

ACTA PROTOZOOLÓGICA

Isospora mimusi n. sp. (Apicomplexa: Eimeriidae) from the Tropical Mockingbird *Mimus gilvus* in South America

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Summary. This current study reports a new isosporoid (Apicomplexa: Eimeriidae) species parasitizing tropical mockingbirds *Mimus gilvus* recovered from illegal trade in Brazil. *Isospora mimusi* n. sp. oocysts are spherical to sub-spherical, $20.6 \times 19.6 \mu\text{m}$, with smooth, bilayered wall, $\sim 1.2 \mu\text{m}$. Micropyle, oocyst residuum and polar granule are absent. Sporocysts are ovoidal, $13.4 \times 9.8 \mu\text{m}$. Stieda and substieda bodies are present. Sporocyst residuum composed of diffuse granules of various sizes, sporozoites have one refractile body.

Key words: *Isospora mimusi*, oocysts, coccidiosis, Passeriformes, Mimidae, illegal trade, CETAS, Seropédica, Brazil.

INTRODUCTION

The tropical mockingbird, *Mimus gilvus* Vieillot, 1808, is a New World passerine bird of the family Mimidae. It has a large geographic range distribution from southern Mexico to northern South America to coastal Eastern Brazil and the Southern Lesser Antilles. This species has always been of great interest to people due to its beauty and, for that reason, it has frequently been illegally captured and traded in Brazil (Sibley and Monroe 1990, Sick 1997, CBRO 2009).

The order Passeriformes has over 100 descriptions of isosporoid coccidian parasites, however, in the family Mimidae there are no records of isosporoid coccidia. On the other hand, according to Lovette and Rubenstein (2007), this family is phylogenetically closely related to the Sturnidae, from which two *Isospora* species have been described from New World passerine birds.

The current study describes the first coccidian species infecting the tropical mockingbird *M. gilvus* recovered from illegal trade. These specimens were held in CETAS (Centro de Triagem de Animais Silvestres – Center for Triage of Wild Animals), IBAMA (Instituto Brasileiro do Meio Ambiente e dos Recursos Naturais Renováveis – Brazilian Institute of Environment and Natural Resources), MMA (Ministério do Meio Ambiente – Ministry of Environment) for rehabilitation and reintroduction into the wild.

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MATERIAL AND METHODS

Fecal samples were collected from two tropical mockingbirds held in individual cages at the CETAS, IBAMA, MMA facility, located at the Municipality of Seropédica in the State of Rio de Janeiro, Brazil. The risk of contamination from the previous birds was minimum because the samples were collected from newly arrived birds in CETAS. Feces were collected immediately after defecation and placed in plastic vials containing 2.5% potassium dichromate solution ($K_2Cr_2O_7$) 1:6 (v/v). Samples were transported to the Laboratório de Coccídios e Coccidioses located at the Universidade Federal Rural do Rio de Janeiro (UFRRJ). Samples were placed in a thin layer (~5 mm) of $K_2Cr_2O_7$ 2.5% solution in Petri dishes, 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 (S.G. 1.20) and microscopically examined using the technique described by Duszynski and Wilber (1997). Morphological observations and measurements, in μm , were performed using a binocular microscope (Carl Zeiss, Germany) with an apochromatic oil immersion objective lens and ocular micrometer K-15X PZO (Poland). Line drawings were prepared using a binocular microscope Wild M-20 equipped with a drawing tube. Photographs were taken using a digital camera model CD Mavica MVC-CD250 Sony®. Size ranges are shown in parenthesis followed by average and shape index (L/W ratio).

RESULTS

Isospora mimusi n. sp. (Figs 1a–d, 2a–c)

Description of sporulated oocyst: Oocyst shape (N = 25): spherical to sub-spherical; number of layers of the oocyst wall: 2; wall thickness: 1.2 (1.2–1.3); outer wall smooth, about 2/3 of total thickness; L × W: 20.6 × 19.6 (19–23 × 18–22), with shape-index: 1.0 (1.0–1.1); micropyle, oocyst residuum and polar granule: absent.

Description of sporocyst and sporozoites: Sporocyst shape (N = 25): broadly elliptical; L × W: 13.4 × 9.8 (11–16 × 9–11); shape-index: 1.4 (1.2–1.6); Stieda body: present, flattened, 0.5 high × 1.5 wide; substieda body: prominent and homogeneous, 2.0 high × 3.5 wide; sporocyst residuum: present, composed of scattered granules of different sizes; sporozoite: vermiform with 1 posterior SRB.

Type-host: The tropical mockingbird, *Mimus gilvus* Vieillot, 1808 (Passeriformes: Mimidae).

