

FOUR SPECIES OF SAPROXYLIC BEETLES (INSECTA: COLEOPTERA) FROM THE REPUBLIC OF MOLDOVA, FIRST REPORT

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Abstract

The work includes the results of the study of saproxylic beetles carried out in forest reserves in the Republic of Moldova. Three genera *Lymexylon*, *Leiestes*, *Pediacus* and four saproxylic coleopteran species *Grynocharis oblonga*, *Lymexylon navale*, *Leiestes seminiger* and *Pediacus dermestoides* were recorded for the first time in the Republic of Moldova in the wood decompose of Codrii and Plaiul Fagului Reserves. Adults of Coleoptera were collected manually under the bark of dead trees in winter or captured using the trunk traps in summer.

Keywords: Codrii, Plaiul Fagului, reserve, insect species, wood.

1. INTRODUCTION

The most successful insect order is Coleoptera with approximately 400,000 species of the beetles described in the world, represents about 38% of all species in 39 insect orders (Zhang, 2011). The dominance of this group in terrestrial ecosystems and in the dead wood can hardly be overstated. The largest, longest-lived and best-known beetles are saproxylic. Saproxylic beetles dominate in terms of sheer number of species in the forest, including at the same time, forest pest species (Gimmel and Ferro, 2018).

The species from the families Lymexylidae and Cucujidae are strictly saproxylic species, while the species from the families Trogossitidae and Endomychidae are associated with dead wood, depending on the larvae of other invertebrate species or fungi that develop on the rotting woody substrate.

The Lymexylidae family is distributed worldwide with approximately 70 species. In Europe, two genera are found: *Hylecoetus* Latreille, 1806 and *Lymexylon* Fabricius, 1775, which are represented in Europe by the species *Hylecoetus dermestoides* (Linnaeus, 1761), *H. flabellicornis* (Schneider, 1791) şi *Lymexylon navale* (Linnaeus, 1758) (Die Käfer Europas).

All species of the Lymexylidae family are harmful to shipyards and timber, some affecting the wood of living trees. Adults attack debarked oak wood (Burgers and Heijerman, 2018).

The Cucujidae family is widespread throughout the world except Africa and is represented by five genera and 70 species (Jaskuła et al., 2020).

Two genera *Cucujus* Fabricius, 1775 and *Pediacus* Shuckard, 1839 are widespread in the Palearctic Region, and 8 species are found in Europe (Wegrzynowicz, 2007; Thomaes et al., 2020). One

species *Cucujus cinnaberinus* Scopoli, 1763 is a threatened species in Europe and has been included in Annex II of the European Habitats Directive (Cálix et al., 2018), the species is also rare in the Republic of Moldova (The Red Book of the Republic of Moldova, 2015).

The family Trogossitidae is widespread throughout the world with about 600 species in 50 genera (Kolibáč et al., 2010). They are considered predators or feed on fungi in both the adult and larval stages and are found under the bark of dead wood affected by fungi and colonized by other insects.

The family Endomychidae includes about 1300 species spread across all zoogeographic regions, but more abundant the species from this family are in tropical and subtropical areas (Tomaszewska, 2005).

The representative of the Endomychidae family are mostly mycophagous, feeding on either fungal spores or fungal hyphae. They consume different types of mushrooms (Agaricales, Polyporales, molds, etc.).

The most common habitat for these species are wood decompose and bark covered with fungi, but there are species that can be collected directly from large basidiomycetes or from the forest litter. Some larvae are exceptions to mycophagy, consuming insects and phytophagous mites, other larvae appear to feed on lichens, and some are in association with ants and termites, but little is known about their food and habits (Tomaszewska, 2005).

According to feeding type of saproxylic beetles they have been classified in several major groups that inhabits decayed wood. Four new species of saproxylic coleoptera have been included in our work. One of them may be referred to as “ambrosia beetles” of which the species in the family Lymexylidae belongs. Between the taxa present in subcortical group of coleoptera, probably feeding upon fungal mycelium there is Endomychidae family. The species from the Cucujidae family are known as “flat bark beetles,” their adults and larvae are often highly flattened and specialized for living under bark. Predatory beetles typical of this habitat is from Trogossitidae family (Gimmel and Ferro, 2018).

