

NEST CHARACTERISTICS OF COPPERSMITH BARBETS (*MEGALAIMA HAEMACEPHALA INDICA*, LATHAM, 1790)

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ABSTRACT

Coppersmith Barbets are tropical treetop dwellers which live in deciduous forests, gardens or even in towns. On the Chulalongkorn University campus, they actively breed in the dry season during January–March. Both the males and females excavate dead and dry branches of *Samanea saman*, *Delonix regia*, *Terminalia catappa*, *Peltophorum pterocarpum*, *Parkia speciosa*, *Spathodea campanulata*, *Acacia auriculiformis* and *Erythrina orientalis* to build their nests. Each year they excavate several new holes but only one hole serves as the nest. The others are used as spare nests and roosting holes. The entrances of the holes are nearly circular, 3.2–4.8 cm in diameter, are always on the undersides of sloping branches, and allow only one bird to enter at a time. The holes are excavated to form a sock-shaped chamber 5.5–6.9 cm wide and 14.2–26.0 cm deep. The preferred nest branches are 21.6–46.5 cm in circumference, 2–241 kg/cm² in hardness, and contain 9.75–12.41% moisture.

INTRODUCTION

The Coppersmith Barbet is a tropical arboreal bird that never descends to the ground. It lives in deciduous forests, gardens and even in towns. Its range is from West Pakistan to Indo-China, Java and the Philippines, but the subspecies *Megalaima haemacephala indica* is found in the Indo-Malayan region (HAVERSCHMIDT ET AL., 1970; HOWARD & MOORE, 1984). The Coppersmith Barbet gets its name from the call, 'tonk-tonk', like hammer blows on an anvil. Males and females look similar. Adult Coppersmith Barbets have a bright crimson patch on the forehead and a band on the breast, bright yellow around the eyes, chin and throat, with a black stripe that extends through the eye from the nostrils, another from the gape to below the cheeks, and both merging into a broad black band passing to the back of the head. The upper plumage is olive-green and the upperparts are yellowish-white with broad olive-green streaks (Fig. 1). They can climb up and down along tree trunks like a woodpecker, using their short stiff tails as a support. The nest cavity of the Coppersmith Barbets is also similar to that of a woodpecker's but barbets always excavate on the undersides of dead branches of soft wooded trees (YAHYA, 1988).

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METHODS

The study area was on the Chulalongkorn University campus. Coppersmith Barbet nests were observed and recorded through four breeding seasons, in 1988, 1989, 1991 and 1994. Eighteen nests were cut down and measured after the breeding season in 1988 and 1989. Nine nests were found with nestlings (defined as nestling nests) and nine nests were empty (defined as roosting holes or spare nests).

“Wood hardness” of nesting branches was measured according to Standard ISO-3350 (Wood determination of static hardness), which employs the Janka hardness test. Wood is cut into cubes 5 cm on a side, and a circle of iron 11.28 mm in diameter is pressed into the wood. Hardness is calculated from $H=KP/m$, where P =loading pressure, m = moisture content and K is a coefficient.

RESULTS

Coppersmith Barbets bred in the dry season during January–March, but they still could be seen at the nest until June. Both the males and females excavated dead and dry branches to build their nest. Coppersmith Barbets preferred to build nests or roost in *Samanea saman*, *Delonix regia*, *Terminalia catappa*, *Peltophorum pterocarpum*, *Parkia speciosa*, *Spathodea campanulata*, *Acacia auriculiformis* and *Erythrina orientalis* trees (Table 1). They also used other tree species for roosts: *Ficus elastica*, *Cassia bakeriana*, *Phyllocarpus septemtrionalis*, *Ficus glaberrima*, *Butea monosperma*, *Gliricidia sepium*, *Lagerstroemia speciosa*, *Cassia fistula*, *Pterocarpus indicus* and *Albizia lebbek* (Table 1). Each year they excavated several new holes but only one hole was used as the nestling nest and the others were reserved as spare and roosting holes. It was possible to find several holes in a single branch and usually they used the lowest hole as the nestling nest (Fig. 2). The characteristics of nests were recorded as follows. The entrance hole was circular, 3.2–4.8 cm in diameter. It was always on the underside of a sloping branch and allowed only one bird to enter at a time. Longitudinal section of eighteen nests showed that they were excavated to form a sock-like chamber (Fig. 3). For nestling nests, the maximum width of the internal chamber varied from 5.5–6.9 cm (mean 6.0 cm) and the depth from the lower entrance to the bottom of the chamber from 14.2–26.0 cm (mean 18.1 cm). Nests were built in branches of 21.6–46.5 cm in circumference (mean 34.0 cm), 2–241 kg/cm² in hardness (mean 78.5 kg/cm²). With 9.75–12.41% moisture content (mean = 11.3%) (Table 3). For roosting holes, details of internal nest measurements are shown in Table 2.

