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A COMPARISON OF PARENTAL CARE OF THE GREAT ANTSHRIKE (*TARABA MAJOR*) IN COSTA RICA AND ECUADOR

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Comparación del cuidado parental del Batará mayor (*Taraba major*) en Costa Rica y Ecuador.

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With its contrasting plumage and penetrating red eye, the Great Antshrike (*Taraba major*) is a bold and striking example of the family Thamnophilidae. Unlike most other antbirds, it covers a broad geographic range, extending from southern Mexico to northwestern Peru, northern Argentina and southeastern Brazil (Zimmer & Isler 2003). In Ecuador, the Great Antshrike occupies dense undergrowth in a variety of habitats including young secondary forests, woodland borders, and shrubby edges and clearings mostly below 1000 m (Ridgely & Greenfield 2001).

Breeding records from Costa Rica, Trinidad, Surinam, Brazil, and Argentina show a good deal of variation in the timing of reproduction of the species across its range (Zimmer & Isler 2003). In all cases, nests appear similar to one found in 1942 by Skutch (1969) at his farm, El General, in Costa Rica. Despite these numerous reports of breeding, however, few details are available apart from Skutch's (1969) original work. Here we describe observations on incubation and brooding from a nest of the Great Antshrike (*T. m. transandeanus*) found in the Buenaventura Reserve (03°39'S, 79°46'W), 20 km north of Piñas, El Oro province, southwestern Ecuador. With these observations, we provide the first behavioral data comparable to Skutch's (1969) work on *Taraba major* (ssp. *melanocrissus*), and provide details which both corroborate and amplify his observations of 65 years ago.

On 1 February 2004, at 10:45 h (EST), we discovered a female Great Antshrike incubating 2 eggs. The nest was located 300 m down the road from Buenaventura Reserve at the edge of a small patch of secondary forest. The nest was an open, rather deep cup, measuring 11.5 cm wide by 15 cm high outside, with inner measurements of 8 cm in diameter by 10 cm deep. It was situated 3.2 m off the ground and suspended by the rim between multiple small branches and vines measuring

FIG. 1. Nest with two nestlings of the Great Antshrike (*Taraba major*), 2 and 3 days old, at Buenaventura Reserve, El Oro, Ecuador, on 13 February 2004. Inset shows side views of each of the two eggs making up the complete clutch.

4–8 mm in diameter. The nest was composed of a scant frame of sparse rootlets and thin, dried vines with a middle layer of dried leaves. It was then sparsely lined with more slender, curled rootlets and vines which were generally long, sometimes measuring more than 1 m in length. The eggs, measuring 30.0 x 22.5 mm and 29.8 x 22.1 mm, were creamy white with cinnamon and lavender hashes concentrated at the larger end (Fig. 1).

To record adult behaviors, we videotaped activity using a camera and tripod set 2 m from the nest. We recorded behavior during incubation from 06:00 to 18:00 h on 7 February, and during nestling provisioning from 06:00 to 18:30 h on 11 February, 06:30 to 18:30 h on 17 February, and from 06:15 to 18:15 h on 20 February. Totaling these peri-

ods, we recorded activity at the nest for 48.7 h (12.1 h of incubation and 36.6 h nestling period).

General observations. During daylight hours, both sexes equally split the tasks of incubating eggs, brooding, and feeding nestlings. Because the female was always on the nest when we arrived to set up the camera at dawn, we believe she spent the night on the nest during both incubation and nestling periods. This is consistent with incubation information from Costa Rica that describes incubation by both sexes during the day and by the female at night (Skutch 1969).

Both adults were reluctant to flush when we approached the nest. Throughout the incubation period they flushed only when we were within 50 cm. During the nestling period the female would scold from within 1–3 m of the nest; however, the male would boldly stand on the nest rim, often pecking our hands, while we weighed and measured the nestlings.

During both incubation and nestling periods, the adults always arrived on the nest rim from the same direction. They did this by first hopping up the substrate vegetation with their back to the camera, then turning during the final hop to land on the rim. It was from this location that they always fed the nestlings, ate fecal sacs, and occasionally stood for up to 27 min at a time. When the adults were ready to incubate or brood, they would hop to the opposite side of the rim, which hung slightly lower, and then sink down into the deep nest cup.

On 7 February, we observed the incubating male rapidly probe the nest lining 12 times (1.9 times per h), in a smooth, vibrating manner, as described previously for other antbirds (Greeney 2004). The female performed this action 14 times (2.5 times per h). Interestingly, no rapid probing was observed after hatching of the eggs. We did not observe either sex "sharp probing" (Greeney 2004) until after the nest contained nestlings. Of 48 sharp probing maneuvers, the female performed 30 (2.9 times per h), while the male performed 18 (1.8 times per h).

Hatching was asynchronous, with the first egg hatching on 10 February and the second the following day. Fledging occurred sometime between 11:00 h on 22 February and 11:30 h on 23 February, giving an overall nestling period of 12–13 days, consistent with previous observations from Costa Rica (Skutch 1969).

