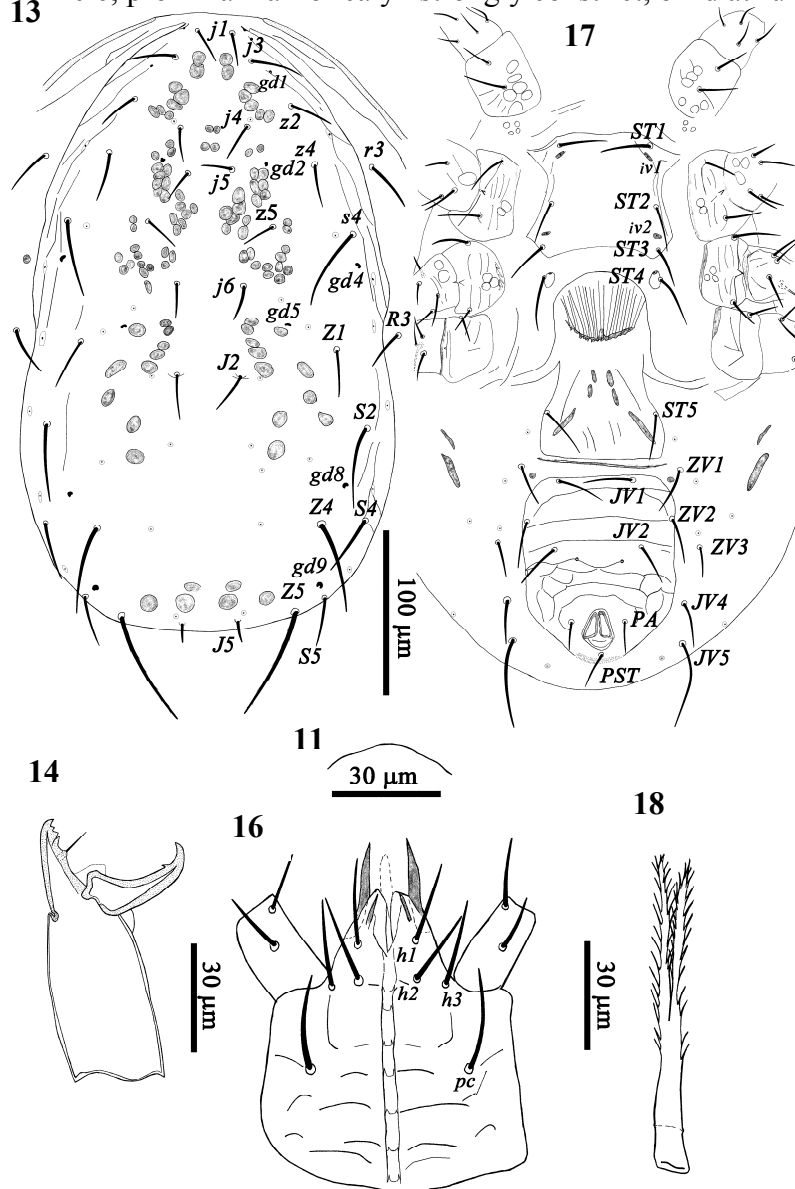
Idiosoma oval. Length of body (excluding palp) 372 (365–375) and (including palp) 567(550–590); width 260 (223–280). Idiosomal setal pattern: 10A:9B/JV–3: ZV. All idiosomal and leg setae smooth, except Z5.

Dorsum (Fig. 13). Dorsal shield smooth, except for a few lateral striae, 345 (325–365) long, 191 (185–195) wide at level of dorsal setae *R1*, with 17 pairs of smooth setae (except Z5) and 16 pairs of lyrifissures and six pairs of solenostomes (*gd1*, *gd2*, *gd4*, *gd5*, *gd8*, *gd9*). Lengths of dorsal setae as follows: *j1* 17 (15–18), *j3* 28 (26–30), *j4* 21(19–22), *j5* 20 (18–22), *j6* 22 (20–24), *J2* 24 (22–25), *J5* 13 (11–14), *z2* 24 (22–25), *z4* 27 (25–30), *z5* 19 (17–20), *Z1* 27 (25–29), *Z4* 49 (47–50), *Z5* 63 (60–64), *s4* 40 (38–41), *S2* 40 (36–42), *S4* 33 (32–35), *S5* 26 (25–27), *r3* 25 (23–26), *R1* 26 (25–26).

Gnathosoma (Figs. 14–16). Three pairs of smooth hypostomal setae, *h1* 24 (20–25), *h2* 25 (24–25) and *h3* 25 (24–26) long and palp coxa with a pair of smooth setae, *pc* 29 (26–30); Hypostomal groove with seven visible rows of denticles, each with two denticles, corniculi distally pointed (Fig. 16); fixed digit of chelicera 32 (30–34) long, with three distal teeth, movable digit 28 (25–30) long and with one tooth (Fig. 14); tectum convex 36 (33–38) wide (Fig. 15).

