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OBSERVATIONS ON THE BREEDING BIOLOGY OF THE MOUNTAIN WREN (*TROGLODYTES SOLSTITIALIS*) (TROGLODYTIDAE: AVES) IN NORTHEASTERN ECUADOR

OBSERVACIONES SOBRE LA BIOLOGIA REPRODUCTIVA DEL SOTERREY MONTAÑES (*TROGLODYTES SOLSTITIALIS*) (TROGLODYTIDAE: AVES) EN EL NORESTE DE ECUADOR

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Abstract.- We describe the details of nest architecture and present data on nestling care of the Mountain Wren (*Troglodytes solstitialis*) in northeastern Ecuador. One nest was built 3.2 m up on the side of an isolated, epiphyte-laden, dead tree stump. It was a small ball, with a centrally located side opening, and was composed of moss and fibers with a lining of bamboo leaves (*Chusquea* sp.). We studied adult behavior and parental care during 10 days of observations, beginning when the single nestling was ca. 9 days old and ending upon fledging. Provisioning visits were unevenly distributed in time. The average daily visitation rate ranged from 2-10.7 visits/h. The number of feeding visits/h did not change significantly with nestling age. During eight days of observations, the male made 50.8% of all visits. Our observations suggest that small, adult Lepidoptera are prominent items in the nestling diet.

Key words: breeding, Ecuador, feeding rates, Mountain Wren, nest architecture, nestling, parental care, *Troglodytes solstitialis*.

Resumen: Describimos los detalles de la arquitectura del nido y presentamos datos sobre cuidado parental del Soterrey Montañés (*Troglodytes solstitialis*) en el noreste de Ecuador. Un nido fue construido 3.2 m sobre el suelo en un tronco muerto, cubierto en epifitos, y aislado en un potrero. El nido era una pequeña bola de musgos y fibras, y la cámara con una guarnición de hojas secas de bambú (*Chusquea* sp.). Estudiamos el comportamiento de los adultos y el cuidado parental durante 10 días de observaciones, comenzando desde cuando el único pichón tenía ca. 9 días de edad y acabando cuando el pichón voló del nido. Las visitas de alimentación fueron distribuidas irregularmente durante el día. Un promedio diario de la frecuencia de visitas fue entre 2-10.7 visitas/h. El número de visitas/h no cambió significativamente con la edad del pichón. Durante ocho días de observaciones, el macho contribuyó 50.8% de las visitas. Nuestras observaciones sugieren que adultos de Lepidoptera son importantes en la dieta de los pichones.

Palabras clave: reproducción, Ecuador, frecuencia de alimentación, Soterrey Montañés, arquitectura del nido, pichón, cuidado parental, *Troglodytes solstitialis*.

INTRODUCTION

The Mountain Wren (*Troglodytes solstitialis*) is a common and widespread Andean wren, one of 12-13 species in the genus, including 12 species in the New World (Brewer 2001, Kroodsma & Brewer 2005). It has a broad geographic range (560,000 km^2 *sensu* BirdLife International 2004), and is predominantly found at elevations of 1700-3500 m (Hilty & Brown 1986, Brewer 2001, Kroodsma & Brewer 2005). Ranging from Venezuela to northwestern Argentina, the Mountain Wren inhabits humid forest, forest edge, and cloud forest, sometimes up to 4500 m (Hilty & Brown 1986) or as low as 700 m (Brewer 2001,

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Ridgely & Greenfield 2001). Of the 5 described races, only the nominate subspecies occurs in Ecuador (Brewer 2001, Ridgely & Greenfield 2001).

The breeding biology of the Mountain Wren is poorly studied. Sclater & Salvin (1879) describe the eggs as white with red spotting, and they also briefly describe the nest. Subsequently, incomplete breeding data has been published from observations in Colombia and Ecuador (Skutch 1960, Ridgely & Gaulin 1980, Hilty & Brown 1986, Greeney & Nunnery 2006). There remains no published information on incubation and nestling periods, or for any aspect of parental care (Kroodsma & Brewer 2005). Here we provide the first detailed description of the nest, as well as observations on nestling provisioning behavior, from observations in northeastern Ecuador.

