

## **The Protected Species of Lepidoptera in the Oak Forest "Dumbrava Sibiului", Romania**

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**Abstract.** This paper presents the results of research on Lepidoptera fauna of protected forest located Dumbrava Sibiu, near Sibiu city . The theme of the work is included in a study of forest biodiversity and Sibiu Lepidoptera "Dumbrava Sibiului" is part of a school project postdoctoral lasted several months in the forest.

The first data on Lepidoptera fauna of the forest were reported by Daniel Czekelius collection and analysis covers a total of 45 species collected from the surrounding forest. An important contribution collections were then collected in the Transylvanian Saxons in 1009 and until around 1960 years and have made such an important contribution to knowledge of this group of insects. Existing data in the literature and museum collections: Dr. Daniel Czekelius, Dr. Eugen Worell, Victor Weindel, Henrich Weyreuch and Rolf von Hannenheimer collections are kept at the Museum of Natural Sciences of Sibiu has been a landmark for this study.

**Keywords:** butterflies, biodiversity, Forest " Dumbrava Sibiului", protected species.

### **INTRODUCTION**

Butterflies (Insecta: Lepidoptera) belong to the best studied group of invertebrates in Transylvania. Data about their distribution appear in many papers concerning particular parts of the country, especially national and landscape parks, nature reserves, and other areas which are attractive as far as nature is concerned, as well as in the vicinity of cities.

Classification Lepidoptera especially useful, useless or indifferent from the point of view, they show that the total number of useful in the strict sense in the world than 10 species, 150-200 the number of producing significant damage to crops or forests. Comparing these figures very small total of 150,000 existing species on Earth at present shows that importance is not negligible Lepidoptera. This paper emphasizes the importance of this order of insects in an oak forest in Sibiu, but also the list of species protected forest area.

Thorough research on the structure and activity in forest "Dumbrava Sibiului" Lepidopterofauna not been made so far to capture species began over 105 years ago by naturalists Saxons in Sibiu. The paper presents a list of the 25 species Macrolepidoptera of 4 Family (Papilionidae, Pieridae Lycaenidae and Nymphalidae) these species are protected in the study forest.

The findings in Forest "Dumbrava Sibiu" allows obtaining recent data on the degree of endangerment of species in the area studied Macrolepidoptera but the specific structure and foundation of horse protection and conservation of the status in order to fit in the category of research in this direction, we assumed that classification according to IUCN in 2000 and 2010 (Rakosy, 2003). Analysis of the degree of endangerment of species allowed knowledge of endangered species and measures to protect them.

National Lepidopterological biodiversity assessment, regional and local, is an important goal in biological research. This work fits in this approach is a small part of a comprehensive study started several years ago in Oak Forest "Dumbrava Sibiului."

Our considerations on the flight periods of Forest "Dumbrava Sibiului", Macrolepidoptera collected from Sibiu are based on research conducted over several years in this biotope (2001-2010), and this paper refers only to species that can be included in the classification system according to IUCN.

Natural conditions and characteristics of the investigated area were presented in several previous works (Stancă-Moise C., 2002, 2003, 2004, 2005, 2006, 2007). There is no doubt that the appearance of species of butterflies in different moments of time exist in relation directly or indirectly with the succession of the area weather conditions. Flight periods of biological features of each expressing Lepidoptera species, and these periods are conditioned by the activity of feeding butterflies but also changes in biotope.

## MATERIALS AND METHODS

The work includes processing of personal collections in the period 2000-2010, and existing data in the literature and in museum collections: Dr. Daniel Czekelius, Dr. Eugen Worell Victor Weindel, Henrich von Hann Weyreuch Annenheimer and Rolf collection that kept at the Museum of natural sciences in Sibiu (Moise C., 2011). The species studied were collected during the 105 years since the nineteenth century to the present and refers only to the Forest "Dumbrava Sibiului."