Type-locality: Seropédica. (S22°43'23.79"; 43°42'36.94"O), Rio de Janeiro, Brazil.

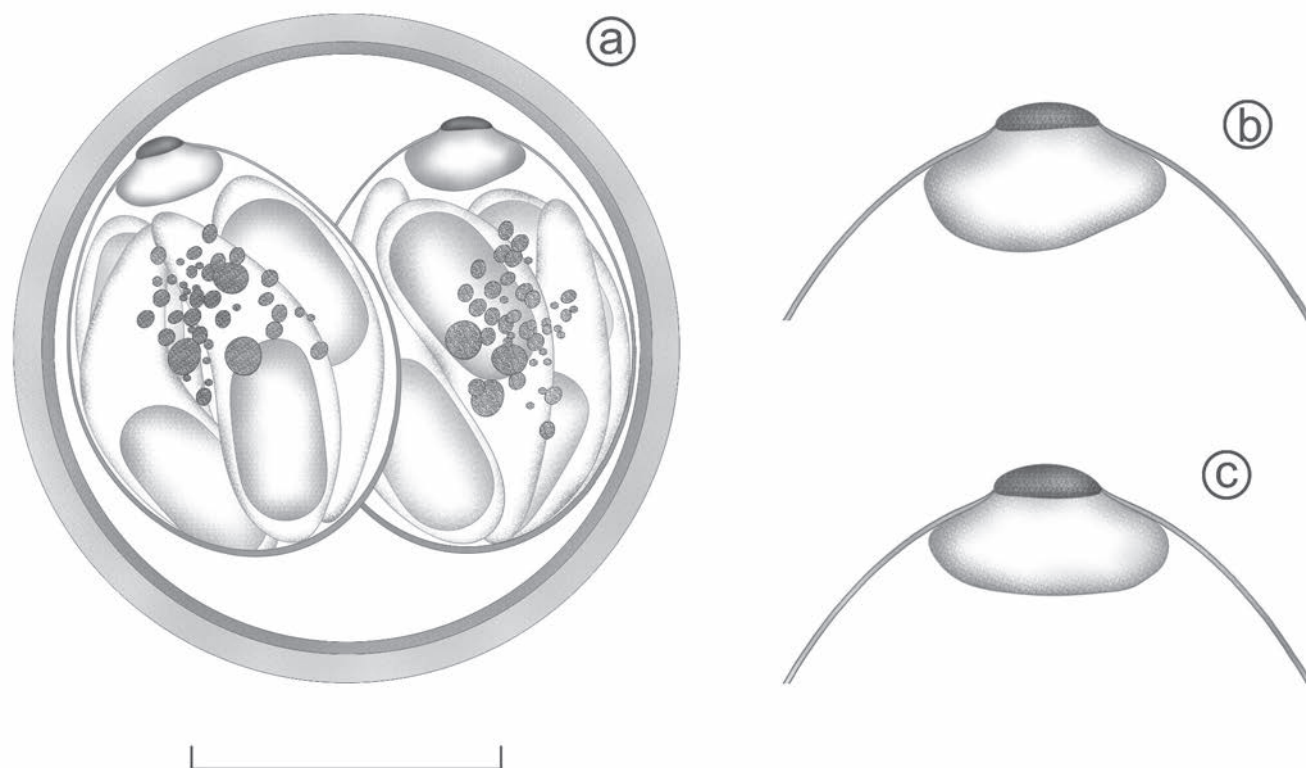


Fig. 1. Line drawings of *Isospora mimusi*, a new coccidium species recovered from the tropical mockingbird, *Mimus gilvus*. (a) sporulated oocyst with its respective variations of (b–c) Stieda and substieda bodies detached. Scalebar: 10 μm for oocyst (a) and 5 μm for Stieda and substieda bodies (b, c).

