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Short Communication

First record of *Lagochilascaris minor* (Nematoda: Ascarididae) in *Leopardus geoffroyi* (Carnivora: Felidae) in Brazil

Primeiro registro de *Lagochilascaris minor* (Nematoda: Ascarididae) em *Leopardus geoffroyi* (Carnivora: Felidae) no Brasil

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Abstract

Lagochilascariasis is a parasitic disease caused by nematodes of the genus *Lagochilascaris*. These parasites occur in the neotropical region and their definitive hosts are wild animals, domestic dogs and felids and, accidentally, humans. Here, infection by *Lagochilascaris minor* is recorded for the first time in a wild felid, in Brazil.

Keywords: Lagochilascariasis, "Geoffroy's cat", natural infection, wild felid.

Resumo

A lagochilascaríase é uma doença parasitária causada por nematoides do gênero *Lagochilascaris*. Com distribuição neotropical, este parasito tem como hospedeiros definitivos animais silvestres, canídeos e felídeos domésticos e, acidentalmente, seres humanos. Registra-se a primeira ocorrência de *Lagochilascaris minor* em um felídeo silvestre no Brasil.

Palavras-chave: Lagochilascaríase, "Gato-do-mato", infecção natural, felino silvestre.

Introduction

Lagochilascariasis is a parasitic disease caused by nematodes of the genus *Lagochilascaris* Leiper, 1909 (PALHETA-NETO et al., 2002). Adult worms infect the oesophagus, pharynx, trachea, related tissues (rhino-oropharynx), and cervical lymphonodes of the definitive hosts (wild animals, dogs and domestic cats, and humans) (CAMPOS et al., 1992, 2017).

There are five currently valid species: *Lagochilascaris minor* Leiper, 1909; *Lagochilascaris major* Leiper, 1910; *Lagochilascaris turgida* (Stossich, 1902) Travassos, 1924; *Lagochilascaris buckleyi* Sprent, 1971; and *Lagochilascaris sprenti* Bowman, Smith and Little, 1983. In South America, *L. major* and *L. minor* have been described as parasitizing felids. However, only *L. minor* has been correlated with human pathological conditions, and this species is therefore considered to have greatest importance of public health (PALHETA-NETO et al., 2002).

Leopardus geoffroyi (d'Orbigny & Gervais, 1844), popularly known as "Geoffroy's cat", is a small neotropical felid that is found across an area extending from south-eastern Bolivia to southern Argentina and Chile (PEREIRA et al., 2015). In Brazil, the species occurs only in the state of Rio Grande do Sul (OLIVEIRA & CASSARO, 2005). These animals have nocturnal habits and solitary behavior, and their diet is made up of small mammals and other vertebrates (BISCEGLIA et al., 2008).

The parasitic fauna of this species has been little studied, as is the case with other neotropical carnivores. It is known that the helminth fauna of Geoffroy's cat is composed of 19 taxa: Nematoda (9), Cestoda (8) and Acanthocephala (2), for which records exist mainly in Brazil, Argentina and Paraguay (Table 1). This paper reports the first occurrence of parasitism by *L. minor* in *L. geoffroyi* in Brazil.

Materials and Methods

In November 2012, a male specimen of *L. geoffroyi* was found dead in the municipality of Pelotas (31 ° 46'19 "S; 52 ° 20'34" W), in the south of the state of Rio Grande do Sul, Brazil. It was collected and taken to the Laboratório de Zoologia de Vertebrados of the Universidade Federal de Pelotas (UFPel) for osteological study.

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The gastrointestinal, respiratory and urinary tracts were donated to the Laboratório de Parasitologia de Animais Silvestres (LAPASIL) of UFPel for parasitological study. We received permission to conduct the study from the Coordinating Council for Teaching, Research and Extension from Universidade de Pelotas, reference COCEPE 234 7861-06/07/2017.

The organs were sectioned, opened and washed with running water in a sieve (150μm mesh). The mucosa and the resulting lavage content were examined under a stereomicroscope. The nematodes were quantified, washed in physiological solution, fixed in cold A.F.A and stored in 70% ethanol. Subsequently, they were clarified with Amann's lactophenol, mounted on semi-permanent slides and viewed under a microscope to perfom morphometric and morphological identifications, in accordance with the description of Sprent (1971a), Costa et al. (1986) and Bowman et al. (2002). The specimens were deposited in the Helminth Collection of the Laboratório de Parasitologia de Animais Silvestres, Instituto de Biologia, Universidade Federal de Pelotas (CHLAPASIL/UFPel) (No. 825).

