

The distribution of lowland *Zootoca vivipara* populations in North-Western Romania

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Abstract. In the North-Western part of Romania (the Western Plains) we have identified *Zootoca vivipara* populations in 78 localities, at altitudes between 89 and 198 m. In this area, the distribution of the viviparous lizard is restricted to regions where the yearly average temperature is lower than 10 °C. In the Western Plains, the *Zootoca vivipara* populations are located in very humid habitats. They inhabit both forested and cleared wetlands, occupying marshes or the areas around plashes. In the Northern part of the Western Plains, the *Zootoca vivipara* populations from the plain are separated from the ones from the Oaş Mountains, by not more than 30 km.

Key words: *Zootoca vivipara*, lowland populations, North-Western Romania

Introduction

Zootoca vivipara represents a model for many studies concerning evolutionary and biogeographical problems (Surget-Groba et al. 2001), presenting both viviparous and oviparous populations. It is distributed mostly in the Northern regions of Europe and Asia, while in the Southern part of Europe, it can only be found in humid mountain regions (Surget-Groba et al. 2002). However, at the Southern limit of its areal, relict populations are spread discontinuously, inhabiting wet plain areas (Heulin 1989, Heulin and Guillaume 1989, Guillaume et al. 1997). Such populations have been signaled in Italy, in the Po River's basin (Richard and Semenzato 1992, Baratelli &

Ghielmi 1994, Ghielmi et al. 2001), or in the Pannonian basin, in Austria, Hungary and Slovakia (Koppanyi 1950, Dely 1957, 1978, Lac & Kluch 1968).

Zootoca vivipara is a glacial relict in Romania, found in the vicinity of its areal's Southern limit (Stugren 1957). In the past it was called "the mountain lizard", being identified only in mountain regions at over 800 m (Fuhn & Vancea 1961), despite the fact that it was also spotted in Hungary, in the proximity of the Romanian-Hungarian border (Dely 1966). Recently, in the Northern part of Romania, several plain populations were identified on both sides of the Carpathian Mountains (Covaciu-Marcov et al. 2002, 2003, 2004, 2005, Ghira et al. 2002, Strugariu et al. 2006).

Knowing the distribution of a group is important in establishing its abundance, and its local conservation status (Haila & Margules 1996). This is very important when considering *Zootoca vivipara* from the Pannonian Basin (Puky et al. 2005), where the species is divided in four distinct groups, among which the populations between the Danube and the Tisa Rivers are more closely related to the oviparous subspecies *Zootoca vivipara carniolica* than to the rest of the viviparous populations (Odierna et al. 2004). This is why we set out to analyze the *Zootoca vivipara* populations from the North-Western Romanian plains, our objectives being as follows:

- i). to establish the distribution of the plain populations from this region;
- ii). to ascertain the factors that determine the distribution of these populations;
- iii). and to identify the habitats of the plain populations.

Material and methods

The study took place between 2001 and 2006. The field investigations were concentrated on the plain regions of North-Western Romania and the hilly sectors in their vicinity (Fig.1). We investigated the herpetofauna of more than 300 plain localities from the Western Plains, using the method of direct observation. The lizards were captured by hand, and after their identification and occasional photographing, they were set free in their habitat of origin.

Results

We identified *Zootoca vivipara* popu-

lations near 78 localities from the Western Plains (North-Western Romania) (Tab.1). The species is present especially in the plain sectors of the Tur, Someș, Crasna, Ier, and Barcau Rivers' hydrographic basins (Fig.1), reaching the lower limit of the surrounding hills. In the hilly regions, it ascends only alongside the main waterflows, populating wetlands, areas with a plane relief from the wide meadows. This kind of situations were encountered in the case of the Crasna and Ier Rivers. In the North-Western part of Romania, the *Zootoca vivipara* populations from the plain are present at altitudes between 89-127 m at the Southern limit (Ier and Crasna Valleys), and 198 m in the north, near the Oas Mountains (Tab.1).

Our results indicate that *Zootoca vivipara* is a common lizard species in the northern sector of the Western Plains. The identification of the 78 localities (Tab.1, Fig.2) with plain populations of *Zootoca vivipara*, should determine the modification of the classic perception existing in Romania, which describes this species as a mountain lizard. The high number of identified plain populations is emphasizing the lack of studies referring to the geographic distribution of Romania's herpetofauna.

The *Zootoca vivipara* populations from the plain are located in very humid habitats. They inhabit both forested and cleared wetlands, many samples being present in the forest swamps of Livada (FU50) and Ruseni (FT48). Here, the lizards are to be found at the skirt of the forest, as well

