

***Dero (Allodero) lutzi* Michaelsen, 1926 (Oligochaeta: Naididae) associated with *Scinax fuscovarius* (Lutz, 1925) (Anura: Hylidae) from Semi-deciduous Atlantic Rain Forest, southern Brazil**

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Abstract

Amphibians are hosts for a wide variety of ecto- and endoparasites, such as protozoans and parasitic worms. Naididae is a family of Oligochaeta whose species live on a wide range of substrates, including mollusks, aquatic macrophytes, sponges, mosses, liverworts, and filamentous algae. However, some species are known as endoparasitic from vertebrates, such as *Dero (Allodero) lutzi*, which is parasitic of the urinary tracts of frogs, but also have a free-living stage. Specimens in the parasitic stage lack dorsal setae, branchial fossa, and gills. Here we report the occurrence of *D. (A.) lutzi* associated with anuran *Scinax fuscovarius* from Semi-deciduous Atlantic Rain Forest in southern Brazil. The study took place at the Caiuá Ecological Station, Diamante do Norte, Paraná, southern Brazil. Seven specimens of *S. fuscovarius* were examined for parasites but only one was infected. Parasites occurred in ureters and urinary bladder. Previous records of this *D. (A.) lutzi* include the Brazilian States of Santa Catarina, São Paulo, Rio de Janeiro, and Minas Gerais, as well as Cuba and North America. This is a new locality record for this species in Brazil. Reports of *Dero (Allodero) lutzi* are rare, due to difficulty of observation, and such events are restricted only the fortuitous cases. It is important to emphasize the necessity of future studies, which are fundamental to the understanding of biological and ecological aspects of this species.

Keywords: anuran, Hylidae, endoparasite, urinary tract, Annelida.

***Dero (Allodero) lutzi* Michaelsen, 1926 (Oligochaeta: Naididae) associado com *Scinax fuscovarius* (Lutz, 1925) (Anura: Hylidae) na Floresta Estacional Semidecidual, Sul do Brasil**

Resumo

Anfíbios são hospedeiros para uma grande variedade de ecto- e endoparasitos, tais como os protozoários e vermes parasitos. Naididae é uma família de Oligochaeta cujas espécies vivem em uma ampla variedade de substratos, incluindo moluscos, macrófitas aquáticas, esponjas, musgos, e algas hepáticas e filamentosas. No entanto, algumas espécies são conhecidas como endoparasitos de vertebrados, como *Dero (Allodero) lutzi*, o qual é um parasito do trato urinário de anfíbios, mas que também possui uma fase de vida livre. Espécimes no estágio parasitário não possuem cerdas dorsais, fossa branquial, e brânquias. Relatamos a ocorrência de *D. (A.) lutzi* associado ao anuro *Scinax fuscovarius* na Floresta Estacional Semidecidual no Sul do Brasil. O estudo foi realizado na Estação Ecológica do Caiuá, Diamante do Norte, Paraná, Sul do Brasil. Sete espécimes de *S. fuscovarius* foram examinados para parasitos, mas apenas um estava infectado. Os parasitos ocorreram nos ureteres e bexiga urinária. Registros anteriores de *D. (A.) lutzi* incluem os estados brasileiros de Santa Catarina, São Paulo, Rio de Janeiro e Minas Gerais, bem como Cuba e América do Norte. Este é o registro de uma nova localidade para esta espécie no Brasil. Registros de *Dero (Allodero) lutzi* são raros, devido à dificuldade de observação, e tais eventos são restritos apenas a casos fortuitos. É importante ressaltar a necessidade de futuros estudos, que são fundamentais para a compreensão de aspectos biológicos e ecológicos desta espécie.

Palavras-chave: anuro, Hylidae, endoparasitas, trato urinário, Annelida.

1. Introduction

Amphibians are hosts for a wide variety of ecto- and endoparasites. Internal parasites of amphibians include protozoans, as well as a variety of parasitic worms (see Wells, 2007). The latter include tapeworms (Cestoda) (Melo et al., 2011), intestinal round worms (Acanthocephala) (Salgado-Maldonado and Caspeta-Mandujano, 2010), tongue worms (Pentastomida) (Christoffersen and De Assis, 2013), nematodes that infect the lungs and visceral organs (Van Sluys et al., 2006), and monogenean and digenean helminths that infect the lungs, muscles, bladder, and digestive organs (Hamann and González, 2009; Santos and Amato, 2012).

Scinax fuscovarius are medium-sized tree frogs widely distributed in southeastern Brazil, northern Argentina, Paraguay, Bolivia, and Uruguay (Haddad et al., 2008; Almeida-Gomes et al., 2010; Frost, 2013). During the day, it shelters in burrows, crevices, trees, soil, and human construction (Araujo et al., 2009).

Species of the family Naididae (Oligochaeta) can live on a considerable range of substrates, including mollusks (Gorni and Alves, 2006), aquatic macrophytes (Mastrantuono, 1986), sponges (Righi, 1984), mosses, liverworts (Vlckvá et al., 2002), and filamentous algae (Armendáriz, 2000). However, some species are known as endoparasitic from vertebrates (see Harman, 1971).

