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Review of *Amblyseius* Berlese (Acari: Phytoseiidae) in Western Siberia, Russia

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**Original research**

**ABSTRACT**

Mites of the genus *Amblyseius* (Acari: Phytoseiidae) in Western Siberia, Russia are reviewed. *Amblyseius silvaticus* (Chant), *A. ampullosus* Wu and Lan and *A. myrtilli* Papadoulis, Emmanouel and Kapaxidi are recorded for the first time from Russia. Females of *A. silvaticus, A. omaloensis, A. myrtilli* and *A. ampullosus* are redescribed in detail and males of *A. silvaticus* and *A. ampullosus* are described for the first time. Chaetotaxy of tarsus I for all studied species is presented. Moreover, the importance of apical sensorial setal cluster of tarsus I in identification of phytoseiid mites is discussed.

**Keywords** morphology; predators; taxonomy; redescription; tarsal setal cluster

**Introduction**

Phytoseiid mites are important natural enemies of phytophagous mites and other different small arthropods. Some of them, such as *Phytoseiulus persimilis* (Athias-Henriot), *Amblyseius swirskii* (Athias-Henriot), *Transeius montdorensis* (Schicha), *Neoseiulus californicus* (McGregor) are available commercially for use in greenhouses. Phytoseiid mites are widely distributed around the world and presently include more than 2,500 valid species in three subfamilies and 94 genera (Demite et al. 2020; Chant and McMurtry 2007). The genus *Amblyseius* is the largest in the subfamily Amblyseiinae, with 434 nominal species (Demite et al. 2020).

Twenty four *Amblyseius* species are reported from Russia (Wainstein 1960; Meshkov 1999; Wainstein and Beglyarov 1971; Wainstein 1978, 1979; Vyotskaya and Bregetova 1957; Wainstein 1975; Makarova 2009; Kolodocha 1990; Livshitz and Kuznetsov 1972; Kolodocha 1981, 2003, 2006).

The present paper aims to increase the knowledge of the mite fauna of Western Siberia, particularly the poorly studied fauna of phytoseiid mites (Tixier et al. 2008). As a result, three species are here reported for the first time from Russia and additional morphological information of apical sensorial setal cluster of tarsus I are provided to complete the description of all the species investigated. Redescription of the females of *Amblyseius silvaticus* Chant, 1959, *A. ampullosus* Wu and Lan, 1991, *A. omaloensis* Gomelauri, 1968a and *A. myrtilli* Papadoulis, Emmanouel and Kapaxidi, 2009 are provided and males of *A. silvaticus* and *A. ampullosus* are described for the first time. Other species such as *A. rademacheri* Dosse, 1958, *A. krantzi* Chant, 1959, *A. meridionalis* Berlese, 1914 and *A. obtusus* Koch, 1839 already redescribed in detail (Kolodocha and Gwiazdowicz [2016], Faraji et al. [2011], Döker et al. [2020]) and no need to provide full redescription in this study.

**Materials and methods**

The mites were collected directly from plant leaves using stereomicroscope Discovery V8 and placed in vials filled with 96% ethanol. Mites from bark and soil samples were extracted
using Berlese-Tullgren funnels. Specimens were cleared in lactic acid solution and mounted in Hoyer’s medium (Walter and Krantz 2009).

Systematics of Phytoseiidae follows that of Chant and McMurtry (2007). Setal nomenclature for the dorsal idiosoma follows that of Lindquist and Evans (1965) as adapted by Rowell et al. (1978), and Chant and Yoshida-Shaul (1991) for ventral idiosoma. The chaetotaxy of the palp tibia and tarsus and the distal part of tarsus I follows that of Jackson (1974). Chaetotaxy of other parts of legs and palps follows that of Evans (1963, 1964, 1969). For designation of dorsal solenostomes and poroids, nomenclature proposed by Athias-Henriot (1975) and Johnston and Moraza (1991) for ventral surface of idiosoma was used. Terminology of the morphological structures of spermatodactyl follows that of Beard (2001). World distribution of investigated species is based on Demite et al. (2020). Measurements of morphological structure are given in micrometers (µm) and presented as a mean followed by the range in parenthesis. Morphological observations, illustrations and measurements were made using compound microscope Axio Imager A2 (Carl Zeiss, Germany), equipped with differential interference contrast (DIC) and phase contrast optical system. Pictures were taken with Axiocam 506 color (Carl Zeiss, Germany). Dorsal shield length measured along the midline from \( j1 \) setae level to \( J5 \) setae level; dorsal shield width taken at \( R1 \) setae level. Length and width of sternal shield were measured as distance between bases of setae \( ST1-ST3 \) and \( ST2-ST2 \) for females and distance between bases of setae \( ST1-ST3, ST2-ST2 \) for males, respectively. Length of legs is from basis of the coxa to apex of the tarsus, excluding pre-tarsus.

The following abbreviations are used in this paper for morphological characters: Dsl – dorsal shield length; Dsw – dorsal shield width; Vsl – ventral shield length; Vsw – ventral shield width at ZV2 level; Nbf – number of teeth on the fixed digit; Nbm – number of teeth on the movable digit.

All examined materials are deposited in the collection of the Tyumen State University Museum of Zoology, Tyumen, Russia.

Results

Family Phytoseiidae Berlese, 1916
Subfamily Amblyseiinae Muma, 1961
Tribe Amblyseiini Muma, 1961
Subtribe Amblyseiina Muma, 1961
Genus Amblyseius Berlese, 1914

Type species: Zercon obtusus Koch, 1839, by original designation.

Amblyseius sylvaticus (Chant) (Figs. 1-8, 26A)

Typhlodromus (Amblyseius) sylvaticus Chant, 1959: 94, Figs. 216, 217.
Amblyseius (Amblyseius) sylvaticus (sic): Muma 1961: 287.
Typhlodromus sylvaticus: Hirschmann 1962: 24.
Amblyseius (Amblyseius) sylvaticus: Denmark & Muma 1989: 73.
Amblyseius patrius Karg, 1970: 295 (synonymized by Denmark & Muma, 1989: 73).

Material examined — two females, Russia, Tyumen province, vicinity of Tyunevo, 57°22′ N, 65°41′ E, 25 September 2018, A. Khaustov coll., on mushrooms of Armillaria genus; 8 females and 5 males, Russia, Tyumen province, Uspenka state zoological reserve, 57°04′ N, 65°04′ E, 28 June 2019, A. Khaustov coll., on bark of Picea obovata Ledeb., Pinus sylvestris L., (Pinaceae) and Betula pendula Roth., (Betulaceae).

World distribution — Cuba, England, Finland, Norway, Switzerland (Demite et al. 2020).

Redescription — Female (Figs. 1, 2B-2H, 3, 4, 6, 7A, 7B, 7D, 7E, 26A) (n = 10)
Idiosomal setal pattern – 10A:9B/JV–3:ZV.

Dorsal idiosoma (Figs. 1A, 7A) – Dorsal shield oval, smooth, 372 (351-386) long and 250 (240-266) wide; with 19 pairs of setae (included r3 and R1), all setae smooth, except J5, Z4 and Z5, slightly barbed; length of setae: j1 34 (30-38), j3 61 (58-67), j4 6 (5-7), j5 5 (4-6), j6 6 (5-7), J2 6 (5-6), J5 9 (8-10), z2 20 (18-21), z4 37 (31-43), z5 5 (5-6), Z1 6 (5-7), Z4 146 (134-160), Z5 247 (233-258), s4 113 (107-116), S2 7 (7-9), S4 7 (6-7), S5 7 (6-8); setae r3 26 (24-28) and RI 9 (8-9) on lateral soft cuticle; dorsal shield with seven pairs of solenostomes (gd1, gd2, gd4, gd5, gd6, gd8, gd9) and 16 pairs of poroids.

Gnathosoma (Figs. 2A – 2D, 2F, 2G) – Anterior margin of epistome bump-like and smooth. Hypostomal groove with seven transverse rows of denticles, each row with two teeth; subcapitular setae h1, h2, h3 subequal (28-30), slightly shorter than palp coxal setae (pc) 34-35.
Figure 2 Amblyseius silvaticus (Chant, 1959), male: A – chelicera and spermatodactyle, female: B – chelicera, C – dorsal view of left palp tarsus, D – anterior margin of epistom, E – spermatheca, F – subcapitulum, G – left palp excepting tarsus, dorsal aspect, H – peritrema.

