

A CONTRIBUTION TO THE STUDY OF DAILY BUTTERFLIES RHOPALOCERA (LEPIDOPTERA) IN A WIDER ČEMERNICA MOUNTAIN AREA

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Summary

Rizo Sijarić, the renowned B&H expert on daily butterflies, initiated studies of the species in Bosnian mountains (mountains of Uzlamac, Čemernica and Borja) in early 1990s. His research was conducted with only a few fieldworks and the number of registered species was small, especially in terms of each mountain separately. Hence, this paper represents an addition to earlier studies on the Čemernica Mountain and a continuation of exploration of Bosnian mountains. The research was conducted from 2006 to 2009. The butterflies were collected with the entomological net at the previously marked research sites. 94 daily butterfly species were identified at the target mountain. The paper provides a systematic and faunistic representation of the collected species, accompanied by the ecological analysis and comparison with daily butterfly fauna of other mountains.

Key words: daily butterflies, Čemernica, species diversity, type of habitat

INTRODUCTION

There are two periods of butterfly studies in B&H, prior and after WWII. It was only foreign scholars who studied butterflies in B&H in late 19th and early 20th centuries: Apfelbek in 1892, Nicholl in 1899 and 1902, Rebel in 1904, Fruhstorfer 1906-1907, Fruhstorfer in 1908, Fruhstorfer 1908-1909, Fruhstorfer in 1910, et al. The second half of 20th century witnessed local scholars such as Lorković, Sijarić, Mihljević, Jakšić, Lelo et al. (Lelo, 2008) making the largest contributions. Initial studies of B&H mountains were conducted along the massive mountains of Maglić, Volujak and Zelengora (Sijarić, 1970), followed by research at Herzegovina mountains of Prenj, Čvrstica and Čabulja (Sijarić, 1971). Later on, many studies were conducted at mountains of Vranica (Sijarić, 1979), Vlašić (Sijarić, 1982), Cincar (Sijarić, 1984), Vran planina (Sijarić, 1996a), Igman (Sijarić and Mihljević, 1975), Orjen (Sijarić, 1983), as well at the Bosnian mountains of Čemernica, Borja and Uzlamac (Sijarić, 1996b). More recent research on daily butterflies was conducted at Blidinje nature park (Kučinić *et al.*, 2005), as well as population-morphological and cytogenetic analyses of *Leptidea sinapis* (Lelo, 1999). Initial studies of daily butterflies in Bosnian mountains were conducted in 1990.

The fieldwork lasted ten days during which time 49 species were registered, 38 of which were registered at the Čemernica Mountain (Sijarić, 1996b).

The aim of our study of the Čemernica Mountain was to better investigate the mountain area and Bosnian mountains in general, at different habitats, in order to find as many species of daily butterflies as possible, differentiate the species in line with the habitat type, and provide guidelines for biodiversity and daily butterfly fauna preservation.

MATERIALS AND METHODS

The study of daily butterflies at the Čemernica Mountain was conducted as a part of the “Biological and ecological studies of the Republic of Srpska” project managed by the Faculty of Natural Sciences and Mathematics in Banja Luka. The study took place from April to September 2006, 2007, 2008 and 2009 with one or two field visits. The transect method was used on the vertical profile, from Bočac and the Vrbas River bank to Goli vis, the mountain peak. The research points were determined in line with the habitat type and vegetation (Table 1). Butterflies were caught by the entomological net. Some species were determined at site and some were placed in tracing paper envelopes and labeled. The determination was performed by using the key with morphological properties (Lelo, 2008; Tolman, 2008) and the key with male genital properties (Jakšić, 1998). Other tools used for the research were a binocular magnifier (Kruss optronic, WF 10X), and tools and materials for the male genitals preparation. Locations, date of discovery and habitat type were provided for each species. Altitude, longitude and latitude were provided from Google Earth.

The Čemernica Mountain is a part of the Dinaride complex with northwest-southeast orientation (Figure 1). It is surrounded by the rivers of Vrbas and Ugar. Altitude varies from 220 to 1338 m (Goli vis). The geological foundation consists mostly of limestone and dolomites, Mesozoic carbonate rocks. The soil is nearly uniform with brown limestone (calcio cambio salts), occasional sinkholes, and alluvial limestone along the Vrbas bank. It was the climate, orographic, edaphic and other properties that resulted in diverse vegetation as follows: thermophile oak trees, thermophile bushes, mesophilic deciduous forests, flooded forests and plains, etc. (Redžić *et al.*, 1986).

