Three New Coccidian Parasites of Brazilian Tanager (Ramphocelus bresilius dorsalis) from South America

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Summary. Three new coccidian (Apicomplexa: Eimeriidae) species are reported from the Brazilian tanager Ramphocelus bresilius dorsalis in Brazil. Oocysts of Isospora tiesangui n. sp. are spherical to sub-spherical, 24.16 × 23.41 µm with smooth, bi-layered wall, ~1.3 µm and shape-index of 1.0; micropyle, residuum and polar granule all absent. Sporocysts are ovoidal, 17.74 × 11.55 µm, with both Stieda and substieda body; residuum present and sporozoites with 2 refractiles bodies each. Oocysts of Isospora marambaiensis n. sp. are spherical to sub-spherical, 29.37 × 27.86 µm, with a smooth, bilayered wall ~1.5 µm and shape-index of 1.0; micropyle, residuum and polar granule all absent. Sporocysts are ellipsoidal, 22.65 × 13.02 µm, with both Stieda and substieda body; residuum present and sporozoites with 2 refractiles bodies each. Oocysts of Isospora sepetibensis n. sp. are sub-spherical to ellipsoidal, 25.53 × 23.77 µm, with a smooth, bilayered wall ~1.4 µm and shape-index of 1.1; no micropyle and residuum, and two polar granules are usually present. Sporocyst are ellipsoidal, 16.92 × 11.01 µm, with both Stieda and substieda body; residuum present and sporozoites with 2 refractiles bodies each.

Key words: Isospora tiesangui n.sp., Isospora marambaiensis n.sp., Isospora sepetibensis n.sp., oocysts, Passeriformes, Thraupidae, Marambaia Island, Rio de Janeiro, Brazil

INTRODUCTION

The thraupid Ramphocelus bresilius dorsalis (Sclater, 1855) is a frugivorous bird, with black and red plumage (Sick 1997). This bird’s global distribution is limited to Brazil and Argentina; its population size has not been quantified, but is estimated to be large (Stotz et al. 1996). In Brazil, its occurrence is observed from Paraiba to Santa Catarina (Sick 1997).

Coccidiosis associated with genus Isospora in birds of the Thraupidae family was first reported by Boughton et al. (1938), when Isospora sp. was observed in four tanagers. Isospora thraupis (Lainson, 1994) was described in the palm tanager, Thraupis palmarum (Wied, 1821). Recently, I. andesensis (Templar, McQuistion, Capparella, 2004) and I. iridornisi (Metzelaars, Spaargaren, McQuistion, Capparella, 2005) were described in the common bush tanager Chloropipps ophthalmicus (Du Bus de Gisignies, 1847) and in the yellow-throated tanager Iridosornis analis (Tschudi, 1844), respectively.
This paper describes three new species of Isospora which infect the Brazilian tanager *R. b. dorsalis* at Marambaia Island in Rio de Janeiro State, Brazil.

**MATERIAL AND METHODS**

One Brazilian tanager at Marambaia Island (23°04′S and 43°53′W) was captured with nets, imprisoned in cage, and feces were collected immediately after defecation. The identification of the species was made by Dr Ildemar Ferreira (Ornithologist), who is one of the authors of this paper. After that, the bird was freed, and the fecal samples were placed into plastic vials containing potassium dichromate solution (K₂Cr₂O₇) at 2.5% v/v, and transported to Laboratório de Coccídios e Coccidiose at Universidade Federal Rural do Rio de Janeiro. Samples were placed on Petri plates in a thin layer of liquid (~5 mm), and kept at laboratory temperature (23–28°C) for ten days until 70% of oocysts were sporulated. Oocysts were recovered by flotation in Sheather’s sugar solution (sp. g. 1.20) and examined under a light microscope using the technique of Duszynski and Wilber (1997). Morphological observations and measurements, in µm, were performed by using a binocular microscope Carl Zeiss with apochromatic oil immersion objective and ocular micrometer K-15X PZO (Poland). Line drawings were prepared with a binocular microscope Wild M-20 with drawing tube. Pictures were prepared using a digital camera model CD Mavica MVC-CD250 Sony®. Size ranges are in parenthesis followed by means, standard deviations and shape index (length/width).

**RESULTS**

The captured Brazilian tanager was a healthily male and shed oocysts of three distinct species. Initially, the oocysts were unsporulated; by day seven, 70% had sporulated.

