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## OBSERVATIONS OF RED-HEADED FALCON *FALCO CHICQUERA* (AVES: FALCONIFORMES: FALCONIDAE) NEST AT KERANIGANJ, DHAKA, BANGLADESH, WITH A FOCUS ON POST-FLEDGING BEHAVIOR

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### OPEN ACCESS

**ABSTRACT:** A nest of Red-headed Falcon *Falco chicquera* was observed in 2009, beginning with the onset of breeding and continuing on to the next breeding of the pair. The nest was found on 02 March 2009 in an electricity pylon in a sub-urban area at Keraniganj, Dhaka, Bangladesh. The incubation period was estimated at a minimum of four weeks and the nestling period was 37 days. Fledglings remained in the nesting area up to four months after fledging. The female almost exclusively fed the nestlings and fledglings. The diet of adults, nestlings and fledglings consisted of 72% small birds (sparrow sized) and 28% *Pipistrellus* bats ( $n = 112$ ). The diet of fledglings consisted of 61% birds and 39% bats ( $n = 72$ ; before independence mainly birds and after independence mainly bats). Parents delivered prey to fledglings up to 39 days after fledging (i.e., post-fledging dependence period was 39 days). The fledgling's flight pattern was distinguishable from the adults nearly two months after fledging. The fledgling's call reminiscent of a begging call was recorded up to 75 days after fledging. Food competition was observed among the fledglings; when one of the fledglings snatched prey from a parent, the other siblings tried to pilfer it. The parents had resumed breeding eight months after the fledging stage of their offspring.

**Keywords:** Bangladesh, breeding, *Falco chicquera*, nest, post-fledging, prey, Red-headed Falcon.



*Falco chicquera*  
Red-headed Falcon



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## INTRODUCTION

The Red-headed Falcon *Falco chicquera* is a resident in tropical Africa, Iran, and the Indian subcontinent (Ferguson-Lees & Christie 2001). Although widely distributed and resident throughout the plains of the subcontinent, it is scarce and local, and probably declining due to habitat degradation (Rasmussen & Anderton 2005; Naoroji 2007). It prefers open habitats, but clumps of leafy trees are used for nesting and roosting (Naoroji 2007).

A few published pieces of information on the study of the breeding ecology of this species in the Indian subcontinent are: Dharmakumarsinhji (1954) on nesting in urban area; Dharap (1974) on nesting in densely populated area, Khan (1978) on ecology and behavior, Gole (1980) on nesting on man-made structure in urban areas, Subramayana (1982; 1985) on breeding, hunting and feeding, Foyzal (2010) on breeding and Naoroji (2011). Naoroji's (2011) paper on breeding in Gujarat, India, is noteworthy, but awareness of the breeding biology and ecology is still patchy.

This falcon is an uncommon raptor in Bangladesh (Khan 1996, 2008). According to Naoroji (2007) and Siddiqui et al. (2008) this is a rare and the only known breeding falcon among the 10 species of falcons in Bangladesh. The first study on this falcon in Bangladesh was conducted by Khan (1978) followed by Foyzal (2010).

Although nesting on man-made structures in urban and suburban areas has been documented (Gole 1980; V. Prakash pers. comm. in Naoroji 2007; Foyzal 2010), little is known of the detailed ecology of the Asian race *F. chicquera* in the expanding urban areas of South Asia, while the incubation period, nestling period and post-fledging dependence period have not been determined for the South Asian race. In this paper I present some observations on the breeding behavior from the onset of nesting to post-fledging on a falcon pair in a suburban area of Dhaka.

## METHODS

### Study area and field methods

Fieldwork was carried out at Hasnabad (23°40.639N & 90°25.490E) a suburb of Keraniganj, Dhaka. Keraniganj is located at the southern edge of Dhaka City, close to the congested old city, isolated by the Buriganga River. While areas to the north and east of the nesting site are densely populated, those to the south and west are more open and rural, with scattered human settlements. A chemical

factory, many brick fields and a ship building yard are located eastward of the nesting pylon. While Hasnabad lacks tall trees, many electricity poles and pylons with a power station exist. The heights of poles and pylons are 6–30 m and a communication pylon of ca. 50m, was present and it was on one of these that a nest of Red-headed Falcon was found in March 2009 (Foyzal 2010).

