Notes on Behaviour of Pig-tailed Macaque *Macaca nemestrina leonina* Towards Sparrow-Hawk, Crows, Drongo and Elephants

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The pig-tailed macaque *Macaca nemestrina* Linnaeus, 1766 (Pocock, 1931) ranges from north east India (south of the Brahmaputra; Choudhury 1988, 1989), south west China, Indochina and Malaya to several Indonesia islands (from lowland to about 1300m altitude) (Groves 1993, Choudhury 2003). The subspecies found in north-east India is *leonina* (Fooden 1975), for which Groves (2001) proposed full specific treatment. The form *leonina* is also known as the northern pig-tailed macaque. It is a poorly known primate; its elusiveness and furtive behaviour being the main reasons for such poor studies and as such its ecology and social behaviour in the wild are difficult to analyse (Bernstein 1967, Caldecott 1986).

Between 1986 and May 2006, while carrying out field surveys in some potential habitats of the northern pig-tailed macaque in northeastern India, I was also able to make the following notes on interactions of pig-tailed macaques with birds and with elephants.

The main observations were carried out in Bherjan-Borajan-Podumoni Wildlife Sanctuary (27°25'-32' N, 95°19'-23' E) in Tinsukia district of eastern Assam and Garampani and Nambor Wildlife Sanctuaries (26°23' N, 93°52' E) in Karbi Anglong district of central Assam. Bherjan-Borajan-Podumoni WS is located on flat terrain (110-130m asl) and has three disjunct blocks covered by partially degraded tropical wet evergreen or rainforest and deciduous plantations. Garampani and Nambor Wildlife Sanctuaries are located on low undulating terrain (170-280m asl) and is covered by partially degraded tropical wet semi-evergreen rainforest.

Pig-tailed macaque and sparrow-hawk: On 7 October 1992 a sparrow-hawk (*Accipiter* spp.) swooped upon a juvenile pig-tailed macaque in Bherjan. The juvenile macaque screamed, which was soon followed by warning barks of adults. The sparrow-hawk which almost touched the macaque stopped and changed its direction of flight. The juvenile macaque then rushed to its mother, the latter showed her agony by putting a mild slap on its face. Large raptors may attack macaques, especially infants. In this case, however, the size of the sparrow-hawk was not large enough that it could have lifted away the juvenile macaque. Apparently, the young hawk was in the pursuits of learning to predate, and the juvenile macaque was yet to master the skill of predation-avoidance.

Pig-tailed macaque and Jungle Crow: On another occasion, a juvenile pig-tailed macaque was seen chasing away a Jungle Crow (*Corvus macrorhynchos*) when the latter tried to sit next to it in a tree branch in Bherjan on 30 November 1992. Perhaps this was possible as the juvenile had learnt the extent of threats from different bird species.

Pig-tailed macaque and Drongo: At about 0640 hrs on 13 June 1993 in Borajan two Large Racket-tailed Drongos (*Dicrurus paradiseus*) were attacking an adult male pig-tailed macaque in a manner they do so with other birds, particularly crows. The macaque, though remained indifferent in the beginning, had to leave the tree. Drongos are persistent attackers and in this case they might have sensed threat to their nest or young from the macaque.

Pig-tailed macaque and Elephant

The macaques of Nambor and Garampani Wildlife Sanctuaries of central Assam had developed 'friendship' with the wild elephants (*Elephas maximus*) and used to follow a few pachyderms. This habit of following elephants was observed since early 1990s in which the macaques feed on the leftover sugarcane. In that area the wild elephants had developed a habit of stopping vehicles on the highway that passed through forest for sugarcane and bananas. Once they finished off chewing the canes, the macaques throng the road to feed on the leftovers. Chiefly arboreal, these monkeys did not hesitate to come down to the ground and frequent the National Highway-39 in search of sugarcane left over by the elephants. In February and March 1992, I watched two groups of pig-tailed macaques by the side of the National Highway-39 feeding on sugarcane, pulling the bark and chewing. Normally the macaques are not shy of elephants but when very close, they moved away by walking briskly or running.

