

Parasites of South African wildlife. XVI. Helminths of some antelope species from the Eastern and Western Cape Provinces

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ABSTRACT

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The numbers and species of helminths recovered from one black wildebeest, *Connochaetes gnou*, three eland, *Taurotragus oryx*, 18 mountain reedbuck, *Redunca fulvorufula*, one red hartebeest, *Aelaphus buselaphus* and two springbok, *Antidorcas marsupialis*, in the Mountain Zebra National Park, Eastern Cape Province; two black wildebeest, two grey rhebuck, *Pelea capreolus*, two mountain reedbuck and four springbok in the Karoo National Park, Western Cape Province; two bontebok, *Damaliscus pygargus dorcas*, two eland, two gemsbok, *Oryx gazella* and two springbok in the West Coast National Park, Western Cape Province; and a single springbok on a farm near Bredasdorp, Western Cape Province, are recorded. Nematodes belonging to a total of 12 genera and 20 species were identified. A single cestode was also recovered. Sixteen new host associations are recorded for the nematodes and one for the cestode *Moniezia benedeni*. *Nematodirus spathiger* had the widest host spectrum and with the exception of black wildebeest, was collected from all the host species examined.

Keywords: Antelope, helminths, nature reserves, wildlife

INTRODUCTION

The helminths of a variety of antelope from the eastern part of South Africa, mainly the Kruger National Park and the KwaZulu-Natal Game Reserves, have been surveyed and the results documented (Horak, De Vos & Brown 1983; Boomker 1990). However, with the exception of those in grysbok, *Raphicerus melanotis*, common duikers, *Sylvicapra grimmia*, kudu, *Tragelaphus strepsiceros*, grey rhebuck, *Pelea capreolus* and bontebok, *Damaliscus pygargus dorcas*, few surveys have been conducted on the internal parasites of antelopes occurring in the Eastern and Western Cape Provinces (Boomker, Horak &

Maclvor 1989c; Boomker, Horak & Knight 1991a; Boomker & Horak 1992).

During the late 1980s and early 1990s the opportunity arose to collect the helminths of antelope in three nature reserves and a commercial farm in these Provinces and the results are presented here.

MATERIALS AND METHODS

Survey localities

Mountain Zebra National Park

This park (32°10'–32°18'S; 25°24'–25°30'E; Alt. 1 200–1 975 m) lies near the town of Cradock in the northern part of the Eastern Cape Province and is approximately 6 536 ha in extent. The vegetation consists of Karroid *Merxmulleria* Mountain Veld, replaced by Karoo on the higher slopes and Karroid Broken Veld in the northern section (Acocks 1988). Rainfall is low with 70% falling during February and

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March (Fourie 1983) and the area can be described as semi-arid. Summers are warm to hot and winters cold with frost occurring regularly. Snow sometimes falls on the higher parts (Penzhorn 1975).

The park contains blesbok, *Damaliscus pygargus phillipsi*, black wildebeest, *Connochaetes gnou*, eland, *Taurotragus oryx*, gemsbok, *Oryx gazella*, mountain reedbuck, *Redunca fulvorufula*, red hartebeest, *Alcelaphus buselaphus*, grey rhebuck, steenbok, *Raphicerus campestris*, klipspringer, *Oreotragus oreotragus*, springbok, *Antidorcas marsupialis* and Cape mountain zebra, *Equus zebra zebra*.

A single black wildebeest, three eland, one red hartebeest and two springbok were shot during the period March 1983 to February 1984. In addition, two mountain reedbuck were shot at approximately three-monthly intervals from November 1983 to December 1985, a total of 18 antelope.

Karoo National Park

The park (32°12'–32°20'S; 22°25'–22°39'E; Alt. 600–1 932 m) is situated near the town of Beaufort West in the north-western part of the Western Cape Province and comprises an area of 17 706 ha. The vegetation consists of typical Karroid Broken Veld, Karroid *Merxmuelleria* Mountain Veld replaced by Karoo and Central Lower Karoo vegetation types (Acocks 1988). Like the Mountain Zebra National Park, the area can be described as semi-arid. Summers are hot to very hot and winters cold, with frost occurring commonly. Snow sometimes falls on the higher reaches.

Two black wildebeest, two grey rhebuck, two mountain reedbuck and four springbok were shot in this reserve during February 1991.

