

First record of the genus *Physaloptera* sp. (Nemata: Physalopteridae) in scats from coyote, *Canis latrans* in Chihuahua, México

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The knowledge of the helminth parasites of *Canis latrans* from México is scarce. This study 23 scats of *C. latrans* were collected and examined to identify alimentary items between April and September of 2018, at the rancho experimental Teseachi of the Universidad Autónoma de Chihuahua, in Namiquipa, Chihuahua, México. Three nematode specimens of *Physaloptera* sp. were found and identified by morphology. This endoparasite is reported for the first time in scats of *C. latrans* for the state of Chihuahua.

El conocimiento de los helmintos parásitos de *Canis latrans* de México es escaso. Este estudio 23 excretas de *C. latrans* fueron recolectadas y examinadas para identificar atributos alimenticios entre Abril y Septiembre del 2018 en el rancho experimental Teseachi de la Universidad Autónoma de Chihuahua, en Namiquipa, Chihuahua, México. Tres especímenes de nemátodos de *Physaloptera* sp. fueron encontrados e identificados por su morfología. Se reporta por primera vez este género de endoparásito en excretas de *C. latrans* para el estado de Chihuahua.

Key words: canidae; carnivora; endoparasite; mammals; nematoda; parasitism.

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Introduction

Canis latrans is a predator with a high degree of adaptation to different ecosystems, from desert to tropical and temperate environments (Bekoff and Gese 2003). Its distribution extends from Costa Rica to northern Alaska (Bekoff 1977). Their reproductive success, the ability to disperse, and their supreme success at adapting to different environments and resources has allowed coyotes to expand both their range and their diet which is now basically omnivorous. These characteristics have made coyotes one of the most abundant and widely distributed carnivores on the American continent (Bekoff 1977; Hall 1981; Vaughan and Rodríguez 1986).

The omnivore diet of *C. latrans* promotes infections by different endoparasite species such as Platyhelminthes and nematodes in the Nearctic Realm: *Ancylostoma* spp., *Capillaria* spp., *Dirofilaria* spp., *Physaloptera* sp., *Strongyloides* sp., *Toxascaris* spp., *Trichinella* spp., among others nematode parasites reported (Ramalingam and Carbyn 1978; Hernández and Laundré 2014; Luna-Estrada et al. 2017). Curiously, up to the present time, there few records of parasites of *Canis latrans* in México, one record the nematode *Strongyloides* sp. parasitizing *C. latrans* from the Zoológico "Manuel Álvarez del Toro", in Chiapas, México (in García-Prieto et al. 2012); and one records the nematode *Dirofilaria immitis* near Queretaro City, México (Hernández and Pineda 2012).

Eight records of parasites have been reported from the municipality of Tepehuanes, Durango; five nematodes (*Ancylostoma caninum*, *Physaloptera* sp., *Spirocerca lupi*, *Spi-*

rura sp., and *Didelphonema longispiculata*), one trematode (*Alaria* sp.) and one cestode (*Taenia pisiformis*; Luna-Estrada et al. 2017). To the best of our knowledge, there is no information on the endoparasites of *C. latrans* from the state of Chihuahua. The aim of this paper was to present the first record of *Physaloptera* sp. obtained from scats of *C. latrans* in the state of Chihuahua, México.

Materials and Methods

Study area. The main goal of the rancho experimental Teseachi is teaching, research and transfer of technology in animal science and natural resources (Espinoza and Quintana 2003). It is located among the municipalities of Namiquipa, Bachiniva and Guerrero in Chihuahua, México (28° 53' 44" N, -107° 27' 22" W, 2,250 masl). This site has an approximate area of 12,300 hectares, the landscape is shaped by hills and high mountain ranges displaying a mixture of open medium grassland, arboreal pasture grasses, oak chaparral, pine-oak forest, and temperate forest. Comisión Técnico Consultiva de Coeficientes de Agostaderos (COTECOCA 1978).

Data collection and identification of parasites. Linear transects of five kilometers were revised in search of scats. A total of 23 scats of *C. latrans* were collected from April to September of 2018, the scats were identified as belonging to *C. latrans* according to the characteristics detailed by Aranda (2012). Each scat collected was georeferenced through a Global Positioning System (GPS), and measurements (width and length) were taken with a measuring tape, and they were subsequently stored individually in

airtight bags. Once in the laboratory at Facultad de Zootecnia y Ecología, Universidad Autónoma de Chihuahua, they were cleaned using conventional means (Arnaud 1993). The nematodes were collected and stored in glass vials with 70 % ethanol to preserve morphological traits for further identification.

The identification of the nematodes was conducted in the Laboratorio de Colecciones Biológicas y Sistemática Molecular (LCBySM), Unidad Académica de Ciencias Biológicas (UACB), Universidad Autónoma de Zacatecas (UAZ), Zacatecas, Zacatecas, México, using conventional morphological techniques (Lamothe-Argumedo 1997) and identified using specialized literature (Chabaud 1975). Voucher specimen was deposited in the reference collection in the laboratory previously mentioned: Colección de Invertebrados no Artrópodos (CINZ08).