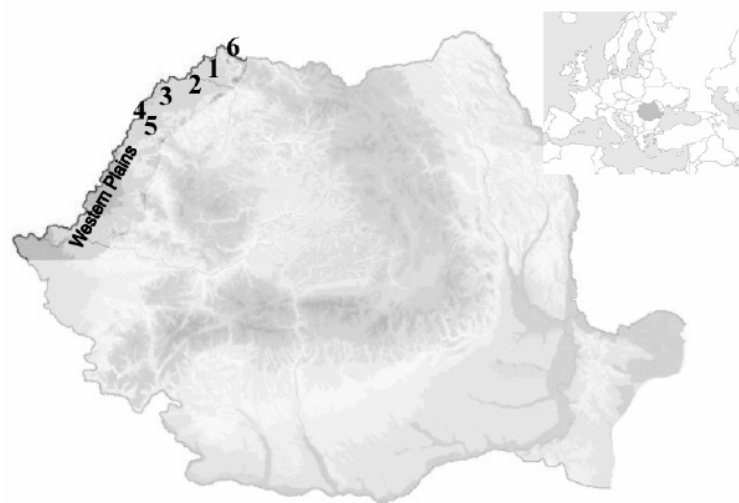


Figure 1. The geographical position of the areas mentioned in text. (1.- Tur Rivers Basin, 2.- Somes Rivers Basin, 3.- Crasna Rivers Basin, 4.- Ier Rivers Basin, 5.- Barcau Rivers Basin, 6.-Oas Mountains)

as in the forest, and also, alongside the paths or the watercourses. The plain populations are present in afforested areas too, occupying marshes or the areas around plashes. Other places in which the species can be found are the wetlands that surround fish ponds. In the absence of these areas, *Zootoca vivipara* is present in the vegetation girdle from the banks of natural streams or in the channels from alongside roads or railroads. In any case, all populated habitats are characterized by the presence of rich grassy vegetation, reed and club-rush. The habitats occupied by the plain populations from North-Western Romania are similar with the ones of the other populations from the Pannonian Basin (Schuster 2004, Puky et al. 2005).

Discussions

The distribution of the plain populations from the Western Plains appears to be limited by a certain climate factor – the 10 °C isotherm of the annual average, situated in the Northern part of Bihor County (Stoenescu et al. 1966). We didn't find any *Zootoca vivipara* populations anywhere South of this line, despite our intensive search, and the fact that favorable habitats are present at least 50 km more to the South.

In the Northern part of the occupied territory, the plain populations reach the baseline of the Oaş Mountains. In this region, the populations from the plain are separated from the ones from the mountains, by not more than 30 km.

Table 1. The list of the localities from the North-Western Romania with recorded lowland *Zootoca vivipara* populations. The data are presented by 10x10 km UTM grid squares. (BH- Bihor County, MM- Maramures County, SM- Satu-Mare County, SJ- Salaj County)

UTM 10x10 km	Locality	A.s.l.	UTM 10x10 km	Locality	A.s.l.
ET75	Voivozi (BH)	105 m	FT34	Bobota (SJ)	164 m
ET75	Șilindru (BH)	105 m	FT34	Moiad (SJ)	171 m
ET86	Valea lui Mihai (BH)	125 m	FT34	Măierişte (SJ)	189 m
ET86	Curtuiușeni (BH)	127 m	FT34	Sărmășag (SJ)	198 m
ET94	Albiș (BH)	141 m	FT35	Supuru de Sus (SM)	140 m
ET94	Petreu (BH)	152 m	FT38	Gelu (SM)	123 m
ET94	Crestur (BH)	150 m	FT39	Vetiș (SM)	89 m
ET96	Vășad (BH)	119 m	FT39	Dorolț (SM)	100 m
ET96	Pișcolț (SM)	126 m	FT39	Dara (SM)	92 m
ET96	Andrid (SM)	107 m	FT49	Satu-Mare (SM)	98 m
ET97	Scărișoara Nouă (SM)	131 m	FT47	Rătești (SM)	183 m
ET97	Resighea (SM)	113 m	FT47	Ardud (SM)	128 m
ET97	Sanislău (SM)	142 m	FT48	Rușeni (SM)	97 m
FT04	Marghita (BH)	118 m	FT58	Tătărești (SM)	153 m
FT05	Cheț (BH)	181 m	FT58	Cărășeu (SM)	142 m
FT06	Irina (SM)	102 m	FT59	Potău (SM)	183 m
FT06	Portița (SM)	108 m	FT59	Medieș Aurit (SM)	148 m
FT07	Ciumești (SM)	143 m	FT68	Lipău (SM)	151 m
FT08	Berea (SM)	149 m	FT69	Someșeni (SM)	153 m
FT08	Foieni (SM)	118 m	FT69	Apa (SM)	152 m
FT08	Urziceni (SM)	110 m	FT69	Medieș Vii (SM)	148 m
FT08	Urziceni de pardure (SM)	110 m	FT79	Seini (MM)	149 m
FT15	Cehăluț (SM)	168 m	FU40	Noroieni (SM)	107 m
FT25	Tășnad (SM)	156 m	FU40	Nisipeni (SM)	107 m
FT16	Ghilești (SM)	156 m	FU40	Micula Nouă (SM)	107 m
FT17	Căuaș (SM)	117 m	FU41	Bercu Nou (SM)	109 m
FT18	Domănești (SM)	111 m	FU41	Porumbesti (SM)	116 m
FT18	Moftinu Mic (SM)	113 m	FU41	Halmeu (SM)	138 m
FT25	Sărăuad (SM)	160 m	FU50	Ciupereni (SM)	142 m
FT26	Săcășeni (SM)	167 m	FU50	Drăgușeni (SM)	142 m
FT26	Cig (SM)	121 m	FU50	Adrian (SM)	138 m
FT27	Ady Endre (SM)	107 m	FU50	Livada (SM)	146 m
FT27	Eriu-Sâncrai (SM)	131 m	FU51	Babesti (SM)	140 m
FT27	Satu Mic (SM)	128 m	FU51	Băbășești (SM)	157 m
FT27	Craidorolț (SM)	121 m	FU51	Turulung (SM)	139 m
FT28	Moftinu Mare (SM)	120 m	FU60	Pășunea Mare (SM)	186 m
FT29	Doba (SM)	94 m	FU61	Turț (SM)	187 m
FT38	Terebești (SM)	117 m	FU61	Turulung Vii (SM)	139 m
FT29	Boghiș (SM)	89 m	FU61	Gherța Mică (SM)	147 m

