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Morphometric studies on *Duttaphrynus melanostictus* (Schneider, 1799) (Anura : Bufonidae) and *Microhyla ornata* (Duméril and Bibron, 1841) (Anura : Microhylidae)

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Corresponding Author*Abstract**

Statistical analysis with traditional morphometry was performed to analyse the intra population variation in the anurans *Duttaphrynus melanostictus*(Schneider, 1799)(Anura : Bufonidae) and *Microhyla ornata* (Duméril and Bibron, 1841) (Anura : Microhylidae). Samples (N=10) collected from different sites of Bangalore University Jnana Bharathi Campus (N 12°56'E 77°30'). Eleven morphometric parameters were considered, significant correlation was obtained between the parameters viz., snout vent length, head length, head width, eye diameter, tympanic diameter, eye- nasal distance, inter-orbital distance, thigh length, foot length, first finger length and first toe length. Regression analysis performed for two morphometric variables viz., head length and the total length and fitted regression equation was obtained for the three species, *Duttaphrynus melanostictus* ($y=0.181x+0.857$, $R^2=0.803$) and *Microhyla ornata* ($y=0.277x-0.057$, $R^2 = 0.555$).

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Introduction

The amphibian fauna is an important component of most terrestrial and freshwater ecosystems, they contribute significantly to the biodiversity of a given area and also serve as a best indicator of environmental health (Blaustein *et al.* , 1994). Several studies on anuran morphometry have been reported worldwide viz., Balleto *et al.*, (1985); Kerney *et al.*, (2007); Vieira *et al.*, (2008) and in India as well Krishnamurthy and Shakuntala (1993); Biju and Bossuyt (2005); Biju *et al.* (2007); Nair and Kumar (2010) and Padhye *et al.* (2012).

The Common Indian Toad, *Duttaphrynus melanostictus* (Anura :Bufonidae) are Yellow to olive brown, red or black, Cornified parts black or tipped black. The frog is common throughout India. They are terrestrial and nocturnal in habit, found in and near water during breeding season. The Ornate Narrow-mouthed Frog, *Microhyla ornata* (Anura : Microhylidae) are Golden to earth brown with darker symmetrical markings on back (frequently arrow-shaped) occupies a number of habitat types including lowland scrub forest, grassland, agricultural land, pastureland and urban areas. Fossorial in habit, it is also found in forest floor leaf-litter (Pratihari and Deuti 2011) and (Hegde and Roy 2011).

MATERIAL AND METHODS**Study area**

The present study was undertaken in the Jnana Bharathi Campus, Bangalore University of Bangalore South Taluk (Map1).

**Map 1. Jnana Bharathi Campus.
A. Dept. of Zoology; B. Water Catchment Area**



Morphometric Study

The morphometric studies were carried out to understand the eco-biology of the anurans. Eleven types of morphometric measurements *viz.*, Head Length (HL), Head Width (HW), Eye Diameter (ED), Tympanic Diameter (TD), Eye and Nostril Distance (END), Snout Vent length (SVL), Interorbital distance (IOD), Thigh length (THL), Foot length (FL), 1st finger length (1FL) and 1st toe length (1TL) were taken using a thread and centimetre scale and recorded in cm. Only prominent anurans with good numerical strength and frequency of availability during survey were chosen from each of the selected site. *D.melanostictus* and *M.ornata* were chosen for morphometric studies in two sampling sites, Department of Zoology,(Figure 1), and JBBU Site WCA-2, *M. ornata* (Figure 2) respectively.

Sampling

Morphometric measurements of the samples (N=10) randomly collected during the survey were taken in the field conditions and animals were released after recording the observations. Care was taken to ensure no stress on the animals during the course of the study. The data was used to analyze the correlation between the morphometric parameters of the individuals of varied size. Regression analysis was performed for two morphometric variables *viz.*, head length and the total length for all the samples. The statistical analysis was performed using SPSS software (11.5 version).