The wild elephants of Garampani and Nambor forests had caught wide attention for their unusual behaviour of seeking food from passing vehicles. A large number of visitors were also attracted to see this 'elephant phenomenon'. It is difficult to say when the elephants in Nambor developed such a habit. But there is little doubt that it was a fairly old one, and may have been in vogue since the 1970s (Choudhury, 1993). So far as the specific record goes, on 14th March 1982, one Forest Ranger

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A wild tusker looking for sugarcane and other edible items in Namboor forests, Assam in 1992. Photo: Anwaruddin Choudhury

A group of Pig-tailed Macaques feeding on left over sugarcane once the elephants left the area, Nambor, Assam. Photo: Anwaruddin Choudhury

saw a herd of 18 elephants stopping a truck carrying sugarcane and pulling out the canes before vanishing into the forests. The phenomenon was discontinued when three tuskers, which probably included the semi-habituated ones, were killed by poachers in 1993. The sugar mill near Golaghat was also closed around the same time although sporadically functioned till mid-nineties. Thus the transportation of sugarcane came to a halt, which also ended this interesting interaction.

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New elevation record of Crested Goshawk *Accipiter trivirgatus* from western Arunachal Pradesh, India

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Crested Goshawk *Accipiter trivirgatus* (Temminck, 1824) is distributed in the open deciduous and semi-evergreen foot hill forest of Himalayas (up to *c.*2000m) from Garhwal Eastwards; south to the Godavari River; SW. India from Goa, southwards: Sri Lanka (Ali, 1996). However, during a field trip in October and November 2008, we recorded a single individual of the species from Potak area (N 27.61947, E 092.38855; 4171m) of West Kameng district of western Arunachal Pradesh, India. This is probably a new elevation record of the species from India.

Arunachal Pradesh is uniquely situated in the transition zone between the Himalayan and Indo-Burmese regions (26°28'– 29°30'N and 91°30'– 97°30'E; 83,743 km²). Choudhury, 2006 recorded 738 species of birds from Arunachal Pradesh. Mishra et. all. 2004, recorded the occurrence of a total 150 species of birds from the Western Arunachal Pradesh covering the West Kameng and Tawang district nearly an area of 7000sq.km. However, we had not found any specific record of the species to this elevation. The different aspects of distribution and habitats of the species are still remaining unrecorded from these areas.

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Studies on Serum Biochemical Values in Tigers (*Panthera tigris*)

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Introduction

Only a few reports are available on serum biochemical parameters of Indian tigers. The present article gives a detailed serum biochemistry of tigers *(Panthera tigris)* which could significantly help in diagnosis of several disease conditions when the values deviate from the normal range.

Materials and Methods

5-10 ml blood was collected from cocygeal vein of 21 tigers maintained at Rescue centre, Bannerghatta Biological Park, Bangalore by using 20 gauge vaccutainers. The animals were physically restrained in squeeze cage without using any anaesthetics. The blood was collected from all the tigers during morning hours between 9am to 10am. Serum was separated and transferred to sterile serum vials and stored at -20°C until further analysis in Wild Animal Disease Diagnostic Laboratory (WADDL), Bannerghatta Biological Park, Bangalore.

From the serum samples liver function test parameters, alanine amino transferase (ALT) alanine amino aspirate(AST) lactatate dehydrogenase and alkaline phosphatase were studied. Kidney function test parameters of Creatinine, blood urea nitrogen (BUN), Blood urea and uric acid and complete lipid profile parameters of total cholesterol, triglycerides were estimated. Further, all the serum samples were also analyzed for major serum electrolytes like calcium, phosphorous, magnesium, chloride and bicarbonates.

All the above said parameters were studied using semi-automatic serum chemistry analyzer (Serial No: 030903, Model :Erba chempro) by using standard reagents and kits provided by the company adopting their standard outlined procedures.

Results and Discussion

From the serum samples of 21 tigers, major biochemical parameters were analyzed. The details of the parameters and results are presented in table 1. Due to non availability of previous data for a few of the parameters in our study for Indian tigers, correlation has been drawn with African tigers and Asiatic lions for such of those parameters.

The mean level of calcium in present study was recorded as 9.71± 0.18 mg % was with in the range reported by Fowler and Miller (2003) (10.1±0.7mg %) in tigers. The phosphorous level in the serum of tigers was recorded as 5.24 ± 0.22 mg % in the present study, which was within the range given by Wallach & Boever (1983) for African lions. Magnesium level in tigers was found as 2.47 ± 0.04 mg %. Similar result was given by Jani *et al* (2007) as 1.75 ± 0.09 mg % in Asiatic lions. The serum level of chloride and bicarbonates in the present was recorded as 102.40 ± 3.32 mg %.and 29.04 ± 1.32 mg % respectively. Fowler and Miller (2003) have reported the chloride level in tiger is 119 ± 4 mg%.

