

SMALL MAMMALS OF THE ADDO ELEPHANT NATIONAL PARK

P. SWANEPOEL

Kaffrarian Museum

King William's Town

5600

Abstract – A survey of the small mammals of the Addo Elephant National Park resulted in a checklist, as well as information on relative numbers, distribution within the Park, reproductive activity, sex ratios, and body measurements. Forty mammals species occur in the Park, while three re-introduced species probably do not occur any longer. Of the 40 species 28 are considered small mammals comprising 13 rodent, eight carnivore, two shrew, two bat, one primate and one lagomorph species, as well as the aardvark: *Crocidura flavescens*, *C. cyanea infumata*, *Rousettus aegyptiacus*, *Eptesicus capensis*, *Cercopithecus pygerythrus*, *Canis mesomelas*, *Ictonyx striatus*, *Poecilogale albinucha*, *Genetta* sp., *Herpestes pulverulentus*, *Suricata suricatta*, *Proteles cristatus*, *Felis caracal*, *Orycteropus afer*, *Lepus saxatilis*, *Cryptomys hottentotus*, *Hystrix africae-australis*, *Pedetes capensis*, *Graphiurus murinus*, *Aethomys namaquensis*, *Praomys natalensis*, *Rhodomys pumilio*, *Mus minutoides*, *Rattus rattus*, *Saccostomys campestris*, *Desmodillus auricularis*, *Otomys irroratus* and *O. unisulcatus*.

Introduction

The main object of the present study was to produce a check list of the smaller mammals of the Addo Elephant National Park. In addition, information was obtained on relative numbers, distribution within the Park, reproduction, body measurements and parasites. However, the identification of the latter had not been completed at the time of writing and is, therefore, not included.

The present study forms part of a larger project concerning the distribution, ecology and taxonomy of the small mammals of the Eastern Cape and represents the first extensive trapping operation for small mammals in the Park. Previously, only one preliminary investigation had been carried out (de Graaff and Nel 1970).

In addition to the African elephant *Loxodonta africana* the following ungulate species were present when the Park was proclaimed in 1931 (Penzhorn 1971): grey duiker *Sylvicapra grimmia*, grysbok *Raphicerus melanotis*, bushbuck *Tragelaphus scriptus*, Cape buffalo *Syncerus caffer* and bushpig *Potamochoerus porcus*. Ungulate species which formerly occurred in the area (Skead 1958) have been re-introduced (Penzhorn 1971): grey rhebuck *Pelea capreolus*, mountain reedbuck *Redunca fulvorufula*, reedbuck

Redunca arundinum, springbok *Antidorcas marsupialis*, red hartebeest *Alcelaphus buselaphus*, koedoe *Tragelaphus strepsiceros* and eland *Taurotragus oryx*.

These re-introductions were reasonably successful. Only the grey reebuck and reedbuck seem to have disappeared, while mountain reedbuck are very scarce. After the addition of Caesar's Dam to the Park, *Hippopotamus amphibius* was introduced (Penzhorn 1971). The last survivor escaped from the Park in 1974 and was destroyed.

A number of black rhinoceros *Diceros bicornis* was also re-introduced and their numbers are increasing satisfactorily.

Physiography

The Addo Elephant National Park is located approximately 55 km NNE of Port Elizabeth in the Sunday's River Valley, at altitudes varying from 60 m to 340 m a.s.l., and at co-ordinates 33°30'S, 25°45'E. The Park has an area of 7 735 hectare.

The Park is situated in the Southern Cape Coastal belt climatic zone (Weather Bureau 1957). Climatic conditions in the Park are, however, somewhat different to the coastal conditions and are more associated with the inland Karoo areas. Hot summers, prolonged droughts and irregular rainfall are typical of the Park area. Monthly rainfall figures from January 1963 through December 1974, recorded at the Park headquarters (33°26'7"S, 25°44'8"E) as well as those recorded at the Sunday's River Citrus Research Station (31°31'S, 25°40'E) are shown in Tables 1 and 2 respectively.

Table 1

Monthly rainfall (mm) at the Addo Elephant National Park (Weather Station 55/447, 33°26,7'S; 25°44,8'E) from January 1963 through December 1974

	1963	1964	1965	1966	1967	1968	1969	1970	1971	1972	1973	1974	Mean
Jan.	89.6	29.0	6.5	31.0	22.0	0.0	17.0	28.5	53.0	41.0	0.0	124.5	36.8
Feb.	14.0	48.5	1.5	7.5	63.0	9.5	25.5	33.0	42.0	28.0	50.0	147.0	39.1
March	105.2	25.5	30.5	33.0	48.5	8.0	132.5	0.0	60.0	26.0	101.0	212.5	65.2
April	86.9	15.2	34.0	26.5	58.0	66.0	11.0	0.0	46.0	23.0	17.0	0.0	32.0
May	31.9	0.2	65.0	30.5	162.0	15.0	21.0	10.0	72.0	28.0	3.7	70.0	42.2
June	8.5	200.0	38.5	0.0	7.0	110.5	40.0	8.0	6.0	24.0	0.0	33.0	39.6
July	42.0	1.5	34.5	8.5	66.0	13.5	0.0	0.0	64.0	13.0	7.0	0.0	20.8
Aug.	48.6	37.7	12.0	51.5	16.0	23.0	14.0	101.5	69.0	13.0	55.0	125.0	47.2
Sept.	4.2	63.5	26.5	23.0	24.0	119.5	17.5	3.5	0.0	19.0	13.0	31.0	28.7
Oct.	40.7	23.2	88.5	5.5	17.0	21.0	18.0	55.0	67.0	10.0	47.5	0.0	32.8
Nov.	37.2	27.3	122.0	44.0	30.5	22.5	21.0	47.5	12.0	29.0	49.5	53.0	41.3
Dec.	42.0	28.0	1.1	0.0	5.0	0.0	7.5	150.0	30.0	10.0	54.0	30.0	29.8
Total:	550.8	499.6	460.6	261.0	519.0	408.5	325.0	436.5	521.0	264.0	397.7	826.0	

Table 2

Monthly rainfall (mm) at the Sunday's River Citrus Research station (Weather Station 35/334, 33°31'S; 25°40'E) from January 1963 through December 1974

	1963	1964	1965	1966	1967	1968	1969	1970	1971	1972	1973	1974	Mean
Jan.	73,0	23,5	9,0	51,1	10,3	0,1	10,9	34,4	22,3	50,2	4,0	79,9	30,7
Feb.	28,9	35,4	9,9	10,0	10,3	17,5	76,9	43,0	66,1	28,2	35,0	99,7	38,4
March	95,4	18,7	31,0	26,9	39,0	20,9	62,1	6,1	40,5	44,5	71,6	98,8	46,3
April	82,6	44,7	36,6	22,4	54,7	73,4	25,1	7,6	114,6	23,7	25,1	58,0	47,4
May	34,3	0,3	59,2	16,1	154,3	8,8	14,3	15,5	55,5	7,4	11,3	63,2	36,7
June	8,0	115,9	39,6	3,2	10,4	94,6	36,7	8,9	1,1	12,5	3,9	20,9	29,6
July	27,5	4,7	63,5	9,2	27,5	12,5	8,6	1,2	70,7	11,2	5,2	1,8	20,3
Aug.	19,2	34,8	4,7	34,6	6,3	22,0	17,7	86,2	83,5	19,4	42,1	84,7	37,9
Sept.	1,3	85,4	34,6	21,1	24,8	119,4	7,6	0,8	0,2	6,6	19,0	50,3	30,9
Oct.	17,7	25,2	66,9	3,4	18,6	16,1	28,8	43,6	46,0	11,0	36,9	3,3	26,5
Nov.	32,6	15,0	118,9	50,5	27,3	18,2	21,8	47,6	12,8	41,0	57,0	46,4	40,8
Dec.	33,9	27,3	7,5	17,8	5,4	6,6	5,8	123,3	32,7	7,3	51,0	17,5	28,0
Total:	454,4	430,9	481,4	266,3	388,9	410,1	316,3	418,2	546,0	263,0	362,1	624,5	

Mean annual rainfall at the Park headquarters from January 1963 through December 1974 is 455,8 mm and that at the Citrus Research Station 413,5 millimetre. The mean annual rainfall recorded at or near the Citrus Research Station during the period 1884 to 1974 is 377,4 mm (*pers. comm.*, Responsible Officer, Citrus Station), with the highest rainfall in 1891 (783,0 mm) and the second highest in 1974 (624,5 mm). Therefore the 826,0 mm recorded in the Park during 1974 (Table 1) is assumed to be the Park's wettest season of this century.

The soil in the Park is a sandy loam on limestone and clays (van der Merwe 1962) and is also described as light-red clay loam by Archibald (1955) and derived from sand- and mudstone of the Sunday's River Stage, Uitenhage Series, Cretaceous System (Toerien 1972). For a detailed description of the geology of the Park, see Toerien (1972).

Vegetation

The Park is situated in the Valley Bushveld (Acocks 1953) and is described as a short, dense, dry forest. It occurs in the Woodland subzone of the Southern Savanna biotic zone (following the biotic zone adaptation of Meester 1965 from Davis 1962), not the South West Cape biotic zone as suggested by de Graaff and Nel (1970). Davis (1962) describes this area towards the sea as being biotically South West Arid.

Archibald (1955) divides the Park into five main plant communities (Fig. 1). For detailed descriptions of the vegetation see Archibald (1955), de Graaff, Schulz and van der Walt (1973) and Penzhorn, Robbertse and Olivier (1974).

