Zoodiversity, **58**(2):103–128, 2024
DOI 10.15407/zoo2024.02.103

UDC 595.42(477)

PREDATORY MITES (PHYTOSEIIDAE, PARASITIFORMES) OF THE FAUNA OF UKRAINE: REDESCRIPTIONS OF THE SPECIES OF *AMBLYSEIELLA* AND *CHELASEIUS*, WITH RESURRECTION OF THE GENUS STATUS FOR *AMBLYSEIULUS*

L. A. Kolodochka

I. I. Schmalhausen Institute of Zoology NAS of Ukraine,
vul. B. Khmelnytskoho, 15, Kyiv, 01054 Ukraine
E-mail: leonsponsor@gmail.com

http://orcid.org/0000-0002-2626-0463

urn:lsid:zoobank.org:pub:AAB52AB5-4B0F-4D18-9F3F-62D6AF5B5081

Predatory Mites (Phytoseiidae, Parasitiformes) of the Fauna of Ukraine: Redescriptions of the Species of *Amblyseiella* and *Chelaseius*, with Resurrection of the Genus Status for *Amblyseiulus*. Kolodochka, L. A. — The article continues the studies of the fauna of phytoseiid mites in Ukraine, the results of which have been partly published by the author recently and contains a review of the genera *Amblyseiulus*, *Amblyseiella*, and *Chelaseius*. A detailed morpho-functional rationale for the resurrection of the genus *Amblyseiulus* Muma, 1961 as a part of the subtribe Proprioseiopsina Chant & McMurtry is provided. In this study, seven species of this genus were identified, one of which, *Amblyseiulus jugortus* (Athias-Henriot, 1966), is recorded for the first time in the fauna of Ukraine. The genus *Amblyseiella* Muma, 1955 is represented in Ukraine by the species *A. antonii* Kolodochka & Omeri, 2010, the second of two species of this genus known in the world. The species *Chelaseius* (*Pontoseius*) *valliculosus* Kolodochka, 1987 is also the only representative of this genus and subgenus in Ukraine. Based on the results of the study, comprehensive illustrated redescriptions of each of the taxa are given, morphological and morphometric data, information on the distribution of genera and species in the world and Ukraine, mite habitats, depositories of type specimens, occurrence, abundance and keys for identification of genera and species.
Key words: phytoseiid mites, taxonomy, diagnoses, new record, resurrection of generic status.

Introduction

Recently, interest in the predatory mites of Phytoseiidae (Acarina, Parasitiformes) has increased. They are known to control populations of phytophagous mites and small insects that cause serious damage to agricultural production. Published articles discuss various areas of research of this family. The accumulated material in some cases forces us to reconsider seemingly established solutions not only in applied research, but also in the field of taxonomy.

This article continues previously published results of long-term studies of the composition of phytoseiid mites in the fauna of Ukraine (Kolodochka, 2022, 2023 a, b) and contains a review of species of the genera *Amblyseiella* Muma, *Chelaseius* Muma & Denmark and *Amblyseiulus* Muma. To the latter genus, the status of an independent genus is resurrected as a result of a reassessment of the previously used criteria. One of the studied species, *Amblyseiulus jugortus* (Athias-Henriot, 1966), is recorded for the first time in the fauna of Ukraine.

The article provides detailed descriptions of the identified species, new data on their distribution, accompanied by diagnoses, descriptions of morphological characteristics and measurement data, information on typical habitats, assessment of abundance and frequency of occurrence, information on distribution in the world and in Ukraine.

Material and Methods

The description of the collection technique and the methods of preparation of faunistic material for the study were described in detail earlier. Referring to the corresponding section of the first article in this series of publications (Kolodochka, 2022), you can get more complete information. Here the main methodological stages of the work are reflected here.

The material was taken in different natural zones of Ukraine on ground vegetation of different types by shaking off mites with a stick onto surface of black plastic peace. Mites were collected from a black sheet with a needle and placed in 70 % ethanol, and in the laboratory they were mounted in Hoyer's liquid on glass slides. The prepared slides were kept into a thermostat at 60°C for 2–3 weeks until Hoyer's liquid completely dried. The specimens were examined under an MBI-3 (LOMO) light microscope with a magnification of 10–90× and a KF-4 phase-contrast device with a camera lucida PA-6 (LOMO) 1.5× to perform drawings and measurements. All drawings in the article are made by the author. More detailed data can be obtained from earlier publications (Kolodochka, 2022; 2023 a, b).

The type material used in the study is deposited in the collections of the I. I. Schmalhausen Institute of Zoology, National Academy of Sciences of Ukraine, Kyiv (SIZK) and in Canadian National Collection, Ottawa, Canada (CNC). If the type material was absent or it condition was insufficiently suitable for drawing, measuring, etc., the description of species, their measurements, and illustrations were based on non-type specimens from Ukraine. Naturally, such specimens must to be in better condition than type specimens after long-term storage in the collection. The non-type specimens were comparing them with types from B. A. Wainstein collection deposited at the Department of Acarology (SIZK), or with illustrations and measurements of specimens in publications of other authors. Measurements are given in micrometers (μm). The terminology of idiosomal setae follows Wainstein (1973 a) with slight modifications, or Wainstein (1973 b) and Kolodochka (1990) for the reproductive system of phytoseiids.

Subfamily Amblyseiinae
Tribe Amblyseiini
Subtribe Amblyseiina

Genus *Amblyseiella* Muma, 1955

Amblyseiella Muma, 1955: 266; Karg, 1993:174; Chant & McMurtry, 2007: 71; Kolodochka & Omeri, 2010: 87; Denmark & Evans, 2019: 23;
Amblyseius (Amblyseiellus): Wainstein, 1962: 14;
Amblyseius (Amblyseiella): Pritchard & Baker, 1962: 225;
Typhlodromus (Amblyseiellus) setosus group, Chant, 1959: 70.

Type species: *Amblyseiella setosa* Muma, 1955: 225.

Diagnosis. Dorsal side of body with 18 pairs of setae: AD1, AD2, AD3, AD4; PD2, PD4; AM1, AM2; AL1, AL3, AL4; PL1, PL2, PM1, PM3, PM4 — on dorsal shield; AS, PS — on interscutal membrane. Setae PL3 is absent. Dorsal setae contrastingly different in length. Ventrianal shield of the female is reduced, bearing 1 pair of preanal setae Pr2 and a pair of anal pores. Pair of ventral setae V3 absent.

Note. For quite a long time, there was an opinion that the genus is represented in the world fauna by three species (Chant & McMurtry, 2007). At the same time, the species independence of two of them has been repeatedly questioned by various researchers (Chant & McMurtry, 2004; Demite et al., 2023). As a result, species *A. rusticana* (Athias-Henriot, 1960), and *A. denmarki* (Zaher & El-Brollosy in: Zaher, 1986) (Chant & McMurtry, 2004) were finally recognized both as junior synonyms of the type species of the genus *A. setosa* Muma, 1955 (Denmark & Evans, 2011). Another species, *A. antonii* Kolodochka & Omeri, 2010 described from Ukraine, is included as a valid taxon in the recently published fundamental surway (Denmark & Evans, 2019).

The structure and distribution of the genus. Representatives of the genus *Amblyseiella* are currently known in North and South America, the Steppe and coastal Regions of Europe and Africa, the Caucasus and the Middle East. One species is known in Ukraine which discussed further (Denmark & Evans, 2019).

Amblyseiella antonii Kolodochka & Omeri, 2010 (fig. 1)

Amblyseiella antonii Kolodochka & Omeri, 2010: 87; Denmark & Evans, 2019: 23.

Material. **Type**. Holotype ♀: Ukraine, Kyiv, Syretski Park, *Juniperus sabina*, 18.08.2008, specimen #5986/1622, 50°28'03.0" N 30°26'24.0" E (Omeri) (SIZK).

Non–type. Ukraine: Lugansk Region, Stanytsa Luhanska, Luhansk Nature Reserve, manor of the reserve, *Acer tataricum*, 08.09.2013, specimen #6541, 1 ♀, 48°37'47.0" N 39°31'07.0" E (Kolodochka) (SIZK).

Redescription. Female. Dorsal shield (fig. 1, *1*) weakly sclerotized, finely striated in anterolateral parts; dorsal solenostomes 7 pairs (*it, iv, id, isc, il, is, ic*). Dorsal setae pointed, needle-shaped (both setae PL1 broken off in holotype). Setae AD2–AD4, PD2, PD4, AM2, PM1 very short, AL4, PM3, PM4 elongate, others medium length. Setae PM4 with 1–2 serrations, others smooth. Setae AM1 and AL2 longer than the distance to the theca of the subsequent setae. Ventrianal shield (fig. 1, *2*) small, oval, with 1 pair of preanal setae; anal pores small, distinct, round, located caudal to the level of theca PrA2. Setae V1, V2, PrA1, MV1, MV2, and PV on membrane surrounding ventrianal shield. Setae V3 both absent. Perithremes extend beyond the level of the techae of setae AD1. Anterior metapodal shield linear, posterior curved (fig. 1, *3*). The posterior part of the peritremal shield is slightly curved, rounded at the end with a short sharp process (fig. 1, *4*). There are 3 large teeth on Df of the chelicerae, and 1 on Dm (fig. 1, *5*). The funnel of the spermatheca is bell-shaped, the atrium is sessile (fig. 1, *6*). Macroseta on legs pointed, smooth. Leg IV has 3 long macrosetae: longest on genu, shorter on basitarsus, and shortest on tibia (fig. 1, *7–9*). Genu on other legs with short macrosete.

Measurements. Lds 438, Wds 237; Lvas 119, Wvas 103, Lian 39; LtIV 176; setae length: AD1 38; AD2 3; AD3 5; AD4 7; PD2 8; PD4 8; AM1 62; AM2 3; AL1 25; AL2 74; AL4 106; PL1 58; PL2 41; PM1 9; PM2 82; PM3 106; AS 23; PS 38; PV 80; MCh IV: ge 99, ti 63, ta 66; MCh III: ge 56; MCh II: ge 38; MCh I: ge 41.

Male unknown.

Diagnosis. *Amblyseiella antonii* is the only representative of the genus in the fauna of Ukraine. It can be easily distinguished from species of other genera outwardly similar to it by generic characters: the dorsal seta PL3 and ventral seta V3 are absent; the ventrianal shield is reduced, with only one pair of preanal setae.

Distribution, habitat, occurrence. Europe (Ukraine). In Ukraine *A. antonii* known only in two geographically distant localities in Wood-and-Steppe (Kyiv, shrub: *Juniperus sabina*), and Steppe (Luhansk Region: trees: *Acer tataricum*); rarely.

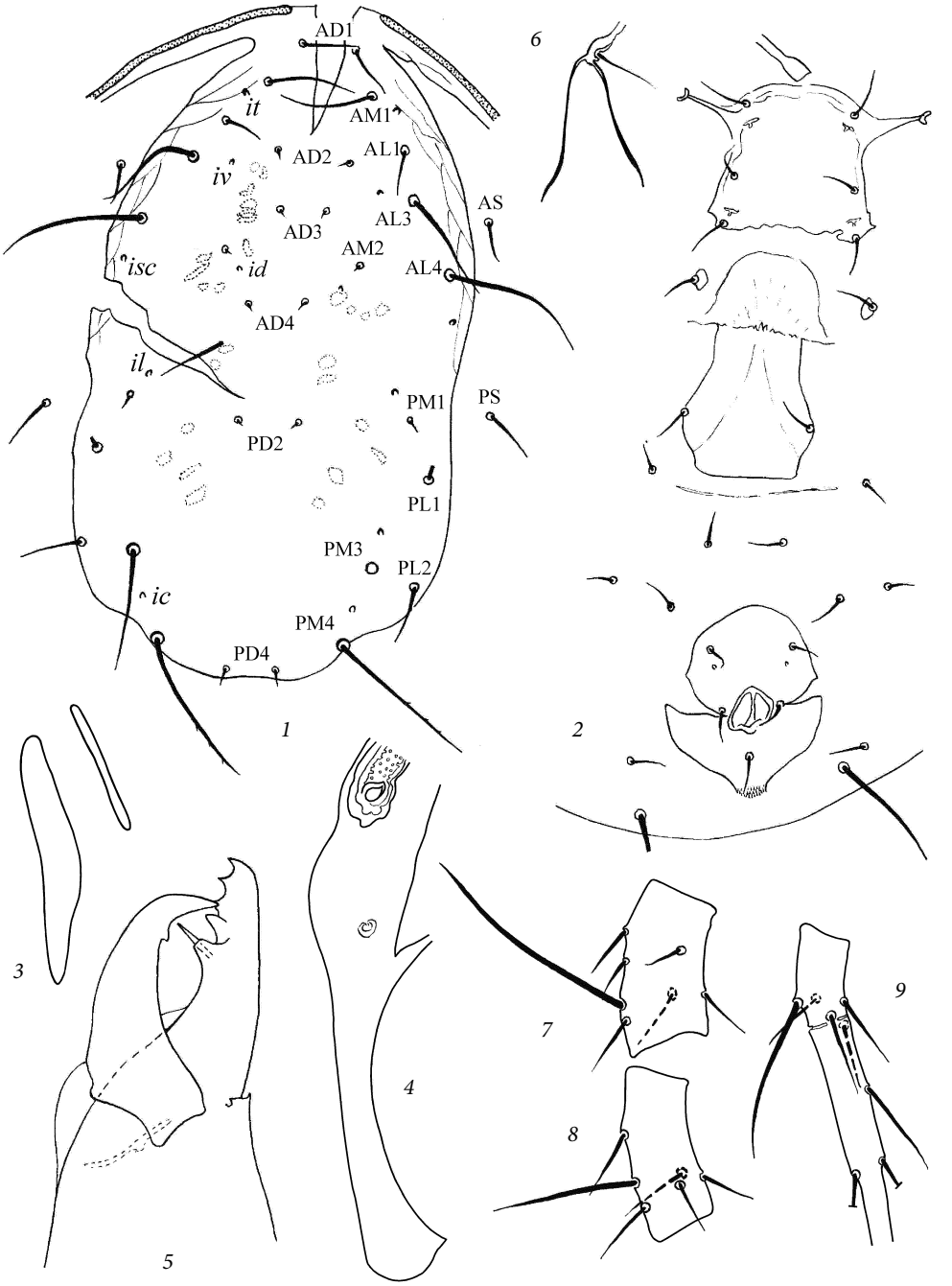

Fig. 1. *Amblyseiella antonii* Kolodochka & Omeri, 2010 ♀ (*1–9*): *1* — dorsal shield; *2* — ventral body surface; *3* — metapodal plates; *4* — posterior part of peritremal schield; *5* — chelicera; 6 — spermatheca; *7* — genu; *8* — tibia; 9 — tarsus (fragment).