The subgenus *Allodero* was erected by Sperber (1948) within the genus *Dero* (Naididae, Oligochaeta) for parasitic or symbiotic species known from Asia, Africa, and South America (Harman, 1971). *Allodero*, *Aulophorus* and *Dero* are considered subgenera of *Dero* by some authors (e.g. Milligan, 1997; Kathman and Brikhurst, 1998; Wetzel et al., 2012). However, Cekanovskaya (1962) and Liang (1964) considered *Dero* and *Aulophorus* as separate genera, while the latter author also separated *Allodero* at the generic level. More recently, *Aulophorus* was listed as a full genus (Timm, 1999). However, we prefer to refer individuals from this study as *Dero (Allodero) lutzi* until a revision of the subgenus *Allodero* is effectively conducted.

The subgenus *Allodero* consists only of one species, *D. (Allodero) lutzi* Michaelsen, 1926. *Dero (Allodero) lutzi* is an endoparasitic of the urinary tracts of frogs of the genus *Hyla* (Maldonado and Oliveira, 1982; Rodrigues and Maldonado Junior, 1982), which also have a free-living stage. Specimens in the parasitic stage lack dorsal setae, branchial fossa, and gills, but when cultured in a free-living form, they developed dorsal setae as well as caudal fossa and gills (Harman and Lawler, 1975). Here we report the occurrence of the endoparasitic Oligochaeta, *Dero (Allodero) lutzi* in the snouted tree frog, *Scinax fuscovarius*, from Semi-deciduous Atlantic Rain Forest in southern Brazil.

2. Material and Methods

This study took place in the Caiuá Ecological Station (22° 37' S and 52° 50' W, 268 m asl), in the municipality of Diamante do Norte, Paraná, Brazil. The region is inserted in the Semi-deciduous Atlantic Rain Forest. Specimens of *Scinax fuscovarius* (n = 7, mean SVL = 40.9 mm, ±3.7 SD

and mean body weight 4.5 g, ±1.4 SD) were collected in temporary and permanent ponds during visual encounters surveys in February, April, and October 2012. Individuals were taken to the laboratory where they were euthanatized with Lidocaine 5%. Subsequently, the lungs, digestive tract, urinary tract, muscle, skin, spleen, and liver were examined for parasites. The Oligochaeta were identified in semi permanent slides. All anurans are housed at the zoological collection of the Universidade Federal de Goiás (ZUFG), Goiânia, Goiás, central Brazil (ZUFG 7109-7113, 7190, 7208). Voucher parasite specimens are housed at the Helminthological collection of the Instituto Oswaldo Cruz (CHIOC), Rio de Janeiro, Rio de Janeiro, Brazil (CHIOC 35863). The current nomenclature of anurans follows Faivovich et al. (2005), Lema and Martins (2011), Frost (2013).

3. Results and Discussion

Seven specimens of *Scinax fuscovarius* were examined for parasites. Analyses of the treefrogs demonstrated that one specimen (male, SVL = 40.75 mm, weight = 4.53 g) was infected by *Dero (Allodero) lutzi* (n = 14, mean length = 3.06 mm, ±0.51 SD; Figure 1), which were found in

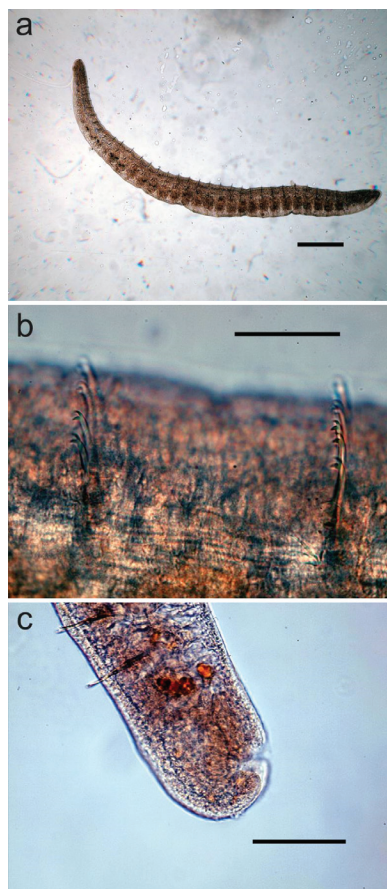


Figure 1. *Dero (Allodero) lutzi* found in an adult male of *Scinax fuscovarius*: a) general aspect (Bar = 500 mm); b) ventral setae (Bar = 50 mm); c) rudimentary caudal fossa (Bar = 150 mm).

ureters and urinary bladder. These oligochaetes are free-living animals (Rodrigues and Maldonado Junior, 1982), which are adapting to parasitism, since the ecological conditions of the bladder and ureters of amphibians resemble those of the external liquid environment used by the frogs. However, the exact route of transmission of naids to frogs is unknown, but previous studies suggest that frogs are infected during the larval stage (Harman and Lawler, 1975).

