



THE PRESENCE OF *EPTESICUS NILSSONII* AND *VESPERTILIO MURINUS* IN THE CROATIAN BAT FAUNA CONFIRMED

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In 2002 specimens of *Eptesicus nilssonii* and *Vespertilio murinus* were caught in mist-nets in mixed forests of spruce, fir and beech in two localities on Mt Velebit. These are the first records in Croatia for 130 years for *E. nilssonii*, and for 68 years for *V. murinus*. Considering all the available data from Croatia and neighbouring countries, we discuss the possible status of these species in the mountain area of the Dinaric Alps. Although all the new findings were males caught in the migratory period (August and September) which indicates the possibility of hibernation in the karstic area of the Dinaric mountains, we do not exclude the possible existence of resident populations.

Key words: Bats, *Eptesicus nilssonii*, *Vespertilio murinus*, Mt Velebit., Croatia

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Metodom lova mrežama za šišmiše na dva lokaliteta na planini Velebitu zabilježeni su u miješanim šumama smreke, jele i bukve borealni šišmiši *Eptesicus nilssonii* i *Vespertilio murinus*. To su prvi podaci nakon 130, odnosno 68 godina od zadnjih nalaza tih vrsta za Hrvatsku. Na temelju svih dosadašnjih podataka za Hrvatsku i susjedne države diskutira se o mogućem statusu ovih vrsta na planinskom području Dinarida. Iako se novi nalazi odnose samo na mužjake iz doba migracije (u kolovozu i rujnu) koji ukazuju na vjerojatnost zimovanja u kršu Dinarida, ne isključuje se postojanje mogućih rezidentnih populacija.

Ključne riječi: šišmiši, *Eptesicus nilssonii*, *Vespertilio murinus*, Velebit, Hrvatska

INTRODUCTION

The published records of the northern bat (*Eptesicus nilssonii* Keyserling et Blasius, 1839) and the parti-coloured bat (*Vespertilio murinus* Linnaeus, 1758) for Croatia date back to the 19th and the first part of the 20th century and lack later confirmation. *E. nilssonii* was quoted by LANZA (1957) for Split (Špalato) and DJULIĆ (1959)

for Zagreb, and *V. murinus* was first mentioned by BLASIUS (1857) and KOLENATI (1860) for Dalmatia and later by DJULIĆ (1959) for Zagreb, with reference to the old collection of the Croatian Public Zoological Museum, today the Croatian Natural History Museum in Zagreb (CNHM). These data, from the southern border of the distribution of the species (MITCHELL-JONES *et al.*, 1999), were, because of the age of their dates and their paucity, considered to indicate merely accidental findings of vagrant specimens, and ĐULIĆ (1994) excluded *E. nilssonii* from the Red Data List of Croatian Mammals and stated that *V. murinus* was a regionally extinct species. Recently, however, LIPEJ & GJERKEŠ (1992) found one single skull of *V. murinus* in owl pellets under the vertical rocks of Mt Čićarija (Istria).

MATERIAL AND METHODS

The first systematic research on bats outside caves in the continental area of Croatia did not begin before 1998. One of the results of our fieldwork with mist-nets and bat-detectors is the finding of *Eptesicus nilssonii* and *Vespertilio murinus* on Mt Velebit. Due to the kindness of Dr F. Spitzenberger we received some old unpublished data from the Mammal Collection of the Natural History Museum Vienna (NMW), which clarified the sources of data in the early publications (BLASIUS, 1857; KOLENATI, 1860). The rest of the old Mammal Collection of the Croatian Natural History Museum in Zagreb was examined too. Some measurements taken from bats caught on Mt Velebit are given in Tab. 1.

Material observed and examined:

Eptesicus nilssonii: **Apatišan** (1058 m/asl), Velebit Mts., 2002: Aug 2, 1 ♂ in mistnet, leg. I. Pavlinić & Z. Scheibl, alcohol (CNHM 6144); **Apatišan**, Velebit Mts., 2002: Aug 3, 1 ♂ in mistnet, obs. and photo I. Pavlinić & Z. Scheibl; **Lubenovačka ruja** (1351 m/asl), Velebit Mts., 2002: Aug 4, 1 ♂ with broken wing, leg. I. Pavlinić & Z. Scheibl, alcohol (CNHM 6145);

Vespertilio murinus: **Dalmatia** (near Zara?), don. Petter 1843, 2 ♂♂, alcohol (NMW 19413, 19414); **Dalmatien**, don. Gj. Kolombatović, 1 ♀, alcohol (NMW 19438); **Vrana**,

Tab. 1. Forearm length of *Vespertilio murinus* and *Eptesicus nilssonii* from Mt Velebit (Croatia).

