

OBSERVATIONS ON NEST SITE AND PARENTAL CARE OF THE CRITICALLY ENDANGERED ROYAL CINCLODES (*CINCLODES ARICOMAE*) IN BOLIVIA

Verónica del R. Avalos¹ & M. Isabel Gómez^{1,2,3}

¹Colección Boliviana de Fauna, Cota Cota, Calle 27, La Paz, Bolivia.
E-mail: veronikavalos@gmail.com

²Museo Nacional de Historia Natural, Cota Cota, Calle 26, La Paz, Bolivia

³Asociación Civil Armonía - BirdLife International, Av. Lomas de Arena 400, Casilla 3566, Santa Cruz de la Sierra, Bolivia

Observaciones del sitio de anidación y cuidado parental de la críticamente amenazada Remolinera Real (*Cinclodes aricomae*) en Bolivia.

Key words: Royal Cinclodes, feeding, nest, parental care, *Polylepis* forest.

The Royal Cinclodes (*Cinclodes aricomae*) is a furnariid considered as Critically Endangered (IUCN 2013) that inhabits the humid patches of *Polylepis* forest and montane shrubs, mainly at altitudes between 3500–4800 m a.s.l. (Birdlife International 2013). The species is threatened because the population is small, declining, and restricted to a severely fragmented habitat (Birdlife International 2013). It was estimated that the world population is close to 250 pairs in the Andes of south-east Peru and adjacent Bolivia (Engblom 2002). In Bolivia, there is a population of 50–70 individuals in the Cordilleras Real of La Paz (Gómez *et al.* 2011). The breeding season of the species occurs in the wet season. Adults

were seen carrying nesting material in September and November, and fledglings were observed in February and March and juveniles between January and April (Aucca & Ferro 2006, Gómez 2009, Birdlife International 2013), respectively. There are also some observations of nests in Peru, on hillsides of large rocks that are near to the ground level (Aucca & Ferro 2006). Nevertheless, virtually not much is known about the nesting biology of this species. Hence the aim of this study was to alight this part of the life history of this species. Here, we report the first description of the nest site and the parental behavior, including feeding of the nestlings, of the Royal Cinclodes in Bolivia.

We studied the Royal Cinclodes in forest patches composed of *Polylepis pepeii* (Rosaceae) and *Gynoxys asterotricha* (Asteraceae) (14°40'S, 69°5'W), which is located nearby to Keara locality, 14 km northwest of the town of Pelechuco, department of La Paz, Bolivia. We searched and observed couples of the Royal Cinclodes from November–December 2008 and in January 2009, respectively.

A single nest containing two nestlings was discovered by following adults carrying food to the nest site on 25 November 2008. The nest was inside a cavity in a slit of a cliff face, located 20 m away of a *Polylepis* forest patch, but covered with scattered small *Polylepis* and *Gynoxys* shrubs and moss cover. The ground between the cliff face and *Polylepis* was covered with rocks of different sizes. The nest cavity entrance, was located 6 m above the ground. After nesting was finished, the cavity dimensions were measured on 4 January 2009. The entrance was 12 cm in height and 30 cm in width, and the cavity itself was 30 cm deep. The inside was lined with pieces of grass.

During five consecutive days from 26–30 November 2008, one observer (VA) monitored the parental behavior of the nest from the ground (without a blind) during the fog days at a distance of 10–15 m. The presence of the observer at this distance had apparently no effect on the birds' behavior. In addition, the food items carried by the parental birds were identified whenever possible. The nest was observed for a total of 55 h during five consecutive days, in which 640 visits by the adult birds were recorded. Both adults stayed in the nest cavity with nestlings (probably brooding or feeding) for $0.9 \text{ min} \pm 2.6 \text{ SD}$ per visit (range 0.05–20.2). However, the time spent in the cavity appeared to decrease as the days passed. In the first day of observation, the adults spent $1.8 \text{ min} \pm 3.2 \text{ SD}$ per visit in the nest and only $0.5 \text{ min} \pm 1.8 \text{ SD}$ in the fifth day. We suspect the adults only fed the

