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A Study of Morphological Variations in Populations of *Hoplobatrachus Tigerinus* (Daudin, 1803), (Anura: Ranidae) District Jamshoro, Sindh

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Abstract: Twenty seven adult specimens of *Hoplobatrachus tigerinus* (Daudin, 1803) were collected from the three adjoining areas of the District Jamshoro, viz: Village Shora, village Chakar Rajar and village Baigo khan Mir Jat during March, September and October 2011. The specimens were taxonomically examined and identified by using morphological characteristics. Variations in populations were recorded through the deep study of morphology that reveals the difference in the dorsal body colour, body weight and body length. This species is reported for the first time from the studied area.

Keywords: Indus Valley Bullfrog, *Hoplobatrachus Tigerinus*, Morphology, Variation.

1. INTRODUCTION

Hoplobatrachus tigerinus was first discovered and reported by Daudin in 1803 from Indian Subcontinent. It is found throughout wetland areas of Pakistan, India, Nepal and Bangladesh (Smith, 2002).

Its dorsal body color is olive green, olive or gray, with dark blotches, a light yellow vertebral streak is rarely absent; a lighter labial and a dark canthal streak are often present; hind limbs have dark bars, which may break in dark blotches; thighs are posteriorly marbled with yellow and black color; a yellow mid dorsal line extends from snout to vent; Ventral side is white (Khan, 1987).

In older bullfrogs, the head is wider while young specimens have slightly longer head; snout is pointed and projecting, canthus is obtuse; loreal are oblique and slightly concave; interorbital space is much narrower than the upper eyelid; tympanum is distinct; fingers are obtusely pointed; tibiotarsal articulation reaches eye or between eye and the naris; toes are blunt, with slightly swollen tips, hind limbs toes are fully webbed; outer metatarsal tubercle is separated nearly to its base; inner metatarsal tubercle is blunt, small and compressed and subarticular tubercles are small (Boulenger, 1890).

The *H. tigerinus* is economically valuable. The lipid composition of body skin of this species has wound healing capacity (Sitaram, 2002).

Bullfrogs are used as source of food both for local consumption as well as for export to several countries, where it is consumed and they help in reducing the number of the insects that destroy crops and transmit diseases (Sai *et al*. 1995).

The aim of this study was to investigate the variations among different populations of *Hoplobatrachus tigerinus*.

2. MATERIALS AND METHODS

All the populations of *Hoplobatrachus tigerinus* were collected from District Jamshoro which is located on the right bank of Indus River, covering the geographical area of about 11,517 Km^2.

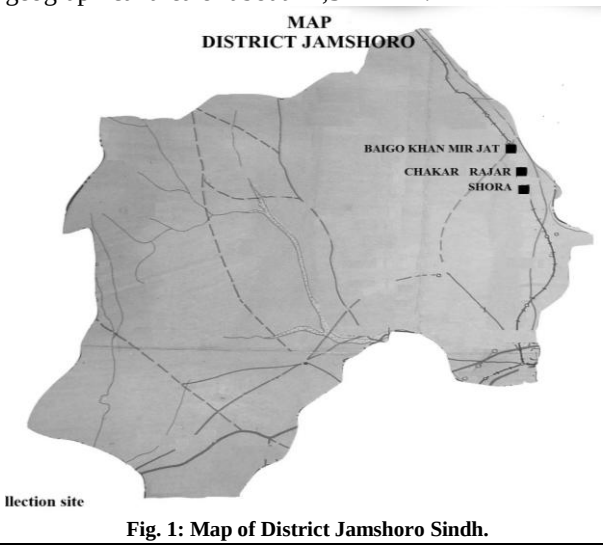


Fig. 1: Map of District Jamshoro Sindh.

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Five adult specimens of bullfrog were collected from a water pond of village Shora in March 2011, seven adult specimens were collected from small water ditch in village Chakar Rajar during September 2011 and fifteen adult specimens were collected from the swampy fields of village Baigo Khan Mir Jat in October 2011 by using an Arial Net.

The specimens were identified by using authentic taxonomic literature (Frost, 2006; Khan, 1987; Khan and Ahmed, 1987; Balletto *et al.* 1985; Beveridge, 1979; Yadav and Pillai, 1975; Boulenger, 1890).

