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Short Communications

Abomasal cryptosporidiosis in mountain gazelles

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FOUR animals from a small herd of an endangered species of mountain gazelles (*Gazella gazella cuvieri*) kept at the Munich zoo were presented with anorexia and weight loss over a period of several months. No diarrhoea was observed in the herd. Symptomatic therapy was not successful. Table 1 gives information about the age, sex and individual case histories of the four gazelles, and the results of diagnostic bacteriology and coproscopy.

The four animals were examined post mortem. Their condition was extremely poor. In gazelles 3 and 4 the abomasal mucosa was thickened. Gazelle 2 showed multiple traumatic injuries caused by aggression by other members of the herd. Gazelles 2 and 4 were very anaemic.

The histopathological observations on the abomasum, small and large intestine and liver of the four animals were similar. The abomasal mucosa was hyperplastic and diffusely infiltrated with small lymphocytes; the mucosal glands were elongated and hypercellular. The mucosal surface was almost continuously lined with round to oval parasitic structures (Fig 1). The largest of these contained several structural subunits, identified by a nucleus, and resembled coccidian oocysts. Their diameter ranged from 5·6 to 7·3 μm. Smaller parasitic bodies contained only one nucleus. The location and morphological appearance of these parasites was compatible with their being *Cryptosporidium* species.

The diagnosis of cryptosporidiosis was confirmed ultrastructurally. The organisms were regularly attached to the apical cell membrane of abomasal mucosal cells by a specialised adhesive zone (feeder organelle) typical for cryptosporidia (Figs 2 and 3) (Pohlenz and others 1978). Microvilli were absent between the cryptosporidia in contact with epithelial cells and the microvilli surrounding the cryptosporidia were stunted. Cryptosporidia were detectable at low magnification as spherical organisms of various sizes representing different stages of their life cycle (trophozoites and schizonts) (Fig 2). Occasionally four merozoites (second generation) were seen within a single parasitic vacuole. Merozoites attached to the apical cell membrane or free in the abomasal lumen occurred rarely (Fig 4).

In all four gazelles the cryptosporidia were restricted to the abomasum and they were not found on enterocytes of the small or large intestine. Additional nematodes were seen on the abomasal mucosa of gazelle 3. The cytoplasm of centrilobular hepatocytes contained abundant lipid vacuoles.

In ruminants, at least two species of cryptosporidia have been proposed (Heine and others 1984, Moon and Woodmansee 1986, Anderson 1987). One, *Cryptosporidium parvum*, taxonomically accepted, commonly parasitises the intestinal tract (Upton and Current 1985); the other, *Cryptosporidium muris*, infects the stomach of mice as seen in Tyzzer's original description of 1907 (Tyzzer 1910) and is believed to colonise the abomasum of calves (Upton and Current 1985, Moon and Woodmansee 1986, Anderson 1987). The size of oocyst measured in 1 μm plastic sections ranged from 5·6 to 7·3 μm. Measurements, however, are usually made on faecal smears, which was not possible in the present case.

To obtain comparable data, oocysts from several confirmed cases of bovine and porcine small intestinal cryptosporidiosis were also meas-

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TABLE 1: Age, sex, case history and results of diagnostic bacteriology and coproscopy of mountain gazelles with abomasal cryptosporidiosis

Gazelle	Age (months)	Sex	Case history	Bacteriology	Coproscopy
1	18	M	Weak twin, reduced growth	ND	ND
2	7	F	Weak twin, reduced growth	ND	*Coccidian oocysts, eggs of gastrointestinal tract strongylids
3	23	F	Weak animal, weight loss	ND	ND
4	Unknown	M	Weight loss	*Escherichia coli*	*Coccidian oocysts, eggs of gastrointestinal tract strongylids

*Not identified as cryptosporidia
ND Not done

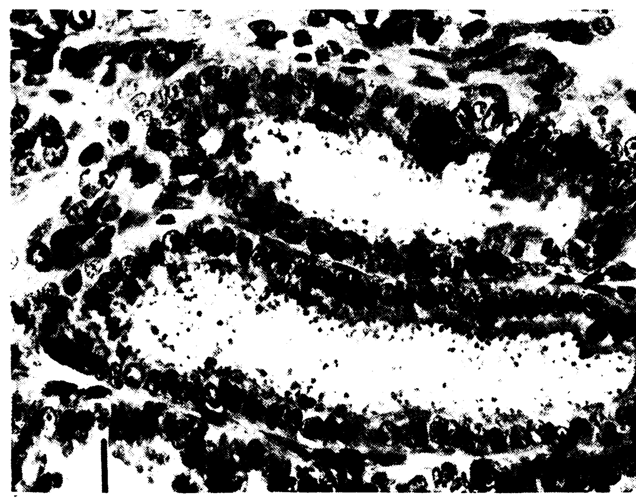

FIG 1: Photomicrograph of cryptosporidian organisms in the abomasal glands or free in the gland lumen of a mountain gazelle. Haematoxylin and eosin. Bar = 25 μm

