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INCUBATION BEHAVIOR OF THE WHITE-BROWED SPINETAIL (*HELLMAYREA GULARIS*) IN SOUTHEASTERN ECUADOR

Harold F. Greeney[1] & Kristof Zyskowski[2]

[1]Yanayacu Biological Station and Center for Creative Studies, c/o Foch 721 y Amazonas, Quito, Ecuador. *E-mail*: revmmoss@yahoo.com

[2]Yale University, Peabody Museum of Natural History, 170 Whitney Avenue, New Haven, Connecticut 06520, USA. *E-mail*: kristof.zyskowski@yale.edu

Comportamiento de incubación del Colaespina Cejiblanca (*Hellmayrea gularis*) en el sureste del Ecuador.

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The White-browed Spinetail (*Hellmayrea gularis*) is a wren-like furnariid representing a monotypic genus. It inhabits the wet undergrowth of Andean forests from western Venezuela south to central Peru, being encountered most frequently in *Chusquea* bamboo thickets and stunted elfin forest near the treeline. Although habitat-specific, the species is fairly common through most of its range and not globally threatened (Hilty & Brown 1986, Fjeldså & Krabbe 1990, Anonymous 2000, Ridgely & Greenfield 2001, Remsen 2003).

Despite being found across a large latititudinal range, the White-browed Spinetail remains poorly studied. The details of nest architecture, a large mossy ball opening laterally, have only recently been described (Greeney & Zyskowski in review), and there is no published information on its breeding behavior. Here we present a description of the eggs, nestlings, and incubation behavior of the White-browed Spinetail from southeastern Ecuador.

We made observations on the breeding of the nominate subspecies of the White-browed Spinetail in October and November of 2004 at the Tapichalaca Biological Reserve (04º 30'S, 79º10'W), located on the east slope of the Andes, c. 11 km north of Valladolid in the southeastern Zamora-Chinchipe Province of Ecuador, at altitudes of 2550–2650 m. The habitat in this area is steeply sloped evergreen forest, with a 15–20 m canopy and an understory dominated by tree ferns (Cyathaceae) and *Chusquea* bamboo (Poaceae) (Krabbe *et al.* 1999). Additionally, Paul Martin found a fourth nest under construction in the vicinity of the town of Papallacta (00°36'44"S, 78°15'12"W), Napo Province, at an altitude of 3340 m. Below, we include egg measurements from this nest.

FIG. 1. Above, a one day old nestling of White-browed Spinetail (*Hellmayrea gularis*) in southeastern Ecuador. Below two eggs of this species, each from a different nest at the same location.

We studied the behavior of adults during incubation at one Tapichalaca nest, by placing a video camera on a tripod 3 m from the nest. We recorded egg weights to the nearest 0.001 g using a microgram balance. At each weighing we calibrated the scale (to control for uneven ground) using a standard weight, and placed each egg on the scale three times, averaging the weights. We calculated rates of mass loss to the nearest 15 min based on the time of day the eggs were weighed, and recognized individual

eggs by marking them with a permanent marker.

Chronology. At Tapichalaca, between 12 October and 8 November 2004, we found three active nests. The first contained two mostly-bare nestlings with flight feather sheaths unbroken. The second nest contained one undeveloped and one slightly-developed egg, and the third contained two well-developed eggs. Nestlings at the first nest fledged on 22 October. Only one egg in the second nest hatched, on 19 November, giving an incubation period of at least 15 days. As the egg was only slightly developed at the time it was discovered, we suggest that incubation period for the White-browed Spinetail would be near that reported for the similarly-sized *Synallaxis* spinetails (15–19 days; Skutch 1996a). We ceased observations on 29 November, when the second nest contained a single 10-day-old nestling and an undeveloped egg. The third nest was not monitored closely, but nestlings observed on 21 November weighed 6.10 and 5.86 g, and were estimated to be 3–5 days old. Paul Martin found the Papallacta nest during the final stages of construction on 22 October 2006, and found it to contain two fresh eggs on 2 November. He did not monitor this nest further. Although our observations indicate a breeding season from about late September to early December, White-browed Spinetails may be nesting in other months across their latitudinal range. This notion is supported by data on the presence of juveniles summarized by Fjeldså & Krabbe (1990).

