Breeding biology of Jungle Myna *Acridotheres fuscus* at Chittagong University Campus, Chittagong, Bangladesh

MD. REZAUL KARIM & MD. FARID AHSAN

Introduction

The Jungle Myna *Acridotheres fuscus*—in Bengali Jhunti Shalik which translates to 'crest myna (or starling)' because the elongated and hackled forehead feathers curve upwards to form a short, bristle-like frontal crest—is one of 12 Sturnidae species found in Bangladesh (Khan 2010) and one of the commonest birds in the country (Khan 1982). Overall, it is greyish-brown in appearance with a conspicuous white wing-patch visible in flight (Ali & Ripley 1983). Although the breeding biology of Common Myna *A. tristis* (Rahman & Hussain 1988) and Chestnut-tailed Starling *Sturnia malabarica* (Khan 1976) have been studied in Bangladesh, a literature search indicated that this is not so in the case of the Jungle Myna; there are publications on taxonomy and distribution of the species (e.g. Rashid 1967, Khan 1982, Ripley 1982, Sarker & Sarker 1988, Harvey 1990, Husain 2003, Khan 2008, Khan 2010) but no published papers on its breeding biology in the country are available. We give below the results of our study of the breeding biology of Jungle Myna at Chittagong University Campus, Chittagong, Bangladesh, between February and July 2011.

Study area and methods

The Chittagong University Campus is located at Fatehpur village, Hathazari sub-district, Chittagong district (22.458–22.483°N 91.775–91.796°E), about 22 km north of Chittagong city. The campus is about 710 ha in area, 72% being low hills and the remainder either plains or valleys. The natural vegetation of the area was mixed evergreen forest; however, the primary vegetation has been completely destroyed and the campus is affected by biotic and abiotic factors due to human habitation and earth erosion (Ahsan & Khanom 2005). There are three distinct seasons in the Chittagong area (Ahmad 1968): summer (March–May), wet (monsoon) (June–October) and winter (November–February). The weather was very hot during the study; the pre-monsoon period in 2011 was characterised by little rain and hot weather which extended into July.

Three areas in the campus, in total about 5 ha, were selected for study—A: Shah Amanat Hall and its surroundings; B: Shah Jalal Hall and its surroundings; C: Kata Pahar hill roadside area (a hill slope). The first two are juxtapositioned on the road forming the eastern boundary of the campus and the third is nearby, just in front of the campus main entrance. These areas were thoroughly searched for nests at the beginning of the breeding season and five of the 23 nests found were selected for study (Table 1). Work was carried out between 06h00 and 18h00. Eggs were marked in pencil for subsequent identification to determine the incubation period and hatching intervals. The dimensions of each egg were measured using slide calipers to ± 0.1 mm, and weighed to 1 decimal place using a digital scale. The incubation period was defined as the period between the laying of the first egg and the hatching of the last egg. The hatchlings were also marked so that their growth rate could be followed up to fledging—nests were visited on alternate days to weigh hatchlings and take morphometric measurements.

Table 1. Location of study nests and their clutch sizes.

Study areas	Nests in area	Nests selected	Nest ref.	Clutch size
A: Shah Amanat Hall	7	2	N-1	3
			N-2	3
B: Shah Jalal Hall	13	2	N-3	3
			N-4	3
C: Kata Pahar roadside area	3	1	N-5	4
Total	23	5		16

Results

Nest site selection and height of the nest

In 2011, the Jungle Myna breeding season at Chittagong University Campus lasted from March to July. Nests were built in internal spaces between walls, crevices in walls, water seep holes in retaining walls, holes in trees and steep banks and even in ventilator ducts of buildings. The height of nests above ground varied from 4.6–12.2 m (average 8.41 m).

