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BUTTERFLIES OF THE VLASINA REGION IN SOUTHEAST SERBIA (LEPIDOPTERA: PAPILIONOIDEA)

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Abstract

Although the Vlasina plateau has proved to be an interesting area hosting diverse and unique flora and fauna, its butterflies have not been thoroughly studied. Consolidating several known records and our field observations, a total of 101 butterfly species were listed for this region. The area hosts a number of important species to be conserved under Natura 2000 and Emerald networks and a significant number of nationally important species. The most interesting record is *Colias caucasica*, a butterfly not yet recorded in the neighboring region, and its finding is described here in more detail.

KEY WORDS: Butterflies, Vlasina lake, *Colias caucasica balcanica*

Introduction

The region of Vlasina is situated in southeastern Serbia, close to the border with Bulgaria. The lowest altitude is about 1200 m a.s.l., making Vlasina one of the widest and highest plateaus in the country. The plateau is surrounded by mountains belonging to the Rhodope Massif and formed during the Tertiary: Vardenik, Čemernik, Gramada (Plana) and Bukova Glava (Randelović & Zlatković, 2010; Stanković & Laušević, 1997). The entire region has quite a uniform geological structure composed of metamorphosed siliceous rocks originating from the Cambrian (Dragišić, 1997). Vlasina is a water-rich area with many small springs, streams and rivers. Geology and water have caused the forming of acid soils. This is a zone of dystric brown forest soil, which develops in mountainous regions within a beech forest zone, but is nowadays mostly eroded and covered by grassy vegetation. Inside of this zone, eugley and dystric cambisol (swamp) soil types are also present (Randelović & Zlatković, 2010).

Vlasina Lake, a deep depression with an artificial reservoir, is situated in the central part of the plateau. The lake was formed by constructing a large earth-filled dam, and its formation flooded one of the largest and most valuable peat bogs in the Balkans called "Vlasinsko blato" (Stanković & Laušević, 1997). Although some unique marshland species disappeared, the remaining relict vegetation could still be found on a number of floating peat isles and in small fragments surrounding the lake (Randelović & Zlatković, 2010).

Vlasina plateau has a very harsh, continental climate. Before peat immersion, the average annual temperature was 6.4°C, warmest in August (16.1°C) and coldest in January (-3.4°C), with an average annual precipitation of 838 mm. Construction of the reservoir decreased the annual temperature and precipitation to 5.7°C and 723 mm, respectively. The warmest and the coldest months remained the same: January -4 °C and August 14.7 °C (Randelović & Zlatković, 2010).

Zonal beech forests are now present only as small fragments and have been replaced by dry grassland vegetation due to strong anthropogenic pressure in the past. Other major vegetation types include silver birch forests, developing as a succession stage, and hygrophilous vegetation communities along streams and the lake itself. The flora of the Vlasina plateau is composed of 178 moss species and 956 species of vascular plants. The total of 91 plant species threatened on a national level signifies the high floristic importance of the area (Randelović & Zlatković, 2010). Mainly because of its attractive terrains, unique vegetation and plant diversity, the Vlasina region was proclaimed a protected landscape in 2006 (Official Gazette of the Republic of Serbia, No. 30/2006).

The fauna of the region remained severely understudied due to its remote location and lack of systematic surveys. Only amphibians, reptiles and birds were studied in more detail and showed a significant species diversity (Crnobrnja-Isailović, Dinov, & Randjelović, 2011; Puzović, Sekulić, Stojnić, Grubač, & Tucakov, 2009; Sterijovski, 2015). The estimated number of bird species is up to 180, although a total of 150 bird species has been recorded and 110 species have confirmed breeding sites here (Puzović *et al.*, 2009). The vulnerable European ground squirrel (*Spermophilus citellus*) could also be found on the Vlasina plateau (Kryštufek, 1996). Insects are among the least studied animal groups in Vlasina. According to our knowledge, the first data on butterflies were published in the "Provisional distribution maps of the butterflies of Yugoslavia", listing 17 species inside UTM square FN03 (Jakšić, 1988). Later on, while reviewing students' insect collections, Stojanović-Radić (2007) recorded the presence of two additional species, while Andus (2008) contributed to these data with a single species. Vlasina's close surroundings, namely the Jerma river gorge in the east and Mt. Besna Kobila in the south, were proclaimed Prime Butterfly Areas (Jakšić, 2008), and it is expected that Vlasina hosts more butterfly species.

As previous butterfly studies in the Vlasina region are scarce, we have summarized the known literature data and recently published records from this area to give the first overview of its fauna as a base for further studies. We also discuss the presence of important species and have added some notes on *Colias caucasica* Staudinger, 1871, reported for the first time from Mt. Veliki Čemernik.

Material and Methods

Field studies targeted 18 localities on the Vlasina plateau (Tab. I; Fig. 1). The area was surveyed on several short occasions in different seasons from 2006 to 2014. The exact coordinates and altitudes were recorded on the spot using GPS devices, and all of the data were systematized in our database after field studies (Miljević & Popović, 2014). A final map was created using QGIS 2.8.1 software (www.qgis.org). It should be

noted that close spatial GPS points from the database were joined together and shown as a single locality for the purposes of this work.

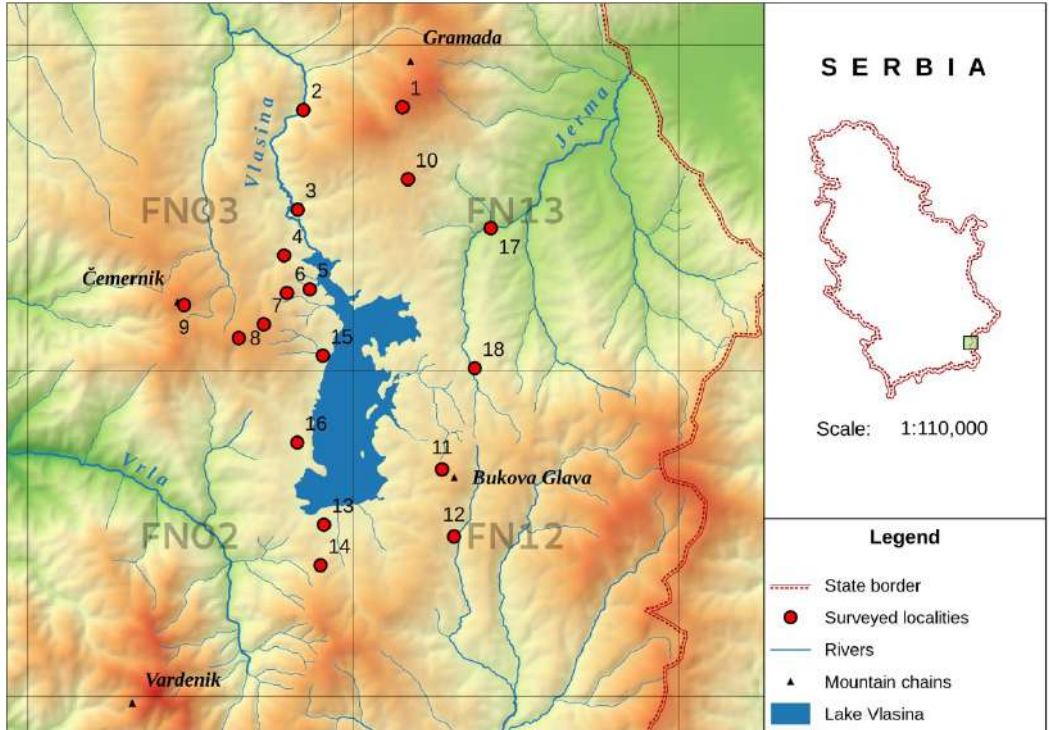


Figure 1. Relief map of the studied region showing localities surveyed during this study: 1. Vrtop surroundings; 2. Rakinci; 3. Vlasina river; 4. Cvetkova river; 5. Vlasina Rid, Lujinci; 6. Vlasina Rid, Serdarova Mahala; 7. Vlasina Rid, Mandžina Mahala; 8. Preslap; 9. Veliki Čemernik; 10. Crossroads at Stefanovićevo čuka; 11. Bukova Glava foothills; 12. Dejanova Mahala, Mladini; 13. Blato; 14. Okruglica; 15. Saint Ilija church; 16. Delnice; 17. Vučja river (downstream); 18. Vučja river (upper stream). Thin lines delimit UTM 10x10 km squares. Labels of each UTM is shown in the center of the square.

