FOOD COMPOSITION OF SOME *Triturus dobrogicus* KIR. 1903 POPULATION FROM NORTH – WESTERN ROMANIA

Alfred-Ştefan CICORT-LUCACIU[1], Diana CUPŞA[2], Ioan GHIRA[3], Horia BOGDAN[4] & Anca POP[4]

[1]S.C. West-Metal S.R.L., Oradea, e-mail: alfred_cicort@yahoo.com
[2]University of Oradea, Faculty of Science, Department of Biology, e-mail: dcupsa@uoradea.ro
[3]University Babes-Bolyai, Cluj-Napoca
[4]B.sc. Student, University of Oradea, Faculty of Science, Department of Biology

Abstract. We studied, for the first time ever, the trophic spectrum of some populations of *Triturus dobrogicus* in the north-western part of Romania. In the stomach contains we've identified vegetal remains, fragments of shaded skin and amphibian spawn alongside numerous animal prey taxa. *Triturus dobrogicus* usually consumes aquatic preys. The trophic spectrum of the newts is influenced by the seasons and by the particularities of the habitats. *Triturus dobrogicus* mostly consumes smaller preys that have a gregarious life. The food of both the crested newt species from Romania is very much alike.

INTRODUCTION

Triturus dobrogicus was considered a subspecies of *Triturus cristatus* for a very long time. Recently, the four subspecies of the crested newt, including the Danube crested newt, were raised from subspecies to species (Bucci – Inocenti et al 1983, Wallis & Arntzen 1989, Arntzen & Wallis 1994). *Triturus dobrogicus* is an endemic species in the lower and the middle basin of the Danube (Litvinchuk & Borkin 2000) presenting a relatively small areal (Arntzen et al 1997). Dew to the recent promotion of the Danube crested newt to the level of species, there is very little known about its spreading and its ecology in Romania. The presence of the species in the north-western part of the country was just recently established (Arntzen et al 1997, Cogălniceanu et al 2000, Covaciu – Marcov et al 2003 a, 2004). The trophic spectrum of the Danube crested newt hasn't been studied in Romania until now. Knowledge about an animal's food is essential, this being the link between the species and its environment (Kennett & Troy 1996). Thus, the objective of our study was to establish the food composition of some populations of *Triturus dobrogicus* and to compare these to the trophic spectrum of *Triturus cristatus*, an aspect that was previously analyzed (Covaciu – Marcov et al 2001, 2002 a, b, c, d, Cicort – Lucaciu et al 2005).

MATERIAL AND METHODS

The study took place in the spring of 2001, a time when newts are in their mating season, living in aquatic habitats. *Triturus dobrogicus* is a species that lives in the plains and populates large aquatic biotopes, rich in vegetation (Cogălniceanu et al 2000), being therefore difficult to capture. We managed to analyze the stomach contains from 72 specimens captured from 5 different areas of Bihor and Satu-Mare counties (tab 1.) all from the northern part of the Western Plain.

Table 1. Regions, period and number of analyzed newts

Region	Resighea	Cheşereu	Arpăşel	Sălard	Girişu Negru
Period (month)	IV	III - IV	V	III	V
Number of newts	22	16	12	10	12

The studied animals were captured either with a square metallic net or round nets mounted on long metal pipes which can be used from the banks of the ponds. The stomach contains were taken as soon as possible after capturing the newts because they digest the food very quickly (Caldwell 1996). The contains were taken applying the stomach wash method (Joly 1987, Leclerc & Curtois 1993), using a serindge with a rubber tube mounted on its end (Covaciu – Marcov et al 2001, 2002 a, b, c, d,). After collecting the samples the animals were set free. The collected stomach contains were stocked in sealed test tubes and conserved

with formalin 4%. The preys were determined with the help of a binocular magnifying glass and the specific literature (Crişan & Mureşan 1999, Crişan & Cupşa 1999, Radu & Radu 1972, Ionescu et al 1971).

We analyzed the following aspects of the trophic spectrum: **1**. the taxonomic appurtenance of the consumed preys. **2**. the variation of the maximum and the average number of preys / individual of *Triturus dobrogicus*. **3**. the amount of a specific prey taxa from the total number of identified preys (the ratio between the preys belonging to that specific taxa and the total number of identified preys). **4**. the frequency with which the newts consumed a particular prey taxa. **5**. the appurtenance of the prey taxa to the aquatic or terrestrial environment and the amount each preys from the two biotopes.

