

## Conspicuous body markings in infant *Myotis emarginatus* (Chiroptera: Vespertilionidae)

Výrazné zbarvení srsti mláďat netopýra brvitého (*Myotis emarginatus*)  
(Chiroptera: Vespertilionidae)

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**Abstract.** Pups of *Myotis emarginatus* exhibit bold markings in their natal coat. They consist of a neck band, a dorsal middle stripe, and a diamond-shaped spot in the distal part of the back. Furthermore, the posterior side of the ears shows a conspicuous pattern. These markings slowly disappear in the course of lactation. Apparently, such temporary body markings in infant bats have not been described yet. Hypotheses concerning this phenomenon are discussed.

**Key words.** *Myotis emarginatus*, natal coat, colouration, vestigial feature.

The most important functions of colouration in mammals are concealment as protection from predators; intra- und interspecific communication; and regulation of physiological processes such as thermoregulation. While the overall colouration in mammals serves mainly as camouflage, body markings are mainly used for intraspecific signalling, for instance to maintain contact between mother and offspring. Markings which serve as intraspecific signals are mainly prevalent in gregarious, diurnal mammals which inhabit open habitats (CARO 2005). However, despite the nocturnality of bats, several species of at least twelve Chiroptera families have also evolved more or less prominent wing and body pelage colouration patterns. Body markings in bats consist of neck bands, spots and stripes as well as countershading (ventral surface much lighter than dorsal part of the body) (SANTANA et al. 2011).

It has been suggested that the roosting ecology is the main driver of evolution of body markings in bats (SANTANA et al. 2011). Bats living in exposed roosts situated in vegetation tend to evolve pelage markings. They serve as disruptive colouration reducing the risk of becoming detected by a potential predator. Larger bats and bats living in larger colonies normally do not exhibit body markings.

Here we report the occurrence of temporary conspicuous body markings in the natal coat of infant Geoffroy's bats, *Myotis emarginatus* (Geoffroy, 1806). Our observations are not in accordance with the opinion expressed by SANTANA et al. (2011) on the ecological conditions in which body markings arise. The pups were born in a dark roost chamber of a castle and belonged to a large maternity colony (almost 700 adult females) which formed one big cluster during most of the roosting time. During the absence of the mothers from the roost, the juveniles formed smaller and larger clusters, few animals stayed solitary.

We studied a maternity colony of *Myotis emarginatus*, housed in the attic of the castle in Lockenhaus, Austria (47° 24' N / 16° 24' E, 388 m a. s. l.). We visited the roost after the adult females had departed for foraging every evening from 8 until 22 June, and on 27 June, 3, 10, 17 July 2017. Our aim was to count the juveniles produced in this year. The roost chamber has only one opening, and the colony roosted away from this window in a dark place. The maximum numbers of females inhabiting the maternity roost varied

between 524 and 694. We operated two digital cameras (Lumix G5) which took hourly photographs of the colony resting on the front and the rear side of a beam which was the favourite roosting site of the colony. Most of the time, the adult females formed a single bee hive-like cluster which covered all sides of the beam. Birthing started on 12 June 2017 when we found 23 aborted embryos of different age and one living pup. The number of juveniles was low until 18 June, but grew steadily until 3 July when we found 361 pups of all age classes from naked to pelages resembling that of adult individuals.

In the growing fur of the natal coat, dark brown markings contrasting with the light brown fur appeared. They consisted of a neck band, a long vertical stripe in the middle of the back and a diamond-shaped spot in the posterior part of the back (Fig. 1). In some individuals, the dorsal stripe extended to the back of the head (Fig. 2). Furthermore, the posterior side of the ear showed a very conspicuous pattern: the basal third was covered by very light, yellowish long hairs (Fig. 3). Later, the body markings became fainter and the vertical stripe broadened. Around the time when the juveniles were fully fledged, the markings had disappeared, probably because of the ongoing growth of the pelage. The last juvenile with markings was observed on 23 July, four days before the whole colony left the roost. As we did not mark the pups individually, it is not possible to determine exactly the time span between appearance and disappearance of the body markings.



Fig. 1. Dorsal body markings in a dead infant *Myotis emarginatus*.

Obr. 1. Zbarvení hřbetní srsti uhynulého mláděte netopýra brvitého (*Myotis emarginatus*).



Figs. 2, 3. 2 – Extension of the dorsal stripe on the back the head in an infant *Myotis emarginatus*. 3 – Section of a cluster of *M. emarginatus* pups showing the pattern of the posterior side of ear.  
 Obr. 2, 3. 2– Rozsah týlního pruhu na hlavě mláděte netopýra brvitého (*Myotis emarginatus*). 3 – Část shluku mláďat netopýra brvitého (*Myotis emarginatus*) ukazující zbarvení zadní strany boltce.

To our knowledge, the occurrence of temporary body markings in infant bats has not been described yet. To explain this perhaps unique or rare phenomenon, two hypotheses are possible. The first hypothesis is the assumption that the markings serve as a signal between pup and mother. As female *Myotis emarginatus* nurse selectively their own young, they have to find their own pups among several hundred others when returning to the roost. They recognise the voice and odour of their individual offspring and remember the place where they left their young. However, the use of an additional visionary cue might be helpful for locating the own pup more quickly, especially if the body markings were individually formed. But can mothers see the markings on the back of their pups in the dark roost? This is not impossible, as a number of bat species can utilise vision at low levels of light (ALTRINGHAM & FENTON 2003). Furthermore, *Myotis emarginatus* is known to be light-tolerant (ISSEL & ISSEL 1953, GAISLER 1971, RICHARZ et al. 1989 and several own observations) which seems to indicate a certain propensity for using light for identifying objects. Nevertheless, given the dense clusters formed by the juveniles, a function as a signal between mother and young seems to be unlikely.

The other hypothesis is that the body markings in infant Geoffroy's bats present a vestigial feature which had lost parts of its function in the course of evolution. Also this hypothesis is not completely improbable. Radio-tracking studies (FLAQUER et al. 2008, ZAHN et al. 2010, DEKKER et al 2013 and own data) revealed that Geoffroy's bats feed mainly in forests and that occasional day- and night-roosts of single individuals are situated on tree branches, under exfoliating tree bark and – completely exposed – on walls of buildings under an overhanging roof. In the evolutionary past, the body markings in adult individuals may have provided crypsis for the ancestors of present Geoffroy's bats. They might have used exposed roosts in the vegetation. When *Myotis emarginatus* started to breed in caves and attics, the body markings may have lost their function and disappeared in the adult pelage, but were retained in the natal coat.

## SOUHRN

Mláďata netopýra brvitého (*Myotis emarginatus*) vykazují silné znamení hřbetního zbarvení srsti. To sestává z šijového pásu, středního hřbetního pruhu a kosočtverečné skvrny v zadní části hřbetu. Mimoto i zadní strana ušních boltců vykazuje výrazné znamení. Toto skvrnění pomalu mizí v průběhu laktace. Takovému dočasně znamení tělesného zbarvení u časných mláďat netopýrů dosud nebylo popsáno, a proto jsou diskutovány hypothesis o důvodu tohoto jevu.

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