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Frog, Rana Curtipes of Rana Curtipes Jerdon the Breeding Behaviour, Sex Ratio, and Sexual Dimorphism in the

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Abstract - Composition of size and age in males and females and morphological characters in comparison with the Moscow Area (Svenigorod Biology Station ZBS), some local moor frog populations (Rana arvalis) from the south of the ranges (the Ukraine). Although the Ukrainian populations are closely located (not more than 40 km), the mean body size and age varies significantly. The mean value of these parameters was therefore lower than those of the ZBS population. In the south, the proportion of female's breeder for the first time in the winter is higher than males; the two-year - old mature specimens of both sexes are more than those of older specimens, compared with the ZBS population, although their share of older specimens is smaller. This spatial heterogeneity in the composition of the age causes specimens from the southern populations to a slightly lower mean age and body size. Although operation is longer in Ukraine than in the Moscow region, growth rates of frogs from southern populations, aged two and three years, are lower and only four years old are higher as ZBS population specimens. These disparities are triggered in the case of women and men from the southern populations by increased reproductive efforts.

Key Word: Morphological, Frogs, Female's Breeder, Populations, Rana Curtipes Jerdon

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INTRODUCTION

Amphibians were the first group of vertebrates that were adapted in the course of evolution to both the aquatic and terrestrial way of life. In the evolutionary history of vertebrates, amphibians have a special position for first living on the ground (Anderson, 2008; Frost et al., 2008). Among fully aquatic fishes and actual land amniotes, amphibians are intermediate. Amphibian species were perpetuated successfully and their survival had to do with the growth of extremities, lungs, other anatomical modifications and, particularly, the evolution of new reproductive strategies in the new terrestrial world (Shine, 1979; Prado et al., 2005). Amphibian reproductive success includes sperm, ovulation, oviposition, fertilisation, growth and metamorphosis (Brown and Cai, 2007). The history of amphibians indicates that the pattern of evolution has progressed from the triassical to the mid-jura period (Anderson, 2008; Boisvert, 2009). The approximate origin date for modern amphibians could be between 351 and 266 Mya (Marjanov and Laurin, 2007), who phylogenetically located similar to the Batrachians' discrepancies (Anderson, 2008; Frost et al., 2008) (the Liss amphibians: frogs, salamanders and limbless caveans, but not amniots, 2007). Over the years different ways of reproduction such as oviparity, ovo-viviparity (for example, Pipa pipa) and viviparity (for example, Salamandra salamandra) emerged as a result of encounters with nature (Wake, 1998). It also appears that amphibians have radiated a large variety of reproductive modes in contrast with other terrestrial vertebrates (e.g. reptiles, birds and mammals) (Diwan, 1996). Since amphibians are poikilothermic and also because most of them rely on water for their reproduction, the constantly changing climatic factors such as air and water greatly affect their reproductive activities. Temperature (Delgado et al., 1992; Sumida et al., 2007). Rainfall, daylength and relative humidity.

India has all three types of amphibian fauna-anura, urodela and apoda. But there is limited knowledge of Indian amphibians' reproductive biology. Many of them, confined to Western Ghats, have unknown breeding patterns and habits, and habitat and life history. In Karnataka, Kerala and Tamil Nadu [Inger and Dutta, 1986; Daniel, and Sekar, 1989] Indian frog Rana curtipes (Jerdon, 1853) is distributed in the Western Ghats. West Ghats range reasonably continuously from 8 to 2loN latitude, between 600 and 2000 m high hills [Daniels, 1992]. [Daniels, 1992].

Temperate and subtropical amphibians' annual reproductive habits have been extensively studied. But there are less tropical studies of Western Ghats in India [inger and Greenberg, 1956, 1963; Ramaswami and Lakshman, 1959; Basu and Mondel, 1961; Basu, 1968; and Agarwal, 1978]. They are also less frequent.

Rana curtipes is one of the small Indian anuran species studied. There is minimal awareness of its breeding biology. Boulenger (1890) made the earliest contribution to the morphology of Rana curtipes. In May and June, Rao (1914) collected some stages of tadpoles from Coorg (Karnataka) and described its morphology in the preliminary. The study was made by Abdulali (1962). The adults collected from Karnataka have the characteristic slow movements. Daniel and Sekar (1989) described the general morphology of adults and their geographical distribution.