RESULTS

In the stomach contains of the 72 analyzed Danube crested newts we identified 5 categories of elements: 1. different groups of prey taxa, 2. vegetal remains, 3. shaded skin fragments, 4. amphibian spawn and 5. mineral elements.

Table 2. The number of the analyzed samples, the number of the prey items and the intensity of the feeding

	Resighea	Cheşereu	Arpăşel	Sălard	Girişul Negru-	Total
No. of samples	22	16	12	10	12	72
No. of prey items	327	124	359	30	814	1654
Average no. of preys	14.86	7.75	29.91	3	67.83	22.97
Maxim number of preys	83	52	53	5	267	267

The vegetal remains were consumed in all 5 investigated regions consisting almost exclusively of aquatic vegetation. The amount of newts that consumed vegetation varies from habitat to habitat, being anywhere between 25 and 72%. The differences are probably caused by the variety of the characteristics of each biotope, the diversity of each one's phytomass. When it comes to amphibians, the consumption of vegetation is considered arbitrary (Whitaker et al 1977). Maybe it's the same with the Danube crested newts, swallowing vegetation alongside their preys. Thus, the amount of newts that consumed vegetation also can be influenced by the trophic offer of each habitat, by the mobility of the preys or their relationship with the phytomass. The maximum amount of consumed vegetation can be found at Resighea, a biotope where we identified the biggest number of prey taxa.

Table 3. The amount of prey items

	Resighea	Cheşereu	Arpăşel	Sălard	Girişul Negru	Total
Platelminta Turbelariata	0	0	0	0	0.30	0.06
Oligocheta - undet.	0	0	0	16.67	0.12	0.36
Oligocheta Lumbricida	1.22	6.45	1.11	10	0.24	1.27
Oligocheta Gasteropoda	2.14	0	0	0	1.22	1.02
Oligocheta Hirudinea	0	0	0	13.33	0	0.24
Araneida	0	0	0	10	0	0.18
Crustacea Izopoda - larva	0	0	0	0	0.49	0.24
Crustacea Izopoda	3.67	0.80	0.27	20	0.61	1.51
Crustacea Cladocere	52.29	0	52.92	0	0	21.83
Crustacea Copepode	11.01	0	0.55	0	52.46	28.11
Crustacea Amfipoda	0.30	7.25	0	0	0	0.60
Miriapode-Chilopode	0	0	0	0	0.12	0.06
Colembola	2.75	0	0	10	0	0.72
Coleoptera-larva	0	0.80	0	3.33	0.49	0.36
Coleoptera Dytiscida - larva	1.52	10.48	0	3.33	0	1.14
Coleoptera - imago undet	0.91	0	0.27	0	0	0.24
Coleoptera Dytiscida	1.22	0	0	0	0	0.24
Coleoptera Carabida	0.30	0	0	0	0	0.06
Trichoptera - larva	6.72	0.80	0	0	0	1.39
Lepidoptera - larva	0	0	0	0	0.12	0.06
Brahicera - larva	0	0	0.27	0	0.24	0.18
Nematocera - larva	15.9	73.39	44.29	13.33	43.73	40.02
Urodela - *Triturus vulgaris*	0	0	0.27	0	0	0.06

Some newts from four of the five habitats consumed shaded skin from other crested newts.In some cases skin fragments from around the fingers could be easily distinguished. Therefore, we can state that *Triturus dobrogicus* consumes the shaded skin of its own species. This form of recycling the epidermal proteins (Weldon et al 1993) was previously documented at other species of newts from Romania (Covaciu – Marcov et al 2002 a, b, c, d, 2003 b, Cicort – Lucaciu et al 2005) and at anurans, too (Guidali et al 1999, Sas et al 2003).

The Danube crested newts from Cheşereu, Sălard and Girişul Negru also consumed amphibian spawn, a widely spread phenomenon amongst newts (Covaciu – Marcov et al 2002 c, 2003 b, Cicort – Lucaciu et al 2004). In the trophic spectrum of the studied populations of *Triturus dobrogicus* we encountered anuran spawns. Apparently *Triturus dobrogicus* consumes less spawns, unlike *Triturus cristatus*. This impression is caused by the fact that in the case of the crested newt we took samples all along its aquatic period while in the case of the Danube crested newt this was not possible. At Resighea no spawns were consumed simply because at the time when we took our samples none of the amphibian species was reproducing. Although the samples from Arpăşel / Tulca and from Girişul Negru were taken in the same day, they showed that in only one of these habitats the newts had consumed spawns. This is so because from the habitat of Arpăşel / Tulca all the green frogs were absent. At Sălard the samples were taken in March, a period when *Rana dalmatina* is reproducing.