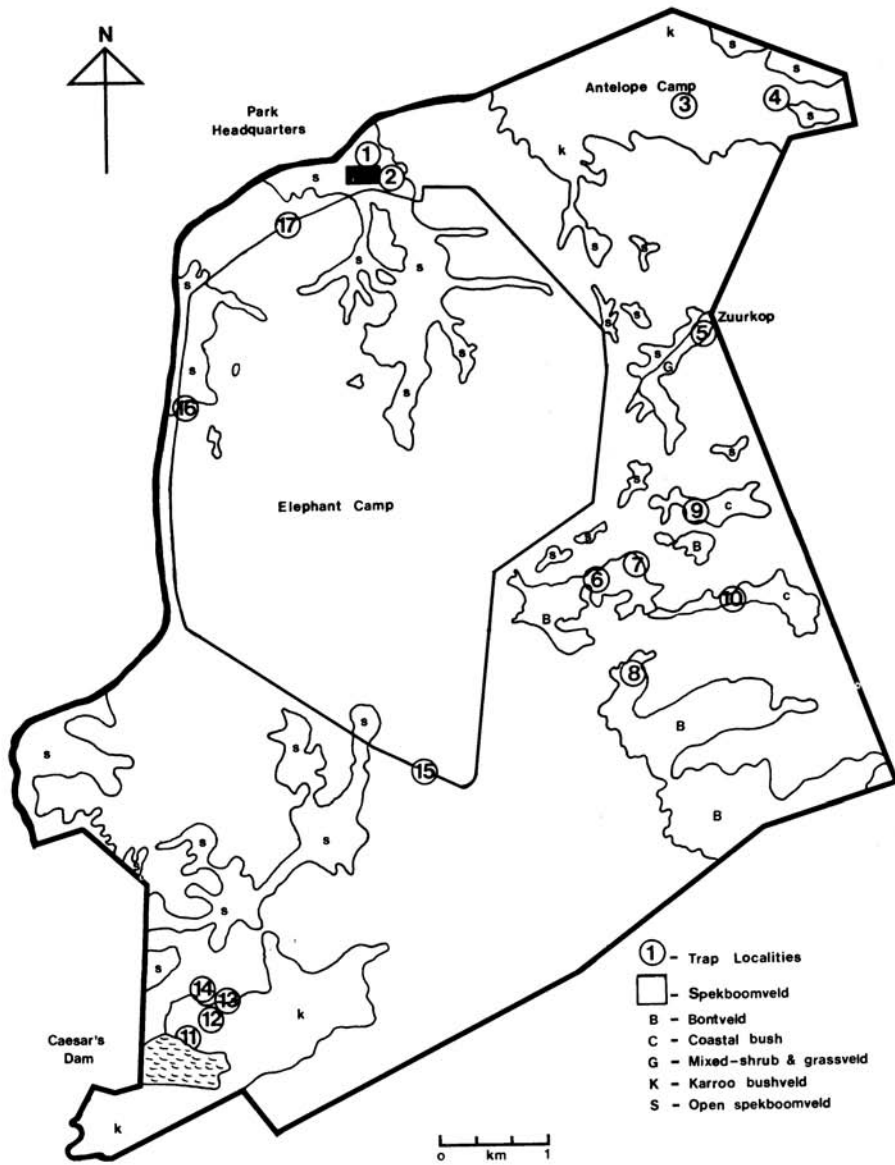


Fig. 1. Map of the Addo Elephant National Park indicating the vegetation types and trap localities (after Archibald 1955).

No significant vegetation changes occurred since the work of Archibald (1955) except where bush had been cleared in the Karroo-bushveld Community in the antelope camp in the northeastern corner of the Park (Liversidge 1965). Although serious deterioration of habitat occurs in the elephant camp (Spekboomveld, and Open Spekboomveld Communities) (Penzhorn *et al* 1974), no major changes in other habitat types are apparent.

Material and Methods

The Park was visited during August 1973, January 1974 and June 1974. Trap lines irregularly spaced (with 30 to 40 traps per line), as well as back break traps irregularly placed (5 m to 30 m apart) were used to sample the small mammals in the main plant communities. Trap localities are shown in Fig. 1. Peanut-butter and rolled oats mixed into a paste was used as bait. Gopher traps for moles were used in certain plant communities. Hares *Lepus saxatilis* were collected by means of a 0,22 rifle, while in the case of small mammals larger than small rodents, sight records were noted. Existing literature records were also taken into account.

Two enclosures in the Park, one (30,5 m × 30,5 m) in an open patch in the Bontveld, and the other (90 m × 90 m) in the antelope camp, were sampled. For all practical purposes Open Spekboomveld (trap locality 1) and Pond (trap locality 2) being within the boundaries of the Park headquarters, also constituted an enclosure.

On capture the animals were identified, sexed, standard measurements taken, the mass and reproductive state of the individual determined and in some instances parasites collected. Thereafter specimens were made into study skins. Skulls and in certain instances skeletal material were kept.

Results and discussion

During January 1974, before the good rains of 1974 commenced, the vegetation was in poor condition, even worse than during the first visit in August 1973 (late winter). This was also clearly shown by poor all-species trap success during this time; at none of the 10 localities sampled did trap success exceed 10 percent (Table 4). During August 1973 six of the nine localities sampled, yielded above 10 per cent trap success, i.e. localities 2 and 6 (inside enclosure), 7, 12, 13 and 14 (Table 3 and Fig. 1).

Table 3

Trap success and number of animals of different species obtained at the various trap localities in the Addo Elephant National Park during August 1973

Trap locality	Species	Number captured				Trap nights	Trap success
		un-sexed	♂	♀	Total		%
Open Spekboomveld (near Nature Conservator's house) (1)	<i>Praomys natalensis</i>	—	1	0	1	45	2,2
	<i>Otomys unisulcatus</i>	—	1	0	1		2,2
	All species	—	2	0	2		4,4
Pond (near Nature Conservator's house) (2)	<i>Rhabdomys pumilio</i>	—	1	0	1	45	2,2
	<i>Praomys natalensis</i>	—	1	0	1		2,2
	<i>O. irroratus</i>	—	2	3	5		11,1
	All species	—	4	3	7		15,6
Caesar's dam (11)	<i>R. pumilio</i>	—	1	0	1	120	0,8
	<i>P. natalensis</i>	—	1	2	3		2,5
	<i>O. irroratus</i>	—	4	3	7		5,8
	All species	—	6	5	11		9,2
Karoo bushveld – Spekboomveld ecotone (13)	<i>P. natalensis</i>	—	0	1	1	105	1,0
	<i>O. unisulcatus</i>	—	1	0	1		1,0
	<i>Aethomys namaquensis</i>	—	5	5	10		9,5
	<i>Desmodillus auricularis</i>	—	1	0	1		1,0
	All species	—	7	6	13		12,4
Karoo bushveld (North of Caesar's dam) (12)	<i>R. pumilio</i>	—	1	1	2	35	5,7
	<i>P. natalensis</i>	—	4	0	4		11,4
	<i>O. unisulcatus</i>	—	0	2	2		5,7
	All species	—	5	3	8		22,9
Spekboomveld (North of Caesar's dam) (14)	<i>O. irroratus</i>	—	1	0	1	20	5,0
	<i>A. namaquensis</i>	1	1	1	3		15,0
	All species	1	2	1	4		20,0
Bontveld (outside enclosure) (6)	<i>R. pumilio</i>	—	0	1	1	75	1,3
	<i>A. namaquensis</i>	1	0	4	5		6,7
	<i>Cryptomys hottentotus</i>	—	1	0	1		1,3
	All species	1	1	5	7		9,3
Bontveld (inside enclosure) (6)	<i>R. pumilio</i>	—	3	1	4	36	11,1
	<i>P. natalensis</i>	—	2	1	3		8,3
	<i>O. irroratus</i>	—	3	0	3		8,3
	All species	—	8	2	10		27,8
Bontveld (near edge) (7)	<i>R. pumilio</i>	—	1	0	1	7	14,3
	<i>A. namaquensis</i>	—	0	1	1		14,3
	All species	—	1	1	2		28,6

Table 4

Trap success and number of animals of different species obtained at the various trap localities in the Addo Elephant National Park during January 1974

