

***Acanthocephalus ranae* (ECHINORHYNCHIDAE) INFECTING *Rhinella icterica*
(BUFONIDAE) IN SANTA CATARINA, BRAZIL**

(Infecção por *Acanthocephalus ranae* (ECHINORHYNCHIDAE) em *Rhinella icterica*
(BUFONIDAE) em Santa Catarina, Brasil)

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RESUMO

O objetivo deste estudo foi identificar parasitos intestinais em sapo cururu – *Rhinella icterica* (Anura: Bufonidae) – na região urbana de Lages, estado de Santa Catarina, Brasil. Dezesesseis espécimes de *Rhinella icterica* foram coletados de julho a outubro de 2010. Os sapos foram necropsiados e removidos os intestinos. Amostras de fezes foram coletadas e processadas por sedimentação espontânea e todo o intestino foi examinado. Todos os sapos apresentaram ovos nas fezes e a forma adulta de *Acanthocephalus ranae* foi detectada no intestino de 100% dos sapos. Este é o primeiro registro desta espécie no estado de Santa Catarina, região sul do Brasil. Palavras-chave: Acanthocephala, *Rhinella icterica*, Bufonidae, sapo brasileiro.

ABSTRACT

The aim of this study was to identify intestinal parasites in the yellow cururu toad – *Rhinella icterica* (Anura: Bufonidae) – in the urban region of Lages, state of Santa Catarina, Brazil. Sixteen specimens of *Rhinella icterica* were collected from July to October 2010. The toads were necropsied for removal of the intestine. Stools were collected and processed by spontaneous sedimentation and the whole length of the intestine was examined. All of the toads presented eggs in their feces and the adult form of *Acanthocephalus ranae* was detected in the intestine of 100% of the toads. This is the first report of this species in the state of Santa Catarina, southern Brazil. Keywords: Acanthocephala, *Rhinella icterica*, Bufonidae, Brazilian toad.

INTRODUCTION

Rhinella (R.) icterica (Spix, 1824) is known in Brazil as cururu toad. It is widely distributed in the Brazilian Atlantic forest and in northeastern Argentina and eastern Paraguay, the latter of which are located on the Brazilian borders (Haddad et al., 2008; Frost, 2011). The

species first belonged to the genus *Bufo*, was then assigned to the genus *Chaunus* (Frost et al., 2006) and now it belongs to the genus *Rhinella* (Chaparro et al., 2007). There are about 5,500 anurans in the world and Brazil harbors the highest richness in and the second largest diversity of anuran species (Mittermeier et al., 1997) approximately 870 known species,

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of which 789 belong to the order Anura (Anjos, 2011).

In Brazil, *R. icterica* is geographically distributed in more than one biome, being found in forest areas and also in the open; however, it can survive in deforested areas and in fields (Haddad et al., 2008). It is common in anthropogenically disturbed areas due to the abundance of food resources and is occasionally found in urban environments (Silvano et al., 2009) such as brooks and still waters, especially during the mating season. Currently, it has disappeared owing to pollution and to the drainage of lagoons, where it breeds. Of the 280 amphibian species of the Brazilian Atlantic Forest, 253 are endemic (Myers et al., 2000).

Information on the planet's biological diversity is scarce and Brazilian reptiles and amphibians are poorly known due to the paucity of medium- and long-term studies and to the lack of surveys into the fauna of different regions (Pombal & Gordo, 2004).

To understand about preservation, it is necessary to know about diversity, ecology and systematics of organisms and ecosystems (Anjos, 2011). Parasites represent the invisible diversity within biodiversity, and helminths that infect vertebrates are poorly known and often underestimated. The inventory and description of parasites in these species are important to improve the understanding of parasitism and its relationship with the ecosystem (Poulin & Morand, 2000; Anjos, 2011).

The aim of this study is to assess the presence of helminths in cururu toad (*Rhinella icterica*) in the urban region of Lages, in the state of Santa Catarina, Brazil, and to contribute towards the inventory and description of parasite species.