Table 4. The frequency of prey items

	Resighea	Cheşereu	Arpăşel	Sălard	Girişul Negru	Total
Platelminta Turbelariata	0	0	0	0	8.33	1.39
Oligocheta - undet.	0	0	0	40	8.33	6.94
Oligocheta Lumbricida	13.6	31.3	33.3	30	16.7	23.6
Oligocheta Gasteropoda	22.7	0	0	0	25	11.1
Oligocheta Hirudinea	0	0	0	30	0	4.17
Araneida	0	0	0	30	0	4.17
Crustacea Izopoda - larva	0	0	0	0	16.7	2.78
Crustacea Izopoda	22.7	6.25	8.33	50	33.3	22.2
Crustacea Cladocere	27.3	0	83.3	0	0	22.2
Crustacea Copepode	13.6	0	8.33	0	41.7	12.5
Crustacea Amfipoda	4.55	18.8	0	0	0	5.56
Miriapode-Chilopode	0	0	0	0	8.33	1.39
Colembola	9.09	0	0	10	0	4.17
Coleoptera-larva	0	6.25	0	10	33.3	8.33
Coleoptera Dytiscida - larva	13.6	25	0	10	0	11.1
Coleoptera - imago undet	13.6	0	8.33	0	0	5.56
Coleoptera Dytiscida	18.2	0	0	0	0	5.56
Coleoptera Carabida	4.55	0	0	0	0	1.39
Trichoptera - larva	54.5	6.25	0	0	0	18.1
Lepidoptera - larva	0	0	0	0	8.33	1.39
Brahicera - larva	0	0	8.33	0	16.7	4.17
Nematocera - larva	22.7	12.5	91.7	30	100	45.8
Urodela - *Triturus vulgaris*	0	0	8.33	0	0	1.39

In the stomach contains of the investigated populations of *Triturus dobrogicus* we also encountered, on very rare occasions, small mineral fragments from the substratum of the habitats. These were probably consumed accidentally, alongside the preys, as it happens in the case of many other amphibian species (Covaciu – Marcov et al 2000). This consumption of mineral elements indicates that *Triturus dobrogicus* is bond to hunting from the substratum of the populated aquatic basin, just like *Triturus cristatus* (Dolmen & Koksvik 1983).

The Danube crested newts consumed 22 prey taxa. Amongst these, only 3 were identified in all 5 biotopes: Lumbricida, Izopoda and Nematocera larvae. The last two taxa are aquatic while the Lumbricidas are characteristic to the wet areas from near the banks. The majority of the rest of the prey taxa were consumed accidentally, representing small amounts, and being identified only in one of the habitats. Most of the consumed preys are quite small but, of course, there are exceptions. For example, at Sălard, a leech from the Haemopis genus was consumed. Hirudineans were also identified but without reaching high amounts (Covaciu – Marcov et al 2002 d). The largest prey that we've discovered is a *Triturus vulgaris* adult and it occurred at Arpăşel / Tulca. Thus, just like *Triturus cristatus*, *Triturus dobrogicus* sometimes consumes smaller species of newts, too (Covaciu – Marcov et al 2001, Cicort – Lucaciu et al 2005).

The great majority of the consumed prey taxa are aquatic, a very predictable fact because *Triturus dobrogicus* was in its mating period during the time of our study. However, terrestrial preys like Araneids or

Coleopterans Carabicide were consumed, too. The situation is similar to the one of the crested newts in their aquatic period. These too consumed mostly aquatic preys, but the big difference is that they did not eat any terrestrial animals (Covaciu – Marcov et al 2002 c, d). Just like *Triturus cristatus*, *Triturus dobrogicus* hunts, in its mating season, in the aquatic habitat that it populates. The consumption of terrestrial preys can only be explained in two ways: either the prey accidentally reaches the aquatic habitat populated by the newt, or the newts can exit their habitat at night or in the wet periods therefore having access to terrestrial preys.

