

11. PARENTAL CARE

11.1 INTRODUCTION

Successful parenting is the ultimate step that enhances individual fitness and play a vital role in the evolution of social systems. Life-history theory predicts that as parents increase their investment in individual offspring, the survival rates of those offspring increase (Stearns, 1992). Parents of altricial young birds spend a large amount of efforts during the breeding season feeding and caring for the young in relation to parents of precocial youngs because altricial young hatch from energy-poor eggs and are helpless at birth. Again in biparental care both parents share incubation, brooding and caring of youngs (Borowik and McLennan, 1999).

In Little Cormorants and Night Herons, prolonged parental care is accomplished by both the partners (Gross, 1923 ; Nobel *et. al.*, 1938 ; Baker, 1929 ; Maxwell and Putnam, 1968 ; Ali and Ripley, 1968 ; Davis, 1993). This chapter attempts to discuss some specific aspects of parental care behaviour.

11.2 METHODS

During the study period the experimental nesting trees and all the nests in each tree were marked. The marked nests were inspected daily during the nesting phase. Efforts were taken to complete inspection as quickly as possible so as to make negligible disturbance to the birds and nestlings. Data were collected by direct observation mostly with "continuous sampling" procedure (Altmann, 1974). Departure and arrival of the parents and possible foraging sites actually used were recorded.

Little Cormorant and Night Heron chicks are in the habit of vomiting almost the entire stomach content when alarmed. This behaviour was utilized in order to obtain information on the composition of chick feed items. The food samples were identified, weighed and preserved in appropriate percentages of formaldehyde, depending on their nature. The day of

hatching was taken to be day-1. Each chick was marked by non-toxic paints of different colours to denote its hatching order. This also helped in determining the age of chicks.

11.3. RESULTS AND DISCUSSIONS

11.3.1. Brooding

With the hatching of the first egg brooding starts which involves covering of the youngs by the parent's body to Receipt warm. In almost all the nests parents sat over the brood even upto the day after the hatching of the last young. After the emergence of the first chick incubating birds stood up often, again sat over the clutch or brood as a regular feature. Covering of the brood in the incubating posture during rains was found upto 10-12 day age of the first young. Thereafter, during rains the chicks took shelter under the parent's body. During the warmer part of the day parents were also found to shade their youngs from the sun. At this time incubating parents obstructed the sun and the youngs gathered in the shade produced. In the midday the parenting birds occasionally spread the wings while standing on the nest which provided additional shade to the youngs. As in incubation brooding also is accomplished by both the partners.

11.3.2. Feeding of young

11.3.2.1. Early hatchling stage

In Little Cormorant

In the early stage of chick development i.e. upto 6th day of hatching at least one of the parents attends the nest . As the other parent returns from foraging grounds, the chicks rise and move their heads in a horizontal plane orienting to the incoming parent. Soon the chicks raise their heads stil further with open beaks and the parent regurgitates a bit of semi-digested food

material into their mouth. In this way the parents feed one, two or all the chicks depending on the behaviour of the chicks as expressed by lateral movement of the head and open beak. On several occasions around the 5th / 6th day of hatching, the parents were observed to insert one fry of *Channa sp.* into the mouth of each chick. It is to be mentioned that the eyes of the chicks open on 5th day so that prior to that visual perception and response is nil or negligible. Predation of chicks by avian predators is highest at this stage. Thus with the onset of solid food (not processed by parents) intake and visual communication the early chick phase terminates.

In Night Heron

At this stage i.e. upto the 4th day of hatching at least one of the parents attends the nest all the time. When parents return from the foraging grounds, the chicks raise and move their head in a horizontal plane. The parents regurgitate liquid or a bit of semi-digested food material into their mouth. On several occasions on the 3rd / 4th day of hatching, the parents were observed to insert fleshy part of fish or crab or *Palaemon sp.* into the mouth / of the hatchlings.