Chaetotaxy of palps: trochanter with two setae v1, v2; femur with five setae, thickened and apically spatulate antero-lateral al, three dorsal (d1, d2, d3) and one postero-lateral (pl); genu with six setae, antero-lateral setae (al1 and al2) thickened , three dorsal setae (d1, d2, d3) and one postero-lateral (pl); tibia with 14 setae, one antero-lateral (al), eight dorsal d1 – 8, two setae di-1, di-2, arise from the dorsal surface at the distal end, two ventral (v1, v2) and one postero-lateral (pl); tarsus with 15 setae (six simple d1, d2, d3, v1, v2, v3; nine stout setae with rounded tips di-1 to di-9) and two-tined apotele (Fig. 2C).

Chelicera (Figs. 2B, 7D) – fixed digit 34 (31-37) long, with 10-11 teeth and pilus dentilis; movable digit 34 (31-38) long, with three teeth.

Ventral idiosoma (Figs. 1B, 7B) – Tritosternum with paired pilose laciniae 96-97, fused basally 41-44, columnar base 16-17 × 12-13 wide. Sternal shield smooth, 71 (68-72) long and
Figure 3 Amblyseius silvaticus (Chant, 1959), female: A–D – right legs I-IV, respectively, excepting tarsi, ventral view; macrosetae depicted in solid black.

80 (78-82) wide, with three pairs of setae ST1 38 (35-43), ST2 32 (30-35), ST3 32 (31-33) and two pairs of lyrifissures iv1, iv2. Setae ST4 34 (32-36) located on small separate metasternal platelets, each with one pore iv3.

Genital shield smooth, 80 (75-84) wide at level of base of setae ST5 35 (32-38), para-genital poroids iv5 on soft cuticle.

Opisthosomatic venter with two pairs of elongated metapodal platelets, primary 24 (22-27) and accessory 16 (12-19) long; four pairs of setae, ZV1 21 (19-24), ZV3 14 (12-16), JV4 16 (13-17), JV5 103 (92-109) long, all smooth, and four pairs of poroids.

Ventrianal shield pentagonal in shape, smooth, 120 (115-125) long and 96 (92-100) wide at level of setae ZV2, with three pairs of pre-anal setae JV1 23 (22-25), JV2 21 (20-25), JV2 25 (23-26), with small rounded pre-anal pores gv3 (distance between pores 45 (43-47)); para-anal
Figure 4 *Amblyseius silvaticus* (Chant, 1959), female: right tarsi I-IV, respectively, macrosetae depicted in solid black: A – dorsal aspect; B – apical sensorial setal cluster area, C–E – ventral aspect.

setae 22 (21-23) and post-anal seta 26 (24-28).

Peritreme (Figs. 1A, 2H) – extends anteriorly to setae \( j1 \).

Spermatheca (Figs. 2E, 7E) – Calyx bell-shaped, 10 (8-13) long and at the opening 8 (7-11) wide, sides of calyx curved; atrium C-shaped, connected without neck with calyx; major duct thick, minor duct not visible.

Legs (Figs. 3, 4) – Legs I 393 (386-405) and IV 425 (412-429) longer than legs II 320 (313-329) and III 320 (317-329). Chaetotaxy normal for phytoseiid mites: Leg I: coxa 0 0/1 0/1 0, trochanter 1 0/1 0/2 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
Figure 5 *Amblyseius silvaticus* (Chant, 1959), male: A – dorsal idiosoma; B – ventral idiosoma.

0 0/1 0/1 0, trochanter 1 0/1 0/2 1, femur 2 3/1 2/1 1, genu 2 2/0 2/0 1, tibia 1 2/1 1/1 1. Leg III: coxa 0 0/1 0/1 0, trochanter 1 0/1 0/2 1, 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 0/1 0/2 1, femur 1 2/1 1/0 1, genu 1 2/1 2/0 1, tibia 1 1/1 2/0 1. Chaetotaxy of tarsi II-IV typical for Phytoseiidae and bears 18 setae $3_{2/3} 3_{2/3} + mv. md$. Tarsus I with 37 setae, excluding apical sensorial setal cluster. Setae $d_3$ 13-15 with rounded tip, $d_4$ 30-34. Apical sensorial setal cluster (Fig. 26A) includes 10 short setae of different shape. Setae $df_1$ (12-14), $df_3$ (7-8) and $df_7$ (6-7) finger-shaped with blunt tips. Setae $df_2$ (5-6), $df_5$ (6-8), $df_6$ (12-13) and $df_8$ (11-12) baculiform with rounded tips, setae $df_8$ usually curved. Setae $df_4$ (8-9), $df_9$ (8-9) spur-like with lobe-like tips, setae $df_{10}$ (5-6) located between $df_4$ and $df_9$ also spur-like with acuminate tip. Measurements of macrosetae as follows: $S_{ge1}$ 36 (35-39), $S_{ge2}$ 40 (38-41), $S_{ge3}$ 64 (58-73), $S_{ge4}$ 143 (132-153), $St_{iv1}$ 43 (40-46), $St_{iv2}$ 108 (102-117), $St_{iv3}$ 84 (78-93). All macrosetae are acuminate.

**Male** (Figs. 2A, 5, 7C, 8) (n = 5)

Idiosomal setal pattern – 10A:9B/JV-3,4:ZV-1,3.

Dorsal idiosoma (Figs. 5A, 8A) – Dorsal shield oval, smooth, 312 (306-316) long and 226 wide. As in female, dorsal shield with 19 pairs of setae, most of which smooth, except $Z_4$ and $Z_5$, slightly barbed. Setae $r_3$ located on dorsal shield, setae $R_1$ on lateral soft cuticle or on dorsal shield. Length of dorsal setae as follows: $j_1$ 29 (27-30), $j_3$ 49 (46-52), $j_4$ 5 (4-7), $j_5$ 5 (4-5), $j_6$ 5 (5-6), $J_2$ 5 (5-6), $J_5$ 8 (7-8), $z_2$ 18 (17-18), $z_4$ 29 (28-32), $z_5$ 5 (4-5), $Z_1$ 5, $Z_4$ 106 (104-118), $Z_5$ 168 (163-174), $s_4$ 84 (81-91), $S_2$ 7, $S_4$ 6 (5-6), $S_5$ 5 (5-6), $r_3$ 18 (17-20), $R_1$ 6 (5-6). Number and location of solenostomes and pores as in female, except $gd_3$, which situated on dorsal shield posteriad base of setae $s_4$.

Ventral idiosoma (Figs. 5B, 8B) – Sternogenital shield smooth with few sclerotized lines.
Figure 6 SEM pictures of *Amblyseius silvaticus* (Chant, 1959), female: A – left tarsus of palp, dorsal aspect; B – right tarsus of palp, dorsal aspect; C – apical sensorial setal cluster area of tarsus I, left leg, dorsal aspect; D – apical sensorial setal cluster area of tarsus I, right leg, dorsal aspect.
Figure 7 Phase contrast (A, B) and DIC (C, D, E) pictures of *Amblyseius sylvaticus* (Chant, 1959). A – dorsal idiosoma of female, B – ventral idiosoma of female, C – chelicera of male with spermatodactyle, D – chelicera of female, E – spermatheca.
Figure 8 Phase contrast pictures of *Amblyseius silvaticus* (Chant, 1959), male: A – dorsal idiosoma, B – ventral idiosoma.

lateral, 125 (123-127) long (*ST1*-*ST5*) and 70 (69-72) wide (*ST2*-*ST2*); five pairs of setae *ST1* 30 (25-31), *ST2* 23 (21-26), *ST3* 24 (22-26), *ST4* 22 (20-25), *ST5* 22 (20-23) and three pairs of lyrifissures *iv1*, *iv2*, *iv3*.

Ventrianal shield reticulated only in anterior part, with three pairs of pre-anal setae *JV1* 17 (16-18), *JV2* 20 (17-22), *ZV2* 17 (16-20), one pair of anal setae *P4* 17 (16-17) and post-anal setae *PST* 20 (20-21), a pair of pre-anal pores *gv3*, posteriad base of setae *JV2* and four pairs of poroids *iv5*, *iv0*, *iv0*, *iv0*. Ventrianal shield 139 (136-146) long, measured along midline; 185 (178-196) wide at level of anterolateral corners. Opisthogastric cuticle with one pair of setae *JV5* 53 (50-57) and one pair of poroids *ivp*.

Chelicera (Figs. 2A, 7C) – Fixed digit 25 (23-26) long, with 9-10 teeth and pilus dentilis; movable digit 25 long with 1 tooth. Spermatodactyl as in Figs. 2A, 7C; shaft of spermatodactyl 14 (13-14) long.