Venter (Figs. 17–18). Tritosternum 84 (78–90) long, with two barbed laciniae (Fig. 18). Sternal shield smooth and with a few striae along margins, posterior margin slightly concave and with three pairs of setae of similar lengths [*St1* 31 (28–33), *St2* 29 (28–31) and *St3* 30 (28–32)] and two pairs of lyrifissures (*iv1*–2); setae *St4* set on small metasternal shields, each shield bearing a small lyrifissure. Genital shield 121 (115–125) long; 75 (70–80) wide at level of base and with a pair of setae, *St5* 29 (28–30) long. Two pairs of elongate metapodal shields, primary shield almost twice as long as secondary shield [26 (25–28), 14 (12–15)]. Ventrianal shield reticulated, 120 (115–125) long and 100 (96–103) wide at widest region, with three pairs of pre-anal setae *JV1* 29 (28–30), *ZV2* 31 (30–32), *JV2* 29 (28–30) long and with a pair of preanal pores, posterior to setae *JV2* and 29 (26–33) apart; para-anal setae *PA* 19 (18–19) and postanal seta *PST* 20 (18–21) long. Opisthogasteric cuticle bearing four pairs of setae *ZV1* 28 (25–33), *ZV3* 21 (20–22), *JV4* 29 (25–32) and *JV5* 52 (46–55) long, all smooth; four pairs of lyrifissures and two pairs of platelets and a slender transverse platelet between genital and ventrianal shields (Fig. 17).

Spermatheca (Fig. 19). With fundibular calyx, 19 (17–20) long and 10 wide at junction with style; proximal half of calyx strongly constricted, bifid atrium.



Figures 13–18. *Neoseiulus marginatus* (Wainstein) (Female). 13. Dorsal view of idiosoma; 14. Chelicera; 15. Tectum; 16. Hypostome; 17. Ventral view of idiosoma; 18. Tritosternum.

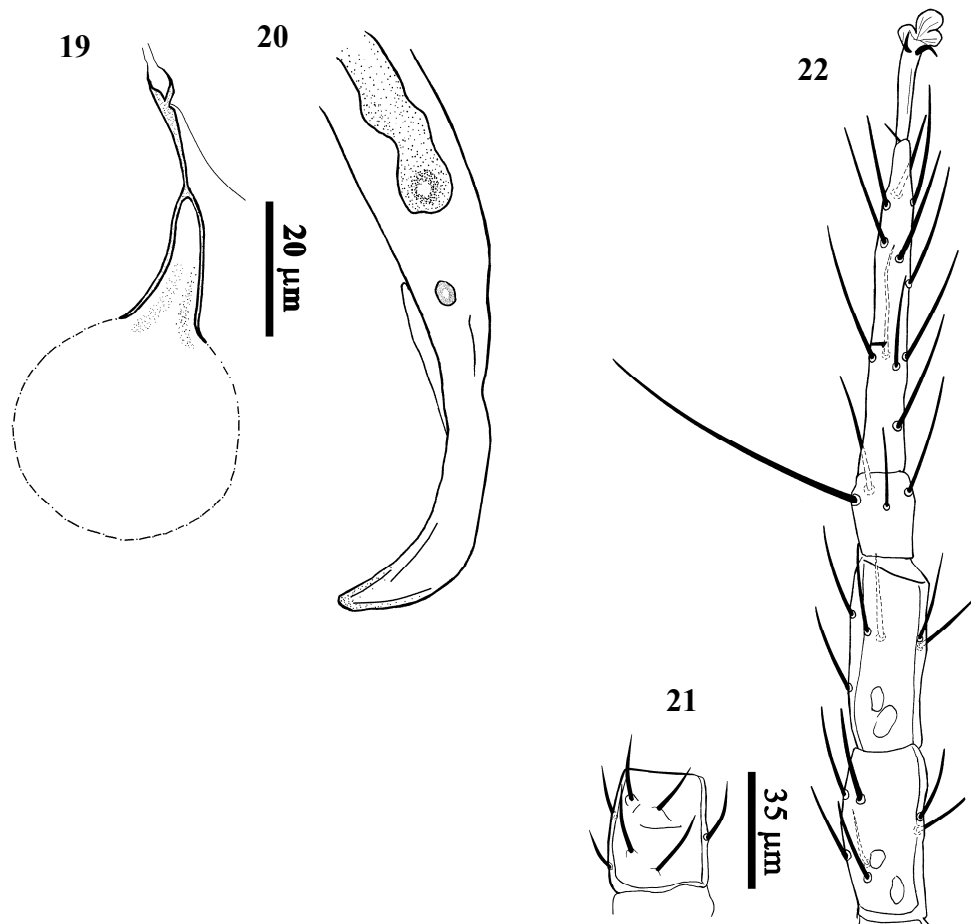
Peritreme (Figs 13 & 20). Stippled; extending to level of setae *j1*, 194 (165–206) long.

