

# FIRST CHECK LIST OF THE SUBFAMILY ARCTIINAE (LEPIDOPTERA, EREBIDAE) IN CROATIA, WITH THE FINDING OF *RHYPARIOIDES METELKANA* (LEDERER, 1861), NEW SPECIES IN CROATIAN FAUNA FROM THE VALLEY OF THE NERETVA RIVER

MLADEN KUČINIĆ<sup>1\*</sup>, MIRJANA MATEŠIĆ<sup>2</sup>, TONI KOREN<sup>3</sup>,  
ANA MRNJAVČIĆ VOJVODA<sup>4</sup>, MLADEN VAJDIĆ<sup>5</sup>, DRAGAN PELIĆ FIXA<sup>6</sup>,  
VIŠNJA BUKVIĆ<sup>7</sup> & †FRANJO PEROVIĆ<sup>8</sup>

<sup>1</sup>Department of Biology (*Laboratory for Entomology*), Faculty of Science, University of Zagreb, Rooseveltov trg 6, 10 000 Zagreb, Croatia

<sup>2</sup>Croatian Business Council for Sustainable Development, Pavla Hatza 12, 10 000 Zagreb, Croatia

<sup>3</sup>University of Primorska, Science and Research Centre, Institute for Biodiversity Studies, Giordana Bruna 6, SI-6310 Izola, Slovenia

<sup>4</sup>Croatian Centre for Agriculture, Food and Rural Affairs, Institute for Plant Protection, Rim 98, 10 000 Zagreb, Croatia

<sup>5</sup>Šestinski dol, Odvojak 21, 10 000 Zagreb, Croatia

<sup>6</sup>Nikole Cara 7, Crikvenica, 10 000 Zagreb, Croatia

<sup>7</sup>Accommodation and Rehabilitation Centre, Ante Starčevića 25, 20350 Metković, Croatia

<sup>8</sup>Croatian Natural History Museum, Demetrova 1, 10 000 Zagreb, Croatia

Kučinić, M., Matešić, M., Koren, T., Mrnjavčić Vojvoda, A., Vajdić, M., Pelić, D. F., Bukvić, V. & Perović, F.: First check list of the subfamily Arctiinae (Lepidoptera, Erebidae) in Croatia, with the finding of *Rhyparioides metelkana* (Lederer, 1861), new species in Croatian fauna from the valley of the Neretva River. *Nat. Croat.*, Vol. 23, No. 1., 67–87, 2014, Zagreb.

The present paper provides the first checklist of the subfamily Arctiinae with biogeographical features and distribution area and reviews some of the interesting species of tiger moths found in Croatia. To determine the level of research of the subfamily Arctiinae in Croatia, a comparison was made with the well-explored tiger moth fauna of Italy, Slovenia, Austria and Hungary. In addition, during September 1997 in the area of the lower course of the Neretva River five specimens of the species *Rhyparioides metelkana* (Lederer, 1861) were collected for the first time for the fauna of Croatia. Another six specimens of this species were collected in the same area in August 2012. This is the southernmost point of its distribution area in Europe, making this record faunistically very interesting. The nearest population of this species is found 400 kilometres to the north in Hungary.

**Key words:** *Rhyparioides metelkana*, Arctiinae, tiger moths, Croatia, distribution, diversity, biogeography

Kučinić, M., Matešić, M., Koren, T., Mrnjavčić Vojvoda, A., Vajdić, M., Pelić, D. F., Bukvić, V. & Perović, F.: Prvi popis vrsta potporodice Arctiinae (Lepidoptera, Erebidae) za Hrvatsku i nalaz *Rhyparioides metelkana* (Lederer, 1861), nove vrste za hrvatsku faunu pronadene u dolini Neretve. *Nat. Croat.*, Vol. 23, No. 1., 67–87, 2014, Zagreb.

\* First author dedicates this paper to his master thesis supervisor dr. sc. Jan Carnelutti (1909-2012)

Ovaj rad daje prvi popis vrsta iz potporodice Arctiinae s biogeografskim značajkama i područjem rasprostranjenosti te daje kratak osvrt na neke zanimljive vrste medonjica u Hrvatskoj. Kako bi se odredio stupanj istraženosti potporodice Arctiinae u Hrvatskoj napravljena je usporedba s dobro istraženim faunama medonjica Italije, Slovenije, Austrije i Mađarske. Uz to, tijekom rujna 1997. godine na području donjeg toka rijeke Neretve prvi puta je sakupljeno pet primjeraka vrste *Rhyparioides metelkana* (Lederer, 1861) za faunu Hrvatske. Narednih šest primjeraka te vrste sakupljeno je na istom području u kolovozu 2012. godine. Ovo je najjužnija točka rasprostranjenja ove vrste u Europi, što ovaj nalaz čini faunistički jako zanimljivim. Najbliža populacija ove vrste nalazi se 400 kilometara sjeverno u Mađarskoj.

**Ključne riječi:** *Rhyparioides metelkana*, Arctiinae, medonjice, Hrvatska, rasprostranjenost, raznolikost, biogeografija

## INTRODUCTION

In the last 20 years a large number of scientific papers have been published on the subject of the Lepidoptera fauna of Croatia. Some of them have dealt with new species recorded for fauna of Croatia (LORKOVIĆ, 1993; KUČINIĆ *et al.*, 1999; MIHOČI *et al.*, 2005, 2006, 2007a, 2011; PERKOVIĆ, 2006; TVRTKOVIĆ *et al.*, 2011; KOREN, 2010, 2012a; KOREN & ČERNE, 2012; KOREN *et al.*, 2013; TÓTH *et al.*, 2013), others with faunistical contributions (HAFNER, 1994; CARNELUTTI, 1994; HABELER, 2005; MIHOČI *et al.*, 2007b; WITHRINGTON & VEROVNIK, 2008; KOREN & LADAVAC, 2010, 2013; KUČINIĆ *et al.*, 2011; ŠAŠIĆ & MIHOČI, 2011; KOREN, 2012b; ŠPANIĆ, 2012; TVRTKOVIĆ *et al.*, 2012), and some with the ecological features of Lepidoptera in certain areas (HABELER, 2005; KUČINIĆ *et al.*, 2013; MIHOČI *et al.*, 2007a, 2011). From the above-mentioned papers, data about the Erebidae, subfamily Arctiinae are found only in a faunistical – ecological article about Lepidoptera species occurring on the island of Krk where 29 species from this subfamily are listed (HABELER, 2005), and in a faunistical paper dealing with the Macroheterocera present in central Istria with 25 recorded species (KOREN & LADAVAC, 2013). A book by Habeler also lists the highest number of Lepidoptera species for fauna of Croatia and it is the most extensive faunistical work about the given area with 1502 species recorded (HABELER, 2005). Most species of the subfamily Arctiinae are generally medium-sized and large moths with generally nocturnal habits, except e.g. the species *Euplagia quadripunctaria* (Poda, 1761), *Amata phegea* (Linnaeus, 1758), *A. marjana* (Stauder, 1913) that exhibit pronouncedly daily activity. Most of the species have expressive patterns, with some genera with uniform yellow, white or grey wing colours. Generally, identification of species is usually feasible by their external appearance except in some genera like *Eilema*, *Spiris*, *Setina* etc. where the analysis of morphological features of genitalia is often inevitable.

The taxonomical status of the Arctiidae family (FORSTER & WOHLFART, 1960; ČERNÝ & NIELSEN, 1996; KITCHING & RAWLINS, 1999; SKINNER, 2009) has been changed due to new research and now Arctiinae have the status of subfamily within the family Erebidae (e.g. FIBIGER *et al.*, 2011; YELA *et al.*, 2011; WITT *et al.*, 2011). In the last 15 years molecular methods have contributed a lot to knowledge in the areas of evolution, taxonomy, systematics, phylogeography and phylogeny for different animal groups (e.g. SKET *et al.*, 2001; VEROVNIK *et al.*, 2004, PAULS *et al.*, 2006, 2008; BALINT *et al.*, 2009; GRAF *et al.*, 2012; BILANDŽIJA *et al.*, 2013; KLOBUČAR *et al.*, 2013; CHIŞAMERA *et al.*, 2014; MAGUIRE *et al.*, 2014; PODNAR *et al.*, 2014; PREVIŠIĆ *et al.*, 2014) including Lepidoptera (e.g. SIHVONEN *et al.*, 2011; ZAHIRI *et al.*, 2011, 2013; BÁTORI *et al.*, 2012; PENZ *et al.*, 2012; BERECZKI *et al.*, 2013; MATOS-MARAVÍ *et al.*, 2013). Until recently, the largest family of Lepidoptera species was Noctuidae (s.l.) with more than 35 000 described species in more than 4200 genera (KITCHING

