



## Rare species of Carabidae and Cicindelidae in Dnipropetrovsk Region, Ukraine

A. V. Putchkov\*, V. V. Brygadyrenko\*\* \* \*\*

\*I. I. Schmalhausen Institute of Zoology of National Academy of Sciences of Ukraine, Kyiv, Ukraine

\*\*Oles Honchar Dnipro National University, Dnipro, Ukraine

\*\*\*Dnipro State Agrarian and Economic University, Dnipro, Ukraine

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I. I. Schmalhausen Institute  
of Zoology of National  
Academy of Sciences  
of Ukraine, B. Khmelnytskoho  
st., 15, Kyiv, 01030, Ukraine.

Oles Honchar Dnipro  
National University,  
Gagarin ave., 72,  
Dnipro, 49010, Ukraine.  
Tel.: +38-050-93-90-788.  
E-mail: brigad@ua.fm

Dnipro State Agrarian  
and Economic University,  
Serhii Efremov st., 25,  
Dnipro, 49600, Ukraine.  
Tel.: +38-050-93-90-788.  
E-mail: brigad@ua.fm

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Dnipropetrovsk Region is situated in the steppe zone of Ukraine, in conditions of insufficient moisture. Forest vegetation covers only 5.1% of the region. Over 80% of the region's area is used for agricultural purposes. A total of 281 species of ground beetles is known for the region, of which this article gives the data on biology and distribution of 82 species that need protection: *Cephalota atrata*, *C. besseri*, *C. elegans*, *Cicindela maritima*, *C. soluta*, *Cylindera arenaria*, *Leistus terminatus*, *Notiophilus rufipes*, *Calosoma sycophanta*, *C. denticolle*, *C. investigator*, *Carabus stscheglowi*, *C. clathratus*, *C. excellens*, *C. hungaricus*, *C. besseri*, *C. estreicheri*, *C. sibiricus*, *Blethisa multipunctata*, *Elaphrus uliginosus*, *Scarites terricola*, *Dyschirius chaldeus*, *Dyschirius obscurus*, *Blemus discus*, *Epaphius secalis*, *Bembidion ephippium*, *B. aspericolle*, *Pogonus cumanus*, *Pogonistes convexicollis*, *Patrobis atrofufus*, *Stomis pumicatus*, *Pedius inquinatus*, *Pterostichus chamaeleon*, *P. elongatus*, *P. macer*, *P. melas*, *Taphoxenus gigas*, *Laemostenus terricola*, *Agonum impressum*, *A. marginatum*, *A. monachum*, *A. sexpunctatum*, *A. viridicupreum*, *Olisthopus sturmii*, *Synuchus vivalis*, *Amara chaudiroi*, *A. crenata*, *A. equestris*, *A. fulva*, *A. sabulosa*, *Curtonotus convexiusculus*, *Anisodastylus poeciloides*, *Diachromus germanus*, *Acupalpus interstitialis*, *A. suturalis*, *Stenolophus discophorus*, *Daptus vittatus*, *Harpalus cephalotes*, *H. dispar*, *H. hirtipes*, *H. laeviceps*, *H. luteicornis*, *H. melan-cholicus*, *H. steveni*, *H. subcylindricus*, *Microderes brachypus*, *Ophonus diffinis*, *Dixus eremita*, *Panagaeus bipustulatus*, *Callistus lunatus*, *Dinodes decipiens*, *Chlaenius alutaceus*, *Ch. festivus*, *Licinus cassideus*, *Badister dorsiger*, *Masoreus wetterhalli*, *Lebia humeralis*, *Demetrias imperialis*, *Cymindis axillaris*, *Polystichus connexus*, *Brachinus ejaculans*, *B. hamatus*, *Mastax thermarum*. To formalize the data on each species, the article provides characteristics of its ecological niche: thermal preferendum, hygro-preferendum, biotopical characteristic, biogeohorizon, trophic preferences, practical significance and protection measures. The main factors of decline in diversity of the fauna of ground beetles in Dnipropetrovsk Region are arable farming, chemical treatment of agricultural land, unregulated cattle grazing, recreational loading, large scale construction in floodplain areas.

**Keywords:** protection of rare species; Red Book; rare insects; beetle fauna; ecological niche; zoophages; steppe zone; protected territories; zoophages; antropogenic impact.

### Introduction

A large number of beetle species belongs to the Caraboidea superfamily, Adephaga suborder, which – within the Palearctics – includes four families: Trachypachidae C. Thomson, 1857, Rhysodidae Erichson, 1848, Cicindelidae Latreille, 1802 and Carabidae Latreille, 1806, of which three have been recorded in Ukraine. At the same time, it has to be noted that there are currently various opinions on the systematics of Caraboidea beetles. A number of systematists (Ganglbauer, 1892; Crowson, 1955; Kryzhanovskij, 1983; Kryzhanovskij et al., 1995; Ball & Bousquet, 2001; Beutel et al., 2007) consider Cicindelinae a subfamily (Cicindelinae) of the Carabidae family, others regard it as a separate family (Jacobson, 1905; Mandl, 1971; Cassola, 2001). Modern studies, carried out based on molecular analysis, integrated comparative study of morphology, ecology, distribution of larvae and imagoes of carabid beetles fully confirm the status of Cicindelinae as a separate family of coleopterans (Putchkov & Cassola, 2005; Bocak et al., 2014; Assmann et al., 2017; López-López & Vogler, 2017).

This paper focuses on the two largest families – Carabidae and Cicindelidae. Not only are they the largest families within the Adephaga suborder, but also some of the taxonomically richest in the entire Coleoptera order. For the fauna of Ukraine, 754 species of ground beetles, belonging to 127 genera, have been recorded (Putchkov, 1998, 2011, 2012a, 2018). Currently, 281 species of carabids have been recorded in Dnipropetrovsk Region (Brygadyrenko, 2003b). In this paper, we present generalized data about the distribution, biology and ecology of ground beetles. We provide

brief descriptions of 82 species of 46 genera of two families (Carabidae – 76 and Cicindelidae – 6), including five species listed in the Red Book of Ukraine, 47 in the Red Book of Dnipropetrovsk Region, while the rest are rare taxa for the region. At the same time, data for all species included in the Red Book and a number of other species (*Leistus terminatus*, *Blethisa multipunctata*, *Elaphrus uliginosus*, *Blemus discus*, *Epaphius secalis*, *Bembidion aspericolle*, *Pterostichus elongatus*, *Olisthopus sturmii*, *Harpalus laeviceps*, *Masoreus wetterhalli*), some data on their discovery are given for the first time or have been significantly expanded. Most of the information has not been provided for the northern subzone of the steppe zone or its Left-Bank or Right-Bank parts in the recent faunistic lists of Carabidae in Ukraine (Putchkov, 2012a, 2018).

Part of the results of our studies of the fauna of ground beetles of Dnipropetrovsk Region was earlier published in a popular edition for school students (Putchkov & Brygadyrenko, 2018), but during the last five years following that publication, a great deal of information about this fauna has been detailed, elaborated and generalized. In general, the manuscript of this article has been prepared earlier, but because our first co-author tragically died of COVID in 2020, it was not published at the time intended. In 2020, and then in 2021, the Dnipropetrovsk Region Council planned a publication of a new Edition of the Red Book of Dnipropetrovsk Region, and many reports were given by the media, preparation stages of the manuscript's edition started, the list of species was updated, and their populations were inventory-checked. However, this attempt failed again, this time because of lack of funds in the Region budget: nature protection was not a priority to the Region's authorities. In 2022, the

publication of the Regional Red Book is hardly possible due to the war. To preserve the scientific data on the contemporary condition of Carabidae fauna, we think it is expedient to publish the currently available data regarding the locations of the populations of rare Carabidae in Dnipropetrovsk Region.

### Ecological situation in Dnipropetrovsk Region

Dnipropetrovsk Region is one of the most diverse regions of Ukraine in terms of both plants and animals. In the region, around 60% of species of the fauna and 40% of the flora of Ukraine has been recorded. The high density of the population, presence of industrial, agricultural complexes and military objects, and also their unification into a single system of the transport network have significantly altered the living locations of the wildlife and the fauna of Prydniprovya, causing fragmentation of populations of many species of living organisms (Pakhomov & Brygadyrenko, 2005).

The territory accounts for 31.92 thou km<sup>2</sup>, which is 5.29% of the territory of Ukraine. Dnipropetrovsk Region is one of the key industrial regions of Ukraine (Umerova, 2020). In 2018, Dnipropetrovsk Region produced: 11% of the Ukraine's GDP; 19% of the overall goods sold by Ukraine; 15% of the overall export of goods; 65% of iron ore and concentrates; 45% of steel; over 64% of pipes.

The Region is situated in the steppe zone of Ukraine, in conditions of insufficient moisture (Belgard, 1950, 1971). Forest vegetation covers only 5.1% of the Region (Lovynska et al., 2021). Over 80% of the Region's area are agricultural lands (around 2,600 thou ha) (Bondarenko & Nazarenko, 2020; Tsyliuryk et al., 2021). In the Region, there are almost 1.5 thou water bodies and ponds, accounting for the area of 26 thou ha. There are 144 small and average-sized rivers running across Dnipropetrovsk Region, the largest of them being the Samara, Vovcha, Inhulets, Saksahan, Bazavluk, Suha and Mokra Sura and Kilchen. The surface waters of the region are characterized by negative water balance, significant anthropogenic transformation, relatively low development of the hydrographic network. In the territory of the Region, three large Dnipro water reservoirs are located (Kahovske, Zaporizke and Dniprodzerzhynske) and 10 small reservoirs. The Region is subject to landslides and erosive processes, waterlogging of the territory, subsidence above abandoned mines, intensity of which depends on a complex impact of natural and technogenic factors (Kharytonov et al., 2021). Dnipropetrovsk Region concentrates almost 9.5 B T of industrial wastes. Annually, 0.3 B T are formed, and their recycling and utilization equals about 33% of the annual formation, the other 0.2 B T continue to fill storage sites and landfills. The amount of wastes is increasing annually.

According to the data of the Region Ecology Service, the work of enterprises of the mining-metallurgic complex results in significant pollution of the atmospheric air, danger of landslides, flooding of settlements and agricultural lands. A negative impact on nature is caused by massive deposits from quarries and sludge accumulators. The four largest sludge accumulators have created a zone of ecological danger for the city of Kryvy Rih, and one of them – for most of the rural territory of former Shyroke District. Technogenic pressure is caused by giant tailing dams and sludge collectors in Zhovti Vody and towns of the western Donbass, and also thermal power plants, quarries in the towns Marhanets, Pokrov (former Ordzhonikidze), Vilnohirs, sinkhole collapses under the mines of the western Donbas and Kryvbas, dozens of retention basins and collectors of toxic wastes. The main environmental polluters are still the enterprises of the processing, mining industries, producers of electric energy, gas, and water. The most ecologically harmful types of economic activities are mining metal ores, generation of electricity, cast iron, steel, and ferroalloys. There are 36.8 thou ha of disturbed land in Dnipropetrovsk Region, including 5.8 thou ha of land which is exhausted and in the need of recultivation.

Almost the entire territory of interfluvies (except slopes of valleys and ravines) has been tilled and is represented by agrocenoses with a system of field-protecting windbreaks. Typical forbes have been preserved only on slopes of ravines, narrow strips of forest, where soils have poor potential for arable farming. Natural forest ecosystems of Dnipropetrovsk Region are in critical condition. A decline in their biodiversity has been

observed. Cultivated ecosystems that exist in the conditions of ecological incompatibility of forests to the conditions of the steppe zone have lower capability to self-regulate and require greater attention during monitoring.

The network of the nature reserve fund of the Region is only 75 thou ha, or 2.35% of the area of the Region, which is extremely low (Masiuk et al., 2021).

Everything aforesaid has led to most formerly common species of plants and animals becoming rare or endangered and now included in the Red Book of Ukraine and the Red Book of Dnipropetrovsk Region. The greatest threat for the biodiversity in the Region is posed by destruction of certain types of landscapes (virgin steppe areas, bairak forests, meadow ecosystems); invasion of the natural ecosystems by alien and genetically-modified organisms; urbanization, uncontrolled use of land resources; industrial impact (mining fossil fuels, impact of energetics, transport, and other kinds of industrial activity); agricultural impact (plant agriculture, livestock farming); impact of forestry and hunting; impact of water economics (Kunakh et al., 2020; Fedyushko & Babchenko, 2021; Tkalic et al., 2021; Yorkina et al., 2021).

The main factors of decrease in biological diversity in the Prydniprovya region are recreational loading; unregulated cattle grazing; massive construction in floodplain areas; chemical treatment of agricultural lands; arable farming; invasion by alien species of plants and animals; use of genetically modified organisms (Yorkina & Budakova, 2020; Kunakh et al., 2021; Shupranova et al., 2021).

### Ecological characteristics of ground beetle species

To formalize the data on each species, we determined its ecological niche (Belgard, 1971; Akimov, 1955; Biallovich, 1960; Emelianov, 1999):

- thermo-preferendum – preference of and distribution in certain temperature conditions of biotope: oligothermophile, mesothermophile or megathermophile;
- hygro-preferendum – preference of particular conditions of moisture: hygrophile, mesohygrophile, hygromesophile, mesophile, xeromesophile, mesoxerophile or xerophile;
- biotopic characteristic – distribution in certain biocenoses: wetlands, meadows, forests, steppe, psamphilous (sandy), floodplain, halophilous (solonchak) species or mixed elements of those groups (forest-wetland, meadow-steppe, forest-meadow, etc.);
- biohorizon – layer of vertical structure of biogeocenosis in which most of the time certain stages of the organism live: geobiont (soil organism), herpetobiont, or stratobiont (litter), hortobiont (inhabitant of grass stand) or dendrobiont (inhabitant of tree crowns), botrobiont (inhabitant of rodents' burrows);
- trophic characteristic – obligate or facultative zoophage, zoophytophage, phytophage, microphage (when nutrition of species is not known completely), phytophage.

Classification of superfamily within tribes and genera is given according to the Catalogue of Ground Beetles of the Palearctics (I. Löbl & D. Löbl, 2003, 2017) with some changes in the status of some species (for example, *Epaphius*, *Curtonotus*, *Dinodes*), based on other studies (Kryzhanovskij, 1983; Kryzanovskij et al., 1995), which are consistent with our opinion.

### Data on the fauna of ground beetles of Dnipropetrovsk Region

The most complete studies for Ukraine are the those mentioned above by Kryzhanovskij (1965) and Putschkov (2018). However, a number of other studies (with various degree of completeness) also contain useful data for identifying species of some genera or tribes – Bembidiini, Trechini (Pawlowski, 1974, 1975; Putschkov & Rizun, 2015), Dyschiriini (Fedorenko, 1996), Nebriini, Chlaeniini, Liciniini (Putschkov, 2013a, 2013d, 2013e), subtribe Tachyina (Kryzhanovskij, 1970), genera *Amara*, *Carabus*, *Cymindis* (Putschkov, 2008, 2012b, 2013c) and a short identification guide of ground beetles of fruit plants of Ukraine (Petrusenko et al., 1999). Some data on identification of ground beetles of the steppe zone are presented in other works (Kryzhanovskij, 1962; Mikhailov, 1976; Griuntal, 1984a, 1984b; Kataev, 1984, 1987; Komarov, 1987, 1991; Fedorenko, 1992, 1993a, 1993b, 1994a, 1994b, 1994c, 1995, 1997; Matalin, 1996,

1997a, 1997b; Berlov & Tilli, 1998). Due to the global climate changes, in the territory of Ukraine, there atypical species are now being recorded. We used identification guides of ground beetles for other countries of Europe (Netolitzky, 1942, 1943; Lindroth, 1949, 1974, 1985, 1986, 2009; Panin, 1952, 1955; Pawlowski, 1974, 1975; Húrka, 1996; Freude et al., 2004; Arndt et al., 2011). Identification of ground beetles is often comparatively easy because of reasonably complete check-lists and catalogues of ground beetles (Kryzhanovskij et al., 1995; I. Löbl & D. Löbl, 2003, 2017).

We conducted our reasearch according to the species compositions of ground beetles, found by other scientists in Ukraine or neighboring countries (Ilin, 1925; Alejnikova, 1964; A. A. Petrusenko & S. V. Petrusenko, 1968, 1970a, 1970b, 1971, 1973; A. A. Petrusenko, 1971; Malcev et al., 1971; Arnoldi et al., 1972; Mordkovich, 1977; Karpova & Matalin, 1991, 1993; Nekuliseanu, 1991; Vakarenko & Khomenko, 1994; Bulokhova, 1995; Nadvornyj, 1996; Nekuliseanu & Matalin, 2000; Putchkov, 2018). Since around 90% of the territory of Dnipropetrovsk Region is occupied by agrocenoses and steppe areas, we recommend focusing on the zonal fauna of ground beetles, which has been studied quite well, but the distribution of some rare species requires a more thorough study. General patterns of the distribution of ground beetles in agrocenoses, pastures, windbreaks and other transformed biocenoses have been analyzed quite broadly starting from the second half of the 20th century (Larsson, 1939; Medvedev, 1950; Medvedev et al., 1951; Arnoldi, 1952, 1953, 1956; Giliarov, 1953, 1965; Sharova, 1958, 1964, 1971, 1981; Bey-Bienko, 1961, 1962; Sturani, 1962; Giliarov & Sharova, 1964; Naydenov, 1965; Titova & Zhavoronkova, 1965; Erwin, 1967, 1969; Tishler, 1971; Kúrka, 1972; Petrusenko, 1973; Mishenko, 1974; Pavlova, 1974, 1979; Iablukov-Khnzorian, 1976; Malausa, 1977; Thiele, 1977; Khotko, 1978; Sigida, 1979, 1993; Sharova & Dushenkov, 1979; Brandmayer et al., 1980; Hengeveld, 1980; Griuntal, 1981; Putchkov & Gnatush, 1981; Klausnitzer, 1983, 1990; Eidelberg, 1984; Sharova & Makarov, 1984; Sustek, 1987, 2012; Putchkov, 1988a, 1988b, 1989, 1990a, 1990b, 2011, 2012a, 2017;

Griuntal & Sergeeva, 1989; Putchkov & Plastun, 1989; Hurka & Jedlickova, 1990; Sergeeva & Griuntal, 1990; Arndt, 1991; Balkenhol et al., 1991; Makarov, 1992, 1994, 2005; Matalin, 1992, 1997b, 2007; Karpova & Matalin, 1993; Kolesnikov & Sumarokov, 1993; Khomenko & Vakarenko, 1993; Luff, 1993, 1998; Soboleva-Dokuchaeva, 1995; Putchkov & Aleksandrowicz, 1997; Lobko, 1998; Turin, 2000; Zherebcov, 2000; Rizun & Khrapov, 2001; Eyre & Luff, 2004; Arndt & Makarov, 2003; Matalin, 2003, 2007; Magura et al., 2004, 2008; Brygadyrenko, 2005a, 2005b, 2014, 2015c, 2015d, 2015e, 2016a, 2016b, 2016c; Ryzhaia, 2005; Sklodowski, 2006; Penev et al., 2007; Komarov & Brygadyrenko, 2008; Putchkov et al., 2008, 2017b; Niemelä & Kotze, 2009; Putchkov & Gavriluk, 2010, 2011; Zamotajlov & Nikitsky, 2010; Kirichenko & Danylik, 2011; Tamutis et al., 2011; Faly & Brygadyrenko, 2014, 2018; Halinowski & Krytskaya, 2014; Korolev & Brygadyrenko, 2014; Brygadyrenko & Korolev, 2015; Brygadyrenko & Reshetniak, 2014a, 2014b, 2016; Putchkov et al., 2016; Rizun & Diedus, 2016; Reshetniak et al., 2017; Ruchin et al., 2017, 2019, 2021a, 2021b; Nikolenko, 2018; Kirichenko-Babko et al., 2019; Komlyk & Brygadyrenko, 2019b, 2020; Langraf et al., 2018, 2019, 2020a, 2020b, 2021a, 2021b; Zamotajlov et al., 2019; Putchkov & Aleksandrowicz, 2020; Ruchin & Egorov, 2021; Parkhomenko et al., 2022). In the conditions of climate change (Buchinskiy, 1963) and changes in vegetation (Baranovski et al., 2016), there can also occur changes in species compositions of carabidofauna, which could be an object of interesting studies (Aleksandrowicz, 2011; Avtaeva et al., 2020, 2021; Brygadyrenko et al., 2021; Makaida et al., 2021).

### Protection of ground beetles

The main measures for the protection of ground beetles must be oriented at protection of the endangered biotopes in which certain species are found. Earlier (1994), three species of ground beetles were listed in the Red Book of Ukraine, providing the data on their distribution and measures for their protection (Table 1).