METHODS

We made observations on the nesting of the Mountain Wren at altitudes of 1900-2300 m in the vicinity of Yanayacu Biological Station and Center for Creative Studies (00°36' S, 77°53' W), 5 km west of Cosanga (Napo Province, northeastern Ecuador), and adjacent to the birding reserve of Cabañas San Isidro. For a more complete site description see Greeney et al. (2006). Apart from scattered observations from 2000 to 2007, most of our data derives from a single nest found by Jose Simbaña on 13 October 2007. At the time of discovery, it contained two young nestlings. After fledging, we carefully removed the nest from the surrounding materials, describing and measuring it at this time. We began regular observations of this nest on 17 November, at which time the nest contained only a single nestling. We estimated that the nestling was ca. 9 days old, based on the observations of the nestlings of Grey-breasted Wood-wren (*Henicorhina leucophrys*) from the same study site (Greeney unpubl. data). We finished observations on 28 November, when a single ca. 18-day-old nestling spontaneously left the nest. We gathered direct observational data by watching the nest from a distance of ca. 15 m, using 10 x 40 binoculars. Data were collected on 10 days, with observation periods ranging from 3-4 h (8 days) to 5 and 8 h. We generally began observations 1-3 h after sunrise. Across the entire period, we watched the nest for 41 h. On 18 November (estimated age 10 days) we mist-netted both parents at the nest, and color banded them. We subsequently assumed that the adult with a brood patch was the female, and that the other was the male. All means are presented with ± SD. Significance values were calculated using Spearman's Rank Correlation tests (r_s).

RESULTS

Nests and seasonal activity: Our focal nest was situated 3.2 m up on the side of an isolated, epiphyte-covered, dead tree stump (5 m tall), in a pasture 15 m from relatively intact forest. The nest was tightly imbedded into epiphytic bryophytes, such that the nest was protected from the back by the tree trunk, and from the top, bottom, and sides by over 10 cm of epiphytic growth. The nest was a small ball, with a centrally located opening. It was roughly circular, and 9 cm in diameter outside. Likewise, the entrance was nearly circular, measuring 3 cm wide by 2.5 cm tall, and opening into a 4.5 cm diameter chamber. This inner chamber was roughly 5 cm tall, with a 2 cm-deep cup. The nest was composed of moss and fibers, evenly mixed and interwoven. The entire inner chamber was sparsely lined with dead, tightly overlapping *Chusquea* bamboo leaves.

Apart from this nest, active in October, we made the following observations in the same locality (all 2000-2100 m, unless otherwise noted). We found nests under construction on 9

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April 2002, 9 May 2003, and 1 October 2003. We also found nests with nestlings on 22 December 2000, and 25 May 2004 (1900 m). We observed adults with dependent fledglings on 16 December 2001 and on 25 January 2005. Including our focal nest, mean height above the ground for all nests was 13.2 ± 9.0 m (n = 6; range = 3.2-25 m). All nests were similar in their locations, sunken into epiphyte clusters, and all were in pastures or at forest edges. At one other of these nests we confirmed the presence of two nestlings, but the contents of the others are unknown.

Nestling provisioning and adult behavior: Before approaching the nest with food, adults often paused at the edge of the forest before rapidly covering the ca. 15 m to the nest in a single flight. Upon arriving at the trunk supporting the nest, they perched 0.5-1 m from the nest, and then ran mouse-like, through the epiphytes to the nest entrance. Provisioning visits were unevenly distributed in time (Fig. 1). On 5 of 10 observation days, the distribution of visits during the day was clumped, and in remaining days it was random (Index of Dispersion; Fowler *et al*. 1998, pp. 62-66). There were occasionally periods which included several feedings during a ca. 10 min period, followed by long absences (the two longest absences lasted 119 and 134 minutes). During feeding bouts, both parents generally fed in quick succession, sometimes arriving simultaneously. The average daily visitation rate ranged from 2-10.7 visits/h (Table 1). The number of feeding visits/h did not change significantly with nestling age (r_s = 0.365, n = 10, p = 0.276).