Results and Discussion

Three female and two male nematodes, all in the adult form, were found in the trachea and esophagus.

The following morphological characteristics were used in identifying *L. minor*: presence of three lips that were wider than long with well-developed cuticular covering; presence of a post-labial deep groove (Figure 1a); posterior margin of the groove forming three triangular interlabial projections; undeveloped lateral alae present along almost the entire length; male with two alate spicules that were smaller than the ejaculatory duct (Figure 1b), equivalent to 33% of the length of the duct (Table 2); and females with vulvar opening located near the middle of the body (Table 2); Eggs were observed in the uterus and presented no more than 25 sculptured pits in their surface (Figure 1c) as described by Volcán et al. (1992).

Lagochilascaris minor and *L. major* are morphologically similar. The morphological characters that differentiate these two species are: the size of the spicules and the ejaculatory duct; and the number of sculptured pits on the surface of the eggs. In *L. minor,* the spicules account for 34 to 56% of the size of the ejaculatory duct, while in *L. major,* the spicules account for 59 to 81% of the duct size. Eggs of *L. major* have 35 to 45 sculptured pits, while *L. minor* has 15 to 25 (COSTA et al., 1986).

The biological cycle of *L. minor* has not been elucidated, but experimental models have suggested that it is heteroxenic and involves rodents and cats, as the intermediate and definitive hosts, respectively (CAMPOS et al., 1992; VOLCÁN et al.,

Table 1. Helminth fauna of *Leopardus geoffroyi* in different regions of South America.

Helminths	Geographical region	References
Nematoda		
Ancylostoma tubaeforme	Argentina	Beldomenico et al. (2005)
Capillaria sp.	Argentina	Beldomenico et al. (2005)
Cylicospirura felineus	Argentina Brazil	Beldomenico et al. (2005) Gallas et al. (2014)
Didelphonema longispiculata	Argentina	Beldomenico et al. (2005)
Dioctophyme renale	Brazil	Trindade et al. (2018)
Pterygodermatites (*Multipectines*) *cahirensis*	Argentina	Beldomenico et al. (2005)
Trichuris campanula	Argentina	Beldomenico et al. (2005)
Toxascaris leonine	Argentina	Beldomenico et al. (2005)
Toxocara cati	Argentina Brazil	Beldomenico et al. (2005) Gallas & Silveira (2013)
Cestoda		
Diphyllobothrium gracilis	Paraguay Brazil	Schmidt & Martin (1978) Vieira et al. (2008)
Diphyllobothrium latum	Brazil	Vieira et al. (2008)
Echinococcus oligarthrus	Brazil	Schmidt (1986)
Mesocestoides sp.	Brazil	Gallas & Silveira (2011)
Spirometra mansonoides	Paraguay	Schmidt & Martin (1978)
Taenia spp.	Argentina	Beldomenico et al. (2005)
Taenia omissa	Brazil	Vieira et al. (2008)
Taenia pisiformis	Brazil	Vieira et al. (2008)
Acanthocephala		
Oligacanthorhynchus pardalis	Brazil	Travassos (1917)
Oncicola campanulata	Brazil	Vieira et al. (2008)

