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Selected Helminth Parasites (Cestoda, Nematoda) of Bobcat, *Lynx rufus* (Carnivora: Felidae), in Northeastern Arkansas

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Cover Page Footnote

The Arkansas Game and Fish Commission issued a Scientific Collecting Permit to CTM. We thank D. Ferguson, furbearer (Black Rock) for providing the bobcat carcass for examination and J. Mike Kinsella (Missoula, MT) for identifying and depositing the cestode and providing Fig. 1. We also thank Gabor Racz (HWML) for expert curatorial assistance and technical help with the cestode.

Selected Helminth Parasites (Cestoda, Nematoda) of Bobcat, *Lynx rufus* (Carnivora: Felidae), in Northeastern Arkansas

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Running Title: Endoparasites of Bobcats

Abstract

The bobcat, *Lynx rufus* is a relatively common Arkansas carnivore that ranges statewide. Although there is a great deal of information on the natural history of this species in the state, there have been few studies where parasites have been documented in Arkansas bobcats. Here, a single specimen was examined and found to be infected with a tapeworm, *Taenia rileyi* and two nematodes, *Toxascaris leonina* and *Toxocara cati*. We document the first record of *T. rileyi* from Arkansas and the first report of *T. leonina* from a bobcat in the state.

Introduction

The bobcat, *Lynx* (syn. *Felis*) *rufus* (Schreber, 1777), is a common moderately-sized stealthy felid that occurs from southern Canada slightly above the 50th parallel south through much of the central USA as far southward as Rio Mezcala, México, just below the 18th parallel (Larivière and Walton 1997); it is found statewide in Arkansas (Sealander and Heidt 1990). In eastern Arkansas, *L. rufus* primarily feeds on rabbits followed by moles and small rodents (Tumlison and McDaniel 1990). Although a great deal is known about various aspects of the natural history and ecology of *L. rufus* in Arkansas (Fritts and Sealander 1978; Tumlison and McDaniel 1981, 1986, 1988, 1990; Tumlison 1983; Rucker *et al.* 1989), little is known about its parasites in the state.

In addition to a suite of ectoparasites, *L. rufus* is host to protozoans, blood parasites, trematodes, cestodes, nematodes, and acanthocephalans (Miller and Harkema 1968; Pence and Eason 1980; Watson *et al.* 1981; Tiekotter 1985; Marchiondo *et al.* 1986; Smith *et al.* 1995; Reichard *et al.* 2004; see also references in Hiestand *et al.* 2014). To our knowledge, the only report of endoparasites from this host in the state was by Heidt *et al.* (1988). They reported eight species of intestinal parasites. Here, we document three helminths from a *L. rufus* from the Ozark Highlands.

Materials and Methods

A single adult male *L. rufus* was collected on 26 February 2021 by a local furbearer in Black Rock, Lawrence County (36°06'53"N, -91°04'25.73"W), using a leg-hold trap and killed by .22 caliber gunshot. The pelage was retained and not available for ectoparasite examination. A blood sample was taken from the heart, smeared on a glass slide, air dried, fixed in absolute methanol, and stained with Wright's Giemsa stain. Fifty high power fields were examined under oil immersion (1,000×) with a light microscope. A mid-ventral incision from throat to anus was made and all organs and 10cm pieces of the intestinal tract were placed in Petri dishes containing 0.9% saline. Feces from the rectum was placed in 2.5% potassium dichromate and examined for coccidia after flotation in Sheather's sugar solution (specific gravity = 1.30). A stereomicroscope was used to scan the material in Petri dishes and when parasites were found, they were rinsed of mucus and fixed in nearly boiling tap water. Cestodes were placed in an individual vial containing 10% neutral buffered formalin and a piece of the posterior proglottid was saved in 70% DNA grade ethanol for potential molecular characterization. Nematodes were preserved in 70% ethanol, cleared in lactophenol, and observed as temporary mounts. Helminths were deposited in the Harold W. Manter Parasite Collection (HWML), University of Nebraska,

Lincoln, Nebraska.

