

Cannibalistic behaviour of *Epidalea (Bufo) viridis* tadpoles in an urban breeding habitat

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Abstract. Larvae of *Epidalea (Bufo) viridis* showing cannibalistic behaviour were observed in June 2006 in a pond from Oradea city, western Romania. This is the first record of such behaviour in the country and probably was induced by the scarcity of food and the high density of larvae present in the rapidly drying pond in which they occurred.

Key words. *Epidalea (Bufo) viridis*, cannibalism, larvae, drying pond

Epidalea (Bufo) viridis is a prolonged breeder anuran (*sensu* Wells 1997) which typically utilises temporary and shallow water bodies (Bologna & Giacoma 2006). The quality of such habitats may show large temporal changes. Resources may be depleted due to high larval densities, intensifying intra-specific competition and growth inhibition. In addition, the concentration of waste elements may increase over time. All these factors become more accentuated when the pond is drying, but tadpoles can respond to desiccation by accelerating metamorphosis (reviewed by Newman 1992) and sometimes even by cannibalism. Larger larvae can thus survive at the cost of smaller conspecifics. In such circumstances, this situation is favourable for the population as a whole, increasing the chance of a reproductive success (Griffiths 1997). Therefore, it can be concluded that the temporary ponds are not free of predators, as it is commonly assumed (Petranka et al. 1999).

Several anuran species with cannibalistic exhibit specific modifications of the oral

apparatus resulting in the existence of more than one morphotype (e.g. *Scaphiopus* toads; Pfenning 1990). However, other species known to utilise cannibalism lack morphological modifications specific to this behaviour (e.g. Petranka et al. 1994).

In 2006 we studied the breeding of an *E. viridis* population in Parkland situated within the city of Oradea, Romania (47°03' N, 21°09' E; a.s.l. 132 m). The habitats used for spawning were temporary ponds established after rains in the small areas with grassy vegetation. No other amphibian species were present in the park. The ponds had a maximum depth of 20-25 centimetres and were subject to pronounced solar exposure. The green toad population from this park is estimated at only 45 adults, due to the numerous arrangement works and the high frequency of reproductive failure. Historically the population was estimated to number 200-300 individuals. Spawning commenced on April 20th and lasted until the beginning of August with a peak in May (Kovács & Sas unpublished data).

On June 2nd we noticed the appearance of cannibalism between the larvae that remained in the drying pond, larvae hatched from eggs laid between 15th and 19th May. The larger larvae were observed feeding on the smaller individuals. Tadpoles with the same initial size acquire nutrients unevenly, either as a result of chance or due to the utilization of different resources, which can lead to the faster growth of some individuals (Wildy et al. 2001). An unequal development rate may also be caused by genetic factors (e.g. Blouin 1992). In addition, crowding and increased competition can result in large tadpoles inhibiting the growth of small tadpoles (Griffiths 1997). Experimental studies have shown that, even at low densities, the presence of an older tadpole slows the growth and development rate of younger ones (Hartel 2007).

Many anuran larvae, in natural or experimental conditions, exhibit cannibalistic behaviour, and these interactions are now thought to be relatively common (see Crump 1992 and Alford 1999 for a review of cannibalism in anurans). Jordan et al. (2004) hypothesized that a combination of high larval densities and food limitation can lead to cannibalism in the *Bufo boreas boreas* larvae. Taking these aspects into account it is probable that cannibalism amongst *E. viridis* larvae may be relatively common, as they live in ephemeral aquatic habitats in which the above mentioned conditions are easily fulfilled. Intraspecific predation in *Rana temporaria* may be influenced by the unsuccessful predation attempts of insect larvae (*Odonata*, *Dytiscus*) on anuran larvae; the tadpoles injured by insects may be more exposed to cannibalism by other tadpoles (T. Hartel personal communication). Intraspecific predation has been

observed in many other anuran species (reviewed by Petranka et al. 1999), suggesting that the phenomena is common and should be studied in more detail. Our observation enlarges the knowledge about *E. viridis* species, but further studies are necessary concerning this behaviour, including researches upon the morphology of the oral apparatus of the larvae for clarifying the cues that induce feeding on conspecifics.

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