West Coast National Park

This park (33°6'–33°10'S; 17°57'–18°2'E; Alt. 0–50 m) is situated on the west coast of the Western Cape

Province, approximately 120 km north of Cape Town, and comprises an area of 24 779 ha. The vegetation consists of Strandveld and isolated patches of Coastal Fynbos (Acocks 1988). The park falls within the winter rainfall region where summers are moderate to hot, and winters cold and wet.

Two bontebok, two eland, two gemsbok and two springbok were shot here during February 1990.

The farm near Bredasdorp

A single springbok ewe was shot on a commercial farm situated approximately 30 km south-east of Bredasdorp, in the southern part of the Western Cape Province. The vegetation is classified as Coastal Fynbos and Coastal Renosterveld (Acocks 1988). In addition to springbok, eland and cattle are also present on the farm.

Collection and counting of parasites

The helminths of all these animals were collected, identified and counted as described by Boomker, Horak & De Vos (1989b). No digests of the abomasal and intestinal mucosae were done on the springbok from the farm near Bredasdorp.

RESULTS

For comparative purposes, the helminths are listed per locality and host rather than locality only. The helminths from eland from the Mountain Zebra and West Coast National Parks are listed in Table 1, those from mountain reedbuck from the Mountain Zebra and Karoo National Parks in Table 2 and those from springbok from all the localities in Table 3. Helminths from bontebok from the West Coast National Park are listed in Table 4 and those from gemsbok from the West Coast National Park in Table 5. Table 6 summarizes the host spectrum of the various helminths.

TABLE 1 The helminths recovered from eland in the Mountain Zebra and West Coast National Parks

Locality, number of hosts examined and helminth species	Number of helminths recovered			Prevalence %
	Larvae	Adults	Total	
Mountain Zebra National Park (n = 3)				
<i>Haemonchus mitchelli</i>	0	250	250	33,3
<i>Nematodirus spathiger</i>	0	1 750	1 750	33,3
<i>Cooperia rotundispiculum</i> race	0	4 750	4 750	33,3
Mean total burden	0	2 250	2 250	
West Coast National Park (n = 2)				
<i>Bronchonema magna</i>	0	0	6	50,0
<i>Cooperia rotundispiculum</i> race	0	35 603	35 603	100,0
Mean total burden	0	17 805	17 805	

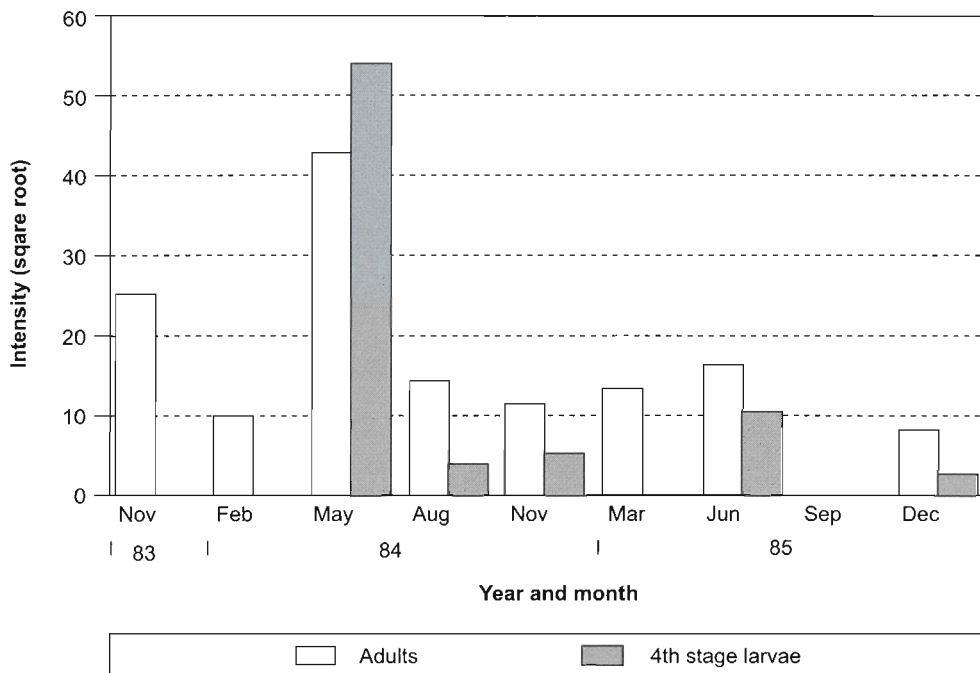


FIG. 1
Mean tri-monthly number of 4th stage and adult nematodes recovered from mountain reedback in the Mountain Zebra National Park. No helminths were recovered from the antelope shot during September 1985

