

**INCUBATION BEHAVIOR OF THE YELLOW-BILLED CACIQUE
(*AMBLYCERCUS HOLOSERICEUS AUSTRALIS*) IN NORTHEASTERN ECUADOR**

**Comportamiento de incubación del Cacique Piquiamarillo (*Amblycercus holosericeus australis*)
en el noreste de Ecuador**

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ABSTRACT

The Yellow-billed Cacique (*Amblycercus holosericeus*) belongs to a monotypic icterid genus distributed through most of Central and South America. It builds an open-cup nest, which distinguishes it from the nesting of other caciques. Little has been published on its breeding biology outside of Costa Rica. We provide the first observations on its nesting and incubation behavior from a nest studied in northeastern Ecuador. The nest was an open cup of vine tendrils and *Chusquea* bamboo leaves, built 2.6 m above the ground in a dense stand of bamboo. The two eggs were incubated for 64.1% of the observation period, made during the final nine days of incubation. Mean duration of on bouts was 40.7 min and mean off bout duration was 24.4 min. The incubating adult frequently slept on the nest by tucking its head under its wing, and often used the typical icterid foraging maneuver of slightly opening its bill to probe into the nest. The nest and eggs described here from Ecuador are very similar to descriptions from other parts of the species's range. This record suggests that the Yellow-billed Cacique nests during the drier season, like other bamboo specialists breeding in our study area.

Key words: *Amblycercus holosericeus*, Andes, eggs, mate feeding, nest, water loss.

RESUMEN

El Cacique Piquiamarillo (*Amblycercus holosericeus*) pertenece a un género monotípico de Icteridae, y está distribuido por la mayor parte de Centro y Sur América. Se sabe que la especie construye un nido en forma de taza, lo que la diferencia de otras especies de caciques, pero hay poca información publicada sobre su biología reproductiva en lugares fuera de Costa Rica. Aquí presentamos las primeras observaciones sobre la anidación y el comportamiento durante la incubación de la especie con base en información obtenida en un nido encontrado en el noreste de Ecuador. El nido era una taza construida con raicillas y hojas de bambú (*Chusquea* sp.), y estaba ubicado a 2.6 m de altura en un área cubierta por bambú denso. Los dos huevos fueron incubados durante el 64.1% del día a lo largo de los últimos nueve días de incubación. El promedio de la duración de periodos de atención fue de 40.7 min y el de periodos de ausencia de 24.4 min. El adulto frecuentemente durmió mientras estaba sentado en el nido, metiendo su cabeza debajo de su ala. Además, frecuentemente metió su pico entre los materiales del nido, abriéndolo un poco, siguiendo un movimiento que típicamente realizan los ictéridos al forrajear. El nido y los huevos descritos aquí son muy parecidos a los de esta especie en otras partes de su distribución. Este registro de anidación sugiere que el Cacique Piquiamarillo anida durante la temporada seca, al igual que otras especies especialistas de bambú que se reproducen en nuestra área de estudio.

Palabras clave: alimentación de la pareja, *Amblycercus holosericeus*, Andes, huevos, nido, pérdida de agua.

The Yellow-billed Cacique (*Amblycercus holosericeus*) belongs to a monotypic genus of blackbirds (Icteridae), and ranges from Mexico to Bolivia. Three subspecies of Yellow-billed Cacique are currently recognized: *flavirostris*, *australis*, and *holosericeus* (Jaramillo & Burke 1999). In Ecuador, the Yellow-billed Cacique (subspecies *flavirostris*) occurs in the lowlands of western Ecuador from northern Esmeraldas south through Guayas, El Oro and Loja, ranging up into the mountains of southern Loja in the Alamor/Cebollal area and at Sozoranga. In addition, *A. h. australis* is an uncommon inhabitant of the undergrowth of montane forests and forest borders in the upper subtropical and temperate zones on the east slope of the Ecuadorian Andes from Napo province southward, spreading west above the inter-Andean valleys in Azuay (Ridgley & Greenfield 2001).

