

A New Coccidian Parasite, *Isoospora andesensis*, from the Common Bush Tanager (*Chlorospingus ophthalmicus*) of South America

Alisha C. TEMPLAR¹, Thomas E. McQUISTION¹ and Angelo P. CAPPARELLA²

¹Department of Biology, Millikin University, Decatur, Illinois; ²Department of Biological Sciences, Illinois State University, Normal, Illinois, USA

Summary. A new species of *Isoospora* is described from the fecal contents of the common bush-tanager, *Chlorospingus ophthalmicus hiaticolus*, an avian host from Peru. Sporulated oocysts are subspherical to ovoid, 22.6×18.7 ($20-24 \times 17-20$) μm , with a smooth, colorless, bilayered wall, the inner wall is slightly thinner and darker than the outer wall. The average shape index is 1.2. No micropyle or oocyst residuum are present, but the oocyst contains one polar granule. Sporocysts are ovoid, 14.1×8.5 ($13-15 \times 8-9$) μm , average shape index of 1.7 with a smooth, single layered wall and composed of a triangular-shaped Stieda body but no substieda body. The tip of the Stieda body is dark gray to black. The subspherical sporocyst residuum is composed of fine, uniform granules. Sporozoites are vermiform with an ovoid, posterior refractile body and an ovoid centrally located nucleus and randomly arranged in the sporocyst.

Key words: Coccidia, *Isoospora andesensis* sp. n.

INTRODUCTION

The common bush-tanager (*Chlorospingus ophthalmicus hiaticolus*) forages primarily in groups of 10 to 20 birds, usually with mixed flocks of other tanagers (Ridgley and Tudor 1989). Common bush-tanagers are primarily found in the coastal mountains of

the Andes, and their diet consists of fruit and insects (Valburg 1992). This paper describes the only isosporan parasite that has been reported in the genus *Chlorospingus*.

MATERIALS AND METHODS

Fecal samples were obtained from the common bush tanager during a bird collecting expedition in Peru during July 2002. Upon collection, the fecal samples were placed in 2.5% (w/v) $\text{K}_2\text{Cr}_2\text{O}_7$ solution and maintained at cool temperatures in the field before being

Address for correspondence: Thomas E. McQuiston, Department of Biology, Millikin University, Decatur, Illinois 62522 USA; Fax: (217) 362-6408; E-mail: tmcquiston@mail.millikin.edu

sent to the third author's laboratory for examination. Procedures for processing, examining, and measuring oocysts are described by McQuiston and Wilson (1989) using an Olympus BX-51 microscope with phase-contrast and differential interference contrast microscopy. All measurements are given in micrometers with the size ranges in parenthesis following the means. Oocysts were five months old when examined, measured, and photographed.

RESULTS

Isospora andesensis sp. n.

Description of oocysts: Oocysts subspherical to ovoid, 22.6×18.7 (20-24, SD = 1.18 \times 17-20, SD = 0.96) (N = 30) with a smooth, bilayered wall; the inner wall is thinner and darker than the outer wall. The shape index (length/width) is 1.2 (1.1-1.3, SD = 0.07). Micropyle and oocyst residuum absent but one ovoid polar granule is present. Sporocysts are ovoid, 14.1×8.5 (13-15, SD = 0.57 \times 8-9, SD = 0.53) (N = 27); shape index is 1.7 (1.6-1.8, SD = 0.09). The Stieda body is triangular shaped with the tip or apex dark gray to black with no apparent substieda body suggesting a membrane enclosing the sporozoites and sporocyst residuum. The sporozoites are vermiform with an ovoid, posterior refractile

body and a centrally located nucleus. The 4 sporozoites are randomly arranged in the sporocyst with a subspherical residuum composed of fine, uniform granules.

Type-host: *Chlorospingus ophthalmicus hiaticolus* (Passeriformes: Thraupidae), sample taken July 17, 2002.

Type-specimens: A phototype series and formalin preserved sporulated oocysts are deposited in the Harold W. Manter Laboratory of Parasitology, University of Nebraska State Museum, Lincoln, Nebraska 68588, accession no. HWML 45412 (for formalin specimens) and HWML 45413 (for phototypes).

Type-location: Peru, San Martin Departamento; ca 24 km ENE of Florida (village) $5^{\circ} 43' 23''$ S, $77^{\circ} 45' 01''$ W, ca 2500 m elevation.

Prevalence: 3/7 (43%) was infected within the same locality, but at varied elevations.

Site of infection: Unknown; oocysts found in feces.

Etymology: The specific epithet, *ensis*, is the Latin word meaning from, and is in reference to the location of the avian host, the Andes Mountains.

Remarks: The oocysts are easily broken and collapse after one hour in sugar solution. There were hundreds of oocysts present in the samples taken from the three infected birds.

