

Study on display sequences in Cotton Pygmy-Goose *Nettapus Coromandelianus Coromandelianus* Gmelin

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ABSTRACT:

The pairing and display sequence of Cotton Pygmy-goose (*Nettapus coromandelianus coromandelianus* Gmelin) in Eastern Assam was observed from April 2007 to July 2008. The frequency of head movement (up-down and left-right) are found to be 0.288 and 0.28 per second. Courtship bouts occurred in groups averaging 5.7 birds, with a male: female ratio of 1.1:1. Several new displays and vocalizations are described. Early pair bonds appeared tenuous and were continually tested until nest-searching activities began in May. Birds in groups displayed and vocalized more than paired birds, and birds displayed and vocalized more or less equally throughout the period with mild rainy climate. Early pairing may be related to a bird's condition, climatic condition, success in obtaining a nesting site, and increased productivity.

Keywords:

Burping, coquette call, chin-lifting, display shake, inciting, preening, vocalizations, whistling jerks.

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INTRODUCTION

Most anatids confine their displays to the water (or land) surface, since their heavy weight relative to their wing area dictates continuous flapping and makes complex maneuvers, such as hovering and soaring, difficult or impossible. Aerial communication is thus largely restricted to short, ritualized flights (ordinarily close to the water surface) and vocalizations, including contact calls that help to maintain flock coherence in these rapid fliers that often go long distances between landings. Most of the studies on display behavior of anatids are confined to Mallards and a few other species.

The ethogram of the Cotton Pygmy-goose (CPG, *Nettapus coromandelianus coromandelianus* Gmelin) is incomplete, so to say not studied at all. A description of Wood duck vocalizations and courtship displays is given by Heinroth (1910) and Lorenz (1951 - 1953). Display behavior in Blue-billed Dick has been studied by Johnsgard and Nordeen (1981). Males court one female with social display relative to *Anas* species (Lorenz 1951 - 1953, Wishart 1983). Pair formation, courtship and display in musk duck and mallards were also studied (Bossema and Roemers 1985, Fullagen and Carbonell 1986).

Information is lacking on the chronology of pair formation and strength of pair bonds on CPG, because most published studies have concerned only spring courtship behavior in Wood ducks (other than CPG), Mallards (Lebret 1961; Weidmann & Darley 1971) and a few other species. CPGs breeds during the monsoon season (Ali & Ripley 1983). This study was designed to determine the chronology and mechanism of pair formation and display in CPG.

STUDY AREA & METHODS

The study was carried out in the Sonitpur district of Assam ($24^{\circ} 09' N$ to $27^{\circ} 58' N$ and $89^{\circ} 42' E$ to $96^{\circ} 01' E$) during 2007 - 2008. The Sonitpur district of Assam, with an area of $5,324 \text{ km}^2$, is located in between $93^{\circ} 2' 80'' E$ to $93^{\circ} 57' 1'' E$ longitude and $26^{\circ} 22' 1'' N$ to $26^{\circ} 42' 2'' N$ latitude. The district is bounded by Hawajan tributary in the east, Pachnoi tributary in the west, the mighty river Brahmaputra in the south and the state Arunachal Pradesh (previously North Eastern Frontier Area or NEFA) in the north. Physiographically, major parts of the district are plain area with a number of tributaries like Pachnoi, Mora-Bhoroli, Jia-Bhoroli, Ghiladhari, Burigang, Borgang, Buroi, and Satrang arose from the hills of Arunachal Pradesh and joins

with the river Brahmaputra.

