

A study on bush frogs (genus : Raorchestes) in Udhagamandalam, Nilgiri Biosphere Reserve, Tamil Nadu

<https://doi.org/10.56343/STET.116.009.002.010>
<http://stetjournals.com>

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Abstract :

The Nilgiri Biosphere Reserve (NBR) is the home for many endemic species of Western Ghats. Amphibians within Western Ghats and Nilgiri Biosphere Reserve show very high level of endemism especially in the genus *Raorchestes*. The genus *Raorchestes* is shrub frog belonged to the family Rhacophoridae, and the class Amphibia. Published information on the Herpetofauna particularly about amphibians of NBR is scanty, There is no detailed study on the ecology of the bush frogs. Hence it was decided to study the ecology, current taxonomic positions, habit and habitat and distribution pattern of bush frogs. Four different localities were selected for this study in and around Udhagamandalam. In each locality visual encounter survey method was used to collect data on bush frogs. During the study period, three species of *Raorchestes* were recorded which included *R. tinniens*, *R. signatus* and *R. thodai*. *Raorchestes* mostly recorded during the rainy season under bushes and other vegetations.

Keywords: *Amphibian, ecology, endemism, Raorchestes,*

INTRODUCTION

“An amphibian is the first “actor” in the evolution of life on land”. Amphibians are the first vertebrate animals to have two completely different life stages, one as tadpoles that generally occur in water and other as adults that are living more on land (Duellman and Trueb, 1994). Amphibians are vital components of a healthy environment. Presence of a good population of amphibian in a region is an indication of a healthy environment (Gururaja et al., 2008). Amphibians play a major role in ecosystem functioning, as prey and predator, especially as a consumer of pest insects. The Western Ghats has a high diversity and endemic amphibian species with 181 known species, (including new species described in recent years) of which 159 (88%) are endemic to the Western Ghats (Aravind and Gururaja, 2011; Bhatta et al., 2011; Zachariah et al., 2011). Few new species of Anurans belonging to the genus *Rhacophorus*, *Polypedatus*, *Raorchestes* have been described from the Western Ghats in recent years. Amphibians within the Western Ghats hotspot show very high level of endemism or local endemism especially in the genera *Raorchestes* when compared to other biogeographic regions of India.

BUSH FROG

These frogs belong to the family Rhacophoridae. The family Rhacophoridae is widely distributed in the tropical regions of Africa and Asia. Tree frogs, bush frogs, gliding frogs and flying frogs are belonged to this family (Daniels, 2005). This family constitutes a diversity of about 300 species of frogs with a distribution in the tropical region of Asia and Africa (Biju, et al., 2010).

Almost all species in this family are tree dwellers and are characterized by the enlarged disc on the fingers and toes. These frogs are capable of taking long leaps from one place to another. Many species in this family are brightly coloured. They vary in length from 1.5 cm to 12 cm. Among the bush frogs, most species lay eggs between leaf folds or directly in water. Few species are even known to develop directly from the eggs without a free living tadpole stage. In those species with direct development in the mode of reproduction, parental care is prevalent to certain extent (Daniels, 2005).

GENUS: RAORCHESTES

Raorchestes is a genus of shrub frogs in the family Rhacossphoridae. This genus is characterized by direct development of the adult, withouts the free living larval phase (Bossuyt and Dubois 2001; Callery et al., 2001). Some species have been found to bury their eggs in soil although they are arboreal, and others attach their eggs to leaves. Bossuyt and Dubois (2001) recognized 110 valid species names in the genus *Raorchestes*. The anuran fauna of the Western Ghats is extremely diverse in terms of species richness (Dutta, 1997; Das, 2000; Bossuyt, 2002; Kuramoto and Joshy, 2003). The highest density of this genus was found in the Western Ghats of India and Sri Lanka There are 146 species of *Raorchestes* reported throughout the world. This genus *Raorchestes* is restricted to the Western Ghats with 39 species (Zachariah et.al. 2011). It is considered as an indicator of fragmented forests for its patchy distribution (Gururaja et al., 2007). The generic name *Philautus* is changed in to “*Raorchestes*” because the generic epithet is derived from the name “Rao” and the scientific nomen “orchestes”. The former is chosen in honour of C.R.Narayana Rao, and in recognition of his contribution to Indian batrachology. The latter is based

