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Study on Train and Tail Feather's of Indian Blue Peacock in Bangladesh National Zoo

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Abstract

The research work was carried out from July 2016 to June 2017 on train and tail feather of Indian Blue Peacock at Bangladesh National Zoo. Several parameters about Train and Tail feathers were measured and observed for finding results related the objectives of the project. The main objectives were to know about number, length, weight, color and pattern of Train and Tail feathers of Indian Blue Peacock. The highest number of Train feather was found 201 and the lowest number was 183. Without this the eye feathers number and the T feathers number also vary from 146 to 160 and 35 to 45. The total tail feathers number was found ranges from 16 to 20. The average length of 'T 'feather was found 153cm and average root length of this feather was found 4.8cm. The average length of large, medium and small 'Eye' feathers was found 128.8cm, 111.5cm and 81.2cm respectively. The root length was found more in large size feathers than the small size feathers. The average weight of 'T' feather is 2.9gm, but the average weight large, medium and small size 'Eye' feather is 2.5gm, 2.2gm and 1.6gm respectively. The average length and root length of tail feathers were 36.35cm and 3.44cm, but the average weight of tail feathers was .95gm only. The eyespots color is purple-black center surrounded by concentric blue-green and bronze-gold regions and the pattern is eye shape. Displaying time was found 2 to 5 minutes for general case but in case of courtship and extremely egger to mate it was found 10 to 18 and 23 to 35 minutes. At the time of displaying the color was found bright, iridescent with blue-green eyespots and the pattern was found intricate semi-circular fan. Molting time was started from mid-April and ends in June last and full and attractive train time were found March and April. Intricate eye and T feathers pattern and uniform eyespots distribution for fan formation is the best attractive mode for mating.

Keywords: Peacock, Train feather, Tail feather, Pattern and Color.

Introduction

The Indian peafowl (*Pavo cristatus*) is a pheasant and is the oldest known ornamental bird. Peacock has a royal blue neck, chest and head with a little blue crown and black eyes. The feathers of this Peacock are iridescent blues, greens and browns. Each of his feathers has an "eye" at the outer end. At the time of feathers displayed, the eye marking on the feathers serve to attract his partner and put her in the mood for mating. Throughout the display, the tail feathers vary in length and the eyes are spread out. Of the length of the Peafowl, 60% of his total body is feathers. When not displaying his tail feathers, the Peacock will carry his long feathers behind him like a long train. Males have harems of up to 5 females. The males establish territories which visiting females wander through. She chooses her mate on the basis of the size, color and the quality of his tail feathers (**Error! Hyperlink reference not valid.**). The Peacock is most well known for its enormous tail feathers and these fan out behind the peacock which can be nearly two meters in length. Colorful display of the peacock is thought to be used for both mating and defense purposes. The male peacock attracts a female to mate with by showing off his array of elaborate feathers (http://a-z-animals.com/animals/peacock/). Indian peafowl breeds from April through October. Peafowl is polygynous and generally has two to three breeding peahens in its harem (Roberts, 1992). A recent study of a feral population suggests that peafowl does not defend its harem due to small breeding territory (Randset al., 1984). The peafowl is a lekking species and Peacock does not provide resources for offspring. It is essential, therefore, for a Peahen to reliably assess the genetic `fitness' of a given Peacock prior to mating, by this way she may adjust her reproductive investment proportionately. Elaborate train of the peacock represents at least one important indicator of male quality which is used by peahens in their assessment; the Peacocks with more elaborate trains have increased mating success (Petrie and Halliday, 1994), their offspring show improved growth and survival (Petrie, 1994) and peahens lay more eggs for peacocks with larger trains (Petrie and Williams, 1993). The Indian Peacock actual tail feathers are short and grey in colour and can only be seen from behind when the tail is extended and fully fanned. The males display their beautiful fanned trains as part of their courtship behaviour to the Peahens. (https://animalcorner.co.uk/animals/peafowl/). These decorative feathers are also referred to as ornamental feathers, or display feathers (Burgess, 2001).

