

DATA UPON THE COMPOSITION AND THE GEOGRAPHIC DISTRIBUTION OF THE HERPETOFAUNA OF THE ALMAS-AGRIJ DEPRESSION (SALAJ COUNTY, ROMANIA)

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Abstract. The herpetofauna of the Almas-Agrij Depression from Salaj County comprises 11 species of amphibians (*Salamandra salamandra*, *Triturus alpestris*, *T. cristatus*, *T. vulgaris*, *Bombina variegata*, *Bufo bufo*, *B. viridis*, *Hyla arborea*, *Rana ridibunda*, *R. dalmatina* and *R. temporaria*) and 6 species of reptiles (*Lacerta agilis*, *L. viridis*, *Zootoca vivipara*, *Anguis fragilis*, *Natrix natrix*, *Coronella austriaca*). The herpetofauna of the investigated region is rather poor, but characteristic to the hill and plateau regions from western Romania. The distribution of the identified species is conditioned by the same factors that generally affect it in the western part of the country. It is important that we discovered a new *Triturus alpestris* population in the Meses Mountains. The identification of the *Zootoca vivipara* species is also of great importance. This is a premier for the mountainous areas from Sălaj County. The species descends in the area at even 543 m altitude, which is very reduced in comparison to other mountainous areas from the country. This fact, connected to that of the appearance of *T. alpestris*, indicates that at least the higher area from the level of Agrij valley, has a distinct status and history, therefore belonging to the western sector of Romania, in which the mountainous elements decrease at low altitudes.

Keywords: herpetofauna, Almas-Agrij, human activities, *Zootoca vivipara*, *Triturus alpestris*.

Rezumat. Date despre compoziția și distribuția geografică a herpetofaunei din Depresiunea Almăș-Agrij (Județul Sălaj, România). Herpetofauna Depresiunii Almăș-Agrij din Județul Sălaj cuprinde 11 specii de amfibieni (*Salamandra salamandra*, *Triturus alpestris*, *T. cristatus*, *T. vulgaris*, *Bombina variegata*, *Bufo bufo*, *B. viridis*, *Hyla arborea*, *Rana ridibunda*, *R. dalmatina* and *R. temporaria*) and 6 species of reptiles (*Lacerta agilis*, *L. viridis*, *Zootoca vivipara*, *Anguis fragilis*, *Natrix natrix*, *Coronella austriaca*). Herpetofauna regiunii investigate este săracă, dar caracteristică pentru regiunile de deal și podiș din partea de vest a țării. Este important faptul că am descoperit o nouă populație de *Triturus alpestris* în Munții Meseș. De asemenea, o importanță deosebită o are identificarea speciei *Zootoca vivipara*. Aceasta este o premieră pentru regiunile montane din județul Sălaj. În zonă specia coboară chiar și la 543 de m altitudine, altitudine foarte redusă în comparație cu alte zone montane din țară. Acest fapt colaborat cu descinderea lui *T. alpestris* indică că cel puțin zona înaltă de la nivelul văii Agrijului are un statut și o istorie aparte, aparținând sectorului din vestul României în care elemente montane coboară la altitudini reduse.

Cuvinte cheie: herpetofauna, Almăș-Agrij, activități umane, *Zootoca vivipara*, *Triturus alpestris*.

INTRODUCTION

Romania's biodiversity is, presently, little known comparing it to the European level (HARTEL et al., 2008), despite the fact that in the country there still are vast surfaces little affected by human activities (HARTEL et al., 2006). The herpetofauna is a group with a large conservation importance, many species being endangered, included in different protection categories at a national level (GUD no. 27 / 2007). However, detailed studies about this particular group were done only in the last years, focused more on certain regions of the country- e.g. the north-west, Moldova or Dobroudja (e.g. COVACIU-MARCOV et al., 2003a, b, 2004, 2005, 2006a, b, c, 2007, 2008a, STRUGARIU et al., 2006, 2007, 2008, GHERGHEL et al., 2007, 2008). Salaj County was partially comprised in some of these recent studies and therefore there are explicit data referring to the herpetofauna of the entire county (GHRIA & GHILE, 1997), or of only its north-west sector (COVACIU-MARCOV et al., 2006d). Dissipated information which partially interest the Salaj County is included in the general volumes on the herpetofauna, particularly on the amphibians of Romania (FUHN, 1960, FUHN & VANCEA, 1961, COGĂLNICEANU et al., 2000). In the case of the endangered species, such information is found in the Red Book of Romania's Vertebrates (IFTIME, 2005). As such, we set out to contribute to establishing the composition and the geographic distribution of the herpetofauna from Salaj County. The present paper shows the results of the studies made in the Almas-Agrij Depression. The objectives were to establish the composition and the geographic distribution of the herpetofauna, of its particularities and differences from other regions of the country and to analyze its threats.

