

**INTERNATIONAL JOURNAL OF ADVANCES IN PHARMACY,
BIOLOGY AND CHEMISTRY****Research Article****Effect of Red Ants invasion on the Nesting and
Brood of Indian Cliff Swallows****HC. Chaya¹ and H. Channaveerappa^{2*}**¹Department of Zoology, Maharani's Science College for Women, JLB, Mysore, India.²Department of Zoology, Govt. Home Science College, Holenarasipura, India.**ABSTRACT**

Cliff Swallows *Petrochelidon fluvicola* build gourd shaped mud nests at Ranganathittu cliff islet each year in the months of November and December in about 20-25 days. Due to the invasion of red ants *Oecophylla smaragdina* in the current year, the entire nest building activity is prolonged and disrupted. The predatory behaviour of these ants resulted in loss of broods and nests of birds.

Keywords: Nest Building, Red ants, Predatory behaviour, Loss of broods.

INTRODUCTION

The Cliff Swallows build mud nests of unique shape that has attracted the ornithologists and behavioural biologists all over the world. The nest building in these birds require favorable conditions such as mud quality, water body, availability of food and protection from the predators & parasites (Kilgore Jr & Knudsen 1977). Though there are reports on the impact of factors on nest building in these birds (Brown et al 2000, Brown C R & Rannala 1995), present report on the effect of *Oecophylla smaragdina* on nest building by Indian Cliff Swallows is a novel one.

The nest building activity of Indian Cliff Swallows *Petrochelidon fluvicola* has been studied for five years at Ranganathittu Cliff islet. The cliff islet formed a secure abode each year for these migrants. These birds build mud nests every year in the month of November-December and migrate back after completion of reproduction during the month of August in the proceeding year[§]. The nest building activity is almost a synchronized process with the time duration. The entire process of nest building lasts between 20-25 days and the eggs are laid before the completion of the gourd shape of the nest; within a week of the first egg laid, the process of nest construction would be completed. This year the nest construction was a non-synchronized and a delayed process and also suffered a total loss of broods due to presence of predatory ants

Oecophylla smaragdina

The effect of this Predator on the nest construction and reproductive failure of these birds is discussed in this paper.

[§](The nests constructed in the previous year will be washed away by the raise of water level in the river in the coming year).

MATERIALS & METHODS

The cliff swallows nest building activity is recorded by digital photography using "Sony Cyber-Shot DSC-HX7V" camera. Each step of the nest building is recorded on each day of nesting activity, starting from its blueprint marking of the nest till the complete gourd shape with a tunnel is produced. The flight of birds around the cliff and movement of red ants on and around the cliff is also recorded. The size of cliff islet, its surroundings and cliff are measured using measuring tape; the vegetation on the cliff that favors growth of ants is also noted.

Observation

There were greater non-synchronous proceedings in the nest construction process. The nest completion generally could have lost in 2-4 weeks (approximately by 2nd week of December 2011), (Fig-2) as per our earlier observations. The swallows arrived at nesting site on time that coincided with the time of previous years. This time swallows did not descend down on the day of their arrival to start the nest construction activity but they kept on flying around the cliff in flocks for

five days. The birds rested on the bamboo bush and other plants on the river bank opposite to the cliff. On the late hours of the 5th day of their arrival a few birds descended down and initiated marking the blue print of the nest. Even the second batch of migrants arrived after two days of the arrival of first batch behaved in the same way. Subsequent of marking, the first mud pellet to initiate nest construction was laid on following day, on the marking that differed in time gap between the migrant birds.

For next four days the swallows did not show any kind of nesting activity. Later on 10th day onwards a platform of 2-3 layers was constructed in about 25 days time. After this lengthy gap of time the process of nest construction went on to complete half cup shape but with an irregular gap of 2-3 days in between.

In about 95 days time fifty percent of the migrants completed half of their nest construction and 25% of these started laying eggs. But these birds delayed the proceeding of nest construction further along with the incubation of eggs was also delayed. By the end of March of 2012 few birds started incubating the eggs laid in.

In total 461 nests were constructed out of these 361 nests were completed remaining 100 nests construction was incomplete 31/100 were ¼ completed 39/100 were half completed 30/100 were ¾ completed these thirty nests had eggs laid within (Fig.3).