11.3.2.2. Mid-hatchling stage

In Little Cormorant

During this period the hatchlings can see the world around them including their siblings, parents and food materials. This period continues until 16th day of hatching. The parents continue to feed the chicks more or less in the same manner as in the earlier phase. However, the feeding frequency and duration of feeding increased considerably. Occasionally the parents were found to place their lower beak beneath the lower beak of the chicks while feeding. The eldest chick (usually larger and heavier) solicited food more often in comparison to others and the parents most often obliged

them. While one of the parents continues to attend the nest throughout this phase, they most often took position at a little distance from the nest but close to it (within 25 to 40 cm.). At the fag end of this phase, however, the nests were found unattended by parents for short period of times (less than 10 minutes). Predation by avian predators and damage to the chicks and the nest by nesting neighbours of the same and others species are high upto this stage. At this phase the parents were found to store some food materials in the nest for later consumption of the chicks in addition to usual mode of feeding. Small sized fish (around 7.5 cm.) thus stored are swallowed whole by the chicks while the larger ones (around 12.5 cm.) were often shared. The chicks actually hold the fish by their feet and cut out small pieces of flesh by the beak one at a time and swallowed the morse.

In Night Heron

This period continues until 13th day of hatching. The parents continue to feed the chicks more or less in the same manner as in the earlier phase. However, feeding frequency and duration of feeding, increased greatly. Although the adult herons are nocturnal, they were found to feed their chicks during early morning hours regularly. They also feed the chicks several times even during the day. At the fag end of this phase, however, the nests were not attended by parents for short periods (less than 15 minutes). The parents at this phase were also found to store some food materials in the nest for later consumption of chicks as in Little Cormorants.

11.3.2.3. Late hatchling stage

In Little Cormorant

This phase extends from 17th to 26/27th days of hatching. Parental feeding in this stage involves several new aspects while the usual patterns are modified substantially both in frequency and quantum. Usual procedure

of chick feeding and storing of food materials in the nest continues. But there is a substantial increase both in diversity and size of the stored food. Feeding frequency also increases considerably. The chicks in this phase feed from the crop of the parents directly by inserting their beaks into the open mouth of the parents. In the process sometimes the chicks insert their beaks as well as the head into the mouth of the parents. On rare occasions smaller chicks were found to feed by inserting their beaks into the mouth of the older ones. On all such occasions, however, both the chicks were fed by the parents immediately prior to the appearance of this peculiar altruistic acts. The chicks at this phase are quite grown up and require huge amounts of food. To meet the huge demand it is necessary for both the parents to be on their foraging trips simultaneously on most of the times and the chicks at the nest are left unguarded. The demand for food of grown-up chicks is so high that on being fed by a parent they are seldom satisfied and continue to force the parent to feed them over and over again. The parents, however, try to feed all the chicks at least once. When a particular chick usually the oldest one continues to press the parent for more food, parents first try to evade them by moving their head sideways or by lifting the head higher beyond the chicks reach. If the chick continues to persuade the parent further the parent usually leave the nest and settle at a distance (1 - 1.5 metre) from the nest but return shortly (2 - 3 minutes) and feeds the other chicks. The chicks often touch one another's beak. This may help them in kin recognition in later life.

In Night Heron

At this phase few new patterns are observed in the feeding procedure. The hatchlings at this stage exhibit billing amongst themselves which has been ascribed by Nobel *et al.* (1938) as indicative of dominance among themselves. On arrival to the nest the parents show a forward thrust movement of the head towards the chick who actually approach the incoming

parent randomly so that it becomes difficult for the parent to start the feeding procedure. Lorenz (1938) used the term repelling reaction for this behaviour which, however, does not seem to be appropriate. In the present study food transfer was always achieved by the parents inserting the bill into the gapping mouth of the chicks. Herrick (1935) on the other hand stated that herons transfer regurgitated food by a cross or juxta-position of bills rather than by inserting of the parents bills into young ones mouth. The manner of food transfer described by Herrick (1935) was never observed at Kulik. Feeding bouts varied in duration and sequence of events. Usually multiple transfer of food occurred during a feeding bout. Most often the parents feed the most dominant chick twice right after arrival to the nest. Then it fed the other chicks in turn. As many as 4 to 5 transfers have been observed. In general this patterns continues upto the fledgling stage.