MATERIAL AND METHODS

Our study took place between 2007 and 2009. The investigated region is found in the centre of Salaj County, comprising the hydrograph basins of the Almas and the Agrij Rivers (Fig. 1), tributaries of the Somes River. Our research area contains the entire Almas-Agrij Depression plus a little bit of the surrounding relief-e.g. parts of the Meses Mountains, Cluj Hills or Dej Hills (POSEA & BADEA, 1984). The altitude of the region is not too high, reaching 996 m a.s.l. in the Priei Hummock (FEY et al., 2001). The minimum altitude is found in the Somes Floodplain, near the town of Jibou, and is about 180 m a.s.l.



Figure 1. The researched area.

Figura 1. Zona cercetată.

In our 3 years of study, we investigated the herpetofauna from 68 localities from the Almas-Agrij Depression. We used the transect method (COGĂLNICEANU, 1997), making many such searches in the habitats from the region. The transect method was recently used in other similar studies, being very efficient with the exception of the snakes, due to their way of life (KATI et al., 2007). The animals were not generally captured, since we mostly used the direct observation method (BROWN, 1997). In the situations in which capturing the animals was necessary, this was usually done by hand. We also used nets for capturing newts in spring, when these animals can't be identified visually, or for capturing large green frogs, because of their fast reactions. After determining, the captured animals were sometimes photographed and all released back in their own habitat. Also, we sometimes determined the animals killed by the locals or by the traffic in the area.

RESULTS

In the Almas-Agrij Depression from Salaj County we encountered 17 species belonging to the herpetofauna. Amongst these, 11 are amphibians - *Salamandra salamandra*, *Triturus alpestris*, *T. cristatus*, *T. vulgaris*, *Bombina variegata*, *Bufo bufo*, *B. viridis*, *Hyla arborea*, *Rana ridibunda*, *R. dalmatina* and *R. temporaria* - and 6 are reptiles - *Lacerta agilis*, *L. viridis*, *Zootoca vivipara*, *Anguis fragilis*, *Natrix natrix* and *Coronella austriaca*.

We analyzed the distribution of the 17 species in all the 68 localities from the Almas-Agrij Depression. After this study, we identified a total of 282 localities for the encountered species in the 67 field locations (Table 1). Most of the distribution localities of the 17 species (188 localities) represent premieres for Romania's herpetofauna. Further more, even the number of reconfirmed localities in this present study-192-is a very high one.

DISCUSSIONS

The herpetofauna of the Almăș-Agrij Depression from Sălaj County is a typical one for the hill and plateau regions of Romania. Thus, the species we have identified in the area are the same ones as signalled in other similar geographic conditions (GHIRA et al., 2002, COVACIU-MARCOV et al., 2003a, 2004, 2005, 2006d, 2007). Some typical species for these regions are present in the Almăș-Agrij Depression, too: *Salamandra salamandra*, *Triturus cristatus*, *Bombina variegata* or *Rana temporaria*. Alongside these, some other species common in our country are to be found, species like *Rana ridibunda*, *Hyla arborea*, *Bufo viridis*, *Lacerta agilis* and *Natrix natrix*. Only the typically plain species are missing from the investigated region. This fact is a consequence of the special uniformity of the area, where the altitude and climate differences (MÂNDRUȚ, 2006, STOENESCU et al., 1966) are relatively reduced and where the human activities have severely affected the landscape, but in a rather even way. As such, the investigated region represents a very uniform area from the zoogeographic and ecologic point of view. The geographic and climate conditions, together with the human activities have conditioned the poor herpetofauna of this territory.