Brief notes on the morphology and distribution of adult Rana curtips were given also by Ravichandran (1993). There is therefore still a lack of a detailed report on the reproductive biology of Rana curtipes. Many of the brief details above deal with northern Ghat populations. But little is known about the Rana that limits people in the southern Western Ghats region. This research was therefore conducted in order to contribute data on Rana Curtin 's reproduction biology from the southern population of Western Ghats. A detailed analysis was needed to analyse the endocrinological role of this amphibian in its growth.

CYCLES FOR REPRODUCTION AND PERIODS OF BREEDING

Male menstrual cycle

All the males collected in 1991 were not mature between January and March and November and December (Table 1.1). One out of 11 (9%) matured in April. Out of 17 (23.5%) and 18 out of 19 (94.7%) were mature between May 4 and June 18. In July and August, all the males collected were mature. Out of 16 (75%) in September 12 and out of 18 (39%) in October 7 were ripe.

Fig.l.l Curtipes for adult fur

Egg laying Time

The males primarily called at night and in the evening. With hind legs folding up, the calling posture was upright. Mating took place shortly after the call began or after a few hours. In general, Amplexus lasted from one to three days. The woman held the man on her back during amplexus and made only slight gestures. There was a prevalent men's rivalry for a woman. But there was no good attack that ended with male elimination. Approached the riverside, where water runs slowment, was generally carried out. When the mate was ready for ovipation, the male came into the shallow water. The female left the water after extracting the eggs while the male was normally some time left. Not a single stretch of eggs was laid. The laying process of the egg therefore lasted approximately 1-2 hours. The egg masses dropped to the ground and were fastened with jelly to substratum or to roots of the trees.

Most women have laid their eggs in their dawn hours, in particular amplexes pairs found in their lab (Table 1.5). But in the night and after heavy rain, few laid eggs. After 2 to 3 days of continuous rain, more clutches were seen.

Ratio of sex

The presence of more males than females was suggested in a three year sample. 161 Rana curtipes were males and 128 were females, compared to 289 in 1991. In 1992 there were 271 frogs, 154 men and 117 females . The frogs were collected. In 1993 there were 147 out of 262 males. The female ratio was 1:1.25, 1:1.31, and 1:1.27 respectively for males in 1991, 1992 and 1993, and was 1.28 + 0,03 on average. Once again the figures (Table 1.7) show that mature males outnumbered mature females with an average sex ratio of 1.52 ± 0.04.

Dimorphic sexuality

A total of 119 ample pairs were found during the investigation and 47 of those pairs were collected . The youngest male mature had a length of 45 mm and a femur length of 14 mm. The largest adult male had a length of 68 mm S-V and a length of 25 mm. In the 1991, 1992 and 1993 males, averaged length s-V was 56.3 ± 6.35, Rana's curtipes 55.7 ± 8.23 and 58.5 + 6.98 mm. In 1991, 1992 and 1993 the mean femur length was 17.9 + 2.06, 17.7 + 2.64 and 19 + 2.99 mm.

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REVIEW LITERATURE

Ramaswami And Lakshman (1959) was the first attempt to ontogenically test an Indian anuron species for Rana cyanophlyctis, an Indian skipper. Shumway was introduced and thus only at developmental stages. The remaining part of the experiments were carried out by Mohanty-Hejmadi and Dutta (1979). Subsequely, Rana limnocharis (Roy and Khare 1977; Khare and Roy 1977) Rhacophorus malabaricus (Secar, 1990) was reported as developing stages of tigresses [Bhati, 196 9; Agarwal and Niazi, 1977; Dutta and Mohanty-Hejmadi, 1978]. The developmental phases of Bufo melanostictus and Polypedate maculatus were a big part of Mohanty-Hejmadi and Dutta (1978, 1988).

Gesner (1960) made developmental tables simpler and recommended a generalised table covering the whole cycle of growth and transformation based on Tables of Rana pipiens [Shumway, 1940; Taylor and Kollros, 1946] and Bufo valliceps [Liambaugh and Volpes, 1957]. This refers to many anurans in general. However, in Gesner's (1960) opinion, separate development tables for each species are necessary to draw valid conclusions because of differences in the sequence and existence of certain specific characteristics in different species. The available literature on the Rana curtipes tadpole [Rao, 1914; Sekar, 1989] is restricted to general issues on a few-stage feeding, ecology and morphology. In addition, the larvae of Karnataka area collected by Rao (1914) and Sekar (1989) were not recorded in the western Ghats south region, as a result of a literature review.

