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## Raillietiniasis in cacique parrot (*Deroptus accipitrinus fuscifrons*) and its importance as a zoonotic disease

### Raillietiniasis en loro cacique (*Deroptus accipitrinus fuscifrons*) y su importancia como enfermedad zoonótica

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#### Abstract

Raillietinosis is a disease of zoonotic importance. The objective of the present work was to report the presence of Raillietina sp. in Cacique parrots (*Deroptus accipitrinus fuscifrons*) in captivity by coprology and necropsy. Analyses revealed that the birds studied were found to be parasitized by cestodes compatible with Raillietina sp. This registry is the first report in Argentina and it acquires great importance since there is the possibility of its transmission to their owners and / or professionals, such as veterinarians, biologists and keepers who contact more directly with these birds.

**Keywords:** *Deroptus accipitrinus*, Parrots, Raillietina, Zoonosis.

#### Introduction

Raillietinosis is a zoonotic disease (OPS, 2003) produced by cestodes, characterized by diarrhea (sometimes bloody) during the acute state and emaciation, cachexia and anemia during the chronic phase. It is caused by some species of the genus Raillietina that parasitize the small intestine (Paul et al. 2012); in parrots it presents a mild parasitism that in most cases does not cause clinical signs (Sciabarrasi et al. 2020).

Of the genus Raillietina, more than 200 species are known; most of them affect birds, in these the most frequent species are: *R. taylori*, *R. tetragonoides*, *R. echinobothrida*, and *R. bonini*. The first two being those eventually reported in parrots and *R. cacatuinae* in cockatoos housed in enclosures with a dirt floor (Doneley, 2010).

#### Resumen

Raillietinosis es una enfermedad de importancia zoonótica. El objetivo del presente trabajo fue reportar la presencia de Raillietina sp. en loros caciques (*Deroptus accipitrinus fuscifrons*) en cautiverio por coprología y necropsia. Los análisis revelaron que las aves estudiadas estaban parasitadas por cestodos compatibles con Raillietina sp. Este registro es el primero que se reporta en Argentina y adquiere gran importancia ya que existe la posibilidad de su transmisión a sus dueños y/o profesionales, como veterinarios, biólogos y cuidadores que tienen un contacto más directo con estas aves.

**Palabras clave:** *Deroptus accipitrinus*, loros, Raillietina, Zoonosis.

They all have indirect life cycles with a pre-patent period of 2 to 3 weeks (García Corredor et al., 2013). The cycle begins with the release of the egg-filled proglottids in the faeces of the definitive hosts (rodents, birds). These are ingested by intermediate hosts (ants, flies, snails, slugs, depending on the Raillietina species).

Then, from the embryonated eggs, the cysticeroid larvae develop, which are infective once the definitive host feeds on the arthropod or the other intermediaries (Ensucho et al, 2015). They are relatively frequent parasites in wild Old-World parrots (yacos, cockatoos), but not in South American parrots (Melo et al., 2013).

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The cacique parrot (*Deroptus accipitrinus*) is a species of South American bird of the Psittacidae family; it is the only member of the genus *Deroptus* (IUCN, 2014). It inhabits the jungles of the Amazon and the Orinoco basin where its population is declining due to increased deforestation (Collar, 1997). There are two subspecies *Deroptus accipitrinus accipitrinus* the nominal species and *Deroptus accipitrinus fuscifrons*, with a much smaller range located south of the Amazon and is distinguished by the much darker color of the feathers of the head. Their size is 33 to 35 cm and when they feel threatened or excited, they have the property of raising the collar of feathers on the nape like a fan (Forshaw, 2010).

The objective of the present work was to report the presence of *Raillietina* sp. in Cacique parrots (*Deroptus accipitrinus fuscifrons*) in captivity; in order to contribute to improving their sanitary and handling conditions as well as those of their caregivers.

### Methodology

This study was carried out at the Zoological Station "La Esmeralda" of the Province of Santa Fe, Argentina (Longitude 31 ° 35'11.6"S, latitude 60 ° 41'32.4"W, at 25 masl), in the months of February and March 2020.

Fecal matter samples were taken from 6 adult individuals of *Deroptus accipitrinus fuscifrons* (3 males and 3 females) each housed, for this study, individually in enclosures according to the species (Figure 1), plus a dead specimen of

traumatic causes preserved of chilled form. The feces were collected non-invasively by means of a polyethylene placed on the floor of each cage, which were removed after 6 hours. At the time of collecting the samples, the outer halo and the lower part that came into contact with the plastic were discarded, so the inner part was taken to avoid damage to the sample. The sampling was repeating 3 times with an interval of one week between each one. They were transported in polyethylene bags and refrigerated, avoiding as much as possible exposure to external factors such as heat and air currents that could cause damage to them, to the Zoology laboratory of the Faculty of Veterinary Sciences (UNL), in a time less than eight hours, where they were processed.