The lack of plain species from the Almăș-Agrij Depression is, however, rather difficult to explain because the lowest altitude here is around 180 m a.s.l. while those particular species are to be found upstream the Someș River, in the Transylvanian Plateau. The absence of some of these species, like *Triturus dobrogicus*, is a consequence of its impossibility of reaching upstream the Someș River due to the narrow areas (e.g. the Țicău-Benesat gorges) situated a bit more downstream from our research area. Other species, like *Bombina bombina*, have probably recently disappeared from the region because of climate changes, because of *Bombina variegata* entering the territory or due to the human activities. *Bombina bombina* was however most likely present in the area, it being indicated upstream the Someș River, all the way to Cluj (FUHN, 1960, GHIRA et al., 2002). The low areas alongside the Someș River represent the most probable routes of this species towards the higher areas of the Transylvanian Plateau. This aspect can be confirmed by the previous results encountered in Maramureș County, 30 km north of our research area (COVACIU-MARCOV et al.,

2007). In that area, *Bombina bombina* is extremely rare in the Someș floodplain, but a proof for its former presence lays in the hybrid populations that live there. The rarity of the species from the region is probably, just like in the case of the Almăș-Agrij Depression, a consequence of the human activities which, in a hilly area, improper for agriculture, have affected exactly this lower sector near the Someș River, thus, the species' habitats. The situation is therefore similar to that described previously in Maramureș County (COVACIU-MARCOV et al., 2007).

The large number in which the species were previously indicated for and re-identified by us indicates that the regions was quite well researched before, being one of Romania's well studied herpetofauna areas. Generally for our country, the number of re-identified localities for a species is very low in comparison to the number of new localities (COVACIU-MARCOV et al., 2003a, b, 2004, 2005, 2006a, b, c, 2007). The relatively high level of knowledge of the herpetofauna from the Almăș-Agrij Depression is a consequence of the area being included in recent article on Transylvania's herpetofauna (GHIRA et al., 2002).

The results we obtained were mainly expectable by comparing to what we knew before about Romania's herpetofauna. With two exceptions, there are no surprises in the distribution of the species or about the limiting factor of this distribution (e.g. altitude, presence of suitable habitats etc). Further more, there are no particularities recorded about the ecology or biology of the identified species in comparison to other regions of Romania or of their general area. This is how *Salamandra salamandra* and *Rana temporaria* come down to about 200-220 m a.s.l., being absent from the low, cleared areas from the meadows of the rivers. The situation is general for the entire region, representing the lowest altitude limit for the two species in the country (COGĂLNICEANU et al., 2000). However, the salamander is rarer than *Rana temporaria*, the common frog being better represented in numbers in all the areas where it is present. This is the effect of the relative scarceness of the characteristic habitat for the species-the mountain valleys inside forests. These are more numerous in the western part of the Agrij Valley, near the limit with the Meseș Mountain, where the salamanders are better represented; in some cases here we even counted hundreds of larvae in the streams.

Our most important discovery is represented by the identification of the mountain lizard, *Zootoca vivipara*. The species was also encountered in the higher area of the Agrij valley, near Poic and Huta localities, at the limit between the depression and Meseș Mount.



Figure 2. Habitat (a) and specimen (b) of *Zootoca vivipara*.
Figura 2. Habitat (a) și exemplar (b) de *Zootoca vivipara*.

