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THE BOSTAMI TURTLE, *TRIONYX NIGRICANS* ANDERSON: POPULATION STATUS, DISTRIBUTION, HISTORICAL BACKGROUND AND LENGTH-WEIGHT RELATIONSHIP[1]

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A study was conducted on the population status, distribution, historical background and length-weight relationship of Bostami turtle, *Trionyx nigricans* Anderson, between September 1984 and August 1986. Total population has been estimated as 320 individuals. A significant length-weight relationship was obtained (P 0.001), where the values of 'r' were 0.959 for CL/CW, 0.921 for CL/TW and 0.965 for CW/TW.

INTRODUCTION

The freshwater turtle, *Trionyx nigricans* is endemic to Bangladesh (Khan 1982a). Anderson (1875) first identified *T. nigricans* from a couple of specimens at the Indian museum which were collected from a "Tank of Chittagong." Annandale (1914) gave a common name "Chittagong mud turtle" to this taxon. However, Khan (1980) suggested a new name, Bostami turtle, as "this turtle does not have a common English name and is not found anywhere other than in the Bayazid Bostami Pond." In the present work Khan's name has been followed, though sometimes it is locally called 'Gazari' or 'Madari.'

In Bangladesh, scientific study of this turtle has so far been very limited. Ahamed (1955), Shafi and Quddus (1977), and Husain (1979) reported some preliminary information regarding turtles and tortoises of Bangladesh, but none of them mentioned the Bostami turtle. Since Annandale (1914), Khan's works (1980, 1982a, b and 1987) have been the only studies on the Bostami turtle. Recently, Haque (1985), and Ahsan and Haque (1986) studied the breeding ecology and ethology of the Bostami turtle. Apparently the species has never existed in the wild state, but a semi-captive colony has become established in an enclosed pond of the shrine of Hazrat Sultan Bayazid Bistami[4] of Chittagong. The shrine is about 6.5 km north-

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west of Chittagong City.

The objectives of the present study were:

I. to assess the distribution and present status; II. to determine the age-composition and sex-ratio; III. to trace out the historical background, and IV. to find out the length-weight relationship of Bostami turtle.

Study Area

The shrine of the famous saint Hazrat Sultan Bayazid Bistami is situated on a hillock at Nasirabad, an industrial area of Chittagong City. Formerly, it was an idyllic spot of scenic beauty about 6.5 km to the north-west of Chittagong City. It lies at c. 22° 11' N and 99° 09' E. The Bostami pond is situated at the foot of a hill about 50 metres in height, the top of which has the 'astana' and 'chilla' of the shrine of Hazrat Sultan Bayazid Bistami. The pond has been excavated and expanded many times. Currently it is about 94.64 m by 61.27 m and rectangular in shape.

The water depth of the pond fluctuates in different seasons. During the monsoon, it may rise upto about 5 m or so which goes down to about 2.5 m before the onset of the next monsoon. The source of water in the pond is mainly rainfall. The water in the pond is more or less clear except during the monsoon.

The concrete area wall surrounding the pond supports mainly algae, mosses and some plants like ferns, grasses, etc. The following trees are mainly found on the bank: Kanthal (*Artocarpus heterophyllus*), Dab (*Cocos nucifera*), Aam (*Mangifera indica*) and Jam (*Syzygium cumini*).

The study period extended between September 1984 and August 1986.

Methods

Census technique: The population status was determined by directly counting the turtles following capture, mark and release method (modified from Joly 1965 and Plummer 1977). Both the 'Dargah' pond and adjacent ditches were included in the study. The turtles have been categorised into adult males, adult females, and young. Young were identified by their comparatively smaller size. Generally, adult males are larger than the adult females. The male and female were distinguished except in a few cases by the following characters.

1) The tail of the female is shorter than that of male, and does not protrude outside the carapace.
2) The carapace of the female is less oval than that of the male.
3) The body of the female is thicker than that of the male.
4) The distance between the two hind legs of the female is greater than that in the male.
5) Adult males are much larger than females.