The morphology of collected specimens was determined through international taxonomic characteristics. Metric ruler and Divider were used for various length measurements in millimeters such as length of the body (snout to vent), length of fore and hind limbs, diameter of eye and tympanic membrane. Body weight of specimens was sought in grams using an electronic Balance.

The following morphological characters were determined to distinguish male and female Bullfrogs:

1. **Female frog**:
a) Tympanum diameter: Equal or smaller than eye
b) Body weight: Heavier than male
c) Body length: Longer than male

2. **Male frog:**
a) Tympanum diameter: Larger than eye
b) Body weight: Lighter than female
c) Body length: Shorter than female

2. RESULTS

The morphological variations were recorded in different populations of *Hoplobatrachus tigerinus.* Village Baigo Khan Mir Jat contained highest population of *H. tigerinus*. All the specimens had light brown dorsal body color **(Fig. 4),** heaviest body weight and largest body length **(Table 1)** as compared to other specimens collected from other areas.

The specimens of *H. tigerinus* collected form village Chakar Rajar observed to be dark green dorsally **(Fig. 5),** lighter in body weight and shorter in body length **(Table 2)** then the specimens collected from village Baigo khan Mir Jat.

Very few bullfrogs could be collected from Village Shora, as this area contained very small population of this species. These specimens were determined to have blackish brown dorsal body color **(Fig. 6),** shortest body length and lightest body weight **(Table 3)** in comparison with the bullfrogs of village Baigo Khan Mir Jat and village Chakar Rajar.

All these populations recorded to be highly variable from each other **(Fig. 2-3).**

Statistical data for measurements:
(All values are expressed by Mean ± S.D)

Table 1: Morphometrics of *Hoplobatrachus tigerinus* population recorded from Baigo Khan Mir Jat.

S. No	Sex	Body weight (mg)	Body length (mm)	Fore limbs length (mm)	Hind limbs length (mm)	Eye diameter (mm)	Tympanum diameter (mm)
7	Female	258.28±1.88	138.85±1.77	48.71±1.88	78.85±1.77	10.71±0.48	10.14±0.69
8	Male	251.5±2.26	134±1.92	44.5±0.75	74.75±0.46	10.75±0.46	11.75±0.47

Table 2: Morphometrics of *Hoplobatrachus tigerinus* population recorded from Village Chakar Rajar.

S. No	Sex	Body weight(mg)	Body length (mm)	Fore limbs length (mm)	Hind limbs length (mm)	Eye diameter (mm)	Tympanum diameter (mm)
4	Female	230±4.08	122.5±2.88	41±1.15	72±1.15	9.75±0.5	9.25±0.5
3	Male	213.33±11.54	113.33±11.54	35.33±2.51	67±1.73	9.66±0.57	11.33±1.15

Table 3: Morphometrics of *Hoplobatrachus tigerinus* population recorded from Village Shora.

S. No	Sex	Body weight (mg)	Body length (mm)	Fore limbs length (mm)	Hind limbs length (mm)	Eye diameter (mm)	Tympanum diameter (mm)
3	Female	103.33±5.77	104±1.73	35.33±0.57	62.33±0.57	8.66±0.57	8.33±0.57
2	Male	94.5±6.36	99±1.41	34.5±0.70	58±2.82	8.5±0.70	10.5±0.70

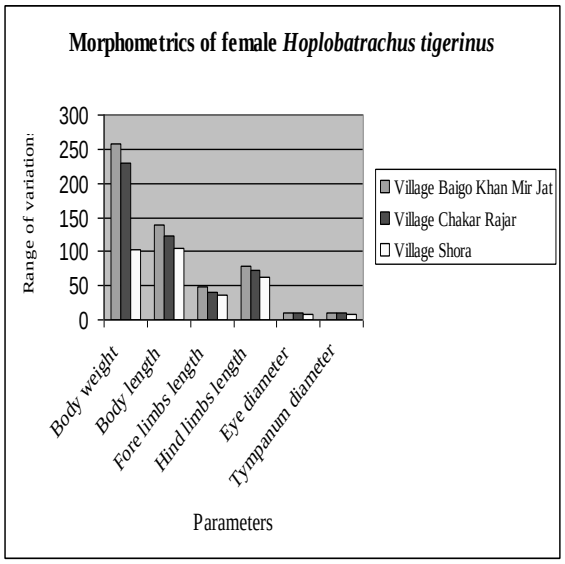


Fig. 2: Comparative morphometrics of *Hoplobatrachus tigerinus* female specimens collected from studied areas.