Legs (Figs. 21–22). Lengths of legs (including pretarsus) as follows: Leg I–IV 348 (340–368), 251 (245–260), 240 (230–252) and 339 (330–350). Basitarsus IV with pointed macroseta (St) 78 (71–82). Genua I–IV with 10–7–7–7 setae.

Specimens examined

Soil and litter of alfalfa plantations at the following sites: Hamedan vicinity of Hamedan province (34° 48' N, 48° 29' E, 1810 m a.s.l.), 14 May 2009, 2(♀♀); Joraghan

village of Hamedan vicinity in Hamedan province (34° 54' N, 48° 32' E, 1715 m a.s.l.), 16 March 2010, 1(♀); Sahneh vicinity of Kermanshah province (34° 22' N, 47° 41' E, 1345 m a.s.l.), 20 November 2009, 1(♀).



Figures 19–22. *Neoseiulus marginatus* (Wainstein) (Female). 19. Spermatheca; 20. Peritreme; 21. Genu II; 22. Leg IV.

Remarks

Specimens of *N. marginatus* collected in this study are similar to original description, except for: genital seta *ST5* is long and extending to the level of posterior margin of genital shield in the Iranian species but it is small and not extending to the level of posterior margin of genital shield in the original description; dorsal setae *s4* are *ca.* 1.5 times as long as *J2* vs. subequal in the original description; setae *JV4* extending pass *JV5* vs. not extending to *JV5* in the original description. Furthermore *N. marginatus* collected from Iran resembles the specimens re-described by Palevsky *et al.* (2009) except for: dorsal setae *Z4* are smooth vs. serrated in specimens collected from palm trees. The specimens collected are also similar to the specimens reported by Faraji *et al.* (2011) from Turkey, except that the Iranian specimens have *Z1* about 1.2 times and *Z5* 1.2 times larger. Also the measurements of idiosomal setae in these specimens are proportionally longer than those reported in Russian specimens studied by Livshitz and Kuznetsov (1972) and Kolodochka (1978): *j3* 20, *j4* 15, *j6* 15, *J2* 15, *z4* 20, *Z1* 20, *Z4* 43, *s4* 30 (Livshitz & Kuznetsov 1972) and *j1* 14, *j3* 19, *j4* 14, *j5* 14, *j6* 11, *J2* 14, *J5* 11, *z2* 16, *z4* 16, *z5* 11, *Z1* 16, *Z4* 33, *Z5* 61, *S2* 28, *S4* 25; *S5* 21; *r3* 16; *R1* 16. *JV5* 45;

macrosetae IV (*St*) 72 (Kolodochka 1978). At last, the specimens presently collected are similar to the specimens reported by Rahmani *et al.* (2010) from Iran except: *J5* 9, *s4* 32 (30–34), *r3* 16 (14–18), *RI* 12 (10–14), *St* IV 55 (52–58).

Neoseiulus sugonjaevi (Wainstein & Abbasova, 1974) (Figs. 23–31)

Syn.: *Amblyseius sugonjaevi* Wainstein & Abbasova, 1974

Female (n = 8). Idiosoma oval. Length of body (excluding palp) 376 (360–390) and (including palp) 583 (556–610); width 254 (223–280). Idiosomal setal pattern: 10A:9B/JV–3: ZV. All idiosomal and legs setae smooth, except Z5.

Dorsum (Fig. 23). Dorsal shield smooth, except for few anterolateral striae, 356 (345–365) long, 191 (185–205) wide at level of dorsal setae *RI*, with 17 pairs of smooth setae (except Z5) and 14 pairs of lyrifissures and three pairs of solenostomes (*gd1*, *gd4*, *gd9*). Lengths of dorsal setae as follows: *j1* 18 (16–20), *j3* 24 (20–26), *j4* 19 (18–19), *j5* 19 (18–20), *j6* 20 (20–21), *J2* 22 (20–24), *J5* 12 (10–13), *z2* 24 (23–24), *z4* 23, *z5* 20 (18–22), *Z1* 23 (22–25), *Z4* 35 (30–38), *Z5* 51 (44–58), *s4* 30 (28–32), *S2* 26 (25–28), *S4* 25 (23–25), *S5* 22 (18–21), *r3* 23 (19–25), *RI* 21 (18–23).

Gnathosoma (Figs. 24–26). Three pairs of smooth hypostomal setae, *h1* 25 (22–27), *h2* 22 (20–24) and *h3* 23 (21–25) long and palp coxa with a pair of smooth setae, *pc* 26 (25–28). Hypostomal groove with eight rows of denticles, each row with two denticles; corniculi distally pointed (Fig. 26); fixed digit of chelicera 38 (36–40) long and with five teeth (two distal and three basal teeth), movable digit with one tooth and 33 (31–35) long (Fig. 24); tectum convex 35 (33–37) wide (Fig. 25).

