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Otitis externa associated with Otodectes cynotis and Malassezia sp. co-infection in a free- ranging maned wolf, Chrysocyon brachyurus (Illiger, 1815), from southeastern Brazil

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Case Report

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Abstract

Parasitic diseases are a significant threat to the conservation of wild carnivores, with Sarcoptiformes mites representing important etiological agents. This report describes one case of mite infestation in a maned wolf, *Chrysocyon brachyurus* (Illiger, 1815), from São Paulo State, Brazil. The animal, found dead in 2023 near the Dois Córregos municipality, presented with otitis externa associated with *Otodectes cynotis* and *Malassezia* sp. At necropsy, both external ear canals contained abundant brown ceruminous exudate with marked crust formation and rancid odor. Mites obtained from ear scrapings were slide-mounted and morphologically identified as *O. cynotis*, and cytology of the auricular exudate revealed abundant yeast cells compatible with *Malassezia* sp. These findings expand the knowledge of *O. cynotis* infestation in free-ranging maned wolves and emphasize the importance of surveillance for parasitic otitis and secondary opportunistic infections in wild carnivores. Otodectic infestation should be considered a potential cause of morbidity in free-ranging maned wolves, particularly due to its debilitating nature (intense pruritus) and the associated risk of secondary infections.

Background

Infectious and parasitic diseases are recognized as major drivers of population decline in wild carnivores and represent one of the main threats to their conservation (Daszak et al. 2000; Megid et al. 2009; De Almeida Curi et al. 2012). Among parasitic agents affecting wild canids, mites of the order Sarcoptiformes, particularly *Otodectes cynotis* (Hering, 1838) (Psoroptidae), are recognized as important ectoparasites of wild canids (Wall and Shearer 1997).

Otocariasis, caused by this mite species, is a common ectoparasitosis in carnivorous mammals. This monotypic, non-burrowing mite primarily inhabits the external ear canal, where it can cause otitis externa with exudation, crust formation, and predisposition to secondary bacterial or fungal infections (Wall and Shearer 1997).

Worldwide, *O. cynotis* has been reported in several wild canids, including the Darwin's fox, *Lycalopex fulvipes* (Martin, 1837), Andean fox, *Lycalopex culpaeus* (Molina, 1782) (Briceño et al. 2020), gray fox, *Urocyon cinereoargenteus* (Schreber, 1775) (Davidson et al. 1992), and Island fox, *Urocyon littoralis* (Baird, 1857) (Vickers et al. 2015).

In Brazil, this mite has been reported in the crab-eating fox, *Cerdocyon thous* (L., 1766), from the states of São Paulo (Huang-Bastos et al. 2020) and Rio de Janeiro (Gredilha et al. 2007), in the Pampas fox, *Lycalopex gymnocercus* (G. Fischer, 1814), from Rio Grande do Sul (Huang-Bastos et al. 2020), and in maned wolf, *Chrysocyon brachyurus* (Illiger, 1815), from Rio de Janeiro (Gredilha et al. 2007).

In this context, the present report describes external otitis associated with *O. cynotis* and *Malassezia* sp. in a free-ranging maned wolf from the central-western region of São Paulo State, Brazil.

Case Presentation

A young male free-ranging maned wolf, *C. brachyurus*, was found dead in 2023 on highway SP-304 (km 259), near the Dois Córregos municipality, in the central-western region of São Paulo State, Brazil. The area lies within the Atlantic Forest biome and is characterized by remnants of seasonal semideciduous forest (IBGE 2019, 2024). The surrounding landscape is highly fragmented and anthropized. Agricultural matrices, mainly sugarcane plantations and cattle pastures, interspersed with urbanized areas represent the main economic activities (MapBiomas 2023). The carcass was submitted for necropsy at the Serviço de Patologia de Animais Selvagens (SEPAS) of the Faculdade de Ciências Agrárias e Veterinárias (FCAV), Universidade Estadual Paulista "Júlio de Mesquita Filho" (Unesp), Jaboticabal, São Paulo, Brazil.

