

CONTRIBUTIONS TO THE KNOWLEDGE OF DIURNAL BUTTERFLIES (LEPIDOPTERA: PAPILIONOIDEA) FROM THE ORHEI NATIONAL PARK

ȚUGULEA Cristina

Abstract. The paper presents the faunal diversity of diurnal butterflies (Lepidoptera: Papilionoidea) from the Orhei National Parc. As a result of the researches carried out, a total of 94 species of diurnal butterflies were identified in the Orhei National Park, belonging to 59 genera and 6 families: Nymphalidae (35 species), Pieridae (12), Papilionidae (4), Lycaenidae (29), Hesperidae (13) and Riodinidae (1 species). The research was carried out in various localities of the Orhei National Park (Ivancea, Vatici, Trebujeni, Romanești, Țigănești, Peresecina, Butuceni, Bravicea and Seliște) during the years 2012-2023. Of the 94 species reported in the reserve, 14 are protected at national and European level, 13 being included in the Red Book of the Republic of Moldova, 2015. The research demonstrates that the Orhei National Parc is an area of great importance for the conservation of biological diversity, and research in the reserve needs to be continued.

Keywords: Lepidoptera, Papilionoidea, Republic of Moldova, diversity, rare species.

Rezumat. Contribuții la cunoașterea fluturilor diurne (Lepidoptera: Papilionoidea) din Parcul Național Orhei. În rezultatul cercetărilor efectuate în Parcul Național Orhei au fost semnalate în total 94 de specii de fluturi diurni, care aparțin la 59 de genuri și 6 familii: Nymphalidae (35 specii), Pieridae (12 specii), Papilionidae (4), Lycaenidae (29), Hesperidae (13) și Riodinidae (1 specie). Cercetările au fost efectuate în diverse localități ale Parcului Național Orhei (Ivancea, Vatici, Trebujeni, Romanești, Țigănești, Peresecina, Butuceni, Bravicea și Seliște) în perioada anilor 2012-2023. Din cele 94 specii semnalate în rezervație, 14 sunt protejate la nivel național și european, 13 fiind incluse în Cartea Roșie a Republicii Moldova, 2015. Cercetările demonstrează că Parcul Național Orhei este o zonă de mare importanță pentru conservarea diversității biologice, iar cercetările în această zonă necesită a fi continuate.

Cuvinte cheie: Lepidoptera, Papilionoidea, Republica Moldova, diversitate, specii rare.

INTRODUCTION

In the fauna of the Republic of Moldova, approximately 1000 species of macrolepidoptera from various families have been recorded and published so far. Of these, 138 species belong to the category of diurnal butterflies and over 850 species are represented by nocturnal lepidopteran species. The faunal diversity of the diurnal butterflies from the fauna of the Republic of Moldova consists of 138 species from 6 families: Hesperidae (20 species), Pieridae (17), Papilionidae (4), Nymphalidae (61), Riodinidae (1) and Lycaenidae (35 species) (ȚUGULEA et al., 2021; ȚUGULEA, 2022).

Butterflies have a significant role in nature and in the human economy, being important links in the biocenotic relationships of the living world. They constitute food both in the adult stage, as well as in the larva, egg, pupa, for insectivorous mammals, birds, reptiles, other insects, etc. Lepidoptera, in turn, serve as hosts for a range of parasites. Therefore, the decline of the lepidopteran population can have severe consequences for the functioning of ecosystems. Besides this, butterflies have a very important role, along with other insects, in the pollination process.

This group of fragile and sensitive insects faces many threats; the limiting factors are habitat fragmentation and destruction, climate change and irrational use of insecticides, intensive grazing, hay cutting, urbanization, deforestation and chemical processing of forests, orchards and forest strips, burning dry grasses and many others. For these reasons, this study is so important, taking into account that the Orhei National Park forms a unique ecosystem, quite attractive for a large number of lepidopteran species.

The interest for the knowledge of Lepidoptera systematic group was manifested in Moldova from the beginning of the 20th century. The first catalogue for the Moldova Lepidoptera was published by Miller and Zubowsky in the first number of the journal “*Works of the Bessarabian Society of Natural Scientists and Amateurs of Natural History*” in 1908. A great value for butterfly fauna is the work of Miller and Zubowsky, later joined by Ruscinski, who published a series of articles between 1908-1937, with a major impact on the study of butterflies, registering many species for the territory of Bessarabia and being the first and some of most valuable taxonomic works for this purpose (MILLER & ZUBOVSKI, 1908; MILLER & ZUBOWSKI 1912; MILLER & ZUBOWSKI 1913; MILLER et al. 1929; MILLER et al. 1932; ZUBOWSKI & RUSCINSKI, 1937). These are some of the few works where we can find mentions of some species reported on the territory of the park.

