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A contribution to the Slovenian spider fauna – II

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Abstract. The present study reports on and discusses new records for the Slovenian spider fauna, namely: *Asthenargus bracianus*, *Clubiona leucaspis*, *Euryopis laeta*, *Lasaeola prona*, *Lathys stigmatisata*, *Meioneta innotabilis*, *Oecobius maculatus*, *Porrhomma microphthalmum*, *Trichoncus saxicola* and *Zodarion pusio*. According to their areas of distribution and confirmed presence in the neighbouring countries, the presence of newly recorded species in Slovenia can be considered as expected, indicating still incomplete knowledge of Slovenian spider fauna.

Key words: new records, spiders, Slovenia, faunistics

Izvleček. Prispevek k favni pajkov Slovenije – II – Prispevek obravnava deset vrst pajkov, ki doslej v Sloveniji še niso bile najdene, in sicer: *Asthenargus bracianus*, *Clubiona leucaspis*, *Euryopis laeta*, *Lasaeola prona*, *Lathys stigmatisata*, *Meioneta innotabilis*, *Oecobius maculatus*, *Porrhomma microphthalmum*, *Trichoncus saxicola* in *Zodarion pusio*. Glede na areale razširjenosti in njihovo pojavljanje v sosednjih državah je pojavljanje večinev prispevku obravnavanih vrst v Sloveniji pričakovano, kar kaže na še vedno pomanjkljivo poznavanje favne pajkov v Sloveniji.

Ključne besede: nove najdbe, pajki, Slovenija, favnistika

Introduction

Slovenian arachnology has a long history. The first records of spider fauna in Slovenia reach back to the mid-18th century (Scopoli 1763), while an impressive opus of the most prominent Slovenian arachnologist, the late Dr Anton Polenec, from the second half of the 20th century includes more than 70 scientific publications (reviewed in Kuntner & Šereg 2002). Nevertheless, our knowledge of Slovenian spider fauna is still incomplete. Regarding the number of spider species in some countries in the region that are of comparable surface (Blick et al. 2004, Kuntner & Šereg 2002), the biogeographic properties of Slovenia and the fact that the number of species listed in so far the only checklist of the Slovenian spider fauna (Nikolić & Polenec 1981) has been almost doubled in recent decades, the initial estimation that another fifty to hundred spider species can be expected to be found in Slovenia (Kostanjšek 2010) might be even underestimated.

In order to contribute to a much needed comprehensive overview of the Slovenian spider fauna, the present study reports on and discusses new records of the Slovenian spider fauna retrieved during a whole-year survey of ground spiders near Nova Gorica in Western Slovenia, and material gathered at the Biology Students Research Camp (RTŠB) in 2011 at Sv. Jurij ob Ščavnici in northeastern Slovenia.

Material and methods

During the survey performed in western Slovenia, the spiders were sampled using 96 pitfall traps set on the slopes of Sabotin and Sv. Katarina near Solkan between March 2008 and March 2009. The traps were filled with ethylene glycol as fixative. During the sampling in north-eastern Slovenia, selective samplings by hand and forceps, catcher net or sampling by sifting of leaf litter were applied at several locations near Sv. Jurij ob Ščavnici between 22. and 29. 7. 2011. Sampled specimens were commonly fixed in 70% ethanol. Absolute ethanol was used as fixative when samples were preserved for further DNA analysis. In most cases, soft tissues were removed from sclerotised parts of genitalia by overnight soaking in 15% KOH.

Specimens were identified according to various determination keys and published descriptions (Roberts 1993a, b, 1995, Heimer & Nentwig 1991, Nentwig et al. 2013). The systematics and nomenclature of the determined spiders follow Platnick (2013).

For each species, data of the collected material include description of the collecting site, geographic latitude and longitude in the Gauss-Krüger coordinates according to on-line application Atlas okolja (ARSO, 2013), altitude in meters above sea level (a.s.l.), date of collection, sampling method, followed by data on the material provider (leg.) and species determinator (det.). Descriptions of the collected material are followed by data on distribution of the species in other countries in the region and comments on the findings.

The specimens are deposited in zoological collection of the Department of Biology, Biotechnical Faculty, University of Ljubljana.

Results and discussion

Clubiona leucaspis Simon, 1932 - Clubionidae

- forest edge, SW slope of Sv. Katarina, NE of Nova Gorica; Y=396480; X=92180, 185 m a.s.l.; 1♀: 28. 6. - 5. 7. 2008; pitfall traps; leg.: Gorjan A., det.: Kostanjšek R.
- meadow, E slope of Sabotin, N of Nova Gorica; Y=396010, X=93890, 120 m a.s.l.; 1♀: 5. - 12. 4. 2008, 1♂: 22. - 29. 3. 2008, 2♂: 29. 3. - 5. 4. 2008, 1♂: 26. 4. - 3. 5. 2008; pitfall traps; leg.: Alenka Gorjan, det.: Kostanjšek R.

Distribution and comment: the species is distributed in western and central Europe (Blick et al. 2004, van Helsdingen 2010) and reaches as far as Bulgaria in the east (van Helsdingen 2010) and Algeria in the south (Platnick 2013). Due to its presence in northern Italy (Stoch 2003) and Austria (Blick et al. 2004), the occurrence of *C. leucaspis* in western Slovenia is not surprising.

Lathys stigmatisata (Menge, 1869) - Dictynidae

- meadow, E slope of Sabotin, N of Nova Gorica; Y=396010, X=93890, 120 m a.s.l.; 3♂: 12. - 19. 4. 2008; pitfall traps; leg.: Gorjan A., det.: Kostanjšek R.

Distribution and comment: in several identification keys commonly used in determination of European spiders (Roberts 1993a, 1995, Heimer & Nentwig 1991), the species is misidentified as *L. puta* (Platnick 2013). The distribution of the species is Palearctic (Platnick, 2013), although its presence has not been confirmed in Scandinavia, former Yugoslavia, Romania and Moldova (van Helsdingen 2010). Since the species is present in all neighbouring countries except Croatia, as already mentioned, the presence of this relatively rare ground species (Heimer & Nentwig 1991) preferring dry land with sparse vegetation (Roberts 1995) in Slovenia has been expected.

Asthenargus bracianus Miller, 1938 - Linyphiidae

- forest, SE slope of Sabotin, N of Nova Gorica; Y=395770, X=93550; 95 m a.s.l.; 1♂: 13. - 21. 12. 2008; pitfall traps; leg.: Gorjan A., det.: Kostanjšek R.
- forest edge, SE slope of Sabotin, N of Nova Gorica; Y=395960, X=93835; 120 m a.s.l.; 1♂: 7. - 13. 12. 2008, 2♂: 13. - 21. 12. 2008, 2♂: 21. - 28. 12. 2008; pitfall traps; leg.: Gorjan A., det.: Kostanjšek R.

Distribution and comment: the distribution of the species is central and eastern European according to Platnick (2013), although the species has been recorded only from Austria (Blick et al. 2004), northern Italy (Stoch 2003), Romania (Weiss & Petrisor 1999) and Croatia (Nikolić & Polenec 1981). The species prefers xerothermic habitats like dry forests or deeper layers of soils including microcavernicolous environments, which are all common in the karst base of Sabotin, where the species was found. Despite all year long sampling in our area of interest in western Slovenia, all specimens of *A. bracianus* were retrieved in winter months, which is in congruity with previously reported winter activity of the species (Nentwig et al. 2013). Although the distribution of *A. bracianus* appears local and has been even referred to as endemic to the Croatian island of Brač (Nikolić & Polenec 1981), it cannot be excluded that this sheet-web spinning species has been often overlooked in the region due to its size, cryptic habitat and phenology.

Meioneta innotabilis (O. P.-Cambridge, 1863) - Linyphiidae

- forest, 2 km SW from Apače, W of Gornja Radgona; Y=569037, X=171103; 220 m a.s.l.; 1♀: 26. 7. 2011; sifting of leaf litter; Leg. RTŠB '11, det.: Kostanjšek R.

Distribution and comment: although not confirmed in Croatia and Hungary (van Helsdingen 2010), the species is widespread throughout Europe and Russia (Platnick 2013) and was therefore expected in Slovenia. This species inhabits tree trunks or the litter in the base of trees (Roberts 1993b), where it was found in our case. While the species is fairly frequently found in Britain (Roberts 1993b), it is considered rare in central Europe (Heimer & Nentwig 1991).

Porrhomma microphthalmum (O. P.-Cambridge, 1871) - Linyphiidae

- meadow, 1.2 km NNE from village Biš, SE of Lenart; Y=568927, X=155230; 225 m a.s.l.; 1♀: 27. 7. 2011; Leg. RTŠB '11, det.: Kostanjšek R.

Distribution and comment: the species has Palearctic distribution (Platnick 2013) and has been recorded in most countries in the region (van Helsdingen 2010), including all countries neighbouring Slovenia. This species prefers plains and is, as in our case, commonly found in agrarian areas (Nentwig 2013, Heimer & Nentwig 1991), or under stones and in undergrowth (Roberts 1993b).

Trichoncus saxicola (O. P.-Cambridge, 1861) - Linyphiidae

- forest, SE slope of Sabotin, N of Nova Gorica; Y=395770, X=93550; 95 m a.s.l.; 1♀: 31. 5 - 7. 6. 2008; pitfall traps; leg.: Gorjan A., det.: Kostanjšek R.

Distribution and comment: the species is distributed throughout Europe and Russia (Platnick 2013), including all Slovenia's neighbouring countries except Hungary (van Helsdingen 2010). This species is usually found in moss or on grass (Roberts 1993b). Althoughit is rarely found in some parts of Europe (Roberts 1993b), this sheet-web spider species might have been overlooked due its small size.

Oecobius maculatus Simon, 1870 - Oecobiidae

- meadow, E slope of Sabotin, N of Nova Gorica; Y=396010, X=93890, 120 m a.s.l.; 1♂: 31. 5. - 7. 6. 2008, 1♂: 14. - 21. 6. 2008; pitfall traps; leg.: Gorjan A., det.: Kostanjšek R.

Distribution and comment: although the two only central European *Oecobius* species are cosmopolitan (Platnick 2013) and often synanthropic (Roberts 1995), and therefore likely present in Slovenia, the first record of the genus *Oecobius* in the area of the former Yugoslav republics belongs to our finding of *O. maculatus*. The species ranges from the Iberian Peninsula throughout the Mediterranean to Azerbaijan (Platnick 2013). Among the countries neighbouring Slovenia, the species has been recorded in Italy, Austria and Hungary (van Helsdingen 2010).

Euryopis laeta (Westring, 1861) - Theridiidae

- forest, SE slope of Sabotin, N of Nova Gorica; Y=395770, X=93550; 95 m a.s.l.; 4♀: 28. 6. - 5. 7. 2008; pitfall traps; leg.: Gorjan A., det.: Kostanjšek R.
- forest edge, SE slope of Sabotin, N of Nova Gorica; Y=395955,X=93835; 120 m a.s.l.; 2♂: 5. - 15. 7. 2008; pitfall traps; leg.: Gorjan A., det.: Kostanjšek R.
- rocks, SE slope of Sabotin, N of Nova Gorica; Y=395655, X=93525; 115 m a.s.l.; 1♂: 17. - 24. 5. 2008, 2♂, 2♀: 24. - 31. 5. 2008, 2♂, 1♀: 31. 5. - 7. 6. 2008, 1♀: 7. - 14. 6. 2008, 4♂, 1♀: 14. - 21. 6. 2008; pitfall traps; leg.: Gorjan A., det.: Kostanjšek R.
- meadow, E slope of Sabotin, N of Nova Gorica; Y=396010, X=93890, 120 m a.s.l.; 1♂: 24. - 31. 5. 2008, 1♂: 31. 5. - 7. 6. 2008 1♂: 7. - 14. 6. 2008, 2♀: 5. - 15. 7. 2008, 1♀: 15. - 20. 7. 2008; pitfall traps; leg.: Gorjan A., det.: Kostanjšek R.