Most of the butterflies were recorded only by observation or netted, identified and released without collecting, but some specimens were also photographed for confirmation purposes. Just a few specimens were collected and preserved in the first author's collection. Identification was made according to available field guides (Popović & Đurić, 2011; Tolman & Lewington, 2008), while the nomenclature and taxonomy follow Fauna Europaea (Karsholt & van Nieukerken, 2013). IUCN categories were taken from Van Swaay et al. (2010) at the European level and from the Red Data Book of Serbian Butterflies at the national level (Table 2 in Jakšić, 2003). The protection status for each species is consistent with the Habitats Directive (92/43/EEC), the last revision of the Bern Convention (Convention on the Conservation of European Wildlife and Natural Habitats, T-PVS/PA (2011) 15) and national legislature (Official Gazette of Republic of Serbia No. 5/2010).

Table I. List of localities visited in the Vlasina region. Coordinates are given in standard WGS 84 coordinate system with longlat projection (EPSG: 4326).

No.	Locality	Altitude (m)	Coordinates	UTM
1	Vrtop surroundings	1660	42°47'15"N; 22°21'11"E	FN13
2	Rakinci	1287	42°47'22"N; 22°19'22"E	FN03
3	Vlasina river	1187	42°45'32"N; 22°19'13"E	FN03
4	Cvetkova river	1244	42°44'48"N; 22°19'12"E	FN03
5	Vlasina Rid, Lujinci	1241	42°44'14"N; 22°19'44"E	FN03
6	Vlasina Rid, Serdarova Mahala	1361	42°44'7"N; 22°19'8"E	FN03
7	Vlasina Rid, Mandžina Mahala	1451	42°43'44"N; 22°18'55"E	FN03
8	Preslap	1575	42°43'27"N; 22°18'2"E	FN03
9	Veliki Čemernik	1626	42°44'1"N; 22°16'38"E	FN03
10	Crossroads at Stefanovićeve čuka	1421	42°46'2"N; 22°21'51"E	FN13
11	Bukova Glava foothills	1360	42°41'14"N; 22°22'13"E	FN12
12	Dejanova Mahala, Mladini	1291	42°40'6"N; 22°22'48"E	FN12
13	Blato	1238	42°40'19"N; 22°19'51"E	FN02
14	Okruglica	1355	42°39'40"N; 22°19'47"E	FN02
15	Saint Ilija church	1223	42°43'8"N; 22°19'56"E	FN03
16	Delnice	1228	42°41'42"N; 22°19'19"E	FN02
17	Vučja river (downstream)	930	42°45'12"N; 22°23'45"E	FN13
18	Vučja river (upper stream)	1190	42°42'53"N; 22°23'20"E	FN13

Results

During our study we recorded a total of 97 butterfly species shown in the following list.

Family Papilionidae

1. *Zerynthia polyxena* (Denis & Schiffermüller, 1775): Vlasina river 28.5.2014. leg. A. Slacki & I. Tot; Cvetkova river 28.5.2014. leg. A. Slacki & I. Tot.
2. *Parnassius mnemosyne* (Linnaeus, 1758): Vlasina Rid, Mandžina Mahala 16.6.2013. leg. M. Popović; Okruglica 19.6.2010. leg. M. Popović.
3. *Iphiclides podalirius* (Linnaeus, 1758): Rakinci 15.7.2007. leg. M. Đurić; Vlasina river 29.5.2013.; 28.5.2014. leg. A. Slacki & I. Tot; Vlasina Rid, Lujinci 14.6.2013. leg. M. Popović; Dejanova Mahala, Mladini 15.5.2008. leg. M. Đurić; Vučja river (upper stream) 4.8.2006.; 14.5.2007. leg. M. Đurić.
4. *Papilio machaon* Linnaeus, 1758: Cvetkova river 28.5.2014. leg. A. Slacki & I. Tot; Saint Ilija church 23.7.2010. leg. K. Veling.

Family Hesperidae

5. *Erynnis tages* (Linnaeus, 1758): Rakinci 14.5.2007. leg. M. Đurić; Vlasina river 28.5.2014. leg. A. Slacki & I. Tot; Cvetkova river 28.5.2014. leg. A. Slacki & I. Tot; Vlasina Rid, Lujinci 14.6.2013. leg. M. Popović; Vlasina Rid, Serdarova Mahala 18.7.2013. leg. A. Slacki & I. Tot; Veliki Čemernik 29.5.2014. leg. A. Slacki & I. Tot; Vučja river (upper stream) 4.8.2006.; 14.5.2007. leg. M. Đurić.
6. *Carcharodus alceae* (Esper, 1780): Vlasina river 28.5.2013. leg. A. Slacki & I. Tot; Cvetkova river 28.5.2013.; 14.7.2014. leg. A. Slacki & I. Tot; Vučja river (downstream) 17.7.2014. leg. A. Slacki & I. Tot.
7. *Pyrgus malvae* (Linnaeus, 1758): Vlasina river 28.5.2014. leg. A. Slacki & I. Tot; Cvetkova river 28.5.2014.; 14.7.2014. A. Slacki & I. Tot; Vlasina Rid, Lujinci 14.6.2013. leg. M. Popović; Vlasina Rid, Serdarova Mahala 18.7.2013. leg. A. Slacki & I. Tot; Veliki Čemernik 29.5.2014. leg. A. Slacki & I. Tot.
8. *Pyrgus armoricanus* (Oberthür, 1910): Vlasina river 28.5.2014. leg. A. Slacki & I. Tot; Veliki Čemernik 29.5.2014. leg. A. Slacki & I. Tot; Dejanova Mahala, Mladini 15.7.2007. leg. M. Đurić.
9. *Pyrgus alveus* (Hübner, 1803): Vlasina Rid, Serdarova Mahala 18.7.2013. leg. A. Slacki & I. Tot; Dejanova Mahala, Mladini 15.7.2007. leg. M. Đurić; Blato 14.7.2013. leg. A. Slacki & I. Tot.
10. *Carterocephalus palaemon* (Pallas, 1771): Rakinci 14.5.2007. leg. M. Đurić; Vlasina river 28.5.2014. leg. A. Slacki & I. Tot; Cvetkova river 28.5.2014. leg. A. Slacki & I. Tot; Vlasina Rid, Serdarova Mahala 16.6.2013. leg. M. Popović.
11. *Thymelicus lineola* (Ochsenheimer, 1808): Cvetkova river 16.7.2013.; 14.7.2014. leg. A. Slacki & I. Tot; Vlasina Rid, Serdarova Mahala 18.7.2013. leg. A. Slacki & I. Tot; Dejanova Mahala, Mladini 3.8.2006; 15.7.2007. leg. M. Đurić; Blato 24.7.2010. leg. K. Veling; Okruglica 4.8.2007. leg. M. Đurić; Saint Ilija church 23.7.2010. leg. K. Veling; 15.8.2010. leg. T. Kaizer; Vučja river (downstream) 17.7.2014. leg. A. Slacki & I. Tot; Vučja river (upper stream) 4.8.2006. leg. M. Đurić; 17.7.2014. leg. A. Slacki & I. Tot.
12. *Thymelicus sylvestris* (Poda, 1761): Vlasina river 15.7.2013.; 15.7.2014. leg. A. Slacki & I. Tot; Cvetkova river 16.7.2013.; 14.7.2014. leg. A. Slacki & I. Tot; Vlasina Rid, Lujinci 18.6.2010. leg. M. Đurić; Vlasina Rid, Serdarova Mahala 18.7.2013. leg. A. Slacki & I. Tot; Veliki Čemernik 17.7.2013. leg. A. Slacki & I. Tot; Blato 14.7.2013. leg. A. Slacki & I. Tot; Okruglica 4.8.2006. leg. M. Đurić; 19.6.2010. leg. M. Popović; 19.7.2014. leg. A. Slacki & I. Tot; Vučja river (downstream) 17.7.2014. leg. A. Slacki & I. Tot.
13. *Ochlodes sylvanus* (Esper, 1777): Vrtop surroundings 13.7.2013.; 16.7.2014. leg. A. Slacki & I. Tot; Vlasina river 15.7.2013.; 15.7.2014. leg. A. Slacki & I. Tot; Cvetkova river 16.7.2013.; 14.7.2014. leg. A. Slacki & I. Tot; Vlasina Rid, Lujinci 18.6.2010. leg. M. Popović; Blato 24.7.2010. leg. M. Đurić; 14.7.2013. leg. A. Slacki & I. Tot; Okruglica 19.7.2014. leg. A. Slacki & I. Tot.

