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THE FIRST FAUNISTIC RECORDS OF BUTTERFLIES AND MOTHS FROM TWO SMALL ADRIATIC ISLANDS, OLIB AND ŠĆEDRO, CROATIA

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Surveys of the butterflies and moths of the Adriatic Islands began in the second half of the 19th century, and are still being undertaken. The researchers mostly survey larger, easily accessible islands, while the smaller ones usually remain completely unsurveyed.

Here we present new faunistic records of butterfly and moth species from two small, previously unsurveyed Dalmatian Islands, Olib and Šćedro. Twenty butterfly species are reported from Olib and 13 butterfly and 5 moth species from Šćedro Island.

Butterflies, moths, Lepidoptera, species richness, islands, *Synthymia fixa*

T. KOREN i B. LAUŠ: Prvi pronalasci faune danjih i noćnih leptira na području dvaju malih Jadranskih otoka, Oliba i Šćedra (Hrvatska). Entomol. Croat. 2012. Vol. 16. Num. 1-4: 115-124.

Istraživanja faune danjih i noćnih leptira jadranskih otoka započela su u drugoj polovici 19. stoljeća, a traju još i danas. Uglavnom se istražuju veći i dostupniji otoci, dok oni manji uglavnom ostaju potpuno neistraženi.

Ovdje predstavljamo nove nalaze faune danjih i noćnih leptira za dva mala, dosada neistražena dalmatinska otoka, tj. Olib i Šćedro.

Na Olibu smo zabilježili ukupno 20 vrsta, a na Šćedru 13 vrsta danjih leptira te 5 vrsta noćnih leptira.

Danji leptiri, noćni leptiri, Lepidoptera, bogatstvo vrsta, otoci, *Synthymia fixa*

Introduction

In the last few years, much new information became available regarding the butterflies of the Adriatic Islands, especially due to papers by Withrington & Ve-

rovnik (2008) and Verovnik (2011). In these papers, the authors compiled all the literature, as well as new records for butterflies on 15 larger Adriatic Islands: Cres, Lošinj, Unije, Krk, Rab, Pag, Dugi Otok, Kornat, Brač, Hvar, Vis, Korčula, Mljet (Withrington & Verovnik, 2008) and Silba and Ugljan (Verovnik, 2011). However, data about the butterfly and moth fauna of smaller islands and islets still remain very scarce (Galvagni, 1902; 1909*a*; 1909*b,* Koren & Bjelić, 2010), and as Verovnik (2011) reported, there are records available from only 20 out of the 79 Croatian islands that are larger than 1 km^2.

Sometimes, such small islands can sustain populations of some rare or interesting species, outside their main area of distribution (e.g. *Dolichopis caspius* (Gmelin, 1789) on Olib (Kletečki et al. 2009)). Surveys of all islands, including the small ones, are necessary, to gain a more complete knowledge and understanding of the flora and fauna of the Adriatic Islands, as well as the processes influencing them.

Olib

The island of Olib is located between the islands of Pag and Silba, within the Zadar County. It is one of the lowest islands in this area, with highest peak Kalac just 74 meters above sea level. The area of Olib is 26.13 km^2, and the length of the coastline is 34.5 km.

The island is built of Cretaceous limestone with dolomite components, and in smaller part of Eocene limestone (Magaš & Faričić, 2002). Due to the carbonate structure, there are no permanent emersions of the fluid surface water, but there are several ponds. In 2001, there were only 147 permanent inhabitants left on the island (Anonymous, 2007). The processes of depopulation and deagrarization have led to a reduction in the number of cattle. This negatively affected the number of ponds, many of which today are dried out or overgrown with vegetation. The Mediterranean climate on the island is characterized by mild and rainy winters with warm and dry summers (Magaš & Faričić, 2002).