This is the first notice of the species in the mountainous zones from Sălaj County. Previously, the mountain lizard was mentioned in the northwestern part of the county, in the plain insinuated along side the Crasna River, where however is represented by plain populations (COVACIU-MARCOV et al., 2006d). The closest mountainous populations from Almăș-Agriș Depression are found at approximately 30 km distance, in Vlădeasa Mount, in Lunca Vișagului locality, Cluj County (GHIRA et al., 2002). Therefore, the continuity of these populations is practically assured, the populations from Sălaj being probably connected, or at least in the recent past they were related to the populations near the level of the Drăgan Valley. Obviously, however, the populations from Meseș Mount do not appear to be and probably are not connected to the plain populations from the northwestern part of the county. In Almăș-Agriș Depression, the species descends to extremely low altitudes, in comparison to other mountainous areas from Romania. Thus, at Poic, *Z. vivipara* was identified at 602 m, while at Huta at just 543 m altitude. These altitudes are unusual for the mountainous populations, being similar just to the ones at which the species decreases in Oaș Mount (COVACIU-MARCOV et al., 2004). Still, the two regions are climatically different, in Oaș the average temperatures being lower and the precipitations richer than in the studied sector from Sălaj (STOENESCU et al., 1966). Therefore, probably the cause of the appearance of the species at low altitudes is not an actual one, but it has to be related to the appearance of the mountain newts and to the general situation from the northwestern part of Romania, where in certain areas the mountainous elements descends at low altitudes (COVACIU-MARCOV et al., 2008b). It seems that the northwestern part of the Agrij Valley is also inserted in this sector with zoogeographical particularities. The explication that we consider is offered by the dynamics of the fauna in the last ice age and in the after-glacial period.

Another special result of our study is the indication of some *Triturus alpestris* populations at altitudes of about 400 m. The identification of populations found under the “classic” limit of distribution in Romania adds to the recent data regarding to the distribution of the species at low altitudes in the western part of the country (COVACIU-MARCOV & CICORT-LUCACIU, 2009). This offers a different image to the entire distribution of this species that does not come down to lower altitudes only in the Western Hills but apparently also in the depression regions. This new data here prove once more that the alpine newt relates differently to altitude in the western part of the country than the rest of Romania.

Although these results are only preliminary, a certain contrast can be distinguished by looking at them, between the herpetofauna of the Almăș and the Agrij hydrograph basins. Thus, the existing situation in the Agrij basin is closer to one typical to the western Romania, a closeness demonstrated by the descent of the alpine newt to lower altitudes. The Almăș basin seems to lack such particularities, consisting in a typical Transylvanian herpetofauna. The differences are the effect of the relief the Almas region being a bit more uniform and with lower altitudes. Unlike it, the Agrij River valley benefits from the nearby Meseș Mountain which determines the presence of some species like the alpine newt. The particularities, at least in the northwestern part of the Agrij basin, are also confirmed by the presence of the *Zootoca vivipara* populations. Although, geomorphically the Almăș-Agrij Depression represents a unit, zoogeographically this is separated in a reduced-sized part, but with a distinct herpetofauna and a much bigger but homogenous area. The difference is an actual one, but it is also caused by the distinct evolution in the past of the two sectors.

The Almăș-Agrij Depression, similar to the entire Sălaj County, represents an area strongly affected and modified by human activities. This fact is obvious despite the fact that there isn't a highly developed industry or a transport infrastructure comparable to other regions of Romania. The human impact is represented by clearings of forests or by excessive agriculture. Although initially this was a vast forest area, the investigated territory is presently mostly deforested; at least in the lower sectors, the forests are completely gone or occupy very little surfaces here and there. The wood cutting still continues and it permanently affects species that are bond to forests-e.g. *Salamandra salamandra*, *Triturus alpestris* and *Rana temporaria*. Excessive gazing is another negative factor that impacts on species that live in meadows or swamplands. Deposited wastes are a reality near practically every human locality, affecting in many cases breeding habitats for amphibians. Last but not least, road kills are another general and global cause for the decline of most amphibians (KRECSÁK et al., 2004, SOS, 2007). This is also the case here, even if it is less visible due to the bad quality of the roads. Traffic impacts mostly on the *Bufo* toads and, among the reptiles, the grass snake. Thus, the majority of the species belonging to the herpetofauna are vulnerable to these human activities and the greatest impact is on the species found in a small number of localities.

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- *****, OUG nr. 27 / 2007 privind regimul ariilor naturale protejate, conservarea habitatelor naturale, a florei și faunei sălbatice.

Table 1. The distribution of the recorded amphibian and reptile species in the Almas-Agrij Depression.
 Tabel 1. Răspândirea speciilor de Amfibieni în localitățile investigate din Depresiunea Almăș-Agrij.

