

Aspects of Egg Laying in Indian Robin (*Saxicoloides fulicata*)

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Abstract: Several aspects of the breeding biology of wild birds have been studied thoroughly. However, information on patterns of egg laying is lacking for most passerines species. Using direct observations of individuals of Indian Robins (*Saxicoloides fulicata*), we documented the timing and duration of egg laying and behaviour of males and females around the time of laying in a tropical study area of Haridwar (29° 55' N, 78° 08' E), India. The mean laying time was SR + 41.4 ± 8.9 min (range: SR + 24 - 58 min) and did not vary with the laying order. The mean duration of laying bouts was 16.9 ± 5.37 min and did not vary significantly for the laying of successive eggs. Females seemed equally active before and after egg laying indicating laying times to be determined primarily by physiological mechanisms involved in egg formation, such as hormone surges and ovulation. In most cases, females were accompanied by their mates when approaching the nest to lay. After leaving their nests following laying, females were immediately joined by their mates or they flew directly to them. Such observations suggest that both sexes may be guarding their pair bond against divorce by either member of the pair. [Sethi, V.K., Bhatt, D., Kumar, A., Naithani, A.B. Aspects of egg laying in Indian Robin (*Saxicoloides fulicata*). [Life Science Journal 2010;7(3):138-140]. (ISSN: 1097-8135).

Key words: Bout duration, egg laying, Indian Robin, *Saxicoloides fulicata*, sunrise

1. Introduction

Estimates of laying times and duration, combined with observations of pair interactions around the time of laying have been known to contribute to our understanding of several aspects of avian biology, such as energetics, hatching asynchrony, the timing of brood parasitism and copulations, and patterns of mate guarding (McMaster *et al.*, 2004). However, such aspects have been poorly studied for most passerine species and the results vary from species to species (McMaster *et al.*, 1999). For example, based on the handful of studies to date, passerines appear to lay either within a restricted period around sunrise or later in the day with significant variation in laying times (e.g. Weatherhead *et al.*, 1991; Oppenheimer *et al.*, 1996; Gill, 2003). Similarly, the time it takes to lay an egg, or laying bouts, varies considerably from just a few seconds to over an hour (Nolan, 1978; Muma, 1986; Peer and Sealy, 1999). In addition, there is almost no information on the interactions between females and their mates before, during, and after laying (Gill, 2003).

In the present study, we gathered information on the timing of egg laying in Indian Robin (*Saxicoloides fulicata*). The objectives of this study were:

(1) to determine egg laying times and laying-bout durations, and (2) to determine the behavior of males and females around the time of laying.

2. Materials and Methods

2.1 Study period and area

We observed individuals of Indian Robin from April to June 2010 within a 12-km radius in Haridwar (29° 55' N, 78° 08' E), Uttarakhand, India. A total of forty laying instances were observed in 12 nests.

2.2 About the species:

The Indian Robin, a territorial bird species, belongs to the Muscicapidae family. It is widespread in South Asia (Ali and Ripley 1998). It is sexually dimorphic in plumage with the male being mainly black while

females are brown in most parts of the body (Grimmett *et al.*, 1998). Juvenile birds are much like females but the throat is mottled (Rasmussen and Anderson, 2005).

This species is found in open stony, grassy and scrub forest habitats (often close to human habitation). Pairs are mainly seen in dry habitats and are mostly absent from the thicker forest regions and high rainfall areas. All populations are resident and non-migratory (Ali and Ripley, 1998). The breeding season varies according to region and usually begins with the first rains (Betts, 1951). Peak breeding in the study area was observed during May (personal observation). Males sing during breeding season and display by lowering and spreading their tail feathers and strutting around the female, displaying their sides and fluffing their undertail coverts (Thyagaraju, 1955). Three to four eggs is the usual clutch (Oates, 1890). Only the female incubates; however, provisioning to young is carried by both the sexes (George, 1961; Ali and Ripley, 1998).

2.3 General methodology

We arrived at study sites during dawn, before awakening of males and females and immediately checked the nest contents. When a nest had one or two eggs, we watched the nest following morning to record laying of consecutive eggs of the clutch. On several occasions, we located the nests under construction, and in such nests we were able to observe the laying of first egg as well. Nests were observed from considerable distance without affecting the pair's behavior. We recorded the time that the female entered the nest to lay and whether the male accompanied the female on her return. Once the female entered the nest, we watched it until the female exited, recorded the time, and then followed the female to determine whether the pair reunited. Nests were re-checked after the laying bout to confirm the presence of a new egg. The duration of the laying bout was calculated by subtracting the time females entered the nest to lay from the time they left it after laying. The midpoint of the

laying bout was considered as laying time. All behaviors were recorded to the nearest minute.

We present times of day as minutes relative to sunrise, which are represented as SR - or SR + depending on whether the event occurred before or after sunrise, respectively. Sunrise times for Haridwar were obtained from the website: www.timeanddate.com. Results are reported as means \pm SD. We used the non-parametric Kruskal-Wallis test to examine variation in laying timing and bout durations among successive eggs within the clutches (Rao and Richards, 2007).

