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# THE NEST, EGGS, NESTLINGS, AND PARENTAL CARE OF THE BRONZE-OLIVE PYGMY-TYRANT (*PSEUDOTRICCUS PELZELNI*)

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**Resumen. – El nido, huevos, pichones, y el cuidado parental del Atrapamoscas pigmeo bronceado (*Pseudotriccus pelzelni*).** Se provee la primera descripción del nido y huevo para el género *Pseudotriccus,* basada en la observación del nido del Atrapamoscas pigmeo bronceado (*P. pelzelni*) ubicado en el bosque húmedo maduro a 1750 m de altura en el lado este de Ecuador. El nido presentó una estructura de forma globular musgosa, con una entrada hacia el costado, situado a 60 cm por encima del suelo y fijado a un pequeño vástago, cerca de un arroyo. Descubrimientos recientes muestran que el nido contenía dos huevos blancos inmaculados. Los dos adultos se encargaron del cuidado de los pichones, pero solamente un adulto empolló. Observaciones breves del día-6 demostraron que los adultos alimentaron a los pichones 4,2 veces por pichón por hora, y empollaron 17.9% del tiempo total. A pesar de la necesidad de estudios adicionales, y basados en la estructura y localización del nido del Atrapamoscas pigmeo bronceado, todo parece indicar que la actual posición filogenética de *Pseudotriccus* con *Corythopis* merece ser reconsiderada.

**Abstract. –** We provide the first nest and egg descriptions for the genus *Pseudotriccus*, based on observations of a Bronze-olive Pygmy-Tyrant (*P. pelzelni*) nest in mature humid forest at 1750 m elevation in eastern Ecuador. The nest was a mossy globular-shaped structure with a side entrance, situated 60 cm above the ground and affixed to a small sapling, near a small stream. Upon discovery, the nest contained two immaculate white eggs. Subsequently, both adults attended the two nestlings, but only one adult brooded. Brief observations on day six showed that adults fed nestlings 4.2 times per nestling hour, and brooded nestlings 17.9% of the time. Although additional information is needed, structure and placement of the Bronze-olive Pygmy-Tyrant nest indicate that the current phylogenetic placement of *Pseudotriccus* with the *Corythopis* antpipits merits reconsideration. *Accepted 2 July 2005.*

**Key words**: Nest, egg, nestling, parental care, behavior, Andes, Ecuador, Bronze-olive Pygmy-Tyrant, *Pseudotriccus pelzelni.*

## INTRODUCTION

The genus *Pseudotriccus* contains three species of small understory flycatchers that occur in humid Andean forests from Panama to Bolivia (Ridgely & Tudor 1994, Fitzpatrick 2004). Although their phylogenetic placement within Tyrannidae has long been unclear, internal and external morphology strongly suggest that the *Pseudotriccus* pygmy-tyrants represent the sister taxa to the *Corythopis* antpipits of lowland South America (Traylor 1977, Traylor & Fitzpatrick 1982, Lanyon 1988). Although behavioral traits may provide important insight into phylogenetic hypotheses, the natural history of *Pseudotriccus* pygmy-tyrants has remained too poorly known to allow rigorous behavioral comparisons with

other genera. Nesting ecology, in particular, may provide valuable insight into phylogenetic relationships (e.g., nest structure; Zyskowski & Prum 1999). Here, we provide the first descriptions of the nest and nesting ecology for the genus *Pseudotriccus*, from a nest of the Bronze-olive Pygmy-Tyrant (*P. pelzelni*) in eastern Ecuador, and discuss phylogenetic implications based on comparisons with nests of *Corythopis* and other species within the subfamily Elaeniinae.

The Bronze-olive Pygmy-Tyrant has the largest geographic range of its genus, occurring from eastern Panama to eastern Peru (Ridgely & Tudor 1994, Fitzpatrick 2004). Although inconspicuous and easily overlooked, the Bronze-olive Pygmy-Tyrant is an active understory bird that makes frequent short flights between perches and attacks insects, using short sally-strikes and leaps, on the undersides of leaves (Hilty & Brown 1986, Ridgely & Tudor 1994). Like its congeners, the Bronze-olive Pygmy-Tyrant frequently snaps its bill and creates a whirring sound with its wings during flight (Wetmore 1972, Hilty & Brown 1986, Ridgely & Tudor 1994). The only breeding information available for the species comes from Colombia, where Hilty & Brown (1986) reported a single male in breeding condition during the month of May. Bronze-olive Pygmy-Tyrant observations presented here are of the nominate subspecies *pelzelni*, which occurs on the east slope of the Andes in Colombia and Ecuador (Ridgely & Greenfield 2001, Fitzpatrick 2004).

