UDC 595.763.2.768
DOI: 10.15587/2519-8025.2025.340982

SAPROXYLIC ROVE BEETLES OF THE SUBFAMILY ALEOCHARINAE (COLEOPTERA, STAPHYLINIDAE) IN PRIMEVAL FIR FOREST OF THE CARPATHIAN NATIONAL NATURE PARK

Yuriy Motruk, Sergiy Glotov

Saproxylic beetles are insects that depend on dead and decaying wood for at least part of their lifecycle, and play an important ecological roles in European habitats. Together with fungi, they contribute to the destruction of deadwood as well as are involved in decomposition processes and the recycling of nutrients in natural ecosystems. The subfamily Aleocharinae is one of the largest subfamilies of rove beetles.
The aim *of the study is to investigate the diversity of saproxylic beetles (Coleoptera, Staphylinidae) in primeval fir forest of the Carpathian National Nature Park.*
Materials and methods. *The report is based on the results of observations and collections, which were conducted in coniferous forests of the Carpathian National Nature Park in 2023–2024. All traps were set up and operated yearly during the vegetation season from early April to late September.*
Results. *The fauna of rove beetles of the subfamily Aleocharinae accounts for 44 species, of which 23 species are obligate or facultative saproxylic. The community of rove beetles of the subfamily Aleocharinae, collected in primeval fir forest of the Carpathian National Nature Park, is characterized by a high level of faunal diversity.*
Conclusions. *The community of rove beetles of the subfamily Aleocharinae, collected in primeval fir forest of the Carpathian National Nature Park, is characterized by a high level of faunal diversity. The fauna of rove beetles of the subfamily Aleocharinae accounts for 44 species, of which 23 species are saproxylic. The result of our research is a section of the composition of the beetle community at a certain stage of forest succession. In the future, these data can be used by researchers to assess other territories, in particular with the aim of forming proposals for rational sustainable permanent forest use, which Ukrainian forestry is gradually moving towards*
Keywords: *Coleoptera, Staphylinidae, Aleocharinae, saproxylic species, primeval fir forest, fauna*

How to cite:
Motruk, Y., Glotov, S. (2025). Saproxylic rove beetles of the subfamily Aleocharinae (Coleoptera, Staphylinidae) in primeval fir forest of the Carpathian National Nature Park. ScienceRise: Biological Science, 2 (43), 9-15. http://doi.org/10.15587/2519-8025.2025.340982

© The Author(s) 2025
This is an open access article under the Creative Commons CC BY license

1. Introduction

Saproxylic beetles are insects that depend on dead and decaying wood for at least part of their lifecycle, and play the important ecological roles in European habitats. Together with fungi, they contribute to the destruction of deadwood and are involved in decomposition processes and the recycling of nutrients in natural ecosystems. They interact with other organisms, such as mites, nematodes, bacteria, and fungi, assisting in their dispersal across the landscape. They also provide an important food source for birds and mammals. The conservation of beetles that depend on dying or dead wood has received a great deal of attention in many parts of the world in recent years. Human activities, such as urbanization and logging, and their results, e.g. global warming, destroy natural ecosystems and threaten rare species [1].

The precise number of saproxylic beetle species is not known, but in Europe without doubt there are several thousands of saproxylic species [2]. Beetle species inhabiting decaying wood are dependent on specific tree species, light and moisture regimes, wood decay stage, microorganisms, and other factors [1]. Saproxylic beetles have important interactions with other organisms, which are significant for ecosystem and economy [2].

Rove beetles (Coleoptera: Staphylinidae) is one of the largest families of beetles; to date, the world fauna comprises more than 66,928 species belonging to 35 subfamilies and 4038 genera [3]. More than 1,300 species are known in the fauna of Ukraine [3].

The subfamily Aleocharinae Fleming, 1821 is one of the largest subfamilies of rove beetles. Today, the world's fauna includes more than 16,500 species belonging to 62 tribes and 1,310 genera [3]; at the same time, several tens of thousands of Aleocharinae species still remain undescribed. Aleocharinae are ubiquitous in all natural zones of the planet, inhabit almost all terrestrial natural and anthropogenic habitats, and actively participate in the activity of natural and artificial biogeoceno-

ses. Larvae and adults of Aleocharinae actively inhabit litter, plant and animal remains, animal excrement, and fungi [4].

