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Internal Parasites of Giraffes (*Giraffa camelopardalis angolensis*) from Etosha National Park, Namibia

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ABSTRACT: During three seasonal periods, parasitological samples were collected from six giraffes (*Giraffa camelopardalis angolensis*) in the Etosha National Park, Namibia. The helminths recovered included *Parabronema skrjabini*, *Skrjabinema* spp., *Haemonchus mitchelli* and *Echinococcus* sp. larvae; *Cytauxzoon* sp. was the only hematozoan found. The low mean abundances of all helminths which ranged from 18 to 531 may be attributed to the low rainfall of this region or because the giraffe is not a preferred host for these species of helminths.

Key words: Giraffe, *Giraffa camelopardalis angolensis*, helminths, hematozoa, survey, prevalence, abundance.

The growth of game ranching in southern Africa necessitates studies on the parasites infecting wildlife in this area. This is further underlined by the potential of cross-transmission of parasites between wildlife and domestic livestock.

Although there is some information on the internal parasites of giraffes (*Giraffa camelopardalis*), most studies have either included only one or two animals or have been only semi-quantitative (Kelly et al., 1968; Round, 1968; Pester and Laurence, 1974; Boomker et al., 1986).

The present study examines quantitatively the parasites in giraffes near Otjovasandu (19°15′S, 14°31′E) in the west of Etosha National Park, Namibia, during three seasonal periods. This is the first such study on the parasite community of the subspecies *Giraffa camelopardalis angolensis*. The range of giraffe extends across northern Namibia. One-quarter of the total Namibian population of approximately 4,000 giraffes occur in Etosha National Park (Joubert and Mostert, 1975).

The vegetation of the study area is Mopane (*Colophospermum mopane*) savanna (Joubert and Mostert, 1975) and the predicted annual rainfall is 300 to 350 mm (1977 unpublished records of the Department of Water Affairs, Windhoek, Namibia). The annual rainfall during the 1985–1986 study period was 233 mm. Both natural and artificial water sources are available to wildlife; seasonal waterholes are filled after rains, while boreholes provide water during dry periods. Three seasons are described for Etosha (Berry, 1980): these are wet and hot (January to April), dry and cold (May to August) and dry and hot (September to December).

Two giraffes were selected randomly and shot during each of the three seasons: November 1985 (adult female, subadult female); January 1986 (subadult male, subadult female); July 1986 (adult female, subadult male). Thin blood smears were prepared at necropsy, fixed in methanol, stained in 10% Giemsa stain and examined for protozoans in immersion oil at 1,000× magnification. Small intraerythrocytic trophozoites (=piroplasms) resembling *Cytauxzoon* sp. were seen on blood smears on two giraffes. Helminth parasites were recovered following procedures described by Horak et al. (1983).

Representative specimens of nematodes recovered in this study are deposited in the U.S. National Parasite Collection (Beltsville, Maryland 20705, USA; accession numbers 80857 to 80859) and in the Onderstepoort Helminthological Collection (Onderstepoort 0110, Republic of South Africa; accession numbers S.2346 to S.2348). Blood smears are deposited in the Onderstepoort Protozoological Collection (accession numbers 6143 and 6144). The specimens of larval stages of *Echinococcus* were inadvertently lost and therefore can not be deposited in a collection.

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TABLE 1. Helminths of giraffes (n = 6) from the Etosha National Park, Namibia, 1985–1986.

			Abundance		
		Prevalence %	Mean	SD	Range
Parabronema skrjabini	adults	100	528	653	9–1,747
	L_4	17	3	6	0–17
Skrjabinema spp.	adults	83	327	480	0–1,135
	L_4	17	9	22	0–53
Haemonchus mitchelli		33	18	41	0–102
Echinococcus	larvae	17	—	—	—

* L_4, fourth stage larvae.

The terms prevalence and abundance follow the definitions of Margolis et al. (1982).

Three nematode and one cestode species were found (Table 1). *Skrjabinema* spp. is a new host record for the giraffe; both *Haemonchus mitchelli* and *Parabronema skrjabini* have been reported from other subspecies of giraffe (Round, 1968; Sachs et al., 1973; Boomker et al., 1986).

In contrast to previously published parasite lists, Boomker et al. (1986) provided the first quantitative study of helminths from the giraffe. Their study included two giraffes (*Giraffa camelopardalis giraffa*) from Kruger National Park (Republic of South Africa) with intensities of total helminths at 2,621 and 19,157 respectively. These greatly exceeded the numbers of helminths found in the present study. The lower rainfall in our study area as compared to the predicted annual rainfall of 600 to 650 mm in the Kruger National Park, may have been the contributing factor resulting in the lower prevalence since these species of nematodes depend on ground moisture for transmission of their third-stage larvae. This may be one reason for the low prevalence and abundance of *H. mitchelli*. The low abundance of *H. mitchelli* in giraffes also may be related to the eland (*Taurotragus oryx*) sharing the habitat with giraffes. Eland are thought to be the preferred host (J. Boomker, pers. comm.) for this helminth species. Although giraffes are predominantly browsers and eland are mixed feeders, they are both reported to graze (Smithers, 1983). This suggests that cross-transmission of *H. mitchelli* may occur. However, it is more likely that cross-transmission occurs at the artificial waterholes in this habitat.

Skrjabinema spp. are not considered nematodes of browsers. In a study of browsers, mixed feeders and grazers, this nematode did not occur in browsers (grey duiker, *Sylvicapra grimmia*) but did occur predominantly in the grazers (Boer goats and Angora goats, *Capra hircus*; grysbuck, *Raphicerus melanotis*) (Boomker et al., 1989a). Greater kudu (*Tragelaphus strepsiceros*), another browser, also is not a preferred host for this nematode (Boomker et al., 1989b).

Parabronema skrjabini, a nematode with an indirect life cycle, requires an intermediate host. In southern Africa, the intermediate host is thought to be *Haematobia* sp. However, whether the species of this fly in southern Africa are the suitable vectors for this nematode is unknown (Boomker et al., 1986).

It was not possible to determine seasonal differences in the abundance of helminths. This resulted from the small host sample size collected in this study.

The nematodes found in this study are not known to infect cattle. Therefore, there is no risk of cross-transmission between cattle and giraffes where they co-occur in the same habitat.

Morphological distinction between intraerythrocytic stages of *Cytauxzoon* sp. and/or *Theileria* sp. is difficult. Both genera have been reported from giraffes in Kenya (Brocklesby and Vidler, 1966). In the absence of serological examination or experimental transmission of the giraffe

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parasite to established hosts of *Cytauxzoon* sp. such as grey duiker, greater kudu, bushbuck (*Tragelaphus scriptus*) and eland (Neitz, 1957; Martin and Brocklesby, 1960), previous authors have not attempted to identify the giraffe parasite specifically.

Cytauxzoonosis in giraffes may not be without consequence. Fatal cytauxzoonosis was reported in a giraffe translocated to northern Natal from Namibia (McCully et al., 1970). The diagnosis was based on the presence of small intraerythrocytic piroplasms, schizogony in the Kupffer cells and hepatocytes, as well as enlargement of these parasitized cells and their tendency to become multinuclear and form syncytia. The exact origin of the giraffe was unknown, but the authors speculated that it may have come from an area free of the disease and could consequently have lacked immunity. Our records indicate that *Cytauxzoon* sp. occur naturally in giraffe in the center of their range.

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