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RESEARCH UPON THE BIOLOGY AND ECOLOGY OF SOME NEWT SPECIES (AMPHIBIA) FROM THE JIU RIVER GORGE NATIONAL PARK

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ABSTRACT

In this study we analyzed the variation in time of the number of individuals in the aquatic stage of two sintopic newt populations - Lissotriton vulgaris (Linnaeus, 1758) and Triturus cristatus (Laurenti, 1768) – after which we calculated the size of each population and their sex ratios.

The common newt population is about 5 times greater than that of the crested newt. The sex ration is about 3F:2M for the common newt and 4F:3M for the crested newt.

The breeding period for the two populations overlaps perfectly in time. However, by comparing it to the common newt, the crested newt exits its habitat in masses. Also, the females of the common new dominate numerically their males in the beginning of their aquatic period.

INTRODUCTION

The most important non-biotic factors the control the activity of amphibians are the humidity and the temperature (Cogălniceanu, 2000). The influence of the temperature on the amphibians is manifested from the cellular level all the way to the population level (Rome et al, 1992).

After exiting their winter stage, the newts belong to the aquatic ecosystems only in the first part of their active state, after which they have a terrestrial life (Fuhn, 1960). Their presence in the aquatic or terrestrial environments is a consequence of their trophic and reproduction activities (Cicort-Lucaciu et al, 2008).

There is only one study on newts in Romania that monitored the repopulation and depopulation of an aquatic habitat (Cicort-Lucaciu et al, 2008). Observations have been made on two newt populations from a plain habitat: *L. vulgaris* and *T. dobrogicus*.

In this case, we set off to analyze two newt populations from a mountain habitat: one of *L. vulgaris* and another of *T. cristatus*. Along with the number of individuals of each species, we also followed their sex, in order to establish their sex ratio.

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MATERIALS AND WORKING METHODS

The study took place in spring 2009, summing up three field trips to the selected habitat: on the 1st, 18th and 28th of April. We analyzed a total of 1517 newt specimens, out of which 1309 were *L. vulgaris* and 208 *T. cristatus*.

The studied newts were captured with round metallic nets on top of long poles. We established the species and sex for each captured specimen and then released them all back to their habitat.

The habitat from near the abbey from Lainici is situated in the Parang Mountains. It is found at the southern limit of the Jiu River Gorge National Park, at an altitude of 900m, in a location known as Comanda. The habitat is a quasi-permanent pond, about 7 m long, which is reduced very much in the droughty years.

The water level has an average of 40-50 cm while the maximum depth is over 1 m. The aquatic vegetation is rich and the mud stratum is quite thick as well. The banks of the pond are bordered with *Juncus* sp. bushes. The habitat is anthropogenically-affected since it's used as drinking and bathing puddle for cattle.

Picture no. 1. The habitat from Comandă

As objectives, we wanted to establish the size of each population, the sex ratio and to analyze the variation in time of the number of specimens present in the habitat. We determined the size of the populations using the specimens' elimination method (Cogălniceanu, 1997), practically counting all the individuals of these populations.

RESULTS AND DISCUSSIONS

In the first study period (April 1st 2009) the biotope was at its greatest, with the newt found mostly near its banks, under clubrush bushes, due to the low temperatures from the deeper waters. At our second visit to the habitat (April 18th 2009), the size of the pond was about half than the first time, and the newts were present in all sectors of the water.

The warming and the reduction of the biotope to about a third of its initial size left us to capture a much smaller number of newts at our third field trip (April 28th 2009). The analyzed populations fluctuated numerically and from the sex ratio's point of view during our entire study period. The temperature and humidity conditions caused these variations, their optimum level being reached during our second study period.

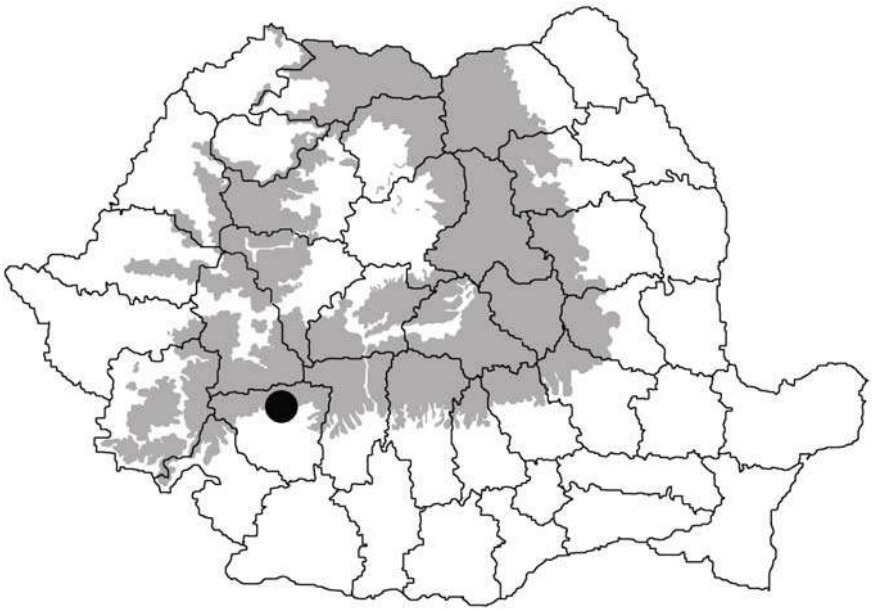

Figure 2. The studied area: Jiu Gorge National Park

The harsh environment conditions, due to the mountain character of the habitat, with the great temperature fluctuations in the beginning and with great water level fluctuations towards the end, shortened the aquatic period of the newts. Generally, the aquatic stage of these two species is stretched across a few months (Fuhn, 1960; Cogălniceanu et al, 2000).