Eggs. Eggs were immaculate white, slightly glossy, subelliptical, and measured 18.8–20.9 x 14.9–16.2 mm (n = 6; mean ± SD = 20.1 ± 0.8 x 15.5 ± 0.5 mm) (Fig. 1). The undeveloped egg was the smallest by almost 1 mm in both directions, and may have been abnormal. Adjusted mean egg size, after removing this egg, was 20.4 ± 0.5 x 15.6 ± 0.4. We weighed eggs (including one undeveloped) at nest # 2 on the day of discovery (day 1, 15 days pre-hatch) and every few days subsequently until two days before the second egg hatched. At this time the first was still undeveloped and the second egg was pipped. The undeveloped egg remained, and was weighed a final time 24 days after discovery, 9 days after hatching of the other. Prior to pipping (days 15–5 pre-hatch), the viable egg (# 2) lost mass at a rate of 0.64% of its original mass/day (24 h), showing an increased rate between 5 and 2 days prior to hatching (1.9%/day), probably due to increased water loss after pipping. The undeveloped egg (# 1) lost mass at a rate of 1.1%/day, showing a decreased rate (0.27%/day) after hatching of egg # 2, probably due to decreased warming by the adults.

Nestlings. Newly hatched nestlings were mostly bare, dark pink, and sparsely covered with gray natal down (Fig. 1). Nesoptiles were most dense and longest (7–10 mm) on humeral and capital tracts. The tarsi, feet, and mouth lining were yellow, and the bill was yellow with a brownish tip. Rictal flanges of the gape were pale creamy white, contrasting with the yellow mouth lining. Wing feathers began to break from their sheaths 9 days after hatching. Given the slightly larger size of Spotted Barbtail (*Premnoplex brunnescens*), for which nestling pins break on day 10 and which has a 19–22 day nestling period (Greeney unpubl. data), we estimate a 19–21 day nestling period for White-browed Spinetail.

Incubation behavior. Nest # 2 was videotaped for a total of 114 h during daylight hours, from 5 to 19 November, roughly from 05:30 to 18:30 h (EST). Results are presented for only 107.6 h of observation between 06:00 and 18:00 h, in order to make more direct comparisons with other species for which similar data are available.

Two adults participated in incubation.