			<i>Forearm</i>
<i>Vespertilio murinus</i>			
Veliki Lubenovac	CNHM 6028	♂	42 mm
Apatišan	obs. only	♂	43 mm
<i>Eptesicus nilssonii</i>			
Apatišan	CNHM 6144	♂	39,1 mm
Apatišan	obs. only	♂	42 mm
Lubenovačka ruja	CNHM 6145	♂	41 mm

circa Lago (probably before 1908), 1 ♂ and 1 ♀, leg. and don. Gj. Kolombatović, alcohol (NMW 19430, 19431); **Dubrava** (Zagreb surrounding, ca 250 m/asl), 1930: May 10, 1 ♀, stuffed specimen, don. State Lower School (CNHM 917); **Zagreb** (ca 200 m/asl), 1929: Aug 30, 1 ♂ leg. V. Magdić (CNHM 865; specimen destroyed); **Zagreb** (ca 200 m/asl), 1909: Sep.15, 1 ♀ leg. Jović, alcohol (CNHM 314), det. and published by B. Đulić (1959) as *E. nilssonii*; **Veliki Lubenovac** (1250 m/asl), Velebit Mts., 1998: Sep 11, 1 ♂ in mistnet, leg. N. Tvrtković & Ž. Ludvig, alcohol (CNHM 6028); **Apatišan** (1058 m/asl), Velebit Mts., 2002: Aug 2, 1 ♂ obs. and photo I. Pavlinić & Z. Scheibl.

RESULTS AND DISCUSSION

Parti-coloured bat (*Vespertilio murinus*). The oldest data from Croatia referring to *Vespertilio murinus* are from the middle of the 19th century. BLASIUS (1857) mentioned this species under the name of *Vesperugo Discolor* Natt. in Kuhl, and KOLENATI (1860) under *Meteorus Discolor* Kuhl for Dalmatia. They did not specify the exact locality so the finding was unconfirmed. KOLOMBATOVIĆ (1884) already had some doubts about these data because for a long time he was unable to find this species. Today we know that the basis for Blasius' mentioning of this species for Dalmatia were two specimens of *Vespertilio murinus* in alcohol, collected by Prof. Petter (Peter?) probably near Zara (= Zadar) and donated to the Vienna Museum collection in 1843. Kolombatović himself succeeded in catching three parti-coloured bats, two probably near Lake Vrana, which he also sent to Vienna Museum along with the rest of his collection, probably in 1908, but these findings were never published. These old data from Dalmatia emphasized this area of the Mediterranean lakes surrounded by high karst mountains as possible temporal foraging habitat for the parti-coloured bat.

Certain confusion in the synonymy of *Vespertilio murinus* and *Myotis myotis* as in FITZINGER (1846) and KOLENATI (1860) originated from the tenth edition of »Systema Naturae« (LINNAEUS, 1758) (for more explanation see BAAGØE, 2001). During the 19th and at the beginning of the 20th century many authors used the name *Vespertilio murinus* Linné and *V. murinus* Schreb. (BLASIUS 1857) for the Mouse-eared bat, *Myotis myotis* (Common bat or Gemeine Fledermaus in old papers). Some authors not familiar with bat synonymy repeated this mistake in papers containing data concerning Croatia (HIRC, 1884; MATISZ, 1896; KORLJEVIĆ, 1903; GIROMETTA, 1913; 1914), and finally later authors considered these published records as those of the true *V. murinus* (LANGHOFFER, 1912; KARAMAN, 1929; PETROVIĆ *et al.*, 1987).

