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NEW RECORDS OF THREE SPECIES OF THE GENUS *ARICIA* REICHENBACH, 1817 (LEPIDOPTERA: LYCAENIDAE) IN CROATIA

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Abstract - Among four species of the genus *Aricia* Reichenbach 1817 that inhabit the territory of Croatia, three can be regarded as mountain species: *Aricia anteros* (Freyer, 1838), *Aricia artaxerxes* (Fabricius, 1793) and *Aricia eumedon* (Esper, 1780). For all three species only a limited number of records exist, with large distribution gaps between them. New records for all three species from the Dinarids are presented. The most notable are two records of *A. anteros*, which was confirmed for Croatia after a period of more than 60 years. Its known range of occurrence in Croatia was greatly expanded with the records on two new localities outside Velebit Mts.

KEY WORDS: *Aricia anteros, Aricia artaxerxes, Aricia eumedon,* Dinarids, new records

Izvleček - NOVE NAJDBE TREH VRST RODU *ARICIA* REICHENBACH, 1817 (LEPIDOPTERA: LYCAENIDAE) NA HRVAŠKEM

Od štirih vrst rodu *Aricia* Reichenbach 1817, ki naseljujejo ozemlje Hrvaške, so tri prepoznane kot hribske in sicer: *Aricia anteros* (Freyer, 1838), *Aricia artaxerxes* (Fabricius, 1793) in *Aricia eumedon* (Esper, 1780). Pri vseh treh vrstah je znano le majhno število najdb na Hrvaškem in z velikimi vrzelmi v znani razširjenosti. Predstavljamo nove podatke za vse tri vrste iz območja Dinaridov. Najbolj izstopajoča sta podatka za vrsto *A. anteros*, ki je bila na Hrvaškem nazadnje zabeležena pred več kot 60 leti. Njeno znano območje razširjenosti se je izrazito povečalo na račun lokacij izven Velebita.

KLJUČNE BESEDE: *Aricia anteros, Aricia artaxerxes, Aricia eumedon,* Dinaridi, nove najdbe

Introduction

During the last several decades many papers about the butterfly fauna of Croatia were published, mainly dealing with the additions to the fauna of some localities or regions (e.g. Mihoci et al., 2007; Koren et al., 2011). In most cases published papers deal with one or few usually rare or new species for the country (e.g. Koren, 2010; Šašić & Mihoci, 2011). Still, data about the butterfly fauna of many regions in Croatia remain scarce and incomplete, and the records of many butterfly species are several decades old, without any recent confirmations. One of such regions, which is also probably the most interesting in Croatia in terms of butterfly fauna, is the Dinaric mountain chain (Fig. 1).

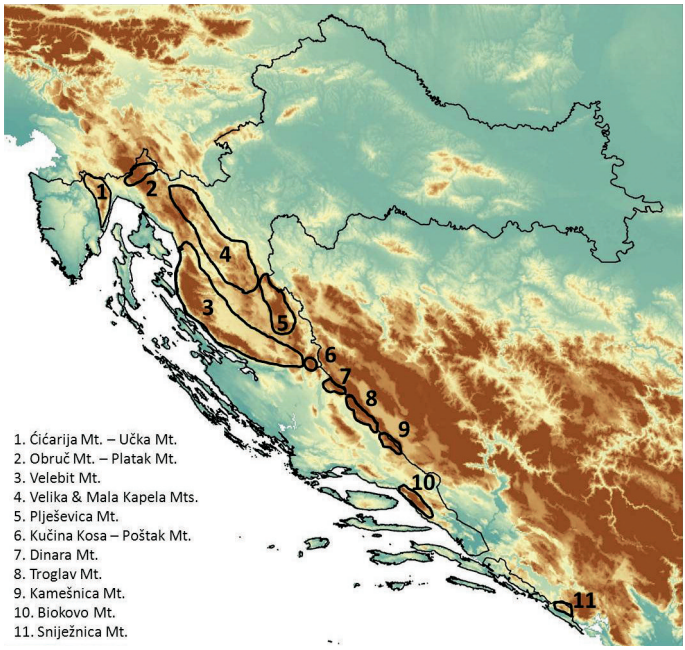

Fig. 1: The main mountain chains and mountains of the Dinarides in Croatia.