The science popularization brochure “*Valori naturale ale Parcului Național Orhei*” = mentioned species included in the Red Book of the Republic of Moldova and various Red Lists at the European and world level, such as *Callimorpha quadripunctaria*, *Acherontia atropos*, *Saturnia pyri*, *Dolbina elegans*, *Iphiclides podalirius*, *Parnassius mnemosyne*, *Zerynthia polyxena*, *Parnassius mnemosyne* and *Zerynthia polyxena* and 3 species included in Annexes II and IV to the European Council Directive – *Callimorpha quadripunctaria*, *Parnassius mnemosyne*, *Zerynthia polyxena* (MUNTEANU et al., 2011).

The aim of this research was to inventory and study the species of diurnal butterflies identified on the territory of the Orhei National Park, especially the identification and study of rare species that require protection and conservation. This article contributes to the understanding of the distribution of lepidopteran species in the Republic of Moldova.

MATERIAL AND METHODS

The Orhei National Park is located in the central area of the Republic of Moldova, with an area of 33,792.09 ha, constitutes about 1% of the area of the Republic of Moldova, including four districts: Orhei, Strășeni, Călărași and Criuleni and 18 localities. From the entire surface of the park, 18.5 thousand ha consists of forests belonging to the Orhei and Călărași forestry enterprises. The central office of the park is located in Butuceni, and the core area includes natural forest near Trebujeni, Butuceni, Donici, Curchi and Țigănești. The Orhei National Park is located in the Codriilor Plateau (90.7%) and in the silvosteppe region (9.3%). The slopes of the Codrii heights are characterized by a sandy relief, represented by narrow ridges, deep valleys and hills. The landscape of the park is hilly, partly covered with forest. The territory is crossed by valleys and the Răut River flows through the park (Fig. 1). The Orhei National Park was founded in 2022 and represents a protected natural area, which contributes to stopping the degradation of forest ecosystems, meadows and contributes to the protection of the flora and fauna characteristic of the existing habitats in the area (<https://whc.unesco.org>, <https://ecopresa.md>). Even though the territory of Orhei National Park is located in the central part of the Republic of Moldova, an area with a rich natural heritage, the diversity of insect species in this area is insufficiently studied.

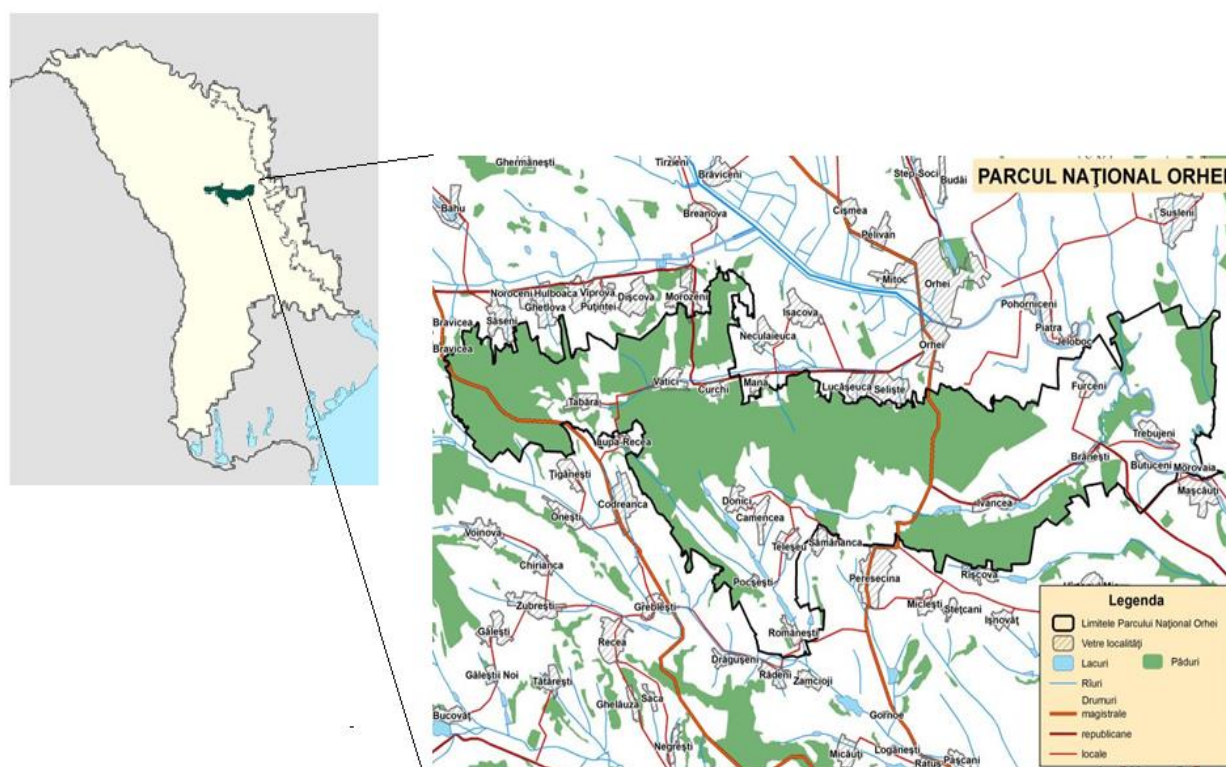


Figure 1. Location of the Orhei National Parc of the Republic of Moldova.