At necropsy, the carcass showed autolytic changes and weighed 18.6 kg. The animal was considered young based on its dentition, which showed little wear. Epicardial fat was present around the coronary vessels, and body condition was considered adequate for a free-ranging animal. The thorax showed a circumscribed penetrating wound (4 cm in diameter) in the pre-costal region, with reddening of the surrounding musculature, and a full-thickness laceration of the heart extending from the right to the left ventricle, with abundant blood clots. Pulmonary lacerations and rupture of the costal portion of the diaphragm, with herniation of the liver into the thoracic cavity, were also observed. Fractures of the skull, right femur, and left scapula showed no associated hemorrhage, suggesting post-mortem injury. The origin of the penetrating wound could not be determined. The stomach was filled with prey remains, including a bird and possibly a lizard. In addition, the right kidney was reduced in size, with a thickened capsule and loss of the renal parenchyma, and contained several nematodes (6.5 to 70 cm long) compatible with *Dioctophyme* sp.

During the necropsy, samples were collected from the ears via scrapings and sterile swabs for cytological and parasitological examinations. Ear scrapings containing mites were preserved in absolute ethanol and sent to the Laboratório de Coleções Zoológicas, Instituto Butantan, São Paulo, Brazil, for taxonomic identification. Additional swab samples were used for cytological examination.

The mites were cleared in lactic acid and slide-mounted with Hoyer's medium, following the procedures described by Krantz and Walter (2009). The slides were examined, and specimens were identified using a Leica DM4000B optical microscope with phase contrast. Identification was based on the diagnostic morphological characters proposed by Huang-Bastos et al. (2020). Voucher specimens were deposited in the Acari Collection of Instituto Butantan under accession number IBSP 25871.

Gross examination of both external ear canals revealed abundant brown ceruminous exudate with moist, sandy appearance, associated with marked crust formation and rancid odor (Fig. 1).

Microscopic examination of the ear scrapings revealed numerous mites morphologically identified as *O. cynotis* according to the diagnostic characters described by Huang-Bastos et al. (2020). Additionally, cytological examination of the auricular exudate revealed abundant yeast cells morphologically compatible with *Malassezia* sp. The simultaneous presence of mites and abundant yeast cells supported the diagnosis of otitis externa associated with *O. cynotis* and *Malassezia* sp.

Discussion and Conclusions

Otodectes cynotis is a well-recognized cause of otitis externa in carnivores, inducing ceruminous exudation, crust formation, intense pruritus, and self-trauma, which may predispose the host to secondary bacterial or fungal infections (Wall and Shearer 1997). In the present case, abundant yeast cells suggestive of *Malassezia* sp. were observed together with *O. cynotis*. This association is biologically plausible because inflammation, increased cerumen production, disruption of the skin barrier, and alterations in the auricular microenvironment caused by mite infestation favor the proliferation of opportunistic yeasts (Nardoni et al. 2014). Similar associations have been described in domestic dogs and cats, in which *Malassezia* spp. proliferate opportunistically once a primary cause damages the ear canal and may exacerbate and perpetuate the inflammation, contributing to chronic-recurrent otitis externa (Saridomichelakis et al. 2007; Nardoni et al. 2014).

The present case occurred in a peri-urban environment. Wild carnivores inhabiting peri-urban environments are exposed to multiple anthropogenic stressors, including habitat fragmentation, reduced food availability, noise, light pollution, and to the risk of vehicle collisions (De Paula et al. 2013; De Paula and Dematteo 2015; Murray et al. 2015; Grilo et al. 2018). Although recently ingested prey in the stomach indicates that the animal was still able to forage, concurrent infections, such as otodectic otitis and renal dioctophymosis, may compromise host condition and increase susceptibility to additional infections (Beldomenico and Begon 2010). Furthermore, direct contact between wild and domestic carnivores facilitates bidirectional pathogen transmission, resulting in morbidity and mortality (De Almeida Curi et al. 2012).

This report has limitations: histopathological evaluation of the ear canal was precluded by advanced autolysis, the yeasts were identified by cytological morphology only, and neither fungal species identification (culture or PCR) nor bacterial culture was performed.

Although *O. cynotis* has previously been reported in maned wolves in Brazil (Gredilha et al. 2007), the present report documents, to our knowledge, the first case of otitis externa associated with *O. cynotis* and *Malassezia* sp. in a free-ranging maned wolf from São Paulo State. This finding expands the known geographic distribution of this host–parasite association and reinforces the need for health surveillance in free-ranging carnivore populations.

