

Observations on the Breeding Biology of Finn's Baya (*Ploceus megarhynchus* Hume) in the Kumaon Terai

BY

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(With a plate)

The observations presented here were made during three field trips to Rudrapur, Kumaon terai, Dist. Nainital, in 1961, 1962 and 1963. It was ascertained that Finn's Baya has two distinct breeding periods, the first, May to middle of July, the second in August-September. The observations show that in the first period the birds build their nests on tree-tops, and in the second low down among *Typha* reed-beds standing in water. Clutch-size, incubation and nestling periods, and nesting success were studied for the first time. Finn's Baya is a polygamous species practising successive polygamy. The male alone builds the nests while the female is almost wholly responsible for the domestic duties. Mud-blobs were observed in the nests as in those of other Indian weavers; their significance remains obscure.

INTRODUCTION

In recent years, particularly after the re-discovery of the Finn's Baya (*Ploceus megarhynchus*) in Kumaon terai (Ali & Crook 1959), there has been considerable interest on two aspects of the biology of this endemic Indian weaver bird, namely the taxonomy of the species (Abdulali 1952, 1954, 1960), and the unusual breeding habits. This paper is a report chiefly on some quantitative aspects of the breeding biology of the bird. The field work was carried out during the breeding seasons of 1961, 1962 and 1963 in Kumaon terai, District Nainital, Uttar Pradesh, under the direction and active participation of Dr. Sálím Ali.

Three other weavers namely the Common Baya (*Ploceus philippinus*), the Blackthroated Baya (*P. benghalensis*) and the Striated Baya (*P. manyar*) also breed in the same area. The selected study area had all the four species breeding so that it might be possible to assess the ecological niche of each species.

STUDY AREA

Rudrapur was selected as the base for the study as the town stands in the midst of the terai, and is well connected by roads with Moradabad,

Rampur and Bareilly. The following villages were visited during field trips : Haldwani, Fatehpur (Bhabar area), Lalkua, Bilaspur, Ghadarpur, Sitarganj, Sultanpur (Terai area) all situated within a radius of fifteen miles of Rudrapur.

MATERIALS AND METHODS

The field work mainly consisted of direct observations of nests and birds, using 6×30 prismatic binoculars. Birds, both adult and nestling, were marked with aluminium rings of the Bombay Natural History Society, and coloured celluloid rings for individual identification. Adults were caught with nylon mist nets. Weights of the young and eggs were taken by a spring balance. The colonies were visited early in the morning and observations were continued till late in the evening but for a short break at mid-day.

FIELD CHARACTERS

Finn's Baya differs from other weaver birds by its larger size and bill although in non-breeding plumage differentiation from the Common Baya in the field is not always certain. In breeding plumage the male is brilliant golden yellow with black wings. The black beak is decidedly larger than that of other weaver birds. In some males the vent area is white and can be clearly seen from a distance, one of the characters on which the eastern race is separated from the western race by Abdulali (1960). The female is in general coloration pale yellow with dark-brown wings. The males utter a harsh *twit twit* during flight from one place to another. Very often they descend on cart-tracks, and even on asphalted roads to pick up grains, spilt during transport. The birds appeared to be very fond of hemp seeds. The females, just prior to the breeding season, usually move in separate flocks of their own sex.

TABLE 1

	3 ♂♂	7 ♀♀
Wing	69 - 79 mm.	66 - 73 mm.
Weight	34 - 40 gm.	30 - 34 gm.

Juvenile males are very similar to the females but can be identified in the field by the call note which is similar to that of adult males. The juvenile males move in flocks of their own, which do not intermix with the breeding population as observed also in the Common Baya (Ali 1931, Ambedkar 1964).

Amongst the breeding males, at least one or two males have a complete black breast-band (BNHS Ring No. AB 1808), which is quite unusual.

