

Morphotype of *Vipera berus nikolskii* VEDMEDERJA, GRUBANT & RUDAEVA, 1986, present in the Buzău Subcarpathians, Romania

Recently, the presence in Romania (Central Moldavian Plateau) of populations of *Vipera berus nikolskii* VEDMEDERJA, GRUBANT & RUDAEVA, 1986, was confirmed on the basis of external morphological studies (ZINENKO et al. 2010); in this paper two single specimens from more western areas of the southern Carpathians (Dâmbovița and Vâlcea County) were classified as “*nikolskii*” morphotypes. The presence of singular specimens bearing “*nikolskii*” morphological characters could simply be the result of genetic variability within *V. berus berus* (LINNAEUS, 1758). However, considering the records’ geographic position and ecological data, this observation could support the idea of a more extended presence of *V. berus nikolskii* morpho- and ecotypes in the area. In the present paper, the authors report data from the southern area of the Carpathian Corner in Romania.

Earlier morphological studies of the vipers from the Central Moldavian Plateau revealed their particular status compared to the neighboring *Vipera berus berus* populations in the Carpathians (VANCEA et al. 1982). The vipers from Central Ukraine, Moldova and the Central Moldavian Plateau (Iași and Vaslui County) in Romania were considered morphologically almost identical to *V. berus nikolskii* from the eastern part of its range, whereas the vipers sampled from the eastern slopes of the Carpathians (Neamț, Bacău and Vrancea Counties, Romania) were described as of intermediate appearance (ZINENKO et al. 2010).

Vipera berus nikolskii was initially included in *V. berus berus* as the black color morph, and then described as a separate species by VEDMEDERJA, GRUBANT & RUDAEVA (1986). Later, the taxon was treated as a subspecies of *V. berus* according to the biological species concept (e. g., by MILTO & ZINENKO 2005), although some authors still consider it a taxon of uncertain status (e.g., BAKIEV et al. 2005; JOGER et al. 2007). MILTO & ZINENKO (2005) described Nikolsky’s Viper as a black colored subspecies of *V. berus* with

increased numbers of loreal, ventral, and subcaudal shields, and one or two rows of shields behind the eye and between supralabials and eye. Previously, the black coloration of adults was considered a diagnostic character for *V. berus nikolskii* (VEDMEDERJA et al. 1986). This view changed after the study by ZINENKO et al. (2010) of Romanian vipers of the *nikolskii* type, which included non-melanistic specimens. According to this latter study, in males the numbers of ventral shields, loreal scales, scale rows around midbody and intercanthalia scales (in descending order) had the highest diagnostic power, whereas in females the number of ventral shields, subocular scales, scale rows around midbody, loreal scales, subcaudal shields and circumocular scales were diagnostic.

In the vicinity of the village Săsenii pe Vale (Buzău County; square in Fig. 1), a live, partly melanistic female viper was encountered (Fig. 2) in April 2009. The occurrence was published by STRUGARIU et al. (2009) as a new distribution record of *V. berus* in the Carpathian Corner. Closer examination of the viper which was released thereafter, showed some characteristics similar to *V. berus nikolskii* (Fig. 3, Table 1). Beside its more or less melanistic appearance, signs of a coloration pattern similar to the non-melanistic or partly melanistic specimens of Nikolsky’s Viper were present. As described by MILTO & ZINENKO (2005), there are some cases in which the adults of *V. berus nikolskii*, especially females, have light dots and spots on supralabials and ventrals, and a reddish-brown colored throat. The presence of light dots applied to the previous specimen, but less so the reddish-brown colored throat. However, the color pattern of this partly melanistic female was similar to those from *V. berus berus* x *V. berus nikolskii* hybrids in which light spotted upper labials, ventral shields and other light elements were registered (ZINENKO & RUZHILENKO 2003).

