

Notes on the nesting biology of Taita Apalis *Apalis fuscigularis*

Lawrence Wagura^a, Mwangi Githiru^a and Luca Borghesio^{a,b,#}

Notes sur la nidification de l'Apalis des Teitas *Apalis fuscigularis*. Les premières données sont présentées concernant la nidification de l'Apalis des Teitas *Apalis fuscigularis*, une espèce classée comme « Gravement menacée d'extinction » endémique des Taita Hills du sud du Kenya. Quatre nids ont été observés entre novembre 2010 et janvier 2011. Tous se trouvaient dans des petites trouées de la forêt naturelle et contenaient 2–3 œufs. Les nids étaient typiques du genre *Apalis* : une boule ovoïde, construite de mousse et de brindilles, avec une entrée latérale. La période de nidification, de la construction du nid à l'envol des jeunes, comprend environ 5–6 semaines. En général, la nidification de *A. fuscigularis* ressemble à celle de l'Apalis à collier *A. thoracica*.

Summary. We report the first detailed data concerning the nesting biology of Taita Apalis *Apalis fuscigularis*, a Critically Endangered species endemic to the Taita Hills of southern Kenya. Four nests were observed between November 2010 and January 2011. All were located in small gaps in natural forest and contained 2–3 eggs. The nests were typical of the genus *Apalis*, ovoid domed structures with a lateral entrance, and constructed of mosses and grass stems. The nesting period, from nest building to fledging of young, lasted c.5–6 weeks. In general, the nesting biology of *A. fuscigularis* resembles that of the closely related Bar-throated Apalis *A. thoracica*.

Taita Apalis *Apalis fuscigularis* is a small-sized (11–12 cm), arboreal warbler that has traditionally been treated as a subspecies of the widespread and geographically variable Bar-throated Apalis *A. thoracica*, which ranges from South Africa to Kenya (Erard *et al.* 1997). However, in view of their marked morphological and vocal variation, some montane populations previously ascribed to *A. thoracica* are often considered separate species (Collar *et al.* 1994). Recent texts (e.g., Ryan *et al.* 2006) split *A. thoracica* into four separate species, namely the broad-ranging *A. thoracica* and three restricted-range taxa: Namuli Apalis *A. lynesii*, endemic to Mount Namuli, Mozambique, Yellow-throated Apalis *A. flavigularis*, of south-east Malawi, and *A. fuscigularis*, endemic to the Taita Hills of southern Kenya.

Taita Apalis is restricted to montane forest at 1,500–2,200 m (authors' unpubl. data). It inhabits forest understorey, favouring gaps and edges with dense undergrowth, where it gleans insects from vegetation mainly 0–2 m above ground (BirdLife International 2011). A survey undertaken in 2001 revealed that the species had at that time a range of >500 ha and that its global population was as small as 310–654 individuals (Borghesio *et al.* 2010). However, recent monitoring suggests a marked decrease (BirdLife International 2011). For these reasons,

A. fuscigularis is currently considered Critically Endangered (BirdLife International 2011).

Data on the breeding biology of threatened species are very important for conservation, as breeding success is a key component of population dynamics and viability. Unfortunately, almost nothing is known of the nesting biology of *A. fuscigularis*, apart from clutch size, which is reported to be 2–4 eggs (Ryan *et al.* 2006). Here, we provide the first detailed description of the species' nest and nesting biology, and compare it with information available for other taxa in the *A. thoracica* species-group.

Study area

The Taita Hills (03°25'S 38°20'E) form an isolated massif c.20 × 20 km in size, rising to more than 2,200 m above the surrounding dry plains at 900 m. Deforestation has been severe, and indigenous forest is now restricted to the highest peaks and steepest slopes, surrounded by a matrix of human settlements. The total extent of closed-canopy natural forest on the hills is c.400–600 ha, subdivided into 12 fragments that are 1–220 ha in size (Rogo & Ouge 2000, Pellikka *et al.* 2009). The flora of the fragments is influenced by human disturbance (Aerts *et al.* 2010). Logging was intense prior to the 1970s, and most of the commercially valuable timber species (e.g. *Ocotea usambarensis*, *Podocarpus* spp.) have been

removed, resulting in sometimes discontinuous canopy cover and increased dominance of early successional trees (Wilder *et al.* 2000, Chege & Bytebier 2005).

