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New records of carabid-associated mesostigmatic mites (Acari: Mesostigmata) from Ukraine with description of adults of *Halodarcia carabidophila* Evans and Fain, 1995 (Halolaelapidae)

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**KEYWORDS** — Acari; Mesostigmata; phoresy; Carabidae; Ukraine; *Halodarcia carabidophila*

**INTRODUCTION**

The Mesostigmata (Gamasida) is a large, cosmopolitan assemblage of parasitiform mites that embraces an unusually diverse variety of lifestyles and habitats (Lindquist *et al.*, 2009). Deutonymphs and adults of many families of Mesostigmata have established close phoretic relationships with other arthropods and, less commonly, with vertebrates (Krantz, 2009). Over 95% species of arthropod-associated mesostigmatic mites are insect associates. The insect orders Coleoptera, Hymenoptera, Diptera and Lepidoptera are the primary hosts of mesostigmatid mites (Hunter and Rosario, 1988). Beetles of the families Carabidae, Curculionidae, Geotrupidae, Histeridae, Lucanidae, Silphidae, Scarabaeidae, Staphylinidae, etc. are common phoretic hosts for the mesostigmatid mites in Europe.

Many members of the genera *Panteniphis* Willmann, 1949 (Digamasellidae), *Stylochirus* G. and R. Canestrini, 1882 (Ologamasidae), *Halodarcia* Karg, 1969 (Halolaelapidae), *Antennoseius* Berlese, 1916 and *Anystipalpus* Berlese, 1911 (Ascidae) are strictly associated with carabid beetles (Bregetova, 1977c; Haitlinger, 1988; Evans and Fain, 1995; Gwiazdowicz, 2000a; Lindquist and Moraza, 2009; Lindquist *et al.*, 2009). Phoresy on carabids was also observed, although rarely, in members of the genera *Parasitus* Latreille, 1795, *Poecilochirus* G. and R. Canestrini, 1882 (Parasitidae), *Dendrolaelaps* Halbert, 1915 (Digamasellidae), *Alliphis* Halbert, 1923 (Eviphididae), *Macrocheles* Latreille, 1829

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The fauna of arthropod-associated Mesostigmata in Ukraine is very poorly known. The purpose of this paper is to add new records of carabid-associated mesostigmatic mites from Ukraine and to describe unknown adults *Halodarcia carabidophila*.

**MATERIALS AND METHODS**

Carabid beetles were collected in various natural zones and administrative regions of Ukraine. Beetles were sampled by hand, by using Barber traps with bait and by using UV lamp (mercury tungsten blended lamp or mercury vapor lamp). Carabids were transferred into vials containing 70% ethyl alcohol and later were examined with aid of a microscope MBS-9.

Mites collected from carabids were cleared in lactic acid and slide-mounted in Hoyer’s medium. Morphology of mites was studied with the aid of a compound microscope, a Mikmed-1 Lomo equipped with a binocular head AU-12, ocular micrometer AM9-2 and digital camera DCM900. The morphological terminology generally follows Evans and Till (1979). Dorsal setae were labelled according to the system of Lindquist and Evans (1965), but our designations are preliminary. Dorsal pore-like structures, glandular openings (solenostomes) and poroids (lyrifissures) are indistinct and have been named as pores. Palpal and leg chaetotaxy follows Evans (1963a, b, 1969). Measurements are given in micrometres (μm). Lengths of shields were taken from the anterior to posterior shield margins along the midline. The length of the second cheliceral segment was measured from the base to the apex of the fixed digit. Leg length was taken from the base of the coxa to the apex of the tarsus, excluding the ambulacrum.

For biological studies of *Halodarcia carabidophila*, well-fed and swollen deutonymphs (collected in the vicinity of Berezovka, 26 Mar. 2011, see examined material) were removed from carabids and placed into glass or plastic 25 ml jars, the lower part of which was filled with a solid mixture of gypsum and charcoal (according to Karg, 1971). High humidity was maintained in these vessels by frequently adding water to the gypsum-charcoal substrate. The mites developed at a temperature of about 20°C. The adult mites were obtained after two to seven days.

Slide-mounted voucher specimens are deposited in the collections of the Department of Zoology, I. I. Mechnikov Odessa National University. Mite taxonomy follows Beaulieu et al. (2011), carabid taxonomy follows Kryzhanovskij et al. (1995).

