

The butterfly (Lepidoptera: Papilionoidea) diversity of Mt. Mosor in Dalmatia, Croatia

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Abstract. Mosor is a small mountain massif situated in central Dalmatia, above the cities of Split and Omiš. It was never a target of any systematic butterfly surveys, with its fauna remaining almost completely unknown. During our surveys from 2011 to 2020, we recorded 96 butterfly species at 60 localities. With the literature record of *Polyommatus ripartii*, a total of 97 species are recorded from Mt. Mosor. The comparison with the published lists of the neighbouring lower Mt. Kozjak and much higher Mt. Biokovo revealed that the butterfly richness of Mt. Mosor is intermediate, with 87 and 116 species recorded from those mountains, respectively. The biogeographical composition of all three mountains is, however, similar, with the dominant Euro-Siberian and Euro-Oriental faunistic elements comprising together about 80% of the species. For some species with scarce information for Croatia or Dalmatia, like *Papilio alexanor*, *Zerynthia polyxena*, *Parnassius mnemosynae*, *Aricia anteros*, *Polyommatus escheri*, *Melitaea aurelia*, *Proterebia phegea*, and *Neptis rivularis*, new records are discussed.

Key words: Croatia, Lepidoptera, faunistics, biogeography, distribution, threat status

Izvleček. Pestrost dnevnih metuljev (Lepidoptera: Papilionoidea) planine Mosor v Dalmaciji, Hrvaška – Mosor je majhen gorski masiv, ki se razteza v srednji Dalmaciji nad mestoma Split in Omiš. Nikoli ni bil tarča sistematičnih raziskav dnevnih metuljev in njegova favna je bila skoraj popolnoma neznana. Med raziskavami od leta 2011 do 2020 smo na 60 lokacijah zabeležili 96 vrst metuljev. Skupaj z literaturnim podatkom za *Polyommatus ripartii* je tako na Mosorju zabeleženih 97 vrst. V primerjavi s sosednjima planinama, nižjim Kozjakom in veliko višjim Biokovom, je pestrost metuljev Mosorja nekje vmes, saj je iz teh planin zabeleženih 87 oziroma 116 vrst. Biogeografska sestava vseh treh planin pa je podobna, saj dominirajo evro-sibirski in evro-orientalski favnistični elementi s skupno približno 80-odstotnim deležem. Za nekatere redke vrste za Hrvaško ali Dalmacijo, kot so *Papilio alexanor*, *Zerynthia polyxena*, *Parnassius mnemosynae*, *Aricia anteros*, *Polyommatus escheri*, *Melitaea aurelia*, *Proterebia phegea* in *Neptis rivularis*, so predstavljene nove najdbe.

Ključne besede: Hrvaška, metulji, favnistika, biogeografija, razširjenost, ogroženost

Introduction

Mosor is a small mountain located in central Dalmatia (SE Croatia), between Mt. Kozjak in the north-west and Mt. Biokovo in the south-east, between Split and Omiš cities. It stretches from the Klis Pass in the northwest to the Cetina River in the southeast and is about 25 km long. The highest peak of the mountain is Veliki Kabal (1,339 m a.s.l.). Mosor has a typical Mediterranean climate. The mountain is of limestone composition, with a large number of pits and caves (Ministry of Environment and Energy 2012). The southern slopes are mostly barren, steep, covered with sparse vegetation, while the northern slopes are covered with deciduous forests. The vegetation of Mt. Mosor is of entirely Mediterranean character (Šegulja & Bedalov 1984). The prevailing forest community, *Quercus-Carpinetum orientalis*, occupies altitudes from 400 to 900 m, while the *Seslerio-Ostryetum* community is present from 900 m upwards (Šegulja & Bedalov 1984). Forest fires are common in the area, especially on the southern slopes of Mt. Mosor. Lower parts of the mountains are easily accessible, and several villages can be reached on both the southern and the northern parts of the mountain. Hiking trails to some of the prominent peaks are available, although poorly maintained.

As for many other mountains in Croatia, historical records of butterflies from Mosor are very limited (Stauder 1911, 1913, 1923). Among the records worth mentioning is the record of *Polyommatus ripartii*, a rare species in Croatia (Koren 2010) from the southern slopes of the mountain (Dincă et al. 2013). Only three species have so far been recorded from Mt. Mosor, indicating the need for a more systematic survey of the mountain. The goal of this contribution is to present the butterfly diversity of Mt. Mosor, and compare it to the published lists of the neighbouring Mt. Kozjak (Koren et al., 2019) and Biokovo (Mihoci et al. 2011; Kačirek 2017). We also discuss distribution and potential threats to the selected species.

Materials and methods

Field surveys, specifically addressing the butterfly fauna of the region, were carried out from 2014 onwards, but we report also some records from 2011 onward. Most data reported here were collated during the 2019 and 2020 seasons, mostly from early May to the beginning of July at altitudes below 800 m a.s.l. Satellite topography and habitat diversity were used to select the potentially suitable localities in the region prior to the field visits, in order to optimize the time spent in the field. The list of localities contains the relevant toponyms, a short description of the habitat, altitude, coordinates, dates of the visits, and the observers' initials.

In order to record butterflies, random walks and general inventories were carried out. Butterflies were observed in flight or netted for identification, using standard field guides (Lafranchis 2004, Tolman & Lewington 2008). Additionally, specimens of the genera *Leptidea*, *Plebejus*, *Melitaea* and *Hipparchia* were collected and their genitalia examined. Revision of the collected specimens from *Pieris napi* | *balcana* aggregate were examined with the aid of wing-markings (Lorković 1970). The nomenclature follows Wiemers et al. (2018).

Comparisons of the species composition between the three mountains, i.e. Mosor, Kozjak and Biokovo were made using biogeographical affiliations of butterflies according to Kudrna et al. (2015).

Results

Overview of butterfly findings on Mt. Mosor

A total of 60 sites were visited during the surveys, some of them on several occasions (Fig. 1; Tab. 1). Here the localities are arranged according to their geographical position, from the west to the east (Fig. 1).

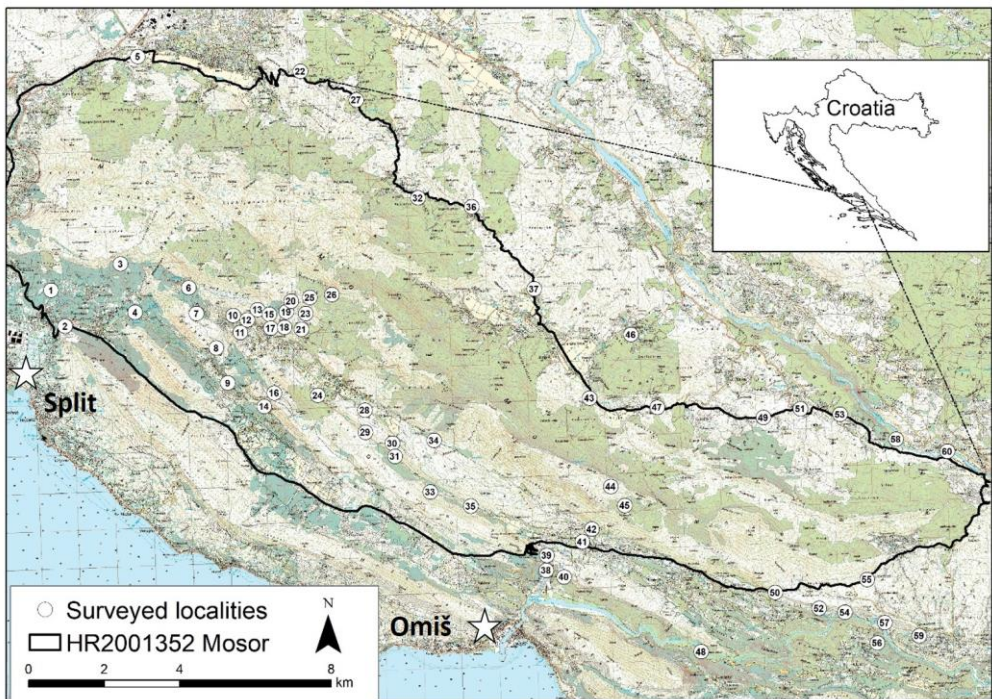


Figure 1. Map of localities where butterfly inventories were conducted on Mt. Mosor from 2014 to 2020. Locality numbers correspond to those in the Tab.1. The borders of the Natura 2000 SCI site HR2001352 are shown.

Slika 1. Zemljevid lokacij, kjer so bili na Mosorju od leta 2014 do 2020 narejeni popisi dnevnih metuljev. Številke lokacij ustrezajo tistim v Tab. 1. Prikazane so meje območja SCI Natura 2000 HR2001352.

Table 1. Overview of localities on Mt Mosor, sampled for butterflies in the 2011–2020 period. Locality numbers and names, WGS84 coordinates, altitude, habitat description, dates of visits and legators are given. Legator abbreviations are as follows: DK: Daria Kranželić, TK: Toni Koren, RV: Rudi Verovnik, GG: Gordana Glavan, IB: Ivona Burić, AŠ: Ana Štih, JB: Jelena Babić, JV: Jan Verovnik.