Family Pieridae

14. *Leptidea sinapis* (Linnaeus, 1758): Rakinci 14.5.2007.; 15.7.2007. leg. M. Đurić; Vlasina river 15.7.2013.; 28.5.2014. leg. A. Slacki & I. Tot; Dejanova Mahala, Mladini 17.5.2008. leg. M. Đurić; Blato 24.7.2010. leg. K. Veling; Saint Ilija church 23.7.2010. leg. K. Veling; Vučja river (downstream) 17.7.2014. leg. A. Slacki & I. Tot; Vučja river (upper stream) 4.8.2006.; 14.5.2007. leg. M. Đurić; 17.7.2014. leg. A. Slacki & I. Tot.
15. *Anthocharis cardamines* (Linnaeus, 1758): Vlasina river 28.5.2013.; 28.5.2014. leg. A. Slacki & I. Tot;

Veliki Čemernik 29.5.2014. leg. A. Slacki & I. Tot; Dejanova Mahala, Mladini 17.5.2008. leg. M. Đurić; Vučja river (upper stream) 14.5.2007. leg. M. Đurić.

16. *Aporia crataegi* (Linnaeus, 1758): Vrtop surroundings 13.7.2013.; 16.7.2014. leg. A. Slacki & I. Tot; Vlasina river 15.7.2013.; 15.7.2014. leg. A. Slacki & I. Tot; Cvetkova river 16.7.2013.; 14.7.2014.; 17.7.2014. leg. A. Slacki & I. Tot; Vlasina Rid, Lujinci 18.6.2010.; 14.6.2013. leg. M. Popović; Vlasina Rid, Serdarova Mahala 16.6.2013. leg. M. Popović; 18.7.2013. leg. A. Slacki & I. Tot; Vlasina Rid, Mandžina Mahala 16.6.2013. leg. M. Popović; Preslap 16.6.2013. leg. M. Popović; Veliki Čemernik 17.7.2013.; 18.7.2014. leg. A. Slacki & I. Tot; Blato 14.7.2013. leg. A. Slacki & I. Tot; Saint Ilija church 23.7.2010. leg. K. Veling; Delnice 16.7.2014. leg. A. Slacki & I. Tot; Vučja river (downstream) 17.7.2014. leg. A. Slacki & I. Tot; Vučja river (upper stream) 17.7.2014. leg. A. Slacki & I. Tot.

17. *Pieris brassicae* (Linnaeus, 1758): Vlasina river 29.5.2013. leg. A. Slacki & I. Tot; Veliki Čemernik 29.5.2014. leg. A. Slacki & I. Tot.

18. *Pieris rapae* (Linnaeus, 1758): Vrtop surroundings 13.7.2013. leg. A. Slacki & I. Tot; Vlasina river 15.7.2013.; 15.7.2014. leg. A. Slacki & I. Tot; Cvetkova river 14.6.2013. leg. M. Popović; 14.7.2014.; 17.7.2014. leg. A. Slacki & I. Tot; Vlasina Rid, Lujinci 14.6.2013. leg. M. Popović; Crossroads at Stefanovićeve čuka 1.10.2010. leg. M. Đurić; Bukova Glava foothills 14.5.2007. leg. M. Đurić; Dejanova Mahala, Mladini 3.8.2006. leg. M. Đurić; Blato 14.7.2013. leg. A. Slacki & I. Tot; Saint Ilija church 23.7.2010. leg. K. Veling; Vučja river (downstream) 17.7.2014. leg. A. Slacki & I. Tot; Vučja river (upper stream) 4.8.2006.; 14.5.2007. leg. M. Đurić; 17.7.2014. leg. A. Slacki & I. Tot.

19. *Pieris napi* (Linnaeus, 1758): Vrtop surroundings 13.7.2013. leg. A. Slacki & I. Tot; Vlasina river 15.7.2013.; 28.5.2014. leg. A. Slacki & I. Tot; Vlasina Rid, Serdarova Mahala 18.7.2013. leg. A. Slacki & I. Tot; Blato 14.7.2014. leg. A. Slacki & I. Tot; Saint Ilija church 23.7.2010. leg. K. Veling; Vučja river (upper stream) 4.8.2006. leg. M. Đurić; 17.7.2014. leg. A. Slacki & I. Tot.

20. *Pieris balcana* Lorković, 1970: Vlasina Rid, Lujinci 14.6.2013. leg. M. Popović; Vlasina Rid, Serdarova Mahala 16.6.2013. leg. M. Popović; Veliki Čemernik 17.7.2013. leg. A. Slacki & I. Tot.

21. *Pontia edusa* (Fabricius, 1777): Vlasina river 15.7.2014. leg. A. Slacki & I. Tot; Vlasina Rid, Mandžina Mahala 16.6.2013. leg. M. Popović; Blato 14.7.2013. leg. A. Slacki & I. Tot.

22. *Colias crocea* (Fourcroy, 1785): Vrtop surroundings 13.7.2013.; 16.7.2014. leg. A. Slacki & I. Tot; Vlasina river 28.5.2014. leg. A. Slacki & I. Tot; Cvetkova river 28.5.2014.; 14.7.2014.; 17.7.2014. leg. A. Slacki & I. Tot; Vlasina Rid, Lujinci 16.8.2010.; 14.6.2013. leg. M. Popović; Vlasina Rid, Serdarova Mahala 16.6.2013. leg. M. Popović; 18.7.2013. leg. A. Slacki & I. Tot; Vlasina Rid, Mandžina Mahala 16.6.2013. leg. M. Popović; Veliki Čemernik 17.7.2013.; 29.5.2014. leg. A. Slacki & I. Tot; Crossroads at Stefanovićeve čuka 1.10.2010. leg. M. Đurić; Dejanova Mahala, Mladini 15.7.2007. leg. M. Đurić; Okruglica 4.8.2006. leg. M. Đurić; 19.7.2014. leg. A. Slacki & I. Tot; Saint Ilija church 23.7.2010. leg. K. Veling; Delnice 16.7.2014. leg. A. Slacki & I. Tot; Vučja river (downstream) 17.7.2014. leg. A. Slacki & I. Tot; Vučja river (upper stream) 4.8.2006. leg. M. Đurić.

23. *Colias caucasica* Staudinger 1871: Veliki Čemernik 17.7.2013.; 18.7.2014. leg. A. Slacki & I. Tot; Blato 16.7.2014. leg. R. Mirić & D. Rajković.

24. *Colias alfacariensis* Ribbe, 1905: Vlasina river 15.7.2013. leg. A. Slacki & I. Tot; Blato 14.7.2013. leg. A.

Slacki & I. Tot; Vučja river (upper stream) 4.8.2006. leg. M. Đurić.

25. *Gonepteryx rhamni* (Linnaeus, 1758): Rakinci 15.7.2007. leg. M. Đurić.

Family Riodinidae

26. *Hamearis lucina* (Linnaeus, 1758): Vlasina river 28.5.2014. leg. A. Slacki & I. Tot.

Family Lycaenidae

27. *Lycaena phlaeas* (Linnaeus, 1761): Vrtop surroundings 13.7.2013. leg. A. Slacki & I. Tot; Cvetkova river 14.7.2014. leg. A. Slacki & I. Tot; Vlasina Rid, Lujinci 14.6.2013. leg. M. Popović; Dejanova Mahala, Mladini 15.7.2007. M. Đurić.

28. *Lycaena dispar* (Haworth, 1802): Okruglica 4.8.2006. leg. M. Đurić.

29. *Lycaena virgaureae* (Linnaeus, 1758): Vrtop surroundings 13.7.2013.; 16.7.2014. leg. A. Slacki & I. Tot; Rakinci 15.7.2007. leg. M. Đurić; Vlasina river 15.7.2013.; 15.7.2014. leg. A. Slacki & I. Tot; Cvetkova river 14.7.2014. leg. A. Slacki & I. Tot; Vlasina Rid, Serdarova livada 18.7.2013. leg. A. Slacki & I. Tot; Dejanova Mahala, Mladini 3.8.2006.; 15.7.2007. leg. M. Đurić; Blato 14.7.2013. leg. A. Slacki & I. Tot; Saint Ilija church 23.7.2010. leg. K. Veling; Vučja river (downstream) 17.7.2014. leg. A. Slacki & I. Tot; Vučja river (upper stream) 4.8.2006. leg. M. Đurić; 17.7.2014. leg. A. Slacki & I. Tot.

30. *Lycaena tityrus* (Poda, 1761): Vrtop surroundings 16.7.2014. leg. A. Slacki & I. Tot; Vlasina river 15.7.2013.; 28.5.2014.; 15.7.2014. leg. A. Slacki & I. Tot; Cvetkova river 28.5.2014. leg. A. Slacki & I. Tot; Vlasina Rid, Serdarova Mahala 16.6.2013. leg. M. Popović; Blato 14.7.2013. leg. A. Slacki & I. Tot; Vučja river (upper stream) 4.8.2006.; 14.5.2007. leg. M. Đurić.