The forest vegetation of the Orhei National Park consists of several oak species (*Quercus petraea*, *Quercus robur*) located on the plateau and on the slopes with northern exposure. Sessile oak mixed with hornbeam (*Carpinus betulus*) are found on the slopes with north-east and east exposure. Sessile oak with linden (*Tilia tomentosa*) and ash (*Fraxinus excelsior*) are found on the slopes with south and south-west exposure. At lower altitudes, oak forests with hornbeam and sessile with pedunculate oaks are found. Willow forests (*Salix* sp.) were formed in the meadows of the medium-sized rivers Ichel, Cula, Vatici and Răut (MUNTEANU et al., 2011).

The research was carried out during the vegetation period of 2012-2023. The entomological material was collected in different habitats of the Orhei National Park, like forests, forest edges, meadows and calcareous canyons from 9 localities on the territory of the Orhei National Park: Ivancea (Orhei district) (Fig. 7), Vatici (Orhei district) (Fig. 4), Trebujeni (Orhei district), Romanești (Strășeni district) (Fig. 5), Țigănești (Strășeni district), Peresecina (Orhei district) (Fig. 3), Butuceni (Orhei district) (Fig. 2), Bravicea (Călărași district) and Seliște (Orhei district).

Diurnal butterflies were collected manually, with an entomological net or photos were taken. The taxonomy of the checklist is supplied according to Fauna Europea and RAKOSY (2013).



Figure 2. Wooded rocky substrates from the Orhei National Park (Butuceni village) (original photo).



Figure 3. Meadow from the Orhei National Park (Peresecina village) (original photo).



Figure 4. The edge of the forest from the Orhei National Park (Vatici village) (original photo).



Figure 5. Glade from the Orhei National Park (Romanești village) (original photo).

RESULTS AND DISCUSSION

The variety of landscapes, the favorable climatic conditions and the diverse spatial structure of the habitats have created optimal conditions for the existence and successful reproduction of butterfly populations on the territory of the Orhei National Park. As a result of the researches carried out, a total of 94 species of lepidoptera were identified in the Orhei National Park, which belong to 59 genera and 6 families: Nymphalidae (35 species), Pieridae (12), Papilionidae (4), Lycaenidae (29), Hesperidae (13) and Riodinidae (1 species) (Table 1). The study of diurnal butterflies from the Orhei National Park reveals a significant number, 94 species which represent 68 % of the total number of diurnal butterfly species in the Republic of Moldova.

Table 1. The list of diurnal butterflies species identified in the Orhei National Park.

No.	Species	Collection sites								
		Ivancea	Vatici	Trebujeni	Romanești	Țigănești	Peresecina	Butuceni	Bravicea	Seliște
Hesperidae Family										
1.	<i>Carterocephalus palaemon</i> (Pallas, 1771)	-	-	-	-	-	-	-	-	+
2.	<i>Charcarodus alcea</i> (Esper, 1780)	-	+	-	-	-	-	+	-	-
3.	<i>Erynnis tages</i> (Linnaeus, 1758)	+	+	-	-	+	+	+	-	-
4.	<i>Hesperia comma</i> (Linnaeus, 1758)	+	-	-	-	-	-	-	-	-
5.	<i>Muschampia floccifera</i> (Zeller, 1847)	+	-	-	-	-	-	-	-	-
6.	<i>Muschampia tessellum</i> (Hubner, 1803)	-	-	+	-	-	-	-	-	-
7.	<i>Ochlodes sylvanus</i> (Esper, 1777)	+	+	-	+	+	+	-	-	+
8.	<i>Pyrgus armoricanus</i> (Oberthür, 1910)	-	+	-	-	-	-	-	-	-
9.	<i>Pyrgus carthami</i> (Hübner, 1813)	-	-	+	-	-	-	-	-	-