Only *Dero* is known to use frogs for transport and as hosts among the Brazilian freshwater genera of naidids (Righi, 1984; Lopez et al., 1999). As example, *Dero superterrenus* Michaelsen, 1912 are free-living inhabitants of tank bromeliads and tree holes and can use amphibians to disperse (Lopez et al., 1999). Laboratory experiments support the hypothesis that the phoretic behaviour presented by *D. superterrenus* is stimulated by chemical substances released by amphibian skins (Lopez et al., 2005). Lopez et al. (2005) suggest that if *D. (A.) lutzi* use the same chemical substances used by *D. superterrenus* to find their amphibian vectors, it will strengthen the hypothesis that parasitic and

phoretic behaviours using frogs are evolutionarily linked in the annelid *Dero* group. Thereby, *D. superterrenus* and *D. (A.) lutzi* might have shared a close common ancestor with parasitic or phoretic behavior (Lopez et al., 2005).

Reports on *Dero (A.) lutzi* are scarce and restricted to a few anuran species. The first record was made on *Trachycephalus* cf. *typhonius*, *Hypsiboas albomarginatus*, *Scinax* gr. *ruber* and *Dendropsophus minutus* (Lutz, 1926). Lutz (1927) found the species in *Hypsiboas faber* (Brazil) and *Osteopilus septentrionalis* from Cuba. Righi (1972) also found *D. (A.) lutzi* in *Scinax strigilatus* and considered *Schmardaella hylae* Goodchild 1951, parasite of *Hyla squirella*, a synonym of *D. (A.) lutzi*. More recently, oligochaetes were expelled along with eggs of *Trachycephalus mesophaeus* during oviposition (Prado et al., 2003). The current taxonomy of hosts is presented in Table 1. The reported of *S. fuscovarius* as host of *D. (A.) lutzi* represents a new host record for this Oligochaeta endoparasite.

Previous records of *Dero (A.) lutzi* include the Brazilian States of Santa Catarina, São Paulo, Rio de Janeiro, and

Table 1. Checklist of anuran species host of *Dero (Allodero) lutzi*.

Host	Locality / Country ^a	Current taxonomy (Host)	Source
BUFONIDAE			
<i>Bufo crucifer</i>	Nova Iguaçu, RJ (BRA)	<i>Rhinella ornata</i>	Rodrigues and Maldonado Junior (1982)
HYLIDAE			
<i>Hyla misera</i>	Rio de Janeiro, RJ (BRA)	<i>Dendropsophus</i> cf. <i>meridianus</i>	Rodrigues and Maldonado Junior (1982)
	Maracay (VEN)	<i>Dendropsophus microcephalus</i>	
<i>Hyla bilineata</i> ^c	São Paulo, SP (BRA)	<i>Dendropsophus minutus</i>	Rodrigues and Maldonado Junior (1982)
<i>Hyla albomarginata</i>	Rio de Janeiro, RJ (BRA)	<i>Hypsiboas albomarginatus</i>	Rodrigues and Maldonado Junior (1982)
<i>Hyla faber</i>	(BRA)	<i>Hypsiboas faber</i>	Rodrigues and Maldonado Junior (1982)
	Diamante do Norte, PR (BRA)	<i>Scinax fuscovarius</i> ^b	
<i>Hyla strigilata</i>	Lauro Müller, SC (BRA)	<i>Scinax</i> gr. <i>catharinae</i>	Rodrigues and Maldonado Junior (1982)
	Belo Horizonte, MG (BRA)	<i>Scinax</i> gr. <i>ruber</i>	Rodrigues and Maldonado Junior (1982)
<i>Hyla venulosa</i>	São Paulo, SP (BRA)		
	Rio de Janeiro, RJ (BRA)	<i>Trachycephalus</i> cf. <i>typhonius</i>	Rodrigues and Maldonado Junior (1982)
<i>Phrynohyas mesophaea</i>	Ubatuba, SP (BRA)	<i>Trachycephalus mesophaeus</i>	Prado et al. (2003)
<i>Hyla septentrionalis</i>	Maracay (VEN)		
	(CUB)	<i>Osteopilus septentrionalis</i>	Rodrigues and Maldonado Junior (1982)
<i>Hyla squirella</i>	Dade County, Florida (USA)	<i>Hyla squirella</i>	Rodrigues and Maldonado Junior (1982)

^a BRA, Brazil: MG, Minas Gerais; PR, Paraná; RJ, Rio de Janeiro; SC, Santa Catarina; SP, São Paulo; CUB, Cuba; VEN, Venezuela; USA, United States of America; ^b This study; ^c name unknown (possible confusion with *Hyla bivittata*).

Minas Gerais, as well as Cuba and North America (Righi, 1984; Christoffersen, 2007). Therefore, our record in Paraná represents a new locality for *D. (A.) lutzi*.

Reports of *Dero (A.) lutzi* are rare, due to difficulty of observation. Such events are restricted to fortuitous cases. In this context, it is important to emphasize the need for future studies to the understanding of biological and ecological aspects of *D. (A.) lutzi*.

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