Distribution and comment: globally, the species is distributed from Europe to Tajikistan, including Tunisia (Platnick 2013). In central Europe, the species is associated to very warm microhabitats (Heimer & Nentwig 1991, Nentwig 2013), and from this aspect it is surprising that the species has not been recorded on the Iberian and Balkan Peninsulas (except Bulgaria) (van Helsdingen 2010). During our survey of the ground spider fauna in western Slovenia, the species was frequently found at the southern slope of Sabotin, which corresponds to the above mentioned preference of warm habitats by *E. laeta* in central Europe.

Lasaeola prona (Menge, 1868) - Theridiidae

- lawn, Pod vinogradi 31, Solkan, Nova Gorica, Y=395933; X=92311; 113 m a.s.l.; 1♂: 23. - 30. 8. 2008; pitfall traps; leg.: Gorjan A., det.: Kostanjšek R.

Distribution and comment: the species has a Holarctic distribution (Platnick 2013); its biology is poorly known (Heimer & Nentwig 1991) and it is generally rare (Roberts 1995). The species is present in central Europe, including all countries in the region except the former Yugoslav republics (van Helsdingen 2010). From this aspect, the presence of the species in Slovenia was assumed, yet not proven, already by Nikolić & Polenec (1981) in their summarized work on the spider fauna of Yugoslavia, where the species still appears under its former name of *Dipoena prona* (Menge, 1868).

Zodarion pusio Simon, 1914 - Zodariidae

- meadow, E slope of Sabotin, N of Nova Gorica; Y=396010, X=93890, 120 m a.s.l.; 1♂ 10. - 17. 5. 2008, 2♂, 1♀: 14. - 21. 6. 2008, 1♂: 28. 6. - 5. 7. 2008, 1♂: 5. - 15. 7. 2008; pitfall traps; leg.: Gorjan A., det.: Kostanjšek R.

Distribution and comment: the species has been recorded from France, Tunisia, Italy, Croatia and Bosnia-Herzegovina only (Platnick 2013). According to its presence in the region, the finding of *Z. pusio* near the Italian border was not surprising.

This contribution to the Slovenian spider fauna is the second in the series, established to encourage and promote new records to the spider fauna in Slovenia and to contribute to the new and up-to-date checklist of Slovenian spiders. The known number of spider species in the territory of Slovenia has increased from the initial 44 species listed in *Entomologia Carniolica* by Scopoli (1763), over 416 species cited in the first and so far the only checklist of the Slovenian spider fauna (Nikolić & Polenec 1981) to 529 in the last summarized work on the Slovenian spider fauna (Kuntner & Šereg 2002). With sporadic papers in between and several after the above mentioned works (e.g. Kuntner 1999, Kuntner & Kostanjšek 2000, Fišer & Kostanjšek 2001, Kostanjšek & Miller 2004, Kostanjšek 2004, Kostanjšek & Fišer 2005, Kostanjšek & Celestina 2008, Gregorič & Kuntner 2009, Kostanjšek 2010), the number of the spiders listed in the checklist of Slovenian spiders (Nikolić & Polenec 1981) has nearly doubled in recent years and currently consists of 739 species, including the species presented in this paper. Despite the fact that the Slovenian spider fauna is still far from being fully known, the above listed additions to our spider fauna as well as a number of changes in the spider nomenclature in recent decades (Platnick 2013) certainly justify the need for a contemporary check-list of Slovenian spiders, which would provide a solid base for further investigations.

Povzetek

Prispevek je drugi v seriji prispevkov o favni pajkov Slovenije, vzpostavljeni z namenom spodbujanja objav novih zanimivih najdb pajkov na območju Slovenije in prispevati k novemu, dopolnjenemu seznamu vrst pajkov Slovenije. Obravnava deset vrst pajkov, ki doslej v Sloveniji še niso bile najdene, in sicer: *Clubiona leucaspis* Simon, 1932, *Lathys stigmatisata* (Menge, 1869), *Asthenargus bracianus* Miller, 1938, *Meioneta innotabilis* (O. P.-Cambridge, 1863), *Porrhomma microphthalmum* (O. P.-Cambridge, 1871), *Trichoncus saxicola* (O. P.-Cambridge, 1861), *Oecobius maculatus* Simon, 1870, *Euryopis laeta* (Westring, 1861), *Lasaeola prona* (Menge, 1868) in *Zodarion pusio* Simon, 1914. Glede na razširjenost obravnavanih vrst v Evropi, je njihovo pojavljanje v Sloveniji pričakovano. Najdba desetih novih vrst na časovno in prostorsko omejenih območjih vzorčenja, predstavljenih v prispevku, kaže na še vedno pomanjkljivo raziskanost favne pajkov v Sloveniji. Ta trenutno obsega 739 vrst, glede na pestrost habitatov v Sloveniji in število poznanih vrst pajkov v primerljivo velikih državah v regiji pa lahko v Sloveniji realno pričakujemo vsaj še sto ali celo več vrst pajkov.

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Species diversity and composition of small mammal communities in Goteniška gora (S Slovenia)

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Abstract. Although a considerable improvement in knowledge about small mammal fauna in Slovenia has been noted over the past 30 years, the group is still understudied. Here we present results of the nine-year trapping and information on abundance and community assemblage of small mammals of Goteniška gora, a mountain in southern Slovenia. Trappings were conducted every September from 2002 to 2010. Traps were set in different habitats, ranging from open-space meadows and stony karst areas to dense fir-beech forests (*Abieti-Fagetum dinaricum*). At least 12 different species constituted local communities, mostly resembling central European deciduous and mixed forest communities. Some representatives of Alpine small mammal communities and a Pleistocene relict were also present.

Key words: small mammal community, long term trapping, Goteniška gora, Dinarides

Izvleček. Vrstna pestrost in sestava združb malih sesalcev na Goteniški gori (J Slovenija) – Kljub napredku na področju raziskovanja malih sesalcev Slovenije v zadnjih 30 letih je ta skupina še vedno slabo preučena. V prispevku predstavljamo rezultate devetletnega vzorčenje na območju Goteniške gore na jugu Slovenije in podatke o gostoti in združbah malih sesalcev na tem območju. Vzorčili smo vsak september v letih od vključno 2002 do 2010 v različnih habitatih, od odprtih travnikov in kamnitega kraškega območja do gostih, dinarskih jelovo-bukovih (*Abietum-Fagetum dinaricum*) gozdnih sestojev. Združbo malih sesalcev Goteniške gore sestavlja vsaj 12 različnih vrst malih sesalcev, v glavnem značilnih za srednjeevropske listopadne in mešane gozdove. Poleg teh smo zabeležili tudi predstavnike alpinskih združb malih sesalcev, kot tudi en pleistocenski relikt.

Ključne besede: mali sesalci, združba, večletno vzorčenje, Goteniška gora, Dinaridi

Introduction

According to the literature, there are more than 2,500 species of small mammals present on all continents except Antarctica (Nowak 1999). More than 125 species are known from Europe (Temple & Terry 2007), where the small mammal assemblage consists of two independent evolutionary lineages: Eulipotyphla (some of the families formerly belonging to the order Insectivora) and Rodentia (Barnett & Dutton 1995). In Slovenia, the group is represented by thirty one species; last one added to the list is the garden dormouse *Eliomys quercinus* (Kryštufek 2003). Since small mammals inhabit different niches and participate in nutrient circulation, they are an important part of every terrestrial ecosystem, representing a link between different trophic levels (Stoddart 1979). Small mammals, especially rodents, are known for periodical oscillations in their numbers. At least 20 hypotheses have been formulated to explain this pattern, invoking the effect of specialist predators, food shortage, or intrinsic factors (Smith et al. 2006, Zub et al. 2012).

Thanks to the work carried out by Slovenian biologists at the end of the 20th century and beginning of the 21st century, considerable knowledge about Slovenian theriofauna has been collected; still, the small mammal fauna remains understudied. B. Kryštufek, the author of *Sesalci Slovenije*, a key work of Slovenian mammalogy (Kryštufek, 1991), made major advances in small mammal knowledge from the 1980s onward. Kryštufek (1983, 1987), Remžgar (1990) and Vrček (2002), among others, have already conducted several small mammal studies from the broader vicinity of Kočevje, including Goteniška gora.

In this paper, we analysed data on small mammals collected during the nine-year trapping in Goteniška gora (S Slovenia) and compiled a list of small mammals present in the study region, including some morphometric characteristics and sample-based estimates of total number of expected species.

Materials and methods

Study area

The study was conducted at Goteniška gora, the mountain situated in southern Slovenia. Mountain ridge orientation follows the main Dinaric ridge direction - from northwest to southeast. The highest peak of Goteniška gora is Goteniški Snežnik (1,290 m a.s.l.). Mean annual air temperature is 6-8°C, mean temperatures for January -2–0°C and 18–20°C for July. Goteniška gora has average annual precipitation between 1,600 and 2,600 mm (ARSO 2006). Although the area has one of the highest precipitation rates in Slovenia, the lack of surface waters is obvious due to the permeable karst geology (Gams 2004). Geological substrate is mostly Cretaceous and Jurassic limestone, dolomite and dolomitic limestone combined with Triassic dolomites (Pleničar et al. 2009). Most of the soil is Chromic Cambisol and Rendzina (Mihelič et al. 2000). Phytogeographically, the altitudes below 700 m a.s.l. belong to the

pre-Dinaric region and those above 700–800 to the Dinaric phytogeographic area (Marinček & Zupančič 1977). The latter region, which includes most of Goteniška gora, is mainly covered with dense Dinaric fir-beech forests (*Abieti-Fagetum dinaricum*) in the areas from 900 to 1,300 m a.s.l. (Surina 2002).

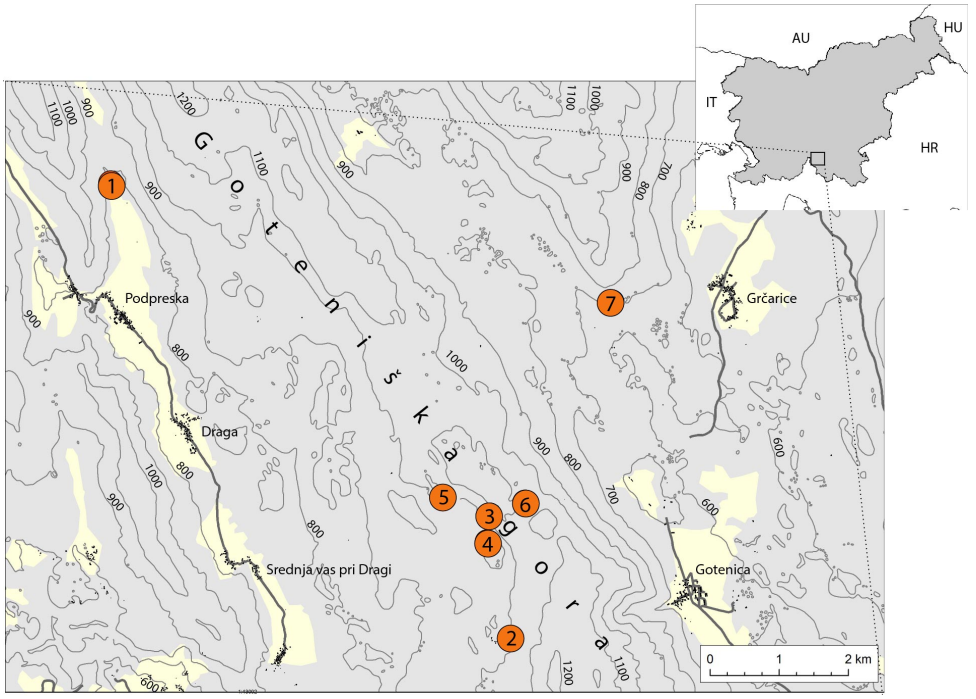

Figure 1. Geographic position of Goteniška gora and sampling sites. Numbers of sampling sites refer to Table 1.
Slika 1. Položaj Goteniške gore in vzorčnih mest. Številke vzorčnih mest se nanašajo na Tabelo 1.