Legs – Legs I 344 (335-346) and IV 371 (367-374) longer than legs II 283 (278-289) and III 288 (279-289). Legs chaetotaxy as in female. Measurements of macrosetae as follow: *SgeII* 33 (31-36), *SgeIII* 45 (41-47), *SgeIV* 97 (91-102), *StIII* 36 (33-38), *StIV* 72 (66-73), *StIV* 71 (67-75).

**Remarks** — In Denmark and Muma (1989), *Amblyseius silvaticus* is placed in the *silvaticus* species group. Also, Denmark and Muma (1989) synonymized *A. silvaticus* and *A. patrius* Karg. Karg and Huhta (2009) then removed this synonymy and updated the identification key of the species group. According to the key of Karg and Huhta (2009), the present specimens
from Western Siberia are intermediate between *A. silvaticus* and *A. tavasticus* in having ratio lengths of setae z2/z3 as in *A. tavasticus* and shape of spermatheca and length of setae Z5 as in *A. silvaticus*. Also, *A. tavasticus* in original description differs in number of teeth on fixed digit (14-16 versus 10-11 in the present Siberian specimens) and presence of delicate transverse lines on the dorsal shield. At my request, Drs Veikko Huhta (University of Jyväskylä, Finland) and Axel Christian (Senckenberg National Museum, Görlitz, Germany) examined paratypes of *A. tavasticus* deposited in Museum of Zoology, Helsinki, Finland and Senckenberg National Museum, Görlitz, Germany, respectively. They confirmed the absence of transverse lines on the dorsal shield. In specimens from Senckenberg National Museum, the number of teeth was about 10-11. The only relevant difference between *A. silvaticus* and *A. tavasticus* is thus the shape of calyx of spermatheca. In *A. tavasticus* it is wider than long, while in *A. silvaticus* the length and width of calyx is subequal (figure 2E). Siberian specimens show some variability in length/width ratio of calyx from equal length and width to length slightly longer than width. Both species have the same habitats and live on bark of trees, mainly in spruce forests. In my opinion, *A. tavasticus* is likely a potential junior synonym of *A. silvaticus*.

**Amblyseius ampullosus** Wu and Lan

*Amblyseius ampullosus* Wu & Lan, 1991: 316.  
*Amblyseius* (*Amblyseius*) *ampullosus*: Wu et al. 2009: 199.

**Material examined** — seven females, one male, Russia, Kurgan province, vicinity of Zverinogolovskoe, 54°27′ N, 64°51′ E, 28 September 2019, A. Khaustov coll., from sod.

**World distribution** — China, Iran (Demite et al. 2020).

**Redescription** — Female (Figs. 9, 10A, 10C–10H, 11, 12, 14A–14C, 14E, 26B) (n = 5)

Idiosomal setal pattern – 10A:9B/JV–3:ZV.

**Dorsal idiosoma** (Figs. 9A, 14A) – Dorsal shield oval, smooth, 333 (327-344) long, 230 (227-236) wide, with 19 pairs of setae (included r3 and R1), all setae smooth. Length of setae: j1 22 (21-24), j3 40 (39-43), j4 6, j5 5 (5-6), j6 5 (5-6), J2 5 (5-6), J5 11 (11-12), z2 12 (11-14), z4 12 (10-14), Z1 6 (6-7), Z4 86 (82-91), Z5 139 (132-148), S2 58 (56-64), S2 9 (9-10), S4 10 (9-10), S5 11; setae r3 15 and R1 9 (8-9) situated on lateral soft cuticle; dorsal shield with seven pairs of solenostomes (gd1, gd2, gd4, gd5, gd6, gd8, gd9), and 16 pairs of poroids.

### Table 1 Character measurements of adult females of *Amblyseius silvaticus* collected in this study compared to previously published character measurements of adult females of *A. silvaticus* and *A. tavasticus* (localities followed by the number of specimens measured between brackets).

| Characters | Russia, Tyumen district (10) | *A. silvaticus* (Finland) (?) |
|------------|-------------------------------|------------------------------|
| Dsl        | 372 (351-386)                 | 365                          |
| Dsw        | 250 (240-266)                 | 230                          |
| j1         | 34 (30-38)                    | -                            |
| j3         | 61 (58-67)                    | 54                            |
| j4         | 6 (5-7)                       | -                            |
| j5         | 5 (4-6)                       | -                            |
| j6         | 6 (5-7)                       | -                            |
| J2         | 6 (5-6)                       | -                            |
| J5         | 9 (8-10)                      | -                            |
| r3         | 26 (24-28)                    | -                            |
| R1         | 9 (8-9)                       | -                            |
| s4         | 113 (107-116)                 | 117                          |
| S2         | 7 (7-9)                       | 7                            |
| S4         | 7 (6-7)                       | -                            |
| S5         | 7 (6-8)                       | -                            |

| Characters | Russia, Tyumen district (10) | *A. tavasticus* (Sweden) (?) | *A. tavasticus* (Finland) (?) |
|------------|-------------------------------|-----------------------------|-------------------------------|
| z2         | 20 (18-21)                    | 23                          |
| z4         | 37 (31-43)                    | 36                          |
| z5         | 5 (5-6)                       | -                           |
| Z1         | 6 (5-7)                       | -                           |
| Z4         | 146 (134-160)                 | 158                         |
| Z5         | 247 (233-258)                 | 230                         |
| Vsl        | 120 (115-125)                 | 122                         |
| Vsw ZV2    | 96 (92-100)                   | 99                          |
| JV5        | 103 (92-109)                  | 95                          |
| SgelIV     | 143 (132-153)                 | -                           |
| SgelIV     | 108 (102-117)                 | -                           |
| SgelIV     | 84 (78-93)                    | -                           |
| Nhf        | 10-11                         | -                           |
| Nbm        | 3                             | 4                           |

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Figure 9 *Amblyseius ampullosus* Wu and Lan, 1991, female: A – dorsal idiosoma; B – ventral idiosoma.

Gnathosoma (Figs. 10A-10D, 10F, 10G) – Anterior margin of epistom smoothly mucronate. Hypostomal groove with seven transverse rows of denticles, each row with two teeth; subcapitular setae *h1, h2, h3* and palp coxal setae *pc* are subequal in length 21-24. Chaetotaxy of palps as in *A. silvaticus*.

Chelicera (Figs. 10A, 14C) – fixed digit 27 (26-27) long, with four teeth and pilus dentilis; movable digit 27 (26-28) long, with two teeth.

Ventral idiosoma (Figs. 9B, 14B) – Tritosternum with paired pilose laciniae 74-77, fused basally 28-31, columnar base 14-16 × 9-10 wide. Sternal shield smooth, 60 (58-62) long and 65 (64-65) wide, with 3 pairs of setae *ST1* 27 (26-28), *ST2* 23 (22-24), *ST3* 26 (24-27) and two pairs of lyrifissures *iv1, iv2*. Setae *ST4* 26 (24-26) situated on small separate metasternal platelets, each with one pore *iv3*.

Genital shield smooth, 59 (58-61) wide at level of base setae *ST5* 25 (24-26), para-genital poroids *iv5* on soft cuticle.

Opisthosomatic venter with two pairs of elongate metapodal platelets, primary 22 (20-26) and accessory 14 (13-16) long; soft cuticle with four pairs of setae, *ZV1* 16, *ZV3* 10 (9-10), *JV4* 10 (8-11), *JV5* 68 (67-69) long, all smooth, and six pairs of poroids.

Ventrianal shield pentagonal, with reticulation in the anterior area, 104 (103-113) long and 86 (81-89) wide, with three pairs of pre-anal setae *JV1* 17 (16-17), *ZV2* 17 (16-18), *JV2* 20 (20-21) long with small rounded pre-anal pores *gv3* (distance between pores 41 (35-43)); para-anal setae *P4* 18 (17-19) and post-anal seta *PST* 22 (21-22) long.
Figure 10 Amblyseius ampullosus Wu and Lan, 1991: A – chelicera of female, B – chelicera and spermatodactyle of male, C – anterior margin of epistom, D – dorsal view of left palp tarsus, E – spermatheca, F – subcapitulum, G – left palp, excepting tarsus, dorsal aspect, H – peritrema.

Peritreme (Figs. 9A, 10H) – extends anteriorly to setae j1.