The first published records of parti-coloured bats according to old literature are those of a male (leg. 1929) and two females (leg. 1930) from the city of Zagreb (DJULIĆ, 1959). One of the females was misidentified as *E. nilssonii* (DJULIĆ, 1959) and cited in HANÁK & HORÁČEK (1986) and GERELL & RYDELL (2001). After examination of the skull and teeth, we reidentified this specimen as the parti-coloured bat. These findings in the urban area of Zagreb indicate that, as in some other big cities in Europe (SPITZENBERGER, 1984), the city was probably a regular mating place

and, considering the time of the records (10 May, 30 August, 15 September), it was also a wintering habitat of a migratory population. Bad water management with the regulation of the Sava River in the middle of 19th century led to the destruction of the rich feeding wet habitats that had probably attracted this species. Insect abundance was also greatly decreased with the use of insecticides in the former »city-health« programs against mosquitoes. Finds of skeletal remains from owl pellets in Istria under the high rocks (LIPEJ & GJERKEŠ, 1992) indicate the position from which males probably attract females for mating before wintering.

The specimens of parti-coloured bat (measurements of the forearm in Fig. 1) caught in mist-nets on Mt Velebit during September 1998 and at the beginning of August 2002 over pools in clearings of mixed forest of beech, spruce and fir were males. The male from Veliki Lubenovac polje (karst field), before being caught in the net, was observed flying along the forest edge, producing loud calls during flight. These new findings are the first confirmed records of *Vespertilio murinus* in Croatia after 68 years. They do not allow any decision to be made on the status of this species in Croatia. An accidental finding of a lactating female in the area of Kočevski rog (Slovenia) in a similar habitat (KRYŠTUFEK & ČERVENY, 1997) should warn us to exclude the possibility that this migratory species (MASING, 1989), which moves greater distances than any other European bat, 1,440 km, is resident in the Velebit area.



Fig. 1. Parti-coloured bat (*Vespertilio murinus*) from Mt Velebit. Photo D. Pelić

Northern bat (*Eptesicus nilssonii*). The only former indication of the occurrence of *Eptesicus nilssonii* in Croatia comes from LANZA (1957) who identified one female bat caught 1873 in Split (Spalato) in a typical Mediterranean region by an unknown collector as *E. nilssonii*. Unfortunately, we were not able to confirm the determination of that specimen (det. Van Cakenberghe from Antwerp and B. Lanza) which is today stored in Museo di Storia Naturale di Florence (Coll. Num. 4831). The length of the forearm is 40.2 mm (LANZA, 1957), but there is a possibility that this specimen was confused with *Hypsugo savii* because of the overlap in dimensions and similarity of body and skull shape (HANÁK & HORÁČEK, 1986; GERELL & RYDELL, 2001). Another explanation of this unexpected finding is that it was a vagrant specimen from the neighbouring mountains of Dinarides. Interestingly, the bat came to Florence Museum as an exchange from the Zoological Museum in Berlin under the name of *Vespertilio discolor*, and was published first as *V. murinus* (DAL PIAZ, 1926).

In 2002, some 130 years later, we finally confirmed this species as a member of the Croatian bat fauna. During three nights in the beginning of August 2002 in two localities (clearings near pools in fir, beech and spruce forest) which are about 7 km apart, three males of the northern bat (Fig. 2) were caught in mist-nets, along with 12 other species of a total of 36 bat specimens. In August, northern bats in the north of Europe undertake up to 30 km long migrations in search of feeding habitats (DE JONG, 1994), and only one longer migration of about 250 km is known (GAISLER *et*