The new coleopteran collecting methods used during the winter – early spring period included the installation of trunk caps and the examination of each oak trunk exposed in the process of decay and a solitary dried tree, allowed the identification of a wide spectrum of saproxylic coleopteran species in the Plaiul Fagului Reserve (Bacal and Buşmachi, 2023a, 2023b, 2024).

2. MATERIALS AND METHODS

The Plaiul Fagului Reserve (47.291111N 28.054444E) is one of the best protected areas in the Republic of Moldova with the surface of 5642.00 ha covered by natural mixed forests based on oak tree species. In 1995, an area of 785.3 ha, was delimited as strictly protected area on the base of the arguments proposed by the researchers from the Botanical Garden and specialists in the field of forestry.

The Codrii Reserve (47°06'09"N 28°21'40"E) is a natural oak forest in combination with sessile oak, ash and hornbeam (Postolache and Lazu, 2018) located in the Central part of the Republic of Moldova with a surface of 5009 ha.

Both forest reserves have plant associations characteristic for Central Europe located at the extreme southeast of their range.

The specimens included in the present study were collected manually during 2023–2024 years in the Plaiul Fagului and Codrii Reserves, under the bark of dead and decaying trees, affected by molds and fungi that grow on dead wood. Also, some Coleoptera specimens were captured using

trunk traps installed on dry or drying trees in the Plaiul Fagului Reserve during summer of 2024 year. A 1:10 solution of kitchen salt was used for insects' conservation in the flight interception traps. Several sites were used to identify the coleopteran species (Die Käfer Europas; UK Beetle Recording).

3. RESULTS AND DISCUSSIONS

As a result of investigation three genera *Lymexylon*, *Leiestes*, *Pediacus* and four species *Grynocharis oblonga*, *Lymexylon navale*, *Leiestes seminiger* and *Pediacus dermestoides* were revealed for the first time in the Republic of Moldova in wood decompose of the Plaiul Fagului and Codrii Reserves. The identified species belong to four different families of order Coleoptera namely Cucujidae, Endomychidae, Lymexylidae and Trogossitidae.

Three species *Leiestes seminiger* and *Pediacus dermestoides* were collected manually from wood decompose, while nine specimens of *Lymexylon navale* were collected in June and July of 2024 using interception traps mounted on debilitated tree trunks in the Plaiul Fagului Reserve.

One specimen of the species *Grynocharis oblonga* was collected manually in the Cordii Reserve.

Because the species are identified for the first time, the information regarding their distribution, biology and ecology are presented below.

Family Cucujidae

Genus *Pediacus* Shuckard, 1839

Species *Pediacus dermestoides* (Fabricius, 1792) (Fig. 1).

Studied material: 1 spec., 16.04.2024, Plaiul Fagului Reserve.

Biology and ecology: Adults have a length of 3.5-4.5 mm. Larvae are predatory, and adults are mostly fungivorous. Adults were collected from dead deciduous and coniferous trees (Gradinarov et al., 2021).

Occurrence: Palearctica.

Rarity criteria: the criteria the species has not been assessed to date. In the European Red List of saproxylic beetles it is cited as DD (Data Deficient) (Nieto and Alexander, 2010; Cáliz et al., 2018).

Family Endomychidae

Genus *Leiestes* Chevrolat, 1836

Species *Leiestes seminiger* (Gyllenhal, 1808) (Fig. 2).

Studied materials: 1 spec., 23.06-08.07.2024, 1 spec., 04-10.09.2024, Plaiul Fagului Reserve.

Biology and ecology: Adults have a length of 2.6-3.4 mm. The period of activity is from early spring to autumn. *L. seminiger* is present especially on trees bearing fruiting bodies of *Piptoporus betulinus* and *Fomes fomentarius* found in Europe and which grows on decayed wood of the different trees species *Abies alba*, *Betula* sp., *Fagus sylvatica* and *Populus tremula* (Tomaszewska, 2005).

Occurrence: It is widely distributed throughout Europe, but with few records from Germany, France, Poland and Slovakia (Tomaszewska, 2005), Caucasus, Iran and Japan (Ruta et al., 2024).