Scan and *ad libitum* sampling methods were used to study the nesting behavior of the Cotton Pygmy-goose, as per Altmann (1974) and Brockelman (1975). Field observations were conducted continuously for three days from April 2007 to July 2008 on every week in each month of the year at Kadamani wetland and Dagaon. Courtship was recorded from a portable tree blind or while concealed in vegetation or in the open. The day samplings were taken total of 2 - 5 hours and totaling 50 hours devoted in a week. The sampling patterns followed for the study time *viz.*, first day: 05:00 to 08:00 hours and 09:00 to 11:00 hours, second day: 08:00 to 09:00 hours, and 11:00 to 14:00 hours, third day: 14:00 to 16:00 hours. Cotton Pygmy-goose behavior before and after courtship and were observed using a pairs of binoculars (10 X 50 and 20 x 50) and data were recorded and sketches were drawn. No birds were marked. The frequency of head movement during feeding and searching of nesting trees were also recorded. The display behaviors were categorized as per Lorenz (1951-1953).

RESULTS & DISCUSSION

The Cotton Pygmy-goose generally found to select big hole or cavity bearing trees for nesting purposes during the breeding season. The initiation of searching the nesting tree was made by the pair before 10 - 12 days of egg laying. Both the male and female birds circling in an around the selected nesting tree, might be to confirm the security status of the trees and as well as the anthropogenic activities. They perform several rounds of flights in various hours of the day near nesting trees and then they select the nest sites. The monitoring flight rate was found to be high on a rainy day between 07:00 - 10:00 hours. They move around the nesting tree for nesting territory with a mean duration of 3.28 hour/day ($n = 7$, **Table 1**). The selection of nesting tree was an unique phenomenon of CPG which prefers to move out during rainy or mild raining condition and the frequency was found to be 0.056 rounds per seconds.

Display behavior and pair formation

During field observations for display behavior and pair formation, altogether 110 Cotton Pygmy-goose were encountered on 10 occasions. Courtship was observed twice (once at Kadamani on 21st May 2007 for 1.4 min and once in an agricultural field on 12th June 2008 for 1.1 min near Dagaon, Biswanath Chariali). Display bouts

Table 1 Movement pattern of Cotton Pygmy-geese during nesting period (prior to nest selection) 2007; (location- Kadamani; Tree species- Sowalo *Litsea polyantha*)

Obs.	Dates	Weather condition	Active period (in hours)	Total time (in hours)	Birds Mov. (no. of tips)	Social Structure	Freq. of movement /sec.
1	06/7/ 2007	Cloudy	06.30 -09.30	3.00 hrs	8	P	0.044
2	14/7/ 2007	Raining	07.10 -10.00	2.40 hrs.	11	P	0.069
3	15/7/ 2007	mild raining	09.45 -11.45	2.00 hrs	8	P	0.067
4	15/7/ 2007	mild raining	07.30 -10.30	2.00 hrs	5	P	0.042
5	16/7/ 2007	--do--	11.00 -14.00	3.00 hrs	0	0	0
6	07/8/ 2007	mild raining	07.00 -09.00	2.00 hrs	7	S (male)	0.058
7	07/8/2007	--do--	09.30 -11.30	2.00 hrs	0	0	0
	Average	---	---	3.28 hrs/day	7.8 tips/day	---	0.056 / second

consisted of a series of sequences in which the intensity of sexual behavior progressively increased. Various types of display bouts were observed, which were categorized as: (i) vocalizations, (ii) head-up-down movement, (iii) head-turn, (iv) burping, (v) Whistling jerks or bill shaking, (vi) Coquette call, (vii) chin-lifting, (viii) display shake, (ix) wing-and-tail-flash, (x) inciting and (xi) preening and feeding *etc.*

A typical display sequences were usually starts with vocalizations or agonistic postures from male (**Fig. 1a**). The male sat quietly on the water; with the head turn back (**Fig. 1b**) and slowly changed positions around the female. The male starts whistling or possess bill jerks or shakes their bills (**Fig. 1c**). The female produce the Coquette call (**Fig. 1d**). The female move the bill down and up as it drinking water and lifts the chin up (**Fig. 1e**), and make a display shake and whistled frequently along with the wing-and-tail-flash (**Fig.1f**) until a male began to inciting or males starts fighting among them. Following an agonistic possession between them, both usually bathed. This behavior leads to a session of preening on breast or back or feeding, and then they completed display

