

## Contributions to the knowledge regarding the composition and geographical distribution of the herpetofauna from Northern Moldavia (Suceava and Botoşani Counties, Romania)

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**Abstract.** In the northern region of Romanian Moldavia we identified 16 species of amphibians: *Salamandra salamandra*, *Mesotriton alpestris*, *Lissotriton montandoni*, *Lissotriton vulgaris*, *Triturus cristatus*, *Bombina bombina*, *Bombina variegata*, *Pelobates fuscus*, *Bufo bufo*, *Bufo viridis*, *Hyla arborea*, *Pelophylax ridibundus*, *Pelophylax lessonae*, *Rana dalmatina*, *Rana arvalis*, *Rana temporaria* and 7 species of reptiles: *Emys orbicularis*, *Lacerta agilis*, *Lacerta viridis*, *Zootoca vivipara*, *Anguis fragilis*, *Natrix natrix*, *Vipera berus*. In addition to these, we have identified *Pelophylax* kl. *esculentus* and hybrids between *Bombina bombina* and *Bombina variegata*. The herpetofauna of the area contains elements more commonly associated with a colder and moister climate. Species such as *Rana arvalis* and *Zootoca vivipara* were present at low altitudes (200 m). *Mesotriton alpestris* and *Lissotriton montandoni* were present in the area at altitudes of 450 m. *Lissotriton vulgaris* and *Lissotriton montandoni* were often present in the same habitats. However, no intermediary specimens were identified. The three forms of the "*Pelophylax esculentus* complex", including *Pelophylax lessonae*, are wide spread in northern Moldavia, being represented by large populations.

**Key words:** amphibians, reptiles, geographic distribution, Northern Moldavia

### Introduction

The northern region of Romanian Moldavia benefits from a climate with Baltic influences, resulting in higher rain fall and colder winters than other areas of Romania (Tufescu et al. 1995). These climatic conditions could also be deduced by analysing the fauna such

as the amphibian and reptile species. However, very few studies detailing the herpetofauna of this region can be found in the Romanian literature. The first explicit data with regards to the herpetofauna of this region, confirming the influence of the climate, record the presence of *Rana arvalis* (Vancea 1959), a glacial relict (Poliş 1977) linked to a

colder and moister climate. Subsequently, some data with regard to the herpetofauna of northern Moldavia was published in the monographs detailing the reptiles and amphibians of Romania (Fuhn 1960, Fuhn & Vancea 1961, Cogălniceanu *et al.* 2000). The first thorough studies dedicated to the study of the herpetofauna from northern Moldavia appear after the year 2000 (Covaciu-Marcov *et al.* 2003a, Strugariu *et al.* 2006a, b), with some data also being included in the publications dedicated to the region of Moldavia from between the Siret and Prut rivers (Covaciu-Marcov *et al.* 2006a). However, these studies are far from complete in their coverage of the region. Thus, the identification of populations of *Zootoca vivipara* from Botoșani County (Covaciu-Marcov *et al.* 2003a) or of the populations of *Pelophylax lessonae* from Suceava County (Strugariu *et al.* 2006b) shed new light on the range of these species in Romania, underlining the importance of new further studies. Therefore, the present paper represents a contribution to enlarge the information base with regards to the herpetofauna of the northern region of Romanian Moldavia.

#### Materials and Methods

The study was conducted at the end of May 2007. The investigated region is situated in the extreme north of Romanian Moldavia, covering a large part of Suceava County and a smaller area of Botoșani County (Fig. 1). The research area comprises the eastern and central parts of Suceava County, its western

limit being the Stânișoarei Mountains and Obcina Feredeului. From Botoșani County, our study covered areas of the Ibăneștilor Coast, Bour Hill (Tufescu 1986) and the lowlands situated in close proximity to these areas. In total, we analyzed the composition and geographical distribution of the herpetofauna from 50 localities within the two counties.



**Figure 1.** Location of the research area (Northern Moldavia) in Romania

During the study, we investigated a large number of localities with contrasting habitats, using the transects method (Cogălniceanu 1997). We generally used the direct observation method (Brown 1997), capturing only those amphibians which could not be identified directly from the water. In these cases, we used a square drag net or a catch net. In all of the cases, the captured animals were released in their habitat following photographing. In addition to the capture and observation of live animals, an important role in our study was played by the identification of animals killed by local people or by cars. The determination of hybrids was based on morphological and chromatic features indicated in the literature (see in Berger 1966, 1973, Cogălniceanu *et al.* 2000, Fuhn 1960, Ghira & Mara 2000, Stugren 1980, Szymura 1993). The distribution maps were done using the UTM technique (Lehrer & Lehrer 1990) with a 10X10 km quadrat.

## Results

A total of 23 species of amphibians and reptiles were identified in the research area, along with 2 types of hybrids between the amphibians (Table 1, Figs 2-3). Of these, the amphibians were represented by 16 species: *Salamandra salamandra*, *Mesotriton alpestris*, *Lissotriton montandoni*, *Lissotriton vulgaris*, *Triturus cristatus*, *Bombina bombina*, *Bombina variegata*, *Pelobates fuscus*, *Bufo bufo*, *Bufo viridis*, *Hyla arborea*, *Pelophylax ridibundus*, *Pelophylax lessonae*, *Rana dalmatina*, *Rana arvalis*, *Rana temporaria*, and the reptiles by 7 species: *Emys orbicularis*, *Lacerta agilis*, *Lacerta viridis*, *Zootoca vivipara*, *Anguis fragilis*, *Natrix natrix*, *Vipera berus*. The hybrids identified in the northern region of Moldavia were between *Bombina bombina* and *Bombina variegata* and between *Pelophylax lessonae* and *Pelophylax ridibundus* (*Pelophylax* kl. *esculentus*).

