# COCCIDIA (PROTOZOA:SPOROZOASIDA) OF CATS AND DOGS

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## ABSTRACT

Studies were undertaken to establish for the first time the identity and prevalence of coccidian parasites of New Zealand cats and dogs and to determine the effect of various factors on the activation of *Isospora felis* and *Isospora rivolta* sporozoites. The associations between these protozoa and such organisms as *Toxoplasma, Sarcocystis, Besnoitia* and other related genera are examined and the literature concerning their life cycles, nomenclature and general biology reviewed.

Examination of faecal samples from 508 cats and 481 dogs from North Island localities revealed that 155 (30.5%) and 307 (63.8%) respectively, contained coccidia. The majority of infected samples were found to contain a single coccidian but in total four valid coccidians from cats and four from dogs, as well as several pseudoparasitic coccidia, were recorded and described. The identities and prevalences of these valid coccidians were:

| | | | | | |
|---|---|---|---|---|---|
| (a) | Cats : | *Isospora felis* | (17.5%) | *Isospora rivolta* | ( 2.2.%) |
| | | *Toxoplasma gondii* | ( 0.98%) | *Sarcocystis* sp. | (16.9%) |
| (b) | Dogs : | *Isospora canis* | ( 4.0%) | *Isospora ohioensis* | ( 9.2%) |
| | | *Hammondia heydorni* | ( 2.7%) | *Sarcocystis* sp. | (58.8%) |

The sex of the host had no significant effect on the prevalence of infection. The effect of other factors, such as season, host age and host origin, however, was found to vary from coccidian to coccidian and appeared to be explicable in terms of differences in routes of transmission, host immunity and intermediate host specificity.

Levels of sporocyst shedding in cats and dogs naturally infected with *Sarcocystis* sp. tended to be low with the majority excreting 200 sporocysts per gram of faeces or less. The specific identities of such sporocysts are unknown but at least some from cats were demonstrated, by mouse infection, to be those of *S. muris*. Attempts to induce similar

*Sarcocystis* infection in mice, using isolates of *I. felis* recovered from the faeces of naturally infected cats were unsuccessful.

After completion of the main survey, a further coccidian showing similarities to *Besnoitia wallacei* was recovered from the faeces of one of five feral cats. The feeding of sporulated oocysts of this coccidian to mice, rats, rabbits and guinea pigs resulted in the formation of typical *Besnoitia* cysts in all hosts except the last.

Studies on the activation of *I. felis* and *I. rivolta* sporozoites revealed that, although some differences were apparent between the two, both were capable of activation over a wide range of conditions.

Activation of both species was observed to take place in trypsin and bile between temperatures of 21° and 43°C (the range tested) and to occur rapidly at 39°C. While the presence of bile appeared to be essential for this process that of trypsin did not. In general, neither the concentration of bile (above 5%) nor the type of bile was found to have any marked effect on the level of activation attained while hydrogen ion concentration (pH range 5.0 to 10.0) also appeared to have little influence.

Unlike many species of coccidia which have been studied, pretreatment of oocysts before exposure to trypsin and bile was found not to be an essential prerequisite for the activation of *I. felis* and *I. rivolta*. However, higher levels of activation were attained when pretreatment was used than when it was not although for *I. rivolta* at least, the level of activation appeared to be less dependent on pretreatment for oocysts stored in sulphuric acid than for those stored in potassium dichromate.

The process of activation and excystation of both species was observed to be essentially similar to that described for other species of coccidia which also lack either sporocyst stieda bodies or oocyst micropyles. Sporozoites escaped following the collapse of the sporocyst wall and were observed to complete excystation through identations and fractures at one or both ends of the oocyst.

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