nestlings because they stayed in the nest cavity for a short time (a minimum of 3 s). Sexual roles in parental care could not be determined because the Royal Cinclodes exhibits no sexual dimorphism in plumage coloration. Nestlings typically started making begging calls after an adult arrived near to the nest site or entered into the nest cavity, and when adults left the cavity. VA heard begging vocalizations from two nestlings during the first four days, but perhaps from only one on the last day of observation.

Among the prey carried by the adults to the nestlings were: larvae of three kinds of nocturnal butterflies (26%), earthworms (23%), spiders and cocoons (20%), myriapods (10%), roundworms (5%), leeches (4%), and other unidentified items (12%) ($n = 150$ visits). We also found leeches, some larvae and small earthworms in the forest and in the moist pastures nearby. Adults also were seen scratching for food in the moss, on the ground of adjacent *Polylepis* forests and pastures. Mean nest feeding rate by both adults was $11.207 \text{ visits per hour} \pm 4.295 \text{ SD}$ (range 2–20, $n = 55 \text{ h}$). The adults rarely arrived at the cavity entrance at the same time (2% of total nest visits), but when they were together, one adult vocalized before leaving the nest. In some cases, the adults fed the nestlings but remained near the nest, occasionally flying back and forth toward the cavity entrance watchfully. Adults removed fecal sacs in their bill and flew away $> 10 \text{ m}$ from the nest.

Little is known about predation on the Royal Cinclodes, or on anti-predation strategies used by this species. On two occasions, adults and nestlings remained silent within the nest cavity or avoided to enter the nest, respectively, when potential predators were nearby. First, on 26 November, when a couple of Aplomado Falcons (*Falco femoralis*) arrived vocalizing loudly near to the nest cavity and stayed perched on the cliff for 5 min, the adult and nestlings inside the nest cavity

stayed quietly for 25 min, even when falcons flew away from the cliff. Second, on 27 November when a small falcon (probably American Kestrel, *Falco sparverius*) arrived to the *Polylepis* forest near the nest site, the adults waited > 84 min before they returned stealthily to the nest cavity, and after 90 additional min they behaved similar the day without predator occurrence.

During the period of study, we observed also displays of adults at the edge of the *Polylepis* forest. On 3 December 2008, three adults were feeding and chasing among them, and on 8 January 2009, a group of five individuals were vocalizing loudly and making short flights up to the trees and down to the moss understory. On 20 January 2009, two adults and one juvenile were observed together in the vicinity of the nest site.

The Royal Cinclodes appeared to exhibit biparental care as found in other Cinclodes genera (Remsen 2003). Furthermore, our Royal Cinclodes nest site in a cliff fissure is similar to the nesting in rocks by its sister species, the Stout-billed Cinclodes (*C. excelsior*) (Graves & Arango 1988), and is consistent with Royal Cinclodes nests in Peru (Aucca & Ferro 2006). The use of natural cavities seems to be a common behavior in the genus *Cinclodes* (Vaurie 1980, Zyskowski & Prum 1999, Remsen 2003), with the particularity that the Royal Cinclodes observed in this study placed the nest in a cliff near to *Polylepis* and *Gynoxis* forest. Such sheltered nesting sites might be important for keeping eggs and nestlings warm in the cold and damp weather of *Polylepis* forests. The size of the entrance may also restrict entry by larger avian predators. The behavior of adults and nestlings could indicate some strategies against predators as well, yet further studies regarding anti-predation behavior of this species are needed. Because the Royal Cinclodes is a habitat specialist limited to the forests of *Polylepis*, it is necessary to achieve more studies about breeding and

feeding ecology of this species to understand the resources needed for its survival. We hope the provided information can be used in subsequent research for the species' conservation.

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