Etkin (1964) proposed that the rise in temperature accelerates metamorphosis. In Rana temporaria and Rana Dalmatina, Riis (1991) reported a logarithmic relationship between temperature and time of embryo evolution. The larval size and length differ by species due to alien (environmental) and intrinsic (genetic) factors. Extra influences have a profound impact on growth of amphibians since they are poikilothermic. In order to confirm this, we based our analysis also on the impact of temperature on the production and transformation of a tropical anuran — Rana curtipes, which is a major extrinsic factor.

Thus the studies performed in Savage (1955), Satel and Wassersug (1981), Ruibal and Thomas (1988), Echeverria and others, such as Kamat, Inger, Laymanowitch, Lajmanovitch, Laymanovitscha and Fernandez, 1983 and 1995, are ecological analyses of the studies conducted on morphological and anatomical characteristics, among others. Foraging is one of the main elements of reproductive health (Nishimura 1999). Consequently, it is not shocking to note that the majority of group-liAong species are able to precisely allocate between the feeding grounds according to habitat profitability (Godin and Keenleyside 1984; Talbot andKramer 1986).

For the stage of amphibian tadpoles it is useful Taylor and Kollros (1936), Gesner (1960) and related tablets. However, at certain stages of development these structures depend on some unclear morphological characteristics. Tadpoles retain their shape without major morphological changes during post feed periods. But the total tadpole length increases many times, and this duration is typically seen as a phase of development. This cycle of growth is followed by prometamorphosis and differential development and growth.

Frieda and Just (1970) showed that, while T3 and T4 in pemetamorphic tadpoles are below the detectable RIA, the exogenous T3 or T4 Adrenal sterosides are known to potentiate thyroid hormone action by increasing the thyroid hormone 's nuclear binding potential in the target tissue [Kikuyama et al . , 1985; Denardo and Sinervo, 1994]. In the early stages of growth (premetamorphosis) corticoids are administered to tadpolises and metamorphosis is detained. However, metamorphosis is accelerated during advanced growth [Kobayashi, 1958]. Glucocorticoid or ACTH injections, which resulted in the production and metamorphosis of the prometamorphic or premetamorphic tadpole treated with thyroxines [White and Nicoll 1981]. The regulatory factors for metamorphosis induced in Kaltenbach (1968) and Dodd and Dodd (1976) have been identified in T3 or T4 as adrenal steroids.

OBJECTIVES OF THE STUDY

1. The aim to research the function of corticosterone in T4 to T3 monodeiodination in Rana curtipes tadpoles.

2. To find development and metamorphosis in rana curtipes: effect of temperature

MATERIALS AND PROCEDURES

On the basis of preliminary remarks made in 1990, the biotope was chosen. The collection site was situated at the edge of an interminable river and surrounding Western Ghats hills, 9 km west of Lake Periyar, Kerala. At 76 SOIE longitude and 90 4S 'N latitude, hills in this region typically are between 850 and 1800 metres high. Mean temperatures vary from 17 to 23o. In winter, however, it drops to 100C. In general, Western Ghats receive a lot of rain from the Monsoon South-West. However, rain also takes place during the northeast monsoon in the southern region, to which the biotope belongs. Therefore, the rainy cycle is also extended locally in the southern latitudes. Because of steeper and longer rainy seasons, perennial and torrential hill streams are popular in southern latitude.

COMMENTS:

Frog collections were made often in the night and early morning when they were foraging their micro-niches or returning them. In their movement, they were significantly slow, especially the women. So gathering them wasn't hard. Frogs, however, were not readily accessible all year round. The majority of frogs from the forest floor, more than 1 km from the water springs, collected during November-March. More adult frogs were found in the valley during April-May, when the showers were pre-monsoon. Frogs were available in large quantities from June to October, in particular near sources of water. They have been found on a moist stream of soil in small whole areas, under stones and dry vegetation.

