

NOTES ON THE MAMMAL FAUNA OF THE
AUGRABIES FALLS NATIONAL PARK AND
SURROUNDING AREAS, WITH SPECIAL
REFERENCE TO REGIONAL ZOOGEOGRAPHICAL
IMPLICATIONS

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Abstract - An annotated checklist of the mammals recorded by direct or indirect means on or near the Augrabies Falls National Park, is provided. Speculations are offered as to which species have become locally extinct during historical times. The Orange River as a faunal dispersal corridor and barrier, is considered. A numerical analysis to determine whether the Augrabies Falls district falls within the Namib or the South West Arid biotic zone, is discussed.

Introduction

Many nature reserves have been proclaimed in southern Africa since the turn of the century. Initially, the prime consideration for the establishment of a new reserve has been the protection of larger mammals. More recently, several attempts were launched to proclaim reserves representative of the various biomes of southern Africa. In the latter case, one of the first objectives has been the reintroduction of game species that may have become locally extinct in historical times. However, some 70% of all southern African mammal species are smaller than a Black-backed Jackal, and this

coupled to a nocturnal or retiring nature render them difficult to the casual eye to detect or observe. Earlier management programs for conservation areas were primarily concerned with big game species. However, more recently it was realised that the wide diversity of smaller less obtrusive mammals with their relatively much higher population densities, approach the biomass of the large species component of a reserve. This implies that smaller mammals exert an influence on any ecosystem that in magnitude may be comparable to that of larger mammals. A need has therefore also arisen for a more intimate knowledge on the smaller mammals of any reserve, in addition to information on which species are now absent from the large mammals component through over exploitation.

The spate of publications in recent years dealing with the faunal diversity of selected areas, is interpreted as being mainly in reaction to the above-mentioned requirement for a more detailed picture of the various ecological components of a conservation area, and is geared towards more efficient management policies and practices. These regional faunal checklists are also of value to modern systematists, in the newly acquired material thus made available for specialist studies, is announced to the scientific community in this way.

Another need for areal faunal lists is to be found in the discipline of zoogeography. Various southern African zoogeographical regions and subregions have been defined in the past (see for instance Davis 1962; Liversidge 1962; Meester 1965; Rautenbach 1978). All these various approaches to defining zoogeographical regions are deductive in nature, as such being based on differential floral communities. The baseline assumption is that faunal communities are adapted *in toto* to major floral communities, and react adaptively to gradual changes occurring in the floral environment. The only way to verify the validity of these zoogeographical regions and subregions, is to directly compare the complete faunal diversities of as many localities as possible on a countrywide basis, with each other. This can be achieved by means of a multivariate computer analysis which generates a phenogram of faunal similarity between the various localities. The latter can then be compared with the existing conventional subdivisions to validate its correctness and accuracy. However, such a detailed comparison of areal faunal composition is not possible as yet as a result of lack of sufficient regional faunal lists.

Study Area

The Augrabies Falls National Park (AFNP) *per se*, flanks the Orange River at the spectacular Augrabies Falls (about 28°35'S, 20°21'E) and is situated from the falls downstream in a westerly direction. The Park is situated in the arid northern Cape Province of the Republic of South Africa and comprises *ca.* 9 441 hectare. Originally, the Park was proclaimed around the impressive waterfalls, which have always been a popular tourist attraction (3 750 ha). During 1969 an exchange of ground resulted in an

increase of the Park area (5 403 ha), to be followed in 1975 by the acquisition of another 4 038 ha to the north of the river.

The Park forms part of an extensive highlying plain which is being drained by tributaries of the Orange River. At the Park headquarters the water thunders down a cascade with a total height of 91 m, while the main falls has a vertical height of 56 metres. From this point westwards, the river meanders down a deep and wide gorge for approximately 18 km before reaching the level surface of the surrounding plains once again. The river and gorge therefore divides the Park into two virtually unbridgeable, separate units along its northern and southern banks.

The Orange River enters the Park in the east as three, perennial streams, with the main stream northernmost. These streams merge ahead of the main falls and below the falls tend to ramify resulting in eight islands of different shapes and sizes.

Geologically, a continental uplift occurred in the area during the late tertiary and water action gave rise to the complex of gorges and ravines cutting through metamorphosed sedimentary rocks of the Kheis system which in turn is part of the Archaic complex. The main component of the geology of the Park consists of red biotitic gneissic granite referred to as Pink Gneiss, which, in turn erodes to form large conspicuous domes of which the so-called Moon Rock is a prime example.