The observation began on 12 January 2009 and continued until 26 February 2010, usually once or twice per day, between 0700–0900 hr and/or 1700–1930 hr. Before fledging sometimes one or two day-intervals without observation occurred between watches. Whenever possible, periods of observation were extended. A nest watch was carried out from the ground near the base of the nesting pylon. A pair of 10×42 binoculars was used for scanning.

## RESULTS

The study on the breeding behavior of the Red-headed Falcon pair from the onset of breeding to the next breeding of the pair has revealed notable information on incubation, chick rearing, fledging, post-fledging, hunting, feeding, prey species selection, inter- and intra-specific encounters and post breeding behavior that are given in Table 1 (Table 1 shows nesting/breeding chronology and breeding/nesting stages of the pair).

### Onset of breeding

On 12 January 2009 a pair of Red-headed Falcons were first observed perched on a ca. 8m high Coconut Palm *Cocos nucifera* near a highway at the periphery of a human settlement at Keraniganj. From 12 January to 14 February, the pair or a single bird was seen in this tree. The tree was vigorously defended from House Crows (mainly by the male) and the female was observed entering the leaf base of the tree, which presumably contained a nest. The female was observed remaining at the leaf base for more than 15 minutes. After 14 February, the tree was apparently deserted by the pair. Following the flight-line of the male on 02 March, I discovered a nest together with an incubating bird.

### Nest

The nest was located 23–24 m above the ground on an electricity pylon nearly a kilometer south-east from the coconut palm where the birds were first observed. The nest was built on a horizontal metal beam where it joined another beam at a 45° angle. The nest had probably been constructed recently by a House Crow, and was made

**Table 1. Nesting/breeding chronology and duration of nesting/breeding stages. The commencement of each stage was identified by the observation listed.**

Nesting stage	Date	Observation	No. days after initiation	Duration of stage (days)
Onset of breeding/ pre-laying	12.i.2009	Pair vociferously defended a tree	–	33
Incubation	02.iii.2009	Nest discovered with an incubating bird	41	28 (21+7 or >7)
Hatching and nestling	23.iii.2009	Female first observed to enter nest with food	69	37
Fledging	29.iv.2009 04.v.2009	1 <sup>st</sup> & 2 <sup>nd</sup> chick fledged 3 <sup>rd</sup> chick fledged	106 111	5
Post-fledging dependence	07.vi.2009	Last prey delivered by adults	116	39

mainly of twigs and some wire, and was taken over by the falcon pair.

### Incubation

The incubation was done mainly by the female (89%). Only on two occasions (11% n=18) the male was observed incubating. On 05 and 08 March the male was observed settling on the eggs at 12:12 and 07:15, respectively. On both the occasions the male took two minutes to enter the nest, after the female had left the nest. The eggs remained unattended for 10–18 minutes during the feeding, the preening and the exercising of the female. Usually the male offered food to the incubating female by emitting a soft krik..krik ...krik..... call and the female left the nest 1–5 minutes later after the initiation of the call. The incubating female was also observed leaving the nest even when a call was not initiated. The female was not vocal. On only one occasion (18 March) the female emitted a call just before entering the nest. On 11 March the male moved close to nest with partly eaten prey accompanied by a soft krik.....krik....krik...call at 07:15, 07:19 and 07:25 respectively. But the female did not leave the nest. After a hunt the male cached the prey. During the period when the eggs were not attended to,

the female's activity included feeding (most commonly), preening, exercising (random wing flaps accompanied by moving on the perch) and territorial aggression. While the female incubated the eggs, the male falcon sometimes remained absent (presumed to be foraging far from the nesting pylon) from the nesting pylon. The male remained absent from the nesting pylon for 10–35 minutes. Clutch size was unknown. Perhaps the eggs were hatched on 23 March. This was confirmed when the female was observed bringing partly eaten prey to the nest for the first time, and continued doing the same on subsequent days (Images 1 & 2).