**RESULTS**

*Suborder Trigynaspida Camin and Gorirossi, 1955*

*Infraorder Antennophorina Camin and Gorirossi, 1955*

*Family Schizogyniidae Trägårdh, 1950*

*Genus Euroschizogynium* Trach and Seeman, 2014

Euroschizogynium calvum Trach and Seeman, 2014

Material examined — one male from *Scarites terricola* Bonelli, 1813, Ukraine, Kherson Region, Skadovsk District, Dzharylhach island (46°02’N, 32°55’E), shore of salt puddle, 18 – 21 Aug. 2014, V. Trach coll.

Distribution — Ukraine (Trach and Seeman, 2014).

Remarks — The genus *Euroschizogynium* is monotypic and known only from the type series from Odessa region of Ukraine; mites were also found on *S. terricola* (Trach and Seeman, 2014). Mites were located on the thorax and abdomen of the beetles. The biology of the Schizogyniidae is generally unknown, but some species are associated with passalid, bark and carabid beetles (Trägårdh, 1950; Kinn 1966; Hirschmann 1972; Trach and Seeman, 2014).
Suborder Monogynaspida Camin and Gorirossi, 1955
Infraorder Gamasina Kramer, 1881
Family Digamasellidae Evans, 1957
Genus Panteniphis Willmann, 1949
Panteniphis mirandus Willmann, 1949

Material examined — one deutonymph from Chlaenius sp., Ukraine, Chernigiv Region, Korop District, Desna River shore, 03 July 1973, unknown coll.; eight deutonymphs from Bembidion sp., same data; five deutonymphs from Omophron limbatum (Fabricius, 1777), same data; thirteen deutonymphs from Bembidion sp., Ukraine, Crimea, Yalta City Municipality, vicinity of Yalta (44°29’N, 34°05’E), Uchan-Su River valley, 17 Juny 2001, A. Khaustov coll.; four deutonymphs from undetermined Carabidae, Ukraine, Odessa Region, Kiliya District, vicinity of Primorskoe (45°30’N, 29°38’E), meadow, 01 May 2003, V. Trach coll.; one deutonymph from Bembidion sp., Ukraine, Crimea, Yalta City Municipality, vicinity of Yalta (44°29’N, 34°05’E), Uchan-Su River valley, 17 Juny 2001, A. Khaustov coll.; four deutonymphs from undetermined Carabidae, Ukraine, Crimea, Yalta City Municipality, vicinity of Yalta (44°29’N, 34°05’E), Uchan-Su River valley, 17 Juny 2001, A. Khaustov coll.; one deutonymph from Agonum sp., Ukraine, Odessa Region, Berezovka District, vicinity of Berezovka (47°10’N, 30°56’E), floodplain forest near Tiligul River, 01 Apr. 2001, V. Trach coll.; seven deutonymphs from Agonum sp., same locality, 16 Apr. 2003, V. Trach coll.; ten deutonymphs from Agonum sp., same locality, 26 Mar. 2011, V. Trach coll.; one deutonymph from Agonum sp., Ukraine, Odessa Region, Belyaevka District, vicinity of Belyaevka (46°25’N, 30°10’E), floodplain forest near Dniester River, 22 Juny 2011, V. Trach coll.

Distribution — Poland, France, Russia, Moldova, Latvia, Slovakia (Bregetova, 1977a; Karg, 1993; Gwiazdowicz, 2000a; Fend’a, 2002; Salmane, 2007).

Remarks — P. mirandus is a rare edaphic species. Deutonymphs of P. mirandus was described by Gwiazdowicz (2000a) from Carabus sp. from Poland. We found carabids with mites only in riparian areas. Mites are phoretic under the elytra of beetles. The genus Panteniphis is new to the fauna of Ukraine.

Family Halolaelapidae Karg, 1965
Genus Halodarcia Karg, 1969

Remarks — So far, four species of genus Halodarcia have been described world-wide, three of them from Europe — Halodarcia incidata Karg, 1969, H. porolata Karg, 1969, H. carabidophila Evans and Fain, 1995 and H. kargi Nikolsky, 1982 from Asia (Karg, 1969; Nikolsky, 1982; Evans and Fain, 1995). Adult mites of the genus Halodarcia are free-living in litter and humus in damp or wet situations; deutonymphs, of at least some species, are subelytral phoretics of carabid beetles (Evans and Fain, 1995).

