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Description of *Typhloseiulus anatolicus* sp. nov. and redescription of two new records of Phytoseiidae (Acari: Mesostigmata) from Turkey

Ismail Döker, Omid Joharchi, Kamil Karut, Cengiz Kazak

**Abstract**

Surveys were carried out to determine Phytoseiidae (Acari: Mesostigmata) species in oak plantations (*Quercus* spp., Fagaceae) in different regions of Turkey. As a result, *Typhloseiulus anatolicus* sp. nov. Döker is described and illustrated based on female and male specimens. The new species is placed in the *simplex* species group of Tsolakis & Ragusa due to the elongated calyx of spermatheca. It differs from its congeners by having seta *J2* more than six times longer than seta *j6*, and seta *S5* about three times longer than seta *R1* as well as eight setae on genu II, in the female. In addition, *Typhlodromus (Anthoseius) rapidus* Wainstein & Arutunjan, and *Paraseiulus incognitus* Wainstein & Arutunjan are reported for the first time for the Turkish fauna. Although *T. (A.) rapidus* was reported for the Turkish fauna by an earlier study, we consider the previous report invalid, because it shows three pairs of preanal setae as opposed to four pairs in the original description and the material examined in this study. Furthermore, *P. incognitus* is removed from junior synonymy with *P. soleiger* and redefined. Therefore, in this study, we retain these two species as distinct species due to differences in their adenotaxy.

**Keywords** predatory mites; taxonomy; new species; Typhlodrominae; biological control

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**Introduction**

Species of the family Phytoseiidae (Acari: Mesostigmata) are unique groups of predators in terms of their frequent exploitation of the foliage habitats of higher plants (McMurtry et al. 2013). The family consists of three subfamilies, Amblyseiinae Muma, Phytoseiinae Berlese, and Typhlodrominae Wainstein (Chant and McMurtry 1994). Among them, the subfamily Typhlodrominae is characterized by having either or both of setae *z3* and *s6* present on the podosoma and with at least one of setae *Z1*, *S2*, *S4*, and *S5* present on the opisthosoma (Chant and McMurtry 2007).

The present study deals with three species in the subfamily Typhlodrominae; the description of a new species *Typhloseiulus anatolicus* sp. nov. Döker, and redescriptions of two new records, *Typhlodromus (Anthoseius) rapidus* Wainstein & Arutunjan 1968, and *Paraseiulus incognitus* Wainstein & Arutunjan 1967, in Turkey. Although *T. (A.) rapidus* was reported for the Turkish fauna by Cobanoglu (1997), we consider her redescription invalid due to differences in the number of preanal setae and the location of dorsal solenostomes in comparison with its original description. In addition, we suggested the resurrection of *P. incognitus* as a valid species in the genus *Paraseiulus*. 

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Material and methods

Leaves of oak trees (*Quercus* spp., Fagaceae) were collected from different regions in Turkey. They were transferred to the laboratory in an icebox and inspected under stereo binocular. Phytoseiid mites were cleared in 60% lactic acid and mounted on microscope slides in Hoyer’s medium. The permanent slides were examined under an Olympus® CX-41 microscope. Illustrations were prepared by using a U-Da drawing attachment, Camera Lucida. Final corrections were made using a computer program Adobe Photoshop (version CS6). Pictures were taken by using compound microscope Axio Imager A2, equipped with differential interference contrast (DIC) optical system and Axiocam 506 color camera (Carl Zeiss, Germany). The taxonomic system follows that of Chant and McMurtry (2007). Dorsal setal nomenclature is based on Lindquist and Evans (1965), as adapted by Rowell et al. (1978); ventral setal nomenclature is based on Chant and Yoshida-Shaul (1991). Nomenclature of dorsal solenostomes (gland pores) is based on Athias-Henriot (1975). Leg chaetotaxy follows that of Evans (1963). For each structure, measurements are given in micrometers and presented as the mean followed by the respective range, in parenthesis.

