Hystrix It. J. Mamm. (n.s.) 22(1) 2011: 73-79

TWO UNUSUAL RECORDS OF THE LESSER HORSESHOE BAT (*RHINOLOPHUS HIPPOSIDEROS*) IN THE MORAVIAN KARST (CZECH REPUBLIC)

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Received 25 August 2010; accepted 15 February 2011

ABSTRACT - During a census of bats hibernating in the Sloupsko-šošůvské Caves in February 2010, a total of 739 *R. hipposideros* were recorded. Among them, a complete albino was examined and found to be a female born in the previous summer. The cases of partial and complete albinism in *R. hipposideros* reported so far are reviewed; all records were made in Central Europe in the Czech and Slovak territories. Also a copulating pair of *R. hipposideros* was documented and photographed. Unlike hibernating individuals, the bats were alert, in dorso-ventral contact with the male biting his mate's dorsal fur.

Key words: Central Europe, hibernating bats, albinism, mating

RIASSUNTO - ***Due inusuali segnalazioni di ferro di cavallo minore (*Rhinolophus hipposideros*) in Moravia (Repubblica Ceca)***. Nel febbraio 2010, il censimento dei pipistrelli in ibernazione nella Grotta Sloupsko-šošůvské ha compreso un totale di 739 *R. hipposideros*. Tra di essi, è stata rinvenuta una femmina albina, nata l'estate precedente. I casi di albinismo in *R. hipposideros* riportati sinora riguardano tutti l'Europa centrale e, in particolare, le Repubbliche ceca e slovacca. Nella stessa occasione, l'accoppiamento di *R. hipposideros* è stato documentato e fotografato. Diversamente dagli individui in ibernazione, i pipistrelli erano attivi e il maschio aderiva con il ventre al dorso della femmina, mordendone la pelliccia.

Key words: Europa centrale, ibernazione, albinismo, accoppiamento.

DOI: 10.4404/Hystrix-22.1-4649

INTRODUCTION

The Moravian Karst (MK) is a 24 km long and 2 to 6 km wide system of Devonian limestone situated in the eastern part of the Czech Republic, the historic country of Moravia. It is the largest and most valuable karst area in the Czech Republic with over 1000 natural limestone caves. The first records of bat assemblages wintering in the MK date back to the middle of the 19th century, when some of the caves were visited by F. A. Kolenati, the author of the first

monograph of European bats (Kolenati, 1860). Systematic research started in the 2nd half of the 20th century and was mostly combined with marking of hibernating bats by aluminium bands (Gaisler and Hanák, 1969). However, due to potentially detrimental effect of marking-and-recapturing, mass banding of hibernating bats was terminated in 1980. Since 1981, bats found in underground shelters throughout the Czech Republic have been counted by short-time illumination to limit disturbance (Horáček, 2001, Gaisler, 2005). This monitoring has been carried out until present and, within the past five years, about 600 caves, mine galleries, cellars and similar underground spaces have been visited each winter (T. Bartonička personal communication 2010).

In Sloupsko-šošůvské Caves, during the past seven years a total of 12 species have been recorded, with a maximum of 9 species during a census (Tab. 1). The hibernating bat community was dominated by *R. hipposideros* and *M. myotis*, *M. emarginatus* being the third most common species. An increasing trend has been shown in *R. hipposideros* and *M. emarginatus* numbers. *M. daubentonii* was the fourth most often recorded species, while the exact numbers of other *Myotis* bat could not be specified. Bats of the genera *Plecotus* and *Barbastella* were only rarely recorded.

During a recent census, a previously seen albino *Rhinolophus hipposideros* was checked and a couple of mating bats of the same species was discovered and documented. The goal of this paper is to describe the two records, review all cases of albinism so far reported in *R. hipposideros*, and comment on previous observations of *Rhinolophus* bats mating in winter. The hibernaculum and its bat community, which is rich in both numbers and species diversity, will be briefly introduced to illustrate the circumstances.

