SHORT COMMUNICATIONS

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REPRODUCTIVE BIOLOGY OF THE YUNGAS MANAKIN (*CHIROXIPHIA BOLIVIANA*) IN MANU NATIONAL PARK, PERU

Jenny Hazlehurst[1] & Gustavo A. Londoño[2,3]

[1] Department of Ecology and Evolutionary Biology, Tulane University, 400 Lindy Boggs Ctr., New Orleans, LA 70118, USA. *E-mail:* jhazlehu@tulane.edu

[2]Florida Museum of Natural History, Dickinson Hall, University of Florida, Gainesville, FL 32611, USA.

[3]Department of Biology, 227 Bartram Hall, University of Florida, P. O. Box 118525, Gainesville, FL 32611, USA.

Biología de reproducción del Yungas Manakin (*Chiroxiphia boliviana*) en el Parque Nacional Manu, Perú.

Key words: *Chiroxiphia boliviana*, Yungas Manakin, Manu National Park, Peru, Pipridae, reproductive biology.

INTRODUCTION

The genus *Chiroxiphia* is composed of five manakin (Family: Pipridae) species that range from Mexico to the Atlantic Forest of southern Brazil). They inhabit a diverse range of habitats, ranging from humid old-growth forests to more open second-growth habitats (Kirwan & Greene 2012). The Yungas Manakin (*C. boliviana*) was split off from the Blue-backed Manakin (*C. pareola*) in 1987 (Parker & Remsen 1987). It inhabits humid hill forests and frequents open areas between 600–2200 m a.s.l. on the eastern slope of the southern Andes from Cuzco in Peru southeast into Bolivia.

Despite their widespread occurrence within their ranges, nesting information is not available in detail for all *Chiroxiphia* spp. Breeding, nest, egg, and nestling descriptions are available for *C. linearis* (Foster 1976), *C. lanceolata* (DuVal 2007), *C. caudata* (Marini *et al.* 2007) and *C. pareola* (Olney 1973). Incubation times are available for *C. lanceolata* (DuVal 2007) and *C. pareola* (Olney 1973). Detailed incubation behavior is available only for *C. linearis* (Foster 1976). Our study provides the first information on nesting for *C. boliviana* and completes the basic nesting information for the genus.

METHODS

Study area. The study was conducted in the foothills adjacent to the Tono River (12°57'58"S, 71°34'5"W) in Manu National

Park, Peru. The Tono River site covers an elevational range of 110–750 m a.s.l. with a mean temperature of 24.2°C (min–max = 19.3°C–30.7°C). The habitat type in the area is premontane forest with a canopy height of 40 m.

Nest, eggs, and incubation patterns. Eggs were weighed to the nearest 0.05 g with a digital scale and measured to the nearest 0.1 mm with calipers on the day the nest was found. The one surviving nestling was measured daily for tarsus length, wing length, and body mass. On the day we found the nest we placed one thermal sensor in the nest under the egg and attached one to the exterior side of the nest wall to obtain incubation data. Sensors were connected to an U12 4-channel Hobo data logger and temperature was recorded at 1-min intervals. Incubation patterns were derived from temperature changes within the nest detected by the sensors (see Cooper & Mills 2005). We placed video cameras near the nest to identify the unbanded *C. boliviana* incubating. We distinguished the female *C. boliviana* from other manakin species based on its stocky shape and red leg color.

RESULTS

One nest was found on 25 November 2009 with two eggs, but one was cracked. The cracked egg was measured and then removed. The nest was found in an open area of 1.5 m high shrubs on the banks of the Tono River (12°57'16"S, 71°33'36"W). The single viable egg hatched on 29 November. On 6 December, the nest was empty and covered in ants but the nest itself appeared undisturbed.

