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Breeding of the plain-mantled tit-spintail (*Leptasthenura aegithaloides*) in a variable hawk (*Geranoaetus polyosoma*) nest in the Atacama Desert, Chile

Nidificación de tijeral (*Leptasthenura aegithaloides*) dentro de un nido de aguilucho (*Geranoaetus polyosoma*) en el desierto de Atacama de Chile

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Abstract

A strategy to avoid nest predation by various bird species is the selection of inaccessible sites or sites of actual danger for potential predators. In this sense nesting near a top predator may be an effective strategy to avoid nest predation, if this predator does not have a preference for eggs or nestlings of the first species. This note reports the first record of nesting by Plain-mantled Tit-Spinetail (*Leptasthenura aegithaloides* Kittlitz, 1830) in an active nest of the variable Hawk (*Geranoaetus polyosoma* Quoy & Gaimard, 1824) and the nesting of the common diuca-finch (*Diuca diuca* Molina, 1782) nearby, during two consecutive years, in the Atacama Desert, Chile. This occurred during the "flowering desert" phenomenon in October of 2014 and September of 2015. We discuss hypotheses that may explain this biological association and its possible ecological implications.

Key words: Commensalism, diuca, *Diuca diuca*, *Eulychnia acida,* extended phenotype, nest-site selection, red-mantled hawk.

Resumen

Una estrategia utilizada por diversas especies de aves para evitar la depredación de los nidos es la selección de sitios de nidificación de difícil acceso o que representen un peligro para los potenciales depredadores de sus nidos.En este sentido la ubicación del nido en las cercanías de un depredador de potenciales depredadores del nido, puede representar una estrategia eficiente para evitar la depredación de nidos si dicho depredador no presenta una preferencia por el consumo de aves o sus huevos. En este trabajo se documenta la nidificación de una pareja de tijeral (*Leptasthenura aegithaloides* Kittlitz, 1830) dentro de un nido de aguilucho (*Geranoaetus polyosoma* Quoy & Gaimard, 1824) y la nidificación de diuca (*Diuca diuca* Molina, 1782) en la periferia del mismo, durante dos años consecutivos, en el desierto de Atacama, Chile. Esto se generó en el contexto de la ocurrencia del fenómeno de desierto florido en octubre del año 2014 y en septiembre del 2015, presentando hipótesis que puedan explicar esta asociación biológica y sus posibles implicancias ecológicas.

Palabras clave: Comensalismo, Diuca, *Diuca diuca*, *Eulychnia acida,* fenotipo extendido, selección de sitio de nido.

INTRODUCTION

The bird nest is part of an animals' extended phenotype since its composition, structure and place of construction can influence chick survival (Martin & Roper, 1988; Dawkins, 1999; Hansell, 2000). One of the major causes of reproductive failure in birds is nest predation (Bradley & Marzluff, 2003; Collias & Collias, 1984), thus this interaction may constitute a selective pressure on their life history and behavior (Bradley & Marzluff, 2003). In order to increase the probability of chick survival, parents select sites where potential predation risk is relatively low (Skutch, 1976) by decreasing nest detectability (e.g., using cavities; Martin, 1995) or using sites that are risky for potential predators (Quinn & Ueta, 2008).

The later strategy usually implies constructing the nest close to or in sites frequented by birds of prey (e.g. raptors) that do not perceive chicks, and their parents, as potential preys (Skutch, 1976). This kind of interaction could be

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considered as commensalism and it can increase the commensalistic reproductive success, which has been documented in hummingbirds (Greeney *et al*., 2015) and passerine birds nesting near to or in prey nests (Quinn & Ueta, 2008).

The plain-mantled tit-spinetail (*Leptasthenura aegithaloides* Kittlitz, 1830) is a species belonging to the ovenbird family, Furnariidae. It nests in secondary cavities (i.e., previously existing cavities in the environment) and occasionally, on other species' abandoned nests (Remsen *et al*., 2014). On the other hand, there are reports of this species using active nests (i.e., reproductively active) of black-chested buzzard-eagles (*Geranoaetus melanoleucus* Vieillot, 1819) (Estades, comm. pers. 2015), monk parakeets (*Myiopsitta monachus* Boddaert, 1783) (Barros, comm. pers. 2014) and variable hawks (*Geranoaetus polyosoma* Quoy & Gaimard, 1824) (Estades, 1999).

