



Research note

First record of *Brachylaima* (Trematoda: Brachylaimidae) in *Salvator merianae* (Squamata: Teiidae)

Primer registro de Brachylaima (Trematoda: Brachylaimidae) en Salvator merianae (Squamata: Teiidae)

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Abstract

Twenty-four gastrointestinal tracts of *Salvator merianae* were examined for helminths research. Immature forms of *Brachylaima* sp. were identified with a prevalence of 4.16%. This is the first occurrence the Brachylaimidae for this host species in Brazil and in South America since the previous records of *Brachylaima* sp. in lizards were known only from Europe and Eurasia.

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Keywords: Argentine black and white tegu; Trematoda; Parasites

Resumen

Se revisó el tubo gastrointestinal de 24 tegus argentinos *Salvator merianae* en busca de helmintos. Se encontraron formas inmaduras de *Brachylaima* sp. con una prevalencia del 4.16%. Este es el primer registro de Brachylaimidae en esta especie de hospedero en Brasil y en América del Sur, ya que los registros previos de *Brachylaima* sp. en lagartos se tenían solo de Europa y Eurasia.

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Palabras clave: Tegu blanquinegro argentino; Trematoda; Parásitos

The geographical distribution of *Salvator merianae* (Duméril and Bibron, 1839) (Squamata: Teiidae), Argentine black and white tegu comprises eastern Bolivia, Argentina, Uruguay and Brazil (Embert, Fitzgerald, & Waldez, 2010; Loebmann & Quintela, 2009). The lizard is omnivorous, feeding on fruits, insects, snails, fish, amphibians, reptiles, rodents, adult birds, nestlings and eggs (Achaval & Olmos, 2003).

Regarding the helminths of *S. merianae*, the diversity is composed of 6 species of Nematoda: *Cruzia travassosi*

Kalil and Vogelsangi, 1932 (Kathlaniidae); *Physaloptera retusa* Rudolphi, 1819 (Physalopteridae); *Diaphanocephalus galeatus* (Rudolphi, 1819) (Diaphanocephalidae); *Spinicauda spinicauda* Olfers, 1819 (Heterakidae); *Physaloptera tupinambae* Pereira, Alves, Rocha, Lima, and Luque, 2012 (Physalopteridae); *Physaloptera baina* Pereira, Alves, Rocha, Lima, and Luque, 2014 (Physalopteridae) and 1 species of Cestoda, *Oochoristica* sp. (Cyclophyllidae) (Ávila & Silva, 2010, 2011; Pereira, Alves, Rocha, Lima, & Luque, 2012, 2014; Vieira, Bernardon, & Müller, 2016). In this context, the present study had the aim to report the occurrence of Brachylaimidae (Trematoda) and their parasitological indexes in *S. merianae*.

Twenty-four *S. merianae* were necropsied (collected in the period of 2007–2015), 20 collected on highways of southern

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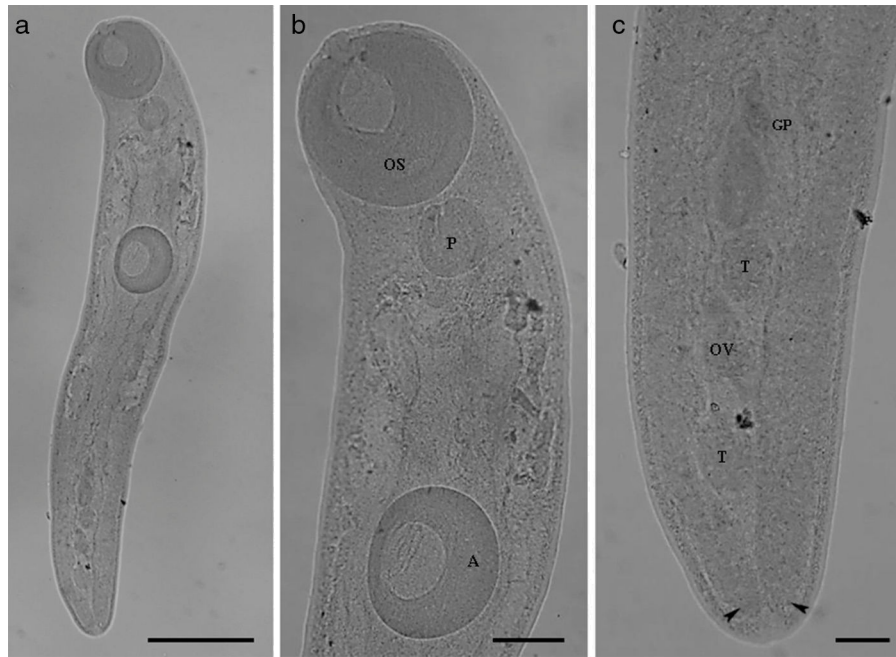


Figure 1. (a–c) *Brachylaima* Dujardin, 1843 (Trematoda: Brachylaimidae) parasite of *Salvator merianae* (Duméril and Bibron, 1839) from southern of Brazil. (a) Body of *Brachylaima* (bar = 0.42 mm); (b) OS = oral sucker; P = pharynx; A = acetabulum (bar = 0.1 mm); (c) GP = genital pore; OV = ovary; T = testes; arrow heads indicate the cecum (bar = 0.06 mm).

