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A SPECIES OF *Sarcocystis* USING OWLS AS DEFINITIVE HOSTS

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Abstract: Sporulated oocysts found in the intestines of a Masked Owl (*Tyto novaehollandiae*) and a Barn Owl (*T. alba*) produced sarcocysts in mice. Schizonts were found in the livers of 3 mice that died at 7-8 days after dosing.

Neither sarcocysts nor schizonts were found in chickens dosed with oocysts from a Masked Owl.

INTRODUCTION

As a result of the pioneering work of Rommel *et al.*[3] and Rommel and Krampitz[4] the involvement of a predator-prey relationship between definitive and intermediate hosts of *Sarcocystis* and *Frenkelia* spp, has been well established. In addition, it is possible to presumptively identify *Sarcocystis* and *Frenkelia* oocysts/sporocysts in the faeces of definitive hosts on the basis that they are isosporan in type and sporulate endogenously.[2,4] Therefore, when sporulated oocysts were found in the intestines of Masked Owls *(Tyto novaehollandiae)* and a Barn Owl *(T. alba)* attempts were made to complete the life cycle of the presumed *Sarcocystis/Frenkelia* sp.

MATERIALS AND METHODS

Eight Masked Owls and a Barn Owl collected as road kills by the author and cooperators were examined for the presence of sporulated, isosporan-type oocysts in their intestines.

Oocysts were collected from the intestines of owls by scraping the mucosa of the small intestine. Scrapings were suspended in antibiotic saline containing 1,000 units of penicillin and 100 μg streptomycin per millilitre. The oocysts were all of one type as described in the results.

Unquantified numbers of oocysts from a Masked Owl were dosed *per os* into 6 laboratory mice (*Mus musculus*) and 6 newly-hatched chickens. The mice were laboratory animals from stocks in which *Sarcocystis* had never been recorded, but even so 12 comparable animals were kept as controls. Seven chickens from the same batch as the dosed birds were kept as controls. Also, oocysts from a Barn Owl were given to 6 mice and 6 comparable animals were kept as controls. Dosed and control animals were placed in separate, isolated cages. Any animals which died were examined immediately and all the others were killed and examined 7-12 weeks after dosing. Procedures used were macroscopic examination of the skinned carcasses, microscopic examination of suspensions of macerated muscles, and microscopic examination of at least 20 haematoxylin and eosin stained sections from each animal. Each section was 10 μm thick. Tissues selected were: tongue, heart, diaphragm (where appropriate), leg and abdominal muscles. In addition, sections were cut from brain, lungs, liver and kidneys of 2 animals from each dosed group and any others dying during the course of the observations.

Four entire mice, dosed 12 weeks earlier with oocysts from a Masked Owl, were fed to an Australian Goshawk (*Accipiter fasciatus*). This was a young adult bird which had been in captivity for some 6 months and had been fed frozen laboratory guinea-pigs during captivity. Two faecal examinations during this period revealed the bird to be free of sporocysts/oocysts.

During the 21 days after mice were fed, faeces were examined daily for sporocysts/oocysts using a sucrose solution (Sp. g. 1.15).

RESULTS

Sporulated oocysts were found in the small intestines of 5 of the 8 Masked Owls and the Barn Owl. These measured an average of 17.5 x 13 μm (30 oocysts), and each contained 2 sporocysts approximately 12.5 x 9 μm inside a thin oocyst wall. A residual body 6 μm in diameter was present within the sporocysts and 4 sporozoites could be vaguely discerned in some sporocysts. There was no observable difference between the organisms present in the two species of owl.

Three of the mice dosed with oocysts from the Barn Owl died 7-8 days after dosing. Death was due to severe hepatocellular necrosis associated with a schizogonic phase of a protozoan parasite. The schizonts, which were restricted to the liver, measured an average of 15 x 11.5 μm (10 schizonts) and their zoites were arranged in a rosette fashion. Apparently the organisms were located within hepatocytes. The 3 surviving mice were observed to have swellings of the masseter and shoulder muscles 7 weeks after dosing and were destroyed. At necropsy, slender white streaks were observed in the abdominal muscles and numerous zoites (6-7 x 2-3 μm) were detected in suspensions of macerated muscles. Stained sections revealed that the muscle swellings and the streaks were due to the presence of numerous sarcocysts. Sarcocysts were common in all skeletal muscles examined, but were sparse in the myocardium. These sarcocysts were elongated, up to 1.8 mm in length, 30-60 μm in diameter and their delicate, well-defined walls surrounded tightly-packed, small zoites. No sarcocysts were detected in the control mice.

None of the mice or the chickens dosed with the oocysts from the Masked Owl died, but all the dosed mice had sarcocysts in their skeletal muscles. These were indistinguishable from those found in mice given oocysts from the Barn Owl. No sarcocysts were found in the chickens or the control mice.

No organism resembling *Frenkelia* were found in any of the experimental animals.

No oocysts were detected in the faeces of the Australian Goshawk during the 3 week observation period.

DISCUSSION

The experimental results indicate that there is a *Sarcocystis* cycle between mice and owls, with schizogony occurring in the liver of the mice. These findings have been confirmed by Frenkel (Pers. Comm.) using oocysts supplied by the author. He first detected sarcocysts on the 31st day of murine infection. Also, Cerna[1] has reported successful transmission of an apparently identical *Sarcocystis* from the European sub-species of *T. alba* to mice.

Logically there should be such a cycle between mice and the larger Tasmanian owls, because mice commonly are found in the stomachs of these birds (Munday, unpublished data). However, as *M. musculus* is an introduced species the question is raised as to whether or not this particular *Sarcocystis* species also has been introduced or was already present in native mice. It is not likely to have been present in native rats, because the oocysts are not infective for laboratory rats (Rickard, Pers. Comm.). Unfortunately, Tasmanian owls were not available to complete the life cycle, but Frenkel (Pers. Comm.) successfully infected the American sub-species of *T. alba* using mice with 56 day infections. Sporocyst shedding commenced 7 days after feeding an infected mouse. As the Australian Goshawk is an accipitriform and not a strigiform bird, it is not unexpected that infection could not be established in this species.

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LITERATURE CITED

1. CERNA, Z. 1976. Relationship of Oocysts of *"Isospora buteonis"* from the Barn Owl (*Tyto alba*) to Muscle Cysts of Sarcosporidians from the House Mouse (*Mus musculus*) Folia Parasit. (*Praha*) 23: 285.
2. FRENKEL, J. K. 1974. Advances in the Biology of Sporozoa. Z. Parasitenk. 45: 125-162.
3. ROMMEL, M., A.-O. HEYDORN and F. GRUBER. 1972. Beiträge zum Lebenszyklus der Sarkosporidien. I Die Sporozyste von *S. tenella* in den Fazes der Katze. Berl. Münch. Tierarzl. Wschr. 85: 101-105.
4. H. E. KRAMPITZ 1975. Beiträge zum Lebenszyklus der Frenkelien. I Die Identität von *Isospora buteonis* aus len Mäusebussard mit einer Frenkelienart *(F. clethrionomyobuteonis sp. n.)* aus der Rötelmaus. Berl. Münch. Tierärztl. Wschr. 88: 338-340.

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