& RAWLINS, 1999). New phylogenetic research supported not only by morphological data of adults and larvae (KITCHING & RAWLINS, 1999) but also by molecular data (e.g. ZAHIRI *et al.*, 2011, 2013) led to substantial changes in the systematics of the noctuoid clade. Some of the subfamilies of family Noctuidae were added to „new“ family Erebiidae (FIBIGER *et al.*, 2011; YELA *et al.*, 2011; WITT *et al.*, 2011). Family Nolidae and family Euteliidae were singled out as separate families with 23 species (Nolidae) and only two species *Eutelia adulatrix* Hübner, 1823 and *E. adoratrix* (Staudinger, 1892) (FIBIGER *et al.*, 2011) in Europe. The former families Arctiidae and Lymantriidae have been downgraded to subfamilies of the family Erebiidae (FIBIGER *et al.*, 2011, YELA *et al.*, 2011; WITT *et al.*, 2011) and that is a major change in the system of the superfamily Noctuoidea. The European Arctiinae fauna counted, according to checklist of Lepidoptera species of Europe from 1996 (ČERNÝ & NIELSEN, 1996), 98 species. This number has been increased after a detailed revision of this subfamily, and the subfamily Arctiinae actually counts 113 species in Europe (YELA *et al.*, 2011; WITT *et al.*, 2011).

The present paper has three main objectives: to establish a check list of species of the subfamily Arctiinae in Croatia; to give a review of the distribution area and biogeographical features of this subfamily in the continental and Mediterranean parts of Croatia and third, to review rare and interesting species of the Croatian fauna with special reference to *Rhyparioides metelkana* (Lederer, 1861), which is reported for the first time for Croatian fauna.

## MATERIALS AND METHODS

Research into the Lepidoptera species in valley of the Neretva River (Fig. 1) was conducted by the Croatian Natural History Museum in Zagreb during the years 1996 and 1997 (M. Vajdić, D. Pelić Fixa, F. Perović, M. Kučinić). Recent research into this area was conducted during the year 2012 by the University of Primorska (T. Koren). All the collected material from the research in 1996 and 1997 is part of the Lepidoptera collections of the Croatian Natural History Museum (Central collection of Hesperiiidae and Macroheterocera, Vajdić Lepidoptera Collection, Kučinić Lepidoptera Collection), and material collected during the research in 2012 is part of the private collection of Toni Koren.

For the purpose of compiling the checklist and distribution of tiger moths in Croatia, an analysis of the available literature was made (e.g. MANN, 1869; ABAFI-AIGNER *et al.*, 1896; KOČA, 1900, 1901; GALVAGNI, 1909; ABAFI-AIGNER, 1910; REBEL, 1910; STAUDER, 1930; MLADINOV, 1958, 1961, 1976; BURGERMEISTER, 1964; KRANJČEV, 1985; CARNELUTTI, 1994; HAFNER, 1994; KUČINIĆ *et al.*, 1994; HABELER, 1976, 2005; WITT, 1987; WITT *et al.*, 2011; KOREN & LADAVAC, 2013). The entomological collections of the Croatian Natural History Museum in Zagreb (Central Collection of Hesperiiidae and Macroheterocera, the Vajdić Lepidoptera Collection, the Kučinić Lepidoptera Collection), of the entomological department of Varaždin City Museum and the Faculty of Forestry at the University of Zagreb as well as material newly collected during the last 10 years (leg. I. Mihoci, leg. M. Vajdić) were inspected. Identification of most of the newly collected material was provided according to standard identification keys: FORSTER & WOHLFAHRT (1960), FAJČIK (2003), SKINNER (2009), WITT *et al.* (2011), and by comparison of specimens with those in the Central Collection of Hesperiiidae and Macroheterocera in the Croatian Natural History Museum in Zagreb. For the proper identification of certain species, genital slides



**Fig. 1.** Valley of the Neretva River: agricultural and natural habitats (photo V. Bukvić).

were prepared following the standard methods (boiling in 10% of KOH, 1-3 minutes). Systematic presentation follows WITT *et al.* (2011).

Data on tiger moths species present in Austria follow HUEMER (2013), for Hungary VARGA *et al.* (2005), for Italy ČERNÝ & NIELSEN (1996) and for Slovenia CARNELUTTI (1992) including some data from WITT *et al.* (2011) (Tab. 1). Biogeographical characteristics of species follow WITT *et al.* (2011), except for the species *Amata phegea* (Linnaeus, 1758) and *Amata marjana* (Stauder, 1913), whose biogeographical characteristics were not given. For these species we determined biogeographical characteristics according to the distribution maps in WITT *et al.* (2011). According to these data *A. phegea* is a European species and *A. marjana* is a Mediterranean-Caucasian-Asian species.

Distribution of tiger moths in Croatia is presented for two biogeographical zones: for the continental part, which includes Pannonian and the peri-Pannonian and mountainous part of Croatia (BERTIĆ, 2001), and for the Mediterranean part, which includes the area of Istria, Kvarner (Primorje) and Dalmatia. So as to attempt to ensure the protection of *Rhyparioides metelkana* Led. in Croatia, we do not present the exact localities in the valley of the Neretva River where the species was found.

## RESULTS AND DISCUSSION

### Faunistical data

Analysis of the data from the literature and data from entomological collections, and partial analysis of recently collected material, 55 species of tiger moths are known for the fauna of Croatia (Tab. 1). Some new data on the distribution of some species (e.g. *Eilema pygmaeola* (Doubleday, 1847)) in Croatia come from distribution maps according to WITT *et al.* (2011). According to these maps (WITT *et al.*, 2011) two species are new for

**Tab. 1.** Area and number of species from subfamily Arctiinae established in Croatia, Austria, Hungary, Italy and Slovenia.

Country	Area (km <sup>2</sup> )	Number of species
Croatia	56 542	55
Austria	83 871	56
Hungary	93 030	52
Italy	301 336	68
Slovenia	20 253	44

fauna of Croatia, *Ocnogyna parasita* (Hübner, 1790) and *Eilema costalis* (Zeller, 1847). Therefore, these species are included in the checklist. *Eilema pseudocomplana* (Daniel, 1939) is included because of its presence in the Mediterranean part of Croatia, on the island of Krk (HABELER, 2005). The species *Hyphoraia testudinaria* (Fourcroy, 1785) is not included in the Croatian fauna although noted according to maps by WITT *et al.* (2011, pp. 129). Istria is marked as a distribution area following the citation: „This species is a European montane species occurring in Pyrenees, the Alps, the Apennines and in Sicily” (WITT *et al.*, 2011). *Cymbalophora pudica* (Esper, 1784) is included only for the Mediterranean part of Croatia, because we found this species mostly at the seaside, and never in the continental Croatia. Similar cases are *Phragmatobia placida* (Frivaldszky, 1835) and *Dysauxes famula* (Freyer, 1836), which are presented in the maps in WITT *et al.* (2011) for the Mediterranean and continental parts of Croatia. In the literature, we found no references to the presence of these species in the continental areas of Croatia (e.g. MLADINOV, 1958, 1976; KRANJČEV, 1985; KUČINIĆ *et al.*, 1994) nor are there any specimens in our museum collections from this area. The species *Hyphoraia aulica* (Linnaeus, 1758) is not marked on the map in WITT *et al.* (2011), but we included this species, because it was found in the Mediterranean and continental parts of Croatia (e. g. STAUDER, 1930; MLADINOV, 1976). For species *Parasemia plantaginis* (Linnaeus, 1758) we believe that in Croatia the subspecies *interrupta* (Schawerda, 1910) (SCHAWERDA, 1910) is present, according to DUBATOLOV (2010).

In the Mediterranean part of Croatia 50 species of Arctiinae are present and 49 species in the continental part (Tab. 2). Most of the species are present in both areas (44 species, representing 84.8% of the total). Six species are present only in the Mediterranean area and five species are present only in the continental area. These data indicate relatively great similarities of tiger moth fauna in the continental and the Mediterranean parts of Croatia, although 11 species are specific to only one of the two areas. One of the reasons for this is the relatively large distribution area of most of the species presented in the Croatian fauna (WITT *et al.*, 2011). The large area of distribution of these species is probably caused by their ecological adaptations to different habitats that are widespread.

To determine the level of research into the fauna of a certain area, the fauna of that area should be compared with same segment of fauna in some other, preferably well-researched area. When conducting these analyses, one should take into consideration the size of the researched area and its habitat diversity. Our comparison included data for areas of Italy, Slovenia, Austria and Hungary that differ considerably, but are the only areas available for comparison because of the high level of research into the fauna of

**Tab. 2.** Number of species and percentage of biogeographical features of Arctiinae in Croatia, and in Continental and Mediterranean part of Croatia.