Spermatheca (Figs. 10E, 14E) – Calyx funnel-shaped, 17 (16-20) long and at the opening 14 (13-15) wide; atrium nodular-like, connected without neck with calyx; major duct thick, minor duct visible.

Legs (Figs. 11, 12, 26B) – Legs I 351 (347-357) and IV 339 (335-342) longer than legs II 259 (255-264) and III 256 (250-258). Chaetotaxy normal for phytoseiid mites: Leg I: coxa 0 0/1 0/1 0, trochanter 1 0/1 0/2 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 2/0 2/1 1, tibia 1 2/1 1/1 1. Leg III: coxa 0 0/1 0/1 0, trochanter 1 0/1 0/2 1, femur 2 2/1 1/0 1, genu 1 2/1 2/0 1, tibia 1 1/1 2/0 1. Leg IV: coxa 0 0/1 0/0 0, trochanter 1 0/1 0/2 1, femur 1 2/1 1/0 1, genu 1 2/1 2/0 1, tibia 1 1/1 2/0 1. Chaetotaxy of tarsi II-IV typical for Phytoseiidae, with 18 setae 3 3/2 3/2 3 + mv, md. Tarsus I bears 37 setae, excluding apical sensorial setal cluster. Setae d3 26-28 with rounded tip, d4 33-35. Apical sensorial setal cluster (Fig. 26B) includes 10 short setae.
of different shape. Setae $df-1$ (12), $df-2$ (6-7), $df-3$ (8) and $df-7$ (8) finger-shaped with blunt tips. Setae $df-5$ (6), $df-6$ (17) and $df-8$ (10-11) baculiform with rounded tips, setae $df-8$ usually curved. Setae $df-4$ (10-11), $df-9$ (8-10) spur-like with lobe-like tips, setae $df-10$ (5-6) located between $df-4$ and $df-9$ also spur-like with acuminate tip.

Measurements of macrosetae as follows: $S_{geII}$ 30 (27-32), $S_{geIII}$ 31 (29-34), $S_{geIV}$ 69 (65-75), $St_{IV}$ 53 (47-59), $St_{IV}$ 55 (51-59). All macrosetae are spine-like and acuminate.

**Male** (Figs. 10B, 13, 14D, 15) ($n = 1$)

Idiosomal setal pattern – 10A:9B/JV-3,4:ZV-1,3

Dorsal idiosoma (Figs. 13A, 15A) – Dorsal shield oval, smooth, 291 long and 219 wide. As in the female, dorsal shield with 19 pairs of setae, all smooth. Setae $r3$ and $R1$ situated on dorsal shield. Length of setae: $j1$ 19, $j3$ 33, $j4$ 5, $j5$ 5, $j6$ 5, $J2$ 5, $J5$ 8, $z2$ 9, $z4$ 8, $z5$ 5, $Z1$ 5, $Z4$ 70, $Z5$ 107, $s4$ 47, $S2$ 9, $S4$ 8, $S5$ 8, $r3$ 13, $R1$ 7. Number and location of solenostomes and

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**Figure 11** *Amblyseius ampullosus* Wu and Lan, 1991, female: right legs I-IV, respectively, excluding tarsus, ventral aspect, macrosetae depicted in solid black.
Figure 12 *Amblyseius ampulusus* Wu and Lan, 1991, female: right tarsi I-IV, respectively, macrosetae depicted in solid black. A – dorsal aspect; B – apical sensorial setal cluster area, C–E – ventral aspect.

pores as in female, except *gd3*, which situated on dorsal shield posterioria base of setae *s4*.

Ventral idiosoma (Figs. 13B, 15B) — Sternogenital shield smooth, 106 long (*ST1-ST5*) and 58 wide (*ST2-ST2*); 5 pairs of setae *ST1* 17, *ST2* 16, *ST3* 19, *ST4* 16, *ST5* 14 and three pairs
of lyrifissures iv1, iv2, iv3.

Ventrianal shield reticulated on anterior part, with three pairs of pre-anal setae JV1 15, JV2 17, ZV2 14, pair of anal setae P4 15 and post-anal setae PST 21, a pair of pre-anal pores gv3, posteriad base of setae JV2 and four pairs of poroids iv5, ivo, ivo, iv. Ventrianal shield 131 long, measured along midline; 152 wide at level of anterolateral corners. Opisthogastric soft cuticle with one pair of setae JV5 29 and three pair of poroids ivp, ivo, ivp.

Chelicera (Figs. 10B, 14D) – Fixed digit 23 long, with three teeth and pilus dentilis; movable digit 24 long with one tooth. Spermatodactyl as in Fig. 10B; spermatodactyl shaft 16 long.

Legs chaetotaxy as in female. Measurements of macrosetae as follow: Sgell 23, SgelIII 25, SgelIV 50, StiIV 39, StIV 51.

Remarks — *Amblyseius ampullosus* is very similar to *A. verginensis* Papadoulis, 1995, but differs in atrium shape of spermatheca, slightly bulbous and C-shaped in *A. verginensis* (vs. well sclerotized and nodular-like in *A. ampullosus*) (Figure 10E). This species was originally described from China, mountain He-Lan-Shan, on *Artemisia* sp. (Wu and Lan, 1991). It was also recorded and redescribed from Iran, from soil (Shirdel et al., 2009), and this is the first record from Russia.

My newly collected material agree very well with the original description given by Wu and Lan (1991).

The male of *A. ampullosus* is described for the first time.
Figure 14 Phase contrast (A, B) and DIC (C, D, E) pictures of *Amblyseius ampulosus* Wu and Lan, 1991: A – dorsal idiosoma of adult female, B – ventral idiosoma of female, C – chelicera of female, D – chelicera of male with spermatodactyle, E – spermatheca.
Amblyseius krantzi (Chant)

Typhlodromus (Amblyseius) krantzi Chant, 1959: 83.
Amblyseius (Amblyseius) krantzi: Muma 1961: 287.

Typhlodromus krantzi: Hirschmann 1962: 23 Fig. 232.
Amblyseius krantzi: Wainstein 1975: 920.

Typhlodromips krantzi: Moraes et al. 1986: 142

Typhlodromips krantzi: Moraes et al. 2004: 215.

World distribution — Alaska, Canada, Kazakhstan, Poland, Russia, USA (Demite et al. 2020).

Material examined — 12 females, Russia, Tyumen province, Uskenka state zoological reserve, 57°04′ N, 65°04′ E, 07 August 2018 and 28 June 2019, V.A. Khaustov coll., on leaves of Urtica dioica L. (Urticaceae) and Geranium sylvaticum L. (Geraniaceae); 32 females and 2 males, Russia, Tyumen province, vicinity of Tyunevo, 57°22′ N, 65°41′ E, 12 October 2017, 25 September 2018, V.A. Khaustov coll., on leaves of Geum rivale L. (Rosaceae), Aegopodium podagraria L. (Apiaceae) and Filipendula ulmaria (L.) Maxim., (Rosaceae); 1 female, Russia, Tyumen province, vicinity of lake Kuchak, 57°21′ N, 66°03′ E, 31 July 2018, V.A. Khaustov coll., on leaves of Rubus saxatilis L. (Rosaceae).

Supplementary description — Female Tarsus I bears 37 setae, excluding apical sensorial setal cluster. Setae d3 13-15 with rounded tip, d4 25. Apical sensorial setal cluster (Fig. 26C) includes 10 short setae of different shape. Setae df-1 (13), df-2 (4), df-3 (9) and df-7 (8) finger-shaped with blunt tips. Setae df-5 (8-9), df-6 (12-13) and df-8 (11) baculiform with rounded tips, setae df-8 usually curved. Setae df-4 (10-11), df-9 (10) spur-like with lobe-like tips, setae df-10 (5-6) located between df-4 and df-9 also spur-like with acuminate tip.