Halodarcia carabidophila Evans and Fain, 1995
(Figures 1 and 2)

Material examined — two deutonymphs from Agonum sp., Ukraine, Odessa Region, Berezovka District, vicinity of Berezovka (47°10’N, 30°56’E), floodplain forest near Tiligul River, 01 Apr. 2001, V. Trach coll.; seven deutonymphs from Agonum sp., same locality, 16 Apr. 2003, V. Trach coll.; ten deutonymphs from Agonum sp., same locality, 26 Mar. 2011, V. Trach coll.; one deutonymph from Agonum sp., Ukraine, Odessa Region, Belyaevka District, vicinity of Belyaevka (46°25’N, 30°10’E), floodplain forest near Dniester River, 22 Juny 2011, V. Trach coll.

Distribution — Belgium (Evans and Fain, 1995).

Remarks — Deutonymphs of Halodarcia carabidophila was described from carabids Agonum spp. and Pterostichus spp. from Belgium (Evans and Fain, 1995). Records of H. carabidophila on the necrophagous silphid N. littoralis may represent a fortuitous attempt to disperse phoretically on an accidental host. The genus Halodarcia is new to the fauna of Ukraine. The adult stages of H. carabidophila obtained in the laboratory are herein described for the first time.
Figure 1: Halodarcia carabidophila Evans and Fain, 1995, female: A – idiosoma, dorsal view (setae of the soft cuticle in the podonotal region on the left side were not drawn); B – idiosoma, ventral view; C-D – variety of shape of anal shields; E – gnathotectum; F – subcapitulum and palp; G – chelicera. Male: H – idiosoma, ventral view; I – gnathotectum; J – corniculus; K – variety of shape of chelicerae. Scale bar: A-D, H 200 μm, E, G, I, K, L 100 μm, F, J 200 μm.
Diagnosis — Adult female with 24 pairs of setae (j2-j6, z2-z6, s1, s3-s5, J1, J2, J4, J5, Z1-Z5, S2) on dorsal shield; sternal shield divided medially; epigynal shield rounded posteriorly; ventri-anal shield elongated, with 2 pairs of preanal setae (JV2, JV3) and circum-anal setae; soft opisthosomal integument hypertrichous; gnathotectum with denticulate lateral margins and tapering undivided median process. Gnathotectum of adult male with smooth lateral margins and tapering median process; spermatodactyl large and curved, longer than movable digit. Deutonymph with 15 pairs of setae (j1-j6, z1-z6, s2, s3, s5, s6) on podonotal shield and normally 10 pairs of setae (J1, J2, J4, J5, Z1-Z5, S2) on opisthonotal shield, setae S1 on soft cuticle; cheilicalar denticles stout with teeth of movable digit weak.

Description of female (n = 4) — Dorsum (Figure 1A). Dorsal shield obovate, length 622 – 651, maximum width 353 – 363, tapering anteriorly from setae s5 and posteriorly from setae Z1. Surface of shield essentially smooth. Dorsal shield with 24 pairs of setae (j2-j6, z2-z6, s1, s3-s5, J1, J2, J4, J5, Z1-Z5, S2), 12 pairs of distinguishable pores and posterodorsal cribrum (terminology by Krantz, 2016), setae J3 absent. Setae j1 and z1 located on fused anteriorly peritrematal shields. Fusion of the dorsal shield with peritremetal shields indistinguishable. Anterior soft lateral integument with 7 pairs of setae (s2, s6, r2-r6) and one pair of pores; posterior soft lateral integument hypertrichous, with about 20 pairs of setae, pores not distinguishable. Most dorsal setae slightly serrated, length 19 – 29.


Epigynal shield triangular, anteriorly elongated and pointed, posterior margin rounded, bearing simple setae st5. Epigynal shield length 189 – 202, maximum width 126 – 160, length st5 40 – 46. Ingual gland platelet with two gv2 pores, pores iv5 present. Ventri-anal shield elongated and reticulated, with rounded anterolateral corners, length 185 – 202, maximum width 109 – 118, cribrum well developed. In one specimen seta JV2 on separate plate (Figure 1C). Shield bearing 2 pairs of simple preanal setae (JV2, JV3), para-anal, post-anal setae and pair of pores (gv3), length of preanal setae 36 – 55, length of para-anal setae 36 – 40, length of post-anal seta 38 – 42. Soft opisthosomal integument hypertrichous, with 20 – 21 pairs of setae (S1, S3-S5, R1-R7 and 9 – 10 pairs setae of UR-series) and pair of metapodal plates, length 8 – 11, width 25 – 32. Longer setae smooth, length 38 – 46, shorter setae slightly serrated, length 21 – 29. Peritremetal shields narrowly fused with exopodal plates of coxae III/IV, bearing at least 2 pairs of pores, shields anteriorly weakly reticulated, peritremes extending to level of dorsal setae z2. Exopodal plates of coxae II/III free. Spermathecal structures indiscernible.

