

PREFACE

Amphibians have an unique place in the evolutionary history of vertebrates. They are the first vertebrates to establish life on land but preferred to settle at the edge of the water, a reminiscent of their aquatic ancestry. The successful perpetuation of a species and it's survival in the new terrestrial environment is dependent on the successful modulation and development of several anatomical features, viz. - limbs, lungs, skin etc. But biologically the most important modification is the evolution of new reproductive strategy.

Amphibians enjoy diverse habitats and accordingly during the course of evolution they have evolved different modes of reproduction such as oviparity, ovoviviparity, and even viviparity. Surprisingly, all these reproductive modes have a concurrent gametogenic pattern.

Conventionally the reproductive cycles of amphibians have been reviewed in terms of histological and histochemical studies (Marshall, 1956; Gallien, 1959; Oordt, 1960; Lofts 1968, 1974, 1984; Basu, 1969; Jørgensen et al., 1979; Rastogi and Iela, 1980; Saidapur, 1983, 1986). The advent of new tools and techniques in cell study have revolutionized the earlier observations made. It is evident from the recent observations that the reproductive pattern vis -a- vis the reproductive mode not only encounter gross cytological changes but are the also reflection of concurrent submicroscopic changes caused due to one or several intrinsic and extrinsic factors.

Most of the work on amphibian reproduction is related to temperate species (Marshall, 1956; Gallien, 1959; Oordt, 1956,1960; Wake, 1977, 1978, 1980, 1982; Worthham, 1977,1982; Lofts, 1968,1974,1984; Duellman et al., 1985; Mizuhira, 1986; Jamieson 1993; Lee et al., 1992,1993; Ford, 1993, Kwon et al., 1995). However, a few similar such works have been extended to other amphibian species of tropical and subtropical regions (Saidapur and Nadkarni, 1975; Saxena and Lal, 1981; Kurian and Saidapur, 1983; Kanamadi et al., 1983; Bohra and Niazi, 1984).

In India about hundred species of anuran, over a dozen species of apodan and only one species of urodele are known to exist. However, studies on the reproductive cycles of Indian amphibians are surprisingly limited to only a half a dozen of species (*Rana cyanophlyctis*, *Rana tigerina*, *Rana hexadactyla*, *Bufo marinus*, *Bufo melanostictus*, *Bufo stomaticus*). Therefore, the scope of study of reproduction in additional amphibian species, especially at the ultrastructural level is highly immense and is of great necessity. The study would be of significance to bridge the gaps in our understanding on various aspects related to the reproductive biology of amphibians. The present study mainly embraces the ultrastructural changes in the reproductive cycles of the Himalayan Newt, *Tylototriton verrucosus* Anderson (*Pleurodeles verrucosus* Anderson), the sole representative of urodele in Indian sub continent. Earlier studies, frequently made by Ray (1978) and Roy (1989), are mainly based on the light microscopy observations.

Present study is, therefore, concerned with the gonadal activities, quantitative aspect of gametogenesis, gonadal cycle and it's environmental control as revealed from the ultrastructural studies made on the male Himalayan Newt, *Tylototriton verrucosus* Anderson.