

## A New Species of *Eimeria* (Apicomplexa) from the Orange-Fronted Conure, *Aratinga canicularis* (Psittaciformes), in Costa Rica

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**Summary.** A new species of coccidian (Apicomplexa, Eimeriidae) is described from the faeces of the Orange-Fronted Conure, *Aratinga canicularis* (Psittaciformes, Psittacidae), from Costa Rica. Oocysts of *Eimeria aratinga* sp. n. were found in 3/21 (14%) birds and are ellipsoidal, 35.0 x 25.9 (32.4-37.6 x 23.8-28.0)  $\mu\text{m}$ , with a smooth, bilayered wall and a shape index (length/width) of 1.35 (1.22-1.50). A micropyle and oocyst residuum are absent but a fragmented polar granule is present. Sporocysts are ovoidal, 19.2 x 9.8 (17.6-20.8 x 9.0-10.4)  $\mu\text{m}$ , and possess Stieda and substieda bodies; shape index 1.97 (1.76-2.22). Each sporozoite has spherical anterior and subspherical to ellipsoidal posterior refractile bodies.

**Key words.** *Eimeria aratinga* sp. n., *Aratinga canicularis* host

### INTRODUCTION

Although over 340 species of psittaciform birds have been described to date (Clements 1981, Forshaw 1989), little is known of their coccidia. As part of a larger study involving parrot behavior in Costa Rica, we were recently able to examine fecal samples from several psittaciform species for coccidia. Several birds, all Orange-fronted Conures (*Aratinga canicularis*), were passing coccidian oocysts unlike any reported thus far from other members of the Psittaciformes. This bird is one of four species of parrots commonly found in the dry forest habitat of northwestern Costa Rica (Forshaw 1989). It ranges widely in flocks of 2-200 as it forages

for seeds, fruits, and flowers. Like most parrots, it nests in cavities, although it is unusual in that it constructs its own nest hollows in arboreal termite mounds rather than using existing tree hollows (Hardy 1963). Below we present a description of this new species of coccidian.

### MATERIALS AND METHODS

All birds were trapped live during June to August, 1992 and February to July, 1993 using mist nets and placed temporarily in cloth bags. Fecal samples were collected from within the bags, which were then placed in screw cap vials in a thin layer of 2.5% (w/v) aqueous solution of potassium dichromate and shipped to Kansas State University. Oocysts were then concentrated by flotation in an aqueous sucrose solution (specific gravity 1.30). Measurements and photomicrographs were taken using Nomarski interference-contrast optics and a calibrated ocular micrometer and are reported in micrometers ( $\mu\text{m}$ ) as means, followed by the ranges in parentheses.

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Table 1

Named and some unnamed species of coccidia (Eimeriidae) reported from Psittaciform birds.				
Species	Host	Oocysts (µm)	Locality	Reference(s)
"Coccidia"				
sp.	<i>Amazona aestiva</i>	No data	Argentina	Tsai et al. (1992)
sp.	<i>Melopsittacus undulatus</i>	No data	No data	Morelli (1956); Panigrahy et al. 1981a 1981b)
sp.	<i>Melopsittacus undulatus</i>	No data	Philippines	Tsai et al. (1992)
sp.	<i>Trichoglossus haematodus</i>	No data	Indonesia	Tsai et al. (1992)
<i>Eimeria</i> spp.				
<i>aratinga</i> sp. n.	<i>Aratinga canicularis</i>	35.0 x 25.9 (32.4-37.6 x 23.8-28.0)	Costa Rica	This study
<i>dunsingi</i>	<i>Melopsittacus undulatus</i>	33.7 x 22.8 (27.8-35 x 20-23)	Cosmopolitan	Brada (1966); Farr (1960); Keymer (1958); Todd et al. (1977)
<i>haematodi</i>	<i>Trichoglossus haematodus</i>	32.3 x 27.6 (24.7-40.0 x 20.8-35.0)	New Guinea	Varghese (1977)
<i>psittacina</i>	<i>Melopsittacus undulatus</i>	22.0 x 17.3 (19.4-26.3 x 15.0-19.7)	Bulgaria	Gottschalk (1972)
<i>Isospora</i> spp.				
<i>melopsittaci</i>	<i>Melopsittacus undulatus</i>	24.0 x 18.5 (20-28 x 17.3-21.3)	India	Bhatia et al. (1973)
<i>psittaculae</i>	<i>Psittacula eupatria</i>	28.6-33.0 x 24.2-28.6	India	Chakravarty & Kar (1946)

*E. dunsingi* Farr, 1960 are only slightly smaller but are pear-shaped rather than ellipsoidal (Farr 1960, Todd et al. 1977). In addition, sporocysts of *E. dunsingi* are less elongate. Oocysts of *E. haematodi* Varghese, 1977 are less elongate, the sporocysts are shorter, and an oocyst residuum is present (Varghese 1977).