31. *Lycaena alciphron* (Rottemburg, 1775): Vrtop surroundings 13.7.2013.; 16.7.2014. leg. A. Slacki & I. Tot; Vlasina river 15.7.2013. leg. A. Slacki & I. Tot; Cvetkova river 14.7.2014.; 17.7.2014. leg. A. Slacki & I. Tot; Veliki Čemernik 17.7.2013. leg. A. Slacki & I. Tot; Delnice 16.7.2014. leg. A. Slacki & I. Tot; Vučja river (downstream) 17.7.2014. leg. A. Slacki & I. Tot; Vučja river (upper stream) 17.7.2014. leg. A. Slacki & I. Tot.

32. *Lycaena candens* (Herrich-Schäffer, 1844): Vrtop surroundings 13.7.2013.; 16.7.2014. leg. A. Slacki & I. Tot; Vlasina river 15.7.2013. leg. A. Slacki & I. Tot; Cvetkova river 16.7.2013.; 14.7.2014. leg. A. Slacki & I. Tot; Vlasina Rid, Lujinci 18.6.2010.; 14.6.2013. leg. M. Popović; Vlasina Rid, Serdarova Mahala 16.6.2013. leg. M. Popović; 18.7.2013. leg. A. Slacki & I. Tot; Veliki Čemernik 18.7.2014. leg. A. Slacki & I. Tot; Dejanova Mahala, Mladini 3.8.2006.; 15.7.2007. leg. M. Đurić; Blato 14.7.2013. leg. A. Slacki & I. Tot; Okruglica 4.8.2006. leg. M. Đurić; 19.6.2010. leg. M. Popović; 19.7.2014. leg. A. Slacki & I. Tot; Delnice 16.7.2014; Vučja river (downstream) 17.7.2014. leg. A. Slacki & I. Tot; Vučja river (upper stream) 17.7.2014. leg. A. Slacki & I. Tot.

33. *Callophrys rubi* (Linnaeus, 1758): Vlasina river 29.5.2013. leg. A. Slacki & I. Tot; Cvetkova river 28.5.2014. leg. A. Slacki & I. Tot; Vlasina Rid, Serdarova Mahala 16.6.2013. leg. M. Popović; Vlasina Rid, Mandžina Mahala 16.6.2013. leg. M. Popović; Preslap 16.6.2013. M. Popović; Veliki Čemernik 29.5.2014. leg. A. Slacki & I. Tot; Vučja river (upper stream) 14.5.2007. leg. M. Đurić.

34. *Satyrrium acaciae* (Fabricius, 1788): Dejanova Mahala, Mladini 15.7.2007. leg. M. Đurić.

35. *Cupido minimus* (Fuessly, 1775): Rakinci 14.5.2007. leg. M. Đurić; Cvetkova river 14.7.2014.; 17.7.2014. leg. A. Slacki & I. Tot; Dejanova Mahala, Mladini 3.8.2006. leg. M. Đurić; Vučja river (upper stream) 4.8.2006.; 14.5.2007. leg. M. Đurić; 17.7.2014. leg. A. Slacki & I. Tot.
36. *Cupido osiris* (Meigen, 1829): Vrtop surroundings 13.7.2013. leg. A. Slacki & I. Tot; Vlasina river 15.7.2013. leg. A. Slacki & I. Tot; Cvetkova river 28.5.2014.; 14.7.2014.; 17.7.2014. leg. A. Slacki & I. Tot; Vučja river (upper stream) 14.5.2007. leg. M. Đurić.
37. *Celastrina argiolus* (Linnaeus, 1758): Vrtop surroundings 13.7.2013. leg. A. Slacki & I. Tot; Vlasina river 28.5.2014. leg. A. Slacki & I. Tot; Cvetkova river 14.7.2014. leg. A. Slacki & I. Tot; Vučja river (downstream) 17.7.2014. leg. A. Slacki & I. Tot.
38. *Pseudophilotes vicrama* (Hemming, 1929): Saint Ilija church 23.7.2010. leg. K. Veling.
39. *Glaucopsyche alexis* (Poda, 1761): Vlasina Rid, Lujinci 13.6.2013. leg. M. Popović.
40. *Phengaris arion* (Linnaeus, 1758): Cvetkova river 14.7.2014. leg. A. Slacki & I. Tot; Vučja river (upper stream) 17.7.2014. leg. A. Slacki & I. Tot.
41. *Plebejus argus* (Linnaeus, 1758): Vrtop surroundings 13.7.2013. leg. A. Slacki & I. Tot; Blato 14.7.2013. leg. A. Slacki & I. Tot; Okruglica 4.8.2006. leg. M. Đurić; Vučja river (upper stream) 4.8.2006.; 14.5.2007. leg. M. Đurić.
42. *Plebejus idas* (Linnaeus, 1761): Blato 14.7.2013. leg. A. Slacki & I. Tot; Vučja river (upper stream) 14.5.2007. leg. M. Đurić.
43. *Aricia agestis* (Denis & Schiffermüller, 1775): Vlasina river 28.5.2014. leg. A. Slacki & I. Tot; Vlasina Rid, Lujinci 14.6.2013. leg. M. Popović; Vučja river (downstream) 17.7.2014. leg. A. Slacki & I. Tot.
44. *Aricia artaxerxes* (Fabricius, 1793): Saint Ilija church 23.7.2010. leg. K. Veling; Delnice 16.7.2014. leg. A. Slacki & I. Tot.
45. *Aricia anteros* (Freyer, 1838): Vlasina river 29.5.2014. leg. A. Slacki & I. Tot; Cvetkova river 28.5.2014. leg. A. Slacki & I. Tot; Vlasina Rid, Lujinci 18.6.2010.; 14.6.2013. leg. M. Popović; Veliki Čemernik 29.5.2014. leg. A. Slacki & I. Tot; Okruglica 19.6.2010. leg. M. Popović.
46. *Aricia eumedon* (Esper, 1780): Vlasina river 15.7.2014. leg. A. Slacki & I. Tot; Vlasina Rid, Lujinci 14.6.2013. leg. M. Popović.
47. *Cyaniris semiargus* (Rottemburg, 1775): Cvetkova river 17.7.2014. leg. A. Slacki & I. Tot; Vlasina Rid, Lujinci 18.6.2010.; 14.6.2013. leg. M. Popović; Vlasina Rid, Mandžina Mahala 16.6.2013. leg. M. Popović; Okruglica 19.6.2010. leg. M. Popović; Vučja river (upper stream) 14.5.2007. leg. M. Đurić; 17.7.2014. leg. A. Slacki & I. Tot.
48. *Polyommatus dorylas* (Denis & Schiffermüller, 1775): Vučja river (upper stream) 14.5.2007. leg. M. Đurić.
49. *Polyommatus amandus* (Schneider, 1792): Vlasina river 15.7.2013.; 15.7.2014. leg. A. Slacki & I. Tot; Cvetkova river 17.7.2014. leg. A. Slacki & I. Tot; Vlasina Rid, Lujinci 18.6.2010.; 14.6.2013. leg. M. Popović; Vlasina Rid, Serdarova Mahala 18.7.2013. leg. A. Slacki & I. Tot; Okruglica 19.6.2010. M. Đurić; Vučja river

(downstream) 17.7.2014. leg. A. Slacki & I. Tot; Vučja river (upper stream) 17.7.2014. leg. A. Slacki & I. Tot.
 50. *Polyommatus icarus* (Rottemburg, 1775): Vlasina river 15.7.2013.; 15.7.2014. leg. A. Slacki & I. Tot; Cvetkova river 14.7.2014.; 17.7.2014. leg. A. Slacki & I. Tot; Vlasina Rid, Lujinci 18.6.2010.; 14.6.2013. leg. M. Popović; Crossroads at Stefanovićeve čuka 1.10.2010. leg. M. Đurić; Dejanova Mahala, Mladini 3.8.2006.; 15.7.2007. leg. M. Đurić; Blato 14.7.2013. leg. A. Slacki & I. Tot; Delnice 16.7.2014. leg. A. Slacki & I. Tot; Vučja river (downstream) 17.7.2014. leg. A. Slacki & I. Tot; Vučja river (upper stream) 4.8.2006.; 14.5.2007. leg. M. Đurić; 17.7.2014. leg. A. Slacki & I. Tot.

51. *Polyommatus eros* (Ochsenheimer, 1808): Veliki Čemernik 17.7.2013.; 18.7.2014. leg. A. Slacki & I. Tot.

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52. *Argynnis paphia* (Linnaeus, 1758): Dejanova Mahala, Mladini 15.7.2007. leg. M. Đurić; Saint Ilija church 23.7.2010. leg. K. Veling; 15.8.2010. leg. T. Kaizer; Vučja river (upper stream) 4.8.2006. leg. M. Đurić; 17.7.2014. leg. A. Slacki & I. Tot.

