

SHORT COMMUNICATION

Larval Cannibalism in the Indus Valley Toad, *Duttaphrynus stomaticus*.

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ABSTRACT

Larval cannibalism was observed in the Indus Valley toad, *Duttaphrynus stomaticus* in Jammu (India), in a natural temporary breeding pond. The larvae were found feeding on eggs and other conspecifics. The behavior was most probably because of the high population density and scarcity of the nutritious food which act as crucial factors in prolonged breeding cycles in temporary and fast drying water bodies. This study is first of its kind from Jammu.

KEY WORDS: Larval Cannibalism, *Duttaphrynus stomaticus*, Conspecifics, Population Density, Nutritious Food.

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The Indus Valley toad, *Duttaphrynus stomaticus* (Fig. 7), is a prolonged monsoon breeder species found widely distributed in the Indian subcontinent. It utilizes the small temporary ponds (for breeding and metamorphosis) in which rain water is gathered and by the end of monsoon toads are grown up and migrate to land. Towards the end of monsoon, water level falls and population density increases in these ponds. Simultaneously food also becomes a limiting factor. Since this toad is continuous breeder, there are produced many generations within the same pond. In some cases, the eldest ones are always at advantage because they enjoy best of the food, space and other requirements for metamorphosis [7]. It is quite tough for the newer generations to survive in the same habitat as they have to struggle harder than their elder conspecifics. Competition for food and space increases with the retreating monsoons as the ponds begin to dry and the older tadpoles (mostly the hind limb stage larvae) adopt the cannibalistic behavior [6]. In other words they switch on to carnivory from the usual herbivorous habit. The larger hind-limb stage (HLS) larvae begin to feed on eggs, external-gill stage (EGS) larvae and the limb-bud stage (LBS) larvae. This enhances the chances of survival and increases the reproductive potential of the population as a whole [4]. Some larger tadpoles feeding on the eggs find the important mineral nutrients like calcium and phosphorus which are required for the faster metamorphosis [2]. In our study, we observed the cannibalism in tadpole larvae of toad *Duttaphrynus stomaticus*, in their natural temporary breeding pond site (Fig. 1 & 2) and later brought them to lab to test some factors responsible for inducing this behavior in them.

Tadpole larvae of *Duttaphrynus stomaticus* were observed to show cannibalism in their natural pond habitat. Their size ranged from 5mm-15mm in length during the tailed stages (Fig. 3 & 4). The strongest cannibalistic behavior was shown by the hind-limb stage. The larvae were found stuck to the strings of newly fertilized eggs (Fig. 5). The hind-limb stage larvae (HLS) fed on the smaller external-gill stage (EGS) and limb-bud stage larvae (LBS) and frequently on those injured by other insect larval infections (Fig. 6). These observations were made throughout the breeding monsoon season.

In order to test suitability of some of the factors like food and space availability, nutrition factors, environmental fluctuations and an interaction of all these, the larvae were collected and brought to lab and subjected to experimental set-up (Table 1). Three different groups were made including different numbers of tadpoles of three types- external gill stage (EGS), limb-bud stage (LBS) and hind-limb stage (HLS). Two small water containers of the size 2ft x 2ft x 2ft and a third one of 1ft x 1ft

x 1ft were used. The tadpoles were fed on half boiled spinach. Containers were filled with half of normal tap water and half of the water from pond.



Fig.1: Temporary breeding pond of The Toad



Fig. 2: Breeding pond during the onset of monsoon retreating monsoon



Fig.3: An individual hind-limb stage Tadpole early monsoon breeding



Fig.4: Low density of Tadpole population during



Fig. 5: Coexistence of the new generation eggs and old generation tadpoles feeding on them



Fig. 6: Tadpoles feeding on other tadpoles



Fig. 7: Adult toad

Cannibalism in larvae of *Duttaphrynus stomaticus* as tested on two parameters i.e. food and space is significant. The food scarcity and space limitation are important factors in those species which are prolonged breeders and utilize temporary shallow water bodies [5]. The phenomenon of feeding on conspecifics in natural or experimental environment is relatively common phenomenon now [1, 3]. This intraspecific predation is not novel in the anuran world. There are a number of factors like the food and space availability, favorable microenvironment, mineral nutrients essential for metamorphosis, genetic predisposition and interaction of many of these factors which shape the actual status of cannibalism in anurans. This opportunistic cannibalistic behavior has been addressed in our experiment as a function of two factors- food and space. The space limitation is more significant factor than the food availability to induce larval carnivory in the herbivorous tadpoles of *Duttaphrynus stomaticus* as indicated in the Table 1.

This study is first of its kind from Jammu region of Jammu & Kashmir, India. It would serve as an attempt to regularize the studies on the very few number of anuran genera which are presently enjoying the status of least concerned in Red Data Book and of even least concern to the common man who is not aware about the significance of amphibians in conserving biodiversity and sustainable development of animal kingdom as a whole.

Table 1: Experimental set-up and Results.

SET NO. FOOD SPACE	I	RESULT	II	RESULT	III	RESULT
	Number of individuals		Number of individuals		Number of individuals	
Food = 50g Space = 2 x 2 x 2	20 EGS 20 LBS	1 EGS consumed	25 EGS 25 LBS 25 HLS	8 EGS and 2 LBS consumed	25 EGS 25 LBS 35 HLS	7 EGS consumed
Food = 100g Space = 2 x 2 x 2	-	3 EGS consumed	-	6 EGS and 8 LBS consumed	-	7 EGS and 9 LBS consumed
Food = 100g Space = 1x1x1	-	4 EGS consumed	-	9 EGS and 11 LBS consumed	-	10 EGS and 11 LBS consumed

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