**Table 1**  
Protection categories of rare species of ground beetles in Dnipropetrovsk Region

Species	Red Book of Ukraine (Shcherbak, 1994)	Red Book of Ukraine (Akimov, 2009)	Red Book of Ukraine 2023 (project)*	Red Book of Dnipropetrovsk Region (Pakhomov et al., 2011)	New Edition of Red Book of Dnipropetrovsk Region (project)**
<i>Cephalota atrata</i> (Pallas, 1776)	–	–	rare	vulnerable	vulnerable
<i>C. besseri</i> (Dejean, 1826)	–	rare	rare	vulnerable	vulnerable
<i>C. elegans</i> (Fischer von Waldheim, 1824)	–	–	–	vulnerable	vulnerable
<i>Cicindela maritima</i> Dejean, 1822	–	–	–	–	rare
<i>C. soluta</i> Latreille & Dejean, 1822	–	–	–	rare	rare
<i>Cylindera arenaria</i> (Füessly, 1775)	–	–	–	rare	rare
<i>Leistus terminatus</i> (Panzer, 1793)	–	–	–	vulnerable	vulnerable
<i>Notiophilus rufipes</i> Curtis, 1829	–	–	–	–	rare
<i>Calosoma sycophanta</i> (Linnaeus, 1758)	vulnerable	vulnerable	vulnerable	endangered	endangered
<i>C. denticolle</i> Gebler, 1833	–	–	–	–	rare
<i>C. investigator</i> (Illiger, 1798)	–	–	–	vulnerable	vulnerable
<i>Carabus stscheglowi</i> Mannerheim, 1827	–	rare	rare	rare	vulnerable
<i>C. clathratus</i> Linnaeus, 1761	–	–	–	vulnerable	vulnerable
<i>C. excellens</i> Fabricius, 1798	–	–	–	vulnerable	vulnerable
<i>C. hungaricus</i> Fabricius, 1792	vulnerable	vulnerable	vulnerable	vulnerable	vulnerable
<i>C. besseri</i> Fischer von Waldheim, 1820	–	–	–	vulnerable	vulnerable
<i>C. estreicherii</i> Fischer von Waldheim, 1822	–	vulnerable	vulnerable	vulnerable	vulnerable
<i>C. sibiricus</i> Fischer von Waldheim, 1820	–	–	–	vulnerable	vulnerable
<i>Blethisa multipunctata</i> (Linnaeus, 1758)	–	–	–	rare	rare
<i>Elaphrus uliginosus</i> Fabricius, 1775	–	–	–	–	rare
<i>Scarites terricola</i> Bonelli, 1813	–	–	–	–	rare
<i>Dyschirius chalceus</i> (Erichson, 1837)	–	–	–	–	vulnerable
<i>D. obscurus</i> (Gyllenhal, 1827)	–	–	–	–	rare
<i>Blemus discus</i> (Fabricius, 1792)	–	–	–	vulnerable	vulnerable
<i>Epaphius secalis</i> (Paykull, 1790)	–	–	–	–	rare
<i>Bembidion ephippium</i> (Marsham, 1802)	–	–	–	vulnerable	vulnerable
<i>B. aspericolle</i> (Germar, 1872)	–	–	–	vulnerable	vulnerable
<i>Pogonus cumanus</i> Lutschnik, 1916	–	–	–	vulnerable	vulnerable
<i>Pogonistes convexicollis</i> Chaudoir, 1871	–	–	–	rare	rare
<i>Patrobus atrofufus</i> (Ström, 1768)	–	–	–	rare	rare
<i>Stomis pumicatus</i> (Panzer, 1796)	–	–	–	–	rare
<i>Pedius inquinatus</i> (Sturm, 1824)	–	–	–	–	vulnerable
<i>Pterostichus chamaeleon</i> Motschulsky, 1866	–	–	–	–	rare
<i>P. elongatus</i> (Duftschmid, 1812)	–	–	–	–	rare

Species	Red Book of Ukraine (Shcherbak, 1994)	Red Book of Ukraine (Akimov, 2009)	Red Book of Ukraine 2023 (project)*	Red Book of Dnipropetrovsk Region (Pakhomov et al., 2011)	New Edition of Red Book of Dnipropetrovsk Region (project)**
<i>P. macer</i> (Marshall, 1802)	–	–	–	rare	rare
<i>P. melas</i> (Creutzer, 1799)	–	–	–	rare	rare
<i>Taphoxenus gigas</i> (Fischer von Waldheim, 1823)	–	–	–	vulnerable	vulnerable
<i>Laemostenus terricola</i> (Herbst, 1784)	–	–	–	rare	rare
<i>Agonum impressum</i> (Panzer, 1796)	–	–	–	rare	rare
<i>A. marginatum</i> (Linnaeus, 1758)	–	–	–	–	rare
<i>A. monachum</i> Duftschmid, 1812	–	–	–	rare	rare
<i>A. sexpunctatum</i> (Linnaeus, 1758)	–	–	–	vulnerable	vulnerable
<i>A. viridicupreum</i> (Goeze, 1777)	–	–	–	vulnerable	vulnerable
<i>Olisthopus sturmi</i> (Duftschmid, 1812)	–	–	–	–	vulnerable
<i>Symuchus vivalis</i> (Illiger, 1798)	–	–	–	–	rare
<i>Amara chaudierei</i> Schaum, 1858	–	–	–	–	rare
<i>A. crenata</i> Dejean, 1828	–	–	–	–	vulnerable
<i>A. equestris</i> (Duftschmid, 1812)	–	–	–	rare	rare
<i>A. fulva</i> (O. Müller, 1776)	–	–	–	rare	rare
<i>A. sabulosa</i> Audenet-Serville, 1821	–	–	–	–	vulnerable
<i>Curtonotus convexiusculus</i> (Marshall, 1802)	–	–	–	–	rare
<i>Anisodastylus poeciloides</i> (Stephens, 1828)	–	–	–	rare	rare
<i>Diachromus germanus</i> (Linnaeus, 1758)	–	–	–	rare	rare
<i>Acupalpus interstitialis</i> Reitter, 1884	–	–	–	–	rare
<i>A. suturalis</i> (Dejean, 1829)	–	–	–	–	rare
<i>Stenolophus discophorus</i> (Fischer von Waldheim, 1823)	–	–	–	–	rare
<i>Daptus vittatus</i> Fischer von Waldheim, 1823	–	–	–	–	rare
<i>Harpalus cephalotes</i> Fairmaire & Laboulbène, 1854	–	–	–	endangered	endangered
<i>H. dispar</i> Dejean, 1829	–	–	–	–	rare
<i>H. hirtipes</i> (Panzer, 1796)	–	–	–	–	rare
<i>H. laeviceps</i> Zetterstedt, 1828	–	–	–	–	rare
<i>H. luteicornis</i> (Duftschmid, 1812)	–	–	–	–	rare
<i>H. melancholicus</i> Dejean, 1829	–	–	–	–	rare
<i>H. steveni</i> Dejean, 1829	–	–	–	endangered	endangered
<i>H. subcylindricus</i> Dejean, 1829	–	–	–	–	rare
<i>Microderes brachypus</i> (Steven, 1809)	–	–	–	endangered	endangered
<i>Ophonus diffinis</i> (Dejean, 1829)	–	–	–	rare	rare
<i>Dixus eremita</i> (Dejean, 1825)	–	–	–	–	rare
<i>Panagaeus bipustulatus</i> (Fabricius, 1775)	–	–	–	–	rare
<i>Callistus lunatus</i> (Fabricius, 1775)	–	–	–	vulnerable	vulnerable
<i>Dinodes decipiens</i> (L. Dufour, 1820)	–	–	–	–	rare
<i>Chlaenius alutaceus</i> Gebler, 1829	–	–	–	vulnerable	vulnerable
<i>Ch. festivus</i> (Panzer, 1796)	–	–	–	vulnerable	endangered
<i>Licinus cassideus</i> (Fabricius, 1792)	–	–	–	–	rare
<i>Badister dorsiger</i> (Duftschmid, 1812)	–	–	–	endangered	endangered
<i>Masoreus wetherhali</i> (Gyllenhal, 1813)	–	–	–	endangered	endangered
<i>Lebia humeralis</i> Dejean, 1825	–	–	–	–	vulnerable
<i>Demetrias imperialis</i> (Germar, 1824)	–	–	–	vulnerable	vulnerable
<i>Cymindis axillaris</i> (Fabricius, 1794)	–	–	–	–	vulnerable
<i>Polystichus connexus</i> (Geoffroy, 1785)	–	–	–	endangered	endangered
<i>Brachinus ejaculans</i> Fischer von Waldheim, 1828	–	–	–	–	rare
<i>B. hamatus</i> Fischer von Waldheim, 1828	–	–	–	endangered	endangered
<i>Mastax thermarum</i> (Steven, 1806)	–	–	–	endangered	endangered

Note: \* – data is provided according to the Order of the Ministry of Environment of Ukraine as of January 19, 2021 № 29 “On Approval of List of Species of Animals to be listed in the Red Book of Ukraine (Fauna), and Species of Animals removed from the Red Book of Ukraine (Fauna)”; \*\* – data is given according to the results of field studies carried out since 2011 up until now.

Those are *Calosoma sycophanta*, or forest caterpillar hunter, *Carabus hungaricus*, and *C. scabrosus tauricus*. Respective to the threat-related status the populations have, the first two species were classified to the vulnerable group (i.e. species that could be endangered in the future), and the latter – endemic to Ukraine – to the rare group. All those species have long been included in the European Red List of Threatened Species. The main causes of decrease in those taxa are prolonged use of pesticides; cutting of trees and shrubs, arable farming in virgin steppe areas, decrease in natural locations of species resulting from other agrotechnical measures and recreational loading.

The third edition of the Red Book of Ukraine already included 7 species of Caraboidea: *Cephalota besseri* (Cicindelidae), *Carabus bessarabicus* Fischer von Waldheim, 1823, *C. estreicheri*, *C. stscheglowi*, *Carterus dama*, *Parazuphium chevrolati* Castelnau, 1833, *Pseudaphaenops jacobsoni* (Pliginsky, 1912) and *Taurocimmerites dublanskii* Belousov, 1998 (Carabidae). Most of them are rare (the two latter are cave-dwelling endemics in Ukraine), and only *Carabus bessarabicus* is endangered. Out of all species of ground beetles living in Ukraine, three taxa (*Carabus hampei* Küster, 1846, *C. zawadskyi* Kraatz, 1854, *C. variolosus* Fabricius,

1787) are included in the IUCN Red List of Threatened Species, and *Carabus intricatus* Linnaeus, 1761 is included in the European Red List of Threatened Species.

However, the number of relatively rare species of ground beetles in the Ukrainian fauna is quite high and, without exaggeration, could account for no less than a quarter of the superfamily. Furthermore, a number of species can be rare in certain regions of Ukraine (administrative regions) because of their insignificant number and occurrence across the country in general or because they live in one or another region at the edge of their range (distribution). Perhaps, they need protection (to one or the other degree), but only after analyzing and substantiating their population status, determining their distribution and ecological specifics.

#### Rare species of carabids in Dnipropetrovsk Region

*Cephalota (Taenidia) atrata* (Pallas, 1776). It is common in steppes of Eastern Europe (south of Ukraine and Russia) and plains of Kazakhstan. In Dnipropetrovsk Region, it has been recorded only in Nikopol district (outskirts of Ust-Kamianka, Y. Y. Tretiakov). Two-three years generation.

Adult beetles appear in late May and are seen until early August. They are active during the day. They live on clayey soils of moderately saline areas of steppe grasslands. The only small population of those insects in the region is in the outskirts of Ust-Kamianka (Nikopol District), on the left bank of the Kamianka River. Megathermophile. Mesophile. Halophilic-steppe species. Larva is geobiont-burrow dweller, imago is a flying epigeobiont. Zoophage. It occurs sporadically, in certain years. Its population has declined during a contraction in the area of its natural habitat, especially virgin steppes (Jacobson, 1905–1916; Medvedev, 1950; Panin, 1952; Yablokov-Khinzorian, 1976; A. A. Petrusenko & S. V. Petrusenko, 1970b; Sharova, 1981; Putchkov, 1990b, 1993, 2005, 2012a, 2013f, 2018; Wiesner, 1992; Putchkov & Cassola, 1994; Kryzhanovskij et al., 1995; Brygadyrenko, 1997a, 2003b; Puchkov & Matalin, 2003; Sumarokov, 2009; Putchkov & Nitochko, 2016).

***Cephalota (Taenidia) besseri* (Dejean, 1826).** It is included in the Red Book of Ukraine – category 3 (rare). Mediterranean species, widespread in Eastern Europe (Romania, south Ukraine and Russia), West and North Kazakhstan, south of Western Siberia. In Dnipropetrovsk Region, it has been recorded only in Pavlohrad District, outskirts of Bulahivka Village, outskirts of the Bulahivka Lyman, where one of the largest population of the species was recorded. Two-three year generation. Adult beetles occur from late May until late August (more often starting from mid June to early July). They are active during the day. They live locally in moderately saline areas, shores of seas and limans, rarely – in sandy and steppe grasslands. Imagoes occur mostly in thickets of *Salicomyia europaea* L. In much lower numbers, they are seen in associations of *Aeluropus littoralis* (Gouan) Parl. and *Halimione verrucifera* (Bieb.) Aellen, 1938. Larvae dig 30 cm-deep burrows, mainly in loamy soils. Megathermophile. Mesohygrophile. Halophile. Larva is geobiont-burrow dweller, while the imago is a flying epigeobiont. Zoophage. Beetles and larvae prey mostly on spiders, small orthopterans, coleopterans and dipterans. At the Bulahivka Liman Ornithological Reserve, the density of populations is small (up to 0.5 ind./m<sup>2</sup>), and the area where they live is very limited. The number declines when the area of natural living locations of the species is being reduced as a result of excessive cattle grazing and land development. Perhaps, spring flooding of biotopes where the species overwinters hinders the spread of the species (Jacobson, 1905–1916; Panin, 1952; A. A. Petrusenko & S. V. Petrusenko, 1970b; Putchkov, 1990b, 1993, 2005, 2012a, 2013f, 2018; Wiesner, 1992; Putchkov & Cassola, 1994; Kryzhanovskij et al., 1995; Brygadyrenko, 1997a, 1999a, 2000, 2003b; Puchkov & Matalin, 2003; Akimov, 2009; Sumarokov, 2009; Ivanov & Fateryga, 2015; Putchkov & Nitochko, 2016).

***Cephalota (Taenidia) elegans* (Fischer von Waldheim, 1824).** Southeast Europe, Kazakhstan, Turkmenistan and Uzbekistan, south part of Western Siberia. In Ukraine, it fragmentally occurs almost throughout the steppe zone, and more often in the south of the left bank. Two subspecies are known: *C. elegans stigmatophora* Fischer von Waldheim, 1824 (far south of Ukraine) and *C. elegans brunnea* Putchkov, 1993 (Dnipropetrovsk Region). The latter subspecies is so far known to live only in Pavlohrad District (outskirts of Bulahivka Village, Bulahivka Liman), where a quite large population was recorded. In the south of Ukraine (solonchaks on Sivash lakeshores), *C. elegans* is sympatric with the close subspecies *C. deserticola sivashensis* Danilevskiy, 2004, being phenologically different. Imagoes of *C. deserticola* emerge early as early May, peaking in Mid-late May and until the first decade of June. Single individuals of *C. elegans stigmatophora* were seen starting only from late May, and its massive emergence was between mid June and the first half of July. Two-three years generation. Adult beetles occur since late May until early September, only in typical solonchak areas with hardly any vegetation or in very sparse thickets of *Salicomyia europaea* L., most often near limans, salt lakes and marine shores. They are active during the day. Larvae dig 20–30 cm-deep burrows in bare saline areas with clayey soils. Megathermophile. Mesohygrophile. Halophile. Larva is geobiont-burrow dweller, imago is a flying epigeobiont. Zoophage. It occurs rarely, but is commonly recorded in some biotopes (especially in solonchaks on Sivash lakeshores). In the Bulahivka Liman Ornithological Reserve of National Significance, the density of its population is sometimes quite high (0.4–0.6 ind./m<sup>2</sup>). Its population has declined following reduction in natural habitat, especially as a result of land development (Jacobson, 1905–1916;

Panin, 1952; A. A. Petrusenko & S. V. Petrusenko, 1970b; Sharova, 1981; Putchkov, 1990b, 1993, 2005, 2012a, 2013f, 2018; Wiesner, 1992; Putchkov & Cassola, 1994; Kryzhanovskij et al., 1995; Brygadyrenko, 1997a, 1999a, 2000, 2003b; Puchkov & Matalin, 2003; Sumarokov, 2009; Putchkov & Nitochko, 2016).

***Cicindela maritima* Dejean, 1822.** Central and Eastern Europe (south to 62° N), Northwest Kazakhstan. In Ukraine, in Polissia, Forest-Steppe, there is a widespread subspecies *C. maritima kirgistica* Mandl, 1936. In Dnipropetrovsk Region, single specimens were encountered in some sandy areas by the Dnipro River. Imagoes occur starting from late May and until early October (more often in June–July and early September). It is active during the day. It occurs rarely and locally on sandy areas with no vegetation, more rarely with single plants, only near water (rivers, lakes, more rarely slightly saline, seashores). Mesothermophile. Larva is hygromesophile, imago is mesohygrophile. Psammophilous-litter species. Larva is geobiont, imago is epigeobiont that runs and flies. Zoophage. Rare species in the fauna of Ukraine. It is not often recorded. Its population has declined with reduction of natural habitats, especially sandy areas near water, and also when the species is affected by recreation loading (Jacobson, 1905–1916; Von Lengerken, 1912; Medvedev, 1950; A. A. Petrusenko & S. V. Petrusenko, 1970b; Sharova, 1981; Putchkov, 1990b, 1993, 2005, 2012a, 2013f, 2018; Wiesner, 1992; Kryzhanovskij et al., 1995; Brygadyrenko, 1997a, 1999b, 2000, 2003b; Vogler et al., 1998; Puchkov & Matalin, 2003; Gebert, 2004; Aleksandrowicz, 2014; Aleksandrowicz & Putchkov, 2015).

***Cicindela* (s. str.) *soluta* Latreille & Dejean, 1822.** Central and Eastern Europe (to 52° N), Northwest Kazakhstan. In Ukraine, it has been seen in Polissia, Forest-Steppe, Donetsk Ridge and northern steppe zone (in the Right Bank, it is widespread up to the south of Mykolaiv Region). In Dnipropetrovsk Region, it is known to live in arena terraces of small rivers (the Samara, Vovcha, Oril, Mokra Sura, Inhulets, etc.) and the Dnipro. One-two year generation. Beetles occur from April until early July, and also singly in September–October (more often – from mid May to late July). In summer, the activity of imagoes decreases significantly, since most adult beetles do not leave the soil after hatching from the pupa and appear only in late spring of the following year. It is common in relatively sparse or open areas of pine forests with herbaceous vegetation, without developed litter horizon. Active during the day. Larvae dig 30–60 cm-deep burrows (depending on soil moisture) in open areas with sparse psammophilous vegetation, active from May to July. Mesothermophile. Mesophile. Psammophilous species. Larva is geobiont-burrow dweller, imago – flying epigeobiont. Zoophage. Imagoes and larvae prey on spiders, small orthopterans, coleopterans, hymenopterans and dipterans. In the steppe zone, it occurs rarely, but in some biotopes, it is recorded as a common species (sandy biotopes of the south of Mykolaiv Region). Its population has declined with the reduction in natural places of occurrence by forest felling, excessive cattle grazing, recreational activity (Jacobson, 1905–1916; Panin, 1952; A. A. Petrusenko & S. V. Petrusenko, 1970b; Putchkov, 1990b, 1991, 1993, 2005, 2012a, 2013f, 2018; Wiesner, 1992; Kryzhanovskij et al., 1995; Brygadyrenko, 1997a, 1999a, 2000, 2003b; Puchkov & Matalin, 2003; Gebert, 2004; Sumarokov, 2009; Aleksandrowicz, 2014).