Indian peafowl (*Pavo cristatus*) have a complex courtship display wherein males (peacocks) engage females (peahens) with elongated train (upper tail covert) feathers that display iridescent colors (Dakin and Montgomerie, 2011;Dakin and Montgomerie, 2013;Loyau*et al*, 2007). Most of the train feathers have a single eyespot at the distal end, and peacocks that display eyespots with greater iridescence obtain more matings (Dakin and Montgomerie, 2013 and Loyau *et al.*, 2007). Variation among peacocks with respect to their morphological traits like body size, feather length, etc. may also influence the feather vibrational frequency which used for train-rattling. As an example train length varies considerably among peacocks–and this trait is highly correlated with train mass (Petrie *et al*., 1996) so train length should determine vibrational frequency for two reasons. First one is peacocks with heavier trains should require more power to vibrate their feathers for at a given frequency and amplitude. For this reason one would expect based on other animal shaking behaviors, individuals with longer and heavier trains should use lower vibration frequencies to minimize costs. Second, expected that train length would influence the resonant properties of the train. Cantilever beam theory predicts that each normal mode's resonant frequency should decrease rapidly with increasing feather length (Smith, 2010). A team of Japanese ecologists studying the same group of feral peafowl over seven years reported that, overall, females didn't seem to favour males with the largest, most symmetrical tails (Takahashi *et al*., 2008). There was a finding that males with very few eyespots in their tail feathers a measure of the size of the tail were unattractive to females, but males with more spots than average had no advantage (Dakin and Montgomerie, 2011).It is intriguing that the colorful eyespots–which influence peahen mate preferences (Dakin and Montgomerie, 2013*).* There was no studied about train and tail feathers of Indian Blue Peacock in Bangladesh. So the study was done with several aspects of train and tail feathers of Indian Blue Peacock in Bangladesh National Zoo.

Materials and Methods

The study was done in Bangladesh National Zoo, Dhaka. There is an aviary in Bangladesh National Zoo in where there were about more than hundred Peafowl staying from which 35 were mature male. So the study was done in the aviary of Bangladesh National Zoo on Peacock. Ten Peacock have been selected for my study which was based on attractiveness and size. These ten Peacock form the harems with female

Peahen. Then the location was identified where they passed their most of time in the day. In that area how many Peahen were stayed beside the single Peacock when displaying observed by me. The snapshot was taken when displaying by the Peacock and also done video for observing properly. Without this ten Peacock were observed directly for taken the information about Train and Tail feathers of from those.

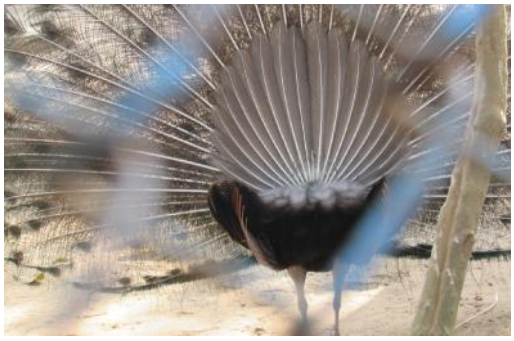

Plate 1: Displaying Train with 'Eye' and 'T' feathers and Tail feathers of Indian Blue Peacock

I was counted the T feathers of Train by direct observation and from the snapshot. But the Eye feathers were counted from the snapshot by using eyespots. The tail feather was also counted by direct observation and from the snapshot.

