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Short note

Rhinella major (Anura: Bufonidae): a new paratenic host of *Centrorhynchus* sp. (Palaeacanthocephala: Centrorhynchidae) in Brazilian Amazon

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ABSTRACT. Acanthocephalans are grouped in a single phylum, having a cosmopolitan distribution and subdivided into three classes. Although species of this parasite acanthocephalans of the genus *Centrorhynchus* have birds and mammals as definitive hosts, they have been reported in amphibians and reptiles, and have been noted as paratenic hosts. In this study we report the record of *Rhinella major* as a new paratenic host for the *Centrorhynchus* sp. from an urban area of the Brazilian Amazon. In this study, for the morphometric measurements to take place, the parasitic specimens found were fixed in an alcoholic liquid medium and the identification of the parasites found were confirmed by specialized literature. The parasitological statistical parameters followed the proposed ecological concepts, calculating the parasite prevalence, intensity, average intensity and average abundance indices with confidence intervals. In the present study, two morphotypes of Acanthocephala were found parasitizing *R. major*. In this study we report the record of *R. major* as a new paratenic host for the *Centrorhynchus* sp.

Keywords: cystacanth, amphibians, morphotypes, endoparasites

Introduction

Rhinella major (Müller and Helmich, 1936) are frogs belonging to the family Bufonidae, distributed in the Neotropical region. These frogs are characterized by their small parotid gland rough skin and well-developed cranial ridges. Adults range in size from 35.8 to 75.8 mm for males and 33.9 to 81.1 mm for females. They are characterized by a dorsum with closed or scattered dark spots, resembling a mosaic pattern, with a cream-colored, unpigmented belly [1]. In this amphibian, different parasites are known that have already been recorded as Ixodidae [2,3] and hemoparasites [4–6]. However, there are no records of parasites of the genus *Centrorhynchus* in this host.

The species of this parasite genus have birds and mammals as definitive hosts, but amphibians and reptiles are considered paratenic hosts of acanthocephalans of the genus *Centrorhynchus* [7]. These hosts can be infected, since *Centrorhynchus* intermediate hosts are terrestrial arthropods, and several groups of these are targets of herpetofauna food diets [8].

Acanthocephalans are grouped in a single phylum, having a cosmopolitan distribution and subdivided into several genera [9]. To date, there are described species of *Centrorhynchus*, of which 22 occur in the Neotropical region [8,10,11]. In this study we report the record of *R. major* as a new paratenic host for the *Centrorhynchus* sp. from an urban area of the Brazilian Amazon.

Materials and Methods

The study was conducted in two areas of the Santarém municipality in western Pará State, Brazil, (Fig. 1) in the period from August to November 2018, being area one (A) located on the right bank of the Tapajós River in a strip of land intended for port use, and area two (B) is located on the right bank of the Curuá-Una River, in near of the damming lake of the Curuá-Una Hydroelectric Power Plant.

parasite specimens found were fixed and preserved in alcoholic liquid medium and the identifications of the parasites found were based on Yamaguti [12]. The parasitological statistical parameters followed the ecological concepts proposed by [13] being calculated the parasite indices of prevalence, mean intensity and mean abundance with confidence intervals (IC) shown in parentheses.

The present study was authorized by the Ministério do Meio Ambiente, through Sistema de Autorização e Informação da Biodiversidade –