The egg incubation was delayed, the first hatching was resulted on 13/14 April 2012. This nest was invaded by Red ants and the broods were killed, gradually invasion extended to other nests as the hatching took place. By the end of May-2012 all the 361 nests were invaded by the predator ants killing the brood leading to total failure of reproduction. In other nests the eggs remain unhatched as those were not incubated. The parents have to desert the nest site abandoning the brood and the nest.

The Red ants *Oecophylla Smaragdina* were not there in the cliff site in previous years and were traced this year on the tree *Syzygium jambulina*, having built four nests (Fig 1-a). The ants stayed on the arbor showing no downward movement towards the cliff even while the nesting activity and subsequent egg laying activity were going on. The ants started descending only after the faecal sacs were thrown on the nest after the eggs were hatched, these nests easily could be identified by the white patch of faecal sac on the nest (Fig 1-b).

DISCUSSION

Predation and prey interactions are common to birds and ants in many natural habitats. Maximum foraging efficiency & minimum predation risk are key factors in the selection of habitat by many animals (Wendee etal 2010). Some birds can assess

nest predation risk and the nest predations do play a role in expression of reproductive strategies in birds (Fontaine and Martin 2006). The predators that invade the habitat can disrupt the ecological relationships (Lingon R A etal 2011). Such an invasion by introduced red fire ants had negative impacts on ecosystem because of their aggressive foraging behavior, high reproductive capability, as well as lack of predators or competitors to control them (Allen etal 2004). The predators may have a strategy that over weighs the adaptive strategies of a prey as in case of vireos where fire ants attacked the nests and brood when the parents were slept and those birds had no appropriate strategies to overcome the attack have to abandon the nests (Smith etal 2007) and the ability of imported red fire ants to feed on the hatching eggs is well documented by many workers (Johnson 1961, Mount 1981, Mount etal 1981, Wilson and Silvy 1988, Robert D M & Malcom L M 2012).

Petrochelidon fluvicola, the streak throated Indian cliff swallow chooses its habitat of maximum safety to build the nest. The cliff at Ranganathittu formed a safety abode for these birds for a long time. The cliff is surrounded by flowing water of river Cauvery located at 12^o 25¹ 30.4 and 76^o.39¹ 3.42¹¹ E is about 180ft long and 70ft wide, with the cliff rock has a length of 24ft and width of 4ft extended over the water body with a gap of about 1ft. the cliff islet is covered over by *Syzygium jambolina* and *Pongamia pinnata* with other type of plants & trees. These two trees types are favorite site of red ants' *Oecophylla Smaragdina* to build their nests. Till this time this islet formed an ecological fortress for any kind of invading predators. In spite of this how these red ants are invaded remains a question. We have a strong prediction that the nests might have been washed away with the floods & landed in that islet. The flood of previous two years 2009 & 2010 might have introduced red ants on to this cliff islet. The nests of these ants are generally found on the trees at the river bank. The other prediction may also be due to accidental anthropogenic dropping was carried from the mainland into islet or this may also be migration of the fertile queen to select this new niche.

Birds might have noticed the presence of ants on the arbor of trees on their immigration to the nest site and might have decided to go by trial & error to test whether those ants could descend down and disrupt nesting by attacking them. Ability of parent's birds to assess the predator risk is well explained in other cases (Fontaine & Martin 2006). Those birds which have completed the process of nesting inevitably incubated the eggs already laid in consequently young ones are hatched; the odour emitted by the faecal sacs thrown on the nest had triggered the ants to descend down and attacked the

brood. Till then the ants never showed a tendency to reach the nest. This strategy of predator had misguided the prey bird to complete the nesting and hatching. Initially the ants attacked four nests and never attacked either the eggs or the parents in the adjacent nests where incubation was going on. In a span of 3-5 days of hatching which took place in about 98 nests & these were invaded by the red ants. By the end of May 2012 the invasion had taken place to all the 361 nests where there were brood & in the remaining nests with unhatched eggs the ants never invaded. This strategy of swallows in delayed nesting & hatching never bothered the predator ants to show any deviation from their earlier fixed strategy to attack only the brood. This strategy of predator over weighted strategy of birds and caused total loss of brood. For these birds to thrive & reproduce in this niche

either the birds have to evolve their strategy to overcome the predation or conservation measures to remove these red ants from this islet to save swallows has to be done. Such a conservation measure using insect growth control (Drees 1991) has resulted in protection of vireos at rollover pass islands.