The Dinaric mountain chain, or simply the Dinarides, is a southern European mountain chain, which stretches across the areas of Slovenia, Croatia, Bosnia and Herzegovina, Serbia, Albania and Montenegro. The Dinarides extend for 645 kilometers along the coast of the Adriatic Sea, from the Julian Alps in the northwest down to the Šar-Korab massif. The Dinarides are the fifth largest mountainous area of Europe after the Caucasus Mountains, Alps, Pyrenees and Scandinavian Mountains. The Croatian part of the Dinarides starts near the border with Slovenia and stretches all along the border with Bosnia and Herzegovina and Montenegro. This area, especially the northern part, from Učka, Gorski Kotar (includes Obruč Mt., Platak Mt., Velika & Mala Kapela Mts.) towards Velebit Mts. was regularly visited by Croatian and foreign entomologists in 20th century (e.g. Grund, 1916; Lorković, 2009) who recorded

a substantial number of species for the region. During the last decade there were two additional systematic surveys of the area. The first survey was that of Velebit Mts. (Mihoci et al., 2007), which added a substantial number of species to the area, but did not confirm some of the most interesting historical records. The second larger survey on the karstic mountains was that of Biokovo Mts. (Mihoci et al., 2011), but that survey focused mainly on the vertical distribution of butterflies without mentioning any precise localities. Moreover, the paper indiscriminately used both literature and recent data (Mihoci et al., 2011), therefore it is impossible to know which records are recent and which are cited from literature.

Many areas, including whole mountains, are still almost without any information regarding their butterfly fauna (e.g. Poštak, Svilaja, Troglav, Dinara, Kamešnica). This is partially due to proximity of the border with Bosnia and Herzegovina which is still under mines, and general remoteness of some mountains. Apart form Gorski Kotar, Velebit and Biokovo the records for other mountain chains are just randomly collected.

Eight species of the genus *Aricia* Reichenbach 1817 inhabit Europe (Vliegenthart et al., 2011), but only 4 species are present in the Balkan Peninsula: *Aricia agestis* (Denis & Schiffermüller, 1775), *Aricia anteros* (Freyer, 1838), *Aricia artaxerxes* (Fabricius, 1793) and *Aricia eumedon* (Esper, 1780). In Croatia all four species are present (Mihoci & Šašić, 2011). According to Mladinov & Lorković (1985) all species, except *A. agestis,* are considered to be strictly mountainous, with their distribution limited to the Dinaric karstic mountain chain. *A. agestis* is a habitat generalist, and as such, it is present and common in almost whole Croatia, and will not be dealt with in this paper.

The aim of this paper is to give an overview of the status and distribution of three species of the genus *Aricia* in Croatia as well as to present new records.

Materials and methods

New records were collected from the year 2002 onwards in different regions of Croatia. Butterflies were collected with an entomological net and stored in private butterfly collection (Koren, Pazin). The determination of species was done using Tolman & Lewington (2008) while the systematics follows Vliegenthart et al. (2011).To fully define the distribution range of the mountain members of genus *Aricia* in Croatia all available literature was studied, and all records are presented here.

Results

During the last decade, several new records for all three mountain *Aricia* species in Croatia were gathered. This includes two new records for *A. anteros*, and three for *A. artaxerxes* and *A. eumedon*. The list of new records is given bellow. All known historical records for these species are summarized in Appendix I.

