Infection rates of pentastomids on lizards in urban habitats in the Brazilian northeast

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Abstract

The rates of pentastomid infections in the syntopic lizards *Hemidactylus mabouia* and *Tropidurus hispidus* inhabiting buildings at the Federal University of Paraiba, in João Pessoa, NE Brazil were examined. A total of 30 specimens of *Hemidactylus mabouia* and 55 specimens of *Tropidurus hispidus* were examined. The animals were sacrificed by freezing and then fixed and conserved in 70% alcohol. Analyses of the respiratory tract of *Hemidactylus mabouia* demonstrated that these lizards were infected by *Raillietiella frenatus* at a rate of 20% (6/30) with an average infection intensity of 1.33 ± 0.21, 1-2. None of the specimens of *T. hispidus* analyzed were infected. *Hemidactylus mabouia* and *R. frenatus* are of African origin and it is possible that there are specific relationships, or preferences, between these two species.

Keywords: parasitism, house geckos, neotropical region.

Níveis de infecção por pentastomídeos em lagartos de habitats urbanos no nordeste brasileiro

Resumo

Foram analisadas as taxas de infecção por pentastomídeos nos lagartos simpátricos *Hemidactylus mabouia* e *Tropidurus hispidus*, habitando prédios da Universidade Federal da Paraíba, em João Pessoa, Nordeste do Brasil. Para tanto, foram examinados 30 espécimes de *Hemidactylus mabouia* e 55 de *Tropidurus hispidus*. Os espécimes coletados foram eutanizados por congelamento, fixados e conservados em álcool 70%. A análise do trato respiratório dos *Hemidactylus mabouia* mostrou que estavam infectados por *Raillietiella frenatus*, com prevalência de 20% (6/30) e intensidade de infecção média de 1,33 ± 0,21, 1-2. Nenhum espécime de *T. hispidus* analisado estava infectado. *Hemidactylus mabouia* e *R. frenatus* possuem origem africana e é possível que haja alguma relação de especificidade ou preferência entre essas espécies.

Palavras-chave: parasitismo, lagartixas domiciliares, região neotropical.

1. Introduction

Parasites can be important regulatory agents in reptile populations, affecting fertility, dietary habits, death rates, or even causing local extinctions. The examination of parasite/host relationships is of known importance in studies of the dynamics, conservation and management of reptile populations (Marcogliese, 2004).

The Pentastomida constitute an important group of respiratory tract parasites in vertebrates, especially reptiles, although they have been little studied in the neotropics (Almeida and Christoffersen, 2002). Works undertaken in Brazil on pentastomid parasitism have focused on numerous topics, including studies of the systematics of this group and rates of reptilian infection (Rego, 1984; Almeida and Christoffersen, 1999; 2002; Vrcibradic et al., 2002; Dias et al., 2005; Almeida et al., 2006a; 2006b; Almeida et al., 2007; 2008a; b; c; Anjos et al., 2008). However, lung infection rates by pentastomids have so far only been determined in eight reptile species. Vrcibradic et al. (2002) examined the infection of *Mabuya agilis* by larvae of *Raillietiella* sp. (collected in coastal dunes areas in the states of Rio de Janeiro and Sergipe); Dias et al. (2005) found infections of *Raillietiella* aff. *furcocerca* in the lungs of *Cnemidophorus abaetensis* and *C. ocellifer* (in coastal dune areas of Bahia State);

Almeida et al. (Almeida et al., 2008b) reported the infection of *Tropidurus hispidus* by *Raillietiella mottae* (in the dryland regions of Ceará State); Anjos et al. (Anjos et al., 2008) described the infection of the invader house gecko *Hemidactylus mabouia* by *R. frenatus* and *R. mottae* (in human residences in the town of Barbalha, Ceará); Almeida et al. (Almeida et al., 2008c) reported infections by *R. mottae* on *T. hispidus*, *T. semitaeniatus*, *Phyllopezus periosus*, and *P. pollicaris* (on rock outcrops in the dryland region of Paraíba State).

The present study evaluated the rates of pentastomid infection in two syntopic species of lizards in an urban habitat in order to examine the composition of the pentastomid fauna and to determine infection rates (prevalence and intensity).

2. Materials and Methods

Eighty-five specimens of lizards (30 *H. mabouia* and 55 *T. hispidus*) were collected in December 2006 in houses on the campus of the Federal University of Paraíba, in the municipality of João Pessoa, Paraíba State (7° 09' S and 34° 47' W), northeastern Brazil. The local climate is hot and humid, with the heaviest rainfall occurring between the months of March through August. The average annual temperature is approximately 25 °C, the total rainfall varies between 1,500 and 1,700 mm, and the relative humidity stays near 80%. The dry season usually varies from between one to three months (October through December) (Lima and Heckendorff, 1985).

Lizards were collected by hand and were quickly euthanized by freezing and then fixed and preserved in 70% ethanol. Lizard snout-vent length (SVL) was measured with a ruler (to the nearest 0.1 mm). Voucher specimens were deposited in the Herpetology Collection of the Department of Systematics and Ecology of the Federal University of Paraíba, in João Pessoa, Paraíba State, Brazil.