Venter (Fig. 27). Tritosternum 90 (86–94) long, with two barbed laciniae (Fig. 27). Venter of idiosoma with 14 opisthogastric setae. Sternal shield smooth, posterior-margin straight and with three pairs of setae of similar lengths [*St1*–3 28 (25–29), 27 (26–27), 26 (24–28)] and two pairs of lyrifissures (*iv1*–2). Setae *St4* 25 (21–28) and set on small metasternal shields and with one small lyrifissure. Genital shield 115 (110–120) long, 76 (74–80) wide at level of *ST 5*, *ST5* 26 (22–29) long. Two pairs of elongate metapodal shields, primary shield almost twice as long as secondary shield [26 (25–26), 12 (11–13)]. Ventrianal shield transversely striated, 122 (112–135) long, and 102 (100–105) wide at level of *ZV2*, three pairs of pre-anal setae *JV1* 21 (21–22), *ZV2* 25 (24–25), *JV2* 23 (23–24) long and with a pair of preanal pores posteromedially to setae *JV2* and 21 (17–25) apart; para-anal setae *PA* 17 (15–18) and postanal seta *PST* 18 (16–20) long. Opisthogastric cuticle bearing four pairs of setae: *ZV1* 25 (24–26), *ZV3* 19 (18–21), *JV4* 21 (18–22) and *JV5* 40 (37–43) long, all smooth; three pairs of lyrifissures and two pairs of platelets and a slender, transverse platelet between genital and ventrianal shields.

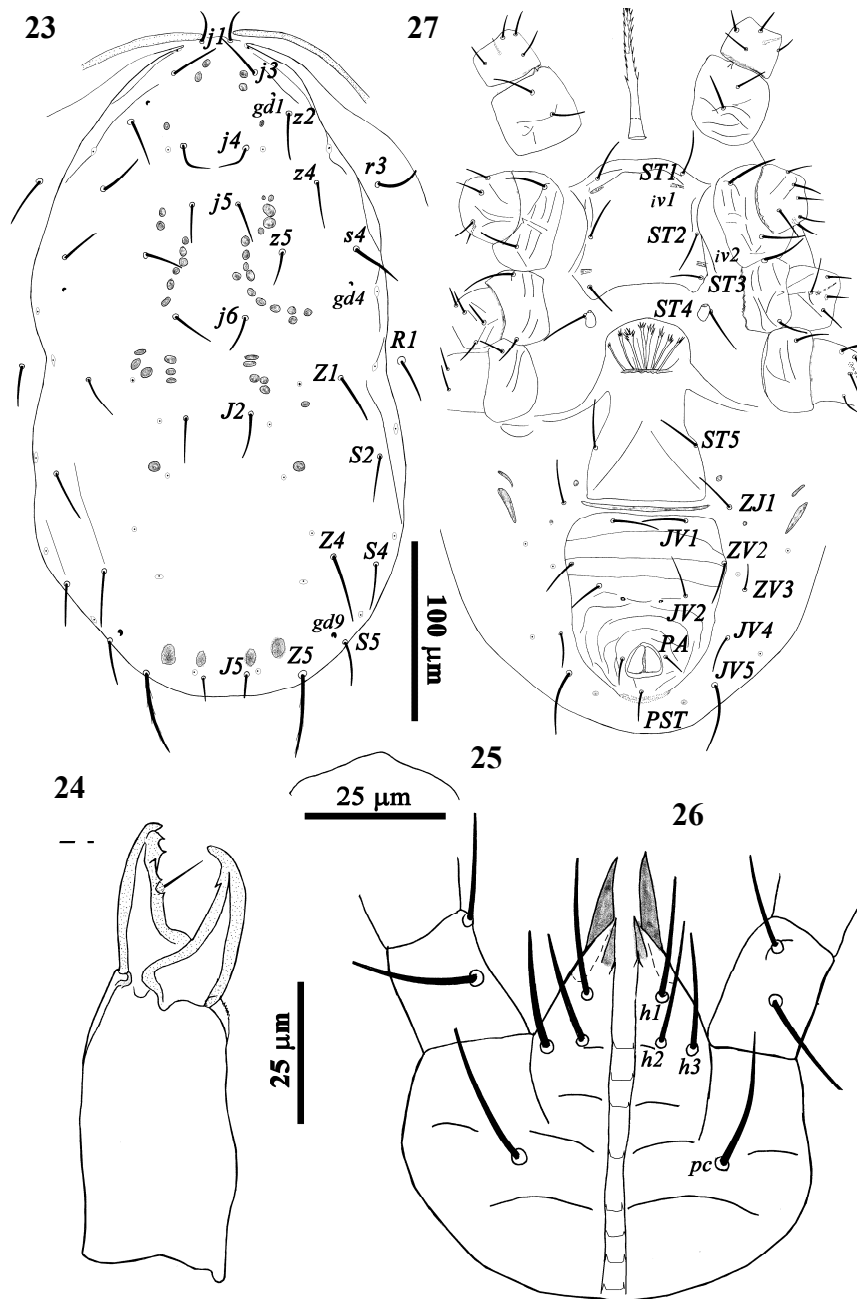
Spermatheca (Fig. 28). With fundibular calyx, 22 (20–23) long and 9 (8–10) wide at junction with vesicle.