There was no significant difference between nestling nests and roosting holes in entrance hole size or width of chamber (t-test, $P > 0.05$: $t = 1.6$, $n = 18$, $p = 0.36$ and $t = 1.47$, $n = 17$, $p = 0.24$) but roosting nests were significantly higher above the ground (t-test, $P < 0.05$: $t = 2.2$, $n = 17$, $p = 0.30$). The chambers of nestling nests averaged deeper than chambers of roosting holes (t-test, $P < 0.01$: $t = 4.52$, $n = 17$, $p = 0.21$).



Figure 1. A Coppersmith Barbet *Megalaima haemacephala indica* found in Chulalongkorn University campus.



Figure 2. Several holes were found in a single branch, but only one is the nestling nest.



Figure 3. Longitudinal section of a branch showed the sock shaped chamber of the nest.



Figure 4. The old nest of a Coppersmith Barbet being used by Plain-backed Sparrow.

Table 1. Tree species in which nestling nests and roosting holes of Coppersmith Barbets were found at Chulalongkorn University in 1988, 1989, 1991 and 1996.

Tree species	Common name	Number of	
		nestling nests	roosting holes
<i>Samanea saman</i>	Rain Tree	17	98
<i>Delonix regia</i>	Flame Tree	8	37
<i>Terminalia catappa</i>	Sea Almond	3	15
<i>Peltophorum pterocarpum</i>	Copper Pod	2	18
<i>Parkia speciosa</i>		1	1
<i>Spathodea campanulata</i>	Fire Bell	1	3
<i>Acacia auriculiformis</i>	Wattle	1	2
<i>Erythrina orientalis</i>	Variegated Coral	1	1
<i>Gliricidia sepium</i>	Quick Stick	0	1
<i>Phyllocarpus septemtrionalis</i>	Monkey Flower Tree	0	2
<i>Ficus glaberrima</i>	Fig	0	2
<i>Ficus elastica</i>	Indian Rubber Fig	0	3
<i>Lagerstroemia speciosa</i>	Queen's Flower	0	1
<i>Butea monosperma</i>	Flame of the Forest	0	2
<i>Cassia fistula</i>	Indian Laburnum	0	1
<i>Cassia bakeriana</i>	Pink Shower	0	3
<i>Pterocarpus indicus</i>	Angsana	0	1
<i>Albizia lebbek</i>	Indian Walnut	0	1
Total		34	192

Table 2. Characteristics of Coppersmith Barbet roosting holes studied in 1988 and 1989 at Chulalongkorn University campus. nm = not measured.

Nest No.	Tree species	Roosting hole entrance		Roosting chamber		Height above ground (m)
		Horizontal (cm)	Vertical (cm)	Width (cm)	Depth (cm)	
1	<i>Samanea</i> sp.	3.8	3.4	5.8	10.0	8.0
2	<i>Samanea</i> sp.	3.8	3.4	5.6	14.0	6.0
3	<i>Samanea</i> sp.	3.5	3.8	5.2	13.5	6.0
4	<i>Samanea</i> sp.	3.6	3.8	5.4	11.6	8.5
5	<i>Samanea</i> sp.	3.7	3.9	5.7	12.2	8.0
6	<i>Samanea</i> sp.	3.2	3.7	nm	nm	nm
7	<i>Samanea</i> sp.	3.4	3.2	6.0	13.1	6.5
8	<i>Samanea</i> sp.	3.1	3.3	6.0	11.3	5.5
9	<i>Pterocarpus</i> sp.	3.2	3.3	5.9	8.2	5.0
Mean		3.478	3.533	5.700	11.738	6.688
S. D.		0.268	0.264	0.288	1.929	1.308

Table 3. Characteristics of Coppersmith Barbet nestling nests studied in 1988 and 1989 at Chulalongkorn University campus.