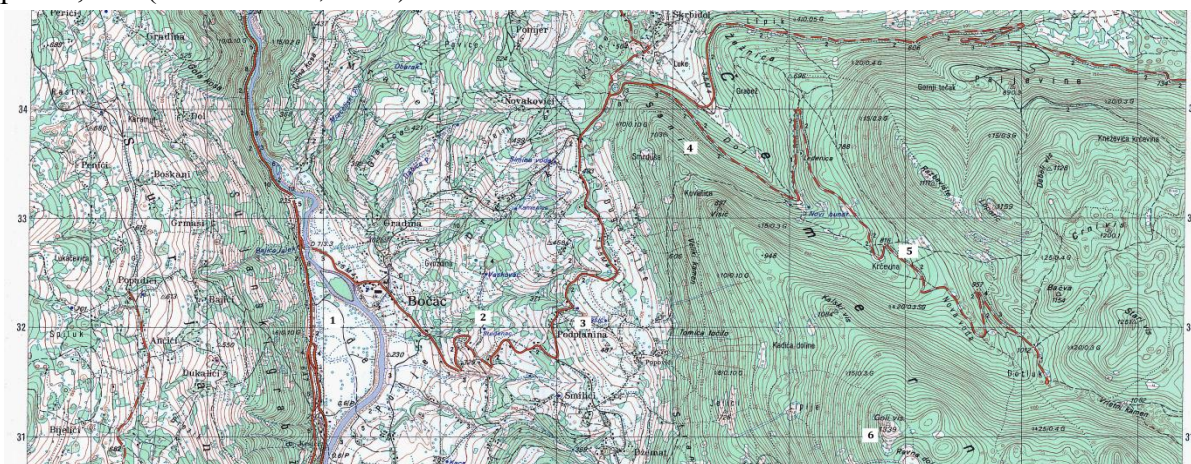


Figure 1. Map outline of vertical profile points at the Čemernica Mountain (detail from the topographical map Bočac 1:25000, Military Geographical Institute, 1976)

Table 1. Basic data on locations and habitat types

Point	Type of habitat	Altitude (m)	Coordinates	
I – Ade	Flooded forests and plains along the Vrbas bank	256	44°32'9.61"N	17° 9'3.94"E
II – Bočac	Mesophilic and thermophilic plains	240-350	44°32'0.44"N	17° 9'27.16"E
III – Podplanina	Thermophile oak forests	487	44°32'25.89"N	17° 9'52.01"E
IV – Sanik, Dol	Spruce forests with hornbeam and maple trees	500-800	44°32'35.03"N	17°12'8.77"E
V – Krčevina	Mesophilic beech forests	816	44°31'37.97"N	17°12'24.88"E
VI – Goli vis	Glades	1339	44°31'14.44"N	17°12'47.10"E
Sokoline	Roads, meadows and forest edges	550-650	44°35'22.29"N	17°21'45.56"E
Lazići	Roads, meadows and forest edges	691	44°34'58.86"N	17°22'42.72"E
Rastik – Asenovača	Roads, meadows and forest edges	373	44°33'18.15"N	17°24'9.62"E

RESULTS

The four-year-long study on the Čemernica Mountain and its vicinity resulted in the detection of 94 daily butterfly species, which was many more in comparison with the two-day-long study back in 1990 when only 38 species were registered. A systematic analysis of fauna resulted in the following butterfly distribution per family: Nymphalidae 47 or 50%, Lycaenidae 23 or 24.5%, Pieridae 10 or 10.6%, Hesperidae 9 or 9.6%, Papilionidae 4 or 4.3% and Riodinidae one or 1.1%.

The following list provides a systematic-faunistic overview of daily butterflies at the Čemernica Mountain and its vicinity:

HESPERIDAE

Erynnis tages (Linnaeus, 1758)

Srednje brdo-Sokoline: 10.8.2006., Rastik-Asenovača: 25.7.2006., Bočac Ade: 13.7., 12.8.2008., Bočac: 13.7., 12.8.2008., 12.7.2009.

Spialia orbifer (Hübner, 1823)

Bočac-Ade 13.7.2008.

Pyrgus malvae (Linnaeus, 1758)

Čemernica:Podplanina: 24.6., 11.9.2008.

Pyrgus alveus (Hübner, 1803)

Goli vis: 24.6.2008, 21.8.2009.

Heteropterus morpheus (Pallas, 1771)

Srednje brdo-Sokoline: 30.6., 28.7.2006. Lazići: 30.6.2006., Sanik-Dol: 12.7.2009.

Thymelicus sylvestris (Poda, 1761)

Srednje brdo-Sokoline: 28.7.2006., 21.7.2007., Rastik-Asenovača: 25.7.2006., Lazići: 30.6.2006., Bočac-Ade: 24.6.2008., Podplanina: 24.6.2008., Sanik-Dol: 24.6., 13.7.2008., 12.7.2009., Goli vis: 21.8.2009.

Thymelicus lineola (Ochsenheimer, 1808)

Srednje brdo-Sokoline: 30.6.2006., 22.6.2007. Rastik-Asenovača: 25.7.2006.

Ochlodes sylvanus (Esper, 1777)

Srednje brdo-Sokoline: 22.6.2007., Rastik-Asenovača: 25.7.2006., Lazići: 30.6.2006.
Podplanina: 12.7.2009., Sanik-Dol: 24.6. 13.7., 30.7., 12.8., 22.8., 11.9.2008., 12.7.2009.,
Krčevine: 24.6., 13.7., 12.8., 12.7.2009., Goli vis: 30.7., 12.8.2008.

***Hesperia comma* (Linnaeus, 1758)**

Krčevine: 21.8.2009., Goli vis: 22.8.2008., 21.8.2009.

PAPILIONIDAE

***Papilio machaon* (Linnaeus, 1758)**

Srednje brdo-Sokoline: 30.6.2006., Bočac, Ade: 21.8.2009., Krčevine: 21.8.2009., Goli
vis: 12.8., 13.7., 22.8., 11.9.2008.

***Iphiclides podalirius* (Linnaeus, 1758)**

Srednje brdo-Sokoline: 15.5., 21.7.2007., Rastik-Asenovača: 25.7.2006., Bočac, Ade:
21.8.2009., Bočac: 13.5., 13.7.2008., 12.7.2009., Podplanina: 29.5., 22.8.2008., Sanik-Dol:
13.7.2008., Goli vis: 12.8.2008.

***Zerynthia polyxena* (Denis & Schiffermüller, 1775)**

Rastik, 15.5.2006. Lazići 27.5.2007.