We analyzed the distribution of the 23 species and 2 hybrids in the 50 investigated localities from the northern region of Moldavia. A total of 395 localities were recorded for the identified species in the 50 field localities (Table 1). Of these, 313 are new localities for the Romanian herpetofauna. *Lacerta viridis* was identified for the first time in the studied region of Botoșani County, being situated at the general border of its distribution range (Naulleau 1997). *Anguis fragilis* is also recorded for the first time in Botoșani County. The present paper contributes to the knowledge regarding the distribution of *Zootoca vivipara* in the lowlands from northern Moldavia, the dis-

tribution of the three forms of the "*Pelophylax esculentus* complex" as well as the distribution of the two newt species that are usually linked to higher altitudes (*Mesotriton alpestris* and *Lissotriton montandoni*).

## Discussion

The climate of our investigated area is colder and moister in comparison to other regions of Moldavia (Stoenescu et al. 1966). This is reflected in the composition of the herpetofauna in the region. Thus, the northern area of Moldavia hosts elements linked to regions with colder and moister habitats. Glacial relicts such as *Rana arvalis* or *Zootoca vivipara*, species which were traditionally considered to be from mountainous areas in Romania (Fuhn & Vancea 1961) and are present at low altitudes in northern Moldavia. Also, *Mesotriton alpestris* and *Lissotriton montandoni*, species which were previously considered to be exclusively present in areas situated at altitudes of above 500 or 700 m (Fuhn 1960, Cogălniceanu et al. 2000), are present in northern Moldavia at 450 m a.s.l. Also, the research area hosts large populations of "green water frogs", including *Pelophylax lessonae*, a species which was previously considered to be extremely rare. The number of localities in which we now record the presence of this species in northern Moldavia exceeds the total number of localities in the whole of Romania from which the species was previously known prior to 2000 (Cogălniceanu et al. 2000).

**Table 1.** Locality records for the amphibian and reptile species in the Northern Romanian Moldavia (BT=Botoșani county, SV=Suceava county, Ss = *Salamandria salamandra*, Ma=*Mesotriton alpestris*, Ltm= *Lissotriton montandonii*, Ltv=*Lissotriton cristatus*, Tc=*Triturus cristatus*, Bb=*Bombina bombina*, Bv=*Bombina variegata*, BX = *Bombina bombina*X *Bombina variegata*, Pf=*Pelobates fuscus*, Buf=*Bufo bufo*, Buv=*Bufo viridis*, Ha=*Hyla arborea*, Pr=*Pelophylax ridibunda*, Pl=*Pelophylax lessonae*, Pe=*Pelophylax kl. esculentia*, Rd=*Rana arvalis*, Ra=*Rana dalmatina*, Rt=*Rana temporaria*, Eo=*Emys orbicularis* La=*Lacerta agilis*, Lv=*Lacerta viridis*, Zy=*Zootoca vivipara*, AI=*Anguis fragilis*, Ni=*Natrix natrix*, Vb = *Vipera berus*) (X = Localities in which we identified the species for the first time; S = Localities in which we reconfirmed the presence of the species; O = Localities in which the species was previously mentioned but the data is not reconfirmed by us; Σ = The sum of localities)

Locality ↓	Species →	County	S	M	L	L	T	B	B	B	P	B	B	H	P	P	P	R	R	R	E	L	L	Z	A	N	V
			s	a	t	b	c	v	v	X	f	u	u	a	r	l	e	d	a	t	o	a	v	v	f	n	b
Bajura		BT	-	-	X	X	X	-	-	X	-	X	-	X	-	X	-	-	-	-	-	X	-	-	-	-	-
Baranca		BT	-	-	X	X	X	-	-	X	-	X	-	X	-	X	-	-	X	X	-	X	-	X	-	X	-
Dărăbani		BT	-	-	-	-	-	-	-	-	-	X	-	-	-	-	-	-	-	-	-	X	-	-	-	-	-
Dersca		BT	-	-	X	X	X	-	X	-	X	-	X	-	X	-	X	-	-	-	-	-	-	-	-	-	-
Hudești		BT	-	-	-	-	-	-	-	-	-	X	-	X	-	S	-	-	-	-	-	-	S	-	-	-	-
Pădureni		BT	-	-	X	X	X	-	X	-	X	-	X	-	X	-	X	-	-	-	-	-	-	-	-	-	-
Hilișeu Cloșca		BT	-	-	-	X	X	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	X	-	X	-	-
Hilișeu Crișan		BT	-	-	X	X	X	-	-	-	-	-	-	-	-	-	-	-	-	X	-	X	X	X	-	X	-
Hilișeu Horia		BT	-	-	X	X	X	-	-	-	-	-	-	-	-	-	-	-	-	-	-	X	X	X	-	X	-
Iezer		BT	-	-	-	X	X	-	X	-	-	-	-	-	X	-	X	-	-	-	-	X	-	-	-	X	-
Oroftiana		BT	-	-	X	X	X	-	-	-	-	X	-	X	-	X	-	X	-	X	X	-	X	-	X	-	-
Plevna		BT	-	-	X	X	X	-	X	-	-	-	-	X	-	-	-	-	-	-	-	X	-	-	-	-	-
Pomărlia		BT	-	-	X	X	X	-	X	-	-	X	-	X	-	X	-	X	-	X	-	X	-	-	-	X	-
Racovăț		BT	-	-	X	X	X	-	X	-	-	X	-	X	-	X	-	X	-	X	-	X	-	-	-	X	-
Suhurău		BT	-	-	X	X	X	-	X	-	-	X	-	X	-	X	-	X	-	X	-	X	-	X	-	-	-
Șendriceni		BT	-	-	X	X	X	-	X	-	-	-	-	-	-	-	-	-	-	-	-	X	-	-	-	X	-
Brădățel		SV	-	-	X	X	X	-	X	-	X	-	X	-	X	-	X	-	X	-	X	-	-	-	-	-	-
Bunești		SV	-	-	S	S	S	-	S	-	X	-	S	S	S	-	S	-	-	-	S	X	X	-	X	-	-
Cacica		SV	-	S	S	S	S	O	S	-	-	S	O	S	O	-	O	-	-	-	S	-	S	-	S	S	O

