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ORIGINAL ARTICLE / ARTÍCULO ORIGINAL

HELMINTH ANALYSIS OF TWO SPECIES OF THE GENUS *STENOCERCUS*,
S. CADUCUS (COPE, 1862) AND *S. SINESACCUS* (TORRES-CARVAJAL,
2005) (SAURIA: REPTILIA)

ANÁLISIS DE HELMINTOS EN DOS ESPECIES DEL GÉNERO
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CARVAJAL, 2005) (SAURIA: REPTILIA)

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34 ABSTRACT

35 The lizard genus *Stenocercus* is one of the most widely distributed taxa in South
36 America, both geographically and ecologically; nevertheless, parasite-host
37 interactions within the group remain poorly documented. Before this study,
38 parasitological studies have been conducted in only two species, *Stenocercus*
39 *roseiventris* (D'Orbigny in Duméril & Bibron, 1837) and *Stenocercus caducus*
40 (Cope, 1863). Thus, the aim of this study is to present new data on helminths
41 infecting *S. caducus* and *S. sinesaccus*. A total of 16 specimens were analyzed.
42 For *S. caducus*, only the nematode *Strongyluris oscar* (Travassos, 1923) was
43 found with a prevalence of 7.69%. For *S. sinesaccus*, three helminth taxa were
44 identified: *Subulura lacertilia* Vicente, Van Sluys, Fontes & Kiefer, 2000,
45 *Oochoristica* sp., and *Oswaldocruzia* sp., with an overall infection prevalence of
46 100%. This research presents the first record of parasites for *S. sinesaccus* and
47 expands the existing parasitological data for *S. caducus*.

Keywords: Helminths – *Stenocercus* – parasites – Tropiduridae – Cerrado – Pantanal

RESUMEN

El género de lagartos *Stenocercus* es uno de los taxones con mayor distribución geográfica y ecológica en Sudamérica; sin embargo, las interacciones parásito-huésped dentro de este grupo aún están poco documentadas. Antes de este estudio, solo se habían realizado estudios parasitológicos en dos especies, *Stenocercus roseiventris* (D'Orbigny in Duméril & Bibron, 1837) y *Stenocercus caducus* (Cope, 1863). Por lo tanto, el objetivo de este estudio es presentar nuevos datos sobre los helmintos que infectan a *S. caducus* y *S. sinesaccus*. Se analizaron un total de 16 especímenes. En *S. caducus*, solo se encontró el nematodo *Strongyluris oscar* (Travassos, 1923) con una prevalencia del 7,69%. En *S. sinesaccus*, se identificaron tres taxones de helmintos: *Subulura lacertilia* Vicente, Van Sluys, Fontes & Kiefer, 2000, *Oochoristica* sp. y *Oswaldocruzia* sp., con una prevalencia de infección general del 100%. Esta investigación presenta el primer registro de parásitos para *S. sinesaccus* y amplía los datos parasitológicos existentes para *S. caducus*.

Palabras clave: Helmintos – *Stenocercus* – parásitos – Tropiduridae – Cerrado – Pantanal

RESUMO

O gênero de lagarto *Stenocercus* é um dos táxons mais amplamente distribuídos na América do Sul, tanto geograficamente quanto ecologicamente; apesar disso, as interações parasita-hospedeiro do grupo ainda são pouco documentadas. Até o presente estudo, somente duas espécies haviam tido sua parasitologia previamente estudada: *Stenocercus roseiventris* (D'Orbigny in Duméril & Bibron, 1837) e *Stenocercus caducus* (Cope, 1863), com registros limitados à Serra de Bodoquena, no Mato Grosso do Sul. Assim, o objetivo deste trabalho é apresentar novos dados sobre helmintos hospedeiros de *S. caducus* e *S. sinesaccus*. Dessa forma, foram analisados 16 espécimes no total. Para *S. caducus*, apenas um helminto foi encontrado, o *Strongyluris oscar* (Travassos, 1923), apresentando uma prevalência de 7,69%. Para *S. sinesaccus*, três táxons de helmintos foram encontrados: *Subulura lacertilia* Vicente, Van Sluys, Fontes & Kiefer, 2000, *Oochoristica* sp. e *Oswaldocruzia* sp., com uma prevalência geral de infecção de 100%. A investigação apresenta o primeiro registro de parasitas para *S. sinesaccus* e expande os dados parasitológicos conhecidos para *S. caducus*.