They were processed using the combined Teuscher flotation and sedimentation technique (sedimentation-flotation with SO<sub>4</sub>Zn) and observed under an optical microscope for identification, counting and measurement according to Martínez Tovar et al., (2015).

Flatworms collected from the dead individual were stained with hematoxylin and rinsed with phenol, according to the methodology adapted from Amato, Böeger and Amato (1991) and Hoffmann (1987). The cestodes were mounted on slides with permanent synthetic resin, identified according to the keys of Anderson, Chabaud and Willmott (2009), Khalil, Jones and Bray (1994) and Vicente, Rodrigues, Gomes and Pinto (1995) and incorporated into the collection of the Chair of Zoology, Diversity and Environment of the FCV-UNL.



**Figure 1.** Individual of (*Deroytus accipitrinus fuscifrons*) in a room for taking samples.

**Statistical analysis:** This research corresponded to a descriptive analytical cross-sectional study with simple random sampling (Wayne, 2006). The results of this research were tabulated in an EXCEL sheet and analyzed by the EPIINFO statistical program (Pérez-Cardona and Suárez-Pérez, 2004). The prevalence of infection was calculated according to Bush, Lafferty, Lotz and Shostak (1997).

**Ethical aspects:** The enclosures were within the guidelines of the WAZA (2017). The management of the birds and the information had the authorization of the Directorate of the Fauna Center "La Esmeralda" together with the corresponding endorsement of the Institutional

Committee of Ethics, Bioethics and Animal Welfare.

### Results and Discussion

Stool analysis revealed the presence, in all samples, of eggs (from 53.9 to 57.7 per 42  $\mu$ ) of cestodes, isolated or in ovigerous capsules approximately 8 in number (Fig. 2). In the autopsy of individual No. 7, hemorrhages of varying intensity were observed in the intestinal mucosa, catarrhal hemorrhagic enteritis, and the parasites themselves during macroscopic observation. Therefore, the 7 birds studied were found parasitized by cestodes compatible with *Raillietina* sp. (100% prevalence).



**Figure 2.** Raillietina sp eggs in ovigerous capsules observed at 40X in *Deropterus accipitrinus fuscifrons* fecal matter.

Sciabarrasi et al. (2020) with similar diagnostic methodology reported the presence of Raillietina sp. in individual parrots of the captive *Forpus coelestis* and *Forpus conspicillatus* species in Argentina, originating from illegal wildlife trafficking.

In Brazil, Melo et al. (2013) recorded parasitism by Raillietina sp. in parrots of the species *Amazona aestiva* in captivity. Although cestodes are common in non-psittacidal wild birds, they are not common in parrots, and their association with mortality is unusual. In general, parrots parasitized by these flatworms can show anemia, weight loss and diarrhea, but more serious infections can facilitate the appearance of other diseases that can cause the death of the animal (Doneley, 2009).

The gregarious habit of parrots can represent a risk for populations affected by parasitic infections; the high population density of the hosts can be an influencing factor in the mortality of individuals facing a disease (Hochachka and Dhondt, 2000).

The feeding habits of birds can also be related to parasitism. Birds that feed on fruits and grains, such as cacique parrots, have great possibilities of contamination during the search for food (Costa et al., 2010), and in turn, can disperse pathogens during foraging (Barrera-Guzmán and Guillén-Hernández, 2008). Also, it factors like stress, inadequate nutrition and contaminated

environments that facilitate the presence of parasites and hosts the normal development of their life cycle.

The treatment and subsequent control of the affected parrots was carried out by deworming with 6 mg of Praziquantel per kg of body weight, in a single dose, mixed with drinking water.

This study made it possible to identify gastrointestinal parasites such as Raillietina in *Deropterus accipitrinus fuscifrons* in captivity, being the first record in Argentina. The fact that other groups of gastrointestinal parasites have not been reported may be due to the systematic deworming plan carried out for nematodes and coccidia by the Institution.

**Conflict of interest:** The author has no conflicts of interest to declare in relation to this manuscript.

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### Conclusions

Wild psittaciformes are hosts for a wide variety of parasites, including some zoonoses, and can transmit them through fecal matter, blood,

secretions and arthropods. The registration in this study of *Raillietina* spp in the *Derophtus accipitrinus fuscifrons* analyzed acquires great importance since, according to what has been indicated by authors, there is the possibility of its transmission for their owners and / or professionals, such as veterinarians, biologists and caregivers who contact more directly with these birds.

The coproparasitology in these species constitutes an important tool for the evaluation of the sanitary conditions of the environment. Despite the limitation of research in this field due to the difficulty in accessing the hosts, knowledge about diseases and their implications are of fundamental importance for biodiversity conservation and management programs, highlighting the knowledge of zoonotic diseases in their actions.

As a prophylaxis, it is recommended as a useful measure for the control of infections by this parasite, the control of rodents, insects and the hygienic handling of food by the caretakers or holders of the birds to avoid contamination of the food to parrots.

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