## MATERIALS AND METHODS

At 11:30 h (EST) on 3 December 2002, during a 2-week expedition to the summit of Volcán Sumaco in Ecuador's eastern Napo Province, we discovered a single nest, containing two eggs, at an elevation of 1750 m. We made brief observations on the day of discovery, measuring the eggs at 16:00 h. On the following day, at 16:25 h, the nest contained two nestlings, which we photographed and measured. On 10 December, we placed a video camera to record behaviors at the nest from 13:15 to 16:30 h. The camera was 4 m from the nest and approximately 1.5 m below the level of the entrance, but in plain sight from the nest. Once we had left the area, adults showed little or no disturbance toward the camera and we recorded a total of 194 min of feeding behavior. At 17:00 h we removed, measured, photographed, and weighed the nestlings to the nearest 0.25 g using a Pesola scale. At 11:00 h on 11 December, we visited the nest a final time and took photographs and measurements of the nest itself, which still contained two nestlings. Video captured on 10 December was later transcribed and the data summarized. The video was deposited in the Yanayacu Natural History Video, Sound, and Image Library. Description of nestling pterolysis follows Proctor & Lynch's (1993) synthesis of methods developed by Miller (1928) and Stewart (1953).

## RESULTS

*Adult appearance and behavior.* On 3 December, the day before hatching, an adult bird was twice flushed from the nest. On both occasions, the adult flew immediately away from the nest, skulking low in the undergrowth until it was out of sight. The bird had two asymmetrical golden-olive scapular patches, with that on the right being approximately 1 cm square, and a dark brown iris, but was otherwise as described and pictured for subspecies *pelzelni* in Ridgely & Greenfield (2001). While we remained at the nest, the adult returned and hopped agitatedly from perch to perch making the sharp snapping noises characteristic of the genus (Ridgely & Tudor 1994). As we left the area, the adult began

FIG 1. Nest of *Pseudotriccus pelzelni*, 10 December 2002, Volcán Sumaco, Napo, Ecuador. Bottom left inset of egg. Photo by H. F. Greeney.

making a shrill drawn-out "*reeeeeeee*"as described by Ridgely & Greenfield (2001).

The 10 December video revealed a second individual, also with a dark brown iris but lacking any scapular markings. This bird also attended the nestlings. Other individuals (n = 12) observed during our expedition all had brown irises and lacked the golden-olive scapular patches.

*Nest description and location.* The nest was located along a small stream ranging from 1 to 2 m wide. The nest was 1.5 m from the stream edge and, due to the steep banks, was 3 m

FIG. 2. Nestling of *Pseudotriccus pelzelni* on day of hatching, 4 December 2002, Volcán Sumaco, Napo, Ecuador. Photo by H. F. Greeney.

above the stream. The nest opening was oriented roughly perpendicular to the flow of the water. Canopy height around the nest was 30–40 m and characterized by heavy epiphytic growth and a dense to fairly open understory dominated by a variety of Rubiaceae, Melastomataceae, Solanaceae, and Urticaceae saplings and herbs.

The nest itself was a globular ball of moss with a side entrance (Fig. 1). Outside dimensions were 11 cm (width) by 12 cm (depth) by 16 cm (height). The opening was located on the upper half of the nest structure, and was partially covered by a thin curtain of moss. A 2.5 cm lip slightly hooded the entrance. The opening measured 4.5 cm wide by 3 cm tall and opened into a chamber measuring approximately 6.5 cm wide by 9 cm tall. The egg cup was 6.5 cm in diameter and 3.5 cm deep and, though examined only with the aid of a flashlight, appeared to consist of dry brown moss with a few feathers and pale fibers. The nest was affixed to the side of a 1.5 -m tall sapling, 60 cm above the ground. At that point, the sapling was 2 cm in diameter. The nest appeared to be incorporated into living moss on the side of the sapling and was likely built into a pre-existing moss clump.

*Eggs.* Both eggs were immaculate white (Fig. 1); both measured 19.0 x 13.6 mm.

