The nest of the Pearled Treerunner (*Margarornis squamiger*)

El nido del Subepalo Perlado (*Margarornis squamiger*)

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Abstract

The Pearled Treerunner (*Margarornis squamiger*) is a small ovenbird (Furnariidae) inhabiting the upper strata of Neotropical montane forests. Little is known of its breeding habits despite its wide distribution and abundance within appropriate habitat. The genus *Margarornis* is considered closely related to *Premnoplex* barbtails, but details of nest architecture supporting this relationship are unavailable. Here we provide the first detailed description of nest architecture for the Pearled Treerunner from a nest encountered in northwest Ecuador. The nest was a tightly woven ball of moss and rootlets, similar in shape to that of the Spotted Barbtail (*Premnoplex brunnescens*) and presumably built in a similar manner. Nest architecture and nestling behavior support a close relationship between *Margarornis* and *Premnoplex*.

Key words: barbtail, Ecuador, Furnariidae, *Margarornis squamiger*, nest architecture.

Resumen

El Subepalo Perlado (*Margarornis squamiger*) es un furnárido pequeño que habita el dosel de los bosques de montaña neotropicales. La reproducción de esta especie es poco conocida, a pesar de su amplia distribución y de ser común en el hábitat adecuado. El género *Margarornis* se considera cercanamente emparentado con los subepalos del género *Premnoplex*, pero no se conocen detalles de la arquitectura del nido que sustenten esta relación. Aquí presentamos la primera descripción detallada del nido del Subepalo Perlado basada en un nido encontrado en el noroeste de Ecuador. El nido era una bola tejida con musgos y raíces, de forma similar al nido del Subepalo Moteado (*Premnoplex brunnescens*) y, presumiblemente, construido de manera similar. La arquitectura del nido y el comportamiento de los pichones apoyan una relación cercana entre *Margarornis* y *Premnoplex*.

Palabras clave: arquitectura del nido, Ecuador, Furnariidae, *Margarornis squamiger*, subepalo.

Introduction

Neotropical ovenbirds and woodcreepers (Furnariidae *sensu* Remsen *et al.* 2011) represent one of the most diverse avian radiations in the New World. In addition to remarkable morphological, ecological, and behavioral diversification, this group is characterized by the evolution of diverse nest architectures (Collias 1997, Zyskowski & Prum 1999). Certain evolutionary innovations in nest placement and structure in the ovenbird-woodcreeper clade might have facilitated its diversification into new habitats and promoted the evolution of novel morphological specializations (Irestedt *et al.* 2006). Unfortunately, however, a thorough understanding of furnariid nest evolution has been impeded by a lack of data on nest architecture and nesting behavior for several key species and genera (Zyskowski & Prum 1999, Remsen 2003, Irestedt *et al.* 2006). Although nest descriptions for several species have been published recently (e.g., Dobbs *et al.* 2003, Greeney & Zyskowski 2008, Zyskowski & Greeney 2010), there are still few available data concerning the natural history and reproductive biology of many members of this family (Remsen 2003).

The "*Margarornis* assemblage" as traditionally defined originally consisted of *Margarornis*, *Roraimia*, *Premnornis*, and *Premnoplex* (Vaurie 1980, Rudge & Raikow 1992a, 1992b). Within this group, however, relationships were unclear for many years owing to conflict between morphological features, molecular data, and natural history (Dobbs *et al.* 2003, Irestedt *et al.* 2006, Areta 2007). Rudge & Raikow (1992b) suggested that *Premnoplex* and *Premnornis* should be considered sister taxa, but Dobbs *et al.* (2003) indicated that the divergent nest structure of *Premnornis* should exclude it from the *Margaronis* group. Indeed, recent DNA data suggest that *Premnornis* forms a separate clade with *Pseudocolaptes*, and is only distantly related to the *Premnoplex-Margarornis* clade (Irestedt *et al.* 2006, Moyle *et al.* 2009, Derryberry *et al.* 2011). This is further supported by similarities in nest architecture between *Premnornis* and *Pseudocolaptes*, both building loose-cup nests of tree-fern scales inside tree cavities (Skutch 1969, Dobbs *et al.* 2003, Solano-Ugalde & Arcos-Torres 2007). Areta (2007) agreed with previous studies that, because characters associated with scansorial habits (e.g., hindlimb musculature) are prone to convergence (Feduccia 1973, Irestedt *et al.* 2004), they are unreliable indicators of phylogenetic affinities and may have misled earlier workers, and suggested that based on general similarities in nest architecture and foraging behavior, *Premnoplex* and *Margarornis* should be considered sister taxa, as was also found in recent molecular analyses (Irestedt *et al.* 2006, 2009, Moyle *et al.* 2009, Peréz-Emán *et al.* 2010, Derryberry *et al.* 2011). However, details of nest architecture supporting this relationship are unavailable.