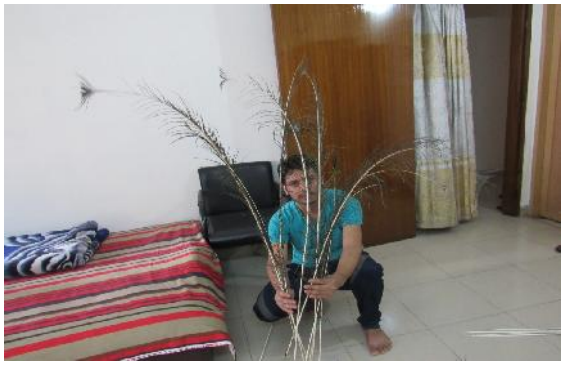

Plate 2: 'T" feathers and Eye feathers of the Train of Indian Blue Peacock

Plate 3: Eyespots of eye feather's of the Train of Indian

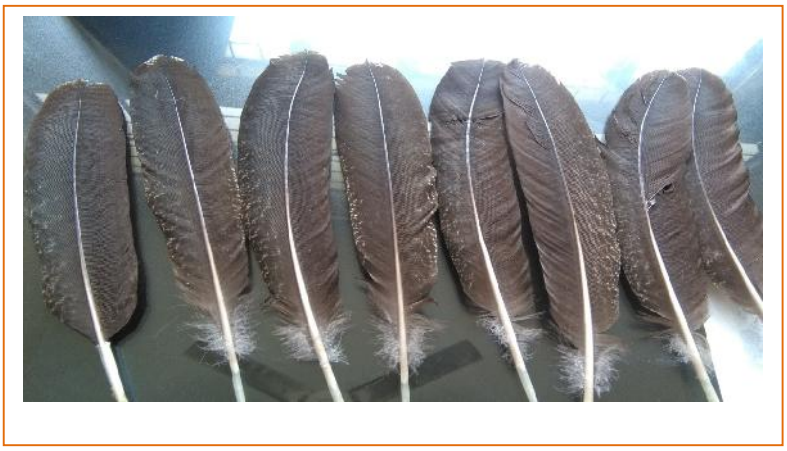

Plate 4: The Tail feathers of Indian Blue Peacock

Then several sizes of tail and train feathers were collected from the aviary store room where they keep the molted Train and Tail feathers. I randomly selected ten 'T' feathers, ten large size (125 to over125cm) Eye feathers, ten medium size (100-124cm) Eye feathers and ten small size (below 100 to75cm) Eye feathers. I also collected 20 Tail feathers randomly by observing the highest to the lowest size. Without this I collected the highest size 'T' feather of Train and the lowest size Eye feather of Train. I selected ten eyespots from ten randomly selected Eye feathers. Then the colors of eyespots were described by observing properly and repeatedly and the length and width of eyespots were measured by measuring scale. Measured and weighted of length and weight of Train and Tail by using measuring scale and weighting balance. The roots length of Train and Tail feather's also measured by measuring scale. I went to Bangladesh National Zoo in monthly interval for observing molting, growing train, absence of train and full train condition. But in the time of breeding season I went to Bangladesh National Zoo in 15 days intervals for observing displaying time and Train pattern of Peacock. This displaying was done video by using handy camera and later observed sharply for describing train color, pattern and appearance. Finally data was tabulated in Microsoft Excel. Then the collected data were analyzed by using the program of computer, Microsoft word, Microsoft Excel.

Results and Discussion

The total train feathers number vary from 183 to 201 (Table 1). Without this the eye feathers number and the T feathers number also vary from 146 to 160 and 35 to 45 (Table 1). The variation may be due to the age and weight variation of mature Peacock.

Table 1. Number of Train feather in Indian Blue Peacock

Serial no.	Total Train feathers	'T' feathers	'Eye' feathers
1	201	41	160
2	199	45	154
3	198	43	155
4	195	43	152
5	193	38	155
6	191	39	152
7	191	41	150
8	189	37	152
9	187	35	152
10	183	37	146

An adult peacock has an average of 200 tail feathers and these are shed and re-grown annually. Of the 200 or so feathers, about 170 are 'eye' feathers and 30 are 'T' feathers (S. Burgess, 2001).This finding also support the present research result about Train feathers of the Indian Blue Peacock of Bangladesh National Zoo. In the most of situations, females don't pick mates on the basis of the number of eyespots on their trains, but that the trait could help to weed out particularly unfit males that are missing lots of feathers (Dakin and Montgomerie, 2011). The total tail feathers number vary from 16 to 20 (Table 2).

Table 2. Number of Tail feather in Indian Blue Peacock

Serial no.	Total Tail feathers
1	20
2	20
3	20
4	20
5	20
6	20
7	18
8	18
9	18
10	16

The variation may be due to the age and weight variation of mature Peacock. The young peacock has low number of tail feathers compared to more adult one, which was found in this study.