The population sizes of the two newt species are of 486 individuals for the common newt and of 89 for the crested newt (Tab. 1.).

The crested newt population is about a fifth of that of the common one. The is partially because of the larger size of the crested newt and the limited size of the habitat and partially because of the water level variation in time (Cicort-Lucaciu et al, 2008).

Table 1.

The Number (*N*) of captured specimens, separated on sex and periods

Species	Sex	April 1st 2009	April 18th 2009	April 28th 2009
Lissotriton vulgaris	total	400	486	423
	M	216	289	256
	F	184	197	167
Triturus cristatus	total	80	89	39
	M	46	50	16
	F	34	39	23

The sex ratio is 59.46 % M / 40.53 % F for the common newt and 56,17 M % / 43,82 % F for the crested newt (Tab. 2.). In the case of both the populations, the balance of the sexes is slightly tilted in favor of the females. Some studies have shown that low temperature values, under a certain optimum interval, favor, in the larval stage of the crested newt, a growth in the number of females (Wallace et al, 1999; Wallace & Wallace, 2000; Kinne, 2006). Other studies state that the winter mortality for the adult common newts is more frequent for males (Bell, 1977; Kinne, 2006).

Table 2.

Sex Ratio (*R*)

Species	Sex	April 1st 2009	April 18th 2009	April 28th 2009
Lissotriton vulgaris	M / F	54% / 46%	59,46% / 40,53%	60,52% / 39,47%
Triturus cristatus	M / F	42,50% / 57,50%	56,17% / 43,82%	41,02% / 58,97%

The newt's breeding activity varies as length and frequency from one species to another and from one population to another (Duellman & Trueb, 1986). In our case, the breeding periods of the two populations overlap in time and the only differences that occur are as quantity. While immigrating in the habitat, the differences are small (P_{Tc} = 89,88%, P_{Lv} = 82,30%), but there is another situation for the emigration (Tab. 3.). The common newt drops back in opposition to the crested one when it comes to depopulating the biotope (P_{Tc} = 43,82%, P_{Lv} = 87,03%). The decrease in size of the habitat toward the end of the aquatic period represents a disadvantage for the crested newt, because of its larger size.

Table 3.

The variation quota (in percents) (*P*) of the number of individuals and their sex

Species	**Sex**	**April 1st 2009**	**April 18th 2009**	**April 28th 2009**
Lissotriton vulgaris	total	82,30	100	87,03
	M	74,74	100	88,58
	F	93,40	100	84,77
Triturus cristatus	total	89,88	100	43,82
	M	92	100	32
	F	87,17	100	58,97

Among the sexes, the differences between the percentage of specimens present from the entire size of the population, in the beginning of the aquatic period, are small for the crested newt (under 5%). In the case of the common newt, the females were present in the habitat on April 1st in much larger numbers ($P_{Lv\text{-}f}$ = 93,40%, $P_{Lv\text{-}m}$ = 74,74%). It has been observed that the males of more species of Urodela go into the water before the females (Halliday, 1998; Gill, 1978; Semlitsch et al, 1993; Douglas, 1979; Scott, 1993). In the case of the species we investigated, it is considered that the males reach the aquatic habitat together with the females (Verrell and Halliday 1985, Halliday 1998). There are however studies that shown that among the crested newt males there is a competitive territorial behavior that determines them to be present in the water before the females (Jalbă, 2008), even if this delay isn't as big as with other species. On the other hand, for both the species that we analyzed, there are studies that demonstrate a competition for ensuring a supplementary semen supply for the females, competition that takes place in the beginning of their aquatic period (Verrell & Halliday, 1985; Baker, 1992; Halliday, 1998).

This behavior, that makes the females dominate the males numerically, also explains the differences between the sexes for our common newt population.

CONCLUSIONS

The sizes of the two populations are: 486 specimens for the common newts and 89 specimens for the crested newts. The breeding period for the two investigated populations was shortened by the harsh environment conditions and therefore took place in April. The number of newts present in the habitat varied in time. Thus, in the beginning and the end of the month there were fewer newts in the pond than in the middle of our study period, when the peak of the reproduction period was reached. Occupying the entire aquatic habitat had more stages, depending on the warmth of the water.

The sex ratio (F:M) is slightly tilted in favor of the females, being of about 3:2 in the case of the common newt and of about 4:3 for the crested one. The action of some environment factors determined the sex ratio to be slightly in favor of the females.

There are no differences between the lengths of the aquatic periods of the two species. The only dissimilarities observed were quantitive and took place when depopulating the habitat. This is when the crested newt left the biotope in masses, due to the habitat drying out and to its larger size. For the common newt, we observed a larger amount of females present in the habitat in the beginning of its aquatic period.

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