Table 1. (continued)

Locality ↓	Species →	County	S	M	L	L	T	B	B	B	P	B	B	P	H	P	P	P	R	R	R	E	L	L	Z	A	N	V
			s	a	t	t	c	v	v	X	f	u	u	r	a	r	l	e	a	a	t	o	a	v	v	f	n	b
Călinești		SV	-	-	X	X	X	X	X	X	X	X	X	X	X	X	X	X	-	-	-	-	X	-	-	-	X	-
Câmpulung Moldovenesc		SV	S	S	-	O	-	S	-	-	-	-	-	-	-	-	-	-	-	-	S	-	S	S	S	S	S	
Ciprian Porumbescu		SV	-	X	X	S	S	-	-	O	-	-	-	-	O	-	-	-	-	-	S	-	-	X	-	-	-	
Ciumârna		SV	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	X	-	X	-	X	
Clif		SV	-	X	X	-	-	X	-	X	X	X	X	X	X	X	X	X	-	-	X	-	X	-	-	-	-	
Dărmănești		SV	-	-	-	S	S	O	S	X	S	O	S	S	O	S	S	S	-	-	O	-	S	-	-	O	S	
Dragomirna		SV	-	-	-	S	S	X	-	-	S	-	S	S	S	S	S	S	S	S	S	-	S	-	S	S	S	
Dumbrava		SV	-	-	-	-	X	-	X	-	X	-	X	-	X	-	X	-	-	-	X	-	-	-	-	-	-	
Fălticeni		SV	-	-	O	S	O	-	-	S	S	S	S	S	S	S	S	S	S	S	S	S	S	-	X	-	S	
Forăști		SV	-	-	-	S	-	S	-	X	S	S	S	-	-	-	-	-	-	-	-	-	S	-	-	-	-	
Gălănești		SV	-	-	-	X	-	-	-	-	X	-	-	-	-	-	-	-	-	-	-	-	X	-	-	-	-	
Grănicești		SV	-	-	-	-	-	-	-	-	-	-	-	-	X	-	-	-	-	-	-	-	X	-	-	-	-	
Horodnic de Sus		SV	-	X	X	-	-	X	-	X	-	X	-	X	-	-	X	X	-	-	X	-	X	-	-	-	-	
Horodniceni		SV	-	-	-	-	X	-	X	-	X	-	X	-	X	-	X	-	-	-	X	-	-	-	-	-	-	
Ilișești		SV	-	-	-	O	S	-	S	-	O	-	S	-	S	-	X	X	-	-	S	-	O	-	X	-	O	
Marginea		SV	-	X	X	X	-	X	-	-	-	-	-	-	-	-	-	X	-	-	X	-	-	-	-	-	-	
Mălini		SV	X	-	-	-	-	X	-	-	-	-	-	-	X	-	X	X	-	-	-	-	-	-	-	-	-	
Măriștei		SV	-	-	-	X	X	X	X	X	X	X	X	X	X	X	X	X	X	-	-	-	-	-	-	-	X	-
Mesteceaniș		SV	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	X	
Moara mică		SV	-	-	-	S	-	S	-	X	-	S	S	-	-	-	-	-	-	-	S	-	X	-	X	-	X	
Paltinu		SV	X	-	X	-	-	X	-	-	-	-	-	-	-	-	-	-	-	-	X	-	X	-	X	-	X	
Pătrăuți		SV	-	-	-	-	-	X	-	-	X	-	X	X	X	X	X	X	-	-	-	-	S	-	-	-	S	

Table 1. (continued)

