First record of amelanism of *Vipera berus bosniensis* Boettger, 1889, in Bulgaria

It is well documented that the lack of dark pigment (amelanism, albinism in the wide sense) represents a genetically preconditioned fault in normal pigmentation, which is recessively inherited (Kabisch 1990). In the narrow sense of total albinism, the phenomenon is characterized by complete lack of pigment. Partial albinism (manifesting itself as flavism and leucism) is being determined by different combinations of mutations, responsible for suppressing the formation of the pigments melanin, purin, pteridin and flavines. Different expressions of the phenomenon are observed among all vertebrate classes, including humans (Bechtel 1978, 1991; Obst et al. 1984; Schiemenz 1985; Schmidt 1989; Thomas et al. 2002; Caro 2005; Nilson et al. 2005; Nikolov et al. 2006; van Grouw 2006, 2011; Kreiner 2007; López & Ghirardi 2011).

Excluding the common breeding practice among herpetoculturists of selection towards abnormal color morphs (KABISCH 1990; BECHTEL 1995), present data indicates that, in the natural environment, albinos, flavistic, and leucistic forms of reptiles are extremely rare. The most likely reasons are the increased predatory pressure on such conspicuous individuals, as well as the correlation of albinism in its different manifestations with numerous malformations and anomalies, greatly reducing the chances for survival of such individuals (MØLLER & MOUSSEAU 2001; CARO 2005). A review of albinism, flavism, and leucism among European Viperidae, covering the period 1900-2007, demonstrates the rarity of their occurrence or the animals' survival in the wild; only 24 individuals from four species entered the literature or were located at important museum collections in Europe (KRECSÁK 2008). In finding the highest number of such anomalies in the boreal species *Vipera berus* (LINNAEUS, 1768) (16 individuals), KRECSÁK (2008) hypothesized a tendency towards increased rates of amelanistic specimens in northern range areas. The author of the present note considers this an incomplete analysis as it lacks a review of the literature and museum collections from extensive areas within the eastern and southeastern distribution of *V. berus* and does not factor the species' range areas.

The present note reports flavism from *V. berus bosniensis* BOETTGER, 1889, in Bulgaria, where the occurrence of the Balkan Adder is restricted to various fragmented habitats at medium to high-elevation mountain areas. The following Bulgarian materials were screened for amelanistic specimens: 183 individuals from personal observations and data provided by colleagues; 74 individuals from 37 localities, deposited in the scientific collections of the National Museum of Natural History - Sofia (Bulgarian Academy of Science); seven individuals from the scientific collection of the Regional Natural History Museum - Plovdiv; 11 individuals, described in herpetological publications of the fauna of Bulgaria (KOVACHEV 1894, 1903, 1905; BOZHKOV 1958; MÜLLER 1939). The above materials which include field records of the past 20 years constitute the only pertinent information available from this Balkan taxon in its natural environment.

The amelanistic individual was observed by the author on June 17, 2011, at 12:18 h local time at the ridge plateau of Vitosha Mountain in the "Turf Reserve" "Torfeno Branishte", Bulgaria. The area is an extensive ridge terrace situated above the tree line, at an altitude between 1750-1850 m a.s.l. It is one of the largest natural deposits of peat in Bulgaria, reaching depths up to two meters. The vegetation is represented by alpine and boreal ericoid communities and temporary marshes with floating, moving peat, and subarctic shrubs of *Salix* spp., with extensive areas covered by Siberian Juniper *Juniperus sibirica* (DIMITROV & GUSEV 2008; RUSAKOVA 2008; KABISCH & GUSSEV 2008; GANEVA & TZONEV 2008). Smaller and larger rocky outcrops of monzonite are dispersed throughout the plateau. This and another place at Vitosha Mountain are the only Bulgarian study sites from where high numbers of over 80 vipers have been collected or observed in the years 2010 to 2012.

It was not possible to capture or photograph the individual, which was only briefly seen. The viper was of small size (estimated length 30-35 cm) with bright yellow-orange body color. A zigzag dorsal line, typical of normal colored individuals of the species, was not discernible. Most records of amelanistic Adders refer to newborns or juveniles due to the low survival rate of albino forms (HALVARSSON 2011). Newborn *V. berus bosniensis* in Bulgaria were 140-194 mm in length, with births occurring between beginning of August and beginning of October (BESHKOV & NANEV 2002; STOJANOV et al. 2011). Therefore, the date of observation and the snake's length exclude the possibility of a newborn individual and suggest rather an age of two to three summers (SCHIEMENZ 1985; VÖLKL & THIESMEIER 2002; NILSON et al. 2005). It is thus remarkable that this individual survived in the wild for that long of a period. The author speculates that in this particular case the following reasons aided its survival: (i) Relatively low pressure comes from natural predators in the region, which could include Short-toed Eagle, harriers, kestrels, Common Raven, feral hogs, foxes

and potentially packs of feral dogs common for the area; some bird species represent potential predators during their migratory flights; (ii) a dense vegetation cover along with the deep peat that provides multiple refugia; and (iii) the presence of a solid prey base for the species, i. e., dense populations of *Zootoca vivipara* (LICHTENSTEIN, 1823) and *Rana temporaria* LINNAEUS, 1758, as well as several species of small rodents.

Large numbers of tourists pass through this area, but the effect on the viper's population is not yet analyzed. Several cases of Adders killed by tourists warrant such a study.

ACKNOWLEDGEMENTS: The author would like to thank Alexander WESTERSTRÖM and Yurii KORNILEV for help, translating the words into English and providing comments on the manuscript.

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KEY WORDS: Reptilia: Squamata: Serpentes: Viperidae; *Vipera berus bosniensis*, amelanism, flavism, Bulgaria

SUBMITTED: February 5, 2013

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