TABLE 2 The helminths recovered from eland in the Mountain Zebra and Karoo National Parks

Locality, number of hosts examined and helminth species	Number of helminths recovered			Prevalence %
	Larvae	Adults	Total	
Mountain Zebra National Park (<i>n</i> = 18)				
<i>Moniezia benedeni</i>	^a	2	2	5,5
<i>Nematodirus spathiger</i>	2 740	4 785	7 525	61,0
<i>Ostertagia</i> type females	–	1	1	5,5
<i>Skrjabinema</i> spp.	–	290	290	166,0
<i>Trichostrongylus falculatus</i>	0	20	20	5,5
Mean total nematode burden	152	283	435	
Karoo National Park (<i>n</i> = 2) No helminths were recovered	0	0	0	0

– Not applicable

^a Do not occur in mountain reedback

Mountain Zebra National Park

The black wildebeest from this locality harboured a single *Taenia* sp. larva, one fourth stage *Haemonchus* sp. larva and 26 *Haemonchus* spp. females.

In eland the *Cooperia rotundispiculum* race was most numerous, accounting for 70% of the adult nematode burden, followed by *Nematodirus spathiger* with 26% (Table 1).

The red hartebeest harboured 1 725 *Nematodirus spathiger*, of which 325 were fourth stage larvae, as well as 100 *Trichostrongylus falculatus*. Both these nematodes are new parasite records for this host.

Four mountain reedback harboured no worms. The remaining 14 antelopes' burdens, including fourth stage larvae, varied from 1–7 600, the larger number occurring in a heavily pregnant female shot during May 1983. *Nematodirus spathiger* was present in 11 of the 14 mountain reedback that harboured worms, and was the only nematode species present in eight of the antelope. These nematodes accounted for 96% of the number of adult nematodes present in these antelope (Table 2).

The seasonal distribution of the helminths recovered from mountain reedback during the November 1983 to December 1985 survey is graphically illustrated

TABLE 3 The helminths recovered from springbok in the Karoo, Mountain Zebra and West Coast National Parks, and on the farm near Bredasdorp

Locality, number of hosts examined and helminth species	Number of helminths recovered			Prevalence %
	Larvae	Adults	Total	
Mountain Zebra National Park (<i>n</i> = 2)				
<i>Cooperioides antidorca</i>	0	1 275	1 275	50
<i>Haemonchus bedfordi</i>	0	475	475	100
<i>Longistrongylus albifrontis</i>	0	89	89	50
<i>Nematodirus spathiger</i>	2 625	1 175	3 800	100
<i>Ostertagia</i> type females	–	25	25	50
<i>Paracooperia serrata</i>	0	1 175	1 175	50
<i>Trichostrongylus falculatus</i>	0	10 975	10 975	100
Mean total burden	1 313	7 595	8 908	
Karoo National Park (<i>n</i> = 4)				
<i>Agriostomum equidentatum</i>	0	40	40	25
<i>Bronchonema magna</i>	0	190	190	50
<i>Cooperioides antidorca</i>	0	30	30	25
<i>Paracooperia serrata</i>	0	145	145	75
<i>Nematodirus spathiger</i>	1 481	4 818	6 299	100
<i>Trichostrongylus falculatus</i>	0	996	996	100
Mean total burden	370	1 555	1 925	
West Coast National Park (<i>n</i> = 2)				
<i>Bronchonema magna</i>	0	58	58	100
<i>Cooperia rotundispiculum</i> race	0	160	160	50
<i>Cooperioides antidorca</i>	0	83	83	50
<i>Longistrongylus curvispiculum</i>	0	309	309	100
<i>Longistrongylus namaquensis</i>	0	298	298	100
<i>Nematodirus spathiger</i>	0	1 552	1 522	100
<i>Paracooperia serrata</i>	0	662	662	100
<i>Trichostrongylus deflexus</i>	0	905	905	100
Mean total burden	0	2 014	2 014	
The farm near Bredasdorp (<i>n</i> = 1)				
<i>Bronchonema magna</i>	–	30	30	100
<i>Haemonchus bedfordi</i>	a	60	60	100
<i>Longistrongylus curvispiculum</i>	a	3 880	3 880	100
<i>Nematodirus spathiger</i>	a	1 520	1 520	100
<i>Ostertagia ostertagi</i>	a	600	600	100
<i>Trichostrongylus falculatus</i>	a	120	120	100
Total burden	a	6 210	6 210	

– Not applicable

a Mucosal digests not done

in Fig. 1. With the exception of May 1984, when a peak burden of 1 875 nematodes was recorded, the tri-monthly mean burdens varied from 65–645 nematodes. No worms were recovered from the antelope examined during September 1985.