Genus Chelaseius Muma & Denmark, 1968
Chelaseius Muma & Denmark, 1968: 232; Karg, 1993: 174;
Chelaseius (Chelaseius) Denmark & Kolodochka, 1990: 219;
Chelaseius (Pontoseius) Kolodochka & Denmark in Denmark & Kolodochka, 1990: 232.
Type species : *Amblyseius floridanus* Muma, 1955: 264.

Diagnosis. Dorsal side of body of female with 19 pairs of setae: AD1, AD2, AD3, AD4; PD2, PD4; AM1, AM2; AL1, AL3, AL4; PL1, PL2, PL3, PM1, PM3, PM4 on the dorsal shield; AS, PS — on the interscutal membrane. Dorsal setae contrastingly different in length. Dorsal shield well sclerotized, smooth; anterolateral margins may have oblique striation or weak reticulate sculpture; carries up to 7 pairs of solenostomes (*it, iv, id, il, isc, is, ic*; missing in some species *id* and *isc*). Dorsal setae differ sharply in length from microchaetae to elongated and whip-like (more frequently AL4, PM3, PM4). Perithremes long, with chaetoids. Ventrianal shield entire, with 3 pairs of preanal setae. Anal pores are present. Legs I–IV bear macrochaetes differing in degree of development. Gnathobase wide, pedipalps thickened, chelicerae massive in relation to body size, Dm without teeth, Df in various species with 2–7 large teeth, which may be well-defined or smoothed; pilus dentilis is noticeably displaced proximally.

According to the characteristics of the setae pattern, genus *Chelaseius* is closest to the genus *Amblyseius* Berlese sensu Muma et Denmark, 1968 as well *Amblyseiulus* Muma, 1961, differing from both in hypertrophied chelicerae with Df longer than Dm. It differs from the genus *Amblyseiulus* in the presence/absence of a pair of dorsocentral setae PD2.

The structure and distribution of the genus. There are 12 known species with worldwide distribution. The vast majority of species have been recorded in the Nearctic of the Neotropical Region, the Oriental Region, the Ethiopian Region, and the Australian Region (Demite et al., 2023), one is known in Ukraine.

Subgenus *Chelaseius* s. str.
Representatives of the nominative subgenus have not been recorded in the Ukraine yet.

Subgenus *Pontoseius* Kolodochka & Denmark
Chelaseius (Pontoseius) Kolodochka & Denmark in: Denmark & Kolodochka, 1990: 232.
Type species: *Chelaseius valliculosus* Kolodochka, 1987: 773.

The monotypic subgenus *Pontoseius* Denmark et Kolodochka, 1990 was established for the species *Chelaseius valliculosus* Kolodochka, 1987 on the basis of differences in the structure of chelicerae, which in mites of the subgenus have straightened, blunt immobile fingers with smoothed, poorly pronounced teeth, while in all species of the nominative subgenus Df long, curved, pointed, with large sharp teeth (Denmark & Kolodochka, 1990). In addition, the dorsal shield of the type species of the genus, *Amblyseius floridanus* Muma, has 7 pairs of solenostomes, while *C. valliculosus* — only 5 pairs (*id* and *il* absent).

Chelaseius* (*Pontoseius*) *valliculosus Kolodochka, 1987 (fig. 2)

Chelaseius valliculosus Kolodochka, 1987: 773;
Chelaseius (Pontoseius) Kolodochka & Denmark in: Denmark & Kolodochka, 1990: 232.

Material. **Types.** Holotype ♀ (damaged): Ukraine: Autonomous Republic of Crimea, Karadag Reserve, Tumanova balka, pine forest, litter with topsoil, 08.07.1980, specimen #4737 (3775), 44°55'20.0" N 35°12'34.0" E; paratype ♂, idem, Northern pass, litter near a huge stone, 31.07.1980, specimen #4738 (3712b) (Kolodochka) (SIZK).

Non-types are absent.

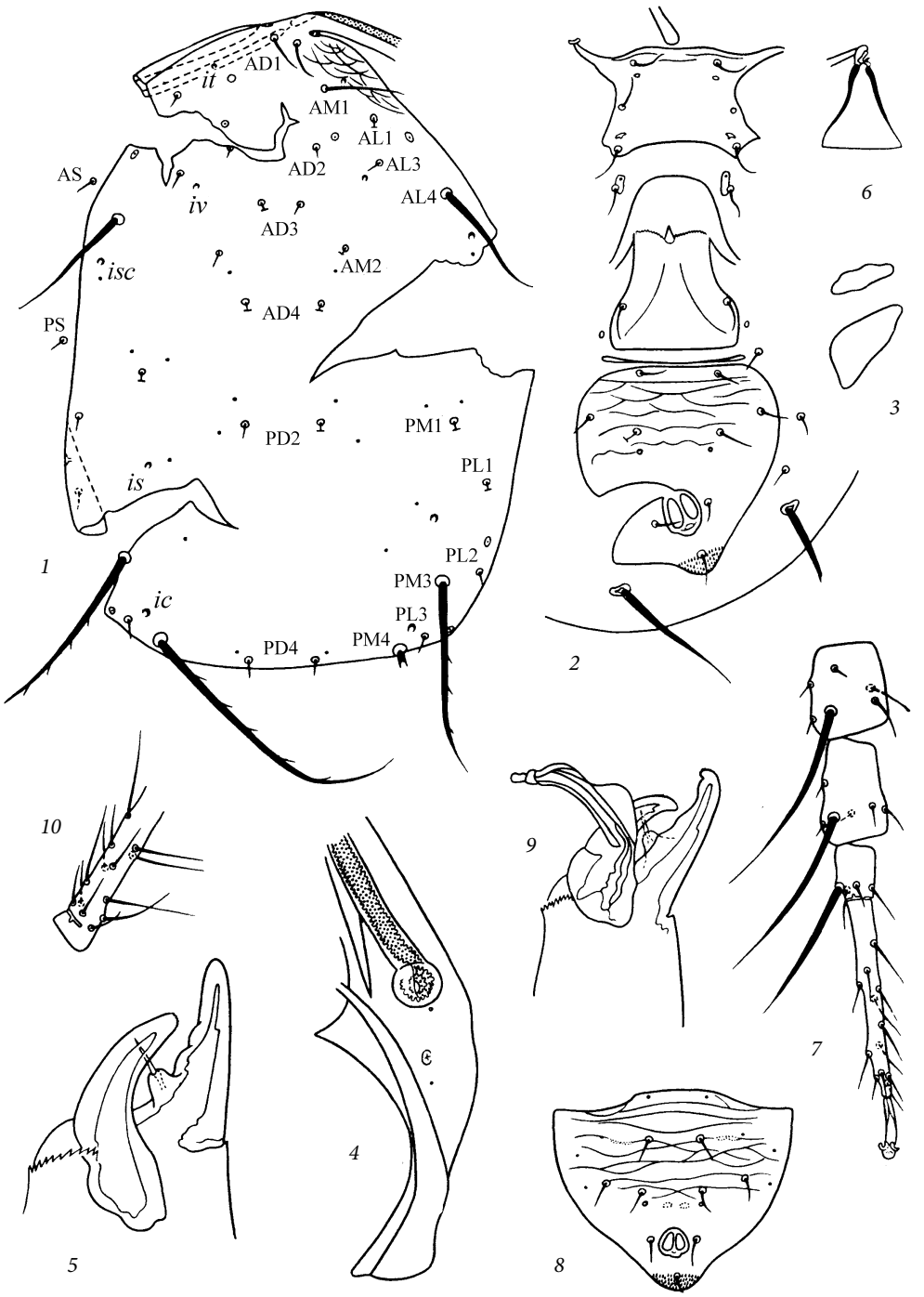

Fig. 2. *Chelaseius valliculosus* Kolodochka, 1987 ♀ (1–7), ♂ (*8*, *9*): *1* — dorsal shield; *2* — ventral body surface; *3* — metapodal plates; *4* — posterior part of peritremal schield; *5* — chelicera; *6* — spermatheca; *7* — fragment of leg IV; *8* — ventrianal shield ; *9* — chelicera with spermatodactyl; *10* — distitarsus of leg I.

Redescription. Female. Dorsal shield (fig. 2, *1*) well sclerotized, oval, narrowing anteriorly, lateral emarginations barely marked, margins of anterolateral part covered with reticulate sculpture in a small area; solenostomes 5 pairs (*it, iv, isc, is, ic*; missing *id* and *il*). Setae AL4, PM2, and PM3 are long and scimitar-shaped; AD1 and AM1 are moderately long; the rest are short or microchaetae 4–7 μm long. Setae PM3, PM4 slightly serrate, others smooth. Perithremes long, almost converging before the theca AD1. Ventrianal shield (fig. 2, *2*) wide, obversely pear-shaped, with an almost straight anterior margin; anal pores clearly visible, round. The posterior metapodal shield is triangular, larger than the anterior one (fig. 2, *3*). The posterior end of the peritremal shield is slightly curved (fig. 2, *4*). Chelicera with blunt fingers. Almost straight Df with large pilus dentilis and two barely visible smoothed teeth, blunt Dm slightly curved, without teeth (fig. 2, *5*). Spermatheca with conical funnel and well developed sessile atrium (fig. 2, *6*). There are 3 macrochaetes on leg IV, the longest on the genu, and the shortest on the basitarsus (fig. 2, *7*). On the genu and tibia of legs III, on the genua of legs II and I along a short macrochaete. Basitarsus of leg I with long thin straight setae (fig. 2, *10*).

Measurements. Lds 480, Wds 280; Lvas 140, Wvas 147, Lian 50; Ltar 129; setae length: AD1 29; AD2 4; AD3 5; AD4 – ?; PD2 5,5–6; PD4 14; AM1 56; AM2 5,5–6; AL1 12; AL3 9; AL4 86; PL1 9; PL2 10; PL3 11; PM1 – ?; PM3 135; PM4 192; AS 15; PS 11;PV 102; MCh IV: ge 109, ti 88, ta 72; MCh III: ge 48, ti34; MCh II: ge39; MCh I: ge 34.

Male. Preanal setae 3 pairs; anal pores round, well visible (fig. 2, *8*). The spermatodactyl is slightly curved, sharply narrowed in the terminal third (fig. 2, *9*). Lds — 345.

Distribution, habitat, occurrence. Europe (Ukraine). In Ukraine: known only from the type locality; rare.

Subtribe Proprioseiopsina Chant & McMurtry, 2005
Proprioseiopsina Chant & McMurtry, 2005: 219.
Type genus: *Proprioseiopsis* Muma, 1961: 277.

The genus *Amblyseiulus* Muma (1961) with the type species *Typhlodromus (Amblyseius) okanagensis* Chant, 1957: 293 was established for mites with an idiosomal dorsal setal pattern similar to that of the mites of the genus *Amblyseius* Berlese, 1914, but with PD2 dorsal setae missing (J2 at Rowell et al., 1978). Later, the genus *Amblyseiulus* Muma as a junior synonym was merged with the genus *Proprioseiopsis* Muma, 1961 (Muma & Denmark, 1968) with the type species *Typhlodromus terrestris* Chant, 1959, which has simultaneously "setae L5 and D5 absent" according to Chant, 1959: 103, 157, fig. 247, or PM1 and PD2 (Wainstein, 1973 a), as well Z1 and J2 (Rowell et al., 1978).

Thus, species with differ dorsal setal patterns were lumped in one genus. This circumstance introduced discrepance into the structure of the subtribe Proprioseiopsina (Chant & McMurtry, 2005).