For counting, individual turtles were marked with a water- proof "Epoxy paint" after cleaning and drying an area of the carapace.

Historical background: The history of the turtles was traced by searching through literature, interviewing the local people and through discussions with the historians of the University of Chittagong.

Length-weight relationship: A total of 100 (54 males and 46 females) specimens were randomly selected and measured for this purpose. Measurements of length, width and weight were taken to the nearest cm and kg respectively.

The following measurements were taken for each specimen.

a) *Carapace-length*: Carapace length was measured from the point of dorsal anterior-most edge of the carapace to the point of dorsal posterior-most edge of the same. The measurement invariably corresponded to the vertical line.
b) *Carapace-width*: Carapace-width was measured from the points between both the dorsal side edges of the carapace where the width was highest. The measurement point invariably corresponded to about anterior one- third of the carapace length.
c) *Total wet-weight*: Each live specimen was lifted out of water and placed inside a gunny bag and then weighed with the help of a spring balance. The actual weight of each specimen was determined by deducting the weight of the gunny bag from the total wet-weight.

RESULTS AND DISCUSSION

Population status: In all, 284 turtles were counted in the Bostami pond and 16 in a separate ditch. The counting was spread over a period of five continuous days. As the turtles spend some time lying buried under mud, it might be possible that a few individuals were missed. However, it is suggested that not more than 320 were available at that time. Of the counted turtles, 162 (54%), 108 (36%) and 30 (10%) were male, female and young respectively. The ratio of adult male-female was 1.5:1.

Khan estimated 150 to 200 turtles in 1980 and 200 in 1982a in the Bostami pond of which 30-40 were young, 60-90 juveniles, and 60-70 adult or old animals. However, his estimates were merely assumptions. The East Pakistan, District Gazetteers, Chittagong, Rizv 1970, reported several hundred turtles in the Bostami pond while Ali (1964) reported the pond as a big tank containing a huge number of turtles. Plummer (1977) recorded the sex-ratio of *T. muticus* as 6.8:1 adult male and female and 1.98:1 all male and female (60 mm or larger in size) which varied seasonally. In the present study the adult male-female sex-ratio of *T. nigricans* was 1.5:1. This variation might be due to habitat and geographical distribution of the species. *T. muticus* was studied in a river while *T. nigricans* is from a pond.

Distribution: *T. nigricans* is an endemic species of Bangladesh (Khan 1982a). Khan (1980, 1982 a & b) and Annandale (1914) reported that *T. nigricans* was found only in a pond attached to the shrine of Bayazid Bostami. We found that besides the Bostami pond the turtles are also present in the adjacent ditches which they have possibly invaded from the Bostami pond. The turtles in the ditches were mostly females. The females wandered out for egg-laying and could not return to the pond due to many reasons. Probably the female turtles got into the nearest water body after egg-laying, and then lost their way and ultimately become separated from the original stock by some barriers like boundary walls, buildings etc.

Historical background: The Bostami turtle is not only an endemic species in Bangladesh, it is restricted, as far as is known, to the Bostami area of Chittagong City. There exists a strong religious belief about these turtles and their attachment to the shrine of Saint Bayazid Bistami. These two things interested us enough to trace out its historical background. The Bostami turtle has been named so,after the saint Sultan al-Arefin Hazrat Bayazid Bistami.

Almost no information on the historical background of *T. nigricans* is on record. There is a tale that these turtles were brought into the Bostami pond by the Saint himself. Locally, it is also believed that these turtles were once sinful men associated with the Saint who changed them into turtles as a punishment for their wickedness. There is another belief that these turtles were scared and 'djinns' (evil spirits) brought by the Saint himself. They were turned into the present shape because they incurred the wrath of the Saint.