The average length of 'T' feather 153cm and average root length of this feather is 4.8cm (Table 3). The average length of large, medium and small 'Eye' feathers is 128.8cm, 111.5cm and 81.2cm respectively (Table 3).

Table 3. Total Length and Root length of Train feather in Indian Blue Peacock

Train Feather		Total length		Root length	
		Average	Range	Average	Range
'T ' feather		153 cm	158-147cm	4.8	5.1-4.4
'Eye' feather	Large	128.8cm	137-125cm	4.1	4.2-3.90
	Medium	111.5cm	117-105cm	3.2	3.5-3.0
	Small	81.2cm	93-75cm	2.6	2.3-2.9
The smallest 'Eye' feather 's length was 13cm			The largest 'T' feather 's length was 158 cm		

The average root length of large, medium and small 'Eye' feathers is 4.1cm, 3.2cm and 2.6cm respectively (Table 3). The root length is more in large size feathers than the small size feathers because these hold the large feathers properly at the time of displaying. Train length varies considerably among peacocks–and this trait is highly correlated with train mass (Petrie *et al*., 1996). With lengths up to 1.5 m, each train feather weighs less than 2 g, yet stands erect with minimal support and endures hundreds of hours of display every breeding season (spanning 2–3 months). The eyespot feathers in the train also vary in length by an order of magnitude ((Dakin and Montgomerie, 2011). Present research does not agree with the earlier result which may be changed of rearing condition of Peacock. The average weight of 'T' feather is 2.9gm, but the average weight large, medium and small size (Table 4).

Table 4. Weight of Train feathers of Indian Blue Peacock

Train Feather		Average	Range
'T ' feather		2.9gm	3.2-2.7gm
'Eye' feather	Large	2.5gm	2.6-2.5gm
	Medium	2.2gm	2.0-2.5gm
	Small	1.6gm	1.5-1.8gm
The smallest 'Eye' feather 's weight was .93gm		The largest 'T' feather 's weight was 3.17gm	

'Eye' feather is 2.5gm, 2.2gm and 1.6gm respectively (Table 4).With lengths up to 1.5 m, each train feather weighs less than 2 g, yet stands erect with minimal support and endures hundreds of hours of display every breeding season (spanning 2–3 months). The eyespot feathers in the train also vary in length by an order of magnitude ((Dakin and Montgomerie, 2011). Present research result doesn't agree with earlier result. This changes result may be occurred due to environmental changes as well as nutrition level of feed.

The average length and root length of tail feathers are 36.35cm and 3.44cm, but the average weight of tail feathers are .95gm only (Table 5).

Table 5. Total length, root length and weight of Tail feather of Indian Blue Peacock

Tail feathers	Average	Range
Total Length	36.35cm	45-28cm
Root length	3.44cm	3.2-3.7cm
Weight	.95gm	.72-1.15gm

Though the length and weight is low but the root length is comparatively high because of the supporting of total Train of Peacock at the time of displaying.

The eyespots color is purple-black center surrounded by concentric blue-green and bronze-gold regions and the pattern is eye shape (Table 5).

Table 5. Color shape and size of eyespots of Indian Blue Peacock

Eyespots			
Color	Shape	Size	
		Length	Width
Bright and iridescent color. The front color appears bronze, blue, dark purple and green but the back of the feather is uniformly brown to grey brown.The eye spots color also can be described as purple-black center surrounded by concentric blue-green and bronze-gold regions.	Eye pattern	Average length 6.6cm Range(7.5-5)cm	Average width5.45 cm Range(4.5-6.5)cm

The eyespots color is bright and pattern is intricate eye(Stuart, 2001).It is intriguing that the colorful eyespots–which influence peahen mate preferences(Dakin and Montgomerie, 2013).The present study also finding the similar result on eyespots. . In the case of the peacock, there are many aesthetic features in the tail. In addition, the peacock also has several aesthetic features in the rest of its body (Stuart, 2001).

