

Nest-site Characteristics of the Edible-nest Swiftlet *Aerodramus fuciphagus* (Thunberg, 1812) at Si-Ha Islands, Phattalung Province, Thailand

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ABSTRACT.—Caves on the Si-Ha Islands, Phattalung Province, Thailand, used by *Aerodramus fuciphagus* as their breeding sites were examined for the nest-site characteristics in October 2000. One hundred and twenty-five nest sites from 25 nest patches were investigated for the texture of the cave wall. Results showed that the nest-site selection was determined by the unique character of the cave wall rather than by random choice. Most nest patches, ranging 1-80 m², were found on the smooth surface of the inward-inclining walls. Nest sites characterized as smooth and concave with supporter were found in all nest patches. Supporters, protruding U-shaped rocks, were found in all nest patches and were used entirely by birds, suggesting that supporters play an important role in the nest survival and the breeding success. The data of nest-site characteristics are important for the development of the interior wall structure of the cultivated house.

KEY WORDS: nest-site characteristics; Edible-nest Swiftlet; *Aerodramus fuciphagus*

INTRODUCTION

The distribution of Edible-nest Swiftlets is in the Oriental region, ranging from the Andaman and Nicobar Islands in the Indian Ocean to South-East Asia and the Lesser Sunda Islands (Cranbrook et al., 1996; Glenister, 1971).

Species that produce nests which are harvested commercially are the Edible-nest Swiftlet or the White-nest Swiftlet *Aerodramus fuciphagus* (Thunberg, 1812), the Black-nest Swiftlet *A. maximus* Hume, 1879 and the Indian Swiftlet

A. unicolor (Jerdon, 1840) (Ali, 1996; Wells, 1999).

A. fuciphagus builds nest wholly from its saliva, so it is renowned as an important species regarding its valuable nest, which is most highly prized. *A. maximus* uses saliva mixed with its feathers and *A. unicolor* which is restricted to the south-west coast of the Indian Subcontinent and Sri Lanka uses saliva incorporated with vegetable matters for its nest (Kang and Lee, 1991; Rodelphe, 1992; Chantler, 1999; Wells, 1999).

A. fuciphagus and *A. maximus* are residents in Thailand, living in sea caves offshore along the coastlines in Prachuap Khiri Khan, Chumphon, Surat Thani, Phattalung, Satun, Trang, Phuket, Phang-nga and Trat Provinces (Lekagul

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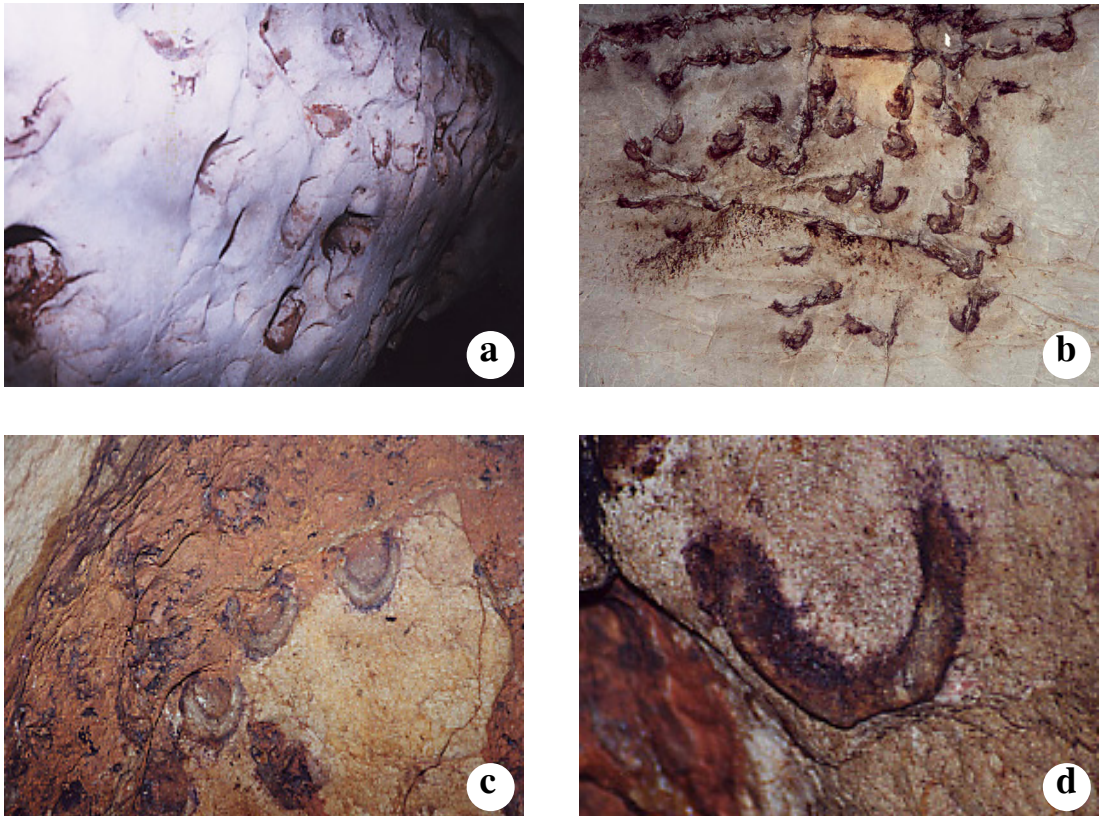