MATERIALS AND METHODS

The Sloupsko-šošůvské Caves (named after the villages of Sloup and Šošůvka) consist of a nearly 7 km long complex of underground domes, corridors and chasms created in two floors. The caves have been made partially accessible to the public by a system of pavements, bridges and stairs and are open daily from May to August, although traffic is limited in September-November and March-April. From December to February the cave is closed to public, to protect the hibernating bats. Hibernating bats are counted once each winter, surveys lasting about 5 hours and invariably following the same track. The records of *R. hipposideros* dealt with in this paper were made during the census on 3rd February 2010. Bats were determined and counted visually, but Olympus Binoculars 8×25 PC I, field 6° were used to identify high hanging bats, mainly small *Myotis* spp., and to count the numbers of individuals in high-standing clusters of *M. myotis*. To verify the size of big clusters on the walls and ceilings of large domes, they were also photographed by Nikon Camera D 70, objective AF-S MICRO NIKKOOR 105 mm, 1:2.8G ED. Both binoculars and camera were essential to determine the species of mating bats.

RESULTS

On 3rd February 2010, a total of 739 *R. hipposideros* were recorded of which 87 bats, including the albino, formed a

Table 1 - Results of the censuses of hibernating bats carried out in the Sloupsko-šošůvské Caves in 2004-2010.

Species (n) / Year	2004	2005	2006	2007	2008	2009	2010
Rhinolophus hipposideros	364	610	654	728	785	749	739
Myotis myotis	441	532	603	746	891	682	552
Myotis emarginatus	11	11	31	16	54	26	25
Myotis bechsteinii					1		
Myotis dasycneme		1			1	12	1
Myotis daubentonii	1	7	5	13	27	2	6
Myotis nattereri			2	2	11	3	
Myotis brandtii						1	
Myotis mystacinus							1
M. brandtii vel mystacinus	3	3	3		10		
Myotis sp.	8	12			1	3	1
Plecotus auritus							3
Plecotus austriacus			2				
Barbastella barbastellus				2			1
Total	828	1176	1300	1507	1781	1478	1329

colony some 130 m from the main entrance in the space called Nicová Cave, about 2 m above its bottom (Fig. 1a).

The albino was discovered on 20th October 2009 by the Sloupsko-šošůvské Caves staff and the bat did not change its position until the February 2010 census. After having been photographed *in loco* (Fig. 1b and 1c), the bat was taken down carefully and examined. It was found to be a young female born in 2009, the cartilaginous zones of its metacarpal and finger bones being still clearly visible. Both ventral and dorsal hair was white, with depigmented wing membranes, nose leafs and ears (Fig. 1d). Unfortunately the bat did not open its eyes within the 5 minutes of examination, before it was released at the site of capture. Although the red colour of its eyes (due to iris translucence) could not be verified, the external appearance of the individual suggested a case of complete albinism.

Deep in the cave, some 400 m from the main entrance and 4.7 m above the cave bottom at the site, a pair of mating *R. hipposideros* bats was discovered. Unlike hibernating individuals of this species, the bats were alert, in dorsoventral contact and not wrapped in their wing membranes. The head of the lower bat, evidently a female, was risen and moving slightly as when echolocating. The male had bitten his mate's dorsal fur (Fig. 1e). The mating couple was observed and photographed for some 5 minutes under intense illumination. The bats showed some movements but remained attached to the cave wall and looked as if they were unable to fly away.