ECOLOGY

Habitat

The breeding birds frequent the swampy area of the terai, a belt 10-12 miles in width with extensive luxuriant growth of elephant grass (*Imperata*), and other grasses, dotted with *Salmaal* *malabarica* and *Sheesham* (*Dalbergia sisoo*) trees. Patches of bulrushes (*Typha*) occur along ditches, ponds and swamps. Insects are abundant and various species of insect-eating birds are characteristic of the area. Warblers of the genera *Cisticola*, *Prinia*, *Acrocephalus* are extremely common, and their call notes very frequently heard.

In 1961, between 1 July and 20 August, I found twenty-one breeding colonies of Finn's Baya on trees, and the total number of nests counted was about eight hundred. The trees being isolated or well spaced-out in the grassland, I feel that I counted all the colonies within a radius of fifteen miles. The trees selected for nesting were : *Salmaal* *malabarica*, *Sheesham* (*Dalbergia sisoo*), Mango (*Mangifera indica*), and Flame of the Forest (*Butea monosperma*). A colony on a dead *Salmaal* near the fish culture pond at Rudrapur was observed in 1961 and again in 1962 and suggests that Finn's Baya uses traditional nesting sites as observed in the Baya (Ali 1931, Ali & Ambedkar 1956, 1957, and Crook 1960).

Although almost all the colonies were located away from human habitations, yet there was one extraordinary nesting colony observed right in the centre of Sultanpur village, about six miles from Rudrapur on the Rudrapur-Ghadarpur road on 14 July, 1961. A leafy banyan tree, (*Ficus bengalensis*), about fifty feet high was selected, not only by Finn's Bayas but also by the Common Baya, the Pied Myna (*Sturnus contra*) and the Drongo (*Dicrurus adsimilis*), for nesting. The uppermost stratum of the tree was occupied by Finn's Baya with fifty completed nests. The nesting was nearly completed by mid-July since many nests looked deserted and were being constantly visited and inspected by a flock of the White-throated Munia (*Lonchura malabarica*). Female Finn's Bayas, still feeding young, collected insects from elephant grass about a hundred yards from the tree. The second stratum was selected for nesting by the Common Baya which had nearly seventy completed nests. Breeding was in full swing and there was constant traffic of birds bringing food for the growing young and nesting materials for construction of new nests. All these were collected from the different patches of grassland in the neighbourhood. Apparently Finn's Baya and the Common Baya do not compete for food and nesting materials. The third stratum was selected for nesting by a pair of Drongos (*Dicrurus adsimilis*) which had three young in the nest. And the last and lowest portion of the foliage canopy,

about ten feet above the ground, held a nest of the Pied Myna (*Sturnus contra*), apparently incubating. The entire colony was benefited by the alertness and fearlessness of the drongos, who constantly drove off crows (*Corvus splendens*) and pariah kites (*Milvus migrans*) approaching the tree.¹

Detailed observations on the nest construction and breeding behaviour of Finn's Bayas breeding on tree-tops were provided by Sálím Ali & Crook in 1959 who stated that 'but for the builders in attendance among the tree-top, one would have hardly thought of looking for a nest colony in such a situation, or recognised such completely unorthodox structures as nests of an Indian weaver bird'. The nests were described as 'unlike those of any other Indian weaver. They are large globular structures, untidily but firmly woven with long strips of coarse grass, and the entrance is at one side near the top. Often a porch-like projection surrounds the entrance forming a small papilla as often seen in munia's nests. The structures are usually firmly knotted to upright twigs which are often worked into the fabric and also support the body of the nests from below. Occasionally the nests are slung sideways on to a twig or two so that the nest chamber hangs free below it. In no case, however, are the nests truly suspended from fine single twigs as is normally the case with the Common Baya (*Ploceus philippinus*) (Ali 1931)'.

During field trips to the Kumaon terai I observed nesting colonies mainly on tree-tops in July (1961), prior to the monsoon, and in reed beds after the rains had properly set in (1962, 1963). The nesting colonies observed in reed beds were recorded for the first time in the Kumaon terai as described here.