However, the general belief is that the famous Iranian Sufi, Sultan al-Arefin Hazrat Bayazid Bistami is buried in this shrine, and so, the whole area has been named Bayazid Bostami and the road in front is called Bayazid Bostami Road after him. The influence of the shrine 'dargah' or 'mazar' in the minds of the local people may be gauged from this. Sultan Bayazid Bistami is a historical figure. He was born in 777 A.D. at Bistam in Iran and died in 874 A.D. (Ali 1964). His mazar is actually situated in Bistam (Arberry 1963). So, there is no 'mazar' of the Saint in the shrine. It is an 'astana' and 'chilla' associated with the name of the great Saint. In the 15th century there was a king in Bengal named Shihab al-din Bayazid Shah. Possibly it is his grave and his name might have been modified as Sultan Bayazid Bistami by some followers. However, it is known that Bayazid Bistami once came to sind to meet his teacher Abu Ali Sindhi and then he might have visited Chittagong (Huda 1985). If so, he might have carried the turtles with him here. So, the species might be present in Iran, Sind or other places from where he collected it. But there is no record of these turtles except from Chittagong (Bayazid Bostami area). This turtle (*T. nigricans*) may be a synonym of an other species of the genus *Trionyx* or may be a sub-species or variety of a species of *Trionyx*.

There is an assumption (Khan 1987) that the

Bostami turtle has evolved from *Trionyx gangeticus* as a result of long isolation.

Length-weight relationship: In general, knowledge about the length-weight relationship is very useful in fisheries management and population analysis.

A size frequency distribution data of 100 specimens are given in Table 1. The minimum and maximum values respectively were 39 cm and 78 cm. in case of carapace-length (CL), 33 cm and 71 cm in case of carapace-width (CW) and 07 kg and 54 kg in case of total body wet-weight (TW) (Appendix). The mean of CL was 62 ± 10.16 cm, of CW was 53.27 ± 9.27 cm and of TW was 28.92 ± 12.71 kg.

Mathematical relationships between carapace-length, carapace-width and total wet body-weight were determined from the data given in Table 1. The regression values were calculated (Table 2).

From the correlation co-efficient values (Table 2) and scattered diagrams (Figs. 1 to 3) a highly significant linear relationship became evident between CL and CW, CL and TW, and CW and TW.

Size frequency distribution (Table 1) showed that the males are generally larger than the females. The male population showed that 64-78 cm length group size was dominant and in case of the female 39-53 cm length group size was dominant.

During the present study it has been found that turtles of the same length widely differed in total body wet-weight. For instance, five specimens with a carapace length of 73 cm had 17, 45, 38, 37 and 42 kg body wet-weight (Appendix).

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TABLE 1

RELATIONSHIP OF CARAPACE-LENGTH AND TOTAL BODY-WET-WEIGHT (FOR OBSERVED AND CALCULATED WEIGHT) IN 8 SIZE GROUPS IN *T. nigricans* (NO. OF MALE = 44, NO. OF FEMALE = 56)

Size group in cm	Sex M-Male F-Female C-combined	Mean carapace length (CL) in cm	Mean Total body wet-weight (TW) in kg	
			*(TW)	**(TW)
39-43	M			
	F-5	41.6	8.4	8.4
	C			
44-48	M			
	F-7	46.43	11.57	11.56
	C			
49-53	M			
	F-14	49.86	14.28	14.26
	C			
54-58	M-3	57.67	19.67	19.67
	F-6	54.83	18	17.99
	C-9	55.78	18.55	18.54
59-63	M-6	62.25	30.25	30.24
	F-2	60	23.5	23.5
	C-8	61.5	28	28
64-68	M-18	66.28	34	34
	F-6	66	33.33	33.31
	C-24	66.21	33.5	33.4
69-73	M-26	70.88	39.27	39.27
	F-3	70.33	39	39
	C-29	70.83	39.24	39.23
74-78	M-5	76.2	48.4	48.3
	F-1	74	50	49.99
	C-6	75.83	48.67	48.67

*TW — observed value, **TW — Calculated value.