According to Walther & Lieth (1960), the climate of the Park can be described as dry throughout the year. According to Köppen's System (Schulze 1947) the climate can be referred to as that of a cold desert. Rainfall is variable and annual precipitation can vary between 33,9 mm (1971) and 421,5 mm (1974). The average temperature fluctuates between -2,0°C in July to 45,0°C in December. Daily temperatures may vary by as much as 19°C.

Botanically, Acocks (1953) classifies the Park as representative of the Namaqualand Broken Veld, while Edwards (1974) interprets it as an example of the Orange River Broken Veld as described by Acocks. A phytosociological and phytogeographical study of the Park was published by Werger & Coetzee (1977).

Material and Methods

The specimens forming the basis for this report, were all accrued by museum scientists employing regular museum collecting procedures, *viz.* trapping, shooting and netting. Specimens were prepared as museum study skins and skulls, and are now formally incorporated in the permanent study collections of the Transvaal Museum (TM), Pretoria; Carnegie Museum of Natural History (CM), Pittsburgh; and United States National Museum of Natural History (USNM), Washington, DC.

For the purpose of this study, collecting expeditions were undertaken to the AFNP during January 1970 and May 1977. Previously collected material are also available in the above mentioned study collections, especial-

ly from localities outside, but in the near vicinity, of the Park. Since some species recorded outside the AFNP were not recorded inside the Park itself, it was decided to consider the entire Augrabies district in an effort to form a better understanding of the true faunal diversity of the district on which to base conclusions. The Augrabies district is here loosely defined as the area encompassed by a radius of ca 60 km from the falls.

In the main text, each species whose presence in the area under discussion could be ascertained is dealt with individually. All known records of occurrence are listed. In the case of material records, the number of specimens available from each locality, as well as the collection in which it is housed, are listed under the subheading "material examined". Personal sight records, confirmed rangers' reports, literature records or internal institutional records, are listed as "additional records".

Unpublished museum records and distribution maps were consulted to establish which species may have been overlooked during the various survey endeavours, as well as to speculate on which of the derived species complement of the Augrabies district are in fact typical inhabitants of other biotic zones. Skead's unpublished compilation of zoohistorical records of occurrence, as well as Du Plessis' (1969) notation of past and present occurrences of perissodactyls and artiodactyls, were furthermore consulted to establish which large mammal species have become locally extinct since historical times.

The coordinates (to the nearest minute) of the localities mentioned in the text, are as follows: Augrabies Falls 18°35'S, 20°21'E; Keimoes Island 28°42'S, 20°58'E; Klaas' Island 28°35'S, 20°21'E; Louisville 28°32'S, 21°12'E; Riemvasmaak 28°33'S, 20°21'E; Rooidam, 11 km W Augrabies Falls 28°39'S, 20°15'E; Stolzenfels 28°30'S, 19°42'E; Swartrandte 28°35'S, 20°19'E; Upington 28°27'S, 21°15'E; Upington, 9 km SA 28°30'S, 21°20'E; Upington, 21 km E 28°27'S; 21°28'E; Upington, 56 km NE 28°20'S, 21°45'E.

Results

The following species have been recorded from the AFNP and surrounding areas:

ORDER INSECTIVORA

Family Macroscelididae

Elephantulus rufestris (A. Smith, 1831) Rock elephant-shrew
Rotsklaasneus

Found amongst rock debris, where it nests in rock crevices. Partly nocturnal and partly diurnal.

Records of Occurrence: Specimens examined, 77: Rooidam, 11 km W Augrabies Falls, 12 (USNM, 12); AFNP, 13 (TM, 13); 21 km E Upington, 51 (USNM, 51); Stolzenfels, 1 (USNM, 1).

Family Soricidae

Crocidura cyanea (Duvernoy, 1838) Reddish-grey musk shrew
Rooigrys-skeerbek

The shrew with the widest geographic range in southern Africa. Adapted to living in a diversity of environmental conditions. The commonest, if not the only shrew of most arid and semi-arid regions.

Records of Occurrence: Specimens examined, 3: AFNP, 2 (TM, 1; CM, 1), 9 km SE Upington, 1 (TM, 1).

