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A noteworthy record of *Rhinolophus hipposideros* nursery roost under a road bridge

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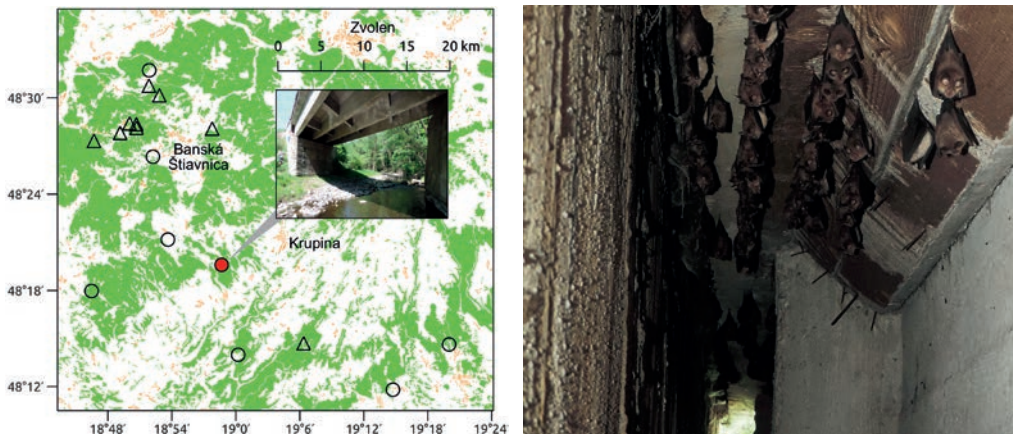
Abstract. In central Europe, roosts under road bridges are reported only rarely for few bat species. Under the concrete road bridge located close to the Hontianske Nemce village (central Slovakia), an abundant (up to 270 females) nursery colony of *Rhinolophus hipposideros* was found. Using infrared monitors, it was confirmed that the bats occurred in the roost permanently during the whole observed period (May – August 2015) while females gave births there at the end of June. It is the first roost of such type for this species recorded in central Europe and also the biggest colony of *R. hipposideros* known in the surrounding region.

Maternity colony, central Europe, diurnal activity, IR monitors, *Rhinolophus hipposideros*

Road bridges over water streams or terrain depressions and valleys provide roosts for different bat species all over the world, especially in areas with a lack of other roosts (Bouchard 1998, Sedgeley & O'Donnell 1999, Keeley & Tuttle 1999, Amorim et al. 2015). Although this type of roost is favourably located directly on a commuting corridor of gleaning or canopy foraging bats (Vaughan et al. 1997) and it is relatively safe from predators and human disturbance, there is an increased risk of bat collision with traffic (Bartonička et al. 2008, Bennet & Zurcher 2013). In central Europe, such roosts were reported only rarely for few vespertilionid species including *Myotis myotis* (Borkhausen, 1797), *Myotis daubentonii* (Kuhl, 1817), *Myotis dasycneme* (Boie, 1825), *Pipistrellus pipistrellus* (Schreber, 1774) and *Nyctalus noctula* (Schreber, 1774) (e.g. Matis & Pasztor 1995, Lučan et al. 2007, Ceľuch & Ševčík 2008, Kmiecik & Kmiecik 2015) but some bridges are relatively famous thanks to long term and year-round occupancy of bats (e.g. *N. noctula* in the Ružomberok town in Slovakia; Školová et al. 2016). Contrary to the above-mentioned species, horseshoe bats are more sensitive to draught in their shelters (Dietz et al. 2009). Nursery colonies of the lesser horseshoe bat, *Rhinolophus hipposideros* (Borkhausen, 1797), in central Europe occupy mainly attics but also other places in buildings such as boiler or store rooms (Spitzenberger 2001, Danko et al. 2012). However, at southern latitudes with the Mediterranean climate, nurseries are more common in caves or mines and they are very rarely found also under bridges (Dietz et al. 2009, Presetnik et al. 2009). In this short note we describe a roost, abundance and activity of *R. hipposideros* which had established an unusual nursery colony under a road bridge near the Hontianske Nemce village (central Slovakia).

The first report on bats roosting under the concrete road bridge located on the route no. 51 between the Hontianske Nemce village and Banská Štiavnica town (48° 20' N, 18° 59' E, 270 m a. s. l.) comes from road workers who repaired this bridge in August 2014. At that time some dozens of *R. hipposideros* were recorded (photographed by J. Pavlíková), roosting in the darkest corners of six semi-open rooms (segments), each of an approximate volume of 1.5 m^2, in the construction on both sides of the bridge where the deck was attached to land abutments. The bridge crosses a small river of Štiavnica, it is surrounded by predominantly beech and oak forests, close (250 m) to an active andesite quarry (Fig. 1). Despite the fact that the bridge was repaired, the next season on 13 May 2015 we found ca. 100 individuals in three such segments on one bank side (the other half of the bridge was not checked on that day). In order to find out whether this bridge serves as a primary full-time nursery roost or whether it is used only temporarily (so-called satellite roost), we installed four automatic TM550-8K infrared [IR] monitors (Goodson & Associates Inc., USA) into the most occupied segments (with the largest amount of accumulated guano) of the bridge to monitor the relative



Figs. 1, 2. 1 – location of the nursery roost of *Rhinolophus hipposideros* under a road bridge (closed circle) on the route no. 51 between Hontianske Nemce and Banská Štiavnica. Other roosts with nursery colonies (open circles) and hibernacula (triangles) of this species in the vicinity are depicted. 2 – colony of *Rhinolophus hipposideros* females during the parturition period on 29 June 2015 (photo by A. Krištín).