Gnathosoma — Gnathotectum (Figure 1E) with denticulate lateral margins and tapering undivided median process. Subcapitulum 189 – 197 maximum width, with seven rows of deutosternal denticles, 15 – 25 denticles per row, subcapitular groove indistinct (Figure 1F). Hypostomal setae simple, pc length 38 – 42, hp1 32 – 36, hp2 27 – 29, hp3 36 – 40. Corniculi horn-like. Palp length 231 – 239, chaetotaxy of palps 2–5–6–14–15, setae v1 on trochanter, d1, d3, pl on femur slightly serrated, setae v2 on trochanter, al on femur, al1 on genu serrated, seta al2 on genu brush-like, palptarsal apotele 3-tined. Second chelicular segment length 155 – 166, fixed digit with 3 – 4 proximal teeth and one small pre-apical teeth, pilus dentilis short, movable digit with 4 – 5 teeth (Figure 1G).

Figure 2: Halodarcia carabidophila Evans and Fain, 1995, female: A – leg I (from coxa to tibia); B – leg II; C – leg III; D – leg IV. Scale bar 200 µm.
2/2–3); leg III: 2, 5 (1–0/1–0/2–1), 6 (1–2/1–1/0–1), 9 (2–2/1–2/1–1), 8 (2–1/1–2/1–1), 18 (3–3/3–1/1–2/2–3); leg IV: 1, 5 (1–0/1–0/2–1), 6 (1–2/1–1/0–1), 10 (2–2/1–3/1–1), 10 (2–1/1–3/1–2), 18 (3–3/3–1/1–2/2–3). Claws I–IV well developed, ambulacral stalk of legs II–IV with long acuminate paradactyli. Most setae slightly thickened and serrated. Coxae II with small anterior spine.


Gnathosoma — Most features of gnathosoma as in female. Gnathotectum (Figure 1I) with smooth lateral margins and tapering median process. Subcapitulum 189 – 197 maximum width, hypostomal setae lengths: pc 25 – 32, hp1 21 – 25, hp2 17 – 21, hp3 21 – 25. Corniculi more pointed than in female (Figure 1J). Palps length 185 – 202. Second cheliceral segment (Figures 1K-L) length 109 – 126, fixed digit with 2 – 3 tooth, pilus dentilis short, movable digit with one large tooth, spermatodactyl large and curved, longer than movable digit.


Remarks — At present, all four species of the genus Halodarcia are known from females, three species (H. carabidophila, H. incideta, H. kargi) are known from males and three species (H. carabidophila, H. incideta, H. porolata) are known from deutonymphs. The key to deutonymphs of the genus Halodarcia was presented by Evans and Fain (1995). The male of H. carabidophila and H. incideta are distinguished from male of H. kargi by the shape of the gnathotectum (in H. kargi anterior margin of gnathotectum with 3 sets of denticulate tips; in H. carabidophila and H. incideta gnathotectum with smooth lateral margins and tapering median process) and the shape of spermatodactyl (in H. kargi weakly curved, approximately equal in length to movable digit; in H. carabidophila and H. incideta spermatodactyl strongly curved, longer than movable digit). The difference between males of H. carabidophila and H. incideta is not clear.

Key to the females of Halodarcia Karg, 1969

1. Ventri-anal shield with one pair of preanal setae .................................................. 2
   — Ventri-anal shield with two pairs of preanal setae .................................................. 3

   — Sternal shield not incised. Ventri-anal shield broadly rounded anteriorly, broadest at mid-way .................................................. H. kargi Nikolsky, 1982

   — Sternal shield not divided medially. Epigynal shield not rounded posteriorly. Setae S1, S3, S4 located on dorsal shield .................................. H. incideta Karg, 1969