Biogeogeographical characteristics	Croatia		Continental part		Mediterranean part	
	N	%	N	%	N	%
Western Palaearctic Species	6	(9.9)	6	(12.1)	6	(12.0)
Trans-Palaearctic Species	22	(39.8)	20	(40.7)	20	(40.0)
Euro-Siberian Species	10	(18.0)	10	(20.2)	7	(14.0)
Palaearctic-Palaeotropical species	1	(1.9)	1	(2.1)	1	(2.0)
Holarctic Species	4	(7.6)	4	(8.2)	4	(8.0)
Holo-Ponto-Mediterranean species	1	(1.9)	1	(2.1)	1	(2.0)
Adriato-Ponto-Mediterranean species	1	(1.9)	1	(2.1)	1	(2.0)
Ponto-Mediterranean-Anatolian species	1	(1.9)	1	(2.1)	1	(2.0)
Ponto-Mediterranean species	2	(3.8)	-		2	(4.0)
South-western Mediterranean species	1	(1.9)	-		1	(2.0)
Mediterranean-Caucasian-Asian	1	(1.9)	1	(2.1)	1	(2.0)
Mediterranean-Iranian species	1	(1.9)	-		1	(2.0)
Mediterranean-Turkestanian species	1	(1.9)	1	(2.1)	1	(2.0)
Mediterranean-western Asiatic species	1	(1.9)	1	(2.1)	1	(2.0)
Alpine-Mediterranean species	1	(1.9)	1	(2.1)	1	(2.0)
European species	1	(1.9)	1	(2.1)	1	(2.0)
Summary	55	(100 %)	49	(100 %)	50	(100 %)

tiger moths and the partial similarities in climatic and vegetation features. In Slovenia there are 44 species recorded (CARNELUTTI, 1992; WITT *et al.*, 2011), in Austria 56 (HUEMER, 2013), in Hungary 52 (VARGA *et al.*, 2005) and in Italy 68 (ČERNÝ & NIELSEN, 1996) (Tab. 1). Based on these data, taking into account the size of the compared areas and their climatic features, we can conclude that in Croatia 90 to 95 % of potential tiger moth fauna has been recorded. This high percentage of recorded tiger moth species indicates the high level of research into this group in Croatia, especially compared to other groups of insects. In the future we can expect to find only few species that are not recorded in Croatian fauna, their value inhering in the better knowledge of the distribution and biogeographical features of this subfamily in certain areas of Croatia derived thereby.

In the Croatian fauna, beside common species found either in the whole territory, or in Mediterranean or continental part, several interesting species are singled out, especially two of them that are very locally distributed: *Rhyparioides metelkana* Led. (Fig. 2) and *Spiris slovenica* (Daniel, 1939), and some that are rare in the Croatian fauna like the species *Eilema pseudocomplana* (Daniel, 1939) and *Pericallia matronula* (Linnaeus, 1758). For these species we give a short review of their biological features like their morphology, number of generations per year, similar species, larval host plants and distribution.

In the research of entomofauna of the lower course of the Neretva River during the year 1997 the species *Rhyparioides metelkana* was recorded for the first time in the Croatian fauna. Record of this tiger moth was confirmed during the year 2012 (leg. T. Koren) in-



**Fig. 2.** *Rhyparioides metelkana* (Lederer, 1861), male, collected in the valley of the Neretva River, 1997 (photo B. Hrašovec).

dicating that the species *R. metelkana* is a permanent element of fauna of this area. Large-scale migration is very improbable due to the available bionomy data (FAJČIĆ, 2003; WITT *et al.*, 2011) and therefore the population in the Neretva valley can be considered as native in this area. In Europe this tiger moth is relatively rare, distributed in scattered populations in Central Europe, in France, Germany, Hungary, Austria, Slovakia, Netherlands and Bulgaria (Fig. 3). Those populations may have high abundance (WITT *et al.*, 2011) but according to our research that was not determined for the population found in the area of the lower course of the Neretva River where 5 specimens (1 female, 4 males) were collected in one night in September 9<sup>th</sup> 1997 (leg. M. Vajdić, F. Perović, D. Pelić Fixa, M. Kučinić), and 6 specimens (2 females, 4 males) on August 7<sup>th</sup> 2012 (leg. T. Koren).

According to its basic biological features *R. metelkana* is a strongly hygrophilous species that can be found in large lowland marshes and swamps, stream valleys and lake shores with wetland larval host plants. *R. metelkana* has only one generation per year, with adults flying from June to August (FAJČIĆ, 2003; WITT *et al.*, 2011). In the area of the lower course of the Neretva River this species was found not only in August but also at the beginning of September (9 September 1997), which was probably caused by the southern position of this population as compared to those of other populations in Central Europe (FAJČIĆ, 2003). This is a nocturnal species with adults coming to the lamp. Larvae feed on hygrophilous plant species *Caltha palustris* and *Mentha aquatica* to which they will often swim. Sexual dimorphism is expressed, the forewings in males are yellow but light brown in females. *R. metelkana* has recognizable morphological features; similar species in Europe are *Diacrisia sannio* (Linnaeus, 1758) and *Rhyparia purpurata* (Linnaeus, 1758) from which it can be easily distinguished. Because this species has a distribution area in central Europe, it would be expected to be found in the continental part of Croatia where systematic research of Lepidoptera was conducted during the 19<sup>th</sup> and 20<sup>th</sup> (e.g.



**Fig. 3.** Map of the distribution of *Rhyparioides metelkana* in Europe (modified according to WITT *et al.*, 2011). Red dot indicates findings from this paper.

ABAFI-AIGNER *et al.*, 1896; KRANJČEV, 1985) and not in the Mediterranean area. The valley of the Neretva River in which this species was recorded is the first known locality for the Mediterranean (except the Black Sea coast) and the second locality for the Balkan Peninsula (Fig. 3). This is also the southernmost point of its distribution in Europe. In Bulgaria *R. metelkana* was recorded only on the coast of Black Sea and it was until now the only record of these species found in the Balkan Peninsula (WITT *et al.*, 2011). All these data indicate that this tiger moth species is local and rare in this area and that the population found in the area of lower course of the Neretva River is the most southern and for sure isolated, being determined by the hygrophilous habitat. At the moment, there is no answer to the question how this species became a faunistic element of the area of the lower course of the Neretva River, which is separated from Central Europe not only spatially but also by the Dinarides mountain chain. A molecular analysis of the population found in the lower course of the Neretva River and of populations from Central Europe would contribute to a better knowledge of the phylogeography and distribution of this species in this part of Europe. Genus *Rhyparioides* Butler, 1877 has four Palearctic species. Others are: *Rhyparioides amurensis* (Bremer, 1861), *Rhyparioides nebulosa* Butler, 1877 and *Rhyparioides subvaria* (Walker, 1855). This genus is generally eastern Asiatic, and only *R. metelkana* is distributed in Europe and has Trans-Palaeartic type of distribution. It is also present in southwest Siberia, the Russian Far East (Primorye), northern China and Japan.

The discovery of this tiger moth species is one of the most interesting findings in the last three decades for the Lepidoptera in Croatia. It shows certain specific features of the area of the lower course of the Neretva River that needs to be protected due to anthro-



pogenic influence, in the first place land reclamation and agriculture (Fig. 1). This area is recognized as extremely valuable because of the wetland areas that are included in the Ramsar Convention that protects wetland areas around the world. Because *R. metelkana* is present in hygrophilous habitats it is also protected by the Ramsar Convention, but there are some other habitats that should be protected in the lower course of the Neretva River, especially meadow biotopes that are maintained through anthropogenic activity (mowing, low intensity grazing). Because of exceptional biodiversity, this whole area should have a higher level of statutory protection e.g. it should be a nature park but with special management plans for particular types of habitat types and groups of organisms that inhabit this area. Aside from *R. metelkana* in the valley of the Neretva River, from the subfamily Arctiinae we also found the species: *Spilosoma lubricipedium* (Linnaeus, 1758), *Phragmatobia fuliginosa* (Linnaeus, 1758), *Arctia villica* (Linnaeus, 1758), *Euplagia quadripunctaria* (Poda, 1761), *Cymbalophora pudica* (Esper, 1784), *Spiris striata* (Ménétries, 1832), *Thaumata senex* (Hübner, [1808]), *Eilema caniola* (Hübner, [1808]), *Eilema* cf. *complanata* (Linnaeus, 1758), *Eilema sororcula* (Hufnagel, 1766) and *Dysauxes famula* (Freyer, 1836) (Kučinić *et al.*, 1996; T. Koren, unpublished data). In addition, in the valley of the Neretva River the butterfly species *Danaus chrysippus* (Linnaeus, 1758) was recorded for the first time for the fauna of Croatia (PERKOVIĆ, 2006).