Two different morphotypes occur within Romanian *V. berus*: typical Adders are characterized by the decreased number of scales in the pileus, and a single row of shields around the eye. In the second (“*nikolskii*”) morphotype, the number of small shields on the pileus is increased and two rows of shields surround the eye (GASC &

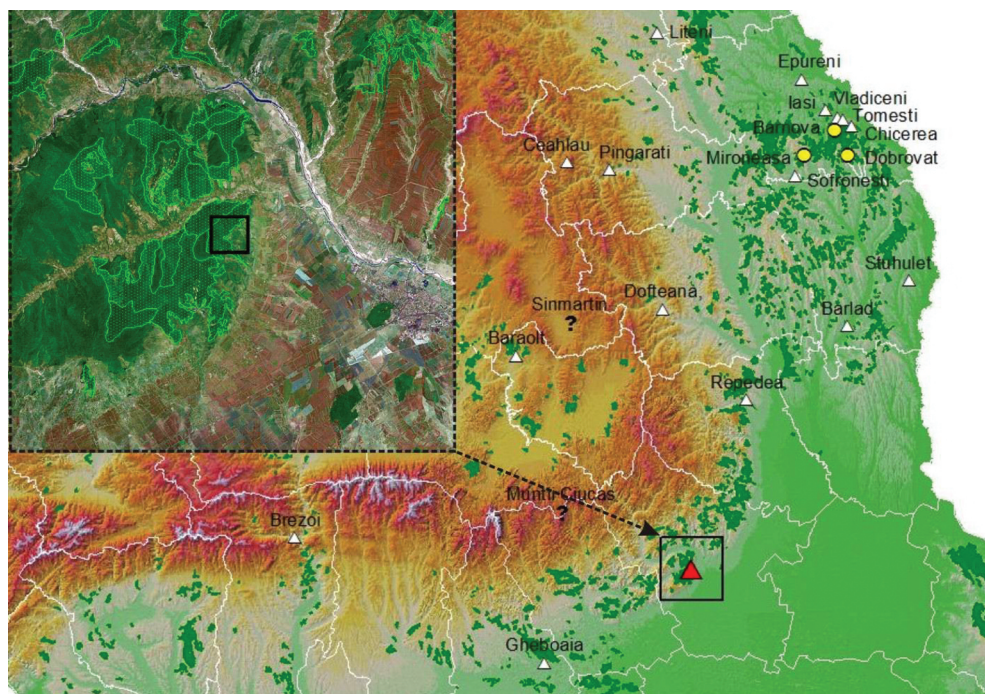


Fig. 1. The location of the viper habitat in Săsenii pe Vale (Buzău County; enlarged detail at left). On the right map, the occurrence of the confirmed *V. berus nikolskii* populations (yellow circles) and singular “*nikolskii*” morphotypes (white triangles) in Romania are shown (source: ZINENKO et al. 2010, present study). The question marks indicate two record localities of alleged *V. berus bosniensis* (BOETTGER, 1880) in the country (source: FUHN & VANCEA 1961). Dark green areas represent the distribution of the 91Y0 Dacian oak and hornbeam forest type in the studied area, and in the central and eastern part of Romania.

GOURMAIN 1968; MILTO & ZINENKO 2005). The pholidosis of the viper from the Buzău Subcarpathians could be categorized as near, not in full agreement with the “*nikolskii*” morphotype. In Adders, head pholidosis pattern, shape, size, number and arrangement of scales are considered highly variable; even among different populations, mean values of characters vary significantly (MILTO & ZINENKO 2005). A fragmented, *aspis* like type of squamation is common in both *V. berus nikolskii* and *V. berus bosniensis* (BOETTGER, 1880), but rare in *V. berus berus* (MILTO & ZINENKO 2005). The erroneous description of *V. berus bosniensis* occurring in Romania was based on a morphotype showing fragmented head scalation (e.g. in Ciuc and Ciucaș Mountains; FUHN & VANCEA 1961). Accordingly, one of the authors (FUHN) considered the morph as an abnormal *V. berus berus*.

