

Extinct frog stages comeback

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The genesis of frogs dates back to millions of years, say around 360 million years ago. Fossil records and scientific studies show that fishes turned frogs in the evolutionary process, thanks to changing habitat - fins and gills became limbs and lungs respectively in the amphibian. Taxonomically, the amphibians are classified into three orders. They are caudata (those with fore limbs, hind limbs and a tail), apoda (those without limbs, worm like) and anura (those without tails). And scientists from the Indian Institute of Science have been exploring the bio-diversity in the Western Ghats, stretching right from Surat (21 degree North) to Kanyakumari (8 degree North). Studying the different amphibian species in the region in relation to the changing landscape, researchers from the Centre for Ecological Sciences at IISc came across 'White-nosed oriental shrub' frogs.



Considered as one of the endemic and endangered species, they are scientifically known as '*Philautus cf. leucorhinus*' and were found in Sagar taluk in Shimoga district in Karnataka. What fascinated the researchers was that, these species were found to skip an important stage in their evolutionary cycle the tadpole stage. "Though studies have been conducted earlier, its the first time that we have witnessed this process in Western Ghats," says K V Gururaja, researcher at the Energy and Wetlands Research Group, Centre for Ecological Sciences. He along with researcher T V Ramachandra conducted the research.

In the Western Ghats region, researchers from Bangalore have come across a rare frog species which skips the tadpole stage in its evolutionary cycle. Ironically, these frogs are officially considered to be extinct, reports Manoj Rammohan.



1. Head, limb and tail differentiation



2. Mouth differentiation



3. Finger differentiation



4. Froglets

Extinct!

Interestingly, this species has been officially recorded to be 'extinct'. According to The Global Amphibian Assessment (GAA) website (www.globalamphibians.org), the '*Philautus Leucorhinus*' has been "listed as extinct because it has not been recorded for around 150 years, and extensive searches over the last ten years have failed to locate this species." GAA provides the comprehensive status assessment of the world's 5,918 known amphibian species, against the IUCN (The World Conservation Union) Red List Categories and Criteria. This species is known only from the type locality 'Ceylon' - Sri Lanka. The type locality is unspecific and it is not possible to produce a map for this species. Specimens of this species reported from the Western Ghats of India are now considered to be *Philautus wynaadensis*, adds the website.

"The frogs found here are very much similar to the extinct species but the findings are not conclusive. We don't have access to the type specimen and the only available is preserved in Zoologisches Museum in Berlin, Germany" says Gururaja. Among the tests that have to be carried out to identify (or classify) an amphibian include morphology, pertaining to its external features and osteology, which looks into the skeletal characteristics apart from acoustics (calling patterns), reproduction behaviour and habitat details. Also, molecular phylogenetics is done to analyse the amphibian's DNA structure and taxonomic position.

Tadpole stage

The oriental shrub frog is one among the 137 amphibian species found in the Western Ghats. Among the 90-odd '*philautus*' species recorded throughout the world, 23 are from this region. The researchers have concluded that as part of adapting itself to the fast changing environmental conditions, these frogs have skipped the 'tadpole' stage in its evolutionary cycle. The research paper published in February in the journal 'Current Science' says that advantage of being adapted to

such development includes avoidance of predation in aquatic media as well as dependency on water body. '*Philautus leucorhinus*' is coloured pale to dark brown on the dorsum with black patches. They get amplexed - where the male frog sits on the female and external fertilisation takes place in a moist place (in terrestrial platform). Unlike other frog species, these lay less eggs and are successful in breeding most of them. "Their reproduction takes place within certain conditions (or constraints) and also depends on available resources." explains Gururaja.

In the laboratory

The unpigmented eggs with uniform cream colour were found to have neural folds within a day. Later, it turned into neural tube; head, tail and limb were formed at the anterior and posterior ends of the neural tube. About six days later, the tail was translucent and pigmentation of iris and heart beats were also observed during the same period. Within six days, major development stages such as demarcation of head, mouth, eye, fore limbs and hind limbs took place; while fingers, toes, mouth parts and eyes developed in the remaining period. These findings act as a warning for the environmentalists and ecologists – the natural habitat of the amphibian Species need to be conserved