The second most interesting species in the subfamily Arctiinae in Croatian fauna is *Spiris slovenica*. This is the species of which WITT *et al.* (2011) wrote: „One of the most surprising findings of the revision of the European Arctiini was the recognition of the species distinctness of *S. slovenica*“. This species was described in 1939 as subspecies *Coscinia striata* ssp. *slovenica* (Daniel, 1939). Revision of the subfamily Arctiinae changed its status into the species *Spiris slovenica* (WITT *et al.*, 2011). *Spiris slovenica* shows a low rate in external morphology from *S. striata*, but analyses of genitalia, especially of the male, clearly distinguish these two species (WITT *et al.*, 2011). Until now it was only recorded in Croatia, Slovenia and Austria (WITT *et al.*, 2011, HUEMER 2012, 2013). Specimens found in Croatia listed in the monograph Noctuidae Europaeae, vol. 13 originate from eggs collected in the area of Rovinj that were successfully grown to adult stages (WITT *et al.*, 2011). In the paper about Bombyces and Sphinges in the upper part of the valley of the River Kupa (region Gorski kotar), Mladinov recorded taxa „*Conistra striata slovenica*“ (MLADINOV, 1976). Analysing the morphology of male genitalia of specimens in „Central collection of Hesperidae and Macroheterocera“ in the Croatian Natural History Museum in Zagreb showed that two specimens (Križpolje, July 1891, coll. B. Gušić – region Lika; Hrvatsko, 1977 leg. L. Mladinov – region Gorski kotar) belong to the species *S. slovenica*. So, this species is distributed in Croatia in the Mediterranean as well as in the continental part. WITT *et al.* (2011) reported that *S. slovenica* is an eastern alpine endemism, distributed in Julian Alps and the northwestern hilly and mountainous areas in Slovenia and Croatia. *Spiris slovenica* is a univoltine species with adults flying in summer. It inhabits xerothermic meadows and steppes.

The third interesting species, *Pericallia matronula*, is a large, easily recognizable tiger moth with specific morphological features that make it easily distinguished from other European species. The map of the distribution area of these Trans–Palaeartic species by WITT *et al.* (2011) also shows the northern continental part of Croatia but it is not recorded for the Mediterranean area of Croatia. This species is distributed in central and in part of northern Europe, Siberia to the Russian Far East (Primorye), China and Mongolia (WITT *et al.*, 2011). Subspecies *sachalinensis* lives in Sakhalin, and the subspecies *helema* can be found in the South Kurile Islands and Japan. WITT *et al.* (2011) says that in

many areas of Europe it is quite rare and local. This is also the case in Croatia. In entomological collections in Croatia only two specimens were found, both collected 100 years ago in Zagreb (10 July 1912). In fieldwork done in the last 20 years this species was not recorded in Croatia. This is probably partly because most of the research was concentrated to the southern karstic areas where this species cannot be found. To determine the true distribution area of these species in Croatia, more systematic research in the continental part should be conducted. The species *P. matronula* can be found in different types of forest habitats, including river valleys, larch and birch forests (especially in Siberia). It is a univoltine species with adults flying in June and July. Larvae overwinter twice; they are polyphagous and feed on short herbs and shrubs.

The fourth interesting species is *Eilema pseudocomplana*. This is a Mediterranean-Iranian species that can be found in the northern continental part of Croatia (WITT *et al.*, 2011), but it was also listed by HABELER (2005) for the Mediterranean area of the Island of Krk. The display of the distribution area of *E. pseudocomplana* on the map by WITT *et al.* (2011) shows distribution only in the border between Croatia and Hungary in the northern continental area, without data for Mediterranean part of Croatia. KRANJČEV did not find this species in the northern continental part of Croatia (region Podravina) during his 14 years of systematic investigation (KRANJČEV, 1985). Thus, for distribution of *E. pseudocomplana* in Croatia we give only data for the Mediterranean part according to HABELER (2005). This species is similar to other species from the *caniola*-subgroup, especially to *Eilema caniola* (Hübner, [1808]), *E. complana* (Linnaeus, 1758) and *E. costalis* (Zeller, 1847), and therefore genitalia must be studied for identification to the species level. To determine the distribution area of these species in Croatia detailed revision of all specimens in museum collections must be made, as well as additional field research. *E. pseudocomplana* is a xerophilous species that can be found on warm lowlands and meso-montane forest steps, rocky ground, warm grasslands in macchia, garrigues, and Mediterranean oak forests. It is a univoltine species with adults flying in summer months from June to August (WITT *et al.*, 2011). Larvae feed on different species of lichens.

From the subfamily Arctiinae, only one species, *Euplagia quadripunctaria* (Poda, 1761), is included to the Annex of the NATURA 2000 convention (ČELIK *et al.*, 2005). This species is very common in Croatia.

Future research into tiger moths should be directed to insufficiently explored areas of Croatia, and this would lead to detailed knowledge about distribution of this subfamily and some of its faunistically important species, e.g. *Ocnogyna parasita* Hb., *Phragmatobia placida* Friv., *Pericallia matronula* L., *Hyphoria aulica* L., *Parasemia plantaginis* (Linnaeus, 1758), *Cymbalophora pudica* Esp., *Pelosia muscerda* Hufn., *P. obtusa* H.-Sch., *Eilema pseudocomplana* Dan., *E. lutarella* L., *Dysauxes famula* Frey.

## Biogeographical data

Biogeographical analysis shows that in Croatian fauna 16 different groups of biogeographical elements can be found for the subfamily Arctiinae (Tab. 2). Most numerous groups are Trans-Palaeartic with 22 recorded species, Euro-Siberian with 10 recorded species and Western Palaeartic species with 7 recorded taxa. These three groups comprise 69.1% of tiger moth species that can be found in the Croatian fauna. In contrast, 13 biogeographical groups represent 30.9% of tiger moth species in Croatian fauna from which 11 groups are represented by only one species (Tab. 2). Analysis of biogeographical characteristics of the subfamily Arctiinae in the Mediterranean and continental parts showed some specificity. All biogeographical groups are present in the Mediterranean

part of Croatia, in total sixteen, three of them not present in continental Croatia: Ponto-Mediterranean, South-western Mediterranean and Mediterranean-Iranian species. Of the remaining biogeographical groups the highest difference is present in the Euro-Siberian group, which has 10 species (22.2%) in the continental part and 7 species (14.0%) in the Mediterranean part of Croatia (Tab. 2). Biogeographical characteristics of Arctiinae fauna in different parts of Croatia have been established with reference to many factors, especially the climatic and vegetation features in these areas and the geomorphological processes in the past.

## ACKNOWLEDGEMENTS

We are very grateful to Professor Boris Hrašovec from the University of Zagreb, Faculty of Forestry, for his help with photography and Iva Mihoci from Croatian Natural History Museum, for technical help. This research was supported by the Croatian Ministry of Science, Education and Sports as a part of the Projects No. 119–1193080–1206.