Fig. 2. Northern bat (*Eptesicus nilssonii*) from Mt Velebit. Photo I. Pavlinić

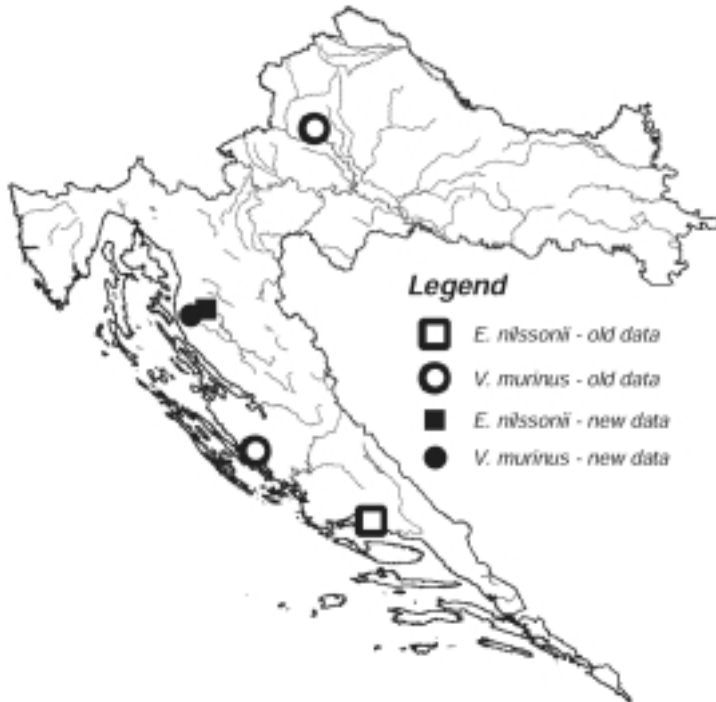


Fig. 3. Position of findings of *Vespertilio murinus* and *Eptesicus nilssonii* in Croatia. Open spots are older data, black spots new data.

al., 2003). Further investigations should tell us what kind of population – resident or only migratory – we are dealing with, because there is evidence of a female in lactation in Slovenia (ČERVENY & KRYŠTUFEK, 1991).

With these new findings (Fig. 3) we confirmed the presence of *E. nilssonii* and *V. murinus* in the bat fauna of the montane and subalpine belt of Mt Velebit and the high bat biodiversity of this area with a known 23 species in all. The Croatian bat fauna now comprises a total of 33 bat species. We expect that these two species will turn out to be resident in the Dinarides, but without better knowledge their statuses can be confirmed only as wintering populations.

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SAŽETAK

Potvrda vrsta *Eptesicus nilssonii* i *Vespertilio murinus* za faunu šišmiša Hrvatske

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Sustavnim istraživanjem faune šišmiša Hrvatske zabilježene su na dvije lokacije na planini Velebit borealne vrste dvobojni šišmiš (*Vespertilio murinus* Linnaeus, 1758) i sjeverni noćnjak (*Eptesicus nilssonii* Keyserling et Blasius, 1839). Uz niz krivo citiranih nalaza starijih autora u LANGHOFFER (1912), KARAMAN (1929) i PETROVIĆ *et al.*, (1987) zbog nepoznavanja sinonimike dvobojnog šišmiša, čije izvorište je u nepreciznoj dijagnozi i vjerojatno netočnom navođenju starog engleskog naziva velikog šišmiša (*Myotis myotis*) u originalnom opisu vrste (LINNAEUS, 1758), dosadašnji stvarni podaci iz Hrvatske se odnose samo na podatke iz Dalmacije s početka XIX (leg. prof. Petter) i s početka XX. stoljeća (leg. Juraj Kolombatović), te 68 godina stare nalaze s područja Zagreba (DJULIĆ, 1959). Jedini podaci o sjevernom noćnjaku odnose se na nalaz iz Splita iz godine 1872 (LANZA, 1957), iako, nažalost, nismo bili u prilici potvrditi identifikaciju tog primjerka. Podatak objavljen u radu DJULIĆ (1959), koji se odnosi na ♀ sjevernog noćnjaka iz zbirke tadašnjega Hrvatskog Narodnog Zoološkog Muzeja (danas Hrvatski Prirodoslovni Muzej) i koji je u kasnijim radovima citiran (HANÁK & HORÁČEK, 1986; GERELL & RYDELL, 2001), u ovom je radu konstatiran kao kriva identifikacija; ponovnom determinacijom je utvrđeno da se radi o dvobojnom šišmišu. Zasada s Velebita imamo samo nalaze mužjaka obje borealne vrste u doba migracije kada su u Europi zabilježeni preleti do 250 (sjeverni noćnjak) i čak 1440 km (dvobojni šišmiš). Status populacija u Sloveniji (ČERVENY & KRYŠTUFEK, 1991; KRYŠTUFEK & ČERVENY, 1997) ukazuje na mogućnost egzistencije rezidentnih (domicilnih) populacija u Hrvatskoj kao i na ostalim planinama Dinarida, ali one se, bez prikupljenih dokaza, mogu smatrati samo zimujućim populacijama.