At the same time, it must be taken into account that a change in the structure or elimination of any structures of the body in the process of onto- or phylogenesis is a clear result of a serious morphological restructuring of organs and its interaction with other organs. With a directed process of elimination, the seta not only disappears as a receiver of tactile stimulation, but at the same time the configuration of the impulse transmission pathways from the nerve ending to the signal processing center must be changed oratrophy or be reconfigurated. This process must be by directed by correction of the genome or under its control. When fixing a new state of the tactile system,

changes inevitably should affect at least a part of the genome. This new state must be selectioned and accepted or discards as unsuccessful. Well-known and well-grounded views on the direction of evolutionary trends in the development of the Phytoseiidae family consider hypotrichia of the chaetome of mites of the family as an irreversible directional process (Chant, 1993). At the same time, external paired cuticular formations, their number and structure (setae of the dorsum as well setae of the ventral side but in lesser extent) under conditions of hypotrichy acquire a large taxonomic weight, as signs that, depending on their significance, can serve as markers indicating not only the differentiation of taxa species level, but also on them more higher rank. That is why combining in one generic taxon species with different setal patterns is extremely undesirable by definition and cannot be accepted. A detailed justification for this was given earlier (Kolodochka, 1998; Kolodochka, 2006). It follows from this that when determining the taxonomic weight (significance) of a trait and its role in making a decision on the generic status of the studied taxon, it is necessary to take into account differences in the taxonomic weight of morphological characters belonging to different categories of significance. At the same time, one should be especially careful when approaching signs that experience a clear pressure of function. It is quite obvious that the topography of the chaetomic pattern is practically not under such pressure and is the most reliable feature in solving many important problems of taxonomy and building a natural system based on the relationship of taxa. When building a system based on the principle of subordination of related taxa, the combination of carriers of different patterns in one generic taxon cannot be natural and makes such an action meaningless.

The following taxonomic actions are performed here. The genus *Amblyseiulus* sensu Muma, 1961 is considered to be a part of the subtribe Proprioseiopsina, which does not affect the stability of the subtribe. It is resurrected in the genus rank, which eliminates the existing imbalance. The genus *Amblyseiulus* includes all nominal species corresponding to its generic diagnosis.

The genus *Amblyseiulus* is only one genus of the subtribe Proprioseiopsina is represented in the fauna of Ukraine.

Genus *Amblyseiulus* Muma, 1961

Type species: *Typhlodromus (Amblyseiulus) okanagensis* Chant, 1957: 293.

Diagnosis. Dorsal side of idiosoma carries 18 pairs of setae (PD2 missing): AD1, AD2, AD3, AD4; PD4; AM1, AM2; AL1, AL3, AL4; PL1, PL2, PL3; PM1, PM3, PM4 — on dorsal shield; AS, PS — both on interscutal membrane; carries up to 7 pairs of solenostomes (*it, iv, id, il, isc, is, ic*). Seta PD2 is absent. Dorsal shield well sclerotized, smooth or reticulate in part or in whole, all setae needle-form smooth with the exception of serrate. In some species setae AL3, PM3 and PM4 longer than other dorsal setae which vary from short to miniature. Some species have dorsal setae of variable length, from short to moderately long, without contrasting differences in size. Perithremes long, with chaetoids. Sternal shield slightly wider than its own length, with notched the posterior margin. Ventrianal shield entire, with 3 pairs of preanal setae and anal pores. Sizes of gnathobase and its parts are proportional to idiosoma. Dm with 1–2 teeth, Df of various species with 2–7 large teeth. Legs II to IV with macrosites in differing degree of development.

The structure and distribution of the genus. Only 7 species of the genus *Amblyseiulus* have been identified in the fauna of Ukraine.

Amblyseiulus bregetovae Abbasova, 1970 (fig. 3)

Amblyseiulus bregetovae Abbasova, 1970: 53;
Amblyseius bregetovae: Ghiliarov et al., 1977: 240;
Proprioseiopsis bregetovae: Moraes, de et al., 1986: 112;
Proprioseiopsis bregetovae: Karg, 1993:176; Chant & McMurtry, 2007: 89.

Material. **Types**. Holotype ♀: Azerbaijan: Institute of Zoology of Azerbaijan, Laboratory of Acarology, Imishli, under haystack, 26.04.1963, specimen #70 (Hadzhiev) (not examined; the description and figures have been made on non-type specimen from Ukraine).

Non–type. 24 specimens (24 ♀). Ukraine: Donetsk Region, Boikovskiy District, Zazhytochnoie village, house mouse nest, 23.05.1968, specimen #S–98 (nest 135), 11 ♀; item, common vole nest, 15.02.1968, specimen # S–99 (104 a), 8 ♀; ibid., the same data, specimen #S–100 (nest 104 b), 2 ♀; Velikonovosiolkovsky District, under haystack from alfalfa, soil 0–5, 31.03.1972, specimen #S–101 (204), 1 ♀; item, under haystack, same data, specimen #S–102 (208), 1 ♀; ibid., 27.03.1972, specimen #S–103 (197), 1 ♀ (Sklyar) (SIZK).

Redescription. Female. Dorsal shield (fig. 3, *1*) well sclerotized, broadly oval, without lateral emarginations, with dark marginal border, smooth, with very slight striation only on anterolateral margins; solenostomes 7 pairs (*it, id, iv, il, isc, is, ic*). Setae AD2, AD3, AM2 are microchaetae (3–6 μm), AD4, PD4, PM1, PL3 are short (10–20 μm), AD1, AL1, PL2 are moderately long (30–40 μm), the rest are elongated. Setae AM1, AL1–AL3, PL1–PL2, PM3, and PM4 serrate. Of these, AL1 and AL3 serrate in the distal half, the rest along the entire length of the seta. Seta AM1 longer than distance to theca AL1. Setae AL1 and AL2 longer than the distance to the next setae. Seta AL3 more than 1.5 times and AL4 more than twice as long as seta AL1. Seta AL3 located in common arc of setae AM1–AL1–AL3–AL4. Seta PL1 1.5 times as long as PL3 and three times as long as PL4. Setae PM4 slightly shorter than PM2. Perithremes almost reaching the techae of setae AD1. Ventral shields strongly sclerotized. Ventrianal shield (fig. 3, *2*) wide, roughly pentagonal, somewhat narrowing towards posterior margin, often with shallow cuts at anterolateral corners, transversely striated. The outlines of its lateral edges can be variable. The shield normally has 3 pairs of ventrianal setae. Sometimes one, rarely both PrA2 setae may be absent. Anal pores distinct, widely spaced. Metapodal scutes small, anterior curved (fig. 3, *3*). The posterior end of the peritremal shield is narrow, curved, and pointed (fig. 3, *4*). Setae PV elongated, serrate. Chelicerae Df with 3 large distal teeth, Dm with 1 (fig. 3, *5*). The spermatheca is relatively small; the walls of the funnel from the massive sessile atrium pressed into it become thinner towards the edges (fig. 3, *6*). The legs look thin relative to the massive body. IV pair of macrochaetes on leg: longest on basitarsus, much shorter on genu and tibia (fig. 3, *7*).

Measurements. Lds 408, Wds 290; Lvas 130, Wvas 156, Lian 56; Ltar 152; length of setae AD1 30; AD2 6; AD3 6; AD4 13; PD4 11; AM1 60; AM2 3; AL1 43; AL3 77; AL4 93; ML 22; PL1 68; PL2 40; PL3 20; PM3 95; PM4 83; AS 32; PS 16; PV 72, MCh IV: ge 45, ti 34, ta 77.

Male is unknown.

Diagnosis. *A. bregetovae* (Abbasova, 1970) is distinguished from other species of this genus described here by several pairs of finely serrated setae located along the periphery of the dorsal shield (AM1, AL1, AL3, AL4, PL1, PL2, PM3, and PM4). In addition, it differs from the commonly encountered *A. okanagensis* (Chant) by the length of some dorsal setae or by the ratio of their lengths. Thus, dorsal setae PL1 and PL2 in *A. bregetovae* are 2.5 times as long, and PL3 are 1.5 times as long as setae of the same name in *A. okanagensis*; in the first species, PM3 setae equal to PM4 or only slightly shorter (PM3 95, PM4 83), while in *A. bregetovae*, as in other species of the genus, PM3 (77 μm) is distinctly shorter than PM4 (112 μm).

Distribution, habitat, occurrence. Europe, Transcaucasia, Middle East. In Ukraine: Steppe zone; under haystacks, in the nests of small rodents; rare.

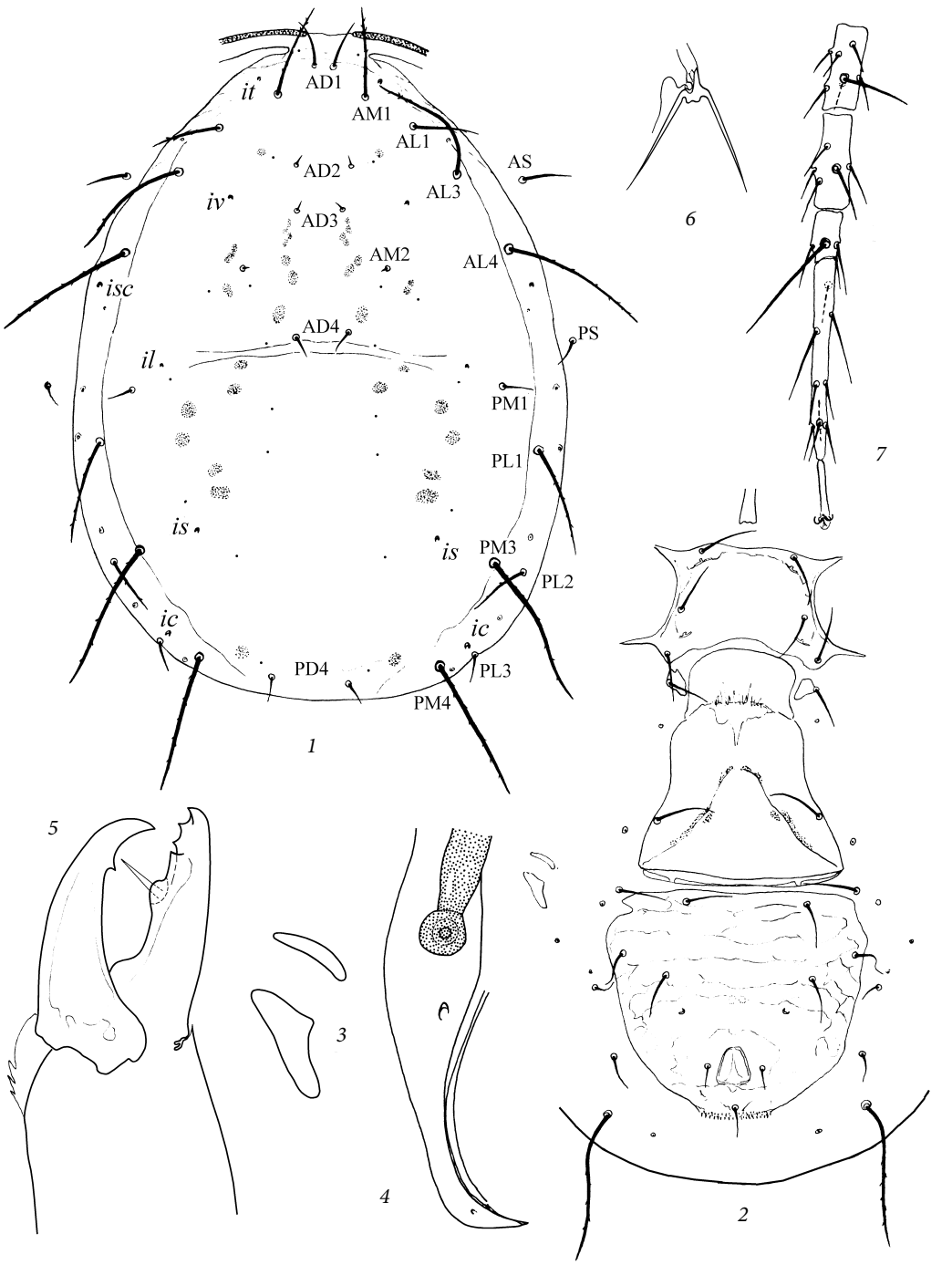

Fig. 3. *Amblyseiulus bregetovae* (Abbasova, 1970) ♀ (*1–7*): *1* — dorsal shield; *2* — ventral body surface; *3* — metapodal plates; *4* — posterior part of peritremal schield; *5* — chelicera; *6* — spermatheca; *7* — fragment of leg IV.

Amblyseiulus jugortus (Athias-Henriot, 1966) (fig. 4)

Amblyseius jugortus Athias-Henriot, 1966: 189; Karg, 1971: 202; Athias-Henriot, 1980: 7;
Proprioseiopsis jugortus: Moraes, de et al., 1986: 116; Karg, 1993: 175; Chant & McMurtry, 2007: 89; Denmark & Evans, 2019: 74.

Material. **Types.** Holotype ♀: France: Corcelles-les-Monts, Cote d'Or, moss with *Juniperus* sp., 30–03 1964, specimen Dijon N 814 [Laboratoire d'Acarologie de l'École Pratique des Hautes Études, Paris] (not examined; the description and figures are based on a non-type specimen from Ukraine).