Tabela 1. Pregled lokacij na Mosorju, kjer so bili vzorčeni metulji v letih 2014–2020. Navajamo številke in imena lokacij, koordinate WGS84, nadmorsko višino, opis habitata, datume obiskov in legatorje. Okrajšave slednjih so naslednje: DK: Daria Kranželić, TK: Toni Koren, RV: Rudi Verovnik, GG: Gordana Glavan, IB: Ivona Burić, AŠ: Ana Štih, JB: Jelena Babić, JV: Jan Verovnik.

Locality no. and name	WGS84 N	WGS84 E	Altitude	Habitat description	Dates of visits and legators
1. Žrnovica, north of the village	43,527441	16,541357	160 m	olive groves, edge of maquis	29.5.2020, IB
2. Žrnovica, north of the village 2	43,518849	16,545722	70 m	river banks and calcareous grasslands	29.5.2020, IB
3. Žrnovica, north of the village, Torine toponym	43,533426	16,56416	360 m	calcareous grasslands	29.5.2020, IB
4. Žrnovica, banks of river Žrnovica	43,521805	43,521805	136 m	calcareous grasslands	11.5.2019, TK, 25.5.2019, TK, 8.6.2019, TK, 29.5.2020, IB
5. Dugopolje	43,582652	16,571114	340 m	forest edge and dry grasslands	6.7.2020, TK, IB, DK
6. Mosor, north of Lolići village	43,527426	16,586406	420 m	ruderal area and calcareous grasslands	29.5.2020, IB
7. Donje Sitno, Prisika	43,521258	16,588743	480 m	calcareous grasslands	29.5.2020, IB
8. Donje Sitno, in a small valley above the village	43,512964	16,595006	270 m	calcareous rocky area, bushes	29.4.2015, RV, 28.5.2015, RV, 20.5.2018, RV, 2.5.2019, TK, 8.6.2019, TK, 1.8.2019, RV, 23.5.2020, RV, GG, JV, 27.6.2020, RV, GG, 4.9.2020, TK
9. Donje Sitno	43,504611	16,598518	329 m	ruderal area, gardens	30.4.2011, TK
10. Gornje Sitno, along the road and track NW of the village	43,520883	16,602217	630 m	calcareous rocky slopes, bushes	28.5.2015, RV, 1.8.2019, RV, 9.5.2020, IB, 7.6.2020, RV, GG
11. Gornje Sitno, along a side road and S of the village	43,516564	16,602997	510 m	gardens, small grasslands, forest edge	29.5.2020, IB, 27.6.2020, RV, GG
12. Gornje Sitno, north of Gabrići	43,519536	16,605308	623 m	rocky areas with small grassland patches	2.5.2018, TK, IB, AŠ, 5.6.2018, TK, IB

Locality no. and name	WGS84 N	WGS84 E	Altitude	Habitat description	Dates of visits and legators
13. Gornje Sitno, south of peak Volujak	43,520377	16,606517	615 m	rocky areas with small grassland patches	30.4.2011, TK
14. Sirotkovići, inside the village	43,498868	16,610278	443 m	gardens	6.7.2020, DK
15. Mosor, along the path on the ridge SW of Umberto Girometta hut	43,520756	16,612572	800 m	rocky areas, small grasslands	27.6.2020, RV, GG
16. Mosor, Zvezdano selo	43,502037	16,613652	650 m	rocky grasslands	2.5.2018, TK, IB, AŠ, 5.6.2018, TK, IB, 11.5.2019, TK, 5.5.2019, TK, JB, 4.9.2020, TK
17. Gornje Sitno	43,5200	16,615556	623 m	rocky grasslands, oak groves	25.6.2018, TK, IB
18. Gornje Sitno, S of the mountain hut	43,519167	16,6175	625 m	grasslands	25.6.2018, TK, IB
19. meadow in the woods S of Umberto Girometta hut	43,521272	16,618069	830 m	rocky grasslands	27.6.2020, RV, GG
20. Gornje Sitno, at the mountain hut Umberto Girometta	43,522778	16,618333	625 m	grasslands and forest edge	25.6.2018, TK, IB
21. SE of mountain hut Umberto Girometta	43,518583	16,622633	800 m	large abandoned meadows	1.8.2019, RV, 27.6.2020, RV, GG
22. Vladovići, small valley west of the village	43,578397	16,624257	475 m	small patches of grasslands, forest edge	11.5.2019, TK, 8.6.2019, TK, 6.7.2020, TK, 6.7.2020, IB, DK
23. along the path on south-facing slopes E of mountain hut Umberto Girometta	43,520758	16,624439	870 m	rocky slopes, bushes	1.8.2019, RV, 27.6.2020, RV, GG
24. Dubrava, south of the village	43,501248	16,627871	510 m	grasslands and forest edge alongside the main road	29.5.2020, IB
25. along the path on the plateau SW of Veliki Kabal peak	43,524731	16,630908	1030 m	sparse oak woods, small clearings	1.8.2019, RV
26. along the path on the S slopes of the Veliki Kabal peak	43,525136	16,633117	1100 m	grassy and rocky open areas	1.8.2019, RV
27. Vladovići village	43,571338	16,642398	530 m	gardens with flowers	6.7.2020, TK
28. Dubrava, ruderal area on a plateau at the cemetery	43,497528	16,643158	520 m	ruderal grasslands, forest edge	2.5.2019, RV, GG

Locality no. and name	WGS84 N	WGS84 E	Altitude	Habitat description	Dates of visits and legators
29. Dubrava, along a small stream S of the village, in a separate valley	43,492272	16,643172	440 m	abandoned, partially overgrown calcareous grasslands	29.4.2015, RV
30. Dubrava, in a small side valley near St. Arnir Church	43,489492	16,651969	520 m	rocky and bushy slopes	2.5.2019, RV, GG, JV, 1.8.2019, RV, 27.6.2020, RV, GG, 4.9.2020, TK
31. NE of Orebić, south of Brojilo	43,486385	16,652701	435 m	grassland patches, forest edge	8.6.2019, TK
32. Smajići, south of the village	43,547742	16,661864	540 m	grasslands	11.5.2019, TK
33. Gata, SE of Rudine	43,477755	16,66397	380 m	dry grasslands	5.6.2018, TK, IB, 6.7.2020, TK, DK, IB, 4.9.2020, TK
34. Dubrova, along the side road SE of the village	43,489992	16,665589	570 m	grasslands	30.4.2011, TK, 2.5.2019, RV, GG, JV, 27.6.2020, RV, GG
35. Gata, south of Sridnji gaj	43,474193	16,677123	355 m	arable land, gardens, grasslands	11.5.2019, TK,
36. Gornji Dolac, Osoje	43,545377	16,679396	605 m	grasslands, forest edge	2.5.2018, TK, IB, AŠ, 11.5.2019, TK, 8.6.2019, TK, 6.7.2020, TK, IB, DK
37. Donji Dolac	43,520779	16,701736	540 m	calcareous grasslands, marl areas and forest edge	11.5.2019, TK, 8.6.2019, TK, 6.7.2020, TK, IB, DK
38. Zakučac, along the stream in the village	43,458569	16,701336	10 m	ruderal area, forest edge	23.5.2020, RV, GG, JV
39. Gata, small valley above S of the village	43,462133	16,7016	240 m	steep rocky slopes	28.5.2015, RV
40. Zakučac, screes above the village on slopes of Mt. Oljica	43,456917	16,707133	220 m	steep rocky slopes	22.5.2014, RV, 29.4.2015, RV, 20.5.2018, RV, 23.5.2020, RV, GG, JV
41. Gata, at the store in the centre of the village	43,465194	16,71332	555 m	gardens	2.5.2019, RV, GG, 6.7.2020, TK

Locality no. and name	WGS84 N	WGS84 E	Altitude	Habitat description	Dates of visits and legators
42. Gata, around Sv. Rok pond	43,4681331	16,7165563	420 m	grasslands and forest edge	31.3.2017, TK, 11.5.2019, TK, PN, 29.6.2019, DK, 6.7.2020, TK, IB, DK
43. Gornji Dolac, west of the village	43,499306	16,716625	596 m	small grassland patches, forest edge	2.5.2018, TK, IB, AŠ, 11.5.2019, TK, PN, 8.6.2019, TK, 6.7.2020, TK, IB, DK
44. Gata, south of Trpošnjak peak	43,478181	16,723034	1013 m	rocky areas, small forest groves	30.6.2019, DK
45. Gata, north of Rastovača peak	43,473611	16,727497	837 m	rocky areas, small forest groves	2.7.2019, DK, 3.7.2019, DK
46. Radovići village	43,514213	16,730553	416 m	forest edge and small grasslands patches	6.7.2020, DK
47. Gornji Dolac, east of the village	43,49679	16,738698	558 m	grasslands and arable land	2.5.2018, TK, IB, AŠ, 25.6.2018, TK, 25.6.2020, TK, IB, AŠ, 11.5.2019, TK, PN, 8.6.2019, TK, 6.7.2020, TK
48. Radmanove mlinice	43,438447	16,751332	50 m	the shore of Cetina River	5.7.2020, IB
49. Blato na Cetini, Trnbusi, along the road to Gornji Dolac, 800 m W of the village	43,49385	16,77733	310 m	overgrown pastures, rocky grasslands	2.5.2014, RV, 6.7.2020, TK, IB, DK
50. Badanj, on along the main road NE of the village	43,452156	16,775967	210 m	rocky slopes	22.5.2014, RV
51. Zavala village	43,495723	16,78551	333 m	gardens inside the village	6.7.2020, TK
52. Smolonje, along the road in the valley NE of the village	43,448167	16,790167	130 m	wooded areas, small grasslands	28.5.2015, RV
53. Jasenje, near the banks of river Cetina	43,494187	16,798348	317 m	grasslands and forest edge	11.5.2019, TK, PN, 8.6.2019, TK
54. Kostanje, in the gorge of Cetina River W of the village	43,447083	16,800769	50 m	grasslands and forest edge	22.5.2014, RV, 28.5.2015, RV, 2.5.2019, RV, GG, JV, 29.6.2016, TK, 5.7.2020, TK, IB