Observations were conducted between March-November 2001-2010. Different parts of the forest and its surroundings have been analyzed with different intensity. Special attention was paid places known to be most attractive to butterflies, or forest edge, clearings nearby, the forest trails, meadows and forest surrounding roads. Detailed data collected on phenology and habitat preferences of species are mainly outside the scope this paper and will be published elsewhere.

After consulting the collection, the Determination made after the copyright material WAS, According to Some species Being updated works by KOCH (1991), Popescu-Gorj (1980), and reference papers in Romania, among Which A Catalogue of Butterflies, RAKOSY et al. (2003).

## RESULTS AND DISCUSSION

Major impact both quantitatively and qualitatively the Lepidoptera population that we were able to identify the Forest "Dumbrava Sibiului" is the result of human factor, that the changes often lead to irreversible changes in work environment. Because its action can witness changes in topography, climate, vegetation, all of which are closely related to the environment.

Human action on the flora and fauna has two sides, one destructive of deforestation, conversion of grasslands to agricultural land, and one unforeseen by replacing native fauna to pest species living in some cultures, or chemical control measures especially to them. The transformation of nature was linked to traditional agriculture began which was to increase the area of land that man has used to deforestation, conversion of fields, grasslands into agricultural land, overgrazing, and intensive modern agriculture then aim draining of swamps and chemical treatment of cultivated land. Other interventions are due to industrialization,

urbanization, construction of roads and highways, tourism activities.

Establishing ownership of *Quercus robur* phytocoenoses is quite difficult, because in "Dumbrava Sibiului" in its present form is mostly the result of human action that has occurred over the centuries by cutting, drainage, replanting and systematization in the woods. On the other hand contribute to this variation of forest conditions edafoclimatic and cenozel interference. The neighboring forest patches of grassland and its influence is felt by passing regular grazing of sheep in forest villages Poplaca and Rășinari.

After analysis of 253 species of Macrolepidoptere collected over time in the perimeter forest but after consultation with materials collected from the same area of the collections mentioned above, in the list below I list the species should be protected. To facilitate national and international comparisons were taken following categories of degrees of hazard (Extinct, Critical Endangered, Endangered, Vulnerable, Near threatened) recommended by IUCN in 2000 and 2001 (Rákósy, 2003).

### Family Papilionidae

Genul **Zerynthia** Ochsenheimer 1816

1. *Zerynthia polyxena* (Denis & Schiffermüller) 1775

**Geographical widespreading:** The species is found in the S and S-E Europe, N-W part of Turkey, S Ural and N-W Kazakhstan. This species is local distributed in Romania. **Habitats and biology:** The adults prefer the rocks with xerothermophilous vegetation and shrubs of calcareous gorges. **Host plants:** *Aristolochia pallida*. **Protective status:** Endangered

Genul **Parnassius** Latreille 1804

2. *Parnassius mnemosyne* Linnaeus 1758

**Geographical spreading:** This endemic subspecies is spread in Transsylvanian mountainous zones of Carpathians (Rákósy, 1997). **Habitats and biology:** The adults fly in June at the edge of the deciduous forests. **Host plants:** *Corydalis* sp. **Protective status:** Near threatened

Genul **Papilio** Linnaeus 1758

3. *Papilio machaon machaon* Linnaeus 1758

**Habitats and biology:** Preferring open habitats in forest, forest-steppe and mountain landscapes. Flight period: April - November depending on climatic conditions, in one to three generations. Males are markedly territorial, the center of an individual territory lying at the dominating elevation. **Host plants:** *Apiaceae*, in the temperate zone most commonly *Carum*, *Seseli* and *Pimpinella*, but the range of host plants is wide and also includes *Daucus* sp., *Prangos* sp., *Ferula*, *Haplophyllum*, *Achillea*, *Artemisia* sp., *Ligusticum* sp., etc., including even *Mentha*. **Protective status:** Endangered