ORDER CHIROPTERA

Family Rhinolophidae

Rhinolophus capensis Lichtenstein, 1823 Cape horseshoe bat
Kaapse blaarnevsvlermuis

Mostly utilizes caves as daytime roosts. The specimens listed below, were collected in large rock crevices and overhangs immediately adjacent to the falls.

Records of Occurrence: Specimens examined, 2: AFNP, 2 (TM, 2).

Family Molossidae

Sauromys petrophilus (Roberts, 1917) Roberts's flat-headed bat
Platkop losstertvlermuis

With its extremely flattened head, this species is adapted to taking refuge by day in very narrow rock crevices. One of the specimens listed below was shot in flight, and the remainder were netted at night over a water reservoir.

Records of Occurrence: Specimens examined, 6: AFNP, 3 (TM,3), Stolzenfels, 3 (USNM, 3).

ORDER PRIMATES

Family Cercopithecidae

Papio ursinus Kerr, 1792 Chacma baboon
Kaapse bobbejaan

A few troops roam the district but their conservation status is not known. Presumably baboon troops are under heavy culling pressure from farming interests. Two resident troops occur within the Park and they cause considerable damage to specimens of Kokerboom *Aloe dichotoma* by eating young leaves and breaking of the growing apices.

Records of Occurrence: Additional records: Personal sight records at AFNP.

Cercopithecus (aethiops) pygerythrus (F. Cuvier, 1821) Vervet Monkey
Blou-aap

Restricted to the riverine bush. A relatively tame group was observed in the rest camp during 1970, but was not encountered during 1977. Renowned for their nuisance value.

Records of Occurrence: Additional records: Personal sight records at AFNP.

ORDER LAGOMORPHA

Family Leporidae

Pronolagus rupestris (A. Smith, 1834) Smith's red rock hare
Smithse rooihaas

Found only in very rocky environment. Although the Park offers ideal habitat, only two individuals were seen during the 1970 and 1977 expeditions. Characteristic toilet sites were, however, abundant.

Records of Occurrence: Specimens examined, 1: AFNP, 1 (TM, 1).

Lepus saxatilis F. Cuvier, 1823 Scrub hare
Kolhaas

Commonly found throughout southern Africa, mostly in sympatry with *L. capensis*. The scrub hare can, unlike *L. capensis*, exist in rocky areas, which may explain why the latter has not been recorded in the Park itself.

Records of Occurrence: Specimens examined, 6: AFNP, 5 (TM, 2; CM, 3), Rooddam, 11 km W Augrabies Falls, 1 (USNM, 1).

ORDER RODENTIA

Family Sciuridae

Xerus inaurus (Zimmermann, 1780) Ground squirrel
Erdmanneljie

This burrowing, diurnal and social animal is found commonly in the sandy areas of the Park, where warrens are constructed.

Records of Occurrence: Specimens examined, 3: AFNP, 2 (TM, 1; CM, 1), Rooddam, 11 km W Augrabies Falls, 1 (USNM, 1).

Family Hystricidae

Hystrix africaeustralis Peters, 1852 Porcupine
Ystervark

Southern Africa's largest rodent has a wide distribution, and is relatively common throughout. Curiously enough this creature is rarely seen. Its local presence is, however, easily established by the quills lost during nocturnal feeding bouts.

Records of Occurrence: Additional records: Annual reports of the Park Ward-

en, National Parks Board of Trustees, Pretoria. Personal sight records at the Moon Rock during May 1977.

Family Pedetidae

Pedetes capensis (Forster, 1778) Springhare
Springhaas

Found only in the less rocky parts of the study area, where suitable soils offer the possibility of constructing its characteristic burrows.

Records of Occurrence: Specimens examined, 2: Rooidam, 11 km W Augrabies Falls, 1 (USNM, 1), Upington, 1 (TM, 1).

Family Petromyidae

Petromus typicus Smith, 1831 Rock rat
Dassierot

An inhabitant of arid regions, adapted to life in rocky environments. It is diurnal and primarily solitary. Its habits of sunning itself during the early mornings and late afternoons, and to deposit faeces in fixed places, are very reminiscent of dassies.

Records of Occurrence: Specimens examined, 20: AFNP, 20 (TM, 8; USNM, 12).

Family Muridae

Aethomys namaquensis (Smith, 1834) Namaqua rock rat
Namakwalandse klipmuis

Without a doubt the most common and widespread rodent in southern Africa. Found in any sort of rocky environment, where the large, untidy, grass nests which are sometimes constructed between rocks is the most striking feature of this species.