Trap locality	Species	Number captured				Trap nights	Trap success %
		Un-sexed	♂	♀	Total		
Open Spekboomveld (near Nature Conservator's house) (1)	<i>R. pumilio</i>	—	1	1	2	170	1,2
	<i>O. unisulcatus</i>	—	4	1	5		2,9
	All species	—	5	2	7		4,1
Caesar's dam (11)	<i>P. natalensis</i>	—	1	1	2	60	3,3
	<i>O. irroratus</i>	—	1	1	2		3,3
	<i>Cryptomys hottentotus</i>	—	0	1	1		1,7
	All species	—	2	3	5		8,3
Karoo-bushveld (North of Caesar's dam) (12)	<i>R. pumilio</i>	—	0	1	1	140	0,7
	All species	—	0	1	1		0,7
Pond (near Nature Conservator's house) (2)	<i>R. pumilio</i>	1	2	1	4	75	5,3
	<i>P. natalensis</i>	—	1	0	1		1,3
	<i>O. irroratus</i>	—	0	1	1		1,3
	All species	1	3	2	6		8,0
Spekboomveld (inside Elephant camp) (16)	<i>O. irroratus</i>	—	1	0	1	210	0,5
	<i>O. unisulcatus</i>	—	1	0	1		0,5
	<i>A. namaquensis</i>	—	1	2	3		1,4
	<i>Saccostomus campestris</i>	—	0	1	1		0,5
	All species	—	3	3	6		2,9
Open Spekboomveld (outside Elephant camp) (16)	<i>O. unisulcatus</i>	—	1	1	2	60	3,3
	All species	—	1	1	2		3,3
Spekboomveld (inside Elephant camp near No. 11 lookout post) (17)	<i>O. irroratus</i>	—	0	1	1	175	0,6
	<i>A. namaquensis</i>	—	1	1	2		1,1
	All species	—	1	2	3		1,7
Spekboomveld (outside Elephant camp near No. 11 lookout post) (17)	<i>A. namaquensis</i>	—	0	3	3	175	1,7
	<i>S. campestris</i>	—	0	1	1		0,6
	All species	—	0	4	4		2,3
Antelope camp (in enclosure) (3)	<i>R. pumilio</i>	—	4	3	7	105	6,7
	<i>P. natalensis</i>	—	0	1	1		1,0
	<i>O. irroratus</i>	—	1	0	1		1,0
	All species	—	5	4	9		8,6
Coastal Bush (Brandkloof) (10)	<i>O. irroratus</i>	—	1	0	1	200	0,5
	<i>A. namaquensis</i>	—	2	0	2		1,0
	<i>Graphiurus murinus</i>	—	0	1	1		0,5
	All species	—	3	1	4		2,0

While the ground was bare or almost so in the Open Spekboomveld community during August 1973 and January 1974, this plant community had much improved towards June 1974 (early winter), still well covered with dry grass, mostly *Cynodon dactylon* and other annuals.

Open Spekboomveld near the Nature Conservator's house yielded low all-species trap success during August 1973 (4,4 per cent) and January 1974 (4,1 per cent) but in June 1974 an extremely high trap success of 51,4 per cent was recorded (Tables 3 to 5).

Table 5

Trap success and number of animals of different species obtained at the various trap localities in the Addo Elephant National Park during June 1974

Trap locality	Species	Number captured			Trap nights total	Trap success %
		Un-sexed	♂	♀		
Open Spekboomveld (near Nature Conservator's house) (1)	<i>R. pumilio</i>	—	19	12	31	29,5
	<i>P. natalensis</i>	—	4	4	8	7,6
	<i>O. unisulcatus</i>	1	5	3	9	8,6
	<i>C. hottentotus</i>	1	1	4	6	5,7
	All species	2	29	23	54	105
Pond (near Nature Conservator's house) (2)	<i>R. pumilio</i>	—	14	16	30	40,0
	<i>P. natalensis</i>	—	5	2	7	9,3
	<i>O. irroratus</i>	—	1	2	3	4,0
	<i>Crocidura flavescens</i>	—	1	0	1	1,3
	All species	—	21	20	41	75
Spekboomveld (inside Elephant camp near No. 3 waterhole) (15)	<i>R. pumilio</i>	2	1	4	7	5,0
	<i>P. natalensis</i>	—	0	2	2	1,4
	<i>O. irroratus</i>	—	1	0	1	0,7
	<i>Mus minutoides</i>	—	0	1	1	0,7
	All species	2	2	7	11	140
Spekboomveld (outside Elephant camp near No. 3 waterhole) (15)	<i>R. pumilio</i>	1	2	2	5	3,6
	<i>A. namaquensis</i>	—	1	1	2	1,4
	<i>S. campestris</i>	—	0	1	1	0,7
	All species	1	3	4	8	140
Karoo-bushveld (north of Caesar's dam) (12)	<i>R. pumilio</i>	11	10	10	13	14,8
	<i>P. natalensis</i>	1	6	10	17	8,1
	<i>A. namaquensis</i>	—	1	0	1	0,5
	<i>C. flavescens</i>	2	0	2	4	1,9
	<i>Desmodillus auricularis</i>	—	0	1	1	0,5
	All species	14	17	23	54	210
Antelope camp (in enclosure) (3)	<i>R. pumilio</i>	6	12	13	31	41,3
	<i>P. natalensis</i>	—	3	8	11	14,7
	<i>O. irroratus</i>	—	1	0	1	1,3
	<i>C. flavescens</i>	—	1	1	2	2,7
	All species	6	17	22	45	75

Antelope camp (outside enclosure) (3)	<i>R. pumilio</i>	-	1	2	3		10,0
	<i>P. natalensis</i>	-	0	1	1		3,3
	All species	-	1	3	4	30	13,3
Antelope camp (bushy ditch) (4)	<i>R. pumilio</i>	-	1	6	7		11,7
	<i>P. natalensis</i>	-	1	0	1		1,7
	<i>O. irroratus</i>	-	0	2	2		3,3
	All species	-	2	8	10	60	16,7
Bontveld (in enclosure) (6)	<i>R. pumilio</i>	1	4	2	7		17,5
	<i>P. natalensis</i>	-	1	0	1		2,5
	<i>O. irroratus</i>	-	1	2	3		7,5
	<i>C. flavescens</i>	-	0	1	1		2,5
	All species	1	6	5	12	40	30,0
Bontveld (outside enclosure) (6)	<i>R. pumilio</i>	-	2	0	2		6,7
	<i>P. natalensis</i>	-	0	1	1		3,3
	All species	-	2	1	3	30	10,0
Bontveld (8)	<i>R. pumilio</i>	1	8	3	12		17,1
	<i>P. natalensis</i>	-	3	2	5		7,1
	<i>O. irroratus</i>	-	1	0	1		1,4
	All species	1	12	5	18	70	25,7
Mixed scrub and grassveld (5)	<i>R. pumilio</i>	-	4	0	4		5,7
	<i>P. natalensis</i>	-	1	0	1		1,4
	<i>O. irroratus</i>	-	1	0	1		1,4
	All species	-	6	0	6	70	8,6
Coastal bush (9)	<i>R. pumilio</i>	-	2	0	2		2,9
	<i>P. natalensis</i>	-	3	1	4		5,7
	<i>A. namaquensis</i>	-	2	3	5		7,1
	All species	-	7	4	11	70	15,7

Despite of markedly improved vegetation cover prevailing in Spekboomveld during June 1974, only a slight increase in trap success was observed compared to those during the vegetationally poorer periods of August 1973 and January 1974 (Tables 3 to 5).

During both periods of trapping in the Bontveld (trap locality 6, Fig. 1; August 1973 and June 1974), the habitat was in a better condition inside the enclosure than outside, but more so during June 1974. Grassveld in the Bontveld outside the enclosure is heavily utilized by buffalo and eland. During June 1974 *Themeda triandra* with leaves still green was more abundant inside the enclosure than outside. The opposite was true for *Digitaria* spp. However, in spite of this improved Bontveld habitat, all-species trap success did not differ much compared to the previous period (August 1973). The difference between trapping in- and outside the enclosure showed the same marked difference in both cases (Tables 3 and 5). Trapping in an additional Bontveld locality (8) during June 1974, yielded success equal to that observed in the enclosure (Tables 3 and 5).

Within, as well as outside the Antelope Camp enclosure (trap locality 3, Fig. 1) grass cover was good during June 1974, compared to January 1974. The Antelope Camp area of the Park especially, is heavily utilised by eland and to a lesser extent by springbok and red hartebeest. This left

the enclosure well vegetated compared to that of the rest of the camp. In the enclosure *Panicum deustum* (still green) and *Cynodon dactylon* (dried out) were abundant while on the outside *P. deustum* was almost totally absent and *C. dactylon* grazed well down, leaving much less cover than in the enclosure for species like *Rhabdomys* and *Otomys*. This well vegetated enclosure yielded a higher rodent population (60 per cent trap success; Table 5) than during January 1974 (8,6 per cent; Table 4).

In the Karoo-bushveld community north of Caesar's Dam (trap locality 12; Fig. 1) a good grass stand was also present during June 1974, compared to extremely poor stands during previous visits. Mostly *Digitaria* sp. and *Eragrostis* sp. with very little *C. dactylon* and *P. deustum* were observed. All-species trap success during August 1973 (22,9 per cent) and June 1974 (25,7 per cent) were approximately the same, while during January 1974 it was clearly lower (0,7 per cent) (Tables 3 to 5).

The species and the number of individuals per species captured at various localities (Fig. 1) together with trap success are shown in Tables 3 to 5, while body measurements are shown in Tables 6 to 10.

