

# SEASONAL INCIDENCE OF HELMINTHS IN THE BURCHELL'S ZEBRA

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## ABSTRACT

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Ten Burchell's zebras were culled in conjunction with the Kruger National Park's game management programme. The colts ranged in age from 9-17 months and the stallions from 2½-23 years. The gastro-intestinal tract and the abdominal cavity were examined for helminths. The principal families of nematodes recovered included the Atractidae, Strongylidae and Spiruridae. The Atractidae included *Crossocephalus* and *Probstmayria*; the Strongylidae 2 subfamilies, Cyathostominae and Strongylinae, and the genera of the Cyathostominae were *Cyathostomum*, *Cylicocyclus*, *Cylicodontophorus*, *Cylicostephanus*, *Cylindropharynx* and *Poteriostomum*. *Craterostomum*, *Oesophagodontus*, *Strongylus* and *Triodontophorus* represent the Strongylinae. The last of the 3 principal families, the Spiruridae, included *Draschia* and *Habronema*. Total worm burdens ranged from 0-1 947 474. Despite the fact that the 3 families have life-cycles that differ greatly, their seasonal incidence over the 11-month period showed similar trends.

## INTRODUCTION

As Burchell's zebra shares many nematodes with the domestic equids, any study of zebra parasites makes a contribution to our knowledge of equine helminthology as a whole.

The helminths of this zebra have been studied by a number of authors (Theiler, 1923; Curson, 1928; Mönnig, 1928; Ortlepp, 1962; McCully, Kruger, Basson, Ebedes & Van Niekerk, 1969), and Round (1968) has compiled a check-list of these parasites. The seasonal incidence of helminths in the zebra, however, has not been studied.

This paper describes a survey conducted in Burchell's zebra in conjunction with the Kruger National Park's game management programme over a period of 11 months. Worm burdens and seasonal incidence are discussed.

## MATERIALS AND METHODS

### Study area

The zebra were culled in the area around Skukuza (24°59'S, 31°36'E) and in Tshokwane in the Kruger National Park in the Eastern Transvaal. The predominant types of vegetation in these areas are Red bushwillow veld, thorny thicket and knobthorn/marula veld (Van Wyk, 1972). This is a summer rainfall area and at Skukuza and Tshokwane little rain falls between May and September. The rainfall for 1978-1979 was the lowest in a 6-year cycle.

### Helminth collection

Two male zebras were shot on successive days in the Kruger National Park at intervals of 1 or 3 months from November 1978 to September 1979. The animals were bled, the blood being collected for other purposes. The carcasses were transported to the Veterinary Laboratory at Skukuza for examination. They were skinned, eviscerated and their ages estimated from an examination of the incisor teeth. The techniques of a post-mortem examination of an equid have been described by Malan, Reinecke & Scialdo (1981a, 1981b). In these zebras, however, the technique differed in 2 respects:

- (a) the size of the aliquots was not standardized, and
- (b) the caecum and colon walls were digested in pepsin/HCl, as described by Reinecke & Brooker (1972) to release the larvae that were counted microscopically, and not *in situ*, as described by Malan *et al.* (1981 b).

Faeces were collected from the rectum for faecal worm egg counts and larval cultures.

## RESULTS

The 20 genera that were recovered belong to 10 families. The principal nematode families include the Atractidae, Strongylidae and Spiruridae. The genera present from the Atractidae include *Crossocephalus* and *Probstmayria*. Those from the Strongylidae form 2 subfamilies, the Cyathostominae, which include *Cyathostomum*, *Cylicocyclus*, *Cylicodontophorus*, *Cylicostephanus*, *Cylindropharynx* and *Poteriostomum* and the Strongylinae which include *Craterostomum*, *Oesophagodontus*, *Strongylus* and *Triodontophorus*. The last of the 3 principal families, the Spiruridae, includes *Draschia* and *Habronema*. The numbers of worms recovered from these zebras are listed in Tables 1 & 2. The total and monthly worm burdens of the 3 families are summarized in Fig. 1.