There is a long history of forest management on this island, which favoured mostly the Holm oak tree (*Quercus ilex*). Other common species on Olib are: the prickly juniper (*Juniperus oxycedrus*), large-fruited juniper (*Juniperus macrocarpa*), mastic (*Pistacia lentiscus*), strawberry tree (*Arbutus unedo*), Aleppo pine tree (*Pinus halepensis*), heath tree (*Erica arborea*), sarsaparilla (*Smilax aspera*),

honeysuckle (*Lonicera implexa*), Montpelier cistus (*Cistus monspeliensis*), curry plant (*Helichrysum italicum*) etc. (Bura, 1955).

Šćedro

Šćedro is a small island located in the middle part of Korčula Channel, just 3 km south of Hvar Island. The area of the island is 8.36 km², while the coastal line is 26.14 km long. The highest peak, Zelenikova glava is only 113 m high. Two settlements are present on the island, Mostir and Nestrane. No permanent inhabitants live on the island, but in the summer time, tourists regularly visit it. While it was in the past used for agriculture, most parts of the island are nowadays covered with pines and maquis, and are therefore hardly accessible. Some vineyards and olive groves still exist in the northern part, but are slowly becoming overgrown, because only few people still tend their land on the island. Aside from the main road, going from the eastern part of the island, to the western part, almost all other paths are already overgrown by forest or maquis. Since 1927 Šćedro Island has been protected by the law as a significant landscape.

The goal of this paper is to present the first faunistic records of butterfly and moths species from two small, previously unsurveyed islands, Olib and Šćedro.

Materials and Methods

During the year 2011 we conducted a preliminary survey on two islands, Olib and Šćedro (Fig. 1). Olib was visited in the period of August 6 till August 15, 2011. The island of Šćedro was visited only once, in May 2011, during a one-day survey, at two localities. Different habitats across both islands were visited. Butterflies were collected with an entomological net, identified in the field, and immediately released. Only a few doubtful species were collected, including moths. All specimens collected are stored in private collection (Koren).

Surveyed localities on Olib Island:

1. Olib settlement and close surroundings, eastern sub-Mediterranean dry grasslands, flower gardens, halophilous scrubs, olive groves, vineyards (44.377074N, 14.786256E), 08.08.2011 - 15.08.2011.
2. Draga cove, forest edges, halophilous scrubs, holm oak forest, (44.414379N, 14.781373E), 12.08.2011.

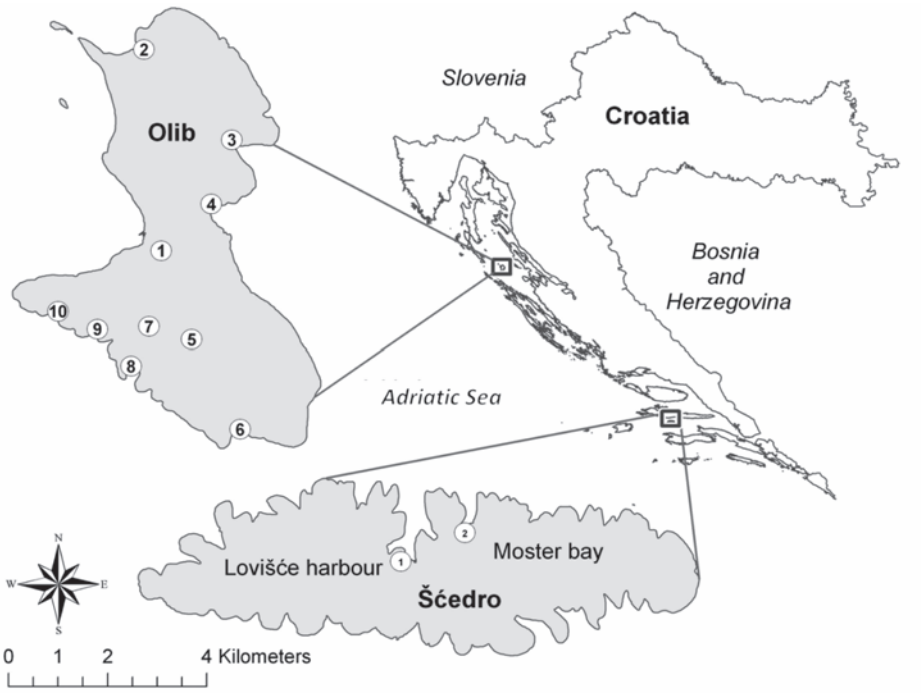

Figure 1. The position of Olib and Šćedro with the survey locations.

