CONTRIBUTION ON THE STUDY OF *Isospora hemidactyli* CARINI, 1936 AND A REPORT OF AN ADELEID PSEUDOPARASITE OF THE HOUSE GECKO *Hemidactylus mabouia*, FROM THE RIO DE JANEIRO METROPOLITAN REGION, BRAZIL*

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ABSTRACT:- BERTO, B.P.; LOPES, B. DO B.; FLAUSINO, W.; TEIXEIRA-FILHO, W.L.; LOPES, C.W.G. **Contribution on the study of *Isospora hemidactyli* Carini, 1936 and a report of an adeleid pseudoparasite of the house gecko *Hemidactylus mabouia*, from the Rio de Janeiro Metropolitan Region, Brazil.** [Contribuição para o estudo de *Isospora hemidactyli* Carini, 1936 e relato de um pseudoparasita adelídeo da lagartixa doméstica *Hemidactylus mabouia* da região Metropolitana do Rio de Janeiro, Brasil]. *Revista Brasileira de Parasitologia Veterinária*, v. 17, n. 3, p.150-154, 2008. Curso de Pós-Graduação em Ciências Veterinárias, Universidade Federal Rural do Rio de Janeiro, BR-465, km 7, Seropédica, RJ 23.890-000, Brasil. E-mail: bertobp@ufrrj.br

A description of the coccidium *Isospora hemidactyli* from the house gecko *Hemidactylus mabouia*, a very common at dwellings in Rio de Janeiro Metropolitan Region, was made in this study. Histograms and linear regression were made for this species and determined the homogeneity of these oocysts despite of large range. Besides it, polysporocystid oocysts also were recovered from feces of the *H. mabouia* house gecko and they were similar to those described previously as the genus *Adelina*. This species should be parasitizing an invertebrate ingested by house gecko, and for that reason, is a pseudoparasite. Oocysts of *I. hemidactyli* were subspherical to ellipsoidal, 24.4 × 22.3µm, with single-layered wall and one polar granule. Sporocysts were subspherical to ellipsoidal, 11.8 × 9.8µm with Stieda and substieda bodies, residuum and sporozoites with refractile body. Oocysts of the pseudoparasite *Adelina* sp. were ellipsoidal, 36.3 × 30.9µm, with bi-layered wall and without micropyle, residuum and polar granule. Eight to 15 sporocysts were presents and were subspherical to broadly ellipsoidal, 12.4 × 11.2µm. Stieda and substieda bodies were absent. Sporozoites present refractile bodies at both ends.

KEY WORDS: Coccidia, sporulated oocysts, *Adelina*, Adelidae, Eimeriidae.

RESUMO

Uma descrição do coccídio *Isospora hemidactyli* da lagartixa doméstica *Hemidactylus mabouia*, muito comum em residências da região metropolotana do Rio de Janeiro, foi feita neste estudo. Os histogramas e a regressão linear para esta espécie confirmaram a homogeneidade de seus oocistos apesar da grande amplitude de variação. Além disto, oocistos polisporocísticos também foram recuperados das fezes de *H. mabouia* e foram semelhantes aos descritos anteriormente no gênero *Adelina*. Esta espécie devia estar parasitando um invertebrado ingerido pela lagartixa doméstica, e por essa razão, é um pseudoparasita. Oocistos de *I. hemidactyli* foram sub-esféricos a elipsóides, 24,4 × 22,3µm, com parede simples e um grânulo polar. Os esporocistos foram subesféricos a elipsóides, 11,8 × 9,8µm com corpos de Stieda e substieda, resíduo e esporozoítas com corpo refráctil. Oocistos do pseudoparasita *Adelina* sp. foram elipsóides, 36,3 × 30,9µm, com parede dupla e sem micrópila, resíduo e grânulo polar. Oito a 15 esporocistos estavam presentes e foram subesféricos a elipsóides, 12,4 × 11,2µm. Os corpos de Stieda e substieda estavam ausentes. Os esporozoítas apresentam corpos refrácteis em ambas as extremidades.

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PALAVRAS CHAVE: Coccídios, oocistos esporulados, *Adelina,* Adelidae, Eimeriidae.

INTRODUCTION

The house gecko *Hemidactylus mabuia* is a reptile of the Gekkonidae family, originated from Africa, and nowadays is found all over Brazil and South America in natural habitats and, more frequently, in human dwellings (VANZOLINI, 1978).

Coccidiosis associated with the genus *Isospora* Schneider, 1881 in geckos was first reported by Ray and Das Gupta (1936), with description of *I. knowlesi* Ray and Das Gupta, 1936 in *H. flaviviridis*, and, in this same year, Carini (1936) described *I. hemidactyli* Carini, 1936 in the house gecko *H. mabuia*. Recently, Lainson and Paperna (1999) re-described *I. hemidactyli* with particular reference to their endogenous stages.