In the breeding season the Indian Blue Peacock displaying so much time at daytime (Table 6).

Table 6. Single Displaying time of Indian Blue Peacock

Displaying time		
General	Courtship	Extremely egger to mate
2-5minutes	10-18minutes	23-35minutes

Hundreds of hours of display by Indian Blue Peacock every breeding season spanning 2 to 3 months ((Dakin and Montgomerie, 2011). Evolutionists fully recognize that sexual selection would often produce features that reduce the ability to escape from predators because aesthetic features often make a creature more conspicuous and slower (Darwin, 1888). So this variation in displaying and enough amount of displaying time is common for the Peacock.

At the time of displaying color is bright iridescent with blue-green eyespots, and the pattern is intricate semicircular fan with angle more than 180 degrees.

Table 7. Train color and pattern at the time of displaying of Indian Blue Peacock

Color and pattern at displaying time		
Color	Pattern	Explanation of color
Bright, iridescent colors with blue-green eyespots.	Intricate pattern. Semi-circular fan with the angle more than 180 degrees.	Total green area spotted with blue-green patches of eyespots. The back color is brown to deep brown, grey brown.

The color and pattern at displaying time is very important for attracting more Peahen in the harem of Peacock. The characteristics, including the colour and pattern of a train, may still entice females (Dakin and Montgomerie, 2011). Sexual selection is a circular process based on a particular fashion. Peahen has have a preference for a long tail, the selection of a male with a long tail is an advantage because the male peachicks will have long tails and therefore be more successful at mating. On the other hand if females prefer beautiful males for mating, then the advantage of beauty can outweigh the advantages of camouflage and maneuverability (Darwin,1888). So color and pattern is very important for mate selection.

The attractive and full train time is March and April and the lack of train time is July to September (Table 8).

Table 8. Several train time of Indian Blue Peacock

Molting time	Lack of train time	Attractive train time
Start from mid-April and end in June last.	The Peacock fully lack of train from July to September.	Full and attractive train time of PeacockMarch and April

The full and attractive train time help to attract more Peahens in the Peacock harem.

Table 9. Pattern of train attract more Peahen for mating

Fan formation of feathers with-	• Uniform distribution of 'eyes' • Intricate 'eye' feathers • Intricate 'T' feathers

The uniform distribution of eyespots and intricate eye and T feathers pattern attract more peahen for mating.

Conclusion

The number of Train feather was found from 183 to 201. Without this the eye feathers number and the T feathers number also vary from 146 to 160 and 35 to 45. The total tail feathers number was found ranges from 16 to 20. The average length of 'T 'feather was found 153cm and the average length of large, medium and small 'Eye' feathers was found 128.8cm, 111.5cm and 81.2cm respectively. The root length was found more in large size feathers than the small size feathers. The average weight of 'T' feather is 2.9gm, and the average weight large, medium and small size 'Eye' feather is 2.5gm, 2.2gm and 1.6gm respectively. The tail feathers average length was 36.35cm and the root length 3.44cm, but the average weight of tail feathers was .95gm only .The eyespots color is purple-black center surrounded by concentric blue-green and bronze-gold regions and the pattern is eye shape. Displaying time was found 2 to 5 minutes for general case but in case of courtship and extremely egger to mate it was found 10 to 18 and 23 to 35 minutes. Displaying time of Indian Blue Peafowl, the color was found bright, iridescent with blue-green eyespots and the pattern was found intricate semi-circular fan formation. Full and attractive train time of Indian Blue Peafowl is March and April. Intricate eye and T feathers pattern and uniform eyespots distribution for fan formation is the best attractive mode for mating.

Finally this can be concluded that in the case of the peacock, there are many aesthetic features in the tail. The number, length, color, pattern and pattern of Train and Tail feathers are very important issue for Indian Blue Peafowl's mate choose, and Physiological balance. Without this the females have a preference for a long tail, the selection of a male with a long tail is an advantage because the male offspring will have long tails and therefore be more successful at mating. The full and attractive train time help to attract more Peahens in the Peacock harem.

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