### Family Pieridae

Genul **Leptidea** Billberg 1820

4. *Leptidea morsei* Fenton 1881

**Geographical spreading:** All Palearctic region. **Habitats and biology:** humid meadows, sparse mixed forests and forest edges up to 2,000 m a. in the mountains. flight period: april-august in two generations. **Host plants:** *Lathyrus* spp. **Protective status:** Endangered

Genul **Colias** Fabricius 1807

5. *Colias myrmidone myrmidone* Esper 1780

**Geographical spreading:** From Central Europe to West Asia. **Habitat and biology:** Steppe and forest-steppe areas with sparse woodlands, mainly of pine, on limestones. **Flight period:** April-September in two to three generations. **Host plant:** *Cytisus* sp., *Chamaecytisus ruthenicus*. Larvae and pupae hibernating. **Protective status:** Vulnerable

Family **Lycaenidae**

Genul **Lycaena** Fabricius 1807

6. *Lycaena dispar* Haworth 1802

**Geographical spreading:** Common in Central Europe and Romania, about the spread of *Rumex species*. **Habitats and biology:** Prefer wetlands and other wet places, bogs, meadows, groves, edges of lakes and streams can reach the outskirts in moist places. Pupa ♀ isolated leaves submit host VIII. Development: larvae hatching occurs after 15 days, after nimfoză. Larvae increase in VI after hibernation the last generation. Crisalidele found on host plants. **Host plant:** *Acetosella vulgaris*, *Rumex crispus*, *Rumex aquaticus*, *Acetosa pratensis*, *Bistorta major*. **Protective status:** Vulnerable

7. *Lycaena helle* (Denis & Schiffermüller 1775)

**Geographical spreading:** This species is locally common in Central and N Europe, W Russia, Central and S Siberia, Mongolia, Amur, but everywhere in small colonies. This species is threatened in all Europe due to intensification of the use of meadows, succession of shrub vegetation and drainage. This species is distributed in northern part of Romania and Transylvania. **Habitats and biology:** Its preferred habitats are wet meadows where its food plant *Polygonum bistorta* is abundant. The adults fly in two generations (April-May and July-August) at the edge of the forests. **Host plant:** *Polygonum bistorta*. **Protective status:** Critical endangered

8. *Lycaena thersamon* Esper 1784

**Geographical spreading:** Eastern Europe and Romania. **Habitats and biology:** prefer flower gardens, meadows, pastures, meadows, forest clearings. **Host plant:** *Rumex* sp, *Sarothamnus* sp., *Polygonum aviculare*, *Bentonia officinalis*, *Calamintha vulgaris*, *Latyrus niger*, *Lapsana communis*. **Protective status:** Vulnerable

Genul **Maculinea** Ecker 1915

9. *Maculinea arion* Linnaeus 1758

**Geographical spreading:** Western Europe, Russia and Romania present. **Habitats and biology:** grassy banks with shrubs, rare woods, forest edge and surrounding meadows. **Host plant:** *Thymus serpyllum*, *T. praecox*, *Lysimachia vulgaris*, *Orchis maculata*, *Prunella vulgaris*, *Serratula tinctoria*, *Molinia coerulea*, *Bentonia officinalis*. **Protective status:** Near threatened

10. *Maculinea teleius* Bergsträsser 1779

**Geographical spreading:** in Central Europe, present in Romania. **Habitats and biology:** Prairies and wetlands in the plains, peat bogs, edges of lakes, flooded fields, up to 1800 m altitude. **Host plant:** *Sanguisorba officinalis*, *Geum urbanum*, *Veronica officinalis*, *Glechoma hederacea*, *Peucedanum chabraei*, *Lysimachia vulgaris*. **Protective status:** Endangered

11. *Maculineaalcon* (Denis & Schiffermüller 1775)

**Geographical spreading:** species present in many parts of Europe but with a local spread and especially N, present in Romania. **Habitats and biology:** slopes with vegetation, deciduous forests, thickets, wetlands, bogs up to 900 m altitude. **Host plant:** *Gentiana pneumonanthe*, *G. cruciata*, *Prunella vulgaris*, *Festuca heterophylla*, *Hieracium racemosus*, *Veronica officinalis*, *Poa nemoralis*. **Protective status:** Endangered