Description of nest and eggs. The nest was a small open cup 0.9 m above the ground in the two-way fork of an understory shrub 1.5 m in height and was woven between the stems and the leaves (Fig. 1a). The outer layer of the cup was made of dried bamboo leaves and small stems. The inner cup was made of fine dried grass fibers interspersed with beige rootlets. Bamboo leaves, dried grasses and spider-webs were used to attach the nest to the shrub. The inner depth of the cup was 22.5 mm, and the outer depth was 28.0 mm excluding the hanging fibers. The exterior dimensions of the cup were 50.0 x 58.7 mm, while the interior dimensions were 46.1 x 35.3 mm. The thickness of the cup wall was 6.4 mm. The dimensions of the eggs were 19.0 x 13.0 mm and 20.0 x 13.5 mm, and they weighed 1.55 g and 1.65 g. The eggs were short, creamy white ovoids with red-brown streaks and splotches, increasing in density in a wreath-like fashion towards the larger end of the egg (Fig. 1b).

Incubation behavior. Temperature sensors recorded 16 h (15:30 h on 25 November until 07:41 h on 26 November) of incubation and then malfunctioned. The first foraging trip occurred at 05:21 h. and female returned to the nest at 17:44 h for night incubation. The female made on average 2.43 ± 0.64 trips per hour (mean ± SE). The average foraging trip duration was 11.87 ± 1.60 min (range = 4.84–24.84 min) and the duration of each incubation bout was 41.30 ± 5.90 min.

Description of nestlings. On day one the nestling weighed 1.45 g, its tarsus measured 7.0 mm, and its wing 6.0 mm (Fig. 1c). The eyes were closed for all 6 days of observation. The chick had fine grey-white natal down on the crown and along the spine and white down on the belly and thighs. The bill was pale yellow and the gape was golden-yellow, with the lower mandible black-tipped. The skin was reddish-brown to pinkish. Pin feathers began to emerge on the wings, chest and along the spine and flanks on 3 December (day 4). By day 5, dark-grey feathers began to emerge (Fig. 1d). The nestling gained weight at a rate of 0.48 g ± 0.22 per day (n = 6 days). The tarsus grew at a rate of 1.25 mm ± 0.75 per day

