Int.J.Curr.Microbiol.App.Sci (2016) *5*(8): 114-120

International Journal of Current Microbiology and Applied Sciences
ISSN: 2319-7706 **Volume 5 Number 8 (2016) pp. 114-120**
Journal homepage: http://www.ijcmas.com

Original Research Article http://dx.doi.org/10.20546/ijcmas.2016.508.014

Morphometric Studies on *Duttaphrynus melanostictus* (Schneider, 1799) Anura: Bufonidae from Central India, Bhopal (MP) with Special Reference to their Mortality by Roads

Amit Kotwal[1]*, Rajni Raina[2] and Ashwani Wanganeo[1]

[1]Department of Environmental Sciences and Limnology Barkatullah University, Bhopal (MP), India
[2]Department of Zoology, Govt. Science and Commerce College (Benazir), Bhopal (MP) India
**Corresponding author*

Keywords
Duttaphrynus melanostictus, Amphibians, Road kill, Morphological characteristics, Bhopal.

Article Info
Accepted:
08 July 2016
Available Online:
10 August 2016

A B S T R A C T

Based on 60 days of field visits (June 2014 to December 2014) a total of 281 specimens of Indian common toad (*Duttaphrynus melanostictus)* were spotted. Statistical analysis with traditional morphometry was performed to analyze the intra population variation in *Duttaphrynus melanostictus* (Anura: Bufonidae) from Bhopal, Madhya Pradesh. In this paper we have presented morphological variation in 20 individuals of *Duttaphrynus melanostictus*. Regression analysis was performed for three morphometric variables viz., Head width(HW) with Snout vent length(SVL) and Hind limb length (HLL) with Snout vent length (SVL) and fitted regression equation $y = 0.2995x - 0.0103$ ($R^2 = 1$) and $y = 1.0247x - 0.0381$($R^2 = 1$) respectively were obtained for the species. Besides this during current work we have observed various anthropogenic pressures but road kill is seen one of the main factor causing amphibian mortality.

Introduction

Amphibians are the ectotherms which have moist skin and are entirely reliant on environmental heat to maintain their body functions. India harbours 342 species of amphibians which includes 306 anuran species, 35 species of *Gymnophiona* and 1 salamander species (Dinesh *et al.*, 2013). In Madhya Pradesh Chandra *et al.*, (2005) had studied and documented 18 species of amphibians. Among them toads are quite different from frogs. Toads generally have shorter legs, warty dry skin and have paratoid glands behind the eyes. Bufonidae is a large and geographically widespread taxon of neobatrachian frogs (Duellman and Trueb, 1986).

The family Bufonide have 597 species and 51 genera, while the genus Duttaphrynus has 29 species (http://www.amphibia web.org/ about/index.html). More than half of the species within the family *Bufonidae* are contained within the genus *Bufo*. *Duttaphrynus melanostictus* commonly called as Asian common toad, Black spectacled toad which belongs to family

*Bufonid*e and genus *Duttaphrynu*s. This species is found in almost all types of biotopes found in the country and occurs from sea level up to 2000 m in the hills (Daniel, 2013).

Study Area

The present study was undertaken in and around Bhopal city, Madhya Pradesh. Bhopal is the capital of Madhya Pradesh and also known as city of lakes. The geographical location lies within 23^{o} 16 N and 77^{o}36 E. It has an average elevation of 500 meters (Fig.1). Bhopal experiences a moderate climate though summers are hot and the temperature may touch 45^{o}C. During winter the temperature is around 10^{o}C.

Materials and Methods

The present study was conducted from June 2014 to December 2014 to see the abundance, morphological parameters of *Duttaphrynus melanostictus* and the impact of vehicular traffic. The survey was conducted visually near human dwellings, playing parks, and micro-habitats like on the floor rocks under the soil, around roads individuals of *Duttaphrynus melanostictus* were collected from different selected sites. Live specimens (N=20) were collected and twenty measurement characters (Chowdhary *et al.,* 2014) using Vernier caliper was recorded. Morphometric measurements of the samples (N=20) collected during the survey were taken in the field conditions and animals were released after recording the observations. Precautions were taken that no stress on the animals was applied during the course of the measurements.

To enumerate the direct impact of roads on *Duttaphrynus melanostictus* the number of road kills that occurred on highways and link roads were counted. These roads were surveyed systematically between 5:30 pm to 10:00 pm once a week from June 2014 to December 2014.