Incubation. During a total of 12.1 h of filming incubation on 7 February, an adult was always present at the nest. The female was incubating when we started filming at 06:00 h and left the nest only when the male relieved her at 07:40 h. The male then stayed at the nest until the female returned at 10:50 h. This continued throughout the day with the incubating adult leaving only when its mate returned. We also noted that an adult was always present when we made a daily nest check on 1–4 and 6–10 February, suggesting that the eggs are covered for the majority of daylight hours. Of 10 visits to the nest during these days, we found the male incubating 60% of the time. On the day we filmed incubation, the male covered the eggs for 53% of daylight hours. Mean duration of incubation bouts (± SD) was 129.2 ± 37.9 min for the male and 113.4 ± 69.0 min for the female.

Brooding. Daytime brooding dropped steadily throughout the observation period. On 11 February the adults spent a combined total of 90% (665 min) brooding. By 17 February the adults spent 47% (338 min) brooding, and by 20 February, the last day we filmed, overall brooding time had dropped to just 3% (20 min) of time filmed. The female contributed 52% of the daytime brooding effort, covering the nestlings on 15 of 27 observed brooding

bouts. While the female exhibited a slightly greater investment in brooding, mean brooding bout by the male was longer. On average (± SD), the male's periods of brooding lasted 42.6 ± 45.5 min while those of the female lasted 37.1 ± 25.2 min. The adults faced the same direction while brooding on 26 of 27 total bouts.

Nestling provisioning. Nestlings began begging when the supporting vine of the nest shook upon the adults' arrival, and stopped soon after one of them was fed. Nestlings were provisioned 90 times during a total of 36.6 h of nestling filming for an overall rate of 1.2 feeds per nestling-hour. Effort was divided equally between the adults, with each sex arriving at the nest with food 45 times. Feeding rates appeared uniform across hours of the day, yet we noted a tripling of the daily feeding rate when comparing the first day of filming to the last. On 11 February (nestlings aged 1 and 0 days old), the feeding rate was 0.7 feeds per nestling-hour. By 17 February, the rate had increased to 0.9 feeds per nestling-hour. By 20 February, nestlings were provisioned 2.1 times per nestling-hour. In fact, of the 90 feeds we observed over 3 days of filming, 57% took place on the last day.

Great Antshrikes are known to eat a variety of foods, from minnows and frogs to insects and slugs (Zimmer & Isler 2003). Our observations were no different. We were able to identify 8 of the 90 prey items brought to the nest. These items included: one large beetle larvae (Scarabaeidae), one green caterpillar (Nymphalidae), one Orthoptera, 3 frogs, one spider, and one lizard.

Fecal sacs. Nestlings produced a total of 51 fecal sacs during 36.6 h of observation for a rate of 0.7 fecal sacs per nestling-hour. All but one was produced in the presence of adults. The female ate 23 fecal sacs and carried 2 away from the nest, while the male ate 19 and carried 7. During the nestling period, the majority of fecal sacs were eaten by the adults; however, this changed on the last day of the nestling period when a total of 8 out of 28 (29%) fecal sacs produced by the nestlings were carried away rather than eaten by the adults.

Conclusions. Our observations on nest architecture and egg form are consistent with other reports (Zimmer & Isler 2003). Apart from these general similarities, the observed behavior was similar to that described by Skutch (1969) from Costa Rica. Skutch noted that the adults protested loudly upon his approach to the nest while the "black-backed male appeared to be more perturbed, for he ventured far nearer than his brown-backed mate" (Skutch 1969). We also found the male to be more aggressive than the female, particularly during the nestling period when he actually stood on the nest and pecked at our hands sharply enough to draw blood.

We observed 100% nest attendance by the adults during incubation, and also noted that the male contributed more to daytime incubation. Similarly, Skutch found 97% attendance by the adults with only 17 min when no adult was incubating (Skutch 1996). He also found that the male contributed 61% of daytime incubation.

The feeding rates we observed were slightly lower than those noted by Skutch (1996). For one 4-day-old nestling, Skutch observed a rate of 1 feed per nestling-hour. For two nestlings, 6 and 7 days old, we recorded only 0.9 feeds per nestling-hour. Additionally, for 9 and 10-day-old nestlings, we observed a feeding rate of 2.1 feeds per nestling-hour, while Skutch reported 2.6 feeds per nestling-hour for one 9-day-old nestling.

Finally, Skutch noted that both parents spent up to 10 min at a time standing on the nest rim in what he termed an "on guard" stance. We also observed both parents stand-

ing on the nest rim for brief, but sometimes long, periods of time. On 17 February, the male stood twice, once for 6.5 min, and the second time for 9 min. That same day, the female stood on the nest rim for just shy of 20 min. The longest standing bout occurred on 20 February when the male fed a nestling and then stood on the nest rim for 27.5 min.

Sixty-five years after Skutch's (1969) original nest observations, we were able to easily repeat his observations, although, unlike Skutch, we had the aid of a video camera! Only through repeated observations on a variety of species, in addition to comparable observations within species across their geographic ranges, can we begin to elucidate the intricacies of Neotropical avian breeding behavior. We encourage others to report similar information in the hopes of understanding between and within species variation.

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