*Isospora tiesangui* n. sp.

**Description of oocysts:** Sporulated oocysts are spherical to sub-spherical (Figs 1A, 2A, B), and measure 24.2 ± 1.1 (22–26) × 23.4 ± 1.4 µm (21–26) (n = 17). They present shape-index of 1.0 (1.0–1.1); are smooth, bi-layered wall, and are 1.3 ± 0.1 µm (1.1–1.4) thick. Micropyle, residuum and polar granule are absent. Sporocyst are ovoid, measuring 17.7 ± 0.8 (17–19) × 11.5 ± 0.7 µm (11–13) (n = 13), with smooth, thin, and single-layered wall. Stieda body is small and elongated laterally. The substieda body is large and prominent. Residuum is dispersed and composed of granular material. Sporozoites present sub-spherical refractile bodies at both ends.

*Type-host:* *Ramphocelus bresilius dorsalis* (Linnaeus, 1766) (Aves: Passeriformes: Thraupidae).

*Type-specimens:* Oocysts are kept in 10% aqueous (v/v) buffered formalin, and deposited at the Parasitology Collection, in the Department of Animal Parasitology, UFRRJ, Seropédica, Rio de Janeiro, Brazil. The repository number is P-14/2007, including phototypes and line drawings.

*Type-locality:* Marambaia Island (23°04′S and 43°53′W), Rio de Janeiro, Brazil.

*Site of infection:* Not investigated.

*Etymology:* The specific name is derived from the common local name for *R. b. dorsalis.*

*Isospora marambaiensis* n. sp.

**Description of oocysts:** Sporulated oocysts are spherical to sub-spherical (Figs 1B, 2C, D), and measure 29.4 ± 1.4 (27–31) × 27.9 ± 1.3 µm (26–29) (n = 15). They present shape-index of 1.0 (1.0–1.1); are smooth, bi-layered wall and are 1.5 ± 0.1 µm (1.5–1.6) thick. Micropyle, residuum and polar granule are absent. The sporocyst is ellipsoidal, and measures 22.6 ± 1.3 (21–24) × 13.0 ± 0.7 µm (12–14) (n = 12), with smooth, thin, and single-layered wall. The stieda body is flattened with small substieda body. Large sporocyst residuum is composed of scattered granular material. The sporozoites present large and elongated refractile bodies at both ends.

*Type-host:* *Ramphocelus bresilius dorsalis* (Linnaeus, 1766) (Aves: Passeriformes: Thraupidae).

*Type-specimens:* Oocysts are kept in 10% aqueous (v/v) buffered formalin, and deposited at the Parasitology Collection, in the Department of Animal Parasitology, UFRRJ, Seropédica, Rio de Janeiro, Brazil. The repository number is P-15/2007, including phototypes and line drawings.

*Type-locality:* Marambaia Island (23°04′S and 43°53′W), Rio de Janeiro, Brazil.

*Site of infection:* Not investigated.

*Etymology:* The specific name is derived from the island of origin of the host.

*Isospora sepetibensis* n. sp.

**Description of oocysts:** Sporulated oocysts are spherical to sub-spherical (Figs 1C, 2E, F), and measure 18.3 ± 0.9 (18–20) × 15.1 ± 0.8 µm (14–16) (n = 13). They present shape-index of 1.1 (1.0–1.2); are smooth, bi-layered wall, and are 1.4 ± 0.1 µm (1.3–1.4) thick. Micropyle and oocyst residuum are absent, and two polar granules are usually present. The sporocyst is...
ellipsoidal, and measures 16.9 ± 0.1 (16–18) × 11.0 ±
0.6 µm (10–12) (n = 12), with smooth, thin, and single-
layered wall. The stieda body is knob-like and flattened
in the superior extremity. Substieda body is prominent
and directly linked to Stieda body. Residuum is dislo-
cated laterally and composed of granular material. The
sporozoites are elongated, possessing two distinct re-
fractile bodies. Anterior refractile body is spherical, and
the posterior one is elongated.

**Type-host:** *Ramphocelus bresilius dorsalis* (Lin-

**Type-specimens:** Oocysts are kept in 10% aqueous
(v/v) buffered formalin, and deposited at the Parasitol-
ogy Collection, in the Department of Animal Parasitol-
ogy, UFRJ, Seropédica, Rio de Janeiro, Brazil. The
repository number is P-16/2007, including phototypes
and line drawings.