Trichostrongylus falculatus was the most numerous nematode in springbok, contributing 72% to the mean adult nematode burden, and together with *Cooperioides antidorca* (8%), *Nematodirus spathiger* (8%) and *Paracooperia serrata* (8%), accounted for 96% of the burden (Table 3).

Karoo National Park

Neither of the two black wildebeest nor the two mountain reedbeek examined in this park had any worms. One grey rhebuck harboured 50 *Nematodirus spathiger*, 20 of which were fourth stage larvae, while the other harboured only a single *Haemonchus bedfordi* male.

Nematodirus spathiger was the most numerous nematode in springbok, and contributed 77% to the mean total adult nematode burden, followed by *Trichostrongylus falculatus* with 16% (Table 3).

TABLE 4 The helminths recovered from two bontebok in the West Coast National Park

Helminth species	Number of helminths recovered			Prevalence %
	Larvae	Adults	Total	
<i>Bronchonema magna</i>	0	44	44	100
<i>Cooperia rotundispiculum</i> race	0	400	400	100
<i>Haemonchus contortus</i>	0	80	80	50
<i>Longistrongylus curvispiculum</i>	^a	3 190	3 190	100
<i>Longistrongylus namaquensis</i>	^a	170	170	50
<i>Ostertagia</i> type females	–	3 970	3 970	100
<i>Ostertagia</i> type larvae	5 483	–	–	100
<i>Nematodirus spathiger</i>	364	6 277	6 277	100
<i>Teladorsagia circumcincta</i>	^a	335	335	100
<i>Trichostrongylus axei</i>	0	82	82	100
<i>Trichostrongylus thomasi</i>	0	230	230	100
Mean total burden	2 924	7 389	10 313	

^a Larvae and females indistinguishable at species level and grouped together as *Ostertagia* type

– Not applicable

TABLE 5 The helminths recovered from two gemsbok in the West Coast National Park

Helminth species	Number of helminths recovered			Prevalence %
	Larvae	Adults	Total	
<i>Bronchonema magna</i>	0	10	10	100
<i>Longistrongylus curvispiculum</i>	0	101	101	50
<i>Nematodirus spathiger</i>	600	13 002	13 602	100
<i>Ostertagia ostertagi</i>	0	3 111	3 111	100
<i>Trichostrongylus deflexus</i>	0	345	345	50
<i>Trichostrongylus falculatus</i>	0	1 036	1 036	50
<i>Trichostrongylus pieterseii</i>	0	1 781	1 781	100
<i>Trichostrongylus rugatus</i>	0	37 176	37 176	100
<i>Trichostrongylus thomasi</i>	0	219	219	50
Mean total burden	300	28 391	28 691	

West Coast National Park

The helminths collected from bontebok are listed in Table 4. The most abundant adult nematodes in this host were *Nematodirus spathiger*, which contributed 42% to the mean total adult nematode burden, while the ostertagiid nematodes *Longistrongylus curvispiculum*, *Longistrongylus namaquensis*, *Teladorsagia circumcincta* and the *Ostertagia* type females together accounted for 52%. The remaining nematodes occurred in small numbers.

The only gastro-intestinal nematode in eland from this park was the *Cooperia rotundispiculum* race, which occurred in large numbers (Table 1).

Trichostrongylus rugatus was the most numerous adult nematode in gemsbok (65%) and together with *Nematodirus spathiger* (23%), contributed 88% of the mean total adult nematode population (Table 5).

Nematodirus spathiger accounted for 39% of the adult nematodes in springbok, *Trichostrongylus de-*

flexus for 22% and the remaining nematodes for 39% (Table 3).

The farm near Bredasdorp

Longistrongylus curvispiculum accounted for 62% of the adult nematode burden in the springbok, *Nematodirus spathiger* for 24% and the remaining four nematode species for 14% (Table 3).