3. Vela Slatina cove, eastern sub-Mediterranean dry grasslands, forest edges, halophilous scrubs, holm oak forest, (44.397403N, 14.803474E), 08.08.2011, 11.08.2011.
4. Slatinica cove, Aleppo pine forest, eastern sub-Mediterranean dry grasslands, forest edges, halophilous scrubs, holm oak forest, olive groves, (44.385969N, 14.798427E), 07.08.2011.
5. Kalac hill, eastern sub-Mediterranean dry grasslands, forest edges, holm oak forest, olive groves, (44.360923N, 14.79377E), 09.08.2011 - 10.08.2011.
6. Južna Slatina cove, eastern sub-Mediterranean dry grasslands, forest edges, halophilous scrubs, holm oak forest, (44.344657N, 14.805513E), 10.08.2011.
7. Križ, eastern sub-Mediterranean dry grasslands, forest edges, holm oak forest, olive groves, (44.363455N, 14.782579E), 14.08.2011.

8. Cove Sveti Nikola, eastern sub-Mediterranean dry grasslands, forest edges, halophilous scrubs, holm oak forest, (44.356154N, 14.77837E), 14.08.2011.
9. Cove Banjve, eastern sub-Mediterranean dry grasslands, forest edges, halophilous scrubs, holm oak forest, (44.362822N, 14.769705E), 09.08.2011.
10. Cove Široki bok, eastern sub-Mediterranean dry grasslands, forest edges, halophilous scrubs, holm oak forest, (44.366204N, 14.759695E), 06.08.2011.

Surveyed localities on Šćedro Island:

1. Šćedro, Lovišće harbor, forest edges, holm oak forest, olive groves, (43.089779N, 16.703370S), 06.05.2011.
2. Šćedro, Moster bay around the old monastery, forest edges, holm oak forest, olive groves, gardens and small parts of dry grasslands (43.092905N, 16.712354S), 06.05.2011.

Aside from butterflies, on Šćedro Island we collected all the day-flying moths that we encountered. We surveyed both localities on the island two times in the day.

Results

During the ten-days survey, 20 species of butterflies were recorded from Olib (Tab. 1). One species, *Pseudophilotes vicrama* (Moore, 1865), is listed in the Red Data List of Croatian Butterflies (Šašić & Kučinić, 2004). This species was previously

Table 1. Distribution of butterflies on the small Adriatic Islands of Olib and Šćedro. The numbering of the localities follows the list of localities. Within families recorded species are listed in alphabetical order.

	Species list	Olib*										Šćedro**	
		1	2	3	4	5	6	7	8	9	10	1	2
	HESPERIIDAE												
1.	*Carcharodus alceae* (Esper, 1780)	•											
2.	*Spialia orbifer* (Hübner, 1823)	•	•				•						
	PAPILIONIDAE												
3.	*Iphiclides podalirius* (Linnaeus, 1758)	•											

