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Research Note

Morphometric Comparison of the Oocysts of *Cryptosporidium meleagridis* and *Cryptosporidium baileyi* from Birds

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ABSTRACT: The structures of oocysts of *Cryptosporidium meleagridis* from turkeys and *C. baileyi* from chickens were compared. Oocysts of *C. meleagridis* were 5.2 by 4.6 μm and contained sporozoites that were 5.2 by 1.4 μm. Oocysts of *C. baileyi* were 6.6 by 5.0 μm and contained sporozoites that were 6.1 by 1.5 μm. The length/width ratio was 1.13 for *C. meleagridis* and 1.33 for *C. baileyi*. The mean lengths, widths, and length/width ratios of oocysts were significantly different ($P < 0.05$) following analysis using the Student's *t*-test. Oocysts of both species were passed fully sporulated in the feces. Oocysts of *C. meleagridis* were infectious for young chicks.

KEY WORDS: chicken, turkey, oocyst, *Cryptosporidium meleagridis, C. baileyi.*

Cryptosporidium spp. are coccidian parasites that inhabit the microvillous border of a variety of epithelial surfaces of man and other vertebrates (reviewed by Fayer and Ungar, 1986). Four species have been named from birds, however, 2 of these species, *C. tyzzeri* and *C. anserinum,* were inadaquately described and their validity is questionable (Current et al., 1986). Slavin (1955) described the oocysts and endogenous life cycle of *C. meleagridis* from naturally infected turkey poults with diarrhea. He reported that oocysts were 4.5 by 4.0 μm and were passed unsporulated in the feces. These measurements were made on stained oocysts, and therefore, are smaller than the actual size of this species. No data were presented on sporulated oocysts or the structure of *C. meleagridis* sporozoites. Current et al. (1986) described the oocysts and life cycle of *C. baileyi* from experimentally infected chickens. Oocysts were 6.3 by 5.2 μm and were passed sporulated in the feces. The present study describes the structure of sporulated *C. meleagridis oocysts* and compares their structure to that of *C. baileyi* oocysts. Information reported in this study should aid in the diagnosis of species causing avian cryptosporidiosis.

Turkey feces containing *C. meleagridis* oocysts were obtained from Dr. M. G. Levy, North Carolina State University. Oocysts were then passaged in 2 groups of 5 3- to 4-day-old poults. To remove contaminating *Eimeria* species, the oocysts collected from the poults were passaged in 2 groups of 5 3- to 4-day-old chicks. Feces from poults and chicks were collected 5–10 days postinoculation. *Cryptosporidium meleagridis* oocysts were concentrated from feces by methods routinely used for *C. baileyi* (Lindsay et al., 1986a, b, 1987). Oocysts of the AU-B1 isolate of *C. baileyi* (Lindsay et al., 1986b) were used for structural comparisons. Oocysts of both species were stored in Hanks' balanced salt solution containing antibiotics (Lindsay et al., 1988) for less than 60 days prior to structural observations. Sporozoites were obtained from oocysts using methods previously described (Sundermann et al., 1987). Oocysts and sporozoites were examined with an Olympus BH-2 microscope equipped with Nomarski interference-contrast optics and a calibrated ocular micrometer. Measurements are expressed as means ± standard error of the mean followed by the ranges and number (N) of stages examined in parentheses. Means were evaluated using the Student's *t*-test (Huntsberger and Billingsley, 1977) to determine if significant differences ($P < 0.05$) in size were present.

Oocysts of *C. meleagridis* were passed fully sporulated in the feces of both poults and chicks. Small numbers of oocysts were passed by both poults and chicks during the 6-day collection period. Oocysts were spherical, irregularly spherical, or slightly elongate. Four sporozoites and an oocyst residuum were present. A micropyle was absent. The wall was about 0.5 μm thick. Oocysts were 5.2 ± 0.08 by 4.6 ± 0.04 μm (4.5–6.0 by 4.2–5.3 μm, $N = 40$). The length/width ratio was 1.13 ± 0.02 (1.00–1.33, $N = 40$). Sporozoites

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were released from the oocysts through a suture that formed in ⅓ to ½ of the oocyst wall. Excysted sporozoites were 5.2 ± 0.10 by 1.4 ± 0.03 μm (4.5–6.0 by 1.2–1.8 μm, $N = 40$). No refractile bodies were present in sporozoites.

Oocysts of *C. baileyi* are passed fully sporulated in the feces (Current et al., 1986; Lindsay et al., 1986b). They are usually elongate, contain an oocyst residuum, and lack a micropyle. The wall is about 0.5 μm thick. Oocysts of the AU-B1 isolate examined in this study were 6.6 ± 0.10 by 5.0 ± 0.05 μm (6.0–7.5 by 4.8–5.7 μm, $N = 40$). The length/width ratio was 1.33 ± 0.02 (1.05–1.79, $N = 40$). Excysted sporozoites were 6.1 ± 0.10 by 1.5 ± 0.03 μm (4.5–7.5 by 1.2–1.8 μm, $N = 40$). No refractile bodies were present in sporozoites.

The mean lengths, widths, and length/width ratios of the oocysts were significantly different ($P < 0.05$). The mean lengths of excysted sporozoites were significantly different ($P < 0.05$) but the widths were not ($P > 0.05$).

Upton and Current (1985) compared the structure of *C. muris* and *C. parvum* oocysts from mammals. They found that oocysts of *C. muris* were larger and more elongate than those of *C. parvum*. This is similar to the relationship that was found to exist between the size and shape of *C. baileyi* and *C. meleagridis* oocysts in the present study. Slavin (1955) also observed a similarity in oocyst structure between *C. meleagridis* and *C. parvum*.

Measurements of *C. baileyi* oocysts in the present study are similar to those previously reported (Current et al., 1986; Lindsay et al., 1986b). Measurements of *C. meleagridis* oocysts in the present study are slightly larger than those reported by Slavin (1955). However, the length/width ratios are identical (1.13). His use of fixed material probably accounts for these size differences.

Cryptosporidium baileyi has been shown to exhibit little host specificity for birds (Current et al., 1986; Lindsay et al., 1986a). It is not infectious for mammals. In the present study, *C. meleagridis* was transmitted to chicks. Further studies are needed to determine the susceptibility of other avian species and mammals to this parasite.

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