Halodarcia incideta Karg, 1969

Material examined — six deutonymphs from Agonum sp., Ukraine, Odessa Region, Berezovka District, vicinity of Berezovka (47°10’N, 30°56’E), floodplain forest near Tiligul River, 09 Mar. 2001, V. Trach coll.; three deutonymphs from Agonum sp.,
same locality, 13 Mar. 2001, V. Trach coll.; two deutonymphs from *Agonum* sp., same locality, 01 Apr. 2001, V. Trach coll.; three deutonymphs from *Bembidion* sp., Ukraine, Crimea, Yalta City Municipality, vicinity of Yalta (44°29′N, 34°05′E), Uchan-Su River valley, 17 Juny 2001, A. Khaustov coll.; two deutonymphs from *Bembidion tetracolum* Say, 1823, same locality, 24 Apr. 2010, A. Khaustov coll.; three deutonymphs from *Bembidion tetracolum* Say, 1823, same locality, 06 Juny 2010, A. Khaustov coll.; five deutonymphs from undetermined *Carabidae*, Ukraine, Odessa Region, Kiliya District, vicinity of Primorskoe (45°30′N, 29°38′E), meadow, 01 May 2003, V. Trach coll.; five deutonymphs from *Chlaenius* sp., Ukraine, Odessa Region, Belyaevka District, vicinity of Troitskoe (46°32′N, 30°00′E), floodplain forest near Turunchuk River, 21 Mar. 2009, V. Trach coll.

Distribution — Germany, Belgium, Latvia (Karg, 1969; Evans and Fain, 1995; Salmane, 2005).

Remarks — The species is new to the fauna of Ukraine.

**Family Ologamasidae Ryke, 1962**

**Genus Stylochirus G. and R. Canestrini 1882**

Remarks — The systematic position of the genus *Stylochirus* was analysed by Mašán and Halliday (2010). The genus *Stylochirus* includes about 15 species, distributed mainly in the Palaearctic region, three species are known in Ukraine — *Stylochirus fimetarius* Müller, 1860, *S. multiclava-tus* (Willmann, 1953), *S. physogastris* (Karg, 1971) (Bregetova, 1977b). Deutonymphs of some *Stylochirus* have been found phoretic on carabid beetles (Davydova, 1975; Bregetova, 1977b; Nikolsky, 1981; Gwiazdowicz, 2000b; Salmane and Telnov, 2009).

**Stylochirus fimetarius** Müller, 1860

Material examined — five deutonymphs from *Pterostichus melanarius* (Illiger, 1798), Ukraine, Crimea, Yalta City Municipality, vicinity of Alupka (44°27′N, 34°02′E), Ai-Petri, Crimean Mountains, 09 Sep. 2001, A. Khaustov coll.; one deutonymph from *Carabus aurontiens* Fabricius, 1792, Ukraine, Zakarpattia Region, Rahiv District, vicinity of Bilyn (48°06′N, 24°12′E), Carpathian Mountains, polonya Dumory, 19 May 2002, A. Gontarenko coll.; five deutonymphs from *Carabus gyllenhali* Fischer von Waldheim, 1827, Ukraine, Crimea, Yalta City Municipality, vicinity of Yalta (44°31′N, 34°08′E), Crimean Mountains, 27 Sep. 2005, V. Trach coll.; thirteen deutonymphs from *Carabus convexus* Fabricius, 1775, Ukraine, Odessa Region, Kodyma District, vicinity of Alexandrovka (48°00′N, 29°14′E), forest, 23 May 2009, V. Trach coll.; two deutonymphs from *Carabus cancellatus* Illiger, 1798, Ukraine, Crimea, Bakhchisaray District, vicinity of Verhnyaya Kutuzovka (44°44′N, 34°20′E), pond of Kutuzovskoe Lake, 26 May 2010, A. Khaustov coll.

Distribution — Palaearctic (Bregetova, 1977b).

Remarks — Mites of *S. fimetarius* were found on the ventral or dorsal side of beetles and under the elytra.

**Family Ascidae Voigts et Oudemans, 1905**

**Genus Antennoseius Berlese, 1916**

**Antennoseius (s. str.) bullitus** Karg, 1969

Material examined — four females from *Pterostichus* sp., Ukraine, Kirovograd Region, Znamekna District, vicinity of Bogdanovka (48°45′N, 32°32′E), forest, 29 Apr. 2001, V. Trach coll.; one female from litter, Ukraine, Odessa Region, Odessa City, (46°33′N, 30°45′E), park, 01 Mar. 2008, V. Trach coll.; thirteen females from undetermined Carabidae, Ukraine, Crimea, Yalta City Municipality, vicinity of Yalta (44°31′N, 34°07′E), Crimean Mountains, 23 Aug. 2008, A. Khaustov coll.


Remarks — *A. bullitus* is known from soil-litter habitats and carabid beetles (Haitlinger, 1988; Karg, 1993; Trach, 2013).