C. V. O'Donel (Baker 1926, 1934) observed the breeding of Finn's Baya [since described as a new subspecies, *Ploceus megarhynchus salimalii* Abdulali (1960)] in Bhutan Duars in the year 1912 and described its nesting habitat as 'a vast area of grass more or less intermixed with scrub'. Sálím Ali & Crook (1959) also observed some half-completed nests and structures in reeds standing in water in Kumaon terai but they considered these as the work of first year juveniles merely 'doodling' with nesting materials. Further they remarked that they did not see any females visiting these nests.

¹ I visited the same tree on 3 September, 1968, and except for Finn's Baya, all the other 'tenants' were in occupation. Perhaps the absence of Finn's Baya is due to the absence of elephant grass from the surrounding area which is now under cultivation.

BREEDING BEHAVIOUR

In 1962 an active reed bed colony was located near Rudrapur at the end of July. The dates of the various stages of this colony (Fish Culture Pond Colony) were as follows :

TABLE 2

Establishment of the Colony	26 - 30 July
Nest construction	1 - 6 August
Egg-laying	5 - 12 August
Hatching	18 - 24 August
Feeding the young	18 August - 3 September
Young leaving the nests	29 August
End of nesting activities	4 - 8 September

Colony site

The colony was located in a reed bed adjacent to the Fish Culture Pond on the Rudrapur-Phoolbagh road about one mile from Rudrapur. The reed bed of *Typha* reeds was roughly half an acre in area. Some of the *Sheesham* trees along the adjacent main road were occupied by the birds in May and June, but none were active in August after the rainy season had properly set in. In the centre of the reed bed, dead and dry, upright, bulrush (*Typha*) stems were available for nesting; for the inspection of the nests one had to wade through knee-deep water. Although fresh leaves and stems were readily available yet the birds selected dry, stiff, upright stems for the construction of their nests.

Other similar colonies were observed in the vicinity of Rudrapur in 1962 and 1963 which suggests that the breeding of Finn's Baya in reed beds once the rains have set in, is a regular feature.

Nest Construction

The male Finn's Bayas, who were the first to arrive on the nesting site, started to construct nests after plucking off the green flexible leaves, leaving behind stiff, bare stems of the *Typha*. The females did not help the males at this stage, but their hidden presence nearby could be detected by the display of the males.

The nest was rather loosely constructed of coarse long, green and flexible strips of elephant grass. Unlike the Bayas' nest, the nests were not pendant but attached firmly to the upright stalks of *Typha*. The general structure and stages in nest construction are remarkably similar to that of the *Quelea* nests of Africa (Morel, Morel & Bourliere 1957, Collias & Collias 1964).

Following are the stages of nest construction :

(1) *Crescent shape*

The male Finn's Baya, after the selection of *Typha* stems tied two or three dry upright stems with a few strands of coarse grass, like a waist

Ambedkar : Finn's Baya



Above : A reed bed nest colony ; Below : Close-up of reed bed nests.

(Photos : Sâlim Ali)

belt, just a few inches above water level, in such a way that the upper free ends came closer together. Then he started the construction of the nest at about 8-14 inches above the belt. By knotting one or two stems and picking the loose end with his beak from the third stem he constructed a bridge-like structure. After adding more material to this structure it became a firm bed of grass on which he could stand to construct the main body of the nest.

(2) *Initial Ring with Pouch*

This is the most important stage in the nest construction. It forms the base of the nest, and it is at this stage that the prospecting females visit the colony and the nests for inspection (Ali 1931) and, if approved, appropriate them for laying the eggs. After the first stage of nest construction the male immediately started on the next stage—the 'Ring with Pouch'. By adding more strands the male made a ring-like structure, and with shaping movements he prepared a ball-like pouch which hung down in the opposite direction to the entrance. By repeatedly adding more material he made a nest with a wide entrance. At this stage also as in other Indian weavers, he added the mud-blobs, within the nest, whose function still remains unknown. As soon as the female arrived he acknowledged her presence with a joyous *twit-twit-twit*, and often jumped in the air to greet her and then both came back to the nest, the male landing on the outer wall of the nest, the female within the ring. Copulation often occurred at this stage, if the female permitted.