53. *Argynnis aglaja* (Linnaeus, 1758): Vrtop surroundings 13.7.2013.; 16.7.2014. leg. A. Slacki & I. Tot; Vlasina river 15.7.2013.; 15.7.2014. leg. A. Slacki & I. Tot; Vlasina Rid, Lujinci 18.6.2010. leg. M. Popović; Veliki Čemernik 17.7.2013.; 18.7.2014. leg. A. Slacki & I. Tot; Dejanova Mahala, Mladini 3.8.2006. leg. M. Đurić; Blato 24.7.2010. leg. K. Veling; 14.7.2013. leg. A. Slacki & I. Tot; Saint Ilija church 23.7.2010. leg. K. Veling; Delnice 16.7.2014. leg. A. Slacki & I. Tot; Vučja river (downstream) 17.7.2014. leg. A. Slacki & I. Tot; Vučja river (upper stream) 4.8.2006. leg. M. Đurić.

54. *Argynnis adippe* (Denis & Schiffermüller, 1775): Vlasina river 15.7.2013. leg. A. Slacki & I. Tot; Cvetkova river 14.7.2014.; 17.7.2014. leg. A. Slacki & I. Tot; Vlasina Rid, Serdarova Mahala 18.7.2013. leg. A. Slacki & I. Tot; Vučja river (downstream) 17.7.2014. leg. A. Slacki & I. Tot; Vučja river (upper stream) 4.8.2006. leg. M. Đurić.

55. *Argynnis niobe* (Linnaeus, 1758): Vrtop surroundings 13.7.2013. leg. A. Slacki & I. Tot; Saint Ilija church 23.7.2010. leg. K. Veling; Vučja river (upper stream) 17.7.2014. leg. A. Slacki & I. Tot.

56. *Issoria lathonia* (Linnaeus, 1758): Vlasina river 15.7.2013.; 28.5.2014. leg. A. Slacki & I. Tot; Cvetkova river 28.5.2014.; 14.7.2014. leg. A. Slacki & I. Tot; Vlasina Rid, Lujinci 14.6.2013. leg. M. Popović; Vlasina Rid, Serdarova Mahala 18.7.2013. leg. A. Slacki & I. Tot; Vlasina Rid, Mandžina Mahala 16.6.2013. leg. M. Popović; Veliki Čemernik 17.7.2013.; 29.5.2014. leg. A. Slacki & I. Tot; Crossroads at Stefanovićeve čuka 1.10.2010. leg. M. Đurić; Vučja river (upper stream) 4.8.2006. leg. M. Đurić; 17.7.2014. leg. A. Slacki & I. Tot.

57. *Brenthis daphne* (Bergsträsser 1780): Vrtop surroundings 13.7.2013. leg. A. Slacki & I. Tot; Rakinci 15.7.2007. leg. M. Đurić; Vlasina Rid, Serdarova Mahala 18.7.2013. leg. A. Slacki & I. Tot; Veliki Čemernik 17.7.2013. leg. A. Slacki & I. Tot; Blato 14.7.2013. leg. A. Slacki & I. Tot; Okruglica 19.7.2014. leg. A. Slacki & I. Tot; Delnice 16.7.2014. leg. A. Slacki & I. Tot; Vučja river (downstream) 17.7.2014. leg. A. Slacki & I. Tot; Vučja river (upper stream) 17.7.2014. leg. A. Slacki & I. Tot.

58. *Brenthis hecate* (Denis & Schiffermüller, 1775): Cvetkova river 14.7.2014. leg. A. Slacki & I. Tot.

59. *Boloria euphrosyne* (Linnaeus, 1758): Vlasina river 28.5.2014. leg. A. Slacki & I. Tot; Cvetkova river 14.6.2013. leg. M. Popović; Vlasina Rid, Lujinci 18.6.2010. leg. M. Popović; Vlasina Rid, Serdarova Mahala 16.6.2013. leg. M. Popović; Vlasina Rid, Mandžina Mahala 16.6.2013; Veliki Čemernik 17.7.2013.; 18.7.2014.

leg. A. Slacki & I. Tot; Okruglica 19.6.2010. leg. M. Popović.

60. *Boloria dia* (Linnaeus, 1767): Dejanova Mahala, Mladini 3.8.2006.; 15.7.2007. leg. M. Đurić; Saint Ilija church 23.7.2010. leg. K. Veling.

61. *Vanessa atalanta* (Linnaeus, 1758): Vrtop surroundings 13.7.2013.; 16.7.2014. leg. A. Slacki & I. Tot; Vlasina river 28.5.2014. leg. A. Slacki & I. Tot; Cvetkova river 16.7.2013.; 28.5.2014. leg. A. Slacki & I. Tot; Vlasina Rid, Serdarova Mahala 16.6.2013. leg. M. Popović; 18.7.2013. leg. A. Slacki & I. Tot; Veliki Čemernik 17.7.2013.; 29.5.2014.; 18.7.2014. leg. A. Slacki & I. Tot; Blato 14.7.2013. leg. A. Slacki & I. Tot; Vučja river (downstream) 17.7.2014. leg. A. Slacki & I. Tot; Vučja river (upper stream) 4.8.2006. leg. M. Đurić; 17.7.2014. leg. A. Slacki & I. Tot.

62. *Vanessa cardui* (Linnaeus, 1758): Vrtop surroundings 13.7.2013.; 16.7.2014. leg. A. Slacki & I. Tot; Vlasina river 15.7.2013.; 28.5.2014. leg. A. Slacki & I. Tot; Cvetkova river 16.7.2013.; 14.7.2014. leg. A. Slacki & I. Tot; Vlasina Rid, Lujinci 18.6.2010.; 14.6.2013. leg. M. Popović; Vlasina Rid, Serdarova Mahala 18.7.2013. leg. A. Slacki & I. Tot; Preslap 16.6.2013. leg. M. Popović; Veliki Čemernik 17.7.2013.; 29.5.2014.; 18.7.2014. leg. A. Slacki & I. Tot; Blato 24.7.2010. leg. K. Veling; 14.7.2013. leg. A. Slacki & I. Tot; Okruglica 19.6.2010. leg. M. Popović; 19.7.2014. leg. A. Slacki & I. Tot; Saint Ilija church 23.7.2010. leg. K. Veling; Vučja river (downstream) 17.7.2014. leg. A. Slacki & I. Tot.

63. *Aglais io* (Linnaeus, 1758): Vrtop surroundings 13.7.2013. leg. A. Slacki & I. Tot; Rakinci 15.7.2007. leg. M. Đurić; Vlasina river 15.7.2013. leg. A. Slacki & I. Tot; Cvetkova river 16.7.2013.; 14.7.2014.; 17.7.2014. leg. A. Slacki & I. Tot; Vlasina Rid, Serdarova Mahala 18.7.2013. leg. A. Slacki & I. Tot; Vlasina Rid, Mandžina Mahala 16.6.2013. leg. M. Popović; Veliki Čemernik 17.7.2013. leg. A. Slacki & I. Tot; Saint Ilija church 23.7.2010. leg. K. Veling; Vučja river (downstream) 17.7.2014. leg. A. Slacki & I. Tot; Vučja river (upper stream) 4.8.2006.; 14.5.2007. leg. M. Đurić.

64. *Aglais urticae* (Linnaeus, 1758): Vrtop surroundings 13.7.2013.; 16.7.2014. leg. A. Slacki & I. Tot; Vlasina river 15.7.2013.; 28.5.2014. leg. A. Slacki & I. Tot; Cvetkova river 16.7.2013. leg. A. Slacki & I. Tot; Vlasina Rid, Lujinci 18.6.2010. leg. M. Popović; Vlasina Rid, Serdarova Mahala 18.7.2013. leg. A. Slacki & I. Tot; Preslap 16.6.2013. leg. M. Popović; Crossroads at Stefanovičeva čuka 1.10.2010. leg. M. Đurić; Okruglica 19.6.2010. leg. M. Popović; Saint Ilija church 23.7.2010. leg. K. Veling.

65. *Polygonia c-album* (Linnaeus, 1758): Vrtop surroundings 13.7.2013.; 16.7.2014. leg. A. Slacki & I. Tot; Vlasina river 15.7.2013. leg. A. Slacki & I. Tot; Cvetkova river 14.6.2013. leg. M. Popović; 17.7.2014. leg. A. Slacki & I. Tot; Vlasina Rid, Lujinci 18.6.2010.; 14.6.2013. leg. M. Popović; Vlasina Rid, Serdarova Mahala 16.6.2013. leg. M. Popović; 18.7.2013. leg. A. Slacki & I. Tot; Vlasina Rid, Mandžina Mahala 16.6.2013. leg. M. Popović; Veliki Čemernik 17.7.2013. leg. A. Slacki & I. Tot; Blato 14.7.2013. leg. A. Slacki & I. Tot; Okruglica 19. 6.2010. leg. M. Popović; Saint Ilija church 23.7.2010. leg. K. Veling; Vučja river (downstream) 17.7.2014. leg. A. Slacki & I. Tot; Vučja river (upper stream) 4.8.2006.; 14.5.2007. leg. M. Đurić; 17.7.2014. leg. A. Slacki & I. Tot.

