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# *Cystoisospora delphini* N. Sp. causing enteritis in a bottlenosed dolphin (*Tursiops truncatus*)

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## Abstract

A new species of Cystoisospora causing enteritis in a bottlenosed dolphin (Tursiops truncatus) is described. The protozoal-infection was successfully treated with Resprim Forte.

## Introduction

A few hundred species of coccidia belonging to over 30 genera have been described in man, terrestrial and aquatic animals (Anderson, 1983; Frenkel, 1977; Frenkel *et al.*, 1987; Kuttin *et al.*, 1982; Kuttin and Kaller, 1992; Levine, 1973; Levine & Ivens, 1965; Schaeperclaus, 1990; Soulsby, 1982). We could not find any report on coccidial infection of dolphins in the literature.

In this paper we report on coccidiosis in a bottlenosed dolphin (*Tursiops truncatus*) caused by a new species of Cystoisospora.

## Case report

In 1994 a captive adult bottlenosed dolphin (*Tursiops truncatus*) suffered from diarrhoea with dark mucoid faeces. The animal was under stress, showed abnormal behaviour and avoided contact with his trainer.

The animal was kept in captivity for 5 years with other bottlenosed dolphins and fed with a variety of 4 species of frozen whole fish: whiting (*Micronesistius poutessou*), sprat (*Spratus spratus*), Atlantic herring (*Clupea harengus*), and mackerel (*Scomber scomberus*). Occasionally the dolphin was observed eating some fresh fish from the sea.

Faecal specimens were checked macroscopically and microscopically by direct smears stained by Giemsa, Beemer-stain for protozoa (Beemer, 1947) and with Calcofluor, Sigma (using fluorescence microscopy). Floatation concentration of eggs and cysts, sedimentation of eggs, and larvae migration tests (Borchert, 1958; Georgi, 1969) were also obtained.

In direct smears of the stool: mucous, many inflammatory cells, erythrocytes and numerous spherical to slight sub-spherical-shaped oocysts 5.6–15μm in diameter containing a spherical sporocyst, 3.2–9.8μm in diameter. Sporulated oocysts containing 2 sub-spherical sporocysts 3–5.5μm in size were also present (Figs 1–3). The length-width ratio of the oocysts was 1 to 1.1. The cell-wall of the oocysts was composed of 2 layers, and was not stained with Calcofluor. The dolphin was treated per os, twice daily for 4 days with 2 tablets of Resprim Forte (Teva Pharmaceutical Industries, Israel) containing 800 mg Sulphamethoxazole and 160 mg Trimethoprim. The treatment was repeated after a week for 5 days. After the treatment, investigations of the stool did not reveal any oocysts. The enteritis stopped and the animal appeared healthy.

## Discussion

We suggest checking stool specimens of aquatic animals also with a brightener-stain as Calcofluor (Sigma or Cyanamid), Cellufluor (Polyciences) or Fungiqual (Ciba Corning) by using fluorescent microscopy. By using this method, algal elements which may occasionally mimic some protozoa, are easily detected (Deutz & Kuttin, 1990; Loupal *et al.*, 1992). The spherical structures found in the smears of the dolphin were not detected by using Calcofluor.

A protozoal infection in marine mammals is a rare condition (Kuttin & Kaller, 1992). Coccidiosis was reported in Harbor seals (Hsu, 1973; Hsu *et al.*, 1974; Hsu, Melby & Altman, 1974, Howard, Britt & Matsumoto, 1983), common seals (Munro & Singe, 1991) and in a South African fur seal (Kuttin & Kaller, 1992).

The genus *Cystoisospora* of the family *Eimeriidae* (Suborder *Eimerina*, Order *Eucoccidiididae*, Subclass *Coccidia*) was created by Frenkel (1977). In