Locality no. and name	WGS84 N	WGS84 E	Altitude	Habitat description	Dates of visits and legators
55. Seoca, Amulića staje	43,454787	16,805966	267 m	road verge, bushy area	11.5.2019, TK, PN
56. Kučiče	43,439663	16,808888	227 m	gardens and grasslands	13.5.2017, TK, AŠ
57. Kostanje, along the path near Cetina River W of the village	43,444417	16,81150	80 m	rocky slopes, arable land, and woods	2.5.2014, RV, 5.7.2020, TK, IB, DK
58. Blato na Cetini, along Cetina River W of the village Strižići	43,488000	16,816483	220 m	road verges and overgrown slopes	2.5.2014, RV, 8.6.2019, TK, 6.7.2020, TK, DK, 4.9.2020, TK
59. Šimunovići, north of the village	43,441149	16,822682	166 m	small grasslands and arable lands	5.7.2020, TK
60. Blato na Cetini	43,484826	16,83314	245 m	grasslands and shores of Cetina River	6.7.2020, TK, IB, DK

Altogether, we recorded 96 butterfly species at 60 localities across Mt. Mosor (Tabs. 1 and 2). More than 30 species were recorded at 14 localities, and more than 40 at only three sites (Loc. 8, 16, 30; Tab. 1). Two butterfly richest localities were both on the southern side of Mt. Mosor at Donje Sitno (Fig. 3a), in a small valley above the village, and near Dubrava, in a small side valley near St. Arnir Church with 57 and 48 species, respectively.

Among the species listed, six were recorded at 30 or more sites (Tab. 2): *Iphiclides podalirius*, *Colias crocea*, *Pieris ergane*, *Aricia agestis*, *Polyommatus icarus* and *Lasiommata megera*.

Table 2. List of species recorded from Mt. Mosor during the studies carried out in the 2011–2020 period, with distribution records of the species and their status in the Red list of Croatia (Šašić et al. 2015) and Europe (van Swaay et al. 2010). Locality numbers correspond to those in the Tab. 1 and Fig. 1. Abbreviations refer to categories: DD: Data Deficient, NT: Near Threatened.

Tabela 2. Seznam vrst dnevnih metuljev, opaženih na Mosorju med raziskavami v letih 2014–2020, s podatki o razširjenosti in njihov status v Rdečih seznamih metuljev Hrvaške (Šašić et al. 2015) in Evrope (van Swaay et al. 2010). Številke lokacij ustrezajo tistim v Tab. 1 in Sl. 1. Okrajšave pomenijo: DD: premalo podatkov, NT: potencialno ogrožena vrsta.

List of species	Locality number	Red list Croatia*	Red list Europe**
Hesperiidae			
1. <i>Ochlodes sylvanus</i> (Esper, 1777)	5, 8, 19, 22, 24, 27, 33, 36, 43, 46, 52, 55, 60		
2. <i>Thymelicus acteon</i> (Rottemburg, 1775)	3, 4, 5, 6, 8, 10, 11, 16, 21, 22, 27, 30, 31, 33, 34, 36, 37, 41, 46, 47, 52, 53, 54, 57	DD	NT
3. <i>Thymelicus lineola</i> (Ochsenheimer, 1808)	8, 19, 21, 24, 45		
4. <i>Thymelicus sylvestris</i> (Poda, 1761)	1, 8, 11, 18, 21, 30, 33, 34, 37, 43, 52, 54		
5. <i>Carcharodus alceae</i> (Esper, 1780)	5, 6, 30, 34, 47, 54, 57		

List of species	Locality number	Red list Croatia*	Red list Europe**
6. <i>Carcharodus orientalis</i> Reverdin, 1913	3, 6, 8, 16, 17, 43, 47, 52, 59		
7. <i>Erynnis tages</i> (Linnaeus, 1758)	5, 6, 8, 16, 22, 23, 24, 30, 34, 37, 43, 46, 47, 52, 53, 54, 58, 59, 60		
8. <i>Pyrgus armoricanus</i> (Oberthür, 1910)	8, 15, 16, 34		
9. <i>Pyrgus malvae</i> (Linnaeus, 1758)	30, 34, 35, 36, 43, 47, 56, 57		
10. <i>Pyrgus sidae</i> (Esper, 1784)	8, 24, 36, 47, 53, 54		
11. <i>Spialia orbifer</i> (Hübner, 1823)	6, 8, 16, 19, 21, 30, 43, 52, 53, 59		
12. <i>Gegenes pumilio</i> (Hoffmannsegg, 1804)	8		
Papilionidae			
13. <i>Iphiclides podalirius</i> (Linnaeus, 1758)	5, 6, 8, 10, 12, 16, 17, 19, 20, 21, 22, 23, 27, 28, 30, 31, 34, 36, 37, 39, 40, 42, 43, 44, 45, 46, 47, 49, 50, 52, 53, 54, 55, 57, 58, 59		
14. <i>Papilio alexanor</i> Esper, 1800	not listed (surroundings of Split)	DD	
15. <i>Papilio machaon</i> Linnaeus, 1758	8, 12, 15, 16, 18, 21, 28, 30, 37, 43, 45, 46, 47, 54, 57	NT	
16. <i>Zerynthia polyxena</i> (Denis & Schiffermüller, 1775)	29, 30, 34, 43, 47, 54	NT	
17. <i>Parnassius mnemosyne</i> (Linnaeus, 1758)	47	NT	NT
Pieridae			
18. <i>Colias alfacariensis</i> Ribbe, 1905	4, 29, 30, 34, 37, 43, 52, 53, 58		
19. <i>Colias crocea</i> (Geoffroy, 1785)	3, 4, 5, 8, 10, 11, 12, 13, 15, 16, 19, 21, 22, 23, 28, 29, 30, 34, 37, 39, 40, 42, 43, 47, 52, 54, 56, 57, 58, 60		
20. <i>Gonepteryx rhamni</i> (Linnaeus, 1758)	6, 8, 10, 11, 18, 19, 20, 21, 29, 30, 34, 36, 42, 52, 54, 57, 58, 60		
21. <i>Gonepteryx cleopatra</i> (Linnaeus, 1767)	34		
22. <i>Leptidea</i> cf. <i>sinapis</i> (Linnaeus, 1758)	4, 5, 8, 9, 12, 16, 19, 23, 29, 30, 33, 34, 37, 40, 42, 43, 52, 54, 56, 57, 58, 60		
23. <i>Anthocharis cardamines</i> (Linnaeus, 1758)	4, 8, 9, 12, 16, 29, 30, 32, 34, 35, 37, 40, 42, 43, 47, 54, 57, 58		
24. <i>Aporia crataegi</i> (Linnaeus, 1758)	4, 17, 19, 21, 22, 37, 40, 47, 52, 53, 54, 56		

List of species	Locality number	Red list Croatia*	Red list Europe**
25. <i>Pieris balcana</i> Lorković, 1970	20, 27, 30, 33, 40, 42, 46, 56, 57, 58, 60		
26. <i>Pieris brassicae</i> (Linnaeus, 1758)	6, 8, 10, 16, 19, 20, 27, 34, 38, 40, 42, 52, 54, 56, 57	DD	
27. <i>Pieris ergane</i> (Geyer, 1828)	1, 3, 4, 5, 6, 8, 10, 11, 12, 15, 16, 17, 19, 20, 21, 22, 23, 25, 30, 31, 33, 40, 42, 46, 47, 48, 53, 54, 56, 57, 58, 59, 60		
28. <i>Pieris mannii</i> (Mayer, 1851)	4, 8, 9, 10, 12, 13, 15, 18, 19, 23, 25, 27, 29, 30, 33, 34, 36, 39, 40, 42, 45, 52, 54, 56, 57, 58		
29. <i>Pieris</i> cf. <i>napi</i> (Linnaeus, 1758)	34, 40, 47, 52, 54, 57, 58		
30. <i>Pieris rapae</i> (Linnaeus, 1758)	4, 5, 6, 8, 16, 17, 20, 27, 30, 31, 33, 34, 37, 42, 43, 52, 54, 56, 57, 58, 60		
31. <i>Pontia edusa</i> (Fabricius, 1777)	4, 5, 8, 15, 16, 30, 33, 36, 43, 47		
32. <i>Lycaena phlaeas</i> (Linnaeus, 1761)	5, 8, 10, 11, 12, 16, 19, 21, 23, 30, 34, 36, 37, 42, 52, 53		
33. <i>Aricia agestis</i> (Denis & Schiffermüller, 1775)	4, 5, 8, 9, 10, 12, 13, 15, 16, 17, 19, 20, 21, 23, 25, 26, 27, 29, 30, 32, 33, 34, 37, 38, 42, 43, 45, 47, 52, 53, 54, 57, 58		
34. <i>Aricia anteros</i> (Freyer, 1838)	26		NT
35. <i>Celastrina argiolus</i> (Linnaeus, 1758)	3, 4, 6, 8, 10, 15, 16, 19, 30, 33, 36, 42, 52, 54, 57		
36. <i>Cupido argiades</i> (Pallas, 1771)	54, 58		
37. <i>Cupido minimus</i> (Fuessly, 1775)	2, 3, 4, 5, 6, 8, 9, 16, 17, 18, 19, 21, 22, 28, 30, 32, 33, 34, 35, 36, 37, 42, 43, 47, 52, 54, 56		
38. <i>Cupido osiris</i> (Meigen, 1829)	10		
39. <i>Cyaniris semiargus</i> (Rottemburg, 1775)	3, 6, 8		
40. <i>Glauopsyche alexis</i> (Poda, 1761)	3, 6, 8, 12, 13, 16, 30, 34, 35, 42, 43, 49, 52, 54, 56, 57	NT	
41. <i>Iolana iolas</i> (Ochsenheimer, 1816)	8, 10, 30, 39, 52, 54		NT
42. <i>Lampides boeticus</i> (Linnaeus, 1767)	54, 58		
43. <i>Leptotes pirithous</i> (Linnaeus, 1767)	54, 58		
44. <i>Tarucus balkanicus</i> (Freyer, 1844)	8		