TABLE 2

CALCULATED VALUES OF STANDARD DEVIATION, REGRESSION CO-EFFICIENTS, INTERCEPT AND CORRELATION CO-EFFICIENT IN THE CL/CW, CL/TW AND CW/TW RELATIONSHIP IN BOSTAMI TURTLE *T. nigricans*

Relationship between		Values of sd (x)	Values of sd (y)	Values of regression co-efficient (b)	Values of intercept (a)	Values of correlation co-efficient (r)
Ordi. (x)	Abscl. (y)					
CL	CW	± 9.27	± 10.16	0.87472	— 1.00264	0.959 (P< 0.001)
CL	TW	± 12.71	± 10.16	1.15279	— 42.55298	0.921 (P< 0.001)
CW	TW	± 12.71	± 9.27	1.323310	— 41.508613	0.965 (P< 0.001)

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Appendix

CARAPACE-LENGTH, CARAPACE-WIDTH AND TOTAL WET-BODY WEIGHT OF 100 SPECIMENS OF *T. nigricans*

Sl. No.	Carapace length (CL) in cm	Carapace width (CW) in cm	Total wet-body Weight (TW) in kg.	Sex	Sl. No.	Carapace length (CL) in cm	Carapace width (CW) in cm	Total wet-body Weight (TW) in kg.	Sex
1.	65	58	47	M	51.	67	58	31	M
2.	75	63	47	M	52.	70	61	43	M
3.	54	48	18	F	53.	57	47	19	M
4.	64	53	27	M	54.	73	61	38	M
5.	49	42	12	F	55.	49	41	13	F
6.	73	64	17	M	56.	57	49	20	F
7.	67	56	31	M	57.	71	60	40	F
8.	49	42	14	F	58.	67	60	34	M
9.	73	63	36	M	59.	70	62	37	M
10.	49	45	16	F	60.	41	37	09	F
11.	72	64	54	M	61.	45	39	12	F
12.	50	42	14	F	62.	73	62	37	M
13.	68	57	35	M	63.	70	58	42	M
14.	44	34	09	F	64.	73	65	42	M
15.	73	71	45	F	65.	50	42	13	F
16.	69	57	31	M	66.	65	54	31	M
17.	68	64	40	F	67.	69	59	36	M
18.	70	60	38	M	68.	66	56	33	M
19.	68	61	36	F	69.	67	56	34	M
20.	67	58	35	F	70.	61	50	25	M
21.	71	64	41	M	71.	47	41	15	F
22.	68	57	35	M	72.	58	47	22	M
23.	74	68	50	F	73.	43	39	09	F
24.	71	61	43	M	74.	71	60	38	M
25.	55	43	15	F	75.	78	62	49	M
26.	64	60	34	F	76.	70	62	42	M
27.	48	42	13	F	77.	68	57	33	M
28.	63	58	33	M	78.	76	66	46	M
29.	70	60	34	M	79.	47	42	09	F
30.	66	53	31	M	80.	50	45	16	F
31.	77	63	49	M	81.	71	61	40	M
32.	63	51	29	M	82.	49	39	14	F
33.	71	64	46	F	83.	49	41	13	F
34.	46	40	12	F	84.	52	47	15	F
35.	75	65	51	M	85.	70	60	39	M
36.	65	53	22	M	86.	71	60	40	M
37.	65	56	36	M	87.	49	42	16	F
38.	70	61	47	M	88.	69	61	37	M
39.	55	49	21	F	89.	72	61	41	M
40.	68	64	43	M	90.	54	47	16	F
41.	50	42	15	F	91.	67	56	32	M
42.	64	56	31	M	92.	69	59	35	M
43.	64	53	27	F	93.	53	44	16	F
44.	65	50	32	F	94.	50	42	13	F
45.	54	45	18	F	95.	62	56	34	M
46.	43	35	08	F	96.	42	35	09	F
47.	66	58	34	M	97.	58	49	18	M
48.	70	61	36	M	98.	60	50	23	F
49.	48	40	11	F	99.	60	49	24	F
50.	69	63	43	M	100.	39	33	07	F

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