Small mammals were trapped in the second half of September from 2002 to 2010. Trappings were performed at seven different localities (Fig. 1, Tab. 1). Through the years, the trapping method was changed in respect to trap setting and number of traps used (ranged from 45 to 128 traps per sampling site). In general, two traps were used in a pair to avoid snapping of at least one from a pair as a consequence of bad weather conditions (e.g. rain or strong wind) and set at 10 m distance in a grid formation. Traps were set in the places with visible signs of small mammals' activity: in front of animal burrows, on paths, etc. Trap checking was performed twice a day: in the morning and in the evening. Baits were a mix of canned sardines in oil and bread crumbs and were refreshed as needed (dissolved by rain, old or removed by other animals). Trapping sessions lasted from three to seven days. If trapping exceeded three days per year, it was usually performed on two different localities that were at least few hundred meters apart. Details about trapping sites, trapping duration, number of used traps and habitat type are given in Tab. 1.

Table 1. List of sampled sites with Gauss-Krüger coordinates and information on the number of traps, habitat type, etc.
Tabela 1. Seznam vzorčenih mest s koordinatnimi točkami po Gauss-Krüger-ju in informacijami o številu pasti, habitatu itd.

	Year	Date	Sample site	Gauss-Krüger y	Gauss-Krüger x	N (traps)	N (days)	Habitat type
1.	2002a	18.-20.9.	Podpreska	472327	57920	64	2	forest edge
2.	2002b	12.-16.9.	Medvedjak, travnik	478110	51357	64	4	meadow
2.	2003	23.-25.9.	Medvedjak, travnik	478110	51357	64	2	meadow
2.	2004	21.-23.9.	Medvedjak, travnik	478110	51357	128	2	meadow
2.	2005	20.-22.9.	Medvedjak, travnik	478110	51357	112	2	meadow, forest edge
3.	2006	26.-28.9.	Sovja stena	477801	53133	112	2	forest
3.	2007	26.-28.9.	Sovja stena	477801	53133	112	2	forest
4.	2008a	20.-22.9.	Goteniška gora	477767	52747	128	2	forest
5.	2008b	24.-26.9.	Ograda	477137	53385	128	3	forest
3.	2009a	19.-23.9.	Sovja stena 1	477801	53133	70	4	forest
3.	2009b	24.-27.9.	Sovja stena 2	477801	53133	70	3	forest
6.	2010a	18.-24.9.	Hajduk	478313	53319	60	6	forest
7.	2010b	18.-24.9.	Konfin	479569	56205	45	6	forest

Measurements and data analyses

Animals were weighed, measured and sexed; specimens were identified according to Macdonald & Barrett (1993). Weight was measured to 0.5 g accuracy with Pesola 60 g Micro-Line Spring Scale. Snout-vent length, tail length, hind feet and ear measurements were taken with a metal ruler (±1 mm accuracy). Animals were skinned, the skin stretched on cardboards of adequate sizes, and the body residuals preserved in 96% ethyl alcohol for future research.

Based on data collected over the nine years, we calculated abundance per species, abundance per year, sex ratio and daily activity. Since data for daily activity and sex ratio are incomplete, we presented results only for the trapping years with complete information (daily activity) and those individuals whose sex was reliably determined (less 12 individuals). For the six most abundant species we calculated minimum, maximum and mean values for every measurement taken. Additionally, we estimated sample-based total species number for small mammals, and species accumulation curve with EstimateS 8.2.0 (Colwell et al. 2012) for Goteniška gora overall and separately for open and forest habitats (Fig. 5). We used R statistical environment (R Development Core Team, 2012) for data handling and calculation of the parameters. Vegan (Oksanen et al. 2012) and BiodiversityR (Kindt & Coe 2005) packages were used for calculating the expected number of species. Data visualization was done using package ggplot2 (Wickham 2009). The R code is available per request from the authors.

Results

Over a period of 9 years, from 2002 to 2010, we trapped 341 animals, belonging to 12 species of small mammals (nine rodents and three insectivores: the latter referring to species belonging to former Insectivora) (Tab. 2, Fig. 2). The information on trapped individuals overall and in two different habitats is given in Tab. 2.

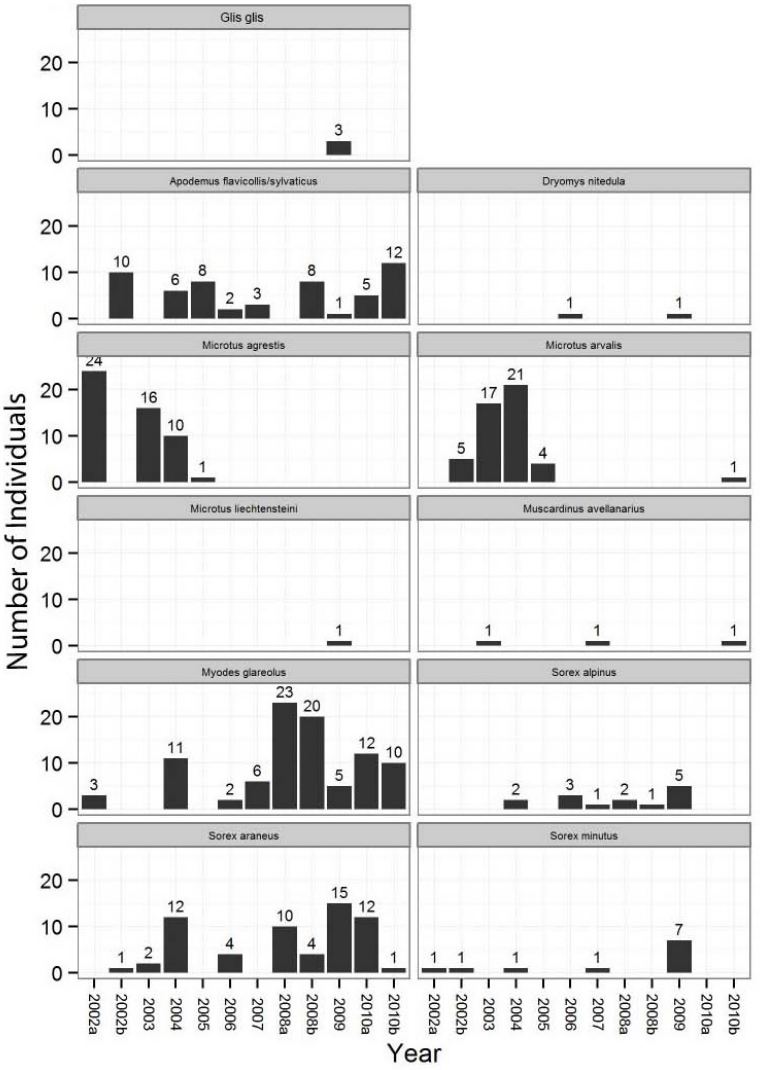

Figure 2. Number of individuals per species through the 2002-2010 period. Years with a and b note stand for two different sampling sites per year.

Slika 2. Število ujetih osebkov za posamezno vrsto skozi leta 2002-2010. Oznaki a in b na letnicah označujeta dve lokaliteti, vzorčeni v istem letu.

Table 2. Species assemblage overall and in two habitats: open and forest habitats. The most abundant species are printed in bold.
Tabela 2. Prikaz vrstne sestave za vsa vzorčenja skupaj ter ločeno po tipu habitata: travniškem in gozdnem. Krepko odtisnjene so najpogosteje ulovljene vrste.

	total number		**open habitat**		**forest habitat**	
Species	**N**	**%**	**N**	**%**	**N**	**%**
Myodes glareolus	**92**	**27.0**	14	10	**78**	**38.8**
Sorex araneus	**61**	**17.9**	14	10	**47**	**23.4**
Apodemus flavicollis/sylvaticus	**55**	**16.1**	14	10	**41**	**20.4**
Microtus agrestis	51	15.0	**51**	**36**		
Microtus arvalis	48	14.0	**42**	**30**	6	3.0
Sorex alpinus	14	4.1	2	1	12	6.0
Sorex minutus	11	3.2	2	1	9	4.5
Glis glis	3	0.8			3	1.5
Muscardinus avellanarius	3	0.8	1	1	2	1.0
Dryomys nitedula	2	0.6			2	1.0
Microtus liechtensteini	1	0.3			1	0.5
total number	**341**	**100%**	**140**	**100%**	**201**	**100%**

The most abundant species of Goteniška gora were bank vole *Myodes glareolus* (27.0%) and common shrew *Sorex araneus* (17.9%), the third most abundant species was yellow-necked/wood mouse *Apodemus flavicollis/sylvaticus* (16.1%) (Tab. 2). The pooled proportion of the remaining species in the community was below 40%. Since morphological features do not always suffice for species determination, data for *A. flavicollis* and *A. sylvaticus* are given together. Due to the habitat type and the biogeographic region itself, our data most likely concern primarily *A. flavicollis*, which is the most abundant small mammal of the Dinaric forests (Kryštufek 1991, Trilar 1991).

If we divide data according to habitat type, open habitat and forest habitat, we can see a notable difference in species composition. In open habitats (meadow above 1,000 m a.s.l.), the most abundant species are field vole *Microtus agrestis* (36%) and common vole *Microtus arvalis* (30%). Composition of the most abundant species in forest habitats resembles overall composition: *M. glareolus* (38.8%), *S. araneus* (23.4%) and *A. flavicollis/sylvaticus* (20.4%). Overall, 140 individuals belonging to at least eight different species were trapped in open habitat and 201 belonging to at least 10 species in forest habitats. Values of body measurements for the six most abundant species are given in Tab. 3.

Table 3. Body measurements for the six most abundant species.
Tabela 3. Vrednosti telesnih velikosti za šest najbolj pogostih vrst.

		Weight [g]			Snout-Vent [mm]			Tail length [mm]			Hind foot [mm]			Ear length [mm]		
	N	Min	Mean	Max	Min	Mean	Max	Min	Mean	Max	Min	Mean	Max	Min	Mean	Max
Myodes glareolus	**92**	13	23.9	62	30	96	150	29	45.1	86	12	18.4	28	7	11.9	19
Sorex araneus	**61**	7.5	8.33	9	54	64.7	77	42	46	49	12	12.3	13			
Apodemus flavicollis/sylvaticus	**55**	12	24.3	40	69	90.7	120	35	94.8	113	12	22.8	29	11	16.9	23
Microtus agrestis	**51**	10	24.1	48	71	95.3	123	21	30.1	44	13	17	20	6	10.9	18
Microtus arvalis	**48**	10	22	52	64	89.8	129	16	29.3	43	14	16.4	26	9	11.4	17
Sorex alpinus	**14**	11.3	12.8	14.2	75	75.5	76	68	69	70	15	15.5	16			

Rodents were generally more abundant, irrespective of differences between habitats, except in the years 2006 and 2009.

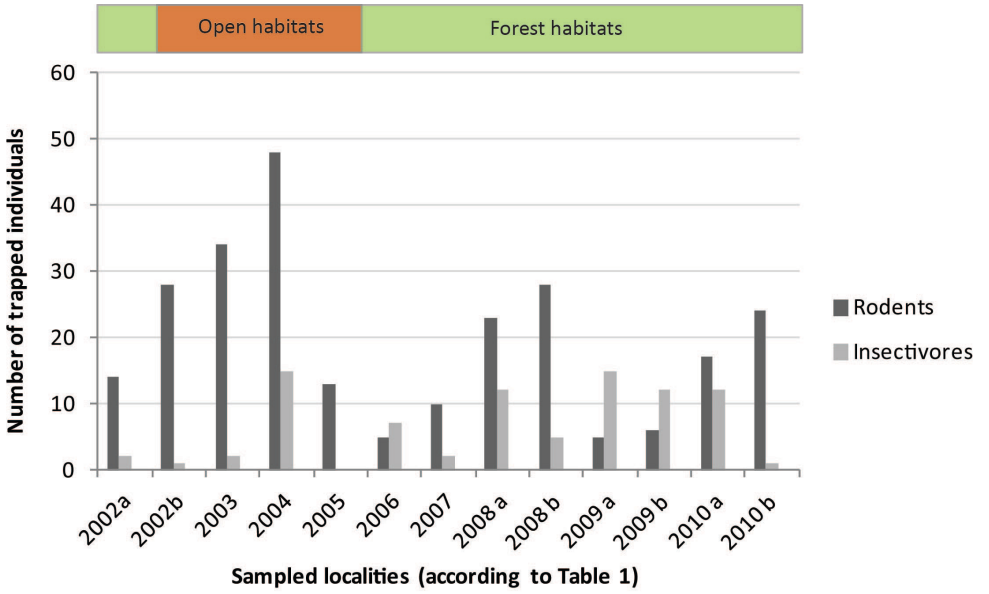

Figure 3. Number of insectivores and rodents trapped according to sampling localities in two different habitat types.
Slika 3. Število ujetih žužkojedov in glodalcev glede na vzorčno mesto v različnih habitatih.