Result and Discussion

For the current study we have studied graphic statistics data along with the correlation analysis are tabulated consecutively (Table 1 and 2). Regression plots for morphometric parameters viz., SVL and HW; SVL and HLL of *Duttaphrynus melanostictus* with fixed regression equation are also depicted (Fig. 4a and b). Average SVL of the sample measured was found to be 9.20 cm. A considerable positive correlation was obtained between the 20 important morphometric parameters considered at the 1 % level of significance (Fig.3). Regression analysis was performed for three morphometric variables viz., Head width (HW) with Snout vent length(SVL) and Hind limb length (HLL) with Snout vent length(SVL) and fitted regression equation $y = 0.2995x - 0.0103$ ($R^2 = 1$) and $y = 1.0247x – 0.0381$ ($R^2 = 1$) respectively were obtained for the species.

Morphological Characteristics

The specimens were larger in size, tympanum was distinct, circular in shape ¾ the diameter of eye. Snout is little obtuse, pupil rounded, tongue oval. Dorsally the skin is deeply tuberculated and has a lot of black spine-tipped warts all over the body (Fig.2). Paratoid glands and cranial ridges were prominent. In adult's tips of toes, fingers, metatarsal tubercles and tubercles on the palm of hand have black cornifications while in juveniles such black cornifications are not developed until they attain size of 25-35mm.On ventral side adults are uniform white while juveniles have white as well as black markings. Heels don't meet when kept at right angle to the body.

Table.1 Morphological parameters used in the study

SVL	**Snout-vent length**
HL	Head length(from back of mandible to tip of snout)
HW	Head width(left side back of mandible to right side back of mandible)
STL	Snout-tympanum length(tip of snout to front of tympanum)
MSL	Mouth angle-snout length(tip of snout to end of mouth opening)
NS	Nostril-snout length(distance from nostril to tip of snout)
NTL	Nostril tympanum length(distance between nostril and front of tympanum)
EN	Distance from front of eye to nostril
TEL	Tympanum eye length(distance between end of eye to front of tympanum)
TD	Tympanum diameter(maximum diameter)
IN	Internarial distance(distance between 2 nostrils)
EL	Eye length(greatest diameter of the eye including upper eye lids)
IOD	Interorbital distance
FAL	Fore arm length(from elbow to base of outer palmer tubercle)
HLL	Hind limb length
THIGHL	Thigh length
TL	Tibia length
Three FL	Third finger length
One FL	First finger length
Fourth FL	Fourth finger length

Table.2 Descriptive statistics of morphometric parameters of *Duttaphrynus melanostictus* (N=20) from Bhopal city, Madhya Pradesh, India.

Parameters	Maximum	Minimum	Mean	Deviation
SVL	13.1	5	9.2	2.304
HL	3	1	2.35	0.596
HW	3.9	1.5	2.75	0.691
STL	2.4	0.8	1.7	0.438
MSL	3.1	1.2	2.2	0.565
NS	0.5	0.1	0.27	0.101
NTL	2.1	0.8	1.5	0.389
EN	1	0.4	0.7	0.158
TEL	0.15	0.06	0.10	0.027
TD	0.8	0.3	0.55	0.149
IN	0.8	0.3	0.55	0.156
EL	1.7	0.6	1.04	0.316
IOD	1.5	0.6	1.05	0.274
FAL	7.6	3	5.3	1.33
HLL	13.5	5.2	9.45	2.36
THIGHL	3	1.2	2.1	0.511
TL	4	1.6	2.9	0.71
3FL	0.8	0.3	0.54	0.150
1FL	0.8	0.3	0.55	0.150
4TL	3.7	1	1.85	0.649

Fig.1 Showing the satellite imagery of the current study area (Source: Google earth)