RESULTS AND DISCUSSION

During the study different frog species exhibited a range of morphologies as listed below from different sites. The mean values of the morphometric parameters of *D. melanostictus* was, HL (22.9±7.7); HW (25.3±9.8); ED (7.5±2.5); TD (4.5±1.6); END(9.5±4.3); SVL (78.8±37.9); IOD (7.9±3.2); THL (26.9±10.4); FL (23.2±7.8); 1FL (8.6±5.1) and 1TL (4.0±1.8). Nair and Kumar (2013) reported HL (16.14 ± 1.61); HW (26.07 ± 1.54); ED (6±0.00); TD (4±0.00); END (3.32 ± 0.25); SVL (68.61 ± 4.98); IOD (5.04 ± 0.13) and THL (29.64 ± 3.89). Regression analysis plots for two parameters head length and the total length for *D. melanostictus* with fitted regression equation is $y = 0.181x + 0.857$ $R^2 = 0.803$.

The mean values of the morphometric parameters of *M.ornata* was, HL (3.7±1.4); HW (4.6±1.1); ED (1.2±0.4); TD (1.3±0.4); END (2.2±0.42);SVL (15.4±3.8);IOD (2.7±0.67); THL(6.0±1.9); FL (4.8±1.2); 1FL (1.2±4.2) and 1TL (1.7±1.3). For the same Nair and Kumar (2013) reported HL (4.83 ± 0.90); HW (6.11 ± 0.82); ED (1.75 ± 0.25); TD (-); END (1.72 ± 0.36); SVL (20.11 ± 1.60); IOD (2.22 ± 0.51) and THL (8.67 ± 0.71). Regression analysis plots for two parameters head length and the total length for *M. ornata* with fitted regression equation is $y = 0.2776x - 0.0575$, $R^2 = 0.5552$.

Table 1: Correlation coefficient (r) values for parameters of *D. melanostictus* and *M. ornata*.

<i>D.melanostictus</i>											
	HL	HW	ED	TD	END	SVL	IOD	TL	FL	1FL	1TL
HL	1	.971**	.879**	.909**	0.556	.896**	.867**	.808**	.882**	.884**	.835**
HW	.641*	1	.874**	.884**	0.498	.905**	.895**	.827**	.892**	.872**	.898**
ED	.855**	.686*	1	.883**	0.21	.942**	.900**	.771**	0.63	.894**	.754*
TD	.633*	.899**	.764*	1	0.317	.911**	.873**	.714*	.737*	.833**	.757*
END	.855**	.686*	1.000**	.764*	1	0.179	0.311	0.431	.776**	0.442	0.277
SVL	.745*	0.424	.706*	0.29	.706*	1	.903**	.806**	.682*	.849**	.882**
IOD	0.592	0.582	0.625	.648*	0.625	0.614	1	.935**	.694*	.965**	.753*
THL	.847**	0.425	.678*	0.355	.678*	.766**	0.423	1	.704*	.925**	.728*
FL	.854**	0.353	.729*	0.299	.729*	.898**	0.589	.884**	1	.694*	.782**
1FL	.855**	.686*	1.000**	.764*	1.000**	.706*	0.625	.678*	.729*	1	.672*
1TL	.695*	0.479	0.547	0.533	0.547	0.541	.802**	0.502	0.534	0.547	1
<i>M.ornata</i>											

** Correlation is significant at the 0.01 level (2-tailed). * Correlation is significant at the 0.05 level (2-tailed).

Legends: Head Length (HL), Head Width (HW), Eye Diameter (ED), Tympanic Diameter (TD), Eye and Nostril Distance (END), Snout Vent length (SVL), Interorbital distance (IOD), Thigh length (THL), Foot length (FL), 1st finger length (1FL), 1st toe length (1TL).

Overall, positive and in many cases significant positive correlation is obtained between the morphological parameters considered with few exceptions of negative correlations (Table 1). With regard to percentage predictions for selected populations from regression analysis was found to be *viz.*, *D. melanostictus* (80%, $R^2= 0.803$) and *M. ornata* (55%, $R^2= 0.555$). In the present study the maximum SVL for the species *D. melanostictus* was 131 mm and *M. ornata* was 22mm, while Singh and Prakash (2007) reported 90mm SVL for *D. melanostictus* and *M. ornata* 22mm SVL, Hegde (2012) reported 160 mm of maximum SVL for *D. melanostictus* and 26 mm of maximum SVL for *M. ornata*. The morphometric data obtained during the present study are unique that the individuals were both aestivating as it was the off-season in the study sites and also individuals collected were juveniles. In both cases the uniqueness lies in the fact that both are first time reports of such conditions of the study species, thus would contribute to the understanding of ecological impacts on morphometry on dormancy and developmental stage of the anurans.

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