

A house-dwelling maternity colony of *Nyctalus leisleri*: first record from the Czech Republic

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Abstract. A house-dwelling maternity roost of Leisler's bats was found in a small village 20 km E of Prague, Czech Republic, in 2011. The bats were roosting in crevices behind wooden facing and under the roofing of a house located at the edge of a large woodland. In 2012, bats used the roost from early May to early September and up to 178 individuals were counted during evening emergence. Repeated findings of non-volant pups and multiple captures of fledged juveniles and lactating females proved annual reproduction of the bats. The reported finding represents the first record of stable occupancy of a house by a maternity colony of Leisler's bats in the Czech Republic and raises a question about possible increase of the use of building roosts by this species in central Europe.

Chiroptera, bats in buildings, synanthropy, roosting ecology

Introduction

The Leisler's bat, *Nyctalus leisleri* (Kuhl, 1817), is a medium-sized (13–18 g) insectivorous vespertilionid bat occurring in a large part of the Western Palearctic region from western Europe and North Africa (incl. the Canary Islands and Madeira) through southern and central Europe to the Urals, Central Asia (Kirghizstan), Afghanistan, western Himalayas and central China (Horáček et al. 2000, Dietz et al. 2009). Throughout its range, it is a typical forest-dwelling species (reviewed by Bogdanowicz & Ruprecht 2004), although extensive use of semi-opened habitats and parkland was reported in some areas (Shiel et al. 1999, Russ et al. 2003, Waters et al. 1999). It seems to be an uncommon and scattered species in most parts of its European range, yet this may be, to some extent, due to a general lack of data on forest bats. The only exception holds for Ireland where it is a common species, most probably because of a lack of competition resulting from the absence of other species of the genus *Nyctalus* (Bogdanowicz & Ruprecht 2004).

Day roosts are typically found in natural and woodpeckers' cavities located in mature trees (Červený & Bürger 1987, Kaňuch et al. 2005, Ruczyński & Bogdanowicz 2005, Spada et al. 2008), although extensive use of bat boxes was reported from some areas (Walk & Rudolph 2005, Dondini & Vergari 2009, Vergari & Dondini 2011), mostly outside the reproductive period. Roost-sharing with noctules (*Nyctalus noctula*) and Daubenton's bats (*Myotis daubentonii*) is frequent (Červený & Bürger 1987, Encarnaçao et al. 2005, Kaňuch et al. 2005, Ruczyński & Bogdanowicz 2005). Roosting in buildings is exceptional in mainland Europe (e.g. Walk & Rudolph 2005, Boston et al. 2012), but it is common in Ireland most probably due to the scarcity of forests (Shiel & Fairley 1999, Waters et al. 1999). Roosting groups in tree cavities typically consist of 20–50 individuals, while much larger colonies are known from buildings in Ireland (up to >1000 individuals; Bogdanowicz & Ruprecht 2004) and France (>150 individuals; Boston et al. 2012). This paper reports on a finding of the first house-dwelling maternity colony of the Leisler's bat in the Czech Republic.

Methods

The bats were captured using mist nets set in front of the roost entrance, perpendicular to emerging bats. The captured bats were sexed, aged and their reproductive status was examined based on the state of nipples and state of epiphyseal fusion on carpal joints in females and juveniles, respectively (Racey 2009). Presence of bats in the roost was recorded by acoustic signs (bat social vocalisation and movements were audible inside the house through thin roof wall) and by emergence counts performed occasionally throughout the breeding seasons of 2011 and 2012.

Results

On 31 August 2011, a maternity roost of Leisler's bats was found in a house at Doubravčice (50° 01' N, 14° 48' E, 340 m a. s. l., Středočeský kraj Region) based on a report of the householder (the second author) who contacted the Czech Bat Conservation Trust to consult the possibility of reconstruction of the house while preserving the bat roost. Although the exact species identity was determined as late as in August 2011, the colony has been using the roost at least since 2000 (M. Mokrycki, pers. obs.).

The house is located at the edge (<20 m) of a large woodland (>500 ha) containing a patch of extensively managed mixed and coniferous forest plots of a different age. The surrounding



Fig. 1. The house serving as a roost of the maternity colony of Leisler's bats. Location of entrances used by bats are marked with arrows.

Table 1. Numbers of Leisler's bats (*Nyctalus leisleri*) observed during evening emergence in the years 2011 and 2012

date	number of individuals	note
2011		
10 August 2011	ca. 150	
31 August 2011	40–50	1 ♂ juv, 2 ♀♀ juv captured
2012		
8 May 2012	5	first confirmed presence in 2012
9 May 2012	0	
10 May 2012	0	
13 May 2012	0	
15 May 2012	8	
16 May 2012	3	
6 June 2012	23	
23 July 2012	178	1 ♂ juv, 1 ♀ juv, 4 ♀♀ ad L, 4 ♀♀ ad PL, 1 ♀ ad MP captured
13 August 2012	117	
2 September 2012	23	
6 September 2012	<5	last confirmed presence in 2012

landscape is composed of a mosaic of arable land (ca. 60%) and forests (ca. 40%). The nearest available water is a small forest brook at a distance of ca. 140 m. The bats roost in crevices under the roofing and behind wooden facing of the house (Fig. 1) and use several narrow (3–5 cm wide) openings to get in and out. They typically use the eastward facing part of the roofing in spring and autumn, while they prefer the southward and westward facing part during mid-summer.