**Antennoseius (s. str.) calathi** Fain, Noti and Dufrêne, 1995

Material examined — two females from *Chlaenius* sp., Ukraine, Odessa Region, Belyaevka District, vicinity of Belyaevka (46°25′N, 30°10′E), flooplain forest near Dniester River, 24 Juny 2008, V. Trach coll.; three females from *Agonum* sp., same data; sixteen females from *Agonum* sp., Ukraine, Odessa Region, Belyaevka District, vicinity of Troitskoe (46°32′N, 30°00′E), flooplain forest near Turunchuk River, 21 Mar. 2009, V. Trach coll.

Distribution — Belgium (Fain et al., 1995).

Remarks — The species was previously known only from the type series from Belgium, which were described from carabids. *A. calathi* is new to the fauna of Ukraine.

**Antennoseius (s. str.) dungeri** Karg, 1965

Material examined — thirty-seven females from *Harpalus* spp. and *Amara* spp., Ukraine, Odessa Region, Kiliya District, Zmeinyiy Island (45°15′N, 30°12′E), 29 July 2005, V. Trach coll.; two females from *Zabrus tenebrioides* Goeze, 1777, Ukraine, Odessa Region, Ovidiopol District, vicinity of Karolino-Bugaz (46°09′N, 30°33′E), 25 May 2007, V. Trach coll.; three females from *Harpalus* sp., Ukraine, Odessa Region, Odessa City (46°26′N, 30°40′E), park, Mar. 2009, V. Trach coll.; one female from *Amara* sp., Ukraine, Odessa Region, Ovidiopol District, vicinity of Roxolany (46°09′N, 30°33′E), steppe, 05 May 2009, V. Trach coll.; two females from undetermined Carabidae, Ukraine, Odessa Region, Belgorod-Dnestrovsk District, vicinity of Zatoka (46°01′N, 30°24′E), Black Sea Coast, 25 Apr. 2011, V. Trach coll.; three females from *Zabrus tenebrioides* Goeze, 1777, Ukraine, Odessa Region, Odessa City (46°27′N, 30°45′E), 10 Juny 2014, V. Trach coll.

Distribution — Europe, Ukraine (Zakarpattia Region), Western Middle-East and Iran (Costa 1969; Bregetova, 1977c; Karg, 1993; Fain et al., 1995).
Trach V.A.


Remarks — The species is known from soil-litter habitats and carabid beetles.

**Antennoseius (s. str.) ponticus**
Tratsch and Makarova, 2008

Material examined — fifteen females from *Harpalus* sp., Ukraine, Kherson Region, Tsyurupinsk District, vicinity of Radensk (46°33'N, 32°57'E), sandy steppe, 14 May 2001, A. Khaustov coll.; six females from undetermined Carabidae, Ukraine, Crimea, Yalta City Municipality, vicinity of Yalta (44°31'N, 34°07'E), Crimean Mountains, 23 Aug. 2008, A. Khaustov coll.; four females from *Harpalus* sp., Ukraine, Kherson Region, Tsyurupinsk District, vicinity of Radensk (46°33'N, 32°57'E), sandy steppe, 05 – 06 Juny 2010, V. Trach coll.; three females on *Calathus* sp., same data; one female on *Daptus* sp., same data; two females from *Harpalus* sp., Ukraine, Crimea, Chernomorskoe District, vicinity of Olenevka (45°22'N, 32°30'E), steppe, 01 May 2013, V. Trach coll.; three females on *Amara* sp., Ukraine, Vinnitsia Region, Haisyn District, vicinity of Gubnyk (48°34'N, 29°20'E), agrocenosis, 19 Juny 2016, V. Trach coll.; three females from *Calathus* sp., same data; two females from *Harpalus* sp., and *Calathus* sp., same locality, pine forest, 20 Juny 2016, V. Trach coll.

Distribution — Ukraine (Crimea, Odessa and Zakarpattia Regions) (Eidelberg, 1990).

Remarks — The species is known only from carabid beetles.

