WHAT TEMPERATURE CAN TOLERATE THE MARSH FROG FROM THERMAL HABITATS? PRELIMINARY RESULTS CONCERNING THE 1 MAI SPA'S POPULATION (NW ROMANIA)

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Abstract. The aim of this study was the experimental determination of the maximum limit of temperature in which marsh frogs (*P. ridibundus*) from thermal water habitats can still survive. For the experiment ten marsh frogs captured from the non-hibernating population from 1 Mai Spa were used. During the experiment we had determined for each frog the value of two parameters: VTMax and CTMax. Following the experiment we did not identify significant differences regarding the thermoresistance of the studied frogs. Thus VTMax had a mean value of 33.9°C and CTMax had the mean value of 36.7°C.

Keywords: *Pelophylax ridibundus,* non-hibernating, thermal waters, thermoresistance, Romania

In Romania, *Pelophylax (Rana) ridibundus* is a common species with large distribution. A special place, concerning the green frogs from Romania, is taken by the non-hibernating populations of *P. ridibundus* from thermal habitats. These populations do not hibernate and remain active during the entire duration of the cold season regardless of the air temperature [4]. Amongst the thermal habitats from north-western part of Romania (with populations of *P. ridibundus*) there are well-known especially those in the proximity of Oradea, from Episcopeşti Spa (1 Mai Spa and Felix Spa). In the last years, there have been identified many thermal habitats in western Romania, most of them being the result of human activity (see in: [4], and also in [9]). In the Romanian specialty literature [3] as well as in the foreign one [1, 5] there are very few data about the mechanisms by which thermal waters act upon amphibians from these habitats.

The aim of this study was to bring some new information and arguments concerning the modi-fycation of the biology of the marsh frog, *P. ridibundus* in the thermal waters from 1 Mai Spa (Bihor County, North-Western Romania). Thus, we performed the experimental determination of the maximum limit of temperature in which marsh frogs can still survive. For this purpose we utilized plastic cages (having insulating feature) with water (see in: [6] and also in: [11]). The cages were provided with several thermostats in order to be obtained temperatures over 40ºC. For the experiment ten marsh frogs captured from the non-hibernating population from 1 Mai Spa were used. During the experiment we had determined for each frog the value of two parameters: VTMax (see in: [8], and also in: [11]) and CTMax (see in: [7]). Both values were determined as the water temperature. VTMax is the temperature value at which or above which frogs tried to escape from the high thermal conditions (accelerated swimming to exit from the cage). CTMax is the temperature value at which frogs began to spasm (see in: [12] and also in: [11]). All of the frogs survived the experiments and were released in their natural habitat.

Following the experiment we did not identify significant differences regarding the thermore-sistance of the studied frogs (Fig. 1). Thus VTMax had a mean value of 33.9°C (range: 31.8°C - 34.52°C) and CTMax had the mean value of 36.7°C (range: 35.6°C – 37.94°C). The small differences from one individual to another might be due to their size (age) as well as to their physiological condition. Apparently, our results are in opposition with those obtained by Covaciu-Marcov in 2004 [2] who had proved that releasing individuals originating from non-thermal waters into waters where temperature exceeds 30ºC leads to their death caused by thermal shock [2]. However, his findings were dealing with the direct introduction into thermal water (with high temperature) of some individuals of marsh frogs. But the adaptation to conditions from thermal habitats is a progressive process. In other words, frogs from downstream (from cold waters) advance gradually upstream (to warm water) towards sectors with higher temperatures. Therefore the modification of the surrounding environment's (water) temperature is gradually and frogs avoid thermal shock. Only by this gradual advancement the marsh frog (or accidentally other species of amphibians too - see in [10]) manage to populate thermal habitats, both the natural and artificial ones.

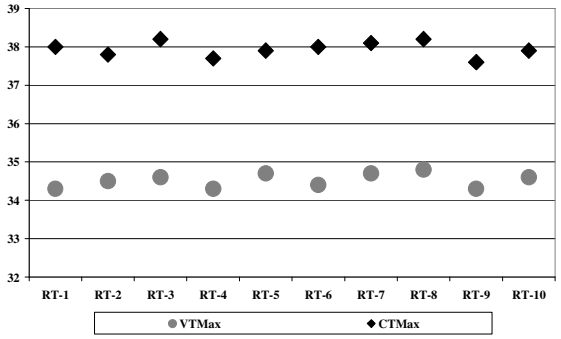

Figure 1. The recorded values of VTMax and CTMax

For the future we have the intention to extend our study on some hibernating population of *P. ridibundus* too, as well as on the other two green frogs from Romania (*P. lessonae*, *P.* kl. *esculentus*) in order to bring fairly significant results in the analyse of the process by which these amphibians populate thermal habitats.

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