*Nestlings.* The eggs hatched between 16:25 h on 3 December and 16:00 h on 4 December. At 16:00 h on 4 December, the right tarsal measurements of the nestlings were 6.0 and 5.9 mm, respectively. The skin was pale yellow-pink; the feet more yellowish. Nestling gapes were bright yellow and mouth linings were yellow. Sparse patches of dark grey

FIG. 3. Six-day old nestling of *Pseudotriccus pelzelni* 10 December 2002, Volcán Sumaco, Napo, Ecuador. Upper left, dark crust in detail. Photo by H. F. Greeney.

down were located on the forecrown, hindcrown, nape, and scapular area with additional small patches on the humeral areas (Fig. 2).

On 10 December, 6–7 days after hatching, the nestlings weighed 5.5 and 6.0 g and had tarsal measurements of 12.1 and 11.7 mm, respectively. The eyes were still closed but distinctly slitted. The capital contour feathers were developing but not yet breaking the skin. Two dense areas of dark gray down remained, the larger on the fore-crown to mid-crown, and a slightly smaller and less dense patch on the hind crown. Ventrally, the intramalar and submalar tracts were also forming below the skin and formed an indistinct V opening posteriorly. The malar and spinal tracts were slightly more developed and just beginning to break the skin posteriorly. The feather pins of the cervical and pelvic regions were broken < 1 mm and those of the dorsal spinal tract were slightly longer, but still obscured by a dense patch of dark gray down. The retrices were just beginning to break the skin. The femoral tracts were approximately as developed as the cervical and pelvic tracts and formed long thin stripes parallel to the spinal tract. Cural tracts were just beginning to develop below the skin. The wing pin feathers were still ensheathed; the primaries being 4–5 mm long and the secondaries 3.5–4.5 mm. The humeral tracts and marginal coverts were beginning to develop but had not yet broken the skin. From the ventral cervical tract, extending laterally and dorsally into the ventral sternal tract, dark grey pin feathers had broken the skin and were approximately 1 mm long. Centrally, on the ventral sternal tract and extending into the ventral abdominal tract, dull

yellow-white pin feathers had broken the skin and were approximately 1 mm long. The skin was yellowish pink with the legs, and especially the feet, being bright yellow. The gape was bright yellow-orange with a slightly more orange mouth lining. The cloaca was dark grey surrounded by dull yellow (Fig. 3). We also noted that there was a dark substance encrusted on the nestlings' nares (Fig. 3). Review of the video showed that the nestlings often raised their heads and opened their mouths in the absence of adults, and we feel they were having trouble breathing. While the source of this dark crust is unknown, we believe it may have been ash from the air that was present as a result of the recent eruption of the El Reventador volcano which had erupted only a few weeks previously.

*Parental care.* Six days after hatching, during 194 min of filming, the nestlings were fed 27 times and produced 4 fecal sacs, for an average feeding rate of 4.2 feedings per nestling-hour and a fecal sac production rate of one per 6.75 feedings. Nestlings were brooded 18% of the time in three bouts of 13.8, 8.3, and 12.6 min.

Adults perched on, or slightly below, the rim of the nest opening and reached inside to feed and retrieve fecal sacs. The nestlings were oriented with their heads facing the back of the nest, and were not visible from outside the nest while begging. Both adults fed the nestlings. Each removed two fecal sacs and neither consumed the sacs at the nest. Only the adult with scapular patches was observed to brood. The other spent no time inside the nest. The adult with patches fed the nestlings 14 times and spent an average of 6.0 s perched on the rim. The adult without patches visited the nest 15 times, successfully fed 13 times, and spent an average of 8.7 s perched on the rim. This individual visited the nest four times while the other was brooding. The brooding adult did not shift and pass food to the nestlings as in Chat-Tyrants (e.g., *Ochthoeca cinnamomeiventris* and *O. diadamea*, HFG unpubl.). Only one prey item was identified, a c. 2-cm long larval Lepidoptera.

While feeding, adults leaned repeatedly and quickly into the nest one to eight times. We did not determine if adults fed both or only one nestling per visit, but their behavior suggests they frequently brought in multiple prey items.