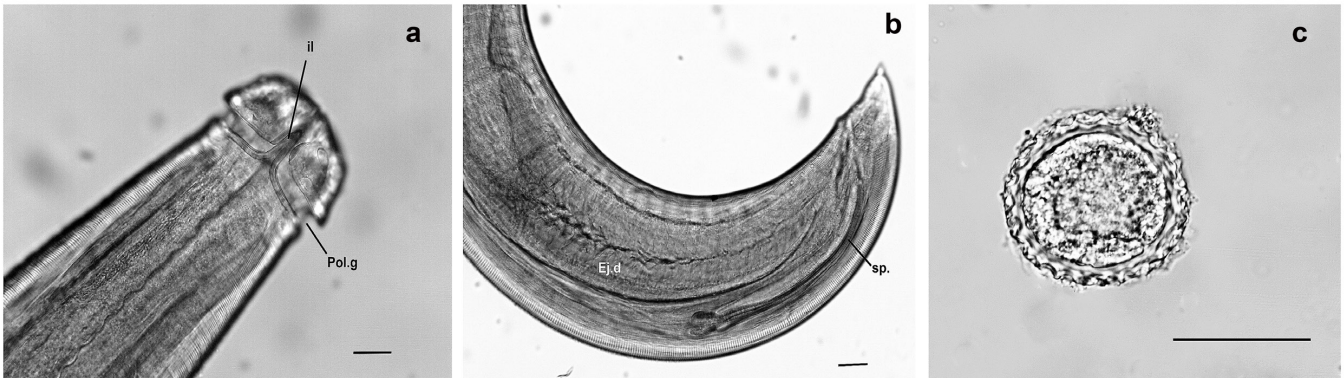

Figure 1. (a) Anterior end of *Lagochilascaris minor* (lateral view): Post-labial groove (Pol.g) and interlabia (il). Bar = 0.04 mm; (b) Posterior end (lateral view) of male showing the ejaculatory duct (Ej.d) and spicule (sp.). Bar = 0.05 mm; (c) Egg. Bar = 0.05 mm.

Table 2. Measurements (mm) of specimens of *Lagochilascaris minor*, found in *Leopardus geoffroyi* in Rio Grande do Sul, Brazil.

Morphometry	Male (n=1)	Female (n=3)
Total length	13.8	15.01-16.9
Lip length	0.06	0.07
Width of lips	0.10	0.12
Interlabial height	0.04	0.04-0.05
Esophagus length	1.8	1.77-1.8
Ejaculatory duct length	1.43	-
Spicule length	0.476	-
Distance between vulvar opening and anterior end	-	7.06-7.88
Tail (anus to end)	-	0.17-0.21

1992; PAÇO et al., 1999). *Leopardus geoffroyi* is an opportunistic predator and its diet may include lagomorphs, birds, insects, reptiles, amphibians and small rodents (SOUSA & BAGER, 2008; PEREIRA et al., 2012). Its diet includes the species that have been mentioned in relation to experimental cycles of lagochilascariasis; *Dasyprocta agouti* (Linnaeus, 1766), *D. leporine* (Linnaeus, 1758), *Cavia porcellus* (Linnaeus, 1758) and *Calomys callosus* Renger, 1830 (BISCEGLIA et al., 2008; SOUSA & BAGER, 2008).

The disease appears similarly in animals and humans. It causes a granulomatous reaction of foreign-body type and lesions that are located in the tissues of the oropharynx, cervical lymph nodes, ears, paranasal sinuses, dental alveolus, lungs and brain, along with peculiar formation of fistulas in the oropharynx (PALHETA-NETO et al. 2002; BARBOSA et al., 2005). Other clinical signs include sinusitis, tonsillitis and respiratory and neurological manifestations that may lead to death of the animal or human (ROSEMBERG et al., 1986; VELOSO et al., 1992). Initially, the disease is insidious, with chronic evolution and periods of remission and relapses. It is therefore difficult to diagnose and is often confused with other infections (MORAES et al., 1985; PAULA et al., 1998). In the external examination performed on the *L. geoffroyi* specimen, no lesion was observed. At necropsy, no changes were found in the trachea and esophagus, i.e. both were intact.

Presence of lagochilascariasis in wild carnivores (Canidae and Felidae) has been recorded in Venezuela in *Speothos venaticus* (Lund, 1842) (VOLCAN et al., 1991); in Mexico in *Puma concolor* Linnaeus, 1771 (FALCÓN-ORDAZ et al., 2016); and in Argentina in *Lycalopex gymnocercus* (G. Fischer, 1814) (SCIOSCIA et al., 2018).

Clinical cases in domestic cats have been reported in Uruguay (SAKAMOTO & CABRERA, 2002; CASTRO et al., 2009) and Argentina (SPRENT, 1971b). In Brazil, cases have been reported in the states of São Paulo (DELL'PORTO et al., 1988), Rio de Janeiro (AMATO et al., 1990; SUDRÉ et al., 2012) and Rio Grande do Sul (REIS et al., 2011; FACCIO et al., 2013).

A report on 13 domestic cats diagnosed with *L. minor* in rural areas in Pelotas (FEHLBERG et al., 2014) and the present report of a wild felid parasitized in an urban area suggest that presence of this parasite is possibly under diagnosed in this region. In addition, these cases serve as an alert for healthcare and animal welfare professionals regarding the pathogenic potential of this parasite, especially in relation to wild animals that are subject to anthropic pressure and live at low population densities.

Conclusions

For the first time in Brazil, *L. minor* is reported in *L. geoffroyi*. This contributes to the knowledge of the helminth fauna of this host and expands the data on the epidemiology of lagochilascariasis in the southern region of this country.

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