Table 6

Aethomys namaquensis mean body mass, total length, tail length, head-and-body length, hind foot (s.u. and c.u.) and ear length together with the standard deviation, standard error, range and sample size of males and females in the Addo Elephant National Park during the period August 1973, January 1974 and June 1974

	MALES					FEMALES				
	\bar{x}	SD	SE	range	n	\bar{x}	SD	SE	range	n
BODY MASS										
Aug. 1973	46,200	10,849	4,852	29-58	5	41,375	13,866	4,902	18-61	8
Jan. 1974	53,000	2,449	1,225	50-56	4	50,167	9,683	3,953	35-61	6
June 1974	44,500	12,662	6,331	30-59	4	53,250	8,421	4,211	41-60	4
Total	47,769	8,990	2,493	29-59	13	46,945	10,921	2,574	18-61	18
TOTAL LENGTH										
Aug. 1973	266,600	27,181	12,156	226-302	5	259,667	37,984	12,661	194-304	9
Jan. 1974	285,000	10,231	5,115	272-297	4	284,400	11,502	5,144	270-295	5
June 1974	256,750	27,220	13,610	220-284	4	272,333	25,325	14,622	245-295	3
Total	269,231	21,393	5,934	220-302	13	269,117	28,890	7,007	194-304	17
TAIL LENGTH										
Aug. 1973	155,800	17,123	7,658	128-174	5	150,40	23,820	7,533	108-182	10
Jan. 1974	166,750	4,787	2,394	163-173	4	165,600	8,204	3,669	156-176	5
June 1974	149,750	12,038	6,019	134-163	4	162,667	14,011	8,090	149-177	3
Total	157,308	11,819	3,278	128-174	13	156,667	18,421	4,342	108-182	18

HEAD AND BODY LENGTH

Aug. 1973	110,800	10,803	4,831	98-128	5	109,444	15,125	5,042	84-131	9
Jan. 1974	118,250	6,652	3,326	109-124	4	118,800	7,662	3,426	111-130	5
June 1974	107,000	15,297	7,649	86-121	4	109,667	11,930	6,890	96-118	3
Total	111,923	10,415	2,889	86-128	13	112,235	12,118	2,939	84-131	17
HIND FOOT (s.u.)										
Aug. 1973	25,6	1,517	0,678	23-27	5	24,500	1,509	0,477	22-27	10
Jan. 1974	23,25	3,202	1,601	20-26	4	25,333	1,034	0,422	24-27	6
June 1974	25,00	—	—	25	4	25,500	1,291	0,646	24-27	4
Total	24,692	1,825	0,506	20-27	13	24,950	1,274	0,285	22-27	20
HIND FOOT (c.u.)										
Aug. 1973	27,00	1,225	0,548	25-28	5	26,2	1,687	0,533	23-29	10
Jan. 1974	25,00	3,559	1,780	21-28	4	27,000	1,414	0,577	25-29	6
June 1974	26,00	—	—	26	4	26,75	1,258	0,629	25-28	4
Total	26,077	1,915	0,531	21-28	13	26,55	1,457	0,326	23-29	20
EAR										
Aug. 1973	19,00	1,581	0,707	17-21	5	17,778	1,642	0,547	16-21	9
Jan. 1974	19,00	2,646	1,323	16-21	3	19,200	1,304	0,583	18-21	5
June 1974	18,00	0,817	0,408	17-19	4	19,500	1,000	0,500	18-20	4
Total	18,667	1,538	0,444	16-21	12	18,556	1,358	0,320	16-21	18

Table 7

Praomys (M.) natalensis mean body mass, total length, tail length, head-and-body length, hind foot (s.u. and c.u.) and ear length together with the standard deviation, standard error, range and sample size of males and females in the Addo Elephant National Park during the period August 1973, January 1974 and June 1974

	MALES					FEMALES				
	\bar{x}	SD	SE	range	n	\bar{x}	SD	SE	range	n
BODY MASS										
Aug. 1973	35,714	11,398	4,308	17-50	7	22,00	5,831	2,916	17-28	4
Jan. 1974	39,500	19,092	13,500	26-53	2	51,0	—	—	51	1
June 1974	41,154	17,129	3,359	18-86	26	36,333	12,026	2,314	18-59	27
Total	39,972	15,792	2,669	17-86	35	35,000	11,346	2,038	17-59	32
TOTAL LENGTH										
Aug. 1973	186,250	30,598	10,818	139-213	8	190,00	10,165	5,083	177-201	4
Jan. 1974	208,5	23,335	16,500	192-225	2	235,5	9,192	6,500	229-242	2
June 1974	197,308	24,089	4,724	154-245	26	189,690	22,846	4,242	143-237	29
Total	195,472	24,845	4,141	139-245	36	192,343	21,010	3,551	143-242	35

TAIL LENGTH

Aug. 1973	91,875	16,278	5,755	68-108	8	89,00	1,414	1,000	88-90	2
Jan. 1974	101,00	19,799	14,000	87-115	2	114,5	0,707	0,500	114-115	2
June 1974	91,962	11,018	2,161	70-112	26	87,581	9,909	1,780	64-106	31
Total	92,445	12,284	2,047	68-115	36	89,200	9,312	1,574	64-115	35

HEAD AND BODY LENGTH

Aug. 1973	94,375	14,966	5,291	71-106	8	102,000	2,828	2,000	100-104	2
Jan. 1974	107,50	3,536	2,500	105-110	2	121,0	8,485	6,000	115-127	2
June 1974	105,346	14,215	2,788	84-138	26	102,414	14,121	2,622	79-131	29
Total	103,028	13,765	2,294	71-138	36	103,515	13,303	2,316	79-131	33

HIND FOOT (s.u.)

Aug. 1973	20,250	0,886	0,313	19-22	8	20,500	1,291	0,646	19-22	4
Jan. 1974	20,00	—	—	20	2	20,00	—	—	20	2
June 1974	20,880	0,971	0,194	19-23	25	20,032	1,109	0,199	18-23	31
Total	20,686	0,937	0,163	19-23	35	20,081	1,110	0,188	18-23	37

HIND FOOT (c.u.)

Aug. 1973	21,625	0,744	0,263	21-23	8	22,750	1,258	0,629	21-24	4
Jan. 1974	22,00	—	—	22	2	22,00	—	—	22	2
June 1974	22,160	1,028	0,206	20-24	25	21,226	1,117	0,201	19-24	31
Total	22,029	0,956	0,166	20-24	35	21,433	1,114	0,188	19-24	37

EAR

Aug. 1973	18,167	0,982	0,401	17-20	6	17,500	1,732	9,866	16-20	4
Jan. 1974	19,5	0,707	0,500	19-20	2	18,00	—	—	18	1
June 1974	17,923	1,016	0,199	16-20	26	17,409	1,469	0,313	15-20	22
Total	18,059	0,971	0,167	16-20	34	17,444	1,474	0,289	15-20	27

Table 8

Rhabdomys pumilio mean body mass, total length, tail length, head-and-body length, hind foot (s.u. and c.u.) and ear length together with the standard deviation, standard error, range and sample size of males and females in the Addo Elephant National Park during the period August 1973, January 1974 and June 1974

	MALES					FEMALES				
	\bar{x}	SD	SE	range	n	\bar{x}	SD	SE	range	n
BODY MASS										
Aug. 1973	41,000	14,464	5,905	27-67	6	34,000	6,245	3,606	29-41	3
Jan. 1974	44,500	11,030	5,515	35-58	4	42,667	9,291	5,365	32-49	3
June 1974	45,667	12,183	1,467	9-63	69	43,250	14,936	2,156	9-73	48
Total	45,254	12,144	1,366	9-67	79	42,704	14,232	1,937	9-73	54

TOTAL LENGTH

Aug. 1973	214,286	23,507	8,885	185-254	7	223,000	4,243	3,000	220-226	2
Jan. 1974	231,750	9,600	4,785	223-241	4	209,750	26,196	13,098	173-230	4
June 1974	217,314	21,321	2,548	133-247	70	213,596	27,698	3,841	127-264	52
Total	217,765	20,904	2,323	133-254	81	213,655	26,886	3,530	127-264	58

TAIL LENGTH

Aug. 1973	106,857	8,707	3,291	99-119	7	112,500	2,210	1,500	111-114	2
Jan. 1974	110,000	2,944	1,472	107-113	4	101,000	13,589	6,795	82-108	4
June 1974	108,039	10,725	1,222	66-125	77	107,944	13,398	1,823	60-127	54
Total	108,034	10,296	1,098	66-125	88	107,633	13,066	1,687	60-127	60

HEAD AND BODY LENGTH

Aug. 1973	107,143	15,593	5,894	85-135	7	110,500	2,121	1,500	109-112	2
Jan. 1974	121,750	9,357	4,679	111-131	4	108,750	12,764	6,382	91-119	4
June 1974	108,900	12,452	1,458	67-130	70	105,923	15,068	2,090	64-137	52
Total	109,383	12,460	1,384	67-135	81	106,276	14,553	1,911	64-137	58

HIND FOOT (s.u.)

Aug. 1973	21,571	1,135	0,429	20-23	7	22,333	0,579	0,335	22-23	3
Jan. 1974	22,750	1,258	0,629	21-24	4	21,750	0,957	0,479	21-23	4
June 1974	22,823	1,534	0,173	16-25	79	22,444	1,657	0,225	17-25	54
Total	22,722	1,484	0,156	16-25	90	22,393	1,575	0,202	17-25	61

HIND FOOT (c.u.)