The mean value of Alkaline phosphatase for tigers in the present study was recorded as 36.32 ± 3.29 U/L which is correlated with the mean value of 40 ± 41U/L reported by Fowler and Miller (2003).

Glucose value of present study was found as 62.91 ± 6.49 mg/dl, but Fowler and Miller (2003) has reported non significantly higher value as 135±45 mg/dl in tigers. The mean value of lactate dehydrogenase in the present study was 504.59 ± 45.59 IU/L. But Fowler and Miller (2003) reported the lower level as 243±189 IU/l in tigers.

The serum level of BUN at 37.05 ± 1.79 mg/dl is non significantly correlates with the earlier reports of 27±7 mg/dl by Fowler and Miller (2003). Mean cholesterol level in present study was found as 315.28 ± 11.85 mg/dl which is significantly higher than the study value of 233±58 mg/dl by Fowler and Miller (2003) in tigers and Wallach & Boever (1983) in lions.

Creatinine level was recorded as 1.90 ± 0.27mg/dl in tigers, similar results were reported (2.7±0.9 mg/dl) by Fowler and Miller (2003) in tigers and (2.35 ± 0.11) by Jani *et al* (2003) in lions. A mean ALT and AST level in serum of tigers was recorded as 86.90 ± 9.24 U/L and 121.75 ± 11.17 U/L respectively. But significantly lower levels of ALT and AST were reported by Fowler and Miller (2003) as 63±40 U/L and 29±18 U/L respectively.

Serum total protein in the tigers was recorded as 8.62 ± 0.32 g %, which did not differ from the earlier report for tigers as 7.1± 0.6 g% (Fowler and Miller, 2003). Mean level of Albumin in present study was found as 3.51 ± 0.10 g % was in agreement with the level of albumin (3.7±0.5g%) in the serum of tigers given by (Fowler and Miller, 2003). Similarly

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Table1. Major biochemical parameters of Asiatic tigers. (n = 21)

S.No	Parameters	Mean ± Standard error	Standard deviation
	SERUM ELECTROLYTES(mg %)		
1	Calcium	9.71± 0.18	0.84
2	Phosphorous	5.24 ± 0.22	1.00
3	Magnesium	2.47 ± 0.04	0.20
4	Chloride	102.40 ± 3.32	15.23
5	Bicarbonates	29.04 ± 1.32	6.07
	LIVER FUNCTION TESTS		
6	Serum total bilirubin (mg%)	1.59 ± 0.14	0.65
7	Direct bilirubin(mg%)	0.57 ± 0.07	0.31
8	Total protein (g%)	8.62 ± 0.32	1.45
9	Albumin (g%)	3.51 ± 0.10	0.46
10	Globulin (g%)	5.04 ± 0.27	1.25
11	Albumin globulin ratio	0.69 ± 0.05	0.24
12	Alanine amino transferase (ALT) (U/L)	86.90 ± 9.24	42.36
13	Alanine amino aspirate(AST) (U/L)	121.75 ± 11.17	51.18
14	Lactatate dehydrogenase(IU/L)	504.59 ± 45.59	208.92
15	Alkaline phosphatase(U/L)	36.32 ± 3.29	15.10
	KIDNEY FUNCTION TESTS(mg/dl)		
16	Creatinine	1.90 ± 0.27	1.23
17	Blood urea nitrogen(BUN)	37.05 ± 1.79	8.19
18	Blood urea	70.70 ± 6.54	29.98
19	Uric acid	3.90 ± 2.79	12.76
	LIPID PROFILE(mg/dl)		
20	Total cholesterol	315.28 ± 11.85	54.31
21	Triglycerides	87.61 ± 16.00	73.33
22	HDL	68.37± 4.48	20.53
23	LDL	207.11 ± 19.05	87.30
24	VLDL	27.07 ± 6.27	28.75
25	Glucose	62.91 ± 6.49	29.74

globulin level was documented as 5.04 ± 0.27g % in the present study was simulate with the earlier report (5.07 ± 0.25 g %) by (Jani *et al* 2007) in Asiatic lions. But Fowler and Miller (2003) non significantly reported the lower mean value of 3.3 ± 0.6 g%. The level of triglycerides in the present study was found as 87.61 ± 16.00 mg/dl, where as Fowler and Miller (2003) reported lower level of 40±26 mg/dl.