Nest construction, egg laying and incubation

Nest construction started at the end of March and was completed in April. Both sexes took an active part in nest-building; when one partner was busy at the chosen site, the other was out of sight. Construction took 15–25 days (average 18 days) using twigs, leaves and mid-ribs of leaves, polythene, jute fibre, straw, grass, feathers and many other miscellaneous items. The first egg was laid 1–2 days after nest completion; thereafter eggs were laid at one day intervals; four birds laid clutches of three eggs, the other a clutch of four (Table 1). The 16 turquoise-blue eggs examined were moderately broad, and pointed at one end; their dimensions were 27.0–29.0 mm (average 28.2 mm) × 18.0–21.0 mm (average 19.5 mm), weight 6.1–6.9 gm (mean 6.6 gm). The mean weight loss was 0.4 gm (2.53 %) prior to hatching. Incubation started when the first egg was laid and continued until the last egg hatched and lasted 18–22 days (mean 20 days). The sexes shared incubation duties, although females spent more time on the nest than males. While one bird was sitting, the other remained very close by, perched on a small bush.

Hatching, hatchlings and fledging success

Fifteen eggs hatched (one egg was broken during handling): the exact time of hatching was not recorded because all eggs hatched at night. The newly-emerged young were naked, with fleshy pink bodies, closed eyes, soft claws and a soft bill with a yellowish gape. Filoplumes were present on the dorsal feather tract, on the nape and on the head above the eyes. Hatchlings were unable to stand up. Feathers started to grow after 4–5 days. The bill and claws slowly became harder. On their first day, hatchlings averaged 4.7 cm in length and weighed 6.4 gm. After 3–4 days, the nestlings tried to open their eyes and continued with frequent pauses until successful: during this period, hatchlings weighed 16.1–17.4 gm (average 17.2 gm). By day 21 the average weight was 75.4 gm (n = 13) and on day 23 had increased to 78.0 gm (n = 6). The fledging period was 23–26 days (mean 24) and fledglings weighed 73.5–79.0 gm (mean 76.5 gm) just prior to leaving the nest (Table 2); 13 nestlings flew successfully—one was lost due to disease and one fell out of the nest.

Feeding

Although both adults took part in feeding the young throughout the day, they did not forage simultaneously—while one parent searched for food, the other stayed at the nest to care for the young. Food was mostly collected in nearby crop fields and a high delivery rate was maintained; the average number of feeding visits by the parents was 49.8 times (range 47–84 times) in one day. Food items were different kinds of invertebrates—small grasshoppers, worms, caterpillars, larvae etc. Parents kept the young warm at night and in the early morning, covering them with their wings and abdominal feathers. The parents usually fed the fledglings until they flew, although some young birds foraged with their parents for several days after fledging.

Table 2. Nestlings growth rate (gm).

		Weight of nestlings (gm) on alternate days											
Nest ref.	**Chick no.**	**1**	**3**	**5**	**7**	**9**	**11**	**13**	**15**	**17**	**19**	**21**	**23**
N-1	1	6.3	12.4	22.2	32.1	42.4	50.1	56.4	60.4	66.5	70.0	75.2	–
	2	6.3	12.4	22.4	32.2	43.2	50.2	56.2	62.2	66.4	71.2	76.0	–
	3	6.4	12.0	21.2	33.1	44.3	50.2	56.2	63.1	66.4	72.0	76	–
N-2	1	5.9	13.1	22.4	32.0	44.4	51.4	55.4	62.0	65.4	71.5	76.5	–
	2	5.9	13.3	13.1	32.2	44.2	51.2	56.3	62.4	65.5	72.0	76.1	78.4
	3*	5.8	9.5	15.4	–	–	–	–	–	–	–	–	–
N-3	1	6.7	14.4	23.5	33.1	43.2	52.1	57.4	63.1	66.2	72.2	75.0	–
	2	6.6	13.9	22.4	32.4	42.1	52.2	56.5	64.2	67.1	71.5	76.2	79.0
	3	6.4	13.8	22.2	31.5	43.2	51.2	56.4	64.3	67.1	72.3	75.1	77.2
N-4	1	6.4	12.5	21.4	33.1	44.2	51.3	56.4	65.1	68.0	72.0	75.2	77.4
	2*	6.4	12.3	22.1	32.2	41.3	52.4	57.1	–	–	–	–	–
	3	6.5	12.4	21.3	32.0	42.2	51.0	57.4	64.5	67.5	71.2	75.0	78.1
N-5	1	6.5	12.5	22.1	33.1	43.0	50.1	56.4	66.4	67.0	71.4	76.0	78.2
	2	6.6	12.4	21.5	32.5	41.3	50.2	55.9	60.2	67.2	70.1	74.5	–
	3	6.6	12.3	22.1	33.2	42.1	50.1	55.4	59.5	67.2	69.9	73.5	–
	4	egg was broken while handling											
Mean daily weight		6.4	12.6	21.7	32.5	43.0	50.1	56.4	62.9	66.8	71.3	75.4	78.0
Mean increase per day		–	6.2	9.1	10.8	10.5	7.1	6.3	6.5	4.0	4.5	3.7	2.6