***Aricia anteros* (Freyer, 1838)**

1. Kuna Konavoska, Sniježnica, road path above the village, dry grassland, UTM: BN81, 42° 33’ 17.50”N, 18° 21’ 43.10”E, 30.VII.2012, 1M, leg. Koren

2. Kučina Kosa, Poštak, Ljubina Poljana, forest edge with *Rubus* bushes, grassland, UTM: WK80, 44° 15' 40.20"N, 16° 6' 27.50"E, 9.VIII.2012, 1M, leg. Koren

Aricia artaxerxes (**Fabricius, 1793**)

1. Troglav, Jankovo brdo, mountain grassland, UTM: XJ27, 43° 58' 6.97"N, 16° 32' 13.44"E, 28.VII.2011, 2F, leg. Koren

2. Obruč, around the Mountain House Hahlići, dry grassland, forest edge, UTM: VL53,45° 26' 43.70"N, 14° 28' 40.60"E, 25.VIII.2011, 2M, 1F, leg. Koren

3. Kučina Kosa, Poštak, Ljubina Poljana, forest edge with *Rubus* bushes, grassland, UTM: WK80,44° 15' 40.20"N, 16° 6' 27.50"E, 9.VIII.2012, 1M, leg. Koren

Aricia eumedon (**Esper, 1780**)

1. Platak, meadows above peak, mountain grassland, UTM: VL63, 45° 25' 47.90"N, 14° 34' 2.60"E, 15.VI.2002, 1M, leg. Koren

2. Fužine, meadows around the city, forest edge, UTM: VL71, 45° 18' 12.20"N, 14° 43' 4.10"E, 25.VI.2004, 1M, leg. Koren

3. Učka, Mala Učka, dry grassland, UTM: VL31, 45° 17' 44.80"N, 14° 11' 58.40"E, 25.VI.2008, 2M, 1F, leg. Koren

Discussion

Aricia anteros (Freyer, 1838)

The distribution of *A. antero*s stretches over the Balkans, and continues toward Greece, Turkey and Iran (Tolman & Lewington, 2008). Its voltinism is dependent on the altitude, and as many as three generations are known from some areas (Tolman & Lewington, 2008). This species is usually present from 500-2000 m a.s.l. (Tolman & Lewington, 2008) but in Turkey is present also on 40 m a.s.l. (Kovanci et al., 2009). Mt. Velebit in Croatia represents its western distribution limit.

The first record for this, as well as many other species in the fauna of Croatia originates from Mann (1869), who mentioned the record of *A. anteros* for "Dalmatia" but without any exact locality. The first record with valid locality originates form the beginning of 20th century from Mamudovac, Velebit Mts. (Abafy-Aigner, 1910). After that period, few additional localities for this species were added, but exclusively for Velebit Mts. (Lorković, 2009). The last record of this species was from 1951, from Mt. Metla, Velebit (Lorković, 2009). During the recent survey of Velebit Mts. this species was not recorded (Mihoci et al., 2007). In all cases only one, or a few specimens were recorded which indicates the rarity of this species in Croatia (Lorković, 2009). The two new records from Mt. Poštak and Mt. Sniježnica (Fig. 2) are important in two ways. They represent first recent records of this species in Croatia in more than 60 years and are the first records in Croatia outside of Velebit Mts.. These new records show that the historical population from Velebit Mts. may have been connected to the Bosnian populations (Lelo, 2008). But even in Bosnia, it is very rare and locally known only from few localities (Lelo, 2008), of which the closest one to the Croatian ones is Tre-

binje, distanced about 20 kilometers from Sniježnica Mt.. Both in Poštak Mt. and Sniježnica Mt., only a single male per locality was recorded, even after a long and intensive search. And while the males are easily distinguishable from other species (Fig. 3), the females can easily be misidentified as females of *A. agestis* or even females of *Polyommatus icarus*. This is probably one of the reasons for such a small number of records in general. The second reason, as it was mentioned before, is the lack of butterfly surveys in general, especially in southern Dalmatian mountains. More records of this species are to be expected in the future. *A. anteros* was not listed in the Red list of Croatian butterflies (Šašić & Mihoci, 2005). However, in the Serbian Red Book of Butterflies it has a status of endangered species (EN) (Jakšić, 2003). Without knowing its distribution or status in Croatia, this rare species should be listed as data deficient (DD).