***Cylindera (Eugrapha) arenaria* (Füessly, 1775).** The range spans from Italy and France eastward to the Ciscaucasia and the western part of North Siberia. In Ukraine, ubiquitously (except the Carpathians and Crimea), but sporadically, the subspecies *C. arenaria viennensis* Schrank, 1781 is widespread. In Dnipropetrovsk Region, it is known from Synelnykovo (near Raiivka Village) and Pavlohrad Districts (arena of the terrace of the Vovcha River, the northern part of the city of Pavlohrad) and the Dnipro-Oril Nature Reserve. One-two years generation. Beetles occur from late May until mid September (most often in June–July) on open sandy areas with sparse vegetation, near water, sometimes in thin strips of forest, in sandy quarries with shallow embedding of soil water. Sporadically common, but local species, especially in the steppe zone. Imagoes are active during the day. They fly to light. Larvae dig 15–25 cm-deep burrows in open sandy areas. Mesothermophile. Mesophile. Meadow-floodplain psammophilous species. Larva is a burrow-digging geobiont, imago – running and flying epigeobiont. Zoophage. It is rare in the steppe zone, but has been recorded as a common species in some sandy areas

around water. Its population has declined due to decrease in the area of natural living locations, especially as a result of agrotechnical measures and land development. Negative impact on the species' abundance is caused by sand extraction in arena terraces of small rivers and the Dnipro. To protect the isolated population in Pavlohrad District, it is necessary to create the Pavlohrad Sandy Steppe Reserve (Jacobson, 1905–1916; Panin, 1952; Yablokov-Khnzorian, 1976; A. A. Petrusenko & S. V. Petrusenko, 1970b; Putchkov, 1990b, 1990c, 1993, 2001; 2005, 2012a, 2013f, 2018; Wiesner, 1992; Kryzhanovskij et al., 1995; Brygadyrenko, 1997a, 1999a, 2000, 2003b; Puchkov & Matalin, 2003; Gebert, 2004; Sumarokov, 2009; Aleksandrowicz, 2014).

***Leistus (s. str.) terminatus (Panzer, 1793)*** (= *rufescens* Fabricius, 1775). It occurs almost throughout Europe (up to 60° N), in the northern part of Kazakhstan, in Southern Siberia (eastward to Baikal and Yakutsk). In Ukraine, it is found in the Carpathians, Polissia, Forest-Steppe. In the Northern Steppe, single specimens were found in the stream-bed floodplain of the Samara River (outskirts of Andriivka Village of Novomoskovsk District). Beetles occur in May – September (more often in late May – June) in deciduous and mixed forests. Imagoes dwell in forest litter, under various types of cover and on the soil surface, sometimes in the tree layer in association of common nettle *Urtica dioica* and thickets of blackberry. Rarely imagoes climb up plants. Reproduction occurs in spring, imagoes overwinter. Oligothermophile. Mesohygrophile. Forest-shrub dweller. Larvae and imagoes are surface-litter stratiobionts. Zoophage. Specializes on consumption of representatives of Collembola class. The southern border of the species' range runs in the northern subzone of the steppe zone. Very rare species in Dnipropetrovsk Region. Only single specimens are found. The number is declining as a result of the global climate changes, decrease in the area of natural living locations (forest areas), destruction of tree and shrub structures, recreational loading on forest ecosystems. It requires protection in the territory of the Samara Pine Forest National Nature Park (Jacobson, 1905–1916; Kryshstal, 1956; Kryzhanovskij, 1983; Perrault, 1991; Kryzhanovskij et al., 1995; Brygadyrenko, 2003a, 2003b; Rizun, 2003; Farkač & Janata, 2003; Assman, 2004a; Putchkov, 2012a, 2013a, 2018; Błaszkiwicz & Schwerk, 2013; Aleksandrowicz, 2014).

***Notiophilus rufipes Curtis, 1829***. Almost throughout Europe, Southern Caucasus, North Siberia. In Ukraine, it occurs almost everywhere, but findings in southern regions of the Steppe need confirmation. In Dnipropetrovsk Region, it is known to live only in Synelnykovo District (outskirts of Raiivka Village). Rare species. Occurs in meadows, glades, forest outskirts and deep in various forests, rarely near aquatic objects. It lives mostly under mosses, in litter and grass. Beetles are active during the day from March to October, most often in June–July. The species overwinters in the imago stage. Mesothermophile. Mesophile. Meadow-forest dweller. Larvae and imagoes are surface-litter stratiobionts. Zoophage, it predated mostly Collembola. It has been singly found in gardens. Rare species in the fauna of Ukraine (Jacobson, 1905–1916; Sharova, 1981; Kryzhanovskij, 1983; Lindroth et al., 1985; Eidelberg, 1989; Kryzhanovskij et al., 1995; Brygadyrenko, 2003b; Rizun, 2003; Bousquet & Barševskis, 2003; Freude et al., 2004; Müller-Motzföld, 2004; Koval, 2009; Sumarokov, 2009; Arndt, 2011d; Putchkov, 2012a, 2013g, 2018; Aleksandrowicz, 2014; Putchkov et al., 2015; Bondarenko et al., 2020).

***Calosoma (s. str.) sycophanta (Linnaeus, 1758)***. Is listed on the IUCN Red List of Threatened Species globally (1991) – category V (vulnerable). Its range includes North Africa, Southern and Central Europe, Southern Sweden, central and southern regions of the East-European Plain, foothills of the Southern Urals, the Caucasus, Southern Caucasus, West and Central Asia, Kazakhstan, Iran and the south of Western Siberia. It has become established in the USA. It is common throughout most of Ukraine, but is more often found in the Forest-Steppe and Southern Ukraine. In Dnipropetrovsk Region, it has been recorded in the Samara Pine Forest, outskirts of the city of Kaminaske (windbreak near the Konoplianka River), in Solone District (Viukovy Bairak) in the territory of the Dnipro-Oril Nature Reserve in Synelnykovo District (Raiivka Village). Beetles (more rarely age III larva) overwinter in soil and litter. Spring-summer type of reproduction. Mating and oviposition (around 60 eggs over the life period) occurs in spring – early summer. Larvae develop in 2–3 months. Beetles are found from April until October, most often

from late May to Mid June. Young beetles emerge in August–September. Imagoes live 2–4 years. Larvae are born 4–7 days after oviposition. Imagoes are active in twilight, and in the day during mild weather. The species is found in broad-leaved and mixed forests, shrubs, bairaks and depressions, on soil surface and in tree crowns. In the Forest-Steppe, the beetles prefer sparse deciduous and mixed forests, windbreaks, oak forests, thickets of shrubs, glades, forest outskirts, cuttings and clearings. In the steppe zone, it lives in bairak forests and shrubs. Imagoes fly to light. In search of prey, beetles and larvae move up trees, predate in soil, upper layers of litter, on trees and shrubs. Mesothermophile. Mesophile. Forest-shrub dweller. Hemistenotopic species. Larva is a litter geostatobiont, imago – epigeo-dendrobiont, which walks and climbs trees. It is a zoophage that mostly consumes butterfly caterpillars, especially hairy (pine-tree lappet *Dendrolimus pini*, spongy moth *Lymantria dispar*, lackey moth *Malacosoma neustria*, fall webworm *Hyphantria cunea*, brown-tail moth *Euproctis chrysorrhoea*, caterpillars of *Orgyia* genus, Tortricidae, Geometridae, Noctuidae). Moreover, consumption of imagoes and larvae of Colorado beetle and larvae and pupae of Tenthredinidae sawflies has also been recorded. It has been singly seen in gardens with various cultivated plants in Crimea, sometimes in windbreaks, parks, more rarely in gardens. It consumes lepidopterans – pests of trees (Noctuidae, Geometridae, *Hyphantria cunea*, *Lymantria dispar*, *Euproctis chrysorrhoea*). Starting from the 1990s, no individuals have been found in the territory of the Region. During the breeding period of a number of harmful lepidopterans (*Lymantria dispar*, *Malacosoma neustria*, *Tortrix viridana*), the species' population sharply increases (up to 10–20 ind./ha). Prolonged use of pesticides in forests, cutting of trees and shrubs decrease in the area of natural habitats of the species have led to a reduction in its populations (Jacobson, 1905–1916; Burgess, 1911; Nolte, 1940; Kryshstal, 1956; Kryzhanovskij, 1962, 1965, 1979, 1985b; Sharova, 1981; Eidelberg, 1984, 1989; Weseloh, 1987, 1988, 1993; Shcherbak, 1994, Akimov, 2009; Kryzhanovskij et al., 1995; Brygadyrenko, 1997b, 1999a, 2003b; Petrusenko et al., 1999; Rizun et al., 2000; Bousquet et al., 2003; Rizun, 2003; Arndt & Trautner, 2004; Holste, 2009; Arndt & Casale, 2011; Putchkov, 2012a, 2018; Bashata et al., 2013; Ivanov & Fateryga, 2015; Alekseev & Ruchin, 2020).

***Calosoma denticolle Gebler, 1833***. Bulgaria, Romania, Eastern Europe (almost to 58° N), Western Turkey, Central Asia, south of Western and Eastern Siberia, Mongolia, West and North China. In Ukraine – throughout the country, except the far north of the Polissia and the Carpathians, most often in the steppe zone. In Dnipropetrovsk Region, it has been found in many steppe areas and has been recorded in almost all administrative districts of the region. In natural biocenoses, it has been found in open areas of meadows and mesophyte steppe areas, more rarely on forest edges and large glades of deciduous and mixed forests. Imagoes were caught using light. Rarely ascend plants. Beetles are active at night, and in twilight on rainy and mild days. Imagoes occur from May to October, but most often in June–July and late August. Reproduction takes place in summer. The species can overwinter in the imago as well as larva stages. Mesothermophile. Mesophile. Meadow-steppe dweller. Larva is geostatobiont, imago – walking epigeobiont. It consumes any available invertebrates, including lepidopterans, mostly field caterpillars (moths, Pyralidae, Noctuidae). Cases of consuming fallen fruits have been observed. It rarely occurs on field crops, and has been singly recorded in parks and windbreaks. Relatively rare species in the Ukrainian fauna. Decrease in abundance is possible in the conditions of increased anthropogenic pressure (arable farming of natural areas, urbanization of territories, use of chemical methods of plant protection). In complex with other insects, it is protected in nature reserves of Central and Southern Ukraine (Jacobson, 1905–1916; Kryshstal, 1956; Kryzhanovskij, 1962; Petrusenko, 1973; Sharova, 1981; Kryzhanovskij et al., 1995; Brygadyrenko, 1996, 1997b, 1999b, 2000, 2003b; Petrusenko et al., 1999; Rizun, 2003; Bousquet et al., 2003; Arndt & Trautner, 2004; Koval, 2009; Sumarokov, 2009; Arndt & Casale, 2011; Putchkov, 2012a, 2018; Putchkov et al., 2019, 2020).

***Calosoma (Charmosta) investigator (Illiger, 1798)***. It is distributed almost throughout Europe, Kazakhstan, Siberia, Far East. It is widespread almost everywhere in the Forest and Forest-Steppe zones of Ukraine, rarely found in the North Steppe. In Dnipropetrovsk Region, it is found in floodplain oak forests of the Oril River (Yurivka, Tsarychanka, Petrykivka Districts), in the Dnipro-Oril Nature Reserve, in bairak forests of Verh-

niodniprovsk, Synelnykovo, Pokrovsk and Vasylykiv Districts. In natural biotopes of the Forest Steppe, its typical habitats are forbe meadow-steppe areas and shrubs. In the steppe zone – other than open areas – it has been encountered in sparse shrub thickets. Imagoes (more rarely age III larvae) overwinter in soil and litter. The development of larvae lasts for 2–4 months. In the Forest Steppe, it occurs in meadows, forbessteppe areas and sparse shrubs. Beetles are more often seen in first half of summer. Mesothermophile. Mesophile. Meadow-forest dweller. Larva is litter geostatobiont, the imago is a walking epigeobiont. It is a zoophage that consumes lepidopterans – pests of agricultural farming and forestry (Tortricidae, Geometridae, Noctuidae). In low numbers, it is found in pastures, parks and gardens. It can be beneficial. Singular specimens occur. In forest ecosystems of Dnipropetrovsk Region, its number is usually 100–200 times lower than that of dominant *Calosoma inquisitor* Linnaeus, 1758. Prolonged use of pesticides; cutting trees and shrubs, tillage of fallow and virgin areas causes decrease in areas appropriate for the existence of the species (Jacobson, 1905–1916; Collins & Holbrook, 1929; Kryzhanovskij, 1962; Sharova, 1981; Kryzhanovskij et al., 1995; Brygadyrenko, 2003b; Rizun, 2003; Bousquet et al., 2003; Sumarokov, 2009; Putchkov, 2012a, 2018; Putchkov et al., 2019; Alekseev & Ruchin, 2020).

***Carabus (Eucarabus) stscheglowi Mannerheim, 1827.*** It is included in the Red Book of Ukraine – category 3 (Rare), Subendemic of Ukraine and Russia. It is widespread in the center and the north of the European Part of Russia, south of Western Siberia. In Ukraine, it occurs mostly in the Forest Steppe, sporadically in yaylas of Crimea (Chatyr-Dag), very rarely – in the steppe zone. It is found in Dnipropetrovsk Region, in Pavlohrad, Novomoskovsk and Synelnykovo Districts. It is also indicated for Nikopol District (outskirts of Kaminaske Village, Y. Y. Tretyakov). Imagoes occur in late spring and in the first half of summer. The overwintering phases are beetles and, possibly, larvae of older ages. In Dnipropetrovsk Region, it is mostly distributed in mesophytic and hygromesophytic types of bairak forests (linden-ash oak forests with *Aegopodium podagraria* L., *Stellaria* L. or herbaceous perennials with broad laminae). The species disappears even after slight signs of salinity appear. In floodplain forests of the Samara and Vovcha Rivers, it occurs locally (linden-ash oak forests with *Stellaria* L. around the streambed and in the central floodplains). Mesothermophile. Mesophile. Forest-meadow dweller. Larvae are litter geostatobionts, imagoes are walking epigeobionts. Zoophage. Rare species, single specimens are found sporadically. In small floodplain linden-ash oak forest structures inside the Samara Pine Forest, it is spread in only 2–4% of their area (up to 0.3 ind./100 m<sup>2</sup>). Its population is declining as a result of introduction of pesticides from tilled areas to bairak forests via burning herbaceous vegetation in forest outskirts, excessive recreational loading on natural living locations of the species (Jacobson, 1905–1916; Kryzhanovskij, 1965; Sharova, 1981; Kryzhanovskij et al., 1995; Brygadyrenko, 1997b, 1998c, 1999a, 2003b; Bousquet et al., 2003; Turin et al., 2003; Putchkov, 2008, 2012a, 2018; Akimov, 2009; Sumarokov, 2009; Ivanov & Fateryga, 2015; Putchkov et al., 2019).

***Carabus (Limnocarabus) clathratus Linnaeus, 1761.*** Europe, Caucasus, Transcaucasia, West Asia, Kazakhstan, north of Kyrgyzstan and Uzbekistan, Mongolia, Southern Siberia, the Far East, Japan. In the Ukrainian plains, it is widespread, except dry steppes of the Black Sea Reserve, Potievka). In the Carpathians, it was seen only in the foothills. The discoveries in the mountains of Crimea need to be confirmed (however, it was recorded in the Kerch Peninsula, near the town of Shchelkino). In Ukraine, there are two subspecies: the nominative subspecies in the Polissia and in the Forest-Steppe, and *C. clathratus auraniensis* J. Muller, 1903 in the southeast (southern Donetsk and Luhansk Regions). In Dnipropetrovsk Region, the nominative subspecies is common, being recorded in floodplains on the left bank (Yurivka, Pavlohrad, Novomoskovsk, Sinelnikovo, Dnipro Districts), and occasionally on the Right Bank (Verkhniodniprovsk, Pyatyhatky Districts). It is seen from early May until late September in deciduous forests, meadows, wet places near rivers and waterlogged sites. It prefers floodplain biotopes (wetlands, wet meadows, reed floodplains, floodplain forests) and open places near water. In the Samara pine forest, it inhabits the banks of oxbow lakes and forest lakes, near-terrace parts of floodplains, water bodies of the third solonetz-solonchak terrace. It overwinters mostly as imago. Imagoes are active at night

and fly to light. Mesothermophile. Mesohygrophile. Larva is litter geostatobiont, imago – epigeobiont that walks. Meadow-wetland dweller. Zoophage. Single specimens have been noted in irrigated fields and gardens. It feeds on various invertebrates (leeches, slugs, earthworms, insects that crawl on the shores). It is rare in the steppe zone. Its population is declining as a result of agricultural activity (pollution of areas near water by pesticides, excessive cattle grazing, arable farming of meadow areas, etc), land development (drying of wetlands and meadows – natural habitats of the species) (Jacobson, 1905–1916; Kryshstal, 1956; Kryzhanovskij, 1965; Hürka, 1970; Yablokov-Khinzorian, 1976; Lindroth et al., 1985; Kryzhanovskij et al., 1995; Brygadyrenko, 1996, 1997b, 1998c, 2000, 2001a, 2003b, 2004b; Bousquet et al., 2003; Turin et al., 2003; Brygadyrenko & Kolisnyk, 2004; Arndt & Trautner, 2004; Putchkov, 2008, 2012a, 2018; Arndt, 2011a; Bashta et al., 2013; Aleksandrowicz, 2014; Putchkov et al., 2019, 2020).

***Carabus (Morphocarabus) excellens Fabricius, 1798.*** In Europe, it is widespread from Romania to the Urals (northward up to 52° N). In Ukraine, the range spans the Prykarpattia, South Polissia to the northern subzone of the steppe zone, but it occurs mainly in the forest steppe zone. In Dnipropetrovsk Region, it was recorded in floodplain (the rivers Dni-pro, Oril, Samara) and bairak forests of the left-bank part of the Region. It occurs in late April to September, more often in June – early July. In natural biotopes of the Forest-Steppe and Polissia, it is encountered in meadows, fallows, glades and forest outskirts of sparse deciduous and mixed forests, sparse tree stands, sometimes in meadow steppes and floodplain meadows, and also in agrocenoses. In the north of the steppe zone, it is a typical species in bairak forests and adjacent areas of mesophyte steppes and grassy floodplain tree-shrub associations. In the conditions of the floodplain of the Samara and Vovcha Rivers, it tolerates well soil salinization, and therefore most often occurs in mesophytic and mesohygrophytic areas of elm-ash and field elm-Tatar maple oak forests, much more rarely – in moist bairak oak forests. Reproduction occurs in spring-summer. It overwinters in the imago and larva stages. Mesothermophile. Mesophile. Meadow-steppe dweller. Larva is litter geostatobiont, imago – epigeobiont that walks. Zoophage. It is locally common in some parks (Lysa Hora, the city of Kyiv) and pastures of the Forest-Steppe; has been singly recorded in windbreaks, fruit gardens, in vineyards and berry gardens. It has also been sporadically recorded in field agrocenoses of the Western and Central Forest-Steppe, especially on tilled crops. In transformed biocenoses of other regions of Ukraine, imagoes are found singularly. It is a zoophage that predates earthworms, slugs, caterpillars and pupae of various lepidopterans, including pests related to the soil layer and trunks of trees at the height until branching (Noctuidae, Geometridae, *Cydia*, fall webworm). Sometimes, it is found on corpses of mammals, where it feeds on larvae of necrophagous insects. It is rare in the steppe zone. Populations are most often small and occupy small areas. Even in the Samara Pine Forest, it occurs in limited sites. Its population is decreasing as a result of agricultural activity in areas adjacent to forest ecosystems, and first of all, recreational loading on the natural habitats. Populations of the species are protected in the Mezhyrichia Landscape Reserve of National Significance and the Mohyla Baba Tract Reserve of Local Significance. The maximum number was recorded in halophytic oak forests and *Populus tremula* kolok forests [kolok forest is an isolated forest in interfluvial and depressions of forest-steppe zone], for example in the Kruhlyk Landscape Reserve of Local Significance (Pavlohrad District). Increased protection is needed for the populations of the species in bairak forests of Synelnykovo District (Jacobson, 1905–1916; Kryshstal, 1956; Kryzhanovskij, 1965; Sharova, 1981; Kryzhanovskij et al., 1995; Brygadyrenko, 1997b, 1998c, 2003b; Putchkov & Lobko, 1998; Petrusenko et al., 1999; Bousquet et al., 2003; Putchkov et al., 2003; Turin et al., 2003; Putchkov, 2008, 2012a, 2018; Sumarokov, 2009; Bashta et al., 2013; Putchkov & Komaromi, 2017; Putchkov et al., 2019).