*Received November 11, 2013*

## REFERENCES

- ABAFI-AIGNER, L., PÁVEL, J., UHRYK, F., 1896: Fauna Regni Hungariae. Lepidoptera. Regia Societas Scientiarum Naturalium Hungarica, pp. 82, Budapest.
- ABAFI-AIGNER, L., 1910: Adaléka Magyar Tenger mellék, Horvátország és Dalmácia lepkefaunájához. *Rovartani Lapok* **17**, 71–105.
- BALINT, M., BOTOSANEANU, L., UJVÁROSI, L. & POPESCU, O., 2009: Taxonomic revision of *Rhyacophila aquitanica* (Trichoptera: Rhyacophilidae) based on molecular and morphological evidence and change of taxon status of *Rhyacophila aquitanica* ssp. *carpathica* to *Rhyacophila carpathica* stat. n. *Zootaxa* **2148**, 39–48.
- BÁTORI, E., PECSENYE, K., TÓTH, J.P. & VARGA, Z., 2012: Patterns of genetic and morphometric differentiation in *Melitaea (Melicta) athalia* (Lepidoptera: Nymphalidae). *Biological Journal of the Linnean Society* **107** (2), 398–413.
- BERECZKI, J., TÓTH, J.P., SRAMKÓ, G. & VARGA, Z., 2013: Multilevel studies on the two phenological forms of Large Blue (*Maculinea arion*) (Lepidoptera: Lycaenidae). *Journal of Zoological Systematics and Evolutionary Research*, **52**(1), 32–43.
- BERTIĆ, I., 2001: Republika Hrvatska – Prirodan obilježja, stanovništvo I geografske regije. In BERTIĆ, I., LAMPEK PAVČNIK, I. & RADOVINIĆ, R. (eds): *Satelitski Atlas*. Naklada Ljevak & GIS Data, Zagreb, 227–336.
- BILANDŽIJA, H., BRIAN, M., PODNAR, M. & ČETKOVIĆ, H., 2013: Evolutionary history of relict *Congerina* (Bivalvia: Dreissenidae): unearthing the subterranean biodiversity of the Dinaric Karsts. *Frontiers in Zoology* **10**, 5, doi:10.1186/1742-9994-10-5
- BURGERMEISTER, F., 1964: Makrolepidopteren aus dem Raume Dubrovnik. *Zeitschrift der Wiener Entomologischen Gesellschaft* **49**, 137–152.
- CARNELUTTI, J., 1992: Rdeči seznam ogroženih metuljev (Macrolepidoptera) v Sloveniji (The Red List of Endangered Macrolepidoptera in Slovenia): *Varstvo Narave* **17**, 61–104.
- CARNELUTTI, J., 1994: Modernisiertes „Verzeichnis der bei Knin gesammelten Schmetterlinge“ von I. Hafner. *Natura Croatica* **3** (2), 185–223.
- CHIŞAMERA, G., BUŽAN, E.V., SAHLEAN, T., MURARIU, D., ZUPAN, S. & KRYŠTUFEK, B., 2014: Bukovina blind mole rat *Spalax graecus* revisited: Phylogenetics, morphology, taxonomy, habitat associations and conservation. *Mammal Review* **44** (1), 19–29.
- ČELIK, T., VEROVNIK, R., GOMBOC, S. & LASAN, M., 2005: *Natura 2000 v Sloveniji*. Metulji, = Lepidoptera. Založba ZRC, ZRC SAZU, pp. 288, Ljubljana.

- ČERNÝ, K. & NIELSEN, S.P., 1996: Arctiidae. In KARSHOLT, O. & RAZOWSKI, J. (eds): The Lepidoptera of Europe, 296-299.
- DUBATOLOV, V.V., 2010: Tiger-moths of Eurasia (Lepidoptera, Arctiinae). *Neue Entomologische Nachrichten* **65**, 1-106.
- FAJČÍK, J., 2003: Motýle Strednej a Severnej Európy – die Schmetterlinge Mittel- und Nordeuropas. Er-Print, pp. 172, Tab 50, Bratislava.
- FIBIGER, M., YELA, J.L., ZILLI, A., VARGA, Z., RONKAY, G. & RONKAY, L., 2011: Check list of the Quadridifid Noctuoidea of Europe. In WITT, Th.J. & RONKAY, L. (eds): *Noctuidae Europaeae*, Vol. 13, 23-44. Sorø (Entomological Press).
- FORSTER, W. & WOHLFAHRT, T.A., 1960: Die Schmetterlinge Mitteleuropas, II., Bombyces & Sphinges. Franckische Verlagshandlung, pp. 243, Stuttgart.
- GALVAGNI, E., 1909: Beiträge zur Kenntnis der Lepidopterenfauna der adriatischen Inseln. *Mitt. D. Naturwiss. Vereins an der Universität Wien* **7** (5-10), 1-96.
- GRAF, W., POPIJAČ, A., PREVIŠIĆ, A., GAMBOA, M. & KUČINIĆ, M., 2012: Contribution to the knowledge of *Siphonoperla* in Europe (Plecoptera: Chloroperlidae): *Siphonoperla korab* sp. n. *Zootaxa* **3164**, 41-48.
- HABELER, H., 1976: Beitrag zur Lepidopterenfauna Dalmatiens. *Acta Entomologica Jugoslavica* **12** (1-2), 67-87.
- HABELER, H., 2005: Die Schmetterlinge der Adria-Insel Krk, pp. 221, Graz.
- HAFNER, I., 1994: Verzeichnis der bei Knin gesammelten Schmetterlinge (Lepidoptera). *Natura Croatica* **3** (2), 119-184.
- HUEMER, P., 2012: Der Slowenische Grasbär (*Spiris slovenica*) – eine Neuentdeckung für Österreich (Lepidoptera, Erebidae: Arctiinae). *Wissenschaftliches Jahrbuch der Tiroler Landesmuseen* **5**, 224-231.
- HUEMER, P., 2013: Die Schmetterlinge Österreichs (Lepidoptera), Systematische und faunistische Checkliste. *Tiroler Landesmuseen*, pp. 304, Tirol.
- KARSHOLT, O. & RAZOWSKI, J., 1996: The Lepidoptera of Europe. A Distributional Checklist. Apollo Books, pp. 380, Stenstrup.
- KITCHING, I. J. & RAWLINS, J. E., 1999: The Noctuoidea. In Kristensen, N.P. (ed): *Handbuch der Zoologie (Handbook of Zoology)*. Band/Vol. IV (Arthropoda, Insecta) Lepidoptera, Moths and Butterflies, 355-401. De Gruyter, Berlin and New York.
- KLOBUČAR, V.I., PODNAR, M., JELIĆ, M., FRANJEVIĆ, D., FALLER, M., ŠTAMBUK, A., GOTTSTEIN, S., SIMIĆ, V. & MAGUIRE, I., 2013: Role of the Dinaric Karts (western Balkans) in shaping the phylogeographic structure of the threatened crayfish *Austropotamobius torrentium*. *Freshwater Biology* **58** (6), 1089-1105.
- KOČA, G.J., 1900: Prilog fauni gore Papuka i njegove okoline. *Glasnik hrvatskog naravoslovnog društva* **12** (1-2), 1-35.
- KOČA, G.J., 1901: Prilog fauni leptira (Lepidoptera) Hrvatske i Slavonije. *Glasnik hrvatskog naravoslovnog društva* **13** (1-2), 1-67.
- KOREN, T., 2010: First finding of Ripart's Anomalous Blue *Polyommatus (Agrodiaetus) ripartii* (Freyer, 1830) (Lepidoptera, Lycaenidae) in Croatia. *Natura Croatica* **19** (2) 463-467.
- KOREN, T., 2012a: The western most record of *Euclasta splendida* (Herrisch-Schäffer, 1884) (Lepidoptera: Crambidae) in Europe. *Polish Journal of Entomology* **81** 331-334.
- KOREN, T., 2012b: New record of three species of genus *Aricia* Reichenbach, 1817 (Lepidoptera: Lycaenidae) in Croatia. *Acta Entomologica Slovenica* **20** (2) 135-146.
- KOREN, T., BERETTA, S., ČRNE, M. & VEROVNIK, R., 2013: On the distribution of *Pyrgus malvoides* (Elwes & Edwards, 1987) (Lepidoptera: Hesperidae) at the eastern part of its range. *Entomologist's Gazette* **64**, 225-234.
- KOREN, T. & ČRNE, M., 2012: The first record of the box tree moth, *Cydalima perspectalis* (Walker, 1859) (Lepidoptera, Crambidae) in Croatia. *Natura Croatica* **21** (2), 507-510.
- KOREN, T. & LADAVAC, L., 2010: Butterfly fauna (Lepidoptera: Hesperioidea & Papilionoidea) of Central Istria (Croatia). *Natura Croatica* **19** (2), 369-380.
- KOREN, T. & LADAVAC, L., 2013: Diversity of Macroheterocera (except fam. Noctuidae [sensu novo] and fam. Geometridae) in central Istria. *Natura Croatica* **22** (1), 73-94.
- KRANJČEV, R., 1985: Odnos faune Macrolepidoptera prema prirodnim i antropogenim staništima Podravine i podravskih pjesaka (I). *Podravski zbornik* **11**, 200-226.