Aug. 1973	23,429	1,133	0,429	22-25	7	24,333	0,579	0,335	24-25	3
Jan. 1974	24,750	1,258	0,629	23-26	4	23,250	1,258	0,629	22-25	4
June 1974	24,367	1,602	0,180	17-27	79	24,074	1,789	0,244	18-27	54
Total	24,311	1,546	0,163	17-27	90	24,033	1,708	0,219	18-27	61

EAR

Aug. 1973	13,200	0,837	0,374	12-14	5	13,667	0,576	0,333	13-14	3
Jan. 1974	12,250	1,500	0,750	10-13	4	14,333	1,155	0,667	13-15	3
June 1974	14,441	0,951	0,124	11-16	59	14,071	1,198	0,185	11-17	42
Total	14,221	0,962	0,117	10-16	68	14,062	1,150	0,166	11-17	48

Table 9

Otomys unisulcatus mean body mass, total length, tail length, head-and-body length, hind foot (s.u. and c.u.) and ear length together with the standard deviation, standard error, range and sample size of males and females in the Addo Elephant National Park during the period August 1973, January 1974 and June 1974

	MALES					FEMALES				
	\bar{x}	SD	SE	range	n	\bar{x}	SD	SE	range	n
BODY MASS										
Aug. 1973	96,778	48,295	16,098	44-171	9	98,833	41,816	17,072	34-133	5
Jan. 1974	117,500	28,018	14,009	96-158	4	105,500	9,192	6,500	99-112	2
June 1974	127,000	36,194	14,777	59-156	6	121,400	33,336	14,909	83-162	5
Total	110,684	39,132	8,978	44-171	19	109,347	32,367	9,344	34-162	12
TOTAL LENGTH										
Aug. 1973	240,125	34,157	12,076	211-292	8	226,000	29,513	13,199	186-251	5
Jan. 1974	261,250	15,628	7,814	243-279	4	244,000	25,456	18,000	226-262	2
June 1974	263,667	32,426	13,238	204-293	6	256,600	21,478	9,606	230-276	5
Total	252,667	28,857	6,802	204-293	18	241,750	23,311	6,729	186-276	12
TAIL LENGTH										
Aug. 1973	92,375	14,520	5,134	75-113	8	88,600	11,887	5,316	74-103	5
Jan. 1974	105,250	10,782	5,391	95-116	4	92,500	19,092	13,500	79-106	2
June 1974	101,500	11,537	4,710	80-112	6	94,600	7,765	3,473	86-107	5
Total	98,278	12,103	2,853	75-116	18	91,750	10,317	2,978	74-107	12
HEAD AND BODY LENGTH										
Aug. 1973	147,750	21,446	7,582	122-181	8	137,400	19,743	8,830	112-158	5
Jan. 1974	156,000	6,272	3,136	148-163	4	151,500	6,364	4,500	147-156	2
June 1974	162,167	21,311	8,700	124-181	6	162,000	16,492	7,376	139-179	5
Total	154,389	18,163	4,281	122-181	18	150,000	15,631	4,512	112-179	12
HIND FOOT (s.u.)										
Aug. 1973	26,111	0,928	0,309	24-27	9	24,667	1,366	0,558	22-26	6
Jan. 1974	27,000	1,414	0,707	25-28	4	25,000	2,828	2,000	23-27	2
June 1974	27,333	1,752	0,715	25-30	6	25,400	0,894	0,400	24-26	5
Total	26,684	1,252	0,287	24-30	19	25,000	1,308	0,363	22-27	13
HIND FOOT (c.u.)										
Aug. 1973	29,111	1,167	0,389	27-31	9	28,333	1,367	0,558	26-30	6
Jan. 1974	29,750	2,630	1,315	26-32	4	27,500	2,121	1,500	26-29	2
June 1974	30,000	1,673	0,683	28-33	6	28,400	1,342	0,600	27-30	5
Total	29,526	1,592	0,365	26-33	19	28,231	1,324	0,367	26-30	13

EAR

Aug. 1973	21,000	1,852	0,655	18-23	8	21,400	1,949	0,8718	20-24	5
Jan. 1974	22,00	1,000	0,577	21-23	3	23,00	—	—	23	2
June 1974	22,333	1,034	0,422	21-23	6	21,800	1,095	0,490	21-23	5
Total	21,647	1,400	0,340	18-23	17	21,833	1,348	0,389	20-24	12

Table 10

Otomys unisulcatus mean body mass, total length, tail length, head-and-body length, hind foot (s.u. and c.u.) and ear length together with the standard deviation, standard error, range, and sample size of males and females in the Addo Elephant National Park during the period August 1973, January 1974 and June 1974

	MALES					FEMALES				
	\bar{x}	SD	SE	range	n	\bar{x}	SD	SE	range	n
BODY MASS										
Aug. 1973	143,50	26,163	18,500	125-162	2	93,000	18,385	13,000	80-106	2
Jan. 1974	74,800	62,512	27,984	20-146	5	71,5	16,263	11,500	60-83	2
June 1974	102,750	46,757	23,379	57-146	4	139,00	26,870	19,00	120-158	2
Total	97,455	47,858	14,430	20-162	11	101,167	16,276	6,645	60-158	6
TOTAL LENGTH										
Aug. 1973	267,50	10,607	7,500	260-275	2	237,00	19,799	14,000	223-251	2
Jan. 1974	200,800	47,378	21,189	138-260	5	247,500	50,205	35,500	212-283	2
June 1974	239,500	34,648	24,500	215-264	2	258,00	25,456	18,000	240-276	2
Total	224,222	35,867	11,056	138-275	9	247,500	26,685	10,895	212-283	6
TAIL LENGTH										
Aug. 1973	99,00	4,243	3,000	96-102	2	91,000	4,243	3,000	88-94	2
Jan. 1974	78,400	14,656	6,555	56-94	5	87,5	2,536	2,500	85-90	2
June 1974	92,000	2,828	2,000	90-94	2	99,00	15,556	11,000	88-110	2
Total	86,000	10,519	3,506	56-102	9	92,500	7,300	2,980	85-110	6
HEAD AND BODY LENGTH										
Aug. 1973	168,500	6,364	4,500	164-173	2	146,000	15,556	1,000	135-157	2
Jan. 1974	122,400	33,171	14,835	82-166	5	160,000	46,669	33,000	127-193	2
June 1974	147,500	31,820	22,500	125-170	2	159,00	9,900	7,00	152-166	2
Total	138,222	26,111	8,704	82-173	9	155,000	22,441	9,162	127-193	6
HIND FOOT (s.u.)										
Aug. 1973	26,5	0,707	0,500	26-27	2	25,000	—	—	25	2
Jan. 1974	23,800	0,837	0,374	23-25	5	25,500	0,707	0,500	25-26	2
June 1974	26,500	1,915	0,957	25-29	4	26,000	—	—	26	2
Total	25,273	1,196	0,361	23-29	11	25,500	0,707	0,500	25-26	6

HIND FOOT (c.u.)

Aug. 1973	29	—	—	29	2	27,00	—	—	27	2
Jan. 1974	25,600	1,517	0,678	24-28	5	28,00	1,414	1,000	27-29	2
June 1974	28,25	2,062	1,031	26-30	4	28,00	—	—	28	2
Total	27,182	1,482	0,447	24-30	11	27,667	1,414	1,000	27-29	6

EAR

Aug. 1973	21,5	0,707	0,500	21-22	2	21,5	2,121	1,500	20-23	2
Jan. 1974	19,800	2,864	1,281	16-24	5	22,0	—	—	22	1
June 1974	20,500	2,517	1,258	17-23	4	22,500	0,707	0,500	22-23	2
Total	20,364	2,287	0,690	16-24	11	22,000	1,118	0,500	20-23	5

Order Insectivora

Family Soricidae

Crocidura flavescens flavescens Red musk shrew

Meester (1961; 1963) recognizes no additional subspecies. *Crocidura flavescens*, previously believed to be excluded from areas with rainfall lower than 500 mm annually (Meester 1963), and therefore also from the South West Arid biotic zone, was captured in the Park during June 1974. Specimens were obtained near the Pond adjacent to the Nature Conservator's house, Karoo-bushveld, Bontveld (in enclosure) and in the Antelope Camp (in enclosure). These records constitute an extension of the known *C. flavescens* range. This species has now apparently also been recorded from owl pellets collected near Springbok in Little Namaqualand (Meester *pers. comm.*) where the rainfall is less than 300 mm per annum depending on the exact locality of the owl pellet collecting site.

C. flavescens seems to be partial to well vegetated areas within its range (Meester 1963) and might, therefore, to a certain extent occur in drier areas (500 mm rainfall per annum) where dense vegetation prevails, e.g. the Addo Bush. In the present study, however, it was not captured in the denser areas of the Park, e.g. Spekboomveld (Table 5). One pregnant female (P5/2) was observed in June 1974.

The following body measurements were obtained for males: mass \bar{x} = 34,0 gm (range 33 to 35), TL \bar{x} = 165,0 mm (range 155 to 175), T \bar{x} = 58,0 mm (range 51 to 65), HF (s.u./c.u.) \bar{x} = 16,5/18 mm (range 16 to 17/18), E \bar{x} 12,5 (range 12 to 13), n = 2; and females: mass \bar{x} = 31,5 g (range 21 to 49), TL \bar{x} = 163,3 mm (range 148 to 178), T \bar{x} = 55,0 mm (range 47 to 58), HF (s.u./c.u.) \bar{x} = 14,8/15,8 (range 14 to 15/15 to 16), E \bar{x} = 12 mm (range 11 to 13), n = 4.

Crocidura cyanea infumata Reddish-Grey musk shrew

One specimen of this species is recorded from the Park by de Graaff and Nel (1970) but it was not captured during the present study. According to Meester (1963) *C.c. infumata* occurs in the Southern Savannah biotic zone and is mostly restricted to the above 500 mm mean annual rainfall zone. It has apparently nowhere been recorded far outside this zone.

Order Chiroptera

Family Pteropidae

Rousettus (Rousettus) aegyptiacus leachi Egyptian fruit bat

Rousettus aegyptiacus is widely distributed throughout Africa and extraliminally in Madagascar and Africa. Four subspecies are recognized of which *R. a. leachi* occurs in Southern and Eastern Africa (Hayman and Hill 1971). One specimen of this species was found trapped in the growth of a thorny bush.