DISCUSSION

Black wildebeest

Although a fairly common antelope species in the colder regions of the country, the helminths of black wildebeest have received little attention. Round (1968) recorded a trematode species, a larval *Taenia* sp. and five nematode species, Young, Zumpt, Boomker, Penzhorn & Erasmus (1973a) a *Haemonchus* sp. and an *Oesophagostomum* sp., and Horak

TABLE 6 The nematode species recovered per host species per locality

Helminth species	Mountain Zebra National Park		Karoo National Park				West Coast National Park				Farm			Number of host species infected	
	<i>Connchaetes gnu</i>	<i>Taurotragus oryx</i>	<i>Redunca fulvorufa</i>	<i>Pelea capreolus</i>	<i>Alcelaphus buseiaphus</i>	<i>Antidorcas marsupialis</i>	<i>Connchaetes gnu</i>	<i>Redunca fulvorufa</i>	<i>Pelea capreolus</i>	<i>Antidorcas marsupialis</i>	<i>Damaliscus pygargus</i>	<i>Oryx gazella</i>	<i>Taurotragus oryx</i>		<i>Antidorcas marsupialis</i>
<i>Agriostomum equidentatum</i>	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1
<i>Bronchomonema magna</i>	-	-	-	-	-	-	-	-	-	-	-	-	-	-	4
<i>Cooperia rotundispiculum</i>	-	-	-	-	-	-	-	-	-	-	-	-	-	-	3
<i>Cooperioides antidorca</i>	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1
<i>Haemonchus</i> sp.	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1
<i>Haemonchus bedfordi</i>	-	-	-	-	-	-	-	-	-	-	-	-	-	-	2
<i>Haemonchus contortus</i>	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1
<i>Haemonchus mitchelli</i>	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1
<i>Longistrongylus abifrontis</i>	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1
<i>Longistrongylus curvispiculum</i>	-	-	-	-	-	-	-	-	-	-	-	-	-	-	3
<i>Longistrongylus namaquensis</i>	-	-	-	-	-	-	-	-	-	-	-	-	-	-	2
<i>Nematodirus spathiger</i>	-	-	-	-	-	-	-	-	-	-	-	-	-	-	7
<i>Ostertagia ostertagi</i>	-	-	-	-	-	-	-	-	-	-	-	-	-	-	2
<i>Ostertagia</i> type females	-	-	-	-	-	-	-	-	-	-	-	-	-	-	3
<i>Paracooperia serrata</i>	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1
<i>Skrjabinema</i> sp.	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1
<i>Teladorsagia circumcincta</i>	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1
<i>Trichostrongylus axei</i>	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1
<i>Trichostrongylus deflexus</i>	-	-	-	-	-	-	-	-	-	-	-	-	-	-	2
<i>Trichostrongylus falculatus</i>	-	-	-	-	-	-	-	-	-	-	-	-	-	-	4
<i>Trichostrongylus pietersei</i>	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1
<i>Trichostrongylus rugatus</i>	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1
<i>Trichostrongylus thomasi</i>	-	-	-	-	-	-	-	-	-	-	-	-	-	-	2
Number of helminth species per host	1	3	4	0	2	7	0	0	2	6	10	9	2	8	6

^a New record

et al. (1983) *Haemonchus bedfordi*, *Oesophagostomum columbianum*, a *Trichuris* sp. and a *Thysaniezia* sp.

The single *Taenia* sp. larva recovered in the black wildebeest in the Mountain Zebra National Park could not be assigned to a species. Gough (1908) and Ortlepp (1961) recorded larval *Taenia hydatigena* in black wildebeest. Horak *et al.* (1983) did not find any larval cestodes in ten black wildebeest from a nature reserve in the Free State and another in Gauteng but found 34,5% of 55 blue wildebeest, *Connochaetes taurinus*, in the Kruger National Park to be infected with the larval stages of *Taenia regis*.

The nematode burden of the black wildebeest examined in this survey is extremely low when compared with that recorded by Horak *et al.* (1983). This probably is a reflection of the adverse climatic conditions, namely hot summers and cold winters with little rainfall during either season, in both the Mountain Zebra and the Karoo National Parks. In addition, wildebeest's apparent resistance to parasite infections (Horak *et al.* 1983) may also have played a role.

Bontebok

The helminths of bontebok have thus far only been studied in the Bontebok National Park, and Boomker & Horak (1992) summarized the findings of several authors.

The only cestodes that have been recovered from these animals are *Moniezia expansa* (Boomker & Horak 1992) and a single *Taenia hydatigena* larva (Verster, Imes & Smit 1975). No cestodes were recovered from the two bontebok in the West Coast National Park.