Brazil (in Rio Grande do Sul State) under the authorization “Instituto Chico Mendes de Conservação da Biodiversidade – Sistema de Autorização e Informação em Biodiversidade” (ICMBIO-SISBIO 38913-1) from municipalities of Pelotas (31°46'19" S, 52°20'33" W) ($n = 13$), Capão do Leão (31°46'3" S, 52°26'55" W) ($n = 10$), and Morro Redondo (31°35'18" S, 52°37'47" W) ($n = 1$), and 4 were donated by the “Núcleo de Reabilitação da Fauna Silvestre e Centro de Triagem de Animais Silvestres da Universidade Federal de Pelotas” (NURFS-CETAS/UFPel).

The gastrointestinal tracts were sectioned into esophagus, stomach, small intestine and large intestine. These were dissected and washed with a water jet through a sieve (150 μ m) and the resulting contents and mucous were examined under an Olympus SZ 51 stereomicroscope. The trematodes were quantified, fixed in AFA, stored in alcohol 70% and dyed with Carmin's Langeron and mounted on slides with Canada's balsam. These were viewed with an Olympus CX21 microscope for morphological and morphometric identification according to Gibson, Jones, and Bray (2002) and Valente, Diaz, Salomón, and Navone (2016).

Vouchers specimens are deposited in “Coleção de Helmintos do Laboratório de Parasitologia de Animais Silvestres do Instituto de Biologia, Universidade Federal de Pelotas (CHLA-PASIL/UFPel)” (Nos. 637 and 638).

Measurements are expressed in millimeters (the mean shown in parentheses) and the photographs were taken with an Olympus BX 41 microscope with attached camera system. The parameters calculated were prevalence (P), mean abundance (MA) and mean intensity of infection (MI) according to Bush, Lafferty, Lotz, and Shostak (1997).

Class Trematoda Rudolphi, 1808

Subclass Digenea Carus, 1863

Family Brachylaimidae Joyeux & Foley, 1930

Genus *Brachylaima* Dujardin, 1843: (immature forms)

(Fig. 1a–c):

Characterization: based on 8 specimens (5 were measured). Length of body 1.66–2.35 (2.04 ± 0.34); width of body (level of acetabulum) 0.3–0.6 (0.43 ± 0.12); length of oral sucker 0.25–0.36 (0.31 ± 0.02); width of oral sucker 0.25–0.35 (0.31 ± 0.02); length of pharynx 0.1–0.18 (0.13 ± 0.03); width of pharynx 0.12–0.16 (0.14 ± 0.01); length of acetabulum 0.23–0.28 (0.26 ± 0.02); width of acetabulum 0.18–0.27 (0.23 ± 0.04); length of ovary 0.04–0.1 (0.07 ± 0.02); width of ovary 0.04–0.08 (0.05 ± 0.02); length of the anterior testicle 0.05–0.1 (0.08 ± 0.02) and width of anterior testicle 0.04–0.09 (0.06 ± 0.02); length of the posterior testicle 0.05–0.1 (0.08 ± 0.02) and width of the posterior testicle 0.03–0.08 (0.06 ± 0.02). The specimens do not present eggs.

Although the specimens found are immature forms, the following morphological characteristics allowed us to assign them to the genus *Brachylaima*: body elongated; acetabulum located in the anterior half of the body; presence of muscular pharynx; caeca long slightly sinuous, extending to the posterior extremity of the body; uterus intercaecal; vitelline fields extending between the posterior margin of the acetabulum to the anterior margin of the anterior testis; genital pore located in the anterior margin of anterior testis; gonads located in the posterior half of the body near the posterior extremity of the body.

Eight trematodes were found parasitizing the small intestine of only 1 *S. merianae* (P = 4.16%; MA = 0.33; MI = 8) from

Pelotas. The specimens when compared to adults are smaller in size with respect to morphology, exhibit testis, ovary and vitelline glands reduced, and the absence of eggs.

The history of *Brachylaima* Dujardin, 1843 is confusing at first, because some authors, generating various synonyms, used different spelling. *Brachylaima* Dujardin, 1843 (Syns *Brachylaime* Dujardin, 1843; *Brachylaimus* Dujardin, 1845; *Brachylaemus* Blanchard, 1847; *Harmostomum* Braun, 1899; *Heterolope* Looss, 1899; *Entosiphonus* Sinitsin, 1931; *Centrodes* Travassos & Kohn, 1964; *Mazzantia* Travassos & Kohn, 1964; *Rallitrema* Travassos & Kohn, 1964) (Gibson et al., 2002). According to Pojmanska (2002), Brachylaimidae Joyeux and Foley, 1930 is composed of Brachylaiminae Joyeux and Foley, 1930 and Itygoniminae Yamaguti, 1958. Brachylaiminae includes *Brachylaima*; *Glaphyrostomum* Braun, 1901; *Parabrachylaima* Lotz and Corkum, 1975; *Postharmostomum* Witenberg, 1923 and *Ectosiphonus* Sinitsin, 1931 (Gibson et al., 2002).