DISCUSSIONS

There are big differences n the food composition of the 5 populations of *Triturus dobrogicus* that we investigated. These differences are either caused by each habitat's characteristics or by the period in which we took the samples. Thus, the average number of preys / individual of *Triturus dobrogicus* is mostly influenced by the time period. The lowest number is recorded in March (3 preys / newt) and the highest one, in May (67.83 preys / newt at Girişul Negru and 29.91 at Arpăşel / Tulca). A number of 14.86 preys / newt is recorded in April while at Cheşereu, where the samples are both from March and April, the average is intermediary. In March, the low temperatures limit, as quantity and quality as well, the spectrum of prey animals from the biotopes. The preys become more and more numerous as we close to the warm season. This evolution can be noted at other species of amphibians, too (Covaciu – Marcov et al 2002 e). The samples from Girişul Negru and from Arpăşel / Tulca were taken the same day, the differences between the number of preys / individual being caused by the characteristics of the two habitats. At Arpăşel, the newts come from a drain from the side of the road with almost no vegetation and almost dried-out in the time of our study. The habitat from Girişul Negru is a more natural one, communicating with a rivulet, having its own vegetation and a bigger depth. Thus, the trophic spectrum is more diversified as we get closer to the warm season, but in the same time, the habitat has a crucial influence in establishing the food composition.

The number of consumed prey taxa varies with the season and the habitat. The smallest figure, 7, was recorded at Cheşereu while the biggest one, 13, at Resighea. Although the samples from Arpăşel / Tulca were taken in May, the newts consumed only 8 prey taxa, less than at Sălard, where in March 9 prey taxa were noted. The difference is caused by the size of the habitat from Arpăşel / Tulca that determines the existence of a smaller number of prey taxa, whereas at Sălard, the biotope is represented by a very large swamp. At Arpăşel / Tulca the number of prey taxa is quite small, due to the characteristics of the habitat, but the number of preys is elevated because of the high temperatures at that time, which lead to a very high increase in the number of the existing taxa (Cladocerans and Nematocera larvae which represent over 97% of the total amount of preys).

The food of the *Triturus dobrogicus* populations that we studied highly resembles with the one of the *Triturus cristatus* populations, fact which was previously investigated (Covaciu – Marcov et al 2001, 2002 a, b, c, d, Cicort – Lucaciu et al 2005). The resemblance is noticeable from two points of view: the one of the consumed prey taxas and the one of the seasonal variations together with the habitat. This fact was predictable, the two species being about the same size, living in similar biotopes, even if *Triturus cristatus* is to be found in higher regions and *Triturus dobrogicus* in the plain (Cogălniceanu et al 2000). Both species eat mostly smaller preys, with a gregarious life, preys that are abundant in the aquatic habitats populated by the newts. Besides these types of preys, the two species also prefer Nematocera larvae and some Crustations. With all that, *Triturus cristatus*, present in mountain habitats, has a wider trophic spectrum, consuming for example Ephemeroptera larvae, too. The resemblance between the trophic spectrums of the two species is grater when it comes to populations of *Triturus cristatus* that are situated at lower altitudes. These consume a variety of preys much closer to the one of the Danube crested newt (Covaciu – Marcov et al 2002 d). Both species consume spawns, shaded skin and vegetal remains, too. In some rare occasions, due to their large size, the two species can also consume specimens from the small species: *Triturus vulgaris*.

Amphibians have two tactics of obtaining preys: "sit-and-wait" and "active foraging" (Toft 1980, Huey & Pianka 1981). The species that use a "sit-and-wait" kind of strategy capture larger preys while the species that use a "active forging" type of strategy capture smaller ones (Duellman & Trueb 1986). This last kind consumes a larger number of preys but uses much more energy doing this (Anderson & Karasov 1981). In the case of the investigated populations of *Triturus dobrogicus* the consumption of smaller preys, with a gregarious way of life, indicates the usage of an "active foraging" type of strategy. The situation is similar to one recorded at a *Triturus cristatus* population from Marghita (Covaciu – Marcov et al 2002 d). However, in not all of its habitats *Triturus dobrogicus* eats only smaller preys; the type of the prey is normally a result of the season and the habitat conditions. In the spring time Nematocera larvae and Copepods are missing, but later on they become abundant and are consumed in large numbers. Thus, the feeding strategy of the Danube crested newts is flexible, modifying itself after the trophic offer. Just like the sister species, Triturus dobrogicus is an opportunist predator, too; its trophic spectrum is influenced by the type of habitat that it occupies, in this case, the plain. In the plain areas the temperatures are higher (Stoenescu et al 1966) and in these waters there is an abundance of smaller preys, largely consumed by the newts.

BIBLIOGRAPHY

Anderson R. A., Karasov W. H., 1981. Contrasts in energy intake and expediture in sit-and-wait and widely foraging lizards. Oecologia 49, 67 – 72.