A number of progressive adaptive features have led to the emergence of specialized forms that successfully coexist with other animals, living in caves, burrows of mammals, nests of birds and communal insects. Most larvae and adults of the subfamily Aleocharinae are non-specialized predators that feed on a variety of invertebrates, acting as natural regulators of their numbers. Some representatives of the *Aleochara* genus act as endoparasitoids of larvae and pupae of dipterans and sawflies, and therefore, breeding and acclimatization of representatives of the genus, which are successfully used to control pests of agricultural crops, is actively carried out worldwide [4]. There are significantly fewer mycophages, which feed on parts of the fruiting body and fungal spores [5], and saprophages, which feed on plant and animal remains and are actively involved in soil formation processes and in the natural circulation of elements. Many species of the subfamily Aleocharinae are characterized by high abundance, a clear allocation to certain natural habitats, and the ability to respond sensitively to changes in the environment, which allows them to be used as objects for bioindication of environmental pollution processes and monitoring of ecosystems [6].

2. Materials and methods

2. 1. Study area

The Carpathian National Nature Park (hereinafter referred to as the Carpathian NNP) is the first and one of the largest national nature parks in Ukraine. Its territory stretches 55 km from north to south and 20 km from west to east. The majority of the park's territory is located within the absolute altitudes of 500 to 2000 m above sea level. The highest point of Ukraine, the top of Mount Hoverla (2061 m above sea level) is located within the Park. The park is located in the highest and most interesting sector of the Gorgany massif in terms of geography. The main part of its territory covers the upper reaches of the Prut River and its tributaries, as well as the Chornyi Cheremosh River basin. The most important objects of the park's protection are natural forest, subalpine and alpine biogeocenoses of Chornohora, relict *Pinus cembra* stands, preserved on the rocky placers of the Chornohora and Gorgany massifs, alpine landscapes with glacial holes, ramparts and lakes of glacial origin, valuable botanical, geological, and morphological monuments. The most valuable areas of the park were protected even before it was declared the National Nature Park.

However, various forms of anthropogenic impact have taken place over a large area, resulting in significant transformations in the natural structure of the vegetation cover [7].

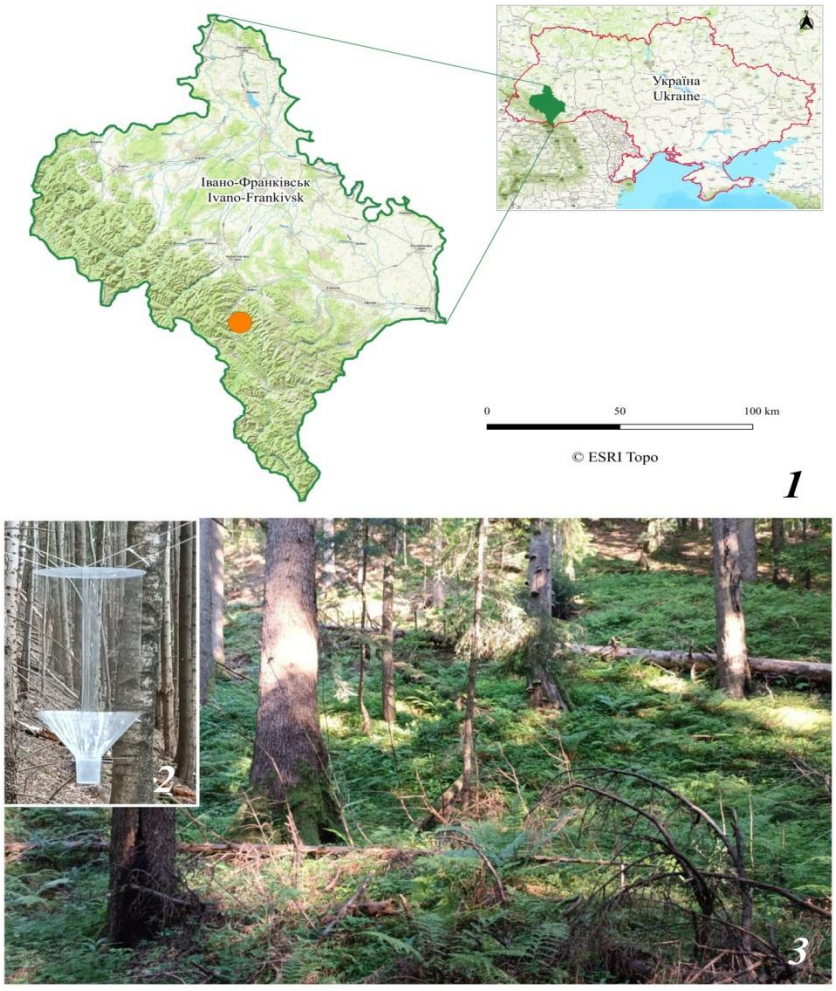

Fig. 1. Location of the study area and collecting method in primeval fir forest of the Carpathian NNP: *1* – location and study area; *2* – general view of polytrap; *3* – primeval fir forest of the Carpathian NNP