4.	*Papilio machaon* Linnaeus, 1758	•										
	PIERIDAE											
5.	*Colias crocea* (Geoffroy, 1785)	•									•	
6.	*Gonepteryx cleopatra* (Linnaeus, 1767)	•	•	•	•	•						
7.	*Leptidea sinapis/reali*										•	•
8.	*Pieris mannii* (Mayer, 1851)	•			•							
9.	*Pieris rapae* (Linnaeus, 1758)	•			•							•
10.	*Pontia edusa* (Fabricius, 1777)										•	
	LYCAENIDAE											
11.	*Aricia agestis* (Dennis & Schiffermüller, 1775)										•	
12.	*Celastrina argiolus* (Linnaeus, 1758)				•		•	•				
13.	*Iolana iolas* (Ochsenheimer, 1816)										•	
14.	*Lycaena phleas* (Linnaeus, 1761)										•	
15.	*Polyommatus icarus* (Rottemburg, 1775)	•		•				•			•	•
16.	*Pseudophilotes vicrama* (Moore, 1865)	•		•	•							
	NYMPHALIDAE											
17.	*Argynnis pandora* (Dennis & Schiffermüller, 1775)											•
18.	*Charaxes jasius* (Linnaeus, 1767)	•			•				•	•		
19.	*Coenonympha pamphilus* (Linnaeus, 1758)	•	•			•		•			•	•
20.	*Hipparchia statilinus* (Hufnagel, 1766)	•	•		•	•		•			•	
21.	*Lasiommata megera* (Linnaeus, 1767)			•		•					•	•	•
22.	*Limenitis reducta* Staudinger, 1901			•			•			•	•	•	•
23.	*Maniola jurtina* (Linnaeus, 1758)	•										
24.	*Pyronia cecilia* (Vallantin, 1894)	•		•		•		•			•		•
25.	*Vanessa atalanta* (Linnaeus, 1758)	•		•			•				•		
26.	*Vanessa cardui* (Linnaeus, 1758)			•									
	NOCTUIDAE											
1.	*Minucia lunaris* (Denis & Schiffermüller, 1775)											•
2.	*Synthymia fixa* (Fabricius, 1787)										•	•
3.	*Tyta luctuosa* (Denis & Schiffermüller, 1775)										•	•
	ARCTIIDAE											
4.	*Arctia villica* (Linnaeus, 1758)										•	•
	GEOMETRIDAE											
5.	*Scopula ornata* (Scopoli, 1763)										•	

* Olib: 1. Olib settlement, 2. Draga cove, 3, Vela Slatina cove, 4. Slatinica cove, 5. Kalac hill, 6. Južna Slatina cove, 7. Križ, 8. Sveti Nikola Cove, 9. Banjve Cove, 10. Široki bok Cove.

** Šćedro: 1. Šćedro, Lovišće harbor, 2. Šćedro, Moster bay.

recorded on many Adriatic islands, including recent records from Pašman and Ugljan (Verovnik, 2011). Specimens of *P. vicrama* were found on the edges of eastern sub-Mediterranean dry grasslands containing their larval host plants - *Thymus* sp. (Tolman & Lewington, 2008). With drastically reduced number of grazers, natural succession took place on the grasslands, which now are in danger of disappearing from the island. This can also endanger *P. vicrama*, a habitat specialist connected mainly to these grasslands.

Two-tailed Pasha, *Charaxes jasius* (Linnaeus, 1767) was always recorded at the edges of forest and coast. Its larval food plant, the strawberry tree (*Arbutus unedo*), is present on the island. One characteristic behavior was noticed - as indicated in the literature, both sexes are attracted to fermenting fruit (Tolman & Lewington, 2008). Two specimens at the Cove Sveti Nikola were observed being attracted to fermented old peach.

No butterfly surveys have been conducted on islands located in the immediate vicinity of Olib (Silba, Ist, Premuda, Molat, Škrada), except for Silba, which has a few published data (Verovnik, 2011). The island of Silba was visited twice, in two different time periods, and 17 butterflies species were recorded (Verovnik, 2011). Species recorded on Silba, but missing from Olib are: *Pyrgus malvae, Pontia edusa, Lycaena phleas, Cacyreus marshalli, Polyommatus bellargus and Polygonia egea*. Species recorded on Olib, but not on Silba are: *Spialia orbifer*, *Pieris mannii*, *Colias crocea*, *Celastrina argiolus*, *Pseudophilotes vicrama*, *Lasiommata megera* and *Maniola jurtina*.