66. *Araschnia levana* (Linnaeus, 1758): Rakinci 14.5.2007.; 15.7.2007. leg. M. Đurić; Vlasina river 28.5.2014. leg. A. Slacki & I. Tot; Dejanova Mahala, Mladini 15.7.2007. leg. M. Đurić; Vučja river (upper stream) 4.8.2006.; 14.5.2007. leg. M. Đurić.

67. *Nymphalis antiopa* (Linnaeus, 1758): Vrtop surroundings 13.7.2013. leg. A. Slacki & I. Tot; Vlasina river 15.7.2013. leg. A. Slacki & I. Tot; Vlasina Rid, Serdarova Mahala 18.7.2013. leg. A. Slacki & I. Tot; Veliki

Čemernik 17.7.2013. leg. A. Slacki & I. Tot; Blato 14.7.2013. leg. A. Slacki & I. Tot.

68. *Nymphalis polychloros* (Linnaeus, 1758): Vrtop surroundings 13.7.2013. leg. A. Slacki & I. Tot; Vlasina river 15.7.2013. leg. A. Slacki & I. Tot; Cvetkova river 14.6.2013. leg. M. Popović; Vlasina Rid, Serdarova Mahala 18.7.2013. leg. A. Slacki & I. Tot; Vlasina Rid, Mandžina Mahala 16.6.2013. leg. M. Popović; Crossroads at Stefanovićevo čuka 1.10.2010. leg. M. Đurić.

69. *Nymphalis vaualbum* (Denis & Schiffermüller, 1775): Vlasina river 12.10.2014. leg. G. Farkaš.

70. *Melitaea cinxia* (Linnaeus, 1758): Vrtop surroundings 13.7.2013. leg. A. Slacki & I. Tot; Vlasina river 15.7.2014. leg. A. Slacki & I. Tot; Cvetkova river 14.7.2014. leg. A. Slacki & I. Tot; Vlasina Rid, Lujinci 18.6.2010. leg. M. Popović; Vlasina Rid, Serdarova Mahala 16.6.2013. leg. M. Popović; Okruglica 19.6.2010. leg. M. Popović.

71. *Melitaea phoebe* (Denis & Schiffermüller, 1775): Cvetkova river 14.7.2014.; 17.7.2014. leg. A. Slacki & I. Tot; Okruglica 19.7.2014. leg. A. Slacki & I. Tot; Saint Ilija church 23.7.2010. leg. K. Veling; Delnice 17.7.2014. leg. A. Slacki & I. Tot.

72. *Melitaea arduinna* (Esper, 1783): Vlasina river 15.7.2013. leg. A. Slacki & I. Tot; Cvetkova river 17.7.2014. leg. A. Slacki & I. Tot.

73. *Melitaea trivia* (Denis & Schiffermüller, 1775): Vrtop surroundings 13.7.2013.; 16.7.2014. leg. A. Slacki & I. Tot; Vlasina river 15.7.2014. leg. A. Slacki & I. Tot; Vlasina Rid, Lujinci 18.6.2010. leg. M. Popović; Vlasina Rid, Serdarova Mahala 18.7.2013. leg. A. Slacki & I. Tot; Veliki Čemernik 17.7.2013. leg. A. Slacki & I. Tot; Blato 14.7.2013. leg. A. Slacki & I. Tot; Okruglica 19.6.2010. M. Popović; 19.7.2014. leg. A. Slacki & I. Tot; Saint Ilija church 23.7.2010. leg. K. Veling; Vučja river (downstream) 17.7.2014. leg. A. Slacki & I. Tot.

74. *Melitaea didyma* (Esper, 1778): Vrtop surroundings 13.7.2013.; 16.7.2014. leg. A. Slacki & I. Tot; Vlasina river 15.7.2013.; 15.7.2014. leg. A. Slacki & I. Tot; Vlasina Rid, Lujinci 18.6.2010. leg. M. Popović; Vlasina Rid, Serdarova Mahala 18.7.2013. leg. A. Slacki & I. Tot; Veliki Čemernik 17.7.2013.; 18.7.2014. leg. A. Slacki & I. Tot; Blato 24.7.2010. leg. K. Veling; 14.7.2013. leg. A. Slacki & I. Tot; Okruglica 19.6.2010. leg. M. Popović; Saint Ilija church 23.7.2010. leg. K. Veling; Vučja river (downstream) 17.7.2014. leg. A. Slacki & I. Tot; Vučja river (upper stream) 14.5.2007. leg. M. Đurić; 17.7.2014. leg. A. Slacki & I. Tot.

75. *Melitaea diamina* (Lang, 1789): Vrtop surroundings 13.7.2013. leg. A. Slacki & I. Tot; Vlasina river 15.7.2013. leg. A. Slacki & I. Tot.

76. *Melitaea aurelia* Nickerl, 1850: Vrtop surroundings 13.7.2013. leg. A. Slacki & I. Tot; Saint Ilija church 23.7.2010. leg. K. Veling.

77. *Melitaea athalia* (Rottemburg, 1775): Vrtop surroundings 13.7.2013.; 16.7.2014. leg. A. Slacki & I. Tot; Rakinci 15.7.2007. leg. M. Đurić; Vlasina river 15.7.2013.; 15.7.2014. leg. A. Slacki & I. Tot; Cvetkova river 14.7.2014.; 17.7.2014. leg. A. Slacki & I. Tot; Vlasina Rid, Lujinci 18.6.2010.; 14.6.2013. leg. M. Popović; Vlasina Rid, Serdarova Mahala 16.6.2013. leg. M. Popović; 18.7.2013. leg. A. Slacki & I. Tot; Vlasina Rid, Mandžina Mahala 16.6.2013. leg. M. Popović; Veliki Čemernik 17.7.2013.; 18.7.2014. leg. A. Slacki & I. Tot; Dejanova Mahala, Mladini 15.7.2007. leg. M. Đurić; Okruglica 19.6.2010. leg. M. Popović; 19.7.2014. leg. A. Slacki & I. Tot; Saint Ilija church 23.7.2010. leg. K. Veling; Delnice 16.7.2014. leg. A. Slacki & I. Tot; Vučja river (downstream) 17.7.2014. leg. A. Slacki & I. Tot; Vučja river (upper stream) 4.8.2006. leg. M. Đurić;

17.7.2014. leg. A. Slacki & I. Tot.

78. *Limnitis populi* (Linnaeus, 1758): Rakinci 15.7.2007. leg. M. Đurić; Vlasina river 15.7.2013. leg. A. Slacki & I. Tot; Vlasina Rid, Lujinci 18.6.2010. leg. M. Popović; Vlasina Rid, Serdarova Mahala 18.7.2013. leg. A. Slacki & I. Tot; Dejanova Mahala, Mladini 15.7.2007. leg. M. Đurić; Okruglica 19.6.2010. leg. M. Popović.

79. *Neptis rivularis* (Scopoli, 1763): Rakinci 15.7.2007. leg. M. Đurić; Cvetkova river 17.7.2014. leg. A. Slacki & I. Tot; Vlasina Rid, Serdarova Mahala 18.7.2013. leg. A. Slacki & I. Tot.

80. *Apatura ilia* (Denis & Schiffermüller, 1775): Vučja river (upper stream) 4.8.2006. leg. M. Đurić; 17.7.2014. leg. A. Slacki & I. Tot.

81. *Apatura iris* (Linnaeus, 1758): Vrtop surroundings 13.7.2013. leg. A. Slacki & I. Tot; Vlasina Rid, Serdarova Mahala 18.7.2014. leg. A. Slacki & I. Tot; Okruglica 4.8.2006. leg. M. Đurić; Saint Ilija church 23.7.2010. leg. K. Veling.

82. *Pararge aegeria* (Linnaeus, 1758): Vlasina river 28.5.2014. leg. A. Slacki & I. Tot; Vučja river (upper stream) 4.8.2006.; 14.5.2007. leg. M. Đurić; 17.7.2014. leg. A. Slacki & I. Tot.

83. *Lasiommata megera* (Linnaeus, 1767): Okruglica 19.7.2014. leg. A. Slacki & I. Tot; Vučja river (downstream) 17.7.2014. leg. A. Slacki & I. Tot.