## DISCUSSION

The phylogenetic position of *Pseudotriccus* has long been unclear. Traditionally allied with the tody-tyrant assemblage (e.g., *Hemitriccus*), cranial, syringeal, and other morphological traits (e.g., proportionately long tarsus) suggest that *Pseudotriccus* pygmy-tyrants are most closely related to the *Corythopis* antpipits (Traylor 1977, Lanyon 1988), with which they are currently placed within the subfamily Elaeniinae, tribe Elaeniini (Dickinson 2003, Fitzpatrick 2004). Behaviorally, however, *Pseudotriccus* and *Corythopis* are strikingly different. Contrary to previous authors (Chapman 1917, Traylor 1977, Traylor & Fitzpatrick 1982), *Pseudotriccus* pygmy-tyrants forage above the ground, up to 5 m in the understory, by flying between perches on plant stems or branches (Wetmore 1972, Hilty & Brown 1986, Ridgely & Tudor 1994, Fitzpatrick 2004; authors' pers. observ.). Although birds of both genera make short upward sally-strikes or leaps for insects on the undersides of leaves, *Corythopis* antpipits search for prey exclusively by walking on the ground with a stereotyped, waterthrush (*Seiurus*)-like gait. Nest structure, placement, and composition material, which have been shown to provide insight into phylogenetic relationships within bird families (e.g., Zyskowski & Prum 1999), including the Tyrannidae (e.g., Lanyon 1988) further demonstrate differences between the two genera. The nest of the Bronze-olive Pygmy-Tyrant

was a globular structure with a side entrance and was attached to the stem of a sapling, above the ground. In contrast, *Corythopis* nests are bulky oven-shaped structures with side entrances, located on the ground (Oniki & Willis 1980, Simon & Pacheco 1996). Although nest composition material may vary with availability and habitat, it is also noteworthy that the *Pseudotriccus* nest was composed entirely of moss, including the cup lining, while *Corythopis* nests are composed primarily of leaves, twigs, and rachises, and lined with fungal hyphae (Oniki & Willis 1980, Simon & Pacheco 1996). We suggest that any similarities in the nests of *Pseudotriccus* and *Corythopis* are superficial at best, and thus question the hypothesis that the two genera represent sister taxa based on behavior.

Within the subfamily Elaeniinae, the Bronze-olive Pygmy-Tyrant nest shows affinities to some described nests of *Camptostoma*, *Zimmerius*, and *Phylloscartes* species (tribe Elaeniini), which tend to be globular with a side entrance and not suspended, but rather bound to a stem or built into existing vegetation (Fitzpatrick 2004). The Bronze-olive Pygmy-Tyrant nest also closely resembles the recently described nest of the Brown-breasted Pygmy-Tyrant (*Hemitriccus obsoletus*; a "bamboo-tyrant" following Ridgely & Tudor 1994), which was globular with a side entrance and attached to vertical stems (Bencke *et al.* 2001). This is particularly interesting given strong similarities in the foraging ecology of *Pseudotriccus* and *Hemitriccus*, as well as other species of the tody-tyrant assemblage (tribe Platyrinchini; Fitzpatrick 2004), and suggests that their non-pendant, globular nest forms may represent a derived character within the tody-tyrant assemblage, which is characterized by pendant, purse-shaped nest forms. On the other hand, the non-pendant, globular nest form appears to have evolved independently in all three of the major tyrannid subfamilies (i.e., Elaeniinae, Fluvicolinae, Tyranninae; Fitzpatrick 2004). Because behavioral characters may be phylogenetically informative in some lineages and variable in others (Zyskowski & Prum 1999), additional information on nest structure, placement, and composition material in *Pseudotriccus* and other genera in the subfamily Elaeniinae will be necessary to evaluate variation in those traits. Partitioning of variation in those traits into genetic and environmental components will allow further elucidation of their phylogenetic implications for *Pseudotriccus*.

As a final note regarding this little known species on Sumaco, we wish to emphasize the potential importance of observed variation in eye color and scapular plumage. The dark brown iris coloration of adults on the slopes of Sumaco is markedly different from the reddish-brown to red iris coloration of populations on the nearby slopes of Volcán Antisana (M. Lysinger pers. com.). Additionally, it appears that the majority of sightings elsewhere in eastern Ecuador are also of individuals with red irides (P. Coopmans, M. Lysinger, L. Nevarete pers. com.). The golden-olive scapular patches shown by one of the two adults attending the nest on Sumaco also appear to be unique, but closer examination of Bronze-olive Pygmy-Tyrants on Sumaco is necessary to determine the significance of these traits.

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