***Carabus (Pachystus) hungaricus Fabricius, 1792.*** It is included in the Red Books of several EU countries. The range spans from Central Europe (Hungary) to Kazakhstan. In Ukraine, it is represented by one subspecies endemic to the country – *C. hungaricus gastridulus* Fischer, 1823 (Crimea) and subspecies *C. hungaricus scythus* Motschulsky, 1847 (the steppe zone and the far south of the Forest Steppe of Ukraine, Moldova), *C. hungaricus mingens* (the far east of the Ukrainian Steppe, south of

Russia, foothills of the Caucasus until the Volga). In Dnipropetrovsk Region, *C. hungaricus scythus* is widespread, found in six locations: outskirts of the city of Kamianske (steppe slopes of a ravine), south of the city of Dnipro near the airport in a virgin steppe area, granite ledges 20 km south of the city of Dnipro (near Maiorivka Village), Synelnykovo District (outskirts of Raivka Village, virgin steppe areas; 3 km northwest of urban-type Settlement Illarionovo, train station Platform 207, steppe virgin slopes of the ravine), the Dnipro-Oril Nature Reserve (sandy steppe). Imagoes and larvae are found only in virgin steppe biotopes, in yaylas in Crimea, in ravines, rarely in fallows. It does not occur in tilled areas. One- and two-year generation. Imagoes winter, more rarely older-age larvae. Mating and oviposition take place in spring. Beetles are active at night, occurring from April to November, but most often – in July–September. Larvae have been seen in May–June. Young beetles emerge in the first half of summer (from overwintered larvae) and in early autumn. Megathermophile. Mesoxerophile. Typical steppe dweller. Larva is litter geostatobiont, imago – epigeobiont that walks. Zoophagy. Very rare (occasional) species in certain parks and old fruit gardens of southern Ukraine. Occurs very locally, but populations in certain steppe biotopes reached 0.5–5.0 specimens per 10 trap-days (Steppe Crimea, Syvash region). In Dnipropetrovsk Region, it is sometimes (except certain years in virgin areas) locally numerous (up to 5–10 ind./100 m<sup>2</sup>). The population is decreasing first of all due to arable farming in virgin steppe areas, excessive cattle grazing, burning dry grass in spring. Reserves must be created for the protection of all discovered populations (Jacobson, 1905–1916; Kryzhanovskij, 1965, 1979, 1983, 1985a; Hürka, 1970; Pavlova, 1977, 1979; Sharova, 1981; Vakarenko & Khomenko, 1994; Kryzhanovskij et al., 1995; Brygadyrenko, 1997b, 1999a, 2003b, 2007; Rizun et al., 2000; Bousquet et al., 2003; Turin et al., 2003; Amdt & Trautner, 2004; Brygadyrenko & Fedorchenko, 2007, 2008; Putchkov, 2008, 2012a, 2018; Shcherbak, 1994; Dekhtyareva, 2002, 2004; Akimov, 2009; Sumarokov, 2009; Pokluda et al., 2011; Putchkov & Markina, 2014; Elek et al., 2014; Ivanov & Fateryga, 2015; Popescu & Iorgu, 2016; Cicort-Lucaciu, 2020).

***Carabus (Trachycarabus) besseeri* Fischer von Waldheim, 1820.** Romania, Moldova, Right-Bank Ukraine, possibly Southeast Poland. One of the 5 species of the *Trachycarabus* subgenus in Ukraine, it is widespread mainly in Right-Bank Forest Steppe and Steppe. On the Left Bank, it is known only in Dnipropetrovsk Region (Dnipro-Oril Natural Reserve). The second population in the Region was discovered in the very small Park Named After 40-Years Anniversary of the Liberation of Dnipropetrovsk (at the crossroad of the Zaporizke Highway and Bohdana Hmelnytskoho Avenue). The third known population was found in the territory of Nikopol District (outskirts of Dmytrivka Village, Y. Y. Tretjakov). Beetles are seen from late May until August. Locally, it is a common species in steppe and near-forest areas, dry meadows, ravines, river valleys, sometimes in windbreaks. Reproduction occurs in summer. Overwintering phases are imago and larva. Mesothermophile. Mesophile (was not found in dry steppes). Mesoxerophile. Typical steppe dweller. Larva is litter geostatobiont, imago – walking epigeobiont. Zoophagy. It seldom occurs in pastures and hayfields of the Right-Bank Steppe. Isolated specimens have been recorded in agrocenoses (grain crops) and windbreaks. It is very rare in the Left-Bank Ukraine. Its population is declining due to the reduction in natural habitat as a result of agricultural activity and recreational loading (Kryzhanovskij, 1965, 1983; Putchkov, 1990a, 2008, 2012a, 2018; Kryzhanovskij et al., 1995; Brygadyrenko, 1997b, 2003b, 2007; Petrusenko et al., 1999; Brygadyrenko & Kabar, 2002; Bousquet et al., 2003; Turin et al., 2003; Ivanov & Fateryga, 2015; Putchkov et al., 2020).

***Carabus (Trachycarabus) estreicheri* Fischer von Waldheim, 1822.** East-European steppe species. It is common in Central Russia, the Ural region, south of Western Siberia. In Ukraine, it is most often found in the forest-steppe zone and the northern subzone of the Steppe. In Dnipropetrovsk Region, it has been found near sparse forests, in ravines, fallows, windbreaks, mesophytic steppe and non-tilled areas. Reproduction occurs in summer. One- and two-year generation. Wintering phase is adult beetles, rarer – older-age larvae. Mating and oviposition takes place in spring. Young imagoes emerge in late spring-first half of summer (from overwintered larvae) and early autumn. Mesothermophile. Mesophile. Meadow-steppe dweller. Larva is litter geostatobiont, imago – epigeobiont that

walks. Zoophagy. It has been rarely found in parks and windbreaks, isolated individuals on field crops in the northern subzone of the Steppe and the Donetsk Ridge. It consumes numerous pests of cultivated forests. Due to the significant percentage of tilled territory, only small populations have been left on the ravine slopes, virgin steppe areas and some bairak forests. Sometimes (locally), it is a common species, up to 2–3 ind./100 m<sup>2</sup>. Its population is likely to be declining due to reduction of the species' natural habitat, impact of agricultural activity and recreational loading. It is protected in association with other insects in the Provallia Steppe Nature Reserve. It is recommended to be protected in many reserves with steppe ecosystems in the territory of Synelnykovo and Dnipro Districts (Jacobson, 1905–1916; Kryzhanovskij, 1965; Sharova, 1981; Kryzhanovskij, 1983; Kryzhanovskij et al., 1995; Brygadyrenko, 1997b, 1999b, 2003b, 2004a, 2007; Bousquet et al., 2003; Turin et al., 2003; Putchkov, 2008, 2012a, 2018; Akimov, 2009; Sumarokov, 2009; Bashta et al., 2013).

***Carabus (Trachycarabus) sibiricus* Fischer von Waldheim, 1820.** Eastern Europe, North Caucasus, South Kazakhstan, south of Western and Eastern Siberia, Mongolia, North China. In Ukraine, it has been recorded in the Forest-Steppe, Steppe and the Crimean Mountains. Discoveries in Northern Polisia are doubtful. According to the recent classification (Bousquet et al., 2003), there are four subspecies in Ukraine, which were earlier regarded as separate species (however, this question remains debatable). Therefore, *C. sibiricus bosporanus* Fischer von Waldheim, 1823 is common on the yaylas of Crimea, whereas *C. sibiricus errans* Fischer von Waldheim, 1823 (= *krynickyi* Fisch.) is widespread in steppes of the south Left-Bank Ukraine (Kherson, south of Zaporizhia and Donetsk Regions), *C. sibiricus haeres* Fischer von Waldheim, 1823 is common in the Central and Left-Bank Steppe; and subspecies *C. sibiricus fossularius* Obydov, 2007 (= *fossulatus* Dejean, 1827) is commonly seen in Central and Northeast Ukraine (Northern Subzone of the Steppe). In the Prykarpattia, Bukovyna and Podilia, the endemic Ukrainian subspecies *C. sibiricus rybinskii* Reitter, 1896 is common. Dnipropetrovsk Region is the integration (hybridization) zone of two subspecies: *C. sibiricus fossularius* and *C. sibiricus haeres*. Individual populations were recorded in Pavlohrad (grassland steppe areas, on chomozem soils and in the arena terrace in a psammophytic steppe ecosystem on the outskirts of the city of Pavlohrad, halophytic oak forests of the Kruhlyk tract), Synelnykovo (outskirts of Raivka Village, windbreaks and ravines) and Nikopol (steppe areas) districts. It is found in sparse forests, ravines, fallows, windbreaks, mesophytic steppe and non-tilled sites. It is common in sites of meadow steppes, ravine slopes and large gullies of the Forest-Steppe. In the conditions of the Steppe, it has been recorded in herbaceous associations of various types, dry and fresh meadows, windbreaks, and even sparse shrubs. In the south of the steppe zone, this species is sympatric and close to *C. perrini planus* Gehin, 1885, but has different phenology. Imagoes are active at night, occur from April to October, more often in the second half of summer. Reproduction occurs in summer. The species overwinters mostly as larva (*C. perrini* breeds in spring-summer, and overwinters mostly in the imago stage). One-two-years generation. Mesothermophile. Mesophile. Meadow-steppe dweller. Larva is litter geostatobiont, imago – walking epigeobiont. It singly occurs in gardens, windbreaks, vineyards, berry gardens and separate fields, but more often – on grain crops and perennial herbs. It consumes a number of pests of agricultural crops. Sometimes (South Ukraine), it becomes locally numerous – up to 5–7 ind./100 m<sup>2</sup>. Its population is declining due to agricultural activity (mainly arable farming) (Jacobson, 1905–1916; Kryzhanovskij, 1965; Sharova, 1981; Kryzhanovskij, 1983; Putchkov, 1990a, 2008a, 2012a, 2018; Kryzhanovskij et al., 1995; Brygadyrenko, 1997b, 1999b, 2003b; Petrusenko et al., 1999; Bousquet et al., 2003; Turin et al., 2003; Brygadyrenko & Fedorchenko, 2007; Sumarokov, 2009; Putchkov et al., 2019b).

***Blethisa multipunctata* (Linnaeus, 1758).** Europe (northward to 64° N), Siberia, Kazakhstan, North China. It occurs throughout most of Ukraine, except the highlands of the Carpathians, dry steppes and Crimea. The southern border of the species' range runs through the northern subzone of the Steppe. In Dnipropetrovsk Region, it has been recorded in the territory of Pokrovsk, Pavlohrad, Novomoskovsk, Synelnykovo Districts. Beetles occur from May until September on the shores of water pools in floodplains, waterlogged and wet meadows, in tree-shrub biotopes, sometimes in sparse forests of various types. It is entering the steppe zone due to



irrigation. Beetles tend to stay in the litter, thickets of common reed (*Phragmites australis* (Cav.) Trin. ex Steud.), sea clubrush (*Bolboschoenus maritimus* (L.) Palla), *Typha cattalis*, *Carex* true sedges, rarely (in the immediate vicinity of water) on moist clayey and sandy sites. Reproduction occurs in the first half of summer. The species most often overwinters in the imago stage. Imagoes are active from April to September. Mesothermophile. Hygromesophile. Floodplain-meadow dweller. Larva is geostatobiont, imago is epigeostatobiont that runs. It has occasionally been found on the banks of park lakes, ponds, singly in old gardens, but only in the forest and forest-steppe zones. It can consume some mosquito pests. It is a rare species: isolated individuals have been recorded. Its population is declining as a result of contraction in its natural habitat: excessive recreational loading on the areas around water bodies, excessive cattle grazing in meadows, cutting of trees and shrubs in floodplains, land developments (Jacobson, 1905–1916; Kryshital, 1956; Sharova, 1981; Goulet & Smetana, 1983; Kryzhanovskij, 1983; Lindroth et al., 1985; Arens & Bauer, 1987; Kryzhanovskij et al., 1995; Brygadyrenko, 2000, 2003b; Rizun, 2003; Häckel, 2003; Paill, 2004a; Putchkov, 2012a, 2018; Błaszkiwicz & Schwerk, 2013; Aleksandrowicz, 2014).

***Elaaphrus (Neolaphrus) uliginosus Fabricius, 1775.*** Throughout Europe (northward to 64° N), Central Asia, Siberia, Far East. In Ukraine – Zakarpattia, the forest and forest-steppe zones, Northern Steppe, Crimean Mountains. In Dnipropetrovsk Region, it is known to live in hygrophytic ecosystems (floodplain, arena water bodies and lakes of the third solonetz-solonchak terrace) of the rivers Samara, Vovcha, Dnipro; also, it has been found in Verhniodniprovsk and Piatyhatky districts. It occurs from late March until Mid September on the shores of various water bodies. Spring-summer species. It overwinters as imago. Megathermophile. Litter species. Larva is geostatobiont, imago is stratobiont. Zoophage. It is seen rarely, but is more common in the northern areas of Ukraine. This species has not been studied sufficiently (Jacobson, 1905–1916; Sharova, 1981; Kryzhanovskij, 1983; Lindroth et al., 1985; Kryzhanovskij et al., 1995; Brygadyrenko, 2000, 2003b, 2003c; Goulet, 2003; Rizun, 2003; Paill, 2004a; Schreiner & Irmiler, 2008, 2010; Arndt, 2011d; Putchkov, 2012a, 2018; Aleksandrowicz, 2014; Sasakawa, 2016).

***Scarites terricola Bonelli, 1813.*** Southern and Central Europe, Caucasus, South Caucasus, North Africa, Turkey, Western and Central Asia, South and East China. In Ukraine, it lives almost throughout the steppe zone, but principally in the south. In Dnipropetrovsk Region, it is so far known only for the territory of the Region's capital (the left bank of the city – the area around the Poltava Highway, Pereddova St., Marshala Malinovskoho St.) and outskirts of Raivka Village (Synelnykovo District). In Ukraine, the nominative subspecies is widespread. It is seen from May to late July, and also in September, mostly on areas with various degree of salinization, often near water. It rarely occurs under bank alluvium. Sometimes, it has been seen in mesophyte steppe. Reproduction occurs in summer. It overwinters as imago, rarer larva. Megathermophile. Mesophile. Relatively halophilous, litter-steppe species. Larva and imago are digging geostatobionts. Zoophage. It was has been noted as an occasional species in some agrocenoses of the south steppe zone, isolated specimens in gardens. It occurs sporadically, most often in southern regions of Ukraine (Jacobson, 1905–1916; Sharova, 1981; Kryzhanovskij, 1983; Lindroth et al., 1985; Kryzhanovskij et al., 1995; Brygadyrenko, 2003b; Balkenhol, 2003, 2004; Yamazaki & Sugiura, 2006; Koval, 2009; Arndt & Bulirsh, 2011; Putchkov, 2012a, 2018).

***Dyschirius (Dyschiriodes) chalceus (Erichson, 1837).*** Almost throughout Europe (up to 50° N), Caucasus, Turkey, Western and Central Asia. Discoveries of the species which were made in the south of Western, Eastern Siberia and the Far East need to be confirmed. In Ukraine, it occurs almost throughout the steppe zone. In Dnipropetrovsk Region, it is only known to live in the territory of the Bulahivka Liman Ornithological Reserve (Pavlohrad District). It is seen from May until August, mostly on banks of seas, limans, salt lakes and solonchaks. It overwinters in the imago stage. Rare species. Megathermophile. Hygromesophile. Halophilous litter species. Larva is geostatobiont, imago is digging geobiont. Zoophage. It has been seen preying on staphilinids of *Bledius* genus (Jacobson, 1905–1916; Sharova, 1981; Kryzhanovskij et al., 1995; Brygadyrenko, 2000, 2003b; Rizun, 2003; Balkenhol, 2003, 2004; Putchkov, 2012a, 2018).

***Dyschirius (Dyschirius) obscurus (Gyllenhal, 1827).*** Almost throughout Europe (up to 54° N), Central Asia, the south of Western and Eastern Siberia. In Ukraine, it inhabits the forest, forest-steppe zones and North Steppe. Discoveries in the southern Steppe and Crimea need to be confirmed. In Dnipropetrovsk Region, it is known to live only in some meadow biotopes on sandy soils of the arena of the Vovcha River (outskirts of the city of Pavlohrad). It is seen from early April to late July, mostly on clean sandy shores of seas, limans and other saline water bodies. It overwinters in the imago stage. Megathermophile. Mesohygrophile. Litter halophilous species. Larva is geostatobiont, imago is digging stratobiont. Zoophage. It has been observed preying on staphilinids of *Bledius* genus. It occurs sporadically, Dnipropetrovsk Region is the southern border of its range (Jacobson, 1905–1916; Sharova, 1981; Kryzhanovskij et al., 1995; Brygadyrenko, 2003b; Rizun, 2003; Balkenhol, 2003, 2004; Putchkov, 2012a, 2018).

***Blemus discus (Fabricius, 1792).*** Almost throughout Europe, the North Caucasus, South Siberia, Far East, Japan. In Ukraine, it occurs in the Carpathians, Polissia, Forest-Steppe, mountains of Crimea. Single discoveries were also reported for the north of the steppe zone. In Dnipropetrovsk Region, it is known only for the territory of the Region's capital (the Tonelna Ravine and forests near apartment blocks Topol-3 and Koreia). It lives mostly on wet clayey and sabulous soils, peatlands, under foliage from tree-shrub vegetation, in floodplains, gullies, and ravines. It sometimes occurs near wetlands, wet meadows, deciduous and mixed forests. It is active at night, and rarely (in twilight and mild weather) during the day. It flies to light (mostly ultraviolet). Beetles are seen from April to October, more often from late June until early September. It overwinters mostly as larva. Imagoes emerge from pupae in July. Oligothermophile. Mesohygrophile. Floodplain forest-meadow dweller. Larva is geostatobiont, imago is superficial stratobiont. Facultative zoophage. Sometimes, it is found in gardens, parks and windbreaks, and singular specimens were seen in fields of tilled (sugar beet) and technical (cannabis) crops in the Forest-Steppe and the Polissia. It is a very rare species for the steppe zone of Ukraine. It can consume some harmful insects and Acari. It is recorded singly. Decrease in natural living locations is possible as a result of decrease in tree and shrub structures. New nature reserves need to be created in the city of Dnipro, and the control of the status of green areas in the city needs to be increased (Jacobson, 1905–1916; Kryzhanovskij, 1983; Kryzhanovskij et al., 1995; Brygadyrenko, 2003b; Moravec et al., 2003; Rizun, 2003; Lompe, 2004; Bukejs & Balalaikins, 2008; Koval, 2009; Putchkov, 2012a, 2018; Aleksandrowicz, 2014; Putchkov & Rizun, 2015).

***Epaphius secalis (Paykull, 1790).*** Almost throughout Europe, Western and Eastern Siberia. In Ukraine, it occurs in the Carpathians, Polissia, Forest-Steppe, north of the steppe zone. In Dnipropetrovsk Region, it is known in the outskirts of Andriivka Village of Novomoskovsk District (alder and willow forests of the central floodplain and near-terrace areas of floodplains of the Samara River). It mostly occurs in deciduous and mixed forests, shrubs, rarely in areas adjacent to meadows and in river floodplains. Sometimes, imagoes are found in river alluvium. Beetles tend to live in the upper layers of soil, foliage litter, semi-decayed tree stumps, under logs, stones, more rarely among herbaceous vegetation; may ascend plants. Beetles are mostly active at night (fly to light). In the steppe zone, they are seen from late March to early November, more often from late July to mid August, and in the Forest Steppe – from mid April to early October, but more often from August to mid September. In the mountains, it reaches the belt of beech forests. Females with eggs have been recorded in September and March–April. In the Forest Steppe, it most often overwinters as imago, in the Steppe – as imago and larva. Mesothermophile. Mesophile. Forest-meadow dweller. Larva and imago are litter stratobionts. Trophic specialization. Zoophage that feeds on various small invertebrates. Sporadic feeding on seedlings and flowering parts of wild and cultivated grasses, technical crops and kitchen garden plants has been observed. In agrocenoses, it has been most commonly found in gardens of the forest and forest-steppe zones. On arable land, it occurs singly and only in the Northern Ukraine, rarely in gardens. It is sporadically common in Polissia and the Forest Steppe, and rare in the south (Jacobson, 1905–1916; Petrusenko, 1973; Kryzhanovskij, 1983; Kryzhanovskij et al., 1995; Brygadyrenko, 2003a, 2003b; Moravec et al., 2003; Rizun, 2003; Lompe,

2004; Putschkov, 2012a, 2018; Błaszkiwicz & Schwerk, 2013; Aleksandrowicz, 2014; Putschkov & Rizun, 2016).

***Bembidion (Notaphemphanes) ephippium (Marshall, 1802)***. From South Moldova to the Lower Volga region. In Ukraine, it has been recorded only in the steppe zone, mainly in the south. In Dnipropetrovsk Region, it occurs only at the Bulahivka Liman Ornithological Reserve (Pavlohrad District). Most often, it is encountered on the shores of seas, limans and salt lakes. In Dnipropetrovsk Region, it is seen very rarely on solonchaks, in associations of sea clubrush (*Bolboschoenus maritimus* (L.) Palla). Imagoes are active from late May to August. It presumably overwinters in the imago phase. Megathermophile. Hygrophile. Litter halophile species, indicator of saline soils. Larva is geostatobiont, imago – superficial stratobiont that runs. Zoophage. Isolated specimens are found in some gardens and parks. Rare species in the region. Its population may be declining as a result of land development in solonchaks, contamination of solonchak ecosystems by pesticides from environmental agrocenoses. It is protected in the Bulahivka Liman Ornithological Reserve (Jacobson, 1905–1916; Kryzhanovskij, 1983; Andersen, 1988; Theiss & Heimbach, 1994; Kryzhanovskij et al., 1995; Brygadyrenko, 2000, 2003b; Marggi et al., 2003; Müller-Motzfeld, 2003; Müller-Motzfeld & Marggi, 2011; Putschkov, 2012a, 2018; Raupach et al., 2016).