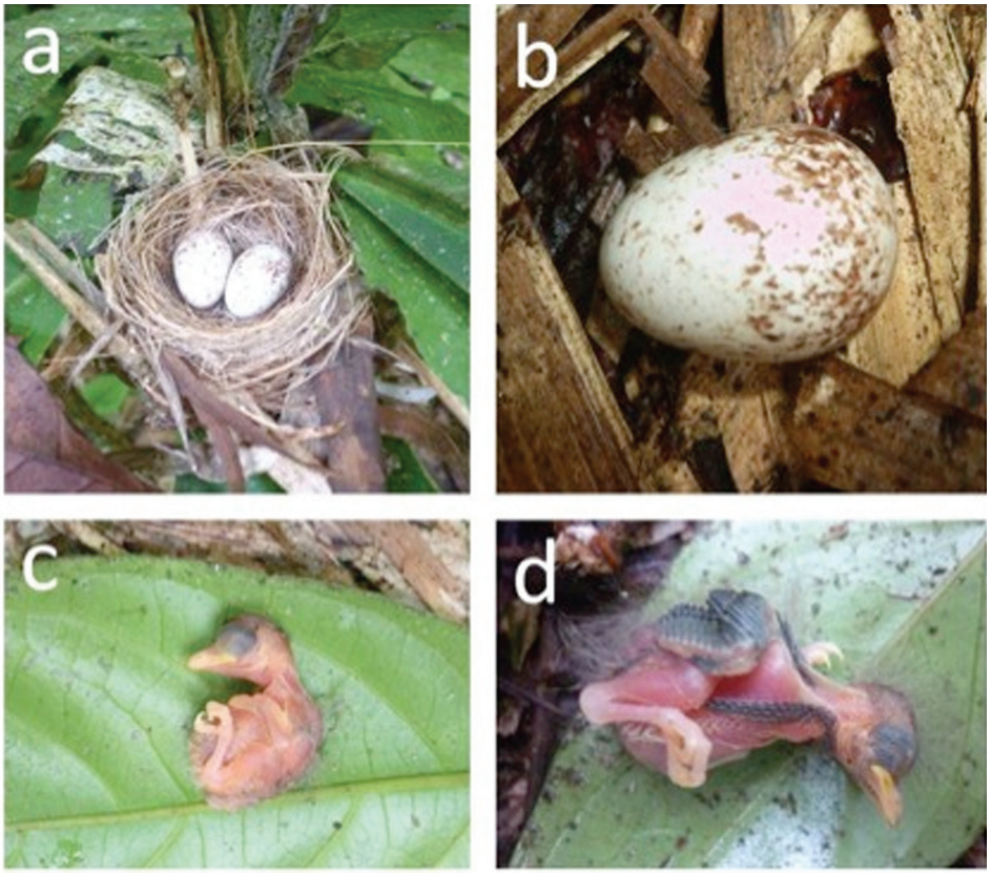

FIG. 1. (a) Nest and eggs of *Chiroxiphia boliviana;* (b) Detail of an egg of *C. boliviana;* (c) Nestling of *C. boliviana* immediately after hatching; (d) Nestling of *C. boliviana* four days after hatching. Pictures:

(n = 6 days), and the wing grew at a rate of 1.33 mm ± 0.33 per day (n = 6 days).

DISCUSSION

The nest construction of *C. boliviana* is similar to that in the rest of its genus (Kirwan & Green 2012). The materials used in the nest are typical of *Chiroxiphia* spp., with dead leaves in the outer cup of the nest and hanging below it. The use of bamboo leaves as the primary nest material is unique to this nest, but our sample size is too small to account for intraspecific variation in nest construction.

The background color of the eggs of *Chiroxiphia* spp. varies intraspecifically, ranging from white to yellowish to brownish-white and the color and the markings from light red-brown to black flecks, splotches, and lines (Kirwan & Green 2012). The eggs of *C. boliviana* fit into this range, but were smaller and weighed less than those of other *Chiroxiphia* spp. (Table 1). In *C. pareola* (in captivity) and *C. lanceolata*, the incubation period is 17 and 18 days, and nestlings fledge after 14 and 16 days, respectively (Olney 1973, DuVal 2007). This study probably captured roughly the first third (6 days) of the nestling period of

TABLE 1. Egg measurements and clutch sizes for the genus *Chiroxiphia* (adapted from Foster 1976; *measurements from this study).

Species	Egg characters	Sample size	Range	Mean
C. linearis (Oaxaca, Mexico)	Length (mm)	18	21.1–22.8	22.1
	Greatest width (mm)	17	15.6–16.8	16.1
	Mass (g)	-	-	-
	Clutch size	9	2	2
C. lanceolata (Central America)	Length (mm)	7	21.0–22.0	21.67
	Greatest width (mm)	7	14.7–16.0	15.31
	Mass (g)	-	-	-
	Clutch size	5	1–2	1.8
C. pareola (Brazil, captivity)	Length (mm)	7	21.5–25.0	-
	Greatest width (mm)	7	14.5–17.0	-
	Mass (g)	1	2.2	2.2
	Clutch Size	7	2	2
C. caudata (Brazil, Paraguay)	Length (mm)	-	21.6–26.0	-
	Greatest width (mm)	-	16.0–17.0	-
	Mass (g)	-	-	-
	Clutch size	-	2	2
C. boliviana (Peru)*	Length (mm)	2	19.0–20.0	19.5
	Greatest width (mm)	2	13.0–13.5	13.3
	Mass (g)	2	1.6–1.7	1.6
	Clutch size	1	2	2

C. boliviana. Incubation patterns similar were similar to those of *C. linearis*, with the first trip at 05:00 h and frequent trips in the early morning and late afternoon (Foster 1976).

Nestlings are only well described in the wild for *C. linearis* (Foster 1976) and *C. lanceolata* (DuVal 2007), and in captivity for *C. pareola* (Olney 1973). The nestling of *C. boliviana* described here is very similar to the description of *C. linearis* nestlings given by Foster (1976) in terms of coloration, the spatial arrangement and development of natal down and feathers, and skin color.

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