Locality ↓	Species →	County	S	M	L	L	T	B	B	B	P	B	B	B	H	P	P	P	R	R	R	E	L	L	Z	A	N	V
			s	a	t	t	c	b	v	X	f	u	u	u	a	r	l	e	a	a	t	o	a	v	v	f	n	b
Pârfeștii de Sus		SV	-	-	S	O	-	S	-	-	-	-	-	O	O	-	O	-	-	O	-	-	S	-	O	O	O	O
Poiana Mărului		SV	-	-	X	X	-	X	-	-	-	-	-	X	X	-	-	-	-	-	-	-	-	-	-	-	-	-
Poiana Stampei		SV	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	X	-	-	-	X	-	-	-	-
Poieni Solca		SV	-	-	-	X	-	X	-	-	-	-	-	-	-	-	-	-	-	-	-	-	X	-	-	-	-	-
Runcu		SV	-	-	-	X	-	X	-	-	-	-	-	-	-	-	-	-	-	-	-	-	X	-	-	-	-	-
Solca		SV	-	X	X	X	-	X	-	-	-	X	X	X	X	X	X	X	-	-	X	-	S	-	-	O	O	-
Șes		SV	-	-	-	S	-	S	-	-	-	S	S	S	S	S	S	S	-	-	S	-	X	X	X	X	X	-
Varvata		SV	-	X	X	X	-	X	-	-	-	X	-	-	-	-	-	-	-	-	X	-	X	X	X	-	-	-
Vatra Moldoviței		SV	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	X	-	X	X	X	-	-	-
Vârfu Dealului		SV	-	X	X	X	-	X	-	-	-	X	-	X	X	X	X	X	-	-	X	-	X	X	X	-	-	-
Vicovu de Jos		SV	-	X	X	X	-	X	-	-	-	X	-	X	X	X	X	X	-	-	X	-	X	X	X	-	-	-
Voitineli		SV	-	X	X	X	-	X	-	-	-	X	-	X	X	X	X	X	-	-	X	-	X	X	X	-	-	-
Zugreni		SV	X	-	X	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	X	-	O	-	S	S	-	S
<b>ΣX</b>			3	9	1	2	1	1	2	7	2	2	6	1	1	1	2	1	1	1	1	2	2	5	7	2	9	1
				0	2	3	9	0	3	1	1	3	7	5	6	8	0	7	3									
<b>ΣS</b>			1	1	1	3	4	1	4	1	1	1	1	1	3	2	1	2	1	-	3	-	7	-	1	1	3	2
<b>ΣO</b>					-	2	2	2	1	-	-	3	1	3	1	2	2	1	3	-	1	-	1	-	2	4	4	2