The sole habitat of highland populations of Yellow-billed Cacique in Ecuador and elsewhere (subspecies *australis*) appears to be stands of *Chusquea* bamboo (Hilty & Brown 1986, Kratter 1993, Ridgley & Greenfield 2001). This nearly impenetrable habitat adds to the challenge of locating nests and observing behavior. What scant data we have on the nesting habits of Yellow-billed Cacique derive from studies by Skutch (1954) on *A. h. holosericeus* in Costa Rica, with only a few scattered records of breeding over the entire range of the species (e.g., Hilty & Brown 1986).

We studied a nest of Yellow-billed Cacique in early December 2006 at Yanayacu Biological Station & Center for Creative Studies (00°35' S, 77°53' W). Yanayacu lies 5 km west of the small town of Cosanga, Napo Province, Ecuador at an elevation of 2100 m. Yanayacu is adjacent to the private reserve of the birding lodge Cabañas San Isidro. In this area, much of the forest along major travel routes has been disturbed or cleared, but large, natural stands of *Chusquea* bamboo and tracts of primary forest remain, including the protected areas around Sumaco and Antisana volcanoes.

CHRONOLOGY.- On 8 December, we found a Yellow-billed Cacique nest containing two eggs at an elevation of c. 2150 m. We began our observations on 9 December at approximately 06:00 h (EST) and continued through 18:00 h on 17 December. On 18

December we ceased observations after both eggs hatched, the first at 06:40 h and the second at 13:00 h. We used a Hi-8 video camera to record behaviors at the nest, placing the tripod and camera approximately 8 m from the nest and recording for most of daylight hours (06:00-18:00 h). Thus, up until the day before hatching, we filmed a total of 93.2 h to document incubation behaviors. The incubating adult occasionally flushed from the nest during visits to change tapes early in the observation period, but within one or two days the adult did not flush and we noted little apparent disturbance due to the camera or tripod. We were unable to monitor the nest after hatching, so our observations are limited to the incubation stage.

NEST AND EGGS.- The nest was located in a large stand of *Chusquea* bamboo, 2.6 m above the ground, 1.5 m from a small trail cut through the bamboo, and 40 m from the edge of the stand. This bamboo habitat surrounding the nest covered an area of ca. 1.5 ha, bordered by pasture below and to the sides, with mature forest above. The nest was an open cup, slightly more oval than circular, with inner and outer diameters (measured at perpendicular angles) of 8 x 9 cm and 12 x 13 cm, respectively. Inner cup depth was 6.5 cm and its outer height was 9.5 cm. The outer portion of the nest was woven around three bamboo shoots (6, 8, and 8 mm diam.) as well as >30 small leaf stems (1 mm diameter) sprouting from the main stem (Fig. 1). It was attached to these substrates by a sparse outer layer of long, thin vine tendrils and dead herbaceous materials. Within this thin outer structural/attachment layer was a thick (2-3 cm) cup composed entirely of dead *Chusquea* leaves. Inside this, the egg cup was sparsely lined with pale fibers. Both eggs were pale blue, with minimal black spotting and squiggles concentrated at the larger end. They measured 27.1 x 19.3 and 27.0 x 19.3 mm. We weighed eggs to the nearest .001 g on 8 and 14 December, and calculated the loss of mass (i.e. water loss; Ar & Rahn 1980) in that interval. Ten days prior to hatching, the eggs weighed 5.125 and 4.980 g, and they lost 1.4 and 1.6% of their mass per day, respectively.

INCUBATION RHYTHMS.- The eggs were incubated for 59.7 h of the observation period (64.1%; Fig. 2). Bouts of attendance ranged from 5.8 to 102.2 min



Figure 1. Nest and eggs of the Yellow-billed Cacique (*Amblycercus holosericeus*) found in December 2006 at the Yanayacu Biological Station, northeastern Ecuador. Photo by H. F. Greeney.