Note: * nestling died before fledging

Discussion

The Jungle Myna breeding season appears to vary slightly depending on ecological factors. In Chittagong, Hannan & Ahsan (2002) observed a single Jungle Myna nest in a hole in a coconut palm *Cocos nucifera* in April. Other authors reported that its breeding season in Bangladesh was from March to July (Harvey 1990) or February to July (Sarker 1987). In Pakistan, nesting usually starts from late April or early May (Roberts 1992); in South India, the species breeds between February and May, but April to June–July in the north (Feare & Craig 1998).

Hume & Oates (1889) reported Jungle Myna nests between 0.6–2.4 m above the ground, and Rashid (1971) between 2.84–6.8 m. Feare & Craig (1998) reported breeding in natural tree holes or disused woodpecker nests, usually 2–6 m above the ground, with man-made sites also used, especially buttressing wall drain holes and bridge revetments, where they may form large colonies and use them year after year; less commonly nests were under the roofing of houses. Overall, Jungle Myna nests have been reported as low as 0.6 m and as high as 12.2 m (this study). Nest sites at the campus were typical of those reported by other authors, in this case between 4.6–12.2 m. Likewise, materials used in nest construction resembled those reported by other authors—bright paper, other rubbish and man-made materials, grass roots and stems, feathers, twigs, and often including pieces of snake slough (Roberts 1992, Feare & Craig 1998).

Eggs have been described as turquoise blue, smooth and with a slight gloss (Ali & Ripley 1983), turquoise blue, unspotted (Roberts 1992), and turquoise blue without markings and poorly glossed, measuring 26.0–32.8 × 19.0–23.0 mm (Schönwetter 1983). Ray (1992) gave the species's egg-laying interval as 24–48 hours. Feare & Craig (1998) reported that in general clutch sizes were 3–6 compared with 3–4 in this study, whilst according to Roberts (1992) the normal clutch size was 4–5 eggs in Pakistan.

Little information has been reported on incubation and nestling periods. Ali & Ripley (1983) only reported that both parents shared incubation duties and brought food to their young. However, Rashid (1971) reported that the incubation period was from 8 to 13 days (average 11 days). This period is significantly shorter than found in the present study (average 24 days); this may be because the area where Rashid worked was warmer and much more urban than the present study site.

Nestling growth rates may be affected by many ecological factors, including limited food availability, weather, parasites, competition between nestlings and variation in parental abilities. However, in this study no such factors were noted. Crop fields close to the study area provided a plentiful supply of insects and larvae. Growth rates of the nestlings were very high up to the ninth day after hatching and then gradually declined up to fledging time (Table 2).

Two broods are often raised (Feare & Craig 1998). Rashid (1971) gave a 66.9% hatching success from 257 eggs but a fledging success of only 45.1% of the eggs laid, much less than that of the present study (81.25%).

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***Md. Rezaul KARIM & Md. Farid AHSAN**, Department of Zoology, University of Chittagong, Chittagong-4331, Bangladesh*
Email: helal03cu@gmail.com (corresponding author), faridahsan55@yahoo.com

Status of the White Wagtail *Motacilla alba* in the Philippines including two new subspecies for the country

M. S. TAÑEDO & R. O. HUTCHINSON

Introduction

The White Wagtail *Motacilla alba* is widely distributed from south-east Greenland across much of northern Eurasia, to westernmost Alaska (Alström & Mild 2003). The species is polytypic with the number of subspecies recognised varying from nine (Alström & Mild 2003, Gill & Donsker 2016) to 11 (Tyler 2016), most of which are readily distinguishable from one another, leading Sangster *et al*. (1999) to suggest that they might actually be nine phylogenetic species, an approach not supported by recent molecular data (Pavlova *et al*. 2005).

