

ALBINISM IN TWO SNAKE SPECIES RECORDED FROM SLOVAKIA

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Vipera berus (Linnaeus, 1758) and *Zamenis longissimus* (Laurenti, 1768) are two of five snake species occur naturally in Slovakia. They are common snakes in the country but it is rare to see albinotic individuals in these species, in general. There has been a lot of observations but no evidence of albinotic *V. berus* in Slovakia and adjacent countries do exist. Most records of albinotic *V. berus* come from Nordic countries whereas albinotic *Z. longissimus* has been observed in Slovakia and in surrounding countries. Mostly albinotic juveniles are found in the wild; in terms of *Z. longissimus* mainly adults were recorded with good health condition. Herein, we describe three albinotic juveniles of these species and we discuss their rarity in nature.

Keywords: Colubridae; Viperidae; *Zamenis longissimus*; *Vipera berus*; color aberration; first record; Central Europe

In reptiles, seven different basic types of color aberrations were described: albinism, axanthism, erythrism, hypomelanism, leucism, melanism and piebaldism, though this list is not exhaustive and nomenclature is not consensual (Bechtel, 1995). There is a huge number of published scientific records regarding to color aberration of reptiles since nothing is comprehensive from recent time. In wild reptiles the literature reports melanism (black body, dark eyes), albinism (white or yellowish body color and red eyes) and leucism (white or pinkish body color, dark eyes) as the most common forms of aberrant coloration (Bechtel, 1995; Broghammer, 2000 and literature therein). In general, animal coloration plays an important role in predator avoidance (through crypsis, mimicry or aposematism; e.g., Sweet, 1985), inter- and intraspecific communication and sexual selection (e.g., Roulin and Bize, 2006). Albinism is an inherited genetic, congenital condition that reduces the amount of melanin pigment that protects organisms from solar radiation. Albinotic individuals have notably sun-sensitive skin, causing them much difficulty during their growth (Spadola and Di Toro, 2007). Moreover, albinos usually have vision problems (Creel et al., 1990; Garipis and Hoffmann, 2000; Hupfeld and Hoffmann, 2006)

making them unable to identify predators what resulted into low survival rate of individuals in nature (e.g., Bechtel and Bechtel, 1981; Krecsák, 2008). Occurrence of the albinism among snakes in nature are not unknown, although they are rare, especially among adult individuals (Krecsák, 2008). Both hereafter described species are well known and studying regarding to coloration with different recorded types of color aberrations (Andrén and Nilson, 1981; Krecsák, 2008; Stojanov, 2014; Cattaneo, 2015). Herein, we bring three rare records of albinism for snakes from Central Europe.

On 15th August 2011 at 13:50 (local time), near Ziar-ska chata in Ziar-ska dolina (Fig. 1), the High Tatras, Slovakia (49.182° N 19.720° E; 1325 m a.s.l.), second author of this paper observed and photographed albinotic, ~150 mm length, newborn individual of *V. berus*. Individual was found during sunny day basking on rocky



Fig. 1. Map of Slovakia with records of albinotic snakes: *Vipera berus* (blue dot), *Zamenis longissimus* (orange dot; 1, Pezinok, 2, Hlohovec).

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Fig. 2. Albinotic juvenile of *Vipera berus* from the High Tatras.

path. This individual was pink with slightly visible dorsal pattern (Fig. 2). Eye color coincided with the body and vertical pupil was significantly red. The locality where the individual was recorded is known with occurrence of this species. The vegetation is represented by alpine communities. In this area following natural predators for *V. berus* were recorded: *Buteo lagopus*, *Falco tinnunculus*, and *Accipiter gentilis*. Albinotic *V. berus* individuals have not been recorded neither in Slovakia nor in surrounding countries. To our best knowledge, this is the first published and photographed record of albinotic *V. berus* from central-eastern Europe (Krecsák, 2008).

