The composition and distribution of the herpetofauna from the Valea Neagra river basin (Neamț County, Romania)

Iulian GHERGHEL[1], Alexandru STRUGARIU[2], Daniel GHIURCA[3], Sorin ROSU[3], Mihail-Victor HUTULEAC-VOLOSCIUC[2]

[1]Piatra Neamt Techincal College, Piatra Neamt, Romania. iuliangherghel@gmail.com
[2]"Al. I. Cuza" University, Faculty of Biology, Iasi, Romania. alex.strugariu@gmail.com
[3] "Ion Borcea" Natural Science Museum, Bacau, Romania. daniel_ghiurca@yahoo.com

Abstract. Our study focused upon an area in which the herpetofauna had previously been very poorly studied. We have managed to identify 12 species of amphibians (*Triturus cristatus*, *Triturus vulgaris*, *Bombina bombina*, *Bombina variegata*, *Hyla arborea*, *Rana ridibunda*, *Rana dalmatina*, *Rana temporaria*, *Bufo bufo*, *Bufo viridis*, *Pelobates fuscus*) and 4 reptile species (*Lacerta agilis, Lacerta viridis, Anguis fragilis and Natrix natrix*) in the 16 investigated localities. Nine of these species have been cited now for the first time in the area. W have also identified hybrids between B. *bombina* and B. *variegata* at 420 m ASL, this altitude is the superior limit of hybrids between Bombina species in Romania.

Key word: amphibians, reptiles, Valea Neagra river, distribution, *Bombina*, hybrids.

Introduction

The first publication which contained data regarding the distribution of the herpetofauna in the "Valea Neagra" River Basin appeared along with the "Fauna R.P.R." volume: "Reptilia" (Fuhn & Vancea, 1961). Forty years later, Cogalniceanu et al (2000) published new data about the distribution of amphibians in Romania, data which also concerned this region.

In the near past, more authors have published data regarding the distribution of amphibians and reptiles (Ghiurca et al. 2005, Gherghel & Ile 2006). Still, the herpetofauna of the region is far from being well studied. Therefore, we aimed to realize a synthesis of the knowledge concerning this topic, based both on the previous publications and our own research in the field.

Material and Methods

Study Methods

Our study was conducted between the years 2004 and 2006. Studiul nostru sa realizat intre anii 2004 si 2006. With the aim of mapping the herpetofauna, the transects method (Cogalniceanu, 1997) was used. The hybrids were determined by their morphological and chromatic characteristics, the determination being made after main features and measurements indicated in the scientific literature (Berger 1966, 1973, Cogălniceanu et al 2000, Fuhn 1960, Ghira & Mara 2000, Stugren 1980, Szymura 1993). The distribution maps were made using the UTM technique (Lehrer & Lehrer 1990) with 2X2 km quadrate.

Study area

The Valea Neagra river basin occupies a surface of 320km^2 and is situated in North-Eastern Romania, between the Siret river meadow and the Cracau-Bistrita depresion. The hydrographical units of the area mainly consists of streams, lakes, temporary and permanent ponds, swamps, and marshlands. A large part of the Valea Neagra rivers basin is covered by agricultural fields. The forested regions are isolated and do not have a surface of over 50 ha (fig. 1).

The minimum altitude of the region is 170 m ASL in the Siret river meadow and the maximum altitude is 439 m ASL at the Poiana Mare Hill.

Results and Discussions

In the investigated region we have identified 12 species of amphibians (*Triturus cristatus*, *Triturus vulgaris*, *Bombina bombina*, *Bombina variegata*, *Hyla arborea*, *Rana ridibunda*, *Rana dalmatina*, *Rana temporaria*, *Bufo bufo*, *Bufo viridis*, *Pelobates fuscus*) and 4 reptile species (*Anguis fragilis*, *Lacerta agilis*, *Lacerta viridis*, *Natrix*

natrix). Amongst these, we have also identified hybrids between *Bombina bombina* and *Bombina variegata*. (tabel 1).