DATA ANALYSIS

Table 1.1 T3 and T4 plasma levels for Rana are produced at different stages

Stages	Number of tadpoles pooled	T_3 ng/dl ± SD	T_4 ng/dl ± SD
XVII	8	Not detected	63.4 ± 4.01
XVIII	7	48.3 ± 5.65	86.3 ± 4.81
XIX	7	55.4 ± 7.30	164.8 ± 10.60
XX	7	86.8 ± 6.10	386.3 ± 12.90
XXI	6	101.4 ± 9.53	528.2 ± 20.20
XXII	6	96.7 ± 8.10	372.6 ± 12.50
XXIII	6	86.3 ± 7.16	293.4 ± 10.60
XXIV	5	71.6 ± 6.30	232.3 ± 13.10
XXV	5	56.9 ± 5.41	152.4 ± 5.90
XXV + 10 days	5	38.3 ± 4.20	62.2 ± 3.34

Table 1.2 Test results of the't' students conducted at various stages of development to test the major variations between l3 and T4

XVIII	T_3 vs T_4	7	48.30	27.37	13.55	>t0.05	>t0.01
		7	86.30	19.84			
XIX	T_3 vs T_4	7	55.40	46.00	22.43	>t0.05	>t0.01
		7	164.80	96.77			
XX	T_3 vs T_4	7	86.79	31.71	35.48	>t0.05	>t0.01
		7	386.30	143.16			
XXI	T_3 vs T_4	7	101.60	37.98	50.37	>t0.05	>t0.01
		7	528.20	352.41			
XXII	T_3 vs T_4	7	96.70	55.83	48.98	>t0.05	>t0.01
		7	372.60	134.52			
XXIII	T_3 vs T_4	7	86.21	65.42	41.94	>t0.05	>t0.01
		7	293.40	101.65			
XXIV	T_3 vs T_4	7	71.60	33.98	29.18	>t0.05	>t0.01
		7	232.30	148.05			
XXV	T_3 vs T4	7	56.90	23.20	31.60	>t0.05	>t0.01
		7	152.40	30.20			
XXV + 10 days	T_3 vs T_4	7	38.30	15.50	11.80	> t0.05	> t0.01
		7	62.24	9.19			

t0.05 for 12 df = 2.18
t0.01 for 12 df = 3.05

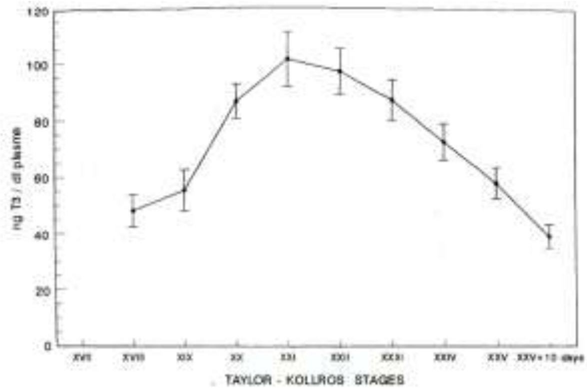

Figure 1.1 Mean plasma T3 levels in the tadpoles and froglets of the Rana cords

Table 1.3. Decrease in T3 percentage in different Rana groups

Treatment	3 h	6 h	9 h	12 h	24 h	36 h	48 h	72 h
T_3 alone	0	15.34	37.5	43.44	73.44	86.9	93.1	96.1
$T_3 + T_4$ (1:1)	0	14.7	33.68	50.15	67.21	80.9	89.34	94.08
$T_3 + T_4$ (1:2)	0	14.38	30.74	42.76	60.81	76.84	84.1	91.97
$T_3 + T_4$ (1:5)	0	12.81	21.43	29.54	42.84	59.22	64.95	80.1

The outcome of the present rana survey confirms the early observations in other amphibian species for the first time. During the pre-metamorphosis phase, circulating levels bf T3 und T4 are below RIA sensitivity and the maximum is during culminating stages. In the post-climax phase, the level decreases and the hormone level is below that of prometamorphic tadpoles. Secondly, monodeiodination in premetamorphic rana curtipes of tadpoles can be induced early. In addition ,this study also showed that, during Rana metamorphosis, corticosterone has no effect on deiodination from T_4 to T_3.

CONCLUSION

The morphometric analysis is one of the important reasons for a biological-description solution. With regard to Indian anuran, it is evident from the literature review that little attention has been paid to life storey, breeding behaviour, and endokrinological influences on the production and metamorphosis of Rana curtipes. There is only a few systematic descriptions (Boulenger, 1882a, 1890, 1920; Guenther, 1875). There are 142 morphometric informations. Thus, this study seeks to introduce this little known tropical species to the scientific world and to determine the effect on the production and metamorphosis of temperatures and hormones. this study show that Rana curtips are normally nocturnal, slow in movement and uncomfortable in sea. Only during the breeding season do they approach water.

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