MATERIAL AND METHODS

Lages is a town located in the plateau region of the state of Santa Catarina, in southern Brazil (27°48'S, 50°20'W, altitude: 916 m), with a territorial extension of 2,651.4

km², a population of 161,583 inhabitants, and 65 districts. The urban area is distributed over 222.4 km². For the sake of this study, the town was split into four quadrants, and the following districts were randomly chosen for the capture of toads: Guarujá, Jardim das Camélias, Popular and Triângulo. A total of 16 toads were captured – four from each district. The toads were captured manually and randomly from July to October 2010 (Fig.1).

The toads were anesthetized with thiopental sodium and euthanized by spinal cord trauma in compliance with the American Veterinary Medical Association (AVMA, 2007) guidelines. After the euthanasia, the animals were necropsied for removal of the intestine. Fecal samples were collected from the intestinal contents and submitted to parasitological testing using spontaneous sedimentation (Foreyt, 2005). All of the fecal matter was removed and the parasites were collected by intestinal lavage, sifted, and the sediment was placed onto glass slides with saline and examined under a stereomicroscope for separation. Thereafter, the helminths were fixed in alcohol-formalin-acetic acid (AFA) and stored in 70% ethanol. The parasites were processed by routine methods and identified according to Yamaguti (1963). The helminths were placed in two collections, at the Laboratory of Parasitology of Universidade do Planalto Catarinense (UNIPLAC) and at the Laboratory of Helminth Infections of the School of Veterinary Medicine of Universidade Federal do Rio Grande do Sul (FAVET/UFRGS). This study was conducted with prior authorization from the Biodiversity Information System (SISBIO) of the Brazilian Environmental Agency (IBAMA) for collection and transportation, under protocol number 25844-1.

RESULTS AND DISCUSSION

The parasitological test by sedimentation revealed acanthocephalan eggs in all toads (Fig.2). Most anurans had low gastrointestinal contents. The small intestine of all toads was infected by parasites, identified as *Acanthocephalus ranae* (Fig. 3) with an intermediate intensity of 25 acanthocephalans per anuran.

Spontaneous sedimentation results fully matched those of intestinal content analysis, showing that 100% of the toads were infected by *Acanthocephalus ranae*.

According to Luque et al. (2005), nematodes are the major parasites found in *R. icterica*. This study demonstrated that 100% of the anurans were infected by acanthocephalans, which is not in line with the report of Martins (2004), who identified 15 helminth species. However, no sample was positive for acanthocephalans. In addition, the report of Smales (2007) showed low acanthocephalan infection rates and also revealed that the identification did not correspond to *A. ranae*. In the state of Santa Catarina, *Acanthocephalus* sp. was found to infect *Chaunus schneideri* and *Chaunus ictericus*, with prevalence rates of 26.19% and 43.10%, respectively, in the town of Três Barras (26°06'23" S and 50°19'20" W) (Lux Hoppe et al., 2008). Pinhão et al. (2009) investigated the helminth population of *R. icterica* collected in Botucatu, a town in the southeastern state of São Paulo, and observed 100% of parasitic infection, with the identification of five helminth species, four nematode species and one acanthocephalan species, identified as *A. saopaulensis*.

While the number of amphibians has declined worldwide since 1980, relatively little is known about their populations in South American countries. Loss of habitat and fragmentation are the biggest threats to amphibian populations, and anthropogenic actions, such as more intensive agriculture and urbanization, have had a negative impact on the diversity and abundance of species (Silva et al., 2009). In Brazil, several studies

have sought to shed some light on the causes for the reduction of amphibian populations and for species extinction, but the focus of such studies is on the southeastern region (Heyer et al., 1988; Izecksohn & Carvalho-E-Silva, 2001). *Rhinella icterica* is tolerant of disturbed environments; its reproduction occurs in the open; and its eggs are deposited in gelatinous strings that stick to the underwater vegetation (Izecksohn & Carvalho-E-Silva, 2001).