The lungs were removed from the lizards and examined for pentastomids using an optical stereomicroscope. The pentastomids found were either preserved in 70% alcohol or mounted on slides and treated with Hoyer's mounting medium. Pentastomid identification was based on the dimensions of the hooks and copulatory spiculae of the males (measured with the aid of a microscope fitted with a micrometer eyepiece) (Ali et al., 1981). Drawings were made with the aid of a drawing tube connected to a brightfield microscope.

Ecological terms related to parasitology used in the present study follow Bush et al. (1997).

3. Results

Of the total of 30 specimens of *H. mabouia* collected, 4 were juveniles (mean SVL = 27.75 ± 2.39 mm; range = 21.0-32.0 mm), 13 were adult females (mean SVL = 55.46 ± 0.9 mm; range = 49-60 mm), and 13 were adult males (mean SVL = 59.69 ± 0.7 mm; range = 56-65 mm).

Only a single species of Pentastomida (*Raillietiella frenatus*) was found parasitizing adults of *H. mabouia*. The general prevalence of infection was 20% (6/30) and the average infection intensity was 1.33 ± 0.21 (range 1-2). No significant differences were detected in infection rates (3 males and 3 females) or in the average infection intensities according to sex (1.33 ± 0.33, 1-2). Parasite infection was not observed in juvenile specimens.

Of the total of 55 specimens of *T. hispidus* collected, 12 were juveniles (mean SVL = 53.25 ± 1.54 mm; range = 41.0-59.0 mm), 21 were adult females (mean SVL = 73.19 ± 1.62 mm; range = 61-88 mm), and 22 were adult males (mean SVL = 83.18 ± 2.45 mm; range = 65-105 mm). All of the tropidurids examined were healthy and lung infection by pentastomids was not observed.

4. Discussion

Parasitism on *H. mabouia* by *R. frentatus* in Brazil was reported by Anjos et al. (2008). An analysis of 37 specimens of *H. mabouia* performed by these authors revealed an infection rate of 43.2%, with an average intensity of 1.8 ± 1.4. That prevalence was higher than the analysis presented here, although the infection intensities were very similar.

Different prevalences have been observed in other studies undertaken in Brazil: *M. agilis* (3.6-9.0%; Vrcibradic et al., 2002); *C. abaetensis* (6.0%; Dias et al., 2005), *C. ocellifer* (2.5%; Dias et al., 2005); *T. hispidus* (11.1%; Almeida et al., 2008b; 2008c); *P. periosus* (66.7%; Almeida et al., 2008c); *P. pollicaris* (16.6%; Almeida et al., 2008c); and *T. semitaeniatus* (13.3%; Almeida et al., 2008c). However, the infection intensities reported by these authors are similar to those reported here: *M. agilis* (1.0 ± 0.0; Vrcibradic et al., 2002); *C. ocellifer* (1.0 ± 0.0; Dias et al., 2005); *T. hispidus* (1.0; Almeida et al., 2008c). Greater intensities were noted, however, in *C. abaetensis* (4.5 ± 0.0; Dias et al., 2005); *T. hispidus* (6.0 ± 1.4; Almeida et al., 2008b); *P. periosus* (5.25 ± 2.0; Almeida et al., 2008c); *P. pollicaris* (5.0; Almeida et al., 2008c); and *T. semitaeniatus* (4.0 ± 3.0; Almeida et al., 2008c. Some differences in these parameters would be expected according to the sampling techniques used and the natural characteristics of each locality.

Anjos et al. (2008) likewise noted the absence of parasitic infections in juvenile specimens of *H. mabouia*. These authors suggested that age and diet may be decisive in determining their parasite composition. Older geckos would have had more exposure time and more chances to enter into contact with sources of infection (Vogel and Bundy, 1987; Cunha-Barros et al., 2003). The diets of the adults are also more diverse (and include numerous types of arthropods, larger animals such as spiders, cockroaches and moths) than those of the juveniles (principally termites and ants) Anjos et al., 2008. However, neither our results nor those of Anjos et al.

(2008), furnish sufficient data to establish whether ontogenetic differences in their diets are determinant for the absence of pentastomids in juvenile geckos.

The absence of infection by *R. frenatus* on *T. hispidus* may be the result of behavioral differences between these diurnal tropidurids and the nocturnal gecko *H. mabouia*. However, Almeida et al. (2008c) reported parasitic infections in diurnal syntopic lizards (*T. hispidus* and *T. semitaeniatus*) as well as in nocturnal species (*P. periosus* and *P. pollicaris*) caused by the same pentastomid species (*R. mottae*). Almeida et al. (2008c) suggested that tropidurids and gekkonids feed on ants and termites that are abundant in Caatinga rock outcrops and that these are likely intermediate hosts of *R. mottae*. There is also the possibility that the exotic pentastomid *R. frenatus* is specific for *H. mabouia*. Other investigations suggest that exotic geckos retained their natural pentastomid fauna (Self and Diaz, 1961; Ali et al., 1981; Ali and Riley, 1983; Pence and Selcer, 1988; Riley et al., 1988; 1991). These exotic pentastomids appear to have been able to colonize intermediate hosts having wide geographic distributions, such as the cockroach, *Periplaneta americana* (Ali and Riley, 1983; Jeffery et al., 1985; Bosch, 1986; Criscione and Font, 2001). More studies will be required to address these questions.

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