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Cystoisospora israeli N. Sp. causing enteritis in a South African fur seal

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Abstract

A new species of *Cystoisospora* causing enteritis in a South African fur seal (*Arctocephalus pusillus*) is described. The coccidiosis was successfully treated with Resprim Forte®.

Introduction

Coccidia are among the most common and important protozoan parasites of vertebrates. Several hundred species belonging to over 30 genera have been described (Levine and Ivens, 1965). The coccidia have been found to be important parasites of man and various animal species, including terrestrial domesticated-, zoo- and wild-animals as well as animals living part-time or all their life in the water (Anderson, 1983; Frenkel, 1977; Frenkel *et al.*, 1987; Kuttin *et al.*, 1982; Levine, 1973; Levine and Ivens, 1965; Soulsby, 1982). According to Howard, Britt and Matsumoto (1983) the only report of coccidiosis

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in marine mammals was caused by *Eimeria phocae* in Harbor seals (*Phoca vitulina*).

In this paper we report on coccidiosis in a South African fur seal caused by a new species of *Cystoisospora*.

Case report

In 1991 a 7-year-old female, South African fur seal (*Arctocephalus pusillus*) suffered from diarrhoea, with very dark, fluid, mucoid faeces, and loss of weight from 57.7 to 47.8 kg. The animal had been kept in captivity for 5 years and was housed with other fur seals.

In direct smears of the stool many inflammatory cells and a few erythrocytes as well as numerous ellipsoidal-shaped oocysts 20-22 by 27-30 µm containing a round sporocyst, 15-16 µm in diameter (Fig. 1), were seen. Sporulated oocysts containing 2 sub-spherical sporocysts 11-15 µm in size (Fig. 2) were also present. The length-width ratio of the oocytes was 1.36. The cell-wall of the oocytes was composed of 2 layers.

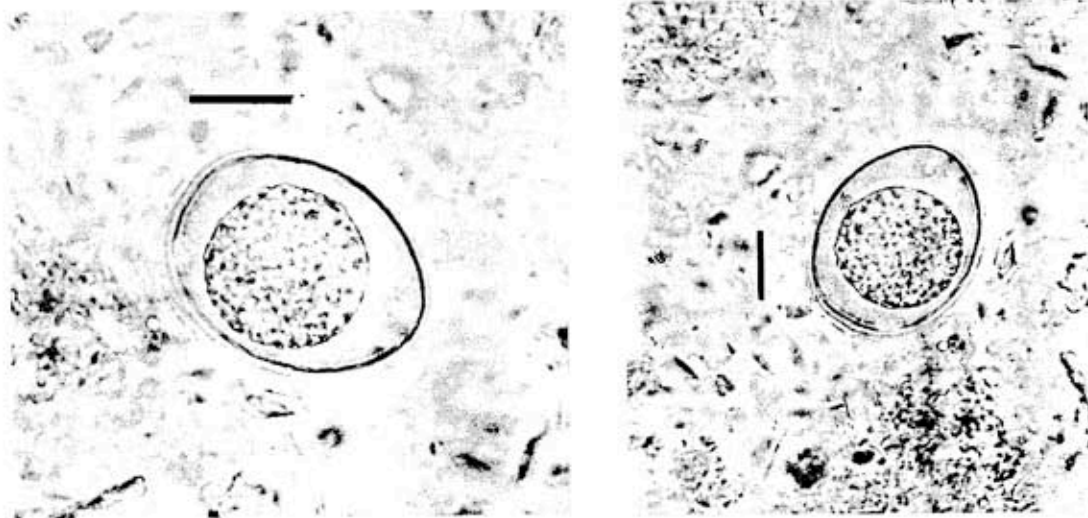


Figure 1. Unsporulated oocyst of *Cystoisospora israeli*. Bar = 10 µm.

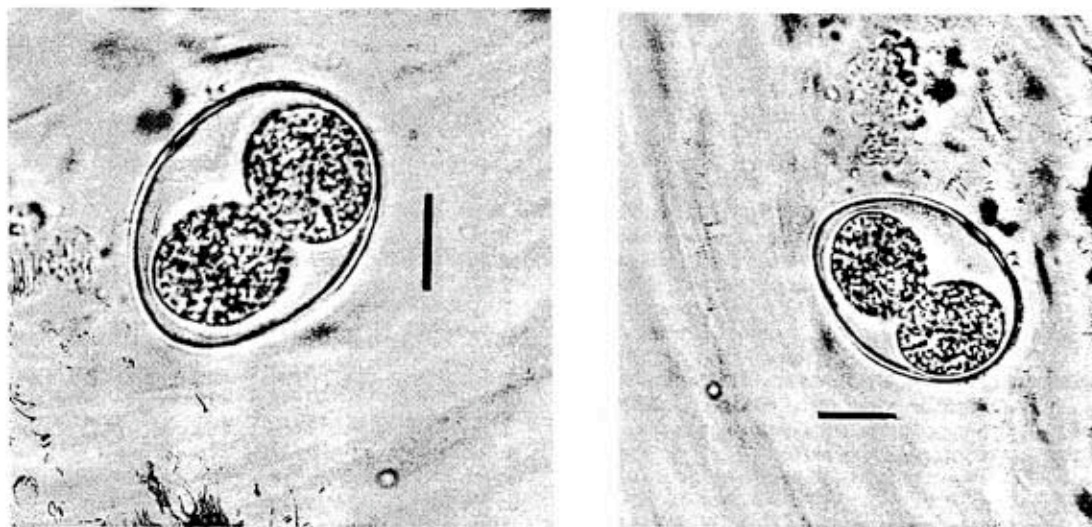


Figure 2. Sporulated oocyst of *Cystoisospora israeli*. Bar = 10 μ m.