Helminth populations are higher during the time amphibians spend in the water, that is, in larval stages and in the breeding season. During this period, anurans are exposed to acanthocephalans and other helminths typically transmitted by the ingestion of aquatic invertebrates. During the terrestrial life cycle, these hosts are exposed to infection by the penetration of larvae into the skin and/or by the ingestion of eggs, but eating habits (27 food items) also play an important role, increasing the possibility of infection by a large number of parasites (Pinhão et al., 2009).

Rhinella icterica is the biggest amphibian in the state of Santa Catarina. It is also one of the best known species among the population as they are easily recognized and do not have elusive habits; for instance, they tend to get close to people's homes to search for food as house and street lamps lure a considerable amount of insects.

The frequency and persistence of parasitic infection depend on different variables. The contact rate between potential hosts and infectious stages is related to the number of adult parasites, to the number of infected hosts, to the maintenance of infectious stages and to the abundance of intermediate hosts, factors that are directly and indirectly determined by environmental conditions.

With respect to anurans, we lack studies on parasite infra community structure that relate their richness to their habitat, eating habits, length of the species,

physiology, and vagility of hosts, and on the possible relationships between the species that make up the parasite communities (Martins 2004).

CONCLUSIONS

The present study is the first report of the predominant infection of *R. icterica* by *A. ranae* in the urban area of Lages, state of Santa Catarina. It is not known whether helminth infection was acquired by the

habitat shared with sympatric populations, whether the presence of *A. ranae* had already been observed in preceding populations or whether there was some association with water, social structure and the available diet at the different collection sites. The paucity of literature data highlights the importance of carrying out further studies and gathering more information about parasite communities among Brazilian anuran amphibians.

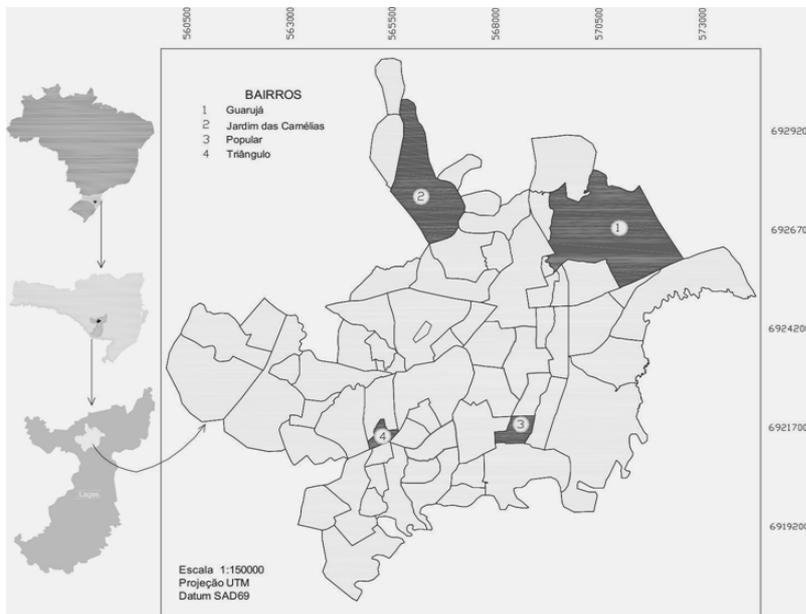


Figure 1- Map of Lages city, showing four districts, Guarujá, Jardim das Camélias, Popular and Triângulo.



Figure 2-
Acanthocephalus ranae egg in *Rhinella icterica* identified by sedimentation (40X)

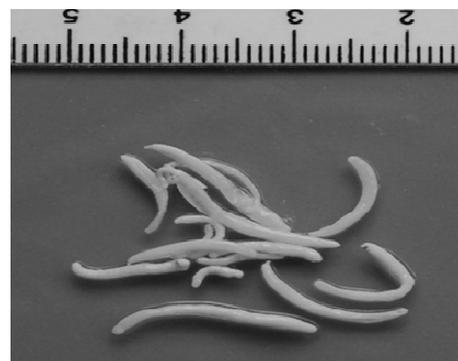


Figure 3 -
Acanthocephalus ranae adults

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