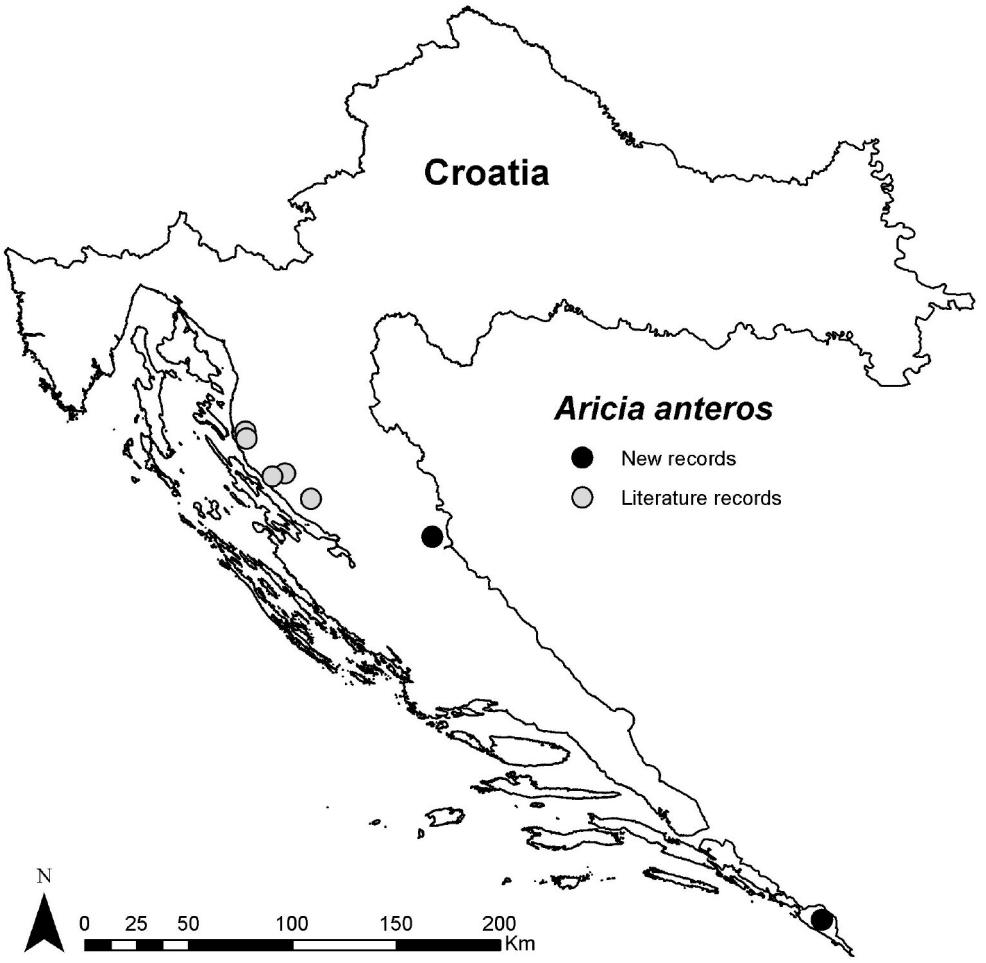

Fig. 2: Distribution of *A. anteros* in Croatia.