We assume that a *Cooperia rotundispiculum* race, typical *Haemonchus contortus*, *Teladorsagia circumcincta* and *Trichostrongylus thomasi* were acquired from other antelope, especially springbok and eland or gemsbok, in the West Coast National Park since they did not occur in the Bontebok National Park. *Cooperia rotundispiculum* is a new parasite record for bontebok.

The mean adult nematode burden of bontebok surveyed in the Bontebok National Park during 1975, 1976 and 1979 was 6787 (Horak, Brown, Boomker, De Vos & Van Zyl 1982b), while the mean adult nematode burden was 5661 in the survey conducted during 1983–1984 (Boomker & Horak 1992). The bontebok from the West Coast National Park harboured a mean of 10313 adult nematodes. We believe that the larger burden is due to the climatic conditions, the West Coast National Park being further in the winter rainfall region than the Bontebok National Park, and the number of other host species present in this park.

Eland

Eland have also not to any significant degree been subject to parasite surveys in recent years. Round (1968) lists only one cestode and five nematode species from this host, and Mares, Amaral & Fachada (1984) two cestode genera and a nematode species from two eland in the former Republic of Transkei, now part of the Eastern Cape Province.

Nematodirus spathiger, *Bronchonema magna* and a race of *Cooperia rotundispiculum* constitute new parasite records for eland. *Bronchonema magna* was in all probability acquired from the springbok, which is the preferred host, while the other two species could have been acquired from any of the other antelopes present in the reserves.

Mares *et al.* (1984) do not record the actual numbers of nematodes recovered from the eland they examined and no other records of helminth burdens in eland could be found. The eland from the West Coast National Park harboured about eight times the mean number of nematodes of those in the Mountain Zebra National Park. We presume that these differences are largely due to the climate and stocking rates.

Grey rhebuck

As with the bontebok, the helminths of grey rhebuck have only been studied in the Bontebok National Park, and Boomker & Horak (1992) have summarized the findings of several authors.

Haemonchus bedfordi is a new parasite record for grey rhebuck and, as only one nematode was found in one of the antelope, it should be considered an accidental parasite.

The helminth burdens of these antelope in the Karoo National Park are insignificant and no comparison with the burdens of the antelope from the Bontebok National Park is possible.

Gemsbok

Although gemsbok are common in the more arid areas of South Africa, and are popular antelope with game farmers and hunters, few helminth surveys have been conducted on them. Round (1968) lists larval *Taenia hydatigena*, a cestode species and four nematode species as occurring in gemsbok in South Africa. Mares *et al.* (1984) list *Fasciola hepatica* and *Haemonchus contortus* from three antelope in the then Republic of Transkei. Gemsbok in the National Kalahari Gemsbok Park harboured *Agriostomum equidentatum*, *Haemonchus contortus*, *Longistrongylus meyeri*, *Paracooperia serrata*, *Impalaia nudicollis* and *Strongyloides* sp., all of which are parasites more commonly encountered in springbok (Boomker, Horak & De Vos 1986). Fourie, Vrahimis, Horak,

Terblanche & Kok (1991) recorded a cestode genus and the larvae of *Taenia* spp., as well as the larval stages of two nematode genera, the adults of four nematode genera and 13 nematode species from gemsbok introduced into the Willem Pretorius Nature Reserve in the Free State.

In the West Coast National Park, the gemsbok harboured a large variety of nematodes. Of these, *Nematodirus spathiger* and *Trichostrongylus rugatus* should be considered as definitive parasites, while *Ostertagia ostertagi*, *Trichostrongylus falculatus* and *Trichostrongylus pietersei* are occasional parasites. *Longistrongylus curvispiculum* and *Trichostrongylus deflexus* should be regarded as accidental parasites since they occurred in small numbers in only one of the gemsbok. New parasite records for gemsbok are *Bronchonema magna*, *Longistrongylus curvispiculum*, *Ostertagia ostertagi*, *Trichostrongylus deflexus*, *Trichostrongylus pietersei* and *Trichostrongylus thomasi*.

The gemsbok from the Kalahari National Gemsbok Park harboured 5 877 intestinal helminths (Boomker *et al.* 1986), those from the Willem Pretorius Nature Reserve a mean of 1 497 (Fourie *et al.* 1991) and those from the West Coast National Park a mean of 28 681 intestinal nematodes. We are of the opinion that the large burdens of the last named antelope are mainly due to climatic conditions and stocking rates.