(3) *Complete nest with wide entrance*

This is the stage when more vigorous activity to complete the nest took place. Pilfering of materials from other nests was a common sight in the colony. More strands were added to thicken the outer wall of the nest. The male brought lining material particularly *Typha* floss which was readily available in the colony. Unlike other weavers this lining was plastered all along the entire inner wall of the nest but more profusely at the bottom of the egg chamber. The floss lining along the entire inner wall probably serves as insulation and for keeping out the rain. After weaving and interlacing more nesting materials, the outer structure presented a coarse crisscross appearance, the entrance of the nest was narrowed down to permit entry of a single bird only. This was the final stage in the nest construction which took roughly between three and five days to complete. The shape of the completed nest was oval with a high lateral entrance. In some cases two entrances were seen. The female spent much time now in the nest and started laying. The male went on to construct a second nest often attached to the first one, in effect converting it into a composite double or multi-chambered structure. These functional composite nests, commonly to be seen in

Finn's Baya colonies, are unique among the Indian weaver birds. In the above colony I observed a compound nest which consisted of seven nests belonging to two males. The entire structure was built on ten dry *Typha* stems. The nests were not inter-connected, each unit being quite independent, with separate entrances. Other instances of this kind in ploceidae are known in the case of the Black Buffalo Weaver of Africa (Chapin 1954, Crook 1964, Collias & Collias 1964) and the giant and spectacular compound nests of the Sociable Weaver (*Philetairus socius*) of South Africa (Friedmann 1950).

In this reed bed it was noted that the nests, which were at the centre of the colony, were very active attracting other birds to build nests around the centre and particularly near the compound nests. The compound nests probably acted as the centre of social stimuli and no doubt served to orientate prospecting females. The peripheral nests always remained undeveloped.

The average weight of the dry nests was found to be 66.8 gm.

One of the basic differences in the breeding biology of Finn's Baya from that of the other Indian weaver birds seems to be that if the nests of Finn's Baya are removed then they abandon the colony site and move elsewhere, whereas other weavers even after repeated destruction of the nests, build again and again at the same site.

Clutch-size

Table 3 shows the average clutch-sizes of Finn's Baya for the years 1959, 61, 62 and 63. To understand the frequency of the clutch-sizes, data from Ali & Crook (1959) are also incorporated here for comparison. The average clutch-size in the tree-top nests was 2.3 in 1959 and 2.5 in 1961; in the reed bed nests it was 2.6 in 1962 and 2.3 in 1963.

TABLE 3

CLUTCH-SIZE

Year	Number of eggs in clutch						Total
	1	2	3	4	5	6	
1959*	..	4	2	6
1961	1	4	3	..	1	..	9
1962	3	8	23	10	5	..	49
1963	2	3	5	10
	6	19	33	10	6	..	74

* Data collected by Sálím Ali & Crook,

Out of 74 clutches observed, 33 clutches or 44.6% had 3, while 19 clutches or 25.6% had 2 eggs each. The average clutch-size in the four years was 2.4 which is decidedly lower than that of the Common Baya recorded as 3.2 in the Poona area (Ambedkar 1964). Moreau (1944) has observed that in various other bird families e.g. Podicipidae, Falconidae, Sylviidae and also Ploceidae there is a tendency for the larger members of the same family to lay smaller clutches.

Due to the short periods of my stay at Rudrapur in all three years it was not possible to collect data on the clutch-sizes and to study various other aspects of the tree-top nests *versus* reed bed nests in any one year to determine if there was a difference in clutch-sizes laid in two entirely different periods of the same year and in the different situations. It is possible that in the terai the available food in different months of the year, and the different nesting sites, have some bearing on the clutch-sizes. Repeat clutches have not been recorded during the investigation.

Egg weight

The eggs were laid daily, mostly in the morning. The first egg was laid in the Colony on 5th August 1962 before 7.30 a.m. This egg was observed in a nest where the males were building their nests in close contact which formed the compound nests. Probably the females were attracted first to these compound nests due to two possible factors (1) social stimuli received through the courtship activities of the males (2) safety from predators.