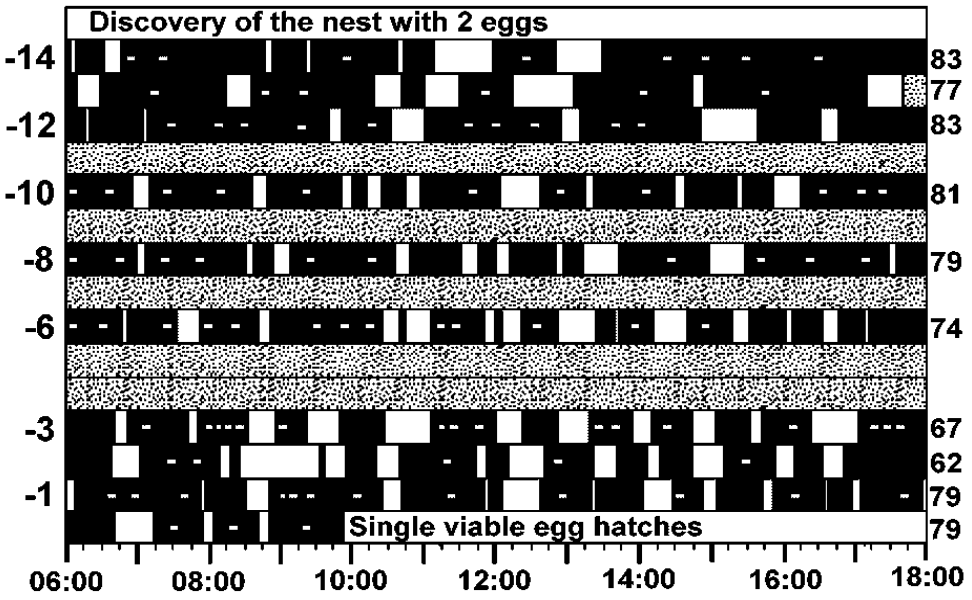

FIG. 2. Diurnal incubation rhythms (06:00–18:00 h) ascertained using video, at a nest of White-browed Spinetail (*Hellmayrea gularis*) in southeastern Ecuador. Black areas indicate adult presence and white areas show absences. Instances where adults exchanged places rapidly, leaving the eggs uncovered for < 2 min are indicated with a white dash. Time of day is indicated along the bottom margin and the number of days before hatching is indicated along the left. The total daily % coverage of the eggs for each day is indicated along the right margin. Areas of stippling indicate periods not observed.

Throughout the study, including three times on the morning before hatching, both adults often brought large tufts of pale plant fibers and seed down (lining), entering the nest with the material, and presumably adding it to the nest before resuming incubation. We observed this on 29.3% (67 of 229) of arrivals at the nest. On 28 occasions (26 with material), an adult arrived at the nest while the other was inside and, after pausing for an average of 2.7 ± 1.3 s, the second adult entered the nest. Both adults remained inside the nest together for an average of 10.5 ± 8.7 s, at which point one emerged with an empty bill. We do not know if adults switched places on these occasions.

Daily coverage of the eggs ranged from 62 to 84% (Fig. 2), with attendance during the entire observation period being 76.4%. Eighty-five periods of recess (eggs unattended) averaged 17.3 ± 12.9 min (range = 2–71 min). Periods of attendance (n =174) averaged 25.0 ± 14.2 min (range = 0.3-86 min). Adults switched places on the nest in three ways. On 46% of 94 switches at the nest (interval between leaving the eggs and covering the eggs < 2 min), the arriving adult perched at the entrance for 1–6 s (mean 2.1 ± 1.1 s) before the incubating adult emerged and flew directly away. The second adult remained perched at the nest opening 1–8 s (mean 3.5 ± 1.4 s) and then entered. During 42% of switches, one adult would leave the nest and 2–108 s (mean 26.4 ± 27.9 s) later the second would perch at the opening for 1–9 s (mean 3.5 ± 1.8 s) and then enter. On only

12% of switches, the arriving adult perched at the nest entrance briefly, then left before the incubating adult emerged and then (presumably the second) returned to enter the nest. Thus, for most of the observation time adults were well hidden from visually oriented predators while at the nest. Often, however, while an adult was present inside the nest, the entire nest, and often the supporting structure, could be seen vibrating rapidly. While the behavior of the adults inside the nest could not be observed, we feel it is likely that adults were engaging in the "rapid probing" or "tremble thrusting" behavior described for other passerines (see summaries in Haftorn 1994 and Greeney *et al.* 2006).

Skutch (1996a), based on observations of multiple species of ovenbirds and woodcreepers (Furnariidae *sensu* Remsen *et al.* 2008) (see also Skutch 1962, 1967, 1969, 1981, 1996b), suggested that the incubation rhythms of furnariids are particularly irregular when compared to other passerines. Our observations of the White-browed Spinetail show that it too has relatively irregular diurnal incubation patterns, with large variance in the duration of both attendances and absences. Since the extensive work of Skutch on Central American birds (see references above), we have learned little concerning the daily patterns of egg attendance in the Furnariidae, and thus have little means of comparing our findings. A constancy of 76% in coverage of the eggs, however, is similar to that reported for most other passerines of comparable size and in which the sexes share incubation duties (Skutch 1962, Deeming 2002).

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