Along the Ukrainian contact zone between *V. berus berus* and *V. berus nikolskii*, there is a hybridization area in which snakes have intermediate morphological characters (ZINENKO 2004). A similar contact zone including the presence of intermediate characters in the specimens can be expected also in Romania where *V. berus berus* and *V. berus nikolskii* may occur in close vicinity in the territory of the Eastern Carpathians and in the eastern part of the Southern Carpathians (comp. the maps in NILSON et al. 2005; BAKIEV et al. 2005). However, as pointed out by ZINENKO et al. (2010), also for the contact zone, the possibility of an extreme manifestation of the *V. berus berus* morphotype cannot be excluded.

On the whole, the distributional range of *V. berus nikolskii* comprises a woodland steppe zone (MILTO & ZINENKO 2005). In the eastern and central Ukraine, the range of



Fig. 2: Habitat (grassland with bushes) at Săsenii pe Vale, Buzău County, Romania (left), and the investigated viper of the *V. berus nikolskii* morphotype (right).

V. berus nikolskii almost completely coincides with the forest-steppe and broadleaved deciduous forest zone (ZINENKO 2006).

The habitat of the specimen encountered in the Buzău Subcarpathians was also a peculiar one (Figs. 1, 2). It is part of a forest-steppe ecotone, which resembles the habitat types occupied by *V. berus nikolskii* in Iași County (STRUGARIU et al. 2009). The habitat lies near to the southern limit of the Getic Subcarpathians, in the Istrița

Hills. The viper was found in a grassland patch characterized by a rich scrub cover, near a farm and a complex vineyard zone (STRUGARIU et al. 2009). The vegetation did not show any sign of agricultural use such as mowing or grazing. The high dry grass from the previous year was lying on the ground. The area is close to the top of a hill (about 310 m a.s.l.) with a southern exposure. The habitat characteristics are similar to the ecotones in which *V. berus*

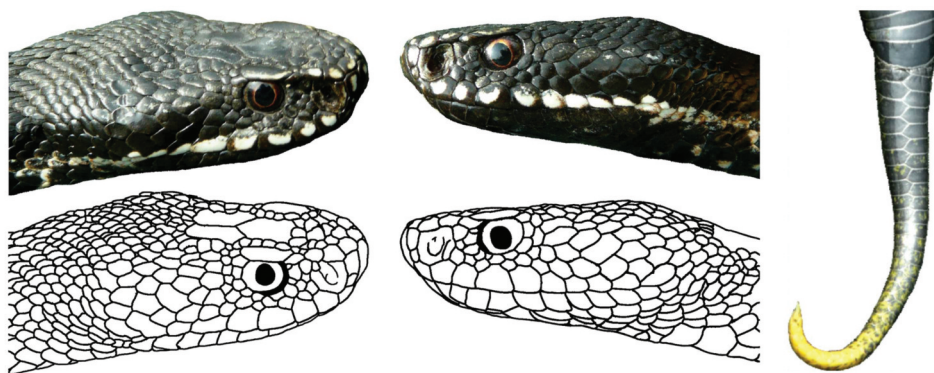


Fig. 3. Pholidosis and color pattern of head and tail of the female viper of the *V. berus nikolskii* morphotype from Săsenii pe Vale, Buzău County, Romania.

Table 1: Color pattern and pholidosis of the female *V. berus* from Buzău Subcarpathians compared to *V. berus berus* (LINNAEUS, 1758) and *V. berus nikolskii* VEDMEDERJA, GRUBANT & RUDAIEVA, 1986. Sample size in brackets.