Rarity criteria: In Slovakia the species is threatened and placed in the VU (vulnerable category) (Holecová and Franc, 2001). It is considered a second-class indicator of natural forests (Müller et al., 2005). *L. seminiger* is among the very rare saproxylic beetles and is considered a relict and endangered element in the natural forests of Poland (Wiezik, 2013).

In the Republic of Moldova, the species is also rare and threatened because dead trees are extracted from natural forests.

Family Lymexylidae

Genus *Lymexylon* Fabricius, 1775

Species *Lymexylon navale* (Linnaeus, 1758) (Fig. 3).

Studied materials: 8 spec., 30.05-23.06.2024, 1 spec., 23.06-08.07.2024, Plaiul Fagului Reserve.

Biology and ecology: Adults have a length of 7-16 mm. It is strikingly slender and dark in color. The male is shorter than the female. They are active from May to July, mainly at night. They are difficult to observe because the adults have a hidden lifestyle and a short lifespan of only a few days (Recalde Irurzun and San Martín, 2013). Adults do not feed, but larvae consume hardwood, especially dead or dying oak.

Occurrence: Central Europe.

Rarity criteria: The species, although considered harmful, is quite rare.

Family Trogossitidae

Genus *Grynocharis* (Thomson, 1862)

Species *Grynocharis oblonga* (Linnaeus, 1758) (Fig. 4).

Studied material: 1 spec., 24.02.2023 Codrii Reseve.

Biology and ecology: Adults have a length of 5,5-8 mm. It is usually found under the bark and in rotten wood of spruce, fir, birch, oak, hornbeam, alder, beech, poplar and willow trees. The species is active from spring to autumn. It hibernates in the larval and adult stages. Both the adult forms and the larvae are mycophagous and feed on mycelium that grows on decaying woody (Pottier et al., 2020).

Occurrence: Central Europe (France, Germany, Belgium, Sweden, Poland) and the European part of Russia.

Rarity criteria: The status of the species has not been assessed.

The new identified genera *Lymexylon*, *Leiestes* and *Pediacus* includes saproxylic species of Coleoptera. Two of them *Lymexylon* and *Pediacus* have only by one species each in Europe.

The genus *Grynocharis* has a Holarctic distribution and comprises four species, of which only *Grynocharis oblonga* și *G. pubescens* (Erichson, 1844) occur in Central Europe including Russia to the Urals, Caucasus and USA except central and southern states, Canada southwestern and southeastern states (Kolibac, 2013). *G. oblonga* is found in the rotting wood of deciduous and coniferous trees, probably being fungivorous (Kolibáč, 2005).

The genus *Leiestes* has 3 species, of which *L. menetriesi* (Falderman, 1837) and *L. seminiger* are distributed in Europe, while *L. fines* (Sasaji, 1995) in Japan (Shockley et al., 1999).

L. seminiger is a saproxylic beetle associated with deciduous and coniferous trees infested with fungi of the species *Piptoporus betulinus*, *Fomes fomentarius* and *Mycoacia fuscoatra* (Stokland et al., 2012). It is a rare species of saproxylic beetles (Wiezik et al., 2015).



Figure 1. *Pediacus dermestoides* (original)



Figure 2. *Leiestes seminiger* (original)



Figure 3. *Lymexylon navale* (original)



Figure 4. *Grynocharis oblonga* (original)

4. CONCLUSIONS

As a result of the research carried out on the coleoptera associated with dead wood in the Plaiul Fagului and Codrii Reserves three genera *Lymexylon*, *Leiestes*, *Pediacus* and four coleopteran species *Grynocharis oblonga*, *Leiestes seminiger*, *Lymexylon navale* and *Pediacus dermestoides* were identified for the first time in the Republic of Moldova.

The use of trunk traps throughout the spring-summer period allowed the identification for the first time in the fauna of the Republic of Moldova of the species *Leiestes seminiger* and *Lymexylon navale*, the other two species being collected manually.

Despite the fact that saproxylic research has been carried out regularly in recent years, new species of coleoptera are still being identified.

The new collection method using trunk traps allowed the capture of several new groups of saproxylic beetles.

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