Results

**Genus Typhloseiulus Chant and McMurtry**

*Typhloseiulus anatolicus* sp. nov. Döker

Zoobank: E621254A-BC10-4865-B055-844ADC7D955

(Figures 1–3)

**Diagnosis**

Female: Idiosomal setal pattern 12A:9B/14:JV–3:ZV (r3 and R1 off shield). Dorsal shield strongly reticulated without waist. Peritremes striated, extending to base of seta j1. Dorsal setae thick, thorn-like, most of them slightly serrated, arising from tubercules, except j4, j5, z5 and R1 smooth and not arising from tubercules. Seta j6 smooth and arising from tubercules. Ratio setae J2/J6 and S5/R1 are about 7.0 and 2.5-3.0, respectively. Sternal shield smooth, with two pairs of setae and one pair of poroids. Setae ST3 and poroids pst2 on separate platelets. Ventrianal shield reduced, square, striated; with one pair of preanal setae, without preanal pores. Calyx of spermatheca elongated, flaring distally; atrium knobbed incorporated to base of calyx. Fixed digit of chelicera with four teeth and movable digit with one simple tooth. Genu II with eight setae (2 2/1 2/0 1). Leg IV with one blunt macroseta on basitarsus; other legs without macroseta.


**Description**

**Female** — (n=10)

*Dorsal idiosoma* (Figure 1A). Dorsal setal pattern 12A:9B (r3 and R1 off shield). Dorsal shield sclerotized, strongly reticulated, without waist. No solenostomes and poroids visible. Muscle-marks (sigillae) visible mostly on podosoma; length of dorsal shield 372 (368–375), width at level of s4 201 (190–225), width at level of S2 210 (193–225). Dorsal setae thick, thorn-like, most of them slightly serrated, arising from tubercules, except j4, j5, z5 and R1 smooth and not arising from tubercules. Seta j6 smooth and arising from tubercules. Measurements of dorsal setae as follows: j1 30 (28–33), j3 40 (38–43), j4 11 (10–12), j5 9 (8–10), J6 14 (12–15), J2 91 (88–95), J5 8 (7–8), z2 35 (33–38), z3 51 (48–53), z4 54 (50–55), z5 9 (8–10), Z1 73
Figure 1  *Typhloseiulus anatolicus* sp. nov. Döker, female. A. Dorsal idiosoma; B. Ventral idiosoma; C. Chelicera; D. Spermathecae.
Figure 2 *Typhloseiulus anatolicus* sp. nov. Döker, female right legs, A. Leg I; B. Leg II; C. Leg III; D. Leg IV

(70–75), Z4 100 (95–103), Z5 101 (95–105), s4 61 (57–63), s6 70 (67–73), S2 84 (80–88), S4 90 (80–95), S5 27 (25–30), r3 38 (36–38) and R1 10 (9–10). Peritremes striated, extending to base of setae j1.

*Ventral idiosoma* (Figure 1B). Ventral setal pattern 14:JV2–ZV. Sternal shield smooth, lightly sclerotized; with two pairs of setae (ST1 and ST2) and one pair of poroids (pst1). Setae ST3 and poroids pst2 on separate platelets; metasternal setae ST4 and a pair of pores (pst3) on metasternal platelets; distance between ST1–ST2 36 (35–38), ST2–ST2 56 (55–58). Genital shield smooth; width at level of setae ST5 57 (53–60). Ventrianal shield reduced, square, and striated; with one pair of preanal setae (JV2) and one pair of paraanal (Pa) and a postanal seta.
Typhloseiulus anatolicus sp. nov. Döker, male, A. Dorsal idiosoma; B. Ventral idiosoma; C. Chelicera

(Pst); without preanal solenostomes. Length of ventrianal shield 92 (88–95), width at level of paraanal setae 64 (63–65). Setae JV1, JV4, JV5, ZV1, ZV2, ZV3 and six pairs of poroids on integument surrounding ventrianal shield. Setae JV5 smooth, 33 (32–35) in length.

Chelicera (Figure 1C). Fixed digit 26 (25–26) long with four teeth and pilus dentilis; movable digit 26 (25–26) long with one tooth.

Spermatheca (Figure 1D). Calyx elongated, saccular, thick walled, flaring distally, 20 (18–22) in length; major duct long and narrow; minor duct not visible.

Legs (Figures 2A–D). Length of legs (excluding pretarsus): I, 291 (290–295); II, 250
Chaetotactic formulae as follows: Leg I: coxa 0 0/1 0/1 0, trochanter 1 0/1 1/2 1, femur 2 3/1 2/2 2, genu 2 2/1 2/1 2. Leg II: coxa 0 0/1 0/1 0, trochanter 1 0/1 1/2 1, femur 2 3/1 2/2 2, genu 2 2/1 2/1 2. Leg III: coxa 0 0/1 0/1 0, trochanter 1 0/1 1/2 1, femur 2 3/1 2/2 2, genu 1 2/1 2/1 2. Leg IV: coxa 0 0/1 0/0 0, trochanter 1 0/1 0/2 0, femur 1 2/1 1/0 1, genu 1 2/1 2/0 1, tibia 1 1/1 2/1 1. Most of antero-dorsal and postero-dorsal, and some lateral setae thick, thorn-like. Leg IV with one blunt macroseta: \(STIV (pd3)\) 25 (23–25) in length. Other legs without macroseta.