11.3.2.4. Post hatchling / Fledgling stage

In Little Cormorant

This phase starts around 27/28 days and continues to 55/60 days when they are able to fly and fend for themselves. The fledglings, however, continue to seek food from the parents for a much longer time even after this period. Some of the characteristics of this phase are : the parents no more store food in the nest, most feedings by the parents are done outside the nest, the chicks hop outside the nest and stay away from the nest for most of the time. Distance hopped gradually increases from 5/6 cm. on 27th day to a maximum of 150 cm. for the oldest chick and 120 cm. for younger chicks around 32/33 days of hatching. Around this time the chicks start flying little distances (110 to 150 cm.) for the first time in life which gradually increases to about 300 to 360 cm. on 40 days of hatching. They switch from hopping to flying at around 32/33 days of hatching but use both the modes of

locomotion throughout life. As in earlier phases they continue to vomit when disturbed even in this stage.

In Night Heron

This phase starts around 25th or 26th days and continues to 53/58 days when they are able to fly and try to capture food from the nearest canal along with parents. At this stage the parents mainly feed the nestlings outside the nest. When they return to close to the nest the nestlings hop out of the nest and beg for food. The parents regurgitate some food to the older nestlings and then the younger ones. However, they feed the nestlings mainly at night and on some occasions also in the day time. The nestlings at this phase also vomit as in the earlier phases when alarmed.

Figure 11.1 shows the diversity of feed items and average weight of feed per chick in the four stages in Little Cormorants and Night Herons. It shows that both diversity of feed items and weight of feed / chick increases continuously in both the bird species. Of the two species Night Heron chicks receive higher amount of feed as also more diverse feed items in all the developmental stages in comparison to Little Cormorant chicks.

Table 11.1 : Feed items at various phases of chick development in Little Cormorants.

Feed species	Early hatchling phase (1 – 6) days, N = 5			Mid hatchling phase (7 – 16 days), N = 12			Late hatchling phase (17-26/27 day), N = 12			Fledgling phase (27/28 – 40 days), N=10		
	No.	Total wt. (gm)	Ave. wt. \pm S.E.	No.	Total wt. (gm)	Ave. wt. \pm S.E.	No.	Total wt. (gm)	Ave. wt. \pm S.E.	No.	Total wt. (gm)	Ave. wt. \pm S.E.
<i>Channa punctatus</i>	05	5.10	1.02 \pm 0.02	01	21.23	21.23 \pm 0	02	42.74	21.37 \pm 0.02	02	45.08	22.54 \pm 1.03
<i>Labeo rohita</i>	--	--	--	02	38.50	19.25 \pm 1.59	02	49.50	24.75 \pm 1.06	01	25.00	25 \pm 0
<i>Puntius ticto</i>	--	--	--	05	21.60	4.32 \pm 0.15	04	22.40	5.6 \pm 0.94	12	81.37	7.68 \pm 0.75
<i>Cirrhinus mrigala</i>	--	--	--	01	22.50	22.50 \pm 0	03	76.50	22.50 \pm 1.31	02	42.14	21.07 \pm 1.32
<i>Paleomon sp.</i>	--	--	--	02	2.60	1.30 \pm 0.07	06	6.84	1.14 \pm 0.01	04	4.60	1.15 \pm 0.02
<i>Channa gachua</i>	--	--	--	--	--	--	02	44.10	22.05 \pm 0.67	02	48.56	24.28 \pm 1.33
<i>Anabus testudenus</i>	--	--	--	--	--	--	01	16.84	16.84 \pm 00	--	--	--
<i>Channa striatus</i>	--	--	--	--	--	--	--	--	--	01	22.26	22.26 \pm 0
<i>Rhynchobdella aculeata</i>	--	--	--	--	--	--	--	--	--	01	9.33	9.33 \pm 0
<i>Rana tigrina</i>	--	--	--	--	--	--	02	40.44	20.22 \pm 1.43	02	47.80	23.90 \pm 0.99
Ave. feed/hatchling (\bar{X} + S.E.)	1.02 \pm 0.02			8.86 \pm 0.11			24.94 \pm 0.39			32.61 \pm 0.28		

Table 11.2 : Feed items at various phases of chick development in Night Heron.