84. *Lasiommata maera* (Linnaeus, 1758): Vrtop surroundings 13.7.2013.; 16.7.2014. leg. A. Slacki & I. Tot; Vlasina river 15.7.2014. leg. A. Slacki & I. Tot; Vlasina Rid, Lujinci 18.6.2010. leg. M. Popović; Vlasina Rid, Serdarova Mahala 18.7.2013. leg. A. Slacki & I. Tot; Veliki Čemernik 17.7.2013. leg. A. Slacki & I. Tot; Okruglica 19.6.2010. leg. M. Popović; Vučja river (downstream) 17.7.2014. leg. A. Slacki & I. Tot.

85. *Coenonympha arcania* (Linnaeus, 1761): Vrtop surroundings 13.7.2013.; 16.7.2014. leg. A. Slacki & I. Tot; Vlasina river 29.5.2013.; 15.7.2014. leg. A. Slacki & I. Tot; Cvetkova river 16.7.2013. leg. A. Slacki & I. Tot; Veliki Čemernik 17.7.2013. leg. A. Slacki & I. Tot; Okruglica 19.7.2014. leg. A. Slacki & I. Tot; Delnice 16.7.2014. leg. A. Slacki & I. Tot; Vučja river (downstream) 17.7.2014. leg. A. Slacki & I. Tot; Vučja river (upper stream) 17.7.2014. leg. A. Slacki & I. Tot.

86. *Coenonympha glycerion* (Borkhausen, 1788): Vrtop surroundings 13.7.2013.; 16.7.2014. leg. A. Slacki & I. Tot; Vlasina river 29.5.2013.; 15.7.2014. leg. A. Slacki & I. Tot; Cvetkova river 16.7.2013.; 14.7.2014. leg. A. Slacki & I. Tot; Vlasina Rid, Lujinci 18.6.2010.; 14.6.2013. leg. M. Popović; Veliki Čemernik 17.7.2013.; 18.7.2014. leg. A. Slacki & I. Tot; Blato 14.7.2013. leg. A. Slacki & I. Tot; Okruglica 19.6.2010. leg. M. Popović; 19.7.2014. leg. A. Slacki & I. Tot; Saint Ilija church 23.7.2010. leg. K. Veling; Vučja river (downstream) 17.7.2014. leg. A. Slacki & I. Tot.

87. *Coenonympha pamphilus* (Linnaeus, 1758): Vrtop surroundings 13.7.2013.; 16.7.2014. leg. A. Slacki & I. Tot; Rakinci 14.5.2007. leg. M. Đurić; Cvetkova river 28.5.2014. leg. A. Slacki & I. Tot; Vlasina Rid, Lujinci 18.6.2010.; 14.6.2013. leg. M. Popović; Vlasina Rid, Mandžina Mahala 16.6.2013. leg. M. Popović; Crossroads at Stefanovičeva čuka 1.10.2010. leg. M. Đurić; Okruglica 19.6.2010. leg. M. Popović; Vučja river (downstream) 17.7.2014. leg. A. Slacki & I. Tot; Vučja river (upper stream) 14.5.2007. leg. M. Đurić; 17.7.2014. leg. A. Slacki & I. Tot.

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89. *Aphantopus hyperanthus* (Linnaeus, 1758): Vlasina river 15.7.2013.; 15.7.2014. leg. A. Slacki & I. Tot; Cvetkova river 14.7.2014. leg. A. Slacki & I. Tot; Vlasina Rid, Serdarova Mahala 18.7.2014. leg. A. Slacki & I. Tot; Dejanova Mahala, Mladini 3.8.2006.; 15.7.2007. leg. M. Đurić; Blato 24.7.2010. leg. K. Veling; Okruglica 4.8.2006. leg. M. Đurić; 19.7.2014. leg. A. Slacki & I. Tot; Saint Ilija church 23.7.2010. leg. K. Veling; Vučja river (downstream) 17.7.2014. leg. A. Slacki & I. Tot; Vučja river (upper stream) 4.8.2006. leg. M. Đurić; 17.7.2014. leg. A. Slacki & I. Tot.
90. *Maniola jurtina* (Linnaeus, 1758): Vrtop surroundings 16.7.2014. leg. A. Slacki & I. Tot; Vlasina river 15.7.2013.; 15.7.2014. leg. A. Slacki & I. Tot; Cvetkova river 14.7.2014.; 17.7.2014. leg. A. Slacki & I. Tot; Vlasina Rid, Serdarova Mahala 18.7.2013. leg. A. Slacki & I. Tot; Dejanova Mahala, Mladini 3.8.2006.; 15.7.2007. leg. M. Đurić; Blato 24.7.2010. leg. K. Veling; 14.7.2013. leg. A. Slacki & I. Tot; Okruglica 4.8.2006. leg. M. Đurić; 19.7.2014. leg. A. Slacki & I. Tot; Saint Ilija church 23.7.2010. leg. K. Veling; 15.8.2010. leg. T. Kaizer; Delnice 16.7.2014. leg. A. Slacki & I. Tot; Vučja river (downstream) 17.7.2014. leg. A. Slacki & I. Tot; Vučja river (upper stream) 4.8.2006. leg. M. Đurić; 17.7.2014. leg. A. Slacki & I. Tot.
91. *Hyponephele lycaon* (Rottemburg, 1775): Blato 3.8.2006. leg. M. Đurić.
92. *Hyponephele lupina* (O. Costa, 1836): Okruglica 4.8.2006. leg. M. Đurić; Saint Ilija church 23.7.2010. leg. K. Veling; Vučja river (upper stream) 4.8.2006. leg. M. Đurić.
93. *Erebia ligea* (Linnaeus, 1758): Vrtop surroundings 16.7.2014. leg. A. Slacki & I. Tot; Rakinci 15.7.2007. leg. M. Đurić; Vlasina river 15.7.2013.; 15.7.2014. leg. A. Slacki & I. Tot; Cvetkova river 16.7.2013.; 14.7.2014.; 17.7.2014. leg. A. Slacki & I. Tot; Vlasina Rid, Serdarova Mahala 18.7.2013; Veliki Čemernik 17.7.2013.; 18.7.2014. leg. A. Slacki & I. Tot; Dejanova Mahala, Mladini 15.7.2007. leg. M. Đurić; Okruglica 4.8.2006. leg. M. Đurić; 19.7.2014. leg. A. Slacki & I. Tot.
94. *Erebia euryale* (Esper, 1805): Vrtop surroundings 16.7.2014. leg. A. Slacki & I. Tot; Cvetkova river 17.7.2014. leg. A. Slacki & I. Tot; Veliki Čemernik 18.7.2014. leg. A. Slacki & I. Tot; Okruglica 4.8.2006. leg. M. Đurić; 19.7.2014. leg. A. Slacki & I. Tot.
95. *Erebia aethiops* (Esper, 1777): Vlasina river 15.7.2014. leg. A. Slacki & I. Tot; Cvetkova river 16.7.2013. leg. A. Slacki & I. Tot; Blato 24.7.2010. leg. K. Veling; Vučja river (downstream) 17.7.2014. leg. A. Slacki & I. Tot.
96. *Erebia medusa* (Denis & Schiffermüller, 1775): Vrtop surroundings 16.7.2014. leg. A. Slacki & I. Tot; Rakinci 14.5.2007. leg. M. Đurić; Vlasina river 29.5.2013.; 15.7.2013.; 28.5.2014. leg. A. Slacki & I. Tot; Cvetkova river 14.6.2013. leg. M. Popović; 16.7.2013.; 14.7.2014. leg. A. Slacki & I. Tot; Vlasina river, Lujinci 18.6.2010.; 14.6.2013. leg. M. Popović; Vlasina river, Serdarova Mahala 16.6.2013. leg. M. Popović; Vlasina Rid, Mandžina Mahala 16.6.2013. leg. M. Popović; Preslap 16.6.2013. leg. M. Popović; Veliki Čemernik 29.5.2014. leg. A. Slacki & I. Tot; Bukova Glava foothills 14.5.2007. leg. M. Đurić; Okruglica 4.8.2006. leg. M. Đurić; 19.6.2010. leg. M. Popović; Vučja river (downstream) 17.7.2014. leg. A. Slacki & I. Tot; Vučja river (upper stream) 14.5.2008. leg. M. Đurić.
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24.7.2010. leg. K. Veling; 14.7.2013. leg. A. Slacki & I. Tot; Okruglica 4.8.2006. leg. M. Đurić; Saint Ilija church 23.7.2010. leg. K. Veling; 15.8.2010. leg. T. Kaizer; Delnice 16.7.2014. leg. A. Slacki & I. Tot; Vučja river (downstream) 17.7.2014. leg. A. Slacki & I. Tot; Vučja river (upper stream) 4.8.2007. leg. M. Đurić; 17.7.2014. leg. A. Slacki & I. Tot.