Non–type. 14 specimens (13 ♀, 1 ♂). Ukraine: Poltava District, Lubny area, Zasullia village, meadow, litter, 01.08.1972, specimen #S–56/100 e, 2 ♂; idem, the same date, specimen #S–119/100 j, 1 ♂; Poltava Sity, env., meadow, soil 0-5, 24.08 1975, specimen #S–51/76b, 1 ♀; idem, litter under *Picea* sp., the same data: specimen #S–128/78g, 1 ♀; specimen #S–129/78 d, 1 ♀; specimen #S–138/75p, 1 ♀; specimen #S–139/75r, 1 ♀; specimen #S–142/75m, 1 ♀;specimen #S–145/79p, 1 ♀; specimen #S–146/79r, 1 ♀; specimen #S–147/79s, 1 ♀; specimen #S–150/79f, 1 ♀; specimen #S–151/79x, 1 ♀ (Skliar) (SYSK).

Redescription. Female. Dorsal shield (fig. 4, *1*) well sclerotized, smooth, with dark marginal border, broadly oval, bearing 7 pairs of solenostomes (*it*, *iv*, *id*, *isc*, *il*, *is*, *ic*). Dorsal scutellum setae AL4, PM3, PM4 thick, distinguished by greatest v length among other dorsal setae. Setae AD1, AM1, and AL1 are small, others short to minute. All setae spiky, except for the rarely serrate PM3 and PM4. Seta AM1 shorter than distance from its theca to theca of seta AL1. Seta AL1 more than twice as long as seta AL3, does not reach its theca. Seta AL3 markedly displaced toward axis of dorsal shield from common arc of setae AM1–AL1–AL4 and located on line connecting thecae of setae AL1–PM1. In other words, the setae of the AD1 pair are moved away from the axial line of the dorsal shield, and the setae AM1 are moved closer to it, as compared with the location of the same pairs of setae, common for species of related genera. Seta AL1 (18–20 μm) 2.5–2.6 times as long as AL2 (7–8 μm). Seta AL1 shorter than distance from its theca to theca AL2. Perithremes extend beyond the level of the tecae of setae AD1.

Ventral shield somewhat wider than genital shield, sculptured in anterior third by thin transverse lines, narrowing caudally, with straight or slightly concave lateral margins (fig. 4, *2*). Anal pores located between the thecae of PrA2 setae and almost in line with them. Metapodal shields elongated; the posterior one is wide and 1.75 times as long as the anterior one (fig. 4, *3*). Posterior end of peritremal shield weakly curved (fig. 4, *4*). Chelicerae with 9 teeth on Df, and 2 on Dm (fig. 4, *5*). Spermatheca small with thick walls and short infundibulum, expands from atrium to sacculus; atrium large, asymmetric, immersed in funnel base (fig. 4, *6*).

Macroseta on leg IV long, thickened, pointed; macrosetae on tibia and basitarsus equal in length, macroseta on tibia one third shorter (fig. 4, *7*). Genu and tibia III, as well as genu II with short macrosetae.

Measurements. Lds 376, Wds 270; Lvas 111, Wvas 90, Lian 37; Ltar 143; setae length: AD1 28; AD2 5; AD3 5; AD4 7; PD4 7; AM1 27; AM2 6; AL1 18; AL3 7; AL4 89; PL1 9; PL2 9; PL3 10; PM1 8; PM3 135; PM4 180; AS 13; PS 6; PV 78; MCh IV: ge 80, ti 57, ta 60; MCh III: ge 43, ti 28; MCh II: ge 21; MCh I: ge 25.

Male. Setae of pairs AD1 and AM1 are similar to those in female (setae of pair AD1 are spaced apart, while pairs of AM1 are spaced closer together). Ventrianal shield with 3 pairs of preanal setae and round anal pores situated practically on the line of the tecae of PrA2 setae. Spermatodactyl L-shaped. Lds — 280.

Distribution, habitat, occurrence. Europe (France, Island, Netherlands, Norway, Russia — Arkhangelsk). In Ukraine: this species is known only in parks and the vicinity of Poltava City (meadow, litter under Picea, soil); rare (Kolodochka & Skliar, 1981).

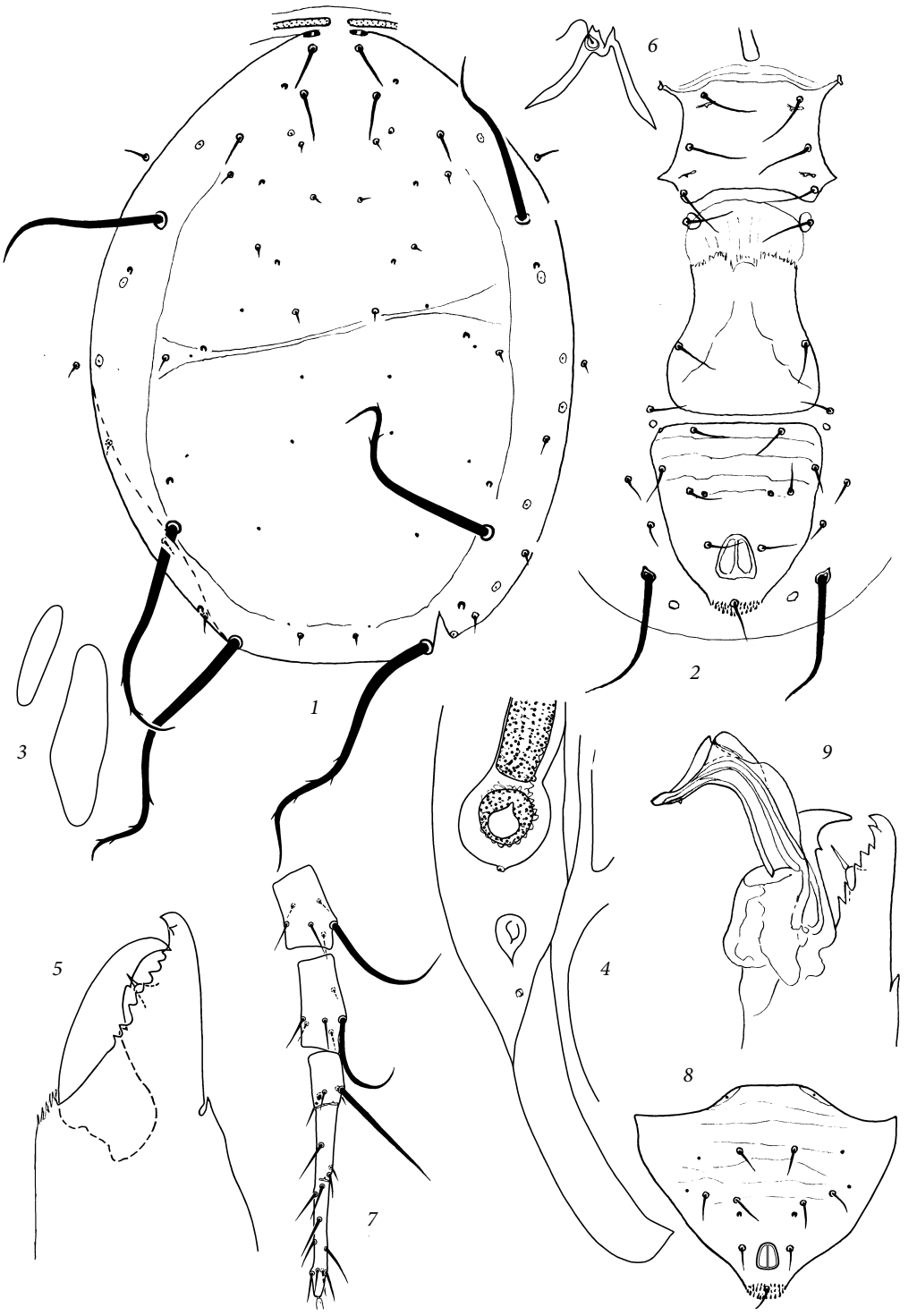

Fig. 4. *Amblyseiulus jugortus* (Athias-Henriot, 1966) (fig. 4) ♀ (*1*–*7*), ♂ (*8*, *9*): *1* — dorsal shield; *2* — ventral body surface; *3* — metapodal plates; *4* — posterior part of peritremal schield; *5* — chelicera; *6* — spermatheca; *7* — fragment of leg IV; *8* — ventrianal shield; *9* — chelicera with spermatodactyl.

Diagnosis. This species is morologically close to *Amblyseius messor*, which also has similar long setae AL4, PM3, PM4 on the dorsal shield. These species are easily distinguished by the ratio of the lengths of two pairs of dorsal setae: in *A. messor* the seta AL1 is 2 times as long as AL3, and in *A. jugortus* it is at least 2.5 times longer then it. In *A. messor*, the funnel walls of the spermatheca are comparatively thinner and the semi-cilindric funnel itself is narrow, while in *A. jugortus*, the funnel walls are thick and the conic funnel is short and wide.

Amblyseius jugortus is also similar to *A. ovicinctus* (see lower) but its dorsal setae AL4 86, PM3 135, PM4 180, and PV 78 μm are distinctly longer than those of *A. ovicinctus* (78, 110, 130, 57, respectively). The macrosetae on the legs of these two species also differ not only in their absolute length, but also in the relative length of the macrosetae of the same name (see Measurements in both species). The infundibulum of *A. jugortus* is short and wide with a thick wall, while in *A. ovicinctus* it is longer and it wall are thinner. A comparison of these taxonomically significant for species identification of phytoseiids details of the internal structure (fig. 4, *6* and fig. 8, *6*) finally convinces of the species independence of these forms.

Amblyseiulus mauiensis (Prasad, 1968) (fig. 5)

Amblyseius mauiensis Prasad, 1968: 1519; Ghiliarov et al., 1977: 240;
Amblyseiulus mauiensis: Kolodochka, 1981: 21;
Proprioseiopsis mauiensis: Moraes, de et al., 1986: 117; Karg, 1993: 177; Chant & McMurtry, 2007: 89.
Amblyseius musaevi Abbasova, 1970 (junior synonym of *Amblyseius mauiensis* Prasad, 1968, according to Wainstein, 1979: 142).

Material. **Type**. Holotype ♀: Hawaii, Maui, Haleakala road, on bamboo leaves (*Bambusa* sp.), [No. of the specimen and data unknown] [B. P. Bishop Museum, Honolulu, Hawaii] (not examined; description made on non-type specimen from Ukraine).

Non-type. 3 specimens (3 ♀). Ukraine: Autonomous Republic of Crimea, Main mountain Range, Nikitskaya yayla, 1400 m a. s. l., tract Krasnyi Kamen, *Verbascum* sp., 15.06.1976, specimen #2053a, 1 ♀, 44°30'55.0" N 34°05'47.0" E; ibid., *Knautia arvensis*, 21.06. 1976, specimen #2154, 1 ♀ (Kolodochka); Kharkiv Region, Zmievsk District, Mokhnach village, forest on the river bank, field mouse (combing mouse fur), 27.07 1979, specimen # P–513 (112), 1 ♀, 49°42'25.0" N 36°21'24.0" E (Naglov) (SIZK).

Redescription. Female. Dorsal shield (fig. 5, *1*) well sclerotized, with a dark marginal border on the sides, broadly oval, without lateral notches, smooth in the central part of the anterior half of the shield, obliquely striated along the lateral margins, covered with reticulate sculpture in the posterior half. There are 6 pairs of dorsal solenostomes (*it, iv, isc, il, is, ic*; missing *id*). Solenostomes *ic* and *ic* are the largest, the rest are noticeably smaller. The solenostome *il* displaced to the edge of the shield towards the seta PS. Dorsal setae thin, pointed, smooth (except for slightly serrate PM3 and PM4). Setae AM4, PM3, PM4 nearly the same length and longest on dorsum, others short, more or less equal in size. Seta AM1 does not reach the theca AL1. Seta AL3 located in common arc of setae AM1–AL1–AL3–AL4. Setae of row PL almost equal in length (differences are 2–3 μ). Perithremes reach the techae of setae AD1. The shields of the ventral side of the body are well sclerotized. Ventrianal shield (fig. 5, *2*) wide, wider than genital one, rounded pentagonal, narrowing caudally, entirely covered with reticulate sculpture; anal pores distinct, not close together. Metasternal shields elongate-oval, anterior scutellum smaller than posterior one (fig. 5, *3*). Posterior part of peritremal shield slightly curved, pointed at end (fig. 5, *4*). There are 3 teeth on Df and 1 on Dm (fig. 5, *5*). Spermatheca with bell-shaped funnel and peak; the massive sessile atrium is pressed into the funnel (fig. 5, *6*). Leg IV has 3 macrochaetes: genu, tibia, and basitarsus, of which the latter is the longest (fig. 6, *7*). There are no macrochaetes on the other legs.

Measurements. Lds 447, Wds 305; Lvas 140, Wvas 143, Lian 58; Lt 145; setae length: AD1 29; AD2 9; AD3 11; AD4 14; PD4 14; AM1 41; AM2 9; AL1 23; AL3 15; AL4 70; PL1 27; PL2 25; PL3 28; PM1 20; PM3 86; PM4 90; AS 27; PS 22; PV 56; MCh IV: ge 50, ti 40, ta 79.