Of particular importance are the food habits these geckos, which are invertebrates basically. Similarly to vertebrates, the invertebrates can be parasitized by different coccidia, adeleids mainly (LEVINE, 1985; BERTO, 2007).

The purpose of this study was to describe the oocysts of *I. hemidactyli* with a statistical approach and also describe sporulated oocysts of a species of the genus *Adelina* Hesse, 1911 parasite of some invertebrate ingested by the house gecko *H. mabuia*.

MATERIAL AND METHODS

Fecal samples were collected during two days from a house gecko of one residential complex located at Rio de Janeiro Metropolitan Region, Brazil. These samples were collected and placed into plastic vials containing potassium dichromate solution ($K_2Cr_2O_7$) at 2.5% 1:6 v/v, and transported to the Laboratório de Coccídios e Coccidioses at Universidade Federal Rural do Rio de Janeiro.

Samples were placed in a thin layer (~ 5 mm) of $K_2Cr_2O_7$ 2.5% solution in Petri plates, and incubated at 23-28°C for 10 days or until 70% of oocysts were sporulated. Oocysts were recovered by flotation in Sheather's sugar solution (sp. g. 1.20) and examined microscopically using a technique described by Duszynski and Wilber (1997). Morphological observations and measurements, in µm, were performed using a binocular microscope Carl Zeiss with apochromatic oil immersion objective lens and ocular micrometer K-15X PZO (Poland). Line drawings were prepared using a binocular microscope Wild M-20 with drawing tube. Pictures were taken using a digital camera model CD Mavica MVC-CD250 Sony®. Size ranges are in parenthesis followed by average, standard deviation and shape index (length/width).

Statistical analyses were performed using the software Excel XP (Microsoft Co., Redmond, WA, USA). Histograms were based on Sampaio (2002) and they represent the width, length and shape-index values of the oocysts and sporocysts and their respective frequencies. Linear regressions for width on length were done according Norton and Joyner (1981) and Pereira et al. (2001).

RESULTS

The house gecko sheds in its feces hundreds of oocysts of two different species. One of them, initially, was unsporulated; by day three, 70% were sporulated. This species was identified as *I. hemidactyli*.

The other coccidium at the same fecal samples presented sporulated polysporocystid oocysts. This species belong to the genus *Adelina*, which should be parasitizing an invertebrate ingested by house gecko.

Isospora hemidactyli Carini, 1936

Description: Oocysts (Figures 1b, 2b) subspherical to ellipsoidal, 24.4 (19.4-28.5) × 22.3µm (18.2-25.3). Shape-index of 1.1 (1.0-1.2). Single-layered wall ~1.2µm, smooth. Micropyle and residuum are absent, but one polar granule is present. Sporocysts subspherical to ellipsoidal, 11.8 (10.2-13.6) × 9.8µm (8.0-11.5). Shape-index of 1.2 (1.1-1.3). Stieda body is knob-like, ~ 1.0 high x 2.1µm wide. The substieda body is prominent, ~1.4 high x 3.0µm wide. Sporocyst residuum dispersed and composed of granular material. Sporozoites with a central nucleus and a robust refractile body at end.

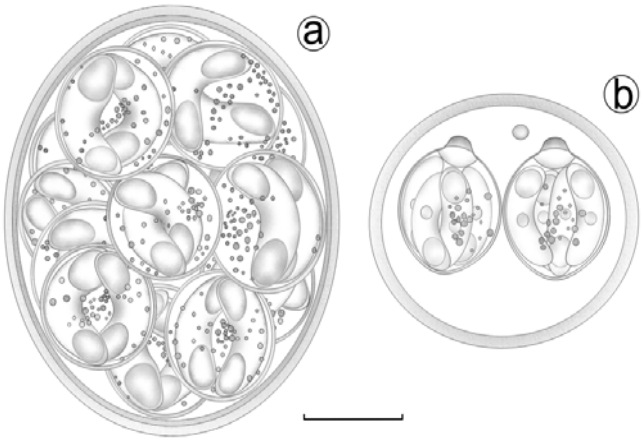

Figure 1. Line drawings of sporulated oocysts of coccidia species recovered from feces of the house gecko, *Hemidactylus mabouia* in the State of Rio de Janeiro. Scale bar = 10 µm. a) Pseudoparasite *Adelina* sp.; b) *Isopora hemidactyli*.

Type host: *Hemidactylus mabouia* Moreau de Jonnès, 1818 (Reptilia: Gekkonidae).

Type locality: Rio de Janeiro, Brazil.

Site of infection: Unknown, oocysts recovered from feces.