Discussion

Examination of literature data showed 20 butterfly species were already recorded in the wider region of the Vlasina plateau. During our survey, 97 species are confirmed, of which 81 are considered new for the studied region. This brought the total number of observed butterfly species on the Vlasina plateau to 101. Since the study was conducted during only a few short visits, it can be assumed that the fauna of this region is surprisingly rich, which is unexpected in light of its uniform geology and predominantly mountainous character.

Among the observed species, 54 are considered threatened at the national level and 19 are protected by national law. *Phengaris arion* is listed as Endangered and another seven species as Near Threatened at the European level. Three species are recognized as important for nature conservation in Europe and listed in Annex II of the Habitats Directive and in the Bern Convention, while six species are included in Annex IV of the Habitats Directive. Comparing this area with some of the most valuable mountains of Serbia, one should note that they host similar numbers of threatened and protected species at the European level (see Popović & Đurić, 2014). This implies that Vlasina should be considered an important area when designating Natura 2000 and Emerald Network sites. On the other hand, Vlasina cannot be paired with more diverse mountains in species richness, number of threatened species or number of nationally protected species, in part because the examined area does not cover localities at lower altitudes. Nonetheless, a large number of threatened and protected species at a national level proves this region is important for nature conservation.

Of previously recorded species, four were not confirmed during our study: *Zerynthia cerisy* (Godart 1824), *Hesperia comma* (Linnaeus 1758), *Pieris mannii* (Mayer 1851), *Arethusana arethusa* (Denis & Schiffermüller 1775). *Z. cerisy* was reported on 17.4.2004 at a locality inside UTM FN13 (Stojanović-Radić, 2007), although it usually appears later in the season, especially at higher altitudes (Miljević & Popović, 2014). As the record comes from the insect collections compiled by students of the Faculty of Natural Sciences and Mathematics, it is most likely a case of mislabeling. However, the species is found in the neighboring regions and its presence, especially at lower altitudes, is probable. *H. comma* was collected on 17.7.1958 in UTM FN12 (Andus, 2008). Other two species are known only by UTM FN03 square from the distribution maps (Jakšić, 1988) and it would be interesting to reconfirm their presence in the near future.

Notes on the most important butterflies

One of the most important sightings for the Vlasina plateau was *Nymphalis vaualbum*, marked as one of the priority species in the Habitats Directive and listed in the Bern Convention. A single known record comes from a photograph made by Geza Farkaš on 12.10.2014 near Vlasina river. This species has been recently found in many localities in Serbia, while records in other parts of Europe have remained rare (see maps in Gascoigne-Pees, Wiskin, Đurić, & Trew, 2014)

The populations of *Polyommatus eros* in eastern Europe were until recently known as a separate species, *Polyommatus eroides* (Frivaldszky, 1835) (Van Swaay *et al.*, 2010). Although the ecology and taxonomy of

this taxon is not well studied (Klimczuk, 2005), it is declared threatened and is listed in Annexes II and IV of the Habitats Directive and in the Bern Convention (Van Swaay et al., 2010). On the Vlasina plateau, a large population was observed on Mt. Veliki Čemernik, where many males could be seen on moist soil, often gathering in large numbers. It is interesting to note that *Zerynthia polyxena* was rarely found at altitudes higher than 900 m (Dapporto, 2009; Miljević & Popović, 2014; Tolman & Lewington, 2008). However, this species is recorded at 1244 m (Vlasina river) and 1210 m (Cvetkova river), making these observations the highest in Serbia. Although not threatened at the European level, the species is listed in Annex IV of the Habitats Directive and is protected in Europe.

Among other important species, *Lycaena dispar*, *Parnassius mnemosyne* and *Phengaris arion* are also listed in the Habitats Directive, with *L. dispar* also included in the Bern Convention.

Notes on *Colias caucasica*

The most important record is certainly *Colias caucasica*, represented here by an endemic Balkan subspecies *Colias caucasica balcanica* Rebel, 1901. Its distribution is fragmented and local, restricted to high mountain chains between 1000-2200 m a.s.l. (Franeta & Đurić, 2011; Tvrtković, Mihoci, & Šašić, 2011) or between 800-2300 m a.s.l. according to Haahtela *et al.* (2011). So far, the butterfly was recorded in Croatia, Bosnia and Herzegovina, Montenegro, Serbia, Macedonia, Greece and Bulgaria (Tvrtković *et al.*, 2011), but known distribution suggests it should also be expected in Albania. Known localities in Serbia include Mts. Kopaonik, Mučanj and Javor (Franeta & Đurić, 2011; Jakšić, 1988) and the locality Ploča, to the north of Kopaonik (Martin Gascoigne-Pees, pers. comm.; Miljević & Popović, 2014). Zečević (1993) also wrote about his observation of this butterfly on Mt. Stara Planina in eastern Serbia, but this record was not confirmed by the author (Zečević, 2002) and was not mentioned during a few recent surveys in this region (Popović & Đurić, 2014).

We recorded *C. caucasica* on Mt. Veliki Čemernik in two consecutive years, on 17.7.2013 and 18.7.2014 (Fig. 2). This butterfly population appears to be exceptionally large, with over 30 specimens counted in 2013 and 45 specimens in 2014. It should be noted that the counting lasted less than an hour and was conducted in bad weather conditions with rain and strong wind. Although the species is known to inhabit steep and inaccessible terrains, the habitats on Mt. Veliki Čemernik are on gentle mountain slopes, in pine and fir forest clearings above 1400 m (Fig. 3). A single specimen was also found in a wet peat meadow of Blato on 17.7.2014 (Radislav Mirić, pers. comm.), but the possibility it was brought there by the wind cannot be excluded.

C. c. balcanica was recorded in karst regions from Croatia, through Bosnia and Herzegovina, western Serbia and further south to Macedonia and Greece (Franeta & Đurić, 2011; Tolman & Lewington, 2008; Tvrtković *et al.*, 2011). Starting from Mt. Kopaonik, going eastwards to Bulgaria, this species was not found on karst, but on siliceous rocks (Abadžiev, 2001; Franeta & Đurić, 2011). The butterfly is known to develop on host plants of the genus *Chamaecytisus*. We recorded *Ch. hirsutus* (L.) and *Ch. ciliatus* (Wahlenb.) on Veliki Čemernik, while in the literature the only reported butterfly host plants are *Ch. hirsutus* and *Ch. absinthioides* (Janka) (Abadžiev, 1994; Tolman & Lewington, 2008). The finding of *Ch. ciliatus* on Mt. Mučanj (Franeta & Đurić, 2011) gives ground to the assumption that this species might also serve as a larval host plant for *C. c. balcanica* and should be checked by future studies.

Our new finding extends the distribution of *C. caucasica* to eastern Serbia, making a connection between localities in southwestern Bulgaria and the rest of Balkans. Being Endangered (E) in Serbia (Jakšić, 2003), new records of this species are regarded as very important to the national insect fauna. It is also important at

the European level, since only a few new colonies of this rare butterfly have been found and some known populations most likely disappeared in the twentieth century (Abadjiev, 2001; Franeta & Đurić, 2011).



Figure 2. *Colias caucasica* – female from Mt. Veliki Čemernik 18.7.2014. Photo by I. Tot.

Conclusions

A short study of the Vlasina region has shown an unexpectedly rich butterfly fauna with many important species listed in international conventions. We hope that the overview of butterfly fauna presented in this paper will provide a solid base for further studies, but also encourage entomologists to further explore the distribution and ecology of *Colias caucasica balcanica*. Mt. Veliki Čemernik proved to be one of the most important localities hosting a number of high mountain species and should be studied in more detail. Moreover, it would be interesting to survey other mountain chains stretching along the border with Bulgaria, where *C. caucasica* and other high mountain species are to be expected.

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Figure 3. The locality Veliki Čemernik showing the habitat of *Colias caucasica*. Photo by A. Slacki.

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ДНЕВНИ ЛЕПТИРИ ВЛАСИНСКОГ ПОДРУЧЈА У ЈУГОИСТОЧНОЈ СРБИЈИ (LEPIDOPTERA: PAPILIONOIDEA)

ИВАН ТОТ, АЊА СЛАЦКИ, МИЛАН ЂУРИЋ И МИЛОШ ПОПОВИЋ

Извод

Иако је Власинска висораван занимљиво подручје високог диверзитета и јединствене флоре и фауне, њени дневни лептири још увек нису детаљније проучавани. Прикупљањем малобројних литературних података и нашим истраживањем утврђено је присуство 101 врсте дневних лептира. Власински крај карактерише велики број значајних врста које треба очувати у оквиру Натура 2000 и Емералд мреже, али и велики број врста од националног значаја. Међу најважнијим је *Colias caucasica*, која до сада није забележена у овом делу Србије, па је њен налаз детаљније описан у раду.

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