Remarks — This species was originally described from Nakusp, British Columbia, Canada, on Ranunculus sp. as T. (Amblyseius) berlesei (Chant 1957). In 1959, this species was renamed to A. krantzi (Chant 1959). In Russia, this species was previously recorded from the Moscow (Meshkov 1999) and Yaroslavl provinces (Wainstein 1975). This species is recorded for the first time in Asian Russia. The characteristics of the specimens herein considered agree well with

| Characters | Russia, Tyumen district (5) | China (?) | Iran (2) | Characters | Russia, Tyumen district (5) | China (?) | Iran (2) |
|------------|-----------------------------|-----------|---------|------------|-----------------------------|-----------|---------|
| Dsl        | 333 (327-344)               | 355-380   | 368-372 | z2         | 12 (11-14)                 | 12,5-17,5 | 12-14   |
| Dsw        | 230 (227-236)               | 240-265   | 228     | z4         | 12 (10-14)                 | 12,5      | 12-14   |
| j1         | 22 (21-24)                  | 23,75-25  | 24-26   | z5         | 5                          | 6,25-7,5  | 5-6     |
| j3         | 40 (39-43)                  | 36,25-48,75 | 41-45  | Z1         | 6 (6-7)                    | 10-12,5   | 8-10    |
| j4         | 6                          | 6,25-7,5  | 6       | Z4         | 86 (82-91)                 | 85-95     | 92-102  |
| j5         | 5 (5-6)                    | 6,25      | 4-5     | Z5         | 139 (132-148)              | 155-157,5 | 157-174 |
| j6         | 5 (5-6)                    | 7,5       | 5       | Vsl        | 104 (103-113)              | 117,5     | 108-126 |
| J2         | 5 (5-6)                    | 7,5-8,5   | 6       | Vsw        | 86 (81-89)                 | 97,5      | 90-94   |
| J5         | 11 (11-12)                 | 8,75-13,5 | 9-10    | JV5        | 68 (67-69)                 | 75,5-80   | 78-81   |
| r3         | 15                         | 15-17,5   | 17      | SgeIV      | 69 (65-75)                 | 80        | 74-85   |
| R1         | 9 (8-9)                    | 11,25     | 9       | StiIV      | 53 (47-59)                 | 62,5-75   | 61-67   |
| s4         | 58 (56-64)                 | 60-65     | 68      | StIV       | 55 (51-59)                 | 60-70     | 50-61   |
| S2         | 9 (9-10)                   | 11,25-12,5 | 10-12  | Nbf        | 4                          | -         | 4       |
| S4         | 10 (9-10)                  | 10-12,5   | 9-10    | Nbm        | 2                          | -         | 2       |
| S5         | 11                         | 11,25-12,5 | 8-10  |            |                            |           |         |
those of the descriptions given by Chant and Hunsell (1971), Congdon (2002) and Kolodochka and Gwiazdowicz (2016). However, the number of teeth on the movable digit in the material here observed is a variable character as some females had two teeth instead of three in the original description and further redescriptions. This species is common on grassy plants in dark spruce forests or in mixed forests with a predominance of spruce. It could be often found together with *Amblyseius rademacheri* Dosse (personal observation).

**Amblyseius meridionalis** Berlese

*Amblyseius obtusus* var. *meridionalis* Berlese, 1914: 144.
*Typhlodromus obtusus* var. *meridionalis*: Chant 1957: 306.
*Amblyseius meridionalis*: Athias-Henriot 1958: 32
*Typhlodromus* (*Amblyseius*) *meridionalis*: Chant 1959: 85.
*Amblyseius* (*Amblyseius*) *meridionalis*: Muma 1961: 287.
*Typhlodromus* *meridionalis*: Hirschmann 1962: 23.
*Typhlodromus* (*Typhlodromus*) *meridionalis*: Westerboer & Bernhard 1963: 690.
*Amblyseius* (*Pauciseius*) *meridionalis*: Denmark & Muma 1989: 131.
*Amblyseius* *calicis* Karg, 1960: 444 (synonymized by Karg, 1971: 214).
*Amblyseius* *spiramentatus* Athias-Henriot, 1961: 429 (synonymized by Ueckermann & Loots, 1988: 79).

**World distribution** — Algeria, Azerbaijan, Canada, France, Germany, Greece, Hungary, Iceland, Iran, Italy, Latvia, Moldova, Morocco, Poland, Spain, Russia (Livshitz and Kuznetsov 1972), Switzerland, Tunisia, Turkey, Ukraine, USA (Demite et al. 2020).

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**Figure 15** DIC pictures of *Amblyseius ampulosus* Wu and Lan, 1991, male: A – dorsal idiosoma; B – ventral idiosoma.
Material examined — three females, Russia, Tyumen Province, vicinity of Malinovka, 55°06′ N, 65°04′ E, 08 May 2019, A. Khaustov coll., in the soil.

Supplementary description — Female Tarsus I with 37 setae, excluding apical sensorial setal cluster. Setae d3 25 with rounded tip, d4 34. Apical sensorial setal cluster (26D) includes 10 short setae of different shape. Setae df-1 (13), df-3 (8) and df-7 (8) finger-shaped with blunt tips. Setae df-2 (7), df-5 (5), df-6 (16) and df-8 (10) baculiform with rounded tips, setae df-8 usually curved. Setae df-4 (11), df-9 (8) spur-like with lobe-like tips, setae df-10 (6) situated between df-4 and df-9 also spur-like with acuminate tip.

Remarks — This species was originally described from Potenza, Basilicata, Italy, in humus (Berlese 1914). It is known from 21 countries in the Palearctic and Nearctic regions (Moraes et al. 2004; Demite et al. 2020). It was previously recorded from leaves of Poterium polygamum (Rosaceae) in Crimea, Russia by Livshitz and Kuznetsov (1972). Siberian specimens well agree with redescription given by Faraji et al. (2011). This species is recorded for the first time in Asian Russia.

Amblyseius rademacheri Dosse

Amblyseius rademacheri Dosse, 1958a: 44.
Typhlodromus (Amblyseius) rademacheri: Chant 1959: 89.
Amblyseius (Typhlodromopsis) rademacheri: Muma 1961: 287.
Typhlodromus rademacheri: Hirschmann 1962: 25 Fig 222.
Typhlodromus (Typhlodromus) rademacheri: Westerboer & Bernhard 1963: 658.
Amblyseius (Amblyseius) rademacheri: Ehara 1966: 23.
Amblyseius (Typhlodromips) rademacheri: Karg 1971: 185.
Typhlodromips rademacheri: Moraes et al. 1986: 145.
Amblyseius (Neoseiulus) rademacheri: Ehara & Amano 1998: 31.
Typhlodromips khnzoriani Wainstein & Arutunjan, 1970: 1498 (synonymized by Wainstein 1975: 658).

World distribution — Armenia, Austria, Azerbaijan, China, Czechoslovakia, Denmark, Georgia, Germany, Hungary, Iran, Italy, Japan, Latvia, Moldova, Netherlands, Poland, Russia, Slovakia, Slovenia, South Korea, Spain, Switzerland, Ukraine (Demite et al. 2020).

Material examined — 22 females, 1 male, Russia, Tyumen Province, vicinity of lake Kuchak, 57°21′ N, 66°03′ E, 31 June 2018, V. Khaustov coll., on leaves of Geum rivale L. (Rosaceae); 28 females, 2 males, Russia, Tyumen Province, Uspekha state zoological reserve, 57°04′ N, 65°04′ E, 26 July 2018, 07 August 2018, 15 August 2019, V. Khaustov coll., on leaves of Arctium lappa L. (Asteraceae), Salix caprea L. (Salicaceae), Rubus idaeus L. (Rosaceae), Urtica dioica L. (Urticaceae); 29 females, 8 males, Tyumen Province, vicinity of Verkhniy Bor, 57°13′ N, 65°28′ E, 16 September 2017, 08 July 2018, 12 July 2018, V. Khaustov coll., on leaves of Lilium martagon L. (Liliaceae), Filipendula ulmaria (L.) Maxim., (Rosaceae), Valeriana wolgensis Kazak. (Valerianaceae), Geranium sylvaticum L. (Geraniaceae), Agrimonia pilosa Ledeb. (Rosaceae), Eupodium podagraria L. (Apiaceae), Humulus lupulus L. (Cannabaceae); 14 females, 4 males, Russia, Tyumen Province, forest park Zatyumensky, 57°09′ N, 65°27′ E, 24 August 2019, 13 September 2019, V. Khaustov coll., on leaves of Geranium sylvaticum L. (Geraniaceae) and Eupodium podagraria L. (Apiaceae).

Supplementary description — Female Tarsus I with 37 setae, excluding apical sensorial setal cluster. Setae d3 15 with rounded tip, d4 30-32. Apical sensorial setal cluster (27A) includes 10 short setae of different shape. Setae df-1 (14), df-3 (9) and df-7 (7-8) finger-shaped with blunt tips. Setae df-2 (5-6), df-5 (8), df-6 (12) and df-8 (10-12) baculiform with rounded tips, setae df-8 usually curved. Setae df-4 (9), df-9 (9) spur-like with lobe-like tips, setae df-10 (6) situated between df-4 and df-9 also spur-like with acuminate tip.

