Isospora ticoticoi n. sp. (Apicomplexa: Eimeriidae) from the Rufous-collared Sparrow Zonotrichia capensis in South America

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Summary. This current study reports a new isosporoid (Apicomplexa: Eimeriidae) species parasitizing rufous-collared sparrows, Zonotrichia capensis, kept in captivity located in the mountainous region of Rio de Janeiro, Brazil. Isospora ticoticoi n. sp. oocysts are spherical to sub-spherical, 23.3 × 22.4 μm, with smooth, bilayered wall, ~1.2 μm. Micropyle and oocyst residuum are absent, however, sometimes, polar granules are present. Sporocysts are ellipsoidal, 17.0 × 10.8 μm. Stieda and substieda bodies are present. Sporocyst residuum is present, sporozoites have one refractile body and a nucleus.

Key words: Isospora ticoticoi, oocysts, coccidiosis, Passeriformes, Emberizidae, Rio de Janeiro, Brazil.

INTRODUCTION

The rufous-collared sparrow, Zonotrichia capensis Muller, 1776, is an emberizid bird found in a wide range of habitats, often near humans, from the extreme southeast of Mexico to Tierra del Fuego, and on the island of Hispaniola. In Brazil, it is a very common cage bird due to its beauty and vocalization (Lougheed and Handford 1992, Sick 1997, CBRO 2007).

The Emberizidae family is one of the families with more descriptions of isosporid coccidian parasites. Until this moment 19 species were described in this family. Brazil has 73 distinct emberizid species catalogued; being that many of these species, or others exotic species, are bred in captivity (CBRO 2007).

The current study describes a new Isospora species infecting rufous-collared sparrows, Z. capensis, kept in captivity located in the mountainous region of Rio de Janeiro, Brazil.

MATERIAL AND METHODS

Fecal samples were collected from ten birds of two distinct breeders of rufous-collared sparrow located in Teresópolis City (22°25’ S, 42°59’ W), Rio de Janeiro State, Brazil. Three samples were collected from a first breeder, whereas the rest of the samples were collected from the other breeder. Birds were held in individual...
Ten rufous-collared sparrows were examined; two of them shed oocysts in the feces. All the positive samples were originating from the first breeder. Initially, the oocysts were non-sporulated, while 70% sporulated by day four.

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

**Description of sporulated oocyst:** Oocyst shape (N = 14): spherical to sub-spherical; number of walls: 2; wall thickness: 1.2 (1.1–1.3); outer wall smooth, about 2/3 of total thickness; L × W: 23.3 × 22.4 (20–25 × 20–24), with shape-index: 1.0 (1.0–1.1); M and O: absent; PG: usually absent; however, sometimes, a unique spherical granule or scattered granules are present.

**Description of sporocyst and sporozoites:** Sporocyst shape (N = 14): ellipsoidal; L × W: 17.0 × 10.8 (15–18 × 10–11); shape-index: 1.6 (1.5–1.7); SB: present, nipple-like, 1.0 high × 2.0 wide; SSB: prominent and compartmentalized; a central and denser portion, 1.5 high × 2.4 wide; the outer portion is larger and colorless, 2.2 high × 3.8 wide; SR: present; SR characteristics: composed of scattered granules of different sizes; SZ: vermiform with 1 posterior SRB and a N.

**Type-host:** The rufous-collared sparrow, *Zonotrichia capensis* (Muller, 1776) (Passeriformes: Emberizidae).

**Type-locality:** Teresópolis City (22°25′ S; 42°59′ W), Rio de Janeiro, Brazil.

**Material deposited:** Oocysts stored in 10% aqueous buffered formalin (v/v), 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-34/2009

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

**Prevalence:** 20% (Two of ten examined birds).

**Etymology:** The specific epithet is derived from the common local name for the host, which is ‘tico-tico’.

**DISCUSSION**

In spite of *Z. capensis* to be a very common cage bird in Brazil, the native birds are protected by law. Thus, the breeders make difficult the collect and, for that reason, only ten fecal samples could be collected.

Descriptions of isosporan coccidia parasitizing birds of the Emberizidae are frequent. Boughton et al. (1938) recovered oocysts from feces of 13 emberizid species, including the golden-crowned sparrow *Z. atricapilla* Gmelin, 1789. Hadley (1910) reports a coccidium parasitizing the white-throated sparrow *Z. albicollis* Gmelin, 1789. These oocysts, however, were not described or named.


*Isospora paroariae* Upton, Current, Clubb, 1985 was described from the red-crested cardinal, *Paroaria coronata* Miller, 1776; and *Isospora tiaris* Ball, Daszak, 1997 was described from soot grassquit, *Tiaris fuliginosa* Wied, 1830 (Upton et al. 1985, Ball and Daszak 1997).

Carvalho-Filho et al. (2005) identified three new species from the double-collared seedeater, *Sporophila caeruleus* Vieillot, 1823, from Eastern Brazil: *I. sporophilae* Carvalho-Filho, Meireles, Ribeiro, Lopes,
Fig. 1. Line drawings of *Isospora ticoticoi*, a new coccidium species recovered from the rufous-collared sparrow, *Zonotrichia capensis*. (a) Sporulated oocyst with its respective variations of (b, c, d) Stieda and substieda bodies detached. Scale-bar: 10 µm for oocyst (a); and 5 µm for Stieda and substieda bodies (b, c, d).


*Isospora braziliensis* Silva, Literák, Koudela, 2006, *I. paranaensis* Silva, Literák, Koudela, 2006 and *I. curio* Silva, Literák, Koudela, 2006 were identified from the lesser seed-finch *Oryzoborus angolensis* Linnaeus, 1766, from Brazil (Silva et al. 2006).

Dolnik and Loonen (2007) described, for the first time, an avian isosporan parasite that succeeds transmission while in the High Arctic: *Isospora plectrophenaxia* Dolnik, Loonen, 2007, parasitized the snow bunting *Plectrophenax nivalis* Linnaeus, 1758.


According to Duszynski and Wilber (1997), a new coccidian species should be compared in details to coccidium species described in the family of the host. Therefore, *I. ticoticoi* was compared to the coccidia from the Emberizidae.

*Isospora ticoticoi* oocysts can be easily distinguished due to compartmentalization of the SSB, since that no coccidium parasite of emberizid birds presents this characteristic.

*Isospora emberizae*, whose host, *E. bruniceps*, is distributed in Asia and Europe; *I. exigua, I. fragmenta, I. rotunda* and *I. temeraria*, whose host, *C. parvulus*, occurs in the Galapagos Islands; and *I. geospizae* and *I. daphnensis*, whose host, *G. fortis*, occurs in the Galapagos Islands. Geographic isolation is considered to be a segregation factor for species of *Isospora* (McQuistion and Wilson 1988).

*Isospora ticoticoi* has not a compact SR founded in *I. paroariae, I. sporophila, I. flausinoi, I. teixeirafilhoi, I.
Fig. 2. Photographs (a, b, c) of Isospora ticoticoi, a new coccidium species recovered from the rufous-collared sparrow, Zonotrichia capensis. Scale-bar: 10 µm.