Taita Apalis is known from only five forest fragments: Ngangao, Vuria, Chawia, Yale and Mbololo (BirdLife International 2011), of which Ngangao hosts approximately two-thirds of the species' global population (Borghesio *et al.* 2010). Ngangao is the second-largest fragment in the Taita Hills (altitude 1,750–2,000 m) with a size of 206 ha, of which 120 ha are natural forest and the rest exotic plantations and rocky outcrops (Pellikka *et al.* 2009). The eastern side of the forest is steep and forested with indigenous trees, while the western side is more open, with rocky outcrops and patches of exotic trees (*Pinus patula*, *Acacia mearnsii*).

Methods

Nests of *Apalis fuscicularis* were found by chance in Ngangao Forest during the execution of bird

monitoring activities. At each nest, the coordinates were recorded using a GPS and observations were made at irregular intervals (of 1–11 days) due to time constraints imposed by other ongoing research activities.

Results

Nesting dates and locations

Four nests were found, one in November 2010, one in December 2010 and two in January 2011. The nests were located within natural forest (Fig. 1), at 1,750–1,840 m. All were sited in small forest gaps c.8–15 m in diameter, at a distance of 40–150 m from the forest edge. The gaps had dense shrubby vegetation and abundant lianas. The nests were placed at a mean height of 1.5 m (range 0.8–1.8 m) on tree saplings (Fig. 2). The plants on which the nests were placed were *Dichapetalum eickii* (Dichapetalaceae) (twice), *Cola greenwayi* (Sterculiaceae) and *Acokanthera oppositifolia* (Apocynaceae).

Nest construction

Both pair members were responsible for nest construction. They were domed, irregular oval

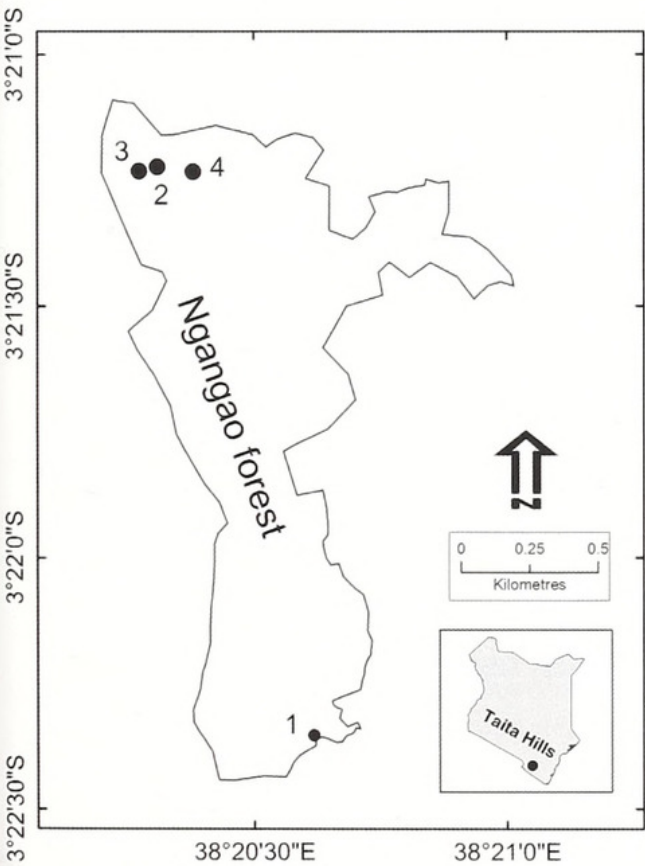


Figure 1. Location of the Taita Apalis *Apalis fuscicularis* nests in Ngangao forest fragment, Kenya.
Localisation des nids de l'Apalis des Teitas *Apalis fuscicularis* dans la forêt de Ngangao, Kenya.