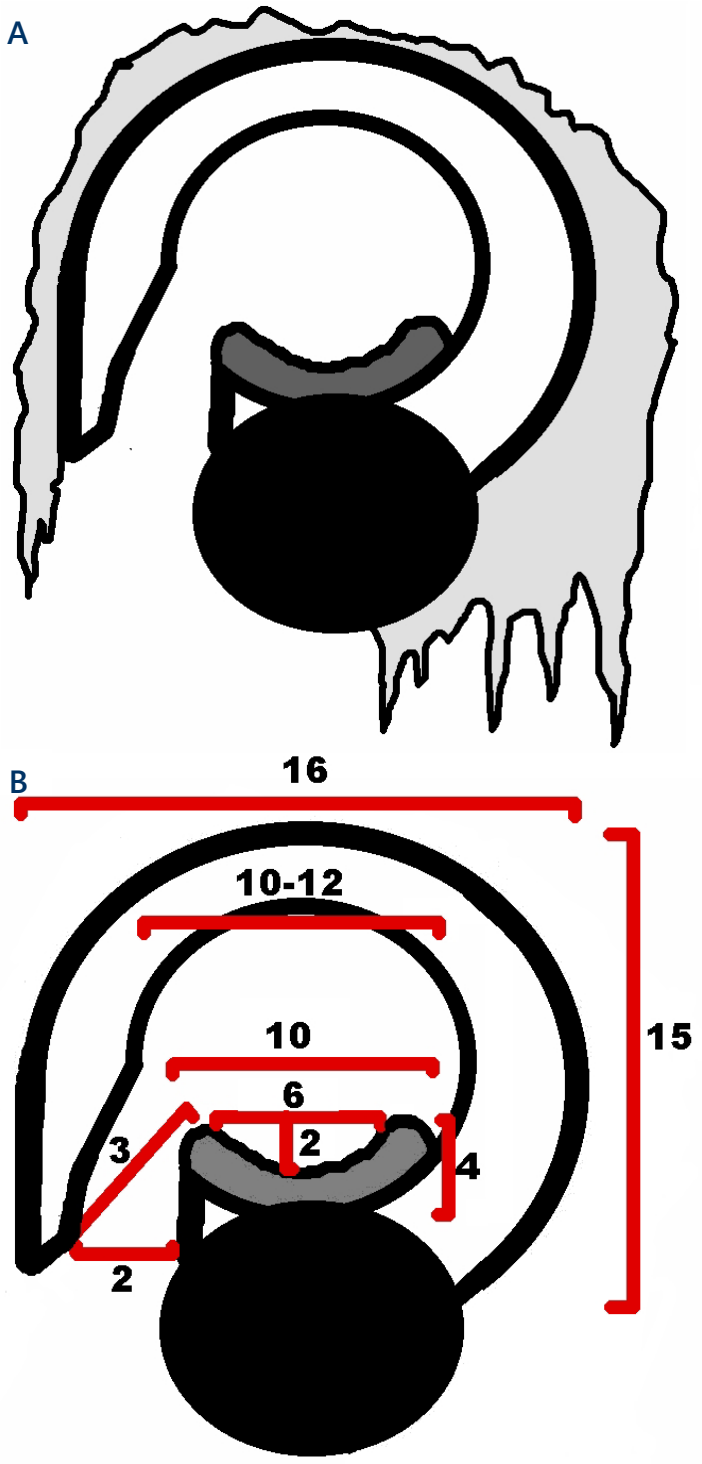

Figure 1. Stylized drawing of a cross-section of the nest of Pearled Treerunner (*Margarornis squamiger*). (A) The black circle represents the supporting branch. Light grey areas represent naturally growing moss surrounding the nest and dark grey areas represent the internal lining of the nest. (B) Red lines indicate measurements (cm) taken as described in the text.

Here, we provide the first detailed description of nest architecture for *Margarornis squamiger* and for the genus *Margarornis*. The only previously existing information on breeding biology for this species was a description of the eggs of *M. s. perlatus* by Sclater & Salvin (1879). Our data allow comparisons with the relatively well-studied *Prem-*

noplex (Skutch 1967, Areta 2007, Greeney 2008a).

Materials & Methods

We studied a nest of Pearled Treerunner found with two nestlings along the Yanacocha-Nono road (0°07' S, 78°35' W), at *ca.* 3000 m, Pichincha Province, northwest Ecuador. Vegetation in the area was not studied in detail, but it appeared to be typical for this elevation in northwest Ecuador. The area surrounding the nest site was a mosaic of pastures and forest fragments ranging in size from 0.5 to 1 ha. We observed adult behavior at the nest through binoculars, but were limited to only a few feeding visits before we approached the nest and caused the fledging of both nestlings. We removed the nest by severing the supporting branch, and examined and photographed it *ex-situ*. We recorded nest measurements (Fig. 1) to the nearest 0.5 cm using steel calipers and cut the nest in half to examine the details of inner architecture and material placement.