Male unknown.

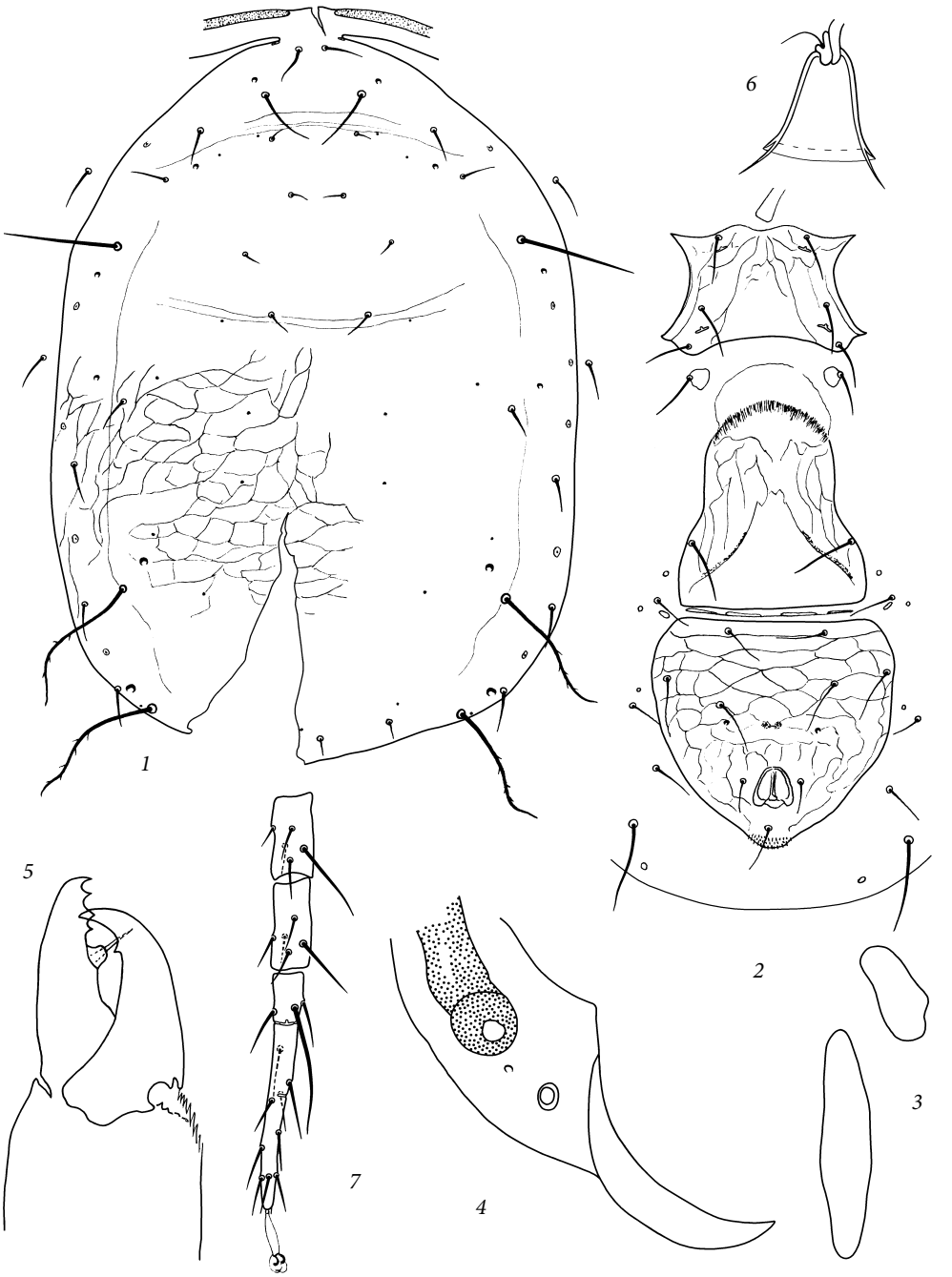

Fig. 5. *Amblyseiulus mauiensis* (Prasad, 1968) ♀ (*1–7*): *1* — dorsal shield; *2* — ventral body surface; *3* — metapodal plates; *4* — posterior part of peritremal schield; *5* — chelicera; *6* — spermatheca; 7 — fragment of leg IV.

Diagnosis. *A. mauiensis* differs from species of the genus *Amblyseiulus* known to the fauna of Ukraine in the reticulate sculpture of all idiosome shields; by six, not seven, pairs of dorsal solenostomes; by unusual displacement of the solenostome il to the edge of the shield. It is similar to *A. sororculus* (Wainstein, I960), which is often found in Ukraine, from which it is easily distinguished by wide genital and ventrianal shields, a visor on the funnel of the spermatheca, while in *A. sororculus* the dorsal shield is smooth, the ventral shields are of moderate width, the funnel of the spermatheca is without a visor.

Distribution, habitat, occurrence. Europe (Ukraine), Transcaucasia (Azerbaijan), Far East of Russia (Primorsky Territory), (USA (Hawaii). In Ukraine: Steppe zone, Crimea; herbs, on small rodents; rare.

Note. Description, morphometry, and illustrations are given for non-typy specimens from the Crimea after comparing them with illustrations of this species in the publications of various authors.

Amblyseiulus messor (Wainstein, 1960) (fig. 6)

Typhlodromus messor Wainstein, 1960: 688.
Amblyseius messor: Athias-Henriot, 1961: 426; Athias-Henriot, 1966: 190; Karg, 1971: 200; Livschitz and Kuznetzov, 1972; 21: Papadoulis and Emmanouel, 1990: 14; Papadoulis, 1993: 92;
Amblyseius (*Amblyseius*) *messor*: Ehara, 1966: 22; Arutunjan, 1977: 34; Ueckermann & Loots, 1988: 66;
Amblyseius messor: Ghiliarov et al., 1977: 238;
Proprioseiopsis (*Amblyseiulus*) *messor*: Karg, 1989: 212;
Proprioseiopsis messor: Moraes, de et al., 1986: 117; Karg, 1993: 176; Moraes et al., 2004: 180; Chant & McMurtry, 2005: 15; Chant & McMurtry, 2007: 89.
Amblyseius obtusus (Koch): Womersley, 1954: 188 (missidentification) (note in: Papadoulis et al., 2009: 69).

Material. **Type**. Syntypes 23 ♀, eastern Georgia, semi-steppe, grass, June 1953 and May 1955.
Non-type. 25 specimens (24 ♀, 1 ♂). Ukraine: Autonomous Republic of Crimea (Southern coast: Yalta, Main mountain range and Karadag), Donetsk, Odesa, Poltava, Kharkiv Regions.

Redescription. Female. Dorsal shield (fig. 6, *1*) strongly sclerotized, with dark marginal border, smooth, broadly oval, without lateral emarginations; 7 pairs of solenostomes (*it, iv, id, isc, il, is, ic*). Dorsal setae sharp, smooth, and vary considerably in length, PM3 and PM4 slightly serrate. Seta PM4 1.5 times as long as PM3 and exceeds distance between theca of PM4 pair. Seta AL4 shorter than PM3 and PM4, others much shorter up to miniature 3–5 μm. Seta AL1 1.5 times shorter than AM1 and 2 times as long as noticeably thinner AL3 (length and arrangement of setae AL1 and AL3 may vary slightly). Seta AL3 is displaced toward the axis of the shield from the commonly observed common arc of setae AL (AM1–AL1–AL3–AL4). Peritremes reach the theca of setae AD1. The shields on the ventral side of the body are also strongly sclerotized. Ventrianal shield (fig. 6, *2*) somewhat wider than genital shield, rounded pentagonal, sometimes rather triangular with rounded margins and concave anterior margin, narrowing caudally, transversely striated; anal pores round, distinct, spaced. The posterior metapodal shield is wide, asymmetrical, larger than the elongated anterior one (fig. 6, *3*). Posterior part of peritremal shield narrow, curved, pointed with terminal pore (fig. 6, *4*). There are 4 teeth on Df and 1 on Dm (fig. 6, *5*). Spermatheca with thick-walled bell-shaped funnel and massive sessile atrium sunk into the base of the funnel (fig. 6, *6*). Leg IV has 3 long macrochaetes: nearly equal on genu and basitarsus, somewhat shorter on tibia (figs 6, 7). Genu III and II with short macrosetae.

Measurements. Lds 400, Wds 250; Lvas 115, Wvas 110, Lian 52; Lt 140; setae length: AD1 30; AD2 3; AD3 3; AD4 5; PD4 6 9; AM1 48; AM2 5; AL1 30; AL3 15; AL4 93; PL1 8;

PL2 9; PL3 16; PM1 7; PM3 120; PM4 188; AS 20; PS 12; PV 86; MCh IV: ge 72, ti 57, ta 70, MCh III: ge 41; MCh II: ge 32.

Male. Preanal setae 3 pairs; anal pores distinct, spaced (fig. 6, 8). Spermatodactyl curved (fig. 6, 9). Lds – 340.

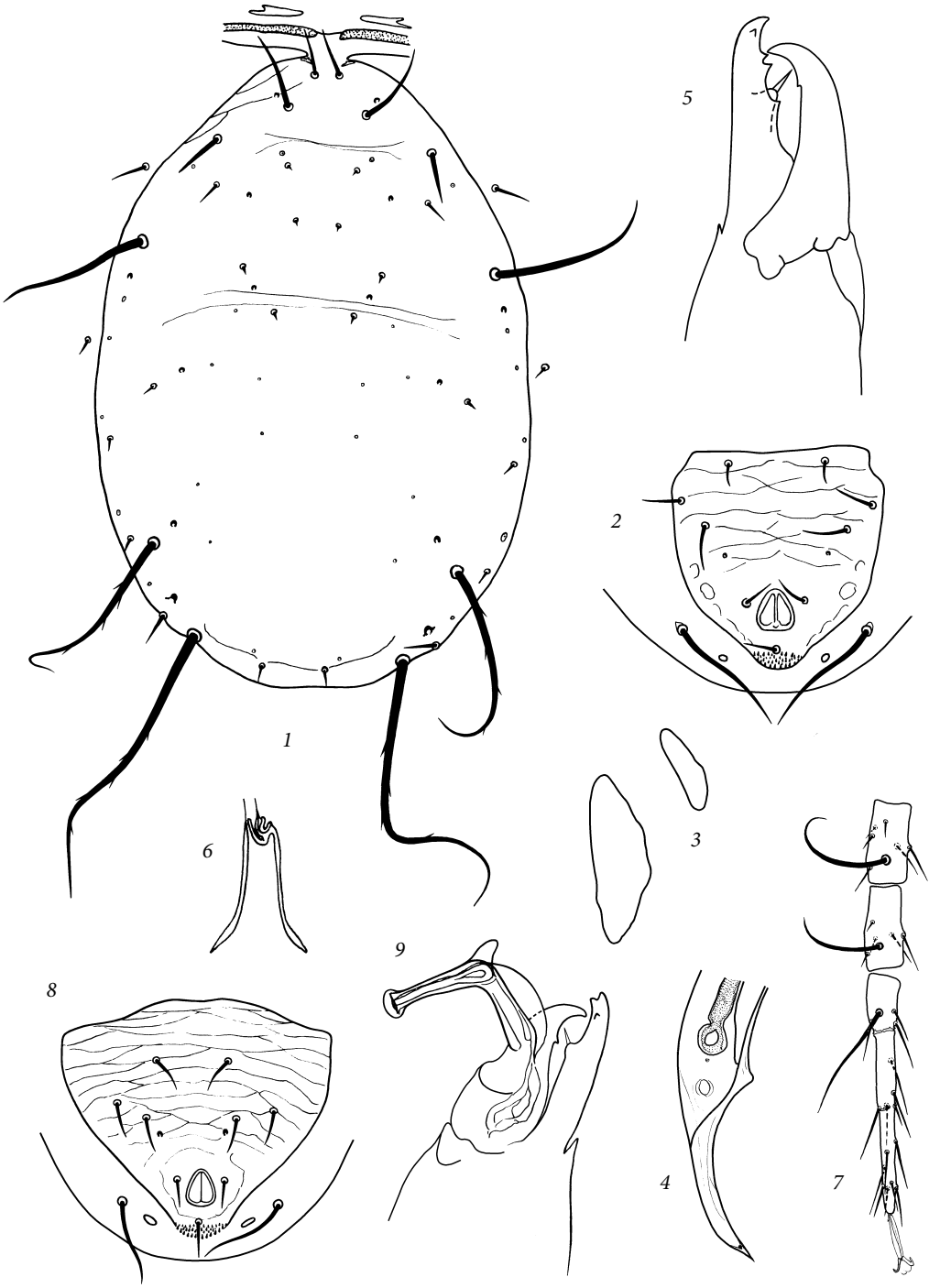

Fig. 6. *Amblyseiulus messor* (Wainstein, 1960) ♀ (*1–7*), ♂ (*8*, *9*): *1* — dorsal shield; *2* — ventral body surface; *3* — metapodal plates; 4 — posterior part of peritremal schield; *5* — chelicera; 6 — spermatheca; 7 — fragment of leg IV; 8 — ventrianal shield; *9* — chelicera with spermatodactyl.