The two methods used to predict total species number of Goteniška gora gave similar results. Sample-based estimation predicted that 11–13 species are present in sampled area of Goteniška gora (10–12 in forest habitats and 8–10 in open habitats); similar results are shown by accumulation curves for open habitats, forest habitats and Goteniška gora overall (Fig. 4).

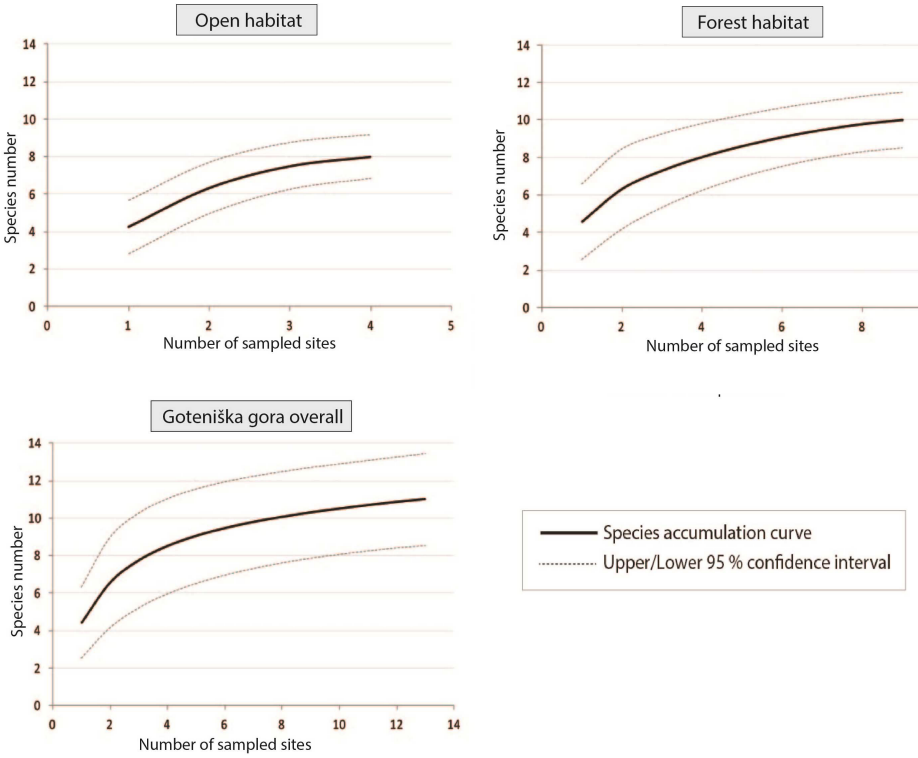

Figure 4. Sample-based species accumulation curves for Goteniška gora overall, open and forest habitats.
Slika 4. Krivulja kopičenja vrst za Goteniško goro, travniške in gozdne habitate, nastala na podlagi vzorčenj.

Table 4. Percentage of males and females per species for Goteniška gora, open and forest habitats.
Tabela 4. Razmerje med spoloma znotraj vrste za Goteniško goro, travniške in gozdne habitate.

	Goteniška gora overall			Open habitats			Forest habitats		
	Total	% ♂	% ♀	Total	% ♂	% ♀	Total	% ♂	% ♀
M. glareolus	**87**	**55**	**45**	14	57	43	**73**	**55**	**45**
S. araneus	**57**	**58**	**42**	14	36	64	**43**	**56**	**44**
A. flavicollis/sylvaticus	**54**	**50**	**50**	14	57	43	**40**	**48**	**53**
M. agrestis	51	30	70	**51**	**30**	**70**			
M. arvalis	47	34	66	**41**	**37**	**63**	6	17	83
S. alpinus	14	50	50	2	0	100	12	58	42
S. minutus	11	73	27	2	50	50	9	78	22
G. glis	3	0	100				3	0	100
D. nitedula	2	100	0				2	100	0
M. avellanarius	2	50	50	1	100	0	1	0	100
M. liechtensteini	1	100	0				1	100	0
Σ =	**329**			**139**			**190**		

Table 5. Ratio of daily and nightly active animals per species for Goteniška gora, open and forest habitats.
Tabela 5. Razmerje med nočno in dnevno aktivnimi živalmi za Goteniško goro, travniške in gozdne habitate.

	Goteniška gora overall			Open habitats			Forest habitats		
	Total	% night	% day	Total	% night	% day	Total	% night	% day
M. glareolus	60	87	13	11	55	45	49	94	6
S. araneus	50	61	39	14	64	36	36	61	39
M. arvalis	43	81	19	42	81	19	1	100	0
A. flavicollis/sylvaticus	41	95	5	14	100	0	27	93	7
M. agrestis	26	62	38	26	61	39			
S. alpinus	11	82	18	2	50	50	9	89	11
S. minutus	8	88	12	1	100	0	7	86	14
G. glis	3	67	33				3	67	33
D. nitedula	2	100	0				2	100	0
M. avellanarius	2	100	0	1	100	0	1	100	0
M. liechtensteini	1	100	0				1	100	0
Σ =	**247**			**111**			**136**		

Discussion

Species assemblage in open and forest habitats highlights duality of small mammal communities according to habitat type. In 2002, 2003, 2004 and 2005, traps were set in open habitats (dry meadows with sufficient but not very tall vegetation). In those years, high proportions of *M. arvalis* and *M. agrestis* were present. Otherwise, these open-habitat species (Niethammer & Krapp 1982, Dienske 1979) were almost absent from forest habitat type. Since *M. arvalis* dispersion is connected to human activities (Kryštufek 1987, Myllymäki 1977), higher population numbers in Medvedjak meadows could be explained by anthropogenic impact (wood industry) within the area in the past. The number of trapped animals switched between two species through years (2002-2005); as the number of *M. agrestis* decreased, the number of *M. arvalis* increased, probably due to the impacts of our trapping on species

assemblage and competition between the two species. As we sampled eight different small mammal species during our four-year trapping in Medvedjak meadows, Vrček (2002) found only *M. agrestis* while trapping at the same site in 2000.

In 2008, higher numbers of *M. glareolus* were trapped at two forest sites, probably due to the high production of beechnut persisting throughout the winter. In mild winters (with no or little snow cover) with enough food resources, spring-born young mature early and breed in the year of their birth, giving another (additional) cohort of young (Gliwicz & Jancewicz 2004, Borkowska & Ratkiewitcz 2004). Similar variations in *M. glareolus* population sizes are known from mount Snežnik in southwestern Slovenia in the 1988–1990 period (Trilar 1991) and other parts of Europe (Ylönen 1988, Zub et al. 2012). Although our data are not directly comparable (since trappings differed among each other in numbers of traps used, trapping days and locations), two independent forest locations with high number of *M. arvalis* trapped in only two days in 2008 strongly suggest that population numbers were high in 2008. Comparing rodents and insectivores, the latter had higher densities only in Sovja stena (2006, 2009a, b).

Most of the trapped individuals (on the species level) were males, except for the most abundant open-habitat species - *M. arvalis* and *M. agrestis* - where females prevailed. Any conclusion concerning population sex structure would be excessive, since localities differ from year to year and trapping methods were inconsistent. Daily activity of small mammals shows that they are mostly nocturnal, but some species show patterns of daily activity. The results show that 18.6% of all *M. arvalis* and 38.5% of all *M. agrestis* were caught during daytime, which could be explained by two-hour activity cycles in day activity pattern in these animals (Daan & Slopseema 1978). High percentage of shrews trapped during the day was expected, since they have high metabolic rate and high activity pattern (Kryštufek 1991). Values of body measurements are in the range of values reported by other authors working in the region and Slovenia (Remžgar 1990, Vrček 2002, Kryštufek 1991), except for several individuals that were either young animals or injured due to trapping.

Besides species that were present through trapping years (depending on trapping site), some rarities were recorded: Liechtenstein's pine vole *Microtus lichtensteini*, forest dormouse *Dryomys nitedula,* hazel dormouse *Muscardinus avellanarius* and common dormouse *Glis glis.* Low number of dormice, only 2.2% of total animals caught, is not surprising since all three members of the family are primarily arboreal species. In Snežnik, less than 10% of all dormice were caught with ground traps (Skok 2011). Additional reason for low number of *G. glis* caught through years is improper (too light) construction of traps used during our research.

In the vicinity of Kočevje (Remžgar 1990), small mammals were snap-trapped on three different locations. Thirteen different species were trapped, three of them absent in our study; bicoloured shrew *Crocidura leucodon,* lesser white-toothed shrew *Crocidura suaveolens* and Miller's water shrew *Neomys anomalus.* We trapped two species that were not present in Remžgar's study (1990): *D. nitedula* and *M. avellanarius.* Although studies were conducted in neighbouring areas, differences between trapped species are expected, since the sampled habitats were different. While Remžgar (1990) laid traps at lower elevations, mostly under 500 m a.s.l. along streams, in forest and in agricultural fields, our study took place in forests and meadows at higher elevations (above 700 m a.s.l.) lacking streams and agricultural fields. In Slovenia, *D. nitedula* is known only from elevations higher than 490 m a.s.l. (Kryštufek 1987, Kryštufek & Vohralik 1994). Beside the habitat differences, *D. nitedula* is an element of

alpine small mammal communities (Trilar 1991), so climate could be an additional reason for their absence at lower altitudes in the vicinity of Kočevje.

Like small mammal communities of Snežnik mountain (Trilar 1991) and the vicinity of Kočevje (Vrček 2002), Goteniška gora small mammal communities also resemble central European deciduous and mixed forest fauna according to Petrov (1985). Apart from central European elements, some other faunal elements are also present in small mammal community of Goteniška gora mountain: alpine shrew *Sorex alpinus*, European snow vole *Chionomys nivalis* and *D. nitedula* as representatives of the alpine communities and *M. liechensteini* as a Pleistocene relict. The above mentioned *C. nivalis* is a rare species for Goteniška gora, caught only twice in Sovja stena before our research begun; one individual was caught on 23. 9. 1998 and one on 26. 9. 1998 (F. Kljun, pers. information).

The estimated number of total species, based on yearly trapped sample, shows that we can expect up to 13 different small mammal species in the sampled areas. Estimated number of species shows that discovery of new species would be a rare event; generally, the surveyed area can be considered well sampled. Curves of species accumulation show a trend similar to the estimation of total number of species. All three habitats (open area habitat, forest habitat and overall sampled sites) share the same trend, approaching the asymptote, which means that most of the species present in the sampling area were trapped. We have to point out that our species number estimates and accumulation curves were sample-based, but Goteniška gora is also inhabited by red squirrel *Sciurus vulgaris,* European mole *Talpa europaea,* and hedgehog *Erinaceus concolor*, which are usually not caught in the kind of traps we used. Additionally, species preferring different habitat types, e.g. anthropophilic species like *Ratus* sp. and *Mus* sp. or lowland species from Remžgar's list (1990), may have been missed.

Unfortunately, owing to the inconsistent sampling methodology and lack of notes about reproductive status, we are unable to make any prediction about population numbers, dynamics, biomasses, reproductive status or age of individuals. The systematic recording of those data should be established in the future, enabling additional analyses and understanding of dynamics of small mammal communities in the region.

