First photo-documented record of the Adder, *Vipera berus bosniensis* (Boettger, 1889) in Varaždin County (Croatia)

Prvi foto-dokumentirani nalaz riđovke, *Vipera berus* bosniensis(Boettger, 1889) u Varaždinskoj županiji (Republika Hrvatska)

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Abstract

During the herpetological trip on 6 April, 2014 the authors found five individuals of *V. berus* in the wet forest of "Križančija" near the village of Lunjkovec, Croatia. This sighting presents the only reliable record of *V. berus* in the Varaždin County. Analyzed morphological characteristics show that collected individuals belong to the *Vipera berus bosniensis* subspecies. This finding is of great value because the lowland populations of *V. berus* are exposed to rapid degradation and loss of favourable habitats and therefore are in rapid decline in Croatia.

***Key words*:** Croatia, Varaždin County, Vipera berus bosniensis, The Adder

Sažetak

Tijekom istraživanja herpetofaune 6. travnja 2014. godine, autori su pronašli pet jedinke riđovke (*Vipera berus*) u vlažnoj šumi „Križančija" u mjestu Lunjkovec, Republika Hrvatska. To je ujedno i jedini pouzdani i foto-dokumentirani nalaz riđovke u Varaždinskoj županiji. Analizirane morfološke karakteristike ukazuju da pronađene jedinke pripadaju podvrsti *Vipera berus bosniensis*. Ovaj nalaz je od velike važnosti jer su nizinske populacije riđovke izložene velikoj degradaciji, gubitku staništa i padu brojnosti populacija u Hrvatskoj.

***Ključne riječi*:** Republika Hrvatska, Varaždinska županija, Vipera berus bosniensis, riđovka

The Adder, *Vipera berus* (Linnaeus, 1785) is the most widespread and also the northernmost distributed terrestrial snake species in the world (Andersson 2003, Carlsson et al. 2003, Gentilli et al. 2006, Kreiner 2007, Malina et al. 2010). There are three separate populations of two subspecies of *V. berus* in Croatia (Ursenbacher et al. 2006, Jelić et al. 2009b, Jelić et al. 2012, Vilaj 2012, Jelić et al. 2013a, Jelić et al. 2013b). Populations of the subspecies *Vipera berus bosniensis* (Boettger, 1889) occur in two different types of habitat: lowland populations inhabit the Pannonian Basin (rivers Sava, Drava, Mura and the Danube at 0-400 m a.s.l.) whilst mountainous populations inhabit the Dinara and Troglav mountains (1500-1900 m a.s.l.). Highland populations of *V. b. berus* (Linnaeus, 1758) subspecies occur only in the Gorski Kotar area (western Croatia), at 800-1600 m a.s.l. (Jelić et al. 2007, Jelić et al. 2009a, Jelić et al. 2012, Vilaj 2012, Jelić et al. 2013a).

During the herpetological research trip on 6 April 2014 the authors found five individuals (three males and two females) of *V. berus* in the wet forest of "Križančija" near the village of Lunjkovec, Croatia (X: 5632766, Y: 5125412), at 145 m a.s.l. The habitat can be described as typical for *V. b. bosniensis*, mostly covered with *Deschampsia sp*., *Rubus sp.*, *Quercus robur*, *Betula pendula*, *Cornus sanguinea* and *Salix alba* on soil, not gravel (Figure 1. and Figure 2.) (Vilaj 2012). This sighting presents the only reliable and photo-documented record for *V. berus* in the Varaždin County. Before, Karaman (1921) and Werner (1897) mentioned that *V. berus* inhabits „Veliki Bukovec" and „Varaždin" (in the Varaždin County) but without precisely defined localities and photo-documentation.

Figures 1. and 2. Habitat of *Vipera berus* in Lunjkovec, Croatia.

Slike 1. i **2.** Stanište riđovke u Lunjkovcu, Hrvatska.

Photo: Igor Vilaj

Some morphological characteristics of collected individuals were checked during the trip shows that all collected individuals had two apical scales and four of them had two subocular scales rows. The dorsal zig-zag band in four individuals was interrupted at least in one part of the body (Figures 3., 4., 5. and 6.). One male was melanistic with white supralabial scales, without a visible dorsal zig-zag band, which is not unusual in other lowlands population in Croatia (Marchand 2011, Jelić et al. 2012, Vilaj 2012) (Figure 7.).