The serum biochemical parameters will directly depend on the type of feed and schedule of feeding in these wild felines, hence in animals with the similar feeding patterns these values can be considered as reference values in Asiatic tigers.

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Seasonality of breeding in captive Sambar deer (*Cervus unicolor*)

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Introduction

In most of the Indian zoos and other captive facilities, sambar deer are creating problem due to unmanageable numbers. Only meager published information is available to reveal its breeding profile. So a thorough understanding of the breeding seasonality of this species is essential. The present work was aimed to make a detailed understanding of the breeding seasonality in this species so that a successful method can be adopted to curtail the population size in future.

Materials and methods

The study was carried out at the State Museum and Zoo, Thrissur, Kerala, India. The zoo was chosen for the execution of the study because of the large number of sambar deer maintained there. There were a total of 70 sambar deer in the enclosure, during the commencement of the study, of which 22 were males including 16 adult stags.

The birth registers maintained at the zoo were scanned to find out the season during which maximum delivery was recorded. The timing of breeding activity was determined by deducting the length of gestation period from the date of delivery. Data for the past 19 years were used for the study.

Results and discussion

As per the birth registers of past nineteen years, November - February appeared to be the period during which maximum number of delivery occurred, therefore the peak breeding period was found to be during March - June. But the recent years average shows that the breeding season tends to be a bit later than the whole nineteen years average. The data are presented in Tables 1 and 2 and Figures 1 and 2.

The breeding related activities of the sambar deer herd used for the study did not show any stern seasonality; there were males in rut throughout the year. There was a slightly higher number of births occurring during the end of dry season and beginning of rainy season, but not significant enough to consider this as the breeding season of the species. The research by Willard and Randall (2002) on a herd of tropical spotted deer had similar reports.

The observations made by Acharjyo *et al.* (2005) in mouse deer in Indian zoos suggested that this species has no fixed birth/breeding season in captivity. Asher (2007) reported that equatorial region cervids are completely aseasonal.

In pampas deer populations inhabiting subtropical to temperate, Ungerfeld *et al.* (2008) reported that births can occur all year round, the peak roughly coinciding with pasture abundance.

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Fig. 1. Month wise births recorded

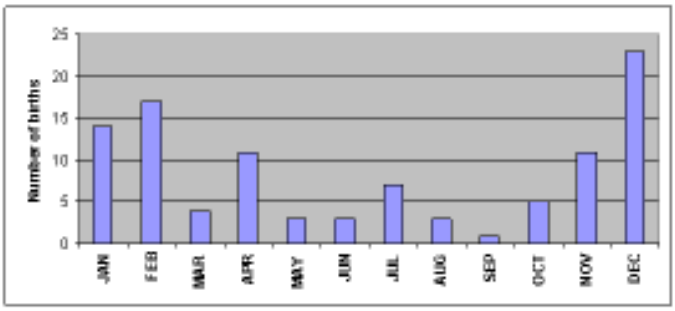

Fig. 2. Month wise breeding estimated

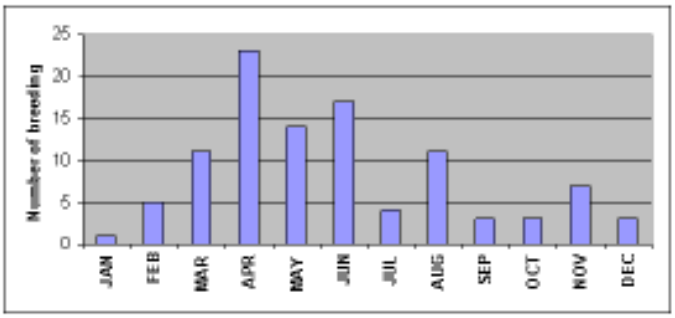

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Table 1. Month wise births recorded.