Figure 2. Nest of Taita Apalis *Apalis fuscicularis* in a small canopy gap, c.1.5 m above ground, Ngangao forest, Kenya, 10 December 2010; the support plant is a sapling of the liana *Dichapetalum eickii* (Lawrence Wagura)
Nid de l'Apalis des Teitas *Apalis fuscicularis* sous une petite ouverture de la canopée, à environ 1,5 m de hauteur, forêt de Ngangao, Kenya, 10 décembre 2010 ; la plante sur laquelle le nid est placé est une jeune liane de *Dichapetalum eickii* (Lawrence Wagura)

balls, broader at the base, with a circular lateral entrance located near the top. They were attached to the trunk or branches of the supporting



Figure 3. Nest and eggs of Taita Apalis *Apalis fuscigularis*, Ngangao forest, Kenya, 10 December 2010 (Lawrence Wagura)
Nid et œufs de l'Apalis des Teitas *Apalis fuscigularis*, forêt de Ngangao, Kenya, 10 décembre 2010 (Lawrence Wagura)

tree using mosses and grass stems. External measurements of three of the nests were 12–17 cm (height) × 6–15 cm (diameter) (the fourth nest was destroyed by a predator before measurements could be taken). The entrance was almost circular with a diameter of 4–8 cm. The outer part of the nest was constructed of loosely woven mosses and thin stems of grass (Fig. 3). The interior was lined with a layer of cotton-like material and scattered but well lined with thin grass stems. Feathers were apparently not used in the structure.

Eggs

Of three observed clutches two had two eggs and the third had three. The fourth nest was found after the young had hatched and contained three pulli, suggesting another clutch of three eggs. The eggs were subelliptical, pale blue and speckled dirty brown (Fig. 3). Of the seven eggs, only one did not hatch (Table 1).

Incubation and nestling stages

As the development of the nesting activities could not be followed at regular intervals, the duration of the different stages is probably slightly

Table 1. Sequence of events at four nests of Taita Apalis *Apalis fuscigularis*. Nest numbers (1–4) correspond to those in Fig. 1. Day 1 = the day the nest was found.
Tableau 1. Déroulement de la nidification pour les quatre nids de l'Apalis des Teitas *Apalis fuscigularis*. Les numéros des nids (1–4) correspondent à ceux de la Fig. 1. Day 1 = le jour que le nid à été trouvé.

Days	Nest 1 (day 1 = 19 Nov 2010)	Nest 2 (day 1 = 1 Dec 2010)	Nest 3 (day 1 = 11 Jan 2011)	Nest 4 (day 1 = 20 Jan 2011)
1	Nest 70% completed	Nest 10% completed	3 pulli	Nest 60% completed
3				Nest completed, empty
5			3 pulli	
6	Nest completed, empty	Nest completed, empty	2 pulli alive, 1 dead	3 eggs
8			2 pulli	
10		2 eggs		
11			Nest empty, fledged?	
15	2 eggs	2 eggs		3 eggs
19		2 eggs		
24	2 eggs	2 eggs		2 pulli + 1 egg
28		1 pullus + 1 egg		
29		2 pulli		
31	Nest predated			
35		Nest predated		2 pulli + 1 egg
37				Fledged



Figure 4. Adult Taita Apalis *Apalis fuscigularis* near its nest, Ngangao forest, Kenya, 19 December 2010 (Lawrence Wagura)

Apalis des Teitas *Apalis fuscigularis*, adulte près du nid, forêt de Ngangao, Kenya, 19 décembre 2010 (Lawrence Wagura)

over-estimated. Table 1 shows the sequence of events observed at the four nests. Based on our observations, nest building took five days at nest 2, which was found during the initial moments of the building phase. Incubation and nestling periods lasted 31 days in nest 4, assuming that incubation commenced on day 5, when three eggs were observed in the nest. The maximum length of time elapsed from the deposition of the first egg to hatching was 20 days (nest 2) to 21 days (nest 4).