### Brooding

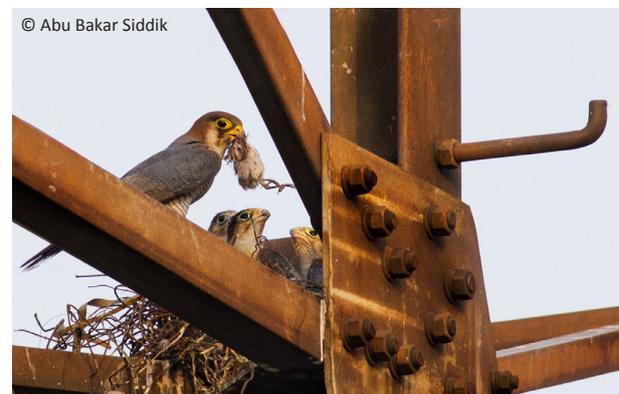
The female alone carried out all the brooding. Brooding discontinued 13 days after hatching. Brooding was completely suspended when the young were 29 days old. Hatchlings remained unattended for 6–17 minutes during the female's feeding out side of the nest. The female first moved away (ca. 100m) from the nestlings with the male 13 days after hatching.

### Prey species

The majority of the prey species were small birds.



**Image 1. Red-headed Falcon *Falco chicquera* - pair resting on electric cable**



**Image 2. Red-headed Falcon *Falco chicquera* - female with prey with chicks**

Prey remains suggest that the falcons hunted almost exclusively on House Sparrows *Passer domesticus*, but occasionally took *Pipistrellus* bats (n=3, presumed more).

**Foraging, hunting and caching**

During incubation the male foraged far from the nesting site. On one occasion (late incubation period, on 20 March) the male chased a House Sparrow in the vicinity of the nest. A radius of ca. 150m was used for bat hunting.

During incubation the male hunted far from the nest site, away from observation. After hatching the male increasingly hunted in the vicinity of the nest. The female resumed hunting 18 days after hatching. A total of 32 hunts were recorded from hatching until fledging. The male hunted 78% and the female 22%. A few hunting attempts were made by the male and the female together but all of these were unsuccessful (Fig. 1). The hunting frequency was highest in the morning. For example, on 12 April (20 days after hatching) four hunts (all small birds) were recorded in less than one hour (07:07–08:02).

Prey was cached on the nesting pylon on various metal beams, always above the nest platform, and sometimes openly on a beam.

**Feeding the nestlings**

The feeding frequency was at its highest in the morning. For example, on one morning (20 days after hatching) four feeding visits occurred in less than one hour with the fourth delivery withdrawn immediately by the female. As nestlings got older the feeding visits increased and then somewhat decreased during the pre-fledging period (Fig. 2). After hatching until 5 April the feeding duration could not be determined because of constant brooding and less visibility from the ground. However after that, the feeding duration was 1–10 minutes, averaged at 5 min per visit (n=11).

**Roosting of parents**

The male always roosted away from the nesting pylon. From the pre-fledging period onwards the female also roosted away from the nesting pylon. Most of the time they moved eastward from the nesting pylon either together (16%) or separately (84%) n=19. Where the birds ended up roosting was difficult to estimate. However, on one occasion an adult was observed roosting on an electricity pylon (ca. 30m high) about 500m westward from the nesting pylon.

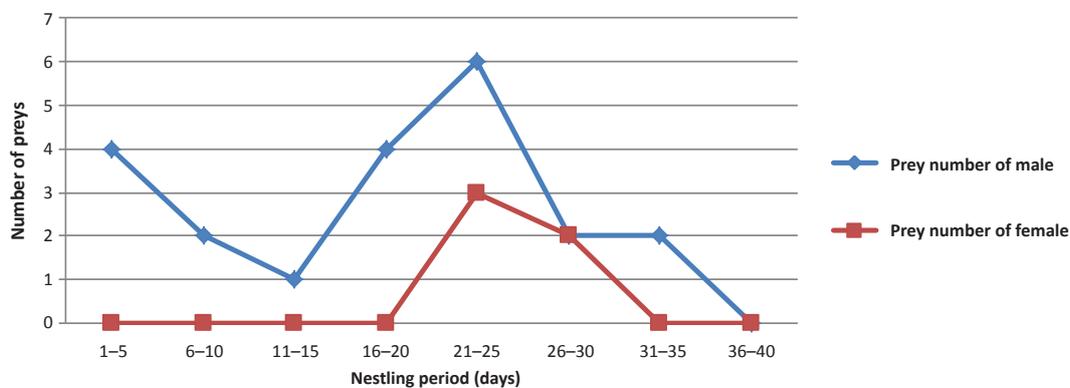


Figure 1. Number of prey hunted by male and female parents at morning or evening or average when both observed the same day.