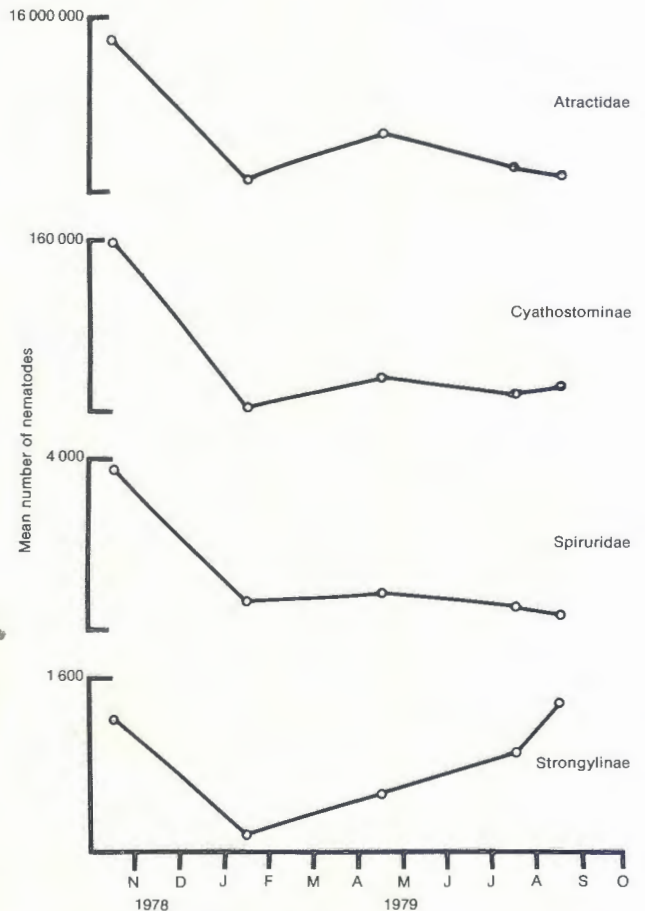


FIG. 1 Seasonal variation in the mean numbers of nematodes belonging to the families Atractidae, Cyathostominae, Spiruridae and Strongylinae

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TABLE 1 Worm burdens and faecal worm egg counts of predominant nematodes recovered from Burchell's zebra\*

Zebra	Colt 1 9 months	Colt 2 12 months	Colt 3 14 months	Colt 4 17 months	Stallion 1 2½ years	Stallion 2 6 years	Stallion 3 7 years	Stallion 4 7½ years	Stallion 5 13 years	Stallion 6 23 years
Age	8/79	11/78	2/79	5/79	2/79	11/78	5/79	8/79	9/79	9/79
Date Killed										
Eggs per gram of faeces	700	—	3 200	700	2 750	—	1 500	1 100	4 500	4 000
<b>Atractidae</b>										
<i>Crossocephalus</i> spp.	12 025	1 947 474	73	2	2 304	285	49 224	0	174 763	95 820
<i>Probstmayria vivipara</i>	1 514 507	3 288 640	97 388	10 038 506	56 370	24 206 530	97 007	1 936 138	995 023	1 508 412
<b>TOTAL</b>	1 526 532	5 236 114	97 461	10 038 508	58 674	24 206 815	146 231	1 936 138	1 169 786	1 604 232
<b>Oxyuridae</b>										
<i>Oxyuris equi</i>	1 515	0	1 168	1 060	5	0	0	0	0	0
<b>Spuridae</b>										
<i>Draschia</i> spp.	27	145	317	7	56	1 173	1 159	953	493	228
<i>Habronema</i> spp.	46	4 351	103	66	164	2 017	855	130	258	70
<b>TOTAL</b>	73	4 496	420	73	220	3 190	2 014	1 083	751	298
<b>Strongylidae</b>										
<b>Cyathostominae</b>										
L <sub>4</sub> Cyathostominae	64	81	592	1 340	166	3 950	3 740	6 140	20	82
†Adult Cyathostominae	1 200	33 231	70	0	11	22 463	80	485	19 380	0
<i>Cyathostomum</i> spp.	870	19 441	71	1 072	6	5 437	7 370	2 182	7 033	2 081
<i>Cylicocyclus</i> spp.	1 400	176 862	1 616	1 518	8	13 350	0	0	480	0
<i>Cylicodontophorus</i> spp.	0	6 646	52	40	10	176	35 600	0	0	0
<i>Cylicostephanus</i> spp.	1 421	2 068	95	522	21	18 617	80	4 250	235	920
<i>Cylindropharynx</i> spp.	70	63	73	82	85	17 187	19 780	19 875	18 173	3 608
<i>Poterostomum</i> spp.	15	0	36	0	0	0	0	0	480	0
<b>TOTAL</b>	5 040	238 392	2 605	4 574	307	81 180	66 650	32 932	45 801	6 691
<b>Strongylinae</b>										
<i>Craterostomum</i> spp.	15	0	0	552	3	1 308	160	1 680	1 320	1 200
<i>Oesophagodontus robustus</i>	0	960	0	0	0	0	0	0	0	0
<i>Strongylus</i> spp.	30	54	172	138	47	104	116	87	45	104
<i>Triodontophorus</i> spp.	5	26	0	4	3	0	0	0	0	0
<b>TOTAL</b>	50	1 040	172	694	53	1 412	276	1 767	1 365	1 304
<b>Trichostrongylidae</b>										
<i>Trichostrongylus</i> spp.	0	0	0	0	0	0	123	20	580	56

\* Since procedures had not yet been standardized, the totals may not reflect valid numbers

† Not identified to generic level

TABLE 2 Analysis of *Strongylus* spp. recovered from Burchell's zebra

Strongylinae	Colt 1		Colt 2		Colt 3		Colt 4		Stallion 1		Stallion 2		Stallion 3		Stallion 4		Stallion 5		Stallion 6	
	9 months	12 months	14 months	17 months	2½ years	6 years	7 years	7½ years	13 years	23 years										
<i>Strongylus asini</i>	0	0	0	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
<i>Strongylus edentatus</i>	0	0	1	0	0	84	0	0	0	0	0	0	0	0	0	0	0	0	0	20
<i>Strongylus vulgaris</i>	30	54	171	137	46	20	116	87	45	87	20	116	87	45	87	45	84	45	84	84

(a) *Atractidae*

*Crossocephalus* spp. This genus was recovered from every animal except 1 stallion. In colts a range of 2–1 947 474 was recorded, and in stallions 0–174 763. Peak worm burdens in colts were recovered in November and in stallions in September.