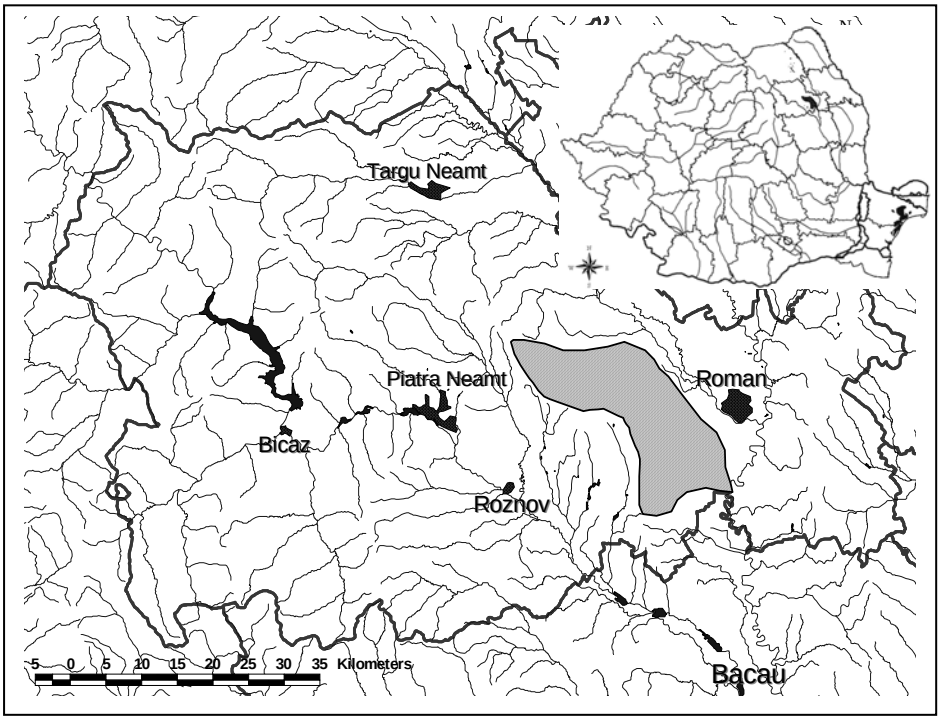

Fig. 1 – Location of the study area in Neamț County (Romania).

Tabel 1 – Distribution of the herpetofauna in the study area

Tc = *Triturus cristatus*, Lv = *Lissotriton vulgaris*, Bb = *Bombina bombina*, Bv = *Bombina variegata*, Bx = *Bombina bombina* X *Bombina variegata*, Pf = *Pelobates fuscus*, Bf b = *Bufo bufo*, Pv = *Pseudopidelea viridis*, Ha = *Hyla arborea*, Pr = *Pelophylax ridibundus*, Rd = *Rana dalmatina*, Rt = *Rana temporaria*, Af = *Anguis fragilis*, La = *Lacerta agilis*, Nn = *Natrix natrix*

Locality / Vill	Tc	Lv	Pr	Rt	Rd	Bb	Bv	Bx	Ha	Bf b	Pv	Pf	La	Lv	Af	Nn
Bălăneşti / Bârgăoani			x	x	x	x	x	x	x		x				x	x
Baratca / Bârgăoani	x		x			x	x	x	x			x				x
Bozienii de Sus / Ruginoasa	x	x	x		x	x	x	x	x	x	x	x		x		x
Budeşti / Făurei	x		x		x	x	x	x	x	x	x	x	x	x		x
Climeşti / Făurei	x		x		x	x	x	x	x	x	x	x	x			x
Dârloaia / Bârgăoani			x	x	x	x	x	x	x		x				x	x
Dulceşti / Dulceşti	s	s	s		x	s			x		x	s		x		x
Ghelăieşti / Bârgăoani	x		x	x	x	x	x	x	x		x				x	x
Ghigoieşti / Stefan cel Mare			x	x		x	x	x	x		x					x
Giuleşti / Secuieni			x			x	x	x	x		x	x	x			x
Hîrtop / Bârgăoani			x	x	x	x	x	x	x	x	x	x				x
Miron Costin / Trifeşti			x		x	x			x	x		x				x
Ruginoasa / Ruginoasa	x		x			x	x	x	x		x	x				x
Secuieni / Secuieni			x		x	x			x		x	x				x
Trifeşti / Trifeşti	x		x			x			x	x		x				x
Vlădiceni / Bârgăoani			x	x	x	x	x	x	x	x	x	x		x	x	x
New localities	7	1	15	6	11	15	12	12	16	7	13	11	3	4	4	16
Reconfirmed presence	1	1	1			1						1				
Total	8	2	16	6	11	16	12	12	16	7	13	12	3	4	4	16
The sum of localities	146															

Triturus cristatus Laurentus 1768. The crested newt is a well represented species in the area, being identified by us in 8 localities, in reproductive pools rich in vegetation from the margins of forests.

