Endoparasites infecting the semiaquatic coral snake *Micrurus surinamensis* (Squamata: Elapidae) in the southern amazonian region, Mato Grosso state, Brazil

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Abstract

A parasitological survey was conducted in specimens of the semiaquatic coral snake *Micrurus surinamensis*, a poorly known South American elapid. Four specimens collected at the southern Amazon region in the Brazilian state of Mato Grosso were analyzed for endoparasites. Three parasite species were recovered from the snake hosts: the pentastomid *Sebekia oxycephala*, the nematode *Physaloptera* sp. and the trematode *Opisthogonimus lecithonotus*. This represents new locality and host record for *S. oxycephala* and *O. lecithonotus*.

Keywords: parasitism, Pentastomida, Nematoda, Trematoda, snakes.

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Resumo

Um estudo parasitológico foi conduzido em espécimes da cobra coral semiaquática *Micrurus surinamensis*, espécie de elapídeo sulamericano pouco conhecida. Quatro exemplares coletados na região sul da Amazônia, no norte do estado de Mato Grosso foram analisados quanto a presença de endoparasitas. Três espécies de parasitas foram encontradas: o pentastomídeo *Sebekia oxycephala*, o nematódeo *Physaloptera* sp. e o trematódeo *Opisthogonimus lecithonotus*. Isso representa novo registro de localidade e hospedeiro para *S. oxycephala* e *O. lecithonotus*.

Palavras-chave: parasitismo, Pentastomida, Nematoda, Trematoda, serpentes

1. Introduction

The coral snake genus *Micrurus* Wagler 1824 comprises 76 species restricted to the Western hemisphere, occupying almost all of the major biomes of the Neotropics (Roze, 1996; Campbell and Lamar, 2004). Many studies on natural history of this genus have been recently published (Marques, 2002; Aguiar and Di-Bernardo, 2007; Ávila et al., 2010), including those dealing with parasites associated with these snakes (Pizzato and Madi, 2002; Silva and Barrella, 2002; Almeida et al., 2007; Santos et al., 2008; MacAllister et al., 2010).

The semiaquatic coral snake *Micrurus surinamensis* is widely distributed in equatorial forests in six countries of South America, feeding mainly on bony fishes and eels (Roze, 1966; Morais et al., 2011). In Brazil, this snake has been reported in the states of Acre, Amazonas, Roraima, Rondônia, Pará, Maranhão, Tocantins, Goiás and Mato Grosso (Passos and Fernandes, 2005; Silva Jr. et al., 2008; Morais et al., 2011). Despite this huge distribution, many biological aspects of *M. surinamensis* have been poorly studied, especially regarding parasitism. The purpose of this note is to report the occurrence of nematode, trematode and pentastomid parasites in *M. surinamensis*.

2. Material and Methods

Four specimens of *Micrurus surinamensis* previously fixed and housed in the "Coleção Zoológica de Vertebrados da Universidade Federal de Mato Grosso," Cuiabá, Brazil (UFMT) were analyzed for parasites. The snakes were collected at three municipalities from Mato Grosso State, all of them in small streams inside alluvial

forest in the Amazonian region: one specimen from Juara municipality, a region characterized by the transition of Cerrado-Amazon areas (UFMT 5950; adult female, 968 mm SVL), one from Cotriguaçu municipality, also a region of Cerrado-Amazon transition (UFMT 9270, adult female, 640 mm SVL), and two from Colniza municipality (UFMT 7164, adult female, 782 mm SVL; UFMT 7170, adult male, 678 mm SVL), a region characterized by Alluvial forest. The snakes were initially preserved in 10% formalin and then stored in 70% ethanol. A mid-ventral incision was made in the body wall, and organ surfaces were visually checked for parasites. Subsequently, the lungs and digestive tract were examined under a stereomicroscope for parasites. For identification, nematodes were cleared in phenol, pentastomids were cleared in a drop of Hoyer's medium and trematodes were stained with carmine and cleared in creosote. All parasites were counted and deposited in the Coleção Helmintológica do Instituto de Biociências (CHIBB) at Universidade Estadual Paulista Júlio de Mesquita Filho, São Paulo State, Brazil.