***Parnassius mnemosyne* (Linnaeus, 1758)**

Bočac, Ade: 13.5.2008., Sanik-Dol: 29.5.2008., Krčevine: 29.5., 24.6.2008., Goli vis:
24.6.2008.

PIERIDAE

***Leptidea sinapis* (Linnaeus, 1758)**

Srednje brdo-Sokoline: 30.6., 10.8.2006., 15.5., 27.5., 22.6., 7.8.2007., Rastik-
Asenovača: 25.7.2006., Lazići: 30.6.2006. Bočac, Ade: 13.5., 13.7., 12.8.2008., 12.7.,
21.8.2009., Bočac 13.5., 13.7., 12.8., 11.9.2008., 12.7., 21.8.2009., Podplanina: 24.6., 12.8.,
22.8.2008. 12.7., 21.8.2009., Sanik-Dol: 29.5., 24.6., 13.7., 12.8., 22.8.2008., 12.7.2009.,
Krčevine: 12.7.2009., Goli vis: 24.6., 13.7., 30.7., 22.8.2008.

***Anthocharis cardamines* (Linnaeus, 1758)**

Srednje brdo-Sokoline: 15.5.2007., Bočac: 13.8.2008., Sanik-Dol: 29.5.2008.,
Krčevine: 29.5.2008.

***Pontia edusa* (Fabricius, 1777)**

Bočac, Ade 11.9.2008.

***Aporia crataegi* (Linnaeus, 1758)**

Srednje brdo-Sokoline: 20.6.2006., 27.5.2007., Rastik-Asenovača: 25.7.2006., Bočac,
Ade 13.5.2008., Podplanina: 29.5.2008., Sanik-Dol: 24.6.2008.

***Pieris brassicae* (Linnaeus, 1758)**

Rastik-Asenovača: 26.6., 25.7.2006., Bočac, Ade: 11.9.2008., Podplanina: 22.8.2008.,
Sanik-Dol: 29.5., 24.6., 13.7., 12.8., 11.9.2008., Krčevine: 12.8., 11.9.2008., 12.7.2009., Goli
vis: 24.6., 22.8.2008.

***Pieris rapae* (Linnaeus, 1758)**

Srednje brdo-Sokoline: 28.7., 7.9.2006., 22.6.2007., Rastik-Asenovača: 25.7.2006.,
Lazići: 30.6.2006., Bočac, Ade: 13.5., 12.8.2008., 21.8.2009., Bočac: 12.8., 11.9.2008.
21.8.2009., Podplanina: 24.6., 22.8., 11.9.2008., Sanik-Dol: 24.6., 13.7., 12.8., 11.9.2008.,
12.7., 21.8.2009., Krčevine: 24.6., 13.7., 12.8., 11.9.2008., Goli vis: 24.6., 13.7.2008.

***Pieris napi* (Linnaeus, 1758)**

Srednje brdo-Sokoline: 20.6., 10.8., 7.9.2006., 15.5., 22.6.2007., Bočac, Ade 12.7.2009., Bočac: 12.8.2008., Sanik-Dol: 13.7., 11.9.2008., 12.7.2009., Krčevine 11.9.2008.

***Colias crocea* (Geoffroy in Fourcroy, 1785)**

Bočac, Ade: 13.7., 12.8., 11.9.2008., 21.8.2009., Bočac: 13.7., 22.8., 11.9.2008., 12.7., 21.8.2009., Podplanina: 11.9.2008., Sanik-Dol: 11.9.2008., Krčevine, 29.5., 12.8., 11.9.2008.

***Colias hyale* (Linnaeus, 1758)**

Bočac, Ade 22.8.2008., Podplanina: 12.8., 22.8.2008., Sanik-Dol: 11.9.2008.

***Gonepteryx rhamni* (Linnaeus, 1758)**

Srednje brdo-Sokoline: 7.8.2007., Bočac: 13.5.2008., 12.7.2009., Podplanina: 12.7.2009., Sanik-Dol: 29.5., 24.6., 12.8., 11.9.2008., Krčevine: 29.5., 13.7., 12.8., 22.8.2008., 12.7.2009.

RIODINIDAE

***Hamearis lucina* (Linnaeus, 1758)**

Srednje brdo-Sokoline, 10.8.2006., Sanik-Dol: 29.5.2008.

LYCAENIDAE

***Lycaena virgaureae* (Linnaeus, 1758)**

Srednje brdo-Sokoline, 30.6.2006.

***Lycaena tityrus* (Poda, 1761)**

Srednje brdo-Sokoline, 10.8.2006., Bočac, Ade: 21.8.2009.

***Lycaena dispar* (Haworth, 1802)**

Bočac, Ade: 21.8.2009.

***Thecla betulae* (Linnaeus, 1758)**

Sanik-Dol: 11.9.2008.

***Favonius quercus* (Linnaeus, 1758)**

Sanik-Dol: 11.9.2008.

***Callophrys rubi* (Linnaeus, 1758)**

Bočac, Ade: 29.5.2008., Krčevine: 29.5.2008.

***Satyrium w-album* (Knoch, 1782)**

Sanik-Dol: 13.7.2008., 12.7.2009., Goli vis: 30.7.2008.

***Satyrium ilicis* (Esper, 1779)**

Srednje brdo-Sokoline: 22.6.2007., Sanik-Dol: 13.7.2008.

***Satyrium acaciae* (Fabricius, 1787)**

Srednje brdo-Sokoline: 7.8.2007., Podplanina: 24.6.2008.