***Bembidion (Talanus) aspericollis (Germar, 1872)***. The range spans South Moldova to Kazakhstan and the mountains of the Central Asia. In Ukraine, it has been recorded almost throughout the steppe zone. In Dnipropetrovsk Region, it is known to live in the ecosystems around solonetz-solonchak terraces of the rivers Samara and Vovcha. It is found on shores of salt lakes, limans and seas. It tends to live in groups of sea clubrush (*Bolboschoenus maritimus* (L.) Palla). It occurs in summer and overwinters as imago. Megathermophile. Hygrothermophile. Litter halophile species, indicator of saline soils. Larva is geostatobiont, imago – surface running stratobiont. Zoophage. Decrease in natural living locations of the species is possible because of land development in solonchaks, contamination of solonchak ecosystems by pesticides from surrounding agrocenoses. It is protected in the Bulahivka Liman Ornithological Reserve (Jacobson, 1905–1916; Sharova, 1981; Kryzhanovskij, 1983; Kryzhanovskij et al., 1995; Brygadyrenko, 2000, 2003b; Marggi et al., 2003; Müller-Motzfeld, 2004; Müller-Motzfeld & Marggi, 2011; Putschkov, 2012a, 2018; Komlyk & Brygadyrenko, 2019a).

***Pogonius (Pogonoidius) cumanus Lutschnik, 1916***. The range spans the south of Moldova to Kazakhstan. In Ukraine, it has been recorded in the far south of Odesa Region (Vilkove) and the Azov Sea region and saline sites in the south of Poltava and Dnipropetrovsk Regions. It possibly inhabits the entire strip of the Black Sea-Azov Basin. In Dnipropetrovsk Region, it is known to live in Pavlohrad District, outskirts of Bulahivka Village, solonchaks near Bulahivka Liman. It occurs in saline, but relatively dry sites on shores of various water bodies, as well as in steppe, usually in June–August. On shores of Bulahivka Liman, it occurs in thickets of *Salicornia europaea* L., *Halimione verrucifera* (Bieb.) Aell. and open areas with no vegetation (in fractures of soils and under shelter). It overwinters as imago. Megathermophile. Mesohygrophile. Halophile, relatively litter species. Larva is geostatobiont, imago – surface stratobiont. Zoophage. In agrocenoses, as occasional species, it was found only when catching using light in gardens and vineyards of Crimea. Relatively rare, local species. However, in some years, its number reached 0.8–1.2 ind./m<sup>2</sup> in the Bulahivka Liman Ornithological Reserve, but the area of the population did not exceed 20 ha. Despite multiple searches in other solonchak sites of the region, even isolated individuals have not been found. The natural habitat of the species is shrinking because of land developments in solonchaks (Jacobson, 1905–1916; A. A. Petrusenko & S. V. Petrusenko, 1970a; Kryzhanovskij, 1983; Kryzhanovskij et al., 1995; Brygadyrenko, 1999a, 2000, 2002b, 2003b; Bousquet, 2003d; Putschkov, 2012a, 2018).

***Pogonistes (s. str.) convexicollis Chaudoir, 1871***. Europe (from Greece to the Caspian Sea), Kazakhstan, Turkey. In Ukraine, it is widespread mostly on the coasts of the Black-Azov Sea Basin. In Dnipropetrovsk Region, it has been recorded in Pavlohrad District, outskirts of Bulahivka, solonchaks of the Bulahivsky Liman. It occurs on saline sites on shores of seas, limans and salt lakes under various remains and alluvium. Relatively rare species. On the shores of Bulahivka Liman, it is found in

thickets of *Salicornia europaea* L., more rarely on open ground with no vegetation, most often in May–August. It overwinters in the imago stage. Megathermophile. Mesohygrophile. Typical halophile. Larva is geostatobiont, imago – surface stratobiont. Zoophage. It occurs locally. Sometimes, its number reached 1.0–1.5 ind./m<sup>2</sup>, but in the area of solonchaks of around 4–5 ha. In some years, the population can rapidly decline. Decrease in natural habitat is possible due to changes in saline regime (for example during irrigation), influx of pesticides from agrocenoses or forests bordering with the Reserve. It is protected in the Bulahivka Liman Ornithological Reserve and the Black Sea Biosphere Reserve (Jacobson, 1905–1916; A. A. Petrusenko & S. V. Petrusenko, 1970a; Kryzhanovskij, 1983; Kryzhanovskij et al., 1995; Brygadyrenko, 1999a, 2000, 2002b, 2003b; Bousquet, 2003d; Baehr, 2004b; Arndt & Schnitter, 2011b; Putschkov, 2012a, 2018).

***Patrobus atrofus (Strom, 1768)***. Almost throughout Europe, south of the Western Siberia. In Ukraine – Carpathians, Polissia, the Forest Steppe (most often in the west) and the Northern Subzone of the Steppe (mainly the Donetsk Ridge). In Dnipropetrovsk Region, it has been recorded in the Samarsky Pine Forest and floodplain forests of the Oril River (alder forests, pre-terrace areas, mesohygrophilous oak forests of the central floodplain). It occurs mostly in forest biotopes, sometimes in sparse tree-shrub associations and parks. It is common in Polissia and the Forest Steppe; rare in the steppe zone. In the Carpathians, it reaches the belt of beech forests. It is seen from April until September. It overwinters in the imago stage, and possibly as some older-age larvae. Oligothermophile. Hygrothermophile. Forest-shrub dweller. Larva is geostatobiont, imago – litter stratobiont. Zoophage. In agrolandscapes (gardens) of Polissia and Prykarpattia, it has been recorded as an occasional species. Isolated specimens were seen in potato fields of the Zakarpattia Region. It preys on some species of insects that are pests to forestry. It occurs locally, though sometimes quite often. Decrease in the natural habitat is possible due to changes in the hydrological regime of the floodplain forests, increase in mineralization of soil moisture, cutting of trees and shrub vegetation. Protection is needed for the local populations in the territory of the Samarsky Pine Forest and in the floodplain of the Oril River (Jacobson, 1905–1916; Kryshtal, 1956; Refseth, 1980; Kryzhanovskij, 1983; Kryzhanovskij et al., 1995; Brygadyrenko, 2002a, 2003b, 2005c; Rizun, 2003; Zamotailov, 2003; Pail, 2004b; Koval, 2009; Putschkov, 2012a, 2018; Aleksandrowicz, 2014).

***Stomis pumicatus (Panzer, 1796)***. Europe, Caucasus, the Southern Caucasus, Turkey. In Ukraine, it occurs almost everywhere, except Crimea and dry steppes. In Dnipropetrovsk Region, it has been recorded in the Samarsky Pine Forest (Novomoskovsk and Pavlohrad Districts), floodplain forests of the Oril River (Yurivka District), the Dnipro-Oril Nature Reserve, bairak forests of the Verhniodniprovsk and Synelnykovo Districts. In the Forest Steppe, it inhabits glades and lives deep in forests and shrubs of various types. In the Steppe, it inhabits bairak forests and floodplain biotopes of various types (shrub associations, wet meadows). Isolated specimens are found in tracts of herbaceous steppe. Imagoes are active at night. They are seen from April until September. Mesothermophile. Mesophile. Forest dweller. Larva is geostatobiont, imago – litter stratobiont. Zoophage. It consumes earthworms, larvae of lepidopterans, dipterans, eggs of terrestrial mollusks, etc. It has occasionally been seen to damage seedlings of mustard. Beneficial entomophage (Jacobson, 1905–1916; Darlington, 1940; Petrusenko, 1973; Sharova, 1981; Bousquet, 1983, 2003c; Kryzhanovskij, 1983; Putschkov, 1990a, 2007, 2012a, 2018; Kryzhanovskij et al., 1995; Brygadyrenko, 1999b, 2000, 2003b, 2003c; Rizun, 2003; Marggi, 2004; Koval, 2009; Brygadyrenko et al., 2012; Bondarenko et al., 2020).

***Pedius inquinatus (Sturm, 1824)***. Northeast Europe, Turkey. In Ukraine – Zakarpattia Region, Steppe Zone and Crimea. In Dnipropetrovsk Region, it has been recorded only in hygrophytic areas of the third solonetz-solonchak terrace of the Vovcha River (outskirts of Levadky Village of Pavlohrad District). It occurs in narrow strips of forest, shrubs and meadows. In Zakarpattia Region, it is indicated as a characteristic inhabitant of the lower forest belt. It is recorded in June – early July. The species most likely overwinters as imago. Megathermophile. Mesophile. Meadow-dwelling species. Larva is geostatobiont, imago – litter stratobiont. Zoophage. It is occasionally seen in lucerne fields in the steppe zone, but the

discoveries need to be confirmed (Jacobson, 1905–1916; Sharova, 1981; Kryzhanovskij, 1983; Eidelberg, 1989; Putchkov, 1990a, 2012a; Kryzhanovskij et al., 1995; Brygadyrenko, 2000, 2003b; Bousquet, 2003c; Marggi, 2004; Putchkov, 2007, 2012a, 2018; Sumarokov, 2009; Guéorguiev, 2011a).

***Pterostichus (Argutor) chamaeleon* Motschulsky, 1866.** South of the Central and Eastern Europe, Kazakhstan, south of Western Siberia. In Ukraine – Zakarpattia Region, the forest-steppe and steppe zone. In Dnipropetrovsk Region, it is known to live on the outskirts of villages Bohuslav, Levadky, Bulahivka of Pavlohrad District – in areas covered by halophytic meadow vegetation. It is rarely found in dry meadows and mesophytic steppe sites. It is seen from late May to July. Mesothermophile. Mesophile. Meadow dweller. Larva is geostatobiont, imago – litter stratobiont. Zoophage. Isolated specimens have been noted in grain crops in southern Ukraine (Jacobson, 1905–1916; Sharova, 1981; Kryzhanovskij, 1983; Putchkov, 1990a, 2007, 2012a, 2018; Kryzhanovskij et al., 1995; Brygadyrenko, 2000, 2003b, 2003c; Rizun, 2003; Bousquet, 2003c; Marggi, 2004; Guéorguiev, 2011b).

***Pterostichus (Omaeus) elongatus* (Duftschmid, 1812).** South part of Central and Eastern Europe, Southern Caucasus, Kazakhstan. In Ukraine – south of Forest Steppe, Steppe, Crimea. In Dnipropetrovsk Region, it has been recorded in about 20% of examined meadow ecosystems located in floodplains of small rivers and the Dniro. The number was low everywhere. It occurs in wet, sometimes waterlogged places, including talwegs of bairaks. It is seen from late March to August. The species overwinters in the imago stage. Megathermophile. Hygromesophile. Meadow-wetland dweller. Larvae and imagoes are litter stratobionts. Zoophage (Jacobson, 1905–1916; Sharova, 1981; Kryzhanovskij, 1983; Eidelberg, 1989; Putchkov, 1990a, 2007, 2012a, 2018; Kryzhanovskij et al., 1995; Brygadyrenko, 2000, 2003b, 2003c; Bousquet, 2003c; Marggi, 2004; Guéorguiev, 2011b).

***Pterostichus (Adelosia) macer* (Marsham, 1802).** Almost throughout Europe, Caucasus, the Southern Caucasus, Kazakhstan, Southern Siberia, Northern China. In Ukraine – almost everywhere, except the Carpathians and Northern Polissia. In Dnipropetrovsk Region, it has been recorded in Pavlohrad (outskirts of Levadky and Bulahivka Villages) and Synelnykovo Districts (outskirts of Raivka Village). It occurs in dry meadows, steppe depressions, non-dense broad-leaved forests, and singly in agrocenoses (the steppe zone). It has been recorded in open, well heated areas near water (shores of fresh and saline water bodies). It is seen from May to September, and overwinters as imago. Mesothermophile. Mesophile. Meadow-steppe dweller. Larva is geostatobiont, imago – litter stratobiont. Zoophage. It rarely occurs on tilled crops of Zakarpattia, on grain crops in the steppe and the forest-steppe zones, and in gardens and berry gardens in montane areas of Crimea. It preys on some species of insect pests. Isolated specimens have been recorded in the steppe zone. Agrotechnical and chemical measures against pests may be reducing its natural living locations (Jacobson, 1905–1916; Sharova, 1981; Kryzhanovskij, 1983; Eidelberg, 1989; Putchkov, 1990a; Kryzhanovskij et al., 1995; Brygadyrenko, 1999b, 2000, 2003b, 2003c; Rizun, 2003; Bousquet, 2003c; Marggi, 2004; Putchkov, 2007, 2012a, 2018; Sumarokov, 2009; Koval, 2009; Guéorguiev, 2011b).

***Pterostichus (Feronidius) melas* (Creutzer, 1799).** Almost throughout Central, the south of Eastern and the east of Southern Europe. In Ukraine – almost everywhere, except the north of Polissia. It has been supposedly found in montane regions of Crimea. In the fauna of Ukraine, it is represented by two subspecies, the nominative occurring in Zakarpattia and Prykarpattia, and *P. melas formicatus* (Kolenati, 1845) – in the south of the left-bank Polissia, the Forest Steppe and the Steppe. In Dnipropetrovsk Region, this subspecies is present in almost all administrative districts. Typical habitats include open biotopes (dry meadows, steppe sites, ravines), rarer sparse windbreaks and agrocenoses. In the mountains, it reaches the belt of beech forests. Imagoes are active at night and in twilight. It is seen rather uncommonly from late March until late October. The species overwinters in the imago stage. Mesothermophile. Mesoxerophile. Meadow-steppe dweller. Larva is geostatobiont, imago – litter stratobiont. Zoophage. Isolated specimens occur in gardens and berry gardens, and in small numbers it is seen in arable lands of Zakarpattia, though is indicated as a common species for Southern Ukraine. It preys on

some species of insect pests. In the steppe zone, its number is always low. Its decline is likely to be as a result of agrotechnical (arable farming in its natural environments) and chemical (insecticide treatments) measures (Jacobson, 1905–1916; Sharova, 1981; Kryzhanovskij, 1983; Kryzhanovskij et al., 1995; Brygadyrenko, 1999b, 2003b, 2003c, 2004a, 2004b, 2016; Rizun, 2003; Bousquet, 2003c; Marggi, 2004; Putchkov, 2007, 2012a, 2018; Koval, 2009; Sumarokov, 2009; Giglio et al., 2011, 2015; Guéorguiev, 2011b; Benitez et al., 2018).

***Taphoxenus gigas* (Fischer von Waldheim, 1823).** The south of Moldova, Ukraine and Russia, Northern Caucasus, steppes of Kazakhstan, south of Siberia (eastward to Altai), Western Mongolia. In Ukraine – throughout the steppe zone and, perhaps, southern regions of the Forest-Steppe. In Dnipropetrovsk Region, it has been found in Synelnykovo (steppe sites along the Synelnykovo–Dniro railway) and Nikopol Districts (Y. Y. Tretiakov). It occurs in relatively dry steppe sites, often in burrows of rodents, sometimes under rocks, in depressions of ravines, on solonchets, rarely in sparse cultivated forests or tree-shrub associations. It is seen from early June to late September, more often in June–July. Beetles are active at night. Most often, it probably overwinters as imago. Megathermophile. Mesoxerophile. Typical steppe dweller, botrobiont. Larva is geobotrobiont, imago – strato-botrobiont. Zoophage, often preys on darkling beetles, consumes many invertebrate botrobionts. Cases have been recorded of eating new-born mice-like rodents. Rarely, but regularly, it is found in fields of grain crops, perennial herbs, in gardens, but only in the south of the steppe zone and Crimea. It consumes a number of insect pests and (facultatively) small mouse-like rodents. It is scarce in the steppe zone, but can be classified as subdominant occurring locally in some biotopes. A decline in its numbers is possible because of extension of arable farming in virgin steppe sites. In association with other insects, it is protected in the Askania Nova, Kamiani Mohyly, Khomutovsky Steppe and Striltsivskiy Steppe nature reserves. Virgin steppe areas in the territory of Synelnykovo District need to be protected (Jacobson, 1905–1916; Sharova, 1981; Kryzhanovskij, 1983; Kryzhanovskij et al., 1995; Brygadyrenko, 1999b, 2003b, 2003c; Casale, 2003; Ruiz et al., 2009; Sumarokov, 2009; Putchkov, 2012a, 2018).

***Laemostenus (Pristonychus) terricola* (Herbst, 1784).** Almost throughout Europe, eastward to the Northern Caucasus. In Ukraine – almost everywhere, but more often in the south. In Dnipropetrovsk Region, it has been found in the territory of the region's capital (parks of the right-bank side of the city, private houses in the area of the Robocha St. and Metalurhiv Ave.), in Pavlohrad and Synelnykovo Districts. It is a relatively ecologically flexible species. It occurs in meadows, steppe, and also burrows of rodents, under shelters, sometimes in sparse forests, parks, bairaks, rarely in agrocenoses. In the Carpathians, from the plains, it reaches the belt of beech and spruce forests (up to the height of 600 m). Beetles are active at night. It is seen from March to October, more often in May–July, and overwinters most likely as imago and larva. Oligothermophile. Mesophile. Meadow-forest dweller. Larva is geostatobiont, imago – stratobotrobiont. It is a zoophage that feeds on many invertebrates. It has rarely been seen in grain crops and in gardens of the Forest-Steppe and the south of Ukraine, and also urbocenoses (lawns and some parks of the city of Kharkiv). Entomophage of some insect pests. In the steppe zone, isolated specimens have been recorded. The decline in its population may be due to damage to soil caused by arable farming, use of pesticides in agrocenoses and forested areas (Jacobson, 1905–1916; Sharova, 1981; Kryzhanovskij, 1983; Gruttke, 1994; Kryzhanovskij et al., 1995; Rizun, 2003; Brygadyrenko, 1999b, 2003b, 2003c; Brygadyrenko & Kabar, 2002; Casale, 2003; Assmann, 2004b; Ruiz et al., 2009; Sumarokov, 2009; Putchkov, 2012a, 2018; Aleksandrowicz, 2014; Brygadyrenko, 2015a).

***Agonum* (s. str.) *impressum* (Panzer, 1796).** Almost throughout Europe, Kazakhstan, Siberia, Far East, Northern China. In Ukraine – the Carpathians, Polissia and the Forest-Steppe, very rarely – the Northern Subzone of the Steppe. In Dnipropetrovsk Region, it has been recorded in Pavlohrad, Dnipropetrovsk and Synelnykovo Districts. It occurs in forests of various types, wet meadows. It is seen from April to August (highest numbers in May). Most often, it overwinters in the imago stage. Mesothermophile. Mesohygrophilic. Meadow-forest, relatively psammophilous species. Larva is geostatobiont, imago – litter stratobiont. Zoophage, it consumes some species of forest and meadow insect pests. In the steppe

zone, isolated have been recorded. The decline in its numbers may be as a result of destruction of the species' living locations – meadows, forest and shrub biotopes. To protect the species, the Landscape Reserve Pavlohrad Sand Steppe on the southern edge of Pavlohrad needs to be created (Jacobson, 1905–1916; Kryshstal, 1956; Sharova, 1981; Kryzhanovskij, 1983; Kryzhanovskij et al., 1995; Brygadyrenko, 1998b, 2003b, 2003c; Bousquet, 2003a; Rizun, 2003; Schmidt, 2004, 2011; Sumarokov, 2009; Putchkov, 2012a, 2013b, 2018; Aleksandrowicz, 2014).

***Agonum marginatum* (Linnaeus, 1758).** The west of North Africa, almost throughout Europe, Caucasus, Ciscaucasia, Turkey. In Ukraine – almost everywhere. In Dnipropetrovs Region, it is known to live only in meadow areas of the arena terrace of the Vovcha River (southern outskirts of the city of Pavlohrad). Most often, it occurs on shores of water bodies, on wet sandy soil. In the Carpathians, it occurs in beech forests and the subalpine zone. It is seen from March until November (most often in April–May). Most often, it is likely to overwinter as imago. Mesothermophile. Hygromesophile. Meadow-litter species. Larva is geostrobiont, imago – litter stratobiont. Zoophage. In the forest and the forest-steppe zones, it rarely occurs in parks, gardens, windbreaks, and occasionally in fields. It is protected in complex with other insects in the Dniester Canyon National Park (Jacobson, 1905–1916; Sharova, 1981; Kryzhanovskij, 1983; Putchkov, 2012a, 2013b, 2018; Kryzhanovskij et al., 1995; Brygadyrenko, 2000, 2003b, 2003c; Rizun, 2003; Bousquet, 2003a; Koval, 2009; Sumarokov, 2009; Schmidt, 2004, 2011; Aleksandrowicz, 2014).