Arntzen J. W., Wallis G. P., 1994. The "Wolterstorff Index" and its value to the taxonomy of the crested newt superspecies. Abh. Ber. Naturk. Vorgesch., Magdeburg. 17, 57 – 66.

Arntzen J. W., Butger R. J. F., Cogălniceanu D., Wallis G. P., 1997. The distribution and conservation status of the Danube crested newt, *Triturus dobrogicus*. Amphibia – Reptilia, 18, 133 – 142.

Bucci - Innocenti S., Ragghianti M., Mancino G., 1983. Investigations of karyology and hybrids in *Triturus boscai* and *Triturus vittatus*, with a reinterpretation of the species groups within *Triturus* (Caudata: Salamandridae). Copeia, 1983, 662 – 672.

Caldwell J. P., 1996. The evolution of myrmechophagy and its correlates in poison frogs (Family *Dendrobatidae*). J. Zool. Lond., 240, 75 – 101.

Cicort - Lucaciu A. - Şt., Covaciu - Marcov S. - D., Cupşa D., Purgea I., Romocea M., 2004. Research upon the trophic spectrum of a *Triturus vulgaris* (Linnaeus 1758) population of the Beiuş depresion area (Romania). Univ. din Bacău, Studii şi Cercetări Ştiinţifice, Biologie, 9, 201 – 206.

Cicort - Lucaciu A. - Şt., Ardeleanu A., Cupşa D., Naghi N., Dalea A., 2005. The trophic spectrum of a *Triturus cristatus* (Laurentus 1768) population from Plopiş Mountains area (Bihor County, Romania). North-Western Journal of Zoology, Vol. 1, 31 – 40.

Cogălniceanu D., Aioanei F., Bogdan M. 2000. *Amfibienii* din România, Determinator. Ed. Ars Docendi, Bucureşti, 1 – 99.

Covaciu - Marcov, S. - D., Cupşa D., Ghira I., 2000. Trophical spectrum of a *Rana ridibunda ridibunda* Pallas 1771 population from Cefa (Bihor county, România). Studii şi cercetări, Biologie, 5, 107 - 115, Bacău.

Covaciu - Marcov S. - D., Cupşa D., Telcean I. C., 2001. Contribuţii la cunoaşterea spectrului trofic al speciei *Triturus cristatus* Laurentus în regiunea Oradea. Analele Univ. din Oradea, Fasc. Biol., Tom VII, 2001, 119 – 142.

Covaciu - Marcov S. - D., Cupşa D., Telcean I. C., Cicort A., 2002 a. Contribuţii la cunoaşterea spectrului trofic al unor populaţii de *Triturus cristatus* (*Amphibia, Urodela*) din depresiunea Beiuşului. Analele Ştiinţifice ale U. S. M. F. "Nicolae Testemiţanu", Vol. 1., 97 - 104.

Covaciu - Marcov S. - D., Cupşa D., Telcean I. C., Cicort A., 2002 b. Studiul spectrului trofic al unor populaţii de *Triturus cristatus* (Laurentus 1768) din zona Dealurilor Tăşadului (Jud. Bihor). Nymphaea, Folia Naturae Bihariae, XXIX, 117 – 145. Oradea.

Covaciu - Marcov S. - D., Cupşa D., Telcean I. C., Cicort A., 2002 c. Spectrul trofic al unei populaţii de *Triturus cristatus* (*Amphibia, Urodela*) din zona Şerghiş, jud. Bihor, România. Oltenia, Studii şi Comunicări, Ştiinţele Naturii, Vol. XVIII, 188 – 194, Craiova.

Covaciu - Marcov S. - D., Cupşa D., Cicort A., Telcean I. C., Sas I., 2002 d. Contribuţii la cunoaşterea spectrului trofic al speciei *Triturus cristatus* (*Amphibia, Urodela*) din regiunea Marghita şi Munţii Pădurea Craiului (jud. Bihor, România). Analele Univ. din Oradea, Fasc. Biol., Tom IX, 2002, 157 – 169.

Covaciu - Marcov S. - D., Cupşa D., Sas I., Ghira I., 2002 e. The study of the trophic spectrum of two populations of *Rana arvalis* Nils., 1842 from the north of Bihor county. Analele Ştiinţifice ale Universităţii "Al. I. Cuza" Iaşi, 160 – 171.