A section of the centuries-old fir forest in Carpathian NPP (Fig. 1) is located on a western slope at an altitude of 760 m above sea level, in sections 30 and 31, quarter 13, of the Pidlisnivskyi Nature Research Department, Carpathian National Nature Park, near the village of Mykulychyn. Coordinates of the site: 48.384000 N, 24.613367 E. The site is located on slightly acidic and deep brown soils with a well-formed humus horizon. The site is represented by reference old-growth fir forests, almost 190 years old. The forest stand consists almost exclusively of *Abies alba* (100%), with occasional *Picea abies* and *Fagus sylvatica*. The pure fir composition is exceptional for the region and indicates the high natural value of the site. The undergrowth is well developed, consisting mainly of young trees around 30 years old, with a ratio of *Abies alba* (80%) to *Picea abies* and *Fagus sylvatica* (20%). The average height of the undergrowth is around 4 meters, and its density is high. The undergrowth is represented by phytocenoses typical of fir forests, including *Corylus avellana*, *Juniperus communis*, and *Sambucus nigra*. The total undergrowth density is approximately 0.1. The grass cover within the site is rich and consists of shade-loving plant species, including *Brachythecium* ssp., *Plagiomnium* ssp., *Asarum europaeum*, and *Symphytum officinale*. The site is rich in standing and fallen dead wood at various stages of decomposition, providing favorable conditions for the development of a wide range of saproxylic insects. The biotope is unique in terms of its naturalness and is an important reference model for research on old-growth forests in the Ukrainian Carpathians.

2. 2. Collection method

The report is based on the results of observations and collections of Yu. Motruk, V. Diedus, and M. Chumak (CMCH), which were conducted in the coniferous forests of the Carpathian National Nature Park in 2023–2024. All traps were set up and operated yearly during the vegetation season from early April to late September [8]. The current taxonomic status, nomenclature, and general distribution of the species follow A. Newton [3]. The geographical coordinates of localities and places of collecting are given according to www.google.com/maps/place. Identification to species was carried out using a binocular magnifier MBS-10. If necessary, the mandibles, genitalia, and other parts of the beetles' bodies were dissected and fixed using thin dissecting needles. Sometimes the material was clarified by boiling or holding in a 10% NaOH solution. After that, the organs were placed in a fixing solution for long-term storage. Canadian balsam or Euparal was used as a fixative.

3. Research results

As a result of processing the specimens, collected during the research in the old-growth fir forest of the Carpathian National Nature Park, 484 specimens belonging to the subfamily Aleocharinae were identified, belonging to 44 species, 25 genera, including *Aleochara bipustulata* (Linnaeus, 1760), *A. brevipennis* Gravenhorst, 1806, *A. cuniculorum* Kraatz, 1858, *A. fumata* Gravenhorst, 1802, *Amischa analis* (Gravenhorst, 1802), *Atheta castanoptera* (Mannerheim, 1830), *A. dadopora* C.G.Thomson, 1867, *A. fungicola* (C.G.Thomson, 1852), *A. hybrida* (Sharp, 1869), *A. picipes* (C.G.Thomson, 1856), *A. vaga* (Heer, 1839), *Liogluta microptera* C.G.Thomson, 1867, *Mocyta fungi* (Gravenhorst, 1806), *Plataraea brunnea* (Fabricius, 1798), *Pycnota paradoxa* (Mulsant & Rey, 1861), *Bolitochara obliqua* Erichson, 1837, *B. pulchra* (Gravenhorst, 1806), *Brachida exigua* (Heer, 1839), *Gyrophaena affinis* Mannerheim, 1830, *G. boleti* (Linnaeus, 1758), *G. gentilis* Erichson, 1839, *G. joyi* Wendeler, 1924, *G. joyioides* Wüsthoff, 1937, *G. nana* (Paykull, 1800), *G. strictula* Erichson, 1839, *Encephalus complicans* Stephens, 1832, *Cyphea curtula* (Erichson, 1837), *Leptusa fumida* (Erichson, 1839), *L. pulchella* (Mannerheim, 1830), *L. ruficollis* (Erichson, 1839), *Oligota pusilla* (Pace, 1985), *Alevonota hepatica* (Erichson, 1839), *A. rufotestacea* Kraatz, 1856, *Anomognathus cuspidatus* (Erichson, 1839), *Pella limbata* (Paykull, 1789), *Myllaena intermedia* Erichson, 1837, *Meotica exilis* (Gravenhorst, 1806), *Ischnoglossa prolixa* (Gravenhorst, 1802), *Haploglossa villosula* (Stephens, 1832), *Ilyobates nigricollis* (Paykull, 1800), *Ocalea concolor* Kiesenwetter, 1847, *Oxypoda alternans* (Gravenhorst, 1802), *O. togata* Erichson, 1837, and *Placusa tachyporoides* (Waltl, 1838).