Color pattern and Pholidosis	<i>V. berus berus</i> from the Suceava region (ZINENKO et al. 2010)	<i>V. berus</i> from the Buzău Subcarpathians (this study)	<i>V. berus nikolskii</i> from the Romanian Moldova (ZINENKO et al. 2010)
Dorsal side of body	Characteristic sexual color dimorphism, melanistic specimens are rare	Completely black	Completely black, partly or non-melanistic, melanistic specimens are not so rare
Dorsal zigzag stripe	Present, absent in melanistic specimens	Absent	Present in the non-melanistic morph, absent in melanistic specimens
Dorsal side of head	—	Two light lines: one starting as a fusion of white spots on posterior supralabials, continuing towards the neck region in whitish-orange; another, less obvious, on the scales of the temporal region	—
Light spots on head scales	—	White spots (to yellowish in the neck area) on apical, canthal, supraoculars, rostral, prenasals, supralabials and some supralabials	—
Throat	—	Black with white-yellow spots	—
Anterior ventrals	—	White-spotted (in general two spots on each ventral)	—
Underside of tail tip	—	12 terminal scales bright yellow; fragmented, bright colored spots in the central parts of the tail area	—
Iris	—	Orange-reddish	—
Ventralia (females / males)	142-154 [8] / 134-148 [11]	151	150-161 [15] / 141-160 [27]
Subcaudalia (females / males)	25-31 [8] / 31-38 [10]	31	33-41 [15] / 36-47 [27]
Longitudinal scale rows at midbody (females / males)	19-21 [8] / 19-21 [11]	23	21-24 [15] / 21-23 [27]
Supralabialia (females / males)	16-18 [8] / 15-18 [11]	19 (right / left: 9 / 10)	16-19 [15] / 16-18 [27]
Sublabialia (females / males)	19-23 [8] / 19-22 [11]	23 (right / left: 11 / 12)	18-24 [15] / 18-24 [27]
Circumocularia (females / males)	16-21 [8] / 15-22 [11]	22 (right / left: 12 / 10)	16-22 [15] / 15-24 [27]
Rows of subocularia (females / males)	0% [8] / 0% [11]	double (single in 2 places) / double (single in 1 place)	13.3% [15] / 0% [27]
Rows of postocularia (right / left)	—	2 complete rows / 2 complete rows	—
Intercanthalia between apical, canthal and frontal shields (females / males)	5-12 [8] / 6-13 [11]	13	4-12 [15] / 4-13 [27]
Parafrontalia between supraocular, frontal and parietal shields (females / males)	8-14 [8] / 4-14 [11]	15 (right / left: 7 / 8)	6-13 [15] / 6-16 [27]
Lorealia between canthal, circumocular, nasal and supralabial shields (females / males)	4-10 [8] / 4-9 [11]	9 (right / left: 5 / 4)	6-13 [15] / 4-10 [27]

nikolskii lives as described by ZINENKO (2006).

In this case, the habitat is located right on the limit of the Dacian oak and hornbeam forests (habitat type bearing Natura 2000 code 91Y0, DONIȚĂ et al. 2005). The main tree species of these forests are *Quercus petraea*, *Qu. robur*, *Fagus sylvatica*, *Carpinus betulus*, *Tilia cordata* and *T. tomentosa*. A similar species composition is listed by ZINENKO (2006) for the Ukrainian habitats.

An interesting feature was the large-scale distributional coincidence of the 91Y0 forest type and the sites from where *V. berus nikolskii* populations, and the “*nikolskii*” morphotype, were reported from the Getic Subcarpathians and outside the Carpathians in Romania (Fig. 1). From this congruency, new localities of *V. b. nikolskii* in the distribution range of this forest category could be predicted. In conclusion, the match of morphological and ecological data encountered supports the presence of the *V. berus* “*nikolskii*” morpho- and ecotype in the Buzău Subcarpathians. Nevertheless, the systematic status of this population should be verified applying genetic methods. However, even the lack of a *V. b. nikolskii* haplotype could not exclude the presence of the morph in case of mtDNA introgression (ZINENKO et al. 2010), whereas nDNA analysis could avoid this uncertainty. The distributional similarity of the 91Y0 forest type and the *V. b. nikolskii* populations, including the “*nikolskii*” morphotype could explain the extent of penetration of *V. b. nikolskii* to the west along the Carpathian Corner in Romania. ZINENKO et al. (2010) considered the penetration improbable due to the fact that the belt of typical *V. b. nikolskii* habitats of broadleaved forests is very narrow here; however, the actual distribution of available habitats is wider.

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