List of species	Locality number	Red list Croatia*	Red list Europe**
45. <i>Plebejus argus</i> (Linnaeus, 1758)	18, 19, 21, 33, 34, 35, 36, 37, 43, 47		
46. <i>Plebejus idas</i> (Linnaeus, 1761)	5, 8, 21, 37, 43		
47. <i>Plebejus argyrognomon</i> (Bergsträsser, 1779)	60		
48. <i>Lysandra bellargus</i> (Rottemburg, 1775)	3, 8, 13, 16, 19, 21, 24, 30, 31, 33, 34, 36, 37, 47, 52, 53, 54, 58		
49. <i>Lysandra coridon</i> (Poda, 1761)	30		
50. <i>Polyommatus amandus</i> (Schneider, 1792)	19		
51. <i>Polyommatus daphnis</i> (Denis & Schiffermüller, 1775)	17, 19, 20, 21, 25, 26, 46		
52. <i>Polyommatus dorylas</i> (Denis & Schiffermüller, 1775)	8		NT
53. <i>Polyommatus escheri</i> (Hübner, 1823)	6, 8, 30, 37, 52, 53, 58		
54. <i>Polyommatus icarus</i> (Rottemburg, 1775)	3, 4, 5, 6, 8, 10, 11, 12, 13, 15, 16, 18, 19, 21, 22, 23, 24, 27, 30, 33, 34, 35, 36, 37, 39, 40, 41, 42, 43, 47, 49, 51, 52, 53, 54, 56, 57, 58, 60		
55. <i>Polyommatus thersites</i> (Cantener, 1835)	30, 37, 43	NT	
56. <i>Scolitantides orion</i> (Pallas, 1771)	6, 8, 12, 13, 16, 30, 32, 34, 36, 37, 38, 40, 42, 43, 47, 52, 54, 56, 57, 58	NT	
57. <i>Pseudophilotes vicrama</i> (Moore, 1865)	5, 10, 13, 22, 23, 34, 37, 40, 57	NT	NT
58. <i>Callophrys rubi</i> (Linnaeus, 1758)	5, 6, 8, 9, 12, 16, 29, 30, 34, 35, 42, 43, 47, 52, 54, 57		
59. <i>Satyrrium acaciae</i> (Fabricius, 1787)	10, 33, 34, 43		
60. <i>Satyrrium ilicis</i> (Esper, 1779)	3, 8, 34, 40, 52, 54		
61. <i>Satyrrium spini</i> (Denis & Schiffermüller, 1775)	5, 8, 10, 11, 12, 15, 16, 18, 19, 21, 22, 23, 25, 26, 30, 33, 34, 36, 37, 40, 45, 47		
62. <i>Favonius quercus</i> (Linnaeus, 1758)	5		
Nymphalidae			
63. <i>Aglais io</i> (Linnaeus, 1758)	58		
64. <i>Argynnis pandora</i> (Denis & Schiffermüller, 1775)	21, 54		
65. <i>Argynnis paphia</i> (Linnaeus, 1758)	26, 33		
66. <i>Brenthis hecate</i> (Denis & Schiffermüller, 1775)	19		
67. <i>Issoria lathonia</i> (Linnaeus, 1758)	8, 15, 18, 19, 21, 36, 47, 53, 54, 58		

List of species	Locality number	Red list Croatia*	Red list Europe**
68. <i>Libythea celtis</i> (Laicharting, 1782)	8, 42, 54		
69. <i>Limenitis reducta</i> Staudinger, 1901	5, 6, 8, 10, 16, 18, 19, 21, 22, 23, 26, 30, 33, 36, 37, 40, 42, 52, 54, 57, 58, 60		
70. <i>Neptis rivularis</i> (Scopoli, 1763)	18, 19, 20, 33, 42		
71. <i>Melitaea aurelia</i> Nickerl, 1850	58	DD	NT
72. <i>Melitaea cinxia</i> (Linnaeus, 1758)	8, 16, 29, 30, 31, 34, 36, 47, 49, 53		
73. <i>Melitaea didyma</i> (Esper, 1778)	1, 3, 4, 5, 6, 8, 10, 11, 15, 16, 19, 21, 22, 30, 33, 34, 36, 37, 39, 40, 47, 52, 53, 54, 57, 58, 60		
74. <i>Melitaea ornata</i> Christoph, 1893	8		
75. <i>Nymphalis antiopa</i> (Linnaeus, 1758)	41, 58		
76. <i>Nymphalis polychloros</i> (Linnaeus, 1758)	15, 40, 42, 54		
77. <i>Polygonia c-album</i> (Linnaeus, 1758)	2, 10, 38, 52, 54, 58		
78. <i>Polygonia egea</i> (Cramer, 1775)	8, 10, 12, 14, 16, 17, 18, 20, 30, 41, 51, 54		
79. <i>Vanessa atalanta</i> (Linnaeus, 1758)	8, 10, 16, 18, 20, 30, 42, 54, 57		
80. <i>Vanessa cardui</i> (Linnaeus, 1758)	4, 8, 10, 12, 16, 18, 21, 23, 25, 26, 29, 30, 31, 32, 34, 37, 39, 40, 42, 43, 44, 52, 53, 54		
81. <i>Coenonympha pamphilus</i> (Linnaeus, 1758)	4, 7, 8, 15, 16, 17, 19, 20, 21, 22, 24, 30, 31, 33, 34, 35, 37, 42, 43, 45, 47, 49, 51, 52, 53, 54, 57, 58, 60		
82. <i>Lasiommata maera</i> (Linnaeus, 1758)	3, 8, 10, 21, 26, 36, 40, 42, 43, 47, 54, 56, 57		
83. <i>Lasiommata megera</i> (Linnaeus, 1767)	1, 4, 5, 8, 9, 10, 12, 13, 16, 17, 22, 23, 27, 29, 30, 32, 33, 34, 36, 37, 39, 40, 42, 43, 45, 47, 49, 52, 53, 54, 57, 58, 60		
84. <i>Pararge aegeria</i> (Linnaeus, 1758)	17, 19, 20, 33, 40, 42, 52, 54, 56, 57, 58, 60		
85. <i>Proterebia phegea</i> (Borkhausen, 1788)	16, 34, 47, 49	NT	
86. <i>Hyponephele lycaon</i> (Rottemburg, 1775)	23		
87. <i>Maniola jurtina</i> (Linnaeus, 1758)	1, 4, 5, 8, 10, 11, 16, 18, 19, 21, 22, 25, 26, 30, 33, 37, 40, 43, 47, 49, 52, 53, 54, 57, 58, 60		
88. <i>Pyronia tithonus</i> (Linnaeus, 1767)	30, 33		

List of species	Locality number	Red list Croatia*	Red list Europe**
89. <i>Melanargia galathea</i> (Linnaeus, 1758)	5, 6, 10, 11, 16, 18, 19, 21, 22, 23, 25, 30, 33, 34, 36, 37, 43, 44, 45, 46, 47, 49, 54, 57, 60		
90. <i>Melanargia larissa</i> (Geyer, 1828)	8		
91. <i>Brintesia circe</i> (Fabricius, 1775)	5, 8, 11, 12, 15, 16, 18, 19, 20, 21, 22, 23, 26, 27, 30, 33, 36, 37, 43, 47, 48, 54, 58		
92. <i>Chazara briseis</i> (Linnaeus, 1764)	16, 47		NT
93. <i>Hipparchia semele</i> (Linnaeus, 1758)	5, 8, 10, 12, 16, 17, 18, 19, 20, 21, 23, 30, 33, 34, 37		
94. <i>Hipparchia statilinus</i> (Hufnagel, 1766)	8, 16, 30, 33		NT
95. <i>Hipparchia syriaca</i> (Staudinger, 1871)	8, 16, 19, 21, 23, 25, 30, 33, 42, 57		
96. <i>Satyrus ferula</i> (Fabricius, 1793)	3, 7, 8, 10, 12, 15, 16, 17, 20, 30, 33, 40, 54		

Biogeographical comparisons of Mts. Mosor, Kozjak and Biokovo

The comparison of the biogeographical affiliation of butterfly species of the three neighbouring mountains of Kozjak, Mosor and Biokovo revealed great similarities (Fig. 2; Appendix I). The Euro-Oriental and Euro-Siberian elements are dominant on all three mountains, with all other categories falling below 10% in the faunistic composition. On the lowest Mt. Kozjak, no montane or boreo-montane elements were recorded; a single montane species was recorded on Mt. Mosor (*Aricia anteros*) and one on Mt. Biokovo (*Erebia melas*), while Mt. Biokovo is also home to one Boreo-montane species, *Aricia artaxerxes*.

