

THE BUTTERFLIES SPECIES FROM THE CARPATHIAN MOUNTAINS PRESENT IN THE COLLECTION OF "LUCIAN BLAGA" UNIVERSITY, SIBIU

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Abstract. The Romanian Carpathians cover an area of 2/3 of Romania (the country) and is a well-known and explored area in terms of biodiversity of species of plants, insects and vertebrates. Due to the collectings conducted up to the present (2016), with synthetic data, the fauna of Lepidoptera in the Romanian Carpathians is quite numerous. In the present paper, there are mentioned the species of Lepidoptera collected from the Bucegi, Făgăraș, Apuseni, Vrancea, Rodnei Ciucaș Mountains by Levente Szekely, a lepidopterologist, within the period 1972-2000 and existing in the collection of "Lucian Blaga" University, Sibiu.

Keywords: Lepidoptera, collection, species.

Rezumat. Specii de fluturi din Munții Carpați existente în Colecția Universității „Lucian Blaga” din Sibiu. Carpații României ocupă o suprafață de 2/3 din teritoriul țării și constituie o zonă cunoscută și bine explorată din punct de vedere al biodiversității speciilor de plante, insecte și vertebrate. Datorită colectărilor efectuate până în prezent, cu date sintetice, fauna de lepidoptere din Carpații României este destul de numeroasă. În lucrarea de față sunt prezentate speciile colectate din zonele montane, Bucegi, Făgăraș, Apuseni, Vrancea, Rodnei, Ciucaș, de către lepidopterologul Levente Szekely între anii 1972-2000 și existente în Colecția Universității „Lucian Blaga” din Sibiu.

Cuvinte cheie: lepidoptere, colecție, specii.

INTRODUCTION

Regardless of their geographical location, all mountain ranges are characterized by relatively harsh and cold climates, high altitudes and varied, often complex topography. The Carpathians (Fig. 1) are the youngest and the most eastern Alpine region of mountains. This relatively low altitude mountain range is characterized by higher alpine areas and permanent snow is not usually present. In fact, only 5% of the surface is above the wooded area. Instead, mountain forests cover more than half of the mountain range. The hills are covered with oak species such as evergreen oak (*Quercus petraea*), while at the average altitude, beech forests predominate.

Forests cover the lower slopes and natural semi, but as the altitude increases and temperature drops, trees become increasingly rare, and there develop alpine meadows, marshy, wetlands and scurbs areas. Taking into account these characteristics it can be explained the richness of the butterfly biodiversity in the Carpathian Mountains. The research about Lepidoptera fauna of the mountains began in the latter part of the nineteenth century by Fleck and Salay (POPESCU-GORJ, 1964), continued in the first part of the last century with Deubel and Czekelius, Ostrogovici (POPESCU-GORJ, 1964). Important research studies were made by: Köning, Niculescu, Săvulescu, Isazk, Szabo, Brătășeanu, Rákossy, Kovács and Székely (SZÉKELY, 2014).



Figure 1. The Romanian Carpathians (<https://www.google.ro/search?q=harta+montana+a+Romaniei>).

MATERIALS AND METHOD

The entomological material of this study was collected by the lepidopterologist Székely Levente, between 1972 and 2000 on the territory of Romania (SZÉKELY, 1995, 1996, 1999a, b, 2003a, b, 2008, 2010, 2011; SZÉKELY & CERNEA, 2007) and we present the specimens captured in the mountainous area. Collectings covered the following mountains in the Romanian Carpathians: Bucegi - Babele, Caraiman, Piatra Arsă, Vârful cu Dor, Vf. Omu, Valley Jepilor, Făgăraș Mountains - Bălea Lake, Apuseni Mountains -Bicazului Gorges, Întregalde, Vrancea Mountains -Tișiței Gorges; Rodnei Mountains, Ciucaș Mountains.

The collectings were conducted using entomological net for Lepidoptera (MOISE, 2011a, b, c, d) and daytime light source for Noctuidae species. In Bucegi, the main gathering places were: Caraiman (2,100 m), Babele (2,200 m) and Vf. Omu (2,400 m), in Făgăraș Mountains (Bălea Lac, 2,200 m), but also in other mountain ranges according to Table 1. The collecting periods were from late May until early September. In the collecting data there are mentioned (day, month, year, genus, place of collecting, geographical coordinates and altitude). The entomological material is currently at "Lucian Blaga" University, Faculty of Agronomy, Food Industry and Environmental Protection (STANCĂ-MOISE, 2015a, b, c, d; VLAD-ANTONIE, 2000, 2004; VLAD-ANTONIE & CIOBANU, 2004). The collection is made systematically being kept in specific boxes in a closet and used properly in subjects of Entomology and control pest populations. The collection contains numerous and valuable taxa (rare and endemic) from the scientific point of view.