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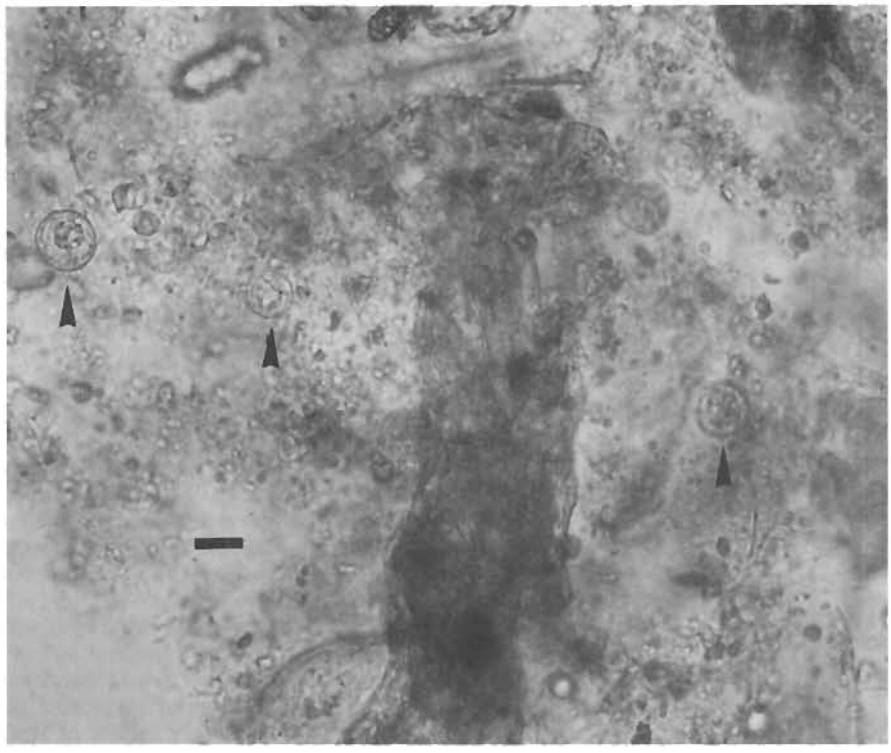

**Figure 1.** A direct smear of a bottlenosed dolphin's stool containing mucous, inflammatory cells, erythrocytes and numerous oocysts (arrows). Beemer stain. Bar=10 μm

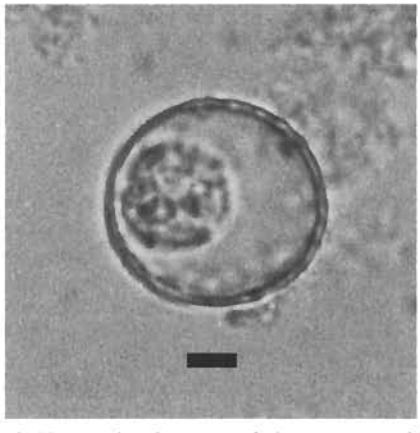

**Figure 2.** Unsporulated oocyst of *Cystoisospora delphini*. Bar=3 μm.

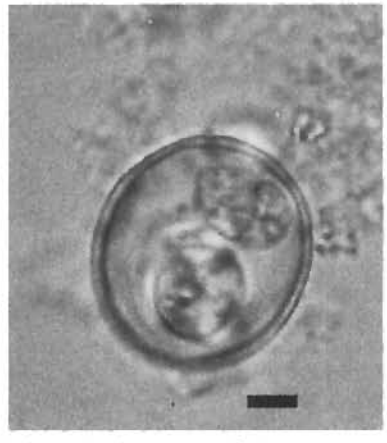

**Figure 3.** Sporulated oocysts of *Cystoisospora delphini* containing 2 sporocysts. Bar=3 μm.

this genus the parasitic cysts formed in intermediary hosts ('prey') infect only definitive predator hosts. The oocysts of the genus *Cystoisospora* are typical by having 2 sporocysts. The sporulated oocysts found in the dolphin's faeces had 2 sporocysts (Fig. 3). The genus includes the following species: *C. felis*, *C. rivolta*, *C. vulpina*, *C. ohioensis*, *C. canis* and *C. israeli* (Frenkel, 1977; Kuttin & Kaller, 1992). The oocysts of the above mentioned *Cystoisospora* species are sub-spherical, ovoid or ellipsoidal. The morphology of the oocysts found in the stool of the dolphin varied from the oocysts' morphology of the known species, by being significantly smaller and spherical.

Beside the fact that the oocysts vary in morphology according to species, a remarkable host specificity exists for individual species (Frenkel, 1977; Levine & Ivens, 1965; Soulsby, 1982). Therefore the *Cystoisospora* found in the stool of the dolphin should be recognized as a new species which we propose to call: *Cystoisospora delphini*. The intermediate host (in which cysts can be formed) of this new species is probably a fish, as our dolphins occasionally eat some fresh fish from the sea.

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