Lissotriton vulgaris Linnaeus 1758. The smooth newt is a relatively rare species in the studied region, being identified by us in only 2 localities, in the same habitats as the crested newt with which it cohabitates (Fuhn 1960, Cogalniceanu et al. 2000).

Pelophylax ridibundus Linnaeus 1758. This is a very common species in the area, being identified in all of the 16 localities, in all of the water pools.

Rana tempoaria Linnaeus 1758. The common frog is a common species, being identified by us in 6 localities, in the North-Eastern areas of the river basin, near lakes, ponds and swamps where it reproduces and sometimes lives during summer.

Rana dalmatina Bonaparte 1839. The agile frog is more common than the previous species, being observed by us in 11 localities. It especially inhabits the deciduous forests.

Bombina bombina Linnaeus 1758. The fire-bellied toad is a common species in the area, being identified by us in all of the 16 investigated localities. In the majority of cases, it was found at altitudes of 250-300m ASL but we have also found populations at 430 m ASL in the center of the investigated region. Populations of agile frogs at altitudes of over 400 m have been found in Norh-Eastern Romania, in the Suceava Plateau (Strugariu et al. 2006), where the ecological situation is similar.

Bombina variegata Linnaeus 1758. The yellow-bellied toad is a relatively common species in the area, being observed in 12 localities. This species was found in the North-Eastern and Eastern areas of the river basin, frequently cohabiting with *Bombina bombina*.

Bombina bombina X *Bombina variegata.* During our study, we have identified hybrid populations between the two native species of *Bombina* in 12 localities from the North, East and Central areas of the river basin, at altitudes of 300-420 m ASL. In western Romania, the Bombina hybrids are found at altitudes of 150 m ASL (Covaciu-Marcov et al, 2000, 2002, 2003a, b, c, 2004, 2005, 2006, Sas et al. 2005) and 300 m ASL (Ghira et al. 2002) and in North-Eastern Romania, at altitudes of 400 m ASL (Strugariu et al. 2006).

Fig.. 2 – Variations in the ventral coloration of *Bombina* sp. Specimens from Budesti.

Hyla arborea Linnaeus 1758. The treefrog being very common in the investigated region. It was identified by us in all of the investigated localities, near lakes and forests.