3. Results

The mean laying time for the Indian Robin was SR + 41.4 \pm 8.9 min (range: SR + 24 - 58 min) (Table 1) and did not vary with the laying order (H = 0.955, df = 3, P>0.05). The duration of laying bouts ranged from 9 to 33 min with a mean laying bout duration of 16.9 \pm 5.37 min (Table 1). The bout duration also did not vary significantly for the laying of successive eggs (H = 0.947, df = 3, P>0.05).

In 17 out of 40 occasions, female Indian Robins were observed foraging on ground nearby the nests before laying. For seven occasions females sang during aggressive interactions with floater or neighbouring females before laying. As soon as a focal female observed any female inside or nearby the territorial boundary, she sang and chased it for a long distance. All such activities of females (such as foraging, calling, chasing intruder females) were observed following egg laying also.

For 37 occasions, females were accompanied by their mates when approaching the nest to lay while in remaining occasions females approached the nest alone. When females were in their nests their mates perched or foraged usually within 3-15 m of the breeding nest. On 32 occasions, these close perching males spontaneously sang loudly when females were in the nest to lay. After leaving their nests following laying, females were immediately joined by their mates (n = 31) or they flew directly to them (n = 7). However, in two instances females flew out of sight once they left the nest, and we were not able to determine when the pair came into contact.

Table 1. Egg laying time and bout duration in Indian Robins (*Saxicoloides fulicata*)

Eggs	Laying time relative to sunrise (SR)	Bout duration (min)	N
I egg	SR+44.42 \pm 9.05 (SR +29 to +53)	16.57 \pm 4.75 (10-22)	7
II egg	SR+40.33 \pm 7.87 (SR +27 to +54)	16.58 \pm 5.77 (10-27)	12
III egg	SR+41.16 \pm 10.61 (SR +24 to +58)	17.75 \pm 2.92 (14-24)	12
IV egg	SR+40.77 \pm 8.84 (SR +30 to +55)	16.55 \pm 8.06 (9-33)	9
All eggs	SR+41.4 \pm 8.94 (SR +24 to +58)	16.92 \pm 5.37 (9-33)	40

4. Discussion

The Indian Robins laid within a restricted period of the day, about forty minutes after sunrise. The timing of egg laying varies considerably among species. For example, species may lay eggs before sunrise (Brown-headed Cowbirds *Molothrus ater*, Scott, 1991; McMaster *et al.*, 2004), shortly after sunrise (Red-winged Blackbirds *Agelaius phoeniceus*, Muma, 1986), about two hrs after sunrise (Gray Catbirds *Dumetella carolinensis*, Scott, 1993) and throughout the day (Dusky Flycatchers *Empidonax oberholseri*, Oppenheimer *et al.*, 1996).

The laying time of Indian Robin coincided with the intense period of the daily activities. For example, females were equally active in various activities such as singing, foraging, interacting with intruder females etc. before and following laying. It has been suggested that egg laying should be less likely to occur at such a time because of the potential risk of damage to an oviducal egg or as a result of energy constraints (Schifferli, 1979; Oppenheimer *et al.*, 1996). However, these factors appear to have a negligible influence on the time of laying in Indian Robins. Like Indian Robins, inconsistencies between time of laying and female activity have been noted in other species also. For example, in American Robin (*Turdus migratorius*), an early morning to late afternoon layer, no differences in female activity were observed before or after laying (Weatherhead *et al.*, 1991). Similarly in European Starlings (*Sturnus vulgaris*), most laying occurred near the end of the peak period of morning social activities (Feare *et al.*, 1982). These considerations suggest that laying times per se may not be the focus of natural selection in some species. Rather, laying times appear to be determined primarily by physiological mechanisms involved in egg formation, such as hormone surges and ovulation (Oppenheimer *et al.*, 1996).

The mean laying bout duration of Indian Robins was 16.92 \pm 5.37 minutes which appears much shorter than a number of bird species studied so far (see McMaster *et al.*, 2004). However, the reason for this is unclear. It has been suggested that species that lay later in the day have longer laying bouts, whereas species that lay early may have been under greater time constraints of foraging than those lay later (McMaster *et al.*, 2004). However, we frequently observed female Indian Robins foraging before laying and throughout the day probably because of easy accessibility of their prey.

Most female Indian Robins (>90 % laying occasions) were accompanied by their mates to the nest before laying; males foraged close to the nest during laying, and pairs re-united shortly after laying. Weatherhead *et al.*, (1991) speculated that the time of laying may reflect selection that favors a particular time for fertilization, which in turn may reflect the best time for copulation. Early-morning laying has been considered the optimal time for copulation to take advantage of the female's insemination window (Cheng *et al.*, 1983). Consequently solicitations, copulations, and mate guarding have been expected to be most frequent shortly after laying. Thus, an obvious interpretation of the behavior of the male Indian Robins is this that males are guarding their fertile mates from the copulation attempts of extra-pair males. In some cases (n = 7), where males did not join the female immediately, females sought out their mates after

laying. Such observations suggest an alternative explanation that both sexes may be guarding their pair bond against divorce by either member of the pair (Hall, 2000; Gill, 2003).

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