Peritreme (Figs. 23 & 29). Stippled; extending to level of setae *j1*, 203 (200–205) long.

Legs (Figs. 30–31). Lengths of legs (including pretarsus) as follows: Legs I–IV 346 (337–354), 266 (263–270), 255 (245–260) and 352 (330–360). Basitarsus IV with pointed macroseta (*St*) 64 (61–70). Genua I–IV 10-7-7-7 setae.

Specimens examined

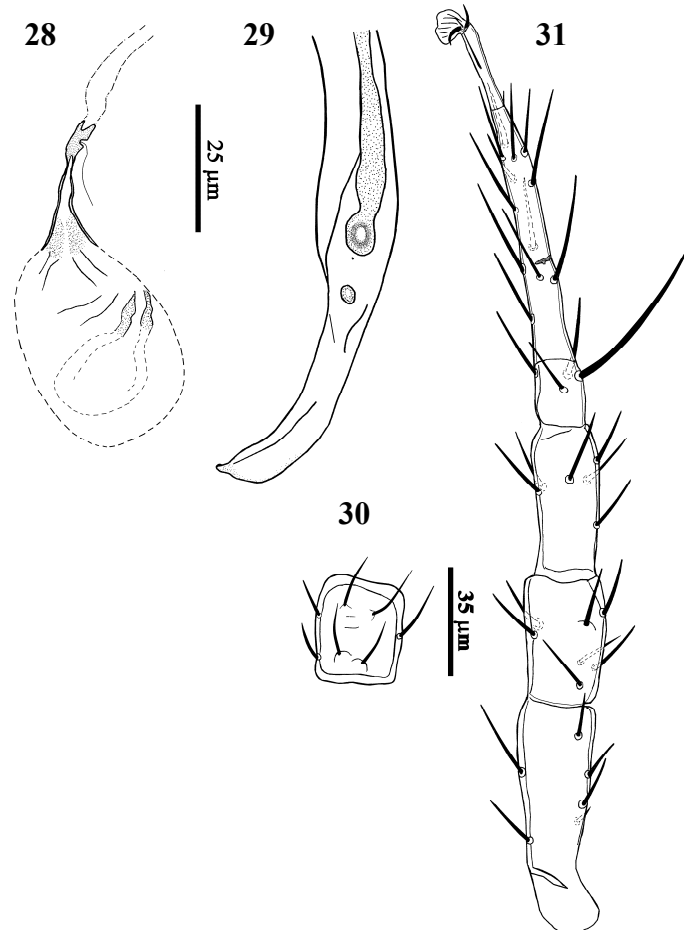
Asad Abad vicinity of Hamedan province (34° 46' N, 48° 06' E, 1566 m a.s.l.), 10 October 2009, 1 (♀) from aerial part of alfalfa; Naran region in Sanandaj vicinity of Kurdistan province (34° 51' N, 46° 59' E, 1421 m a.s.l.), 07 November 2009, 2 (♀♀) from aerial part, soil and litter; Kamyaran vicinity of Kurdistan province (34° 51' N, 46° 56' E, 1628 m a.s.l.), 14 November 2009, 1 (♀) from aerial part; Sahneh vicinity of Kermanshah province (34° 28' N, 47° 41' E, 1345 m a.s.l.), 07 August 2009, 3 (♀♀) from aerial part and 09 November 2009, 1 (♀) from soil and litter.



Figures 23–27. *Neoseiulus sugonjaevi* (Wainstein & Abbasova) (Female). 23. Dorsal view of idiosoma; 24. Chelicera; 25. Tectum; 26. Hypostome; 27. Ventral view of idiosoma.

Remarks

The characteristics of the specimens collected are very similar to those of the original description and other Iranian specimens reported by Kolodochka *et al.* (2003).



Figures 28–31. *Neoseiulus sugonjaevi* (Wainstein & Abbasova) (Female). 28. Spermatheca; 29. Peritreme; 30. Genu II; 31. Leg IV.