***Cupido minimus* (Fuessly, 1775)**

Srednje brdo-Sokoline: 22.6.2007., Bočac: 12.8.2008., Sanik-Dol: 22.8.2008., Krčevine: 29.5., 12.8.2008., Goli vis: 24.6., 13.7., 30.7.2008.

***Cupido decoloratus* (Staudinger, 1886)**

Bočac, Ade: 13.7.2008., Bočac: 12.8., 22.8.2008., Sanik-Dol: 13.7., 12.8.2008., Krčevine: 12.7.2009.

***Cupido argiades* (Pallas, 1771)**

Srednje brdo-Sokoline, 7.8.2007., Bočac, Ade: 21.8.2008., 12.7.2009., Bočac: 12.7., 21.8.2009., Podplanina: 12.7., 21.8.2009., Krčevine: 12.8.2008.

***Celastrina argiolus* (Linnaeus, 1758)**

Sanik-Dol: 30.7.2008.

***Scolitantides orion* (Pallas, 1771)**

Sanik-Dol: 29.5., 13.7., 30.7., 22.8.2008.

***Glaucopteryx alexis* (Poda, 1761)**

Bočac, Ade: 13.5.2008.

***Phengaris arion* (Linnaeus, 1758)**

Srednje brdo-Sokoline, 10.8.2006.

***Phengaris alcon* (Denis & Schiffermüller, 1775)**

Rastik-Asenovača: 30.6.2006.

***Plebejus idas* (Linnaeus, 1758)**

Rastik-Asenovača: 26.6.2006., Bočac: 12.8.2008., Podplanina: 12.8.2008.

***Plebejus argus* (Linnaeus, 1758)**

Srednje brdo-Sokoline: 20.6.2006., Lazići: 30.6.2006., Bočac, Ade: 13.5., 12.8.2008., 12.7.2009., Bočac: 13.7., 12.8., 11.9.2008., 12.7., 21.8.2009., Sanik-Dol: 21.8.2009.

***Aricia agestis* (Denis & Schiffermüller, 1775)**

Bočac: 29.5.2008., Podplanina: 11.9.2008., Sanik-Dol: 24.6., 13.7., 30.7., 11.9.2008. 21.8.2009., Krčevine: 13.7., 11.9.2008., Goli vis: 30.7., 22.8., 11.9.2008.

***Cyaniris semiargus* (Rottemburg, 1775)**

Srednje brdo-Sokoline: 20.6.2006., Goli vis 24.6.2008.

***Polyommatus icarus* (Rottemburg, 1775)**

Srednje brdo-Sokoline: 20.6., 30.6., 10.8., 7.9.2006., 27.5., 21.7.2007., Rastik-Asenovača: 25.7.2006., Lazići: 30.6.2006., Bočac, Ade: 24.6., 13.7., 12.8.2008., 11.9.2008., Bočac: 12.8., 11.9.2008., 12.7., 21.8.2009., Podplanina: 24.6., 12.8., 11.9.2008. 12.7.2009., Sanik-Dol: 12.8.2008., Krčevine: 12.8.2008., 21.8.2009., Goli vis: 24.6., 12.8., 11.9.2008.

***Polyommatus coridon* (Poda, 1761)**

Krčevine: 21.8.2009., Goli vis: 30.7., 22.8., 11.9.2008., 21.8.2009.

NYMPHALIDAE

***Argynnis paphia* (Linnaeus, 1758)**

Srednje brdo-Sokoline: 7.8.2007., Rastik-Asenovača: 26.6., 25.7.2006., Bočac: 21.8.2009., Podplanina: 11.9.2008., 12.7.2009., Sanik-Dol: 24.6., 13.7., 30.7., 12.8., 22.8., 11.9.2008., 12.7., 21.8.2009., Krčevine: 13.7., 12.8., 22.8., 11.9.2008., 12.7., 21.8.2009., Goli vis: 22.8.2008.

***Argynnis aglaja* (Linnaeus, 1758)**

Srednje brdo-Sokoline: 20.6., 30.6., 28.7., 10.8.2006., Lazići: 30.6.2006., Sanik-Dol: 13.7.2008., 12.7.2009., Krčevine: 13.7.2008., 12.7., 21.8.2009.

***Argynnis adippe* (Denis & Schiffermüller, 1775)**

Srednje brdo-Sokoline: 30.6., 28.7., 7.9.2006., Rastik-Asenovača: 26.6., 25.7.2006., Sanik-Dol: 13.7.2008., 12.7.2009., Krčevine: 13.7.2008., 12.8., 12.7.2009., Goli vis: 13.7.2008.

***Issoria lathonia* (Linnaeus, 1758)**

Sanik-Dol: 29.5., 12.8.2008., Krčevine: 12.8.2008. 12.7., 21.8.2009., Goli vis: 24.6., 12.8., 11.9.2008., 21.8.2009.

***Brenthis ino* (Rottemburg, 1775)**

Srednje brdo-Sokoline, 20.6., 30.6., 28.7.2006., Lazići, 30.6.2006.

***Brenthis daphne* (Denis & Schiffermüller, 1775)**

Srednje brdo-Sokoline, 20.6., 30.6.2006., 22.6.; 21.7.2007., Lazići, 30.6.2006., Bočac, Ade: 13.5.2008., Sanik-Dol: 24.6., 13.7.2008.

***Brentis hecate* (Denis & Schiffermüller, 1775)**

Srednje brdo-Sokoline, 20.6., 30.6.2006., Lazići, 30.6.2006., Bočac, Ade: 12.7.2009.