Mountain reedbuck

The helminths of mountain reedbuck are also not well known despite this antelope's relative abundance in southern Africa.

Gough (1908) records a *Taenia* sp. larva, Veglia (1919) *Paramphistomum bothriophoron*, *Paramphistomum cervi* and *Haemonchus contortus*, Thwaite (1927) *Setaria boulengeri*, and Mönnig (1924) *Setaria hornbyi*. Ortlepp (1961) mentions only *Setaria boulengeri* and Baker & Boomker (1973) recovered ten nematode species, three nematode genera, *Paramphistomum* spp. (*sic*) and the larval stages of *Taenia* spp. from mountain reedbuck in the Loskop Dam Nature Reserve in the then Transvaal (now Mpumalanga). In addition, Baker & Boomker (1973) and Young *et al.* (1973a) found *Haemonchus* sp., *Nematodirus spathiger*, *Setaria boulengeri* and *Moniezia expansa* from these antelope in the Mountain Zebra National Park.

Moniezia benedeni and *Trichostrongylus falculatus* are new parasite records for mountain reedbuck.

Baker & Boomker (1973) recorded 1 107 nematodes from the small intestine of mountain reedbuck shot in the Loskop Dam Nature Reserve. Young *et al.* (1973a) did not record the numbers of helminths recovered from mountain reedbuck from the Mountain Zebra National Park but the mean adult nematode

burden of the antelope from the same locality examined in this study was 283, which is negligible.

Comment: The identifications of *Paramphistomum* spp. in these antelope should be treated with reserve. According to Eduardo (1983), the genus *Paramphistomum* in Africa is limited to *Paramphistomum cephalophi*, from *Cephalophus nigrifrons* in Rwanda. *Paramphistomum bothriophoron* has been transferred to the genus *Calicophoron* (Eduardo 1983) while *Paramphistomum cervi* is in all probability a misidentification.

Red hartebeest

As with the gemsbok, red hartebeest are antelope that prefer the drier parts of the country. Few helminths have been recorded from these animals, and Ortlepp (1961) lists two trematode and five nematode species. Mares *et al.* (1984) added two cestode genera, three nematode genera and two nematode species, while Boomker *et al.* (1986) added *Impalaia nudicollis* and a *Parabronema* sp. to the list. *Nematodirus spathiger* and *Trichostrongylus falculatus* are new parasite records for these antelope.

Boomker *et al.* (1986) found 1 774 helminths in the red hartebeest from the Kalahari Gemsbok National Park, which is comparable to the 1 825 recorded from these antelope from the Mountain Zebra National Park.

Springbok

The helminths of springbok have been well documented by Ortlepp (1961), Round (1968), Young, Zumpt, Basson, Erasmus, Boyazoglu & Boomker (1973b), Horak, Meltzer & De Vos (1982a), De Vos (1982a), De Villiers, Liversidge & Reinecke (1985) and Boomker *et al.* (1986). A cestode genus, a cestode species and two larval cestodes, one trematode species, and 27 nematode species and four nematode genera have thus far been recovered.

De Villiers *et al.* (1985) recorded helminth burdens ranging from 2 954–12 224 in springbok from the Northern Cape Province. Horak *et al.* (1982a) found springbok in the Bontebok National Park to harbour 7 129–17 819 nematodes, those from Gauteng 2 563–11 585, and those from the Northwest Province 12 449–71 790. The numbers of fourth stage larvae often exceeded those of the adults nematodes. In the surveys conducted by De Villiers *et al.* (1985) and Horak *et al.* (1982), *Paracooperia serrata* was the most common nematode. The springbok from the Karoo and West Coast National Parks had insignificant numbers of this helminth and *Nematodirus spathiger* was the most commonly encountered parasite in both parks.

Ostertagia ostertagi from the antelope from the farm near Bredasdorp and *Cooperia rotundispiculum* from

the antelope in the West Coast National Park are new parasite records for springbok.

A summary of the host associations and the number of helminth species per host per locality are presented in Table 6. From this table it is apparent that bontebok in the West Coast National Park harboured the greatest number of nematode species (ten) followed by gemsbok (nine) and springbok (eight) at the same locality. Springbok in the Mountain Zebra National Park had seven species of nematodes and these antelope in the Karoo National Park and on the farm near Bredasdorp had six species. We believe that the number of antelope species in the West Coast National Park influenced the variety and the numbers of the helminths recovered from them.