***Agonum* (s. str.) *monachum* Duftschmid, 1812 (= *aratum* Duftschmid, 1812; = *makolskii* Roubal, 1935).** Almost throughout Europe, Caucasus, Kazakhstan, the south of Western Siberia. In Ukraine – the Bukovina, Zakarpattia, Polissia, Northern Subzone of the Steppe, the Donetsk Ridge, Crimea. It may be found in the Forest Steppe as well. In Dnipropetrovs Region, it has been reported in Pavlohrad (outskirts of the city of Pavlohrad) and Synelnykovo (outskirts of Raivka Village) districts. It occurs on shores of rivers and in wetlands (in thickets of reed or *Carex* true sedges), in mixed and broad-leaved forests, more often in wet places, sometimes on solonetz soils. It is seen in May–August, most often in June. Imagoes most likely overwinter. Mesothermophile. Hygromesophile. Meadow-forest dweller. Larva is geostrobiont, imago is litter stratobiont. Zoophage. As an occasional species, it has been reported in some floodplain agrocenoses of the forest and forest-steppe zones, but those reports need to be confirmed because of difficulties of identification. In the steppe zone, singular specimens were recorded. The decline in its population may be due to pressure from anthropogenic factors (destruction of the species' living locations) (Jacobson, 1905–1916; Kryshstal, 1956; Sharova, 1981; Kryzhanovskij, 1983; Kryzhanovskij et al., 1995; Brygadyrenko, 1998b, 2000, 2003b; Bousquet, 2003a; Schmidt, 2004, 2011; Sumarokov, 2009; Putchkov, 2012a, 2013b, 2018; Aleksandrowicz, 2014).

***Agonum* (s. str.) *sepxunctatum* (Linnaeus, 1758).** Almost throughout Europe, Caucasus, Turkey, Kazakhstan, the south of Siberia, Far East. In Ukraine – almost everywhere, except Crimea and dry steppes. In Dnipropetrovs Region, it has been reported in Pavlorad (outskirts of the city of Pavlohrad, Levadky and Bohuslav Villages), Synelnykovo (outskirts of Raiivka Village) and Dnipropetrovs (the Dnipro-Oril Nature Reserve) districts. It is found in various open wet sites (most often in mesohygrophite meadows), and also forests of various types. In the Carpathians, from the lowlands, it reaches the subalpine zone. In the south, it occurs only in floodplain biotopes. It prefers light soils. In Dnipropetrovs Region, it has been recorded on the shores of arena water bodies. It tends to live in over-wet sandy areas with sparse vegetation. It is seen from April until September, more often in early May. Most often, it overwinters in the imago stage. Mesothermophile. Mesohygrophile. Forest-meadow dweller. Hemipolite species. Larva is geostrobiont, imago – litter stratobiont. Zoophage. In transformed biotopes, it has been rarely seen in tree structures in plains of Ukraine, but most often in Polissia. Isolated specimens have been recorded on tilled lands. In the steppe zone, only isolated specimens recorded or the number is low. The decline in its population may be as a result of destruction of the species' living locations – meadow arenas of biotopes. To protect the species, the Pavlohrad Sandy Steppe Landscape Reserve on the southern outskirts of Pavlohrad needs to be created (Jacobson, 1905–1916; Kryshstal, 1956; Sharova, 1981; Kryzhanovskij, 1983; Lindroth et al., 1985; Kryzhanovskij et al., 1995; Brygadyrenko,

1998b, 2003b, 2003c; Rizun, 2003; Bousquet, 2003a; Schmidt, 2004, 2011; Koval, 2009; Putchkov, 2012a, 2013b, 2018; Aleksandrowicz, 2014).

***Agonum* (s. str.) *viridicupreum* (Goeze, 1777).** Almost throughout Europe, Caucasus, Turkey, Iraq, Kazakhstan, the south of Western Siberia. In Ukraine – almost everywhere, except the south of the Steppe, represented by the nominative subspecies, whereas discoveries of subspecies *A. viridicupreum cuprinum* Motschulsky, 1844 are doubtful. In Dnipropetrovs Region, it has also been recorded in Pavlohrad District (outskirts of Levadky, Bohuslav, Bulahivka Villages). Most often, it occurs in hygrophite meadows or near water in thickets of common reed *Phragmites australis* from April to September. In the Carpathians and montane region of Crimea, it reaches the belt of beech forests. Most often, it overwinters in the imago stage. Mesothermophile. Mesohygrophile. Floodplain-meadow dweller. Hemistenotopic species. Larva is geostrobiont, imago – litter stratobiont. Zoophage. As an occasional species, it has been recorded in some fields of Zakarpattia. Isolated specimens have been seen in the steppe zone. The decline in its population may be because of destruction of the species' habitats – meadow biotopes (Jacobson, 1905–1916; Kryshstal, 1956; Sharova, 1981; Kryzhanovskij, 1983; Kryzhanovskij et al., 1995; Brygadyrenko, 1998b, 2000, 2003b, 2003c; Rizun, 2003; Bousquet, 2003a; Schmidt, 2004, 2011; Koval, 2009; Drees et al., 2011; Putchkov, 2012a, 2013b, 2018; Brygadyrenko et al., 2012; Slinko & Brygadyrenko, 2012; Aleksandrowicz, 2014).

***Olisthopus sturmii* (Duftschmid, 1812).** Central and, partly, Southern Europe. Turkey, Kazakhstan, the south of Siberia, Far East. In Ukraine – almost ubiquitously, except the south of the Steppe. In Dnipropetrovs Region, it has been seen only in Synelnykovo District. It inhabits broad-leaved mesophytic forests and shrubs. Sometimes, it occurs in bairaks, groves, gardens and windbreaks. It has been rarely seen in meadows with sparse shrub vegetation. In the Carpathians, it reaches the belt of beech forests, but in Crimea, it has sometimes been found in yaylas. It is seen from April to September (more often in June). It probably overwinters as imago. Mesothermophile. Mesophile. Meadow-forest dweller. Larva is geostrobiont, imago is litter stratobiont. Zoophage. As an occasional species, it has been recorded in gardens, parks and windbreaks. Very rare species (Jacobson, 1905–1916; Sharova, 1981; Kryzhanovskij, 1983; Putchkov, 2012a, 2018; Kryzhanovskij et al., 1995; Rizun, 2003; Bousquet, 2003c; Sumarokov, 2009; Schmidt, 2004, 2011).

***Synuchus vivalis* (Illiger, 1798).** Europe, Caucasus, South Caucasus, Turkey, Israel, Kazakhstan, West Siberia, Far East, Japan. In Ukraine – almost everywhere, except steppes. In Dnipropetrovs Region, it has been seen only in plakor forests on the outskirts of Andriivka village of Novomoskovsk district. It rarely occurs in sparse broad-leaved forests, but tends to live in shrubs and groves. In the Carpathians, it reaches the spruce forest belt. It is seen from late April until October. The species overwinters in the imago stage. Mesothermophile. Mesophile. Forest polyzonal species. Larva is geostrobiont, imago – litter stratobiont. Zoophage. It has rarely been seen in gardens and parks, and isolated specimens in some dense windbreaks. On tilled lands, it has been recorded as an occasional species (Jacobson, 1905–1916; Sharova, 1981; Kryzhanovskij, 1983; Kryzhanovskij et al., 1995; Bousquet, 2003c; Brygadyrenko, 2003b, 2003c; Rizun, 2003; Assmann, 2004d; Marggi, 2004; Brygadyrenko & Fedorchenko, 2007; Brygadyrenko & Faly, 2009; Koval, 2009; Lindroth, 2009; Sumarokov, 2009; Putchkov, 2012a, 2018; Aleksandrowicz, 2014).

***Amara* (*Zezea*) *chaudoiri* Schaum, 1858.** Central and Eastern Europe, Caucasus, South Caucasus, Turkey, Central Asia and the south of Western Siberia. In Ukraine – almost everywhere, but sporadically. In Dnipropetrovs Region, it has been seen only in dry meadows of the third solonetz-solonchak terrace of the Samara River (outskirts of the city of Pavlohrad). It seldom occurs in open meadows and mesophyte steppes (in the north of its range), rarely in river alluvium. In plains, it is more often seen in May–July, and in the Carpathians – in June–July. Mesothermophile. Mesophile. Meadow-steppe dweller. Larva is geostrobiont, imago – litter stratobiont. Phytozoophage. It has rarely been seen in pastures and recorded as occasional species on some field crops in the forest-steppe zone. Rare species (Jacobson, 1905–1916; Kryshstal, 1956; Bily, 1975; Sharova, 1981; Kryzhanovskij, 1983; Eidelberg, 1989; Kryzhanovskij et al., 1995; Brygadyrenko, 1999b, 2000, 2003b, 2003c; Rizun, 2003;

Freude et al., 2004; Hieke, 2004, 2011; Koval, 2009; Sumarokov, 2009; Putchkov, 2012a, 2012b, 2018; Bondarenko et al., 2020).

***Amara (Bradytus) crenata Dejean, 1828.*** It has no nature-protection status. Almost throughout Europe (except Northern), Caucasus, Turkey, Iran, Turkmenistan, Kazakhstan, the south of Western Siberia. In Ukraine, it occurs in the Steppe, the southeast of the Forest-Steppe and Crimea. In Dnipropetrovsk Region, it has been seen only in steppe areas of the Near-Samara International Biosphere Stationary named after O. L. Belhard (the outskirts of Vsesviatske Village of Novomoskovsk District). Very rarely, it occurs in some steppe, often saline areas. It has been seen in June. Overwintering phase is likely the imago. Megathermophile. Mesoxerophile. Steppe dweller, moderately halophile species. Larva is geostatobiont, imago is litter stratobiont. Phytozoophage. As an occasional species, it has been recorded in some fields of the Southern Steppe. Very rare species. In complex with other insects, it is protected in Reserves in Southern Ukraine (the Khomutovsky Steppe Black-Sea Biosphere Reserve and the Kamiani Mohyly Reserve) (Jacobson, 1905–1916; Bily, 1975; Sharova, 1981; Kryzhanovskij, 1983; Kryzhanovskij et al., 1995; Brygadyrenko, 1999b, 2003b, 2003c; Rizun, 2003; Freude et al., 2004; Hieke, 2004, 2011; Sumarokov, 2009; Putchkov, 2012a, 2012b, 2018).

***Amara (Percosia) equestris (Duftschmid, 1812).*** Europe, Caucasus, Southern Caucasus, Kazakhstan, Central Asia, Siberia, West China. In Ukraine – almost everywhere (except the North Polissia), but most often in southern regions. In most of the country's territory, it is represented by the widespread nominative subspecies (in the far southeast of Ukraine, possible discovery of *A. equestris pastica* Dejean, 1831 subspecies was made). In Dnipropetrovsk Region, it has been found in Pavlohrad, Vasylykivka and Synelnykovo Districts. It has been rarely encountered in various relatively xeromesophytic meadow areas and steppe. Sometimes, it has occurred in sparse tree-shrub biotopes. In the mountains, it reaches the belt of beech forests. In the south of the Polissia and the Forest-Steppe, it lives in herbaceous and shrub groups on the southern slopes of hills, more rarely in glades and near-forest areas of deciduous and mixed forests. In the steppe zone, it is characteristic in meadows, various types of steppe, shrubs, ravines and depressions, and more rarely occurs in bairak forests. Sometimes it is seen in floodplain biotopes and river alluvium. Imagoes are active mostly at night. They fly to light. They appear from late March until mid September, more often in May–June. In August, beetles can enter diapause. Imagoes hatch from pupae in late May. Females with eggs have been seen in early June. Most often, it overwinters as larva. Megathermophile. Broad mesophile. Meadow-steppe dweller. Larva is geostatobiont, imago is litter stratobiont. Supposedly zoophytophage: it is indicated as predator that consumes pods of Acridoidea. Consumption of plants has not been studied. Can prey on some species of insect pests (Acridoidea). In the steppe zone, single specimens have been seen. The decline in its population may be due to arable farming in natural steppe sites (Jacobson, 1905–1916; Kryshthal, 1956; Bily, 1975; Sharova, 1981; Kryzhanovskij, 1983; Hieke, & Wrase, 1988; Kryzhanovskij et al., 1995; Brygadyrenko, 1999b, 2000, 2001a, 2003b; Rizun, 2003; Hieke, 2003, 2004, 2011; Sumarokov, 2009; Putchkov, 2012a, 2012b, 2018; Bondarenko et al., 2020).

***Amara (Bradytus) fulva (O. Müller, 1776).*** Almost throughout Europe, Ural, Southern Caucasus, Kazakhstan, Siberia (eastward to the Baikal). In Ukraine – everywhere, most often in Polissia and the Forest-Steppe. In Dnipropetrovsk Region, it has been found in the arena terraces of small rivers (Samara, Vovcha, Oril) and the Dnipro. It lives in various floodplain biotopes (meadows, tree-shrub areas), mainly on sandy and loamy soils. In the Forest-Steppe, it is quite common in meadows, more rarely in mixed and deciduous forests. In the steppe zone, typical living locations are depressions, ravines, bairak forests, and sometimes occurs in mesophytic steppes. It has been seen in alluvium on shores of rivers, seas, limans and salt lakes. The beetles are seen from late March to October, more often in May–June. They are active mostly at night. They overwinter in the imago stage. Mesothermophile. Mesophile. Floodplain-meadow psammophytic species. Larva is geostatobiont, imago – stratobiont that digs. Phytozoophage. It has been seen eating larvae of some beetles (click beetles, Scarabaeidae, Curculionidae, Chrysomelidae) and Lepidoptera (Noctuidae, Geometridae, Cydia). They rarely eat seedlings and seeds of wild and cultivated grasses and kitchen garden plants. In the conditions of

agrolandscapes, it has been seen only in the Polissia and the right-bank Steppe, but in small numbers. Sometimes, it occurs in pastures, more rarely in gardens, parks and windbreaks, on sandy soils. In agroecosystems of the steppe zone, it has been recorded as a rare species. It can predate some insect pests. In the steppe zone, isolated specimens have been recorded. Its population may be declining due to expansion of arable farming into natural areas, especially sites of psammophytic steppe and meadows (Jacobson, 1905–1916; Kryshthal, 1956; Petrusenko, 1973; Bily, 1975; Sharova, 1981; Kryzhanovskij, 1983; Kryzhanovskij et al., 1995; Brygadyrenko, 1999b, 2003b; Hieke, 2003, 2004, 2011; Bukejs & Balalaikins, 2008; Koval, 2009; Sumarokov, 2009; Putchkov, 2012a, 2012b, 2018; Aleksandrowicz, 2014; Kolesnikov & Malueva, 2015).

***Amara (Celia) sabulosa Audenet-Serville, 1821.*** Southeast and south of Central Europe, Asia Minor. In Ukraine, it was recorded in Zakarpattia, in the Western Podilia, the forest-steppe and steppe zones. In Dnipropetrovsk Region, it has been reported for the territory of Synelnykovo District. It occurs rarely in sparse broad-leaved forests, but tends to live in shrubs and groves. It was seen from late April until October. It overwinters as imago. Megathermophile. Mesophile. Meadow-steppe dweller. Larva is geostatobiont, imago is litter stratobiont. Phytozoophage. Isolated specimens were found on field crops in Zakarpattia, Forest-Steppe and Steppe. Very rare species. In complex with other insects, it is protected in reserves of South Ukraine (The Black Sea Biosphere Reserve, Khomutovsky Steppe and Kamiani Mohyly Reserves) (Jacobson, 1905–1916; Bily, 1975; Sharova, 1981; Kryzhanovskij, 1983; Eidelberg, 1989; Kryzhanovskij et al., 1995; Freude et al., 2004; Hieke, 2004, 2011; Koval, 2009; Sumarokov, 2009; Putchkov, 2012a, 2012b, 2018).

***Curtonotus convexiusculus (Marsham, 1802).*** Europe, North Caucasus, Turkey, Kazakhstan, West Siberia, China, Mongolia. In Ukraine – almost everywhere, except the Carpathians, but most often in the Right-Bank Ukraine. In Dnipropetrovsk Region, it is known only in dry meadow ecosystems of the solonetz-solonchak terrace of steppe rivers (Oril, Samara, Vovcha, Inhulets, Dnipro). It occurs in meadows of various types, fallows and steppe areas, sometimes solonchaks (in the steppe zone) or near water bodies. In the forest zone and the forest-steppe, it tends to live in areas of meadow steppes, less often shrubs and mixed forests. In the conditions of the Steppe, it was seen in densely vegetated areas, shrubs, depression, in talwegs of ravines. It is scarce in floodplain biotopes, shores of seas, limans and salt lakes. Sometimes, it ascends plants. Is seen from mid April to late October, most often in June–July. Females with eggs have been seen in mid June. It overwinters as imago and, perhaps, larva. It is active mostly in twilight and at night. Megathermophile. Mesophile. Meadow-steppe, moderately halophilous species. Larva is geostatobiont, imago – litter stratobiont. Zoophytophage. Regarding animals, it has been seen to consume small invertebrates with soft coatings, for example pupae of *Cydia* moths. As with plants, it insignificantly damages wild and cultivated grasses, technical and medicinal plants. It is not often observed. However, in fallows, gardens, parks and windbreaks, it is a quite common species. In Central Europe, it has been sporadically recorded in local landfills, sometimes even more often than in natural habitats. In field crops, isolated individuals are recorded (Jacobson, 1905–1916; Petrusenko, 1973; Sharova, 1981; Kryzhanovskij, 1983; Eidelberg, 1989; Kryzhanovskij et al., 1995; Brygadyrenko, 1999b, 2000, 2003b; Rizun, 2003; Freude et al., 2004; Hieke, 2004, 2011; Saska, 2005; Brygadyrenko & Faly, 2009; Koval, 2009; Sasakawa, 2009, 2010; Sumarokov, 2009; Putchkov, 2012a, 2018).

***Anisodasytus (Hexatrichus) poeciloides (Stephens, 1828).*** North Africa, almost throughout Europe (except the north), Caucasus, Southern Caucasus, Kazakhstan, east of Western and Central Asia, the south of Western Siberia. In Ukraine (and then eastward), it is represented by the widespread subspecies *A. poeciloides pseudoaeneus*. It has been seen in the steppe zone, most often in Left Bank and Crimea (except mountains). In Dnipropetrovsk Region, it has been found in floodplain (meadows with signs of salinization) and solonetz-solonchak terraces of small rivers (Samara, Vovcha, Oril). It occurs in open biotopes with various degrees of salinity. It is common in alluvium near saline water bodies. At Bulahivka Liman, it dominates in associations of *Halimione verrucifera* (M. Bieb.) Aellen, 1938) and lowland meadow areas. It is seen from late April until August, most often in June–July. Beetles are active in twilight, and at night

during hot weather. Females with eggs are seen from late June to mid August. It overwinters as imago and 2–3 age larvae. Megathermophile. Mesohygrophile. Moderately halophilous steppe species. Larva is geostrobiont, imago – litter stratobiont. Zoophytophage. As an occasional species, it was reported for some gardens and fields of grain crops (mainly flying to light). Facultative entomophage, eats various invertebrates, rarely plants as well. In Dnipropetrovsk Region, it is seen sporadically. The decline in its numbers may be due to developments of land in solonchets (Jacobson, 1905–1916; Kryshstal, 1956; Sharova, 1981; Kryzhanovskij, 1983; Kryzhanovskij et al., 1995; Brygadyrenko, 1998a, 2000, 2003b; Ito, 2003; Wrase, 2004, 2011a; Sumarokov, 2009; Putchkov, 2012a, 2018).

***Diachromus germanus* (Linnaeus, 1758).** Almost throughout Europe (except the north), Caucasus, Southern Caucasus, Kazakhstan, Central Asia. In Ukraine – almost everywhere, except highlands of the Carpathians. In Dnipropetrovsk Region, it has been found in floodplain (meadows with signs of salinization) and solonetz-solonchak terraces of small rivers (Samara, Vovcha). It occurs in various open meadow and steppe biotopes, rarely in sparse tree-shrub sites. In the Carpathians, it reaches the beech forest belt. It is observed from late March until September, most often in June–July. It can probably overwinter as larva, as well as imago. Mesothermophile. Mesohygrophile. Meadow dweller. Larva is geostrobiont, imago – litter stratobiont. Zoophytophage. Isolated individuals have been seen in pastures and fallows. As an occasional species, it has been recorded in agrocenoses of Zakarpattia. In Dnipropetrovsk Region, it is sporadic. Its population may be declining because of arable farming in steppe and meadow areas (Jacobson, 1905–1916; Kryshstal, 1956; Kryzhanovskij, 1983; Lindroth et al., 1985; Kryzhanovskij et al., 1995; Brygadyrenko, 2000, 2003b; Ito, 2003; Rizun, 2003; Wrase, 2004, 2011b; Koval, 2009; Sumarokov, 2009; Putchkov, 2012a, 2018; Aleksandrowicz, 2014).