10.	<i>Pyrgus malvae</i> (Linnaeus, 1758)	+	+	+	-	+	+	+	+	+
11.	<i>Spialia orbifer</i> (Hübner, 1823)	-	-	+	-	-	-	+	-	-
12.	<i>Thymelicus lineola</i> (Ochsenheimer, 1808)	+	+	-	-	+	+	-	-	+
13.	<i>Thymelicus sylvestris</i> (Poda, 1761)	+	+	-	+	+	-	-	+	+
Papilionidae Family										
14.	<i>Iphiclides podalirius</i> (Linnaeus, 1758)	+	+	+	+	+	+	-	-	+
15.	<i>Papilio machaon</i> (Linnaeus, 1758)	+	-	-	+	+	+	-	-	-
16.	<i>Parnassius mnemosyne</i> (Linnaeus, 1758)	+	-	-	-	-	-	-	-	-
17.	<i>Zerynthia polyxena</i> (Denis & Schiffermüller, 1775)	+	+	-	-	-	-	-	-	-
Pieridae Family										
18.	<i>Anthocharis cardamines</i> (Linnaeus, 1758)	+	-	+	-	+	+	-	+	-
19.	<i>Aporia crataegi</i> (Linnaeus, 1758)	+	-	-	-	-	-	-	-	-
20.	<i>Colias alfacariensis</i> (Ribbe, 1905)	+	+	-	-	-	-	-	-	-
21.	<i>Colias croceus</i> (Fourcroy, 1785)	-	+	-	-	+	+	-	-	+
22.	<i>Colias hyale</i> (Linnaeus, 1758)	+	-	-	-	+	-	-	-	-
23.	<i>Gonepteryx rhamni</i> (Linnaeus, 1758)	+	-	-	-	-	-	-	-	-
24.	<i>Leptidea morsei</i> Fenton, 1881	+	-	-	-	-	-	-	-	-
25.	<i>Leptidea sinapis</i> (Linnaeus, 1758)	+	+	+	-	+	+	-	-	+
26.	<i>Pieris brassicae</i> (Linnaeus, 1758)	+	+	+	+	+	+	+	+	+
27.	<i>Pieris napi</i> (Linnaeus, 1758)	+	+	+	+	+	+	+	+	+
28.	<i>Pieris rapae</i> (Linnaeus, 1758)	+	+	+	-	+	+	+	+	-
29.	<i>Pontia edusa</i> (Fabricius, 1777)	+	+	-	+	+	+	-	+	+
Riodinidae Family										
30.	<i>Hamearis lucina</i> (Linnaeus, 1758)	+	+	-	-	+	-	-	-	+
Lycaenidae Family										
31.	<i>Aricia agestis</i> (Denis & Schiffermüller, 1775)	+	+	-	+	+	+	-	+	+
32.	<i>Callophrys rubi</i> (Linnaeus, 1758)	+	+	-	-	-	-	-	-	-
33.	<i>Celastrina argiolus</i> (Linnaeus, 1758)	+	-	-	-	+	-	-	-	-
34.	<i>Cupido alcetas</i> (Hoffmannsegg, 1804)	+	+	-	-	+	-	-	-	+
35.	<i>Cupido argiades</i> (Pallas 1771)	-	+	-	-	-	-	-	-	-
36.	<i>Cupido decolorata</i> (Staudinger, 1886)	-	+	-	-	-	-	-	-	-
37.	<i>Cupido minimus</i> (Fuessly, 1775)	+	+	-	-	-	-	-	-	+
38.	<i>Cyaniris semiargus</i> (Rottemburg, 1775)	+	-	-	-	+	-	-	-	-
39.	<i>Glaucopsyche alexis</i> (Poda, 1761)	+	-	-	-	-	-	-	-	-
40.	<i>Lycaena dispar</i> (Haworth, 1802)	+	+	-	-	+	-	-	+	+
41.	<i>Lycaena phlaeas</i> (Linnaeus, 1761)	-	-	-	-	-	-	-	-	+
42.	<i>Lycaena thersamon</i> (Esper, 1784)	+	-	-	-	-	-	-	-	-
43.	<i>Lycaena tityrus</i> (Poda, 1761)	-	+	-	-	-	-	-	-	-
44.	<i>Lycaena virgaureae</i> (Linnaeus, 1758)	-	+	-	-	-	-	-	-	-
45.	<i>Lysandra bellargus</i> (Rottemburg, 1775)	+	-	+	-	+	+	+	-	-
46.	<i>Lysandra coridon</i> (Poda, 1761)	+	-	+	-	+	-	+	-	-
47.	<i>Neozephyrus quercus</i> (Linnaeus, 1758)	+	-	-	-	-	-	-	-	-
48.	<i>Plebejus argus</i> (Linnaeus, 1758)	+	+	+	+	+	+	+	+	+
49.	<i>Plebejus argyrognomon</i> (Bergstrasser 1779)	+	+	+	-	-	-	-	-	+
50.	<i>Plebejus idas</i> (Linnaeus, 1761)	+	+	+	+	+	+	+	+	+
51.	<i>Polyommatus daphnis</i> (Denis & Schiffermüller, 1775)	+	-	-	-	-	-	-	-	-
52.	<i>Polyommatus icarus</i> (Rottemburg, 1775)	+	+	+	+	+	+	+	+	+
53.	<i>Polyommatus thersites</i> (Cantener, 1835)	-	+	-	-	-	-	-	-	-
54.	<i>Satyrium acaciae</i> (Fabricius, 1787)	+	+	-	-	-	-	-	-	-
55.	<i>Satyrium ilicis</i> (Esper, 1779)	+	-	-	-	+	+	-	-	-
56.	<i>Satyrium pruni</i> (Linnaeus, 1758)	+	-	-	-	+	-	-	-	-
57.	<i>Satyrium spini</i> (Denis & Schiffermüller, 1775)	-	-	-	-	-	-	-	-	+
58.	<i>Satyrium w-album</i> (Knoch, 1782)	+	-	-	-	+	-	-	-	-
59.	<i>Thecla betulae</i> (Linnaeus, 1758)	-	+	-	-	-	-	-	-	-
Nymphalidae Family										
60.	<i>Aglais io</i> (Linnaeus, 1758)	-	+	-	-	+	+	+	-	+
61.	<i>Aglais urticae</i> (Linnaeus, 1758)	+	-	-	-	-	-	-	-	-
62.	<i>Apatura ilia</i> (Denis & Schiffermüller, 1775)	+	-	-	-	-	-	-	-	-
63.	<i>Aphantopus hyperantus</i> (Linnaeus, 1758)	+	+	-	-	-	-	-	-	-
64.	<i>Araschmia levana</i> (Linnaeus, 1758)	+	-	-	-	-	-	-	-	-
65.	<i>Argynnis pandora</i> (Denis & Schiffermüller, 1775)	+	-	-	-	+	-	-	-	-
66.	<i>Argynnis paphia</i> (Linnaeus, 1758)	+	+	-	-	+	+	+	-	+
67.	<i>Boloria dia</i> (Linnaeus, 1767)	+	+	+	-	+	+	-	-	+
68.	<i>Brenthis ino</i> (Rottemburg, 1775)	-	+	-	-	-	-	-	-	-
69.	<i>Brintesia circe</i> (Fabricius, 1775)	+	-	-	-	-	-	-	-	-
70.	<i>Coenonympha arcania</i> (Linnaeus, 1761)	+	-	-	-	-	-	-	-	-
71.	<i>Coenonympha glycerion</i> (Borkhausen, 1788)	+	+	-	-	+	+	-	-	+
72.	<i>Coenonympha pamphilus</i> (Linnaeus, 1758)	+	-	+	+	+	-	-	+	+
73.	<i>Euphydryas maturna</i> (Linnaeus, 1758)	-	+	-	-	-	-	-	-	+
74.	<i>Fabriciana adippe</i> (Denis & Schiffermüller, 1775)	+	-	-	-	-	-	-	-	-
75.	<i>Hipparchia fagi</i> (Scopoli, 1763)	+	-	-	-	-	-	-	-	-
76.	<i>Issoria lathonia</i> (Linnaeus, 1758)	+	+	+	+	+	+	+	+	+