Analyzed morphological characteristics show that the observed individuals belong to the *Vipera berus bosniensis* subspecies (Tóth & Farkas 2004). This finding is of great value because the lowland populations of *V. berus* are exposed to rapid degradation and loss of favourable habitats and therefore in a rapid decline here (Jelić et al. 2012, Jelić et al. 2013b). *V. berus* was a protected species by Law on Nature Protection in Croatia up until the new Law on Nature Protection (2013) when it unduly lost its protected status. On the other hand, it is listed as Near Threatened (NT [B2b(ii, iii)]) in the new Red book of amphibians and reptiles of Croatia (Jelić et al. 2012), with a decreasing trend of recent populations primarily because of habitat loss (Jelić et al. 2009a, Jelić et al. 2009b, Jelić et al. 2012, Jelić et al. 2013a).

V. b. bosniensis also inhabits nearby regions: Prekmurje in Slovenia (Cafuta 2010) and south – west Hungary (Fejérváry 1923, Tóth & Farkas 2004, Tóth et al. 2010). Fejérváry (1923) claims that there must be some kind of intermediate zone, between Hungarian and Croatian population of *V. b. bosniensis*, probably in the southern part of the County of Zala (Ormánd near Komarváros).Our finding site (Lunjkovec)(Figure 8.) is relatively close to south - west Hungary (approximately 25 - 30 kilometers), and Slovenia (approximately 30 kilometers air distance) which indicates that these three populations might be territorially connected, but this must be verified by further research. On the other hand, Mura and Drava rivers might represent a distribution barrier between these tree populations.

This is the only, currently known, lowland population of the Adder by the Drava river. Finding from Cirkovljan near Prelog (Međimurje County) published in Jelić et al. (2013a) it is not reliable since there isn't photo-documentation or voucher specimen. Authors also visited mentioned locality several times and they haven't found the Adder. Also, the type of habitat in Cirkovljan is estimated by authors as non typical for the lowland *V. b. bosniensis* population, based on the other studied locations in Croatia.

The lack of legislative protection of the Adder only indicates an even greater risk of possible population decline. Furthermore, knowledge about the distribution of venomous snakes is very important from medical and educational standpoints, regarding snake bite prevention and treatment (Malina et al. 2011).

Figures 3 and 4. Typically coloured (with zig- zag pattern) *Vipera berus* males from Lunjkovec, Croatia.
Slike 3 i 4. Tipično obojeni mužjaci (s cik –cak uzorkom) riđovke iz Lunjkovca, Hrvatska.
Photo: Igor Vilaj

Figures 5 and 6. Typically coloured (with zig- zag pattern) *Vipera berus* females from Lunjkovec, Croatia.
Slike 5 i 6. Tipično obojene ženke (s cik –cak uzorkom) riđovke iz Lunjkovca, Hrvatska.
Photo: Igor Vilaj

Figure 7. Melanistic *Vipera berus* male from Lunjkovec, Croatia.
Slika 7. Melanistični mužjak riđovke iz Lunjkovca, Hrvatska.

Photo: Igor Vilaj

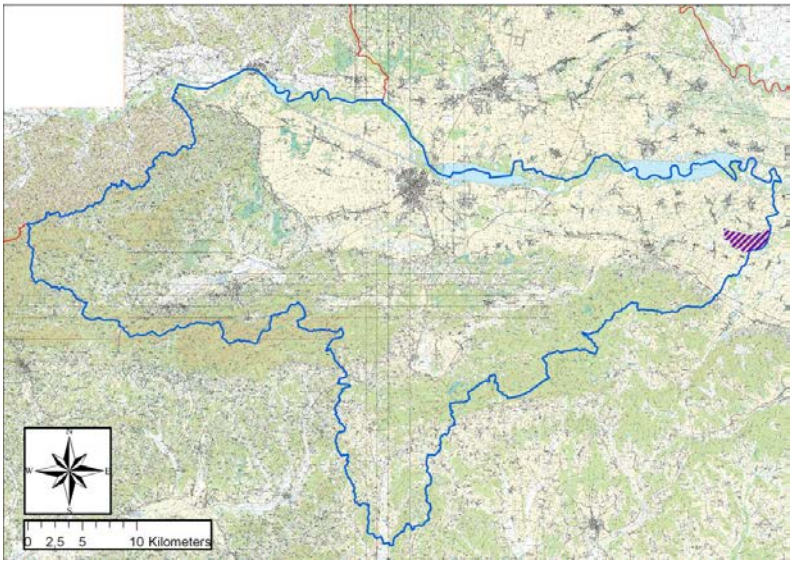

Figure 8. Location of the newly discovered population (marked purple on the map) of *Vipera berus* in Varaždin County (Lunjkovec), Croatia.
Slika 8. Lokalitet (označen ljubičastom bojom) na kojem su pronađene riđovke u Varaždinskoj županiji (Lunjkovec), Hrvatska.

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