Nest No.	Tree species	Nest entrance hole		Nest chamber		Height above ground (m)	Circumference of branch (cm)	Wood Hardness (kg/cm ²)	Wood Moisture (%)
		Horizontal (cm)	Vertical (cm)	Width (cm)	Depth (cm)				
1	<i>Samanea</i> sp.	3.4	3.9	6.9	16.7	6.0	37.6	48.5	9.8
2	<i>Samanea</i> sp.	3.5	4.8	5.8	15.0	7.0	32.0	6.0	10.2
3	<i>Samanea</i> sp.	4.2	3.3	5.6	14.2	5.0	27.2	65.0	11.6
4	<i>Samanea</i> sp.	3.5	3.3	6.8	18.0	4.0	46.5	26.8	12.4
5	<i>Samanea</i> sp.	3.8	4.0	6.0	19.0	6.0	34.4	241.0	10.9
6	<i>Acacia</i> sp.	3.2	3.5	6.0	19.8	4.0	21.6	2.0	10.7
7	<i>Delonix</i> sp.	3.6	3.6	5.5	26.0	6.0	30.5	54.0	11.9
8	<i>Delonix</i> sp.	4.3	4.0	5.7	14.4	5.0	40.0	92.0	12.9
9	<i>Delonix</i> sp.	3.4	3.5	5.7	20.0	6.0	35.8	171.0	11.5
Mean		3.656	3.767	6.0	18.122	5.444	33.956	78.478	11.31
S. D.		0.374	0.474	0.51	3.711	1.014	7.287	79.537	1.01

DISCUSSION

The cavity nest of the Coppersmith Barbets is like that of other barbets in being excavated in soft dead wood and always on the underside of a sloping branch (SKUTCH, 1944; YAHYA, 1988; HERBERT, 1924). Their nests are distinguishable from those of woodpeckers which make nests and entrance holes in the trunks of both dead and live trees (JOHNSSON ET AL., 1993; KOWALCZYK, 1990). Cavity nesting species may select different habitats to avoid inter-specific competition (LI & MARTIN, 1991). In this study, the Coppersmith Barbet preferred *Samanea saman* tree due to the character of its branches and their suitable size for building the nest. When the branch was dead, they built the nests in sloping branches of suitable size (circumference 21.6–46.5 cm) rather than in the trunk. This might be for two reasons. First, the wood of the trunk is harder (greater thickness of secondary growth) than the branch, so it is more difficult to excavate. Second, the trunk of the tree is vertical, so the entrance hole is more easily soaked by rain.

The inside of the nest is a sock-like chamber, like other barbets (YAHYA, 1988) and woodpeckers (MCAULIFFE & HENDRICKS, 1988). This study found that the depth of the nestling chamber was significantly greater than in roosting holes, but the width was not significantly different. Since the nestling nest needs more space, the barbet has to excavate its chamber deeper than in the roosting hole.

The height of the nest above ground varied from 4–8 m, but depended on the height of the tree. Coppersmith Barbets prefer specific trees in which to build their nests, and if the branch is too high above the ground, it will be too small to contain the nest. Roosting holes were significantly higher than nestling nests. When several holes were found along a single branch, Coppersmith Barbets preferred to use the lowest as the nestling nest. This may minimise the probability of predation or wind damage. The old nests of the Coppersmith Barbet were used by the Plain-backed Sparrow (Fig. 4), Tree Sparrow, Collared Falconet, and may be useful for several secondary hole-nesting species. Nevertheless, it was found that the diameter of the entrance was important for determining which species could use the cavity (JOHNSSON ET AL., 1993).

This study of nest characteristics of Coppersmith Barbets is useful for nature conservation. Barbets, like many other birds, play a role in the maintenance of the balance of nature by destroying harmful insects and dispersing seeds of plants. Its old nests can also be utilised for breeding by secondary hole nest species such as mynas, lorikeets and Magpie Robins (YAHYA, 1987).

ACKNOWLEDGMENTS

The author thanks Dr. S.A. Hussain from the Bombay Natural History Society and Dr. H.S.A. Yahya from Aligah Muslim University for advice and providing some papers, Associate Professor Pring Sriarun from the Faculty of Forestry, Kasetsart University, for the measuring of the hardness and moisture of the woods, and Dr. Thawatchai Santisuk from the Royal Forest Department for identifying tree species. Finally, I wish to thank Dr. Pilai Poonswad from the Faculty of Science, Mahidol University, for useful comments on this paper, and Dr. Warren Brockeman for review of the manuscript.

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