The species descends until 500 m in the Oaş Mountains, prior to our study it was reported at 650 m in Maramures (Ardelean & Beres 2000). It is likely that not long ago, before the profound human activities in the Oaş Depression, the plain and mountain populations may have come in direct contact. This link is possible due to the fact that the Oaş Mountains are not bordered by hills (Mihăilescu 1969), the wet plain habitats coming into contact with those from the mountains. This phenomenon is also observed in the case of other species, both belonging to the herpetofauna – like *Vipera berus* or *Salamandra salamandra* (Covaciu-Marcov et al. 2004, 2007) – and to the vegetation – like *Sphagnum sp.* (Karacsonyi 1995) –, which in this region extend down-

wards the upper limits of the plain.

The greatest plain populations of *Zootoca vivipara* are situated in vast wetlands, especially in afforested ones. At Livada (FU50) in the Tur River Valley, in a woodland marsh, we managed to count more than 100 individuals in only one day. At Voivozi (ET75), in the Ier Valley, in a vast swamp, we encountered 56 specimens. The smallest numbered populations are those from the vegetation girdles that surround the channels. In this kind of habitats we observed an average of only 2-3 individuals. The populations from the Pannonian Basin are generally low in numbers (Puky et al. 2005) in comparison to those in other zones of the areal (Arnold 2002).

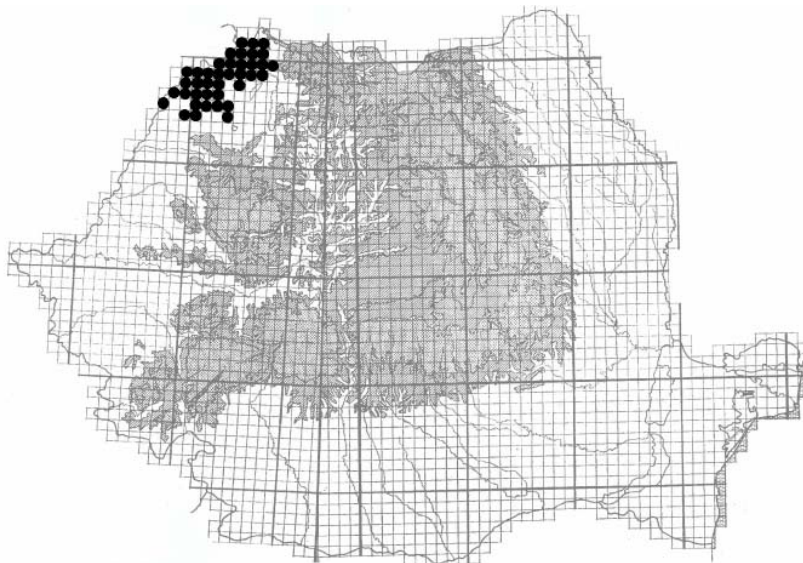


Figure 2. The recorded distribution of the lowland *Zootoca vivipara* populations in North-Western Romania. The data are presented by 10x10 km UTM grid squares. (For the list of localities and the last reference papers see Table 1)

The majority of the habitats inhabited by the *Zootoca vivipara* plain populations, are isolated from one-another, being separated by agricultural fields or even localities. Many populations are limited to the small space represented by ditches located alongside roads. Their original habitat was destroyed after the dyking and draining works which strongly affected the area. The draining works done in the Po River's Basin have had the same effect on the *Zootoca vivipara* plain population (Surget-Groba et al. 2002). In 2005, the population from Vetis (FT39) disappeared after the marsh was set on fire and partially transformed into an agricultural field. In conclusion, we consider that the species in the investigated territory is overall vulnerable, some populations being critically threatened. In some cases, they occupy isolated swamps situated in localities, including the town of Valea lui Mihai (ET86 - the Ier Valley), or the city of Satu Mare (FT49 - the Somes Plain); the presence of this species in localities was also signaled in other regions (Papendieck & Romanowsky 2001). The marshes nearby localities are strongly affected by human activities, being used as dump yards. The populations that don't live in forests are also threatened by regular burning of the vegetation. Less affected by humans are the populations from the afforested areas and the ones from the Carei Plains (the Crasna Valley). Human activities are rare here due to the sandy soil, which is not favorable for agriculture.

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