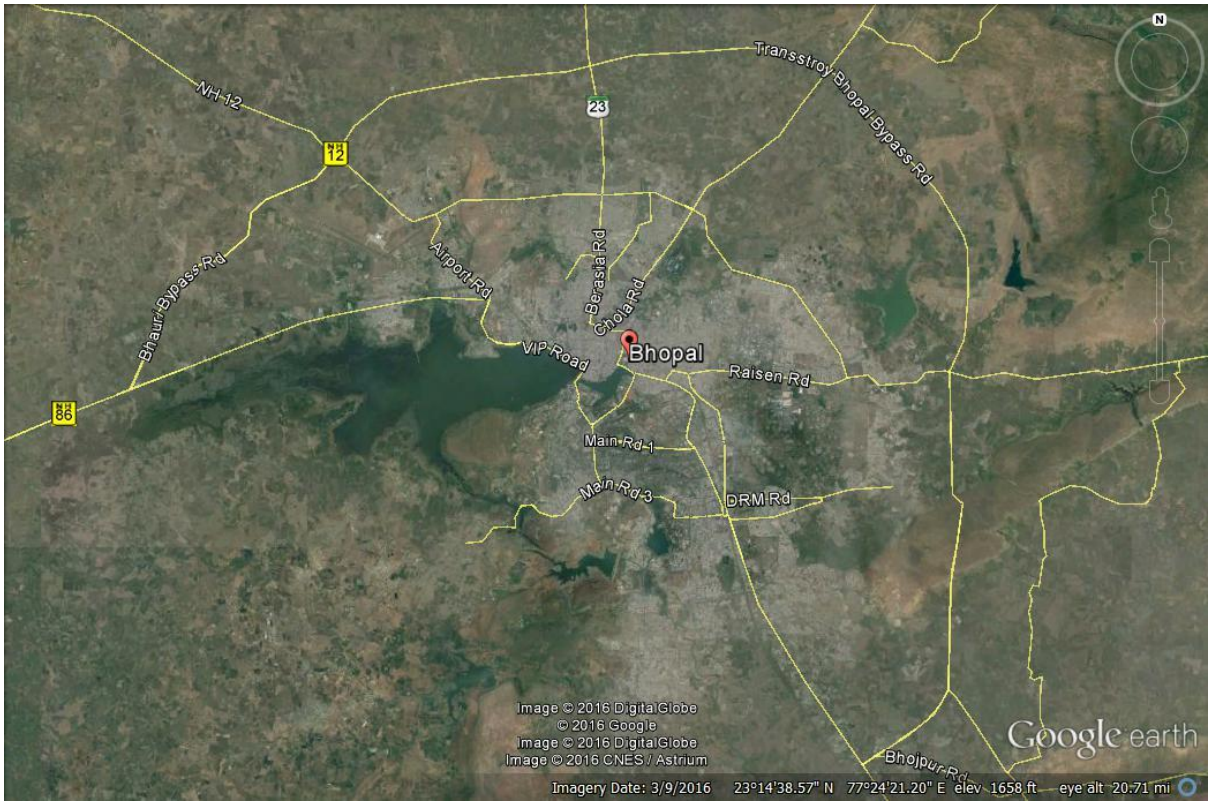

Fig.2 A. Dorsal view. B. Showing Road Kill. C. Lateral view. D. Ventral view of *Duttaphrynus melanostictus*

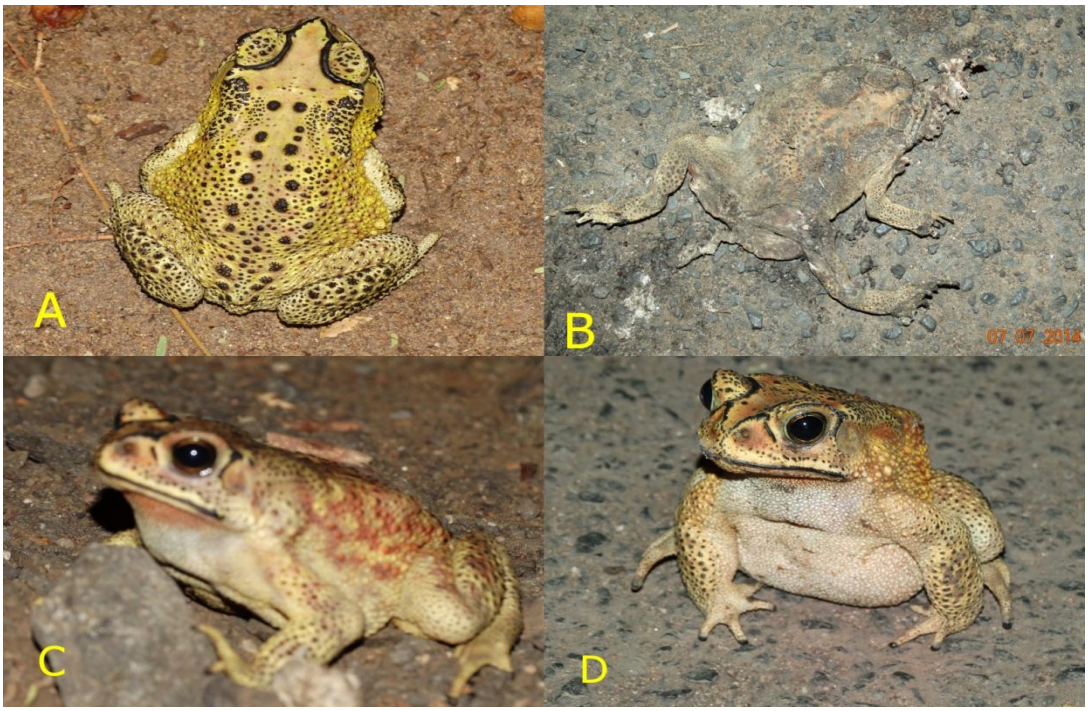

Fig.3 Correlation coefficient (r) values for important morphometric parameters of *Duttaphrynus melanostictus* (N=20) from Bhopal region, Madhya Pradesh, India