3. Results and Discussion

We recovered 73 specimens of three parasite species (Table 1): 50 larvae of the nematode *Physaloptera* sp. from the stomach of one snake host (CHIBB 6743); 20 adults of the trematode *Opisthogonimus lecithonotus* from the mouth and esophagus of one snake host (CHIBB 5068); and 3 nymphs of the pentastomid *Sebekia oxycephala* in the body cavity of two snake hosts, infected with 1 or 2 nymphs (CHIBB 6744).

Currently, four species of *Physaloptera* have been reported infecting reptiles from South America (*Physaloptera liophis, P. obtusissima, P. lutzi*, and *P. retusa*), and identification is based on male caudal morphology and length of spicules (Vicente et al., 1993). Our specimen could not be identified due to their immature condition. Usually these nematodes use amphibians, lizards and snakes as intermediate hosts (Anderson, 2000).

The pentastomid *Sebekia oxycephala* is widely distributed, occurring from the southern part of the United States to southern South America (Almeida et al., 2010). In Brazil, nymphs of *S. oxycephala* have been reported parasitizing four freshwater fish species: *Serrasalmus nattereri*, *Pseudoplatystoma corruscans* and *Phallocerus harpagus* (see Almeida et al., 2010) and *Serrasalmus marginatus* (Vicentin et al., 2011). Adults of this pentastomid have been reported infecting crocodilian species (Junker and Boomker, 2006). The life cycle of *S. oxycephala* is well known and involves several freshwater fish species as intermediate hosts (Venard and Bangham, 1941; Riley, 1986; Almeida et al., 2010). Heymons (1935) suggested that nymphs of this pentastomid may also infect lizards and snakes, but Riley (1986) considered the source of this information vague and pointed out the need for confirmation. However, nymphs of *Sebekia* have been reported to infect other Neotropical snakes, such as *Helicops leopardinus* (Rego and Vicente, 1988), *Nerodia* spp. (Overstreet et al., 1985), and *Micrurus surinamensis* (this work). The infection of these snakes with nymphs of *Sebekia*, could be related to their semi-aquatic habitats (Ávila et al., 2006; Morais et al., 2011; Mushinsky et al., 1982), since nymphs of *Sebekia* actively infect their intermediate hosts (Junker et al., 1998). Moreover, the reports of *Sebekia* infecting the terrestrial coral snake *Micrurus alleni* (Goldberg and Bursey, 2004) could be explained by their piscivorous diet (Roze, 1996; Cunha and Nascimento, 1978).

Opistogonimus lecithonotus were reported from the oral cavity and esophagus of 22 Neotropical snake species, including one coral snake, *Micrurus pyrrhocryptus* (Lunaschi and Drago, 2007). Snakes infected by *O. lecithonotus* show a high phylogenetic distance and belong to several genera and families (e.g., Dipsadidae, Colubridade, Viperidae and Elapidae; see Lunaschi and Drago, 2007), with a wide variety of habits (e.g., terrestrial, aquatic, semifossorial) and prey types (e.g., anurans, fishes, snakes, mammals, etc), thus making it difficult to provide general predictions about which ecological aspects of the hosts make them susceptible to infection by this trematode.

In conclusion, despite of our small sample size, the present study makes an important contribution to our knowledge of parasitism in snakes of South America, since *M. surinamensis* represents a new host record for these three parasite species. Moreover, the state of Mato Grosso is a new locality record for *S. oxycephala* and *O. lecithonotus*. Hence, we strongly suggest more studies dealing with parasitism in Neotropical snakes, especially regarding elapids, for a better understanding of ecological processes, such as infracommunity structure and infection patterns.

Table 1 - Epidemiological data for four *Micrurus surinamensis* and their nematode parasites at the southern Amazonian region, Mato Grosso State, Brazil. For each nematode the prevalence, intensity of infection (mean ± one standard deviation), mean abundance and the sites of infection are given. Abbreviations are: BC = Body cavity and MO = Mouth.

Parasite species	N	Prevalence (%)	Intensity of infection	Mean abundance	Site of infection	Host voucher number
Sebekia oxycephala	3	50	1.5	0.75	BC	UFMT 7164, 7170
Physaloptera sp.	50	25	50	12.5	BC	UFMT 5950
Opisthogonimus lecithonotus	20	25	20	5	MO	UFMT 9270

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