The variable hawk is a raptor species that belongs to the family Accipitridae and build sits nests using branches as building material (Bierregard & Marks, 2014). In this article we document the selection of a variable hawk's active nest as its nesting site by a plain-mantled tit-spine tail pairin the Atacama Desert, Chile.

This study represents the first record of a pair of plain-mantled tit-spine tail nesting for two consecutive years in the nest of a variable hawk. This behavior occurred during two consecutive years, coinciding with the occurrence of the El Niño phenomenon. In October 8th, 2014, in Quebrada de Tamarico, located 15 km north of the city of Vallenar (28°26'17''S 70°46'59''O, 628 m a.s.l.). We repeatedly observed a pair of plain-mantled tit-spinetails carrying food into a cavity located between the branches of the active nest of a variable hawk (*Geranoaetus polyosoma*). The active nest of this hawk was situated on a Copao cactus (*Eulychnia acida* Phil.), 3.4 m high, and guarded by an adult female (Fig. 1). During that day the nest was visited twice in order to check the activity of the plain-mantled tit-spinetailpair. The first visit was at midday and the second at 17:00 hr. In both visits, it was possible to observe the pair carrying insects into the nest and removing fecal sacs. The second record was made between September 30th and October 3rd, 2015. We did sampling observations of twenty minutes during the morning and afternoon, in the same location already described for 2014. At this time we observed, once again, the same behavior: a plain-mantled tit-spinetailpair entering the same hawk's nest carrying food, removing fecal sacs and vocalizing (Fig. 2). It was also possible to hear the chicks vocalizing when the parents approached, even when the nest was occupied by three hawk chicks and both parents. The visits of the Plain-mantled tit-spinetails remained constant, even with the presence of both hawk parents in the nest.

Additionally, 20 m from the hawk nest cactus, we recorded the nest of a common diuca-finch (*Diuca diuca* Molina, 1782) with two and four eggs during 2014 and 2015, respectively (Fig. 3). Repeated nesting behavior in two consecutive years, confirms the use of the perimeter next to the hawk's nest as a suitable nesting site for these species. This phenomenon has also been observed by Estades

Figure 1: Nest of the red-backed hawk on *Eulychnia acida.*

Figura 1: Nido de aguilucho sobre *Eulychnia acida.*

(comm. pers. 2015), who saw a plain-mantled tit-spinetail nesting on a nest of Black-chested buzzard, with a common diuca-finch nesting on the base of the tree.

The nesting site choice could be determined by a strategy of the plain-mantled tit-spinetail to avoid nest predation, since birds constitute a low proportion of the diet of Variable Hawks (less than 5 %) and this proportion is even smaller for passerine birds (Schlatter, 1980; Jimenez, 1995; Jaksic 2001; Figueroa *et al*., 2003; Travaini *et al*., 2012; Remsen *et al*., 2014). Furthermore, a study of the Variable hawk diet in the Atacama Desert found that birds were not present in their diet (Valladares *et al*., 2015). For this site, species that could be plain-mantled tit-spinetail's nest predators, but at the same time be prey of the variable hawk are the elegant fat-tailed mouse opossum (*Thylamys elegans*) and the invasive species of the gender *Rattus* (Mann, 1978; Iriarte, 2008).

With the information we have reported it is not possible to determine if the pair of plain-mantled tit-spinetail selected this site in order to avoid predation, or because the hawk's nest had suitable cavities in a landscape where this kind of cavities are rare, or both. Notwithstanding the above, the reproductively active nest of the common diuca-finch during both years of sampling, supports the hypothesis that this site could be used to avoid potential predators because 1) The plain-mantled tit-spinetail does not feels threatened by the presence of the variable hawk, and 2) apparently both species consider this site as suitable for reproduction and breeding, suggesting there was not nest predation either

Figure 2: A plain-mantled tit-spinetail parent carrying fecal sacs from its nest.

Figura 2: Adulto de tijeral sacando un saco fecal desde su nido.

Figure 3: Common diuca-finch nest in the vecinity of variable hawk nest.

Figura 3: Nido de diuca en las cercanías del nido de aguilucho.

during the first event. However, it is necessary to obtain further data in order to compare the reproductive success and depredation loss of the plain-mantled tit-spinetail's eggs or chicks within and outside of hawk's nests. Additional information could certainly help uncover the underlying biological explanations as to why these birds selected this nest site and thus, the importance of this biological interaction and the prevalence of this behavior in environments with scarce potential nesting cavities.

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