Results and Discussion

The blood was negative for any intraerythrocytic hematozoans and the bobcat was not passing coccidia in its feces at the time of death. However, three species of helminths were found in *L. rufus* as follows:

CESTODA: CYCLOPHYLLIDEA: TAENIIDAE

***Taenia rileyi* Loewen, 1929.** – Nine tapeworm specimens (Fig. 1A, HWML 112230) matched the description of *T. rileyi* (Rausch 1981). The rostellum (Fig. 1B) has 42 hooks (21 large, 21 small) that measured 230 and 180 μm long, respectively. *Taenia rileyi* has been reported in bobcats from Georgia, Illinois, Minnesota, Nebraska, “New England”, North Carolina, Oklahoma, South Carolina, Texas, Utah, Virginia, and West Virginia (Hiestand *et al.* 2014; McAllister *et al.* 2019). Larval *T. rileyi* have been reported in cricetid rodents in Florida and Georgia and may serve as intermediate hosts of this tapeworm (Kinsella 1988, 1991). Hiestand *et al.* (2014) reported *T. rileyi* occurred in high prevalence (70%) that caused intense infections in Illinois bobcats; it is also considered to be a bobcat-host specific helminth. We here document *T. rileyi* from Arkansas for the first time.

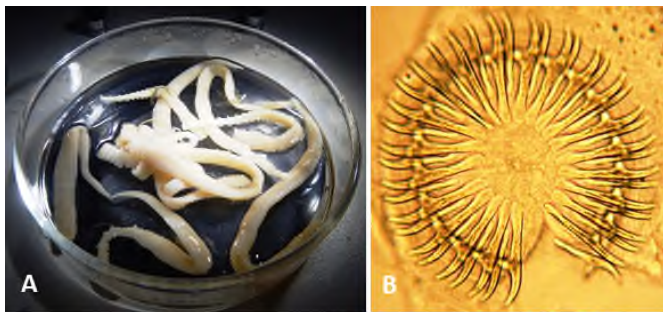


Figure 1. *Taenia rileyi* from *Lynx rufus* from Lawrence County, Arkansas. (A) Recovered tapeworms. (B) Rostellar hooks.

NEMATODA: ASCARIDIDA: ASCARIDIDAE

***Toxascaris leonine* (von Linstow, 1902).** – A single female specimen (HWML 112231) was recovered from the intestine. This nematode is a common parasite found in domestic and wild canids and felids. Sprent (1959) provided a host list that included a variety of canids, felids, and procyonids. The life cycle includes oral ingestion of the infective

ova, and then the egg-hatched larvae mature in the small intestine of the definitive hosts (Sprent 1959). It is cosmopolitan in distribution and the paratenic hosts are usually rodents (primarily rats and mice). This nematode poses potential threats to public health due to aberrant larva migrans (Beaver and Bowman 1984). Shoop *et al.* (1991) reported it in the state from mixed-breed cats (*Felis catus*) from Conway County.

***Toxocara cati* Schrank, 1788.** – Three female and a single male specimen (HWML 112251) were recovered from the intestine. Specimens fit the description of *T. cati* by possessing a ventriculus posterior to the esophagus (Sprent 1956). Heidt *et al.* (1988) previously reported *T. cati* from bobcats from Montgomery County. It was also reported from *F. catus* from Conway County (Shoop *et al.* 1991).

In the only previous report of parasites on eight Arkansas bobcats, Heidt *et al.* (1988) documented the following helminths (1 cestode, 7 nematodes): *Taenia taeniaformis*, *Ancylostoma* sp., *Spirometra mansoides*, *Physaloptera rara*, *T. cati*, *Strongyloides* spp., *Trichurus* spp., and *Capillaria* spp. Interestingly, these authors did not report *T. leonina* and *T. rileyi* that we found in the current study from *L. rufus*.

Overall, comparative data on the helminth parasites of mammals in the Order Carnivora in Arkansas is poorly known. Given this lack of information on endoparasite diversity on carnivores in the state, continuation of helminth surveys will surely lead to additional new host and geographic records.

Acknowledgments

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