***Boloria euphrosyne* (Linnaeus, 1758)**

Krčevine: 29.5.2008.

***Boloria dia* (Linnaeus, 1758)**

Rastik-Asenovača, 26.6.2006., Lazići, 30.6.2006. Bočac, Ade: 12.8., 11.9.2008., Bočac: 12.8.2008. Bočac, Ade 12.8.2008., Krčevine: 22.8.2008.

***Vanessa atalanta* (Linnaeus, 1758)**

Podplanina: 11.9.2008., Sanik-Dol: 30.7., 22.8., 11.9.2008., Krčevine: 13.7., 11.9.2008., Goli vis: 30.7., 11.9.2008., 21.8.2009.

***Vanessa cardui* (Linnaeus, 1758)**

Krčevine: 12.7., 21.8.2009., Goli vis: 12.8.2008.

***Aglais io* (Linnaeus, 1758)**

Srednje brdo-Sokoline, 15.5.2007., Sanik-Dol: 11.9.2008., Krčevine: 22.8., 11.9.2008., 12.7.2009., Goli vis: 22.8.2008.

***Aglais urticae* (Linnaeus, 1758)**

Bočac: 29.5.2008.

***Polygonia c-album* (Linnaeus, 1758)**

Srednje brdo-Sokoline, 30.6., 28.7.2006., 27.5., 22.6.2007., Rastik-Asenovača, 26.6.2006., Sanik-Dol: 24.6., 13.7., 30.7., 12.8., 22.8., 11.9.2008., Krčevine: 24.6., 11.9.2008.

***Araschnia levana* (Linnaeus, 1758)**

Srednje brdo-Sokoline, 28.7., 7.9.2006., 15.5., 22.6.2007., Bočac: Krčevine: 21.8.2009.

***Nymphalis antiopa* (Linnaeus, 1758)**

Srednje brdo-Sokoline 27.5.2007., Bočac 24.6.2008, Krčevine 24.6.2008.

***Nymphalis polychloros* (Linnaeus, 1758)**

Goli vis: 29.5.2008.

***Euphydryas maturna* (Linnaeus, 1758)**

Bočac, Ade: 13.5.2008., Sanik-Dol: 24.6.2008., Krčevine: 29.5., 24.6.2008., Goli vis: 24.6.2008.

***Euphydrya aurinia* (Rottemburg, 1775)**

Srednje brdo-Sokoline, 20.6.2006., 27.5.2007., Krčevine: 29.5., 24.6.2008., Goli vis: 24.6.2008.

***Melitaea phoebe* (Denis & Schiffermüller, 1775)**

Bočac, Ade: 21.8.2009., Bočac: 29.5., 12.8.2008., 21.8.2009., Podplanina: 21.8.2009., Sanik-Dol: 29.5.2008.

***Melitaea didyma* (Esper, 1778)**

Rastik-Asenovača, 26.7.2006., Bočac, Ade: 12.7., 21.8.2009.

***Melitaea cinxia* (Linnaeus, 1758)**

Srednje brdo-Sokoline, 27.5.2007., Lazići, 30.6.2006., Sanik-Dol: 29.5.2008.

***Melitaea athalia* (Rottemburg, 1775)**

Srednje brdo-Sokoline, 20.6., 30.6., 10.8.2006., Rastik-Asenovača, 26.6., 25.7.2006., Lazići, 30.6.2006. Bočac, Ade: 12.8.2008., 12.7.2009., Bočac: 29.5., 12.8., 22.8.2008., 21.8.2009., Podplanina: 29.5., 24.6., 12.8.2008., 21.8.2009., Sanik-Dol: 29.5., 24.6., 12.8., 22.8.2008., 12.7., 21.8.2009., Krčevine: 22.8., 11.9.2008., Goli vis: 24.6., 13.7.2008.

***Melitaea aurelia* (Nickerl, 1850)**

Bočac: 12.8.2008.

***Melitaea diamina* (Lang, 1778)**

Srednje brdo-Sokoline, 30.6.2006., Goli vis: 24.6.2008.

***Limenitis populi* (Linnaeus, 1758)**

Srednje brdo-Sokoline, 20.6., 30.6.2006.

***Limenitis camilla* (Linnaeus, 1758)**

Bočac, Ade: 12.7.2009., Sanik-Dol: 24.6., 13.7., 12.8., 22.8.2008., 12.7.2009., Krčevine: 13.7.2008., 24.6.2008.

***Limenitis reducta* (Staudinger, 1901)**

Bočac, Ade: 13.5.2008.

***Neptis sappho* (Pallas, 1771)**

Srednje brdo-Sokoline, 10.8.2006., 22.6., 21.7., 7.8.2007., Rastik-Asenovača, 25.7.2006., Sanik-Dol: 22.8.2008., 12.7.2009., Krčevine: 29.5.2008., 12.8.2008.

***Apatura iris* (Linnaeus, 1758)**

Srednje brdo-Sokoline, 22.6.2007., Sanik-Dol: 24.6.2008., 12.7.2009.

***Pararge aegeira* (Linnaeus, 1758)**

Srednje brdo-Sokoline, 10.8.2006., 27.5., 22.6., 21.7.2007., Sanik-Dol: 29.5., 24.6., 30.7., 12.8., 22.8., 11.9.2008., 21.8.2009., Krčevine: 29.5., 22.8.2008.

