

A New Coccidian Parasite, *Isoospora samoensis*, from the Wattled Honeyeater (*Foulehaio carunculata*) from American Samoa

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Summary. A new species of *Isoospora* is described from the feces of the wattled honeyeater, *Foulehaio carunculata* from American Samoa. Numerous oocysts of similar morphology were found in a single adult wattled honeyeater. Sporulated oocysts are ovoid, 28.9×26.1 ($25-32 \times 23-30$) μm , with a smooth, colorless, bilayered wall; the inner wall is slightly thicker and darker than the outer wall. The average shape index is 1.1. No micropyle or oocyst residuum are present but the oocyst contains one or two ovoid polar granules. Sporocysts are ovoid, 17.1×10.9 ($16-18 \times 10-11$) μm with a smooth single layered wall and an average shape index of 1.6. The Stieda body is broad, dome-like with a rather rectangular-shaped substieda body. Within the sporocyst is a large amorphous residuum composed of coarse granules and 4 randomly arranged, sausage-shaped sporozoites with a subspherical, posterior refractile body and a centrally located nucleus.

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

INTRODUCTION

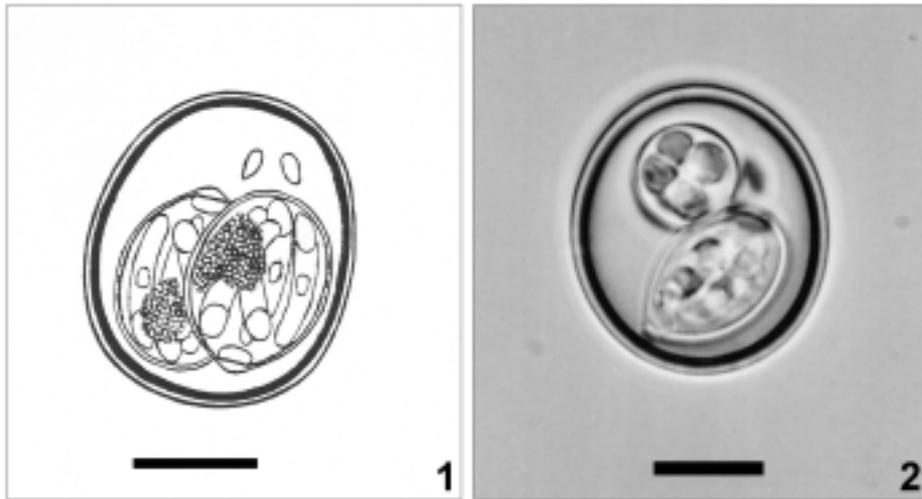
As one of the most widely distributed birds of Fiji, Tonga, and Samoa, the wattled honeyeater (*Foulehaio carunculata*) may be found in any habitat from montane forest to mangroves along the seaward edge (Watling 1982). An endemic bird to the region and common inhabitant of suburban gardens, *F. carunculata*

is a medium-sized bird with drab olive-green plumage. It has a paler underside, which may appear scaled, a fine, slightly down-curved bill, and a conspicuous yellow wattle below its eye. Although drab in appearance, this bird is an attractive songster. Its down-curved bill, distinctive feeding behavior, and voice distinguish it from other birds (Watling 1982).

Foulehaio carunculata eats primarily nectar but also fruit and a fair proportion of spiders and insects during breeding season. It also kills lizards and geckos, which it sometimes eats.

No prior studies have reported coccidian parasites in *F. carunculata* or in any other species in the genus. This

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Figs 1, 2. *Isospora samoensis* sp. n. from *Foulehaio carunculata*. **1** - composite line drawing of sporulated oocyst; **2** - photomicrograph of sporulated oocyst. Scale bars 10 µm.

paper describes a new coccidian species found in the Wattled Honeyeater, *F. carunculata*.

MATERIALS AND METHODS

One *F. carunculata* was captured and a fecal sample was obtained on November 28, 2001 from the island of American Samoa in the South Pacific. The sample was sent to the second author's laboratory for examination and was received on July 15, 2002. Procedures for preserving fecal material and for measuring and photographing oocysts were described in McQuiston and Wilson (1989). All measurements are presented in µm with size ranges in parentheses following the means. Oocysts were approximately 8 months old when examined, measured, and photographed.

RESULTS

Isospora samoensis sp. n. (Figs 1, 2)

Description of oocysts: Oocysts ovoid, 28.9×26.1 (25-32, SD=2.09 \times 23-30, SD=1.94) (N=26) with a smooth, bilayered wall; the inner wall slightly thicker and darker than the outer wall. The shape index (length/width) is 1.1 (1-1.3, SD=0.08). Micropyle and oocyst residuum are absent, but one or two ovoid polar granules are present. Sporocyst ovoid, 17.1×10.9 (16-18, SD=0.59 \times 10-11, SD=0.48) (N= 13) with a smooth single layered wall; shape index 1.6 (1.5-1.7, SD=0.10).

The Stieda body is broad, dome-like with a rather rectangular-shaped substieda body. The sporozoites are sausage shaped with a slightly ovoid, posterior refractile body and a smaller, centrally located nucleus. The sporozoites are randomly placed in the sporocyst with a large, amorphous residuum composed of coarse granules.

Type host: *Foulehaio carunculata* (Gmelin, 1788) wattled honeyeater (Passeriformes: Meliphagidae).

Type specimens: A phototype series and buffered formalin-preserved sporulated oocysts of *Isospora samoensis* sp. n. are deposited in the Harold W. Manter Laboratory of Parasitology, University of Nebraska State Museum, Lincoln, Nebraska 68588, accession no. HWML 45410 (syntypes) and HWML 45411 (phototypes).

Type location: American Samoa, Tau village on Tau Island: 14°14'01"S, 169°30'52"W

Prevalence: 1/1 was infected with *Isospora samoensis*.

Sporulation time: Unknown, oocysts were partially sporulated when received at the laboratory and became fully sporulated after exposed to air for several days.

Site of infection: Unknown, oocysts found in feces.

Etymology: *samoensis* means found on the island of Samoa.

Remarks: The only bird sampled was passing hundreds of oocysts. All the oocysts appeared morphologically similar and unique to the host.

The oocysts appeared unusually sensitive to osmotic pressure. Many oocysts buckled within 1-2 h after floating in Sheather's sugar solution.

DISCUSSION

The isosporan coccidia are protozoan parasites with a direct life cycle and no intermediate hosts. Oocysts develop endogenously, are passed in the feces, and sporulate in the environment. Birds become infected when they ingest the sporulated oocysts while feeding.

It is unusual to find coccidian oocysts in the feces of a fruit eating avian host. McQuiston (2000) sampled 655 South American passerine birds representing 190 species and compared the prevalence of coccidian parasites with host diet, habitat and behavior. Only 1.1% of birds whose primary diet was fruit were passing coccidian oocysts. However, the study also reported that hosts whose diet included ground insects had a prevalence rate of coccidia of 22.8%. Since wattled honeyeaters forage on the ground for spiders and insects to supplement their diet, this is most likely the mechanism for transmission of the coccidian parasite.

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REFERENCES

- McQuiston T. E. (2000) The prevalence of coccidian parasites in passerine birds from South America. *Trans. Ill. State Acad. Sci.* **93**: 221-227
- McQuiston T. E., Wilson M. (1989) *Isoospora 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
- Watling D. (1982) Birds of Fiji, Tonga, and Samoa. Millwood Press, Wellington, New Zealand

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