77.	<i>Lasiommata maera</i> (Linnaeus, 1758)	+	-	-	-	-	-	-	-	-
78.	<i>Maniola jurtina</i> (Linnaeus, 1758)	+	+	+	+	+	+	+	+	+
79.	<i>Melanargia galathea</i> (Linnaeus, 1758)	+	-	-	-	-	-	-	-	-
80.	<i>Melitaea athalia</i> (Rottemburg, 1775)	+	+	+	+	+	+	+	+	+
81.	<i>Melitaea aurelia</i> (Nickerl, 1850)	+	-	-	-	-	-	-	-	+
82.	<i>Melitaea cinxia</i> (Linnaeus, 1758)	-	+	-	-	-	-	-	-	-
83.	<i>Melitaea didyma</i> (Esper, 1778)	-	+	-	-	-	-	-	-	-
84.	<i>Melitaea phoebe</i> (Denis & Schiffermuller, 1775)	+	+	-	+	-	+	-	+	+
85.	<i>Minois dryas</i> (Scopoli, 1763)	-	-	-	-	-	-	-	-	+
86.	<i>Neptis sappho</i> (Pallas, 1771)	+	+	-	-	+	+	-	-	+
87.	<i>Nymphalis xanthomelas</i> (Esper 1781)	+	-	-	-	-	-	-	-	-
88.	<i>Pararge aegeria</i> (Linnaeus 1758)	-	+	-	-	-	-	-	-	-
89.	<i>Phengaris alcon</i> (Denis & Schiffermüller, 1775)	-	+	-	-	-	-	-	-	-
90.	<i>Phengaris arion</i> (Linnaeus, 1758)	-	+	-	-	-	-	-	-	-
91.	<i>Polygonia c-album</i> (Linnaeus, 1758)	+	+	-	-	+	+	-	-	+
92.	<i>Speyeria aglaja</i> (Linnaeus, 1758)	+	-	-	-	+	-	-	-	-
93.	<i>Vanessa atalanta</i> (Linnaeus, 1758)	+	+	+	+	+	+	+	+	+
94.	<i>Vanessa cardui</i> (Linnaeus, 1758)	+	+	+	+	+	+	+	+	+

Most of the identified species are from the families Nymphalidae – 35 species and 25 genera and Lycaenidae – 29 species and 13 genera. The Hesperiiidae family was represented by 13 species and 9 genera, Pieridae – 12 species and 7 genera, Papilionidae – 4 species and Riodinidae were represented by one species and one genus (Fig. 6).

