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Flavistic mound-building mouse (*Mus spicilegus*) in Slovakia

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Flavistic mound-building mouse (*Mus spicilegus*) in Slovakia. – Acta Mus. Siles. Sci. Natur., 71: 189-192, 2022.

Abstract: In this paper are presented two cases of abnormal colouration individuals of *Mus spicilegus* from northern border of the species' range. The individuals were caught during long-term research (from 2002 to 2021) of species in autumn-winter seasons in field biotopes on south-eastern Slovakia. The first individual captured on December 2, 2004, was subadult male. The second individual captured on November 11, 2020, was subadult female. Determination by morphological traits and subsequent dissection confirmed that both trapped mice were subadults. According to the findings, the observed individuals meet the criterion of flavism. The dorsal fur was yellow (or beige); the auricle, feet, and tail were light; and coloration on the belly was white. This finding is important not only in terms of colour anomalies, but also in terms of genetics.

Key word: anomalous colouration, flavism, field areas

Introduction

Mammalian colouration is most often the effect of the presence or absence of melanin pigment in the cortex and medulla of hair, in the epidermis of skin and in the iris of eyes (Hiler 1983, Green 1977, Binkley 2001, Imes *et al.* 2006, Whitman 2009, Summers 2009, Łopucki & Mróz 2010, McCardle 2012, Steen & Sonerud 2012, Łopucki *et al.* 2013, Nedyalkov *et al.* 2014, Čanády *et al.* 2008, Čanády 2015, 2016). According to Caro (2005), most mammals show gradual variation in colour across populations, while some populations exhibit discontinuous variation and are either white or black. Above mentioned authors showed that the most common abnormality in mammals was albinism, less likely was melanism, and the least likely was flavism.

Atypical coloration has been noted in several mammalian groups (e.g., insectivores, bats, rodents, carnivores, ungulates, primates, etc.). For rodents of various genera (e.g., *Microtus*, *Myodes* (*Clethrionomys*), *Apodemus*, *Mus*, etc.), colour anomalies are typical (Binkley 2001, Łopucki & Mróz 2010, McCardle 2012, Steen & Sonerud 2012, Łopucki *et al.* 2013, Čanády *et al.* 2008, Čanády 2015, 2016).

Several examples of flavism from the Czech and Slovak Republic (formerly Czechoslovakia) in *A. flavicollis* were presented by Hanák (1957), in *A. sylvaticus* by Štusák (1987), and in *A. agrarius* by Čanády (2016). Flavism was also recorded in *M.* (*C.*) *glareolus* (Literák & Zejda 1995), in the House mouse, *Mus musculus* (Hanák 1957) and in the Steppe mouse *Mus spicilegus* (Čanády *et al.* 2008).

The present study described the two individuals of *Mus spicilegus* with signs of abnormal colouration. These data contribute to the overall knowledge about the occurrence of anomalous colouration in the species.

Material and methods

Long-term research (2002–2021) of *Mus spicilegus* in Slovakia was carried out at several localities from geographical region Košická kotlina basin. During this period, mice samplings were conducted using a common theriological technique with Chmela-type live traps at the circumference of active overwintering mounds (Čanády *et al.* 2009). Traps were baited with nuts or sunflower seeds and exposed over several days, with a check made

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each morning between 7:00 and 8:00. The trapping over several days was carried out due to agricultural works associated with ploughing and subsequent destruction of overwintering mounds. The material presented here consistent of two individuals caught during autumn-winter season 2004 and 2020 in field biotope in the vicinity of Kechnec village (48°33'11"N, 21°14'26"E, 200 m a.s.l.) and Haniska village (48°36'45"N, 21°16'7"E, 189 m a.s.l.), both on south-eastern Slovakia (Fig. 1).



Fig 1: Locations of colouration anomalies of the mound-building mouse (*Mus spicilegus*) trapped in field environment of Slovakia: A – Kechnec village, B – Haniska village (Source: ©2021 Google, Image©2021 Maxar Technologies).

Results and Discussion

Mus spicilegus belongs to the mice, which are characterized by a light-grey-brown, ochre-brown, or dark grey to dark coloration on the back of the body. The colour of the abdomen is very variable, from snow-white to yellowish to almost grey in subadults and juveniles (Macholán 1996a, b, Unterholzner & Willenig 2000). The same colouration was registered for the Slovak population of *M. spicilegus*. At the same time, two anomalous coloured individuals with signs of flavism were recorded for the first time for this species in Slovakia (Čanády *et al.* 2008, data presented here). Determination by morphological traits and subsequent dissection confirmed that the trapped mice were a subadult male and female of *M. spicilegus*. The first individual captured on December 2, 2004, was subadult male (Fig. 2A). The second individual captured on November 11, 2020, was subadult female (Fig 2B). There were no differences in body size from the population of normally coloured individuals from the territory of Slovakia. The dorsal fur was yellow (or beige); the auricle, feet, and tail were light; and coloration on the belly was white.

Trapping of flavistic individuals of *M. spicilegus* over a span of 17 years indicates that, in eastern Slovakian population, mutations in the Tyr genes, which are responsible for the production of melanin, are maintained (Barsh 2001, Oetting *et al.* 2003, Blaszczyk *et al.* 2005). These findings support the hypothesis about genetic information maintenance in a population. Moreover, it is also in agreement with previous findings (Binkley 2001, Imes *et al.* 2006, Łopucki & Mróz 2010) that recessive alleles affecting colour anomalies are maintained in the population for a long time and under certain conditions may be expressed phenotypically. For instance, Łopucki & Mróz (2010) showed that in Poland most cases of anomalous colouration in rodents were recorded in habitats with various degrees of isolation due to suboptimal or unfavourable conditions therein. This fact confirmed the hypothesis on the influence of environmental conditions on the frequency of recessive alleles' display in populations of ground-dwelling small mammals. Similarly, it is presumed that changes in the genetic structure of small mammal populations leading to the manifestation of such recessive genetic traits as pigmentation anomalies (e.g., albinism or melanism) can serve as an indicator of environmental changes. The genetically inherited recessive traits such as colouration anomalies can indicate a bottleneck and current or past inbreeding in a population. Therefore, these data contribute to the overall knowledge about the occurrence of anomalous coloration in both species of genus *Mus*.



Fig 2: Anomalously coloured (flavism) specimens of the mound-building mouse (*Mus spicilegus*) trapped in field environment of Slovakia: A – male from Kechnec village (photo: M. Stanko), B – female from Haniska village (photo: A. Csanády), ventral (a) and dorsal (b) view.

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