***Acupalpus (Ancylostria) interstitialis* Reitter, 1884.** South and, partly, Central Europe, Turkey, Kazakhstan. In Ukraine, it occurs mostly in the steppe zone, but also reaches the Southern Forest-Steppe. In Dnipropetrovsk Region, it has been seen only in the south (Synelnykovo District). It is most often encountered on shores of saline water bodies, sometimes in solonchets and solonchaks. Isolated specimens have been seen in ravines, depressions and river valleys. It is active mostly in twilight, and flies to light at night. Beetles are seen from early April to late October, most often in May–June. Megathermophile. Mesohygrophile. Steppe dweller, moderately halophilous species. Larva is geostrobiont, imago – litter stratobiont. Phytozoophage. As an occasional species, it is seen in fields (most often irrigated) in the south of the steppe zone (Jacobson, 1905–1916; Sharova, 1981; Kryzhanovskij, 1983; Putchkov, 2012a, 2017, 2018; Kryzhanovskij et al., 1995; Jaeger, 2003, 2004; Freude et al., 2004; Sumarokov, 2009; Jaeger, 2011).

***Acupalpus saturalis* (Dejean, 1829).** Almost throughout Europe (except Northern), Caucasus, Turkey. In Ukraine, it has been recorded in almost all the lowland territory (except the Carpathians and Crimea). In Dnipropetrovsk Region, it has been found only in the south (Synelnykovo District). It has seldom been seen in open wet biotopes, including halophytic sites. It is seen from May to July. It flies to light. Mesothermophile. Mesophile. Meadow dweller. Larva is geostrobiont, imago – litter stratobiont. Phytozoophage. As an occasional species, it has been seen in some irrigated agrocenoses of the Steppe (Jacobson, 1905–1916; Kryshstal, 1956; Sharova, 1981; Kryzhanovskij, 1983; Kryzhanovskij et al., 1995; Jaeger, 2003, 2004, 2011; Rizun, 2003; Freude et al., 2004; Sumarokov, 2009; Putchkov, 2012a, 2017, 2018).

***Stenolophus* (s. str.) *discophorus* (Fischer von Waldheim, 1823).** Southern, Central and Eastern Europe, Caucasus, Southern Caucasus, east of West and Central Asia, Kazakhstan, West Siberia. In Ukraine – almost ubiquitously, except the montane part of the Carpathians. Highly polymorphic species by colour. Specimens that have the elytra of the same red-yellow colour are m. *flavisculus* Motsch.; if the 1st section of the elytra is yellow and the spot is divided into two parts – m. *bipartitus* Puel.; individuals with reddish spots on the head are m. *trinotatus* Puel. In Dnipropetrovsk Region, it has been seen in solonetz-solonchak terraces of steppe rivers of many administrative districts. Typical habitats are shores of various water bodies, including saline ones. It is common in floodplain

biotopes (waterlogged areas, reed beds, meadows, open areas in water). It is seldom seen in meadows, and in floodplain tree-shrub groups. It is sometimes found in river and marine alluvium. It rarely ascends plants. Beetles are active in twilight, and at night during hot weather. Daily activity is seen in spring and mild weather. In the steppe zone, imagoes are seen mostly from mid March to early November, but most often in June–July. Emergence from pupal stage was observed from late May to mid July. Females with eggs are seen from mid June to early August. In the Forest-Steppe, beetles are found from mid April to early October, most often in July–early August. It overwinters as beetles and, perhaps, second-third age larvae. Mesothermophile. Mesohygrophile. Floodplain-litter dweller. Hemistenotopic species. Larva is geostrobiont, imago – litter stratobiont. Phytozoophage. Beetles eat flowering parts of various grasses and invertebrates with soft coatings. The larvae are indicated to have facultative saprophagy. Isolated individuals are seen in fields of irrigated crops. In parks and gardens, it actively flies towards light (Jacobson, 1905–1916; Sharova, 1958, 1981; Kryzhanovskij, 1983; Kryzhanovskij et al., 1995; Matalin, 1996, 1997a; Brygadyrenko, 2003b; Jaeger, 2003, 2004, 2011; Rizun, 2003; Sumarokov, 2009; Putchkov, 2012a, 2018; Aleksandrowicz, 2014; Faly et al., 2017).

***Daptus vittatus* Fischer von Waldheim, 1823.** North Africa, Southern and Southeast Europe, Caucasus, Southern Caucasus, Turkey, Western and Central Asia, Kazakhstan, south of West Siberia and Western China. In Ukraine – almost throughout the steppe zone, but most often in the south. In Dnipropetrovsk Region, it has been found only in the territory of the Bulahivka Liman Ornithological Reserve (Pavlohrad District). It occurs in biotopes with various degrees of salinity, often near water bodies. It is commonly found in marine alluvium. It is seen in June–August. It overwinters in the larva stage. Meathermophile. Mesohygrophile. Steppe dweller, moderately halophilous species. Larva is geostrobiont, imago – litter stratobiont. Mixophytophage, but prefers plants. It has been seen as random species in agrocenoses of the south of the steppe zone (caught using light) (Jacobson, 1905–1916; Sharova, 1981; Kryzhanovskij, 1983; Kryzhanovskij et al., 1995; Brygadyrenko, 1999b, 2000, 2003b; Kataev et al., 2003; Wrase, 2003; Jaeger, 2004; Sumarokov, 2009; Putchkov, 2012a, 2018).

***Harpalus cephalotes* Fairmaire & Laboulbene, 1854.** Southeast Europe, North Caucasus, Southern Caucasus, Iran, Turkey, West and Central Asia. In Ukraine – southern regions of the steppe zone, Crimea (most often in the east). In Dnipropetrovsk Region, it has been seen in solonetz-solonchak terraces of small rivers (Samara, Vovcha, Oril). It has been found in xerophyte steppe, saline habitats, near sea, limans, salt lakes and lower areas of rivers. Beetles are active at night (fly to light). Megathermophile. Hygromesophile. Steppe dweller, relatively halophytic species. Larva is geostrobiont, imago is litter stratobiont. Zoophytophage. As an occasional species, it has been seen in some fields of grain crops in the steppe zone, in gardens of plains of Crimea. Rare Euro-Kazakhstani species for the steppe zone of Ukraine. It occurs rarely in Dnipropetrovsk Region, locally and not every year. Arable farming in meadows and saline areas, use of pesticides are the main causes of the ongoing vanishing of this species (Jacobson, 1905–1916; Sharova, 1981; Kryzhanovskij, 1983; Eidelberg, 1989; Kryzhanovskij et al., 1995; Brygadyrenko, 1999b, 2000, 2003b; Kataev et al., 2003; Wrase, 2004, 2011b; Sumarokov, 2009; Putchkov, 2012a, 2018).

***Harpalus dispar* Dejean, 1829.** Southern Europe, Caucasus, Southern Caucasus, Turkey, Kazakhstan, the south of Siberia, Mongolia. In Ukraine – in the south subzone of the Steppe, possible discoveries were made in more northern regions. In Dnipropetrovsk Region, it was recorded only in Synelnykovo District. In Ukraine, the widespread subspecies is *H. dispar splendens* Gebler, 1829. Typical habitats are open biotopes with low level of salinity, not necessarily near water. It is seen in June–August. It probably overwinters as larva. Megathermophile. Mesophile. Steppe dweller, halophilous species. Larva is geostrobiont, imago is litter stratobiont. Mixophytophage that consumes both plants and animals. Isolated individuals seen in pastures, parks, gardens and vineyards. In agrocenoses (as an occasional species), it has been recorded only when catching using light (Jacobson, 1905–1916; Sharova, 1981; Kryzhanovskij, 1983; Kataev, 1984; Eidelberg, 1989; Kryzhanovskij et al., 1995; Kataev et al., 2003; Sumarokov, 2009; Wrase, 2011b; Putchkov, 2012a, 2018).

***Harpalus hirtipes* (Panzer, 1796).** Almost throughout Europe (except Northern), Caucasus, Kazakhstan, south of Siberia, Mongolia, Western China. In Ukraine, it has been recorded ubiquitously, except the north of the Polissia and the Carpathians. In Dnipropetrovsk Region, it has been found in small areas of sandy steppe in arena terraces of the Dnipro, Samara, Vovcha and Oril. In the Steppe, it prefers open biotopes (virgin areas). In the forest-steppe zone, it is seen only in areas with sparse grass stand, in mesoxerophytic habitats (southern slopes of hills, gullies). It has sometimes been found in burrows of rodents. It may ascend plants. The activity mostly takes place in twilight, but in spring and mild weather, it can be seen during the day, and at night during hot weather. In the steppe zone, the beetles are active from late March to early October, most often in July–September. In the Forest-Steppe, imagoes are seen from late April until September. Mesothermophile. Mesophile. Meadow-steppe dweller. Larva is geostatobiont, imago – litter stratobiont. Zoophytophage. Beetles consume invertebrates with soft coatings, can sporadically eat seedlings of wild and cultivated grasses, override strawberries and fallen fruits. Isolated specimens have been seen in gardens, parks and very rarely in tilled lands (Jacobson, 1905–1916; Petrusenko, 1973; Sharova, 1981; Kryzhanovskij, 1983; Kataev, 1984; Eidelberg, 1989; Kryzhanovskij et al., 1995; Brygadyrenko, 2000, 2003b; Kataev et al., 2003; Rizun, 2003; Sumarokov, 2009; Wrase, 2011b; Putchkov, 2012a, 2018).

***Harpalus laeviceps* Zetterstedt, 1828** (= *quadripunctatus* Dejean, 1829). Throughout Europe, Caucasus, Turkey, Kazakhstan, Siberia, eastward to Japan. In Ukraine, it has been seen everywhere, except the steppe zone and Crimea. In Dnipropetrovsk Region, it has been found in the Samarsky Pine Forest, floodplain forests of the Oril River, some bairak forest structures in the left-bank part of the region. It is common in forests, especially broad-leaved, and rarer in ecotone forest areas (glades and near-forest sites). It is seen from May to mid July, and also in September–October, but in lower numbers. It overwinters in the imago stage. Mesothermophile. Broad mesophile. Forest dweller. Larva is geostatobiont, imago – litter stratobiont. Zoophytophage. In agroecosystems, it is recorded as an occasional species. Most often, it is found in parks, where it is locally common, in old gardens, sometimes in windbreaks. Relatively rare species (Jacobson, 1905–1916; Sharova, 1981; Kryzhanovskij, 1983; Kataev, 1984; Eidelberg, 1989; Kryzhanovskij et al., 1995; Brygadyrenko, 2000, 2003b; Kataev et al., 2003; Rizun, 2003; Koval, 2009; Sumarokov, 2009; Wrase, 2011; Putchkov, 2012a, 2018).

***Harpalus luteicornis* (Duftschmid, 1812).** Almost all of Europe, West Siberia. In Ukraine, it has been recorded almost everywhere, except Crimea, but most often in the forest, forest-steppe zones and the Carpathians. In Dnipropetrovsk Region, it has been found in small areas of mesophytic steppe and dry meadows of Dnipropetrovsk, Piatyhatky, Mahdalynivka and Yurivka Districts. It has rarely been seen in various meadows, most often on clayey and loamy soils. Less often, it has been recorded in sparse forests, mainly broad-leaved. In the Carpathians, it reaches the belt of beech forests. The numbers are high from late May to August. Mesothermophile. Mesophile. Meadow-forest dweller. Larva is geostatobiont, imago – litter stratobiont. Zoophytophage. As an occasional species, it has been seen in agroecosystems of the forest-steppe zone. Most often (sometimes as common), it has been found in parks and old gardens. Relatively rare species (Jacobson, 1905–1916; Sharova, 1981; Kryzhanovskij, 1983; Kataev, 1984; Eidelberg, 1989; Kryzhanovskij et al., 1995; Brygadyrenko, 2000, 2003b; Kataev et al., 2003; Rizun, 2003; Sumarokov, 2009; Wrase, 2011; Putchkov, 2012a, 2018).

***Harpalus melancholicus* Dejean, 1829.** North Africa (Algeria), Europe (except Northern), Caucasus, Southern Caucasus, Turkey, Iran, Turkmenistan. In Ukraine – the east of the forest-steppe, the steppe zone and Crimea. In Dnipropetrovsk Region, it has been recorded in steppe areas in almost all administrative districts, but the numbers were low or very low everywhere. It is typical for slightly sodded areas in steppes of various types, most often with sandy or sabulous soils. Also, it occurs on shores of seas and limans, in river valleys, on slopes of sand dunes. It is active mostly at night, but sometimes in the day (in mild weather). The beetles are seen from early April to October, most often in July. Megathermophile. Mesoxerophile. Steppe dweller. Larva is geostatobiont, imago – litter stratobiont. Zoophytophage. Isolated specimens have been found in pastures, parks, gardens and vineyards. In agroecosystems (as an occasional spe-

cies), it has been recorded only when catching using light (Jacobson, 1905–1916; Sharova, 1981; Kryzhanovskij, 1983; Kryzhanovskij et al., 1995; Brygadyrenko, 1999b, 2000, 2003b, 2003c; Rizun, 2003; Kataev et al., 2003; Freude et al., 2004; Jaeger, 2004; Sumarokov, 2009; Wrase, 2011b; Putchkov, 2012a, 2018).

***Harpalus steveni* Dejean, 1829.** Eastern Europe, Caucasus, Kazakhstan, the south of West Siberia. In Ukraine – southern regions of the steppe zone, Crimea (most often in the east). In Dnipropetrovsk Region, it has been seen in solonetz-solonchak terraces of small rivers (Samara, Vovcha, Oril). It occurs in xeromesophyte steppe and relatively saline habitats. It is seen in June–July. It is one of the most halophytic species of the *Harpalus* genus. The beetles are active during the day and at night (fly to light). Megathermophile. Xeromesophile. Steppe dweller, relatively halophytic species. Larva and imago are stratobionts that dig. Zoophytophage. As an occasional species, it has been recorded in some agroecosystems of the south of Kherson Region and Steppe Crimea. Rare Euro-Kazakhstan species of the steppe zone of Ukraine. In Dnipropetrovsk Region, it is seen singly. In areas where the species is common, its number is 10–50-fold lower than that of other species of *Harpalus* genus (Jacobson, 1905–1916; Sharova, 1981; Kryzhanovskij, 1983; Kataev, 1984; Eidelberg, 1989; Kryzhanovskij et al., 1995; Brygadyrenko, 2000, 2003b; Kataev et al., 2003; Sumarokov, 2009; Putchkov, 2012a, 2018).

***Harpalus subcylindricus* Dejean, 1829.** Southeast and, partly, Central Europe, Caucasus, Southern Caucasus, Turkey, Iran, Kazakhstan, Kirgizstan, the south of West Siberia, and West China. In Ukraine, it occurs in the east of the Forest-Steppe, throughout the steppe zone and in the Crimean Mountains. In Dnipropetrovsk Region, it has been recorded in almost all administrative districts, but it is sporadic everywhere. It is seldom recorded in open virgin meso- and xerophyte areas. It is seen from late May until August. Mesothermophile. Mesoxerophile. Steppe dweller. Larva is geostatobiont, imago – litter stratobiont. Zoophytophage. It has sometimes been recorded as a common species in pastures of the southeast of the Forest-Steppe. Rarely, but constantly, it is seen in hayfields and fallows. On field crops, it has been recorded as an occasional species (Jacobson, 1905–1916; Sharova, 1981; Kryzhanovskij, 1983; Kataev, 1984; Eidelberg, 1989; Kryzhanovskij et al., 1995; Brygadyrenko, 1999, 2000, 2003b; Kataev et al., 2003; Rizun, 2003; Koval, 2009; Sumarokov, 2009; Aleksandrowicz, 2011; Wrase, 2011; Putchkov, 2012a, 2018).

***Microderes brachypus* (Steven, 1809).** The south of Eastern Europe, Northern Caucasus, Southern Caucasus, Iran, Turkey, West and Central Asia, Kazakhstan, Mongolia and West China. In Ukraine – southern regions of the steppe zone, Crimea (most often in the east). In Dnipropetrovsk Region, it has been found in solonetz-solonchak terraces of small rivers (Samara, Vovcha). It occurs in xerophytic steppe and semideserts. In Dnipropetrovsk Region, it is found under rocks on solonchak sites with no vegetation, in associations of *Halimione verrucifera* (Bieb.) Aell., in halophytic meadows and solonchaks. It occurs rarely in April–September (mostly in May–June). Most often, it probably overwinters in the imago stage. Megathermophile. Mesoxerophile. Steppe dweller, halophile species. Stenotopic species. Larva and imago are litter geostatobionts. Zoophytophage. Interesting representative of ground beetles of the Asian fauna. In Dnipropetrovsk Region, it is seen very rarely. The decline in its numbers may be due to extension of arable farming in the areas of halophytic steppes, land developments in solonchaks. It is protected in the Bulahivka Liman Ornithological Reserve of National Significance (Jacobson, 1905–1916; Kryzhanovskij, 1983; Kryzhanovskij et al., 1995; Brygadyrenko, 1999b, 2000, 2003b; Kataev et al., 2003; Rizun, 2003; Sumarokov, 2009; Putchkov, 2012a, 2018).

***Ophonus* (s. str.) *diffinis* (Dejean, 1829).** Europe (except the northern part), Caucasus, Southern Caucasus, West Asia, Iran, Turkey. In Ukraine – the steppe zone and the south of the forest-steppe zone, Zakarpattia, the Carpathian foothills. In Dnipropetrovsk Region, it is found in above-floodplain (meadows and steppes with signs of salinization) and solonetz-solonchak terraces of small rivers (Samara, Vovcha). It occurs rarely in various open biotopes, mainly in meadows and mesophytic steppe. In the Carpathians, it reaches the belt of beech forests. It is seen from late April to September. It overwinters mostly as larva, but possibly as imago as well. Megathermophile. Mesophile. Meadow-steppe dweller. Larva and imago are litter geostatobionts. Trophic specialization. Zoophytophage that con-

sumes both animals and plants (unripe seeds). As an occasional species, it has been recorded on some field crops in the south of Ukraine. Rare species in the northern steppe subzone of Ukraine. It is rare in Dnipropetrovsk Region. The decline in its population may be because of agrotechnical measures, arable farming in virgin areas of steppes and meadows (Jacobson, 1905–1916; Kryzhanovskij, 1983; Kryzhanovskij et al., 1995; Brygadyrenko, 1999b, 2003b; Kataev et al., 2003; Rizun, 2003; Wrase, 2004, 2011b; Koval, 2009; Sumarokov, 2009; Putchkov, 2012a, 2018; Aleksandrowicz, 2014).

***Dixus eremita* (Dejean, 1825).** Southern and Southeast Europe, Caucasus, Southern Caucasus, Turkey, West and Central Asia, Kazakhstan. In Ukraine – throughout the steppe zone and Crimea. Possibly, it was discovered in the south of the Forest-Steppe, especially the Left Bank. In Dnipropetrovsk Region, it has been recorded on dry steppe areas, slopes of ravines of southern exposure in Shyrokin, Kryvy Rih and Nikopol Districts. It occurs in open steppe areas, usually in depressions, ravines, sparse bairak forests, in windbreaks from late May to August. It overwinters mostly as larva. Megathermophile. Xerophile. Steppe dweller. Larva is geotratobiont, imago – litter stratobiont. Phytophage that eats seeds of Brassicaceae, more rarely grasses. As an occasional species, it is seen in some fields (grain crops, perennials), pastures, sometimes gardens and windbreaks. Relatively rare species (Jacobson, 1905–1916; Petrusenko, 1973; Sharova, 1981; Kryzhanovskij, 1983; Kataev, 1984; Eidelberg, 1989; Kryzhanovskij et al., 1995; Brygadyrenko, 2003b; Kataev et al., 2003; Rizun, 2003; Koval, 2009; Sumarokov, 2009; Wrase, 2011; Putchkov, 2012a, 2018).

***Panagaeus bipustulatus* (Fabricius, 1775).** Europe, Caucasus, Southern Caucasus, Western Asia. In Ukraine, the nominative subspecies occurs almost ubiquitously (except highlands). It is seen almost throughout Dnipropetrovsk Region, but its number is low. It rarely occurs in open biotopes, being more often seen in sparse broad-leaved forests. In the Carpathians, it reaches the belt of beech forests, sometimes the subalpine zone. It is seen from early May until mid September. Mesothermophile. Mesophile. Meadow dweller. Larva is geotratobiont, imago is litter stratobiont. Zoophage. It rarely occurs in parks and windbreaks. Relatively rare species (Jacobson, 1905–1916; Kryzhanovskij, 1983; Eidelberg, 1989; Kryzhanovskij et al., 1995; Beahr, 2003c, 2004e; Brygadyrenko, 2003b, 2005c; Rizun, 2003; Loza & Brygadyrenko, 2007; Brygadyrenko & Faly, 2009; Sumarokov, 2009; Putchkov, 2012a, 2018; Blaszkiewicz & Schwerk, 2013; Aleksandrowicz, 2014; Brygadyrenko, 2015b).