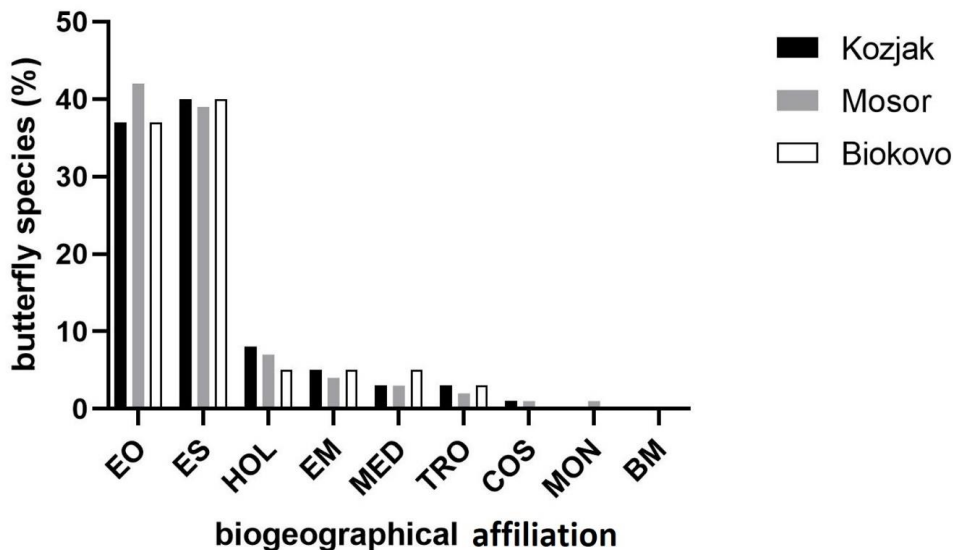


Figure 2. Biogeographical affiliation of butterfly species recorded on Mts. Mosor, Kozjak (data from Koren et al. 2019) and Biokovo (data from Mihoci et al. 2011, Kačierek 2017). The biogeographical affiliation is based on Kudrna et al. (2015), with abbreviations referring to: ES – Euro-Siberian, EO – Euro-Oriental, MON – Montane, HOL – Holarctic, EM – Euro-Meridional, BM – Boreo-Montane, MED – Mediterranean, TRO – Tropical, COS – Cosmopolitan.

Slika 2. Biogeografska pripadnosti vrst dnevnih metuljev, zabeleženih na planinah Kozjak, Mosor (podatki iz Koren et al. 2019) in Biokovo (podatki iz Mihoci et al. 2011, Kačierek 2017). Biogeografska pripadnost je povzeta po Kudrna in sod. (2015), okrajšave pomenijo: ES – evro-sibirski, EO – evro-orientalski, MON – montanski, HOL – holarktični, EM – evro-meridionalni, BM – boreo-montanski, MED – sredozemski, TRO – tropski, COS – kozmopolitski.

Discussion

General overview

For Mt. Mosor, only three species have been mentioned in the literature so far: *Pieris manni* (Stauder 1913), *Coenonympha pamphilus* (Stauder 1923) and *Polyommatus ripartii* (Dincă et al. 2013). Of these, *P. ripartii* was not confirmed during our survey despite deliberate search. We visited the area mentioned in Dincă et al. (2013) on several occasions, but were not able to record the species or its host plant (*Onobrychis* spp.). However, both *Cupido osiris* and *Polyommatus thersites*, which were recorded from the same side of the mountain, share its host plant, indicating that *P. ripartii* could be present there, although not at the indicated locality.

Biogeographical comparisons of Mt. Mosor with Mts. Kozjak and Biokovo

The three mentioned coastal mountains of central Dalmatia, altogether host 130 butterfly species (Mihoci et al. 2011, Kačirek 2017, Koren et al. 2019, this survey). This is about 66% of all butterfly species present in Croatia. The number of butterfly species of Mt. Mosor with 97 species is higher than in Mt. Kozjak with 87 species (Koren et al. 2019). The latter could be explained by its smaller size, lower altitude, and less diverse habitats. Still, 12 species occurring on Mt. Kozjak were not recorded on Mt. Mosor during our survey: *Pyrgus alveus*, *Pyrgus serratulae*, *Polyommatus admetus*, *Charaxes jasius*, *Fabriciana adippe*, *Speyeria aglaja*, *Brenthis daphne*, *Melitaea phoebe*, *Coenonympha arcania*, *Hyponephele lupinus*, *Hipparchia fagi* and *Euchloe ausonia*. Further surveys of Mt. Mosor will likely yield some of the mentioned species due to presence of suitable habitats and its vicinity to both Kozjak and Biokovo, on which some of those species have been recorded in the past (Mihoci et al. 2011, Kačirek 2017, Koren et al. 2019).

The largest and most diverse is Mt. Biokovo, for which 116 butterfly species have been reported (Mihoci et al. 2011; Kačirek 2017). However, some of these records are possibly erroneous (e.g. *N. sappho*, *M. dryas* etc.), as these species were not recorded anywhere else in Dalmatia during recent butterfly surveys, therefore further inventories in particular on the northern side of the mountain are needed. Nevertheless, the butterfly fauna of Mt. Biokovo is more diverse in comparison with both Mt. Kozjak (Koren et al. 2019) and Mt. Mosor, but still much depleted in comparison with other larger or more inland positioned mountains like Lička Plješevica or Velebit Mts. for which 152 and 153 butterfly species have been reported (Mihoci et al. 2007; Tvrtković et al. 2015; Koren et al. 2020). Apart from difference in altitude, the size of the mountain systems could be the main reason for the observed differences in diversity, as this implies higher habitat diversity and larger number of surveyed localities.

Several interesting or unexpected species were recorded during the surveys on Mt. Mosor. For each of them, additional information on their occurrence and distribution in Croatia is provided.

Comments on the selected species

***Papilio alexanor* (fam. Papilionidae)**

The species has been reconfirmed for Croatia only recently (Verovnik & Švara 2016), but soon after that additional records and the confirmation of its presence in other historical localities were made (Rusell & Pateman 2018, Koren et al. 2019). During our surveys, we recorded this elusive species at four localities in the survey area. The species is, however, known from the exact area (Verovnik & Švara 2016). We searched intensively for additional localities of this species, but while its host plant *Opopanax chironium* W. D. J. Koch was recorded at several localities both on the southern and northern sides of Mt. Mosor, no additional *P. alexanor* populations were detected. Interestingly, Stauder (1911) also searched for this species in a seemingly suitable habitat on Mt. Mosor, but with no success. In order to protect this rare species from over-collecting, no exact localities and time of observation are disclosed in this

paper, as was the case with the previous publications (Verovnik & Švara 2016, Koren et al. 2019).

***Zerynthia polyxena* (fam. Papilionidae)**

We recorded this species at six localities, mostly on the northern side of the mountain. The habitat of this species includes small valleys called »dolci«, which are nowadays still used as arable land. The edges of these arable areas are usually maintained and regularly mown enabling growth of its host plant, *Aristolochia clematitis* L., which is common in such areas. Recent surveys of Dalmatia show that *Z. polyxena* is much more widespread in Dalmatia than previously considered (see Lorković 2009, Šašić et al. 2015).

***Parnassius mnemosyne* (fam. Papilionidae)**

This is a widespread species in Croatia with scattered populations usually present in the montane areas (Lorković 2009). In Dalmatia, this species is limited to mid and high elevations in the mountains and has a very patchy distribution. On Mt. Mosor, we recorded this species only on the northern side where only a few individuals were observed at a single locality near Gornji Dolac. As the populations of this species were found also on Mt. Kozjak (Koren et al. 2019) and Mt. Biokovo (Mihoci et al. 2011), further records are expected from other mountain systems along the Dalmatian coastline.

***Aricia anteros* (fam. Lycaenidae)**

This elusive species has a much wider distribution in Croatia than historically known (see Lorković 2009). Aside from Mt. Velebit, the species has been recently recorded on Mt. Sniježnica (Koren 2012) as well as on Mt. Lička Plješevica further north (Koren et al. 2020). During our survey of Mt. Mosor, several specimens were observed along the path on the southern slopes of the highest peak Veliki Kabal. Interestingly, it was recorded neither on Mt. Kozjak (Koren et al. 2019) nor Mt. Biokovo (Mihoci et al. 2011), despite the higher altitude of the latter. The caterpillars of *A. anteros* feed on *Geranium* sp. and *Erodium* sp. (Thikolovets 2011) and are therefore most probably not the limiting factor for the distribution of this species in the country. Targeted surveys of appropriate habitats of this species should be conducted to determine the true range and its conservation status in Croatia.