Genul **Aricia** Reichenbach 1817

12. *Aricia eumedon* Esper 1780

**Geographical spreading:** All Palearctic region. Transylvania, the Eastern Carpathians. **Habitats and biology:** wet meadows, marshy meadows with *Geranium palustre*. **Protective status:** Vulnerable

Genul **Polyommatus** Latreille 1804

13. *Polyommatus amandus amandus* Schneider 1792

**Geographical spreading:** common species throughout Europe and in Romania. **Habitats and biology:** is widespread in the lowlands to the mountains. **Host plant:** *Asarum europaeum*, *Asperula odorata*, *Galium verum*, *Deschampsia caespitosa*, *Bentonia officinalis*, *Orchis maculata*. **Protective status:** Endangered

**Family Nymphalidae**

Genul **Euphydryas**

14. *Euphydryas aurinia aurinia* Rottemburg 1775

**Geographical spreading:** All Palearctic region. **Habitats and biology:** Dry meadows and or steppe. In the mountains, up to the upper timber-line. **Flight period:** June to July. Egg-laying in groups of 5-30 on leaves. **Host plants:** *Succisa pratensis*; *Scabiosa succica*, *Digitalis*, *Plantago*, *Veronica*, *Geranium*, *Sambucus*, *Gentiana*, *Valeriana*, *Lonicera*, *Spiraea*, *Viburnum*, *Succisa*. Larvae living gregariously. Larval colonies weaving dense cocoons, feeding inside and nearby. Hibernation larval. **Protective status:** Endangered

15. *Euphydryas maturna* Linnaeus 1758

**Geographical spreading:** Euroasiatic species with local colonies in Central, Eastern and Southeastern part of Europe. In Romania, *E. maturna partiensis* occurs especially in Transylvania and Banat. **Habitats and biology:** The adults fly in June-July at the edge of the deciduous forests, especially in the calcareous zones. **Larval food:** *Fraxinus excelsior*, *Salix caprea*, *Plantago lanceolata*, *Veronica chamaedrys*, *Succisa pratensis*. **Protective status:** Vulnerable

Genul **Nymphalis** Kluk 1780

16. *Nymphalis vaualbum* (Denis & Schiffermüller 1775)

**Geographical spreading:** From Central Europe to Japan. **Habitats and biology:** Deciduous forest. **Flight period:** April to September, in one generation, in the south sometimes partly in two generations. **Host plants:** *Ulmus*, *Betula*, *Populus*, etc. Active migrant. Hibernation imaginal. **Protective status:** Critical endangered

17. *Nymphalis xanthomelas* Esper 1781

**Geographical spreading:** Europe cents in Siberia. **Habitats and biology:** Occurring nearly everywhere, but the main biotopes are associated with valley forests because the larvae feed

on willows (*Salix*); *Salix excelsa* has been recorded as a host plant species. *Flight period*: July to October, hibernated butterflies in March to May. In the mountains up to 2,700 m alt. Outbreaks common. Migrations over vast distances. **Protective status**: Critical endangered

Genul **Argynnis** Fabricius 1807

18. *Argynnis laodice* Pallas 1771

**Geographical spreading**: From Europe to China and Assam. **Habitats and biology**: Humid meadows in the belts of mixed forest and forest-steppe. *Flight period*: July to August. Additional feeding usually on *Sorbaria sorbifolia* and *Spiraea*. In the European part, this species is very local because of habitat decline. Being active migrants, some specimens can occur far away from the place of birth. **Host plant**: *Viola palustris*. **Protective status**: Endangered

