

## FIRST REPORT OF BURROWING PARROT (*CYANOLISEUS PATAGONUS*) NESTING IN TREE CAVITIES

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**Abstract** · The Burrowing Parrot *Cyanoliseus patagonus* is known to breed in burrows mostly on cliffs and ravines in arid or semi-arid regions of Argentina and Chile. However, during a tree cavity monitoring project we confirmed at least two active nests in tree cavities. Cavity entrances were located between 3.1 and 5.3 m above the ground in live caldén (*Prosopis caldenia*) trees, Parque Luro, province of La Pampa, Argentina. One nest failed while the other one successfully produced three fledglings. The absence of cliffs and scarcity of ravines in the region, and the presence of a nesting colony of the Blue-crowned Parakeet (*Thectocercus acuticaudatus*) in the site may have promoted the adoption of this new nesting substrate for the species.

### Resumen · Nidificación inusual del Loro Barranquero (*Cyanoliseus patagonus*) en cavidades naturales de árboles

El Loro Barranquero (*Cyanoliseus patagonus*) nidifica mayoritariamente en cavidades en barrancos y acantilados en regiones áridas y semiáridas de Argentina y Chile. Sin embargo, durante un proyecto de monitoreo de cavidades en árboles, confirmamos al menos dos nidos activos de Loro Barranquero. La entrada de las cavidades estuvo localizada entre 3.1 y 5.3 m de altura en árboles vivos de caldén (*Prosopis caldenia*), en Parque Luro, provincia de La Pampa, Argentina. Un nido fracasó mientras que el otro tuvo éxito produciendo tres volantones. La escasez de barrancos y la presencia de una colonia de nidificación de Calancate Común (*Thectocercus acuticaudatus*) en el sitio, podrían haber favorecido la adopción de este nuevo sustrato de nidificación para la especie.

**Key words:** Burrowing Parrot · Cavity nester · *Cyanoliseus patagonus* · Unusual nidification

The dependence on cavities for nesting could limit the distribution of most Neotropical cavity nesters, at least in some environments (Collar 1997, Cornelius et al. 2008; Cockle et al. 2009, 2010). With the exception of parakeets of the genus *Myiopsitta*, which are specialized in the building of stick nests, the rest of the Neotropical parrots need cavities for nesting, and tree-cavities are the most commonly used type of cavity (Brightsmith 2005, Parr & Juniper 2010, Renton et al. 2015). A few parrot species use natural holes in cliffs and ravines, and some species excavate cavities in cliffs or termite mounds (Brightsmith 2005, Parr & Juniper 2010). Nest site selection in parrots usually depends on the availability of adequate breeding substrates and the abundance and distance to resources such as food and water (Shukuroglou & McCarthy 2006, Ortiz-Catedral & Brunton 2009, Webb et al. 2012, Galbraith et al. 2014, Tella et al. 2014, Barría et al. 2017, Ramirez-Herranz et al. 2017). Local predator communities could determine which type of breeding substrates are safer for breeding, and parrots could be selecting breeding sites based on predation risk (Brightsmith 2005, Renton et al. 2015). For example, some species like Military Macaw (*Ara militaris*) or Red-fronted Macaw (*Ara rubrogenys*), which commonly use cavities in cliffs, occasionally use tree-cavities (Rojas et al. 2012, Bonilla Ruz et al. 2014). On the other hand, some species which usually breed in tree-cavities, as the Red-and-green Macaw (*Ara chloropterus*) or Amazon parrots (*Amazona* sp.), use cliff cavities in some regions (Eitniear et al. 1997, Pivatto et al. 2006, Williams 2009, Stahala 2016).

Receipt 20 July 2017 · First decision 6 November 2017 · Acceptance 28 March 2018 · Online publication 7 April 2018

Communicated by Donald Brightsmith © The Neotropical Ornithological Society

The Burrowing Parrot (*Cyanoliseus patagonus*) is a medium-sized parrot that lives in the southern Neotropical region. It is common in shrubby steppes and grasslands of arid and semi-arid regions of Argentina, Chile, and, in the past, in Uruguay (Di Iorio et al. 2010, Masello et al. 2011, Couve et al. 2016). As with many other Psittaciformes, the Burrowing Parrot is highly gregarious, usually moving and roosting in large flocks of up to 3000 individuals and nesting in large colonies (Masello & Quillfeldt 2002, Masello et al. 2006, Grilli et al. 2012, Tella et al. 2014, Sánchez et al. 2016, Ramirez-Herranz et al. 2017). The Burrowing Parrot is considered a species dependent on cliffs for nesting. However, in nest site selection it shows some plasticity and has been recorded nesting in collapsed mines, wells, and house walls that mimic the conditions of cliffs (Masello & Quillfeldt 2005a). Although several resources are critical for the maintenance of healthy populations of the species, such as water availability and natural vegetation (Masello et al. 2011, 2015), some authors suggested that availability of adequate nesting substrate could limit its distribution (Masello & Quillfeldt 2005b, Tella et al. 2014, Ramirez-Herranz et al. 2017). Here we report two nesting attempts of Burrowing Parrots in tree cavities during the Austral breeding season of 2016/2017.