The record of 20 species from Olib, during a summer visit to the island can indicate high butterfly richness, especially due to the small area of the island, and the high temperatures that in that period limit the activity of organisms. But aside from that, several more species can be expected on the islands, especially some spring-flying species.

On Šćedro we recorded 13 butterflies and 5 moth species. From the Pieridae family we recorded four: *Leptidea sinapis/reali*, *Pieris rapae* (Linnaeus, 1758), *Pontia edusa* (Fabricius, 1777) and *Colias crocea* (Geoffroy, 1785). The genitals of *Leptidea* sp. were not checked, so they need to be referred to as *L. sinapis/reali*. While we encountered few *L. sinapis* specimens on the island, for the other three species we saw only one specimen per species, which can probably indicate migration activities. All three species are very common in Croatia, including the islands. The Nymphalidae family was represented with 5 recorded species: *Vanessa atalanta* (Linnaeus, 1758), *Argynnis pandora* (Dennis & Schiffermüller,

1775), *Lasiommata megera* (Linnaeus, 1767), *Limenitis reducta* (Staudinger, 1901) and *Coenonympha pamphilus* (Linnaeus, 1758). While *C. pamphilus, L. megera* and *L. reducta* were common on the island, we recorded only a single individual of *V. atalanta*, which can probably be related to the migratory activities of this species.

Four Lycaenidae species were recorded on Šćedro: *Lycaena phlaeas* (Linnaeus, 1761), *Polyommatus icarus* (Rottemburg, 1775), *Aricia agestis* (Dennis & Schiffermüller, 1775) and *Iolana iolas* (Ochsenheimer, 1816). The first three species are considered to be very common, while *I. iolas*, as a habitat specialist, is considered to be rare in the Croatian islands as a whole (Verovnik, 2011). We recorded one single male, flying over bushy vegetation at the edge of a macadam path. Across the path, the larval host plants, *Colutea arborescens,* of this butterfly was also present (B. Salkić, pers. comm.). We caught all lycaenid specimens that we encountered on Šćedro, but this was the only *I. iolas* specimen recorded.

The most interesting moth species that we encountered on this island was *Synthymia fixa* (Fabricius, 1787) (Fig. 2). This species is a day-flying member

Figure 2. *Synthymia fixa* from Šćedro Island.

of the Noctuidae family, flying from April to July, in one generation. The monophagous caterpillars of this species feed on bitumen vetch (*Psoralea bituminosa*). *S. fixa* is a thermophilous, sedentary species (Scalerico et al, 2007). The only published data on this species' presence in Croatia are reviewed by Kučinić (1997) and refer to Dalmatia County without any details as to place and time of observations. After checking available relevant publications with the records of Noctuidae in Croatia, we could not find any other record of *S. fixa* in Dalmatia. Nevertheless, this is first record for this species in Croatia with precise observation data such as exact locality and recording date. On Šćedro, this moth was very common, flying during the daytime even without being disturbed. In total, four individuals were collected from the islands, with many more individuals observed. On the nearby Hvar Island, during a one-week survey of butterflies, the species was not observed, despite habitats similar to ones at Šćedro island.

During the past few decades Šćedro lost its permanent population. The result of this is the reduction of favorable habitats (open grasslands) for butterflies, due to the succession. Butterfly species remain on this island due to the few open areas, like olive groves, which are still regularly maintained. In the future, some of the species recorded could disappear from the island.

Conclusions

No data concerning the butterfly and moth populations of the two small Adriatic islands of Šćedro and Olib have previously been published. Although both islands were visited only once, the number of species recorded on those occasions can indicate quite high richness in comparison with some other small islands, like Kornat and Žut (Koren & Bjelić, 2010). The habitat comparison between both islands is rather difficult, because on Olib, a wide range of habitats is present, and on Šćedro, favorable habitats for butterflies are scarce, and include only few open grassy areas. A total of 31 species, including a new record for Croatia of *S. fixa*, emphasizes the importance of surveys of even such small and seemingly unimportant islands for overall biorichness.

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