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Helminth Parasites of Cape Mountain Zebras from Cape Province, South Africa

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ABSTRACT: Parasites were collected from 13 Cape mountain zebras (*Equus zebra zebra*) in the Mountain Zebra National Park, South Africa, during four seasons of 1983 and 1984. Eighteen nematode species belonging to the families Atractidae, Habronematidae, and Strongylidae, and one species of cestode were recovered. The most abundant nematodes were *Cyathostomum tetracanthum*, *Cylicostephanus longiconus* and *Probstmayria vivipara*. Only one of the 10 cyathostome nematodes recovered, *C. longiconus* was present in every zebra.

Key words: Cape mountain zebra, *Equus zebra zebra*, helminth parasites, nematode parasites, cyathostomes, prevalence, intensity.

In southern Africa there are three species or subspecies of zebras; Burchell's zebra (*Equus burchelli antiquorum*), the Cape mountain zebra (*Equus zebra zebra*) and Hartmann's mountain zebra (*Equus zebra hartmannae*) (Smithers, 1983). The nematode parasite burdens of Burchell's zebras and Hartmann's mountain zebras in South Africa and Namibia have been reported previously (Scialdo-Krecek et al., 1983; Krecek et al., 1987a, b).

Cape mountain zebras (*Equus zebra zebra*) are rare with only about 474 known individuals in August 1985 (Smithers, 1986). Suitable protected areas in the historic range of the Cape mountain zebra are being restocked from the population in the Mountain Zebra National Park (MZNP). More females than males have been translocated, resulting in a surplus of males in the MZNP population (Penzhorn and Van der Merwe, 1988). Some of these males were made available for multidisciplinary research projects in which we participated. No information is available on the abundance and prevalence of internal parasites in these zebras. Our ob-

jective was to determine the species, prevalence, and abundance of the internal parasites of this host.

Thirteen Cape mountain zebras were shot in the neck and bled (three to four each season) from February 1983 to July 1984 in the Mountain Zebra National Park (MZNP) (32°14'S, 25°25'E). All zebras were male except one, and ranged from 1 to 21 yr of age. The 6,536 ha park is situated southwest of Cradock in the Cape Province, Republic of South Africa and was ranch land prior to 1937. The dominant vegetation is a transitional veld type referred to as eastern mixed Karoo and is typified by a mixture of grass and Karoo bushes including *Pentzia incana*, *P. globosa* and *Chrysocoma tenuifolia* (Fourie, 1983). The long-term mean annual rainfall in the park is 394 mm. The total rainfall for 1983 was 400 mm (National Parks Board, Skukuza 1350, South Africa, unpubl.).

The zebras were evaluated for helminths as described by Krecek et al. (1987a). The terms prevalence, intensity and abundance used in relation to the parasite burdens follow the definitions of Margolis et al. (1982). Identification of the helminth parasites followed the descriptions of four authors. All species except six were according to Lichtenfels (1975). *Cyathostomum montgomeryi*, *Cylicocyclus gyalcephaloides*, *Cylicocyclus nassatus*, and *Habronema zebrae* were identified with Theiler (1923); *Cylicostephanus longiconus* was identified with Scialdo-Krecek (1983); and for *Crossocephalus viviparus*, Le van Hoa (1962) was used.

Eighteen species of nematodes including a new species of *Triodontophorus* re-

TABLE 1. Helminth fauna of 13 Cape mountain zebras from the Mountain Zebra National Park, South Africa, 1983 to 1984.

Species of helminth	Number infected	Preferred sites in host ^a	Abundance		
			Mean	SE	Range
Nematoda					
Cyathostominae					
Cyathostominae (L ₄) ^c	13	SI, LI	4,384	3,840	751–12,632
<i>Cyathostomum catinatum</i>	4	VC	65	166	0–580
<i>Cyathostomum labratum</i>	2	VC	23	60	0–200
<i>Cyathostomum tetracanthum</i>	12	VC	3,011	3,272	1–9,690
<i>Cyathostomum montgomeryi</i>	1	VC	0.8	2.8	0–10
<i>Cylicocyclus auriculatus</i>	7	VC	251	432	0–1,385
<i>Cylicocyclus gyalcephaloides</i>	9	DC	606	1,024	0–3,200
<i>Cylicocyclus nassatus</i>	4	VC	60	124	0–400
<i>Cylicostephanus calicatus</i>	3	DC	170	599	0–2,162
<i>Cylicostephanus longiconus</i>	13	DC	2,588	2,018	55–6,185
<i>Cylicostephanus minutus</i>	4	VC	15	37	0–102
Strongylinae					
<i>Triodontophorus</i> spp. (L ₄) ^c	5	VC	73	175	0–605
<i>Triodontophorus</i> sp. (b)	8	VC	167	261	0–889
<i>Triodontophorus nipponicus</i>	4	VC	41	94	0–300
<i>Triodontophorus serratus</i>	8	VC	51	72	0–192
Atractidae					
<i>Probstmayria vivipara</i>	7	VC	1,188,480	3,349,577	0–11,866,946
<i>Crossocephalus viviparus</i>	1	VC	0.8	2.8	0–10
Habronematidae					
<i>Draschia megastoma</i>	1	St	3.2	11	0–41
<i>Habronema</i> (L ₄) ^c	1	St	7.4	27	0–96
<i>Habronema</i> spp.	3	St	4.3	14	0–50
<i>Habronema muscae</i>	5	St	26	67	0–243
<i>Habronema zebrae</i>	1	St	9.9	36	0–128
Cestoda					
Anoplocephalidae					
<i>Anoplocephala perfoliata</i>	9	Ce	23	29	0–99