**Antennoseius (s. str.) pseudospinosus**
Eidelberg, 1990

Material examined — five females from *Badister* sp., Ukraine, Odessa Region, Berezovka District, vicinity of Berezovka (47°10'N, 30°56'E), flooplain forest near Tiligul River, 26 Mar. 2000, V. Trach coll.; three females from *Agonum* sp., same locality, 09 Mar. 2001, V. Trach coll.; two females from *Pterostichus* sp., same locality, 01 Apr. 2001, V. Trach coll.; nine females from *Agonum* sp., same locality, 16 Apr. 2002, V. Trach coll.; five females from *Chlaenius* sp., Ukraine, Odessa Region, Belayaevka District, vicinity of Belyaevka (46°25'N, 30°10'E), flooplain forest near Dniester River, 24 Juny 2008, V. Trach coll.; eighteen females from *Agonum* sp., same data; one female from *Agonum* sp., Ukraine, Odessa Region, Belayaevka District, vicinity of Troitskoe (46°32'N, 30°00'E), flooplain forest near Turunchuk River, 21 Mar. 2009, V. Trach coll.; twelve females from undetermined Carabidae, Ukraine, Crimea, Bahchisaray District, vicinity of Verhnyaya Kutuzovka (44°44'N, 34°20'E), pond of Kutuzovskoe Lake, 26 May 2010, A. Khaustov coll.; one female from *Bembidion* sp., Ukraine, Crimea, Simferopol District, vicinity of Lozovoe (44°54'N, 34°10'E), Salgir River valley, 01 May 2013, V. Trach coll.

Distribution — Ukraine (Crimea, Odessa and Lugansk Regions) (Trach and Makarova, 2008; Trach, 2013).

Remarks — The species is known from carabid beetles and, putatively accidental, from leaf beetle *Chrysolina gypsophila* (Küster, 1845) and soil-litter habitats.

**Antennoseius (Vitzthumia) multisetus**
Eidelberg, 2000

Material examined — two females from *Calathus fuscipes* (Goeze, 1777), Ukraine, Crimea, Yalta City Municipality, vicinity of Nikita (44°30'N, 34°14'E), 17 Oct. 2010, A. Khaustov coll.

Distribution — Ukraine (Crimea), Iran (Eidelberg, 1989; Sklyar, 1994; Kazemi and Moraza, 2013).

Remarks — The species is known only from carabid beetles.

Distribution — Ukraine (Crimea), Moldova, Russia (Eidelberg, 2000).

Remarks — The species is known only from carabid beetles.

Genus Anystipalpus Berlese, 1911

Remarks — The genus Anystipalpus includes five species. Currently, three species are known in Ukraine — Anystipalpus livshitsi (Eidelberg, 1989), A. percicola Berlese, 1911, A. stepposus Trach, 2012 (Eidelberg, 1989; Trach, 2012a, 2013). Mites of this genus reported only from carabid beetles and labidurid earwigs (Lindquist and Moraza, 2009).

Anystipalpus labiduricola
Lindquist and Moraza, 2009

Material examined — four females from Harpalus dispar splendens (Gebler, 1829), Ukraine, Odessa Region, Kominternovo District, vicinity of Korsunci (46°35′N, 30°44′E), salt-marsh on the coast of Kuyalnik Estuary, 15 Mar. 2014, V. Trach coll.

Distribution — Iran (Lindquist and Moraza, 2009).

Remarks — A. labiduricola was previously known only from the type series, which was described from labidurid earwigs. The species is new to the fauna of Europe and Ukraine.

Anystipalpus livshitsi (Eidelberg, 1989)