FIGURE 1. Types of nest-sites at Si-Ha Islands, Phattalung Province, Thailand: (a) smooth and concave without supporter sites; (b) smooth with supporter sites; (c) rough and concave with supporter sites; (d) rough with supporter site, focusing the protruding U-shaped rock.

and Round, 1991; Royal Forestry Department of Thailand, 1999).

Generally, it is known that the Edible-nest Swiftlets are cave dwellers and their nesting areas are usually inaccessible for human and are located in dim to completely dark sites in limestone caves. They are occasionally found in abandoned houses and in other man-made structures (Langham, 1980; Kang et al., 1991).

To date, little has been reported about the nest-site selection in *A. fuciphagus* and basic information on the characteristics of the cave wall where their nests are located does not exist. Such information is important for the conservation and perhaps for the development of the artificial nest site in cultivated houses.

STUDY SITE

The study site was located in the caves on islands, namely Ko Na Thewada, Ko Ru Sim and Ko Ta So. These islands are in the group of Si-Ha Islands (Ko Si Ko Ha) located at 7°25'N, 100°15'E of Songkhla Lake, Phattalung Province, southern Thailand. Each island, at the elevation ca. 63-100 m above sea level, has limestone caves of various sizes which are roosting and nesting habitat of co-existing cave dwellers such as *A. fuciphagus*, *A. maximus*, bats, rats, snakes and invertebrates. The entrances to most of the caves are on the cliffs, facing the sea or the forest. One representative cave on Ko Ru Sim, namely "Tam Nam", has the entrance at the surface of sea water level at

which bird nests are located in the hall above the sea water. There are several chambers of varying sizes in each cave, ranging from a few to hundreds of cubic metres. Chambers are located from 1 m to >100 m away from the cave entrance. Normally, light enters the cave through the entrance, and sometimes through apertures in the roof of the cave. Thus the main chamber near the cave entrance is dimly lit, but most of the chambers and side-branches are completely dark. Cave floors are covered with bird and bat droppings, feathers, debris of eggs and dead chicks, together with garbage such as expired batteries, matches, etc. This always makes the air inside the cave foul. The ambient temperature and relative humidity in caves during the study period ranged from 27 to 32 °C and from 64 to 81 %, respectively.

In the study caves, *A. fuciphagus* nested in groups, ranging from 10 to more than 1,000 nests in one area. Each nesting area on the wall was called a nest patch whereas a nest site was defined as the area on the cave wall to which a single nest cup was attached. In this study, the areas of the sampled nest patches ranged from 1 to 80 m² (average = 12.32 m²). Most nest patches were found on the wall, of which the height were 2.5 m to > 10 m above the cave floor. Nest patches of at least 20 nest sites with the height of < 10 m from the cave floor were examined.

METHODS

The study was conducted after the nests were collected by commercial collectors in October 2000. The characteristics of 125 nest sites from 25 nest patches were investigated. Five nest sites in each nest patch were selected systematically, starting with one nest site at the center of each patch and four others at approximately 1 m away at right angles to the center. Nest-site characteristics recorded were the surface and the angle of the cave wall.

The surface of the cave wall to which the nests of *A. fuciphagus* were attached was noted as smooth or rough, concave or flat, and with



FIGURE 2. A nest patch on the inward-inclining wall in Nong Kaw Cave, Ko Ta So, Phattalung Province, Thailand.

or without supporter (Fig. 1). A supporter is a protruding rock of U-shaped form on the wall surface (Fig. 1d). The number of supporters and the number of nests within a nest-patch were counted in order to examine whether there was any correlation between them.

The angle of the cave wall was classified as: 1) the vertical wall with an angle of approximately 90° to the horizontal line, 2) the outward-inclining wall with the angle > 90° to the horizontal line, 3) the inward-inclining wall with the angle of < 90° to the horizontal line (Fig. 2).