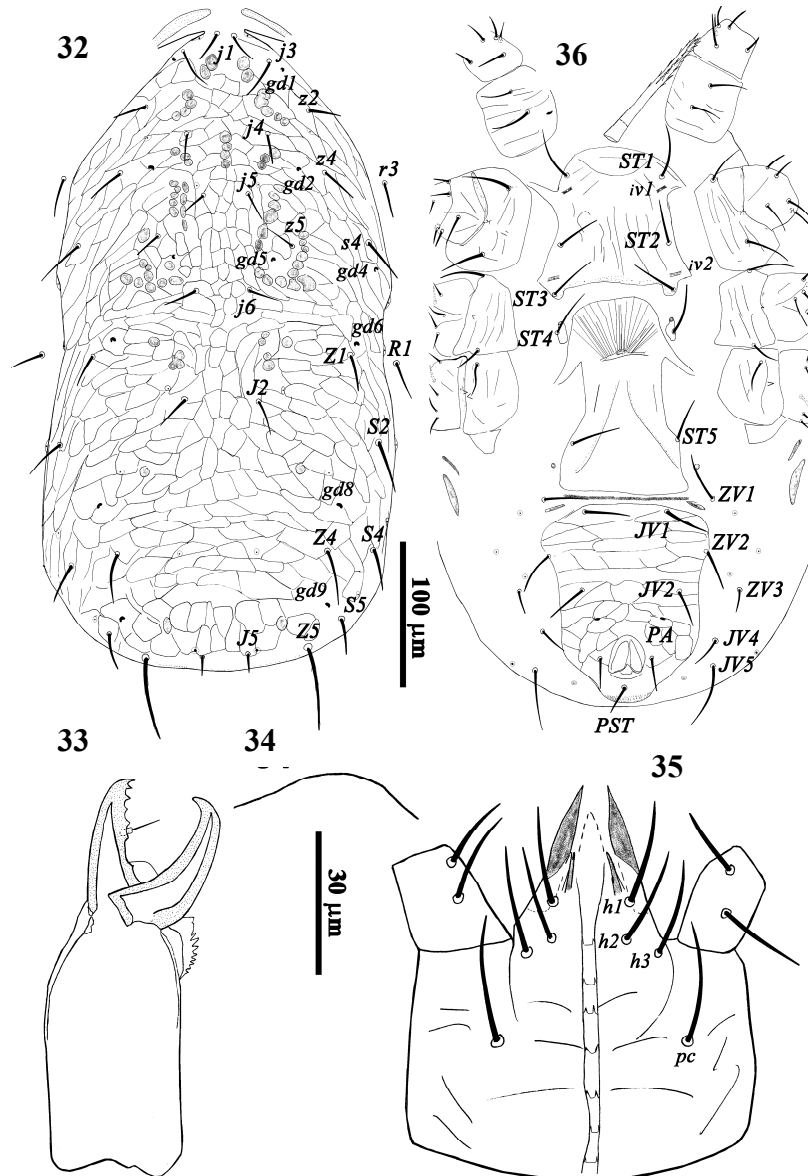
Neoseiulus zwoelferi (Dosse, 1957) (Figs. 32–40)

Syn.: *Typhlodromus zwolferi* Dosse, 1957

Female (n = 26) (10 specimens measured). Idiosoma oval. Length of body (excluding palp) 445 (400–495); (including palp) 639 (560–690); width 335 (310–360). Idiosomal setal pattern: 10A:9B/JV–3: ZV. All idiosomal and leg setae smooth, except Z5.

Dorsum (Fig. 32). Dorsal shield reticulated, 404 (360–430) long, 212 (200–220) wide at level of setae *R1*, with 17 pairs of smooth setae (seta *Z5* serrated) and 12 pairs of lyrifissures and seven pairs of solenostomes (*gd1*, *gd2*, *gd4*, *gd5*, *gd6*, *gd8*, *gd9*). Lengths of dorsal setae as follows: *j1* 16 (13–18), *j3* 27 (24–30), *j4* 19 (14–21), *j5* 19 (16–22), *j6* 21 (19–25), *J2* 24 (20–26), *J5* 12 (11–14), *z2* 24 (20–27), *z4* 26 (22–32), *z5* 19 (16–22), *Z1* 26 (23–29), *Z4* 47 (41–50), *Z5* 61 (55–65), *s4* 37 (33–41), *S2* 39 (33–41), *S4* 32 (30–35), *S5* 25 (21–30), *r3* 25 (21–27), *R1* 25 (21–29).

Gnathosoma (Figs. 33–35): Three pairs of smooth hypostomal setae, *h1* 23 (20–25), *h2* 22 (18–25) and *h3* 23 (22–25) long and palp coxa with a pair of smooth setae, *pc* 24 (21–26); hypostomal groove with seven rows of denticles, each with two denticles, corniculi distally pointed (Fig. 35); fixed digit of chelicera 33 (30–35) long, with six teeth (a basal tooth) plus one plus dentilis 8 (7–10) long, movable digit 28 (25–33) long and toothless (Fig. 33); tectum convex 37 (31–42–45) wide (Fig. 34).

