

First description of nest and eggs of the White-lined antbird (*Percnostola lophotes*), and breeding observations of poorly known birds inhabiting *Guadua* bamboo in southeastern Peru

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Abstract

Little is known about the breeding biology of many tropical bird species, despite the value of nest architecture and breeding behavior to science and conservation efforts. We present breeding information for nine species of birds inhabiting *Guadua* bamboo thickets in southeastern Peru, including the first description of the nest and eggs of the White-lined Antbird (*Percnostola lophotes*). We also provide partial descriptions for nests of Sulphur-bellied Tyrant-Manakin (*Neopelma sulphureiventer*) and Moustached Wren (*Thrythorus genibarbis*), both of which lack described nests and exhibit some degree of *Guadua* bamboo habitat specialization in southeastern Peru. We also describe the juvenal plumage of Bamboo Antshrike (*Cymbilaimus sanctamariae*), Long-crested Pygmy-Tyrant (*Lophotriccus eulophotes*), and White-cheeked Tody-Tyrant (*Poecilatriccus albifacies*). We further provide nesting details for White-browed Antbird (*Myrmoborus leucophrys*), Goeldi's Antbird (*Myrmeciza goeldii*), and Dusky-tailed Flatbill (*Ramphotricon fuscicauda*), for which one or few nests are known. We synthesize these new observations by discussing the taxonomic implications of nest architecture for these species.

Key words: Birds, habitat specialists, juvenal plumage, nesting records, *Neopelma sulphureiventer*, Peru, Thamnophilidae, Tyrannidae.

Resumen

La biología reproductiva de muchas especies de aves es poco conocida en los trópicos, a pesar del valor que la arquitectura de nidos y otra información de la biología reproductiva ofrecen a los biólogos. Presentamos la primera descripción del nido y huevos del Hormiguero Lineado Blanco (*Percnostola lophotes*), y observaciones de nidos en construcción del Tirano-Saltarín Ventriazufrado (*Neopelma sulphureiventer*) y el Cucarachero Bigotudo (*Thrythorus genibarbis*). Todas estas especies poseen algún grado de especialización al hábitat de bambú (*Guadua* spp.) en el sudeste Peruano y sus nidos no habían sido previamente descritos. También utilizamos observaciones realizadas en el hábitat de bambú para describir la apariencia en estado juvenil del Batará de Bambú (*Cymbilaimus sanctamariae*), el Tirano-Pigmeo Crestilarga (*Lophotriccus eulophotes*), y el Tirano-Tody Cachetiblanco (*Poecilatriccus albifacies*), para los cuales no se poseían buena información sobre su biología reproductiva. Presentamos más detalles de nidificación del Hormiguero Cejiblanco (*Myrmoborus leucophrys*), el Hormiguero de Goeldi (*Myrmeciza goeldii*), y el Picoplano Colioscura (*Ramphotricon fuscicauda*), de los cuales sólo unos pocos nidos son conocidos. Finalmente, discutimos las implicaciones taxonómicas de la arquitectura de los nidos.

Palabras Clave: Aves, especialistas del hábitat, *Guadua* bambú, *Neopelma sulphureiventer*, Perú, plumaje juvenil, registros reproductivos, Thamnophilidae, Tyrannidae.

Descriptions of nests, eggs, and young are lacking for many Neotropical bird species. For example, the nests of almost 30% of Ecuador's mainland avifauna remain undescribed (H. Greeney pers. comm.). As such natural history details are often used to test phylogenetic hypotheses (Whitney et al. 1996, Sheldon & Winkler 1999, Zyskowski & Prum 1999), filling these gaps is crucial to our understanding of avian diversification and ecology. Such data are essential to understanding how seasonal fluctuations in precipitation, food resources, or other environmental factors influence bird behavior and breeding seasonality (Stutchbury & Morton 2001, Wikelski et al. 2000, 2003). In particular, little is known about the breeding behavior of birds inhabiting *Guadua* bamboo (Kratter 1994, 1998), a habitat that supports a diverse assemblage of specialist insectivores in southeastern Peru (Kratter 1997, Lebbin 2007a), including recently described species (Fitzpatrick & Willard 1990, Lane et al. 2007). The main portion of the breeding season for forest birds is suggested to occur between mid-August and mid-November at Cocha Cashu in southeastern Peru (Terborgh et al. 1990), a time period that precedes and overlaps with the start of the rainy season (CICRA 2004). Here we present observations of breeding behavior of several poorly known birds inhabiting *Guadua* bamboo (*G. weberbaueri* and *G. sarcocarpa*) habitat in southeastern Peru.