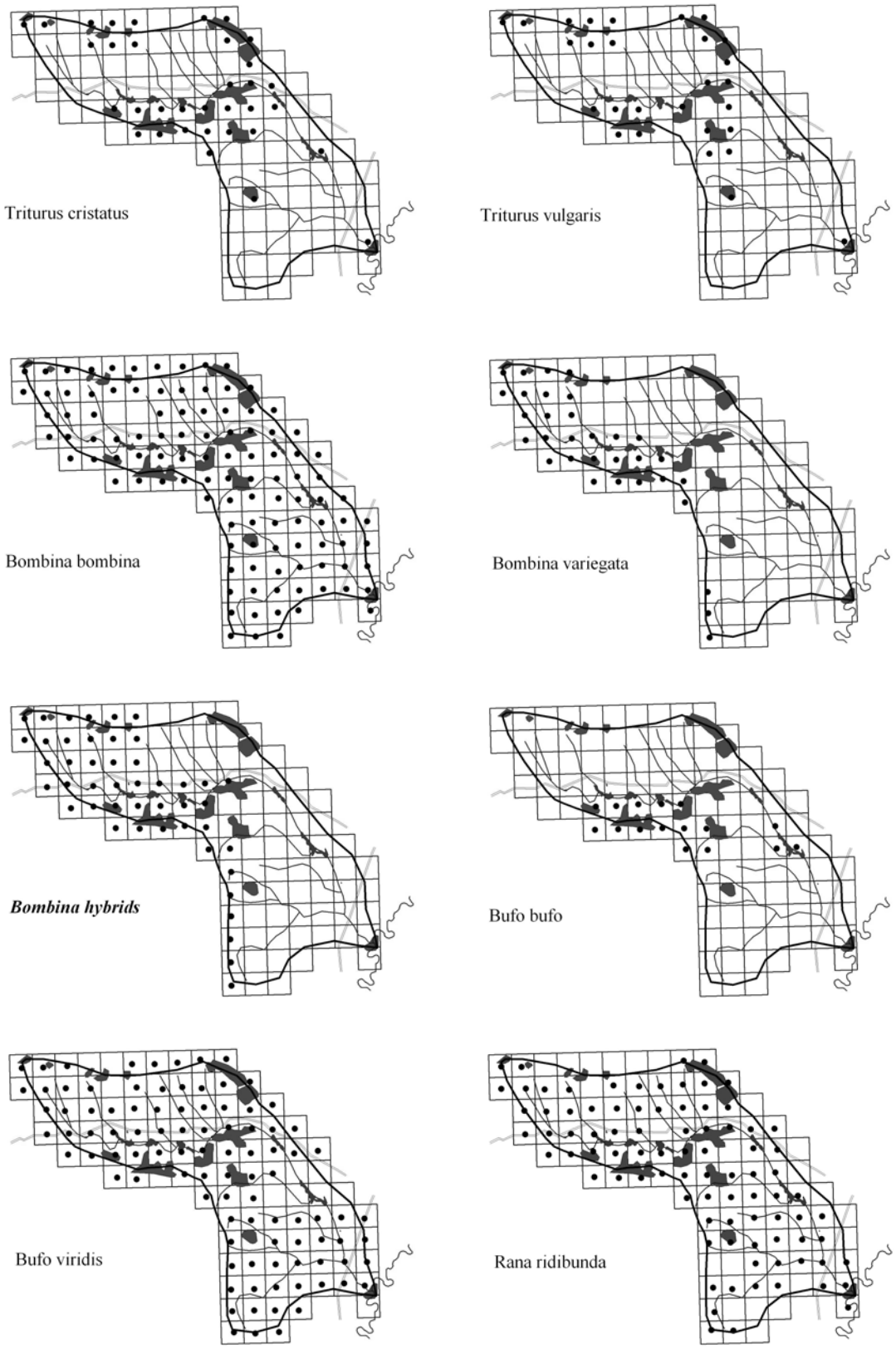

Fig. 3a. Distribution of the herpetofauna in the Valea Neagra river basin.

Bufo bufo Linnaeus 1758. The common toad is a relatively common species in the area, being identified by us in 7 localities, in forests and gardens.

Pseudepidelea viridis Laurentus 1768. The green toad is more common than the previous species, being identified by us in 13 localities, in symilar habitats to the common toad.

Pelobates fuscus Laurentus 1768. The common spade-foot toad is a common species in the area, being identified in 12 localities.

Lacerta agilis Linnaeus 1758. The sand lizard is a rare species in the Valea Neagra river basin, being identified in only 3 localities. We encountered it at forest margins or at the edges of roads, in areas with thick vegetation.

Lacerta viridis Laurentus 1768. The green lizard is more common then the previous species, being identified in 4 localities. It was found at forest margins and on steap sunny sloaps with thick vegetation.