- KUČINIĆ, M., KOREN, T., MIHOČI, I., VUKOVIĆ, M., JAKOVLJEVIĆ, T., BUKOVEC, D. & JENČIĆ, S., 2013: Can spreading of the Geranium bronze *Cacyreus marshalli* (Butler, 1898) (Insecta, Lepidoptera, Lycaenidae) in Croatia be assigned to climate change? *Periodicum Biologorum* **115** (3), 429-433.
- KUČINIĆ, M., PEROVIĆ, F. & VUJČIĆ-KARLO, S., 1996: Entomološka istraživanja donjeg toka rijeke Neretve. Hrvatski prirodoslovni muzej, pp. 70, Zagreb.
- KUČINIĆ, M., IGALFFY, K., ŠAŠIĆ, M. & BALEN, S., 1994: Istraženost faune leptira (Insecta, Lepidoptera) Gorskog kotara s posebnim osvrtom na šire područje NP „Risnjak“. Zbornik radova „40 godina Nacionalnog parka Risnjak“. Nacionalni park Risnjak, 91-99, 158-159.
- KUČINIĆ, M., MIHOČI, I., TVRTKOVIĆ, N., ŠAŠIĆ, M., BOJANIĆ-BAREZIĆ, D., JOKOVIĆ, S., MAZIJA, M. & POPIJAČ, A., 2011: Raznolikost danjih leptira (Insecta: Lepidoptera, Rhopalocera) otoka Mljeta. Zbornik radova simpozija „Dani Branimira Gušića, Nove spoznaje iz prirodoslovlja otoka Mljeta“, 111-125.
- KUČINIĆ, M., TVRTKOVIĆ, N. & KLETEČKI, E., 1999: The False ringlet (*Coenonympha oedippus*) is a member of the Croatian butterflies fauna after all. *Natura Croatica* **8** (4), 399-405.
- LORKOVIĆ, Z., 1993: *Leptidea reali* REISSINGER 1989 (= *lorkovicii* REAL 1988) a new European species (Lepid., Pieridae). *Natura Croatica* **2** (1), 1-26.
- MAGUIRE, I., PODNAR, M., JELIĆ, M., ŠTAMBUK, A., SCHRIMPF, A., SCHULZ, H., KLOBUČAR, G., 2014: Two distinct evolutionary lineages of the *Astacus leptodactylus* species-complex (Decapoda: Astacidae) inferred by phylogenetic analyses. *Invertebrate Systematics* **28**, 117-123.
- MANN, J., 1869: Lepidopteren gesammelt während dreier reisen nach Dalmatien in den Jahren 1850, 1862 und 1868. Verhandlungen zoologisch-botanischen Gesellschaft in Wien **19**, 371-388.
- MARAVIĆ, P.F., PEŃNA, C., WILLMOTT, K.R., FREITAS, A.V.L. & WAHLBERG, N., 2011: Systematics and evolutionary history of butterflies in the „Taygetis clade“ (Nymphalidae: Satyrinae: Euptychiina): Towards a better understanding of Neotropical biogeography. *Molecular Phylogenetics and Evolution* **66** (1), 54-68.
- MIHOČI, I., DELIĆ, A., GJURAŠIN, B., BUČAR, M. & KUČINIĆ, M., 2007a: First finding of the critically endangered butterfly *Maculinea alcon* (Denis & Schiffermüller, 1775) (Lepidoptera: Lycaenidae) in the Pannonian part of Croatia. *Natura Croatica* **16** (1), 19-28.
- MIHOČI, I., HRŠAK, V., KUČINIĆ, M., MIČETIĆ STANKOVIĆ, V., DELIĆ, A. & TVRTKOVIĆ, N., 2011: Butterfly diversity and biogeography on the Croatian karst mountain Biokovo: Vertical distribution and preference for altitude and aspect? *European Journal of Entomology* **108** (4), 623-633.
- MIHOČI, I., ŠAŠIĆ, M. & VUKOVIĆ, M., 2007b: Contribution to the butterfly fauna (Hesperioidea & Papilionoidea) of the Velebit Mountain, Croatia. *Natura Croatica* **16** (1), 29-62.
- MIHOČI, I., TVRTKOVIĆ, N. & ŠAŠIĆ, M., 2005: Grecian Copper *Lycæna ottomanus* (Lefebvre, 1830) (Lepidoptera, Lycaenidae) – a new species in the Croatian butterfly fauna. *Natura Croatica* **14** (4), 255-262.
- MIHOČI, I., VAJDIĆ, M. & ŠAŠIĆ, M., 2006: The status of the Damon Blue *Polyommatus (Agrodiaetus) damon* (Denis & Schiffermüller, 1775) (Papilionoidea: Lycaenidae, Polyommata) in the Croatian butterfly fauna. *Natura Croatica* **15** (1-2), 15-25.
- MLADINOV, L., 1958: Popis noćnih leptira (Noctua) Zagreba i okolice. Hrvatski narodni zoološki muzej, **1** (posebna izdanja), pp. 61, Zagreb.
- MLADINOV, L., 1961: Drugi prilog fauni leptira (Lepidoptera) otoka Paga. Hrvatski narodni zoološki muzej, Entomološki odjel **3**, Zagreb.
- MLADINOV, L., 1976: Lepidoptera iz doline gornjeg toka rijeke Kupe II. Bombyces i Sphinges. *Acta Entomologica Jugoslavica*, **12** (1-2), 89-98.
- PAULS, S.U., GRAF, W., HAASE, P., LUMBSCH, H.T. & WARINGER, J., 2008: Grazers, Shredders and filtering carnivores – The evolution of feeding ecology in Drusinae (Trichoptera: Limnephilidae): insights from molecular phylogeny. *Molecular Phylogenetics and Evolution* **46**, 776-791.
- PAULS, S.U., LUMBSCH, H.T. & HAASE, P., 2006: Phylogeography of the montane caddisfly *Drusus discolor*: evidence for multiple refugia and periglacial survival. *Molecular Ecology* **15** (8), 2153-2169.
- PENZ, C.M., DEVRIES, P.J., & WAHLBERG, N., 2012: Diversification of Morpho butterflies (Lepidoptera, Nymphalidae): A re-evaluation of morphological characters and new insight from DNA sequence data. *Systematic Entomology* **37** (4), 670-685.
- PERKOVIĆ, D., 2006: *Danaus chrysippus* (Insecta, Lepidoptera) a new species in the fauna of Croatia. *Natura Croatica* **15** (1-2), 61-64.
- PODNAR, M., BRUVO MAĐARIĆ, B. & MAYER, W., 2014: Non-concordant phylogeographical patterns of three widely codistributed endemic Western Balkans lacertid lizards (Reptilia, Lacertidae) shaped by spe-

- cific habitat requirements and different responses to Pleistocene climatic oscillations. *Journal of Zoological Systematics and Evolutionary Research* 52 (2), 119-129.
- PREVIŠIĆ, A., SCHNITZLER, J., KUČINIĆ, M., GRAF, W., IBRAHIMI, H., KEROVEC, M. & PAULS, S.U., 2014: Micro-Scale Vicariance and Diversification of Western Balkan Caddisflies Linked to Karstification. *Freshwater Science* 33 (1), 250-262.
- REBEL, H., 1910: Lepidopteren aus dem Gebiete des Monte Maggiore in Istrien. XXI. Jahresbericht des Wiener entomologischen Vereines 1910, p. 97-110.
- SKET, B., DOVČ, P., JALŽIĆ, B., KEROVEC, M., KUČINIĆ, M. & TRONTELJ, P., 2001: A cave leech (Hirudinea, Erpobdellidae) from Croatia with unique morphological features. *Zoologica Scripta* 30 (3), 223-229.
- SCHAWERDA, K., 1910: Zwei Arctiidenformen aus Bosnien und der Herzegovina. *Verhandlungen der zoologisch-botanischen Gesellschaft in Wien* 60, 90-93.
- SIHVONEN, P., MUTANEN, M., KAILA, L., BREHM, G., HAUSMANN, A. & STAUDE, H.S., 2011: Comprehensive Molecular Sampling Yields a Robust Phylogeny for Geometrid Moths (Lepidoptera: Geometridae): PLoS ONE 6 (6) e20356.
- SKINNER, B., 2009: Colour Identification Guide to Moths of the British Isles (Macrolepidoptera). Apollo Books, pp. 325, Stenstrup.
- STAUDER, H., 1930 Die Schmetterlingsfauna der illyro-adriatischen Festland- und Inselzone (Fauna Illyro-Adriatica). *Entomologischer Anzeiger Wien* 10, 9-11, 36-37, 52-57 75-77, 105-108, 133-136, 153-155, 201-204, 249-252, 275-276, 294-297, 309-310, 351-352, 374-377, 436-437.
- ŠAŠIĆ, M. & MIHOČI, I., 2011: Annotated checklist of Croatian butterflies with vernacular names. *Natura Croatica* 20 (2), 425-436.
- ŠPANIĆ, R., 2012: Butterfly fauna (Papilionoidea & Hesperioidea) in the surrounding area of Karlovac, Croatia. *Natura Croatica* 21 (2), 455-470.
- TÓTH, J., VARGA, K., VÉGVÁRI, Z. & VARGA, Z., 2013: Distribution of the Eastern knapweed fritillary (*Melitaea ornata* Christoph, 1893) (Lepidoptera: Nymphalidae): past, present and future. *Journal of Conservation Insects* 17, 245-255.
- TVRTKOVIĆ, N., MIHOČI, I. & ŠAŠIĆ, M., 2011: *Colias caucasica balcanica* Rebel, 1901 (Pieridae) in Croatia – the most western distribution point. *Natura Croatica* 20 (2), 375-385.
- TVRTKOVIĆ, N., ŠAŠIĆ, M., MIHOČI, I., VUKOVIĆ, M. & BIJELIĆ, M., 2012: Review of the butterfly fauna (Hesperioidea & Papilionoidea) of the Dinara mountain range. *Natura Croatica* 21 (2), 471-481.
- VARGA, Z., RONKAY, L., BÁLINT, Z., LÁSZLÓ, G.M. & PEREGOVITS, L., 2005: Checklist of the fauna of Hungary, Vol. 3 (Macrolepidoptera), Hungarian Natural History Museum, pp. 114, Budapest.
- VEROVNIK, R., SKET, B. & TRONTELJ, P., 2004: Phylogeography of subterranean and surface populations of water lice *Asellus aquaticus* (Crustacea: Isopoda). *Molecular Ecology* 13, 1519-1532.
- YELA, J.L., ZAHIRI, R., WAHLBERG, N., RONKAY, L. & ZILLI, A., 2011: Phylogenetic overview of Noctuidae sensu lato. In WITT, TH.J. & RONKAY, L. (eds): *Noctuidae Europeae*. Vol. 13, 17-22. Sorø (Entomological Press).
- WITHRINGTON, D.K.J. & VEROVNIK, R., 2008: Butterflies (Rhopalocera) of the Croatian Islands. *Entomologist's Gazette*, 59, 3-25.
- WITT, T., 1987: Lepidopterologische Sammelergebnisse der Reisen Franz Daniels nach Istrien in den Jahren 1965 mit 1971 (Lepidoptera, Bombyces et Sphinges). *Entomofauna* 8, 413-440.
- WITT, TH.J., SPEIDEL, W., RONKAY, G., RONKAY, L. & LÁSZLÓ, GY.M., 2011: Subfamilia Arctiinae. In WITT, TH.J. & RONKAY, L. (eds): *Noctuidae Europeae*, Vol. 13, 81-448. Sorø (Entomological Press).
- ZAHIRI, R., KITCHING, I.J., LAFONTAINE, D., MUTANEN, M., KAILA, L., HOLLOWAY, J.D. & WAHLBERG, N., 2011: A new molecular phylogeny offers hope for a stable family level classification of the Noctuoidea (Lepidoptera). *Zoologica Scripta* 40, 158-173.
- ZAHIRI, R., LAFONTAINE, D., SCHMIDT, C., HOLLOWAY, J.D., KITCHING, I.J., MUTANEN, M. & WAHLBERG, N., 2013: Relationships among the basal lineages of Noctuidae (Lepidoptera, Noctuoidea) based on eight gene regions. *Zoologica Scripta* 42 (5), 488-507.

