

THE STUDY OF MORPHOLOGICAL VARIATIONS OF FROGS IN SOUTH INDIAN SCENARIO

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ABSTRACT

Amphibian research in India is limping primarily due to the lack of appropriate and reliable reference books that cover all the known species. Such guides, despite the number of excellent photographs of rare species, Amphibians are in most cases, small, diverse and sensitive environmental variability. They can be good indicators of habitat diversity, biological variety and local stressors on the environment. The lack of correctly identified and well maintained specimens have offered little scope for even a serious student of amphibian, studies to attempt preparing a field guide to any part of India. Loss of habitat and human interference are the two most common threats facing amphibians in India. Lack of consistent studies on amphibian population dynamics for most of the species preclude confident statements or even inference of reduction in population. In the present investigation two families are studied among Indian amphibians of which family Ranidae (The True Frogs) and Bufonidae (True Toads) In general, studies on the amphibians are very important.

Key Words: Amphibian fauna, Morphological characters, Family Ranidae (The True Frogs) And Family Bufonidae (True Toads).

INTRODUCTION:

The use of the term "frog" in common names usually refers to species that are aquatic or semi-aquatic and have smooth, moist skins; the term "toad" generally refers to species that are terrestrial with dry, warty skins. (Kuzmin, Sergius L. 1999-09-29). There are numerous exceptions to this rule. The European fire-bellied toad (*Bombina orientalis*) has a slightly warty skin and prefers a watery habitat. Whereas the Panamanian golden frog (*Atelopus zeteki*) is in the toad family Bufonidae and has a smooth skin. (Lips, K *et al.*, 2010). The Anura include all modern frogs and any fossil species that fit within the anuran definition. The characteristics of anuran adults include: fewer presacral vertebrae, the presence of a urostyle formed of fused vertebrae, no tail, a long and forward-sloping ilium, shorter fore limbs than hind limbs, radius and ulna fused, tibia and fibula fused, elongated ankle bones, absence of a prefrontal bone, presence of a hyoid plate, a lower jaw without teeth (with the exception of *Gastrotheca guentheri*) consisting of three pairs of bones (angulosplenic, dentary, and mentomeckelian, with the last pair being absent

in Pipoidea), (Duellman an unsupported tongue, lymph spaces underneath the skin, and a muscle, the protractor lentis, attached to the lens of the eye. (Cannatella, David; 2008). The anuran larva or tadpole has a single central respiratory spiracle and mouthparts consisting of keratinous beaks and denticles. (Cannatella, David; 2008).

A true toad is any member of the family Bufonidae, in the order Anura (frogs and toads). This is the only family of anurans in which all members are known as toads, although some may be called frogs. The bufonidae now comprise more than 35 genera, *Bufo* being the most widespread and well known. True toads are widespread and are native to every continent except Australia and Antarctica, Most lay eggs in paired strings that hatch into tadpoles, although, in the genus *Nectophrynoides*, the eggs hatch directly into tiny toads. (Zweifel, Richard G., 1998). True toads are toothless and generally warty in appearance. They have a pair of parotoid glands on the back of their heads. These glands contain an alkaloid poison which the toads excrete when stressed. The poison in the glands contains a number of toxins causing different effects. Bufotoxin is a general term. Different animals contain significantly different substances and proportions of substances. Some, like the cane toad *Rhinella marina*, are more toxic than others. Some "psychoactive toads", such as the Colorado River toad have been used recreationally for the effects of their bufotoxin. Male toads possess a Bidder's organ. Under the right conditions, the organ becomes an active ovary and the toad, in effect, becomes female. (Brown *et al.*, 2002).

Species of the genus *Breviceps* spend most of the year underground; even when on the surface, they are inconspicuous because of their slow movements and cryptic colouration. They walk rather than hop. They are able to burrow rapidly, backwards, into the soil by using the enlarged, spade-like metatarsal tubercles on their feet. (Minter, Leslie Rory; 1999). These frogs emerge after rain to feed on small arthropods such as ants, termites, beetles, moths, woodlice, amphipods, juvenile millipedes, and caterpillars. Reproduction also occurs during the rainy season. After hatching, the movements of the tadpoles make the remains of the egg mass into a froth. The female remains close to the egg chamber until the tadpoles are fully developed. (Minter, Leslie Rory; 1999). Günther's frog is a species of frog in the family Ranidae. It was formerly placed in the genus *Rana*. It is found in China, Hong Kong, Macau, Taiwan, Vietnam, and possibly Cambodia and Laos. An introduced population is found on Guam. (Wostl, *et al.*, 2016) An alternate common name is Günther's Amoy frog, and the honorific is often spelled "Guenther's".

