

Ex-situ conservation approach for the endemic bush frogs in the Western Ghats, India

*J.Leona Princy, P.Kannan and P.Santhosh Kumar

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Department of Zoology & Wildlife Biology, Government Arts College, Udhagamandalam, The Nilgiris, Tamil Nadu-643 002.

Abstract:

Conserving animals outside the protected areas is known as *ex situ* conservation. Biology of the Western Ghats amphibians is less explored subject, particularly with regard to reproductive behaviour. In the present study development and hatching success of an endemic frog to Pykara, The Nilgiris, Western Ghats were achieved. Egg mass of frog found near human habitation mass was brought to laboratory and kept in a plastic container to study the possibilities of keeping this kind of eggs in captive conditions. The egg mass had 24 eggs which were maintained at room temperature. The eggs underwent direct development, and hatching of froglets came out after 28 days. After few days the froglets were released into natural environment. Species of the hatchlings was not identified because of its smaller size. However, the features assure that it could belong to the *Raorchestes* species, which is endemic to Western Ghats.

Keywords: *Raorchestes* , captive condition , direct development, *Ex-situ* Conservation approach.

The diversity of reproductive modes is much greater in amphibians than in other groups of vertebrates, especially the amniotes. Mode of reproduction is a combination of oviposition site and type of egg development. (Biju, 2003)

Amphibians exhibit remarkable variations in development from egg to adult. One such extreme modification is direct development, where in free-swimming tadpole stage is completely eliminated and eggs hatch into baby frogs, resembling the adults except for their size. Species that are adapted completely to terrestrial living generally exhibit direct development. The advantage of being adapted to such a development includes avoidance of predation, which is prevalent in aquatic media, parental care and more importantly, dependency on water body for development and complex metamorphic processes. Direct development by passing an aquatic, free-swimming tadpole stage in amphibians seems to be the fastest reproductive mechanism adapted in vertebrates and specifically among anamniotes. Based on site of egg development, as many as 29 breeding types have been recorded in amphibians. Nevertheless, direct development has an evolutionary significance in adapting to non aquatic habitats, resembling oviparous development like birds and reptiles. The Western Ghats, a hill range on the west coast of India, with rich biodiversity harbours as many as 137 amphibian species. Among these, the *Philautus* genus (Anura: Ranidae: *Rhacophorinae*), commonly known as oriental shrub frog has direct development from egg to adult. (Gururaja and Ramachandra, 2006). The genus *Raorchestes* (formerly *Philautus*) was erected by Biju *et al.*, (2010) based on molecular phylogenetic studies. Members of this genus are known for direct development (Patil and Kanamadi, 1997;

Krishnamurthy *et al.*, 2002; Biju, 2003; Gururaja and Ramachandra, 2006; Biju *et al.*, 2010).

The highest density in this genus is found in the Western Ghats of India and Srilanka. This genus *Raorchestes* is restricted to the Western Ghats with 39 species (Zachariah *et al.* 2011). Biology of the Western Ghats amphibians is a less explored subject particularly with studies on reproductive behaviour. Arboreal direct development has also been observed in the Indian species *P. bombayensis* (Bossuyt *et al.*, 2001), *P. tinniens* (Bossuyt & Dubois, 2001) and *P. glandulosus* (Biju, 2003). None of these authors however, provided data beyond the breeding event itself. In this paper we describe hatching and development of *Raorchestes* species from Pykara, The Nilgiris, Western Ghats.

Pykara (11.458943'N & 76.583076'E) is situated at an altitude 2071 m above sea level. The average annual temperature in Pykara is 15.2 °C. The average annual rainfall is 2001 mm. Relative humidity is 98%. The forest is scattered throughout the area. It has shola trees, eucalyptus, wattle trees and most of the area changed into human dwelling places. Tourism is prominent in this area and on noted as one of the major threats for amphibian species. During our field work in this area we observed that one clutch of egg near human habitation which was mostly utilized by cattle for grazing purposes.

The Egg clutch was collected from a burrow near cattle grazing field on 2nd July 2014. The clutch contains 24 eggs. The diameter of the eggs was 0.4cm. Eggs were unpigmented with uniform cream colouration. Each egg was covered with transparent, elastic and gelatinous membrane. By noticing the threats for the eggs because of cattle, the egg clutch was safely brought to the laboratory of Department of Zoology and Wildlife biology, Govt.Arts College, Ooty and kept in a plastic

*Corresponding Author :
email: leonaprincymc@gmail.com

container. The bottom bed of soil and decomposed leaves which were collected from the sight where collected, the egg clutch were placed in bottom of the plastic container. The height of soil bed was 0.9 cm with a diameter of 12.3 cm and depth of 4.5cm to keep the egg clutch. In this plastic container egg clutch was kept. Water was sprinkled on the bed every 3-4days / Once to keep the soil in moist condition. No artificial lighting was used. Daily observation was made to note the improvement of the development of eggs. The eggs underwent direct development, and hatching of froglets occurred after 28 days on (30th July 2014). All the 24 eggs were hatched out successfully. (Figure 1-8)

The froglets Snout vent length (SVL) measured 0.3 cm when they emerged. Hatched out froglets was light brown in colour with 'X' mark on the dorsal side. Upper eyelids bordered by golden yellow colour. After few days the froglets were released in to natural environment area. Species cannot be identify because it is too small in size, but we assured that and it may be a *Raorchestes* species. Our study motivated by the need to develop captive breeding techniques as a tool of last resort for the ex situ conservation of endemic and critically endangered species of frogs.

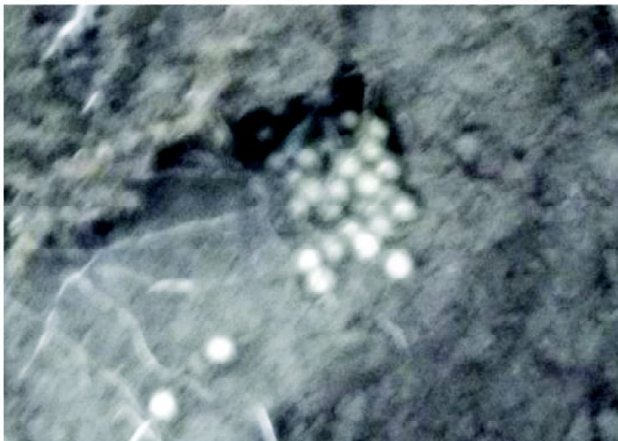


Fig.1 Clutch of eggs observed near Human habitation



Fig.2 Clutch of eggs kept in a plastic container in laboratory condition



Fig.3 Development of eggs till day 10



Fig.4 Development of eggs till day 15



Fig.5 Development of eggs till day 25



Fig.6 Three days before for hatching

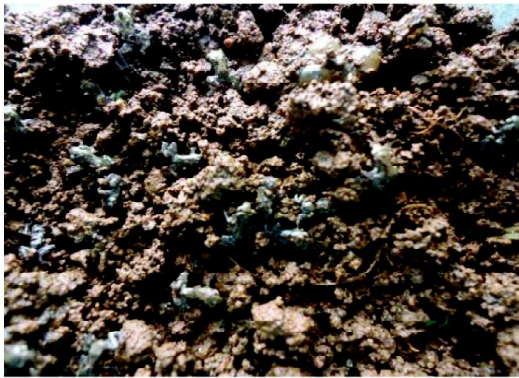


Fig.7 Newly hatched tiny froglets on the soil



Fig.8 Tiny froglets attached on the side of the Plastic container

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