3. 1. Annotated list of saproxylic rove beetles of the subfamily Aleocharinae in primeval fir forest of the Carpathian National Nature Park

***Aleochara* (*Xenochara*) *cuniculorum* Kraatz, 1858**

Material. 19.05.2023 (1); 13.08.2024 (1).

Bionomics. A eurytopic species, found locally, mainly on the plains, in the lowlands and foothills, in deciduous forests, meadows, in agrocenoses, is nidicolous and associated with subterranean burrows and nests of various mammals: badger, fox, rabbit, hamster, ground squirrel, common voles, exceptionally also mole and sand martin, and can be found under wet leaves and in forest layer, in rotten stumps and under logs of fallen trees, sometimes on animal cadavers [9–11]. The larva is a parasitoid of several dipteran families, develops in the puparia of flies, pupates in the soil, adults prey on fly larvae and also feed on decomposing animal flesh [12].

Distribution. Widespread Transpalaearctic species eastward to the Far East and northern Mongolia and the Neotropical region [3].

***Aleochara* (*Xenochara*) *fumata* Gravenhorst, 1802**

Material. 23.07.2024 (1).

Bionomics. A eurytopic mycetophilous forest species, found locally on the plains and in the mountains, in deciduous forests, where it lives in the fruiting bodies of xylotrophic fungi, sometimes in wood, affected by fungi and under the bark of dead tree trunks, also on tree sap; sometimes on animal cadavers [10, 11].

Distribution. Traspalaearctic species, from Europe to Far East, introduced to the Nearctic [3].

***Atheta* (*Atheta*) *fungicola* (Thomson, 1852)**

Material. 21.05.2024 (5).

Bionomics. A eurytopic mycetophilous species, often occurs on plains and in mountains, in natural and artificial forests, on various wood and terrestrial fungi, as well as in rotting fungi, in rotten wood, in moist forest litter and in burrows of small mammals [11]. Adults and

larvae appear to be generalist predators of small arthropods and dipteran larvae and eggs, found in moist leaf litter and soil [13, 14].

Distribution. Distributed in Europe and Turkey [3].

***Liogluta microptera* Thomson, 1867**

Material. 19.05.2023 (2); 21.05.2024 (2); 13.06.2023 (3).

Bionomics. A eurytopic hygrophilous species, occurs on plains and in mountains, in deciduous, coniferous, and mixed forests, forest edges, woodsides, sometimes in meadows, fields, in meadow litter and under moist leaves, along the banks of rivers and reservoirs, sometimes together with ants [11]. Adults and larvae appear to be generalist predators of small arthropods and dipteran larvae and eggs, found in moist leaf litter and soil [13, 14].

Distribution. Species with a wide distribution in Europe, eastwards to Asia Minor; also recorded from northeastern China [3].

***Anomognathus cuspidatus* (Erichson, 1839)**

Material. 11.06.2024 (11); 13.06.2023 (3); 23.07.2024 (3).

Bionomics. A eurytopic forest species, occurs mainly in lowland areas and foothills, less often in mountainous areas, under bark and on freshly cut trunks of deciduous (*Acer*, *Aesculus*, *Betula*, *Fagus*, *Populus*, *Quercus* and *Salix*) and coniferous (*Picea* and *Pinus*) tree species. It occurs more often under rotten, fungus-infected bark, less often under the bark of freshly fallen trees, in passages and together with representatives of *Ipidae*, in rotten wood, in old rotten stumps and muddy organic residues in hollows of old trees [10, 11].

Distribution. Widely distributed in Europe, also known from North Africa, Turkey and China**,** introduced in North America [3].

***Bolitochara pulchra* (Gravenhorst, 1806)**

Material. 21.05.2024 (2).

Bionomics. A eurytopic forest mycetophilous species, occurs in deciduous and mixed forests, in river valleys, on plains, in foothills and less often in mountain forests, up to the subalpine zone, it occurs in young, old and rotten carpophores of fungi, in rotten wood, under the bark of dead trees and in rotten wood. Larvae are said to be mycophagous, adults feed on fly larvae in fungi [11].

Distribution. Widespread from West Europe to Siberia [3].

***Bolitochara obliqua* Erichson, 1837**

Material. 11.06.2024 (3).

Bionomics. A eurytopic forest mycetophilous species, ubiquitous in deciduous and mixed forests, in river valleys, on plains, in foothills and less often in mountain forests, up to the subalpine zone. Beetles live mainly in terrestrial and xylotrophic fungi (*Polyporus squamosus*, *Laetiporus sulphureus*), in rotten wood, under the bark in dead wood. Larvae are said to be mycophagous, adults feed on fly larvae in fungi [10].

Distribution. Widespread in Europe, from Great Britain to European Russia except north, in the Caucasus region and Middle Asia [3].