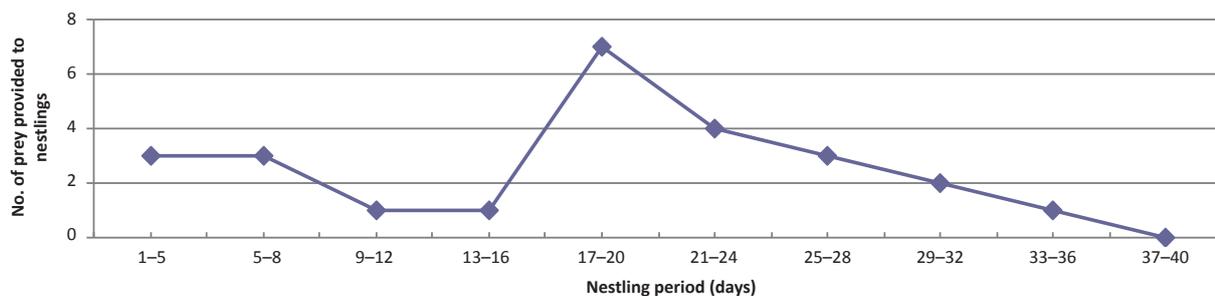


Figure 2. Number of prey brought to the nestlings at morning or evening or average when both observed the same day.

### Pre-fledging

From 22 April onwards, when the chicks were estimated to be 30 days old, wing flapping and stretching by the young increased significantly. When the parents arrived, the chicks begged, but the parents didn't respond as much as they had previously. The duration of feeding by the female was now reduced to two minutes ( $n=2$ ).

### Fledging

On 29 April, at the age of 37 days, two chicks fledged while the third chick fledged on 4 May (5 days after the two chicks fledged). On 29 April, one of the fledglings roosted 2m under the nest beam. Another remained ca. 2m above ground on the beam, frequently trying to climb up the slippery metal beam, but failing. At last at 18:43 this fledgling flew ca. 40m and landed on a 2m high coconut palm and roosted there. The next morning this chick was found in the nest. On April 30, the female fed ( $n=3$ ) the two chicks that remained in the nest; the other chick remained 2m under the nest and did not get fed, despite its vociferous begging.

### Post-fledging

#### Feeding by adults and prey transfers

During the post-fledging period, the female usually brought prey to the nest, both hunted by herself or given to her by the male, and then fed the fledglings at the nest. From 14 May, the parents began to only deliver the prey, rather than tearing it up for the fledglings and the last prey was delivered to the nest on 15 May, 16 days after fledging. After 7 June, 39 days post-fledging, prey was no longer delivered to the young (Fig. 3), and thereafter they followed an adult, making begging calls—the last begging call was heard on 13 July, 75 days after fledging. From the observations, it appeared that from 24 days after fledging onwards the fledglings were cared for by a single adult, whose sex was not determined, with the partner adult

sometimes sighted c. 600m away.

The siblings were competitive; on 18 May 2009, when one fledgling snatched prey from the adult's talon, the others tried to pilfer it, making begging calls. The fledgling with the food avoided its competitor siblings by making a short flight. On 1 June 2009, one fledgling followed another that had food about 200m away from the nest site. These attempts at thievery were not successful. Only on one occasion 21 days after fledging did a fledgling successfully pilfer food from a sibling.

As they got older, the fledglings approached the adult and grabbed food, rather than being given it. Their behavior became more and more aggressive, for example, on 31 May, some 32 days after fledging, on the approach of the adult with prey, all three fledglings left the nest site and about 50m away one snatched the prey from the adult in midair. The other two siblings grappled with it and all three fell, disengaging only just before hitting the ground.

On two occasions prey fell to the ground from the fledglings during feeding. On both occasion the fledglings stooped at once but failed to retrieve the prey, (one time an Oriental Magpie Robin *Copsychus saularis* drove the fledglings away).