Localities	S s	T a	T c	T v	B v	B u f	B u v	H a	R r	R d	R t	L a	L v	Z v	A f	N n	C a
Adalin	-	-	-	-	X	-	-	-	-	X	-	-	-	-	-	-	-
Agrij	O	-	S	X	S	S	S	S	S	S	S	S	S	-	S	S	O
Almașu	-	-	-	-	X	-	-	-	X	X	-	X	-	-	-	-	-
Baica	-	-	-	-	X	-	-	-	X	X	-	-	-	-	-	-	-
Băbiu	-	-	-	-	X	-	-	-	-	X	-	-	-	-	-	-	-
Bălan	S	-	S	-	S	O	O	S	S	S	S	S	S	-	O	S	-
Bicălatu	-	-	-	-	X	-	-	-	-	-	-	-	-	-	-	-	-
Bodia	O	-	S	-	S	S	S	S	S	S	S	S	S	-	S	S	-
Bogdana	S	-	O	S	S	S	O	S	S	S	S	S	O	-	S	S	-
Borza	-	-	-	-	X	X	-	-	X	X	-	-	-	-	-	-	-
Bozna	X	-	-	-	X	-	-	-	-	X	X	-	-	-	-	-	-
Brebi	X	-	-	-	X	X	-	X	-	X	X	-	-	-	-	-	-
Brusturi	O	-	O	-	S	O	O	O	S	S	O	-	O	-	O	S	O
Buciumi	O	X	S	X	S	S	O	S	S	S	S	S	O	-	-	S	-
Ciglean	X	-	X	X	X	X	-	X	X	X	-	S	-	-	-	X	-
Chechiș	S	-	S	X	S	O	O	O	S	S	S	S	S	-	O	S	-
Chendrea	O	-	O	X	S	O	O	O	S	S	S	S	-	-	O	S	-
Chichișa	-	-	-	X	X	-	-	-	X	X	-	-	-	-	-	-	-
Ciumârna	X	-	-	-	S	-	S	-	O	S	S	S	S	-	-	O	-
Creaca	-	-	-	X	X	X	-	-	X	X	-	-	-	-	-	-	-
Cubleșu	-	-	-	-	X	-	-	-	-	X	-	-	-	-	-	-	-
Cuțiș	-	-	-	-	-	-	-	-	-	X	-	-	-	-	-	-	-
Cuzăplac	-	-	-	-	X	-	-	-	X	X	-	-	-	-	-	-	-
Dragu	-	-	-	X	X	-	-	-	X	X	X	-	X	-	-	-	-
Fildu de Jos	-	-	-	-	X	-	-	-	-	X	-	X	-	-	-	-	-
Fildu de Mijloc	-	-	-	-	X	-	-	-	-	X	-	X	-	-	-	-	-
Fildu de Sus	X	-	-	-	X	-	-	-	-	-	X	X	-	-	-	-	-
Gălgău Almașului	S	-	-	-	X	X	-	-	X	X	X	-	X	-	S	X	-
Gălășeni	-	-	X	X	X	-	-	-	-	X	-	-	-	-	-	-	-
Gălpăia	-	-	X	-	X	-	-	-	-	X	X	X	-	-	-	-	-
Huta	S	X	S	X	S	S	O	S	S	S	S	S	O	X	S	S	-
Hida	-	-	-	-	X	-	-	-	X	X	-	-	X	-	-	-	-
Jac	-	-	X	-	X	-	-	-	S	X	-	O	-	-	O	-	-
Jebucu	-	-	X	-	X	-	-	-	-	X	-	X	-	-	-	-	-
Jibou	S	-	X	-	S	X	X	-	-	X	X	X	-	-	-	S	O
Lupoaia	O	-	O	-	S	S	O	S	S	S	O	O	-	-	-	S	O
Mesteacănu	X	-	X	X	X	-	-	-	-	X	X	X	X	-	-	-	-
Mierța	-	-	-	-	X	-	-	-	-	X	-	-	-	-	-	-	-
Moigrad	S	-	X	-	X	-	-	X	O	X	X	S	-	-	O	-	-
Păușa	O	-	O	-	S	O	S	O	S	S	O	S	S	-	O	S	O
Petrindu	-	-	-	-	X	-	-	-	-	X	-	-	-	-	-	-	-
Poarta Sălajului	-	-	-	-	S	-	-	-	S	S	-	S	O	-	-	O	-
Poic - Satu Hurez	X	X	-	X	X	X	-	-	-	X	X	-	-	X	X	X	-
Prodănești	S	-	S	X	S	S	O	S	S	S	S	S	O	-	O	S	-
Racăș	O	-	S	-	S	O	O	O	S	S	S	-	-	-	-	-	-
Răstolț	O	-	O	-	S	S	O	O	S	S	O	S	S	-	O	S	X
Românași	-	-	-	-	S	-	X	-	S	S	-	S	-	-	-	-	-
Romița	O	-	O	-	S	O	S	S	S	S	O	S	O	-	O	S	-
Ruginoasa	-	-	X	-	X	-	-	-	X	X	X	-	-	-	-	-	-
Sângeorgiu de Meseș	X	-	-	-	X	-	-	-	X	X	X	X	-	-	-	X	-
Sânmihailu Almașului	-	-	-	-	-	-	O	-	S	S	X	O	-	-	O	O	-
Sânpetru Almașului	O	-	O	-	S	O	O	O	S	S	S	S	S	-	O	S	-
Sfăraș	-	-	X	X	X	-	-	-	-	X	-	-	-	-	-	-	-
Stana	X	-	-	-	X	-	-	-	-	X	X	X	-	-	-	-	-
Stâna	S	X	X	X	S	-	S	-	O	S	X	S	O	-	O	-	O
Stoboru	-	-	X	X	X	-	-	-	-	X	-	-	-	-	-	-	-
Stupini	-	-	-	-	X	-	-	-	-	-	-	S	O	-	O	O	-
Sutoru	O	-	-	X	S	O	O	S	S	S	-	S	O	-	O	O	-
Tâmașa	-	-	-	-	-	-	-	-	-	X	-	-	-	-	-	-	-
Tetișu	-	-	-	-	X	-	-	-	-	-	-	-	-	-	-	-	-
Tihău	O	-	-	-	S	S	O	S	S	S	O	O	O	-	O	O	-
Treznea	S	-	-	-	X	X	-	-	-	X	X	S	S	-	-	-	-
Țăudu	-	-	-	-	X	-	-	-	-	X	X	-	-	-	-	-	-
Ugruțiu	-	-	-	-	X	-	-	-	-	X	X	X	X	-	-	-	-
Var	S	-	S	-	S	S	O	S	S	S	S	S	O	-	O	S	-