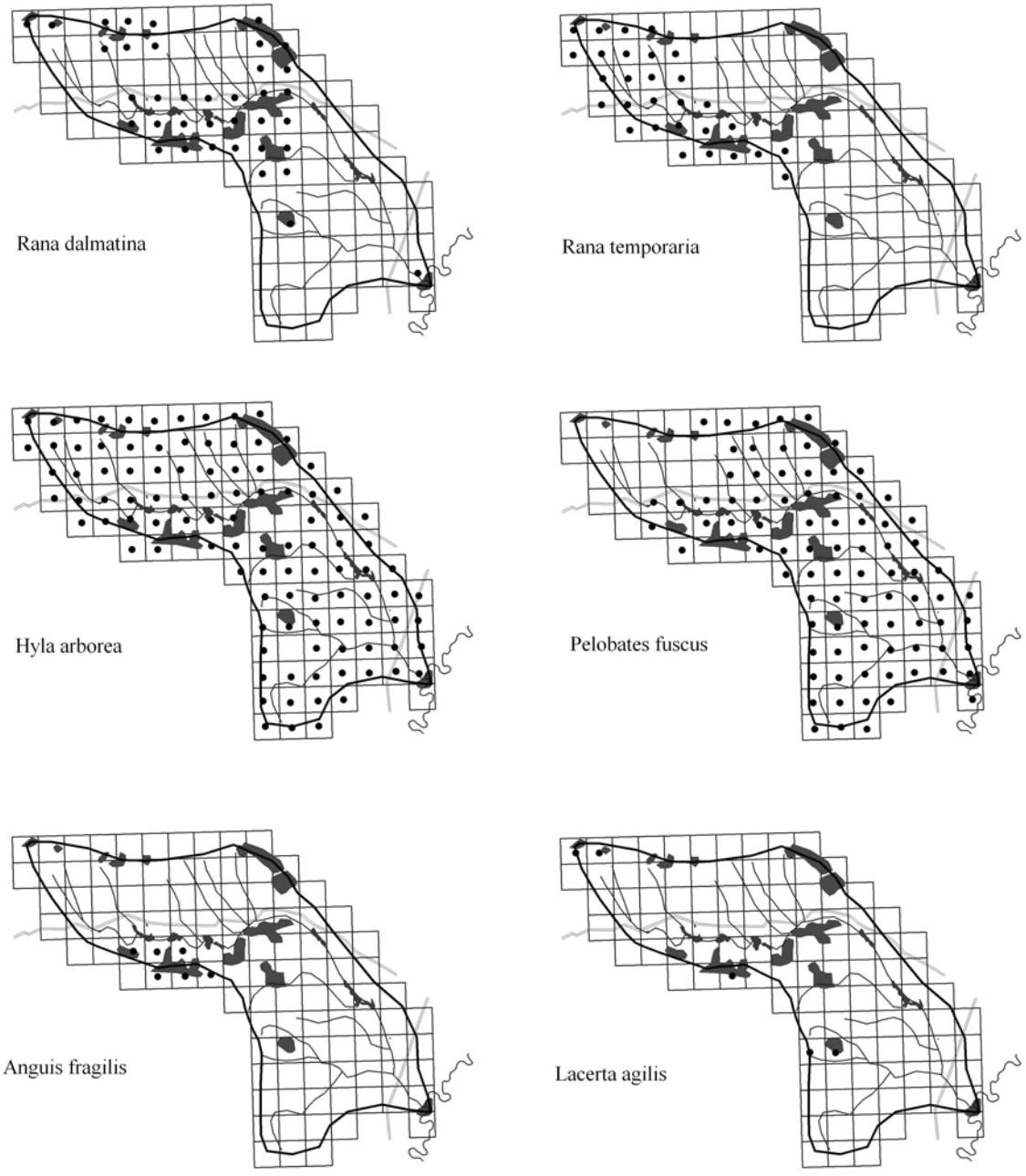

Fig. 3b. Distribution of the herpetofauna in the Valea Neagra river basin.

Anguis fragilis Linnaeus 1758. The slow-worm was found in 5 localities, insid forests or at the edges of roads.

Natrix natrix Linnaeus 1758. The grass snake is the most common reptile species of reptile in the region, being identified by us in all of the 16 localities, in forests, swamps, near streams or in fish farms.