This report documents otitis externa associated with *O. cynotis* and *Malassezia* sp. in a free-ranging maned wolf from southeastern Brazil. Otodectic infestation, together with environmental stressors associated with peri-urban habitats, may compromise animal health, welfare, and fitness. These findings reinforce the importance of epidemiological surveillance, health monitoring of free-ranging carnivores, and mitigation of anthropogenic impacts, particularly at the wildlife–domestic animal interface, as key strategies for maned wolf conservation.

Declarations

Competing interests

The authors declare that they have no competing interests.

Ethics approval

The study was conducted in accordance with the local legislation and institutional requirements. All the procedures adopted in this study are in accordance with current international standards. This work was authorized by the Chico Mendes Institute for Biodiversity Conservation (ICMBio/Sisbio #82767-4), by the Ethics Committee for the Use of Animals (CEUA) at UNESP/FCAV (proc. #2729/22) and by the Environmental Research Institute of the Secretariat for the Environment, Infrastructure and Logistics of the São Paulo State Government (#2180/2023).

Consent to participate

Not applicable. The animal was a free-ranging maned wolf found dead. Therefore, there was no owner or guardian from whom consent could be obtained.

Consent for publication

Not applicable.

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Author Contribution

Conceptualization: G.P.S., K.W. Methodology: C.P.C., G.P.S., R.B.-S., N.C.C., F.C.J. Investigation: C.P.C., G.P.S., R.B.-S., N.C.C., L.O.A., F.C.J. Data curation: C.P.C., G.P.S. Resources: L.O.A., D.M.B.-B., K.W. Validation: K.W. Visualization: C.P.C. Supervision: E.G.L.-H., D.M.B.-B., K.W. Project administration: K.W. Funding acquisition: E.G.L.-H. Writing – original draft: C.P.C. Writing – review & editing: all authors. All authors read and approved the final manuscript.

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Availability of data and materials

All data generated or analyzed during this study are included in this published article.

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Figures

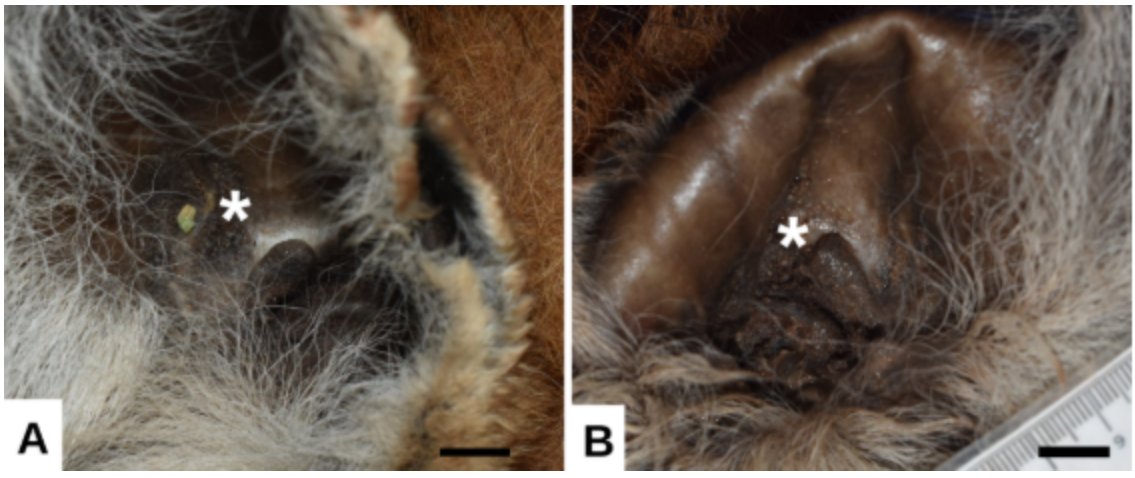


Figure 1

Gross appearance of the external ear canals of a free-ranging maned wolf. (A) Left ear and (B) right ear showing abundant brown ceruminous exudate (asterisk), crust formation, and thickening of the auricular folds. Scale bars = 1 cm