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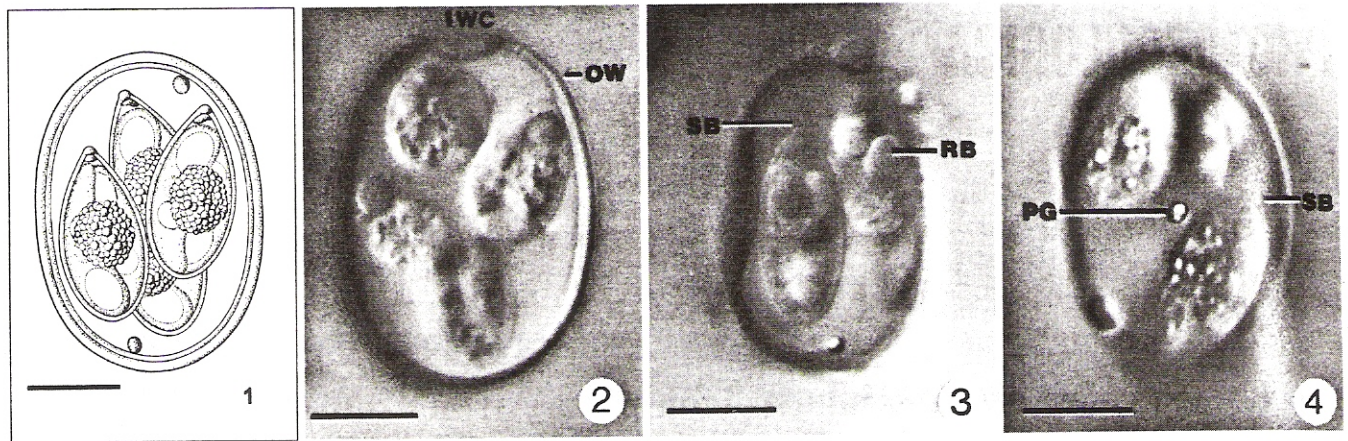


Fig. 1. Composite line drawing of sporulated oocyst of *Eimeria aratinga* sp. n. Bar - 10  $\mu$ m

Figs. 2-4. Nomarski interference-contrast photomicrographs of sporulated oocysts of *Eimeria aratinga* sp. n. Bars - 10  $\mu$ m Abbreviations: IWC - inner wall collapse at pole of oocyst after exposure to sucrose solution, OW - oocyst wall, PG - polar granule; RB, refractile body, SB - Stieda body

## RESULTS

Fecal samples were collected from a total of 75 parrots: *Amazonia albifrons* (26 adults/juveniles and 6 nestlings), *A. auropalliata* (4 adults/juveniles and 7 nestlings), *Aratinga canicularis* (21 adults), and *Brotogetis jugularis* (11 adults). Coccidian oocysts were recovered only from the feces of 3/21 (14%) *Aratinga canicularis*. Upon sporulation, these oocysts were found to represent a previously unreported species, which is described below.

### *Eimeria aratinga* sp. n. (Figs. 1-4)

**Description of oocysts:** Oocysts ellipsoidal, 35.0 x 25.9 (32.4-37.6 x 23.8-28.0), with a smooth, bilayered wall ca 1.5-1.8 thick; inner layer 0.4-0.5; outer layer 1.0-1.4; shape index (length/width) of 1.35 (1.22-1.50). Micropyle and oocyst residuum absent, fragmented polar granule present, consisting as 2-5 granules. Sporocysts ovoidal, 19.2 x 9.8 (17.6-20.8 x 9.0-10.4), with smooth, thin wall ca 0.5 thick; shape index 1.97 (1.76-2.22); Stieda body present, consisting as small, button-like structure; small substieda body present. Sporocyst residuum present, 7.5 x 6.5 (6.4-8.0 x 4.8-7.2), consisting as many granules in compact mass. Sporozoites elongate, arranged head-to-tail in sporocyst, 15.6 x 4.2 (13.6-17.6 x 3.8-5.0). Each sporozoite with spherical anterior refractile body, 3.3 (2.6-4.0), and sub-spherical to ellipsoidal posterior refractile body, 5.2 x 4.0 (4.0-6.4 x 3.6-4.8). Nucleus located between refractile bodies.

**Type-host:** *Aratinga canicularis* (Linné) "Orange-Fronted Conure" (Psittaciformes, Psittacidae)

**Type locality:** Area de Conservación Guanacaste, Costa Rica; 10°45'N, 85°35'W.

**Site of Infection:** unknown. Oocysts recovered from feces.

**Sporulation:** unknown. Oocysts arrived at Kansas State University fully sporulated and may have sporulated en route. Other known coccidia from Psittaciform birds are known to sporulate exogenously.

**Prevalence:** 3/21 (14%) *Aratinga canicularis* were passing oocysts.

**Etymology:** the specific epithet reflects the host genus.

**Type specimens:** phototypes of *Eimeria aratinga* from *Aratinga canicularis* have been deposited in the U.S. National Parasite Museum in Beltsville, Maryland as USNM No. 83814.

## DISCUSSION

Prolonged exposure to sucrose solution often resulted in the partial collapse of the inner oocyst wall at one pole (Fig. 2). Thus, even though a true micropyle was not noted, modification of the wall at one pole may occur.

To date, only 5 members of the apicomplexan family Eimeriidae (3 eimerians and 2 isosporans) have been reported from Psittaciform birds (Table 1). Oocysts and sporocysts of *Eimeria psittacina* Gottschalk, 1972 are considerably smaller and cannot be confused with the species reported herein (Gottschalk 1972). Oocysts of