Methods

Breeding information of bamboo specialists was recorded opportunistically during research on bird communities inhabiting *Guadua* bamboo patches at sites along the Manu (Cocha Cashu: 11°85'S, 71°32'W, Patterson et al. 2006, and Playa Bonita: 11°50'18.9" S, 071°23'06.7" W), Tahuamanu (Oceania: 11°23'S, 69°32'W), Madre de Dios and Los Amigos rivers (CICRA: 12°34'S, 70°05'W, and CM1: 12°34'S, 70°04'W, Pitman 2006) in southeastern Peru. These sites have similar avifaunas, and are all part of the Inambari center of endemism (Cracraft 1985) and South-east

Peruvian Lowlands endemic bird area (Stattersfield et al. 1998). Vegetation in this region is dominated by mature terra firme forests (Salo et al. 1986) characterized by high tree diversity and a canopy of 35-50 m (Terborgh & Petren 1991). Within this diverse forest matrix, our study focused on forest patches dominated by *Guadua* bamboo (Judziewicz et al. 1999).

Observations near the Madre de Dios and Los Amigos rivers were conducted during July 2002, June-August 2003, February-April 2004, June 2004, July-September 2004, and October-November 2004. Observations along the Manu River were conducted during June-July 2004 and along Tahuamanu River in October 2004. At Los Amigos, June through August tend to be drier months with August as the driest month, after which rains increase and often peak in January (CICRA 2004). We collected information on breeding behavior (e.g. copulations, brood patches, nest building, incubation, adults carrying fecal sacs or feeding young, and presence of individuals in juvenal plumage) and nest architecture (e.g. placement and measurements) of bamboo specialists.

Results

Species accounts

Bamboo Antshrike (*Cymbilaimus sanctamariae*). On 7 July 2004, inside a *Guadua* bamboo patch at Playa Bonita, Peru, we observed an independent male with plumage characteristics intermediate between an adult male and an adult female (Fig. 1). The individual had male plumage characteristics including a white throat, upper breast with fine black barring, and a black crest; however, its belly and vent were warm brown like a female. On the nape, plumage transitioned smoothly from masculine grays to feminine browns. No breeding information for this species was previously available (Zimmer & Isler 2003), and this individual was presumed to be molting into definitive plumage.