Feed species	Early hatchling phase (1 - 4) days, N = 04			Mid hatchling phase (5 - 13 days), N = 09			Late hatchling phase (14-24/25 day), N = 11			Fledgling phase (25/26 - 38 days), N=13		
	No.	Total wt. (gm)	Ave. wt. ± S.E.	No.	Total wt. (gm)	Ave. wt. ± S.E.	No.	Total wt. (gm)	Ave. wt. ± S.E.	No.	Total wt. (gm)	Ave. wt. ± S.E.
Predigested liquid material, semidigested fish, fleshy parts of crabs & <i>Palaemon</i> sp.	04	12.10	3.02±0.08	--	--	--	--	--	--	--	--	--
<i>Palaemon</i> sp.	--	--	--	05	8.56	1.71±0.04	10	13	1.3±0.07	08	17.12	2.14±0.80
<i>Channa punctatus</i>	--	--	--	05	30.0	6.00±1.21	06	48	8.0±1.24	06	121.80	20.30±1.03
<i>Labeo bata</i>	--	--	--	--	--	--	04	66	16.5±1.40	--	--	--
<i>Catla Catla</i>	--	--	--	--	--	--	--	--	--	01	9.00	9.00±0
<i>Channa gachua</i>	--	--	--	04	32.0	8.00±0.07	04	26	6.5±1.03	09	99.0±00	11.0±1.06
<i>Puntius ticto</i>	--	--	--	07	22.40	3.2±0.65	08	18.4	2.3±0.15	18	61.20	3.4±0.08
<i>Rhynchobdella aculeata</i>	--	--	--	03	12.3	4.10±0.07	06	37.2	6.2±0.74	06	52.7	8.7±0.92
<i>Heteropneustes fossilis</i>	--	--	--	--	--	--	04	30.48	7.62±0.75	09	17.10	1.9±0.59
<i>Colisha chuna</i>	--	--	--	--	--	--	03	3.6	1.2±0.03	--	--	--
<i>Amblypharyngodon mola</i>	--	--	--	--	--	--	02	3.8	1.9±0.02	--	--	--
<i>Colisha lalius</i>	--	--	--	--	--	--	--	--	--	11	19.80	1.80±0.05
<i>Rana tigrina</i>	--	--	--	--	--	--	02	56.68	14.17±1.22	07	134.40	19.2±1.15
Tadpoles	--	--	--	04	6.48	1.68±0.03	--	--	--	--	--	--
Ave. feed/hatchling (\bar{X} ± S.E.)	3.02 ± 0.08			12.41 ± 0.17			27.56 ± 0.32			40.93 ± 0.36		