Povzetek

Čeprav se je v zadnjih 30 letih poznavanje malih sesalcev v Sloveniji zelo izboljšalo, je o skupini še vedno znanega razmeroma malo. V prispevku smo analizirali rezultate devetletnega vzorčenja malih sesalcev na območju Goteniške gore v južni Sloveniji in podajamo nekaj informacij o razširjenosti in zgradbi združb malih sesalcev na tem območju. Geološko podlago raziskovanega območja sestavljajo večinoma kredski in jurski apnenci ter dolomiti in dolomitski apnenci, pomešani s triasnimi dolomiti. Taka podlaga je primerna za goste dinarsko jelovo-bukove gozdove, ki pokrivajo večino območja. Vzorčili smo vsak september v letih od 2002 do 2010 na sedmih različnih lokacijah Goteniške gore. Vzorčenja so se razlikovala v trajanju (od 2 do 6 dni) in številu uporabljenih pasti (od 45 do 128). Živali smo lovili z mrtvolovkami, ki smo jih nastavljali na določene gozdne ali travniške površine, kjer so bile vidne sledi aktivnosti malih sesalcev (luknje, steze, ...). Ujete živali smo premerili, stehtali ter določili spol, nato pa jih razkožili in kože ter preostanke teles shranili v 96 % etanolu. V 9 letih smo ujeli 12 različnih vrst malih sesalcev, večinoma značilnih za srednjeevropske listopadne in mešane gozdove. Poleg teh smo ujeli tudi

vrste, značilne za alpinske predele ter pleistocenske relikte teh predelov. Izračunali smo glavne značilnosti telesnih dimenzij za ujete vrste; dolžine trupa, repa, stopala, ušesa in telesno maso. Ugotovili smo razlike v vrstni sestavi med gozdnimi in odprtimi, travniškimi habitati. Največji delež ujetih živali je pripadal gozdni voluharici *M. glareolus* (27 %), za njo pa gozdni rovki *S. araneus* (17,9 %) in rumenogrli/navadni belonogi miši *A. flavicollis/sylvaticus* (13,5 %). Izračunali smo oceno pričakovanega števila vrst malih sesalcev na preučevanem območju. Pričakujemo lahko približno 13 vrst, kar nam pove, da je možnost najdbe novih vrst na vzorčenem območju redek dogodek ter da so vzorčna mesta že dobro povzorčena.

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SHORT COMMUNICATION

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First record of the Greek clouded yellow *Colias aurorina* Herrich-Schäffer, 1850 (Lepidoptera: Pieridae) for Albania

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Abstract. During our field survey in the south-eastern part of the Republic of Albania, we encountered the Greek clouded yellow (*Colias aurorina*) at two sites, representing the first record for the species in Europe outside Greece. It was found common at one site on the Albanian side of the Grammos Mts. with possibly continuous range into northern Greece. As larval host plant of the Greek clouded yellow *Astragalus thracicus* was present in abundance on the northern slopes of the mountain, we consider the species as not threatened in Albania. In addition, the purple emperor (*Apatura iris*) and the Balkan green-veined white (*Pieris balcana*) were recorded for the first time in Albania.

Key words: diversity, faunistics, Lepidoptera, Rhopalocera, field survey

Izvleček. Prva najdba grškega senožetnika *Colias aurorina* Herrich-Schäffer, 1850 (Lepidoptera: Pieridae) v Albaniji – Med terenskim delom v jugovzhodnem delu Albanije smo našli grškega senožetnika (*Colias aurorina*) na dveh lokacijah, kar so prve najdbe te vrste v Evropi zunaj Grčije. Vrsta je bila pogosta na eni izmed lokacij na albanski strani gorovja Grammos, kjer je njena razširjenost verjetno povezana s populacijo na grški strani. Ker severna pobočja gore na gosto porašča hranilna rastlina gosenic grškega senožetnika *Astragalus thracicus*, sklepamo, da vrsta v Albaniji ni ogrožena. Dodatno smo kot novi najdbi za Albanijo našli tudi velikega spreminjavčka (*Apatura iris*) in balkanskega belina (*Pieris balcana*).

Ključne besede: pestrost, favnistika, Lepidoptera, Rhopalocera, terenske raziskave

Introduction

The butterfly fauna of the Republic of Albania is one of the most poorly studied in Europe. Main reason for that is its inaccessibility during the communist regime after the Second World War. Therefore, it is not surprising that the only comprehensive faunistic survey of the Albanian butterflies was published by Rebel & Zerny in 1931. Two additional surveys published in a local journal (Murraj 1972, Misja & Kurrizi 1984) did not contribute much new information

and include several potentially erroneous records. As several widespread species in the Balkans and the neighboring countries are not listed in any of the published lists, we could say that the butterfly fauna of Albania is still insufficiently studied.

Greek clouded yellow *Colias aurorina* Herrich-Schäffer, 1850 reaches its northwestern limit of distribution in the mountains of Greece (Pamperis 2009). It is known from several mountain ranges from the Peloponnesus in the south to the Grammos Mts. in the north, close to the border with Albania. It is much more widespread in the mountains of Turkey, Caucasus, NE Iraq and western Iran. There are isolated populations in the Khopet Dag Mts. in Turkmenistan (Tshikolovets 1998) and notably in the high mountains of Lebanon (Larsen 1974). The populations from Greece have been described as a separate subspecies *hledreichii*, and those from Lebanon as ssp. *libanotica*. In general, the species is very variable in wing colouration and as in other yellows there is an orange and a grayish form of females (f. *fountainei*). Due to its large size compared to other yellows, pointed apex of the forewing and dark orange colour of the upper side, adults are easily distinguishable from the other yellows present in Europe.

The larvae of the Greek clouded yellow utilize different *Astragalus* spp. host plants (Tshikolovets 2011), although in Greece it is known to feed only on *A. creticus*, *A. parnassi* and *A. thracicus* (Tolman & Lewington 1998, Pamperis 2009). The butterfly is characterized as a predominantly mountainous species inhabiting dry rocky grasslands, pastures and scrubland with abundance of the larval host plant at altitudes from 450 to 2400 m (Pamperis 2009). Despite their strong flight, the adults are closely associated with larval habitat and return to the host plant site even when disturbed (Hesselbarth et al. 1995). In this respect, the habitat and presence of the larval host plant can be considered as good indicators of the butterfly's presence.

Material and methods

The butterflies of the south-eastern part of Albania were surveyed during 10. - 12. 7. 2012. Due to the limited time available, we searched only for adult butterflies, netting them when necessary for determination. Tolman & Lewington (1998) was used for identification of adults. For the determination of *Pieris balcana* Lorković, 1986 the information provided by Ziegler (2013) was additionally used. With few exceptions, butterflies were released at the site of the capture. The voucher specimens are deposited in the authors' private collections. Satellite photographs accessed in Google Earth were used to identify potential sites before the survey. Butterfly surveys were focused on potential habitat of the Greek clouded yellow, which can be easily recognized by low bushes of the larval host plant (Fig. 1). Other butterfly species and their abundance were also recorded during the field survey.

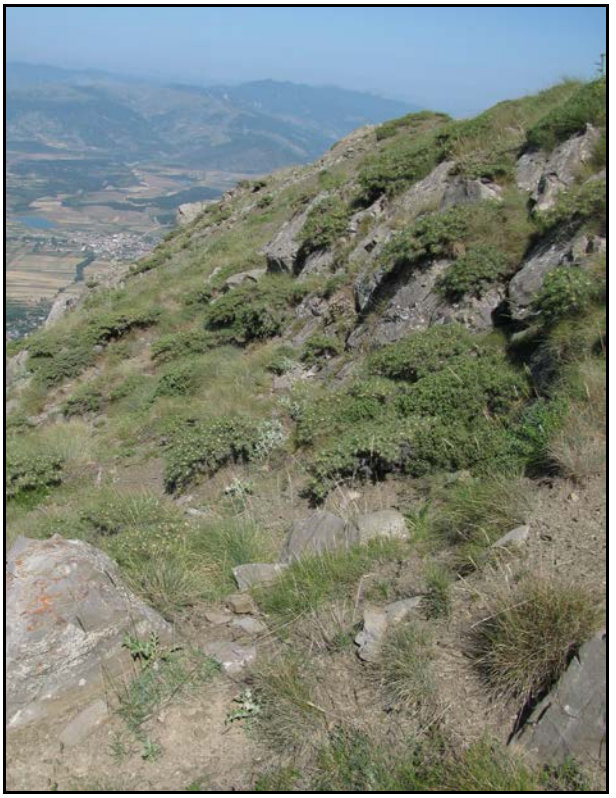

Figure 1. Habitat of the Greek clouded yellow (*Colias aurorina*) with predominant cover of the larval host plant *Astragalus thracicus* on the northern slopes of Mt. Grammos above the village Rehovë (photo: Rudi Verovnik).
Slika 1. Življenjski prostor grškega senožetnika (*Colias aurorina*) na severnih pobočjih gorovja Grammos nad vasjo Rehovë; tu največjo pokrovnost dosega hranilna rastlina gosenic te vrste *Astragalus thracicus* (foto: Rudi Verovnik).

Results and discussion

Among eight surveyed sites, the larval host plant *Astragalus thracicus* and the Greek clouded yellow were observed at two sites (Tab. 1) approximately 20 km apart in the northern and central parts of the Grammos mountain range. The site near Dardhë is characterized by dense deciduous woods on the northern side of the ridge. It is dominated by beech forest, with flower-rich meadows distributed along the road. Here no host plants or adults of the Greek clouded yellow were observed, but many woodland species were present, including *Apatura iris* (Linnaeus, 1758) and *Pieris balcana*. On the southern slopes and part of the ridge south of the road, the habitat is barren with prominent, scarce batches of the larval host plant *Astragalus thracicus*. At least two worn males of the Greek clouded yellow were observed and netted here, while a single female was seen nectaring on batches of an unidentified scabiose from close proximity. An impressive list of 66 butterfly species was observed at the site.

Table 1. Records of newly observed butterfly species for Albania.
Tabela 1. Podatki o prvih najdbah vrst dnevnih metuljev za Albanijo.

Species	Date	Locality	Altitude	Lat.	Long.
Apatura iris	11.7.2012	Korçë Dardhë, at the pass N of ski-run	1,550 m	40° 31.471'	20° 48.141'
Pieris balcana	11.7.2012	Korçë Dardhë, at the pass N of ski-run	1,550 m	40° 31.471'	20° 48.141'
Colias aurorina	11.7.2012	Korçë Dardhë, ridge S of the pass	1,620 m	40° 31.038'	20° 47.647'
Colias aurorina	12.7.2012	Ersekë, Rehovë, N slopes of Mt. Grammos	2,150 m	40° 19.992'	20° 45.124'

The site at Rehovë village near Ersekë town is situated above the village on the slopes of the main chain of the Grammos Mts. The habitat is predominantly rocky pastures that start just above the village. In places, these are intensively grazed, but become less grazed and more flower-rich towards the highest peaks. The larval host plant *Astragalus thracicus* was possibly the commonest plant on the steeper parts of the slope (Fig. 1), evidently not being grazed by the sheep. The Greek clouded yellows proved to be one of the most abundant butterflies at the site. Adults were seen at altitudes from 1250 to 2150 meters mostly in close proximity of the host plants, which also provided the nectar source for the adults. All observed males and most of the females were worn, indicating the end of the season for this butterfly in mid-July. The majority of females observed were greyish green f. *fountainei* (Fig. 2), while males were dark orange - typical of the Greek subspecies *heldreichii*. Males were seen patrolling along the slopes, while females were more sedentary commonly visiting flowering host plants and ovipositing (Fig. 3).