**Male** — (n=2)

**Dorsal idiosoma** (Figure 3A). Dorsal setal pattern 12A:9B (r3 on shield and R1 off shield). Dorsal shield sclerotized, strongly reticulated, without waist. No solenostomes and poroids visible. Muscle-marks (sigillae) visible mostly on podosoma; length of dorsal shield 295–300, width at level of s4 170–178, width at level of S2 168–178. Dorsal setae thick, thorn-like, most of them slightly serrated, arising from tubercules, except j4, j5, z5 and R1 smooth and not arising from tubercules. Seta j6 smooth and arising from tubercules. Measurements of dorsal setae as follows: j1 20–21, j3 25–26, j4 10, j5 10, j6 12, J2 20–25, J5 5–8, z2 20–25, z3 32–33, z4 35–40, z5 10, Z1 35–40, Z4 55–60, Z5 55–57, s4 40–47, s6 38–45, S2 45–47, S4 44–50, S5 10, r3 25–30 and R1 8–10. Peritreme striated, extending to base of seta j3.

**Ventral idiosoma** (Figure 3B). Ventral setal pattern 12:JV–3,4:ZV–3. Sternogenital shield unsclerotized. Sternogenital area with five pairs of setae (ST1, ST2, ST3, ST4 and ST5) and three pairs of poroids (iv1, iv2 and iv3); distance between setae ST1–ST5 115, distance between setae ST3 55–60. Ventrianal shield triangular, striated with four pairs of preanal setae (JV1, JV2, ZV1 and ZV2), and one pair of para-anal (Pa) and a post-anal seta (Pst). Length of ventrianal shield 115–121, width at level of setae anterior corners 140–145. Seta JV5 smooth 10–13 in length.

**Chelicera** (Figure 3C). Fixed digit with one tooth and pilus dentilis; movable digit with one bifid tooth. Spermatophoral process L-shaped, 20 in length, with toe blunt tip.


**Material examined**

Holotype female, nine paratype females and two paratype males were collected from *Quercus* sp. (Fagaceae) in Niksar County, Tokat, 40°35′18″N, 36°59′23″E, 556 meters above sea level, 27 October 2019. All type materials are deposited in Acarology Laboratory, Department of Plant Protection, Cukurova University, Adana, Turkey.

**Etymology**

The name of the new species “*anatolicus*” is derived from Anatolia which is the westernmost extension of continental Asia and constitutes most of the territory of Turkey.

**Differential diagnosis**

*Typhloseiulus anatolicus* sp. nov. Döker belongs to the *simplex* species group by having an elongated calyx of spermatheca as defined by Tsolakis and Ragusa (2017). Among the eight species listed in the *simplex* species group, the new species shows affinity to *T. erymanthii* (Papadoulis and Emmanouel, 1988) and *T. subsimplex* (Arutunjan, 1972) by having thicker and longer setae S5. This seta is simple and its length is always ≤ 15 in the other six species known in the species group (Ragusa and Swirski 1976; Kolodochka 1980; Chant and Yoshida-Shaul 1983; Ragusa Di Chiara 1992; Papadoulis et al. 2009; Tsolakis and Ragusa 2017). *Typhloseiulus anatolicus* sp. nov. Döker can be separated from *T. erymanthii* by having longer dorsal setae especially in z-Z and s-S series. In addition, *T. erymanthii* has bifid tooth on movable digit of chelicera in contrast to a simple tooth in the new species. *Typhloseiulus anatolicus* sp. nov.
Döker is also different from *T. subsimplex* by having all dorsal setae serrated (except *j4, j5, j6, z5, R1*), as oppose to only setae *j1, Z4, Z5, S2*, and *S4* serrated in the latter species (Arutunjan 1972; Chant and Yoshida-Shaul 1983). In addition, seta *J2* is 91 (88–95) in length, and it is longer than the distance between its base and that of seta *Z4* in the new species. In contrast, seta *J2* is 66 and it is shorter than the distance between its base and that of seta *Z4* in *T. subsimplex*. Finally, the ratio setae *J2/J6* is about 7 in the new species, and this ratio is about 2 and 4 in *T. erymanthii* and *T. subsimplex*, respectively.