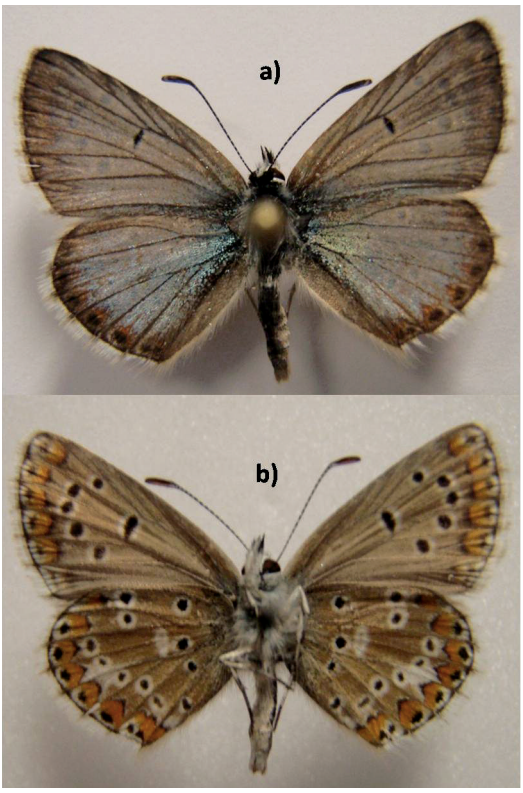

Fig. 3: Male specimen of *A. anteros* from Sniježnica Mt. (a. upperside, b. underside).

Aricia artaxerxes (Fabricius, 1793) ssp. *allous* Geyer, 1837

This species is distributed from the area of North Africa, across Europe, Turkey and as far as the Altai (Tolman & Lewington, 2008). The nominate subspecies, *A. artaxerxes artaxerxes* (Fabricius, 1793) is present only in England, while the Balkan specimens belong to the subspecies *Aricia artaxerxes allous* Geyer, 1837. The range of this subspecies starts at the Pyrenees, continues toward Alps, central and northern Europe and the Balkan Peninsula (Tolman & Lewington, 2008). In Croatia this species is limited to the Dinaric Mountains, and the literature records for this species are rather scarce. Its distribution starts in the area of Gorski Kotar, continues toward Velebit Mt. and across the Dinaric Mountains toward Mts. Troglav and Kamešnica. The only recent record originates from Mt. Kamešnica (Mihoci et al., 2006). In nearby Slovenia, this species is more common, and not strictly confined to higher altitudes (Verovnik et al., 2012) as is the case in Croatia (Mladinov & Lorković, 1985). The new records of this species in Croatia originate from mountain areas of Mt. Obruč, Mt. Poštak and Mt. Troglav (Fig. 4). They fill the distribution gap between Velebit Mts. and Mt. Kamešnica. For now, the southernmost record is from Mt. Biokovo (Mihoci et al., 2011).

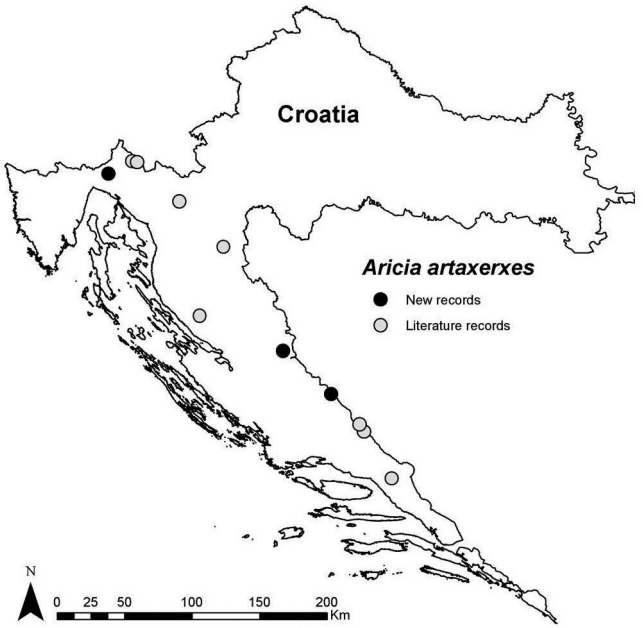

Fig. 4: Distribution of *A. artaxerxes* in Croatia.