RESULTS AND DISCUSSION

Results showed that nest-site selection in *A. fuciphagus* was constrained by the unique character of the cave wall in which the bird did not choose the nest site randomly. All nest patches were found on inward-inclining walls. None was found on the outward-inclining wall and the vertical wall. Most of the nests (89.4%)

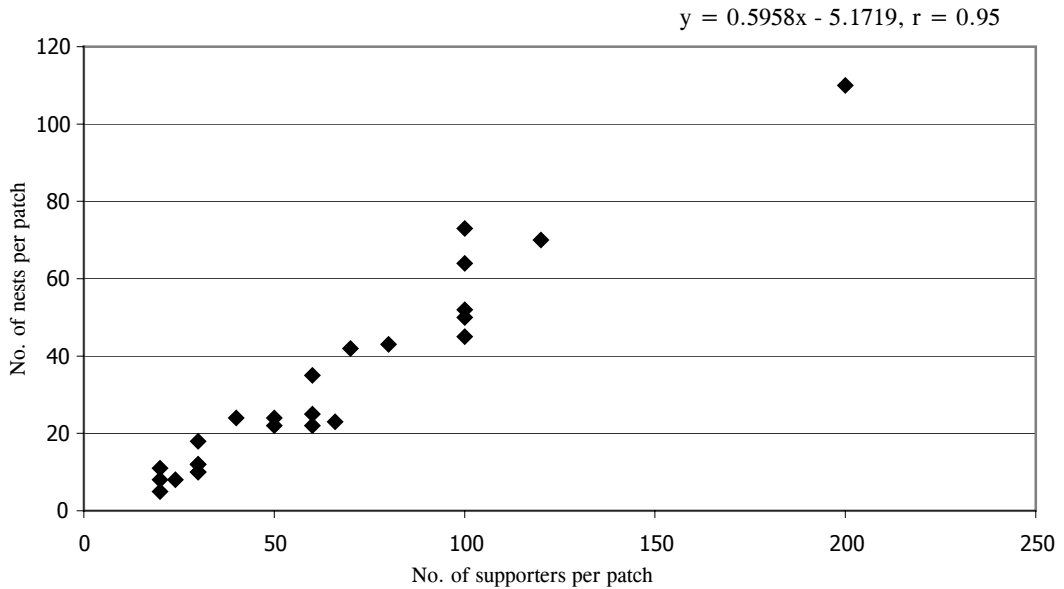


FIGURE 3. The number of nests per patch versus the number of supporters per patch. Data were obtained from 25 nest patches in 8 caves of Si-Ha Islands, Phattalung Province, Thailand. Each point represents one nest-patch.

were attached to the smooth than the rough surface of the wall (Table 1). Nest sites characterized as “smooth and concave with supporter site” were found in all nest patches and were most selected by birds. Sites with supporters were found scattered in the nest patches on an average of 49.3 % of the total nest sites with the range of 25-75 % and all were occupied by the breeding pairs. The number of supporters in each nest patch was significantly correlated with the number of nests in that patch ($r =$

0.95, Fig. 3), suggesting that the supporter plays an important role in nest survival.

The question of how the supporter or the protruding U-shaped rock appears on the surface of the cave wall remains unclear. Some may be geological phenomena, but a large number of them found within nest patches suggests that they were probably not formed by geological processes alone. We hypothesize that most of them were probably formed due to the accumulation of calcium carbonate from the

TABLE 1. Nest-site selection of *A. fuciphagus*, Si-Ha Islands, Phattalung Province, Thailand.

Nest-site characteristics	Number of nests	%
Smooth and flat with no supporter	3	2.4
Smooth and flat with supporter	28	22.0
Smooth and concave with no supporter	10	8.0
Smooth and concave with supporter	71	57.0
Rough and flat with no supporter	1	0.8
Rough and flat with supporter	2	1.6
Rough and concave with no supporter	5	4.0
Rough and concave with supporter	5	4.0
Total	125	100.0

limestone rock at the base of the nest cup which becomes U-shaped after repeated use over many years.

In the study caves, it seems that the smooth and concave with supporter sites were insufficient. A nest site that is occupied by one breeding pair would not be available for another unless the first pair dies. Hence, inferior breeders may be forced to occupy the lower quality sites (*i.e.* smooth and flat sites or rough and flat sites) in the same patch even though those sites lack supporters.

The height and the angle of the wall may influence the selection in the way that inaccessible sites, such as those high up on the ceiling or on the inward-inclining walls, may normally prevent predators from gaining access to eggs and nestlings.

From the observation on the use of the cave wall by congeners, it indicates that *A. fuciphagus* and *A. maximus* have avoided interspecific competition for the nesting space by using different areas of the cave wall. Both species were not found nesting in the same nest patch in this study. This is in accordance to the report of Boswall and Kanwanich (1978). However, the interaction between the two species is interesting and deserve further studies. In addition, the correlation between the role of supporter and the breeding success at fledging as well as the formation of the U-shaped supporter are also interesting to be investigated in the future.

ACKNOWLEDGMENTS

We would like to thank the concessionaire and his staff for giving permission to conduct the research on Si-Ha Islands, Phattalung Province. We thank the field assistants for their help. We also thank Phillip D. Round and anonymous reviewers for helpful suggestions and comments on this manuscript. This work was supported by the TRF/BIOTEC Special

Program for Biodiversity Research Training grant T_345002.

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