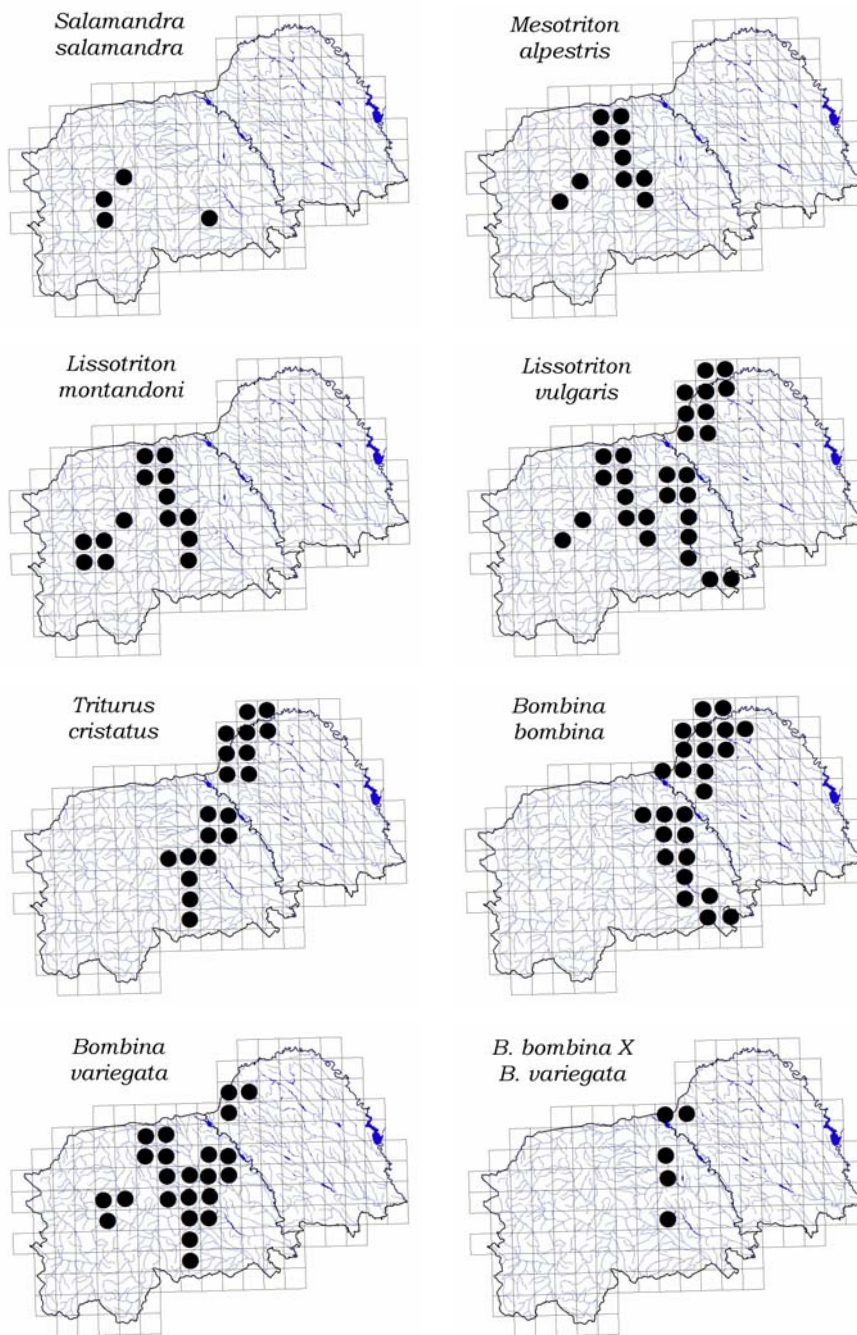
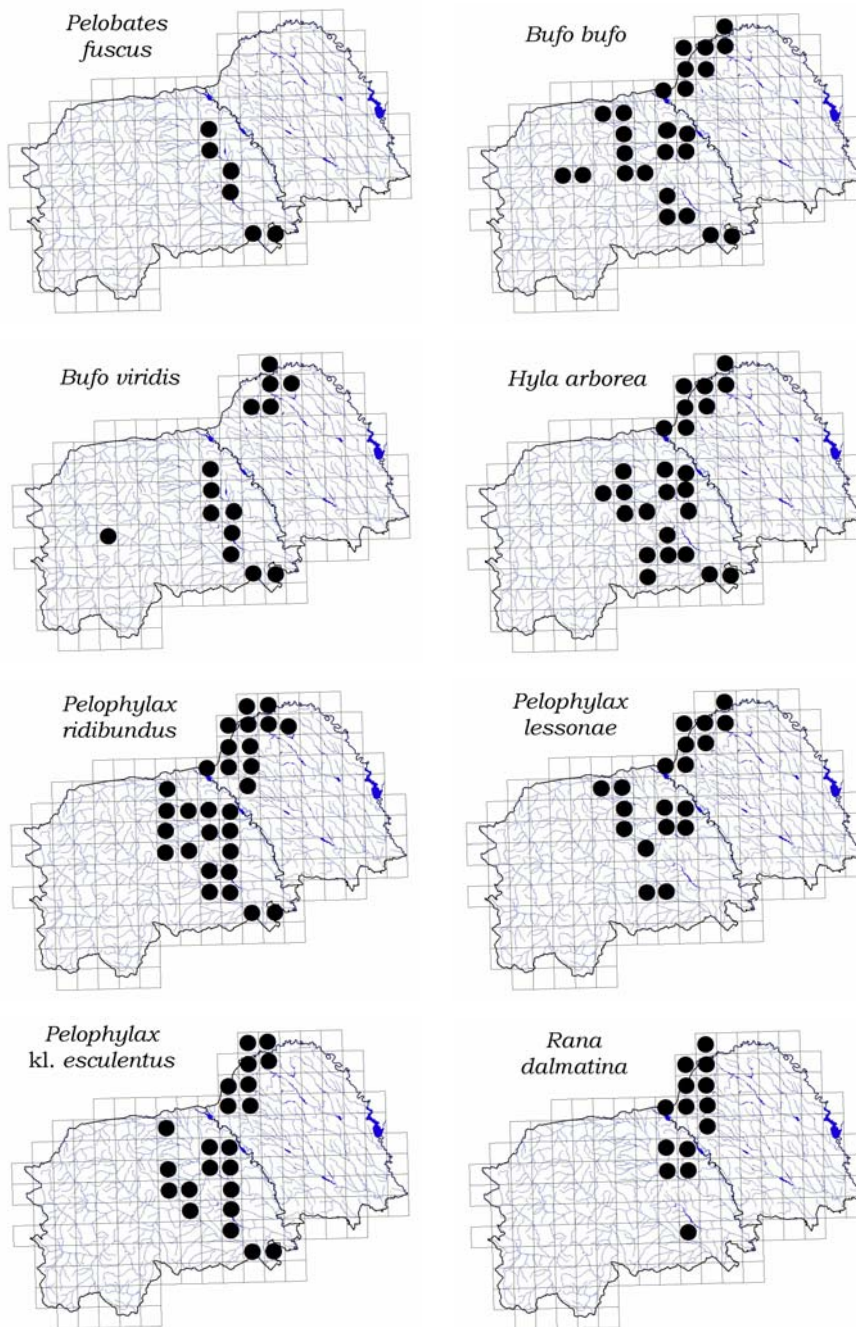


Figure 2/A. Distribution of the recorded amphibian species in the the research area



**Figure 2/B.** Distribution of the recorded amphibian species in the the research area

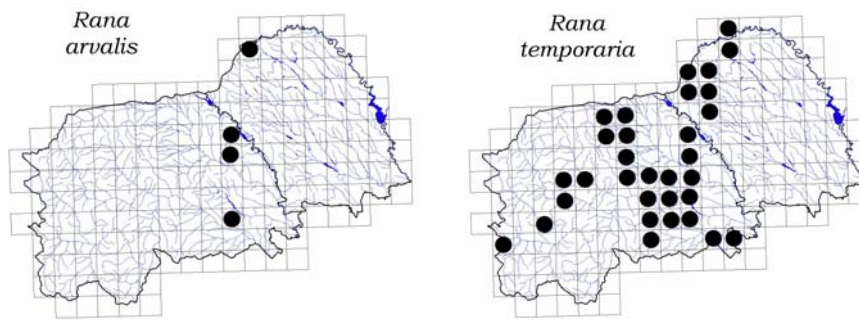


Figure 2/C. Distribution of the recorded amphibian species in the the research area



Figure A. *S. salamandra* from Câmpulung Moldovenesc (SV) (photo by Al. Strugariu 2007)

We have identified all 4 newt species that are known to live in the area: *Mesotriton alpestris*, *Lissotriton montandoni*, *Lissotriton vulgaris*, *Triturus cristatus*. Nevertheless, the first two species are absent from Botoşani County due to the low altitude of the area, and the

Siret river, which appears to be a natural barrier. The colonisation of these areas would have been possible from the highlands between the Siret and Prut rivers from Ukraine. However, despite intense searches, we could not identify these species in the

higher areas of the Ibăneștilor Coast and the Bour Hill. It is probable that the low altitude and the climate during the time of the dispersal of these species in Ukraine did not allow these species to disperse to the higher areas of Botoșani County, even if the altitude at the Ibăneștilor Coast and the Bour Hill exceed those at which these species occur in western Romania (Covaciu-Marcov *et al.* 2003b, 2004a, 2005a, b, 2006b).