## SAŽETAK

**Prvi popis vrsta potporodice Arctiinae (Lepidoptera, Erebidae) za Hrvatsku i nalaz *Rhyparioides metelkana* (Lederer, 1861), nove vrste za hrvatsku faunu pronađene u dolini Neretve**

M. Kučinić, M. Matešić, T. Koren, A. Mrnjavčić Vojvoda, M. Vajdić, D. Pelić Fixa, V. Bukvić & T. Perović

U radu se daje prvi cjeloviti popis potporodice Arctiinae, rasprostranjenost i biogeografske značajke u Hrvatskoj, te osvrt na neke zanimljive vrste medonjica zabilježenih u našoj fauni: *Pericallia matronula* L., *Spiris slovenica* Dan. i *Eilema pseudocomplana* Dan. Dosadašnjim istraživanjima za faunu Hrvatske utvrđeno je 55 vrsta, od čega u kontinentalnom dijelu 49, a u mediteranskom 50. Za oba područja zajedničke su 44 vrste (84,8 %). Tako velika faunistička sličnost uvjetovana je između ostaloga i velikim područjima rasprostranjenja na kojima je prisutan najveći broj medonjica utvrđen u fauni Hrvatske. Te vrste najvjerojatnije su dobro prilagođene na različite tipove staništa s velikom rasprostranjenošću. U svrhu utvrđivanja stupnja istraženosti, fauna medonjica Hrvatske uspoređena je s faunama medonjica Italije, Slovenije, Austrije i Mađarske, područja s jako dobrom poznatom faunom ove potporodice. Za određeni broj vrsta (e.g. *Ocnogyna parasita* Hüb., *Phragmatobia placidada* Friv., *Pericallia matronula* L., *Hyphoraia aulica* L., *Cymbalophora pudica* Esp., *Pelosia muscerda* Hufn., *P. obtusa* Her.-Sca., *Eilema pseudocomplana* Dan., *E. lutarella* L., *Dysauxes famula* Frey.) točnije poznavanje rasprostranjenosti trebat će se utvrditi u budućim istraživanjima.

Na području donjeg toka rijeke Neretve sakupljeno je tijekom 1997. godine pet primjeraka močvarne medonjice *Rhyparioides metelkana* Led., po prvi puta zabilježena u fauni Hrvatske (leg. M. Vajdić, D. Pelić-Fixa, M. Kučinić). Nalaz je potvrđen 2012. godine na istom području (leg. T. Koren). Ovaj nalaz je značajan jer je to najjužnija točka u arealu te vrste u Europi, prvi nalaz u ovom području Sredozemlja i drugi nalaz za Balkanski poluotok. Prva najbliža populacija močvarne medonjice udaljena je oko 400 km i nalazi se u Mađarskoj.

## CHECK LIST OF THE SUBFAMILY ARCTIINAE IN CROATIA WITH DISTRIBUTIONAL AND BIOGEOGRAPHICAL DATA

### Family Erebidae Leach [1815]

#### Subfamily Arctiinae Leach [1815]

##### *Spilarctia* Butler, 1875

1. *Spilarctia lutea* (Hufnagel, 1766)  
Distribution in Croatia: Continental part, Mediterranean part.  
Biogeographical characteristics: Trans-Palaeartic species.

##### *Spilosoma* Curtis, 1825

2. *Spilosoma lubricipeda* (Linnaeus, 1758)  
Distribution in Croatia: Continental part, Mediterranean part.  
Biogeographical characteristics: Trans-Palaeartic species.
3. *Spilosoma urticae* (Esper, 1789)  
Distribution in Croatia: Continental part, Mediterranean part.  
Biogeographical characteristics: Trans-Palaeartic species.

##### *Hyphantria* Harris, 1841

4. *Hyphantria cunea* (Drury, 1773)  
Distribution in Croatia: Continental part, Mediterranean part.  
Biogeographical characteristics: Holarctic species.

##### *Epatolmis* Butler, 1877

5. *Epatolmis luctifera* ([Denis & Schiffemüller, 1775])  
Distribution in Croatia: Continental part, Mediterranean part.  
Biogeographical characteristics: Trans-Palaeartic species.

##### *Diaphora* Stephens, 1827

6. *Diaphora mendica* (Clerck, 1759)  
Distribution in Croatia: Continental part, Mediterranean part.  
Biogeographical characteristics: Euro-Siberian species.
7. *Diaphora luctuosa* (Hübner, [1831])  
Distribution in Croatia: Continental part, Mediterranean part.  
Biogeographical characteristics: Adriato-Ponto-Mediterranean species.

##### *Watsonarctia* de Freina & Witt, 1984

8. *Watsonarctia deserta* (Bartel, 1902)  
Distribution in Croatia: Continental part.  
Biogeographical characteristics: Euro-Siberian species.

##### *Diacrisia* Hübner, [1813]

9. *Diacrisia sannio* (Linnaeus, 1758)  
Distribution in Croatia: Continental part, Mediterranean part.  
Biogeographical characteristics: Euro-Siberian species.



***Rhyparioides* Butler, 1877**

10. *Rhyparioides metelkana* (Lederer, 1861)  
Distribution in Croatia: Mediterranean part.  
Biogeographical characteristics: Trans-Palaeartic species.

***Rhyparia* Hübner, [1820]**

11. *Rhyparia purpurata* (Linnaeus, 1758)  
Distribution in Croatia: Continental part, Mediterranean part.  
Biogeographical characteristics: Trans-Palaeartic species.

***Ocnogyna* Lederer, 1853**

12. *Ocnogyna parasita* (Hübner, 1790)  
Distribution in Croatia: Continental part, Mediterranean part.  
Biogeographical characteristics: Ponto-Mediterranean-Anatolian species.