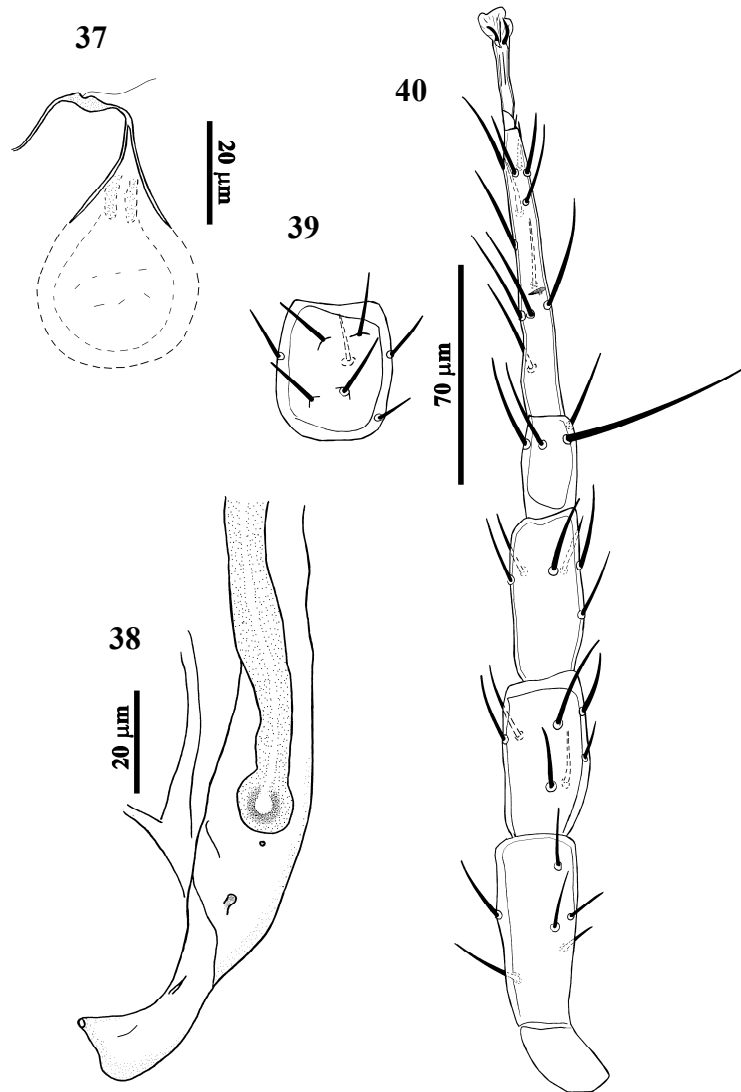


Figures 32–36. *Neoseiulus zwoelferi* (Dosse) (Female). 32. Dorsal view of idiosoma; 33. Chelicera; 34. Tectum; 35. Hypostome; 36. Ventral view of idiosoma.

Venter (Fig. 36). Tritosternum 82 (77–87) long, with two barbed laciniae (Fig. 36). Sternal shield with a few irregular lines medially, posterior margin straight and with three pairs of setae of similar lengths [*St1* 31 (28–34), *St2* 28 (26–31) and *St3* 27 (25–30)] and two pairs of lyrifissures (*iv1-2*); setae *St4* set on small metasternal shields, each shield bearing a small lyrifissure. Genital shield 119 (115–125) long; 75 (67–80) wide at level of setae *St5* 29 (24–31) long. Two pairs of elongate metapodal shields, primary

shield almost twice as long as secondary shield [25 (23–27), 13 (11–15)]. Ventrianal shield reticulated, 118 (107–125) long and 100 (96–107) wide at level of setae *ZV2*, three pairs of pre-anal setae *JV1* 27 (24–30), *ZV2* 28 (25–32), *JV2* 28 (25–30) long and with a pair of preanal pores, posterior to setae *JV2* and 48 (46–49) apart; para-anal setae *PA* 17 (15–21) and postanal seta *PST* 19 (16–24) long. Opisthogasteric cuticle bearing four pairs of setae *ZV1* 27 (23–33), *ZV3* 20 (16–21), *JV4* 26 (24–29) and *JV5* 51 (45–53) long, all smooth; four pairs of lyrifissures and two pairs of platelets and a slender transverse platelet between genital and ventrianal shields (Fig. 36).

Spermatheca (Fig. 37). Calyx fundibular, 20 (17–24) long and 10 (8–13) wide at junction with vesicle.



Figures 37–40. *Neoseiulus zwoelferi* (Dosse) (Female). 37. Spermatheca; 38. Peritreme; 39. Genu II; 40. Leg IV.

Peritreme (Figs. 32 & 38). Stippled; extending to level of setae *jl* (fig. 32), 188 (165–200) long.