(mean \pm SD = 40.7 \pm 24.5 min). The duration of absences from the nest ranged from 0.3 to 65.1 min (mean \pm SD = 24.4 \pm 15.1 min). On three occasions, the adult was absent for less than 1 min and, as presumably only one adult is attending the eggs (Skutch 1954), we feel these short absences may represent instances of the attending adult foraging on insects spotted from the nest, something we have observed in other incubating passerines in the area (e.g., Greeney 2006).

BEHAVIORS AT THE NEST.- Other than basic incubation rhythms (Fig. 2), we quantified eight separate aspects of adult behavior at the nest: sleeping on the nest during the daylight hours, the amount of time both adults were present at the nest, probing (two forms, see below), preening, arranging material in the nest, indiscernible behaviors and movement during which the adult was not vigilant, and vocalizing.

While sitting on the eggs, the adult frequently rested its bill on the rim for up to five minutes, pausing from their typical vigilant, quick head movements. Occasionally, it closed its eyes for brief periods, appearing to doze. The adult usually stood briefly before flying from the nest, typically hopping to the rim, then departing. The adult's entrance into the nest cup was similarly swift, though it often took 3-10 s to settle onto the eggs. In addition, the adult also spent a large percentage of its time actually sleeping on the nest, an activity we have rarely seen in other open-cup nesting birds (Greeney pers. obs.). We recorded the bird as sleeping when it tucked its bill and head backwards under its wing and back feathers, completely obscuring our view of the bill and eyes. In total, the incubating adult slept during 7.4% of its time at the nest.

We never observed both adults at the nest simultaneously until eight days prior to hatching. From then on, a second cacique, presumably the male, was seen daily. On no day, however, was total si-

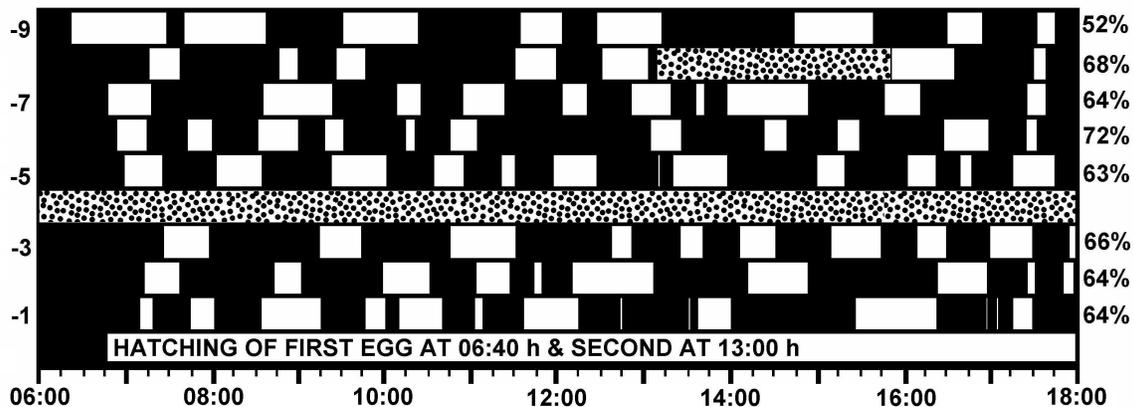


Figure 2. Incubation rhythms of the Yellow-billed Cacique (*Amblycercus holosericeus*) from 9-17 December 2006 at the Yanayacu Biological Station, northeastern Ecuador. Black areas represent time on the nest, white areas represent time away from the nest. Stippled areas are periods that were not filmed. Total percent daily coverage is shown on the right. The day of incubation, in relation to hatching is shown on the left. Both eggs hatched on 18 December.

multaneous presence of adults longer than 25 s. The second adult would arrive, feed the incubating bird, and leave almost immediately. Over the entire period of observation, we observed 11 mate feedings. This occurred most frequently (five times) the day before hatching, perhaps indicating the male's anticipation of hatching. Adults spent only 0.04% of the observation period at the nest together.