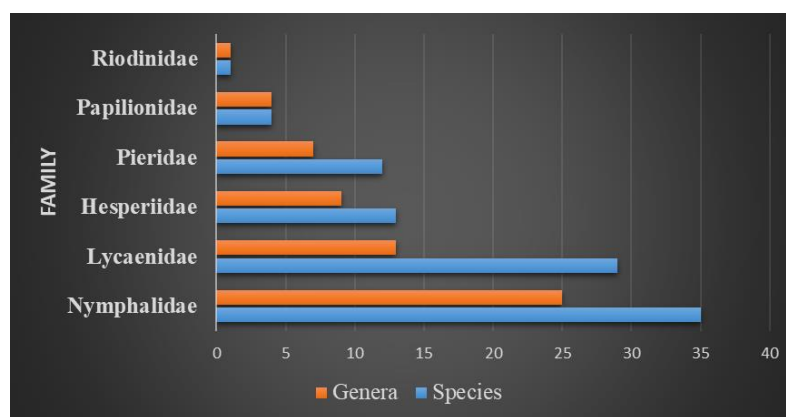


Figure 6. Repartition by families of the diurnal butterflies from the Orhei Natural Park.

The butterflies were collected in 9 localities on the territory of the Orhei National Park. Table 2 shows the collection sites and the number of species recorded.

Table 2. Number of species reported from the collecting sites.

Sites	Number of species
Ivancea (Orhei district)	70
Vatici (Orhei district)	53
Trebujeni (Orhei district)	23
Romanești (Strășeni district)	18
Țigănești (Strășeni district)	42
Peresecina (Orhei district)	31
Butuceni (Orhei district)	18
Bravicea (Călărași district)	19
Seliște (Orhei district)	37

Most species were reported in the Ivancea and Vatici villages (Orhei district) – 70 species and 53 species respectively. The village of Ivancea is a picturesque village in the central part of Moldova, the Codrilor area, with a special natural landscape (Fig. 7). The village is surrounded by wooded hills, lakes and lowlands, which create favourable conditions and facilitate the development of a large number of butterfly species.

In the Vatici village, 53 species of diurnal butterflies were recorded. Certainly, the number of species that populate the ecosystems in this collection site is higher, taking into account the diversity of the researched biotopes. Further research is to be carried out.



Figure 7. The edge of the forest of Ivancea village, Orhei district (Orhei National Park).

The fewest species of lepidoptera were reported in Romanești (Strășeni district), Butuceni (Orhei district) and Bravicea (Călărași district), a fact caused by the lower frequency of field trips in these collection sites.

The following species of diurnal butterflies were found in all collection sites: *Pieris napi*, *Pieris rapae*, *Issoria lathonia*, *Polyommatus icarus* and *Plebejus argus*. These species are characterized by a wide ecological valence of adaptability to environmental conditions.

On the territory of Orhei National Park, a large number of rare species that require protection and conservation have been reported, 13 of which are cited in the Red Book of the Republic of Moldova (2015): *Muschampia floccifera*, *Zerynthia polyxena*, *Parnassius mnemosyne*, *Papilio machaon*, *Leptidea morsei*, *Hamearis lucina*, *Lycaena virgaureae*, *Phengaris arion*, *Plebejus argyrognomon*, *Polyommatus daphnis*, *Euphydryas maturna*, *Neptis sappho*, *Nymphalis xanthomelas* and *Apatura ilia* (Table 3).

The species *Euphydryas maturna* is included in the IUCN Red List (International Union for Conservation of Nature) with the status of VU. The species *Lycaena dispar* and *Zerynthia polyxena* are found in the Berne Convention, Annex I and Annex II respectively. The following species are included in the Habitat Directive (Annex II) – *Lycaena dispar*, *Euphydryas maturna*, *Leptidea morsei* and *Nymphalis xanthomelas* and in Annex IV the species *Parnassius mnemosyne*, *Zerynthia polyxena*, *Leptidea morsei*, *Lycaena dispar*, *Phengaris arion*, and *Euphydryas maturna* are included.

Table 3. The diurnal butterfly species reported in the Orhei National Park that are protected at national and European level.