The weights of the fresh eggs were determined for the first time in 1962. The heaviest egg was 3.1 gm. and the lightest weighed 2.1 gm. The average weight was 2.7 gm. It is a common tendency in Finn's Baya for the second egg to be heavier than the first as shown in Table 4.

TABLE 4

WEIGHT IN GMS. OF 1ST AND 2ND EGGS OF A CLUTCH

No.	1st egg	2nd egg
1	2.8	2.9
2	2.1	2.2
3	2.6	2.8
4	2.6	3.0
5	2.6	2.8
Mean	2.54	2.74

It is, at the present state of knowledge, not possible to explain the significance of this consistent difference in weights.

Incubation

Incubation is performed by the female alone, as in other Indian weaver birds. The nests were well insulated due to interior lining of the entire inner wall of the nests. In view of this insulation of the nests and high atmospheric temperature, it was not surprising to see the extreme irregular movements of the females which sat on the eggs for a few minutes ranging from ten seconds to eight minutes. There was constant inward and outward traffic of the females in the Colony and the Colony appeared to be most lively and active at this stage and the next stage of the breeding cycle. Incubation usually started from the first egg, and here the period was reckoned from laying of the first egg to its hatching.

Night brooding was carried out only by the females entering the nests before sunset. The eggs were inspected each morning for hatching. The data in Table 5 show that the most frequent incubation period was 14 and 15 days.

TABLE 5

INCUBATION PERIOD

<i>Incubation period (days)</i>	<i>No. of clutches</i>
13	7
14	10
15	10
16	8

Average for 35 clutches—14·5

It is interesting to note that Finn's Baya has a shorter incubation period, 14·5 days than that of the Common Baya 16·5 days (Ambedkar 1964).

Nestling period

The female Finn's Baya broods the young during night in the same way as she incubates the eggs. She rarely stays in the nest after the 3rd or 4th day of hatching. The young are mostly fed on insects collected only by the female from the neighbouring area. The male usually does not collect food but guards his nests alertly from enemies, particularly crows. Throughout the day he perches on the nests singing and chirruping. Feeding by regurgitation is common for the first two or three days and thereafter the female brings morsels large enough for the young to swallow. In some cases the feeding instinct was observed to be present also in the males. On 3rd September, 1962, the male who was guarding the nest, fed the young with insects brought by the female.

The female passed on the food to the male to deliver it to the young. She was making continuous foraging trips.

The first young hatched in the colony was on 18th August afternoon. Almost all the eggs hatched between 18th August and 24th August, in a week's time. This was the most active part of the breeding cycle and the birds were constantly going out of the Colony in flocks for collecting food and bringing new materials for adding to the nests. The nestling period of Finn's Baya is between 12 and 17 days as shown in Table 6.

TABLE 6

<i>Days after hatching</i>	<i>No. of young flew off</i>
12	7
13	11
14	13
15	9
16	1
17	1
42 Total	

Based on forty-two observations, the mean, maximum and minimum nestling period was recorded. Twenty-four young flew off successfully when they were 13 and 14 days old. The mean period was 14.5 days. From available data it is considered as the shortest nestling period among the Indian weaver birds.

Nesting success

Nesting success may be defined as the ratio of young that flew from the nests to the number of eggs laid. In the Fish Culture Pond Colony, out of 79 eggs laid, 55 eggs hatched (69.6%) and 42 young flew off successfully (53.1%). This high nesting success can be attributed to the following three factors (1) safe nesting site (2) very short breeding cycle (3) abundant food supply.

The breeding activities at this colony ended on 4th Sept., i.e., 39 days after commencement.

PREDATORS

No predators were observed in the Colony (Dr. Sálím Ali's obs.) except parties of House Crows and Jungle Crows, whose efforts towards predation were unsuccessful. The crows were driven off by the male Finn's Baya as they attempted to enter the colony. They found it difficult



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