***Phragmatobia* Stephens, 1828**

13. *Phragmatobia fuliginosa* (Linnaeus, 1758)  
Distribution in Croatia: Continental part, Mediterranean part.  
Biogeographical characteristics: Holarctic species.
14. *Phragmatobia placida* (Frivaldszky, 1835)  
Distribution in Croatia: Mediterranean part.  
Biogeographical characteristics: Ponto-Mediterranean species.

***Parasemia* Hübner, [1820]**

15. *Parasemia plantaginis* (Linnaeus, 1758)  
Distribution in Croatia: Continental part, Mediterranean part.  
Biogeographical characteristics: Holarctic species.

***Arctia* Schrank, 1802**

16. *Arctia festiva* (Hufnagel, 1766)  
Distribution in Croatia: Continental part.  
Biogeographical characteristics: Trans-Palaeartic species.
17. *Arctia villica* (Linnaeus, 1758)  
Distribution in Croatia: Continental part, Mediterranean part.  
Biogeographical characteristics: Mediterranean-western Asiatic species.
18. *Arctia caja* (Linnaeus, 1758)  
Distribution in Croatia: Continental part, Mediterranean part.  
Biogeographical characteristics: Holarctic species.

***Pericallia* Hübner, [1820]**

19. *Pericallia matronula* (Linnaeus, 1758)  
Distribution in Croatia: Continental part.  
Biogeographical characteristics: Trans-Palaeartic species.

***Hyphoraia* Hübner, [1820]**

20. *Hyphoraia aulica* (Linnaeus, 1758)  
Distribution in Croatia: Continental part, Mediterranean part.  
Biogeographical characteristics: Euro-Siberian species.

*Chelis* Rambur, [1866]

21. *Chelis maculosa* ([Denis & Schiffermüller], 1775)  
Distribution in Croatia: Continental part, Mediterranean part.  
Biogeographical characteristics: Euro-Siberian species.

*Callimorpha* Latreille, 1809

22. *Callimorpha dominula* (Linnaeus, 1758)  
Distribution in Croatia: Continental part, Mediterranean part.  
Biogeographical characteristics: Western Palaearctic species.

*Euplagia* Hübner, [1820]

23. *Euplagia quadripunctaria* (Poda, 1761)  
Distribution in Croatia: Continental part, Mediterranean part.  
Biogeographical characteristics: Western Palaearctic species.

*Tyria* Hübner, [1819]

24. *Tyria jacobaeae* (Linnaeus, 1758)  
Distribution in Croatia: Continental part, Mediterranean part.  
Biogeographical characteristics: Euro-Siberian species.

*Cymbalophora* Rambur, [1866]

25. *Cymbalophora pudica* (Esper, [1785])  
Distribution in Croatia: Mediterranean part.  
Biogeographical characteristics: South-western-Mediterranean species.

*Spiris* Hübner, [1819]

26. *Spiris striata* (Linnaeus, 1758)  
Distribution in Croatia: Continental part, Mediterranean part.  
Biogeographical characteristics: Euro-Siberian species.
27. *Spiris slovenica* (Daniel, 1939)  
Distribution in Croatia: Continental part, Mediterranean part.  
Biogeographical characteristics: Alpine-Mediterranean species.

*Coscinia* Hübner, [1819]

28. *Coscinia cribraria* (Linnaeus, 1758)  
Distribution in Croatia: Continental part, Mediterranean part.  
Biogeographical characteristics: Trans-Palaearctic species.

*Utetheisa* Hübner, [1819]

29. *Utetheisa pulchella* (Linnaeus, 1758)  
Distribution in Croatia: Continental part, Mediterranean part.  
Biogeographical characteristics: Palaearctic-Palaeotropical species.

*Miltochrista* Hübner, [1819]

30. *Miltochrista miniata* (Forster, 1771)  
Distribution in Croatia: Continental part, Mediterranean part.  
Biogeographical characteristics: Trans-Palaearctic species.

- Nudaria* Haworth, 1809
31. *Nudaria mundana* (Linnaeus, 1761)  
Distribution in Croatia: Continental part, Mediterranean part.  
Biogeographical characteristics: Western Palaearctic species.
- Thumata* Walker, 1866
32. *Thumata senex* (Hübner, [1808])  
Distribution in Croatia: Continental part, Mediterranean part.  
Biogeographical characteristics: Western Palaearctic species.
- Cybosia* (Hübner, [1819])
33. *Cybosia mesomella* (Linnaeus, 1758)  
Distribution in Croatia: Continental part, Mediterranean part.  
Biogeographical characteristics: Euro-Siberian species.
- Pelosia* (Hübner, [1819])
34. *Pelosia muscerda* (Hufnagel, 1766)  
Distribution in Croatia: Continental part, Mediterranean part.  
Biogeographical characteristics: Trans-Palaearctic species.
35. *Pelosia obtusa* (Herrich-Schäffer, [1852])  
Distribution in Croatia: Continental part, Mediterranean part.  
Biogeographical characteristics: Trans-Palaearctic species.
- Lithosia* Fabricius, 1798
36. *Lithosia quadra* (Linnaeus, 1758)  
Distribution in Croatia: Continental part, Mediterranean part.  
Biogeographical characteristics: Trans-Palaearctic species.
- Atolmis* (Hübner, [1819])
37. *Atolmis rubricollis* (Linnaeus, 1758)  
Distribution in Croatia: Continental part, Mediterranean part.  
Biogeographical characteristics: Trans-Palaearctic species.
- Eilema* (Hübner, [1819])
38. *Eilema griseola* (Hübner, [1803])  
Distribution in Croatia: Continental part, Mediterranean part.  
Biogeographical characteristics: Trans-Palaearctic species.
39. *Eilema depressa* (Esper, [1787])  
Distribution in Croatia: Continental part, Mediterranean part.  
Biogeographical characteristics: Trans-Palaearctic species.
40. *Eilema lutarella* (Linnaeus, 1758)  
Distribution in Croatia: Continental part, Mediterranean part.  
Biogeographical characteristics: Trans-Palaearctic species.
41. *Eilema lurideola* (Zincken, 1817)  
Distribution in Croatia: Continental part, Mediterranean part.  
Biogeographical characteristics: Trans-Palaearctic species.

42. *Eilema caniola* (Hübner, [1808])  
Distribution in Croatia: Continental part, Mediterranean part.  
Biogeographical characteristics: Holo-Ponto-Mediterranean species.
43. *Eilema costalis* (Zeller, 1847)  
Distribution in Croatia: Mediterranean part.  
Biogeographical characteristics: Ponto-Mediterranean species.
44. *Eilema palliatella* (Scopoli, 1763)  
Distribution in Croatia: Continental part, Mediterranean part.  
Biogeographical characteristics: Mediterranean-Turkestanian species
45. *Eilema complana* (Linnaeus, 1758)  
Distribution in Croatia: Continental part, Mediterranean part.  
Biogeographical characteristics: Trans-Palaeartic species
46. *Eilema pseudocomplana* (Daniel, 1939)  
Distribution in Croatia: Mediterranean part.  
Biogeographical characteristics: Mediterranean-Iranian species.
47. *Eilema pygmaeola* (Doubleday, 1847)  
Distribution in Croatia: Continental part, Mediterranean part.  
Biogeographical characteristics: Trans-Palaeartic species.
48. *Eilema sororcula* (Hufnagel, 1766)  
Distribution in Croatia: Continental part, Mediterranean part.  
Biogeographical characteristics: Trans-Palaeartic species.

*Setina* Schrank, 1802

49. *Setina irrorella* (Linnaeus, 1758)  
Distribution in Croatia: Continental part.  
Biogeographical characteristics: Euro-Siberian species.
50. *Setina roscida* ([Denis & Schiffermüller], 1775)  
Distribution in Croatia: Continental part.  
Biogeographical characteristics: Euro-Siberian species.

*Amata* Fabricius, 1807

51. *Amata phegea* (Linnaeus, 1758)  
Distribution in Croatia: Continental part, Mediterranean part.  
Biogeographical characteristics: European species.
52. *Amata marjana* (Stauder, 1913)  
Distribution in Croatia: Continental part, Mediterranean part.  
Biogeographical characteristics: Mediterranean-Caucasian-Asian species.

*Dysauxes* Hübner, [1819]

53. *Dysauxes ancilla* (Linnaeus, 1767)  
Distribution in Croatia: Continental part, Mediterranean part.  
Biogeographical characteristics: Western-Palaeartic species.

54. *Dysauxes famula* (Freyer, 1836)  
Distribution in Croatia: Mediterranean part.  
Biogeographical characteristics: Trans-Palaeartic species.
55. *Dysauxes punctata* (Fabricius, 1781)  
Distribution in Croatia: Continental part, Mediterranean part.  
Biogeographical characteristics: Western Palaeartic species.