Records of Occurrence: Specimens examined, 179: AFNP, 153 (TM, 19; CM, 26; USNM, 108), Rooidam, 11 km W Augrabies Falls, 9 (USNM, 9), Keimoes Island, 89 (USNM, 89), Stolzenfels, 13 (USNM, 13), 21 km E Upington, 15 (USNM, 15).

Thallomys paedulus (Sundevall, 1846) Black-tailed tree rat
Swartstert boomrot

Occur only in association with trees, mostly *Acacia*. Hence, the Black-tailed tree rat occurs in the study area only in riverine vegetation.

Records of Occurrence: Additional records: Louisvale to Goodhouse along Orange River (Roberts 1951).

Praomys (M.) natalensis (Smith, 1834) Multimammate mouse
Vaalveldmuis

Widespread and common in southern Africa. A plains animal, requiring

some form of protection against predators and adverse weather conditions, – mostly grass or certain types of shrub.

Records of Occurrence: Specimens examined, 12: AFNP, 9 (TM, 6; CM, 3), Rooidam, 11 km W Augrabies Falls, 3 (USNM, 3).

Rhabdomys pumilio (Sparrman, 1784) Striped mouse
Streepmuis

One of the few diurnal rodents of southern Africa. It also has a wide geographical range. Although it is a common animal, it is not quite as common as *A. namaquensis* or *P. natalensis*.

Records of Occurrence: Specimens examined, 59: AFNP, 25 (TM, 11; CM, 7; USNM, 7), Rooidam, 11 km W Augrabies Falls, 32 (USNM, 32), Stolzenfels, 2 (USNM, 2).

Family Cricetidae

Petromyscus collinus (Thomas & Hinton, 1925) Pygmy rock mouse
Klein rotsmuis

A nocturnal inhabitant of rocky environments of arid regions. At the AFNP, substantial numbers were trapped during 1977, but none in 1970.

Records of Occurrence: Specimens examined, 23: AFNP, 21 (TM, 9; CM, 7; USNM, 5), Stolzenfels, 2 (USNM, 2).

Saccostomus campestris Peters, 1846 Pouched mouse
Wangsakmuis

Widespread, but not commonly trapped in large numbers at any one time. The series of 18 specimens available from AFNP, was accrued during four different expeditions, and as far as known it is one of the largest available from a single locality. The pouched mouse is a nocturnal, terrestrial inhabitant of open plains. It transports the seeds collected during nocturnal ventures in the pouches to its burrow, where food is hoarded.

Records of Occurrence: Specimens examined, 25: AFNP, 18 (TM, 10; CM, 5; USNM, 3), Stolzenfels, 7 (USNM, 7).

Parotomys brantsii A. Smith, 1840 Brant's Karroo rat
Brantse Karoo rot

As far as is known, it is primarily diurnal. Small colonies construct burrow systems at the bases of shrubs. From here it ventures along runways to feed on plants in the vicinity. Individuals spend much time at the entrance of burrows, grooming or just sitting. Utters a sharp, piercing alarm whistle. See Nel & Rautenbach (1974) for further details.

Records of Occurrence: Specimens examined, 13: AFNP, 3 (TM, 3); specimens donated by D. H. S. Davis, from 2822AA (1); 2221BB (2); 2821AD (7).

Parotomys littledalei Thomas, 1918 Littledale's Karroo rat
Littledalese Karroo rot

As far as can be ascertained, there are no major differences in overall behaviour of this species and that of *P. brantsi*.

Records of Occurrence: Specimens examined, 5: Louisville, 5 (TM, 5).

Desmodillus auricularis (A. Smith, 1834) Namaqua gerbil
Namakwalandse nagmuis

A terrestrial, nocturnal and burrowing rodent. It is primarily solitary. Feeds on seeds, which are stored in quantity in the complicated burrow systems.

Records of Occurrence: Specimens examined, 48: Rooidam, 11 km W Augrabies Falls, 7 (USNM, 7), Keimoes Island, 8 (USNM, 8), Stolzenfels, 17 (USNM, 17), 21 km E Upington, 16 (USNM, 16).