Material examined — two females from Harpalus sp., Ukraine, Odessa Region, Berezovka District, vicinity of Berezovka (47°11′N, 30°54′E), steppe, 11 May 2000, V. Trach coll.; five females from Brachynus sp., same locality, 30 Mar. 2001, V. Trach coll.; three females from Poecilus sp., Ukraine, Odessa Region, Razdelnaya District, vicinity of Maloe (46°44′N, 30°28′E), steppe, 08 Apr. 2001, V. Trach coll.; eight females from Amara sp., Ukraine, Kirovograd Region, Znamenka District, vicinity of Bogdanovka (48°45′N, 32°32′E), 29 Apr. – 06 May 2001, V. Trach coll.; seven females from Harpalus sp., Ukraine, Nikolaev Region, Elanets District, vicinity of Novoalexandrovka (47°34′N, 32°00′E), steppe, 07 Apr. 2002, V. Trach coll.; one female from Calosoma auropunctatum Herbst, 1784, Ukraine, Kherson Region, Chaplynka District, vicinity of Askania-Nova (46°27′N, 33°52′E), 04 – 15 July 2002, V. Trach coll.; eight females from Harpalus sp., Ukraine, Odessa Region, Kiliya District, Zmeinyiy Island (45°15′N, 30°12′E), 29 July 2005, V. Trach coll.; five females from Amara sp., same data; 9 females from Harpalus distinguendus (Duftschmid, 1812), Ukraine, Odessa Region, Razdelnaya District, vicinity of Kirovo (46°43′N, 30°15′E), field, 11 Aug. 2007, V. Trach coll.; one female from Calathus halensis (Schaller, 1783), same data; three females, from Harpalus rufipes (De Geer, 1774), same locality, 11 May 2008, V. Trach coll.; one female from Cymindis sp., Ukraine, Odessa Region, Kodyma District, vicinity of Alexandrovka (48°00′N, 29°16′E), steppe, 15 May 2010, V. Trach coll.; one female from Harpalus distinguendus (Duftschmid, 1812), Ukraine, Odessa Region, Odessa City (46°26′N, 30°46′E), park, 24 Mar. 2010, V. Trach coll.; one female from Calathus sp., Ukraine, Kherson Region, Kalanchak District, vicinity of Chervony Chaban (46°10′N, 33°34′E), steppe, 02 – 05 May 2011, V. Trach coll.; one female from Brachynus sp., same data; twenty-eight females from Brachynus sp., Ukraine, Nikolaev Region, Berezovka District, vicinity of Novofedorovka (46°46′N, 31°19′E), field, 16 July 2014, V. Trach coll.; two females from Calathus distinguendus Chaudoir, 1846, Ukraine, Odessa Region, Kominternovskoe District, vicinity of Lubopol (46°41′N, 31°08′E), steppe, 31 May 2015, O. Deli coll.; one female from Zabrus tenebrioides Goeze, 1777, same data.

Distribution — Ukraine (Crimea, Donetsk, Lugansk and Poltava Regions), Moldova, Kazakhstan, Iran (Eidelberg, 1989; Sklyar, 1994; Lindquist and Moraza, 2009; Trach, 2013).

Remarks — The species is known only from carabid beetles.
Anystipalpus percicola Berlese, 1911

Material examined — one female from Licinus cassideus (Fabricius, 1792), Ukraine, Crimea, Yalta City Municipality, vicinity of Nikita (44°30'N, 34°14'E), 17 Oct. 2010, A. Khaustov coll.

Distribution — Italy, Ukraine (Crimea), Iran (Berlese, 1911; Eidelberg, 1989; Lindquist and Moraza, 2009).

Remarks — The species is known only from carabid beetles.

Anystipalpus stepposus Trach, 2012

Material examined — one female from Calathus fuscipes (Goeze, 1777), Ukraine, Crimea, Yalta City Municipality, vicinity of Nikita (44°30'N, 34°14'E), 17 Oct. 2010, A. Khaustov coll.; two females from Licinus cassideus (Fabricius, 1792), same data; one female from Zabrus tenebrioides Goeze, 1777, Ukraine, Odessa Region, Bolgrad District, vicinity of Gorodnee (45°53'N, 28°51'E), wheat field, 24 June 2016, L. Nedelcheva coll.


Remarks — The species was previously known only from soil-litter habitats.

Gaeolaelaps similisetae (Karg, 1965)

Material examined — fourteen females from Bembidion sp., Ukraine, Crimea, Simferopol District, vicinity of Lozovoe (44°54'N, 34°10'E), Salgir River valley, 01 May 2013, V. Trach coll.


Remarks — The species was previously known only from soil-litter habitats. G. similisetae is new to the fauna of Ukraine.

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REFERENCES


Family Laelapidae Berlese, 1892

Genus Gaeolaelaps Evans and Till, 1966

Remarks — The genus Gaeolaelaps Evans et Till, 1966 includes over 100 described species. Most species were described from soil and litter, but some species were collected from nests of vertebrates and from arthropods (or their nests), including mygalomorph spiders, millipedes, cockroaches, termites, carabid, passalid, cerambycid, scarabaeid beetles and ants (Bregetova, 1977d; Karg, 1993; Beaulieu, 2009; Trach, 2012b, 2016; Kazemi et al., 2014). Only four species of Gaeolaelaps were previously encountered in Europe on carabids — G. nolli (Karg, 1962) on Agonum fuliginosum (Panzer, 1809) in Belgium, G. aculeifer (Canestrini, 1884) on Carabus intricatus Linnaeus, 1681 in Poland, G. carabidophilus Trach, 2012 on Stenolophus mixtus (Herbst, 1784) and G. khaustovi Trach, 2016 on Bembidion sp. in Ukraine (Fain et al., 1995; Haitlinger, 2008; Trach, 2012b, 2016).

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