Results

From the 23 scats examined, only one was positive for worms parasites (prevalence of 4.3 %) with three specimens; two females were identified and the other was in high degree of decomposition. Nematodes were identified through the use of morphological characters, and they clearly belong to genus *Physaloptera* sp. (Nemata: Physalopteridae). The two specimens obtained were measured with an average total length of 24 mm. In the optical microscope different structures were observed that allowed the identification at genus level, such as the anal opening, the size and structure of the embryonated eggs [42.11 to 55.47 (50.61) \pm 2.95 μ m long x 30.00 to 36.70 (32.40) \pm 1.75 μ m width, $n = 20$], and cephalic features, such as two large, simple, triangle lateral lips, two pairs of frontal papillae, internal teeth (three in each lip) and presence of a well developed stoma (Figure 1 to 3). Because there were no males collected, it was not possible to identify these nematodes to the species level (Ramalingam and Carbyn 1978; Ortlepp 1922).



Figure 1. Embryonated eggs of *Physaloptera* sp. Scale bar = 50 μ m.

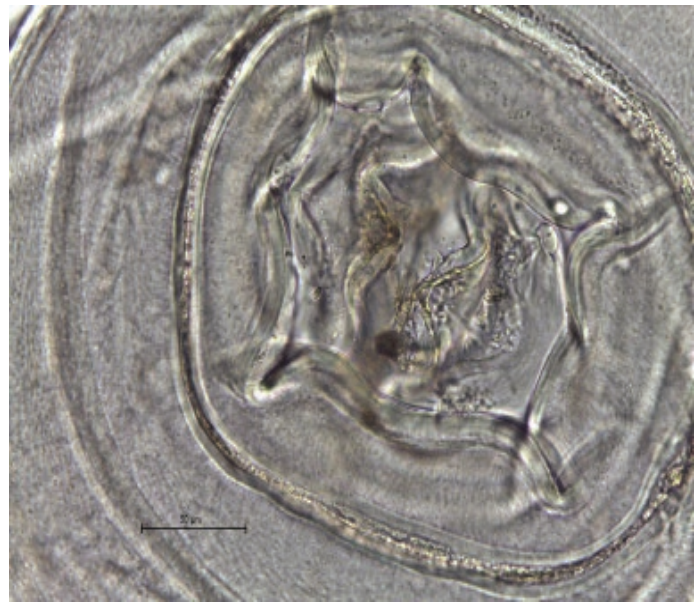


Figure 2. Cephalic end, apical view. Scale bar = 50 μ m.

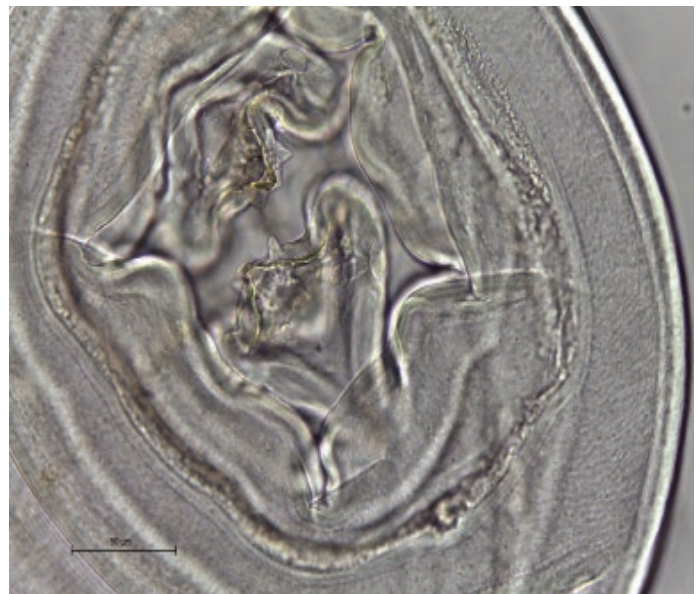


Figure 3. Internal teeth (three in each lip) and buccal cavity. Scale bar = 50 μ m.

Discussion

For the Mexican Republic there are few records documenting infection of nematodes in *C. latrans* through gastrointestinal dissections, however none with scats review (García-Prieto *et al.* 2012; Hernández and Pineda 2012; Luna-Estrada *et al.* 2017). To our knowledge, for the state of Chihuahua there was no record of *Physaloptera* sp. in *C. latrans*. The presence of *Physaloptera* sp. in Chihuahua agrees with Luna-Estrada *et al.* (2017), they reported the presence of this nematode in *C. latrans* in northern México, in Tepehuanes Durango (at 425 km lineal distance approximately). Nematode species of the genus *Physaloptera* (Nematoda: Physalopteridae) are parasites of mammals, birds and reptiles (Chabaud 1975).

The life cycle of *Physaloptera* spp. is indirect, the coyotes are considered the definitive hosts of the *Physaloptera rara* from North America (Ameel 1955), the infections is

through oral ingestion of the intermediate hosts (e. g., beetles, crickets, cockroaches, earwigs and grasshoppers) or ingestion of paratenic hosts, such as mice that are infected with encysted juvenile or larval *Physaloptera* sp. (Petri 1950; Olsen 1980). The presence of *Physaloptera* sp. in coyote scats agrees with the feeding habits of this canid, because this nematode is parasite of intermediate hosts like lagomorphs and rodents. They are common prey of *C. latrans*, where the parasites complete its life cycle (Luna-Estrada et al. 2017).

Parasites are an important part of the natural biota of free-living organisms, playing a role as bioindicators of ecosystem health (Marcogliese 2005), despite this, there is a lack of information on Mexican mammal parasites, so it is necessary to increase the study of helminth fauna in the Mexican Republic. This is the first report of *Physaloptera* sp. in scats of *C. latrans* in Chihuahua, Chihuahua, México.

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