	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	TOTAL
JAN																1				**1**
FEB			1					1		1						2				**5**
MAR			1		1	1		1	2	1	1					1		2		**11**
APR	3		1	1				1	1	4	5	2		1	3				1	**23**
MAY		1				1	1					1	2	2	3	1	2			**14**
JUN			3									1			1	1	6	5		**17**
JULY															2			2		**4**
AUG							1							4	3	2		1		**11**
SEP			2														1			**3**
OCT					1								1					1		**3**
NOV				4												2	1			**7**
DEC			1			1										1				**3**
TOTAL	**3**	**1**	**9**	**5**	**2**	**3**	**2**	**3**	**3**	**6**	**6**	**4**	**3**	**7**	**12**	**11**	**10**	**11**	**1**	**102**

Table 2. Month wise breeding estimated.

	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	TOTAL
JAN		1				1	1					1	2	2	3	1	2			**14**
FEB			3									1			1	1	6	5		**17**
MAR															2			2		**4**
APR							1							4	3	2		1		**11**
MAY			2														1			**3**
JUN					1								1					1		**3**
JULY				4												2	1			**7**
AUG			1			1										1				**3**
SEP																1				**1**
OCT			1					1		1						2				**5**
NOV			1		1	1		1	2	1	1					1		2		**11**
DEC	3		1	1				1	1	4	5	2		1	3				1	**23**
TOTAL	**3**	**1**	**9**	**5**	**2**	**3**	**2**	**3**	**3**	**6**	**6**	**4**	**3**	**7**	**12**	**11**	**10**	**11**	**1**	**102**

Notes on morphometry and abnormal nests of Baya Weaver *Ploceus philippinus* Passeriformes

A. Mohamed Samsoor Ali*

Abstract
Nest morphometric features of Baya Weaver, *Ploceus philippinus* were studied in Mayiladuthurai and Nannilam Taluks of Tamil Nadu, India. The measurement showed that complete nests differed significantly (P<0.05) in variables namely total length, maximum depth of the nest, egg chamber depth and egg chamber circumference. The bird normally constructed either dome or bottle shaped hanging nests in the study area. Furthermore six different types of abnormal nests were also observed in the study area.

Keywords: Baya Weaver, entrance tube, abnormal nests

Introduction
The Baya Weaver, *Ploceus philippinus* is a polygynous bird; males establish small territories in trees. Within territories, males alone build elaborate hanging nests. The birds selected palm *Borassus flabellifer*, date palm *Phoneix psuilla* and coconut trees *Cocos nucifera* for nest construction (Asokan et al. 2008). Nests are built with grass and palm fibres and construction passes through several distinct stages, including an intermediate helmet-shaped structure. At this stage male's display to visiting females by quivering their wings and uttering a high-pitched screeching song, while perched on or near their helmet nests. A visiting female perches on the chinstrap of the helmet, pulls at nest fibres with her bill and pushes at the walls with her wings. Finally, she selects the best nest indicating her willingness to accept the architect of that nest as her mate. Before eggs are laid, the male must complete the nest by weaving the floor of the egg chamber. He also builds a vertical entrance tube of variable length. If a helmet is not accepted by any female, the male tears it down and may build a new one in its place. Breeding behaviour of the Baya Weaver has been published earlier in India by several researchers (Ali 1931; Crook 1960; Davis 1974; Mathew 1976; Sharma 1990, 1992; Pande 1991, Borkar & Komarpant 2003). Information on nest characteristics of this species in South India especially Tamil Nadu is sporadic. Hence, the present paper deals the morphometric characters and abnormal nests of Baya Weaver.

Materials and methods
The study was conducted in Mayiladuthurai and Nannilam taluks (10°4' N latitude and 79° 5' E longitude) of Tamil Nadu, India between December 2002 and March 2003. The river Cauvery is a perennial water sources in the study area. The agricultural operations are involving cultivation of paddy, sugarcane, cotton, groundnut, banana, pulses and other cereals. The north-east monsoon usually brings rain this area during October-December (65% of the total rainfall in a year).

A large number of nest colonies were observed in the agricultural fields. The breeding activities comes to end, the parent birds then, leave their nests along with the juveniles. Such abandoned nests were collected in the field and measurements were taken in the laboratory. The nests were grouped into two categories namely complete nests and incomplete nests. The complete nest referred to as nest with entrance tube and incomplete nest referred to as nest in helmet stages. Total weight of the each nest was weighed in 200g spring balance with 5g accuracy. The length, width, circumference and depth of the nests were measured by using a centimeter scale and a marked thread. The stalk and entrance tube thickness was measured by using a divider.