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on the first generic name coined for frogs of Raorchestes group (Biju et.al. 2010).The present article deals with the micro and macro habitats of bush frogs in and around Udhagamandalam, preparation of inventory of species of bush frogs (Genus: Raorchestes), the diversity and distribution pattern of bush frogs in disturbed and undisturbed habitats , existing threats, and preparation of action plan for their conservation in and around Udhagamandalam, Nilgiri Biosphere Reserve.

MATERIALS AND METHODS

Visual encounter survey method was used to collect data from July 2012 to March 2013, which involves searching for bush frogs in a locality or vegetation types and recording all visible frogs on the surface (Campbell and Christman, 1982, Corn and Bury, 1990). While walking, the vegetation, path, and other possible places for frogs were scanned, and the species observed within a 10 m distance from the path were recorded. Ecological information of the species such as colour variations, microhabitat, defects and threats (presence of predators, habitat change) were recorded. The sampling duration in each locality was largely depending on the size of the area. Morphometric measurements of Raorchestes such as body length, head length, head width, hind limb length and fore limb length were taken for all individuals sighted during the study period .Vernier calliper and scales were used to measure the required parameters.

RESULT

Totally 50 individuals of Raorchestes were recorded in and around Udhagamandalam, in the Nilgiri District of Tamil Nadu. Of these, 32 (64%) were Raorchestes

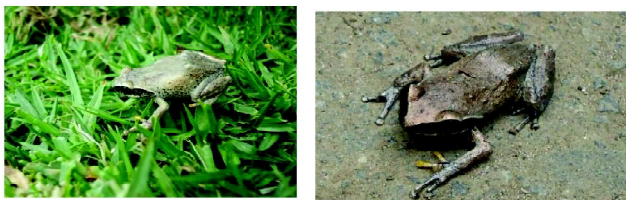


Fig 1: Raorchestes tinniens recorded in Udhagamandalam



Fig 2 : Raorchestes signatus recorded in Udhagamandalam

tinniens, 15 (30%) were Raorchestes signatus, and 3(6%) were Raorchestes thodai. The microhabitats in which they occupied were under the stone, bush, grass and the ground. A total of 27 individuals (54%) were recorded from underneath of the stone, and 15 (30%) individuals were recorded from bushes (Figure 1-4). Various types of activities such as resting under stone, bushes, jumping and moving on the surface were noticed. The seasonal distribution pattern of Raorchestes indicated that, during the rainy season 34 (68%) individuals, and during the winter season a total of 16 (32%) individual were recorded. Micro habitats from which the amphibians recorded were mostly ground forbes and grasses. However, Raorchestes were mostly recorded under stones. (Table 1)

Threats for Raorchestes in Udhagamandalam, The Nilgiris

Habitat disturbance and loss of forests cover are major threats to bush frogs, because majority of bush frogs occupy regions that are being used for agricultural purposes. Pesticides play a major role in creating an unstable environment for amphibian, particularly for the bush frogs. Excessive use of pesticides such as DDT, Dieldrin and Malathion has been shown to affect the