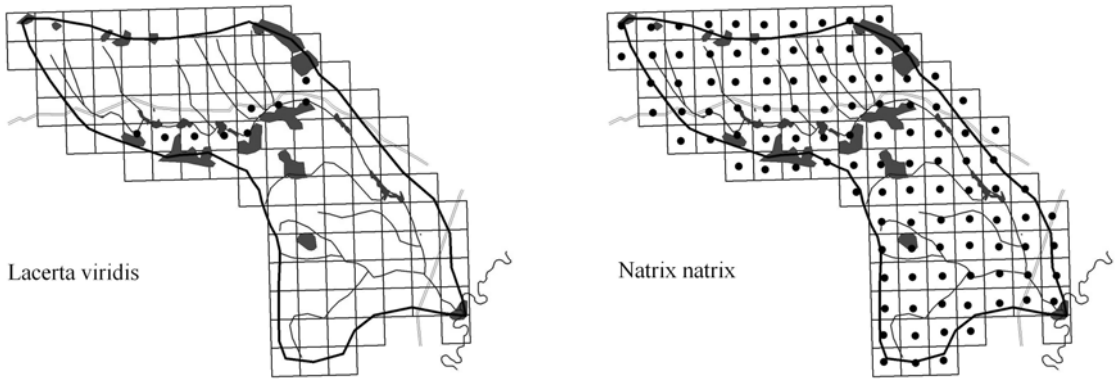

Fig. 3c. Distribution of the herpetofauna in the Valea Neagra river basin.

Conclusions

During our research in the Valea Neagra river basin, we have identified 12 amphibian species (*Triturus cristatus*, *Triturus vulgaris*, *Bombina bombina*, *Bombina variegata*, *Hyla arborea, Rana ridibunda*, *Rana dalmatina*, *Rana temporaria*, *Bufo bufo*, *Bufo viridis*, *Pelobates fuscus*) and 4 species of reptiles (*Anguis fragilis*, *Lacerta agilis*, *Lacerta viridis*, *Natrix natrix*). We have also identified hybrids between Bombina bombina and *Bombina variegata*.

Rana dalmatina, Bombina variegata, Hyla arborea, Bufo bufo, Bufo viridis, Lacerta agilis, Lacerta viridis, Anguis fragilis si *Natrix natrix* have now been cited for the first time in the Valea Neagra rivers basin.

Bombina bombina and the hybrids between this species and *Bombina variegata* are found in the area at their superior altitude limite.

In the 16 investigate geographical localities, we have identified 146 new localities for the distribution of the herpetofauna in Romania.

Acknowledgements. The authors of this paper wish to thank all the members of the Romanian Herpetological Society, the Moldavica Herpetological Club and the Herpetological Club of Oradea for their support. We are also indebted to Alexandru Iftime (Bucuresti) for helping us with some of the cited literature and helpful comments on the manuscript.

References

Berger, L. (1966): Biometrical studies on the population of water frog from the environs of Poznan. Ann. Zool. 23: 303 – 324.

Berger, L. (1973): Systematics and hybridization in European green frogs of Rana esculenta Complex. J. Herpetol. 7: 1 – 10.

Cogalniceanu, D (1997): Amphibian ecology practicum; methods and techniques in the study of amphibian ecology. Ed. Universităţii din Bucureşti: 1 – 122. (in Romanian)

Cogalniceanu, D., Aioanei, F., Bogdan, M. (2000): Amphibians from Romania. Determination keys. Ed. Ars Docendi, Bucureşti: 1 – 99. (in Romanian)

Covaciu-Marcov, S. D., Gira, I., Venczel, M. (2000): Contributions for the study of the herpethofauna of Oradea. Nymphaea, Folia Naturae Bihariae, Oradea XXVIII: 143 – 158. (in Romanian, with English abstract)

Covaciu-Marcov, S. D., Telecean, I., Cupsa, D., Cadlet, D., Zsurka, R. (2002): Contributions to the study of the herpethofauna from Marghita (Bihor County, Romania). Analele Univ. din Oradea, Fasc. Biol., Tom IX, 2002: 47 – 58. (in Romanian, with English abstract)

Covaciu-Marcov, S.D., Sas I., Cicort-Lucaciu, Al., Kovacs, E.H. (2003a): Notes upon the herpetofauna of the Northern area of Botosani County(Romania), Studii şi Cercetări Biologie 8, Universitatea din Bacău Noiembrie: 201-205.

