

Westernmost record of *Zootoca vivipara* (LICHTENSTEIN, 1823), in the Rhodope Massif, Serbia

Approximately 40 % of the overall distribution area of the Common Lizard, *Zootoca vivipara* (LICHTENSTEIN, 1823), belongs to an area extending from the very north to the south of the European continent (BÖHME 1997). This species, which is adapted to temperate and cool climates, has a scattered distribution in the Balkans, as suitable habitats become restricted to higher elevations towards the south of the peninsula. At the southeastern edge of the species' European range, i. e., on the central and eastern Balkans, population groups are isolated by lowlands and river valleys that divide the massifs of the Dinarid, Hellenid, Balkan and Rhodope mountain belts. There, the Common Lizard is found up to 2900 m altitude in Bulgaria (AGASYAN et al. 2010), preferably in humid mountain grasslands and meadows, peat bogs and wood edges. In the central/eastern Balkans, the populations form three groups paralleling the existing mountain belts, the lizards of: (i) the Balkan Massif in Serbia and Bulgaria, (ii) the Suva Mountain in Serbia, and (iii) the Rhodope Massif extending from southeastern Serbia and eastern Macedonia, across western, central and southern Bulgaria to northeastern Greece. Some authors term those parts of the Rhodope Massif west of the Struma Valley (south Serbia, southwest Bulgaria and Macedonia) "Serbo-Macedonian Massif", arguing that these mountains did not experience the severe Alpine metamorphic overprint (SCHMID et al. 2008, and references therein). However, both Serbo-Macedonian and Rhodope *sensu stricto* Massifs share similarities in metamorphic type, age, etc. (reviewed in WÜTHRICH 2009); the definition and autonomy of the Serbo-Macedonian Massif is still a matter of debates.

Published records of *Z. vivipara* in the southeastermost part of the species' range referred to both Serbian and Bulgarian portions of Balkan Massif (Stara /Balkan Mt. - RADOVANOVIĆ 1951; DŽUKIĆ 1972; CRNOBRNJA-ISAILOVIĆ & ALEKSIĆ 2004; PETROV et al. 2006; LJUBISAVLJEVIĆ et al. 2010; STOJANOV et al. 2011), Suva Mt. (KARAMAN



Fig. 1: Male specimen of *Zootoca vivipara* (LICHTENSTEIN, 1823), from Vardenik Mountain, Rhodope Massif, Serbia (1,871 m altitude), pileus in dorsal view (Photo: O. ISAILOVIĆ).

1939; RADOVANOVIĆ 1951) and the Bulgarian part of Rhodope Massif (Rila Mt., Dospat, Pirin Mt. – reviewed in PETROV et al. 2006 and STOJANOV et al. 2011). Lack of records in the Greek Rhodope Mountains could be explained either by absence of adequate habitats or field research. Similarly, in southeastern Serbia south of the Mt. Suva,

specific records were never published, though the species was mentioned in the preliminary list of amphibians and reptiles of the Vlasina plateau by KRIZMANIĆ (2003), and on the web-site of the Protected Landscape “Vlasina” < <http://www.piovlasina.com/Lat/Siteview.asp?ID=625> >.

Vlasina is a mountain plateau with an average elevation of 1,200-1,300 m above sea level, surrounded by the Mountains of Plana in the north, Čemernik in the west, Bukova Glava in the east and Vardenik in the south (RANĐELOVIĆ & ZLATKOVIĆ 2010). The Vlasina Plateau mostly harbors amphibian and reptile species typical for boreal forests of the taiga type and high mountain-pastures (MATVEJEV 1961): *Ichthyosaura alpestris* (LAURENTI, 1768), *Bufo bufo* (LINNAEUS, 1758), *Rana temporaria* LINNAEUS, 1758, (LINNAEUS, 1758) (CRNOBRNJIA-ISAILOVIĆ et al. 2011). Also the following species representative of European deciduous forest habitats are recorded there, *Salamandra salamandra* (LINNAEUS, 1758), *Bombina variegata* (LINNAEUS, 1758), *Rana dalmatina* FITZINGER in BONAPARTE, 1839, *Anguis fragilis* LINNAEUS, 1758, *Natrix natrix* (LINNAEUS, 1758) and *Lacerta agilis* LINNAEUS, 1758, the dominant lizard species in the area.