Asian common toads Bufonidae (True Toads) breed in still and slow-flowing rivers and temporary and permanent ponds and pools. Adults are terrestrial and may be found under ground cover such as rocks, leaf litter, and logs, and are also associated with human habitations. The larvae are found in still and slow-moving waterbodies. (van Dijk, P. P.; *et al.* 2004). They are often seen at night under street lamps, especially when winged termites swarm. They have been noted to feed on a wide range of invertebrates, including scorpions (Berry, P. Y.; Bullock, J. A. 1962). Tadpoles grown in sibling groups metamorphosed faster than those that were kept in mixed groups. Tadpoles have been shown to be able to recognize kin. (Saidapur, S. K.; Girish, S. 2000). The anuran tadpoles are highly plastic and therefore depending upon the ecological conditions the

morphological features, habitat, time of the year when they are found in different geographical locations, duration of metamorphosis and size at transformation vary greatly within and between the species.

MATERIALS AND METHODS:

Procurement of the experimental animals:

Collections were made either during late evening, nights or early hours of the day. The habitats surveyed ranged from agricultural fields through semi-evergreen and low-altitude evergreen forests to high elevation evergreen forests of the area. During each collection, all aquatic, semi-aquatic, terrestrial and arboreal habitats were intensively searched for the presence of amphibians. Care also taken to search remote microhabitats, such as rock crevices, areas covered butters, leaf litter, fallen and decaying wood, shrub-root basis and temporary water bodies formed during monsoons. At every collection, only a sub sample of each new species seen was preserved in formaldehyde for identification. The remaining frogs after collection were examined for morphological structures in both males and females. Then they were released into their respective natural habitats.

Maintenance of frog

Healthy frogs, weighing 50 ± 3 gms were collected from the pond, acclimated to the laboratory conditions in large glass aquaria with water (Temperature $27 \pm 2^\circ\text{C}$; P^{H} 7.0 ± 0.2 , light period – 12 hours) for 7 days. They were fed with cockroaches and earthworms *ad libitum*, with change of water daily.

RESULTS AND DISCUSSION:

FAMILY: RANIDAE (THE TRUE FROGS)

1. *Rana breviceps* :- It belongs to Phylum - Chordata ; Class – Amphibia; Sub-Class – Lissamphibia ; Order – Anura and Family – Ranidae. They are terrestrial, nocturnal and are found in association with the common Indian toads in the evening. Head is broader than long. Snout is short and rounded, not projecting beyond the mouth. Nostril is equidistant from the tip of the snout and the eye. Ear drum is distinct. Fingers are without webs, the first finger is much longer than the second but equal to or a little shorter than the third. Tips of the fingers are swollen but not disc-like. Hind limbs very short. Joints between the segments of the fingers and toes are well developed. Toes are slightly webbed. A highly developed, large shovel-shaped inner pedal tubercle is present. Outer pedal tubercle is absent. Skin is smooth on the back and granular on the belly and underside of the thighs. The back is yellowish brown color with dark spots or markings. The lower side is pinkish white (Plate 1.1 Fig .A &B).



Fig. A: Dorsal view

Fig. B: Ventral view

2. *Rana Verrucosa Gunther* :- It belongs to Phylum - Chordata ; Class – Amphibia; Sub-Class – Lissamphibia ; Order – Anura and Family – Ranidae. It is also called *Rana keralensis* – Dubois. Now it is referred as “*Limnonectes keralensis*”. It is commonly called as ‘warty frogs’. These are stocky, medium sized frogs with slight hump on the back, which is observed at rest. Head is slightly broader than long. Snout is somewhat pointed. Eyes are large; the pupil is round and dilatable. The nostril is equidistant from the tip of the snout and the eye. Ear drum is distinct, nearly equal to the diameter of the eye. Fingers are without webs, the first is longer than the second. Tips of the fingers are almost pointed. Toes are largely webbed with two segments of the fingers and toes are large and prominent. The inner pedal tubercle is elliptical but outer tubercle is small and oval. Skin on the back is rough and warty but smooth on the belly. A skin fold extends from the eye to the shoulder. The colouration of the body varies with the habitat of back ground. Upper parts are dark grey or brown with some dark markings. Lips and limbs are barred. Sometimes a median stripe is present. Eyes are black. Males are smaller than females (Plate 1.2 Fig. A & B).



