

Short Communication

Known hosts of the nematode endoparasite (*Ascarididae*: *Hexametra angusticaecoides*), including the Madagascar leaf-nosed snake (*Lamprophiidae*: *Langaha madagascariensis*)

J. John Morton^{1*} and Kenneth L. Krysko²

¹ College of Veterinary Medicine, University of Florida, Gainesville, Florida 32611, USA

² Florida Museum of Natural History, Division of Herpetology, University of Florida, Gainesville, Florida 32611, USA

E-mail: morton13@ufl.edu (JJM), kenneyk@flmnh.ufl.edu (KLK)

*Corresponding author

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Abstract

The nematode endoparasite, *Hexametra angusticaecoides* Chabaud and Brygoo, is an intestinal and coelomic nematode known only from lizards and snakes. Herein, we provide a list of all known hosts to date, and document a new host, the Madagascar leaf-nosed snake, *Langaha madagascariensis* Bonnaterre (Lamprophiidae). Because the known paratenic hosts (mosquitos, midges, and cockroaches) of *Hexametra angusticaecoides* are all extremely common in Florida, as well as Florida having the highest number of established non-native amphibians and reptiles in the entire world, this should be a concern to biologists and conservationists regarding imported animals for the pet trade.

Key words: Boidae; Cestoidea; Chamaeleonidae; Reptilia, Sauria

Introduction

The nematode endoparasite, *Hexametra angusticaecoides* Chabaud and Brygoo, 1960, is an intestinal and coelomic nematode of lizards and snakes. *Hexametra angusticaecoides* larvae are ingested by larval stages of mosquitos (*Culex*), midges (*Chironomus*), and cockroaches (*Periplaneta orientalis*) (Anderson 2000; Baker 1989), where they enter the malpighian tubules and lie dormant without growth (Anderson 2000). It is via consumption of these insects that *H. angusticaecoides* is then passed into the intermediate/primary host (i.e., chameleon) (Coke 1997). Second stage *H. angusticaecoides* larvae pass into the body cavity of the host where they begin to grow, but have also been found in stomach, liver, abdominal fat bodies, subcutaneous space, lungs (Coke 1997), and intestines (Anderson 2000). Anderson (2000) hypothesized that the adult stage of *H. angusticaecoides* may re-enter the intestinal system via the lungs. Within the subcutaneous

and alimentary tract of the intermediate/primary host, the nematode persists as an adult (Sprent 1982), but it also be transferred to a secondary host (i.e., Malagasy boas) (Thompson 1994). However, direct infection of chameleons has also occurred experimentally using *H. angusticaecoides* larvae hatched from eggs, as well as larvae removed from *Culex* and other chameleons (Anderson 2000).

Relatively few host species have been identified for *Hexametra angusticaecoides*. Herein, we provide a list of all known hosts to date, and document a new host, the Madagascar Leaf-nosed Snake *Langaha madagascariensis* Bonnaterre, 1790 (Lamprophiidae).

Materials and methods

We obtained host species information from the literature. In August 2001, an adult (52.7 cm SVL, 33.1 cm tail length) female *Langaha madagascariensis* was collected in Madagascar and imported into Miami, Florida, United States.

Figure 1. Gravid female *Langaha madagascariensis* with four *Hexameta angusticaecoides* exteriorized. Photograph by Kenneth L. Krysko.



Table 1. Known hosts of the nematode endoparasite, *Hexameta angusticaecoides*.

Suborder/ Family	Species	Common Name	Locality	First Source
Sauria Chamaeleonida e	<i>Calumma boettgeri</i>	Boettger Chameleon	Madagascar	Caballero 1968
	<i>Calumma brevicorne</i>	Short-horned Chameleon	Madagascar	Brygoo 1963
	<i>Calumma parsonii</i>	Parson's Chameleon	Madagascar	Brygoo 1963
	<i>Furcifer lateralis</i>	Carpet Chameleon	Madagascar	Brygoo 1963
	<i>Furcifer oustaleti</i>	Oustalet's Chameleon	Madagascar	Chabaud and Brygoo 1960, McAllister et al. 2011
	<i>Furcifer pardalis</i>	Panther Chameleon	Madagascar	Caballero 1968
	<i>Furcifer rhinocerotus</i>	Rhinoceros Chameleon	Madagascar	Caballero 1968
	<i>Furcifer verrucosus</i>	Spiny/Warty Chameleon	Madagascar	Chabaud and Brygoo 1960
Serpentes Boidae	<i>Sanzinia madagascariensis</i>	Madagascar Tree Boa	Madagascar	Ghadirian 1968
	<i>Acrantophis dumerili</i>	Dumeril's Ground Boa	Madagascar	Ghadirian 1968
Lamprophiidae	<i>Leioheterodon madagascariensis</i>	Malagasy Giant Hognose Snake	Madagascar	Ghadirian 1968
	<i>Ithycyphus miniatus</i>	Tiny Night Snake	Madagascar	Ghadirian 1968
	<i>Madagascarophis colubrinus</i>	Madagascar Cat-eyed Snake	Madagascar	Ghadirian 1968
	<i>Langaha madagascariensis</i>	Madagascar Leaf-nosed Snake	Madagascar	This Study

This snake was dead on arrival, salvaged for deposit in the Florida Museum of Natural History (FLMNH), University of Florida (UF

125922) (see Krysko 2003), and later dissected. Endoparasites were removed and preserved in 70% ethanol (Figure 1).

Results and discussion

We found that all known hosts of *Hexametra angusticaecoides* were confined to reptiles, including only lizards and snakes (Table 1). Our *Langaha madagascariensis* was found to be gravid, containing 12 oviducal eggs, and four *H. angusticaecoides* (one female, two males, and one third stage) within its digestive tract.

Our data provide the first documentation of *Langaha madagascariensis* as a host of *Hexametra angusticaecoides*. Additionally, because the known paratenic hosts (mosquitos, midges, and cockroaches) of *H. angusticaecoides* are all extremely common in Florida, as well as Florida having the highest number of established non-native amphibians and reptiles in the entire world (Krysko et al. 2011), this should be of high concern to Florida biologists and conservationists.

All wild caught and imported reptiles should be subject to serial fecal examinations by a qualified individual and treated with a broad spectrum antihelminthic, such as those containing fenbendazole, if an infestation of *Hexametra angusticaecoides* is discovered. These animals should be quarantined and prophylactically dewormed due to extra-intestinal migration of the larvae and adults resulting in false negative fecal exam. Following the initial treatment, all animals should be subject to serial fecal examination to look for parasite shedding since initial treatment may be ineffective against extra-intestinal phases (Coke 1997).

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