^c L₄ = fourth stage larvae.^a VC = ventral colon; DC = dorsal colon; LI = large intestine; SI = small intestine; St = stomach; Ce = cecum.

ferred to as *Triodontophorus* sp. (b) as well as a cestode species were recovered from the mountain zebras (Table 1). The nematodes consisted of 10 cyathostomes (small strongyles), three large strongyles, two atractids and three habronematids. Representative specimens of helminths recovered in this study were deposited in the U.S. National Parasite Collection, Beltsville, Maryland (USA) (Accession Numbers 82730 to 82737).

Prevalence ranged from 8 to 100% and the preferred site in the host was the ven-

tral colon (Table 1). The most abundant nematode was *Probstmayria vivipara* followed by *Cyathostomum tetracanthum* and *Cylicostephanus longiconus*. In addition to *Anoplocephala perfoliata* one unidentified cestode was recovered from one of the zebras.

Tissue specimens of both ventral and dorsal colon walls were collected and preserved in 10% buffered formalin. These were embedded in paraffin wax, sectioned at a thickness of 6 μ m, stained with hematoxylin and eosin, and examined with



FIGURE 1. Ulcerative lesion in the large intestinal wall of a Cape mountain zebra in association with adult *Triodontophorus* spp. Bar = 1 cm.



FIGURE 2. Low magnification of submucosal cysts containing cross-section of unidentified strongyles. H&E stain. Bar = 1 mm.

a light microscope. Macroscopic lesions which contained *Triodontophorus* spp. were noted in both colonic walls (Fig. 1). Based on the histopathologic examination of this lesion, there were well-circumscribed ulcers penetrating the muscularis mucosa with inflammatory reaction. This lesion appeared to be a chronic process and was circumscribed, extending to the muscular tunic with a mixed cellular component. The cellular component consisted predominantly of lymphocytes, macrophages and plasma cells. Although scattered, eosinophils were present in the reaction zone; but they occurred predominantly in clusters at the periphery of the reaction. The luminal surface of the ulcer was covered by a layer of necrotic cellular debris with several nematodes imbedded therein. Masses of bacteria were present on the luminal surface of the necrotic debris covering the ulcer. Below the necrotic

tissue there was a small amount of granulation tissue.

Several submucosal cysts from the ventral and dorsal colon walls occurred in which strongyle larvae were entrapped (Fig. 2). No other pathogens or cells occurred in these aggregates. The main character of this lesion was that of a granuloma.

The most abundant nematode species was *Probstmayria vivipara*, while *Cyathostomum tetracanthum* and *C. longiconus* were the most prevalent (Table 1). In previous studies, both the attractid nematodes, *P. vivipara* and *C. viviparus*, were recovered from Burchell's and Hartmann's mountain zebras in large numbers (Scialdo-Krecek et al., 1983; Krecek et al., 1987a, b). In the present study, the mean (\pm SE) abundance of *P. vivipara* recovered was 1,188,480 (\pm 3,349,577), and the prevalence was 54%; virtually no *C. viviparus* were recovered. These figures are consid-

erably lower than in the previous study in which prevalence was 76% and 96%, and mean abundance 536,000 for *C. viviparus* and 21,000,000 for *P. vivipara*, respectively (Krecek et al., 1987a). Perhaps the larger numbers in the present study are a function of host preference for this subspecies of zebra.

In an earlier report on the endoparasites of the Cape mountain zebra from the same park, Penzhorn (1984) listed only one cyathostome (*Cylicocyclus auriculatus*) and one large strongyle (*Triodontophorus serratus*). That was not an intensive study as indicated by the author and this is confirmed by the presence of only three of the 19 helminth species recovered in the present study. The recovery of the cestodes, *Anoplocephala perfoliata* and *Anoplocephala magna* by Penzhorn (1984) is consistent with our findings, for *A. perfoliata*.

The nematode parasites recovered were comparable in diversity of species and abundance to those of the mountain zebras (*E. zebra hartmannae*) in Etosha.

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