Remarks — All measurements and morphological characters of Siberian specimens are very close to those of the redescription of Kolodochka and Gwiazdowicz (2016). This species
is the most abundant in the investigated area. It is common on various grassy plants and often
found with another species of Phytoseiidae mites in the present survey.

**Amblyseius obtusus (Koch)**

Zercon obtusus Koch, 1839: 13.
Seius obtusus: Berlese 1889: 7.

Typhlodromus obtusus: Chant 1957: 306.
Typhlodromus (Amblyseius) obtusus: Chant 1959: 90.
Amblyseius (Amblyseius) obtusus: Muma 1961: 287.
Typhlodromus affatissetus Wainstein, 1960: 683 (synonymized by Wainstein 1975: 916).
Amblyseius mirosetae Muma, 1961: 289 (synonymized by Denmark & Muma 1989: 7).

**World distribution** — Algeria, Argentina, Armenia, Azerbaijan, Azores, Canada, Chile, Costa Rica, Croatia, Cuba, Czech Republic, England, France, Germany, Georgia, Greece, Haiti, Hawaii, Hungary, Iran, Ireland, Italy, Kazakhstan, Latvia, Moldova, Morocco, New Zealand, Norway, Pakistan, Poland, Portugal, Romania, Russia, Slovakia, Spain, Sweden, Tunisia, Turkey, Ukraine, USA, Venezuela (Demite et al. 2020).

**Material examined** — two females, Russia, Tyumen Province, vicinity of lake Kuchak, 57°21′N, 66°03′E, 27 April 2018, 11 August 2018, A. Khaustov coll., from humus; one female, Russia, Tyumen Province, forest park Zatyumensky, 57°09′N, 65°27′E, 19 April 2019, A. Khaustov coll., from moss.

**Supplementary description** — Female Tarsus I with 37 setae, excluding apical sensorial setal cluster. Setae d3 18-19 with rounded tip, d4 33-35. Apical sensorial setal cluster (27B) includes 10 short setae of different shape. Setae df-1 (14), df-3 (8) and df-7 (8-9) finger-shaped with blunt tips. Setae df-2 (7), df-5 (6), df-6 (16-17) and df-8 (11-12) baculiform with rounded tips, setae df-9 usually curved. Setae df-4 (10), df-9 (9-10) spur-like with lobe-like tips, setae df-10 (5) situated between df-4 and df-9 also spur-like with acuminate tip.

**Remarks** — *Amblyseius obtusus* is a cosmopolitan species, reported in more than 30 countries (Demite et al., 2020). All measurements and morphological characters of Siberian specimens are very close to redescription of Döker et al. (2020). It is a first record of *A. obtusus* in Asian Russia.

**Amblyseius omaloensis** Gomelauri

Amblyseius omaloensis Gomelauri, 1968a: 702

Amblyseius benefactor Meshkov, 1991: 139 (synonymized by Meshkov 1999: 430).

**World distribution** — Georgia, Russia, Lithuania, Moldova (Kolodochka 2006; Demite et al. 2020).

**Material examined** — seven females, Russia, Tyumen Province, Uspenka state zoological reserve, 57°04′N, 65°04′E, 02 October 2017, 06 September 2019, A. Khaustov coll., from moss.

**Redescription** — Female (Figs. 16, 17, 18, 19, 20, 27C) (n = 4)

Idiosomal setal pattern – 10A:9B/JV–3:ZV.

Dorsal idiosoma (Figs. 16A, 20A) — Dorsal shield oval, smooth, 353 (340-371) long and 232 (229-236) wide; with 19 pairs of setae (included r3 and R1), all setae smooth, except Z4 and Z5, slightly barbed; length of setae: j1 26 (25-27), j3 42 (40-44), j4 6 (5-6), j5 5 (5-6), j6 5 (5-6), j2 5 (5-6), j3 9 (8-10), z2 15 (15-16), z4 15 (13-16), z5 5 (5-6), Z1 6 (5-6), Z4 91 (90-92),
Figure 16 *Amblyseius omaloensis* Gomelauri, 1968a, female: A – dorsal idiosoma; B – ventral idiosoma.

Z5 140 (132-147), s4 63 (62-67), S2 9 (8-10), S4 8 (7-9), S5 8 (7-8); setae r3 18 (17-18) and R1 14 (13-14) on lateral soft cuticle; dorsal shield with seven pairs of solenostomes (gd1, gd2, gd4, gd5, gd6, gd8, gd9) and 16 pairs of poroids.

Gnathosoma (Figs. 17A, 17C, 17E, 17F) – Anterior margin of epistome bump-like and smooth. Hypostomal groove with seven transverse rows of denticles, each row with two teeth; subcapitular setae h1 31 (30-32), h2 25 (24-25), h3 25 (24-25), palp coxal setae (pc) 31 (30-31). Chaetotaxy of palps: trochanter with two setae v1, v2; femur with five setae, thickened and apically spatulate antero-lateral al, three dorsal (d1, d2, d3) and one postero-lateral (pl); genu with six setae, antero-lateral setae (al1 and al2) thickened, three dorsal setae (d1, d2, d3) and one postero-lateral (pl); tibia with 14 setae, one antero-lateral (al), eight dorsal d1 – 8, two setae di-1, di-2, arise from the dorsal surface at the distal end, two ventral (v1, v2) and one postero-lateral (pl); tarsus with 15 setae (six simple d1, d2, d3, v1, v2, v3; nine stout setae with rounded tips di-1 to di-9) and two-tined apotele (Fig. 17F).

Chelicera (Figs. 17B, 20C) – fixed digit 30 (28-34) long, with 15-16 teeth and pilus dentilis;
movable digit 34 (34-36) long, with three teeth.

Ventral idiosoma (Figs. 16B, 20B) – Tritosternum with paired pilose laciniae 81-84, fused basally 34-35, columnar base 13-15 × 10-12 wide. Sternal shield smooth, 65 (64-66) long and 68 (67-69) wide, with three pairs of setae ST1 32 (27-35), ST2 26 (24-30), ST3 26 (23-27) and two pairs of lyrifissures iv1, iv2. Setae ST4 27 (25-32) situated on small separate metasternal platelets, each with one pore iv3.

Figure 17 Amblyseius omaloensis Gomelauri, 1968a: A – subcapitulum, B – chelicera, C – anterior margin of epistom, D – spermatheca, E – right palp, excepting tarsus, dorsal aspect, F – dorsal view of right palp tarsus, G – peritrema.
Genital shield smooth, 71 (70-71) wide at level of base of setae ST5 26 (24-28), para-genital poroids iv5 on soft cuticle.

Opisthosomatic venter with two pairs of elongated metapodial platelets, primary 20 (19-21) and accessory 14 (14-15) long; four pairs of setae, ZV1 16 (16-17), ZV3 12 (10-13), JV4 14 (13-14), JV5 66 (63-70) long, all smooth, and five pairs of poroids.

Ventral shield pentagonal in shape, reticulate, 115 (113-117) long and 93 (91-94) wide at level of setae ZV2, with three pairs of pre-anal setae JV1 18 (17-19), JV2 18 (17-19), JV2 21 (20-21), with small rounded pre-anal pores gv3 (distance between pores 43 (42-45)); para-anal setae 19 (18-20) and post-anal setae 20 (19-21).

Peritreme (Figs. 16A, 17G, 20A) – extends anteriorly to setae j1.

Spermatheca (Figs. 17D, 20D) – Calyx tube-like, 25 (24-25) long and at the opening 6 (6-7) wide; atrium C-shaped, connected without neck with calyx; major duct thick, minor duct not visible.
Figure 19 *Amblyseius omaloensis* Gomelauri, 1968a, female: left tarsi I-IV, respectively, macrosetae depicted in solid black. A – dorsal aspect; B–D – ventral aspect.

Legs (Figs. 18, 19) – Legs I 344 (340-349) and IV 350 (345-353) longer than legs II 278 (276-279) and III 271 (267-273). Chaetotaxy normal for phytoseiid mites: Leg I: coxa 0 0/1
Figure 20  Phase contrast (A, B) and DIC (C, D) micrographs of *Amblyseius omaloensis* Gomelauri, 1968a: A – dorsal idiosoma of adult female; B – ventral idiosoma of female; C – chelicera of female; D – spermatheca.
0/10, trochanter 1 0/1 0/2 1, femur 2 3/1 2/2 2, genu 2 2/2 1/2 1, 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 2/0 2/1 1, tibia 1 2/1 1/1 1. Leg III: coxa 0 0/1 0/1 0, trochanter 1 0/1 0/2 1, femur 1 2/1 1/0 1, genu 1 2/2 0/1 1, tibia 1 1/1 2/0 1. Chaetotaxy of tarsi II-IV typical for Phytoseiidae and bears 18 setae 3 2/3 2/3 + mv, md.