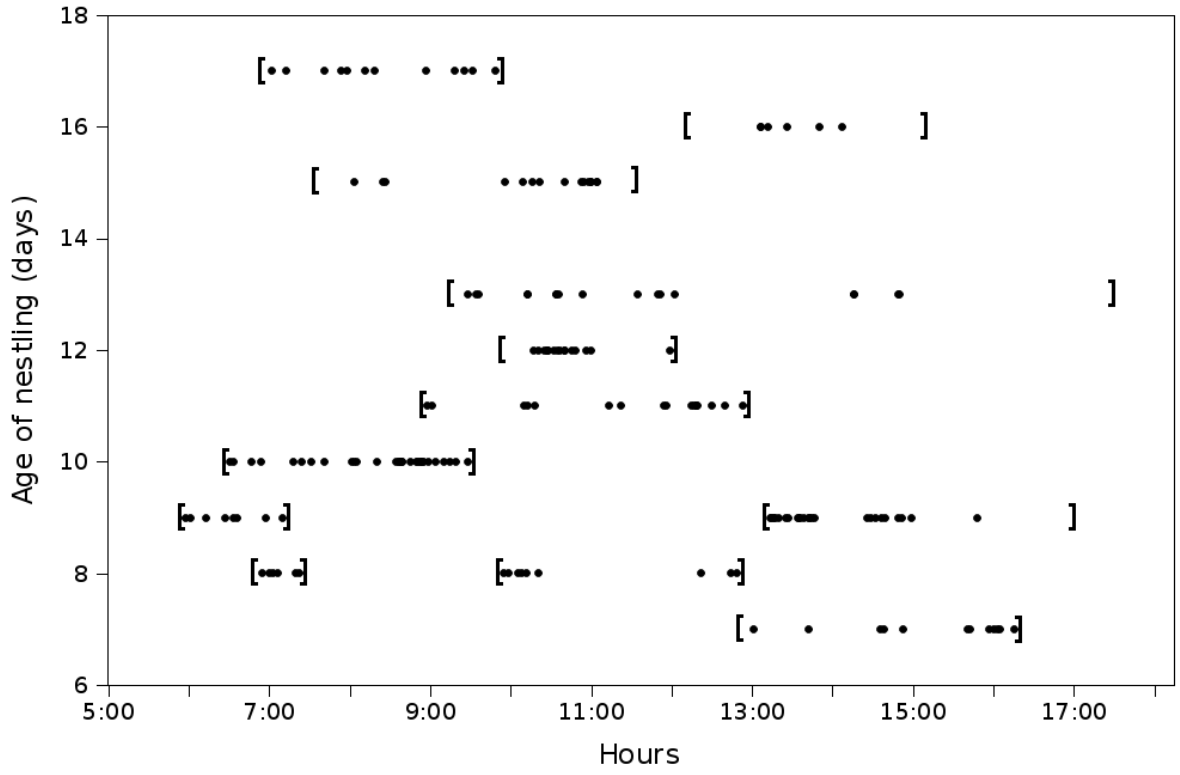

Figure. 1. Daily patterns of provisioning at a nest of the Mountain Wren (*Troglodytes solstitialis*) containing one nestling in northeastern Ecuador. Each point represents one feeding visit and parentheses show the start and end of each observation period.

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Table 1. Pattern of provisioning rates in the nest of the Mountain Wren.

Estimated nestling age (days)	Number of observation hours	Visits/hour
10	3.5	3.4
11	3.5	4.4
12	5	5.7
13	4	10.7
14	4	4.0
15	3	8.4
16	8	2.5
18	4	3.7
19	3	2.0
20	3	4.0

During eight days of observations after banding the adults, we observed 149 feeding visits. For 126 of these visits we were able to identify the arriving adult by its band color. The male made 64 (50.8%) visits, and the female 62 (49.2%).