***Lasiomata maera* (Linnaeus, 1758)**

Bočac, Ade: 22.8.2008., Sanik-Dol 11.9.2008., 21.8.2009., Krčevine: 29.5., 11.9.2008., Goli vis: 24.6.2008.

***Lasiomata megera* (Linnaeus, 1767)**

Bočac, Ade: 13.7., 22.8.2008.

***Coenonympha arcania* (Linnaeus, 1761)**

Srednje brdo-Sokoline, 27.5., 22.6.; 21.7.2007., Lazići, 30.6.2006. Podplanina: 29.5.2008., Sanik-Dol: 29.5., 24.6., 13.7.2008., 12.7.2009., Krčevine: 12.7.2009.

***Coenonympha glycerion* (Borkhausen, 1788)**

Srednje brdo-Sokoline, 20.6.2006., Podplanina: 29.5.2008.

***Coenonympha pamphilus* (Linnaeus, 1758)**

Srednje brdo-Sokoline, 10.8., 7.9.2006., Lazići, 30.6.2006., Bočac, Ade: 24.6., 13.7., 12.8., 11.9.2008., 21.8.2009., Bočac: 29.5., 12.8., 11.9.2008., 22.8., 21.8.2009., Podplanina: 29.5., 24.6., 22.8., 11.9.2008., 21.8.2009., Sanik-Dol: 13.7.2008., Krčevine: 22.8.2008., 11.9.2008., 21.8.2009., Goli vis: 24.6.2008., 30.7.2008., 11.9.2008 21.8.2009.

***Pyronia tithonus* (Linnaeus, 1757)**

Srednje brdo-Sokoline, 28.7., 10.8.2006., Bočac, Ade: 12.7.2009., Bočac: 12.7.2009.

***Aphantopus hyperanthus* (Linnaeus, 1758)**

Srednje brdo-Sokoline, 10.8.2006., 22.6., 22.6., 21.7., 7.8.2007., Rastik-Asenovača, 26.6.2006., Bočac, Ade: 24.6.2008., 13.7.2008., Bočac: 13.7.2008.(II), Podplanina: 12.7.2009. Sanik-Dol: 30.7.2008., 12.8.2008. 12.7.2009., Goli vis: 13.7.2008., 30.7.2008.

***Maniola jurtina* (Linnaeus, 1758)**

Srednje brdo-Sokoline, 30.6., 28.7., 10.8., 7.9.2006., 22.6., 21.7., 7.8.2007., Rastik-Asenovača, 26.6.2006., Bočac, Ade: 24.6., 13.7., 12.8., 22.8., 11.9.2008., 12.7., 21.8.2009., Bočac: 13.7., 12.8.2008., 12.7., 21.8.2009., Podplanina: 24.6., 12.8., 22.8., 11.9.2008., 12.7., 21.8.2009., Sanik-Dol: 29.5., 24.6., 13.7., 30.7., 12.8., 22.8.2008., 12.7., 21.8.2009., Krčevine: 24.6., 13.7., 12.8.2008., 12.7., 21.8.2009., Goli vis: 24.6., 13.7.2008. 21.8.2009.

***Erebia ligea* (Linnaeus, 1758)**

Srednje brdo-Sokoline, 7.8.2007., Sanik-Dol: 24.6., 13.7.2008.

***Erebia aethiops* (Esper, 1777)**

Srednje brdo-Sokoline, 28.7., 10.8.2006., Sanik-Dol: 13.7., 30.7., 12.8., 22.8., 11.9.2008., 12.7., 21.8.2009., Krčevine: 13.7., 12.8., 22.8.2008., 12.7., 21.8.2009., Goli vis: 22.8.2008., 21.8.2009.

***Erebia medusa* (Denis & Schiffermüller, 1775)**

Bočac, Ade: 13.5.2008., Bočac: 29.5.2008., Četinari, 29.5.2008., Krčevine: 29.5.2008.

***Melanargia galathea* (Linnaeus, 1758)**

Srednje brdo-Sokoline, 30.6., 28.7.2006., 22.6., 21.7.2007., Rastik-Asenovača, 25.7.2006., Lazići, 30.6.2006. Bočac, Ade: 12.7.2009., Bočac: 12.7.2009., Podplanina: 12.7.2009. Sanik-Dol: 24.6., 13.7., 30.7.2008., 12.7.2009., Krčevine: 13.7.2008. 12.7.2009., Goli vis: 30.7., 22.8.2008., 21.8.2009.

***Satyrus ferula* (Fabricius, 1783)**

Rastik-Asenovača, 25.7.2006.

***Minois dryas* (Scopoli, 1763)**

Srednje brdo-Sokoline: 28.7., 10.8., 7.9.2006., 22.6., 21.7., 7.8.2007., Rastik-Asenovača, 26.6., 25.7.2006., Bočac: 12.8.2008. Podplanina: 12.7., 21.8.2009.

***Hyparhia semele* (Linnaeus, 1758)**

etinarska suma 30.7.2008.

***Brintesia circe* (Fabricius, 1775)**

Srednje brdo-Sokoline, 10.8., 7.9.2006., Sanik-Dol: 13.7., 12.8., 22.8.2008., Goli vis: 12.8.2008., 21.8.2009.

Figure 2. Displays the presence of registered species at the Čemernica Mountain in line with families.