(**Fig. 1g-i; Fig. 2**). Similar types of behavioral observations were also made by Lorenz (1951 - 53), Johnsgard (1960), McKinney (1970), Armbruster (1982) and others in various species of anatids. Increased intensity of vocalizations and aggressive behavioral postures increases the sexual excitement again. The length of display sequences ranged between 2 - 6 minutes interspersed with 10 - 65 minutes of preening or feeding. These types of behavioral displays were frequently seen during breeding season. The display behaviors were observed during early hours of the morning and late afternoon. The displayed vocalization was almost similar with that of domestic pigeon before mating, *viz. gor...r...gor...r...gor...r.....*. The up-down postures, left-and-right side movement of head are the common display behavior of CPG. The frequency of head movement was found to be 0.288 and 0.28 per second (total duration =204.29 minutes; n =7) respectively during the study period (**Table 2**). Fox and Madsen (1981) published more or less similar results in Greenland White-fronted goose (*Anser albifrons*) while studying its pre-nesting behavior.

Table 2. Frequency of head movement of Cotton Pygmy-geese during breeding season (Location: Kadamani wetland, date: 02/07/2007 and 03/07/2007).

Sl. Nos.	Distance of obs. (m)	Duration of obs. (sec.)	Up and down movement of the head		Lt. and Rt. movement of the head	
			No. of times	Freq/sec	No. of times	Freq/sec
1	18.00	60	33	0.55	31	0.517
2	20.00	120	40	0.333	36	0.300
3	22.00	120	31	0.258	36	0.300
4	26.00	150	36	0.24	33	0.220
5	22.00	150	49	0.327	47	0.313
6	23.00	230	37	0.161	37	0.161
7	32.00	600	87	0.145	88	0.147
Average	23.29	204.29	44.71	0.288	44	0.280