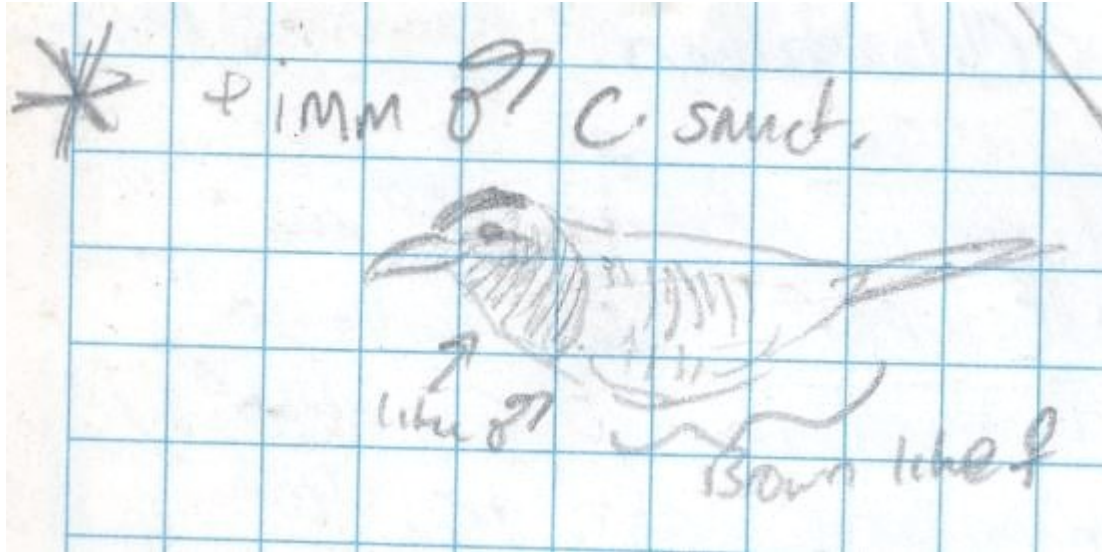


Fig. 1. Field sketch of immature male Bamboo Antshrike (illustration: DJL).

White-lined Antbird (*Pernostola lophotes*). We observed a White-lined Antbird nest briefly, at least once daily, during 4-7 September 2004 near CM1 at Los Amigos. Observation times were minimized to avoid disturbing the nest, and rarely lasted more than a few min. The entire nest was constructed entirely of bamboo leaves and thin branches. The nest was located on top of 13 cm of dead bamboo debris on the ground, underneath live *Guadua* bamboo and *Costus* stems within bamboo forest. The nest (Fig. 2) was a cup placed inside a larger domed structure, creating the appearance of a naturally formed clump of bamboo leaves, and generally resembled a larger version of local nests of White-browed Antbird (*Myrmoborus leucophrys*, Figs. 4-5). Externally, the nest measured 20 cm wide, 25 cm tall, and 15 cm front to back. The entrance was 7.1 cm wide and 7.5 cm tall, with an interior cup depth of 9.9 cm. The nest contained two eggs, measuring 26.0 x 16.8 mm and 26.1 x 17.1 mm. Eggs were off-white with burgundy splotches, mostly on the large end (Fig. 3). Both sexes incubated. We flushed the female off the nest on 4

September (time unrecorded). We found the male incubating on the mornings of 6 September (at sometime between 07:23-07:59 h), and 7 September (at sometime between 06:32-06:41 h and again at 08:38 h). Both the male (on 7 September) and female (on 4 September) flushed from the nest in an awkward manner, traveling away by clumsily tumbling over themselves near the ground, potentially serving as a distraction display targeted towards a perceived predator. Other antbirds are observed to perform similar distraction displays near nests (Willis & Oniki 1972, Londoño 2003, Bradley 2008). In addition to this nest, we observed a female feeding a fledgling within bamboo at Oceania on 13 October 2004. On 17 October 2004, we captured a female with a brood patch. This female was suspected to be the same one observed feeding a fledgling three days prior, as these two observations were recorded within 20 m of each other. These observations represent the first description of nest, eggs, and timing of breeding for this species as no breeding information was previously available (Zimmer & Isler 2003).



Fig. 2. White-lined Antbird nest with two eggs (Photo: DJL).



Fig. 3. Male White-lined Antbird incubating (left) a clutch of two eggs (right, on 0.5 cm grid paper; Photos: DJL).

White-browed Antbird (*Myrmoborus leucophrys*). We found a nest with two eggs on 28 July 2004 near CICRA (Fig. 4), after flushing an adult female from the nest. This nest was placed on the ground in a ravine dominated by *Guadua* bamboo. The nest was made of dry bamboo leaves. The outer structure of the domed nest was 18 cm tall, 21 cm wide, and 17 cm front to back. The side entrance was 5 cm wide and 6 cm tall. The internal egg cup was 8 cm deep. Both eggs were white with burgundy speckling. On 2 August, the nest contained two nestlings. From 4-7 September 2004, we observed a second nest at CM1 (Fig. 5) located adjacent to a trail where we were mist netting. We captured both the male and female attending this nest, within 2 m of the nest. It was similar in construction to the first nest, also placed on the ground within bamboo. It was made of bamboo leaves and thin bamboo branches. The round nest had an outside diameter of 13 cm. The entrance was 5.3 cm tall x 6.4 cm wide, and the cup was 6.1 cm deep. It contained two mostly-naked nestlings with open eyes. Their skin was generally black, but paler red on their