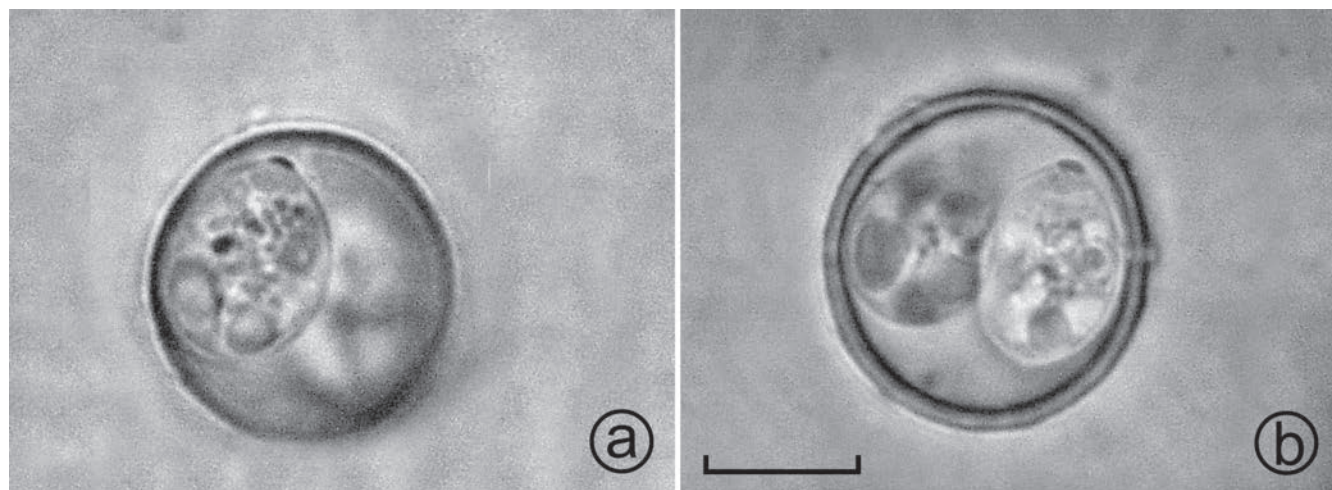


Fig. 2. Photographs (a, b) of *Isoispora mimusi*, a new coccidium species recovered from the tropical mockingbird, *Mimus gilvus*. Scalebar: 10 μ m.

Material deposited: Oocysts were stored in absolute ethanol, and deposited in the Parasitology Collection, in the Department of Animal Parasitology, at UFRRJ, located in Seropédica, Rio de Janeiro, Brazil. Phototypes and line drawings are deposited at the same location. The repository number is P-40/2011.

Site of infection: Unknown. Oocysts collected from fecal samples.

Prevalence: 100% (Two of two examined birds).

Sporulation time: 4 days.

Etymology: The specific epithet is derived from the generic name of the type host.

DISCUSSION

According to Duszynski and Wilber (1997), a new coccidian species should be compared in detail with coccidian species that are feature-similar and belong to the same host family. Therefore, due to the lack of descriptions of coccidian parasites from mimids, *I. mimusi* n. sp. was compared with the coccidia from birds of the family Sturnidae, which is closely related to the Mimidae.

Two *Isoispora* species have been recorded from captive sturnids, in the New World: *Isoispora graculai* (Bhatia, Chauhan, Arora, Agrawal 1973) Upton, Erst, Clubb, Current, 1984 was originally described from the hill myna *Gracula religiosa* Linnaeus, 1758, in India

(Bhatia *et al.* 1973); however, Upton *et al.* (1984) subsequently re-described this species, providing information on additional features, when they recovered similar oocysts in the feces of hill mynas imported from Southeast Asia to the USA. Recently, *Isoispora rothschildi* Upton, Wilson, Norton, Greiner, 2001 was described in fecal samples of *Leucopsar rothschildi* Stresemann, 1912, in USA (Upton *et al.* 2001). The oocysts of *I. graculai* and *I. rothschildi* have polar granule; while *I. mimusi* does not present this structure (Table 1).

Based on these morphological features, *I. mimesi* is considered as new to science and represents the first isosporoid coccidian reported from a mimid bird.

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Table 1. Comparative morphology of *Isoospora mimusi* n. sp and *Isoospora* spp. recorded from New World passerine sturnids.

Coccidia	References	Oocysts				Sporocysts					
		Shape	Measurements (µm)	Shape index	Wall (µm)	Polar granule	Shape	Measurements (µm)	Stieda body	Substieda body	Residium
<i>Isoospora graculair</i> ^a	Upton <i>et al.</i> (1984)	sub-spherical	24.6 × 22.4 (20–28 × 20–24)	1.1 (1.0–1.2)	one-layered, ~1.5	present, 1 or 2	ovoidal	17.7 × 11.6 (15–21 × 10–13)	small, darkness	homogeneous	compact
<i>I. rothschildi</i> ^a	Upton <i>et al.</i> (2001)	sub-spherical	22.3 × 21.6 (20–26 × 19–23)	1.0 (1.0–1.2)	bi-layered, ~1.6	present, 1 or more	ovoidal	15.9 × 10.6 (15–18 × 9–11)	present	present	compact
<i>I. mimusi</i> ^b	Current work	sub-spherical	20.6 × 19.6 (19–23 × 18–22)	1.0 (1.0–1.1)	bi-layered, ~1.2	absent	ovoidal	13.4 × 9.8 (11–16 × 9–11)	flattened	prominent, homogeneous	diffuse

Species parasites of passerine birds of the families: ^aSturnidae and ^bMimidae.

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