Distribution, habitat, occurrence. Europe, Caucasus, Transcaucasia; Middle East, Central Asia, America; Africa, Canary Islands; Australia, New Zealand, Tasmania Island. In Ukraine: Steppe zone, Wood-and-Steppe zone, Crimea — grasses, litter, on wheat roots, stump dust, on small rodents and in their nests; ordinary.

Diagnosis. *A. messor* is distinguished from species of the genus having long dorsal setae AL4, PL3 and PL4 in several features: seta AL1 reaches theca AL3; seta PL3 equal to distance from its theca to theca PM4; Df with 4 teeth, Dm with 1; funnel of spermatheca with moderately thickened wall and narrow in general, sharp expands towards the sacculus in the last third.

Note. There were 23 females of *Amblyseiulus messor* in collection by labeled as syntypes of this species according to information in original description. The revision revealed 15 females are present now in the collection by B. A. Wainstein (SIZK), which informed in original description that material was taken in East Georgia. The location of the rest specimens is unknown.

Amblyseiulus okanagensis Muma, 1961 (fig. 7)

Typhlodromus okanagensis: Chant, 1957: 293;
Typhlodromus okanagensis levis: Wainstein, 1960: 686; Livschitz & Kuznetsov: 1972: 22;
Amblyseiulus okanagensis: Hirschmann, 1962: 7;
Amblyseiulus okanagensis: Karg, 1971, 202;
Amblyseius okanagensis: Giliarov et al., 1977: 240;
Amblyseius (*Amblyseius*) *okanagensis*: Arutunjan, 1977: 34;
Amblyseius (*Amblyseiulus*) *okanagensis*: Kolodochka, 1978: 43;
Proprioseiopsis okanagensis: Moraes, de et al., 1986: 120; Miedema, 1987: 11; Karg, 1993: 176; Chant & McMurtry, 2007: 89.

Material. **Types.** Holotype ♀, Canada, British Columbia, Oliver, on peach leaves, N. H. A., specimen #6542 (CNC) (examined).

Non–types. 97 specimen (80 ♀, 17 ♂). Ukraine: Autonomouse Republic of Crimea, Cherkasy, Chernihiv, Kyiv, Kherson, Luhansk, Mykolaiv, Poltava, Rivne, Transcarpathia, Vinnitsa, Zhytomyr Regions, 97 specimens (SIZK).

Redescription. Female. Dorsal shield (fig. 7, *1*) strongly sclerotized, with dark marginal border, smooth, broadly oval, without lateral emarginations; solenostomes 7 pairs (*it*, *iv*, *id*, *isc*, *il*, *is*, *ic*), of which *ic* are the largest. Setae AM1, AL1, AL3 reach the thecae of next setae. Seta AL3 markedly shifted toward axis of shield from common arc of setae AM1–AL1–AL3–AL4. Seta PL1 more than twice as long as setae PL2 and PL3. Setae PM3, PM4 serrate, others smooth. Perithremes reach the thecae of setae AD1. Shields on ventral side of body heavily sclerotized. Ventrianal shield (fig. 7, *2*) transversely striated, wider than genital shield, narrowing caudally, bearing 3 pairs of setae; anal pores distinct, spaced. Metapodal shields elongate, posterior one not more than twice as long as anterior (fig. 7, *3*). Posterior part of peritremal shield narrow, widening towards pointed end (fig. 7, *4*). Four teeth on Df, 1 on Dm (fig. 7, *5*). Spermatheca (fig. 7, *6*) with a thick-walled bell-shaped funnel and a massive sessile atrium, as if pressed into the funnel. Leg IV has 3 macrosetae: on genu, tibia, and basitarsus, the last of which is longer than the others (fig. 7, *7*). Genu III and II with short macrosetae.

Measurements. Lds 408, Wds 265; Lvas 135, Wvas 127, Lian 52; Ltar 138; setae length: AD1 29; AD2 7; AD3 8; AD4 15; PD4 10; AM1 52; AM2 8; AL1 37; AL3 64; AL4 84; PL1 40; PL2 14; PL3 14; PM1 23; PM3 77; PM4 112; AS 36; PS 21; PV 60; MCh IV: ge 55, ti 47, ta 68; MCh III: ge 29; MCh II: ge 27.

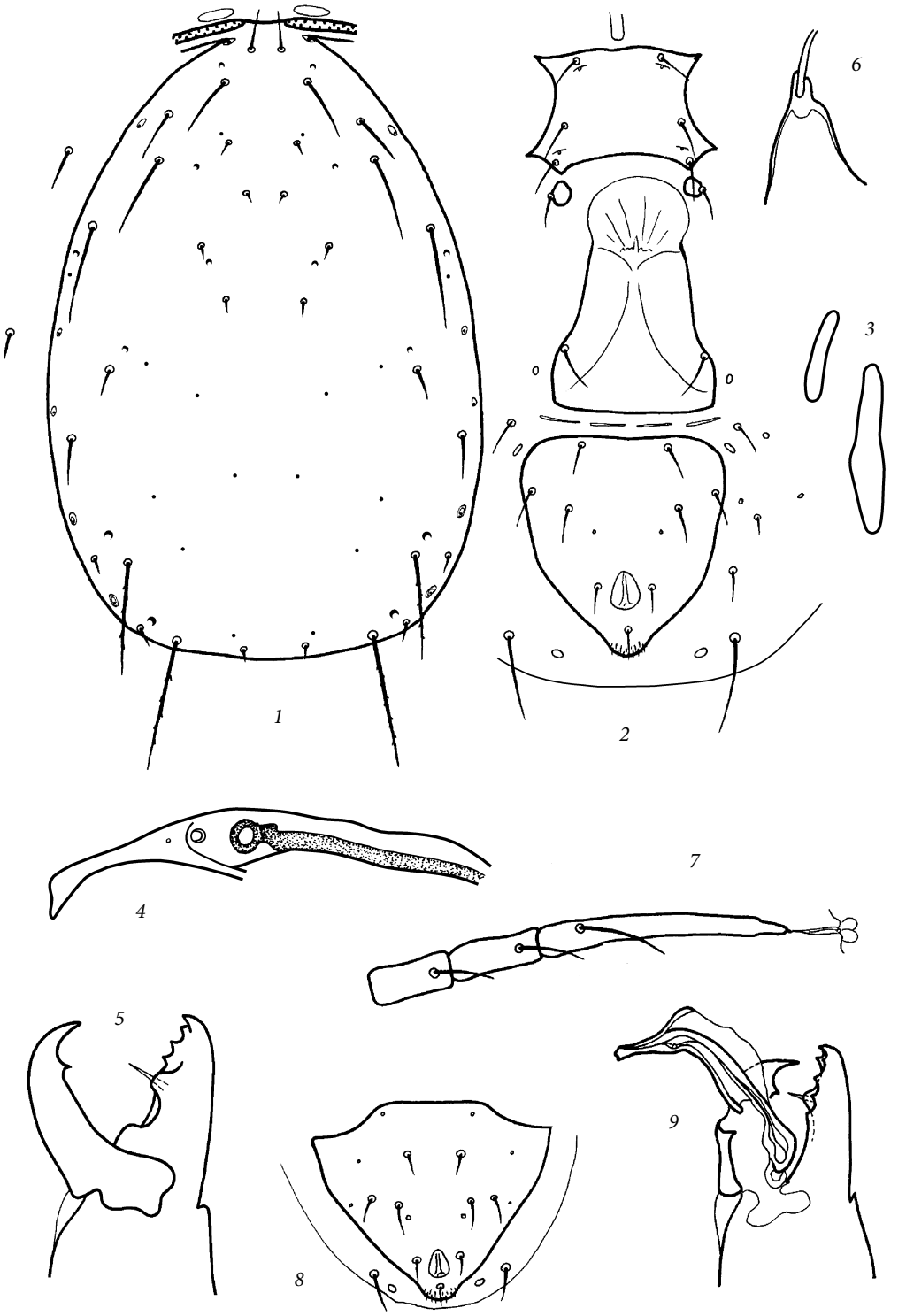

Fig. 7. *Amblyseiulus okanagensis* (Chant, 1957) ♀ *(1–7),* ♂ *(8, 9): 1* — dorsal shield*; 2* — ventral body surface; *3* — metapodal plates; *4* — posterior part of peritremal schield; *5* — chelicera; *6* — spermatheca; *7* — fragment of leg IV; *8* — ventrianal shield; *9* — chelicera with spermatodactyl.

Male. Preanal setae 3 pairs; anal pores distinct, spaced (fig. 7, *7*). Spermatodactyl curved (fig. 7, *8*). Lds — 310.

Distribution, habitat, occurrence. Europe, Transcaucasia, Near East, North America, Far East. In Ukraine: Wood-and-Steppe, Steppe zones, Polissia, Transcarpathia, Crimea (southern slope of the Main Range of Mountains, Yayla; Cape Kazantip): herbaceous plants of the lower tier, litter, rodent nests, soil; by chance — on trees; ordinary.

Diagnosis. *A. okanagensis* differs from the similar to it *A. sororculus* in relatevely longer dorsal setae AL1, AL3, and PL1, as well as by a different ratio of their lengths (in *A. sororculus* AL1 twice shorter as AL3, and in *A. okanagensis*. AL1 is 1.5 times as longer as AL3). While seta PL1 nearly triple longer then PL2 and PL3 in *A. okanagensis*, and in *A. sororculus* thees three setae are equal. In addition, seta AL3 in *A. sororculus* is near four times shorter than the distance to the theca of seta AL4, while seta AL3 in *A. okanagensis* almost equal of seta AL4. In the female *A. sororculus*, the ventrianal shield is narrower than in *A. okanagensis*, and the males of thees species are well distinguished by the structure of the spermatodactyl.

Note. The description and drawings of the female and male are based on non-type material from Kyiv Region; the morphometry is given according to the re-examined holotype; the male is depicted based on non-type material from Ukraine. During the re-examination of the holotype, a discrepancy in a number of characters was noticed between the holotype and the material from our collection. Thus, setae AL4, PL1, PM2, and PM3 in mites from Ukraine were shorter than similar setae in the holotype by 16, 17, 19, and 25 %, respectively. In addition, the number of teeth on Df in the holotype it are 6, while there are 3–4 teeth in non-type specimen. Other characters were not in doubt. Interestingly, the dimensions of the evasive setae of the studied specimens practically coincide with the dimensions of the same-named setae of the species *Typhlodromus okanagensis levis* Wainstein, 1960 from Kazakhstan studied by the author from the holotype, which was earlier recognized as a junior synonym of *A. okanagensis* Chant (Karg, 1971). At the same time, the observed discrepancy can be attributed to population differences within the same species. It is this point of view that is proposed to be accepted before conducting comparative studies on samples that are equivalent in number of individuals.

Amblyseiulus ovicinctus (Athias-Henriot, 1961) (fig. 8)

Amblyseius ovicinctus Athias-Henriot, 1961: 421; Wainstein & Shcherbak, 1972: 43;
Typhlodromus ovicinctus: Hirschmann, 1962: 4, Taf. 6, fig. 114;
Amblyseius ovicinctus: Athias-Henriot, 1966: 190;
Amblyseius ovicinctus: Giliarov et al., 1977: 238.
Proprioseiopsis ovicinctus: Moraes, de et al., 1986: 121; Karg, 1993: 175; Chant & McMurtry, 2007: 89.

Material. **Type.** "Holotype ♀, Iberian Peninsula, Sierra de Estrella (N-<Northern> Portugal), Gesiebe an Quelle uber der Strasse von Maitengas am Hang des Gebirges entland, (No. of the specimen unknown), 22.07 1955" (*cit.*: Athias-Henriot, 1961: 421) (not examined; description made on single non-type specimen from Ukraine).

Non-type. Ukraine: Kyiv Region, Liutezh, mixed forest, dry moss with sod, 04.06.1968, specimen #3550–15(4), 1 ♀, 50°40'00.0" N, 32°24'02.0" E (G. Shcherbak) (in B. A. Wainstein' collection, SYZK).

Redescription. Female. Dorsal shield (fig. 1, *1*) well sclerotized, oval, without lateral emarginations, smooth, with dark lateral border; solenostomes 7 pairs (*it*, *iv*, *id*, *isc*, *il*, *is*, *ic*). Dorsal setae sharp, smooth, only PM3 and PM4 with few serrations. Setae AL4, PM3, and PM4 long, thickened; AD1, AM1 and AL1 are small, the rest are short and microsetae. Seta AM1 shorter than distance from its theca to theca of seta AL1. Seta

Fig. 8. *Amblyseiulus ovicinctus* (Athias-Henriot, 1961) ♀ (*1–7*): *1* — dorsal shield; *2* — ventral body surface; *3* — metapodal plates; *4* — posterior part of peritremal schield; *5* — chelicera; *6* — spermatheca; *7* — fragment of leg IV.