Aricia eumedon (Esper, 1780)

A. eumedon is distributed across Europe, toward Turkey, Mongolia, Tian Shan and Altai (Tolman & Lewington, 2008). It flies from May until August in a single brood. In most parts of Europe its distribution span is between 750 – 2400 m a.s.l., while in northern Europe it flies also at the sea level (Tolman & Lewington, 2008).

Most records of *A. eumedon* in Croatia originate from Velebit Mts. (Grund, 1916; Mladinov, 1973; Lorković, 2009) (Fig. 5). However, during the recent survey of Velebit Mts., *A. eumedon* was not recorded, so its presence there requires confirmation (Mihoci et al., 2007). Mladinov & Lorković (1985) mention the record for Učka, probably referring to the record of Withrington (1984). They mention also that this species is present in the area of Gorski Kotar, but without precise localities (Mladinov & Lorković, 1985). Mann (1869) mentions the record of *A. eumedon* for middle Dalmatia, but also without any precise locality. Stauder (1923) later mentions the same record and states that it probably originates from Biokovo, but leaves the question mark near the locality name. During the recent survey of butterflies of Biokovo (Mihoci et al., 2011) *A. eumedon* was not recorded. So until any specimens are found, the imprecise citation for Dalmatia and Biokovo should be ignored. The new record from Mala Učka confirms its presence on this mountain. Furthermore, the two new records from Gorski Kotar, Platak Mt. and village Fužine represent the first precise localities for this species in the area of

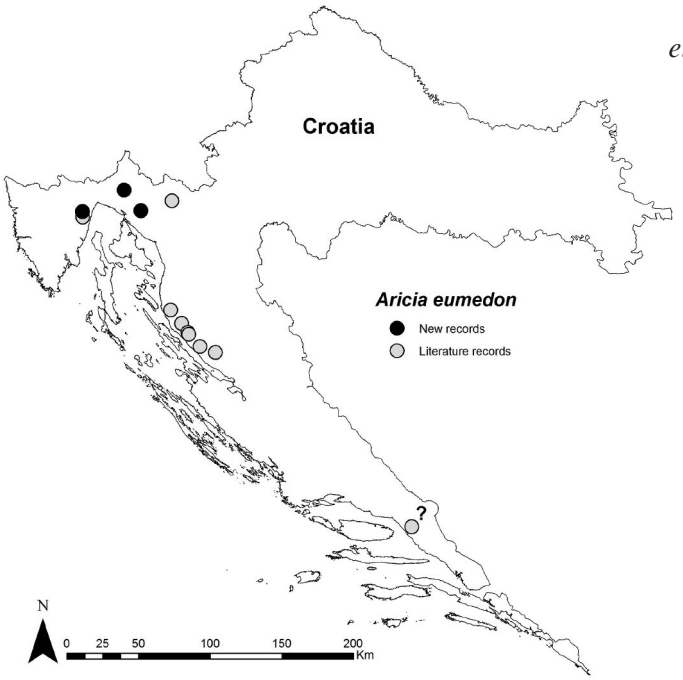

Fig. 5: Distribution of *A. eumedon* in Croatia

Gorski Kotar. They fill the distribution gap between Učka and Mt. Velebit, and indicate that the populations may indeed be connected. The presence of this species on the mountains of southern Dalmatia remains unconfirmed, but the records from nearby Bosnia and Herzegovina (Lelo, 2008) indicate that it could be present even there. In Slovenia, this species is more common than in Croatia, but still rare (Verovnik et al., 2012). It is considered vulnerable (VU) in Slovenia due to the contraction of its known range (Verovnik et al., 2012). In Croatia, its status is still not known or assessed.