Fig. A: Dorsal view

Fig. B: Ventral view

FAMILY: BUFONIDAE (TRUE TOADS)

The diagnosis of a toad is quite easy because of its fat body, broad waist, short legs and awkward hopping movements. The skin is thick, glandular and rough with warts tubercles. The pupil is horizontal and the jaws are toothless. However, the toad's most distinguishing feature is the presence of a pair of conspicuous parotid glands behind the ear drum. Varying in shape and size according to the species, these glands secrete a poisonous substance which causes a burning sensation in the mucous lining of the Captor's mouth. The secretion emitted by a full grown common toad is enough to kill a dog. Most species are terrestrial or fossorial. The family contains 25 genera and 335 species world wide. In India there are 4 genera and 21 species of which 2 species are found in the present survey.

3. Bufo melanostictus Schneider:- It belongs to Phylum - Chordata ; Class – Amphibia; Sub-Class – Lissamphibia ; Order – Anura and Family – Bufonidae. It is commonly called as “common Indian Toad ‘. It is distributed through out the South India. It is nocturnal in habit and generally found in gardens and road sides. This toad is usually terrestrial and found in and near the water only during breeding season. Females are larger than males. Head is broader than long with cornified bony ridges. Snout is rounded. Nostril is a little nearer to the tip of the snout than the eye. Ear drum is distinct, circular and oval. Parotid glands are large and bean shaped. Fingers are without webs, the first finger is equal to or a little longer than the second. Tip of the fingers and toes are swollen. Toes are partly webbed with more than three segments of the fourth toe free. Two oval (inner and outer) pedal tubercles are present. Skin is rough with several black tipped spiny warts on the upper side, hence the specific name. Lower side is also rough in texture. The color of the body may be dark brownish with few or rose colored spots on the back. Lower parts are dull white with a yellowish tinge (**Plate 1.3 Fig. A & B**).

**Fig. A: Dorsal view****Fig. B: Ventral view**

4. Bufo stomaticus Lutken:- It belongs to Phylum - Chordata ; Class – Amphibia; Sub-Class – Lissamphibia ; Order – Anura and Family – Bufonidae. It is commonly called “marbled toad “. It is terrestrial and nocturnal but they are found near water in the breeding season. They may be found with the common Indian toads at night and spend the day in the same habitat. They are medium sized toads. Females are larger than males. Head is broader than long and without any bony ridges. Snout is rounded. Nostril is nearer to the tip of the snout than the eye. Ear drum is distinct, circular or oval and nearly two-thirds the diameter of the eye. Parotid glands are large, flat and elliptical but not bean shaped. Fingers are without webs, the first finger is longer than the second. Tips of the fingers and toes are swollen. Toes are almost two-third webbed with two segments of the fourth toe free. Two oval (inner and outer) pedal tubercles are present with sharp edges. The joint between the ankle and foot reaches in between the ear-drum and eye, when the hind leg is held parallel to the body. There are several irregular flat warts on the upper side. The lower side is coarsely granular except the throat and the chin. The upper parts are brownish. Belly and upper lip is dull whitish (**Plate 1.4 Fig. A & B**).



Fig. A: Dorsal view



Fig. B: Ventral view

CONCLUSION: The recent frightening decline in amphibian populations worldwide, there has been a burst of interest in the study of Indian amphibians especially with regard to faunal diversity, reproduction, development and behavior. The most important factor leading to amphibian population declines is habitat destruction. When forests are cleared it is no surprise that species that once lived there disappear. According to current circumstances the tremendous decline of amphibian population leads to increased biggest locust swarm attack in over two decades, several parts of North Gujarat have seen crops like castor; cumin and mustard take a major hit. Hence the present status report attempts to review studies on the behavioral ecology of toads in the south Indian waters.

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