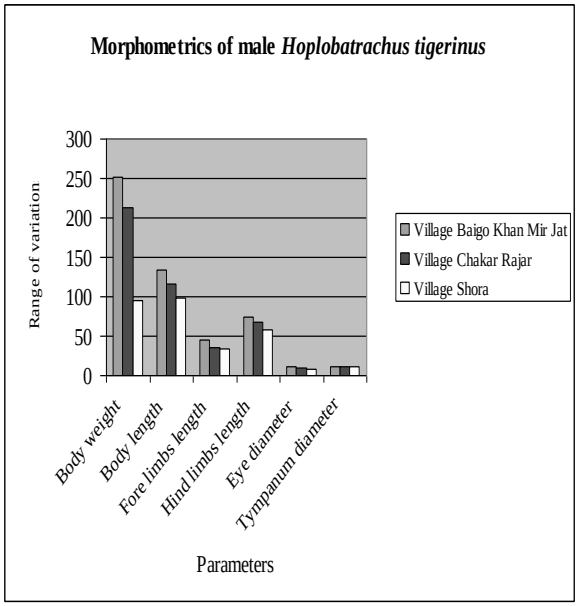


Fig. 3: Comparative morphometrics of *Hoplobatrachus tigerinus* male specimens collected from studied areas.

3. DISCUSSION

District Jamshoro has several seasonal, temporary and permanent water reservoirs such as ponds, ditches, canals and river tributaries. A large survey was conducted in District Jamshoro and its adjacent areas to record the undocumented existence of Bullfrog species.

The variations were determined in different populations of *Hoplobatrachus tigerinus* mainly in nature of dorsal body color (Fig. 4-6) body weight and body length **(Fig. 2-3).**

This species has previously been reported by several researchers of Pakistan and other areas (Frost, 2006; khan, 1987; Dubois, 1976; Smith, 1940; Boulenger, 1890). They all reported the characters of this species only from a particular region. No report existed on the variations compared within different populations of *H. tigerinus* of same region before this paper.

This work mentions the variations in bullfrogs that indirectly suggest the variety of niche that District Jamshoro provides to amphibian species including bullfrogs.

Different populations of *H. tigerinus* of adjacent areas of District Jamshoro show high variations, although atmospheric temperature and light intensity of these areas do not vary from each other and share almost same soil texture.

Probably these variations were attributed to the difference in chemical quality of water reservoirs where in bullfrogs dwell, variation in food quantity and age groups.



Fig. 4: *Hoplobatrachus tigerinus* collected from Village Baigo Khan Mir Jat.

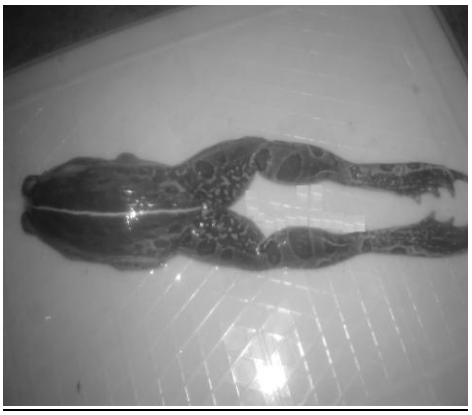


Fig. 5: *Hoplobatrachus tigerinus* collected from Village Chakar Rajar

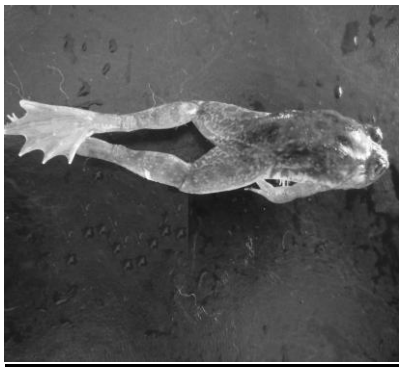


Fig. 6: *Hoplobatrachus tigerinus* collected from Village Shora.

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