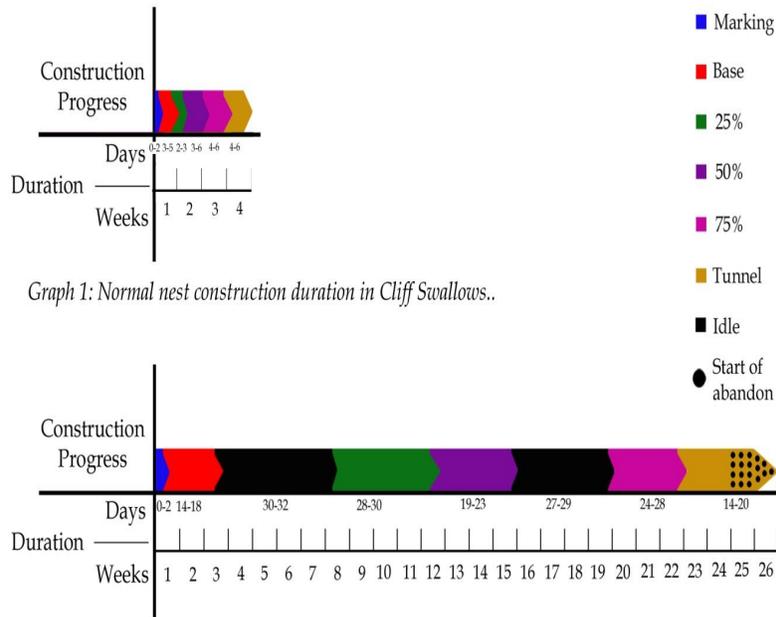
Often the predator-prey interaction has been considered to be the fertile ground for co-evolution. Such interaction escalates evolution of traits in both prey & predator (Smith et al 2007). It is too early to predict such an evolutionary change in this case, though there was a slight change in the nesting behaviour in Cliff Swallows. In case this predation continues even in the coming years of their reproduction, there may be total loss of habitat for these birds and may lead to disappearance of the Cliff Swallows at this locality.



Fig. 1a:



Fig. 1b:



Graph 1: Normal nest construction duration in Cliff Swallows..

Graph 2: Nest construction duration in Cliff Swallows due to effect of predator.

Fig. 2:

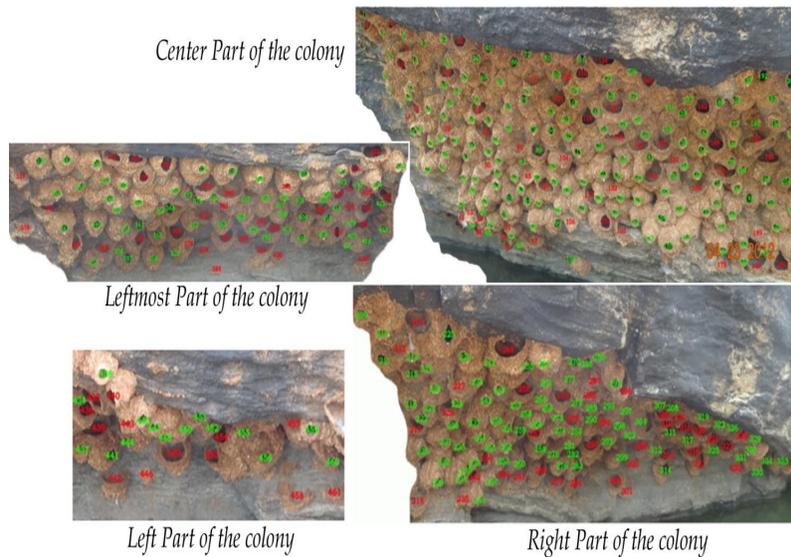


Fig. 3: Red numbered is incomplete nests & Green numbered are completed nests (Photo recorded about 15days before the birds abandoned site).

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