Family Vespertilionidae

Eptesicus (Eptesicus) capensis Cape serotine bat

Hayman and Hill (1971) call for a revision of this species before a conclusion concerning subspecies status can be reached. A colony of these bats was present in the attic of the Nature Conservator's house. According to Shortridge (1934) they are gregarious, while Ansell (1960) and Smithers (1971) regard them as being solitary.

Order Primates

Family Cercopithecidae

Superspecies *aethiops*

Cercopithecus (Cercopithecus) pygerythrus pygerythrus Vervet monkey
(see Dandelot 1971).

Various sight records of the vervet monkey were obtained in the Spekboom Community.

Order Carnivora

Family Canidae

Canis mesomelas mesomelas Black-backed jackal

Sight records and the frequent call of these animals at night confirm the presence of a fair number of black-backed jackal. *Vulpes chama* (Silver jackal) previously reported to occur in the Park (Labuschagne and van der Merwe 1963), in all probability does not occur.

Family Mustelidae

Ictonyx striatus Striped polecat

Poecilogale albinucha White-naped weasel

Status of subspecies uncertain (Meester *et al.* 1964).

According to the Nature Conservator, genets do occur. Pending a revision, two *Genetta* spp. are recognized in Southern Africa. Both *G. genetta* and *G. tigrina*, are reported to occur in the vicinity of the Park (Skead 1958; Meester *et al.* 1964) but in the absence of specimens no identification is possible.

Herpestes pulverulentus Cape Grey Mongoose

Suricata suricatta Suricata

Sight records confirm the presence of both species.

Family Protelidae

Proteles cristatus cristatus Aardwolf

Validity of subspecies uncertain (Meester *et al.* 1964). According to the Nature Conservator the aardwolf occurs.

Family Felidae

Felis caracal caracal Caracal

Specimens obtained from farms adjacent to the Park makes it justifiable to assume their presence within the Park.

Order Tubulidentata

Family *Orycteropus afer afer* Aardvark

Distributed throughout the Park but fairly uncommon.

Order Lagomorpha

Family Leporidae

Lepus saxatilis albaniensis Scrub hare

The distribution of this subspecies, recognized by Petter (1971), is given by Roberts (1951) as Fish River Valley towards King William's Town and inland to Middelburg. It is geographically the nearest subspecies described to the study area and, therefore, the two specimens obtained from the Park are identified accordingly.

The occurrence of *Lepus capensis* (de Graaff and Nel 1970) is in doubt, while *Pronolagus crassicaudatus* previously reported to occur (de Graaff and Nel 1970) almost definitely does not occur.

Order Rodentia

Family Bathyergidae

Cryptomys hottentotus hottentotus Common mole-rat

Only a few specimens are obtained due to a minimum trapping effort. It is, however, judging according to the presence of mole heaps, widely distributed throughout the Park in all vegetation types.

Family Hystricidae

Hystrix africae-australis Cape porcupine

No other subspecies are recognised (Misonne 1971). The presence of porcupines is evident from quills collected at various localities.

Family Pedetidae

Pedetes capensis capensis Spring hare

Meester *et al.* (1964) listing six subspecies, state that probably too many are recognized. Misonne (1971) recognizes only one. According to the Nature Conservator, spring hares are uncommon.

Family Muscardinidae

Graphiurus (Claviglis) murinus Forest dormouse

No further subspecies are listed by Misonne (1971). One specimen was obtained from the Coastal Bush in the Brandkloof area during January 1974 (Table 4).

Family Muridae

Subfamily Murinae

Aethomys namaquensis namaquensis Namaqua rock rat

Meester *et al.* (1964) recognizes two subspecies in Southern Africa but speculates that more might be valid. *Aethomys namaquensis* was obtained from the following habitats: Karoo-bushveld, Karoo-spekboomveld ecotone, Spekboomveld, Bontveld, and Coastal Bush. It was notably absent from the Antelope Camp. Although also absent from the Mixed Scrub and Grassveld Community this could possibly be ascribed to a too small trap effort (Tables 3 to 5).

Although *A. namaquensis* was relatively common in the Karoo-spekboomveld ecotone in August 1973 (Table 3), it was absent from the Karoo-bushveld during this time. In June 1974 one specimen was obtained from the Karoo-bushveld, while the ecotone was not sampled again.

Five specimens of *A. namaquensis* were caught in the Bontveld during August 1973 (Table 3; trap locality 6, outside enclosure) and none in June 1974 (Table 5; trap localities 6 and 8).

During both periods of trapping in Coastal Bush habitats, *A. namaquensis* proved to be the most abundant species (Tables 4 and 5; Fig. 1; trap localities 9 and 10).

During August 1973 no reproductive activity was observed in *A. namaquensis*, while during January and June 1974 both males and females were found to be active. An average of 4 foetuses ($n = 2$, range 3 to 5) was observed. No significant departure from a 1:1 sex ratio was found ($X^2 = 1,400$). The male ratio was 40 per cent ($n = 35$).

From the body measurements of *A. namaquensis* obtained (Table 6) no sexual dimorphism is apparent. Tail length comprises 58,3 per cent of total length in specimens from the Park.

Four specimens obtained by de Graaff and Nel (1970) were thought to be possibly *A. granti*. However, they later proved to be *A. namaquensis* (Nel *pers. comm.*).

Praomys (Mastomys) natalensis Multimammate mouse

Several subspecies have been described of which the validity seems to be doubtful (Meester *et al.* 1964; Misonne 1971). This species was obtained from all habitats sampled, with the exception of the Spekboomveld outside the elephant camp. During August 1973 trap success exceeded 10 per cent in one (Karoo-bushveld) of the six trap localities from which *P. natalensis* was recorded (Table 3). During January 1974 *P. natalensis* trap success never exceeded 10 per cent. Not even when the trap success for species was combined, did it exceed 10 per cent at any one trap locality during this time (as seen above, and in Table 4). During June 1974 *P. natalensis* showed a higher than 10 per cent success at only one (Antelope Camp enclosure) of the 12 localities from which this species was obtained.

Praomys natalensis is generally assumed to be nocturnal (e.g. Grant in Shortridge 1934; Ansell 1960; Delany 1964; Delany and Kansime-ruhanga 1970; Smithers 1971). Veenstra (1958) reports that wild recently captured *P. natalensis* showed two peaks of activity one at dusk and a larger one at sunrise. A small amount of activity was also observed during the day.

Laboratory animals apparently show only the latter peak and much more activity during the day. In the present study, in contrast to most literature cited, a number of specimens was trapped during the day (between 13h00 and 15h00), therefore suggesting a certain amount of diurnal activity in the wild. These animals were obtained from the Antelope Camp enclosure during June 1974, at a time of high population numbers.

During August 1973 *P. natalensis* males were found to be reproductively active while no pregnant females were encountered. During January and June 1974 both males and females were reproductively active. A mean of 8,2 foetuses per pregnant female ($n = 7$, range 5 to 13) was observed. In the right horn of the uterus the mean was 4,9 (range 1 to 8) and in the left 3,3 (range 1 to 5).

No significant departure from a 1:1 sex ratio was observed ($X^2 = 0,013$). The male ratio proved to be 50,7 per cent ($n = 75$).

Mean, standard deviation and standard error of *P. natalensis* body measurements are in Table 7. According to this information males have longer hind feet than females (HF s.u.: $t = 2,492$, d.f. 70, $p < 0,02$; HF c.u.: $t = 2,430$, d.f. 70, $p < 0,02$).

When tail length was plotted against head-and-body length it was found that older (bigger) animals tend to have relatively shorter tails. This was also observed by Coetzee (1967), Chapman, Chapman and Robertson (1959), and Hanney (1965). It was, however, not found to be the case in a live trap study near Pongola in northern Natal where tail length tended to be relatively longer in older animals (Swanepoel unpublished data).

Chapman *et al.* 1959 and Hanney (1965) used the anus to tail tip method of measuring tail length, which is inadvisable and gives erroneous results (Coetzee 1967). This method results in longer tail and shorter head-and-body measurements compared to the vertebral method used in the present study and is, therefore, not directly comparable. Only 8,7 per cent of *Praomys natalensis* in the present study ($n = 69$) showed tail length to be equal or longer than head-and-body length. *Praomys natalensis* from Pongola has relatively longer tails (50,9 per cent of total length) than those from the Congo (Dieterlen 1967), Uganda (Delany and Neal 1966), and Addo (46,8 per cent of total length) but seem to be smaller in total length except in the case of Addo where total length compares favourably.

Rhabdomys pumilio Four-striped mouse

This species needs revision and therefore no subspecies is listed (see Meester *et al.* 1964; Misonne 1971).

Rhabdomys pumilio was recorded in all the vegetation types sampled, with the exception of the Karoo-Spekboomveld ecotone in the area north of Caesar's Dam. It is, however, not concluded that it does not occur in this habitat. This plant community was only sampled during the first visit to the Park when grass cover was absent from the area. If it had been sampled during June 1974 when grass was abundant, *R. pumilio* would most probably have been recorded.

Rhabdomys pumilio was not recorded from the Spekboomveld prior to June 1974. This is also thought to be mainly due to the virtual absence of grass cover in this vegetation type during the first two visits (August 1973 and January 1974). The improvement of the grass cover in the Spekboomveld and other communities during June 1974 was also reflected in the *R. pumilio* numbers observed throughout the Park during this time. During June 1974 *R. pumilio* was the most abundant species in all the habitats sampled with the exception of the Coastal Bush Community, where both *A. namaquensis* and *P. natalensis* numbers exceeded that of *R. pumilio* (Table 5). During August 1973 and January

1974, *R. pumilio* was, however, relatively less common than during June 1974 (Tables 3 and 4).