***Leptusa* (*Dendroleptusa*) *fumida* (Erichson, 1839)**

Material. 13.06.2023 (4); 07.07.2023 (3); 23.07.2024 (2); 30.07.2023 (6); 30.08.2023 (1).

Bionomics. A eurytopic forest species, occurs in deciduous and mixed forests, where it is found under fungus-infested bark of fallen trees and stumps, under bark, infested with other insects, under trunk moss and lichens as well as in the fruiting bodies of xylotrophic fungi [11].

Distribution. Widespread in Europe, North Africa, eastwards to Siberia [3].

***Leptusa* (*Leptusa*) *pulchella* (Mannerheim, 1830)**

Material. 21.05.2024 (5); 11.06.2024 (33); 13.06.2023 (2); 07.07.2023 (4); 23.07.2024 (26); 30.07.2023 (2); 13.08.2024 (4); 30.08.2023 (2); 03.09.2024 (3).

Bionomics. A eurytopic forest species, occurs in deciduous and mixed forests, in river valleys, on plains, in foothills and less often in mountain forests, up to the subalpine zone, where it is found under fungus-infested bark of fallen trees and stumps, under bark, infested with other insects, under trunk moss and lichens as well as in the fruiting bodies of xylotrophic fungi [11].

Distribution. Widespread in Europe, eastwards to Turkey, Armenia, Georgia and Iran [3].

***Leptusa* (*Pachygluta*) *ruficollis* (Erichson, 1839)**

Material. 11.06.2024 (5); 23.07.2024 (1); 13.08.2024 (1).

Bionomics. A eurytopic forest species, occurs in deciduous and mixed forests, where it occurs under fungus-infested bark of fallen trees and stumps, especially on dead branches of deciduous species (*Fagus*, *Corylus*, *Acer*, *Quercas*, *Ainas*), under bark, infested with other insects, under trunk moss and lichens, as well as in the fruiting bodies of xylotrophic fungi and together with ants. [11].

Distribution. Distributed in Europe and Turkey [3].

***Gyrophaena* (*Agaricophaena*) *boleti* (Linnaeus, 1758)**

Material. 21.05.2024 (2); 11.06.2024 (9); 07.07.2023 (1); 23.07.2024 (4); 30.07.2023 (6).

Bionomics. A eurytopic forest mycetophilous species, occurs in river valleys, on plains and in mountains, in natural and artificial forests [10, 11]. Larvae and adults are obligate mycobionts, occurring in fungal carpophores (*Polyporus, Trametes*, *Fomes*, *Daedalea*), feeding on mature fungal spores [3, 5].

Distribution. Widespread in Europe, the Caucasus, reaching East Siberia and Kazakhstan [3].

***Gyrophaena* (*Gyrophaena*) *gentilis* Erichson, 1839**

Material. 19.05.2023 (5); 07.07.2023 (5).

Bionomics. A eurytopic forest mycetophilous species, occurs in river valleys, on plains and in mountains, in natural and artificial forests. Larvae and adults are obligate mycobionts, occurring in fungal carpophores, feeding on mature fungal spores [10, 11, 15].

Distribution. Distributed in Central and Northern Europe, the Caucasus, Asia Minor, Middle Asia and Siberia [3].

***Gyrophaena* (*Gyrophaena*) *joyi* Wendeler, 1924**

Material. 11.06.2024 (1).

Bionomics. A eurytopic forest mycetophilous species, occurs in river valleys, on plains and in mountains, in natural and artificial forests. Larvae and adults are obligate mycobionts, occurring in fungal carpophores, feeding on mature fungal spores [10, 11, 15].

Distribution. Distributed from Europe to Western and Central Asia and East Siberia [3].

***Gyrophaena* (*Gyrophaena*) *joyioides* Wüsthoff, 1937**

Material. 23.07.2024 (1); 30.07.2023 (2).

Bionomics. A eurytopic forest mycetophilous species, occurs in river valleys, on plains and in mountains, in natural and artificial forests. Larvae and adults are obligate mycobionts, occurring in fungal carpophores, feeding on mature fungal spores [10, 11, 15].

Distribution. Distributed from Europe, Turkey, Armenia to Western Siberia [13].

***Gyrophaena* (*Gyrophaena*) *nana* (Paykull, 1800)**

Material. 23.07.2024 (1).

Bionomics. A eurytopic forest mycetophilous species, occurs in river valleys, on plains and in mountains, in natural and artificial forests. Larvae and adults are obligate mycobionts, occurring in fungal carpophores, feeding on mature fungal spores [10, 11, 15].

Distribution. Transpalaearctic, distributed from Europe to the Russian Far East, introduced to Nearctic [3].

***Gyrophaena* (*Leptarthrophaena*) *affinis* Mannerheim, 1830**

Material. 19.05.2023 (1); 11.06.2024 (1); 03.09.2024 (4).