This study was conducted at the Reserva Provincial Parque Luro (RPPL, 36°54'33"S; 64°16'57"W), La Pampa Province, Argentina. The climate is semi-arid, with seasonal precipitations (400–700 mm annual) from October to March and a dry season during 6 to 7 months per year (Cabrera & Willink 1973, Cano et al. 1980). With 7600 ha, the RPPL is the largest protected caldén (Fabacea, *Prosopis caldenia*) forest area in La Pampa Province and houses a mosaic of different habitats, including extremely closed scrubland (locally known as "Fachinal") and secondary closed and mature open forests (Sarasola et al. 2005). The caldén is the dominant tree species in the forest, and in well preserved mature old forests, this tree offers a large number of cavities (21 cavities/hectare, unpubl. data). However, only 2.3% of the tree cavities in our study site have dimensions similar to those used by Burrowing Parrots on cliffs (Masello et al. 2006, López et al. in prep.).

As part of a monitoring project on cavity nesters, we searched for and monitored tree-cavities during the austral breeding season (between September 2016 and January 2017). We visited each cavity periodically (every 5 to 7 days). During each visit we checked the cavity content to determine if it was occupied and the identity of the species using it. We found that two tree-cavities in caldén trees were used by Burrowing Parrots to breed (Figure 1). The cavities (A and B) were close to each other (750 m apart) and located in an area with a high density of Blue-crowned Parakeet (*Thectocercus acuticaudatus*) and Monk Parakeet (*Myiopsitta monachus*) nests. Cavity depths were 50 cm (A) and 133 cm (B). The entrances of the cavities were located in secondary branches at heights of 5.3 m (A) and 3.1 m (B). The dimensions of

the cavity entrances were (width x height): 29.3 x 22.5 cm (A) and 17.0 x 13.7 cm (B). Both cavity trees showed signs of fire damage (i.e., scars on the outside and the inside of the cavities).

Cavity A was occupied by a pair of Burrowing Parrots from at least 12 October 2016 (when the nest was discovered) to 22 November 2016. During the visit on 22 November, there were two adult Burrowing Parrots inside the cavity but no egg was seen. In the next visit on 29 November (7 days later), the cavity was occupied by a Barn Owl (*Tyto alba*) incubating two eggs. Therefore, the Burrowing Parrots apparently left the cavity before laying eggs. After being occupied by the owls, the Burrowing Parrots kept vocalizing in front of, or in the entrance of the cavity which could suggest that they were actively displaced by the owls.

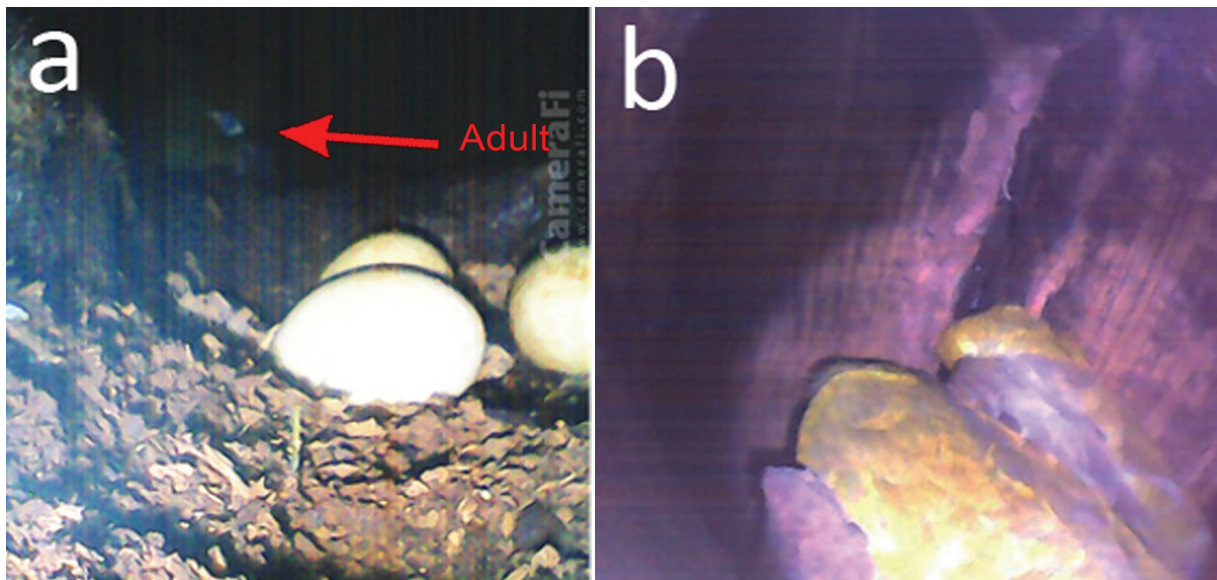
Cavity B was occupied by a pair of Burrowing Parrots, from 2 November 2016 (when the nest was discovered) to late January of 2017. The parrots laid three eggs between 15 and 22 November 2016 (Figure 2). The three eggs successfully hatched, and on 30 January 2017, three fledglings left the nest. During the breeding season we observed up to nine adult Burrowing Parrots around this nest. Although individuals were not individually marked, we observed at least three different individuals entering the cavity and staying for a few minutes inside the nest, in what we assume were feeding visits. Burrowing Parrots around the nest vocalized with alarm calls when Pampas fox (*Lycalopex gymnocercus*), Molina's hog-nosed skunks (*Conepatus chinga*), wild boars (*Sus scrofa*), and people approached the nesting tree.