Results

On 2 February 2009, from 1330 to 1400 h, we observed a nest of Pearled Treerunner containing two well-feathered nestlings. Two adults brought single, small invertebrates to the nest but we could not observe details of feeding behaviors because the nest's entrance was hidden. We did not observe adults remove fecal sacs after feeding, and upon approaching the nest, we discovered a large number of fecal sacs accumulated on the ground below the nest.

The nest was saddled over a horizontal branch measuring 8 cm in diameter (Fig. 1), ca. 8 m above the ground. The nest was a thick-walled ball of moss with a lateral, downward facing, tubular entrance. Following the terminology of Simon & Pacheco (2005), the nest most closely matches closed/globular/bottom or closed/retort/bottom. The entrance tunnel was 3.5 cm wide, 2 cm tall, and 3 cm long from the outer lip to the front rim of the egg cup. A flap of loose moss hung from the branch partially obscuring the entrance in such a way that the entrance tube was extended by 4 cm, but adults clung to the true lip of the entrance tunnel while delivering food. In this position they were totally obscured except from directly below the nest. The bulk of the nest was supported by the branch with the entrance tunnel projecting downwards along the edge of the branch, such that the inner portion of the tunnel was partially formed by the branch itself (Fig. 1).

The inner chamber of the nest was roughly spherical and 10-12 cm in diameter. The egg cup rested directly on the supporting branch, formed the bottom portion of the inner chamber, and was composed mostly of rootlets and grass blades, lined with mammal hairs, bark strips and sparse treefern scales (*Cyathea* sp.). This cup separated easily from the surrounding moss and measured 10 cm wide by 4 cm tall externally and 6 cm wide by 2 cm deep internally. Externally, the nest measured 15 cm tall, 14 cm wide, and 16 cm from front to back (Fig. 1). The walls of the nest were 1.5 to 2.5 cm thick and composed of tightly compacted, living moss penetrated by numerous rootlets of surrounding epiphytes. The nest was completely embedded in surrounding, naturally growing moss and epiphytes (principally Piperaceae, orchids, and ferns). It was difficult to tell if the nest had been constructed inside a natural mossy cavity or if moss had secondarily grown to cover the nest, though we suspect the former. We suspect that the nest was likely very old because the moss and rootlets forming its walls were tightly compacted, grown together, and partially decomposed into soil.

We made observations at an additional nest of Pearled Treerunner found by Jose Simbaña at the Yanayacu Biological Station, at 2200 m in the

Napo province of northeastern Ecuador. This nest was under construction in June 2008 and we noted that two adults participated in its construction. Nest shape and attachment were similar to the nest we describe above; it was located 21 m above the ground on a mossy branch attached to an isolated tree surrounded by pasture. We observed continued construction activity over the course of 4 months before the branch collapsed during a rainstorm, which prevented detailed observations on its architecture.

Discussion

The architecture of the nest of the Pearled Treerunner we examined in detail was very similar to that of nests described for the Spotted Barbtail (Greeney 2008b): a ball of moss with a downward-facing tubular entrance and enclosing an inner egg-cup built of different materials. Nests of *M. squamiger* are also similar in placement to a nest of Ruddy Treerunner (*M. rubiginosus*) from Costa Rica examined from a distance but not collected nor examined closely (Mennill & Doucet 2005). In addition to similarities in nest architecture, there are behavioral characteristics strongly supporting a close relationship between *Margarornis* and *Premnoplex*. Perhaps the most interesting are the observations on the Napo nest that suggest nests of *Margarornis* are built over a long period of time, a characteristic that, so far as is known within the Furnariidae, is shared only with Spotted Barbtail (4 -18 months; Greeney 2008b). These observations, along with the seemingly great age of the Pichincha nest described above, suggest that Pearled Treerunner may also reuse nests for many years (Greeney 2008a,b). Although we did not confirm this, it is also likely that *Margarornis* shares the innovative "stuffing" technique of nest construction described for *Premnoplex* (Greeney 2008b). The third behavioral trait shared between Pearled Treerunner and Spotted Barbtail is the apparent lack of parental removal of fecal sacs (Areta 2007, Greeney 2008a), evidenced in this case by the accumulation of feces directly below the nest. It remains to be seen if these characters are shared with other members of the genus *Margarornis*. We hope this note encourages the study of further nests of this genus and of other poorly studied tropical birds.

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