Bionomics. A eurytopic forest mycetophilous species, occurs in river valleys, on plains and in mountains, in natural and artificial forests. Larvae and adults are obligate mycobionts, occurring in fungal carpophores, feeding on mature fungal spores [10, 11, 15].

Distribution. According to, widespread from North Africa and Siberia and the Russian Far East; also known from North America [3].

***Cyphea curtula* (Erichson, 1837)**

Material. 23.07.2024 (1).

Bionomics. A stenotopic forest species, found under rotten tree bark, often in lying trunks, especially on aspen in larval galleries of *Xylotrechus rusticus*, *Saperda perforata*, *Trypophloeus* species and *Cossus cossus*; in warm and sunny weather beetles appear outside on and near tree trunks [10].

Distribution. Widespread in Europe, Georgia**,** introduced in North America [3].

***Oligota pusillima* (Gravenhorst, 1806)**

Material. 21.05.2024 (1).

Bionomics. A eurytopic forest species, ubiquitous in deciduous and mixed forests, occurs in all habitats from lowlands to subalpine zone; found in hollow trees, in leaf litter and other decaying plant matter, in hay and other mouldy substrates, in agaric fungi and once in a mole nest; also occurs in the nests of *Formica* ssp. and *Lasius* ssp. ants [10].

Distribution. Widespread Palaearctic species, introduced in various regions of the world, subcosmopolitan [3].

***Pella limbata* (Paykull, 1789)**

Material. 21.05.2024 (4); 11.06.2024 (1).

Bionomics. A stenotopic hygrophilous species, occurs on plains and in mountains, in natural and artificial deciduous and mixed forests, on moist and damp sites, along river and water banks, habitats with *Lasius brunneus*, *L. flavus*, *L. fuliginosus*, and sometimes in mosses and plant remains [11].

Distribution. Broadly distributed in Europe, eastwards to East Siberia [3].

***Ischnoglossa prolixa* (Gravenhorst, 1802)**

Material. 19.05.2023 (1); 13.06.2023 (1); 07.07.2023 (2).

Bionomics. A eurytopic forest species, occurs on plains and in mountains, in natural and artificial deciduous, coniferous and mixed forests, where they are found under bark, in leaf litter and moss, at the base of old trees, in wood debris, and sometimes together with *Lasius fuliginosus* [11].

Distribution. Widespread in Europe, North Africa, eastwards to North Korea [3].

***Haploglossa villosula* (Stephens, 1832)**

Material. 21.05.2024 (4); 11.06.2024 (7); 13.06.2023 (1); 07.07.2023 (2); 30.08.2023 (1); 03.09.2024 (1); 09.10.2023 (1).

Bionomics. A eurytopic forest species, occurs on plains and in mountains, in natural and artificial deciduous and mixed forests, at the base of old trees, in tree hollows, in the nests of birds and small mammals, habitats with *Lasius* ssp., and sometimes in mosses [11].

Distribution. Widespread in Europe, North Africa, eastwards to Turkey, Armenia, Azerbaijan, South Korea, and China [3].

***Oxypoda* (*Mycetodrepa*) *alternans* (Gravenhorst, 1802)**

Material. 11.06.2024 (12).

Bionomics. A eurytopic mycetophilous species, occurs locally on plains and in mountains (up to h≈1600 m.a.s.l.), in deciduous and mixed forests, widespread and common in decaying, as well as mature and rotten terrestrial and xylotrophic fungi, often attends agaric fungi. Adults and larvae general predators on small arthropods and dipteran larvae and eggs occurring in moist leaf litter and soil (Newton, 1984; Koch, 1989; Klimaszewski, 2000) [11].

Distribution. Widespread in North Africa and Europe, eastwards to Iran and Middle Asia [3].

***Placusa* (*Placusa*) *tachyporoides* (Waltl, 1838)**

Material. 19.05.2023 (1); 13.06.2023 (16); 07.07.2023 (4).

Bionomics. A stenotopic forest species, occurs under bark of recently fallen trees; sometimes in fungi,

such as Fomes fomentarius [10].

Distribution. Widespread from Western Europe to Japan, introduced in North America [3].

3.2. Obligate and facultative saproxylic rove beetles of the subfamily Aleocharinae in primeval fir forest

The analysis of identified species according to the generally accepted specification is based on the degree of dependency on deadwood as habitat, with a distinction being made between obligate and facultative deadwood users [1]. Based on our own observations and literary sources, we divided all identified species into obligate saproxylic rove beetles of the subfamily Aleocharinae if the availability of dead wood is essential for their survival during some part of their life cycle. Among the species identified, obligate saproxylic rove beetles include: *Atheta fungicola*, *Anomognathus cuspidatus*, *Bolitochara obliqua*, *B. pulchra*, *Gyrophaena affinis*, *G. boleti*, *G. gentilis*, *G. joyi*, *G. joyioides*, *G. nana*, *G. strictula*, *Cyphea curtula*, *Leptusa fumida*, *L. pulchella*, *L. ruficollis*, *Oligota pusilla*, *Ischnoglossa prolixa*, *Haploglossa villosula*, *Oxypoda alternans*, and *Placusa tachyporoides*.