If nesting tree was observed a movable hide was erected by using Casuarina and Bamboo poles under the tree. The internal structure of each nest was closely observed with the help of 7x50' field binoculars. If abnormal nest was observed, the shape and abnormal position of nest was noted and the diagram was made in the field.

Results and discussion
During the study, totally 17 complete and 33 incomplete nests were collected and their morphometric measurements are given in Table 1. One-way Analysis of Variance (ANOVA) inferred that total length ($F_{1, 48} = 6.07$; $P<0.05$), maximum depth ($F_{1, 48} = 11.89$; $P<0.01$), egg chamber circumference ($F_{1, 48} = 22.47$; $P<0.01$), and egg chamber depth ($F_{1, 48} = 17.62$; $P<0.01$) differed significantly in complete and incomplete nests (Table 1). Weight of the complete nests was slightly heavier (39.7 ± 15.34 g) than that of incomplete nests (37.8 ± 21.33g). Total length of complete and incomplete nests was 27.5 ± 9.31cm and 22.4 ± 5.27cm, respectively. Earlier, Quader (2003) reported that mean length, width and depth of nests were 20.67 cm, 8.91 cm and 13.39 cm respectively. Arulchelvan (1983) recorded that much longer nest (66.7 ± 3.17 cm) of Baya Weaver in Mannampandal area, Tamil Nadu. The size of the nests was determined by various factors *viz.,* availability of nesting materials, nesting season, habitat and nest construction experience of cock.

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Mean entrance tube length of the complete nests was 5.0 ± 2.70cm, whereas the incomplete nest did not have an entrance tube. This length was more or less similar to previous studies (Wood, 1926; Arulchelvan, 1983; Edwards, 1983; Quader, 2003). Quader (2003) stated that nests with short entrance tube had a lower hazard than those with long suspensions, possibly because short suspensions prevent nests from being tossed about violently in strong winds and thereby losing their eggs or nestlings. Another advantage of short length of the entrance tube was larger number of feeding trips to keep pace with requirement of food for rapidly growing chicks. The variations in nests entrance tube length could be also associated with the presence of potential predators such as snakes and rodents (Ali & Ambedkar, 1956; Crook, 1960, 1963; Davis, 1974; Quader, 2003).

Besides normal nests, various types of abnormal nests were constructed by male Baya Weaver.
1) Multi-stalked nests: Generally only one stalk was fabricated by male, but in some cases more than one stalk was also found (Fig. 1 A).
2) Fused nests: In some cases, one side nest was fused with the main nest, except from the bottom of the tube (Fig. 1 B).
3) Stalkless nest: Generally the Baya Weaver constructed stalked nests on trees, but in rare cases stalkless nests were noticed in nature (Fig. 1 C).
4) Symmetrical nest: In ordinary complete nests, the position of the egg chamber and the entrance hall were identified i.e. greater bulged egg chamber occurred on one side. Sometimes the entrance tube was placed exactly centered so that both halves get similar bulges hence such nests were called symmetrical nests (Fig. 1 D).
5) Bi-storeyed nests: Sometimes, the Baya constructed one completed nest followed by one half completed nests (Fig. 1 E) or fusion of two completed nests (Fig. 1 F) in vertical plane.

Earlier, several researchers have already reported different kinds of abnormal nests of Baya Weaver in various places of India (Ambedkar, 1980; Anon, 1981; Davis, 1985, Sharma, 1985, 1988, 1995). Sharma (1995) reported nearly 15 types of abnormal nests on the basis of structural complexity. Ambedkar (1980) and Davis (1985) recorded that structural modification and complexity of multi-chambered nests. In present study, two types of bi-storeyed nests were also recorded. One of the reasons for construction of multi-storeyed nests was that when the length of the nest increased, the snake and other predators found it more difficult to approach the nest content. Mishra (2004) reported the abnormal nests (long entrance tube) in Black-breasted Weaver, *Ploceus benghalensis* colony in Kanpur, Uttar Pradesh, India, who have concluded that birds making long entrance tubes to prevent enemies like snakes from entering the nest.

In conclusion, the abnormal nests had more complexity in the structural modifications, which would require enormous amount of effort and working hours. Hence, the diversity of the abnormal nest could be associated with competition for getting a partner. The places where number of females were high the chances of getting a partner would not be difficult task and in such places the male could not put more complexity in the nest construction.