Type material: Oocysts in 10% aqueous (v/v) buffered formalin deposited at the Parasitology Collection, in the Department of Animal Parasitology, UFRRJ, Seropédica, Rio de Janeiro, Brazil. Repository number is 03/2008, including phototypes and line drawings.

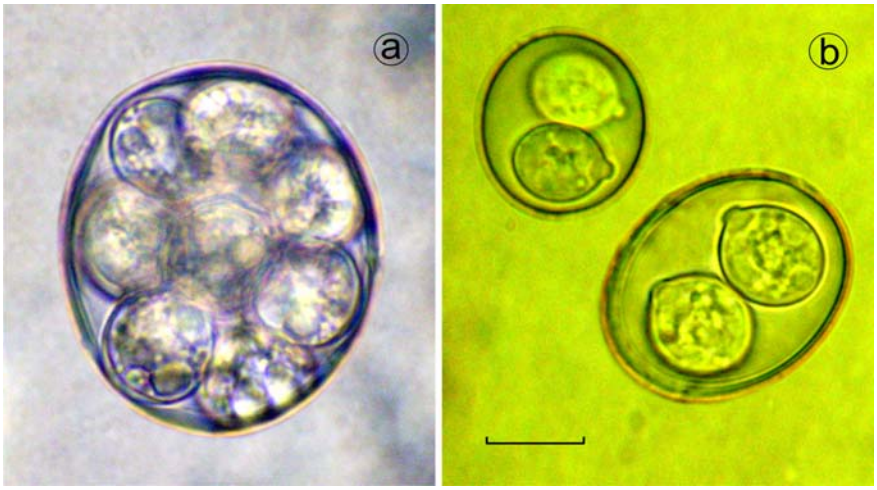

Figure 2. Photographs of oocysts of the pseudoparasite *Adelina* sp. (a) and *Isopora hemidactyli* (b), recovered from feces of the house gecko, *Hemidactylus mabouia* in the State of Rio de Janeiro, all in the same scale. Scale bar = 10 µm.

Pseudoparasite *Adelina* sp.

Description: Oocysts (Figures 1a, 2a) ellipsoidal, 36.3 (31.8-40.7) × 30.9µm (29.0-33.2). Shape-index of 1.2 (1.1-1.3). Bi-layered wall ~1.4µm, being the outer brownish and smooth and the inner, darkness and smooth. Micropyle, residuum and polar granule are absent. The number of sporocysts per oocyst varied from 8 to 15. Sporocysts predominantly subspherical to broadly ellipsoidal, 12.4 (11.6-12.9) × 11.2µm (10.7-12.0). Shape-index of 1.1 (1.0-1.2). Stieda and substieda bodies absent. Sporocyst residuum composed of scattered granules dispersed. Sporozoites present sub-spherical refractile bodies at both ends.

Type transported host: *Hemidactylus mabouia* Moreau de Jonnès, 1818 (Reptilia: Gekkonidae).

Type locality: Rio de Janeiro, Brazil.

Site of infection: Unknown, this species was infecting an invertebrate ingested by house gecko.

Type material: Oocysts in 10% aqueous (v/v) buffered formalin deposited at the Parasitology Collection, in the Department of Animal Parasitology, UFRRJ, Seropédica, Rio de Janeiro, Brazil. Repository number is 04/2008, including phototypes and line drawings.

Fifty oocysts of *I. hemidactyli* were described and measured. Analyzing Figure 3, frequencies in the classes increase and diminish gradually, or either, the measurements of the oocysts and sporocysts are presented in lesser amount in the limits of the values and larger amount in the medium values and could be also explained by Figure 4.

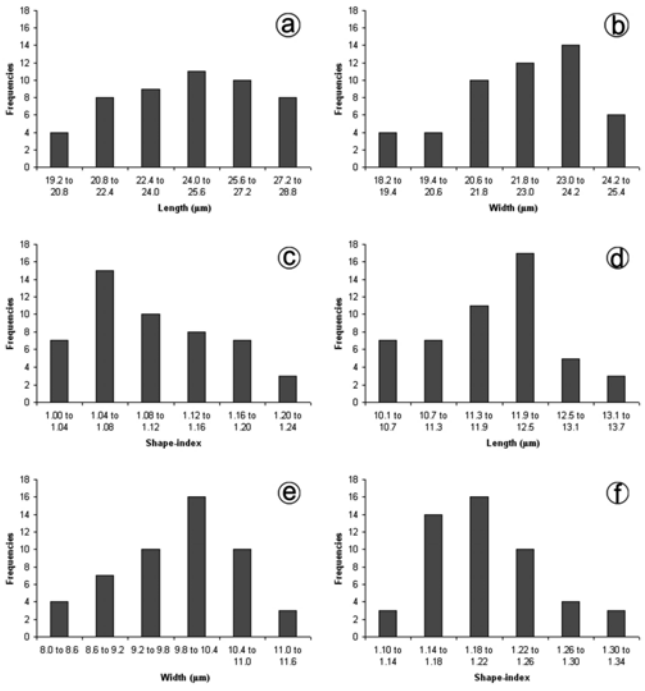

Figure 3. Frequencies in the distribution of the sporulated oocysts of *Isopora hemidactyli* recovered from fecal samples of the house gecko, *Hemidactylus mabouia* in the State of Rio de Janeiro. a) Length, b) Width and c) Shape-index of the oocysts; d) Length, e) Width and f) Shape-index of the sporocysts.