**Genus Typhlodromus** Scheuten

**Subgenus Anthoseius** De Leon

*Typhlodromus* (*Anthoseius*) *rapidus* Wainstein & Arutunjan


( Figures 4–6)

**Diagnosis**


**Ventral idiosoma** (Figures 4B, 6). Ventral setal pattern 15:JV:ZV. Sternal shield smooth, lightly sclerotized; with two pairs of setae (*ST1* and *ST2*) and two pairs of poroids (*pst1* and *pst2*); distance between *ST1*–*ST2* 38 (37–40), *ST2*–*ST6* 63 (62–65). Sternal setae *ST3* on soft integument; metasternal setae *ST4* and a pair of pores (*pst3*) on metasternal platelets. Genital shield smooth, narrower than ventrianal shield; width at level of setae *ST5* 63 (60–67). Ventrianal shield pentagonal, smooth; with four pairs of pre-anal setae (*JV1, JV2, JV3* and *ZV1*); one pair of paraanal (*Pa*) and a postanal seta (*Pst*); with small rounded preanal solenostomes (*gv3*) posterior to setae *JV2*, distance between *gv3–gv3* 27 (24–32). Length of ventrianal shield 112 (110–114), width at level of setae *ZV2* 79 (78–80), width at level of paraanal setae 72 (69–74). Setae *ZV1, ZV3, JV4* and *JV5* and six pairs of poroids on integument surrounding ventrianal shield. Setae *JV5* smooth, 34 (30–37) in length.

**Chelicera** (Figure 4C). Fixed digit 26 (25–26) long with four teeth and pilus dentilis; movable digit 26 (26–27) long with three teeth.

**Spermatheca** (Figure 4D). Calyx narrow, tubular, flaring distally, 29 (28–30) in length, annulus visible in middle of calyx; atrium large nodular attached to calyx without neck.

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Döker I. et al. (2023), *Acarologia* 63(2): 553-568. https://doi.org/10.24349/r4a9-vy9o
Figure 4 Typhlodromus (Anthoseius) rapidus Wainstein & Arutunyan 1968, female, A. Dorsal idiosoma; B. Ventral idiosoma; C. Chelicera; D. Spermathecae
Figure 5 Typhlodromus (Anthoseius) rapidus Wainstein & Arutunjan 1968, female right legs, A. Leg I; B. Leg II; C. Leg III; D. Leg IV

Legs (Figures 5A–D). Length of legs (excluding pretarsus): I, 299 (295–300); II, 254 (250–260); III, 261 (260–265); IV, 339 (330–345). Chaetotactic formulae as follows: Leg I: coxa 0 0/1 0/1 0, trochanter 1 0/1 1/2 1, femur 2 3/1 2/2 2, genu 2 2/1 2/1 2, tibia 2 2/1 2/1 2. Leg II: coxa 0 0/1 0/1 0, trochanter 1 0/1 0/2 1, femur 2 3/1 2/1 1, genu 2 2/1 2/0 1, tibia 1 2/1 1/1 1. Leg III: coxa 0 0/1 0/1 0, trochanter 1 1/1 0/2 0, femur 1 2/1 1/0 1, genu 1 2/1 2/0 1, tibia 1 1/1 2/1 1. Leg IV: coxa 0 0/1 0/0 0, trochanter 1 1/1 0/2 0, femur 1 2/1 1/0 1, genu 1 2/1 2/0 1.
Figure 6 *Typhlodromus (Anthoseius) rapidus* Wainstein & Arutunjan 1968, female ventrianal shield

1, tibia 1 1/2 0 1. Leg IV with one knobbed macroseta: **StIV** (*pd3*) 40 (38–42). Other legs without macroseta.

**Male**
Not found in this study.

**Material examined**
Five females from *Quercus* sp. (Fagaceae) in Niksar County, Tokat, 40°35′18″N, 36°59′23″E, 556 meters above sea level, 27 October 2019.

**Remarks**
*Typhlodromus (Anthoseius) rapidus* was described by Wainstein and Arutunjan in 1968 based on the material collected from *Quercus* sp. in Tugay, Iori River, Georgia, and apple trees in Karahundj, Goris, Armenia. Many morphological details including measurements of some setae and leg chaetotaxy were missing in the original description and there was no accurate redescription. Therefore, we provide a complementary description of this species for the first time from specimens collected from *Quercus* sp. in Turkey. Morphological characters and measurements of the current material are almost identical to the original description. However, measurements of seta **z3** 24 (23–25) are slightly longer than that provided in the original description (18). We consider this difference as intraspecific variation.