	SVL	HL	HW	NS	NTL	EN	TD	EL	IOD	HLL	THIGHL	FAL	TL	4TL
SVL	1.000	0.978	0.998	0.797	0.993	0.921	0.976	0.946	0.981	0.623	0.995	0.995	0.997	0.763
HL		1.000	0.977	0.755	0.978	0.904	0.981	0.938	0.956	0.612	0.967	0.970	0.975	0.760
HW			1.000	0.786	0.990	0.918	0.982	0.937	0.982	0.623	0.994	0.990	0.995	0.751
NS				1.000	0.790	0.740	0.761	0.870	0.809	0.263	0.774	0.803	0.786	0.586
NTL					1.000	1.000	0.974	0.930	0.976	0.585	0.988	0.987	0.994	0.726
EN						1.000	0.883	0.886	0.906	0.610	0.923	0.923	0.910	0.709
TD							1.000	0.934	0.957	0.605	0.971	0.967	0.973	0.705
EL								1.000	0.936	0.576	0.931	0.940	0.936	0.762
IOD									1.000	0.551	0.978	0.980	0.979	0.710
HLL										1.000	0.652	0.585	0.621	0.577
THIGHL											1.000	0.988	0.993	0.749
FAL												1.000	0.991	0.782
TL													1.000	0.769
4TL														1.000

Fig.4 (a & b) Regression analysis plots for morphometric parameters of *Duttaphrynus melanostictus* with fitted regression equation

