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Author: Munday, B. L.

Source: Journal of Wildlife Diseases, 19(2) : 146-147

Published By: Wildlife Disease Association

URL: https://doi.org/10.7589/0090-3558-19.2.146

Journal of Wildlife Diseases, 19(2), 1983, pp. 146–147

An Isosporan Parasite of Masked Owls Producing Sarcocysts in Rats

B. L. Munday, Mt. Pleasant Laboratories, P.O. Box 46, Launceston South, Tasmania 7250, Australia

The masked owl (*Tyto novaehollandiae*) is a medium-sized raptor which is killed commonly by motor vehicles when pursuing prey along road verges. Isosporan parasites typical of *Sarcocystis* spp. have been found in 38% of these birds killed on roadways (Munday et al., 1979, J. Wildl. Dis. 15: 57–73).

Inoculation of sporocysts collected from masked owls into laboratory rats (*Rattus norvegicus*) and mice (*Mus musculus*) has led to three different outcomes. Firstly, the isolation in mice of a parasite indistinguishable from *Sarcocystis dispersa* Cerna, 1978 has been reported previously (Munday, 1977, J. Wildl. Dis. 13: 205–207). The failure of another isolate to produce sarcocysts in either rats or mice has also been reported previously (Munday and Mason, 1980, J. Wildl. Dis. 16: 83–87). The third outcome has been to produce sarcocysts in rats, but not mice, and is the subject of this note.

Intestinal scrapings from a masked owl revealed the presence of sporulated oocysts and sporocysts typical of a *Sarcocystis* sp. The oocysts measured 15.0–17.5 μm (17.0 ± 0.6) by 11.9–13.0 μm (12.5 ± 0.8) (n = 10) and contained two sporocysts. Free sporocysts measured 11.5–13.0 μm (12.2 ± 0.7) by 7.25–8.7 μm (8.0 ± 0.7) (n = 15) and contained four sporozoites and a residual body 5 μm in diameter (Fig. 1).

Intestinal scrapings were suspended in distilled water for inoculation per os into laboratory rodents. As many organisms remained embedded in intestinal tissue, it was not possible to estimate the number of sporocysts given.

The rats and mice were from stocks held at Mt. Pleasant Laboratories and had never been found to be spontaneously infected with *Sarcocystis* sp. Two rats were given 5 ml of suspension and four were kept as uninoculated controls. Similarly, six mice were given 1 ml of suspension and four were kept as controls. The animals were observed daily until they were killed 56 days post-inoculation, when mature sarcocysts were found in the inoculated rats, but not in the control rats or any of the mice. At necropsy, samples of muscle from the tongue, heart, diaphragm, abdominal wall and fore- and hind-limbs were fixed in 10% formol saline prior to processing for light and electron microscopy. Material for light microscopy was embedded in

Received for publication 16 August 1982.

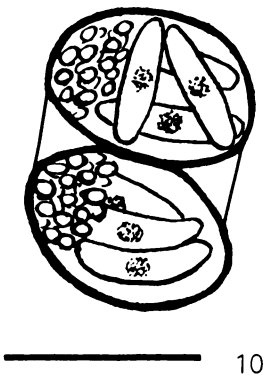

FIGURE 1. Line drawing of sporulated oocyst in intestinal scrapings from a masked owl (*Tyto novaehollandiae*).

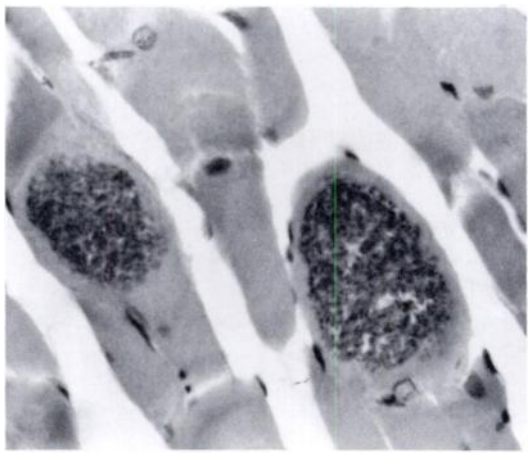

FIGURE 2. Sarcocysts in the diaphragm of a laboratory rat (*Rattus norvegicus*). H&E. ×1,500.