***Callistus lunatus* (Fabricius, 1775).** North Africa (Mauritania), almost throughout Europe (except the Northern), Caucasus, Southern Caucasus, Turkey, Kazakhstan, Central Asia, the south of Siberia (eastward to Baikal). In Ukraine – almost ubiquitously (except dry steppes), but most often in Polissia and in the Forest-Steppe. In Dnipropetrovsk Region, it has been found in the outskirts of the city of Pavlohrad and in Synelnykovo District. It rarely and locally occurs in wet meadows, near-water habitats, wetlands, sometimes floodplain tree and shrub-vegetated biotopes. In forest ecosystems of various types, it flies towards light. Most often, it lives in open areas near water, waterlogged areas, reed beds. Very rarely, it occurs in depressions of virgin areas of mesophyte steppes. In the Carpathians, it reaches the beech forest belt. It is seen from April to October. It overwinters mostly in the imago stage. Mesothermophile. Hygromesophile. Meadow-floodplain litter species. Larva is geotratobiont, imago – litter stratobiont. As an occasional species, it was recorded in some anthropogenic landscapes, including gardens, berry gardens, parks, singly in windbreaks. One of the original and beautiful near-water ground beetles of the Ukrainian fauna. Its number is low and it could be declining because of land developments (drainage) and use of chemical means against plant pests (Jacobson, 1905–1916; Sharova, 1981; Kryzhanovskij, 1983; Kryzhanovskij et al., 1995; Brygadyrenko, 2000, 2001b, 2003b; Kirschenhofer, 2003; Rizun, 2003; Hartmann, 2004; Koval, 2009; Putchkov, 2012a, 2013d, 2018; Aleksandrowicz, 2014; Bondarenko et al., 2020).

***Dinodes decipiens* (L. Dufour, 1820).** North Africa, Southern and partly Central Europe, Caucasus, Southern Caucasus, Turkey. In Ukraine – the steppe zone, almost throughout the Forest-Steppe (except the north), Zakarpattia. In Dnipropetrovsk Region, it has been sporadically recorded in outskirts of the cities of Pavlohrad and Dnipro, in Synelnykovo district (outskirts of Raiivka village). It rarely occurs in various open biotopes,

including mesophyte steppe, windbreaks, but not near water. It chooses xerophytic areas, well heated by the sun. It has also been seen on shores of seas, limans, salt lakes, fresh and dry halophytic meadows in floodplains of rivers. It is active in the day and at night. Imagoes were recorded from May to August, most often in July. Megathermophile. Mesoxerophile. Meadow-steppe dweller. Larva is geotratobiont, imago – litter stratobiont. Zoophage. In the conditions of cultivated landscapes, it has been rarely seen in gardens, vineyards, and occasionally in tilled fields. Rare species (Jacobson, 1905–1916; A. A. Petrusenko & S. V. Petrusenko, 1971; Kryzhanovskij, 1983; Kryzhanovskij et al., 1995; Brygadyrenko, 1999a, 2000, 2001b, 2003b; Hartmann & Arndt, 2001; Kirschenhofer, 2003; Hartmann, 2004; Putchkov, 2012a, 2013d, 2018).

***Chlaenius (Agostenus) alutaceus* Gebler, 1829.** Southeast Europe, Caucasus, Southern Caucasus, Kazakhstan, Central Asia, Siberia, Far East. In Ukraine – the steppe zone, Crimea. It was possibly found in the Forest-Steppe. In Dnipropetrovsk Region, it is common on shores of water bodies of the third solonetz-solonchak terraces of the rivers Samara and Vovcha, and also Synelnykovo District. It occurs sporadically in various biotopes near water, most often in associations of common reed (*Phragmites australis* (Cav.) Trin. ex Steud.) or sea clubrush (*Bolboschoenus maritimus* (L.) Palla); along saline water bodies and on solonchaks. It is seen from early May to July. The species overwinters most likely as imago. Megathermophile. Hygromesophile. Halophytic species that lives around water. Larva is stratogeobiont, imago – litter stratobiont. Zoophage. As an occasional species, it has been seen in some agroecosystems during catching using light. One of few representatives of ground beetles of the Asian fauna in Ukraine. Zoophage, consumes some species of insect pests and slugs. The species is seen sporadically, isolated specimens were found in 4% of examined ecosystems around water in Dnipropetrovsk Region. Locally, its number reached 0.02–0.10 ind./m<sup>2</sup>. The decline in the number of the species could be caused by land developments (drainage), pesticide use in the territories near water bodies, increase in recreational loading on the areas where the species lives (Jacobson, 1905–1916; A. A. Petrusenko & S. V. Petrusenko, 1971; Kryzhanovskij, 1983; Kryzhanovskij et al., 1995; Brygadyrenko, 1999a, 2000, 2001b, 2003b; Hartmann & Arndt, 2001; Kirschenhofer, 2003; Hartmann, 2004; Putchkov, 2012a, 2013d, 2018).

***Chlaenius* (s. str.) *festivus* (Panzer, 1796).** North Africa, almost throughout southern part of Europe, Caucasus, Southern Caucasus, West and Central Asia, Kazakhstan, the south of West Siberia. In Ukraine – in the Forest-Steppe and the Steppe, most often in the south. In Dnipropetrovsk Region, it has been found in the outskirts of Levadky Village of Pavlohrad District on the third solonetz-solonchak terrace of the Vovcha River. It occurs near various (sometimes saline) water bodies, most often still-water floodplains, and singly in shrub associations in floodplains. It is seen from May until September (most often in June). The species overwinters as imago. Megathermophile. Hygromesophile. Litter-floodplain halophilous species. Larva is stratogeobiont, imago – litter stratobiont. Zoophage. Other than insects, it often predated slugs and tadpoles. In some agroecosystems (gardens, vineyards), it was only caught using light. The number is low, but sometimes can reach 0.2–0.3 ind./100 m<sup>2</sup>. Its number could be decreasing because of land developments (drainage) (Jacobson, 1905–1916; A. A. Petrusenko & S. V. Petrusenko, 1971; Kryzhanovskij, 1983; Kryzhanovskij et al., 1995; Brygadyrenko, 2001b, 2003b; Hartmann & Arndt, 2001; Kirschenhofer, 2003; Hartmann, 2004; Koval, 2009; Putchkov, 2012a, 2013d, 2018; Scholtz & Ralston, 2017).

***Licinus* (s. str.) *cassideus* (Fabricius, 1792).** Europe, Caucasus, the west of the Southern Caucasus, Turkey. In Ukraine – almost everywhere, except the Carpathians and Polissia (nominative subspecies). In Dnipropetrovsk Region – almost ubiquitously, but sporadically. It occurs rarely in various open biotopes, sometimes in near-forest areas. It is seen from April until September. It overwinters probably as imago. Mesothermophile. Mesoxerophile. Meadow-steppe dweller. Larva is geotratobiont, imago – litter stratobiont. Zoophage. Isolated individuals have been seen in gardens of lowland and mountain Crimea. Relatively rare species (Jacobson, 1905–1916; Kryzhanovskij, 1983; Eidelberg, 1989; Kryzhanovskij et al., 1995; Brygadyrenko, 1999, 2000, 2003b; Baehr, 2003a; Rizun, 2003; Loza & Brygadyrenko, 2005, 2007; Trautner, 2011; Putchkov, 2012a, 2013e, 2018; Aleksandrowicz, 2014).



***Badister (Trimorphus) dorsiger (Duftschmid, 1812).*** Eastern Europe, Urals. In Ukraine – the Carpathians, Polissia, left-bank Steppe and the Northern Subzone of the Steppe. In Dnipropetrovsk Region, it was found only in wetlands of near-terrace areas of floodplains of water bodies of the Samara Pine Forest (the Karavanyshche Lake, outskirts of Andriivka Village of Novomoskovsk District). Isolated specimens are found in wet forests, near water bodies and hygrophytic meadow areas. In the Carpathians, it reaches the beech forest belt. In Dnipropetrovsk Region, it lives in grey alder (*Alnus incana*) forests with forbes. It overwinters probably as imago. Oligothermophile. Hygrophile. Wetland-meadow species. Larva is stratogobiont, imago – litter stratobiont. Zoophage. Very rare species. In Ukraine, it is known only through individual discoveries. The southern boundary of its range runs through the steppe zone (Jacobson, 1905–1916; Kryzhanovskij, 1983; Komarov, 1991; Kryzhanovskij et al., 1995; Brygadyrenko, 2003b; Rizun, 2003; Assman, 2004c; Loza & Brygadyrenko, 2005, 2007; Putchkov, 2012a, 2013e, 2018; Aleksandrowicz, 2014).

***Masoreus wetherhali (Gyllenhal, 1813).*** Central and Eastern Europe, Caucasus, Urals, Kazakhstan, Siberia (eastward to Baikal). In Ukraine – the Polissia, Forest-Steppe, left-bank Steppe (the Donetsk Ridge) and the Crimean Mountains. In Dnipropetrovsk Region, it was found on the second arena terrace of the Vovcha River (outskirts of the city of Pavlohrad), in the territory of the region's capital (talweg of the Tunelna Ravine), in Synelnykovo District (outskirts of Raivka Village). It occurs singly in broad-leaved and mixed forests, sometimes in mesohygrophytic meadow areas. In Dnipropetrovsk Region, it was found mostly in mesophytic moist conditions in sparse psammophyte vegetation, under rocks. Overwintering phase is likely the imago. Mesothermophile. Mesophile. Forest-meadow dweller. Very rare species, which is known in Ukraine only because of individual findings. The southern border of its range runs through the steppe zone (Jacobson, 1905–1916; Sharova, 1981; Kryzhanovskij, 1983; Kryzhanovskij et al., 1995; Brygadyrenko, 1999b, 2003b; Bousquet, 2003b; Rizun, 2003; Baehr, 2004c; Amdt et al., 2011b; Putchkov, 2012a, 2018; Aleksandrowicz, 2014).

***Lebia (s. str.) humeralis Dejean, 1825.*** Southern Europe from Italy to Turkey, Caucasus, Southern Caucasus, Western Asia, Iran. In Ukraine – the south of the forest-steppe and the steppe zone, Crimea, Zakarpattia. In Dnipropetrovsk Region, the species has been recorded only in the outskirts of the region's capital (near the airport). In the Forest-Steppe, it occurs mostly in river valleys, in floodplain tree-shrub groups, in various meadows, more rarely in wet areas. In the Steppe, it has been recorded in sparse deciduous and mixed tree stands, and also moist depressions and talwegs of ravines. By pattern of daily activity, it is similar to other species of the genus. The beetles are seen from early April to mid August, and then in late September–October, but most often in late April–early May. It overwinters as imago. Megathermophile. Mesophile species. Meadow-forest dweller. Larva is ectoparasite of leaf-eating beetles of *Galeruca* (Chrysomelidae) genus, imago is tamnohortobiont (tamnobiont is a living organism that lives in shrubs, hortobiont is a living organism that lives in grass). Imagoes are predators that consume small invertebrates with soft coatings (Aphidoidea, Psilidae, small caterpillars). Feeds to a certain extent on plants. It has been very rarely recorded in gardens of southern Ukraine (Jacobson, 1905–1916; Kryzhanovskij, 1983; Kryzhanovskij et al., 1995; Brygadyrenko, 1999, 2003b; Kabak, 2003; Rizun, 2003; Persohn, 2004; Amdt, 2011e; Putchkov, 2012a, 2018; Aleksandrowicz, 2014).

***Demetrius (Aetophorus) imperialis (Germar, 1824).*** North Africa, Europe, Caucasus, Southern Caucasus, Kazakhstan. In Ukraine – almost ubiquitously, except montane areas, but most often in Polissia and the Forest-Steppe. In Dnipropetrovsk Region, the species has been found on the outskirts of the city of Pavlohrad (near the Pavlohradska Mine). It occurs rarely in open biotopes, as well as planted tree structures (but not in forests). In the territory of Dnipropetrovsk Region, singular specimens were seen in common reed on the shores of temporary water bodies. It is seen from March until November, sometimes in warm winter months. It overwinters as imago. Mesothermophile. Mesophile. Meadow-shrub dweller. Larva is likely to be dendrostratobiont, imago – under-bark hortodendrobiont (hortodendrobiont is a living organism that lives in grass and trees). Zoophage. In agrolandscapes, it is infrequently seen only in some gardens of Polissia and the Forest-Steppe. In parks and windbreaks,

it was recorded as an occasional species. One of the few representatives of hortodendrobiont ground beetles in Ukraine. Beneficial entomophagous of some garden insect pests. The number is low, but it occurs regularly. Decline in its number can be caused by chemical measures against pests (Jacobson, 1905–1916; Kryzhanovskij, 1983; Kryzhanovskij et al., 1995; Brygadyrenko, 1999, 2003b; Kabak, 2003; Rizun, 2003; Persohn, 2004; Putchkov, 2012a, 2018; Aleksandrowicz, 2014).

***Cymindis (s. str.) axillaris (Fabricius, 1794).*** North Africa, almost throughout Europe (except Fennoscandia), Caucasus, West Asia, Iran, the south of Turkmenistan and Kazakhstan. In Ukraine, it has been recorded in the steppe zone and Crimea. Possible discoveries were made in southern regions of the Forest-Steppe. In Dnipropetrovsk Region, it has been seen only on the outskirts of Andriivka Village of Novomoskovsk District and outskirts of the city of Nikopol, but sporadically everywhere. It occurs in steppe areas, sometimes in sparse shrubs, on rocky and sandy open areas on slopes of hills, gullies and riverside slopes of southern exposure, rarely in forest glades. It has sometimes been recorded on shores of seas, limans and solonchaks. It is mostly active at night. The beetles are seen from late April until early November, most often in June. It overwinters in the imago stage. Megathermophile. Mesoxerophile. Steppe dweller. Larva is geostratobiont, imago – litter-fracture stratobiont. Zoophage. In agrolandscapes, it has sporadically been recorded as an accidental species. Rare species (Jacobson, 1905–1916; Hürka, 1969, 1986; Kryzhanovskij, 1983; Kryzhanovskij et al., 1995; Brygadyrenko, 1999, 2003b; Kabak, 2003; Rizun, 2003; Persohn, 2004; Sumarokov, 2009; Amdt & Schnitter, 2011a; Putchkov, 2012a, 2013c, 2018; Aleksandrowicz, 2014).

***Polystichus connexus (Geoffroy, 1785).*** Almost entire southern part of Europe, Caucasus, Southern Caucasus, Turkey, Western and Central Asia, Iran, Kazakhstan, the south of West Siberia (eastward to the Yenisey). In Ukraine – Zakarpattia, the south of the forest-steppe and the steppe zones. It was possibly discovered in other regions of the Forest-Steppe. In Dnipropetrovsk Region, it was found in Novomoskovsk (outskirts of Andriivka Village, it flew to light at night) and Synelnykovo (outskirts of Raiivka Village) districts. It rarely occurs in various steppe biotopes, but tends to live in sandy areas. It has been sporadically recorded in birch kolki forests in the lower part of the Dnipro. It is seen from April to October. It overwinters in the imago stage. Megathermophile. Mesophile. Steppe dweller, relatively psammophytic species. Larva is stratogobiont, imago – litter stratobiont. Zoophage. It has rarely been seen in some parks of the southeast (city of Donetsk). Isolated specimens have been seen in gardens, windbreaks and fields in the Forest-Steppe (Cherkasy Region) and the steppe zone. Scientifically interesting Mediterranean element of the Ukrainian fauna. Zoophage, it consumes some species of insects. The number is low, observed as isolated specimens occur. The number may be declining because of destruction of natural living locations as a result of arable farming and recreational loading (Jacobson, 1905–1916; Sharova, 1981; Kryzhanovskij, 1983; Kryzhanovskij et al., 1995; Brygadyrenko, 2003b; Baehr, 2003b, 2004d; Sumarokov, 2009; Amdt, 2011c; Putchkov, 2012a, 2018).

***Brachinus ejaculans Fischer von Waldheim, 1828.*** Southeast Europe, Caucasus, Southern Caucasus, Western and Central Asia. In Ukraine – almost ubiquitously, except the Carpathians and Polissia. In Dnipropetrovsk Region, it has been recorded almost throughout the territory, but sporadically. It lives in flooded and mesophyte meadows and other floodplain biotopes. Sometimes, it is encountered on shores of the Black and Azov seas and wet solonchaks. The beetles appear from early March to late November. Megathermophile. Mesohygrophile. Floodplain-meadow species. Hemi-temnotopic species. Larva is probably geostratobiont, imago – litter stratobiont. Zoophage. In agrocenoses, it is seen rarely and only on irrigated crops. Isolated specimens have been recorded in gardens in the lowlands of the Crimea (Jacobson, 1905–1916; Kryzhanovskij, 1983; Juliano, 1986a, 1986b; Eidelberg, 1989; Nyilas, 1994; Kryzhanovskij et al., 1995; Brygadyrenko, 1999, 2003b; Kabak, 2003; Rizun, 2003; Baehr, 2004a; Koval, 2009; Bragic et al., 2009; Sumarokov, 2009; Amdt, 2011d; Putchkov, 2011, 2012a, 2018; Aleksandrowicz, 2014).

***Brachinus (Cnecostolus) hamatus Fischer von Waldheim, 1828.*** Southeast Europe, Caucasus, Southern Caucasus, Turkey, Iran, West Asia, Kazakhstan, the south of West Siberia. In Ukraine, it occurs in the

south of the steppe zone and the Crimea. In Dnipropetrovsk Region, it has been found in Synelnykovo District (outskirts of Raiivka Village). It is rarely seen in various open steppe biotopes, sometimes in sparse shrub thickets. It is seen from May to July. The species probably overwinters in the imago stage. Megathermophile. Mesoxerophile. Steppe dweller, moderately halophilous species. Larva is strato­geobiont, imago – litter strato­biont. Zoophage. As an accidental species, it has been found in gardens of the Crimea. The northern border of its range in Ukraine runs through Dnipropetrovsk Region. Scientifically interesting Mediterranean element of the Ukrainian fauna. The number is low, isolated individuals are found. Its population may be declining because of destruction of natural biotopes by tillage and recreation loading (Jacobson, 1905–1916; Sharova, 1981; Kryzhanovskij, 1983; Eidelberg, 1989; Kryzhanovskij et al., 1995; Hedlička, 2003; Baehr 2004a; Sumarokov, 2009; Putchkov, 2011, 2012a, 2018).

***Mastax thermarum* (Steven, 1806)**. Southeast Europe, Caucasus, Southern Caucasus, Turkey, Iran, Western Asia, Kazakhstan, the south of Siberia and the Far East. In Ukraine, it has been recorded singly in the right-bank steppe zone (Odesa, Kherson, Dnipropetrovsk Regions). It has been seen in Synelnykovo District (outskirts of Raiivka Village) and outskirts of the city of Kryvyi Rih. It is very rarely found in mesophyte steppe areas and in river valleys, in non-dense shrub vegetation, but not in wet places. It occurs in June–July and probably overwinters as imago. Megathermophile. Mesophile. Meadow-steppe species. Larva is strato­geobiont, imago is litter strato­biont. Zoophage. In Dnipropetrovsk Region, one specimen was found in Kryvyi Rih district on rock stockpiles (N. Home­niuk). In Dnipropetrovsk Region runs the southern border of the species' range in Ukraine. Scientifically interesting Ancient Mediterranean element of the Ukrainian fauna. The number is very low, isolated specimens are found. The population of the species may decline because of destruction of natural habitat by arable farming and recreational loading (Jacobson, 1905–1916; Sharova, 1981; Kryzhanovskij, 1983; Kryzhanovskij et al., 1995; Hrdlička, 2003; Baehr 2004a; Sumarokov, 2009; Putchkov, 2011, 2012a, 2018).

## Conclusion

Recovery of the populations of rare species of Carabidae and Cicindelidae in the territory of the steppe zone of Ukraine, and particularly Dnipropetrovsk Region, is possible only in the conditions of inventory checking and monitoring of their populations. The global climatic changes, expansion of introduced species, use of novel technologies in agriculture and livestock farming and military engagements may cause extinction of many populations of rare species of ground beetles. Increase in the global temperature poses a serious threat to forest-dwelling species, for which Dnipropetrovsk Region is the southern border of their range. The spread of new insecticides and deterioration of the overall practice of use of pesticides in the regions jeopardize species that live in virgin steppe biotopes. Unfortunately, the protection of the environment stopped being a priority of the government at both regional and state levels. This will inevitably cause extinction of most vulnerable species in the territory of Dnipropetrovsk Region.

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