Tarsus I with 37 setae, excluding apical sensorial setal cluster. Setae d3 13 with rounded tip, d4 28-32. Apical sensorial setal cluster (27C) includes 10 short setae of different shape. Setae df-1 13, df-3 7, df-7 8 finger-shaped with blunt tips. Setae df-2 4, df-5 6, df-6 16 and df-8 9-10 baculiform with rounded tips, setae df-8 usually curved. Setae df-4 9, df-9 8 spur-like with lobe-like tips, setae df-10 5 situated between df-4 and df-9 also spur-like with acuminate tip. Measurements of macrosetae as follows: SgeII 30 (28-31), SgeIII 34 (32-35), SgeIV 75 (70-80), StiIV 62 (60-64), StIV 59 (58-59). All macrosetae are acuminate.

Remarks — *Amblyseius omaloensis* is known only from Europe (Demite et al., 2020). All measurements and morphological characters of Siberian specimens are very close to description of Meshkov (1991). It is the first record of *A. omaloensis* in Asian Russia.

### Amblyseius myrtilli Papadoulis, Emmanouel and Kapaxidi

*Amblyseius myrtilli* Papadoulis, Emmanouel & Kapaxidi, 2009: 57, Fig. 33.

World distribution — Greece (Demite et al. 2020).

Material examined — six females, Russia, Tyumen Province, forest park Zatyumensky, 57°09' N, 65°27’ E, 26 April 2019, A, Khaustov coll., from soil; 2 females, Russia, Kurgan Province, vicinity of Zverinogolovskoe, 54°27’ N, 64°51’ E, 28 September 2019, A, Khaustov coll., from soil; 2 females, Russia, Tyumen Province, vicinity of lake Kuchak, 57°21’ N, 66°03’ E, 27 April 2018, A, Khaustov coll., from soil.

Redescription — Female (Figs. 21, 22, 23, 24, 25, 27D) (n=4)

Idiosomal setal pattern – 10A:9B/JV–3:ZV.

Dorsal idiosoma (Figs. 21A, 25A) – Dorsal shield broadly oval, smooth, 362 (360-363) long and 262 (246-279) wide; with 19 pairs of setae (included r3 and R1), all setae smooth; length of setae: j1 24 (22-25), j3 43 (41-46), j4 6 (6), j5 6 (5-6), j6 6 (5-6), J2 7 (6-7), J5 11 (10-12), z2 13 (11-14), z4 9 (8-10), z5 6 (6), Z1 7 (6-7), Z4 89 (86-92), Z5 164 (156-173), s4 63 (62-67).

### Table 3

| Characters | Russia, Tyumen district (4) | Georgia | Lithuania |
|-----------|----------------------------|---------|-----------|
| Dsl       | 353 (340-371)              | 515     | 348       |
| Dsw       | 232 (229-236)              | 294     | 219       |
| j1        | 26 (25-27)                 | 22      | 25        |
| j3        | 42 (40-44)                 | 41      | 41        |
| j4        | 6 (5-6)                    | 7       | 6         |
| j5        | 5 (5-6)                    | 7       | 6         |
| j6        | 5 (5-6)                    | 7       | 5         |
| J2        | 5 (5-6)                    | 7       | 6         |
| J5        | 9 (8-10)                   | 6       | 9         |
| r3        | 18 (17-18)                 | -       | 11        |
| R1        | 14 (13-14)                 | -       | 10        |
| s4        | 63 (62-67)                 | 65      | 65        |
| S2        | 9 (8-10)                   | -       | 8         |
| S4        | 8 (7-9)                    | 9       | 8         |
| S5        | 8 (7-8)                    | 9       | -         |

| Characters | Russia, Tyumen district (4) | Georgia | Lithuania |
|-----------|----------------------------|---------|-----------|
| z2        | 15 (15-16)                 | 16      | 14        |
| z4        | 15 (13-16)                 | 17      | 13        |
| z5        | 5 (5-6)                    | -       | 6         |
| Z1        | 6 (5-6)                    | 12      | -         |
| Z4        | 91 (90-92)                 | 95      | 89        |
| Z5        | 140 (132-147)              | 129     | 139       |
| Vsl       | 115 (113-117)              | -       | 114       |
| Vsw/ZV2   | 93 (91-94)                 | -       | 89        |
| JV5       | 66 (63-70)                 | -       | 67        |
| SgeIV     | 75 (74-80)                 | -       | 67        |
| StiIV     | 62 (60-64)                 | -       | 58        |
| StIV      | 59 (58-59)                 | -       | 56        |
| Nbf       | 15-16                      | -       | 16        |
| Nbm       | 3                         | -       | 3         |

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Figure 21 *Amblyseius myrtilli* Papadoulis, Emmanouel and Kapaxidi, 2009, female: A – dorsal idiosoma; B – ventral idiosoma.

60 (57-62), S2 11 (10-12), S4 10 (9-10), S5 11 (10-11); setae r3 15 (14-15) and R1 10 (9-11) on lateral soft cuticle; dorsal shield with seven pairs of solenostomes (gd1, gd2, gd4, gd5, gd6, gd8, gd9) and 16 pairs of poroids.

Gnathosoma (Figs. 22B, 22C, 22D, 22E) – Anterior margin of epistome bump-like and smooth. Hypostomal groove with seven transverse rows of denticles, each row with two or three teeth; subcapitular setae h1 25 (24-26), h2 24 (23-24), h3 24 (23-24), palp coxal setae (pc) 28 (27-28). Chaetotaxy of palps: trochanter with two setae v1, v2; femur with five setae, thickened and apically spatulate antero-lateral al, three dorsal (d1, d2, d3) and one postero-lateral (pl); genu with six setae, antero-lateral setae (al1 and al2) thickened, three dorsal setae (d1, d2, d3) and one postero-lateral (pl); tibia with 14 setae, one antero-lateral (al), eight dorsal d1 – 8, two setae al-1, al-2, arise from the dorsal surface at the distal end, two ventral (v1, v2) and one postero-lateral (pl); tarsus with 15 setae (six simple d1, d2, d3, v1, v2, v3; nine stout setae with rounded tips di-1 to di-9) and two-tined apotele (Fig. 22C).

Chelicera (Figs. 22A, 25C) – fixed digit 28 (27-30) long, with 3-4 teeth and pilus dentilis; movable digit 28 long, with two small teeth.

Ventral idiosoma (Figs. 21B, 25B) – Tritosternum with paired pilose laciniae 78, fused basally 25, columnar base 15-16 × 12 wide. Sternal shield smooth, 62 (59-63) long and 66 (63-67) wide, with three pairs of setae ST1 31, ST2 25 (24-25), ST3 26 (25-28) and two pairs of lyrifissures iv1, iv2. Setae ST4 23 (22-25) situated on small separate metasternal platelets, each with one pore iv3.
Genital shield smooth, 67 (66-71) wide at level of base of setae $ST5$ 31 (29-32), para-genital poroids $i5$ on soft cuticle.

Opisthosomatic venter with two pairs of elongated metapodal platelets, primary 24 (22-26) and accessory 18 (17-19) long; four pairs of setae, $ZV1$ 16 (16-17), $ZV3$ 8, $JV4$ 12 (12-13), $JV5$ 68 (67-68) long, all smooth, and five pairs of poroids.

Ventrianal shield pentagonal in shape, noticeably wider than genital shield, with reticulation in anterior part, 120 (116-123) long and 111 (106-116) wide at level of setae $ZV2$, with three pairs of pre-anal setae $JV1$ 17 (16-18), $ZV2$ 18 (16-19), $JV2$ 24 (23-25), with small rounded pre-anal pores $gv3$ (distance between pores 46 (44-48)); para-anal setae 20 (19-21) and post-anal setae 20 (20-21).

Peritreme (Figs. 21A, 22F, 25A) – extends anteriorly to setae $j1$.

Spermatheca (Figs. 22G, 25D) – Calyx sacculus-like, 25 (23-26) long and at the opening 15 (12-16) wide; atrium C-shaped, connected without neck with calyx; major duct thick, minor duct visible in some specimens.