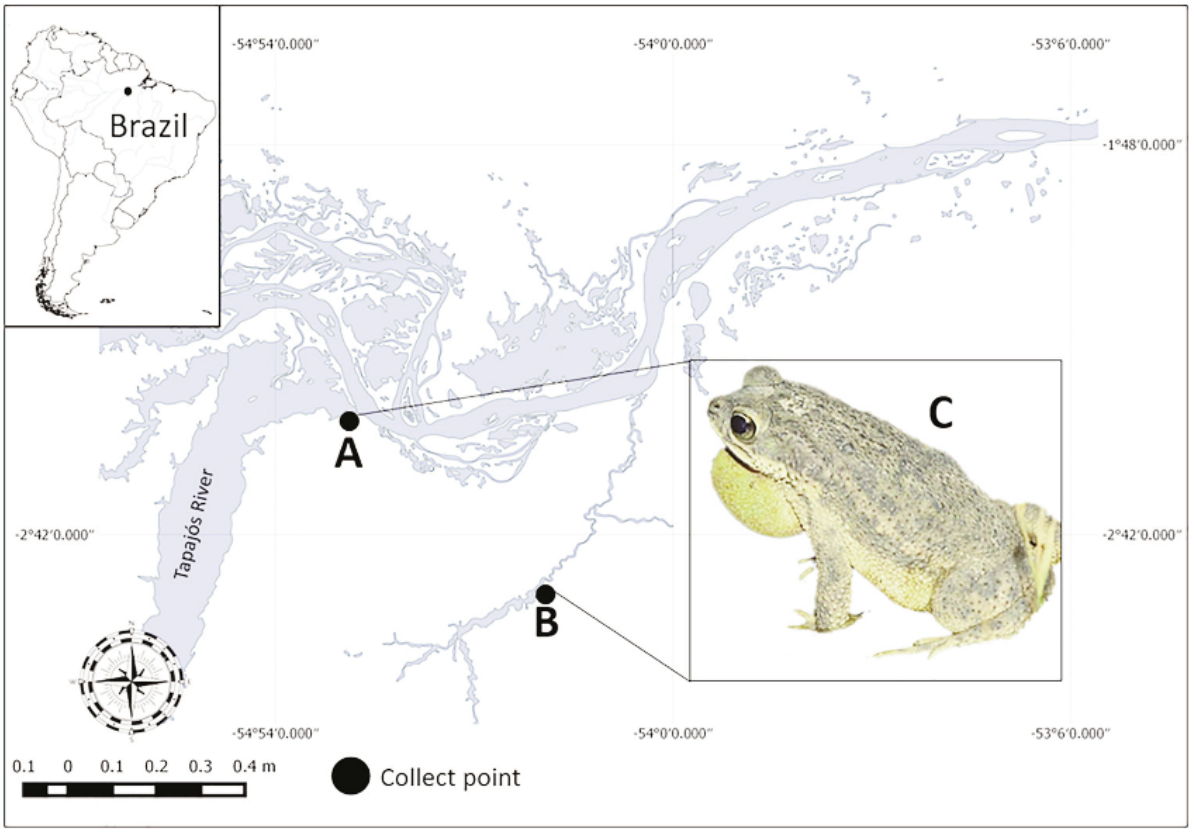

Figure 1. Location of host collection points. A. Urban area of the Santarém municipality; B. Curuá-Una hydroelectric power plant; *C. Rhinella major*

The methods of Time-Limited Visual Search (PVLT) and Occasional Encounters (EO) were used to capture the hosts. The captured anurans were placed in plastic bags, identified and transported to the Laboratory of Ecology and Animal Behavior of the Universidade Federal do Oeste do Pará. In the laboratory, the animals were anesthetized and euthanized using 2% lidocaine, and the measurements of snout-vent lenght (SVL) (mm) and total weight (g) were taken. After confirmation of death, the gastrointestinal tract of the frogs was removed and individually analyzed with the aid of a stereo microscope (Zeiss-Discovery. V8). The

SISBIO (Process # 66047-4). All handling and sampling procedures were approved by the Ethics Committee on Animal Use of the Universidade Federal do Oeste do Para through CEUA-UFOPA Protocol # 0320180024.

Results

A total of 45 individuals were caught and parasitological examination revealed the presence of two morphotypes compatible with Acanthocephala (Fig. 2). Two individuals were infected by *Centrorhynchus* sp. (Fig. 2A and B) (n=4), with mean

Figure 2. Parasitic forms of Acanthocephala found in *Rhinella major*. A and B. Morphotypes of *Centrorhynchus* sp. found; C. Cystacanth; D. Detail of proboscis

abundance of 0.09 (IC: 0.0 to 0.22), mean intensity 2.0 and prevalence of 0.044 (IC: 0.005 to 0.151), presented two morphotypes and only species from collect point A showed parasitic infection.

Morphotype A: presents body longer than wide measuring = 2.841 µm long by = 466.3 µm wide, proboscis measures = 542.1 µm long, in the apical region presents = 35.5 µm wide and at the base = 51.6 µm, and 13 rows with 9 hooks each are observed.

Morphotype B: it presents long body marked by the presence of a tail, its total length is = 3.031.3 µm with width of = 384.5 µm, proboscis presents = 961.4 µm long with = 229.2 µm wide in the apical region and = 329 µm at the base, and 19 rows with 13 hooks.

Moreover, 12 individuals were infected by cystacanths (Fig. 2C) (n=38) with mean abundance of 0.85 (IC: 0.38 to 1.98), mean intensity of 3.17 (IC: 1.67 to 5.83) and prevalence of 0.267 (IC: 0.146 to 0.419). This morphotype presents capsular cystic form measuring = 521 µm long by = 247.7 µm wide, the internal parasitic form presents proboscis (Fig. 2D) short in relation to body with = 171 µm long, in the apical region measuring = 108 µm and at the base = 90.5 µm the portion corresponding to the body shows = 436.8 µm in length and = 171.2 µm in width.

Discussion

The findings in the present study corroborate the results of [11] in studies with *Rhinella fernandezae* in the state of Rio Grande do Sul, Brazil and those of [14] on specimens of the same species from Paraguay.

The presence of cystacanths and *Centrorhynchus* sp. found in amphibians and reptiles is justified by the ingestion of arthropods (intermediate hosts), items that are contemplated in the diets of several species [8,15]. According to [16], the diet of *R. major* from the state of Amapá, Brazil, is composed of insects of the orders Blattaria, Coleoptera, Embioptera, Hymenoptera and Isoptera, which may justify the parasitic interaction between the species, corroborating the hypothesis of species cycle of the genus *Centrorhynchus*. Mesquita [17] recorded the predation of a specimen of *R. major*, by *Guira guira* (Cuculidae, Crotophaginae) in northeastern Brazil, and a new species of Centrorhynchidae was subsequently recorded in this same bird species in Argentina [10], which, in general, may provide support for the participation of amphibians as intermediate or paratenic hosts of this group of parasites until their ingestion by the definitive host (birds or mammals). It is necessary to speculate about the definitive hosts of the parasites found, as well as the role of frogs in their life cycle. Most likely, these are birds that can often eat frogs, and frogs are the transmission link between intermediate and definitive hosts.

This is the first record of this interaction involving amphibians of the genus *Rhinella* in the Brazilian Amazon and the parasite *Centrorhynchus* sp. However, further integrative studies are needed, considering ecological aspects of the hosts, as well as the use of molecular tools to better characterize the parasites, elucidating the participation of vertebrate specimens in their cycle and the possible results of this parasitic interaction.

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