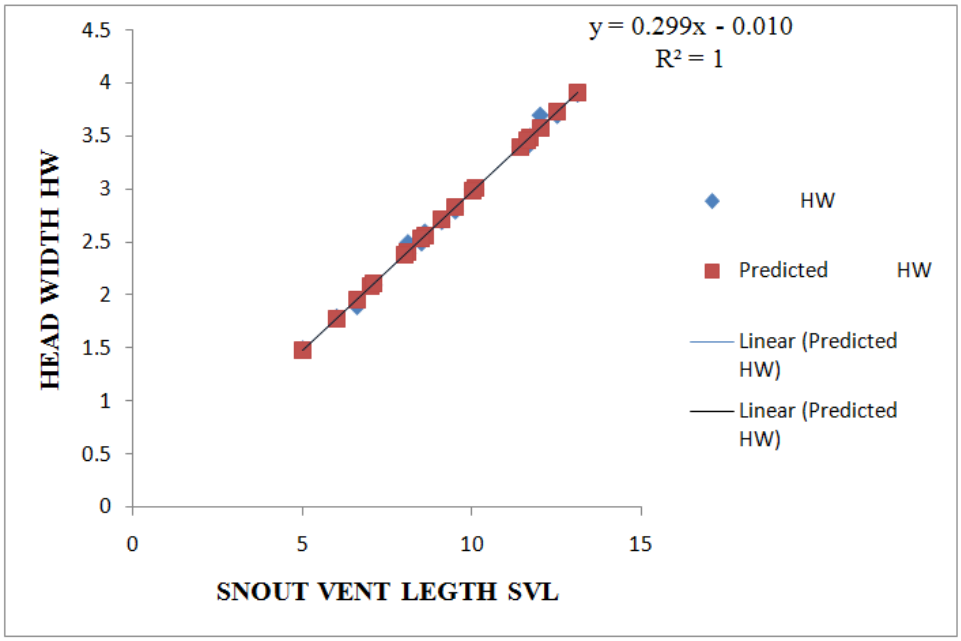

Fig.4a

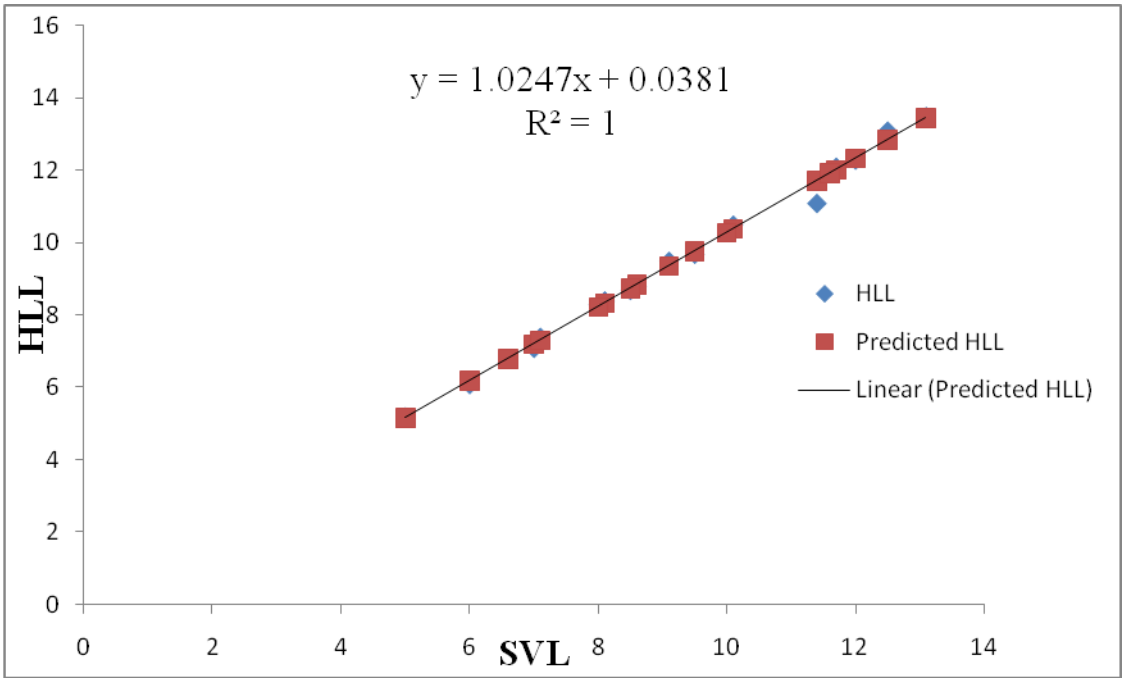

Fig.4b

First finger equals or slightly longer varies in some specimens. Along the dorsal side two series of warts (black cornified) from middle of paratoid glands up to ventis present in adults. Data obtained on the morphometry of the species during the present study would contribute to the knowledge of the bio-ecological perspectives of the species.

Besides many anthropogenic pressures especially road kill is found to be main factor of their decline in current study area. *Duttaphrynus melanostictus* was the most affected (98%), species followed by *Rana tigrina* as reported from the Anamalai Hills (Kumar *et al.*, 2001). The reason behind this massacre is their foraging nature of these toads, which are very fond of gathering around road sides during monsoon for breeding and feeding purposes. Daniels (2005) also reported about their foraging nature, gatheringnear street lamps and vehicle head lights to feast on insects; coupled with their highly eurytopic and human commensally traits (Daniel, 2002; Daniels, 2005) could also be the possible reasons for their higher susceptibility of becoming road kill victims. At last we suggest road barriers and fencing around the sides of roads to stop approaching of amphibians on roads to reduce vehicle-caused mortalities.

References

Chandra, K., Gajbe, U. 2005**.** An inventory of herpetofauna of Madhya Pradesh and Chhattisgarh. *Zoos' prints J.*, 20(30): 1812-1819.

Chowdhary, A.K., Bahuguna, V., Bahuguna, S.N. 2014. Morphometric studies on *Sphaerotheca breviceps* (Schneider, 1799) from Western Himalaya, Srinagar Garhwal region of Uttarakhand. *Int. J. Adv. Res.*, 2(5):

165-172.
Daniel, J.C. 2002**.** The Book of Indian Reptiles and Amphibians. Hardcover., Oxford University Press (BNHS), India, 177pp.
Daniels, R.J.R. 2005. Amphibians of Peninsular India. Hyderabad University Press, India, 268pp.
Dinesh, K.P., Radhakrishnan, C., Gururaja, V. K., Deuti, K., and Bhatta, G. 2013**.** A Checklist of Amphibian of India.
Duellman, W.E., Trueb, L. 1986. Biology of Amphibians. Johns Hopkins University Press, Baltimore, MD.
Kumar, V.S.P., Vasudevan, K., and Ishwar, N.M. 2001. Hepetofaunal mortality on the roads in the Anamalai Hills, Southern Western Ghats. Hamadryad, 26(2): 265-272.

How to cite this article:

Amit Kotwal, Rajni Raina and Ashwani Wanganeo. 2016. Morphometric Studies on *Duttaphrynus melanostictus* (Schneider, 1799) Anura: Bufonidae from Central India, Bhopal (MP) with Special Reference to their Mortality by Roads. *Int.J.Curr.Microbiol.App.Sci.* 5(8): 114-120. doi: http://dx.doi.org/10.20546/ijcmas.2016.508.013