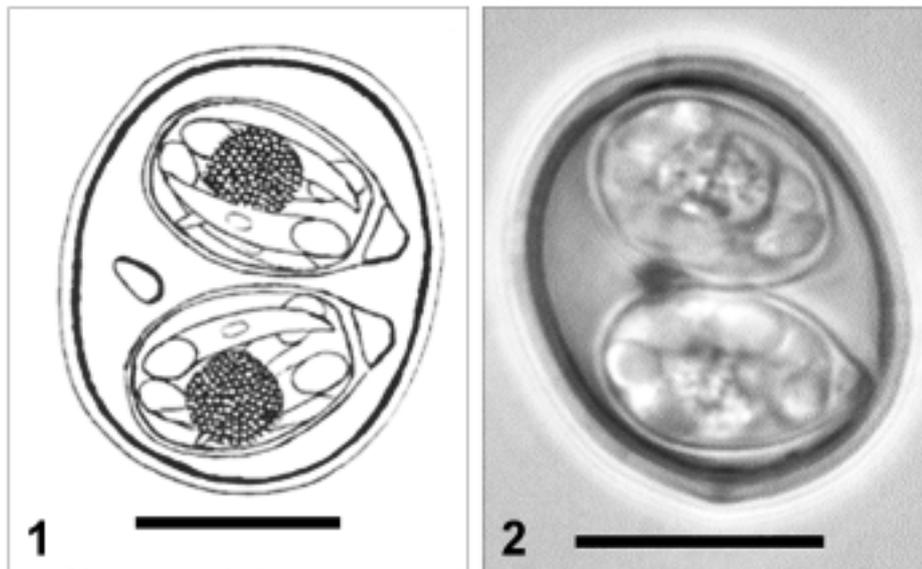


Fig. 1. Composite line drawing of sporulated oocyst of *Isospora andesensis* sp. n. from *Chlorospingus ophthalmicus*. Scale bar 10 μ m.

Fig. 2. A differential interference contrast photomicrograph of sporulated oocyst of *Isospora andesensis* sp. n. Scale bar 10 μ m.

DISCUSSION

Tanagers (Order Passeriformes, Family: Thraupidae) are not definable as a monophyletic group (Isler and Isler 1987, Ridgely and Tudor 1989). No taxonomic character exists that specifically defines the tanagers (Ridgely and Tudor 1989). They are mainly tropical in distribution, and reach maximum diversity in the Andes, where mixed flocks may have up to a dozen or more tanager species in them (Ridgely and Tudor 1989).

Boughton *et al.* (1938) reported coccidia in three genera of Andean tanagers, the southern palm tanager, *Thraupis palmarum palmarum*, the Brazilian silver-beaked tanager, *Rhamphocelus brasilius*, the magpie tanager, *Cissopis leveriana*, and southern silver-beaked tanager, *Rhamphocelus carbo carbo*. However, all were reported from captured birds in zoos and none of the coccidia were described or named. Lainson (1994) described *Isospora thraupis* from the palm tanager, *Thraupis palmarum melanopectera*, a possible sympatric species with *Chlorospingus ophthalmicus*. Although the average oocysts of *Isospora thraupis* are similar in size ($19.9 \times 19 \mu\text{m}$) and shape index (1.0) to *Isospora andesensis* sp. n. ($22.6 \times 18.7 \mu\text{m}$ and 1.2), the sporozoites and sporozoites are quite different between the two species. *I. thraupis* has an inconspicuous Stieda body and a very small, but distinct substieda body. *I. andesensis* sp. n. has a prominent, triangular-shaped Stieda body and no substieda body. Sporozoites of *I. thraupis* have two refractiles bodies while *I. andesensis*

sp. n. sporozoites have only one refractile body. Additionally, no polar granule is reported in *I. thraupis* oocysts while *I. andesensis* sp. n. has one polar granule.

Acknowledgements. The authors thank the Academy of Natural Sciences of Philadelphia for funding the bird collecting expedition, Mr. Zachary A. Cheviron for host identification and capture location data, Amanda Hill for the composite drawing and Ms. Mary Ellen Martin for assistance in naming the parasite. Microscopy equipment was funded by National Science Foundation grant number DBI 0116693.

REFERENCES

- Boughton D. C., Boughton R. B., Volk J. (1938) Avian hosts of the genus *Isospora* (Coccidiidae). *Ohio J. Sci.* **38**: 149-163
- Isler M. L., Isler P. R. (1987) The Tanagers: Natural History, Distribution, and Identification. Smithsonian Institution Press, Washington, D.C.
- Lainson R. (1994) Observations on some avian coccidia (Apicomplexa: Eimeriidae) in Amazonian Brazil. *Mem. Inst. Oswaldo Cruz Rio de J.* **89**: 303-311
- McQuiston T. E., Wilson M. (1989) *Isospora geospizae*, a new coccidian parasite (Apicomplexa: Eimeriidae) from the small ground finch (*Geospiza fuliginosa*) and the medium ground finch (*Geospiza fortis*) from the Galapagos Islands. *Syst. Parasitol.* **14**: 141-144
- Ridgely R. S., Tudor G. (1989) The Birds of South America. University of Texas Press, Austin, Texas
- Valburg L.K. (1992) Flocking and frugivory: the effect of social groupings on resource use in the common bush-tanager. *Condor* **94**: 358-363

Received on 1st June, 2004; revised version on 2nd August, 2004; accepted on 3rd August, 2004