RESULTS AND DISCUSSIONS

Of the 32 species collected from the Carpathian Mountains, 12 species were collected between 900 and 1,400 m altitude, 17 species between 1600 to 1800 m altitude and 10 species between 2000-2400. For analyzing the distribution of Macrolepidoptera fauna in the mountains of Romania, there were chosen the following types of subalpine and alpine ecosystems (SZÉKELY, 1994).

Alpine meadows, tundra vegetation-grasslands with *Carex curvula* feature, altitudes of over 2,300 m. This ecosystem is covered by poor and dry vegetation due to strong winds and low temperatures, with a reduced number of plant species.

Sipos and alpine meadows with fescue: *Nardus stricta*, *Festuca supina*, occupying large areas of the mountain plateaus. The altitudes are between 2,000 and 2,400 m and correspond to the lower alpine area. Fescue meadows are the most common in this area. The vegetal carpet is much richer, consisting of more than 35 plant species, but is best represented by moss. In some places, they are intermingled with clumps of juniper trees (*Pinus mugo*), for example at Piatra Arsă in Bucegi Mountains (SZÉKELY, 1994, 2003b).

Subalpine meadows, situated between 1,700 and 2,000 m altitude, with different species of fescue (*Festuca rubra*, *Festuca amethystrina*) and various flowering plants from June to September. The habitat presents the largest number of identified species (RÁKOSY, 1993).

The vegetation at the edge of the coniferous forests (1,600-1,800 m altitude) is the richest ecosystem in Lepidoptera. This type of ecosystem is characterized by larch (*Larix decidua*) forests. The habitat consists of mountain meadows rich in flowering plants. The specific lepidopteran species (17 species) belong to the upper mountain level (Table 1).

Table 1. Systematic list of the macrolepidoptera (Insecta: Lepidoptera) collected from the Carpathian Mountains.

No.	Species	Specimens and date of collecting	Location in the Carpathian Mountains	Altitude (m).	Degree of endangerment
1	<i>Dendrolimus pini montana</i> Staudinger, 1871	1♂, July 20, 1993	Roșu Mountain	1.300	
2	<i>Cosmotriche lunigera</i> Esper, 1784 (sin. <i>C. lobulina</i> Denis&Schifferrmüller, 1775)	2♂♂, July 20, 1983 August 4, 1996	Roșu Mountain (Ciucaș Massif) Cheile Bicazului	1.300 1.100	
3	<i>Pieris bryoniae wolensky</i> Berger, 1925	1♀, July 25, 1991	Jepilor Valley, Bucegi Mountains	1.800	VU
4	<i>Argynnis addipe addipe</i> Denis&Schifferrmüller, 1775	1♂, August 5, 1986	Bicazului Gorge	1.100	NT
5	<i>Nymphalis antiopa antiopa</i> Linnaeus, 1758	2♂♂, August 11, 12, 1985	Bicazului Gorge	1.100	VU
6	<i>Erebia euryale syrnia</i> Fruhstorfer, 1909	1♂, May 21, 1993 1♀, August 24, 1995	Piatra Arsă, Bucegi Mountains, Piatra Craiului, Bucegi Mountains	2.100 1.600	NT
7	<i>Erebia manto trajanus</i> Hormuzachi, 1895	1♀, August 11, 1994	Jepilor Valley, Bucegi Mountains	1.800	VU
8	<i>Erebia epiphron transsylvanica</i> Rebel, 1908	1♂, August 11, 1984 1♀, July 20, 1993	Babele (Bucegi Mountains) Zăgan Massif, Ciucaș Mountains	1.300 1.700	NT
9	<i>Erebia aethiopus</i> Esper, 1777	1♂, July 2, 1996 1♀, July 27, 1997	Bicazului Gorge Întregalde, Apuseni Mountains	1.100	NT
10	<i>Erebia gorge</i> Hübner, 1804	1♂, July 29, 1994	Bălea Lake, Făgăraș Mountains	2.200	VU
11	<i>Erebia pronöe regalis</i> Hormuzachi, 1937	1♂, August 1, 1990	Caraiman, Bucegi Mountains	2.100	NT
12	<i>Erebia melas carpathicola</i> Popescu	1♂, July 23, 1985	Rodnei Mountains	1.800	VU