In Brazil, 4 species of *Brachylaima*, *Brachylaima advena* Dujardin, 1843; *Brachylaima centrodes* (Braun, 1901); *Brachylaima marsupium* (Braun, 1901) and *Brachylaima mazzantii* (Travassos, 1927) have been registered in mammals (Muridae, Cricetidae; Didelphidae) and birds (Columbidae, Odontophoridae, Tinamidae) (Travassos, Teixeira-de Freitas, & Kohn, 1969). Although there are no reports of *Brachylaima* sp. parasitizing *S. merianae*, other digeneans were found parasitizing Teiidae, in *Tupinambis teguixin* Linnaeus, 1758: *Pulchrosomoides elegans* Freitas and Lent, 1937 (Cathaemasiidae); *Paradistomum parvissimum* (Travassos, 1918) (Pronocephalidae); *Dasymetra tupinambis* Nasir and Diaz, 1971 (Plagiorchiidae) and in *Tupinambis rufescens* (Günther, 1871): *Styphlodora condita* Faria, 1911 (Plagiorchiidae) (Ávila & Silva, 2010).

Brachylaima species are generally found in the alimentary tract of birds, mammals and rarely in amphibians (Gibson et al., 2002). For lizards, (Squamata) immature forms were registered in the Spain by Roca, López-Balaguer, and Hornero (1989) in *Podarcis bocagei* (Seoane, 1884) (Lacertidae) (P=0.9%). For the islands (Balearic Archipelago) in *Podarcis pityusensis* (Boscá, 1883) [P=0.2% (n=564)] and in *Podarcis lilfordi* (Günther, 1874) [P=0.8%; MA=0.01; MI=1.3 (n=386)] (Roca, 1996).

In Portugal, Galdón, Roca, Barbosa and Carretero (2006) recorded in *P. bocagei* [P=0.4% (n=249)] and *Podarcis carbonelli* Pérez Mellado, 1981 (Lacertidae [P=1.2%; MA=4.7; MI=0.05] (n=257)]. In Turkey, Yildirimhan, Bursey, and Altunel (2011) in *Lacerta trilineata* Bedriaga, 1886 (Lacertidae) [P=9%; MA=0.4; MI=5 (n=38)] and Incedogan, Yildirimhan, and Bursey (2014) in *Chalcides ocellatus* (Forsk., 1775) (Scincidae) [P=2.2%; MA=0.02; MI=12 (n=45)]. In Poland, registered in *Anguis fragilis* Linnaeus, 1758 (Anguidae) and *Lacerta agilis* Linnaeus, 1758 (Lacertidae) (Lewin, 1990, 1992 apud Incedogan, Yildirimhan, & Bursey, 2014).

In this study, the prevalence, mean abundance and mean intensity values of infection found for *Brachylaima* sp. in *S. merianae* were low (P=4.16%; MA=0.33; MI=8), corroborating with previous studies which indicate that this is a parasite atypical in lizards (Galdón, Roca, Barbosa, & Carretero, 2006;

Incedogan et al., 2014; Roca et al., 1989; Yildirimhan, Bursey, & Altunel, 2011).

The life cycle of *Brachylaima* spp. has 2 terrestrial gastropods as intermediate hosts and birds, mammals and less frequently amphibians and reptiles as definitive hosts (Butcher & Grove, 2001). It is probable that the infestation of *Brachylaima* sp. in *S. merianae* occurred through the feeding cycle (Kiefer & Sazima, 2002).

Cases of infection *Brachylaima* spp. in humans were recorded in South Australia (Butcher, 2016; Butcher & Grove, 2001). The patients (2 children and 1 adult) had gastrointestinal symptoms such as abdominal pain and chronic diarrhea. After treatment, adults and eggs of the trematodes were obtained and through experimental infection were identified as *Brachylaima cribbi* Butcher and Groove, 2001 (Butcher, 2016). Both patients lived in rural areas, with plenty of snails, which after analysis of these cases were confirmed as the source of infection in children and adults, the ingestion of raw snails and vegetables contaminated respectively (Butcher, 2016). Although in Brazil there are no cases of infection in humans, the occurrence of *Brachylaima* sp. in *S. merianae* serves as an alert for possible infections, and in other animals that are natural predators such as the carnivorous mammals: *Procyon cancrivorus* (Cuvier, 1789), and *Canis lupus familiaris* Linnaeus, 1758 (Quintela, Lob, & Artioli, 2014; Rangel & Neiva, 2013), once the digenetic has zoonotic potential, and the predators may hold their dispersion.

For the first time in Brazil and the South American continent, immature forms of *Brachylaima* sp. were registered in *S. merianae* presenting the morphological characterization, parasitological indexes and photographs.

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