Conclusions

The records of three mountain species of the genus *Aricia* in Croatia are generally scarce, and limited to the Dinaric mountain chain. Newly collected data improve the current knowledge about the known distribution of all three species in Croatia. Moreover, *A. anteros*, which was not recorded in Croatia for more than 60 years, is recorded outside Velebit Mts.. The two new localities greatly expand the known distribution of this species in Croatia toward the south and confirm that it is still a member of Croatian butterfly fauna.

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Appendix I. Literature and new records of three mountain species of genus Aricia in Croatia

Locality	Sampling date	Sex	Collector	Reference
***Aricia anteros* (Freyer, 1838)**				
Middle Dalmatia	/	/	Mann	Mann (1869)
Velebit, Mamudovac	/	/	Pavél	Abafy-Aigner (1910)
Velebit, Visibaba	25. VII. 1910	2M	Grund	Grund (1916)
Velebit, Visibaba	VII.1912		Grund	Mladinov (1973)
Middle and southern Velebit	/	/	/	Mladinov & Lorković (1985)
Southern Velebit	/	/	/	Mladinov & Lorković (1985)
Velebit, Visočica	12. VII 1932	1F	Lorković	Lorković (2009)
Velebit, Metla	1933	2F	Lorković	Lorković (2009)
Velebit, Metla	21. VII. 1951	1M	Lorković	Lorković (2009)
Velebit, Alan	VII. 1914	1M	Steiner	Lorković (2009)
Velebit, Visibaba	VII.1912	1M	Grund	Lorković (2009)
Kuna Konavoska, Sniježnica	30.VII.2012	1M	Koren	Author coll.
Poštak, Ljubina Poljana	9.VIII.2012	1M	Koren	Author coll.
***Aricia artaxerxes* (Fabricius, 1793)**				
Hrvatsko, Kupa	/	/	/	Mladinov (1978)
Ložec, Kupa	/	/	/	Mladinov (1978)
GorskiKotar	/	/	/	Mladinov & Lorković (1985)
Velikai Mala Kapela	/	/	/	Mladinov & Lorković (1985)
JužniVelebit	/	/	/	Mladinov & Lorković (1985)
Klek	14.VIII.1899	/	Koča	Mladinov (1973)
Kamešnica, Gornja Korita	1.-2. IX. 2005	/	/	Mihoci et al. (2006)
Biokovo, northern aspect	1994-2004	/	/	Mihoci et al. (2011)
Troglav, Jankovobrdo	28.VII.2011	2F	Koren	Author coll.
Obruč, PD Hahlici	25.VIII.2011	2M, 1F	Koren	Author coll.
Poštak, Ljubina Poljana	9.VIII.2012	1M	Koren	Author coll.
***Aricia eumedon* (Esper, 1780)**				
Middle Dalmatia	/	/	/	Mann (1869)
Velebit, Visibaba	/	/	/	Grund (1916)
Biokovo	/	/	/	Stauder (1923)
Velebit, Visibaba	/	/	Grund	Mladinov (1973)
Učka, Istra, 900m	/	/	/	Withrington (1984)
Istra	/	/	/	Mladinov & Lorković (1985)
Gorski Kotar	/	/	/	Mladinov & Lorković (1985)

Locality	Sampling date	Sex	Collector	Reference
Northern middle Velebit	/	/	/	Mladinov & Lorković (1985)
JužniVelebit	/	/	/	Mladinov & Lorković (1985)
Velebit, Opaljeno Brdo	VII.	/	Gušić	Lorković (2009)
Velebit, Pasji Klanac	VII.	/	Gušić	Lorković (2009)
Velebit, Butinovača	VII.	/	Gušić	Lorković (2009)
Velebit, Visočica	/	/	/	Lorković (2009)
Velebit, Badanj	/	/	/	Lorković (2009)
Platak, meadows above peak	15.VI.2002	1M	Koren	Author coll.
Fužine	25.VI.2004	1M	Koren	Author coll.
Učka, Mala Učka	25.VI.2008	2M, 1F	Koren	Author coll.