Legs (Figs. 23, 24) – Legs I 351 (349-353) and IV 327 (318-336) longer than legs II 270 (264-279) and III 257 (248-264). Chaetotaxy normal for phytoseiid mites: Leg I: coxa 0 0/1 0/1 0, trochanter 1 0/1 0/2 2, 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 2/1 2/1 1, genu 2 2/0 2/0 1, tibia 1 2/1 1/1 1. Leg III: coxa 0 0/1 0/1 0, trochanter 1 0/1 0/2 1, 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 0/1 0/2 1, femur 1 2/1 1/0 1, genu 1 2/1 2/0 1, tibia 1 1/1 2/0 1.
Figure 23 *Amblyseius myrtilli* Papadoulis, Emmanouel and Kapaxidi, 2009, female: left legs I-IV, respectively, excluding tarsus, ventral aspect, macrosetae depicted in solid black.

Chaetotaxy of tarsi II-IV typical for Phytoseiidae and bears 18 setae 3 3/2 3/2 3 + mv; md. Tarsus I with 37 setae, excluding apical sensorial setal cluster. Setae d3 22-24 with rounded tip, d4 30. Apical sensorial setal cluster (27D) includes 10 short setae of different shape. Setae df-1(12), df-3 (7-8) and df-7 (8-9) finger-shaped with blunt tips. Setae df-2 (7), df-5 (6), df-6 (16) and df-8 (9-10) baculiform with rounded tips, setae df-8 usually curved. Setae df-4 (12-14), df-9 (9) spur-like with lobe-like tips, setae df-10 (6) situated between df-4 and df-9 also spur-like with acuminate tip. Measurements of macrosetae as follows: SgeII 31 (30-32), SgeIII 32 (31-33), StiIII 25 (24-27), SgeIV 75 (72-80), StiIV 60 (59-60), StIV 55 (52-58). All macrosetae are acuminate.

**Remarks** — *Amblyseius myrtilli* is known only from Greece, on leaves of *Vaccinium myrtillis* (Ericaceae) and from litter under *Juniperus* sp. Morphological characteristics of Siberian specimens are consistent with those provided in the original description (Papadoulis et al., 2009). It is the second record of *A. myrtilli* in the world and the first report in Russia. The record of *A. myrtilli* in Russia is not accidental, since in Greece it was found in the mountains at an altitude of 1800 m. At this altitude, the climate is moderate and more or less similar to the southwestern Siberia.
Discussion

Usually, Phytoseiidae taxonomists, pay little attention to leg chaetotaxy and only report the length of macrosetae and chaetotaxy formula of genua II and III. The chaetotaxy of tarsus I is not considered, and the utility of some characters in Phytoseiidae species identifications is discussed below.

Jackson (1974) studied chaetotaxy of distal part of tarsus I, tarsus and tibia of palp in phytoseiid mites. He reviewed chaetotaxy of palp and apical sensorial setal cluster of tarsus.
Figure 25 Phase contrast (A, B) and DIC (C, D) micrographs of *Amblyseius myrtilli* Papadoulis, Emmanouel and Kapaxidi, 2009: A – dorsal idiosoma of adult female, B – ventral idiosoma of female, C – chelicera of female, D – spermatheca.
I in detail, based on specimens of *Phytoseiulus persimilis*. On the distal part of tarsus I, he recognized nine groups of short, peg- or spur-like setae and designated them by the prefix as df ("dorsal field").

In all the Siberian *Amblyseius* specimens here considered, I identified on the distal part of tarsus I the group of ten modified, different in shape setae df1-df10 (Figs. 6C, 6D, 26, 27). Nine of them (df1-df9) are similar in shape and situated on the same positions as described for *P. persimilis* (Jackson 1974). However, I examined an additional seta in this complex, designated here as df10. This seta is similar in shape to setae df4 and df9 (spur-like), but shorter in length and always situated between them. Moreover, I discovered some differences in apical sensory setal cluster between the *Amblyseius* species here considered. The most noticeable differences in the length of setae df6. For example, in *A. silvaticus, A. rademacheri* and *A. krantzi* this setae 12-13 in length vs 16-17 in other species (Figs. 26, 27). Also, the shape of setae df1 usually thickened finger-shaped in most Siberian *Amblyseius* species, except narrow baculiform in *A. krantzi* and *A. rademacheri* (Figs. 26C, 27A).

Relative length of setae d3 and d4 might also be useful as an additional diagnostic character. These two setae are situated posteriad df5 (Figs. 26, 27). According to relative length of setae d3 and d4, all the studied Siberian *Amblyseius* specimens can be divided into two groups: with relative length 1:2 (*A. silvaticus, A. omaloensis, A. rademacheri, A. krantzi*) and 1:1.2 (*A. ampullosus, A. myrtilli, A. meridionalis*) or 1:1.7 in case of *A. obtusus*.

All characters discussed above, are stable and were measured on several specimens of each *Amblyseius* species. In my opinion, tarsus I of phytoseiid mites is an important segment for identification on generic (at least *Phytoseiulus* and *Amblyseius*) and species levels and should be carefully studied in different Phytoseiidae genera. The use of sensory setae on tarsus I as diagnostic character is very limited in other groups of Mesostigmata. The best example is description of tarsal sensory cluster in some genera of Blattisocidae (Phytoseioidea) (Lindquist, Moraza 2010, 2012; Moraza, and Lindquist 2011). Leonovich (1989) provided the detailed morphological structure of setal structures in tarsal sensory complex and revealed the difference in its structure in different families of Gamasina. The correct study of all setae in tarsal sensory cluster requires high quality microscopes with DIC illumination as well as SEM microscopes;

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**Table 4** Character measurements of adult females of *Amblyseius myrtilli* collected in this study compared to previously published character measurements of adult females of *A. myrtilli* (localities followed by the number of specimens measured between brackets).

| Characters | Russia, Tyumen district (4) (?) | Greece |
|------------|---------------------------------|--------|
| Dsl        | 362 (360-363)                   | 329 (324-335) |
| Dsw        | 262 (246-279)                   | 222 (212-234) |
| j1         | 24 (22-25)                      | 23 (22-23) |
| j3         | 43 (41-46)                      | 43 (41-45) |
| j4         | 6 (6)                           | 5       |
| j5         | 6 (5-6)                         | 5       |
| j6         | 6 (5-6)                         | 5       |
| J2         | 7 (6-7)                         | 5       |
| J5         | 11 (10-12)                      | 10 (9-13) |
| r3         | 15 (14-15)                      | 10 (9-11) |
| R1         | 10 (9-11)                       | 8 (7-9) |
| s4         | 60 (57-62)                      | 54 (52-54) |
| S2         | 11 (10-12)                      | 8 (7-9) |
| S4         | 10 (9-10)                       | 8 (7-9) |
| S5         | 11 (10-11)                      | 9 (9-11) |
| z2         | 13 (11-14)                      | 11 (9-13) |
| z4         | 9 (8-10)                        | 9 (7-9) |
| z5         | 6 (6)                           | 5       |
| Z1         | 7 (6-7)                         | 7       |
| Z4         | 89 (86-92)                      | 83 (81-86) |
| Z5         | 164 (156-173)                   | 146 (140-153) |
| Vsl        | 120 (116-123)                   | 113 (110-115) |
| Vsw ZV2    | 111 (106-116)                   | 105 (101-110) |
| JV5        | 68 (67-68)                      | 63 (S8-67) |
| SgeIV      | 75 (72-80)                      | 66 (59-70) (S9-70) |
| R1         | 60 (59-60)                      | 55 (52-56) |
| s4         | 55 (52-58)                      | 49 (45-52) |
| S2         | 3-4                             | 3       |
| S4         | 2                               | 2       |
however, the most obvious diagnostic character (ratio of length of setae $d_3$ and $d_4$) is clearly discernable in phase contrast and even in bright field.

The chaetotaxy of palps and tarsus I are similar in the male and female for all studied species.

I studied tarsal sensory cluster only for abovementioned species of the genus *Amblyseius*. In the next papers on the systematics of Siberian Phytoseiidae, I am going to described tarsal sensory clusters in other specious genera, such as *Transeius*, *Neoseiulus* and *Typhlodromus*.

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Figure 27 Apical sensorial setal cluster area and setae d3 and d4 of tarsus I, female, right leg, dorsal aspect. A – Amblyseius rademacheri Dosse, 1958, B – Amblyseius obtusus (Koch, 1839), C – Amblyseius omaloensis Gomelauri, 1968, D – Amblyseius myrtilli Papadoulis et al., 2009.
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