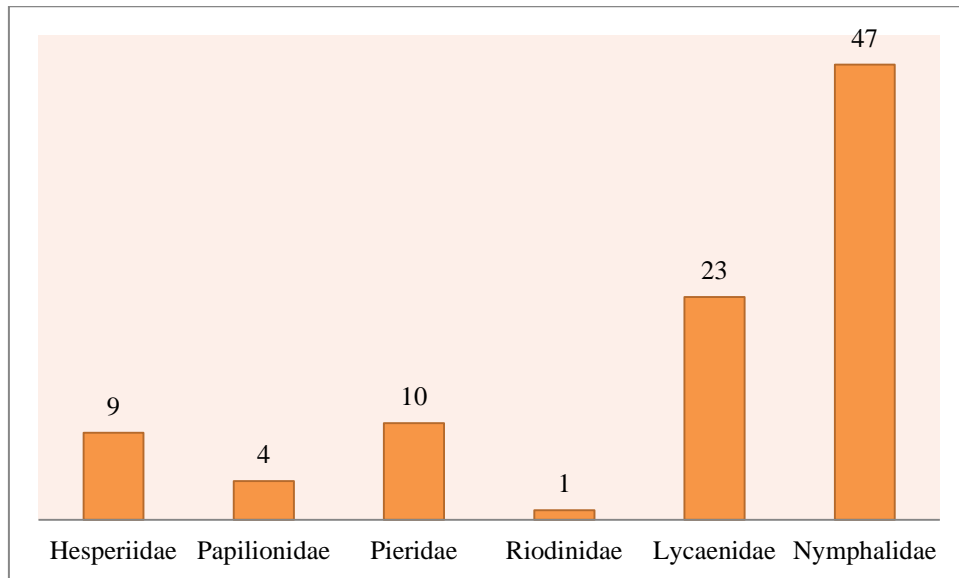


Figure 2. Presence of species per families

DISCUSSION

189 species of daily butterflies have been registered in B&H so far, most of which are located in Herzegovina and east Bosnia mountains. Previous studies of B&H mountains suggested that western part of the country were home to only 106 species or 56% (Sijarić, 1977), and most butterflies were registered on the mountains of Prenj, Čvrsnica, Čabulja (117) and Maglić, Volujak, Zelengora (112). Given the criteria for the selection of protected areas, Čemernica's butterflies rank the mountain as a mid-opulent area (Jakšić, 2008). The following species were registered in 1990: *Parnassius apollo*, *Lycaena phlaeas*, *Aricia artaxexes*, *Polyommatus dorylas*, *Polyommatus daphnis* and *Hipparchia fagi*, so the current number of butterfly species at the Čemernica Mountain is 100 which makes 52.9% of all daily butterflies in B&H (Sijarić, 1996b).

According to the Regulation on Endangered and Protected Wild Species of the Republic of Srpska, not a single daily butterfly species at the Čemernica Mountain is protected (Official Gazette of the Republic of Srpska, 65/20). The B&H fauna Red list (Official Gazette of the Federation of Bosnia and Herzegovina, 7/14) showed that only one species was categorized as threatened (EN) (*Phengaris arion*), and two species were categorized as risky (VU) (*Favonius quercus* and *Euphydryas maturna*).

The ecological analysis of the vertical profile indicates a poor differentiation of species in terms of habitat type, which is typical of low mountains due to merging and overlapping of flora. Some species have larger populations in some habitats. In forest belts, in glades and roads there is a huge population of species from *Erebia*, *Limnitis*, *Argynnis* genus; beech forests are rich in population of *Euphydryas maturna* and *Parnassius mnemosyne*; the Goli vis glade is rich in *Polyommatus coridon* and *Hesperia comma*; lowland meadows are rich in typical meadow species. Species display most similarities between adjacent points (flooded plains-meadows, oak trees-beech trees, etc.), and most differences between forest and meadow communities.

CONCLUSION

There were two studies on daily butterflies at the Čemernica Mountain: first in 1990 when Sijarić registered only 38 species and second from 2006 to 2009 when 94 species were detected.

According to the criteria for species population detection at a habitat, Čemernica with its 100 species is moderately rich in daily butterflies. Nevertheless, the entire western Bosnia is rather poor in daily butterfly species due to the lack of high mountains and species which typically inhabit them. Being a low mountain, Čemernica is not abundant in floral communities, so the differences among the points of the vertical profile were minimal in terms of daily butterfly communities.

Systematically, daily butterflies were distributed in the following families: Nymphalidae 47 species, Lycaenidae 23 species, Pieridae 10 species, Hesperidae 9 species, Papilionidae 4 species and Riodinidae one species.

The initial 1990 study covered the species of *Parnassius apollo*, *Lycaena phlaeas*, *Aricia artaxexes*, *Polyommatus dorylas*, *Polyommatus daphnis* and *Hipparchia fagi*, which were not registered during the second study. This means that the current number of daily butterfly species at the Čemernica Mountain is 100 or 52.9% of the total B&H species.

It should be noted that the mountain's habitats are endangered due to heavy deforestation which might lead to severe population decrease or even extinction of some species. At Čemernica, there are also species which are valuable and rare. There should be a continuation of this study in order to complete the species list, track the negative anthropogenic impact, and undertake adequate protection measures.