In addition to sleeping, 4.2% of the incubating adult's time at the nest was spent engaged in non-vigilant behaviors. A behavior which we termed gape-probing accounted for a large percentage of this time (2.7%). This behavior involved the adult thrusting its bill into the nest lining or rim and opening its bill in the manner described as a foraging technique for many icterids (eg., Beecher 1951). At times, a gape-probe bout lasted several minutes, with multiple probes into the nest. This was the major form of nest maintenance and roughly half the time resulted in the location and ingestion of something. Unlike the rapid probing maneuver described below, this movement was slow and methodical. This appears to be the first observation of gaping used during nest maintenance. We observed an additional form of probing, called rapid probing, where the adult probed into the bottom of the nest with a series of rapid head movements in a sewing machine-like fashion. Rapid probing at the nest is not uncommon, and has been observed in many other species (e.g., Greeney *et al.* 2006, Haftorn 1994). We did not observe instances of sharp probing (a single peck into the nest lining), and the few times when adults appeared to rapid probe (10) were much gentler and less well-defined than in other species (Greeney pers. obs.). Although there are several hypothesized reasons for rapid probing (see references above), we suspect that in this species rapid probing was used to roll the eggs. Other than these behaviors, the adult spent only 0.8% of its time preening, 0.1% of its time arranging stray bits of material in the nest, and 0.5% of its time moving about with undetermined purpose. Finally, while seated over the eggs, the adult called from the nest a total of seven times on five of the nine days of observation. Calls usually appeared to be in response to a conspecific vocalization away from the nest and were single events lasting roughly 1-2 seconds. All vocalizations were similar to the long, down-slurred whistle followed by a prolonged rat-

ting churr described by other authors: *cheeeeeuu-chrrrrrr* (e.g., Ridgely & Greenfield 2001, Skutch 1954, Stiles & Skutch 1989).

CONCLUSIONS.- The nest and eggs described here in detail, for the first time from Ecuador, are nearly identical to those described by Skutch (1954) from Costa Rica. Similarly, Skutch (1954) reported Yellow-billed Caciques calling from the nest in response to a mate's call nearby. A variety of other icterid genera have also been observed calling from the nest during incubation (e.g., Orians 1985), so it is no surprise that we observed similar behavior in Yellow-billed Caciques in Ecuador.

Yellow-billed Caciques at this nest were observed sleeping on the nest during daylight hours for far longer periods than any other species of open-cup nester that we have experience with (Greeney pers. obs.). This unusual behavior for open-cup nesting birds would appear to make incubating adults highly susceptible to predation, but we hypothesize two possible reasons to account for it. First, perhaps the location of the nests in areas of thick bamboo, with many interlocking stems, provides an early warning system for the birds. Any shaking of the foliage by an approaching predator would be easily noted. Secondly, this behavior may indicate higher vigilance during the night. The most commonly encountered predators within bamboo in our area are unidentified species of nocturnal rodents which nest in leafy balls suspended in the bamboo (Greeney pers. obs.). These appear most active at night, and we suspect that the necessity for higher vigilance at night may require adults to sleep more during the day.

September to December are the drier months in our study area, and it is noteworthy that this is the sixth species considered a "bamboo specialist" in this area to have been found breeding during this time period (Greeney *et al.* 2005a, b, Gelis & Greeney 2006, Martin & Greeney 2006, Greeney & Miller in press). Although there are certainly other variables (i.e., resource availability, rainfall) involved, we hypothesize that this may be a result of differential growth rates of *Chusquea* bamboo in the area. If more rapid bamboo growth occurs during the wetter months, avian species which attach their nests to bamboo during this period may suffer hig-

her rates of nest failure due to shifting foliage around the nest. Although the reasons for this pattern are speculative, this topic is worthy of further investigation.

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