Legs (Figs. 39–40). Lengths of legs (including pretarsus) as follows: Legs I–IV 334 (315–350), 246 (235–260), 238 (225–258) and 333 (320–357). Basitarsus IV with pointed macroseta (St) 73 (60–81). Genua I–IV with 10–8–7–7 setae.

Specimens examined

Kabodarahangh vicinity of Hamedan province (35° 13' N, 48° 45' E, 1663 m a.s.l.) 24 May 2010, 2 (♀♀) from aerial part of alfalfa and 20 March 2010, 1 (♀) from soil and litter; Joraghan village of Hamedan vicinity in Hamedan province (34° 54' N, 48° 32' E, 1715 m a.s.l.), 08 August 2009, 2 (♀♀) from soil and litter; Haji Abad village of Famenin vicinity in Hamedan province (35° 05' N, 48° 57' E, 1624 m a.s.l.), 2 (♀♀) from aerial part; Veinesar region of Ghorveh vicinity in Kurdistan province (35° 01' N, 48° 04' E, 1811 m a.s.l.), 09 August 2009, 2 (♀♀) from aerial part; Sanandaj vicinity of Kurdistan province (35° 24' N, 46° 53' E, 1705 m a.s.l.), 09 August 2009, 1(♀) from aerial part; Karvandan village of Dehgolan vicinity in Kurdistan province (35° 18' N, 47° 22' E, 1813 m a.s.l.), 11 August 2009 and 02 September 2009, 8 (♀♀), 24 October 2009, 4 (♀♀) from aerial part; km 40 Sanandaj–Marivan in Kurdistan province (35° 24' N, 46° 53' E, 1705 m a.s.l.) 24 October 2009, 2 (♀♀) from soil and litter; Naran region of Sanandaj vicinity in Kurdistan province (34° 51' N, 46° 59' E, 1421 m a.s.l.), 13 November 2009, 2 (♀♀), aerial part.

Remarks

This species was the dominant and most widespread species in this survey. The collected specimens are similar to those re-described by Chant and McMurtry (2003), except that setae *ZVI* and *JVI* are about twice as long as *ZV3* in the specimens collected, while those 3 setae are illustrated as having similar lengths by Chant & McMurtry (2003). The Iranian specimens also differ from the Greek specimens, that have seta *Z4* smooth and fixed digit with six teeth vs. *Z4* serrate and fixed digit with four teeth (Papadoulis *et al.* 2009). The Iranian specimens are also similar to the specimens reported by Kolodochka (1978), except that the Iranian specimens have *S2*, *S4*, *Z4* about 1.2 times and *JV3* 1.6 times longer. At last, the specimens presently collected are similar to those reported by Rahmani *et al.* (2010) from Iran.

Conclusion

This study showed that the species *N. zwoelferi* was collected and observed frequently in all three regions of this study so that the same result was obtained in the former (Khanjani 1996; Asali Fayaz *et al.* 2010) and *A. obtusus* less collected. It seems *N. zwoelferi* has wide distribution from the past in this area and can be good potential to control small phytophagous arthropods in the alfalfa ecosystems in western parts of Iran.

Key to species of phytoseiid mites in alfalfa farms in western parts of Iran in this study

1. Seta *Z5* whip-like, Seta *s4* about 7.0 times as long as seta *Z1*, genua and tibiae III–IV each with one macroseta *Amblyseius obtusus* (Koch)
- Seta *Z5* not whip-like, Setae *s4* at most 1.5 times as long as seta *Z1*, genua and tibiae III–IV without macroseta 2
2. Genu II with 7 setae, movable digit of chelicera with one tooth 3
- Genu II with 8 setae, movable digit of chelicera tooth-less
..... *Neoseiulus zwoelferi* (Dosse)

3. Dorsal shield with 6 pairs of solenostomes (*gd1*, *gd2*, *gd4*, *gd5*, *gd8*, *gd9*), Z4 49 (47–50), S2 40 (36–42) long.....*Neoseiulus marginatus* (Wainstein)
 – Dorsal shield with 3 pairs of solenostomes (*gd1*, *gd4*, *gd9*), Z4 35 (30–38), S2 26 (25–28) long..... *Neoseiulus sugonjaevi* (Wainstein & Abbasova)

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بازتوصیف چهار گونه کنه فیتوزئید (**Acari: Mesostigmata**) مرتبط با مزارع یونجه در غرب ایران

چکیده

چهار گونه کنه فیتوزئید *Neoseiulus marginatus*, *Amblyseius obtusus* و *N. sugonjaevi* و *N. zwoelferi* از روی یونجه *Medicago sativa* از غرب ایران گزارش و بازتوصیف می‌شوند. گونه *N. zwoelferi* به عنوان گونه فراوان و با پراکندگی گسترده در این منطقه تعیین شد.

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