**Type-locality:** Marambaia Island (23°04′S and 43°
53′W), Rio de Janeiro, Brazil.

**Site of infection:** Not investigated.

**Etymology:** The specific name is homage to Sepet-
tiba bay, where the island is located in Brazil.

**DISCUSSION**

According to Duszynski and Wilber (1997), the new
coccidian species should be compared in detail to the
coccidian species that is most structurally similar to it
within the same host family.

Thraupids comprise a relatively large family, which
surround 272 described species. In Brazil, inhabit 98
of these species; however the descriptions of parasites
of the genus *Isospora* in Thraupidae family are scarce
(Stotz et al. 1996).

The first description was made by Boughton et al.
(1938) when coccidia was recovered of four Andean
tanagers: (1) the southern palm tanager, *T. palmarum*;
(2) the magpie tanager, *Cissopis leveriana* (Gmelin,
1788); (3) the southern silver-beaked tanager, *R. carbo*
(Pallas, 1764); and (4) the same host of this work, the
Brazilian tanager, *R. b. dorsalis*. However, all of them
were reported from captured birds in zoos and none of
the coccidia were described or named.

Three species have been described so far. *I. thrau-
pis* was described by Lainson (1994) from the palm
tanager, *T. palmarum*. Templar et al. (2004) described
*I. andesensis* from the common bush tanager, *C. oph-
thalmicus*, and Metzelaars et al. (2005) described *I. iri-
dosornisi* from the yellow-throated tanager, *I. analis.*

**Fig. 1.** Line drawings of sporulated oocysts of new coccidia spe-
cies recovered from the Brazilian tanager, *Ramphocelus bresilius.*
A – *Isospora tiesangui* n. sp.; B – *Isospora marambaiensis* n. sp.;
C – *I. sepetibensis* n. sp. Scale bar: 10 µm
Fig. 2. Photographs of oocysts of *Isospora tiesangui* n. sp. A, B – *Isospora marambaiensis* n. sp. C, D – *Isospora sepetibensis* n. sp. E, F – all in the same scale. *I. tiesangui* presenting Stieda (A) (filled arrowhead) and substieda body (A) (empty arrowhead). Sporozoites presenting refractile bodies (B) (filled arrowhead) and wall bi-layered oocyst (B) (empty arrowhead). *I. marambaiensis* presenting Stieda (C) (empty arrowhead) and substieda body (C) (filled arrowhead). Wall bi-layered oocyst (D) (empty arrowhead). Sporozoites presenting refractile bodies (D) (filled arrowhead). *I. sepetibensis* presents Stieda (E) (filled arrowhead) and substieda body (E) (empty arrowhead). Wall bi-layered oocyst (F) (empty arrowhead), and the two usual polar granules (E) (filled arrowheads). Scale bar: 10 µm.

*Thraupis palmarum* is sympatric with *R. b. dorsalis* in Brazil. *C. ophthalmicus* is sympatric only in Argentina, and *I. analis* is not sympatric with *R. b. dorsalis* (Stotz et al. 1996).

The oocysts of three species described in this work are larger than *I. thraupis*, *I. andensis* and *I. iridosornisi*.

*Isospora tiesangui* does not have polar granules as found in *I. andensis* and *I. iridosornisi*, and it is differentiated from *I. thraupis* for presenting wall bi-layered oocyst, large and prominent substieda body, and dispersed sporocyst residuum.

Also, *I. marambaiensis* does not have polar granules, and it is differentiated from *I. thraupis* for presenting wall bi-layered oocyst, larger and ellipsoidal sporocyst, a great amount of dispersed sporocyst residuum, and sporozoites with larger and elongated refractile bodies.

*Isospora sepetibensis* oocysts are similar to *I. iridosornisi*; however, *I. sepetibensis* oocyst is larger and usually presents two polar granules. The sporocysts are large and ellipsoidal, and the residuum is dispersed. The sporozoites present two refractile bodies. Beside these differences, the hosts of both species are not sympatric.

Based on all morphological characteristics mentioned, the described species is considered to be new coccidian species from the Brazilian tanager, *R. b. dorsalis*. 
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REFERENCES


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