	Gorj&Alexinschi, 1959				
13	<i>Macaria liturta</i> Clerck, 1759	1♀, July 20, 1993	Roșu Mountain	1.300	
14	<i>Glacies coracina dioszeghyi</i> Schmidt, 1930	2♂♂, August 1, 1993 July 31, 1993	Omu Peak (Bucegi Mountains) Piatra Arsă (Bucegi Mountains)	2.400 2.100	
15	<i>Eupithecia icterata icterata</i> Villers, 1789	1♂, July 21, 1993	Roșu Mountain	1.300	
16	<i>Geometra papilionaria</i> Linnaeus, 1758	1♂, July 2, 1996	Bicazului Gorge (Harghita)	1.100	
17	<i>Idaea aversata aversata</i> Linnaeus, 1758 (sin. <i>I. remulata</i> Linnaeus, 1758)	1♀, August 5, 1996	Bicazului Gorge	1.100	
18	<i>Entephria cyanata</i> Hübner, 1809	1♂, June 3, 1995	Țiștei Gorge (Vrancei Mountains)	900	NT
19	<i>Chloroclysta citrata</i> Linnaeus, 1761	1♂, August 2, 1996.	Bicazului Gorge -Harita	1.100	NT
20	<i>Colostygia pectinataria</i> Knoch, 1781	1♂, August 4, 1996	Bicazului Gorge -Harghita	1.100	
21	<i>Hydriomena furcata</i> Thunberg, 1784	1♂, August 5, 1996	Bicazului Gorge -Harghita	1.100	
22	<i>Perizoma verberata</i> Scopoli, 1763	1♂, August 14, 2000 2♀♀, August 2, 1998 August 14, 2000	Jepilor Valley (Bucegi Mountains) Jepilor Valley (Bucegi Mountains)	1.700 1.700	
23	<i>Rhinoprora chloerata</i> Mabille, 1870	1♂, June 10, 1990	Piatra Mare	1.000	
24	<i>Eupithecia icterata icterata</i> Villers, 1789	1♂, July 21, 1993	Roșu Mountain	1.300	
25	<i>Aplocera simplicata</i> Treitschke, 1835	1♂, July 27, 1994, 2♀♀, August 6, 1993 July 5, 2000	Bălea (M-ții Făgăraș) Jepilor Valley (Bucegi Mountains) Caraiman (Bucegi Mountains)	2.100 1.800 2.100	NT
26	<i>Ptilodon capucina</i> Linnaeus, 1758	1♀, August 1, 1995	Roșu Mountain	1.300	
27	<i>Apamea monoglypha</i> Hufnagel, 1766 (sin. <i>polyodon</i> Linnaeus, 1761, nec. Clerck, 1759)	1♀, June 25, 1994	Jepilor Valley (Bucegi Mountains)	1.400	
28	<i>Ochropleura flammatra flammatra</i> Denis&Schiffermüller, 1775	1♂, September 26, 1994	Caraiman (Bucegi Mountains)	2.100	
29	<i>Diarsia mendica mendica</i> Fabricius, 1775	1♂, July 17, 1993	Lacu Roșu-Cupaș	1.300	
30	<i>Xestia ochreago</i> Hübner, 1790	1♂, August 11, 1994	Jepilor Valley (Bucegi Mountains)	1.600	EN
31	<i>Anaplectoides prasina</i> Denis&Schiffermüller, 1775	1♀, July 28, 1978	Lacu Roșu-Cupaș	1.300	
32	<i>Limantria monacha</i> Linnaeus, 1758	1♀, August 2, 1996	Bicazului Gorges (Harghita)	1.100	

CONCLUSIONS

The Carpathian Mountains are characterized by a varied fauna of Lepidoptera. Among endemics there are included: *Erebia melas carpathicola* Popescu Gorj & Alexinschi, 1959, *Glacies coracina dioszeghyi* Schmidt, 1930. Analyzing the microlepidoptera fauna from zoogeographic aspect, we find as dominance elements the Siberian ones, followed by the Ponto-Mediterranean European, including different endemic species - Carpathian (2), Holarctic (12) and cosmopolitan species (10). There is a greater presence of subtropical cosmopolitan species.

Most species are associated with the habitat of Holarctic tundra, alpine arctic the elements, or at least boreal elements, many with circumpolar distribution (SZÉKELY, 1994, 1996a, b).

This paper contributes to the study of Lepidoptera fauna collected in the Carpathian Mountains in Romania during 1983-2000. The species collected from 900 m to 2,400 m., 32 identified species, belong to 7 families of Macrolepidoptera (Lasiocampidae, Saturniidae, Lemoniidae, Sphingidae, Thyatirinae, Drepanidae, Geometridae) (Table 1).

The geographical position, climate, geological structure and topography of mountainous areas made possible the concentration of large numbers of species at high altitudes. There is a big difference between the slopes and the fauna of Bucegi and Făgăraș Mountains, the delimitation being made at an altitude of about 2,000 m, which corresponds to the lower limit of the plateau; and alpine fauna default boundary between the subalpine and alpine.

At altitudes above 2,000 m, the number of collected species is lower, most of them being migratory species, good flying, often passing over the highest peaks of the Carpathians. There were identified 20 species, located at altitudes between 1,100 and 1,300 m.

The species list is updated according to the Romanian brochure and the most valuable aspect is the specification of the IUCN degree of endangerment of each species. By its documentary and scientific value, the collection of Lepidoptera of "Lucian Blaga" University is available to those interested in a valuable documentary material accessible online; Macrolepidoptera species collected from the Carpathian Mountains, can be used for systematic, faunal and zoogeographical studies.

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