*Probstmayria vivipara*. This species reflected the highest numbers of all helminths recovered. In colts they ranged from 97 388–10 038 506, and in stallions from 56 370–24 206 530. Peak worm burdens in colts were recorded in May and in stallions in November.

(b) *Oxyuridae*

*Oxyuris equi*. All but one of the colts and the youngest stallion (2½ years) were positive for this species, with numbers ranging from 5–1 515. The youngest colt (9 months old) had the highest adult worm burden of 1 255, while the young stallion had only 5 4th stage larvae (L<sub>4</sub>) and no adult *O. equi*.

(c) *Spiruridae*

Both genera were present in all the animals.

*Draschia* spp. Colts had a range of worms from 7–317 and stallions from 56–1 173. Peak burdens were noted in February for colts and in stallions in November.

*Habronema* spp. The range recorded in colts was 46–4 351 and in stallions 70–2 017. The peak worm burdens in both colts and stallions were noted in November.

(d) *Strongylidae*

*Cyathostominae*

Fourth stage *Cyathostominae* larvae (L<sub>4</sub>) with range of 64–1 340 were recorded in colts, 20–6 140 in stallions and the peak worm burdens in colts and stallions occurred in May and August respectively. Adults had a range of 0–33 231 in colts, 0–22 463 in stallions and in both cases the maximum numbers were recorded in November.

Worm burdens of the genera of this subfamily were:

*Cyathostomum* spp. These species were consistently present in moderate numbers ranging from 6–19 441.

*Cylicocyclus* spp. Although 3 stallions had no worms of this genus, numbers ranged from 8–176 862 in the other animals.

*Cylicodontophorus* spp. One colt and 3 stallions were negative from these species, and in the other animals 10–35 600 worms were recovered.

*Cylicostephanus* spp. These were consistently present in numbers ranging from 21–18 617.

*Cylindropharynx* spp. This genus was always present, ranging in numbers from 63–19 875.

*Poteriostomum* spp. Only 3 animals were positive for this genus with very low numbers ranging from 15–480.

*Strongylinae*

*Craterostomum* spp. This genus was recovered in 2 out of 4 colts and the highest burden for stallions was 1 680 in August.

*Oesophagodontus robustus*. Nine hundred and sixty were present in 1 colt only.

*Strongylus* spp. In colts these ranged from 30–172 and in stallions from 45–116. An analysis of this genus is presented in Table 2.

*Strongylus asini*. This species was recorded from the livers of 2 animals. The livers, however, were not thoroughly examined and possibly higher numbers of *S. asini* than we recorded may have been present.

*Strongylus edentatus*. Small numbers of this species were recorded from 3 animals only, with worm burdens of 1, 20 and 84 respectively. The last-mentioned was recorded in November.

*Strongylus vulgaris*. This species was consistently present in all the animals. The range in colts was 30–171 and in stallions 20–116. The numbers tabulated for *S. vulgaris* reflect adult stages except for 3 animals with larval stages. Colt 3 had 12 5th stage and 21 L<sub>4</sub>; Stallion 1, 1 5th stage and 8 L<sub>4</sub>, and finally Stallion 3 with 5 5th stage and 11 L<sub>4</sub>. The peak month was February.

*Triodontophorus* spp. The 4 colts had burdens ranging from 4–26. Only 1 stallion had 3.

(e) *Trichostrongylidae*

*Trichostrongylus* spp. were found in the 4 oldest animals, those of 3 of these animals being recorded as *T. thomasi*. The range was 20–580 with the peak burden in September.

(f) *Filariidae*

*Setaria equina* was recorded in 1 colt, which had only 1 worm, and in 2 stallions, which had 3 and 11 worms respectively.

(g) *Strongyloididae*

*Strongyloides westeri*. Only 10 worms were recovered in the youngest colt.

(h) *Anoplocephalidae*

*Anoplocephala* spp. The burdens in 2 colts were 16 and 82 respectively, and the 4 oldest stallions had 2, 3, 4 and 25 worms respectively.

(i) *Schistosomatidae*

*Schistosoma* spp. Two of the older animals had only 2 of this genus and 11 male schistosomes, and it was therefore not possible to determine the species.

DISCUSSION

The survey was conducted over a period of 11 months and thus seasonal incidence cannot be compared from year to year.

The *Atractidae*, *Cyathostominae* and *Spiruridae* follow a similar seasonal trend, despite the fact that they have markedly different life cycles. To the best of our knowledge, the entire life cycle of the *Atractidae* is completed in one host, the *Cyathostominae* have free living larval stages and the *Spiruridae* have an arthropod as an intermediate host.

The highest numbers of adult *O. equi* being present in the youngest zebra and the lowest numbers of L<sub>4</sub> being present in the older animal (Stallion 1) would seem to indicate a susceptibility of the colts and a resistance in the older stallions.

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