#### Nest site defense

Throughout the nesting period the adults were aggressive towards House Crows, Large-billed Crow *Corvus macrorhynchus*, Black Kite *Milvus migrans*, Peregrine Falcon *Falco peregrinus calidus*, Eurasian Hobby *Falco subbuteo*, and conspecifics, near the nest site. Once during incubation, the female directly joined the male to help drive off a Peregrine Falcon passing close-by. During the nestling period, the female was once observed chasing an intruding male Red-headed Falcon between the beams of the nesting pylon. Her mate then came and vigorously drove the intruder off, making a loud, angry,

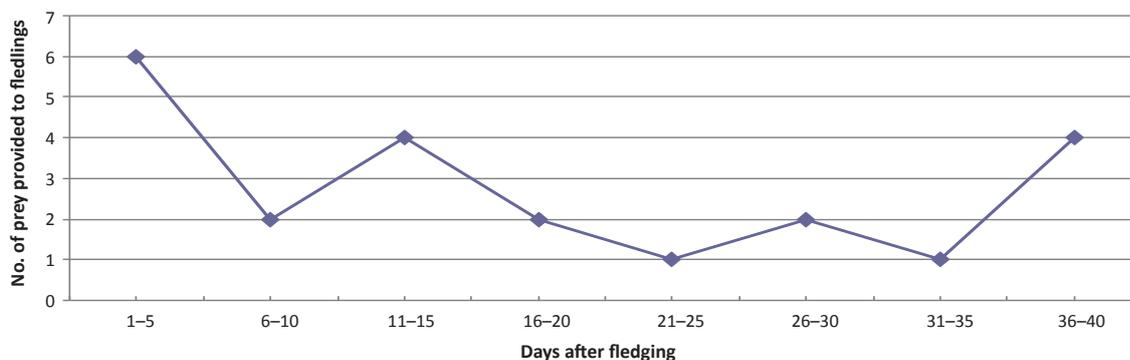


Figure 3. Number of prey brought to fledglings at morning or evening or average when both observed the same day.

piercing kukree...kukree....kukreeeee call.

The fledglings also occasionally joined with the adults in defending nest. On one occasion, 23 days after fledging, all three fledglings drove away a Black Kite from the vicinity of the nest accompanied by their calling (call reminiscent of begging call). On another occasion one fledgling joined with an adult at the nest site to defend it against a Large-billed Crow. During the same time period, the nest was defended by the adult pair six times and by a single adult five times. The nesting pylon was defended by the adult until 17 June (until the 49<sup>th</sup> day after fledging). The last time the nest was defended was recorded on 29 June and it was presumed to have been conducted by a juvenile. Out of 13 defensive moves, the pair defended it six times, the single adult five times, the fledglings once, the adult and the fledgling combined once.

### Social interactions

After fledging, the female remained close to the fledglings and she foraged in the vicinity of the nest, with the male staying further away. As the fledglings' flight skills developed, the adults went further and further away from the nesting pylon, although they were always close enough to respond with a defence of the nest if it was needed. For example, 49 days after fledging, when a flock (12–15) of House Crows gathered at the nesting pylon where, two fledglings were still present, an adult returned from far and drove off all the crows. The fledglings also remained close to each other, even resting together at the nest.

The fledglings playfully chased each other. As the fledgling's flight skills developed they frequently playfully chased each other, most of the time accompanied by a call. Eighteen days after fledging, the fledglings first chased each other. The last they chased each other was recorded on 9 July. On one occasion both the parents and two fledglings were observed feeding together on a single prey.

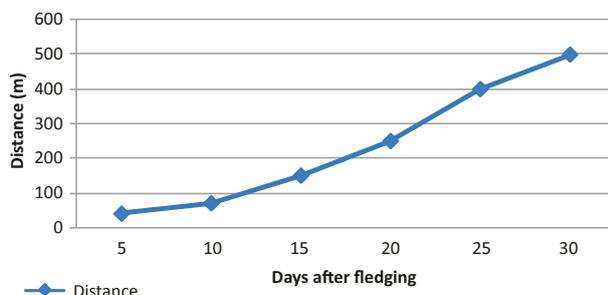


Figure 4. Distance passed by the fledglings in relation to days after fledging

### Development of flight skills

The fledgling's flight was restricted to short distances between metal beams (12%) on the pylon until 9 May (other than the 40m flight of one fledgling on the fledging day discussed above), after which the fledglings began flying a 60m radius (19%). Fifteen days after fledging one fledgling flew ca. 150m (40%). Thereafter, the flying distance gradually increased, but was usually restricted to ca. 500m around (29% n=52 for one month) the nesting pylon for the remainder of my observations (Fig. 4).