Nestling and nestling food: When the nestlings were first weighed on 15 November, they weighed 8.1 and 7.3 g (Figure 1). On 22 November, at an estimated age of 15 days, the single nestling was completely covered with feathers. It was unable to fly, but seemed able to abandon the nest, returning only reluctantly. Measurements: weight 9.25 g (78% of average adult weight sensu Kroodsma & Brewer 2005), wing 31 mm, tarsus 17 mm and bill 7.5 mm.

In general, we were only able to identify larger prey items. On 18 (10%) of 180 observed provisioning visits, adults brought adult lepidopterans (mostly dull colored, and likely captured while at rest), up to ca. 4 cm long. In rare occasions we were able to identify other items including: larval Lepidoptera (4), Diptera or Hymenoptera (4), spiders (3), Orthoptera (2), Odonata (1), and Coleoptera (1). Non-quantified observations, at non-focal nests, also suggest that small, adult Lepidoptera are prominent items in the nestling diet of this species.

DISCUSSION

The clumped distribution of feeding visit that we observed differs from the provisioning visit distribution reported in related species: House Wren (*Troglodytes aedon*) (Kendeigh 1952) and Northern Wren (*T. troglodytes*) (Armstrong 1955) where it is more uniform. The pattern we observed, however, may be biased by the fact that nest contained only one nestling during our observations. Similarly, we did not observe an increase in visits with nestling age, which was found in House Wrens (Kendeigh 1952). The number of feeds/nestling/h reported here ranged from 2.0 to 10.7. In Southern House Wren (*T. musculus*), during the second and third weeks of the nestling period, feeding rates were 6.6 and 5.5 visits per nestling/h, respectively (Skutch 1960). Data for Carolina Wren (*Thryothorus ludovicianus*), during the first and second weeks of the nestling period was 1.1 and 2.6 visits per nestling/h, respectively (Skutch 1976).

Our estimated length for the nestling period of Mountain Wren (18 days) differs little from those of House Wren, Northern Wren (both temperate zone) and Southern House Wren (Kroodsma & Brewer 2005). Data for most tropical representatives of the genus, however, are lacking. Adult Lepidoptera appear to play a significant role in nestling diet of Mountain Wrens. Interestingly, Kroodsma & Brewer (2005) in their review of wren diets

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(Troglodytidae), do not mentioned adult Lepidoptera. They are, however, mentioned by Glutz von Blotzheim (1985) in the diet of the Northern Wren.

Sclater & Salvin (1879) first described the nest of Mountain Wren from Colombia but, while they mention a "side entrance" do not actually state the form of the nest. Subsequently Skutch (1960) described one nest from Ecuador as having a side entrance, but no roof, implying that the nest was simply a cup built into a pre-existing niche. Skutch (1960) did not, however, remove the nest for close inspection. The nest we examined was clearly a domed structure, and had a bamboo lining as did the nest described by Skutch (1960). It is possible that there is some amount of variation in the degree to which adults construct a dome, as seen in other cavity nesting passerines (e.g., Zyskowski & Prum 1999, Greeney 2008). We feel, however, that close inspections of other nests will likely confirm that this species regularly builds an enclosed nest, as in most other troglodytids (Brewer 2001). Otherwise, our observations confirm previous observations that this species is quite variable in its choice of nest sites (Sclater & Salvin 1879, Skutch 1960, Ridgely & Gaulin 1980).

Our records of breeding activity for the Mountain Wren are, surprisingly given their abundance (Ridgely & Greenfield 2001), only the fourth published for Ecuador (Skutch 1960, Fjeldså & Krabbe 1990, Greeney & Nunnery 2006). Our records suggest a fairly extended breeding season in northeastern Ecuador, with nesting initiated from the middle of the rainier season through most of the drier period (Greeney *et al.* 2006, Valencia 1995). Along with two nests with nestlings found in east-central Ecuador in October by Skutch (1960), our records suggest that peak breeding for this species in eastern Ecuador occurs in the drier months.

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