Fig 3: Raorchestes thodai recorded in Udhagamandalam

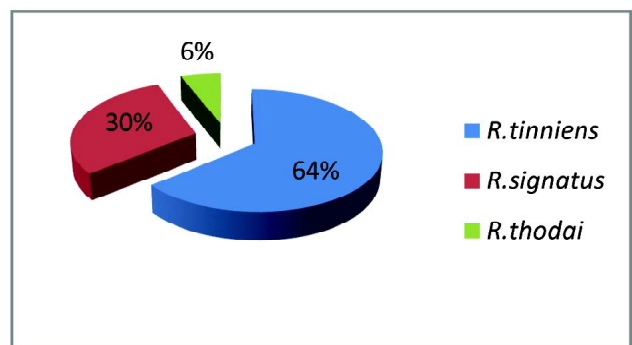


Fig.4 Species wise data on Genus :Raorchestes in Udhagamandalam

Table 1: Morphometric measurements of different species of Raorchestes

S.No	Measurements (cm)	R. tinniens	R. signatus	R. thodai
1	Total length(TL)	2.4 ± 0.45 (1.5 -3.5) (n=32)	3.4 ± 0.68 (3 - 4.5) (n=15)	3 ± 0.2(2.8-3.2) (n=3)
2	Head length (HL)	0.7 ± 0.1 (0.5 -1) (n=32)	0.9 ± 0.14 (0.7 -1.3) (n=15)	0.7± 0.3 (0.4 -1) (n=3)
3	Head width (HW)	0.6 ± 0.24 (0.4 -1.6) (n=32)	0.8 ± 0.31 (0.5-1.6) (n=15)	0.7 ± 0.1 (0.6 -0.8)(n=3)
4	Fore limb length (FL)	0.8 ± 0.28(0.4 -1.5) (n=32)	1.7± 0.17 (0.8 -2.2) (n=15)	1.2± 0.2 (1-1.5) (n=3)
5	Hind limb length (HL)	2.3 ± 0.66(0.8 - 2.9) (n=32)	3.74± 0.93 (3-5) (n=15)	3.2±0.2(3-3.5) (n=3)

immune system of any amphibian species. While use of herbicides has an effect on their reproductive ability by inducing sex reversal.

DISCUSSION

Biju et al., (2009) reported that 12 new species of *Philautus* with its systematic and phylogeny in the Western Ghats, India. These 12 new species are described and compared with other members of the genus, especially with the name bearing types of Indian *Philautus*. such as *P.anili*, *P.beddomii*, *P. coonoorensis*, *P.glandulosus*, *P.tinniens*, *P.signatus*, *P.ponmudi*. During the study period two species were recorded namely, *P.tinniens* and *P.signatus*. Zachariah et al. (2011) reported new species of *Raorchestes* from the Western Ghats of India such as *R.agasthyaensis*, *R.ravii*, *R.johnceei*, *R.thodai*. In this *R.thodai* was recorded during the study period in and around Udhagamandalam, Nilgiris.

Relatively higher number of species was recorded from Finger Post area in Udhagamandalam which included *R.tinniens*, *R.signatus* and *R.thodai* that may be due to habitat availability, even though these areas have fragmented forest patch and mainly occupied by plantations such as Eucalyptus, wattle and pine trees. Nevertheless this area provides lot of micro habitats that are suitable for the *Raorchestes* species.

Maximum number of *Raorchestes* species were recorded during rainy season that could be due to breeding activities of this species. During the breeding season, both male and female *Raorchestes* come out from the bushes for breeding purposes and pave the way for sight and visibility of many individuals on the ground. Further and more intensive explorations may yield a good number of amphibian fauna in Ooty.

CONCLUSION

The available reports on amphibians are all only short term studies. It is suggested to have a long term project with adequate man power and expertise in view of the biodiversity in Ooty. A careful study must be taken to know the impact of pesticides on the population levels of each species and find out susceptible species and conservation strategy should be arrived at. Since human habitation supporting more species, it is necessary to prevent killing by people by educating the people.

ACKNOWLEDGEMENTS

One of the authors, J. Leona Princy, thanks the DST (INSPIRE Fellowship) Government of India, New Delhi. The authors thank Dr.J.Ebanaser HOD, Department of Zoology and Wildlife Biology, Government Arts College, Udhgamandalam for the encouragement and the facilities.

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