During August 1973 *Rhabdomys pumilio* trap success exceeded a 0,0 per cent at two of the six localities (Bontveld enclosure, and edge of Bontveld) from which it was obtained (Table 3). During January 1974 no localities sampled yielded *R. pumilio* trap success above 10 per cent (Table 4), while during June 1974 eight of the 13 showed trap success to be 10 per cent or more (Table 5).

During August 1973 only males were found to be reproductively active while both males and females were active in January and June 1974. A mean of 5,5 foetuses per female was observed ($n = 21$, range 3 to 11). In the right horn of the uterus the mean was 2,5 (range 1 to 6) and in the left 3,0 (range 1 to 5). The sex ratio proved to be 1:1 (male ratio : 54,3 per cent; $n = 173$; $X^2 = 1,301$).

Although male body measurements usually averaged more than those of females no significant differences exist (Table 8). Therefore no sexual dimorphism is apparent from the body measurements of *R. pumilio* in the Park.

Mean head-and-body length of *R. pumilio* from Augrabies Falls National Park is 111,9 mm and that from Golden Gate Highlands National Park is 99,5 mm (Coetzee 1970). Smithers (1971) found mean head and body length in specimens from southwestern Botswana to be 107,3 mm and those from Lobatse, Gaborone and Baralong area to be 106,4 mm. In the present study it is 108,1 mm. Therefore, comparable to those of Augrabies and Botswana but larger than that found at Golden Gate. All those localities with the exception of Golden Gate are situated in dry hot areas. Mean tail length in southwestern Botswana comprises 49,6 per cent of mean total length. Comparable localities to this area are Augrabies (tail length 52,4 per cent of total length) and Rietfontein (tail length 52,0 per cent of total length) (Coetzee 1970). Tail length was found to comprise 49,9 per cent of total length in material from the study area, while Coetzee (1970) reports 52,2 per cent in material from Uitenhage (approximately 45 km SW of the study area).

In the drier areas, *R. pumilio* head-and-body length appears from the above to be approximately the same, while tail length seems to vary even within the same general area. Relative tail length is known to differ in different age (or size) classes, becoming relatively shorter in the bigger animals (Hanney 1965). No such difference was apparent in the present study when tail length was plotted against head-and-body length. Caution should, however, be taken in making conclusions on unrepresentative samples and without taking age (or tooth wear classes) into account.

Mus minutoides Pygmy mouse

This species is badly in need of revision and more than one species might prove to be represented in southern Africa (Meester *et al.* 1964).

One specimen of this species was captured in the Spekboomveld during June 1974. It is apparently uncommon.

Rattus rattus Black or Brown rat

It is an introduced species, mainly associated with man. Specimens were collected in the out-buildings of the rest camp.

Family Cricetidae

Subfamily Cricetomyinae

Saccostomys campestris Cape pouched mouse.

The affinities of this genus are controversial.

Saccostomus campestris was only recorded from the Spekboomveld and in low numbers. Body measurements obtained are of females only. Mass \bar{x} = 39 gm (range 36 to 42); TL \bar{x} = 147,3 mm (range 146 to 149); \bar{x} = 43 mm (range 42 to 44); HF. (s.u./c.u.): \bar{x} = 17,3 mm/19 (range 16 to 18/18 to 20); E \bar{x} = 17,7 mm (range 17 to 18); n = 3.

Subfamily Gerbillinae

Desmodillus auricularis Namaqua gerbil

This South West Arid biotic zone species occurs only in the Karoo-bushveld and Karoo-Spekboomveld ecotone vegetation types. Therefore, as in the case of *O. unisulcatus* (see below), it occurs in communities representing the drier South West Arid elements. *E. auricularis* is extremely scarce and only two specimens were captured during the study (Tables 3 and 5).

Subfamily Otomyinae

Otomys irroratus irroratus Vlei rat

According to Meester *et al.* (1964) animals from this area belong to the subspecies *O. i. irroratus* but Misonne (1971), pending a revision, lists no subspecies.

Otomys irroratus was, with the exception of the Open Spekboomveld, Karoo-bushveld, and Karoo-Spekboomveld ecotone, captured in all plant communities.

This species was recorded within the enclosures in the Bontveld (trap locality 8) and the Antelope Camp (trap locality 4). Its absence outside the enclosures (trap locality 3 and 6) is ascribed to a lack of cover during the time of trapping.

When *Otomys irroratus* numbers and trap success, obtained at the Pond (trap locality 2) during June 1974 (Table 5) are compared to those obtained during August 1973 (Table 3) and January 1974 (Table 4), there seems to be no positive correlation between the improved habitat condition which prevailed in June 1974, and *O. irroratus* numbers and trap success. The same holds true for numbers and trap success in the

Antelope Camp enclosure (trap locality 3) when the two periods January (Table 4) and June 1974 (Table 5) are compared.

Davis (1973) after scanning the literature and doing an activity study in the field came to the conclusion that *O. irroratus* is primarily crepuscular. In the present study it was obtained from traps during the early morning as well as later during the day.

O. irroratus males as well as females were found to be reproductively active during all visits to the Park. The mean number of foetuses found per female was 2,1 (range 1 to 3; $n = 10$), with the mean for the right uterus horn 1,0 range (0 to 3) and that of the left horn, 1,1 (range 0 to 2). The sex ratio of the animals captured did not differ significantly from a 1:1 ratio ($X^2 = 0,714$). The male ratio was 57,1 per cent ($n = 35$).

Mean, standard deviation, and standard error of *O. irroratus* body measurements are shown in Table 9. Male hind foot length exceeds that of females significantly (HF s.u.: $t = 3,640$, d.f. 30, $p < 0,01$; HF c.u.: $t = 2,414$, d.f. 30, $p < 0,05$). No sexual dimorphism is present in the other body measurements. Tail length was found to comprise 38,5 per cent of total length.

Otomys unisulcatus unisulcatus Bush Karoo rat

Otomys unisulcatus was only recorded from the Open Spekboomveld, Karoo-spekboomveld ecotone, and the Karoo-bushveld Communities. Therefore, *O. unisulcatus* and *O. irroratus* are distributionally nearly exclusive, the exception being the Spekboomveld Community where both species were captured.

Otomys unisulcatus is uncommon in Spekboomveld. One specimen only, was obtained from this plant community, in January 1974 (trap locality 16). It is, however, fairly common in Open Spekboomveld (trap locality 1). It was present in the Karoo-bushveld during August 1973 but absent during subsequent visits (Tables 3 to 5).

Being present in the Spekboomveld Community, *O. irroratus* might also be present in the Open Spekboomveld as well as in the Karoo-Spekboomveld ecotone and, therefore, *O. irroratus* and *O. unisulcatus* would probably also come in contact in these habitats.

The familiar stickpile nests (Shortridge 1934; Roberts 1951) of *O. unisulcatus* were only observed in the Open Spekboomveld (trap localities 1 and 16), Karoo-bushveld (locality 12), and Karoo-spekboomveld ecotone (locality 13). It was never observed in the Spekboomveld.

An example of a clear-cut line in their distribution is illustrated at the Pond, where *O. irroratus* occurs in the mesic habitat surrounding the pond while *O. unisulcatus* occurs within 20 m to 30 m from the Pond in the drier Open Spekboomveld. In spite of extensive trapping at these two localities during the visits to the Park, *O. irroratus* was never found in the Open Spekboomveld near the Pond, while *O. unisulcatus* again, was never found in the moist habitat around the Pond (Tables 3 to 5).

Otomys unisulcatus is a South West Arid biotic zone species with marginal encroachment in the South-West Cape biotic zone (Davis 1962), and possibly the Southern Savanna Woodland subzone. Davis (1962) assumes the area which roughly includes the Sunday's River Valley Bushveld, to be biotically South West Arid (annual rainfall <500 mm) and, therefore, does not regard *O. unisulcatus* as marginally encroaching in the Southern Savanna.

Otomys unisulcatus has been reported to be diurnal (Roberts 1951) but in the present study they were also obtained from traps early in the morning, indicating them to be crepuscular as well.

During January 1974, a stomach of *O. unisulcatus* examined yielded vegetable matter and a few seeds. Roberts (1951) reports that it feeds on green vegetable matter. In the dry habitat in which it usually occurs, green vegetable matter is not always available and, therefore, drier material (e.g. seeds) will have to be taken under such adverse conditions.

Both males and females were reproductively active during all visits. Mean number of foetuses per female was 2,0 (range 1 to 3; n = 4).

No significant departure from a 1:1 sex ratio was observed ($X^2 = 1,800$). The males ratio is 65,0 per cent (n = 20). No sexual dimorphism in body measurements was observed. Tail length comprises 37,9 per cent of total length in the specimens from the study area.

Conclusions

According to Liversidge (1965) the Spekboomveld (covering 90 per cent of the Park area) is particularly poor in variety of bird species, while the Karoo-bushveld (covering 7 per cent of the Park area) has a relatively high number of species. In the present study Spekboomveld yielded the largest number of rodents species (seven), and Karoo-bushveld six. Although Bontveld also yielded six species, this also include *Cryptomys hottentotus* which occurs in the former two habitats as well.

A relatively rich variety of small mammal species could be demonstrated for the Spekboomveld, but quantitatively it seems that this habitat generally yields less than most of the other habitats.

Rodent numbers proved to be highest during the wetter period (June 1974). *Rhabdomys pumilio* was more common during this period, while most of the other rodent species did not show a marked difference in numbers, between the dry and wet seasons.