In contrast, a facultative deadwood user "may use but does not require some component of the dead wood cycle for some or all of its life history" [1], e.g., species, which can use multiple resources for nesting, oviposition or hunting [1]. Facultative saproxylic rove beetles among the species identified include: *Aleochara cuniculorum*, *A. fumata*, *Liogluta microptera*, and *Pella limbata*.

Research limitations. The research was conducted for only two years, so there is a high probability that some species were not detected, particularly those that are in small numbers.

Prospects for further research. The result of our research is a section of the composition of the beetle community at a certain stage of forest succession. In the future, these data can be used by researchers to assess other territories, in particular with the aim of forming proposals for rational sustainable permanent forest use, which Ukrainian forestry is gradually moving towards.

4. Conclusions

The community of rove beetles of the subfamily Aleocharinae, collected in primeval fir forest of the Carpathian NNP, is characterized by a high level of faunal diversity. The fauna of rove beetles of the subfamily Aleocharinae accounts for 44 species, of which 23 species are saproxylic. Such diversity indicators are determined by the species composition of forest, undergrowth, shrub and grass cover. A considerable proportion of ancient trees, dead wood at different stages of decomposition provides the presence of ecological niches due to the diversity of microhabitats for saproxylic beetles.

Conflict of interests

The authors declare that they have no conflict of interest regarding this research, including financial, personal, authorship or any other kind of conflict that could influence the research and its results, presented in this article.

Funding

The study was conducted without any financial support.

Data availability

The data will be provided upon a reasonable request.

Use of artificial intelligence tool

The authors confirm that they did not use artificial intelligence technologies in the creation of the presented work.

Acknowlegements

We would like to thank our colleagues and friends prof. Dr. Thibault Lachat (Forest Sciences, School of Agricultural, Forest and Food Sciences HAFL, Bern University of Applied Sciences, Zollikofen, Switzerland and Swiss Federal Institute for Forest, Snow and Landscape Research WSL, Birmensdorf, Switzerland) and prof. Dr. Martin Gossner (Forest Entomology, Swiss Federal Institute for Forest, Snow and Landscape Research WSL, Birmensdorf, Switzerland and Switzerland Institute of Terrestrial Ecosystems, Department of Environmental Systems Science, Zürich, Switzerland) for organizing and collaborating on several projects to study biodiversity in primeval forests of the Ukrainian Carpathians. We express our gratitude to V. I. Diedus (State Museum of Natural History, Lviv, Ukraine) and M. V. Chumak (Uzhhorod National University, Uzhhorod, Ukraine) for support and assistance during the preparation of this study. We are grateful to A.Yu. Glotova (Novoiavorivsk, Ukraine) and N.Yu. Polchaninova (V. N. Karazin Kharkiv National University, Kharkiv, Ukraine) for correction of the English text of the manuscript as well as V.V. Mirutenko (Uzhhorod National University, Uzhhorod, Ukraine) and O.I. Kyselyuk (Carpathian National Nature Park, Yaremche, Ukraine) for important suggestions.

References

1. Alexander, K. N. A., (2008). Tree Biology and Saproxylic Coleoptera: Issues of Definitions and conservation language. Annual Review of Ecology, Evolution, and Systematics, 10, 9–13. Available at: https://www.persee.fr/doc/revec_0249-7395_2008_sup_10_1_1455

2. Nieto, A., Alexander, K. N. A. (2010). European Red List of saproxylic beetles. Luxembourg: Publications Office of the European Union, 39. Available at: https://www.cerambycoidea.com/titles/nietoalexander2010.pdf

3. Newton, A. (2025). StaphBase (version Aug 2022). Catalogue of Life (Version 2025-07-10). Catalogue of Life Foundation. Amsterdam. https://doi.org/10.48580/dg9ld-3gk

4. Thayer, M. K.; Beutel, R. G., Leschen, R. A. B. (Eds.) (2005). Staphylinidae. Coleoptera, Vol. I. Morphology and Systematics (Archostemata, Adephaga, Myxophaga, Polyphaga partim). Handbook of Zoology Vol. IV, Arthropoda: Insecta. Part 38. De Gruyter, Berlin, New York, 296–345. Available at: https://www.semanticscholar.org/paper/Morphology-and-systematics-(Archostemata%2C-Adephaga%2C-Beutel-Leschen/80e58a3e2ff73afa5d6d1b74f6490a2d1a72f686