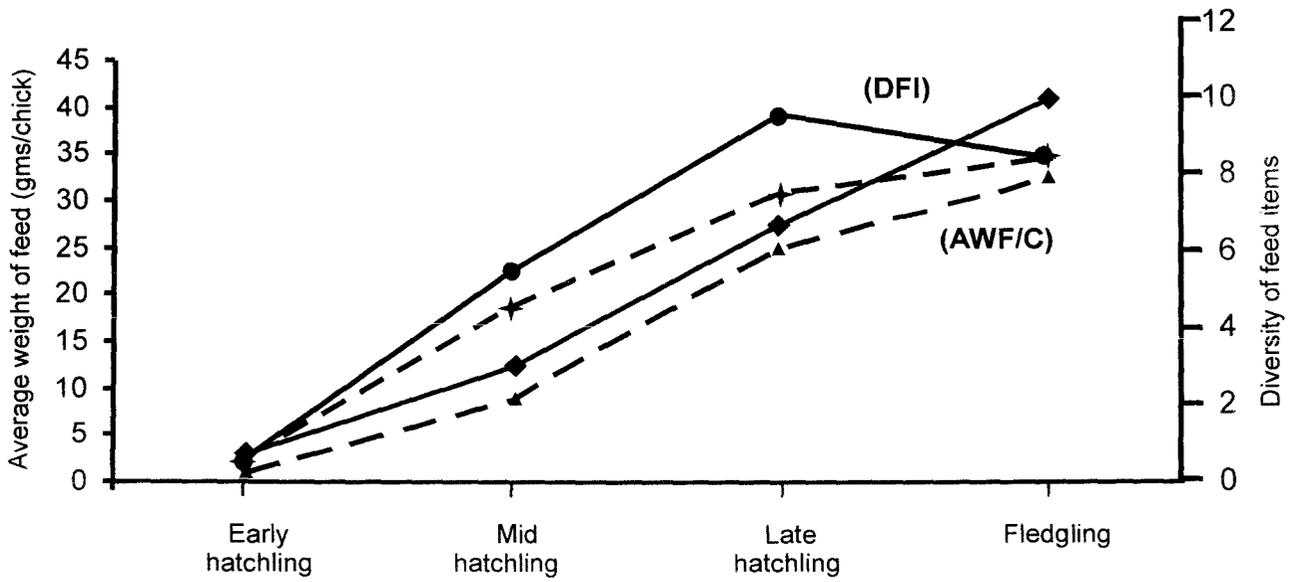


Fig. 11.1 Shows average weight of feed/chick (AWF/C) and the diversity of feed items (DFI) in the four stages of chick development in Little Cormorant (dotted line) and Night Heron (solid line)



Channa punctatus

Plate 11.1 Food of early hatchling of Little Cormoran.

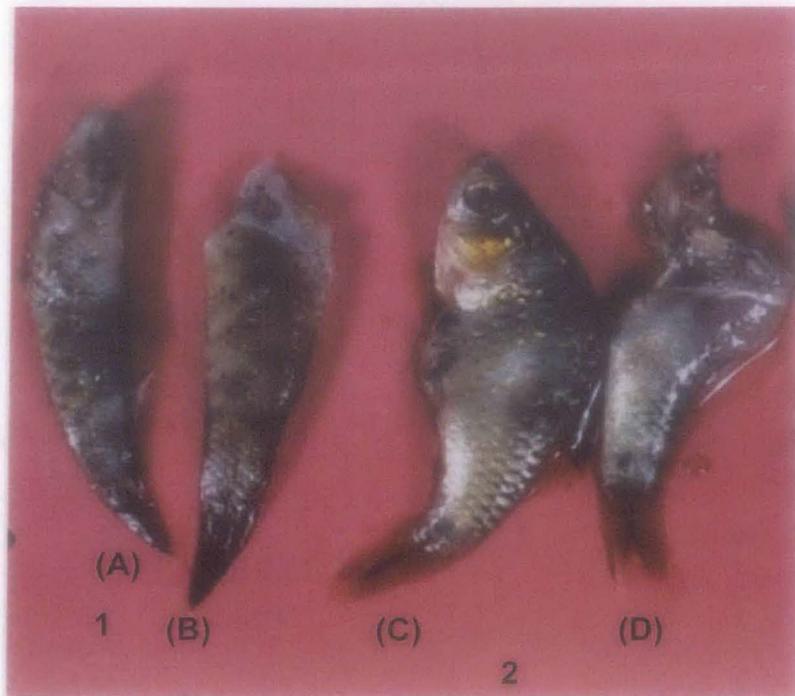


Plate 11.2 Food of mid hatchling of Little Cormorant.
1. *Channa punctatus* 2. *Puntius sp.*