*Mesotriton alpestris* and *Lissotriton montandoni* (Fig. B), in Suceava County were recorded at altitudes as low as 450 m. These species practically come down to the border between the Obcina Mare and the Rădăuți De-

pression and the Suceava Plateau. However, even if this data is new for the region, these are not the lowest altitudes in Romania in which these species can be found. They have been identified at lower altitudes both in areas from western Romania (Micluță 1970, Covaciu-Marcov *et al.* 2003b, 2004a, 2005a, b, 2006b) and in Moldavia (Ghiurcă *et al.* 2005, Gherghel & Ile 2006).

The 4 species of newt occur together in the same habitat (Figs C-D) in many of the localities from Moldavia and, in 7 of our investigated localities, *Lissotriton montandoni* and *Lissotriton vulgaris* use the same habitats for reproduction. In all of these cases, despite



**Figure B.** *Lt. montandoni* from Zugreni (SV) (photo by Al. Strugariu 2007)



**Figure C.** Habitat of *Lt. vulgaris*, *Lt. montandoni*, *M. alpestris* and *T. cristatus* near Ciprian Porumbescu (SV) (photo by A.S. Cicort-Lucaciu 2007)



**Figure D.** Habitat of *Lt. montandoni*, *M. alpestris* and *T. cristatus* near Solca (SV) (photo by A.S. Cicort-Lucaciu 2007)

capturing several dozen individuals of both species, we did not observe any intermediary specimens. This is important because the two species frequently cross-breed, and as a result hybrids have been observed in several other localities in Romania as well as other parts of their range (Babik *et al.* 2003, Cogălniceanu *et al.* 2000, Fuhn *et al.* 1975, Iftime 2004, 2005). The 4 newt species appear together most frequently in large sized habitats (swamps, ponds, canals) within forested areas. Other species of amphibians also occur in these habitats, including *Pelophylax lessonae*, *Mesotriton alpestris* and *Lissotriton montandoni*. *Lissotriton vulgaris* frequently inhabit temporary habitats such as puddles formed in tire tracks, canals and ditches from forests.

The two species of the *Bombina* genus and the hybrids between them occur in both counties. *Bombina bombina* is present in large numbers within the lower regions, in the areas adjacent to the Prut, Siret and Suceava rivers. *Bombina variegata* is represented by larger populations in the mountain areas, but it is also present in the Dragomirna Hill, the Bour Hill and the Ibăneștilor Coast. It is probable that the populations from the northern area of Botoșani County are separated from Romanian Carpathian populations, its distributional range being continued in Ukraine. In northern Moldavia, *Bombina variegata* is present at altitudes higher than 300 m, only exceptionally being present at altitudes as low as 280 m in Botoșani county. Thus, the fact that this species occurs at higher alti-

tudes in Moldavia than in western Romania (Strugariu *et al.* 2006b) is confirmed.

With regards to the hybrid area between *Bombina bombina* and *Bombina variegata*, our data indicates the presence of several hybrid sectors in the area, distinct from the perspective of the involved populations of *Bombina variegata*. Thus, one hybrid zone surrounds the Bour Hill and the Ibăneștilor Coast from Botoșani County and another surrounds the Dragomirna hill and is bordered to the west by the Eastern Carpathians, probably through the Suceava Plateau. The hybrid area is situated at altitudes of around 300 m, higher than in north-western Romania (Covaciu-Marcov *et al.* 2002, 2003c, 2004b, Sas *et al.* 2005).

The 3 forms of the green water frog complex are present in a large number of localities from northern Moldavia. In many cases, the 3 forms are present in the same habitats. However, in some cases, only *Pelophylax ridibundus* cohabitates with *Pelophylax kl. esculentus*, *Pelophylax lessonae* cohabitates only with *Pelophylax kl. esculentus* or, *Pelophylax kl. esculentus* does not cohabitates with any of the other forms. However, these cases are determined only by particular habitats (Figs E-G) which are not favourable for certain forms of the complex, or by the chance that in certain habitats, more forms existed but we were unable to identify them. Therefore, based on the fact that the 3 forms are distributed together, we consider that the three forms are pre-



**Figure E.** Habitat of *P. lessonae* near Măriței (SV) and Călinești (SV) localities (photo by A.S. Cicort-Lucaciu 2007)



**Figure F.** Habitat of *P. ridibundus* and *P. kl. esculentus* near Pădureni (BT) and Dresca (BT) localities (photo by A.S. Cicort-Lucaciu 2007)



**Figure G.** Habitat of *P. lessonae* and *P. kl. esculentus* near Pomârla (SV) (photo by A.S. Cicort-Lucaciu 2007)

sent in the whole studied region, with the exception of areas higher than 500 m a.s.l. From the systems described in the literature (Tunner & Heppich-Tunner 1991), the R-E-L system is present in the research area, even if, locally other systems appear.