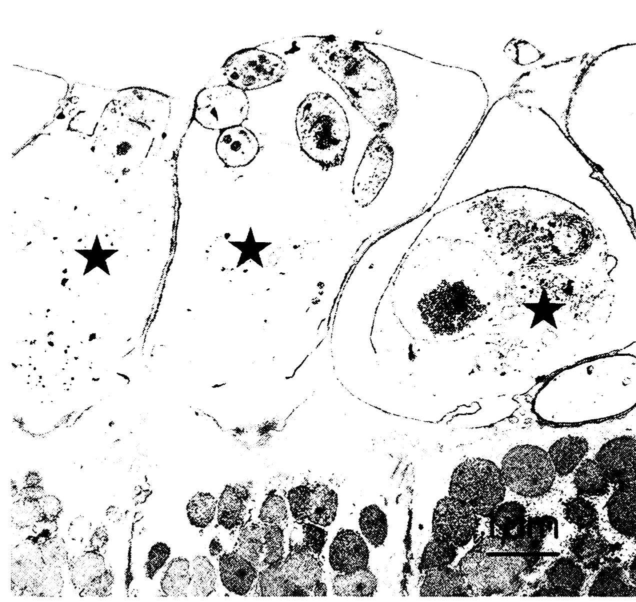

FIG 2: Electron micrograph of development stages (trophozoite, schizonts) of cryptosporidia (asterisk) on an abomasal epithelial cell. Transmission electron micrograph prepared from formalin fixed tissues. Bar = 1 μm

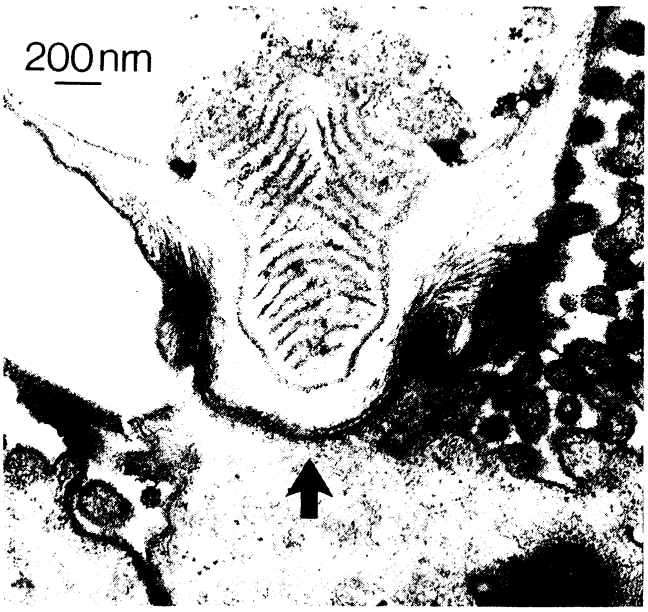

FIG 3: Electron micrograph of a feeder organelle (arrow) attaching cryptosporidia to abomasal epithelial cells. Bar = 200 nm

FIG 4: Electron micrograph of free stages of cryptosporidial merozoites in the abomasal lumen. Bar = 400 nm

ured in plastic sections. The diameters of these oocysts ranged from 3·8 to 4·9 μm. Diameters measured in sections are smaller than those measured in faecal smears (Tzipori and others 1981, Heine and Boch 1981, Links 1982) owing to the shrinkage of tissues during dehydration and preparation for histopathology. It was clear, however, that the cryptosporidian oocysts in these gazelles were considerably larger than the ones in bovine and porcine intestinal cryptosporidiosis. Gastric cryptosporidia have been described in reptiles (Brownstein and others 1977, Dillehay and others 1986) gastric and intestinal cryptosporidia in human AIDS patients (Berk and others 1984) and in a chinchilla (Yamini and Raju 1986). Intestinal cryptosporidia have been recorded in gazelles and other captive wild ruminants (Heuschele and others 1986).

Abomasal cryptosporidian oocysts considerably larger than intestinal oocysts have been reported in calves (Upton and Current 1985, Moon and Woodmansee 1986, Anderson 1987). To the authors' knowledge none have been reported previously in wild or captive ruminants; the organisms were in the size range of *C muris* which usually parasitises the stomach of mice. Neither in mice nor in calves has *C muris* been associated with a wasting disease comparable to that reported here in mountain gazelles.

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