On May 4, 2013, at midday, the authors located two adult males of *Z. vivipara* in the highest regions of Mt. Vardenik, in the zone of high mountain pastures: one individual



Fig. 2: Male specimen of *Zootoca vivipara* (LICHTENSTEIN, 1823), from Vardenik Mountain, (1,693 m altitude), (Photo: O. ISAILOVIĆ).

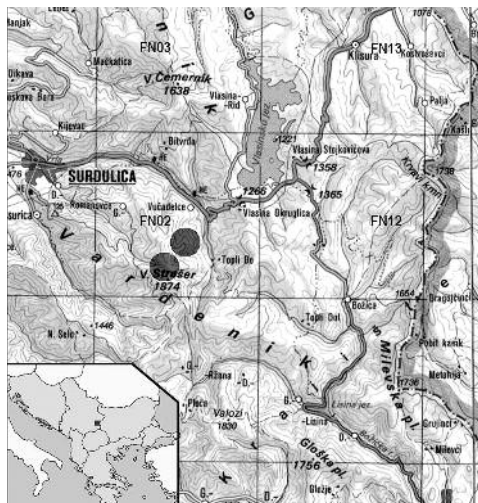


Fig. 3: New record of *Zootoca vivipara* (LICHTENSTEIN, 1823), in the westernmost Rhodope Massif, Serbia (central/eastern Balkan Peninsula).

(Fig. 1) was captured on the mountain summit (Veliki Strešer, 1871 m a.s.l., $42^{\circ}37'50.8''N$, $22^{\circ}16'1.1''E$) and the other (Fig. 2) on the northern slope (1693 m a.s.l., $42^{\circ}37'56.3''N$, $22^{\circ}16'20.5''E$), both within the 10 km x 10 km UTM National Grid Reference system number FN02 (Fig. 3). They moved quickly through the bushes. Along the left side of the mountain path from 1,671 m a.s.l. to the mountain peak, three adult specimens were counted. Active *L. agilis* were also noticed there. On the way back, four adult Common Lizards were seen. The vegetation of high mountain pastures in this area belongs to the class *Juncetea trifidi* HADAČ 1946, with the dominant association of *Lino-Nardetum strictae* REXHEPI & N. RANDJELOVIĆ 1980 (RANDJELOVIĆ & ZLATKOVIĆ 2010). However, at the first capture site the authors observed *Centaureo-Festucetum vallidae* N. RANDJELOVIĆ (1978) 1981. While soil and air temperature at 5 cm above the ground were $23^{\circ}C$ and $24.5^{\circ}C$, respectively, cloacal temperatures of specimens varied from $20.7^{\circ}C$ to $32.2^{\circ}C$. Relative humidity measured at soil level at the spots of capture varied from 44 % to 54 %, for slope and summit, respectively. Snout-vent-length of the captured lizards was 45.3

mm and 49.9 mm; they weighed approximately 2.75 g and 3.75 g each. Measuring and photographing procedures were done at the capture spots and specimens were released afterwards.

The most common and widespread Central and North European reptiles become rare in the south of the continent (see GASC et al. 1997) and regionally endangered at the periphery of their range (HOFFMANN & BLOWS 1994). Generally, peripheral populations are scattered, quite isolated and thus sensitive to the negative impact of stochastic variation of genetic, demographic and environmental factors (SIMBERLOFF 1988). From a conservation point of view, they are precious sources of unique or rare genetic variants (FRANKHAM & BALLOW & BRISCOE 2004). Regarding the Common Lizard, this statement was earlier supported by the phylogeographic study of SURGET-GROBA et al. (2001) that pointed to the apparent haplotype diversity among the populations from the Balkan, Vitosha, Rila and Pirin Mountains in Bulgaria. A similar diversity degree may exist on the westernmost edge of the Rhodope or Serbian-Macedonian Massif, where at least patches of habitats suitable for Common Lizards could occur on the mountains Besna Kobila, Dukat and Crnook. Earlier search for Common Lizards in this area just confirmed frequent occurrence of *L. agilis* on highland pastures and meadows of Mt. Besna Kobila (SMILJKOVIĆ, pers. comm.), and the same results were obtained upon a recent quest conducted on the eastern ridge of Mt. Vardenik at 1,575-1,633 m altitude (CRNOBRNJIA-ISAILOVIĆ, DINOVIĆ & ČOŠIĆ, unpublished data).