Covaciu - Marcov S. - D., Cupşa D., Telcean I. C., Sas I., Cicort A., 2003 a. Contribuţii la cunoaşterea herpetofaunei din regiunea cursului mediu şi inferior al Crişului Negru (jud. Bihor, România). Muzeul Olteniei Craiova, Oltenia, Studii şi Comunicări Ştiinţele Naturii, Vol XIX, 189 – 194.

Covaciu - Marcov S. - D., Cupşa D., Cicort A., Naghi N., Vesea L., 2003 b. Date despre spectrul trofic al unor populaţii de *Triturus alpestris* din zona Muntelui Şes (jud. Bihor, România). Oltenia, Studii şi Comunicări, Ştiinţele Naturii, Vol. XIX, 171 – 176.

Covaciu - Marcov S. - D., Ghira I., Sas I., 2004. Contribuţii la studiul herpetofaunei zonei Oaşului, (Judeţul SM, Romania). Mediul, Cercetare, Protecţie, Gestiune, 2, Cluj – Napoca, 107 – 112.

Crişan A., Cupşa D., 1999. Biologie animală 1: Nevertebrate, Ed. Convex S. A., Oradea, 1 – 238.

Crişan A., Mureşan D., 1999. Clasa Insecte, Manual de Entomologie generală, Universitate Babeş – Bolyai, Presa Universitară Clujană, 1 – 165.

Dolmen, D. & Koksvik, J. I., 1983. Food and feeding habits of *Triturus vulgaris* (L.) and *T. cristatus* (Laurenti) (Amphibia) in two bog tarns in central Norway. Amphibia – Reptilia, 4: 17 – 24.

Duellman W. E., Trueb L., 1986. Biology of amfibians. New – York (Mc Graw-Hill), 1 – 670.

Guidali F., Scali S., Carettoni A., Fontaneto D., 1999. Feeding habits, niche breadth and seasonal dietary shift of *Rana dalmatina* in northern Italy. Current studies inherpetology, Miaud C & Guyetant R (eds), Le Bourget du Lac / France, S.E.H., 161 – 166.

Huey, R. B., Pianka, E. R., 1981. Ecological consequences of foraging mode. Ecology 62 4: 991 – 999.

Ionescu M. A., Lăcătuşu M., 1971. Entomologie, Ed. Did. şi Ped., Bucureşti, 1 – 416.

Joly P., 1987. La regime alimentaire des Amphibiens: methodes d'etude. Alytes, 6, 11 – 17.

Kenett R., Troy O., 1996. Diet of Two Freshwater Turtles, *Chelodina rugosa* and *Elseza dentata* (*Testudines: Chelide*) from the Wet – Dry Tropics of Northern Australia. Copeia, 1996 (2),409 – 419.

Leclerc J., Curtois D., 1993. A simple stomach flushing method for Ranid frogs. Herp. Review, 24, 142 – 143.

Litvinchuk S. N., Borkin L., 2000. Intraspecific taxonomy and nomenclature of the Danube crested newt, *Triturus dobrogicus*. Amphibia – Reptilia, 21, 419 – 430.

Radu G. V., Radu V. V., 1972. Zoologia Nevertebratelor, Vol. 2, Ed. Did. şi Ped., 1 – 708.

Sas I., Covaciu - Marcov S. - D., Cupşa D., Aszalos L., Kovasc E. H., Telcean I. C., 2003. Data about the trophic spectrum of a population of *Rana arvalis* of the Andrid area (Satu – Mare county, România). Universitatea din Bacău, Studii şi Cercetări Ştiinţifice, Biologie, 8, 216 – 223.

Stoenescu Ş. M., Şchiop A., Dica I., Popescu E., Patrichi E., Ţepeş E., 1966. Atlasul climatologic al R. S. R., Bucureşti

Toft C. A., 1980. Feeding ecology of thirteen syntopic species of *Anurans* in a seasonal tropical environment. Oecologia 52, 131 – 141.

Wallis G. P., Arntzen J. W., 1989. Mitochondrial – DNA variation in the crested newt superspecies; limited cytoplasmic gene flow among species. Evolution, 43, 88 – 104.

Weldon P. J., Demeter B. J., Rosscoe R., 1993. A survey of shed skin – eating (dermatophagy) in *Amphibians* and *Reptiles*. J. Herpetol. 27, 219 – 228.

Whitaker J., Rubin O. D., Munsee J. R., 1977. Observation on food habits of four species of spadefoot toads, genus *Scaphiopus*. Herpetologica 33: 468 – 475.