The White Wagtail has long been considered a rare winter visitor to the Philippines with a total of eight records (all subspecies *ocularis*) recognised by Dickinson *et al*. (1991), with Kennedy *et al*. (2000) including a further record assigned to the subspecies *lugens* (Nuytemans 1998). All the above records were seen between 10 October and 20 March (Kennedy *et al*. 2000). Here we present new data on the occurrence of White Wagtail in the Philippines including confirmation of two additional subspecies, *leucopsis* and *baicalensis*.

Records for the Philippines classified in terms of subspecies

Records up to 31 December 2015 were trawled from a variety of sources including the database of the Wild Bird Club of the Philippines (WBCP), eBird, and online wildlife photography forums and communities. Only records with an exact date, location, and an accurate count of birds are included in the analyses.

A total of 259 individuals have been documented (Table 1), of which the following 204 were identified to subspecies level.

Motacilla alba ocularis

The eight records involving nine individuals recognised by Dickinson *et al*. (1991) and subsequently by Kennedy *et al*. (2000) were widespread, with records from Balabac, Batan, Calayan, Lubang, Luzon, Negros, Palawan and Sanga Sanga. Since the publication of Kennedy *et al*. (2000) there have been a further 30 records involving 117 individuals (Table 1).

Motacilla alba lugens

Kennedy *et al*. (2000) included a single record of this subspecies at Pasaleng Bay, Ilocos Norte province, Luzon, on 28 February 1996 (Nuytemans 1998), but this is now supplanted as the first Philippine record by an individual seen at the Santa Fe River, Nueva Vizcaya province, Luzon, on 14 March 1990. There have now been 24 records of this subspecies involving 25 individuals (Table 1).

Motacilla alba leucopsis

The first record of *leucopsis* for the Philippines was on 30 March 2004 when an individual was observed by Jonathan Villasper and Mark Jason Villa at Barangay Tambo, Parañaque, Metro Manila, Luzon.

It was identified as *M. a. leucopsis* using the following field characters: black mantle continuing up the nape to crown; white face with no dark eye-stripe; white underparts with an isolated black breast shield which became mottled towards the throat. There have now been 35 records involving 51 individuals (Table 1).

Motacilla alba baicalensis

An adult, probably a male, was first seen on 21 March 2012 at Camiguin Norte, Babuyan Islands, Cagayan province. Images were obtained by the observers Paula Peralejo, Dada Macusi and Dexter Bongo.

It was identified as *baicalensis* using the following field characters: extensive breast shield extending downwards to lower breast and upwards around the bottom of the ear-coverts and onto the lower throat; white face and neck; black nape patch contrasting sharply with pure grey mantle and extending upwards to rear crown; bright white median and greater wing-coverts with just faint grey centres to a few of the feathers, forming a large and conspicuous white patch on the closed wing. There has been one subsequent record (Table 1).

Discussion

With only nine records involving 10 individuals in Kennedy *et al*. (2000), our summary (Table 1) shows that 259 individual White Wagtails have now been documented up to 31 December 2015; most of these records occurred between 2010 and 2015 and this reflects the increasing interest and rising skill of observers in the Philippines in the recent past. Today, it is clear that this species is better considered a scarce but regular passage migrant and non-breeding winter visitor. The relative occurrence of the four subspecies breaks down as follows: *ocularis* (62%), *lugens* (12%), *leucopsis* (25%) and *baicalensis* (1%).

Records now span the period 31 August to 14 April, an extension of 64 days over the period given by Kennedy *et al*. (2000), with a peak between October and December (Figure 1). Distribution of the records is perhaps biased towards areas with higher observer coverage such as Laoag, Ilocos Norte province, Luzon, and the Metro Manila area, Luzon; nevertheless the records are clearly concentrated in the north and north-west of the archipelago, a pattern that might be expected of a migrant arriving from north-east Asia and near the southern extent of its wintering range. Of the 259 individuals