In their initial attempts at flight, the fledglings tried to land frequently, even on small trees. Their flight pattern was immediately distinguishable from adults as it was slower, with much wing flapping, punctuated by soaring. Fledglings attained rapid wing beats about two months after fledging, and then their flight became indistinguishable from the adults.

### Development of hunting behavior

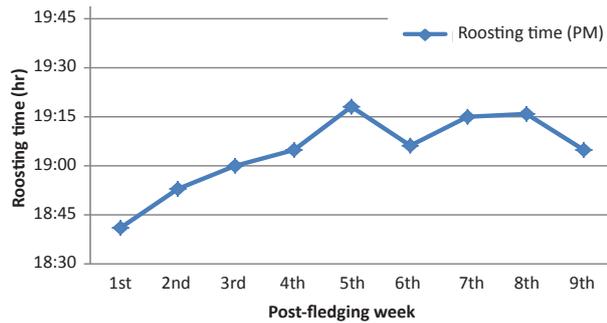
The hunting behavior of the fledglings was first observed 18 days after fledging. The fledgling was then observed to scan the ground and surroundings with typical adult-like head bobbing, perched on a ca. 8m long electricity pole about 80m away from the nesting pylon. On this occasion, however, the fledgling did not fly towards any prey. During the ensuing three weeks, the fledglings were observed bringing small birds to the nesting pylon (n=4), although it was not clear whether the small birds were caught by the fledglings themselves or provided by the adults. During this time the fledglings were observed trying to hunt the Indian Pond Heron *Ardeola grayii* (which is a big prey for the falcon) albeit unsuccessfully, the Oriental Magpie Robin *Copsychus saularis*, the Common Myna *Acridotheres tristis*, the Asian Pied Starling *Sturnus contra*, the Black-rumped Flameback *Dinopium benghalense*, the House Swift *Apus pacificus* as well as House Sparrows. A *Pipistrellus* bat was successfully hunted in the vicinity of the nest, 40 days after fledging.

On one occasion (13 June), a single fledgling hunted and consumed 3 *Pipistrellus* bats within 15 minutes (18:55–19:10). The fledglings hunted the *Pipistrellus* bats (N=26) much more frequently than the adults.

The fledglings were also observed making hunting attempts cooperatively (usually two fledglings and rarely all three together).

### Roosting of juveniles

One fledgling roosted at the nest until 9 May, but thereafter the nest was not used for roosting at all. All the three fledglings always roosted on the beams' joint corner



**Figure 5. Roosting time of the fledglings during post-fledging nine weeks (11 May to 6 August) period. Average roosting time of per week showing here.**

of the nesting pylon at different heights of the nesting pylon. A fledgling roosted at 20m (45.45%), another at 24m (36.36%) and yet another at 28m (18.18%) height (n=66) of the nesting pylon. The average height was 24m and  $SD \pm 4$ . The fledglings roosted on the nesting pylon after fledging right up to August. They usually roosted in the evening. On a few occasions they had roosted in the late evening and very late evening. From 8 June the third fledgling irregularly roosted at the nesting pylon. Until May the fledglings roosted before 19:00. After May (when the day length increased) roosting occurred between 19:00–19:30 (Fig. 5).

#### Subsequent use of nest

After fledging the nest was used for feeding (51.11%), resting (35.35%) and perching (13.33%, n=45). The nest was used as a food delivery platform by the adults up to 15 days after fledging, thereafter the nest was used only by the fledglings until 11 August, the last observation of the use of the nest. One fledgling was observed resting (perhaps laying in the nest) at the nest for 37 minutes. Juveniles (two together) were last seen on 19 August at the nesting pylon and all the three were seen for the last time on 5 August.

#### Resightings of parents

The adults started frequenting their old nest site after August. Before they resumed breeding, the adults were sighted 42 times. They were sighted 33 times at the nesting pylon, and the remaining nine times they were sighted in a radius of ca. 400m from the nesting pylon. During this period, their main activity appeared to be hunting and feeding. Others activities were vocalizing, mobbing crows and exercising. During feeding House Crows approached very close to the falcons and often tended to mob them, and occasionally did mob them. The falcons were observed to be not as aggressive as they

were during breeding time. On a few occasions (n=5) 3–4 falcons were sighted (presumed juvenile entered natal territory) in the natal territory, and on all occasions the parents were aggressive towards conspecific intruders.