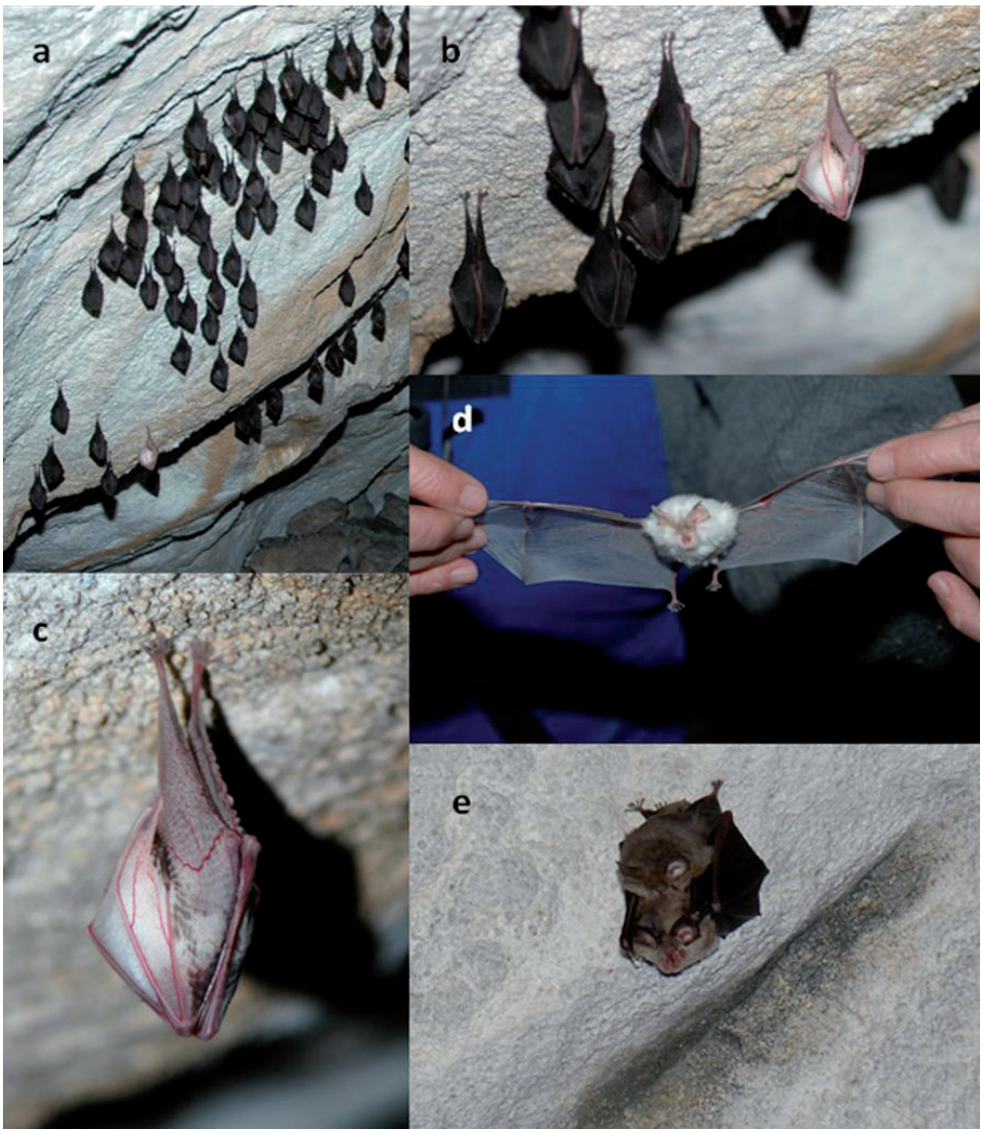

Figure 1 - a) Hibernating colony of *Rhinolophus hipposideros* with the albinotic female at the left bottom; b) Albinotic individual compared to normally coloured conspecifics. c) Hibernating albinotic female *R. hipposideros*; d) Detailed view of the ears, face and white fur of the albinotic female; e) A mating pair of *R. hipposideros*.

DISCUSSION

In the years 1958-2001, 13 bat species were found in the Sloupsko-šošůvské Caves, out of the 22 species recorded within the MK territory and 26 species known from the whole Czech Republic (Zukal et al. 2001, Gaisler et al. 2006).