Helminths

Although *Bronchonema magna* was originally described from blesbok, *Damaliscus pygargus phillipsi* by Mönnig (1932), it seems to be equally common in springbok (Ortlepp 1962) and bontebok (Verster *et al.* 1975; Horak *et al.* 1982b). However, it seems springbok are the preferred host of these nematodes and they tend to disappear from other antelope when springbok are removed from an area, as discussed by Boomker & Horak (1992). Since the nematodes occurred only in springbok in the Karoo National Park, but in all four the antelope species in the West Coast National Park, we believe that the presence of springbok in the West Coast National Park is undesirable.

Nematodirus spathiger is well-adapted to the semi-arid regions (Viljoen 1969). Since the infective third stage larvae occur within the egg and only hatch after good rain, massive infections are possible (Reinecke 1983). It appears to be a definitive parasite of all the hosts examined in this survey. As is evident from Table 5, gemsbok in the West Coast National Park seem to be especially good hosts.

Both *Trichostrongylus axei* and *Trichostrongylus thomasi* were recovered from the abomasum of both the bontebok in the West Coast National Park. The latter nematode represents a new parasite record for bontebok and usually fills the niche in antelope that *Trichostrongylus axei* occupies in domestic ruminants. Previous records of *T. thomasi* are from animals in the Kruger National Park and its surrounds, Mpumalanga (Horak *et al.* 1983; Boomker *et al.* 1989b), impala and red duiker in north-eastern KwaZulu-Natal (Boomker, Horak, Flamand & Keep 1989a; Boomker, Horak & Flamand 1991b), springbok near Lichtenburg, Northwest Province (Horak *et al.* 1982a) and kudu in the Etosha Game Reserve, Namibia (Boomker, Anthonissen & Horak 1988). All these localities are more than 1 000 km north of the West Coast National Park and it seems likely that this nematode was introduced into this park with one of the host species, probably gemsbok.

Trichostrongylus rugatus is a common parasite of domestic sheep and goats in the southern Eastern and Western Cape Province (Boomker *et al.* 1989c; Horak, Knight & Williams 1991; Reinecke, Kirkpatrick, Swart, Kriel & Frank 1987) and appears to be equally well adapted to gemsbok.

CONCLUSION

The danger of translocating antelope to small game reserves without prior anti-parasitic treatment has been pointed out by Horak (1980). Similarly, the translocation of antelope to climatic or vegetation regions where they normally did not occur can also be dangerous. We believe that a potentially hazardous situation exists in the West Coast National Park, where the climatic conditions appear to be favourable for the worms but cause stress especially in gemsbok and bontebok. For example, gemsbok in the Kalahari Gemsbok National Park harboured a total of 5 877 nematodes, including fourth stage larvae (Boomker *et al.* 1986), while those in the Free State harboured approximately 2 866 (Fourie *et al.* 1991). The mean burden of the antelope in the West Coast National Park was 28 691, which is 4.9–10 times as many worms.

A similar situation occurred in bontebok when they were kept near the town of Bredasdorp. They did not grow or reproduce well and harboured large numbers of parasites (Van der Walt & Ortlepp 1960). They were then moved to the current locality, near Swellendam, where their numbers increased and, presumably, their parasite loads declined.

As far as the helminths are concerned, a similar situation seems to develop in the West Coast National Park. Antelope in the Bontebok National Park harboured a mean of 1 722 adult trichostrongylids during the 1979 survey (Horak *et al.* 1982b) and 5 382 during the 1983/84 survey (Boomker & Horak 1992), *Nematodirus spathiger* being the most common nematode in both surveys. The mean number of adult helminths in the two bontebok in this survey was 7 389, the majority of which were ostertagiid nematodes of the genus *Longistrongylus*. The latter nematode genus is considered more pathogenic than *Nematodirus*, since they occur in the abomasum where they cause lesions similar to those of *Ostertagia* spp. and *Teladorsagia* spp. of cattle and sheep (Pletcher, Horak, De Vos & Boomker 1984). In addition, the forced association of antelope lends itself to cross infection. The occurrence of *Bronchonema* in gemsbok and eland can only be ascribed to the presence of springbok, while *Cooperia rotundispiculum* in springbok, eland and bontebok is the direct result of sharing pastures with eland. The *Cooperia* spp. are generally considered harmless in well-fed adult animals (Reinecke 1983), but *Bronchonema* may in time cause the death of some of the antelope.

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