No.	Species	Red Book of the Republic of Moldova (2015)	IUCN Red List	Berne Convention	Habitats Directive	The Red List of European butterflies
Hesperiidae Family						
1.	<i>Muschampia floccifera</i>	CR	NT			NT
Papilionidae Family						
2.	<i>Papilio machaon</i>	VU	LC			LC
3.	<i>Parnassius mnemosyne</i>	VU	NT		Anex IV	NT
4.	<i>Zerynthia polyxena</i>	VU	LC	Anex II	Anex IV	LC
Pieridae Family						
5.	<i>Leptidea morsei</i>	VU	NT		Anex II, Anex IV	EN
Riodinidae Family						
6.	<i>Hamearis lucina</i>	CR	LC			LC
Lycaenidae Family						
7.	<i>Lycaena dispar</i>		NT	Anex I	Anex II, Anex IV	LC
8.	<i>Lycaena virgaureae</i>	CR	LC			
9.	<i>Phengaris arion</i>	VU	NT		Anex IV	EN
10.	<i>Plebejus argyrognomon</i>	VU	LC			LC
11.	<i>Polyommatus daphnis</i>	VU	LC			LC
Nymphalidae Family						
12.	<i>Neptis sappho</i>	VU	LC			NT
13.	<i>Euphydryas maturna</i>	EN	VU		Anex II, Anex IV	VU
14.	<i>Nymphalis xanthomelas</i>	VU	LC		Anex II	VU

With the 94 species of diurnal butterflies recorded in this research, which represent more than 68% of the Papilionoidea fauna of the country, to which the large number of rare species recorded is added, the Orhei National Park area is of particular importance in terms of biodiversity. The study demonstrated that Orhei National Park has a rich and valuable lepidopteran fauna.

The species *Papilio machaon*, *Zerynthia polyxena*, *Hamearis lucina*, *Glaucopsyche alexis*, *Lycaena dispar*, *Apatura ilia*, *Neptis sappho* and *Euphydryas maturna* develop rigid populations in the central area of the Republic of Moldova. They are frequently found in large numbers.

The species *Parnassius mnemosyne* has a localized distribution, but the reported populations are rich in individuals. The species *Muschampia floccifera*, *Nymphalis xanthomelas*, *Leptidea morsei*, *Phengaris arion* recorded a minimum number of individuals observed during the research period. These species are found sporadically.

Habitat fragmentation, pollution, intensive agriculture, deforestation, mechanical mowing, overgrazing, fires are the main causes of population decline or even the disappearance of some diurnal butterfly species from the studied area.

CONCLUSIONS

As a result of the research carried out, a total of 94 species of lepidoptera were reported in the Orhei National Park, which belong to 59 genera and 6 families: Nymphalidae (35 species), Pieridae (12), Papilionidae (4), Lycaenidae (29), Hesperidae (13) and Riodinidae (1 species). Of these, 13 species are rare and protected by legislation of Republica Moldova: *Muschampia floccifera* (Zeller, 1847), *Zerynthia polyxena* (Denis & Schiffermüller, 1775), *Parnassius mnemosyne* (Linnaeus, 1758), *Papilio machaon* (Linnaeus, 1758), *Leptidea morsei* Fenton, 1881, *Hamearis lucina* (Linnaeus, 1758), *Lycaena virgaureae* (Linnaeus, 1758), *Phengaris arion* (Linnaeus, 1758), *Plebejus argyrognomon* (Bergstrasser 1779), *Polyommatus daphnis* (Denis & Schiffermüller, 1775), *Euphydryas maturna* (Linnaeus, 1758), *Neptis sappho* (Pallas, 1771) *Nymphalis xanthomelas* (Esper 1781) and *Apatura ilia* (Denis & Schiffermüller, 1775).

This study demonstrates that Orhei National Park has a rich and valuable lepidopteran fauna. The relatively large area of the reserve and the rich diversity of biotopes favour the presence of many lepidopteran species with various ecological preferences. The significant number of registered species, to which the large number of rare species for the fauna of the Republic of Moldova is added, proves that the Orhei National Park is an area of particular importance for the conservation of biological diversity.

ACKNOWLEDGMENTS

The researches were funded by the Research Subprogram 010701 – “Evaluation of the structure and functioning of animal world and aquatic ecosystems under the influence of biotic and abiotic factors in the context of ensuring ecological security and the well-being of the population”.

I express my sincere thanks to dr. hab. Busmachi Galina, to dr. hab. Derjanschi Valeriu and dr. Țugulea Andrian for their significant help in collecting the entomological material and for significant contributions to the improvement of this paper.