R. hipposideros was the most common species during most of the first 30 years of observation, but recently was replaced by *M. myotis*. During the past decade, however, a positive trend in the development of numbers of *R. hipposideros* has been observed. A similar population increase was recorded by Furmankiewicz et al. (2007) in the German and Polish territory of the Sudetes, north of the Czech border.

Partial albinos or flavistic individuals of *R. hipposideros* were reported from the Na Pomezí Caves (Gaisler 1961), Roušarova Cave and Rasovna Cave (Bartonička and Buřič, 2007). All three caves are situated in the Jeseníky Mts, north-eastern Czech Republic, a few kilometres away from each other. All records were made in winter and the three bats were adult males. A white coloured juvenile, probably a partial albino as well (sex unknown) was observed attached to its mother in a summer colony in the church spire at Ruský Hrabovec, eastern Slovakia (Danko, 1995). A complete albinotic adult male was found dead on the floor of the castle loft at Betliar, eastern Slovakia (Horáček, 1995). Another complete albino male was recorded in Roušarova Cave, where the bat was observed and photographed in a hibernating colony, invariably at the same spot each winter, from 2000 to 2007 (Bartonička and Buřič, 2007). The authors did not record the age of the bat when it was observed first but it must have been born in 1999 at the latest. Thus the colour anomaly did not prevent the animal surviving more than seven years. The albino *R. hipposideros* described in this paper is the only albinotic female of the species recorded so far. Reviewing all known cases of complete albinism in bats, Uieda (2000) reported such anomaly in 38 species belonging to eight families. Most species belonged to Vespertilionidae and only four to Rhinolophidae. With the current three records, complete albinism in *R. hipposideros* can be considered relatively frequent (Uieda, 2000). Surprisingly, all cases of partial and complete albinism in *R. hipposideros* concern individuals found in the territory of the combined Czech and Slovak Republics. One cause may be their high population density, resulting in a relatively high probability of the genetic mutation causing albinism. The species is less common in western Europe and some Mediterranean countries, e.g. Italy (Crucitti and Cavalletti, 2002). Alternatively, the unusual high frequency of albinos may depend on the low genetic variation of the species in central Europe, as a result of its postglacial spreading from geographically limited refugia (P. Benda, *pers. comm.*, 2010). So far, most of the albinos were recorded in caves in the Jeseníky Mts area. It is possible that the population of *R. hipposideros* hibernating in these caves has a fixed frequency of the albinotic allele (Bartonička and Buřič, 2007).

Photos of mating bats usually show vespertilionid species such as *Myotis daubentonii* (Schober and Grimmberger, 1998), while the mating of horseshoe bats is only briefly described (Ransome, 1990, Schober, 1998). An exception is the popular book by Bernadovič (2000) with a clear photo of a *R. hipposideros* mating pair (p. 89),

taken in the Bystrianská Cave, central Slovakia, on 2nd April 1999 (M. Uhrin, *pers. comm.*, 2010). In the photograph the position of the mates is similar to that recorded in the Sloupsko-šošůvské Caves, except the wings of the female, which are spread. Ransome (1990) observed twenty cases of mating *Rhinolophus ferrumequinum*. The most extended mating he saw was in a cave in Somerset where the pair remained locked together for some forty minutes. The male had mounted dorsally, and was biting the fur at the nape of the female's neck. In contrast, the mating males of *R. hipposideros* photographed in Moravia and Slovakia were biting the female's fur not at the nape but further caudal. Basically, the cases of mating described or photographed in *Rhinolophus* do not differ from that in vespertilionid bats (Hill and Smith, 1984). The only other observation of copulation in *R. hipposideros* in the Czech territory appears to be that made by I. Grulich at the beginning of April 1949 in Mladečské Caves, northern Moravia. The record is interesting because it evidenced sexual activity of the species in early spring (Gaisler, 1966).

ACKNOWLEDGMENTS

We are grateful to Z. Řehák, J. Zukal, B. Koutecký and three students for helping with the census of bats in the cave, and to P. A. Racey and P. Benda who reviewed an earlier version of the manuscript and gave us helpful suggestions.

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