Viile Jacului	-	-	-	-	X	-	-	-	-	X	-	-	-	-	-	-	-
Voivodeni	-	-	-	-	X	-	-	-	-	X	-	-	-	-	-	-	-
Zimbor	O	-	S	-	S	O	O	S	S	S	-	S	-	-	O	-	-
ΣX	9	4	1	1	4	8	2	4	1	3	1	1	5	2	1	4	1
ΣS	1	-	1	1	2	1	6	1	2	2	1	2	9	-	5	1	-
ΣO	1	-	8	-	-	1	1	7	3	-	6	4	1	-	1	6	6
	4					0	7						2		8		

Legend:

Ss = *Salamandra salamandra*, **Ta** = *Triturus alpestris*, **Tc** = *Triturus cristatus*, **Tv** = *Triturus vulgaris*, **Bv** = *Bombina variegata*, **Buf** = *Bufo bufo*, **Buv** = *Bufo viridis*, **Ha** = *Hyla arborea*, **Rr** = *Rana ridibunda*, **Rd** = *Rana dalmatina*, **Rt** = *Rana temporaria*, **La** = *Lacerta agilis*, **Lv** = *Lacerta viridis*, **Zv** = *Zootoca vivipara*, **Af** = *Anguis fragilis*, **Nn** = *Natrix natrix*, **Ca** = *Coronella austriaca*.

Geographical localities (86), 38 investigated for the first time

New localities (X): 188

Localities in which we reconfirmed the presence of the species (S): 192

The sum of localities (X+S): 380

Localities in which we did not reconfirm the presence of the species (O): 105

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