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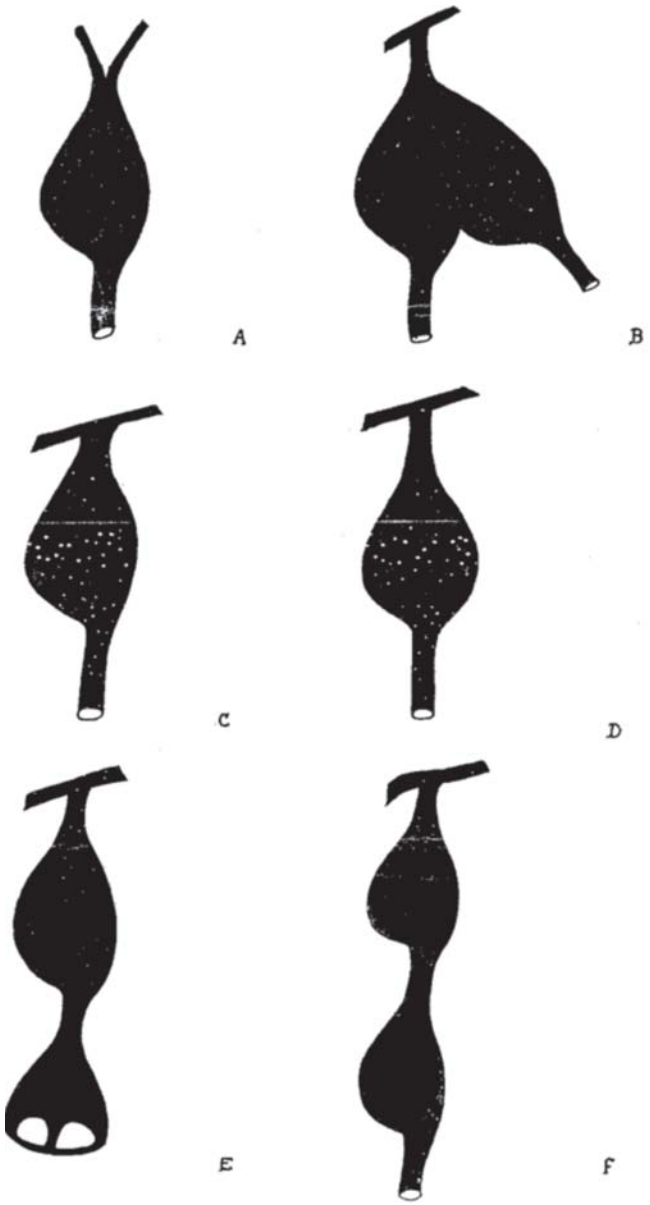

Table 1. Morphometric measurements of Baya Weaver nests (Values mean ± SD).

Variables	Complete nests (n=17)	Incomplete nests (n=33)	ANOVA	
			F	P
Weight (g)	39.7 ± 15.34	37.8 ± 21.33	0.10	0.752
Total length (cm)	27.5 ± 9.31	22.4 ± 5.27	6.07	0.017*
Total width (cm)	19.3 ± 1.93	19.8 ± 2.08	0.78	0.383
Maximum depth (cm)	19.9 ± 2.71	16.4 ± 3.76	11.89	0.001*
Stalk length (cm)	4.6 ± 7.24	2.3 ± 4.00	2.10	0.154
Stalk width (cm)	2.3 ± 3.49	1.7 ± 2.71	0.42	0.521
Stalk thickness (cm)	0.2 ± 0.48	0.1 ± 0.29	1.64	0.207
Egg chamber width (cm)	11.3 ± 1.63	11.8 ± 1.32	1.38	0.246
Egg chamber circumference (cm)	23.1 ± 2.34	20.8 ± 1.43	17.62	0.000*
Egg chamber depth (cm)	16.8 ± 3.81	12.3 ± 2.84	22.04	0.000*
Entrance tube length (cm)	5.0 ± 2.70	...	...	...
Entrance tube width (cm)	7.5 ± 0.92	...	...	...
Entrance tube circumference (cm)	11.5 ± 1.91	...	...	...
Entrance tube thickness (cm)	0.4 ± 0.07	...	...	...

*Statically significant (One-way ANOVA; P<0.05)

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