Obr. 1, 2. 1 – poloha materskej kolónie *Rhinolophus hipposideros* pod mostom (plný krúžok) na ceste č. 51 medzi Hontianskymi Nemcami a Banskou Štiavnicou. Ostatné úkryty materských kolónií (prázdne krúžky) a zimoviská (trojuholníky) daného druhu v okolí sú vyznačené. 2 – materská kolónia *Rhinolophus hipposideros* počas obdobia rodenia mláďat dňa 29. 6. 2015 (foto A. Krištín).

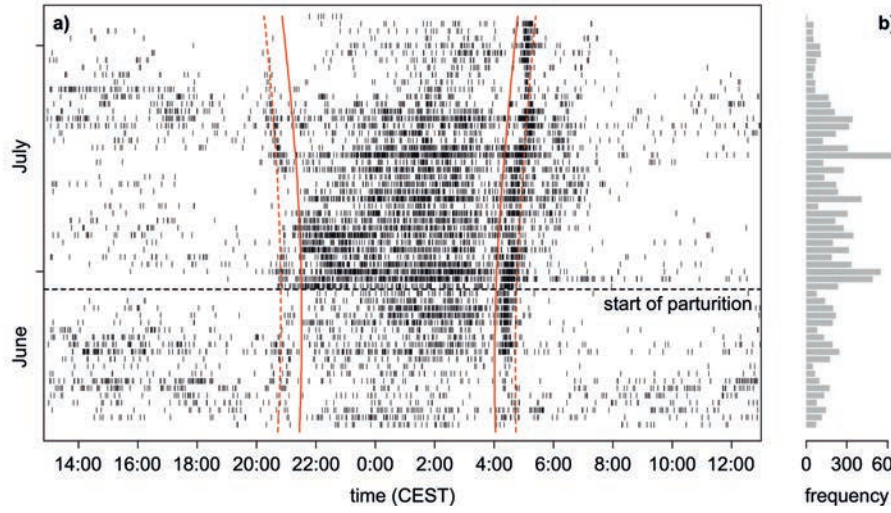


Fig. 3. Distribution and frequency of the relative flight activity of *Rhinolophus hipposideros* within the road bridge roost plotted for (a) time of day and (b) season. Vertical curves denote the time of sunset and sunrise (full) and civil twilight (dashed).

Obr. 3. Rozloženie a frekvencia relatívnej aktivity jedincov *Rhinolophus hipposideros* v úkryte pod cestným mostom (a) v čase dňa a (b) počas sezóny. Zvislé krivky naznačujú časy západu a východu Slnka (plné) a občianskeho šera (čiarkované).

activity of bats. IR monitors are able to detect the movements of emerging bats even in complete darkness and record their activity in minimum intervals of 6 s.

The recorded activity confirmed that the bats occurred in the roost permanently during the whole observed period (May – August 2015) although the number of individuals fluctuated. The total numbers of bats recorded by visual counts in all six segments were as follows: 10 June – 174 inds., 19 June – 201 inds., 29 June – 270 inds., 17 August – 204 inds. On 29 June we observed that some females were bearing 1–2 day old newborns (Fig. 2). Numbers found in August thus included adult females with weaned juveniles. The relative activity always culminated during the morning swarming with an apparent increase during night time after parturitions until the time when the offspring became capable of flight. Such equally distributed nocturnal activity of *R. hipposideros* during the lactation period is in contrast to most bat species exhibiting a bimodal pattern (Wegiel & Wegiel 1997). Frequent day time activity was recorded as well when the bats switched between bridge segments on the opposite banks (Fig. 3).

The roost of *R. hipposideros* under the road bridge near Hontianske Nemce is the first of such type for this species recorded in central Europe whereas the nearest similar one was found in Slovenia (Presetnik et al. 2009). Actually, the horseshoe bats roosted in untypical semi-open rooms with penetrating sunlight and draught coming from outside (Fig. 2), thus the microclimatic conditions there were probably less suitable compared to conventional roosts in attics (e.g. Gombkötö 1997, Dietz et al. 2009). Bridges and drainage galleries are well known as regular bat roosts in subtropical or arid conditions where the availability of other roost types is limited (Kunz 1982). These features beg the question about any ecological advantage of using the described roost. On the other hand, little attention has been paid to checks of potential roosts of bats under bridges in Slovakia (Ceľuch & Ševčík 2008). Moreover, regarding colony size, this nursery reached the upper limit (i.e. 200–300 females) that is known for the species in central Europe (e.g. Gombkötö 1997, Danko et al. 2012). In Austria, for example, most of the nursery colonies have less than 10 individuals (73% of 434 colonies) and only rarely (2%) exceed 100 individuals (Spitzenberger 2001). In the surrounding region of Štiavnické vrchy Mts. and Krupinská planina Plateau (Fig. 1) this is the biggest colony of *R. hipposideros* known so far (Uhrin 1999, Zlacká 2004, http://www.biomonitoring.sk), thus it is worth of protection not only due to its unique ecological character.

Súhrn

Zaujímavý nález materskej kolónie podkovára malého pod cestným mostom. Cestné mosty sú v strednej Európe pomerne málo známe ako úkryty niekoľkých druhov netopierov. Početná materská kolónia *Rhinolophus hipposideros* (do 270 samíc) bola nájdená pod betónovým cestným mostom v blízkosti obce Hontianske Nemce (stredné Slovensko). Sledovaním aktivity netopierov sme zistili, že kolónia sa vyskytovala pod mostom trvalo počas celej sezóny (máj–august 2015), pričom koncom júna tam samice rodili mláďaťa. Jedná sa o prvý nález takého netradičného úkrytu daného druhu v strednej Európe a v okolitej oblasti ide o najväčšiu známu kolóniu *R. hipposideros*.

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