The first albinotic individual of *Z. longissimus* (Fig. 3A) was found in the park of the local castle (Zámocký park), southwestern Hlohovec town, west Slovakia (48.421° N 17.790° E; 187 m a.s.l.; Fig. 1). Approximately 350 mm length juvenile was observed on 29th



Fig. 3. Albinotic individuals of *Zamenis longissimus* recorded in Hlohovec (A) and Pezinok (B).

May 2016. The individual was white and pink colored with slightly visible dorsal pattern (Fig. 3A) typical for juveniles of this species. Coloration of the head was slightly yellow in crescent-shaped blotches and pink in normally black streak occurring from eyes to corner of mouth. Eyes were significantly red. This species is relatively common in the surroundings of Hlohovec despite this finding of *Z. longissimus* was striking. It represents first observation in the area as it is more frequently observed north of Hlohovec in the vicinity of river Váh in Považský Inovec.

The last observation occurred on 9th October 2016 at 14:50 (local time), near Pezinok town, the Little Carpathians (48.306° N 17.274° E; 186 m a.s.l.; Fig. 1) where approximately 300 mm length albinotic juvenile of *Z. longissimus* was found (Fig. 3B). Coloration of the body was the same as in the individual mentioned above. This individual was born in that year and found in the garden near a vineyard during cloudy weather with temperature about 12°C. This species is a common reptile in

the area of observation. This record of albinotic individual in the Little Carpathians is not the first (Balthasar, 1935), but long time period between the findings indicate how these records are rare.

Despite to tens observed individuals of both species in the field through Slovakia, Czech Republic and the Balkans during ten years we never recorded similarly colored individuals. The occasional occurrence of such individuals is probably not surprising and the frequency of their observation depends on the amount and season of field work and the survival rate of albinotic individuals.

In both described species coloration plays an important role. For example, the dorsal zigzag band of adders is either cryptic, and functions to confuse visually hunting predators by inducing “flicker-fusion” (Shine and Madsen, 1994), or has an aposematic effect, which is perceived by avian predators and avoided (Wüster et al., 2004). Among the European vipers, albinotic individuals were reported so far at four species in several published cases: *Vipera ammodytes*, *V. aspis*, *V. berus*, and *V. seoanei* (Andrén and Nilson, 1975; Krecsák, 2008; Stojanov, 2014 and literature therein). According to the Krecsák’s (2008) review, 16 albinotic and leucistic specimens of *V. berus* were found of the total 24 specimens of European vipers. Ten records come from the Nordic countries and also number of snakes per habitat unit seems to be higher in the northern parts of the species range (Krecsák, 2008). The most albinotic specimens found in nature are newborns or juveniles what corresponds with our records.

As to *Z. longissimus* there is lower number of records. Probably the first described Erber (1879) from Austria (Vienna) followed by Balthasar (1935) from Slovakia, Radovanović (1941) from Serbia, Sochurek (1955) from northern Austria, Bruno and Maugeri (1990) from southern Switzerland, Ferri and Bettiga (1992) from northern Italy and Krofel (2004) from northeastern Slovenia. Interestingly and in contrast to viper records, most of these albinotic individuals of *Z. longissimus* were adults in good health condition. It may be related to environment where vipers in Central Europe live, i.e., cooler mountain habitats where UV radiation is stronger. Absence of melanophores in albinotic individuals do not protect sufficiently the body against to UV radiation. It may have fatal consequences for surviving of juveniles. On the other hand, *Z. longissimus* inhabits a lower elevations in scrubby habitats that provide better protection. Since our observation of a newborns albino does not contribute to the mechanisms or causes of the abnormal coloration’s origin, records of albino individuals are generally very rare among the European reptiles. Accord-

ing to Bechtel (1995), there is estimates suggest orders of 1:10,000 to 1:30,000 in vertebrates. Therefore they should be collected in details to improve our knowledge on the dynamics of albinism in nature.

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