underparts. Their rictal flanges were pale yellow-white and their palates were yellow. Feather pins were beginning to emerge from the skin on their backs and wings (Fig. 5). Our findings are similar to previous nest descriptions of this species and other *Myrmoborus* (Londoño 2003, Zimmer & Isler 2003). Additionally, we observed a female preening a male on 3 November 2004 in bamboo near CICRA. This observation enlarges the list of antbird genera observed to allopreen. Allopreening has been observed in the antbird genera *Thamnophilus*, *Cercomacra*, *Hylophylax*, and *Gymnopithys*, with the female usually being the receiver, and this behavior appears to reinforce pair-bonds in response to territorial disputes with conspecifics (Zimmer & Isler 2003). Courtship feeding of the female by the male is a common behavioral prelude to pair formation and copulation for many antbird species (Zimmer & Isler 2003), and allopreening possibly serves a similar function.



Fig. 4. White-browed Antbird nest (with cm rule for scale) and two-egg clutch (on 0.5 cm grid paper) at CICRA, Los Amigos, in July 2004 (Photos: DJL).



Fig. 5. White-browed Antbird nest and nestlings (inset) near CM1, Los Amigos, in early September 2004 (Photos: DJL).

Goeldi's Antbird (*Myrmeciza goeldii*). We flushed an adult female off a nest containing one egg on 5 October 2004 near CICRA (Fig. 6). Afterwards, we quickly measured and photographed the nest to minimize disturbance and were unable to return later to collect more data. The nest was located on the ground in a dense successional riparian forest thicket, characterized by many lianas, *Heliconia*, and ground bromeliads, but no *Guadua* bamboo. The nest was made of leaves and twigs, with the nest cup hidden underneath a domed structure of leafy debris and accessible by a side entrance. Externally, the nest measured 20 cm wide, 13.5 cm tall, and 15 cm front to back. The internal egg cup

was 3.9 cm deep. The egg (Fig. 6) was pale pink with burgundy spots and measured 25.5 x 19.7 mm. This breeding information is more detailed than the brief description of an open cup nest belonging to this species (Zimmer & Isler 2003), but largely consistent with the details of two Sooty Antbird (*Myrmeciza fortis*) nests with domed architecture (Wilkinson & Smith 1997). We interpret the domed structure of our Goeldi's Antbird nest as an intentional feature of its construction and suspect this domed structure is one of the “details lacking” from previous nest descriptions of this species (Zimmer & Isler 2003).



Fig. 6. Nest and egg (on 0.5 cm grid paper, inset) of Goeldi's Antbird on 5 October 2004 near CICRA, Los Amigos (Photos: DJL). Note the large amount of twigs and leaves piled above the cup portion of the nest.

Sulphur-bellied Tyrant-Manakin (*Neopelma sulphureiventer*). We observed an individual (presumably female) actively constructing a nest (Fig. 7) on 16 October 2004, within a *Guadua* bamboo patch at Oceania. We were unable to follow this nest to completion. The partially completed nest was a thin, shallow cup of woven bamboo fibers, slung between two tertiary bamboo branches, 10-11 m up in bamboo. It resembled manakin nests in structure (Foster 1976,

Tostain 1988, Marini 1992, Sick 1993, Snow 2004, Doucet & Mennill 2005), though the use of spider-web in construction was not visible. Its placement also resembled that of a Dwarf Tyrant-Manakin (*Tyrannetes stolzmanni*) nest (Greeney et al. 2004), though the nest differed by its composition of bamboo materials. To the best of our knowledge, this is the first breeding information reported for any species of *Neopelma*.