REFERENCES

- Apfelbeck, V. (1892). *Dojako u južnoj BiH opažene vrste Rhopalocera (Dnevni leptirovi)*. *Glasnik zemaljskog muzeja*, 4, 192-196.
- Fruhstorfer, H. (1906-1907). Neue Parnassius Formen. *Societas Entomologica*, 21(18), 137-140, 170-172.
- Fruhstorfer, H. (1908). Neue Paläarktische Rhopaloceren - Rassen. *Int. Ent. Z. Guben.* 2(28), 194-195, 214-215.
- Fruhstorfer, H. (1908-1909). Neue Paläarktische Satyriden - Rassen. *Entomologische Zeitschrift*, 22, 127-128, Frankfurt.
- Fruhstorfer, H. (1910). Neue Satyriden. *Int. Ent. Z. Guben.* III, 133-135.
- Lelo, S. (1999). Populaciono-morfološka i citogenetička istraživanja vrste *Leptidea sinapis* Linnaeus 1758, (Lepidoptera, Pieridae) Sarajevske okoline. [Master' thesis]. Prirodno - matematički fakultet Univerziteta u Sarajevu, Sarajevo.
- Lelo, S. (2008). *Dnevni leptiri Bosne i Hercegovine (Lepidoptera: Papilionoidea i Hesperioidea): Ključ za determinaciju vrsta sa osnovnim monografskim podacima*. Sarajevo: Prirodno - matematički fakultet Univerziteta u Sarajevu, p. 133.
- Jakšić, N. P. (1998). *Male genitalia of butterflies on Balkan peninsula with a check-list. Lepidoptera: Hesperioidea and Papilionoidea*. Bratislava: Slamka.

- Jakšić, P. (2008) *Prime Butterfly Areas in Serbia / Odabrana područja za dnevne leptire u Srbiji*. Beograd: HabiProt.
- Kučinić, M., Stanić, S., Durbešić, P., Mihoci, I., Landeka, N. & Deliće, A. (2005). A review of research into butterflies (Lepidoptera: Rhopalocera) in Blidinje nature park (Bosnia and Herzegovina). *Entomologica Croatica*, 9(1-2), 11-28.
- Military Geographical Institute Maps. (1976). *Military Geographical Institute map of Bočac* (ca. 1:25000.) Belgrade: Military Geographical Institute.
- Nicholl, D. L. M. (1899). Butterfly hunting in Dalmatia, Montenegro, Bosnia and Herzegovina. *Entomologist's Rec. J. Var. London*, 11, 1-8.
- Nicholl, D. L. M. (1902). The Lepidoptera of Bosnia and Montenegro. *Entomologist's Rec. J. Var. London*, 14, 141-146.
- Official Gazette of the Republic of Srpska, No. 65 (2020). Uredba o strogo zaštićenim i zaštićenim divljim vrstama.
- Official Gazette of the Federation of Bosnia and Herzegovina, No. 7 (2014). Crvena lista divljih vrsta i podvrsta biljaka, životinja i gljiva, 24-25.
- Rebel, H. (1904). Studien uber die Lepidopterenfauna der Balkanlander, II Teil Bosnien und Hercegovina. *Annalen des k.k. Naturhistorischen Hofmuseum*, 19, 97-377
- Redžić, S., Omerović, S. & Golić, S. (1986). Prilog poznavanju šumskih fitocenoza planine Čemernice. *Godišnjak Biološkog Instituta Univerziteta u Sarajevu*, 39, 125-139.
- Sijarić, R. (1970). Fauna Rhopalocera i Hesperoidea (Lepidoptera) na području prašume Perućica u kompleksu planina Maglić, Volujak i Zelengora. *Glasnik Zemaljskog muzeja (PN) NS* 9, 186-191.
- Sijarić, R. (1971). Faunistička istraživanja Rhopalocera (Lepidoptera) na kompleksu hercegovačkih visokih planina (Prenj, Čvrstica i Čabulja). *Glasnik Zemaljskog muzeja (PN), NS*, 10, 163-184.
- Sijarić, R. (1977). Faunistički prikaz Rhopalocera (Lepidoptera) zapadne Bosne. *Glasnik Zemaljskog muzeja (PN), NS*, 16, 175-192.
- Sijarić, R. (1979). Populacije Rhopalocera (Lepidoptera) u ekosistemima planina Vranice u Bosni. *Drugi kongres ekologa Jugoslavije*, str. 1953–1961.
- Sijarić, R. (1982). Sastav populacija Rhopalocera (Lepidoptera) u ekosistemima planine Vlašić. *Glasnik Zemaljskog muzeja (PN), NS*, 21, 163-172.
- Sijarić, R. (1983). Sastav i struktura populacija Rhopalocera (Lepidoptera) u ekosistemima krša jugoistočne Hercegovine i Orjena. *Glasnik Zemaljskog muzeja (PN), NS*, 22, 81-93.
- Sijarić, R. (1984). Naselja Rhopalocera (Lepidoptera) u biocoenozama planine Cincar (Bosna). *Bilten Društva ekologa Bosne i Hercegovine, Serija B - Naučni skupovi i savjetovanja*. No 2. III Kongres ekologa Jugoslavije. Knjiga I, str. 385 – 390.
- Sijarić, R. (1996a). Fauna Rhopalocera (Lepidoptera) Vran planine (Hercegovina). *Glasnik Zemaljskog muzeja (PN), NS*, 31, 369-388.
- Sijarić, R. (1996b). Faunistička istraživanja Rhopalocera (Lepidoptera) bosanskog pobrđa. *Glasnik Zemaljskog muzeja (PN), NS*, 31, 389-402.
- Sijarić, R. & Mihaljević, B. (1975). Rhopalocera i Hesperoidea (Lepidoptera), planine Igman kod Sarajeva. *Glasnik Zemaljskog muzeja (PN), NS*, 14, 163-175.

Tolman, T. (2008). *Collins butterflies guide. The most complete guide to the butterflies of Britain and Europe*. London: Collins.

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