Covaciu-Marcov, S. D., Sas, I., Cupsa, D., Meleg, G., Bud, B. (2003b): Herpethological studies in the Padurea Craiului and Plopişului Mountains region. Analele Univ. din Oradea, Fasc. Biol., Tom X: 81 – 95. (in Romanian, with English abstract)

Covaciu–Marcov, S. D., Cupsa, D., Telecean, I., Sas, I., Cicort, Al. St.(2003c): Contributions to the study of the herpethofauna from the middle and inferior course of the Crişul Negru River (Bihor County, Romania). Oltenia, Studii şi Comunicări, Ştiinţele Naturii, Vol. XIX: 189 – 194. (in Romanian, with English abstract)

Covaciu-Marcov, S. D., Gira, I., Sas, I. (2004): Contributions to the study of the herpethofauna from Oaş region (Satu – Mare County, Romania). Environment and Progress 2. Cluj –Napoca: 107 – 112. (in Romanian, with English abstract)

Covaciu-Marcov S. D., Cicort - Lucaciu A. Şt., Sas I., Bedet, A. M., Bogdan, H. (2005): Herpetofauna from the basin of Mureş river in Arad county, Romania. Mediul cercetare, protecţie şi gestiune, 5, Cluj –Napoca: 147 – 152.

Covaciu-Marcov, S.D., Sas.I, Kiss, A., Bogdan, H., Cicort-Lucaciu, A.Ş. (2006a): The herpetofauna from the Teuz hidrographic basin (Arad County, Romania). North-Western Journal of Zoology 2 (1): 27-38

Covaciu-Marcov, S.D., Ghira, I., Cicort-Lucaciu, A. St., Sas, I., Strugariu, Al., Bogdan, H.V. (2006b). Contributions to the knowledge regarding the geographical distribution of the herpetofauna of Dobrudja, Romania. North-Western Journal of Zoology 2 (2): 88-125.

Fuhn, I. (1960): The fauna of the People's Republic of Romania. vol. XIV, fascicola I, Amphibia. Editura Academiei R.P.R., Bucureşti: 1 – 288. (in Romanian)

Fuhn, I, Vancea, Şt. (1961): "Fauna R.P.R.", Vol. XIV, II Reptilia. Ed. Academiei, R.P.R.,Bucuresti.

Fuhn, I. (1969): *Broaşte, şerpi, şopârle*. Ed. Ştiinţifică, Bucureşti.

Gherghel, I, Ile, D. (2006): Contributions. to the distribution of Amphibia, Caudata in Neamţ County, Romania. North-Western Journal of Zoology 2 (1): 44-46.

Ghira, I., Mara, G. (2000): Using the allelomorphic feature in identifying two species belonging to genus Bombina (Anura, Discoglossidae) from Transilvania. Studia Univ. Babeş – Bolyai, Cluj – Napoca, XLV: 85 – 95.

Ghira, I., Venczel, M., Covaciu-Marcov, S. D., Mara G., Ghile, P., Hartel, T., Torok, Zs., Farkas, L., Racz, T., Farcas, Z., Brad, T. (2002): Mapping of Transylvanian Herpetofauna. Nymphaea, Folia Naturae Bihariae, Oradea XXIX: 145-203.

Ghiurca, D., Rosu, S., Gherghel, I. (2005): Preliminary data concerning the herpetofauna in Neamţ County (Romania). Analele Univ. Oradea, Fasc. Biologie, Tom. XII: 53-62.

Iftime, Al. (2005): Amfibieni. Reptile. În: Cartea Roşie a Veretebratelor din România, editori: Botnariuc & Tatole. Ed. Acad. Române: 1 – 325.

Lehrer, A.Z., Lehrer, M.M. (1990): Cartografierea faunei si florei Romaniei (coordonate arealografice). Ed. Ceres, Bucuresti

Sas, I., Covaciu-Marcov, S.D., Pop, M., Ile, R.D., Szeibel, N., Duma C. (2005): About a closed hybrid population between *Bombina bombina* and *Bombina variegata* from Oradea (Bihor county, Romania) North-Western Journal of Zoology, Vol.**1:** 41-60.

Strugariu, Al, Gherghel, I, Huţuleac-Volosciuc, M.V., Sas, I, Sahlean, T.C., Puşcaşu, Cr. M. (2006b): Preliminary data concerning the distribution of amphibian fauna in Suceava County (Romania). Anal. Univ. Oradea. Fasc. Biologie, TOM XIII.: 39-47