Genul **Neptis** Fabricius 1807

19. *Neptis hylas (sappho)* Pallas 1771

**Geographical spreading**: From Central Europe to Japan. All regions, except Delta. **Habitats and biology**: Open places in light forest, along rivers and streams. In the northern part of the range, flying from mid-June to July in a single generation. In the south, flight in May to August in two generations. Host plants *Lathyrus vernus*; first generation on *Lathyrus humilis*, second generation on *Lespedeza bicolor*. Larval instars live and hibernate in rolled leaves. **Protective status**: Vulnerable

Genul **Lopinga** Moore 1893

20. *Lopinga achine achine* Scopoli 1763

**Geographical spreading**: From Europe to the Amur region. All provinces of Romania. Exception: Dobrogea and the Danube Delta. **Habitats and biology**: of forest clearings, selvedges forests, thickets. Flying from mid-June to July. **Protective status**: Vulnerable

Genul **Hyponephele** Muschamp 1915

21. *Hyponephele lycaon* Rottemburg 1775

**Geographical spreading**: From Europe to Central Asia.

**Habitats and biology**: ribs dry, barren places, debris, pine groves, rocky areas, scrub. *Flight period*: June-August. **Protective status**: Endangered

Genul **Erebia** Dalmar 1816

22. *Erebia medusa medusa* (Denis & Schiffermüller 1775)

**Geographical spreading**: From Europe, Romania: Transilvania, Banat, Maramures and Moldova. **Habitats and biology**: Edges of forests and meadows wet cuts and clearings of the forest, slopes and ravines and sunny with low vegetation, mountains of low altitude to 1200 m. **Host plant**: *Digitaria sanguinalis*, *Milium effusum*, *Festuca ovina*, *Panicum sp.*, *P. sanguinale*, *Lolium sp.*, *Poa nemoralis*, *Galium schultesii*, *Majanthemum bifolium*, *Dactylis glomerata*, *Hieracium racemosus*. **Protective status**: Near threatened

23. *Erebia aethiops aethiops* Esper 1816

**Geographical spreading:** Common species especially in central and northern and north of England, also in the Balkans, the Alps (2000 m alt.), the Carpathians and other mountain areas, island species. Present in our country. **Habitats and biology:** prefer forest edges, rare woods and bright coniferous wet meadows, slopes covered with bushes, up to 1800 m altitude., exceeding this limit sometimes, very rarely on sand dunes and scree. **Host plant:** *Molinia caerulea*, *Sesleria caerulea*, *Dactylis glomerata*, *Poa annua*, *Galium verum*, *Festuca heterophylla*, *Carex pallescens*, *Serratula tinctoria*, *Calamintha vulgaris*, *Latyrus niger*, *Agrostis canina*. **Protective status:** Near threatened

24. *Erebia gorge* Hübner 1804

**Geographical spreading:** Mountains of Europe. Eastern Carpathians (Ceahlău), Carpathians, Apuseni Mountains. **Habitats and biology:** subalpine and alpine rocks (between 1600 to 2200 m). **Protective status:** Vulnerable

25. *Erebia euryale* Esper 1805

**Geographical spreading:** Europe and Romania in the Carpathian. **Habitats and biology:** lush gardens, meadows, forest edges, near the pine forests in mountain areas up to 1000-1800 m altitude. **Flight period:** July to August. **Host plant:** *Sesleria* sp., *Festuca ovina*, *F. rubra*, *Poa* sp., *Carex* sp., *Vignea* sp., *Calamagrostis* sp., *Milium effusum*, *Digitaria* sp. **Protective status:** Near threatened

## CONCLUSIONS

As a conclusion to the above we can say that the territory is strong anthropic Forest "Dumbrava Sibiului", especially the NE which is near Sibiu. This affected the life and work Macrolepidoptera by the disappearance of biotopes favorite host plants, so over the years were some species, others are very rare or even extinct a long time. Great diversity of butterfly species registered in the Forest "Dumbrava Sibiului" in the years 2001-2010 time interval and the presence of 25 species endangered to the woods, framed in the IUCN system proposed national forest perimeter makes it possible to consider as an important biotope for this group of insects that must be protected.

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