Palavras-chave: Helmintos – *Stenocercus* – parasitas – Tropiduridae – Cerrado – Pantanal

INTRODUCTION

Tropidurid lizard genus *Stenocercus*, is one of the most widely distributed taxa in South America, both geographically and ecologically (Torres-Carvajal, 2007). Actually, 81 species are recognized and distributed in forested environments from

northern Colombia through Bolivia and Brazil to central Argentina, mainly distributed in the Andean region (Ávila-Pires, 1995; Torres-Carvajal, 2007). However, despite their wide distribution and diversity, their habits remain poorly understood (Ávila, 2008; Silva *et al.*, 2010).

Stenocercus caducus (Cope, 1863) encompasses a large part of the genus's distribution, occurring in Argentina, Bolivia, and Brazil (Nogueira & Rodrigues, 2006). Studies with *S. caducus* focus primarily on its reproductive biology, sexual dimorphism, diet, and habitat use (Ávila, 2008; Silva, 2010; Smith & Smith, 2019), with a single study on parasitism (Ávila *et al.*, 2010).

On the other hand, *Stenocercus sinesaccus* (Torres-Carvajal, 2005) is recorded in the Brazilian states of Mato Grosso, Rondônia, and Goiás (Torres-Carvajal, 2005; Morais *et al.*, 2010), being a species with a significant gap in knowledge, limited essentially to taxonomic diagnosis and distribution notes.

Parasitism is one of the most widespread modes of life on the planet, and studies in parasitology are key to better understanding the natural history, ecology, life cycle, and evolution of parasites and hosts (Loreau *et al.*, 2005; Albuquerque *et al.*, 2012; Vieira *et al.*, 2019). Despite the diversity of species within the genus *Stenocercus*, there is a gap in parasitological research on the group. To date, only two have been the subject of parasitological studies: *Stenocercus roseiventris* (D'Orbigny in Duméril & Bibron, 1837) and *Stenocercus caducus* (with records limited to the Serra de Bodoquena in Mato Grosso do Sul (Ávila & Silva, 2010). Thus, this study presents new data on parasitism in *S. caducus* and *S. sinesaccus*, expanding knowledge regarding the genus.

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117 MATERIAL AND METHODS

118 Specimens of *S. caducus* were collected at two localities in Mato Grosso do Sul
119 state: Dois Irmãos do Buriti municipality (19°13'15.78" S, 57°34'23.11" W) and
120 Morro Santa Cruz (19°13'15.78" S, 57°34'23.11" O) and Serra do Amolar (17°49'
121 S, 57°29' W), Corumbá municipality. Specimens of *S. sinesaccus* were collected
122 at Manso Dam (APM Manso; 14°44'42"S 55°19'23"W), Chapada dos Guimarães
123 municipality, Mato Grosso State. These localities are within the Pantanal
124 (Corumbá municipality) and Cerrado Biomes, where lizards were captured by
125 hand during active searches and by pitfall traps with drift fences (Fitzgerald,
126 2012). Lizard specimens were euthanized with a lethal injection of Thiopental,
127 fixed with 10% formalin, and housed at Coleção Zoológica de Referência do
128 Campus de Corumbá, Seção de Herpetologia da Universidade Federal do Mato
129 Grosso do Sul (CEUCH) e Coleção Herpetológica da Universidade Federal de
130 Mato Grosso, acervo de vertebrados do Instituto de Biociências (UFMT-R).

131 With the aid of a digital caliper (1mm precision), the snout-vent length (SVL) of
132 each lizard specimen was taken, and then each individual was necropsied with a
133 careful examination for helminths in the body cavity, lungs, and digestive tract
134 under a stereoscopic microscope. Helminths found were processed following the
135 guidelines of Aguiar *et al.* (2026): nematodes were cleared in phenol, and
136 cestodes were dehydrated in an increasing series of alcohol, stained with the
137 hydrochloric carmine technique, cleared in eugenol, mounted on temporary
138 slides, and analyzed under a light microscope. After identification, helminth

vouchers were deposited at Coleção Helmintológica do Instituto de Biociências da Unesp de Botucatu (CHIBB 2414, 2415, 3090, 3278, 3279, 3280, 3281, 3355, 3356 e 3357).