The morphological characteristics of this species including the shape of the calyx of the spermatheca, a clear ring in the middle of the calyx, the nature of dorsal and ventral appearance,
knobbed seta Z5 and macroseta StIV fit well the definition of porathi species group by Tsolakis and Ragusa (2015). Therefore, we here included T. (A.) rapidus as a new member of the porathi species group.

Cobanoglu (1997) supposedly reported and redescribed this species based on the material collected from Corylus sp. (Betulaceae) as a first record for the Turkish fauna. However, her specimens, as having three versus four pairs of preanal setae is distinctly different from the type material illustrated by Wainstein and Arutunjan (1968) as well as the material examined in this study (Figure 6). In addition, her illustration of the location of dorsal solenostomes gd2, gd6, gd8 and gd9 showed some discrepancies compared to the original description and the redescription provided here. The number of preanal setae is one of the most important characters used to separate species in the genus Typhlodromus (Papadoulis et al. 2009; Tixier et al. 2016; Döker et al. 2021; Ferragut and Baumann 2021). Therefore, the specimens reported by Cobanoglu (1997) definitely represent another species and they should be reconsidered in further studies. As a result, the real T. (A.) rapidus is reported for the first time for Turkish fauna in this study.

**Genus Paraseiulus Muma**

*Paraseiulus incognitus* Wainstein & Arutunjan, 1967: 1768. (Figures 7–9)

**Diagnosis**

Idiosomal setal pattern 13A:8A/JV–2,3:ZV (r3 and R1 off shield). Dorsal setae smooth, except Z5 with few barbs. Dorsal shield strongly reticulated with two pairs of solenostomes (gd2 and gd6). Peritrematal shield without digitiform microvilli, peritreme extending between setae j1–j3. Sternal shield smooth, with two pairs of setae, lateral margin with projection at level of setae ST2, ventrianal shield elongated, sole-shaped, striated, with two pairs of preanal setae and without preanal solenostomes. Spermatheca with bulbous atrium and narrow-tubular calyx without neck. Fixed digit of chelicera with four teeth and movable digit with one tooth. Genu II with eight setae (2 2/1 2/0 1). Legs without macroseta.

**Re-description**

**Female — (n=5)**

* Dorsal idiosoma (Figures 7A, 9). Dorsal setal pattern 13A:8A (r3 and R1 off shield). Dorsal shield entire, well sclerotized, strongly reticulated, with strong waist at level of R1, with two pairs of solenostomes (gd2 and gd6) and fifteen pairs of visible poroids (id1, id2, id4, id5, id6, idm1, idm2, idm3, idm4, idm5, idm6, is1, idl1, idl3 and idl4). Muscle-marks (sigillae) visible on podosoma; length of dorsal shield 316 (303–325), width at level of s4 160 (153–168), width at level of S2 180 (170–188). Dorsal setae smooth, except Z5 with few barbs. Measurements of dorsal setae as follows: j1 16 (15–16), j3 26 (24–28), j4 21 (20–22), j5 22 (21–22), j6 24 (22–26), J2 28 (28–29), J5 9 (7–10), z2 25 (23–27), z3 26 (25–26), z4 28 (26–30), z5 21 (20–21), z6 24 (23–25), Z4 30 (28–32), Z5 29 (27–31), s4 28 (26–30), s6 30 (28–32), S2 32 (31–33), S4 28 (26–30), S5 26 (25–27), r3 28 (27–29) and R1 25 (24–27). Peritrematal shield without digitiform microvilli, peritreme extending between setae j1–j3.

* Ventral idiosoma (Figure 7B). Ventral setal pattern 13:A/JV–2,3:ZV. Sternal shield smooth, lightly sclerotized; posterior margin with strong median concavity; lateral margin with projection at level of setae ST2; with two pairs of setae (ST1 and ST2) and one pair of poroids (pst1); distance between ST1–ST2 32, ST2–ST2 44 (42–45). Poroid pst2 free on integument, sternal setae ST3 on separate platelets; metasternal setae ST4 and a pair of pores (pst3) on metasternal platelets. Genital shield mostly smooth, with some striations, as wide as ventrianal shield; width at level of setae ST5 44 (43–46). Ventrianal shield elongated, sole-shaped, with...
Figure 7 Paraseiulus incognitus Wainstein & Arutunjan 1967, female, A. Dorsal idiosoma; B. Ventral idiosoma; C. Chelicera; D. Spermatheca
**Figure 8** *Paraseiulus incognitus* Wainstein & Arutunjan 1967, female left legs, A. Leg I; B. Leg II; C. Leg III; D. Leg IV