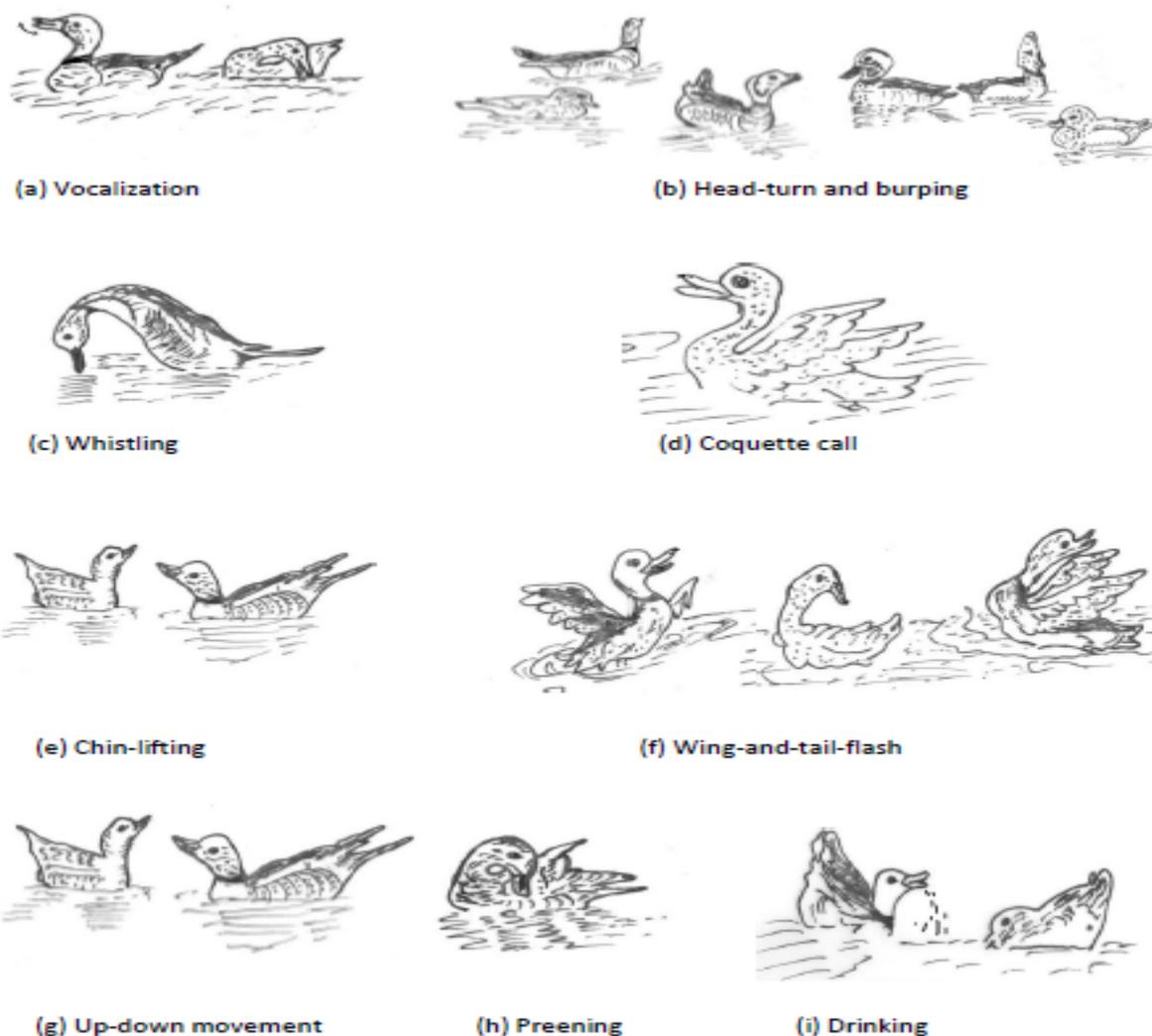


Fig. 1 Diagrammatic representation of courtship behavior of Cotton Pygmy-goose observed during the study period.

The results of the present study shows that, in Cotton Pygmy-goose the pair formation starts from the month of May and retains up to the month of July, though they pass most of the time of the year in flocks, they form pair with a male and a female during the breeding season. The Cotton Pygmy-goose moves out of the foraging site during breeding period in search of nesting tree. The frequency of group formation was found to be 5.4 birds with maximum 8 pairs during the third week of May and second week of June 2007 (**Table 3**).

The study shows that, the Cotton Pygmy-goose prefers to nest during June – September. Higher frequency of nesting was found in the month of August, though the pairing and courtship display starts in the months of May to July during the study period ($n=52$). The nest site selection and display behavior in Cotton Pygmy-goose are related

with the breeding season and availability of habitats for the growing ducklings. This might be due to their requirement of extra as well as stored energy for nesting period. Pair formation takes place throughout the year for the adult Cotton Pygmy-goose. However, the most active period of display and copulation found during the present observation was May to July. It is important to mention here that, the growing of breeding plumage will encourage to formation of pairs. The Cotton Pygmy-goose acquires alternate plumage in November retains up to February, pair by May to July, lay first eggs in second half of the May. The breeding plumage might help in courtship. Though early pairs are frequently unstable, but firm bonds are distinguishable only after many weeks of pairing activity.

Table 3. Pair formation in Cotton Pygmy-goose around the Kadamani wetland, 2007.

Months	Duration	No. of pairs	No. of solitary male/female
May 2007	1/5/2007 to 7/5/2007	3	-
	8/5/2007 to 14/5/2007	4	-
	15/5/2007 to 21/5/2007	8	-
	22/5/2007 to 28/5/2007	6	1 M
	29/5/2007 to 31/5/2007	6	1 M
June 2007	1/6/2007 to 7/6/2007	6	1 M
	8/6/2007 to 14/6/2007	8	-
	15/6/2007 to 21/6/2007	4	1 M
	22/6/2007 to 28/6/2007	6	1 M
	29/6/2007 to 30/6/2007	6	1 M

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