Due to small size and secretive behavior, Common Lizards can be overlooked easily during short-term field search and the new finding encourages further attempts to locate populations also more to the south of Mt. Vardenik. *Zootoca vivipara* is strictly protected by Serbian national regulations (ANONYMOUS 2010a, 2010b), but its importance for the local and regional biodiversity is still insufficiently presented to the public. Preservation of Common Lizard favorable habitats is of particular importance in this southern part of its range as they are extremely rare, very scattered and thus vul-

nerable to all forms of human induced habitat change. This applies, e.g., to the potential development of ski resorts in this area, where there already is destruction of valuable boreal habitats and high-mountain pastures for winter sports activities and infrastructure on several mountains in Serbia, including Kopaonik Mt. (since 1986) and Stara Mt. (since 2004).

ACKNOWLEDGMENTS: Two authors (JCI and OI) are grateful to S. DRAGOSAVAC for company in the field and L. ARSIĆ for “Vlasinski vrtovi” for hospitality. This work was supported by the Ministry of Education, Science and Technological Development of the Republic of Serbia, grant no. 173025.

REFERENCES: AGASYAN, A. & AVCI, A. & TUNIYEV, B. & CRNOBRNJIA-ISAILOVIĆ, J. & LYMBERAKIS, P. & ANDRÉN, C. & COGALNICEANU, D. & WILKINSON, J. & ANANJEVA, N. & ÜZÜM, N. & ORLOV, N. & PODLOUCKY, R. & TUNIYEV, S. & KAYA, U. & BÖHME, W. & NETTMANN, H.K. & JÖGER, U. & CHEYLAN, M. & PÉREZ-MELLADO, V. & BORCZUK, B. & STERJJOVSKI, B. & WESTERSTRÖM, A. & SCHMIDT, B. 2010. *Zootoca vivipara*. In: IUCN 2012. IUCN Red List of Threatened Species. Version 2013.2. < www.iucnredlist.org > [Downloaded on 10 February 2014]. ANONYMOUS (2010a): Regulation on proclamation and protection of strictly protected and protected plant, animal and fungi species.- Official Gazette Republic of Serbia, Beograd; 5/10 [In Serbian]. ANONYMOUS (2010b): Regulation on proclamation and protection of strictly protected and protected plant, animal and fungi species. Appendix 1. Strictly protected species.- Official Gazette Republic of Serbia, Beograd; 5/10 [In Serbian]. BÖHME, W. (1997): *Lacerta vivipara* JACQUIN, 1787; pp. 268-269. In: GASC, J.-P. & CABELA, A. & CRNOBRNJIA-ISAILOVIĆ, J. & DOLMEN, D. & GROSSENBACHER, K. & HAFFNER, P. & LESCURE, J. & MARTENS, H. & MARTINEZ-RICA, J. P. & MAURIN, H. & OLIVEIRA, M. E. & SOFIANIDOU, T. S. & VEITH, M. & ZUIDERWIJK, A. (eds.): Atlas of amphibians and reptiles in Europe. Paris (Societas Europaea Herpetologica, Muséum National d'Histoire Naturelle & Service du Patrimoine Naturel) [collection Patrimoines Naturels 29]. CRNOBRNJIA-ISAILOVIĆ, J. & ALEKSIĆ, I. (2004): Clutch size in two central Balkan populations of European Common Lizard *Lacerta vivipara*.- Biota, Rače; 5: 5-10. CRNOBRNJIA-ISAILOVIĆ, J. & DINOVIĆ, J. & RANĐELOVIĆ, V. (2011): Occurrence of European Adder (*Vipera berus*, Viperidae, Ophidia) on Vlasina Plateau (Southeastern Serbia).- Biologica Nissana, Niš; 2: 1-7. FRANKHAM, R. & BALLOU, J. D. & BRISCOE, D. A. (2004): A primer of conservation genetics. Cambridge (Cambridge University Press), pp. 220. GASC, J.-P. & CABELA, A. & CRNOBRNJIA-ISAILOVIĆ, J. & DOLMEN, D. & GROSSENBACHER, K. & HAFFNER, P. & LESCURE, J. & MARTENS, H. & MARTINEZ-RICA, J. P. & MAURIN, H. & OLIVEIRA, M. E. & SOFIANIDOU, T. S. & VEITH, M. & ZUIDERWIJK, A. (eds.) (1997): Atlas of amphibians and reptiles in Europe. Paris (Societas Europaea Herpetologica, Muséum National d'Histoire Naturelle & Service du Patrimoine Naturel) [collection Patrimoines Naturels 29], pp. 494. HOFFMANN, A. A. & BLOWS, M. W. (1994): Species borders: ecological and evolutionary perspectives.-