Tatera leucogaster (Peters, 1852) Bushveld gerbil
Bosveldse nagmuis

This is typically a woodland savanna species. Its occurrence in the study area, may be correlated with the riverine bush along the Orange River. Prefers more open, sandy aspects of the environment to construct communal burrow systems. Nocturnal. Distinct runways interconnect burrow systems.

Records of Occurrence: Specimens examined, 72: AFNP, 34 (TM, 14; CM, 13; USNM, 7), Stolzenfels, 10 (USNM, 10), 21 km E Upington, 28 (USNM, 28).

Gerbillurus paeba (A. Smith, 1836) Pygmy gerbil
Klein nagmuis

This is a very common rodent of sandy areas of the western semi-arid and arid regions of southern Africa. Nocturnal, terrestrial and saltatorial. It constructs fairly extensive tunnel systems, mostly arranged in warrens. Prone to sporadic population outbreaks.

Records of Occurrence: Specimens examined, 85: AFNP, 31 (TM, 4; CM, 10; USNM, 17), Rooidam, 11 km W Augrabies Falls, 7 (USNM, 7), Stolzenfels, 41 (USNM, 41), 21 km E Upington, 6 (USNM, 6).

Gerbillurus vallinus Thomas, 1918 Brush-tailed gerbil
Borselstertnagmuis

Unlike *G. paeba*, the brush-tailed gerbil is found only in the small area from the Bukaros Mountains in South West Africa (SWA)–Namibia to the Kalahari Gemsbok National Park around through the Northern Cape on each side of the Orange River. It probably is the most localized species in this district.

Records of Occurrence: Specimens examined, 41: AFNP, 2 (USNM, 2), Rooi-

dam, 11 km W Augrabies Falls, 3 (USNM, 3), Stolzenfels, 34 (USNM, 34), 21 km E Upington, 2 (USNM, 2).

ORDER CARNIVORA

Family Canidae

Otocyon megalotis (Desmarest, 1822) Bat-eared fox
Bakoorvos

A social and nocturnal inhabitant of lower rainfall areas. A family group lives in self-constructed burrows. Feeds predominantly on invertebrates. *Records of Occurrence:* Specimens examined, 1: 56 km NE Upington, 1 (USNM, 1).

Canis mesomelas Schreber, 1775 Black-backed jackal
Rooijakkals

A widespread canid in southern Africa, and consequently also resident in the Park. This is a problem species on account of its predatory habits competitive to organized agriculture (stock breeding). A crepuscular to nocturnal species, often seen and heard in the Park.

Records of Occurrence: Additional records: Annual reports of the Park Warden, National Parks Board of Trustees, Pretoria.

Family Mustelidae

Ictonyx striatus (Perry, 1810) Sriped polecat
Stinkmuishond

A widely distributed mustelid with a wide habitat tolerance. Nocturnal and terrestrial. Feeds mainly on invertebrates, but small vertebrates and birds' eggs are also taken.

Records of Occurrence: Specimens examined, 4: AFNP, 1 (CM, 1), Rooidam, 11 km W Augrabies Falls, 1 (USNM, 1), Stolzenfels, 2 (USNM, 2).

Family Viverridae

Cynictis penicillata (G. Cuvier, 1829) Yellow mongoose
Gelmeerkat

Common in open areas such as grassveld and karoo veld. Occurs only marginally in woodland savanna. During the day individuals hunt mostly solitary, although small groups share the same burrow during the night.

Records of Occurrence: Specimens examined, 3: AFNP, 2 (TM, 2), Upington, 1 (TM, 1).

Herpestes pulverulentus Wagner, 1839 Cape grey mongoose
Kaapse grysmuishond

A very common viverrid of arid and semi-arid regions. Diurnal. Although this species offers many advantages for a serious ethological study, the Cape grey mongoose has hitherto received little attention from field biologists.

Records of Occurrence: Specimens examined, 3: AFNP, 3 (TM, 1; CM, 2).

Herpestes sanguineus (Rüppell, 1835) Slender mongoose
Transvaalse rooimuishond

A diurnal and terrestrial inhabitant of woodland savanna areas. Believed to penetrate the semi-arid western regions via the corridor of woodland on the banks of the Orange River. All three specimens examined are very reddish in colour, and thus falls in the *ratlamuchi* section of described forms.

Records of Occurrence: Specimens examined, 3: Rooidam, 11 km W Augrabies Falls, 1 (USNM, 1), Upington, 1 (TM, 1), 21 km E Upington, 1 (USNM, 1).