Fig. 7. Sulphur-bellied Tyrant-Manakin nest under construction. Illustration based on photograph (inset) and field sketches (photo and illustration: DJL).

Long-crested Pygmy-Tyrant (*Lophotriccus eulophotes*). On 13 March 2004, we observed a group of three birds, including a begging juvenile, near the edge of disturbed terra firme forest near CICRA. On 19 June 2004, we captured and photographed a juvenile with pale

yellow rictal flanges and short crest feathers in *Guadua* bamboo near CICRA (Fig. 8). No breeding information for this species was previously available (Fitzpatrick et al. 2004).



Fig. 8. Juvenile (left) and adult (right) Long-crested Pygmy-Tyrant (Photos: DJL). Note short crest plumes and more prominent rictal flanges in juvenile.

White-cheeked Tody-Tyrant (*Poecilatriccus albifacies*). We observed a pair of adults foraging quietly in *Guadua* bamboo on 6 September 2004 near CM1, followed closely by two juveniles. The juveniles were

also foraging themselves using short sally-glean maneuvers. Compared to an adult female, the juveniles appeared greener above, and had slightly shorter bills and tails. The juveniles' mandibles were mostly a dark

blackish color, paler only at the base, contrasting with the entirely pale orange lower mandible of adults. A family group of five was also observed at Pantiacolla Lodge, southeastern Peru, in early September 2003 (Roger Ahlman pers. comm.). No breeding information for this species was previously available (Fitzpatrick et al. 2004).

Dusky-tailed Flatbill (*Ramphotrigon fuscicauda*). Between 19-25 July 2004, we observed an adult incubating three eggs in a nest adjacent to a heavily-used trail near the boundary between a *Guadua* bamboo patch and terra firme forest at CICRA (Fig. 9). We banded the incubating bird on 25 June 2003. The nest was eventually abandoned, after which we measured the

cavity and eggs. The nest was located in a natural cavity in a rotten tree limb, 26 cm in diameter and inclined at a 40° angle. The entrance measured 8 cm wide, 11 cm tall, and was 41 cm off the ground. The cavity depth was ~31 cm. The nest was lined with fine plant fiber, gray down, leaves, mammal (likely peccary) hair, and translucent snakeskin. Parker (1984) reports similar nest placement and construction among *Ramphotrigon* species, with nests including mammal hair (but not snake skin). The eggs were tan, with burgundy stripe-splotches. The three eggs measured 20.4 x 14.8 mm, 19.4 x 14.8 mm, and 20.2 x 15.1 mm. Parker (1984) reports a clutch size of two for this species and a clutch size of three for the Rufous-tailed Flatbill (*R. ruficauda*).



Fig. 9. Dusky-tailed Flatbill on nest within cavity on 24 July 2004 near CICRA, Los Amigos (Photo: DJL).

Moustached Wren (*Thryothorus genibarbis*). We captured a female with an egg in the oviduct on 19 August 2004, in *Guadua* bamboo near CICRA. We captured an adult with a brood patch on 26 October

2004, in *Gynerium* cane near CICRA. We observed nest building on 4 November 2004 at CICRA. The nest (Fig. 10) appeared complete or nearly so, but we were unable to follow its fate, nor determine if it was used for breeding,

or alternatively, as a dormitory. The nest was a woven oblong ball-dome constructed of various dry grasses and twigs between 2-5 mm in diameter, had a tubular entrance, and was placed in a bunch of grass at the edge of successional terra firme forest adjacent to the CICRA soccer field. The entrance hole measured 5 cm wide and

6 cm tall, and was 45 cm off ground. The nest measured 17 cm wide at the top and 30 cm wide at the bottom, 13 cm back to front, and 17 cm tall. These are the first nesting observations of this species, and the nest structure is typical for the genus *Thryothorus* (Kroodasma & Brewer 2005).



Fig. 10. Moustached Wren nest on 4 November 2004 at CICRA, Los Amigos (Photo: DJL).