From 3 to 178 individuals were observed leaving the roost between August 2011 and September 2012 (Table 1). In 2012 the roost was occupied continuously from May to September. Reproduction of Leisler's bats inside this roost was confirmed based on the following findings: (1) non-volant (ca. two-week old) juvenile Leisler's bats were found fallen under the roost in late June 2011 and 2012; (2) two fully fledged juvenile females and one juvenile male were captured on 31 August 2011 along with 40–50 individuals observed emerging from the roost and, (3) one juvenile male, one juvenile female, four lactating, six post-lactating and one adult non-reproductive female, respectively, were captured upon their emergence from the roost on 23 July 2012. The mean (\pm S.D.) forearm length of the captured individuals was 43.8 ± 1.1 mm ($n=13$) and body mass was 12.9 ± 1.1 g.

Discussion

The reported finding represents the first record of stable occupancy of a house by a maternity colony of Leisler's bats in the Czech Republic. All the other available records of this species from buildings concerned either individuals that occasionally entered through open windows or those found solitarily roosting behind opened window shutters (Anděra & Hanák 2007). However, all these findings come from outside the reproductive period, while all other records of maternity colonies in the Czech Republic have been made in tree cavities (Řehák 2005, Anděra & Hanák 2007).

The same holds for a vast majority of records of maternity roosts of Leisler's bats from other central European countries (summarized in Bogdanowicz & Ruprecht 2004, Dietz et al. 2009). The only published information on house-dwelling maternity roosts comes from Germany, where

one nursery colony and one likely site of reproduction were found in Bavaria (Walk & Rudolph 2005). Several unpublished records of maternity roosts in buildings exist from Saarland, Bremen and Lower Saxony, Germany. The two colonies from Saarland were situated in mortuaries that were located close to woods and had wooden facing at the outside and at the roof. Another colony using spaces behind wooden facing at the roof existed in Saarbrücken at a private house close to a woodland. No exact data on numbers of bats in these roosts are available (C. Harbusch, in litt.). The Bremen colony, containing some 25–30 bats, usually changes the roosts in an older oak hollow in a city park and a four-floor house during the breeding season (L. Bach, in litt.). The colony in Bad Lauterberg im Harz (Lower Saxony) have about 20 Leisler's bats. The roost is between the roof tiles and the boarding beneath (D. Anderson, in litt.).

Given the above-mentioned records and the fact that the discovered Czech roost has been used by Leisler's bats for at least 12 years, the use of buildings may be more common than previously thought. Alternatively, it may be a newly adopted and expanding behaviour. We hypothesize that increasing use of buildings as roosts of maternity colonies may occur in this species in the future, most probably due to a decreasing availability of suitable natural roosts but also due to benefits that building roosts may provide to bats, such as more space for roosting and favourable microclimate (Lausen & Barclay 2006). Much larger colonies roosting in buildings (many tens to many hundreds of individuals; see e.g. Shiel & Fairley 1999, Boston et al. 2012, this study) as compared to tree cavities (20–67 inds.; Červený & Bürger 1987, Bogdanowicz & Ruprecht 2004, Kaňuch et al. 2005) may support this hypothesis. This phenomenon definitely deserves further attention.