REFERENCES

- MILLER E. & ZUBOVSKI N. 1908. Materials on the Entomological Fauna of Bessarabia. Lepidoptera (Macrolepidoptera). *Works of the Bessarabian Society of Natural Scientists and Amateurs of Natural History*. Edit. „Tipo-Litografia”, Chișinău. 3: 410-425. [In Russian]. МИЛЛЕР Е. & ЗУБОВСКИЙ Н. Материалы по энтомологической фауне Бессарабии. Чешуекрылые (Macrolepidoptera). *Труды Бессарабского общества естествоиспытателей и любителей естествознания*. Типо-Литография Ф. П. Кашевского. Кишинев, 1908, Т. I, Часть 3-я. с. 410-425.
- MILLER E. & ZUBOVSKI N. 1912. Materials on the Entomological Fauna of Bessarabia. Lepidoptera (Macrolepidoptera). *Works of the Bessarabian Society of Natural Scientists and Amateurs of Natural History*. Edit. „Gubernia Besarabia”, Chișinău. 2: 93-96. [In Russian]. МИЛЛЕР Е. & ЗУБОВСКИЙ Н. Материалы по энтомологической фауне Бессарабии. Чешуекрылые (Macrolepidoptera). Дополнение I. *Труды Бессарабского общества естествоиспытателей и любителей естествознания*. Кишинев: Типография Бессарабского Губернского Правления. 1912, Т. II, Вып. 2. с. 93-96.
- MILLER E. & ZUBOVSKI N. 1913. Materials on the Entomological Fauna of Bessarabia. Lepidoptera (Macrolepidoptera). *Works of the Bessarabian Society of Natural Scientists and Amateurs of Natural History*. Edit. „Gubernia Besarabia”, Chișinău. 4: 261-262. [In Russian]. МИЛЛЕР Е. & ЗУБОВСКИЙ Н. Материалы по энтомологической фауне Бессарабии. Чешуекрылые (Macrolepidoptera). Дополнение II. *Труды Бессарабского общества естествоиспытателей и любителей естествознания*. Кишинев: Типография Бессарабского Губернского Правления. 1913, Т. IV, с. 261-262.
- MILLER E., ZUBOVSKI N., RUSCINSCHI A. 1929. Materiale pentru fauna entomologică din Basarabia. Macrolepidoptera. Suplimentul III. *Buletinul Muzeului Național de Istorie Naturală*. Tipografia Eparhială „Cartea Românească”, Chișinău. 2-3: 97-130.

- MILLER E., ZUBOWSKY N., RUSCHTSCHINSKY A. 1932. Materilien zur kenntnis der entomologischen fauna Bessarabiens. Macrolepidoptera. *Buletinul Muzeului Național de Istorie Naturală*. Chișinău. **4**: 25-38.
- MUNTEANU A., COVALI V., ȚÎCU L., DERJANSCHI V., ROTARU A. 2011. Valori naturale ale Parcului Național Orhei. <https://www.undp.org/sites/g/files/zskgke326/files/migration/md/ORhei.pdf> (Accessed at February 17, 2024).
- RAKOSY L. 2013. *Fluturii diurni din România. Cunoaștere, protecție, conservare*. Edit. MEGA. Cluj-Napoca. 352 pp.
- ȚUGULEA CRISTINA. 2022. *Brenthis daphne* (Bergsträsser, 1780) (Lepidoptera: Papilionoidea) – prima semnalare în fauna Republicii Moldova. In: *Buletinul Academiei de Științe a Moldovei. Științele vieții*. Chișinău. **1**(345): 65-70. DOI: <https://doi.org/10.52388/1857-064X.2022.1.08> (Accessed: December 2023).
- ȚUGULEA CRISTINA, BACAL SVETLANA, BUȘMACHIU GALINA. 2021. *Specii de insect rare din Republica Moldova*. Institutul de Zoologie, Chișinău: F.E.-P."Tipografia Centrală". Chișinău. 44 pp.
- ZUBOWSKY N. & RUSCINSKI A. 1937. Materialien zur Kenntnis der entomologischen Fauna Bessarabiens. Macrolepidoptera. Nachtrag V. *Buletinul Muzeului Regional al Basarabiei*. Chișinău. **8**: 23-35.
- ***. *CARTEA ROȘIE A REPUBLICII MOLDOVA*. 2015. Ediția a 3-a. Edit. Știința. Chișinău. 492 pp.
- ***. FAUNA EUROPAEA– all European animal species on the web. *Fauna Europaea: Papilionoidea*. (Ed. H. de Jong) Fauna Europaea version 2014. Available online at: <http://www.faunaeur.org>. (Accessed: 2022-2024).
- ***. Orheiul Vechi Archaeological Landscape". UNESCO World Heritage Centre. <https://whc.unesco.org/en/tentativelists/6220/> (Accessed: December 2023).
- ***. <https://ecopresa.md/parcul-national-orhei-potential-natural-si-turistic/> (Accessed: December 2023).

Țugulea Cristina

Institute of Zoology, Academiei Str. 1, Moldova State University, Chișinău, Republic of Moldova.
E-mail: tuguleacristy@yahoo.com

Received: April 1, 2024
Accepted: June 3, 2024