AL1 more than twice as long as seta AL3 and shorter than distance to its theca. Seta AL3 strongly displaced toward axis of dorsal shield from common arc of setae AM1–AL1–AL4 and located on line joining the thecae of setae AL1–AM2. Thus, the setae of the AD1 pair are moved away from the axial line of the dorsal shield, while the setae AM1 are moved closer to it, as compared with the common location of the same pairs of setae in species of related genera. The peritremes extend slightly beyond the theca AD1. Ventrianal shield (fig. 8, *2*) with slight transverse sculpture in anterior half, wider than genital shield, narrowing caudally, lateral margins convex, anterior margin concave; anal pores spaced, round, distinct, close to the thecae of PrA2 setae. Metapodal shields elongated; posterior shield wider than anterior one and 1, 6 times as long as it (fig. 8, *3*). The spermatheca is medium in size, the walls of the short conical infundibulum are slightly thickened; atrium sessile, large (fig. 8, *4*). Df chelicera with 9 teeth (2 distal, 7 others in one medial row), Dm with 2 teeth (fig. 8, *5*). The posterior end of the peritremal shield is sickle-shaped, pointed (fig. 8, *6*). Leg IV has 3 thick macrosetae: on the genu, tibia, and basitarsus, the last of which is the longest (fig. 8, *7*). Leg III with a short macrosetae at genu and a longer one at tibia. Leg II with a short macrochaete at genu.

Measurements. Lds 365, Wds 270; Lvas 102, Wvas 100, Lian 37; Ltar 118; setae length: AD1 23; AD2 4; AD3 4; AD4 6; PD4 8, AM1 37; AM2 5; AL1 18; AL3 7; AL4 78; PL1 7; PL2 8; PL3 10; PM1 6; PM3 110; PM4 130; AS 12; PS 4; PV 54; MCh IV: ge 75, ti 60, ta 53; MCh III: ge 32, ti 21; MCh II: ge 27; MCh I: ge 22.

Male. The original description of the male consists of note about free ventrianal shield, T-shaped spermatodactyl and does not contain morphometry and drawings. In the specimen from Ukraine studied by the author, the male was not found (please see Note below).

Distribution, habitat, occurrence. Europe (Portugal, Russia; Ukraine). In Ukraine: moss and turf in pine and mixed forest (Kyiv Region); rare.

Diagnosis. *A. ovicinctus* is similar to *A. messor* in having long and thickened dorsal setae AL4, PM3, and PM4, contrasting in length with the rest of setae on dorsal shield. The difference between the two species is that the setae PM4 in *A. ovicinctus* near 1.5 times shorter than those in *A. messor* (130 against 188 μm) and do not exceed half the width of the dorsal shield at the level of setae PM1. In addition, the number of teeth on the fingers of chelicerae in these species is also different (*A. ovicinctus* has 9 teeth on Df and 2 on Dm, while *A. messor* has 3 teeth on Df and 1 on Dm).

Amblyseiulus sororculus (Wainstein, I960) (fig. 9)

Typhlodromus sororculus Wainstein, I960: 685;
Amblyseius sororculus: Athias-Henriot, 1966: 193;
Amblyseius sororculus: Abbasova, 1972: 16;
Amblyseius (*Amblyseius*) *sororculus*: Arutunjan, 1977: 34;
Amblyseius sororculus: Giliarov, 1977: 238;
Amblyseiulus sororculus: Karg, 1971: 202;
Amblyseius (*Amblyseiulus*) *sororculus*: Kolodochka, 1981: 45;
Proprioseiopsis sororculus: Moraes, de et al., 1986: 124; Karg, 1993: 177; Chant & McMurtry, 2007: 89; Denmark & Evans, 2019: 78.
Amblyseiulus levani Gomelauri, 1988 (synonymy by Abbasova, 1972: 18).

Material. **Types.** Syntypes: 1 ♀, Russia, Perm Region, in nests of mouse-like rodent *Microtus arvalis*; 1 ♀, 10.04.1951, specimen #N1312 (Ланге); Moscow Region, specimen #2134, 1 ♀, 1956 (SIZK, in collection B. A. Wainstein) (examined).

Non-type. 17 specimens (16 ♀, 1 ♂). Ukraine, Crimean Autonomous Republic, Karadag, N slope, soil near roots of *Pinus* sp., 09.07.1975, specimen #356/1–2234, 1 ♀, 44°53'12.0" N 35°16'44.0" E (G. Shcherbak.); Cape Kazantip, north coast, not far from the lighthouse, bush, *Crataegus* sp., 30.05.1979, specimen #3411,

1 ♀, 45°28'10.0" N 35°50'35.0" E; Arabat Spit, steppe area, env. Volok village, *Echium vulgare*, 06.06.1979, specimen #3467, 5 ♀, 45°45'00.0" N 34°59'00.0" E (Kolodochka); Donetsk Region, Volodarka District, Nazarivka village, Stone Graves reserve, meadow, soil 0-5, 02.09.1973, specimen #S–74/239, 1 ♀, 47°19'31.0" N 37°08'09.0" E; Boykivsk District, Khomutovska Steppe reserve, on a forest mouse, 19.07.1968, specimen #S–75/408, 1 ♀, ,47°24'55.0" N 38°03' 7.0" E; idem, nest of a forest mouse, 28.11.1967, specimen #S–81/51c,

Fig. 9. *Amblyseiulus sororculus* (Wainstein, I960) ♀ (1–7), ♂ (*8*, *9*): *1* — dorsal shield; *2* — ventral body surface; *3* — metapodal plates; *4* — posterior part of peritremal schield; *5* — chelicera; *6* — spermatheca; *7* — fragment of leg IV; *8* — ventrianal shield; *9* — chelicera with spermatodactyl.

1 ♀; idem, 07.07.1968, specimen #S–94/172, 1 ♀; , idem, nest of *Microtus arvalis*, 05.10.1967, specimen #S–164/14, 1 ♀; Zaporozhye Region, Novonikolayevka town, litter, meadow, 24.09.1973, specimen #S–95/5b, 1 ♀, 47°58'34.0" N 35°54'20.0" E; Vasiliev District, Sofievka village, soil 0-5, Steppe, 24.09.1973, specimen #S–77/35, 1 ♀, 47°24'37.0" N 35°17'05.0" E; Poltava City, litter under *Picea* sp., 28.09.1975, specimen #S–120/79g, 1 ♀, 49°36'42.0" N 34°36'48.0" E; idem, the same data, specimen #S–122/79j, 1 ♂, (Skliar); Kharkiv Region, Izium District, Komarovka village, on *Microtus rossiaemeridionalis*, 10.04 1968, specimen #S–509/38, 1 ♀, 49°16'35.0" N 37°15'44.0" E (Naglov) (SIZK).

Redescription. Female. Dorsal shield (fig. 9, *1*) smooth, strongly sclerotized, with dark marginal border, solenostomes 7 pairs (*it*, *iv*, *id*, *isc*, *il*, *is*, *ic*). Dorsal setae fine, sharp, smooth, except for slightly thickened and very weakly serrate PM3 and PM4. Setae AL1, PM1, and PS 1.5–2 times, and AL1 and AS 2.5–3 times as long as very short AD2–AD4, PD4, AM2, and PL1–PL3. Seta AL3 markedly shifted toward axis of shield from common arc of setae AM1–AL1–AL4. Peritremes nearly reaches the thecae of setae AD1. Ventrianal shield (fig. 8, 2) finely transversely striated; anal pores are large, round, widely spaced, often asymmetrically placed (one of the pores is displaced caudally relative to the other), which noted in the original description, but is not always maintained on a sufficiently representative sample. Metapodal shields elongated, posterior one not less than 2.4 times as long as anterior (fig. 9, *3*). The posterior part of the peritremal shield is very narrow, crescent-shaped (fig. 9, *4*). There are 4 teeth on Df of the chelicerae, and 1 tooth on Dm (fig. 9, *5*). The funnel walls of the spermatheca are thickened, the atrium is large and merged with the base of the funnel (fig. 9, *6*). On leg IV there are elongated macrochaetes: on tibia shorter than others (fig. 9, *7*), on maple and tibia of leg III along a short macrochaete.

Measurements. Lds 400, Wds 275; Lvas 127, Wvas 110; Lian 54; L tar 130; setae length: AD1 22; AD2 3; AD3 3; AD4 9; PD4 9; AM1 30**;** AM2 3**;** AL1 18**;** AL3 9**;** AL4 54**;** PM1 13**;** PL1 9**;** PL2 9**;** PL3 9**;** PM3 68**;** PM4 79**;** AS 18**;** PS 14; PV 54**;** MCh IV: ge 56, ti 43, ta 60, MCh III: ti 25, ge 21.

Male. Preanal setae 3 pairs; anal pores small, round, spaced apart (fig. 9, *6*). The spermatodactyl is large, L-shaped (fig. 9, *7*).

Diagnosis. *A. sororculus* differs from similar *A. okanagensis* in short dorsal setae AL1 and AL3, as well as in a different ratio of their lengths (in *A. sororculus* AL1 is 2 times as long as AL3, but in *A. okanagensis* AL1 is 1.5 times as short as AL3). In addition, seta AL3 in *A. sororculus* is four times shorter than the distance to the theca of seta AL4, while seta AL3 in *A. okanagensis* almost equal of seta AL4. In the female *A. sororculus*, the ventrianal shield is narrower than in *A. okanagensis*, and the males of thees species are well distinguished by the structure of the spermatodactyl.

Distribution, habitat, occurrence. Europe, Transcaucasia. In Ukraine: Wood–and-Steppe zone, and Steppe zone; shrubs, herbs, grasses, litter, soil; on small rodents and in their nests; ordinary.

Key to species of three phytoseiid genera of Ukrainian fauna

1. Dorsal setae of PL3 pair absent; ventrianal shield with 1 pair of preanal setae (PrA2). ..... *Amblyseiella* Muma (one speceis known in Ukraine — *A. antonii* Kolodochka & Omeri, 2010).
— Dorsal setae of PL3 pair present; ventrianal shield with 3 pair of preanal setae (PrA1, PrA2, V2) 2
2. Dorsal setae PD2 pair absent. ..... *Chelaseius* Muma & Denmark (one speceis known in Ukraine — *Ch. valliculosus* (*Pontoseius)* Kolodochka, 1987).
— Dorsal setae PD2 pair absent. ..... *Amblyseiulus* Muma 3
3. Six pairs of solenostomes on dorsal shield (*id* pair absent); solenostome il shifted to edge of dorsal shield. ..... *A. mauiensis* (Prasad)
— Seven pairs of solenostomes present on dorsal shield; solenostome *il* is in usual position for species of the family 4

4. The length of seta PM4 is equal to the distance between the thecae of setae of PM3 pair. 5
— Seta PM4 1.2 times shorter than the distance between the thecae of setae of PM3 pair. 7
5. Seta AL1 equal to or longer than the distance from its own theca to theca AL3; seta PL3 equal to distance from its theca to theca PM4; Df with 4 teeth, Dm with 1; funnel of spermateca as a whole is narrow, with a moderately thickened wall. ..... *A. messor* (Wanstein)
— Seta AL1 shorter than distance to theca AL3; seta PL3 2 times shorter than distance from its theca to theca PM4; Df with 9 teeth, Dm with 2; funnel short, widly conical with thick wall 6
6. Wall of spermateca funnel significantly thickened ..... *A. jugortus* (Atias-Henriot)
— Wall of spermateca funnel moderately thickened ..... *A. ovicinctus* (Atias-Henriot)
7. Many dorsal setae in lateral row weakly serrated (AM1, AL1, AL3, AL4, PL1, PL2, PM2, PM3) ....*A. bregetovae* (Abbasova)
— All dorsal setae smooth, except for weakly serrated setae of pairs PM3 and PM4 8
8. Setae AM1, AL1, AL3 longer than the distance from their own tecae to the tecae of subsequent setae ..... *A. okanagensis* (Chant)
— Setae AM1, AL1, AL3 shorter than distance from their own tecae to tecae of subsequent setae. .... *A. sororculus* (Wainstein)

Acknowledgments

This study was funded for I. I. Schmalhausen Institute of Zoology of the National Academy of Sciences of Ukraine (State Registration Number of the work: 0116U003015, II-51-21) by the National Academy of Sciences of Ukraine. The type material for this study was obtained by author with the kind assistance of Professor D. A. Chant and Dr. Eiko Shaul (Canadian National Collection, Toronto, Canada), for which the author once again expresses his gratitude.

Referenses

Abbasova, E. D. 1970. Little-known and new species of predatory mites Ptytoseiidae of the fauna of Azerbaijan. *Zoologicheskii Zhurnal*, **49** (1), 45–55 [In Russian].

Abbasova, E. D. 1972. Phytoseiid mites (Parasitiformes, Phytoseiidae) of Azerbaijan. *Avtoreferat Dissertacii na soiskanie uchenoy stepeni kandidata biologicheskihk nauk.* Akademia Nauk Azerbaijanskoy SSR, Institut Zoologii, 1–34 [In Russian].

Arutunjan, E. S. 1977. *Identification manual of phytoseiid mites of agricultural crops of the Armenian SSR.* Izdatelstvo Acad. Sci. Armenian SSR, Erevan, 1–177 [In Russian].