*Pelophylax lessonae* is constantly present in the research area, being widely distributed in northern Moldavia. These data, along with previous research (Covaciu-Marcov et al. 2006 a, Strugariu et al. 2006 b) draw a unitary range for the distribution of this species, linked to its range from Ukraine (Gunther 1997). In northern Moldavia, *Pelophylax lessonae* populates large wetlands situated in, or in close proximity to, forested areas. The species' preference for forest swamps has been observed by several other authors (Rybacki & Berger 1994, Covaciu-Marcov et al. 2006b). Occasionally, this species appears in small puddles inside the forests, but always in close vicinity to the forest's edge. Sometimes, it is present in artificial canals or fish ponds. It prefers the sectors more exposed to the sun and it reproduces in areas with lush vegetation. *P. lessonae* typically prefers deciduous forests but in some exceptions it reaches mixed forests from the limit between the Obcina Mare and the Suceava Plateau.

From the three forms of the green frog complex, it appears that *Pelophylax ridibundus* reaches altitudes of around 500 m, in areas covered by coniferous forests. Unlike *Pelophylax lessonae*, *Pelophylax* kl. *esculentus* also inhabits un-forested areas with a higher level of

anthropogenic impact but it is also present deep inside forests. *Pelophylax ridibundus* is especially abundant in large accumulations of water from the lowlands, including those situated in close vicinity to agricultural fields.

*Rana dalmatina* is situated in northern Moldavia at the extreme limit of its European range, with the species not being identified east of the Prut river (Grossenbacher 1997). It was previously recorded in a few localities from the region (Cogălniceanu et al. 2000, Covaciu-Marcov et al. 2006a, Iftime 2005, Strugariu et al. 2006b). However, we have recorded this species in 8 localities from the northern area of Botoșani County, where the species is well represented in the forested areas and in swamps. The species appears to be rare in the areas from Suceava County which are situated at altitudes above 400-500 m, being absent from all mixed and coniferous forests surveyed.

In addition to *Rana dalmatina*, *Rana temporaria* (Figs H-I) is often present at the same sites, a fact that is also valid for Botoșani County, where it was previously identified in a few localities (Covaciu-Marcov et al. 2003a). We identified *Rana temporaria* populations in 6 localities from Botoșani County, at altitudes higher than 200 m, in the forested area from the Bour Hill and the Ibăneștilor Coast. In Suceava County, the species is much better represented, being one of the most common amphibian species from the county. In Suceava County, *Rana temporaria* is not exclusively present in forested sectors, the



**Figure H.** Adult *R. dalmatina* from Adâncata (SV) (photo by Al. Strugariu 2007)



**Figure I.** Adult *R. temporaria* from Dărmănești (SV) (photo by Al. Strugariu 2007)

species being present in large swamps or in moist areas near streams and rivers. In many cases, the two brown ranid species occupy the same habitats as the 3 green frog forms.

*Zootoca vivipara* (Fig. J) is a common species in Suceava County but it is much rarer in Botoşani County. This fact is not surprising due to the fact that it was traditionally considered to be a mountain species in Romania (Fuhn & Vancea 1961) and was only recently identified in the lower altitude regions of the country (Ghira et al. 2002, Covaciu-Marcov et al. 2003a, 2004a, Strugariu et al. 2006a). In Sucea-

va County, the species is present both in typical mountain habitats with coniferous forests, as well as the Suceava Plateau, and even at low altitudes in river meadow habitats. This fact is very important, proving the existence of a link between the mountain populations and those from low altitudes, a fact which was previously proven for the case of the populations from north-western Romania (Covaciu-Marcov et al. 2004 a). In Botoşani County, the species is much rarer, both from the point of view of the number of localities in which we identified it (Table 1) and pointing terms of local abundance.