Plate 11.3 Food of late hatchling stage of Little Cormorant



Plate 11.4 Semi-digested food of early hatchling stage of Night Heron

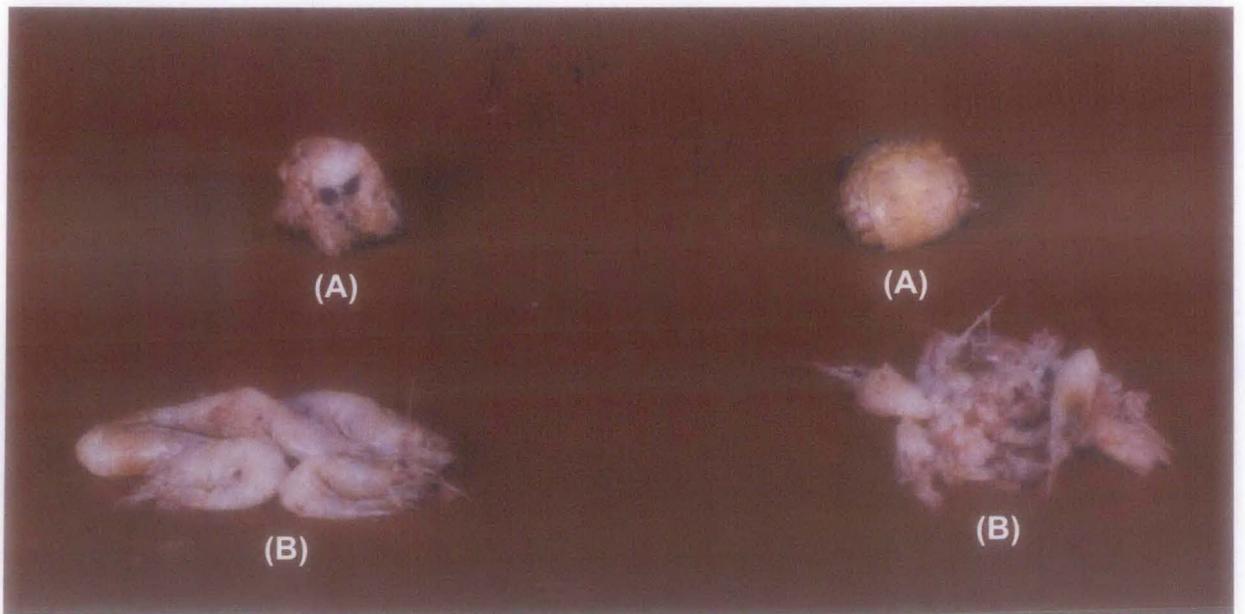


Plate 11.5 Food of mid-hatchling stage of Night Heron
(A) Crab (B) *Paleomon* sp.

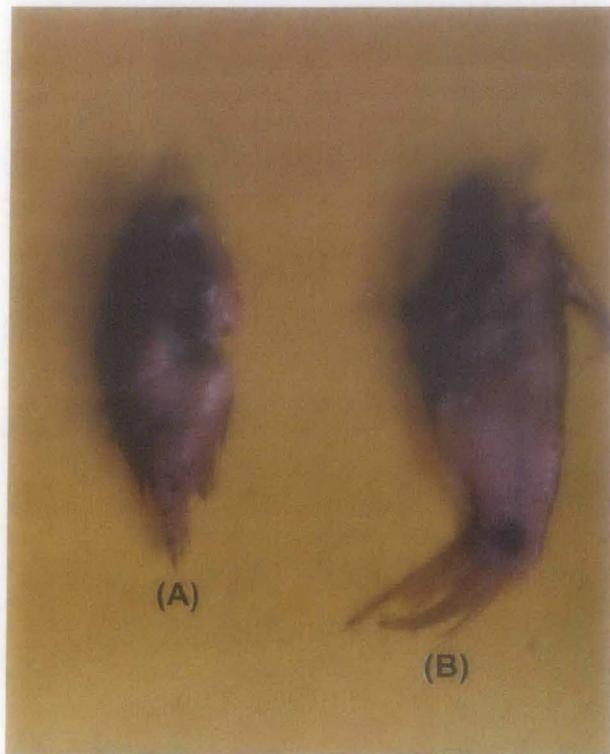


Plate 11.6 Food of post-hatchling stage of Night Heron
(A) *Colisa* sp. (B) *Puntius* sp.



Plate 11.7 **Adult Little Cormorant feeding a grown-up hatchling**
(P) Parent (H) Hatchling