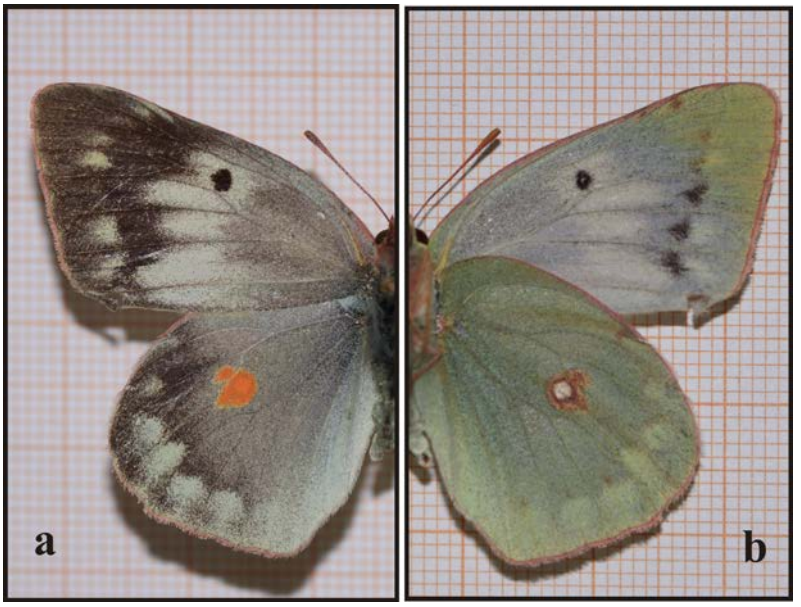

Figure 2. The upperside (a) and underside (b) of the female of *Colias aurorina* f. *fountainei*, the common form of females on the northern slopes of Mt. Grammos (photo: Rudi Verovnik).
Slika 2. Zgornja (a) in spodnja stran (b) samice *Colias aurorina* f. *fountainei*, pogostejše forme samic na severnih pobočjih gorovja Grammos (foto: Rudi Verovnik).

Figure 3. Female ovipositing on *Astragalus thracicus* (a) and gliding along the slope searching for oviposition spot (b) (photo: Miloš Popović).
Slika 3. Samica pri odlaganju jajčec na *Astragalus thracicus* (a) in iskanju mesta za odlaganje jajčec (b) (foto: Miloš Popović).

At this site, the butterfly diversity was lower (51 species), but several interesting species were observed. Most remarkable are the records of *Erebia rhodopensis* Nicholl, 1900 and *Coenonympha orientalis* Rebel, 1910, which were recorded for the first time in the southern part of Albania. *E. rhodopensis* had previously been known only from Mt. Kobilica, part of the Šar Planina Mts. (Rebel & Zerny 1931), while for *C. orientalis* the same authors describe a new subspecies *skypetarum* from the northern Albanian Alps.

Given the close proximity of the records of Greek clouded yellow in northern Greece (Pamperis 2009), its discovery in Albania was anticipated and provides only a small shift of its range northwards in Europe. It has a possibly continuous distribution on both sides of the Grammos Mts. and could also be found elsewhere in the mountains of southern Albania. As the larval host plant is very conspicuous, additional surveys should target locating them in other mountain chains up to the central part of Albania. Most of these mountains have not been surveyed yet and there is a great chance to find some additional populations.

Despite the known distribution of the Greek clouded yellow in Albania is very limited, the extent of the habitat observed and its current use for extensive pastoralism could not be considered threatened. The abundance of the larval host plant in grazed areas indicates that *A. thracicus* is not preferred by the cows and sheep probably due to spiny branches. The Greek clouded yellow is not indicated as threatened for Greece (Pamperis 2009) and Europe in general (Van Swaay et al. 2010). The lack of records for *Apatura iris* and *Pieris balcana* is rather surprising as both species are known from the neighbouring areas of northern Greece (Pamperis 2009) and Macedonia (Schaider & Jakšić 1989). As they are both linked to

woodland habitat, their range in SE Albania is possibly limited due to the lack of suitable forest cover. Three new species for butterfly fauna of Albania observed during our limited survey indicate that the butterfly fauna of this interesting country is extremely poorly studied. We hope that the results of our study will generate more interest in faunistic surveys of this fascinating country.

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SHORT COMMUNICATION

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Mating of *Myotis capaccinii* (Bonaparte, 1827) and other interesting autumn bat observations in the cave Rivčja jama (central Slovenia)

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Abstract. Rivčja jama in central Slovenia is a well researched bat summer roost; however, the autumn composition of its bat fauna is still poorly known. Therefore, we conducted mistnetting in front of the cave on 28. 9. 2011. We caught five bat species; most interesting among them were long-fingered bat (*Myotis capaccinii)* and lesser mouse-eared bat (*M. oxygnathus*), both otherwise rarely recorded in central and eastern Slovenia. Mistnets captures, together with visual observation, also confirmed mating of *M. capaccinii* in the cave.

Key words: Rivčja jama, cave, bats, mating, *Myotis capaccinii*, *Myotis oxygnathus*, Slovenia

Izvleček. Parjenje dolgonogih netopirjev *Myotis capaccinii* (Bonaparte, 1827) in druge zanimive jesenske najdbe netopirjev v Rivčji jami (osrednja Slovenija) – Rivčja jama je dobro raziskano poletno zatočišče netopirjev, medtem ko je jesenska sestava netopirske favne manj poznana. Zato smo 28. 9. 2011 pred vhodom jame opravili mreženje. Ujeli smo 5 vrst netopirjev, od katerih sta bili najbolj zanimivi v osrednji in vzhodni Sloveniji sicer redko zabeleženi vrsti: dolgonogi netopir (*Myotis capaccinii*) in ostrouhi netopir (*M. oxygnathus*). Glede na vmrežene dolgonoge netopirje in opazovanje v jami sklepamo, da je jama tudi parišče te vrste.

Ključne besede: Rivčja jama, netopirji, parjenje, *Myotis capaccinii*, *Myotis oxygnathus,* Slovenija

Introduction

Rivčja jama (cave cadastre number 110) is a cave, situated approximately 20 m from the left bank of the Krka River, near Male Rebrce between Ivančna Gorica and Žužemberk in central Slovenia (lat. 14.87° E, long. 45.86° N; 220 m a.s.l.). The cave entrance is approximately 10 m wide and 6 m high. First part of the cave is around 30 m long horizontal hall, with a rise at the innermost part of the cave. Observations of bats from Rivčja jama are mostly known from summer, when approximately 500 female greater mouse-eared bats (*Myotis myotis*) form a nursery colony in the cave (Zagmajster 2009a). Individuals of greater horseshoe bat (*Rhinolophus ferrumequinum*), lesser horseshoe bat (*R. hipposideros*),

Schreibers' bat (*Miniopterus schreibersii*) and (in summer 2011) a few individuals of long-fingered bats (*Myotis capaccinii*) were recorded in the cave (Presetnik et al. 2009, 2011, Hudoklin & Presetnik 2012). At the end of summer and in autumn bats may congregate in large numbers in front of the caves during the nights and bat species that swarm at cave do not necessarily roost in it or visit it in other parts of the year (Dietz et al. 2009). As very few data are known for the autumn period (Presetnik et al. 2009), we wished to gain some insights in bat species composition during the swarming period.

Material and methods

On 28. 9. 2011, we conducted day survey in Rivčja jama and evening mistnetting in front of its entrance. Two mistnets (6 m and 5 m long and approximately 3 m high) were placed at the cave entrance, but they did not reach the ceiling. Mistnets were erected 30 minutes before the sunset (sunset: 17:48 CET DST) and pulled down at 00:50, when bat activity (monitored with Pettersson D200 heterodyne ultrasound detector Pettersson Elektronik AB) abated for at least 30 minutes. Mistnets were regularly checked, species of the caught bats determined using Dietz & von Helversen identification key (2004), sexed, and age category and reproductive status estimated according to Anthony (1990) and Haarsma (2008). We measured the body mass using 60 g Pesola spring scale with 0.5 g precision and forearm length using calliper. Bats were released as quickly as possible, a few meters away from the cave.

Results and discussion

We caught nine bats of five different species (Tab. 1). This, however, was just a small proportion of flying bats according to bat detector observations. We assume that Rivčja jama is a swarming place; for absolute confirmation, additional research is necessary.

Table 1. Mistnetted bats at Rivčja jama on 28. 9. 2011.
(side of the net: in / out – bats was flying from / into the cave, sex: F – female, M – male; sexual characteristics: E (epididymes): 0 / + / ++ / +++ – empty / little filling / round and almost filled / very rounded and filled, T (testes): 0 /, + / ++ / +++ – not swollen / slightly / intermediate / very swollen, age: AD – adult, SUBAD – sub adult, AB – forearm length, m – body mass)
Tabela 1. Netopirji, ujeti v mreže pred Rivčjo jamo dne 28.9.2011.
(stran mreže: in – netopirji so leteli iz jame, out – netopirji so leteli v jamo; spol: F – samica, M – samec; spolne značilnosti: E (obmodki): 0 / + / ++ / +++ – prazni / malo polni / okrogli in skoraj polni / zelo okrogli in polni, T (testisi): 0 / + / ++ / +++ neodebeljeni / rahlo / srednje / močno odebeljeni; starost: AD – odrasel, SUBAD – spolno nezrel; AB – dolžina podlahti, m – masa telesa)

Time of capture / Ura ujetja	Air temperature / Temp. zraka [°C]	Side of net / Stran mreže	Species / Vrsta	Sex / Spol	Sexual characteristics / Spolne značilnosti	Age / Starost	AB [mm]	m [g]
19:11	16.8	In	*Myotis capaccinii*	F	parous	AD	41.0	9.0
19:20	16.2	In	*Myotis capaccinii*	F	parous	AD	40.8	8.5
19:26	15.9	In	*Myotis capaccinii*	F	parous	AD	40.6	9.0
19:26	15.9	In	*Myotis capaccinii*	M	E: +++ T: ++(+)	AD	39.0	8.5
21:18	14.0	In	*Barbastella barbastellus*	M	E: ++ T: +	AD	40.0	8.5
21:38	13.6	In	*Myotis capaccinii*	M	E: +++ T: +++	AD	42.3	8.5
21:38	13.6	Out	*Rhinolophus hipposideros*	F	nullipara	AD	40.2	8.5
22:22	13.0	Out	*Myotis daubentonii*	M	T: tiny, dark	SUBAD	37.4	8.5
22:51	12.7	Out	*Myotis oxygnathus*	M	E: +	AD	58.1	26.0

The most numerous mistnetted bats were the long-fingered bats, with four out of five caught early in the night on the inner side of the nets. Therefore we assume that they were using the cave as a day roost, which is also consistent with our day time observation, when between 14 and 20 bats of a smaller species of the genus *Myotis*, which were assumed to be long-fingered bats, were observed. Two of them were hanging solitarily, while others rested in small groups of 2-3 animals on the ceiling at the end of the cave. At 19:26, a male and a female were caught simultaneously, flying out of the cave (Tab. 1) after a short period of chasing each other at the cave entrance, as observed by ultrasound detector. Wet tuft of fur on the back of the female and very swollen testes and fully filled epididymes of the male indicated that a mating couple had most likely been caught (Fig. 1a, b). Especially wet fur on the female back side (Fig. 1a) is indicative of recent mating, given that during actual mating male bat embraces the female with forearms (ventral dorsal position) and in many species firmly bites into her neck-fur (Dietz et al. 2009). Additional confirmation of mating was the result of cave inspection during the mistnetting. At least 10 long-fingered bats were hanging in a loose group approximately 20 cm apart from each other in the central part of cave ceiling at approximately 22:20 and 22:50. Among them there were at least two presumably mating couples – one bat covering the other with its wings. Mistnetting observations as well as observations from the cave confirm that long-fingered bats use Rivčja jama as mating site. Our and other recent findings (Presetnik et al. 2011, Hudoklin & Presetnik 2012) in respect of this species in Rivčja jama are the first indications that long-fingered bat could have their permanent population also in the Krka River area in the central part of Slovenia. This gives a new perspective of the long-fingered bats' distribution, since all other new records have been restricted mainly to the SW part of the country (Jazbec 2009, Presetnik et al. 2011), with only one record of a single individual in the Krka River valley approximately two decades ago (Hudoklin 1999). The possible permanent population is therefore important information for the species' conservation. More research, however, is needed to fully understand its distribution in this area.