Strong waist posterior to setae *ZV2*, smooth; with two pairs of pre-anal setae (*JV1* and *ZV2*); one pair of paraanal (*Pa*) and a postanal seta (*Pst*); without preanal solenostomes. Length of ventrianal shield 98 (97–99), width at level of setae *ZV2* 44 (40–46), width at level of paraanal setae 48 (45–50). Setae *ZV1*, *ZV3*, *JV4* and *JV5* and six pairs of poroids on integument surrounding ventrianal shield. Setae *JV5* smooth, 26 (25–27) in length.
**Chelicera** (Figure 7C). Fixed digit 20 (20–21) long with four teeth and pilus dentilis; movable digit 23 (23–24) long with one tooth.

**Spermatheca** (Figure 7D). Calyx elongated, narrow, tubular, flaring distally, 42 (40–45) in length; atrium large nodular attached to calyx without neck.

**Legs** (Figures 8A–D). Length of legs (excluding pretarsus): I, 232 (228–235); II, 198 (188–205); III, 193 (185–200); IV, 249 (243–255). Chaetotactic formulae as follows: Leg I: coxa 0 0/1 0/1 0, trochanter 1 0/1 1/2 1, femur 2 3/1 2/2 2, genu 2 2/1 2/1 2, tibia 2 2/1 2/1 2. Leg II: coxa 0 0/1 0/1 0, trochanter 1 0/1 0/2 1, femur 2 3/1 2/1 1, genu 2 2/1 2/0 1, tibia 1 2/1 1/1 1. Leg III: coxa 0 0/1 0/1 0, trochanter 1 1/1 0/2 0, femur 1 2/1 1/0 1, genu 1 2/1 2/0 1, tibia 1 1/1 2/1 1. Leg IV: coxa 0 0/1 0/0 0, trochanter 1 1/1 0/2 0, femur 1 2/1 1/0 1, genu 1 2/1 2/0 1, tibia 1 1/1 2/0 1. Legs without macroseta.

**Male**
Not found in this study.

**Material examined**
Five females from *Quercus* sp. (Fagaceae) near Seydiler, Kastamonu, 41°42′28″N, 33°42′37″E, 1167 meters above sea level, 29 October 2019.

**Remarks**
*Paraseiulus incognitus* was described by Wainstein and Arutunjan in 1967 based on the material collected from various host plants including, alder, apple, ash, cherry, oak and...
pear in Kazakhstan, Crimea, Georgia and Russia, but with the holotype female and the allotype male collected from *Malus* sp. in Alma-Ata, Kazakhstan. This is the first report of *P. incognitus* for the Turkish fauna. The original description is in Russian and lacks many morphological details which are currently used for species delimitation in Phytoseiidae systematics. The redescription by Kolodochka (1983) is reasonably detailed but still lacks in several morphological characteristics such as leg chaetotaxy. During their revision of the genus, known as *soleiger* species group in the genus *Typhlodromus* Scheuten at that time, Chant and Yoshida-Shaul (1982) examined a slide of *P. incognitus* identified by Dr. Wainstein and implied that there was no recognizable difference between *P. incognitus* and *P. soleiger*. As a result, Chant and Yoshida-Shaul (1982) considered this species as a junior synonym of *P. soleiger*. However, *P. incognitus* is distinctly different from *P. soleiger* by having two pairs (*gd2* and *gd6*) of dorsal solenostomes versus only one pair (*gd6*) in the latter (Kolodochka 1983; Ferragut 2018) (Figure 9). The presence or absence of dorsal solenostomes are widely used for species delimitation in a series of phytoseiid genera including *Paraseiulus* Muma (Faraji et al. 2008; Papadoulis et al. 2009; Kreiter et al. 2010; Ferragut and Ueckermann 2012; Döker et al. 2021). In addition, the taxonomic utility of a single pair of solenostomes to separate closely related species in the genus *Kampimodromus* and *Neoseiulus* have been confirmed by molecular analyses in several cases (Döker et al. 2018; Khaustov et al. 2022). Therefore, *P. incognitus* and *P. soleiger* are altogether two distinct species and they can be easily separated by the presence or absence of *gd2* solenostomes on the dorsal shield, respectively (Kolodochka 1983).

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**References**