Trends in Ecology and Evolution, Cambridge; 9: 223-227. KRIZMANIĆ, I. (2003): Herpetofauna. Protected landscape „Vlasina“, contribution to the study. Beograd (Institute for Nature protection of Serbia), pp. 5 [In Serbian]. LJUBISAVLJEVIĆ, K. & JOVIĆ, D. & DŽUKIĆ, G. (2010): Morphological variation of the Common lizard *Zootoca vivipara* (JACQUIN, 1787) in the Central Balkans.- Archives of Biological Sciences, Beograd; 62: 791-799. MATVEJEV, S. D. (1961): Biogeography of Yugoslavia. Basic principles.- Bioloski Institut NR Srbije, Beograd; (special edition) 9: 1-232 [In Serbian, with English summary]. PETROV, B. P. & TZANKOV, N. & STRIJBOŠCH, H. & POPGEORGIEV, G. & BESHKOV, V. (2006): The herpetofauna (Amphibia and Reptilia) of the western Rhodopes mountain (Bulgaria and Greece); pp. 893-894. In: BERON, P. (ed.): Biodiversity of Bulgaria. 3. Biodiversity of western Rhodopes (Bulgaria and Greece). Sofia (Pensoft & Natural Museum of Natural History). RANĐELOVIĆ, V. & ZLATKOVIĆ, B. (2010): Flora and vegetation of Lake Vlasina. Niš (Faculty of Sciences and Mathematics, University of Niš), pp. 448 [In Serbian]. SCHMID, S. M. & BERNOULLI, D. & FUGENSCHUH, B. & MATENCO, L. & SCHEFER, S. & SCHUSTER, R. & TISCHLER, M. & USTASZEWSKI, K. (2008): The Alpine-Carpathian-Dinaridic orogenic system: correlation and evolution of tectonic units.- Swiss Journal of Geosciences, Basel; 101: 139-183. STOYANOV, A. & TZANKOV, N. & NAUMOV, B. (2011): Die Amphibien und Reptilien Bulgariens. Frankfurt am Main (Ed. Chimaira), pp. 588. SIMBERLOFF, D. (1988): The contribution of population and community ecology to conservation science.- Annual Review of Ecology and Systematics, Palo Alto; 19: 473-511. SURGET-GROBA, Y. & UEUJIN, B. & GUILLAUME, C.-P. & THORPE, R. S. & KUPRIYANOVA, L. & VOGGIN, N. & MASLAK, R. & MAZZOTTI, S. & VENCZEL, M. & GHIRA, I. & ODIERNA, G. & LEONTYEVA, O. & MONNEY, J.-C. & SMITH, N. (2001): Intraspecific phylogeography of *Lacerta vivipara* and the evolution of viviparity.- Molecular Phylogenetics and Evolution, San Diego; 18: 449-459. WÜTHRICH, E. D. (2009): Low temperature thermochronology of the Northern Aegean Rhodope Massif. PhD Thesis, Swiss Federal Institute of Technology, Zurich, pp. 99.

KEYWORDS: Reptilia: Squamata: Sauria: Lacertidae, *Zootoca vivipara*, central/eastern Balkan Peninsula, Serbia, Vlasina plateau

SUBMITTED: September 12, 2013

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