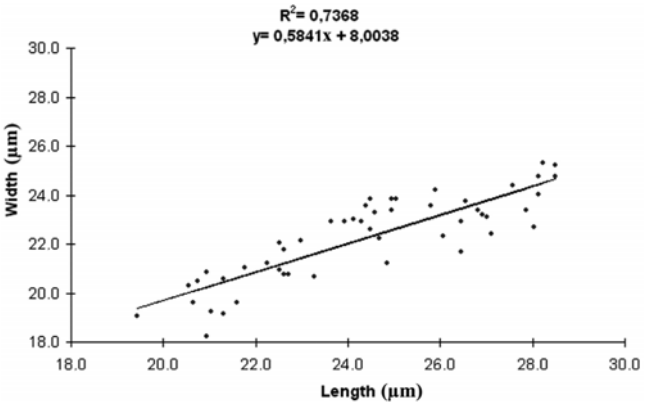

Figure 4. Distribution of the sporulated oocysts of *Isopora hemidactyli* recovered from fecal samples of the house gecko, *Hemidactylus mabouia* in the State of Rio de Janeiro.

DISCUSSION

The oocysts of *I. hemidactyli* recovered in this study were similar those reported by Lainson and Paperna (1999). These authors, previously, described a large range of the length and width of the oocysts, and these results were also perceived in this study.

Despite of observed range at figure 3, the oocysts and sporocysts measurements were uniforms in their distribution, evidencing the presence of a single species as *I. hemidactyli*. Besides it, the linear regression also confirmed the homogeneity of this species, as observed by Norton and Joyner (1981) and Pereira et al. (2001) for other coccidia.

Some coccidia, mainly of the genus *Adelea* Schneider, 1875, *Adelina* and *Barroussia* Schneider, 1885, used of the food habit of the vertebrates predators of its invertebrate hosts to secure what will be dispersed, in other words, the vertebrate while ingest an invertebrate parasitized by coccidia can disperse the oocysts of this invertebrate while shedding them in its feces (WENYON, 1926).

This habit can be responsible for several mistaken on the descriptions of some coccidia, due to high resistance of the oocyst wall, even sporulated, can pass through gastrointestinal tract without losing its morphological characteristics. In this way, several coccidia described in vertebrate hosts can be pseudoparasites. So, in fact, they are parasites of invertebrate hosts (DUSZYNSKI et al., 2000; TEIXEIRA et al., 2003).

The adeleids and the species of the genus *Barroussia*, are parasites of invertebrates that presents polysporocystid oocysts, however some descriptions of new species, with oocysts containing high number of sporocysts are done in vertebrates (WENYON, 1926).

The genus *Pythonella* Ray and Das Gupta, 1937, *Octosporella* Ray and Ragavachari, 1942, *Skrjabinella* Matschoulsky, 1949, *Hoarella* Arcay de Peraza, 1963, *Gousseffia* (Gousseff, 1937) Levine, 1980, *Polysporella* McQuistion, 1990 and its species presents polysporocystid oocysts and are, in fact, pseudoparasites. Duszynski et al. (2000) considered these genera like of dubious validity.

Recently, apparently new descriptions had been done with careful. Daszak and Ball (1998) recovered polysporocystid oocysts of the lizard *Anolis trinitatis*. Teixeira et al. (2003) described polysporocystid oocysts from the feces of the big-eared opossum *Didelphis aurita*, and Lopes et al. (2006) also described similar oocysts to the genus *Barroussia* and *Adelina* of the South American coati *Nasua nasua*.

Mistakes or incomplete descriptions were very common because of systematic of the Coccidia is not only associated to visualization and/or morphological characterization of the oocysts from fecal samples, it is also dependent of the study of the biology of the parasite, of the habits of their hosts and of other factors that can be specifically important (FAYER, 1980; DUSZYNSKI et al., 2000).

In this study, besides the description of *I. hemidactyli* in the house gecko, polysporocystid oocysts similar to those described previously as the genus *Adelina* were also observed; however, the definitive host of this parasite was not found.

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