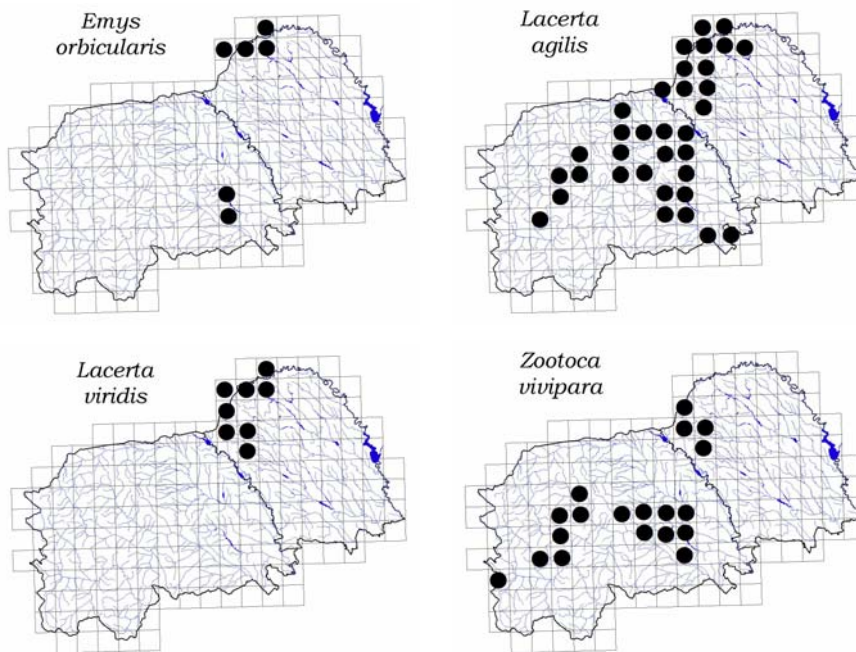
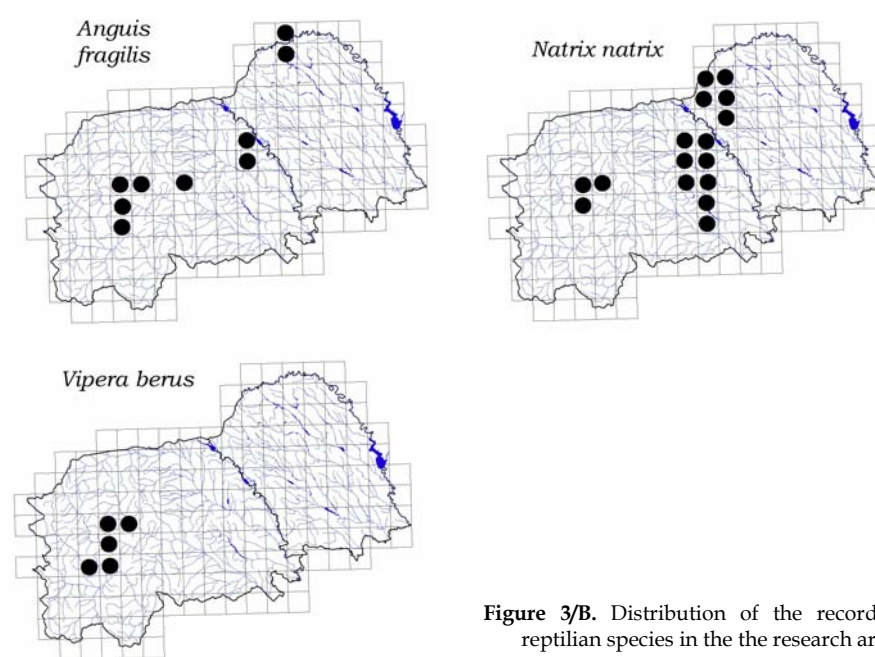


Figure 3/A. Distribution of the recorded reptilian species in the the research area



**Figure J.** Adult *Z. vivipara* from Câmpulung Moldovenesc (SV) (photo by Al. Strugariu 2007)



**Figure 3/B.** Distribution of the recorded reptilian species in the the research area



**Figure K.** Female (up) and male (down) *Vipera berus* from Câmpulung Moldovenesc (SV)  
(photo by Al. Strugariu 2007)



**Figure L.** Melanistic *V. berus* from Câmpulung Moldovenesc (SV) (photo by Al. Strugariu 2007)



**Figure M.** Typical landscape from the Eastern Carpathians. Habitat of *A. fragilis*, *L. agilis*, *Z. vivipara*, *N. natrix* and *V.berus*, (photo by Al. Strugariu 2007)

The 3 identified populations are situated at altitudes of 170-200 m.

Differences between the two counties can be seen by analysing the habitats used by *Zootoca vivipara*. In Suceava County, the species inhabits a wide variety of habitats, all of them characterised by a high level of humidity. Thus, it is present at the edges of forests, swamps, edges of canals or ditches, etc. In Botoşani County, *Z. vivipara* was almost always observed in the vegetation from the edges of canals, ditches and streams. Very rarely does it inhabit larger swamps. These are probably more recently colonized habitats, in which the species has moved due to the destruction of its original living spaces, this would explain the rarity of the species in the area. Consequently, despite being common in Suceava County, the *Zootoca vivipara* populations from Botoşani County, are small in number and likely to be threatened as a result of human activities. It is likely that the populations from Botoşani County are relicts of a once much wider range between the Siret and Prut rivers. The southern limit of its original range is hard to identify. It is possible that even future studies will not be able to identify this limit due to the anthropogenic impact from the southern areas of Botoşani County.

The northern region of Moldavia is comprised of three sectors, with a rich and important herpetofauna: **1.** the eastern limit of the Carpathians, **2.** the periferic area of the Dragomirnei Hill and **3.** the periferic area from the Bour

Hill and the Ibăneştilor Coast. The first region is characterized by large *Mesotriton alpestris* and *Lissotriton montandoni* populations which are situated at their lower altitudinal range limit. In many cases, all 4 identified newt species inhabit the same habitats within this area. In some cases, in addition to the newts, all the forms of the green water frog forms appear, as well as some brown ranid species. In the area of the Dragomirnei Hill, large populations of the "*Pelophylax* kl. *esculentus* complex", *Pelobates fuscus* and brown ranids are present. Also, this area represents an important hybridising sector for the two *Bombina* species. In the area of the Bour Hill and the Ibăneştilor Coast, numerous populations of green water frog forms and brown ranid species, including *Rana arvalis*, appear. Among the reptile species, populations of *Anguis fragilis* and *Emys orbicularis* also appear. Also, low altitude populations of *Zootoca vivipara* are present in the area. Thus, the three regions should benefit from special attention; priority should be given to the protection and conservation of the forested areas within these regions.

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Submitted: 27 October 2007  
/ Accepted: 17 March 2008