Of the species obtained by trapping in the present study *R. pumilio*, *P. natelensis*, an *A. namaquensis* proved to be widely distributed throughout the Park, while *Cryptomys hottentotus* occurs in most plant communities.

Liversidge (1965) finds the birds of the Park to be a mixture of arid west and humid coast types and states that despite the impression of dominant arid west type habitat, the avifauna tends to be more related to the east coast type. He cites the absence of larks and other karroid birds species to support this statement. Small mammals, typical of the South

West Arid but not endemic to it, present in the area are *O. unisulcatus* and *D. auricularis*. They were found to be associated with the drier vegetational elements while animals more typical of the Southern Savannah but not endemic to it are *O. irroratus* and *C. flavescens*. They again are more associated with the relatively moister habitats. *Otomys irroratus* and *O. unisulcatus* are distributionally almost exclusive. Both species occur in Spekboomveld, although only one *O. unisulcatus* specimen was obtained from this plant community.

De Graaff and Nel (1970) found an average all-species trap success of 10,8 per cent but gives no breakdown of trap success per habitat or species. Therefore, no fruitful comparison with the present study could be made. In the present study the average-species percentage trap success for the different periods was as follows: Aug. 1973 – 16,7 per cent; Jan. 1974 – 4,2 per cent and June 1974 – 25 per cent.

Acknowledgements

I am grateful to the National Parks Board of Trustees for approving and financially assisting the project; to Mr. B. L. Penzhorn for reading and commenting on the manuscript; to Prof. J. Meester for commenting on the manuscript at an earlier stage; to the Nature Conservator of the Addo Elephant National Park, Mr. P. van Staaten, who assisted in many ways; and to Mr. Comen Shai for preparing the specimens.

REFERENCES

- ACOCKS, J. P. H. 1953. Veldtypes of South Africa. *Mem. bot. Surv. S. Afr.* 28.
- ANSELL, W. F. H. 1960. *Mammals of Northern Rhodesia*. Lusaka: Government Printer.
- ARCHIBALD, E. E. A. 1955. An ecological survey of the Addo Elephant National Park. *J. S. Afr. Bot.* 20:137–154.
- CHAPMAN, B. M., R. F. CHAPMAN and I. A. D. ROBERTSON. 1959. The growth and breeding of the multi-mammate rat, *Rattus (Mastomys) natalensis* (Smith) in Tanganyika Territory. *Proc. zool. Soc. Lond.* 133:1–9.
- COETZEE, C. G. 1967. The breeding season and population structure of the multimammate mouse *Praomys (Mastomys) natalensis* (A. Smith, 1834) in the Transvaal Highveld. M.Sc Thesis, University of Pretoria.
- COETZEE, C. G. 1970. The relative tail length of the striped mice *Rhabdomys pumilio* Sparrman 1784 in relation to climate. *Zool. afr.* 5(1):1–6.
- DANDELLOT, P. 1971. Order Primates, main text. In: MEESTER, J. and H. W. SETZER (eds.) 1971. *The mammals of Africa: An identification manual*. Washington D.C.: Smithsonian Institute Press.

- DAVIS, D. H. S. 1962. Distribution patterns of Southern African Muridae, with notes on some of their fossil antecedents. *Ann. Cape prov. Mus.* 2:56-76.
- DAVIS, R. M. 1973. The ecology and life history of the Vlei rat, *Otomys irroratus* (Brants, 1827), on the Van Riebeeck Nature Reserve, Pretoria. D.Sc. Dissertation, University of Pretoria.
- DE GRAAFF, G. and J. A. J. NEL. 1970. Notes on the smaller mammals of the Eastern Cape National Parks. *Koedoe* 13:147-149.
- DE GRAAFF, G., K. C. A. SCHULZ and P. T. VAN DER WALT. 1973. Notes on rumen contents of Cape buffalo *Syncerus caffer* in the Addo Elephant National Park. *Koedoe* 16:45-58.
- DELANY, M. J. 1964. A study of the ecology and breeding of small mammals in Uganda. *Proc. zool. Soc. Lond.* 142:347-370.
- DELANY, M. J. and W. D. K. KANSIIMERUHANGA. 1970. Observations on the ecology of rodents from a small arable plot near Kampala, Uganda. *Rev. zool. Bot. Afr.* LXXXI:417-425.
- DELANY, M. J. and B. R. NEAL. 1966. A review of the Muridae (Order Rodentia) of Uganda. *Bull. Br. Mus. nat Hist. Zoology B* 13:297-355.
- DIETERLEN, F. 1967. Jahreszeiten und Fortpflanzungs Perioden bei den Muriden des Kivusee-Gebietes (Congo). *Z. Säugetierk.* 32:1-44.
- HANNEY, P. 1965. The Muridae of Malawi (Africa: Nyasaland). *J. Zool., Lond.* 146(4):577-633.
- HAYMAN, R. W. and J. E. HILL. 1971. Order Chiroptera In: MEESTER, J. and H. W. SETZER (eds.) 1971. *The mammals of Africa: An identification manual*. Washington D.C.: Smithsonian Institute Press.
- LABUSCHAGNE, R. J. and N. J. VAN DER MERWE. 1963. *Mammals of the Kruger and other National Parks*. Pretoria: National Parks Board.
- LIVERSIDGE, R. 1965. The birds of the Addo Elephant National Park. *Koedoe* 8:41-67.
- MEESTER, J. A. J. 1961. A taxonomic revision of Southern African Crocidura (Mammalia: Insectivora) *Ann. Mag. Nat. Hist.* 13(4): 561-571.
- MEESTER, J. 1963. A systematic revision of the shrew genus *Crocidura* in Southern Africa. *Transvaal Museum Memoir* 13.
- MEESTER, J. 1965. The origins of the Southern African Mammal fauna. *Zool. afr.* 1:87-95.
- MEESTER, J., D. H. S. DAVIS, and C. G. COETZEE. 1964. *An interim classification of Southern African Mammals*. Z.S.S.A. and C.S.I.R. (Roneod).
- MISSONNE, X. 1971. Order Rodentia. In: MEESTER, J. and H. W. SETZER (eds.) 1971. *The Mammals of Africa: An identification manual*. Washington, D.C.: Smithsonian Institution Press.
- PENZHORN, B. L. 1971. A summary of the re-introduction of ungulates into South African National Parks (to 31 December 1970). *Koedoe* 14:145-159.
- PENZHORN, B. L., P. J. ROBBERTSE, and MARIA C. OLIVIER.

1974. The influence of the African Elephant on the vegetation of the Addo Elephant National Park. *Koedoe* 17:137-158.
- PETTER, F. 1971. Order Lagomorpha. In: MEESTER, J. and H. W. SETZER (eds.) 1971. *The mammals of Africa: an identification manual*. Washington, D.C.: Smithsonian Institution Press.
- ROBERTS, A. 1951. *The Mammals of South Africa*. Johannesburg: "The Mammals of South Africa" Book Fund.
- SHORTRIDGE, G. C. 1934. *Mammals of South West Africa*. Vol. I. London: Heineman.
- SKEAD, C. J. 1958. Mammals of the Uitenhage and Cradock districts C.P. in recent times. *Koedoe* 1:19-59.
- SMITHERS, R. H. N. 1971. The mammals of Botswana. *National Museums of Rhodesia Memoir* 4.
- TOERIEN, D. K. 1972. Geologie van die Addo-olifant Nasionale Park. *Koedoe* 15:67-75.
- VAN DER MERWE, C. R. 1962. *Soil groups and sub groups of South Africa*. 2nd and Revised ed. Science bulletin No. 231. Pretoria: Government Printer.
- VEENSTRA, A. J. F. 1958. The behaviour of the Multimammate mouse *Rattus (Mastomys) natalensis*. *Anim. Behav.* 6:195-206.
- WEATHER BUREAU. 1957. *Climate of South Africa IV. Rainfall maps*. Pretoria: Government Printer.

THE HORN BASES OF THE REEDBUCK *REDUNCA ARUNDINUM*

H. JUNGIUS

World Wildlife Fund

1110 Morges

Switzerland

and

C. P. CLAUSSEN

Institut für Pathologie der

Medizinischen Akademie

Lübeck

W. Germany

Abstract — The structure and function of the horn bases of the reedbuck *Redunca arundinum* are discussed. It is shown that the white colouration which often occurs is not caused by glandular secretion but by small horn particles which are shed, exposing the lighter coloured material underneath. The shining horn base probably plays a role in the display behaviour of males.

Introduction

The objective of this study is to elucidate the structure and the function of the conspicuous white horn bases of the common reedbuck *Redunca arundinum*. It is of interest to examine this phenomenon, not only because it is a typical characteristic of the species, but also because Millais (1895) recorded that the horn bases produce an oily secretion during the mating season, a statement which to the best of our knowledge has never been refuted.

This paper is part of a comprehensive field study on the behaviour and the biology of the reedbuck in which the senior author was engaged in the Kruger National Park, Republic of South Africa, from March 1967 to April 1968 (Jungius 1970, 1971a, 1971b).

Material and Methods

The reedbuck is a medium sized antelope with a shoulder height of 80cm – 105cm in rams and 65cm – 95cm in ewes (Haltenorth 1963). The general colour is brown with a marked tendency to buff or yellow. In the Kruger National Park the species frequents reedbeds along rivers, vleis, the tall grassveld and tree savannah. They live very concealed, alone or in families, and are easily overlooked by the careless observer (Jungius 1971a).