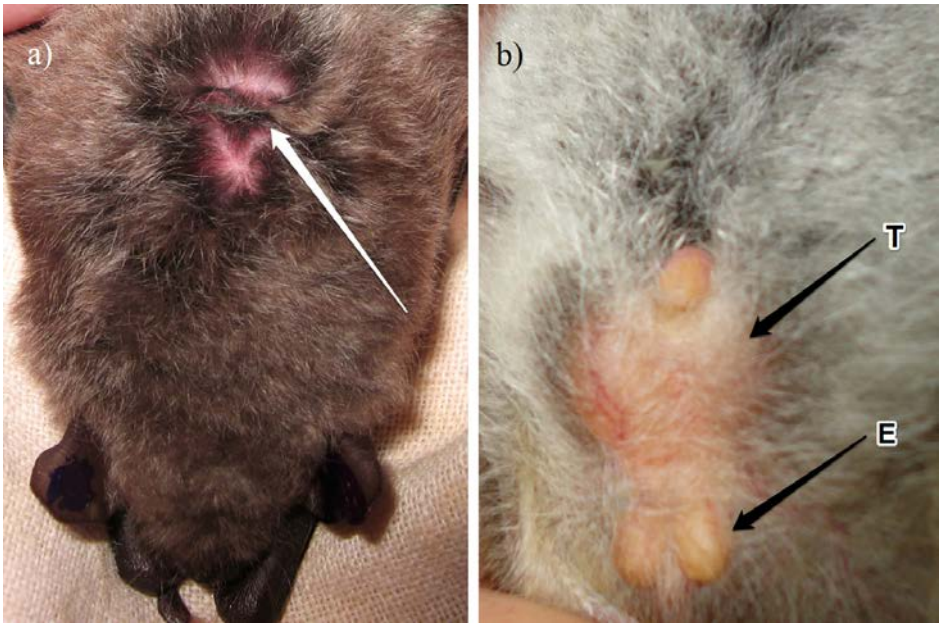

Figure 1. a) Wet tuft of fur on *M. capaccinii* female's back indicating recent mating, b) very swollen testes (T) and fully filled rounded epididymes (E) of male caught simultaneously at Rivčja jama on 28.9. 2011 (photo: Simon Zidar).
Slika 1. a) Moker šop dlake na hrbtu, ki nakazuje da se je samica dolgonogega netopirja (*M. capaccinii*) pred kratkim parila in b) močno odebeljeni testisi (T) in zelo polni okrogli obmodki (E) samca, ki je bil ujet hkrati s samico pred Rivčjo jamo dne 28.9.2011 (foto: Simon Zidar).

Second interesting finding was the discovery of lesser mouse-eared bats (*M. oxygnathus*), which is the second observation of this species in SE Slovenia; it is the first after more than 30 years (Đulič 1979 in Presetnik et al. 2009) and approximately 30 km E of the eastern most published newer record of this species in the southern part of Slovenia (Zagmajster 2009b). The caught male had 9 horizontal creases on the left ear and 8 on the right ear, which initially indicated a greater mouse-eared bat, until noted that it was without the characteristic black spot on the tip of the tragi. The length of its upper tooth row was 8.6 mm, which firmly determined it as lesser mouse-eared bat. Nursery colonies of the greater mouse-eared bat are often mixed with other bat species in large clusters (Dietz et al. 2009). In Slovenia, at least two such cases are known, where individuals of lesser mouse-eared bats are mixed in groups with greater mouse-eared bats and other species in caves (Zagmajster 2009a, b). Our finding of the specimen of lesser mouse-eared bat at Rivčja jama opens a question, whether the species is also present in nursery colony with greater mouse-eared bats during the summer.

Other caught bats, i.e. lesser horseshoe bat, barbastelle bat *(Barbastella barbastellus*) and Daubenton's bat (*M. daubentonii*), are commonly found in the vicinity of Rivčja jama (Presetnik et al. 2009). Nevertheless, the last two are new species for Rivčja jama, in which 8 bat species have now been confirmed.

Acknowledgements

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Observations of the common wall lizard *Podarcis muralis maculiventris* (Werner, 1891) outside its natural range in Slovenia

Najdba pegaste pozidne kuščarice *Podarcis muralis maculiventris* (Werner, 1891) zunaj meja njene naravne razširjenosti v Sloveniji

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Common wall lizard (*Podarcis muralis* (Laurenti, 1768)) is a small lacertid lizard with snout-vent length of up to about 75 mm (Arnold et al. 2007). It is distributed throughout most of Europe, ranging from Spain in the southwest, France and Belgium to the north, Greece to the southeast and Slovakia and Romania in the east (Gasc et al. 1997). In Slovenia, the species is widely distributed throughout the country (Krofel et al. 2009). Two subspecies occur in Slovenia according to the published descriptions: *Podarcis muralis maculiventris* (Werner, 1891), which can be found in Slovenian Istria, and *Podarcis muralis muralis* (Laurenti, 1768), which is distributed throughout the rest of the country (Brelih & Džukić 1974, Gruschwitz & Böhme 1986). The subspecies are differentiated by the absence of the orange to brick red colouration of the throat and ventral side, complex speckled dorsal and ventral pattern and higher number of dorsal scales in *P. m. maculiventris* compared to the nominate subspecies (Gruschwitz & Böhme 1986, Vogrin 1999, Corti & Lo Cascio 2002, Arnold & Ovenden 2002) (Fig. 1).

A small population of *P. m. maculiventris* has been observed in the town of Žalec near Celje, approximately 140 km inland from the Slovenian coastline. First *maculiventris* type animals were observed in 2010 on a railroad embankment near the Feralit foundry (Fig. 1). During later field surveys, conducted from May to September 2011 and from April to September 2012 on different locations around the town of Žalec, we found a large population of individuals with morphological characteristics typical of *P. m. maculiventris* in the southern part of the town. The area with located finds spans approximately 900 m along the railroad embankment and 300 m into the town (Fig. 2). The area is mostly residential with individual houses and gardens, lined with hedges, stone and concrete walls and intersected with paved roads. This kind of habitat is typical of this species, which is often present in urban environment (e.g. Rugiero 2004).

In the area, a total of 103 observations were made of animals that showed at least one of the morphological characteristics and colouration typical of *P. m. maculiventris* (Fig. 1). All determinations were made by observation and photographing from a distance, but six males were also caught and eventually released. These six individuals all exhibited colouration characteristics typical of *P. m. maculiventris*: high contrast speckled pattern on the dorsal and ventral sides and a complete lack of orange or brick red colour on the throat and ventral side. Dorsal scale rows were not counted and no body measurements were taken. Out of all *P. muralis* observed in the area during the survey period, an estimated 30% of the animals were *maculiventris* type. All observations were made based on the morphological characteristics of the animals, but without further DNA analysis the presence of *P. m. maculiventris* cannot be confirmed with utmost certainty.

The presence of observed individuals in this area could most likely be explained with an accidental introduction of cargo delivered to the foundry. Another way of introduction could be their arrival via train wagons. The latter explanation is less likely as no *maculiventris* type was present at the nearby train station (700 m to the east from the site of first observation), where only animals of *muralis* type were observed. Such introductions are not a unique event in *Podarcis muralis*. More and more reports are published about accidental introductions of this species from numerous countries outside its natural range, including Germany, Romania, Great Britain, Canada and

United States of America (Brown et al. 1995, Allan et al. 2006, Schulte 2008, Schulte et al. 2011, Langton et al. 2011).

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Figure 1. *Podarcis muralis maculiventris*, animal from Dragonja on the left and from Žalec on the right, Slovenia (photo: Tomaž Jagar).
Slika 1. *Podarcis muralis maculiventris*, levo osebek iz bližine Dragonje, desno osebek iz Žalca, Slovenija (foto: Tomaž Jagar).

Figure 2. Map showing the area where *Podarcis muralis maculiventris* individuals were observed in Žalec, Slovenia (source: www.geopedia.com). Locality of the first observation is marked with red circle. Borders of the area are lines connecting the outermost localities of observed individuals.
Slika 2. Karta območja, kjer so bili opaženi osebki *Podarcis muralis maculiventris* v Žalcu, Slovenija (vir: www.geopedia.com). Lokacija najdbe prvih osebkov je označena z rdečim krogcem. Meje območja so določene s črtami, ki povezujejo najbolj zunanje najdbe opazovanih osebkov.

Dravsko polje – another observation of the raccoon dog *Nyctereutes procyonoides* (Gray, 1834) in Slovenia

Dravsko polje – ponovno opažanje rakunastega psa *Nyctereutes procyonoides* (Gray, 1834) v Sloveniji

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In the early hours of 27. 6. 2012, I was driving from Podova to Brunšvik. When I was approximately 3 km SE of Rače (Dravsko polje), in close vicinity of the Gauss–Krüger coordinates Y: 555690, X: 144030 (lat: 46.4383, long.: 15.7199), a raccoon dog crossed the road in front of the car. The animal was about the size of a red fox (*Vulpes vulpes*), but had a shorter tail. The colour of the fur was mostly grey and brown. The most reliable sign that I was indeed dealing with a raccoon dog was the dark face mask on its head. It was different than the face mask of a badger (*Meles meles*), since the badger has black stripes placed vertically over the eyes, while the raccoon dog has a dark mask around the eyes. Also, the animal had a dark coloured head and not white, like a badger. The landscape where I spotted the raccoon dog was highly agricultural and thus different from its preferred habitat, which is wet and open: damp meadows and forests, with sparse canopy but abundant undergrowth, marshlands, river valleys and gardens (Kauhala & Kowalczyk 2001). However, raccoon dog may occupy various habitats from continuous forests to open agricultural landscapes as well as suburban areas (Kauhala & Kowalczyk 2001). The few kilometres distant wetland forest around Rače Fishponds may provide quite suitable habitat for the species.

Whether the observed putative raccoon dog was a vagrant, a resident in this area, or if it escaped from captivity still needs to be verified. According to Vrezec (2007), this observation is fourth confirmed record of the raccoon dog occurring in Slovenia, and since all sightings have been made in different parts of the country, we may expect more encounters in the future. The raccoon dog is an invasive species in some parts of Europe and locally may be a significant threat to waterfowl and amphibian populations (Kauhala & Auniola 2001). It may also be an important vector of rabies, sarcoptic mange and trichinellosis, and is a potential carrier of *Echinococcus multilocularis*, a parasite dangerous to humans (Kauhala & Kowalczyk 2001). Therefore we must carefully monitor reports on its distribution as well as signs of its reproductive population. If necessary, appropriate measures to prevent further spreading of this non-native species should be taken as well.

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I would like to thank Primož Presetnik (Centre for Cartography of Fauna and Flora) for furnishing me with data and literature on the occurrence of the raccoon dog in Slovenia.

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Twenty-two year-old *Rhinolophus hipposideros* (Bechstein, 1800): the longest known lifespan of a bat in Slovenia

Dvaindvajsetletni mali podkovnjak *Rhinolopus hipposideros* (Bechstein, 1800): najdaljša življenjska doba netopirja v Sloveniji

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The second author has ringed 43 *Rhinolophus hipposideros* in the cave Kevderc na Lubniku (Slovene Cave Cadastre No. 3) near Škofja Loka in NW Slovenia (lat. 46.16°, long. 14.26°) with intention to follow the dispersion of the species' wintering population. On 4. 4. 1989, seven males and four females were marked with bird rings (ring codes: Lj Slo A 289401–289411), and additional 24 males and 8 females on 10. 3. 1991 (ring codes: Lj Slo A 456905–456936). No permit for ringing was necessary at the time; for legal details see Presetnik et al. (2009). Presetnik et al. (2009) report on observation of several (six) ringed bats in the winter of 1998/99 in the same cave, while surveys in the winters of 2002/03 and 2005/06 failed to produce evidence of any ringed individuals. Another small-scale bat banding project was embarked upon by the first author in 2006 and continued in 2007 (altogether 65 animals marked with bat bands; permit No. 35701-80/2004 issued by the Slovenian Environment Agency) in the cave Marijino brezno, situated approximately 2.6 km E of Kevderc. Subsequently, we systematically searched for banded bats also in the cave Kevderc. Indeed, on 2. 2. 2007 we noticed *R. hipposideros* with a ring on the right forearm, hibernating in the entrance hall, approximately 30 m from the cave entrance, hanging on a small rock protuberance three meters above ground (Fig. 1a). At that time, we thought it was one of the animals banded in Marijino brezno and did not examine it to read the ring code. In the ensuing winter (6. 12. 2008), a bat, most probably the same animal, was hanging exactly on same spot. To our surprise, a closer examination revealed that it was one of the bats ringed in 1989. The specimen was a male with a ring code that was not fully readable. It clearly started with »Lj Slo A 289«, followed by an unreadable digit, a digit that was most likely »9« or »0«, while the last digit was most likely »1«. As *R. hipposideros* were ringed in Slovenia with bird rings starting with »Lj Slo A 289« only in cave Kevderc na Lubniku, we observed the male with ring code »Lj Slo A 289401«.