The use of natural cavities in trees by the Burrowing Parrot has not been recorded previously. Although the species has been recorded breeding in different structures of human origin such as collapsed mines, quarries, wells, and house walls (Masello & Quillfeldt 2005a, Tella et al. 2014), all these unusual breeding substrates resemble the natural breeding substrates used by the species (cliff or ravine walls). The use of tree cavities is thus a completely new breeding substrate suggesting that the species may be more flexible in nesting than previously thought. However, the use of cavities in trees is not that unexpected, as other presumed exclusive cliff nesters, including Red-fronted Macaw and Military Macaw, have recently been found nesting in tree cavities (Rojas et al. 2012, Bonilla Ruz et al. 2014). The lack of parrot studies in this particular forest region prevents us from saying if this is a regular but under-observed phenomenon, or if just these particular individuals were exploring new nesting substrates.

The Reserva Provincial Parque Luro is located in central Argentina, a region considered as a wintering area for the Burrowing Parrot (Bucher & Rinaldi 1986, Bucher & Rodríguez 1986, Masello et al. 2011). However, at the reserve itself, the Burrowing Parrot is considered as uncommon year-round (Siegenthaler et al. 2004). Burrowing Parrots breed in ravines between 60 and 120 km away (close to General Acha and Vic-



**Figure 1.** Adult Burrowing Parrot (*Cyanoliseus patagonus*) on the entrance of the cavity B occupied by the species nesting during the 2016 season in the Reserva Provincial Parque Luro, La Pampa, Argentina. Photograph: P. Orozco Valor (28 November 2016).



**Figure 2.** Burrowing Parrot (*Cyanoliseus patagonus*) nest in a natural cavity in a Caldén (*Prosopis caldenia*) tree, Reserva Provincial Parque Luro, La Pampa, Argentina; a) three Burrowing Parrot eggs (front) and adult (behind) can be seen within the tree cavity B (see text), 22 November 2016; b) Burrowing Parrot fledglings in the cavity, 6 January 2017.

torica towns). In the last decade, flocks of 500 to 1000 individuals were observed during the breeding season gathering in a town roost within 40 km of the RPPL (Toay; Galmes & Reyes com. pers.), and some smaller groups of parrots (10–15 individuals) have

been seen feeding in the Reserve (FGL and JMG pers. obs.). The reasons for this recent increase in the number of parrots in the area remain unknown and deserve further research. There are no ravines nor rocky cliffs within 50 km of the RPPL. It is likely that

this absence of typical nesting substrates has induced the parrots to explore other potential nesting sites.

Caldén tree pods are an abundant and high quality parrot food source at the site. There is also fresh water available. Therefore, except for the lack of cliffs the area seems to provide adequate/appropriate ecological conditions for the species. In this context, the high density of tree-cavities in the RPPL allowed Blue-crowned Parakeets to establish a nesting colony. During the breeding season we detected at least 12 active nests of this species in an area of less than 2 ha, and at least two dozen of nests of Monk Parakeets in the same area. Maybe Burrowing Parrots found this high density of parakeets similar to the colonies where they usually breed, triggering an interspecific attraction stimulus leading them to occupy some of the available cavities.

Our observations here can help to understand the flexibility in nest site choice of the Burrowing Parrot, and how using tree cavities could facilitate the use of the high quality caldén forest.

## ACKNOWLEDGMENTS

We thank the Dirección de Recursos Naturales and the Subsecretaría de Ambiente de La Pampa for authorizing the investigations. The staff of the Subsecretaría de Turismo de La Pampa kindly allowed us to use facilities within the RPPL, and L. Córdoba granted us transportation to and from RPPL. We thank the volunteers who helped us in the field: P. Orozco Valor, M. Larrea Sola, D. Gallego, L. Ambrosio, E. Giusti, M. Viana, L. Echeto, G. Desch, C. Sanchez, C. López, T. Pagella, and C. Faguaga. We also thank J. Masello, two anonymous reviewers, and the editor D. Brightsmith for their contribution to this manuscript. FGL and MER were supported by a fellowship from the National Scientific and Technical Research Council (CONICET; Res. D N° 4981/15 and 4845/14). JMG and IB are CONICET Researchers. We want to dedicate this paper to the late Mikel Larrea Sola, an in-fatigable and smiling field assistant and friend who left us too early.

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