The fur seal was treated per os, twice daily for 2 days with tablets of Resprim Forte® (Teva Pharmaceutical Industries, Israel) containing 800 mg Sulphamethoxazole and 160 mg Trimethoprim. The treatment was repeated after 10 days. After the treatment, investigations of the stool did not show any oocysts. The diarrhoea stopped and the animal gained weight.

Discussion

A protozoal infection in marine mammals should be a rare condition. In the recently published *Handbook of Marine Mammal Medicine*, edited by Dierauf (1990), protozoal diseases are not even mentioned. The only occurrence of a coccidial infection in marine mammals we could find in the literature, was coccidiosis in Harbor seals (*Phoca vitulina, concolor*) caused by *Eimeria phocae* (Hsu, 1973; Hsu *et al.*, 1974; Hsu, Melby and Altman, 1974; Howard, Britt and Matsumoto, 1983) and common seals (Munro & Singe, 1991).

As the endogenous stages of the life-cycle of many species of coccidia are unknown, (as in the case of the protozoa found in the South African fur seal), the morphology of the oocysts is most commonly used as criteria for classification and separation of coccidial species (Levine and Ivens, 1965). Among the many recognized genera in the family *Eimeriidae* (Suborder *Eimeriina*, Order *Eucoccidiididae*, Subclass *Coccidia*) Soulsby (1982) mentioned the important genera which infect domestic animals: *Tyzzeria*, *Isospora*, *Eimeria* and *Wenyonella*.

Frenkel (1977) created a new genus: '*Cystoisospora*' in which parasitic cysts formed in intermediary

hosts ('prey') and infect only definitive predator host. He included in the new genus 5 heterogeneous species of the genus *Isospora* Schneider, 1881, one of them was *Cystoisospora (Isospora) rivolta*. The oocysts of the genus *Cystoisospora (Isospora)* are typical by having 2 sporocysts (Frenkel, 1977; Frenkel *et al.*, 1987; Levine, 1973; Soulsby, 1982). The sporulated oocysts of the coccidia found in the faeces of the South African fur seal had 2 sporocysts, and were similar to those seen in *Cystoisospora (Isospora) rivolta* in cats. There are small variations in the literature concerning the morphology of the oocysts of *Cystoisospora (Isospora) rivolta*. Soulsby (1982) described the oocysts as 21–28 by 18–23 μ m (mean 25 by 20 μ m) with a length-width ratio of 1.25, while Frenkel *et al.* (1987) mentioned their size as 23–29 by 20–26 μ m (mean 25 by 23 μ m) with a length-width ratio of 1.09. The oocysts found in the fur seal were 27–30 by 20–22 μ m (mean of 28.5 by 21 μ m) with a length-width ratio of 1.36. According to Frenkel *et al.* (1987), the size of the sporocysts of *Cystoisospora rivolta* are 15 by 17.2 μ m in size, while the sporocysts seen in the oocysts of the fur seal measured 11–16 μ m.

Beside the fact that the oocysts vary in morphology according to species, a remarkable host specificity exist for individual species (Frenkel, 1977; Soulsby, 1982). Therefore the *Cystoisospora* found in the stool of the South African fur seal kept in Israel, should be recognized as a new species which we propose to call: *Cystoisospora israeli*.

Fish are known to be infected by various coccidia (Schaeperclaus, 1990; Soulsby, 1982). As our fur seals occasionally eat some fresh fish from the sea,

it is plausible that one kind of those fish is the intermediate host, in which cysts of *Cystoisospora israeli* can be formed, and then infect the definitive host—the South African fur seal.

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definitive predator host. 5 heterogeneous species described, 1881, one of them *rivolta*. The oocysts of *Cystoisospora* are typical by (Frenkel *et al.*, 1977; Frenkel *et al.*, 1982). The sporulated oocysts found in the faeces of the harbor seal were sporocysts, and were *Cystoisospora* (Isospora) oocysts. Variations in the morphology of the oocysts of *Cystoisospora*. Soulsby (1982) described by 18–23 µm (mean 25 µm) with a length-width ratio of 1.25, while the oocysts of *Cystoisospora* found in the fur seal were 28.5 by 21 µm with a length-width ratio of 1.35. According to Frenkel (1977) the sporocysts of *Cystoisospora* in size, while the sporocysts of *Cystoisospora* in the fur seal measured

oocysts vary in morphology, a remarkable host specificity (Frenkel, 1977; Frenkel *et al.*, 1982). *Cystoisospora* found in the fur seal kept in the laboratory is a new species which we describe as *Cystoisospora israeli*. It is characterized by various coccidia. Soulsby (1982). As our fur seal is a fish from the sea,