***Polyommatus escheri* (fam. Lycaenidae)**

The distinct subspecies *Polyommatus escheri dalmatica* (Speyer, 1882) occurs in the Balkan Peninsula (Tolman & Lewington 2008). It is easily recognizable by the broader marginal black border and brighter blue colouration in the males (Tolman & Lewington 2008). This typical thermophilous species is distributed in Croatia from Istria in the north-west (Koren et al. 2018), along the islands in Kvarner, and the Dalmatian coastline (Lorković 2009). During our surveys, we recorded this species at seven localities (Tab. 2). It was numerous at most sites, and both males and females were recorded, indicating strong populations in the areas. Typical habitats in which observed are road verges or patches of barren sandy ground where the larval host plant *Astragalus monspessulanus* (Linnaeus, 1753) grows (Fig. 3b). This is in line with observed habitats of this species elsewhere in the region (Verovnik 2004, Micevski et al. 2009). While the

species is not considered threatened in Croatia (Šašić et al. 2015), we believe its status should be revised due to its limited distribution, specific habitat preference, and larval monophagy.

***Proterebia phegea* (fam. Nymphalidae)**

In Croatia, it is distributed from Pag Island in the north to the northern slopes of Mt. Biokovo in the south (Zakšek 2005, Koren et al. 2010). As it is listed both in Annexes II and IV of the Habitats Directive, Special Areas of Conservation (SACs) are required to be designated, while Annex IV contains species in need of strict legal protection (Ur. l. EU 1992). In total, 14 Natura 2000 sites were designated for the long-term survival of this species within Croatia (Narodne Novine 2019), which is one of the two EU countries in which the species is present. In Greece, no such areas were designated so far. *P. phegea* has not been recorded previously on Mt. Mosor. It inhabits rocky calcareous grasslands with large open areas among bushes and tree groves. Such habitats were historically widespread in large parts of Dalmatia, but are nowadays becoming more and more reduced due to abandonment and subsequent succession. This also applies to Mt. Mosor, especially the northern side which is almost entirely overgrown. A strong population of this species was discovered on the southern slopes in the area that was only recently reopened by forest fires. This possibly benefited the species and could ensure its further survival in the area. Stopping the succession of the grasslands and former pastures to closed-canopy forests should be implemented for the wellbeing of the species. We also suggest it should be added as a target species to the Natura 2000 site Mosor (HR2001352).

***Melitaea aurelia* (fam. Nymphalidae)**

This species is widespread in western and northern Croatia, with the southernmost record at Zrmanja Vrelo (Koren & Jugovic 2012) and Mt. Biokovo (Kačirek 2017). A single male was collected on the banks of the Cetina River during this survey, and the identification was confirmed by the examination of its genitalia (Jakšić 1998). This record expands the known distribution of the species in Croatia and fills a distribution gap between Vrelo Zrmanje in the north and Mt. Biokovo in the south. This is also the second record of this species for the Dalmatia region, as no historical records exist and the species was not recorded during other recent surveys in the region (Verovnik et al. 2015, Koren et al. 2019, Kučinić et al. 2017).

***Neptis rivularis* (fam. Nymphalidae)**

Records of this forest species are very scattered in southern Croatia. Recently it was found in the mountains bordering Bosnia & Herzegovina, including the Dinara Mts. (Tvrković et al. 2012), Mt. Kamešnica (Koren & Lauš 2013) and Lička Plješevica (Koren et al. 2020). In Dalmatia, it is known also from Mt. Biokovo where it is common in the upper parts of the mountain (Mihoci et al. 2011, Koren, pers. obs.). We recorded this species at five localities on Mt. Mosor (Tab. 2). The largest colony was detected in the woods near the Umberto Girometta chalet. This species is likely more common in the mountains of Dalmatia than considered previously, with further surveys possibly revealing additional populations in the region.

Threats and conservation

In the past, livestock breeding with pasturing was the most significant economic activity in the Mt. Mosor area as well in the whole Split region (Samac 1956). Much has changed in half a century and nowadays pastures in the region are mostly abandoned, with many of them already completely overgrown by forests. During our survey, we observed cattle only on rare occasions, and mostly on the northern side of the mountain. The abandonment of pasturing will likely have a negative impact on the butterfly diversity of the area in the future, especially on grassland specialists. This is a common threat in the whole Dalmatia region, and has been observed in many other butterfly rich areas (e.g. Koren et al. 2019, 2020).

One of the present threats to the open grassland habitats of Mt. Mosor is spreading of the invasive plant *Amorpha fruticosa* L. This species has become widespread in Croatia, but in the coastal regions it occurs only sporadically with individual plants (Novak & Novak 2018). This, unfortunately, is not true for the Cetina Valley and wider surroundings of Omiš where it is extremely common (Novak & Novak 2018). One of such localities is at Kostanje, along the Cetina River west of the village (Fig. 3c), where some rare butterfly species like *Cupido argiades*, *Melitaea aurelia* and *Lampides boeticus* (Tab. 2) were recorded. All efforts should be made to contain the spreading of *A. fruticosa* L. and, if possible, eradicate it entirely from this region.

The same is true for another invasive species present in the area, *Ailanthus altissima* (Mill.) Swingle, which commonly occurs on the southern slopes of Mt. Mosor, especially in and around villages. The uncontrolled spreading of this species can greatly affect the natural balance and have a strong negative impact on biodiversity in general (Sladonja et al. 2015). This plant can also invade steep rocky terrain, which is a suitable habitat for *Opopanax chironium* W. D. J. Koch, a larval host plant of *Papilio alexanor*. As for *A. fruticosa* L., containment and eradication are of high priority to conserve the natural habitats in the region.

Conclusions

During the last decade, a large number of faunistic contributions on butterflies of Croatia greatly expanded the knowledge about the distribution of many rare or local species as well added records for some unexplored regions or mountains (e.g. Mihoci et al. 2007, 2011, Koren et al. 2019, 2020, etc.). This, however, is not sufficient to track current changes in the environment which have, across Europe, already been proved to have drastic negative impact on butterfly populations. For example, the index of common grassland butterfly species abundance has declined by 39% since 1990, indicating a dramatic loss of grassland biodiversity within the European Union (Van Swaay et al. 2019). Even more drastic are the comparisons of the larger dataset for the well-studied countries such as the Netherlands, where an 80% decline in butterflies in general was observed (Van Strien et al. 2019). In order to track such changes in the future, appropriate butterfly transects should be implemented across Croatia, particularly at Natura 2000 sites such as Mt. Mosor. As the abandonment of pasturing continues, such monitoring would provide important information on what is happening with the butterfly populations there. Furthermore, there are some extremely rich natural habitats that could also be monitored for the changes in species abundance and composition. We suggest at least two such sites for long-term surveys at Mt. Mosor, one at Donje Sitno, in a small valley above the

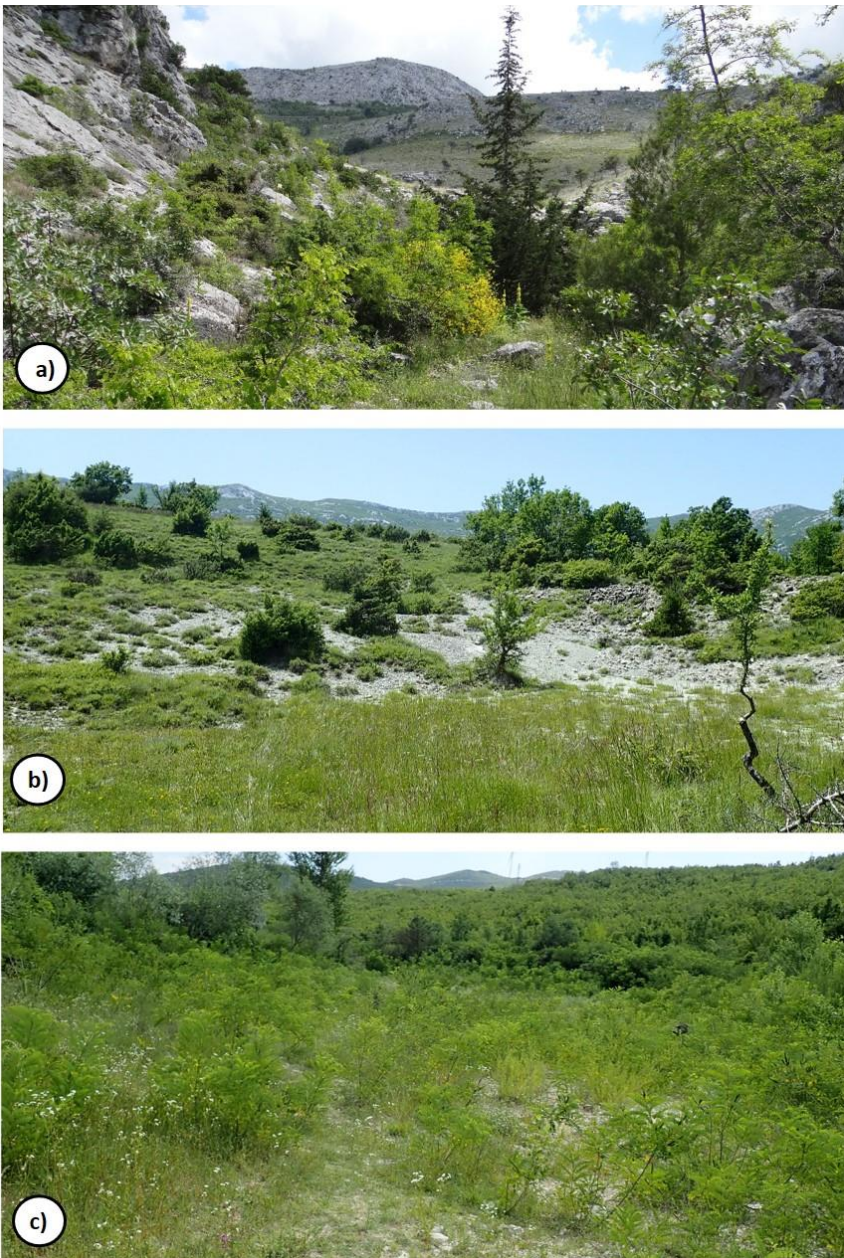


Figure 3. a) Donje Sitno in a small valley above the village, the butterfly richest area on Mt. Mosor, b) Donji Dolac, calcareous grasslands and marl areas, the habitat of *Polyommatus escheri*, c) *Amorpha fruticosa* L. invasion near the banks of Cetina River at Kostanje village.