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References

- ANDĚRA M. & HANÁK V., 2007: *Atlas rozšíření savců v České republice. Předběžná verze. V. Letouni (Chiroptera) – část 3. Netopýrovití (Vespertilionidae – Vespertilio, Eptesicus, Nyctalus, Pipistrellus a Hypsugo)* [Atlas of the Distribution of Mammals in the Czech Republic. Preliminary Version. V. Bats (Chiroptera) – Part 3. Vesper Bats (Vespertilionidae – Vespertilio, Eptesicus, Nyctalus, Pipistrellus and Hypsugo)]. Národní muzeum, Praha, 172 pp (in Czech, with a summary in English).
- BOGDANOWICZ W. & RUPRECHT A. L., 2004: *Nyctalus leisleri* – Kleinabendsegler. Pp.: 717–756. In: KRAPP F. (ed.): *Handbuch der Säugetiere Europas. Band 4: Fledertiere. Teil II: Chiroptera II. Vespertilionidae 2, Molossidae, Nycteridae*. Aula-Verlag, Wiebelsheim, 582 pp.
- BOSTON E. S. M., ROUÉ S. G., MONTGOMERY W. I. & PRODÖHL P. A., 2012: Kinship, parentage, and temporal stability in nursery colonies of Leisler's bat (*Nyctalus leisleri*). *Behavioral Ecology*, **23**: 1015–1021.
- ČERVENÝ J. & BÜRGER P., 1987: Density and structure of the bat community occupying an old park at Žihobce (Czechoslovakia). Pp.: 475–488. In: HANÁK V., HORÁČEK I. & GAISLER J. (eds.): *European Bat Research 1987*. Charles University Press, Praha, 720 pp.
- DIETZ C., VON HELVERSEN O. & NILL D., 2009: *Bats of Britain, Europe and northwest Africa*. A&C Black Publishers Ltd., London, 400 pp.
- DONDINI G. & VERGARI S., 2009: Harem size and male mating tactics in *Nyctalus leisleri* (Kuhl, 1817) (Chiroptera, Vespertilionidae). *Hystrix, n. s.*, **20**: 147–154.
- ENCARNAÇÃO J. A., KIERDORF U., HOLWEG D., JASNOCH U. & WOLTERS V., 2005: Sex-related differences in roost-site selection by Daubentons's bats *Myotis daubentonii* during the nursery period. *Mammal Review*, **35**: 285–294.

- HORÁČEK I., HANÁK V. & GAISLER J., 2000: Bats of the Palearctic region: a taxonomic and biogeographic review. Pp.: 11–157. In: WOŁOSZYN B. W. (ed.): *Proceedings of the VIIIth European Bat Research Symposium. Volume I. Approaches to Biogeography and Ecology of Bats*. Institute of Systematics and Evolution of Animals PAS, Kraków, 280 pp.
- KAŇUCH P., KRISTÍN A. & KRÍŠTOFÍK J., 2005: Phenology, diet, and ectoparasites of Leisler's bat (*Nyctalus leisleri*) in the Western Carpathians (Slovakia). *Acta Chiropterologica*, **7**: 249–258.
- LAUSEN C. L. & BARCLAY R. M. R., 2006: Benefits of living in a building: big brown bats (*Eptesicus fuscus*) in rocks versus buildings. *Journal of Mammalogy*, **87**: 362–370.
- RACEY P. A., 2009: Reproductive assessment of bats. Pp.: 249–264. In: KUNZ T. H. & PARSONS S. (eds.): *Ecological and Behavioral Methods for the Study of Bats*. The Johns Hopkins University Press, Baltimore, xvii+901 pp.
- ŘEHÁK Z., 2005: Distributional status of *Nyctalus leisleri* in the Czech Republic. *Nyctalus (N. F.)*, **10**: 337–343.
- RUCZYŃSKI I. & BOGDANOWICZ W., 2005: Roost cavity selection by *Nyctalus noctula* and *N. leisleri* (Vespertilionidae, Chiroptera) in Białowieża primeval forest, Eastern Poland. *Journal of Mammalogy*, **86**: 921–930.
- RUSS J. M., BRIFFA M. & MONTGOMERY W. I., 2003: Seasonal pattern activity and habitat use by bats (*Pipistrellus* spp. and *Nyctalus leisleri*) in Northern Ireland, determined using a driven transect. *Journal of Zoology, London*, **259**: 289–299.
- SHIEL C. B. & FAIRLEY J. S., 1999: Evening emergence of two nursery colonies of Leisler's bat (*Nyctalus leisleri*) in Ireland. *Journal of Zoology, London*, **247**: 439–447.
- SHIEL C. B., SHIEL R. E., & FAIRLEY J. S., 1999: Seasonal changes in the foraging behaviour of Leisler's bats (*Nyctalus leisleri*) in Ireland as revealed by radio-telemetry. *Journal of Zoology, London*, **249**: 347–358.
- SPADA M., SZENTKUTI S., ZAMBELLI N., MATTEI-ROESLI M., MORETTI M., BONTANDINA F., ARLETTAZ R., TOSI G. & MARTINOLI A., 2008: Roost selection by non-breeding Leisler's bats (*Nyctalus leisleri*) in montane woodlands: implications for habitat management. *Acta Chiropterologica*, **10**: 81–88.
- VERGARI S. & DONDINI G., 2011: Long-term monitoring of *Nyctalus leisleri* at an Italian mating site. *Hystrix, n. s.*, **22**: 93–98.
- WALK B. & RUDOLPH B.-U., 2005: Verbreitung und Status des Kleinabendseglers (*Nyctalus leisleri*) in Bayern. *Nyctalus (N. F.)*, **10**: 368–374.
- WATERS D., JONES G. & FURLONG M., 1999: Foraging ecology of Leisler's bat (*Nyctalus leisleri*) at two sites in southern Britain. *Journal of Zoology, London*, **249**: 173–180.

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