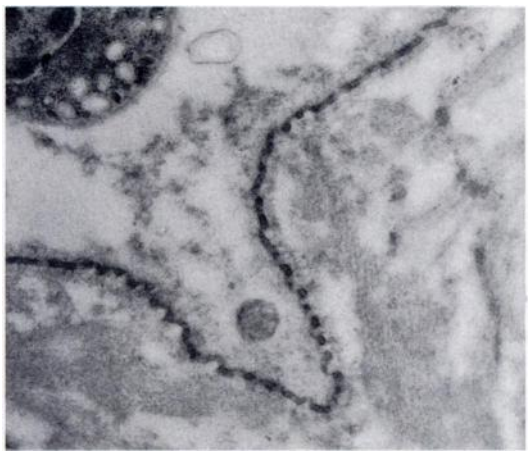

FIGURE 3. Wall of *Sarcocystis* sp. in *R. norvegicus*. Note simple configuration with invaginations. ×20,000.

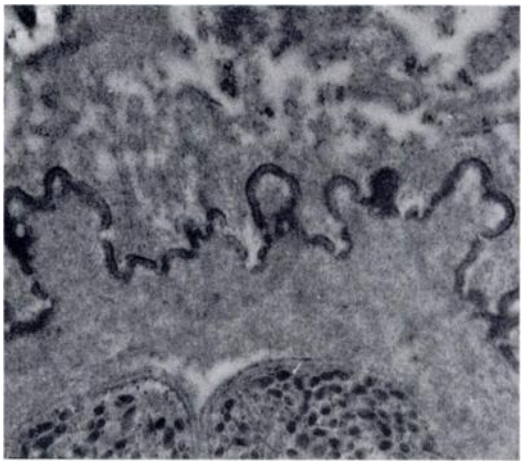

FIGURE 4. Wall of *Sarcocystis dispersa* in *Mus musculus*. Note extensive folding. ×20,000.

paraffin and five sections were cut at 5 μm thickness from each block prior to staining with haematoxylin and eosin. Samples of diaphragm from both inoculated rats were post-fixed in osmium tetroxide, embedded in araldite and ultrathin sections were stained with lead citrate and uranyl acetate for transmission electron microscopy. Sarcocysts were present in the diaphragms of both inoculated rats and the skeletal muscles of one. As none of these sarcocysts was cut longitudinally, their entire length could not be determined. The longest measured 54 μm and widths varied from 15 to 38 μm. The cysts in the skeletal muscles were approximately half the diameter of those in diaphragms. There were no detectable trabeculae in the sarcocysts and the cyst wall was barely detectable by light microscopy (Fig. 2). Electron microscopy revealed that the cyst wall was extremely simple, without protrusions, but with invaginations (Fig. 3), which is quite distinct from *S. dispersa* which has an extensively folded wall (Fig. 4) (Senaud and Cerna, 1978, Protistologica 14: 155–176; Munday, unpubl. data).

Of the described *Sarcocystis* spp. in rats, it is possible to distinguish the organism under consideration from *S. azevedoi* Shaw and Lainson, 1969, *S. cymruensis* Ashford, 1978, *S. murinotechis* Munday and Mason, 1980, *S. oryzomyos* and *S. proechimyos* Shaw and Lainson, 1969, *S. singaporensis* Zaman and Colley, 1976 and various unnamed *Sarcocystis* spp. (Rzepczyk and Scholtyseck, 1976, Z. Parasitenkd. 50: 137–150; Lai, 1977, Southeast Asian J. Trop. Med. Public Health 8: 417–418; Daly and Markus, 1980, Electron Microsc. Soc. South Afr. Proc. 8: 95–96; Munday and Mason, 1981, N.Z. J. Zool. 8: 563) on the basis of sarcocyst wall morphology and/or definitive hosts. Its cyst wall and zoites are very similar, if not identical to those of *S. booliati* Dissanaike and Poopalachelvan, 1975 (Kan and Dissanaike, 1976, Int. J. Parasitol. 6: 321–326). Whether or not it is identical with *S. booliati* will be determined only by appropriate life-cycle experiments using infected moonrats (*Echinosorex gymnurus*) and owls. It is possible that the organism isolated in experimental rats is the same as the *Sarcocystis* sp. with a thin cyst wall previously found in wild rats in Tasmania (Munday et al., 1978, J. Wildl. Dis. 14: 417–432).

Even with the demonstration of owl/mouse and owl/rat cycles, there still remains the enigma of *Sarcocystis*-type sporocysts which have been recovered from masked owls and which apparently have not been infective for rats or mice. Other prey species which could be intermediate hosts, and which harbor unidentified sarcocysts, include marsupial mice (*Antechinus* spp.), bandicoots (*Isoodon macrourus*), and various birds (Munday et al., 1978, loc. cit., 1979, op. cit.)

Thanks are due to Mr. C. Donaldson, Deloraine, Tasmania who collected the owl and Dr. D. Munro, New Town Research Laboratories, Tasmania, who prepared the electron micrographs.