Discussion

We present the first description of the nest and eggs of the White-lined Antbird. We observed nest building in the Sulphur-bellied Tyrant-Manakin and Moustached Wren, both of which lack described nests. We also described juvenal or immature appearance for Bamboo Antshrike, Long-crested Pygmy-Tyrant, and White-cheeked Tody-Tyrant, all of which lack such information. Further, and more detailed, observations of breeding behavior of all these species are desirable.

The domed nest architecture observed in this study for the White-lined Antbird, White-browed Antbird, and Goeldi's Antbird is unusual in the *Thamnophilidae* (Zimmer & Isler 2003). Domed or otherwise chambered nest architecture is shared with the Black-headed Antbird (*Pernostola rufifrons*), Sooty Antbird, White-shouldered Antbird (*Myrmeciza melanoceps*), other *Myrmoborus* species, Bare-crowned Antbird (*Gymnocichla nudiceps*), Slender-billed Antbird (*Rhopornis ardesiacus*), and *Pyriglena* Fire-eyes (Wilkinson & Smith 1997, Zimmer & Isler 2003, Londoño 2003, Greeney et al. 2004, Bradley 2008).

Nest architecture may be useful for predicting evolutionary relationships in birds (Whitney et al. 1996, Zyskowski & Prum 1999, Sheldon & Winkler 1999, Barber & Rice 2007). A recently published molecular phylogeny of antbirds (Brumfield *et al.* 2007) places the White-lined Antbird sister to *Myrmoborus*, within a larger clade including the Black-headed Antbird, *Pyriglena* Fire-eyes, Bare-crowned Antbird, and several large *Myrmeciza* species (*fortis*, *immaculata*, *goeldii*, and *melanoceps*), but the Slender-billed Antbird was not included in this study. This clade excluded *Schistocichla*, which was once considered part of *Percnostola* (Isler *et al.* 2007), and also excluded many other *Myrmeciza* species (e.g. Plumbeous Antbird, *M. hyperythra*, Brumfield *et al.* 2007). Domed nest architecture may be a synapomorphy shared by this clade proposed by Brumfield *et al.* (2007). If this hypothesis is true, we predict that other species nested within this clade and currently lacking described nests will be found to have similar nest architectures. Our observation combined with recent phylogenetic analysis (Brumfield *et al.* 2007) suggests that Goeldi's Antbird belongs to a clade of dome-nesting antbirds. Furthermore, our observations of a White-lined Antbird nest support this species placement within a clade of dome-nesters, as in Brumfield *et al.* (2007), thereby clarifying the taxonomic affinities of this species. A more complete taxon sampling, for both nest descriptions and molecular data, is needed to confirm this phylogenetic hypothesis.

The nest architecture of the Sulphur-bellied Tyrant-Manakin described here is similar to that of other manakins and *Tyrannetes*. The inclusion of *Neopelma* and *Tyrannetes* within Pipridae, rather than Tyrannidae, is currently favored (Snow 2004), and supported by molecular phylogenies (Chesser 2004, Barber & Rice 2007, Rheindt *et al.* 2008). Our observations of *Neopelma* nest architecture, combined with published

observations of a *Tyrannetes* nest (Greeney *et al.* 2004), are consistent with this classification.

Many of our breeding observations of birds inhabiting bamboo occurred within the August-November period suggested by Terborgh *et al.* (1990) as the main breeding season in southeastern Peru. The active White-browed Antbird nest on 28 July, the begging Long-crested Pygmy-Tyrant on 13 March, the active Dusky-tailed Flatbill nest in late July, and breeding observations of other birds species outside bamboo (unpublished data, see also Lebbin 2007b, Raine 2007) indicate that breeding activity occurs among some species during almost all other months of the year in southeastern Peru and important patterns may be missed by the August-November generalization. A more thorough analysis of breeding phenology and factors that influence timing of breeding of birds in southeastern Peru, as done for parrots by Brightsmith (2005), is a worthy topic of study, but beyond the scope of this paper.

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