During incubation, we observed the female in the nest on four occasions, while the male was very vocal nearby. Post-hatching, both adults were seen feeding the young at short intervals during the morning hours. Feeding reduced as the day progressed and completely ceased between c.13.00 hrs and 15.00 hrs. The principal food items were small Orthoptera and moths.

Two of the four nests were destroyed by unidentified predators before the young fledged, while at nest 3 we are unable to assess whether the two nestlings, which had reached an advanced development stage, fledged: the nest was found empty but without any damage or signs of predation (Table 1). Two young successfully

fledged at nest 4 and were observed with the adults for several days in the nest's vicinity.

Discussion

This is the first detailed description of the nest, eggs and nesting behaviour of *A. fuscigularis*. The period during which we observed the nests, November–February, encompasses the short rains and the subsequent short dry season in the Taita Hills. As we were unable to undertake field work in March–April (the long wet season), we are unaware if the nesting season of *A. fuscigularis* extends to that period, but our preliminary data suggest that the species' breeding season corresponds to that of most other insectivorous forest birds in the Taita Hills region, i.e. November–April (Brown & Britton 1980).

According to our observations, *A. fuscigularis* constructs its nests in forest gaps on low trees / saplings. This matches the habitat choice of *A. thoracica* in its East African range (Erard *et al.* 1997, Ryan *et al.* 2006). Since treefalls that create forest gaps are usually the result of physical disturbance (e.g., wind, landslides, fires or human activities), our findings suggest that *A. fuscigularis* is a disturbance-dependent species, as has also been suggested for *A. thoracica* (Erard *et al.* 1997) and *A. lynesii* (Ryan *et al.* 1999). This hypothesis requires confirmation based on a larger sample of nests in future studies.

Nest structure and dimensions, clutch size, egg colour patterns, and parental behaviour during the incubation and nestling stages correspond to what is known for *A. thoracica*, *A. lynesii* and *A. flavigularis* (Ryan *et al.* 2006). At one nest, we estimated a total of 31 days for the incubation and nestling stages combined, which falls exactly in the middle of the 27–35 days reported for *A. thoracica* (Erard *et al.* 1997).

Nesting success is low in the Cisticolidae (Ryan *et al.* 2006), and this would be crucial information for evaluating the conservation status of *A. fuscigularis*. We observed successful fledging in one, possibly two, out of four nests. Unfortunately, this sample is too small to permit any precise estimation of nesting success.

Acknowledgements

Our work was supported by BirdLife International, the RSPB / Birdfair Research Fund for Endangered Birds, Conservation des Espèces et Populations

Animales (CEPA, France), Zoologische Gesellschaft für Arten- und Populationsschutz (ZGAP, Germany), North of England Zoological Society and the Taita Hills Biodiversity Project of Ghent University led by Prof. L. Lens (Belgium). We thank Vincent Otieno, Adam Zuberi, Peter Kafusi and Lawrence Wanjai for their assistance in collecting data. Luc Lens and Warwick Tarboton provided useful comments on the manuscript. We also thank the Kenya Forest Service and the Taita community for their cooperation and support.

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^a Department of Zoology, National Museums of Kenya, PO Box 40658-00100, Nairobi, Kenya.

^b Department of Biological Sciences, University of Illinois at Chicago, 845 W Taylor Street, 60607 Chicago, IL, USA. E-mail: borghesio@gmail.com

Corresponding author

Received 1 June 2011; revision accepted 10 November 2011.



Wagura, Lawrence, Githiru, Mwangi, and Borghesio, Luca. 2012. "Notes on the nesting biology of Taita Apalis Apalis fuscicularis." *Bulletin of the African Bird Club* 19(1), 42–46. <https://doi.org/10.5962/p.309956>.

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