Slika 2. a) Donje Sitno, majhna dolina nad vasjo, vrstno najbogatejše območje za metulje na Mosorju, b) Donji Dolac, kraška travišča in laporji, habitat *Polyommatus escheri*, c) invazija *Amorpha fruticosa* L. ob bregovih reke Cetine v bližini vasi Kostanje.

village, which was the butterfly richest site in this survey (Tab. 2, Fig. 3a), and the second above Zvezdano selo, which includes the habitat of the Natura 2000 species *P. phegea*. To achieve this, local butterfly volunteers should be organized and trained, including employees of the Public Institution for the Management of Protected Areas in the County of Split and Dalmatia: »Sea and Karst« who manage the Natura 2000 site Mosor. Only with local interest, active habitat management and long term monitoring, the high diversity of butterflies on Mt. Mosor can be efficiently maintained.

Povzetek

Širše območje planine Mosor je bilo med najmanj raziskanimi glede favne dnevnih metuljev v Dalmaciji. Do predstavljenih raziskav so bile na tem območju zabeležene le naključne najdbe treh vrst (Stauder 1911, 1913, 1923, Dincč et al. 2013), med njimi tudi na Hrvaškem redkega modrina *Polyommatus ripartii*, ki ga med našimi raziskavami nismo potrdili. Raziskave favne dnevnih metuljev na Mosorju so potekale med letoma 2011 in 2020, še posebej intenzivno v zadnjih dveh letih. Metulje smo popisovali na 60 lokacijah in skupno zabeležili 96 vrst. V primerjavi s sosednjima planinama Kozjak (87 vrst) in Biokovo (116 vrst), je Mosor glede pestrosti dnevnih metuljev nekje vmes, na kar kažejo tudi vmesne vrednosti njegove najvišje nadmorske višine (1339 m) in velikosti območja raziskave. Biogeografsko pa si je favna dnevnih metuljev vseh treh planin zelo podobna z dominantnimi evro-sibirskimi in evro-orientalskimi favnističnimi elementi s skupno približno 80-odstotnim deležem. Edina montanska vrsta, najdena na Mosorju, je modrin *Aricia anteros*.

Med najpogostejšimi vrstami lahko v ospredje postavimo *Pieris ergane*, ki je sicer habitatni specialist, vezan na skalnata kraška območja, in se drugod na Hrvaškem pojavlja bolj lokalno. Bolj zanimive pa so najdbe nekaterih redkejših vrst, med katerimi naj omenimo vrste *Papilio alexanor*, *Zerynthia polyxena*, *Parnassius mnemosynae*, *Aricia anteros*, *Polyommatus escheri*, *Melitaea aurelia*, *Proterebia phegea* in *Neptis rivularis*. Pomembne so predvsem najdbe vrst iz Direktive o habitatih (Ur. l. EU 1992) *Z. polyxena* in *P. phegea*, ki sta ključni za vzpostavitev varstvenih ukrepov varovanja vrst na Natura 2000 območju Mosor (HR2001352). Glavni ogrožajoči dejavnik na preiskovanem območju je opuščanje travniških površin, predvsem paše, kar vodi v zaraščanje in izgubo habitatov travniških vrst. Drugi pomemben dejavnik, povezan z zaraščanjem, je pojavljanje dveh invazivnih rastlinskih vrst *Amorpha fruticosa* L. in *Ailanthus altissima* (Mill.) Swingle. Predvsem slednja porašča tudi skalnate predele, kjer izpodriva *Opopanax chironium* W. D. J. Koch, gostiteljsko rastlino ogroženega lastovičarja *Papilio alexanor*. Samo z vzpostavitvijo dolgoročnega monitoringa, aktivnim ohranjanjem ključnih življenjskih prostorov in lokalno iniciativo lahko ohranjamo bogato vrstno sestavo dnevnih metuljev na Mosorju.

Acknowledgments

We are grateful to Jan Verovnik, Ana Štih, Darija Kranželić, Petra Novina and Jelena Babić for their help during our field trips. Part of this survey was financed by the Public Institution for the Management of Protected Areas in the County of Split and Dalmatia »Sea and Karst« to which we are very grateful, too. The work of GG and RV was partially funded by the Slovenian research agency (program P1-0184).

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Appendix I. List of the butterfly species of Mts. Mosor, Kozjak (data from Koren et al. 2019), and Biokovo (data from Mihoci et al. 2011, Kačirek 2017). The biogeographical affiliation of the species is based on Kudrna et al. (2015), the abbreviations refer to: ES – Euro-Siberian, EO – Euro-Oriental, MON – montane, HOL – Holarctic, EM – Euro-meridional, BM – boreo-montane, MED – Mediterranean, TRO – tropical, COS – cosmopolitan.

Dodatek I. Seznam vrst dnevnih metuljev planin Mosor, Kozjak (podatki iz Koren et al. 2019) in Biokovo (podatki iz Mihoci et al. 2011, Kačirek 2017). Biogeografska pripadnost vrst je povzeta po Kudrna in sod. (2015), okrajšave pomenijo: ES – evro-sibirski, EO – evro-orientalski, MON – montanski, HOL – holarktični, EM – evro-meridionalni, BM – boreo-montanski, MED – sredozemski, TRO – tropski, COS – kozmopolitski.

List of species	Mosor	Kozjak	Biokovo	Biogeographical affiliation*
1. <i>Ochlodes sylvanus</i> (Esper, 1777)	•	•	•	ES
2. <i>Thymelicus acteon</i> (Rottemburg, 1775)	•	•	•	EO
3. <i>Thymelicus lineola</i> (Ochsenheimer, 1808)	•	•	•	HOL
4. <i>Thymelicus sylvestris</i> (Poda, 1761)	•	•	•	EO
5. <i>Carcharodus alceae</i> (Esper, 1780)	•	•	•	MED
6. <i>Carcharodus floccifera</i> (Zeller, 1847)			•	EO
7. <i>Carcharodus lavatherae</i> (Esper, 1783)			•	EM
8. <i>Carcharodus orientalis</i> Reverdin, 1913	•	•	•	EO
9. <i>Erynnis tages</i> (Linnaeus, 1758)	•	•	•	ES
10. <i>Pyrgus alveus</i> (Hübner, 1803)		•	•	ES
11. <i>Pyrgus armoricanus</i> (Oberthür, 1910)	•	•	•	EO
12. <i>Pyrgus malvae</i> (Linnaeus, 1758)	•	•	•	ES
13. <i>Pyrgus serratalae</i> (Rambur, 1839)		•	•	ES
14. <i>Pyrgus sidae</i> (Esper, 1784)	•	•	•	EO
15. <i>Spialia orbifer</i> (Hübner, 1823)	•	•	•	EO
16. <i>Gegenes pumilio</i> (Hoffmannsegg, 1804)	•	•	•	EO
17. <i>Iphiclidus podalirius</i> (Linnaeus, 1758)	•	•	•	ES
18. <i>Papilio alexanor</i> Esper, 1800	•	•	•	MED
19. <i>Papilio machaon</i> Linnaeus, 1758	•	•	•	ES
20. <i>Zerynthia cerisy</i> (Godart, 1824)			•	EO
21. <i>Zerynthia polyxena</i> (Denis & Schiffermüller, 1775)	•		•	EO
22. <i>Parnassius mnemosyne</i> (Linnaeus, 1758)	•	•	•	EO
23. <i>Colias alfacariensis</i> Ribbe, 1905	•		•	EO
24. <i>Colias croceus</i> (Fourcroy, 1785)	•	•	•	EO
25. <i>Colias hyale</i> (Linnaeus, 1758)			•	ES
26. <i>Gonepteryx cleopatra</i> (Linnaeus, 1767)	•		•	MED
27. <i>Gonepteryx rhamni</i> (Linnaeus, 1758)	•	•	•	ES
28. <i>Leptidea sinapis</i> (Linnaeus, 1758)	•	•	•	ES
29. <i>Anthocharis cardamines</i> (Linnaeus, 1758)	•	•	•	ES
30. <i>Aporia crataegi</i> (Linnaeus, 1758)	•	•	•	ES
31. <i>Pieris balcana</i> Lorkovic, 1970	•			ES
32. <i>Pieris</i> cf. <i>napi</i> (Linnaeus, 1758)	•	•	•	ES
33. <i>Pieris brassicae</i> (Linnaeus, 1758)	•	•	•	ES
34. <i>Pieris ergane</i> (Geyer, 1828)	•	•	•	EO
35. <i>Pieris mannii</i> (Mayer, 1851)	•	•	•	EO
36. <i>Pieris rapae</i> (Linnaeus, 1758)	•	•	•	HOL
37. <i>Pontia edusa</i> (Fabricius, 1777)	•	•	•	ES
38. <i>Euchloe ausonia</i> (Hübner, 1804)		•	•	MED
39. <i>Lycaena alciphron</i> (Rottemburg, 1775)			•	EO
40. <i>Lycaena phlaeas</i> (Linnaeus, 1761)	•	•	•	HOL
41. <i>Lycaena thersamon</i> (Esper, 1784)			•	EO
42. <i>Aricia agestis</i> (Denis & Schiffermüller, 1775)	•	•	•	ES