Ethical aspects: Lizard sampling permits were issued by Instituto Chico Mendes de Conservação da Biodiversidade (ICMBio), and this study was approved by the Animal Ethics Committee of the Universidade Federal do Ceará (CEUA-UFC), process #CEUA 6314010321.

RESULTS

Thirteen *S. caducus* (69.28 ± 8.95 mm SVL; three females and ten males) were examined, and the helminth *Strongyluris oscar* Travassos, 1923 (n=4) was found. The overall prevalence was 7.69%. The helminths were found in a male, primarily in the large intestine (n=3), with one being found in the small intestine.

Three *S. sinesaccus* (68.48 ± 7.38 mm SVL; one female and two males) were examined, and three helminth taxa were found: the helminth *Subulura lacertilia* Vicente, Van Sluys, Fontes & Kiefer, 2000 (n=41), an unidentified species of *Oochoristica* (n=7), and an unidentified species of *Oswaldocruzia* (n=1). The overall prevalence was 100%, while the individual prevalence was 66.7% for *Subulura lacertilia*, 33.3% for *Oochoristica* sp., and 33.3% for *Oswaldocruzia* sp. *Subulura lacertilia* was found in the large intestine of a male (n=13) and a female (n=28). *Oochoristica* sp. was found in the small intestine of a male, while one *Oswaldocruzia* sp. was found in the small intestine of the other male, representing a co-infection with *S. lacertilia*.

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163 **DISCUSSION**

164 The Pantanal covers 1.9% of the Brazilian territory in the Mato Grosso and Mato
165 Grosso do Sul states (IBGE, 2019, 2025), with a total area of 150,961 Km² and
166 harboring 31 lizard species (Strüssmann *et al.*, 2007), of which 41.9% have been
167 studied for parasites. On the other hand, the Cerrado is the second largest Biome
168 in Brazil, covering parts of 11 states plus the Federal District, with 76 lizard
169 species registered and only 21 (27.6%) studied for parasites. This low number is
170 concerning, as both ecosystems are suffering from biodiversity loss due to
171 agricultural activities (MMA, 2016).

172 To the best of our knowledge, only two species of *Stenocercus* have been studied
173 for parasites: *Stenocercus roseiventris* and *Stenocercus caducus*. The last one
174 involved a study restricted solely to the Serra de Bodoquena region where two
175 helminths were found (*Strongyluris oscari* and *Skrjabinellazia intermedia*; Ávila &
176 Silva, 2010). The three analyzed specimens of *S. sinesaccus* exhibited a high
177 parasite load, with three different types of helminths found; however, the data
178 were insufficient to determine a relationship between richness/abundance and
179 snout-vent length (SVL). It is noteworthy that parasitological studies have been
180 conducted on only approximately 3.7% of the genus *Stenocercus*, underscoring
181 the fact that there is much more to be discovered.

182 Despite the small sample size of lizards analyzed, the results obtained in the
183 present study contribute to expanding knowledge regarding the endoparasitic
184 fauna of *S. caducus* and *S. sinesaccus*. However, given the wide distribution of

185 *S. caducus* and the lack of studies on *S. sinesaccus* and most species of the
186 genus, there is a clear need for further research with larger sample sizes to better
187 understand and characterize helminth diversity and the relationships between
188 these parasites and their hosts.

189 **Author contributions: CRediT (Contributor Roles Taxonomy)**

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196 **Conceptualization:** LC, GPC, MMAL

197 **Data curation:** RWA, RJS

198 **Formal Analysis:** GPC, RWA

199 **Funding acquisition:** RWA

200 **Investigation:** KLC, RWA

201 **Methodology:** MMAL

202 **Project administration:** KLC

203 **Resources:** RWA

204 **Software:** KLC, GPC, MMAL, WRA, RJS

205 **Supervision:** KLC, RWA

206 **Validation:** RWA

207 **Visualization:** KLC, GPC, MMAL, WRA, RJS

208 **Writing – original draft:** KLC, GPC, MMAL, WRA, RJS

209 **Writing – review & editing:** KLC, GPC, MMAL, WRA, RJS

210

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