5. Ashe, J. S. (1984). Generic revision of the subtribe Gyrophaenina (Coleoptera: Staphylinidae: Aleocharinae) with a review of the described subgenera and major features of evolution. Quaestiones entomologicae, 20 (3), 129–349. Available at: https://www.biodiversitylibrary.org/part/204370

6. Bohac, J. (1999). Staphylinid beetles as bioindicators. Agriculture, Ecosystems & Environment, 74 (1-3), 357–372. https://doi.org/10.1016/s0167-8809(99)00043-2

7. Kyseliuk, O. I., Prykhodko, M. M., Yavorskyi, A. I., Abramiuk, U. M., Belei, L. M., Belmeha, V. V. et al. (2009). Karpatskyi natsionalnyi pryrodnyi park. Ivano-Frankivsk: Foliant, 672. Available at: https://www.researchgate.net/profile/Vitaliy-Nazarenko/publication/268808851_831_Bezhrebetni/links/54884d2b0cf2ef34479074db/831-Bezhrebetni.pdf

8. Duelli, P., Obrist, M. K., Schmatz, D. R. (1999). Biodiversity evaluation in agricultural landscapes: above-ground insects. Agriculture, Ecosystems & Environment, 74 (1-3), 33–64. https://doi.org/10.1016/s0167-8809(99)00029-8

9. Assing, V. (2009). On the taxonomy and zoogeography of some Palaearctic Aleochara species of the subgenera Xenochara Mulsant & Rey and Rheochara Mulsant & Rey (Coleoptera: Staphylinidae: Aleocharinae). Beiträge Zur Entomologie = Contributions to Entomology, 59 (1), 33–101. https://doi.org/10.21248/contrib.entomol.59.1.33-101

10. Horion, A. (1967). Staphylinidae. 3. Vol. 11. Habrocerinae bis Aleocharinae (Ohne Subtribus Athetae). Faunistik der mitteleuropäischen Käfer. Überlingen-Bodensee: P.C.W. Schmidt, 419. Available at: https://fernleihe.boss.bsz-bw.de/Record/(DE-627)143153811#interlibraryloan

11. Koch, K. (1989). Die Käfer Mitteleuropas. Ökologie. Band E1: Carabidae-Micropeplidae. Krefeld: Goecke & Evers, 440. Available at: https://openlibrary.org/books/OL27992161M/Die_K%C3%A4fer_Mitteleuropas_Bd._E1

12. Maus, Ch., Mittmann, B., Peschke, K. (2008). Host Records of Parasitoid Aleochara Gravenhorst Species (Coleoptera, Staphylinidae) Attacking Puparia of Cyclorrhapheous Diptera. Deutsche Entomologische Zeitschrift, 45 (2), 231–254. https://doi.org/10.1002/mmnd.19980450209

13. Klimaszewski, J. (2000). Diversity of the rove beetles in Canada and Alaska (Coleoptera, Staphylinidae). Mémoires de la Soiété Royale Belge d'Entomologie, 39, 3–126. Available at: https://www.naturebob.com/sites/default/files/Klimaszewski2000-Diversity-of-the-rove-beetles-of-Canada-and-Alaska.pdf

14. Newton, A. F. Jr.; Wheeler, Q., Blackwell, M. (Eds.) (1984). Mycophagy in Staphylinoidea (Coleoptera). Fungus Insect Relationships: Perspectives in Ecology and Evolution. New York: Columbia University Press, 302–353. Available at: https://cup.columbia.edu/book/fungus-insect-relationships/9780231054683

15. Michaud, J.-P., Majka, C. G., Privé, J.-P., Moreau, G. (2010). Natural and anthropogenic changes in the insect fauna associated with carcasses in the North American Maritime lowlands. Forensic Science International, 202 (1-3), 64–70. https://doi.org/10.1016/j.forsciint.2010.04.028

Received 22.07.2025
Received in revised form 19.08.2025
Accepted 23.09.2025
Published 03.10.2025

Yuriy Motruk*, PhD Student, Junior Researcher, Department of Entomology and Biodiversity Preservation, Uzhhorod National University, Pidgirna str., 46, Uzhhorod, Ukraine, 88000, Carpathian National Nature Park, Vasyl Stus str., 6, Yaremche, Ukraine, 78500

Sergiy Glotov, PhD, State Museum of Natural History National Academy of Sciences of Ukraine, Teatralna str., 18, Lviv, Ukraine, 79008, Luhansk Nature Reserve National Academy of Sciences of Ukraine, Rubizhna str., 95, Stanica Luhanska, Ukraine, 93602, Luhansk Taras Shevchenko National University, Ivana Banka str., 3, Poltava, Ukraine, 36003

***Corresponding author**: Yuriy Motruk, e-mail: motrukyurii@gmail.com*