#### Adults resumed breeding

From 25 December onwards the pair was once again highly aggressive towards crows, vigorously defending a ca. 50m long communication pylon about 200m eastward from the previous nesting pylon. On 29 December mating occurred at 08:25 at the previous nesting pylon (where the three chicks were fledged). Eventually on 26 February 2010, the pair was observed to be incubating again on a third electricity pylon ca. 28m (the highest nest recorded ever for this species) above the ground 630m away from the original nesting pylon.

## DISCUSSION

#### Nesting

The Red-headed Falcon nests on trees and the nesting height varies from 4–14 m (Naoroji 2007). It prefers large trees where large trees are available, a nest was recorded on a 24m high tree (Subramanya 1982). In 1978 four nests located in Bangladesh were in trees. Three nests out of four were located in Dhaka City (Khan 1978). In the recent past, two nests of different pairs in different districts in Bangladesh were recorded on man-made structures (Foyzal 2010).

Nesting on an electricity pylon, as recorded in this study and in the recent past, seems to be a response by Red-headed Falcon to the shortage of large trees and suggests a hitherto little-appreciated ecological flexibility that may help this species survive in increasingly urbanized landscapes.

#### Incubation

The incubation period has not been previously recorded for the Indian sub continental race (Naoroji 2007). The average incubation period for the African race is 33 days (range 32–35 days; Osborne 1981). Naoroji (2007) mentioned that the Indian race usually laid eggs by end February to early March. The nest that was discovered on 2 March was in incubating condition and the hatching occurred on 23 March. Given that the incubation is at least three weeks in comparison with the African race and the usual egg-laying time of the Indian race, the incubation period could be estimated as a minimum of four weeks, although the days that the eggs were laid are not known for sure.

Subramanya (1985) mentioned that the male offered food to the incubating female by a shrill kuk-reeee call. In this study the male's food offering call was a soft krik..krik..krik. Perhaps food offering calls vary in different pairs.

### Nestling period

The nestling period is also not well generalized for the Indian race (Naoroji 2007). For one nest studied in India the nestling period was estimated as 48 days (Naoroji 2011). In comparison, the present study indicates that the nestling period was 37 days, quite comparable to the African race (34–37 days; Osborne 1981). In 2008 a nest was found in Gazipur district in Bangladesh with about two nestlings that were seven days old (Foysal 2010). These nestlings fledged between 11 and 18 April. This suggests that the nestling period was around 40 days. More nests should be studied to generalize the nestling period.

### Post-fledging dependency period

Observations also indicate that the fledglings received food from the parents for 39 days after fledging, after which they successfully hunted for themselves. This suggests that the post-fledging dependence period is 39 days.

### Vocalizations

The adults have vocal variations (Naoroji 2007). This study found fledglings' call had no variation. All kinds of fledgling calls were reminiscent of a begging call that were recorded up to 75 days after fledging. This suggests that juveniles attained vocal variations like adults at a minimum of 75 days after fledging.

### Dispersal of juvenile

Fledglings roosted at the nesting pylon until August and from June onwards the roosting juvenile numbers gradually decreased. This suggests that fledglings dispersed from the nesting area four months after fledging and they gradually dispersed one after another. However, post-fledging dispersal distance is not known. Radio or satellite tagging of juveniles can reveal post-fledging dispersal distance.

### Adults and independent juveniles interaction

Ali & Ripley (1978) cited an observation received from Neelakantan who observed that fully fledged juveniles

were driven off by parents (presumed). During post-dispersal time on five occasions I have observed adults driving away conspecifics from their territory. It can also be presumed that parents chase off independent juveniles.

### Adults resumed breeding

This species frequent their old nest site about 20 weeks before egg-laying. I agree with Subramanya (1985) that the adults leave the nest site after the young becomes independent, and frequent their old nest site about 20 weeks before egg-laying. More data, both in urban and rural settings are needed before determining reproductive success and population dynamics of this little known falcon.

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