Athias-Henriot, C. 1960. Nouveaux *Amblyseius* d'Algerie (Parasitiformes, Phytoseiidae). *Acarologie*, 2, 288–299.

Athias-Henriot, C. 1961. *Mesostigmates (Urop. excl.) edaphiques Mediterreneens* (Acaromorpha, Anactinotrichida). *Acarologia*, 3 (fasc. 4), 381–509.

Athias-Henriot, C. 1966. Contribution a l'etude des *Amblyseius* palearctiques (Acariens anactinotriches, Phytoseiidae). *Bulletin Scientifi que de Bourgogne*, 24, 181–226.

Athias-Henriot, C. 1980. Terrestrial Parasitiformes Gamasida I. The Families Phytoseiidae, Pergamasidae, Eviphydidae, and Zerconidae. *The zoology of Iceland*, 3 (Part 57 d), 1–38.

Berlese, A. 1914. Acari nuovi. *Redia,* 10, 143–150.

Chant, D. A. 1957. Descriptions of some phytoseiid mites (Acarina: Phytoseiidae). Part I.Nine new species from British Columbia with keys to the species of British Columbia. Part II. Redescriptions of eight species described by Berlese. *Canadian Entomology***, 89** (7), 289–308.

Chant, D. A. 1959. Phytoseiid mites (Acarina: Phytoseiidae). Part I. Bionomics of seven species in southeastern England. Part II. A taxonomic review of the family Phytoseiidae, with descriptions of 38 new species. *Canadian Entomology*, 91 (Suppl. 12), 1–166.

Chant, D. A. 1993. Paedomorphosis in the family Phytoseiidae (Acari: Gamasina). *Canadian Journal of Zoology*, **71** (7), 1334–1349.

Chant, D. A. & McMurtry, M. H. 2004. A review of the subfamily Amblyseiinae Muma (Acari: Phytoseiidae)**,** Part III. Amblyseiini Wainstein: subtribe Amblyseiina n. subtribe. *Internatiional Journal of Acarology*, **30** (3), 171–228.

Chant, D. A. & McMurtry, J. A. 2005. A review of the subfamily Amblyseiinae Muma (Acari: Phytoseiidae), Part V. The tribe Amblyseiini Wainstein, subtribe Proprioseiopsina Chant and McMurtry. *Internatiional Journal of Acarology*, **31** (1), 3–22.

Chant, D. A. & McMurtry M. H. 2007. *Illustrated key and diagnoses for the genera and subgenera of the Phytoseiidae of the wourld (Acari: Mesostigmata).* Indira Publishing House, West Bloomfield, Michigan, USA, 1–220.

Demite, P. R., Moraes, G. J. de, McMurtry, J. A., Denmark, H. A. & Castilho, R. de C. 2023. *Phytoseiidae Database*. – http://www.lea.esalq.usp.br/phytoseiidae/ (Accessed: September 2023).

Denmark, H. A. & Kolodochka, L. A. 1990. Revision of the genus *Chelaseius* Muma and Denmark (Acari: Phytoseiidae). *International Journal of Acarology*, **16** (4), 219–233.

Denmark, H. A. & Evans, G. E. 2011. *Phytoseiidae of North America and Hawaii (Acari, Mesostigmata)*. Indira Publishing House, West Bloomfield 1–451.

Denmark, H. A. & Evans, G. A. 2019. *Additions to the world fauna of the family Phytoseiidae (Acari: Mesostigmata) with an illustrated key to the subfamilies, tribes, subtribes and genera of Phytoseiidae of the World.* Indira Publishing House, West Bloomfield, 1–315.

Ehara, S. 1966. A tentative catalogue of predatory mites of Phytoseiidae known from Asia, with deskriptions of five new species from Japan. *Mushi*, 39, 9–30.

Hirschmann, W. 1962. *Gangsystematik der Parasitiformes. Acarologie Schriftenreihe für vergliechende Milbenkunde*. Hirschmann–Verlag, Fürth/Bay, **5** (5–6), 1–80.

Ghiliarov, M. S., Bregetova, N. G., Wainstein, B. A., Kadite, B. A., Koroleva, E. M., Petrova, A. D., Tikhomirov, S. I. & Shcherbak, G. I. 1977. *Manual of edaphic mites (Mesostigmata).* Nauka, Leningrad, 1–718 [In Russian].

Karg, W. 1971. *Acari (Acarina) Milben Unterordnung. Anactinochaeta (Parasitiformes). Die freilebenden Gamasina, (Gamasides), Raubmilben, Teil 59*. VEB Gustav Fischer Verlag, Jena, 1–475.

Karg, W. 1983. Systematische Untersuchung der Gattungen und Untergattungen den Raubmilbenfamilie Phytoseiidae Berlese, 1916, mit der Beschreibung von 8 neuen Arten. *Mitteilungen aus dem Zoologischen Museum in Berlin*, **59** (2), 293–328.

Karg**,** W. 1989. Neue Raubmilbenarten der Gattung *Proprioseiopsis* Muma, 1961 (Acarina: Parasitiformes) mit Bestimmungsschlusseln. *Zoologische Systematik*, **116** (2), 199–216.

Karg, W. 1993. *Acari (Acarina), Milben Parasitiformes (Anactinochaeta), Cohors Gamasina Leach, Raubmilben, 59 Teil*. Gustav Fischer Verlag, Jena–Stuttgart–New York, 1–523.

Kolodochka, L. A. 1978. Guidelines for the identifi cation of plant-dwelling phytoseiid mites. *Naukova dumka*, Kyiv, 1–78 [In Russian].

Kolodochka, L. A., 1981. New phytoseiid mites (Parasitiformes, Phytoseiidae) of Crimea. I. *Vestnik Zoologii,* 1, 18–22 [In Russian].

Kolodochka, L. A. 1987. New species of the genus *Chelaseius* (Parasitiformes, Phytoseiidae) from Crimea. *Zoologocheskii Zhurnal*, **66** (5), 773–775 [In Russian].

Kolodochka, L. A. 1990. New in the structure of spermateca of female phytoseiid mites (Parasitiformes, Phytoseiidae). *Vestnik Zoologii*, 1, 74–75 [In Russian].

Kolodochka, L. A., 1998. Two new tribes and the main results of the revision of Palearctic phytoseiid mites (Phytoseiidae, Parasitiformes) with the concept of a family system. *Vestnik Zoologii*, **32** (1–2), 51–63 [In Russian].

Kolodochka, L. A. 2006. Phytoseiid mites of the Palaearctic Region (Parasitiformes, Phytoseiidae): faunistics, taxonomy, ecomorphology, evolution. Schmalhausen Institute of Zoology, NAS of Ukraine, 1–250. (*Vestnik Zoologii*, Suppl. 21) [In Russian].

Kolodochka, L. A. 2022. The predatory mites (Phytoseiidae, Parasitiformes) in the fauna of Ukraine: a new species and a new subgenus of the genus *Graminaseius*. *Zoodiversity*, **56** (6), 463-472. https://doi.org/10.15407/zoo2022.06.463

Kolodochka L. A. 2023 a. The predatory mites (Phytoseiidae, Parasitiformes) in the fauna of Ukraine: a review with a key to species and new combinations in the genus *Transeius*. *Zoodiversity*, **57** (3), 191–214. https://doi.org/10.15407/zoo2023.13.191

Kolodochka, L. A. 2023 b. The predatory mites (Phytoseiidae, Parasitiformes) in the fauna of Ukraine: of the genera *Paragigagnatus*, *Carinoseius*, *Kampimodromus*, *Eharius*, *Typhlodromips*, and *Euseius*. *Zoodiversity*, **57** (6), 477–506. DOI 10.15407/zoo2023.06.477

Kolodochka, L. A. & Omeri, I. D. 2010. A new species of predaceous mites of the genus *Amblyseiella* (Parasitiformes, Phytoseiidae) from Ukraine. *Vestnik Zoologii*, 44 (1), 87–90 [in Russian].

Kolodochka, L. A. & Skliar, V. E. 1981. Phytoseiid mites (Phytoseiidae, Parasitiformes) from the soil, litter and nests of rodents in the Steppe and Forest-Steppe zones of Ukraine. Problems of soil zoology. *Abstracts of the VII All-Union Conference, Kyiv, 1981*, 102–103 [In Russian].

Livschitz, I. Z. & Kuznetzov, N. N. 1972. To the knowledge of Crimean phytoseiids (Parasitiformes, Phytoseiidae). *In*: *Pests and diseases of fruit and ornamental plants*. Yalta, 1972, 13–64. (Proceedings of the State Nikitsky Botanical Garden, 61) [In Russian].

Miedema, E. 1987. Survey of phytoseiid mites (Acari: Phytoseiidae) in orchards and surrounding vegetation of northwestern Europe, especially in the Netherlands. Keys, descriptions and figures. *Netherlands Journal of Plant Pathology*, 93, Suppl. 2, 1–64.

Moraes, G. J, McMurtry, J. A. & Denmark H. D. 1986. *A catalog of the mite family Phytoseiidae. references to taxonomy, synonymy, distribution and habitat*. Brasilia: EMBRAPA–DDT, 1–353.

Moraes, G. J, McMurtry, J. A., Denmark H. D. & Campos C. B. 2004. Revised catalog of the mite family Phytoseiidae. *Zootaxa*, 434, 1–494.

Muma, M. H. 1955. Phytoseiidae (Acarina) associated with citrus in Florida. *Annals of Entomological Society of America*, 48, 262–272.
Muma, M. H. 1961. Subfamilies, genera and species of Phytoseiidae (Acarina: Mesostigmata). *Florida State Museum Bulletin*, **5** (7), 267–302.
Muma, M. H. & Denmark, H. A. 1968. Some generic descriptions and name changes in the family Phytoseiidae (Acarina: Mesostigmata). *Florida Entomology*, 51, 229–240.
Papadoulis, G. Th. & Emmanouel, N. G. 1990. Phytoseiid mites of Greece: new records of species and descriptions of the male and immature stages of *Typhlodromus erymantii* Papadoulis et Emmanuel. *Bioliogia Gallo–Hellenica*, 17, 13–26.
Papadoulis, G. Th. 1993. *Studies on morphology and systematycs of the family Phytoseiidae (Acari: Mesostigmata) in Greece*. Ph. D. Thesis, Agriculture University of Athens, 1–462.
Papadoulis, G. Th. Emmanouel, N. G. & Kapaxidi, E. V. 2009. *Phytoseiidae of Greece and Cyprus (Acari: Mesostigmata)*. Indira Publishing House, West Bloomfield, Michigan, USA, 1–200.
Prasad, V. 1968. *Amblyseius* mites from Hawaii. *Annals of Entomological Society of America*, **61** (6), 1524–1521.
Pritchard, A. E. & Baker E. W. 1962. Mites of the family Phytoseiidae from central Africa, with remarks on the genera of the world. *Hilgardia*, **33** (70), 205–309.
Rowell, H. J., Chant, D. A. & Hansell, R. I. C. 1978. The determination of setal gomologies and setal patterns on the dorsal shield in the family Phytoseiidae (Acarina: Mesostigmata). *Canadian Entomology*, 110, 859–876.
Ueckermann, E. A. & Loots, G. C. 1988. The African species of the subgenera *Anthoseius* De Leon and *Amblyseius* Berlese (Acari: Phytoseiidae). *Entomology Memoir, Department of Agriculture and Water Supply Republic of South Africa*, 73, 1–168.
Wainstein, B. A. 1960. New species and subspecies of the genus *Typhlodromus* Scheuten (Parasitiformes, Phytoseiidae) of the USSR fauna. *Zoologicheskii Zhurnal***, 39** (5), 683–690 [in Russian].
Wainstein, B. A. 1962. Revision du genre *Typhlodromus* Scheuten, 1857 et systematique de la famille des Phytoseiidae (Berlese, 1916). *Acarologia*, **4** (1), 5–30.
Wainstein, B. A. 1973 a. On the position of the genus *Evansoseius* in the system of the family Phytoseiidae (Parasitiformes). *Zoologicheskii Zhurnal*, **52** (2), 274–277.
Wainstein, B. A. 1973 b. On the structure of some taxonomically important organs of Phytoseiidae. *Zoologicheskii Zhurnal,* **52** (12), 1871–1872.
Wainstein, B. A. 1979. Predatore mites of the family Phytoseiidae (Parasitiformes) of the Primorsky Territory. *Nazemnye Chlenistonogie Dal`nego Vostoka*, Vladivostok, Russia, 137–144 [In Russian].
Wainstein, B. A. & Shcherbak, G. I. 1972. Species of gamasids of the genus *Amblyseius* (Parasitiformes, Phytoseiidae) new to the fauna of the Ukrainian SSR. *Vestnik Zoologii*, 6, 35–48 [In Russian].
Womersley, H. 1954. Species of the subfamily Phytoseiinae (Acarina: Laelaptidae) from Australia. *Australian Journal of Zoology,* 2, 169–191.
Zaher, M. A. 1986. Predaceous and nonphytophagous mites (Nile Vallty and Delta). Text. *Survey and ecological studies on phytophagous, predaceous and soil mites in Egypt*. PL 480 Programme USA, Project, Egypt, 1–567.

Received 22 August 2023
Accepted 22 February 2024