The ring had penetrated the wing membrane (Fig. 1b). Other than that, we noticed no obvious damage, like unusual teeth abrasion, etc. The male was in a good body condition, weighing 6.0 g. In the next years, we observed the same animal on the same rock protuberance on 29. 1. 2009, 3. 2. 2010 and 16. 1. 2011, but during our detailed surveys on 14. 1. 2012, 8. 2. 2012 and 1. 1. 2013 we failed to find any ringed bat in the cave. Even though we cannot completely rule out the possibility of the bat hibernating elsewhere, we think he did not change his traditional cave for hibernation and assume the old male probably died in 2011.

Twenty-one years and 10 months passed from the time of ringing till the most recent sighting. If we assume, however, that the male was born before 15. 7. 1988 (most *R. hipposideros* in the area are born between the end of June till mid-July), he survived a minimum of 22 years and 6 months. This makes him, to our knowledge, the third oldest *R. hipposideros* ever recorded in the world, being surpassed only by the female, which lived to the age of 29 years and max. 7 months, the 25 year-old male ringed in the Czech Republic (Gaisler et al. 2003), and closely followed by the Polish female, which survived over 21 years (Harmata 1982). All other accounts of this species' longevity are less than 20 years, e.g. out of more than 6,000 ringed bats with more than 1,000 recoveries, only three were older than 15 years and 12 older than 10 years (Gaisler et al. 2003). Given that *R. hipposideros* has the average lifespan of 4–5 years (Dietz et al. 2009), our finding of more than 22 year-old male is a rare occurrence on a world scale, and the longest lifespan recorded for a bat in Slovenia.

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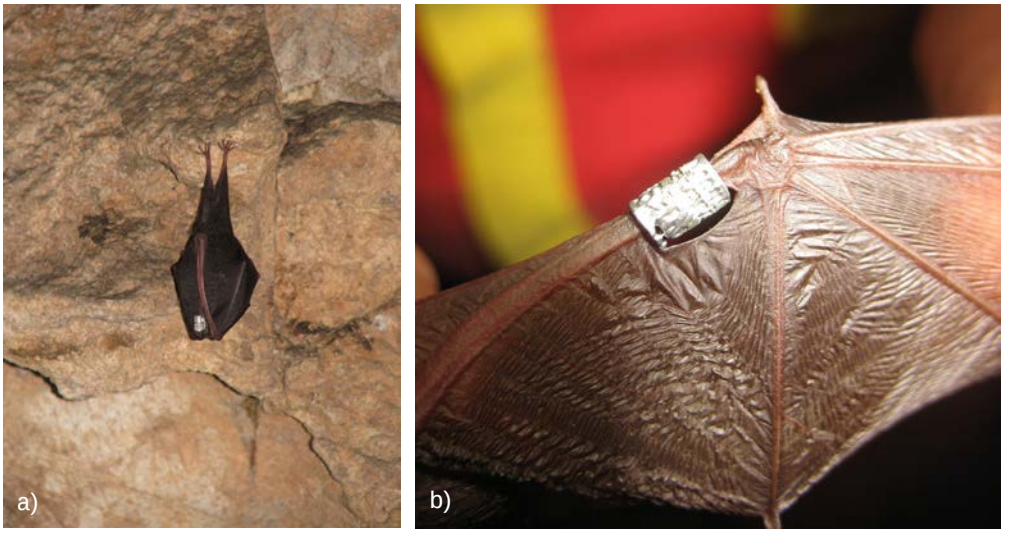

Figure 1. a) The old *Rhinolophus hipposideros* male hibernating at its usual place in the cave Kevderc na Lubniku during the last sighting (photo: Tea Knapič, 16 Jan 2011); and b) the ring on the bat's right wing (photo: Primož Presetnik, 6 Dec 2008).

Slika 1. a) Zadnje opažanje starega samca malega podkovnjaka (*Rhinolophus hipposideros*), prezimujočega na običajnem mestu v Kevdrcu na Lubniku (foto: Tea Knapič, 16.1.2011), in b) obroček na njegovi desni prhuti (foto: Primož Presetnik, 6.12.2008).

First record of a flavistic lesser horseshoe bat *Rhinolophus hipposideros* (Bechstein, 1800) in Slovenia

Prva najdba flavističnega malega podkovnjaka *Rhinolophus hipposideros* (Bechstein, 1800) v Sloveniji

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An unusually coloured lesser horseshoe bat (*Rhinolophus hipposideros*) individual was observed by the Group for bats during the Biology Students Research Camp »Pivka 2012« on 21. 7. 2012 in the Church of St. Lovrenc at Dolenja vas near Cerknica in the SW part of Slovenia (Gauss-Krüger coordinates: 71347, 449179 (ARSO 2012)). It was part of the nursery colony that consisted of 58 adults, 26 of which were females with juveniles. Bats were positioned in the belfry, in the partition above the bells. At the time of our survey, the church's attic was being renovated, but the belfry remained untouched. Bats disturbance and change of roosting site can probably be excluded as the records from 2006 and 2010 confirmed presence of the bats only in the belfry (CKFF 2012). It is very likely that the attic renovation did not affect conditions in the belfry also due to the lack of direct connection between the attic and the belfry.

The observed individual with colouration anomaly was an adult female with a normally coloured juvenile. It had beige-coloured fur and the same colouration of the skin on the hairless areas of the muzzle and ears. Membranes and protuberances on the nose were not translucent. Due to the absence of pigments on the membrane, carpals and metacarpals were pink-coloured. The observed female meets the criterion of flavism, type of hypochromatism, where affected individuals have yellow or red hair on the insufficiently pigmented skin (Červený 1980). In the case of flavistic male lesser horseshoe bat from Jeseníky Mountains (Czech Republic), the colouration was described as ochre (Červený 1980) and we could apply this description also to the individual from Dolenja vas. Dorsal fur of adult lesser horseshoe bats is usually greyish brown to yellowish brown, while ventral side is paler grey-white (Dietz et al. 2009, Petrinjak 2009). Young animals are generally grey (Dietz et al. 2009).

We were not able to catch the observed individual, but we had the opportunity to observe it for quite some time and to take some in loco photos. A reddish colour was seen in the eyes, but it is hard to confirm that the iris was completely red, because of the distance from which the individual was observed, and due to the photos' insufficient quality. Some authors define red or pink iris as an indicator of the degree of albinism, because red tinge in the iris shows absence of pigments (Murariu & Chisamera 2006).

Our observation is the first observed hypomelanistic lesser horseshoe bat in Slovenia and, according to the available literature, the first observation of a flavistic female with juvenile for the species, which suggests that flavism does not represent a mating barrier. In Europe, coloration anomalies have been recorded in at least 17 different bat species (Gaisler & Pokorný 2002), while complete albinism in bats was recorded in at least 8 bat families and 38 species all over the world (Uieda 2000). Among bats leucism, localized lack of pigment, is more often found (Bartonička & Buřič 2007, Haarsma 2008), while observations of flavism are, at least in literature, rarely described. Albinism among lesser horseshoe bats is suggested to be relatively frequent (Gaisler et al. 2011, Uieda 2000). Observations of complete albinism in lesser horseshoe bats are known from different localities in Austria (Reitter 2010), from the Czech Republic (Horáček 1995, Bartonička and Buřič 2007, Gaisler et al. 2011) and possibly from eastern Slovakia (Danko 1995). The repeated observations in Jeseníky Mountains in the Czech Republic suggest that the Jeseníky local population has a fixed frequency of the albinotic allele (Bartonička & Buřič 2007). Finding the causes of colouring anomalies that occur in some of the mammals is continuing, given that the lack of respective pigments in food or environmental factors are not sufficient for a convincing explanation (Murariu & Chisamera 2006).

Among all the bat species present in Slovenia, the highest number of maternity roosts is known in lesser horseshoe bat (Petrinjak 2009). Since their roosts are well known, we will have the opportunity to observe possible specimens with colouration anomalies in the vicinity of our record in the following years.

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Figure 1. Flavistic lesser horseshoe bat *Rhinolopus hipposideros* female with a juvenile in a church belfry at Dolenja vas, SW Slovenia; a) flavistic female in a nursery colony, b) uniform beige colouration and red eyes indicate flavism, juvenile is normally pigmented, c) dorsal view of flavistic female (photo: Aja Zamolo).

Slika 1. Flavistična samica malega podkovnjaka *Rhinolopus hipposideros* z mladičem v zvoniku cerkve v Dolenji vasi, JZ Slovenija; a) flavistična samica v porodniški koloniji, b) enotna bež obarvanost in rdeče oči nakazujejo flavizem, mladič je normalno obarvan, c) flavistična samica s hrbtne strani (foto: Aja Zamolo).

Popravki

Erratum: **»Spodnja Klevevška jama – pomembno zatočišče netopirjev in novo najdišče dolgokrilega netopirja (*Miniopterus schreibersii*) na Dolenjskem (JV Slovenija).«**
Presetnik P. & Hudoklin A., Natura Sloveniae 7(1), 2005, str. 31-35.

Str. 31: pravilen zapis imena drugega avtorja je Andrej Hudoklin.
Page 31: correct name of the second author is Andrej Hudoklin.

Erratum: **»Opis prvih najdb nimfnega netopirja (*Myotis alcathoe*) v Sloveniji«**
Presetnik P., Natura Sloveniae 14(1), 2013, str. 5-13.

Str. 8: v glavi tabele 1 bi moral biti pri letu najdbe 2008 izpisan simbol za samico namesto za samca. Popravljena tabela sledi:
Page 8: in the head of Table 1, by year of find 2008, the correct sign for sex is female instead of male. Corrected table is as follows:

Tabela 1. Mere nimfnih netopirjev (*Myotis alcathoe*), vmreženih ob mlaki pri Rdečem kamnu, in mere, ki jih za to vrsto podajajo različni avtorji. (1) – Dietz et al. 2007; (2) – Niermann et al. 2007
Table 1. The measurments of *Myotis alcathoe* mistnetted in Slovenia at the Rdeči kamen pond and measurements given by other writers. (1) – Dietz et al. 2007; (2) – Niermann et al. 2007

mera / mesurement	**Slovenija / Slovenia**			**srednja Evropa / Central Europe** (1)	**Poljska / Poland** (2)
leto najdbe / year of find:	**2007** ♂	**2008** ♀	**2011** ♀		
dolžina podlaktnice / forearm length [mm]	33,0	33,3	33,4	<32,8 (30,8 – 34,6; do 34,8)	28,4 – 33,4
masa / weight [g]	5,0	6,0	6,0	3,5 – 5,5	3,2 – 4,7
dolžina palca / thumb length [mm]	5,0	4,8	4,8	< 4,7 (3,8 – 5,0)	4,0 – 4,5
dolžina 3. dlančnice in prstnic / 3rd finger length [mm]	51,9	53,6	/	50 – 56	/
dolžina 5. dlančnice in prstnic / 5th finger length [mm]	41,1	41,8	/	37 – 44	44,7 – 53,1
dolžina goleni / tibia length [mm]	15,2	15,8	15,4	< 14,8 (13,5 – 15,9)	/
dolžina stopala / foot length [mm]	5,8	/	5,2	< 5,6 (5,1 – 5,8)	/

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