List of species		Mosor	Kozjak	Biokovo	Biogeographical affiliation*
43.	<i>Aricia anteros</i> (Freyer, 1838)	•			MON
44.	<i>Aricia artaxerxes</i> (Fabricius, 1793)			•	BM
45.	<i>Cacyreus marshalli</i> Butler, 1898			•	TRO
46.	<i>Celastrina argiolus</i> (Linnaeus, 1758)	•	•	•	ES
47.	<i>Cupido minimus</i> (Fuessly, 1775)	•	•		EO
48.	<i>Cupido osiris</i> (Meigen, 1829)	•	•	•	ES
49.	<i>Cupido argiades</i> (Pallas, 1771)	•	•		HOL
50.	<i>Cyaniris semiargus</i> (Rottemburg, 1775)	•		•	ES
51.	<i>Glaucopsyche alexis</i> (Poda, 1761)	•	•	•	ES
52.	<i>Iolana iolas</i> (Ochsenheimer, 1816)	•	•	•	EO
53.	<i>Lampides boeticus</i> (Linnaeus, 1767)	•	•	•	TRO
54.	<i>Leptotes pirithous</i> (Linnaeus, 1767)	•	•	•	TRO
55.	<i>Plebejus argus</i> (Linnaeus, 1758)	•	•	•	ES
56.	<i>Plebejus argyrognomon</i> (Bergsträsser, 1779)	•			ES
57.	<i>Plebejus idas</i> (Linnaeus, 1761)	•	•	•	HOL
58.	<i>Lysandra bellargus</i> (Rottemburg, 1775)	•	•	•	EO
59.	<i>Lysandra coridon</i> (Poda, 1761)	•	•	•	EO
60.	<i>Polyommatus admetus</i> (Esper, 1783)		•		EO
61.	<i>Polyommatus ripartii</i> (Freyer, 1830)	•			EO
62.	<i>Polyommatus daphnis</i> (Denis & Schiffermüller, 1775)	•		•	EO
63.	<i>Polyommatus amandus</i> (Schneider, 1792)	•		•	ES
64.	<i>Polyommatus dorylas</i> (Denis & Schiffermüller, 1775)	•		•	EO
65.	<i>Polyommatus escheri</i> (Hübner, 1823)	•	•	•	EM
66.	<i>Polyommatus icarus</i> (Rottemburg, 1775)	•	•	•	ES
67.	<i>Polyommatus thersites</i> (Cantener, 1835)	•	•		ES
68.	<i>Pseudophilotes vicrama</i> (Moore, 1865)	•		•	EO
69.	<i>Scolitantides orion</i> (Pallas, 1771)	•	•		ES
70.	<i>Tarucus balkanica</i> (Freyer, 1844)	•			EO
71.	<i>Callophrys rubi</i> (Linnaeus, 1758)	•	•	•	ES
72.	<i>Satyrrium acaciae</i> (Fabricius, 1787)	•	•	•	EO
73.	<i>Satyrrium ilicis</i> (Esper, 1779)	•	•	•	EO
74.	<i>Satyrrium spini</i> (Denis & Schiffermüller, 1775)	•	•	•	EO
75.	<i>Satyrrium w-album</i> (Knoch, 1782)			•	ES
76.	<i>Favonius quercus</i> (Linnaeus, 1758)	•	•		EO
77.	<i>Charaxes jasius</i> (Linnaeus, 1767)		•	•	TRO
78.	<i>Argynnis paphia</i> (Linnaeus, 1758)	•		•	ES
79.	<i>Argynnis pandora</i> (Denis & Schiffermüller, 1775)	•	•	•	EO
80.	<i>Fabriciana adippe</i> (Denis & Schiffermüller, 1775)		•	•	ES
81.	<i>Fabriciana niobe</i> (Linnaeus, 1758)			•	ES
82.	<i>Speyeria aglaja</i> (Linnaeus, 1758)		•		ES
83.	<i>Boloria euphrosyne</i> (Linnaeus, 1758)			•	ES
84.	<i>Brenthis daphne</i> (Bergsträsser, 1780)		•		ES
85.	<i>Brenthis hecate</i> (Denis & Schiffermüller, 1775)	•		•	ES
86.	<i>Issoria lathonia</i> (Linnaeus, 1758)	•	•	•	ES
87.	<i>Libythea celtis</i> (Laicharting, 1782)	•	•	•	EO
88.	<i>Limenitis camilla</i> (Linnaeus, 1764)			•	ES
89.	<i>Limenitis reducta</i> Staudinger, 1901	•	•	•	EO

List of species	Mosor	Kozjak	Biokovo	Biogeographical affiliation*
90. <i>Neptis rivularis</i> (Scopoli, 1763)	•		•	ES
91. <i>Neptis sappho</i> (Pallas, 1771)			•	ES
92. <i>Melitaea aurelia</i> Nickerl, 1850	•		•	EO
93. <i>Melitaea cinxia</i> (Linnaeus, 1758)	•	•	•	ES
94. <i>Melitaea didyma</i> (Esper, 1778)	•	•	•	ES
95. <i>Melitaea phoebe</i> (Denis & Schiffermüller, 1775)		•		ES
96. <i>Melitaea ornata</i> Christoph, 1893	•			ES
97. <i>Melitaea trivia</i> (Denis & Schiffermüller, 1775)			•	EO
98. <i>Aglais io</i> (Linnaeus, 1758)	•	•	•	ES
99. <i>Aglais urticae</i> (Linnaeus, 1758)			•	ES
100. <i>Nymphalis antiopa</i> (Linnaeus, 1758)	•	•	•	HOL
101. <i>Nymphalis polychloros</i> (Linnaeus, 1758)	•	•	•	EO
102. <i>Nymphalis xanthomelas</i> (Esper, 1781)			•	ES
103. <i>Polygonia c-album</i> (Linnaeus, 1758)	•		•	ES
104. <i>Polygonia egea</i> (Cramer, 1775)	•	•	•	EO
105. <i>Vanessa atalanta</i> (Linnaeus, 1758)	•	•	•	HOL
106. <i>Vanessa cardui</i> (Linnaeus, 1758)	•	•	•	COS
107. <i>Coenonympha arcania</i> (Linnaeus, 1761)		•		EM
108. <i>Coenonympha pamphilus</i> (Linnaeus, 1758)	•	•	•	EO
109. <i>Coenonympha rhodopensis</i> Elwes, 1900			•	MED
110. <i>Lasiommata maera</i> (Linnaeus, 1758)	•	•	•	ES
111. <i>Lasiommata megera</i> (Linnaeus, 1767)	•	•	•	EO
112. <i>Pararge aegeria</i> (Linnaeus, 1758)	•	•	•	EO
113. <i>Erebia melas</i> (Herbst, 1796)			•	MON
114. <i>Proterebia phegea</i> (Borkhausen, 1788)	•	•	•	EO
115. <i>Hyponephele lupinus</i> (O. Costa, 1836)		•	•	ES
116. <i>Hyponephele lycaon</i> (Rottemburg, 1775)	•	•	•	ES
117. <i>Maniola jurtina</i> (Linnaeus, 1758)	•	•	•	ES
118. <i>Pyronia cecilia</i> (Vallantin, 1894)			•	MED
119. <i>Pyronia tithonus</i> (Linnaeus, 1767)	•		•	EM
120. <i>Melanargia galathea</i> (Linnaeus, 1758)	•	•	•	EO
121. <i>Melanargia larissa</i> (Geyer, 1828)	•	•	•	EO
122. <i>Arethusana arethusia</i> (Denis & Schiffermüller, 1775)			•	EO
123. <i>Brintesia circe</i> (Fabricius, 1775)	•	•	•	EO
124. <i>Chazara briseis</i> (Linnaeus, 1764)	•		•	ES
125. <i>Hipparchia fagi</i> (Scopoli, 1763)		•	•	EM
126. <i>Hipparchia syriaca</i> (Staudinger, 1871)	•		•	EO
127. <i>Hipparchia statilinus</i> (Hufnagel, 1766)	•	•	•	EM
128. <i>Hipparchia semele</i> (Linnaeus, 1758)	•	•	•	EM
129. <i>Minois dryas</i> (Scopoli, 1763)			•	ES
130. <i>Satyrus ferula</i> (Fabricius, 1793)	•	•	•	EO
Number of species per mountain:	97	87	116	