Family Protelidae

Proteles cristatus (Sparrman, 1783) Aardwolf
Maanhaarjakkals

A timid and secluded protelid occurring in the Park in low numbers. A resident clan occurs on Klaas' Island while other individuals are sighted regularly from the Swartrandte, as well as in areas adjacent to the Park. It seems as if the numbers of this harmless carnivore are increasing since the proclamation of the Park in 1966.

Records of Occurrence: Additional records: Annual reports of the Park Warden, National Parks Board of Trustees, Pretoria

Family Felidae

Panthera pardus (Linnaeus, 1758) Leopard
Luiperd

Second to the lion, the leopard is the largest predator in southern Africa. Unlike the lion, however, the free-ranging leopard still occurs over large areas. Its shy and retiring habits renders the leopard difficult to control. Within the AFNP a few resident individuals occasionally raid adjoining farms with resultant stock losses. In former years when the water level of the river fluctuated markedly, they would enter the Park by crossing the Orange River at low level from the uninhabited Riemvasmaak area to the north and from South West Africa-Namibia to the north-west. The Orange River Project has stabilized the water level in the Park in recent years, possibly acting as a physical barrier of greater significance.

Records of Occurrence: Additional records: Annual reports of the Park Warden, National Parks Board of Trustees, Pretoria.

Felis caracal Schreber, 1776 Caracal
Rooikat

The caracal is yet another widespread indigenous carnivore in competition with man. Although methods exist limiting the movement and numbers of the black-backed jackal (fencing and other mechanical aids such as the Coyote-Getter) with some success, it has been observed that the caracal seems to occupy the niche vacated by the black-backed jackal. The problem of predation on domestic stock has thus only been transferred from a canid to a felid, and in the latter case where control measures are not effective.

Within the Park, a number of caracal have taken up residence in 1967/1968, with a subsequent marked fall in the numbers of dassies occurring in their range of movement.

Records of Occurrence: Additional records: Annual reports of the Park Warden, National Parks Boards of Trustees, Pretoria.

Felis libyca Forster, 1780 Cape wild cat
Vaalboskat

Widespread in southern Africa, but not often encountered. Nocturnal. Seen occasionally during the day in the Park.

Records of Occurrence: Specimens examined, 1: AFNP, 1 (CM, 1).

ORDER TUBULIDENTATA

Family Orycteropodidae

Orycteropus afer (Pallas, 1766) Aardvark
Erdvark

Occasionally occurs within the confines of the Park, and its presence is felt in no uncertain manner by digging underneath boundary fences, thereby creating subways for the movement of small carnivores, porcupines and springhares.

Records of Occurrence: Additional records: Annual reports of the Park Warden, National Parks Board of Trustees, Pretoria.

ORDER HYRACOIDEA

Family Procaviidae

Procavia capensis (Pallas, 1766) Cape dassie
Klipdas

Dassies are particularly common in the study area. Individuals in those areas near the waterfalls which are frequented regularly by tourists, have

become remarkably tame – allowing a person to approach to within a few feet. Diurnal, and a social animal.

Records of Occurrence: Specimens examined, 3: AFNP, 2 (TM, 1; CM, 1); Rooidam, 11 km W Augrabies Falls, 1 (USNM, 1).

ORDER ARTIODACTYLA

Family Bovidae

Tragelaphus strepsiceros (Pallas, 1766) Kudu
Koedoe

The first confirmation of its re-occurrence in the Park since proclamation were tracks found during May 1977. Subsequently individuals or small groups are recorded at regular intervals.

Records of Occurrence: Additional records: Annual reports of the Park Warden, National Parks Board of Trustees, Pretoria.

Sylvicapra grimmia (Linnaeus, 1758) Grey duiker
Grysdruiker

A widespread small antelope, capable of withstanding much hunting pressure. Nocturnal. Solitary animals are most commonly encountered.

Records of Occurrence: Additional records: Annual reports of the Park Warden, National Parks Board of Trustees, Pretoria.

Antidorcas marsupialis (Zimmermann, 1780) Springbok

Without a doubt this was the most common plains antelope during historical times. Well known for its former mass migrations. A small herd of 8 animals was reintroduced during 1976. These individuals have not been seen subsequently.

Records of Occurrence: Additional records: Annual reports of the Park Warden, National Parks Board of Trustees, Pretoria.

Oreotragus oreotragus (Zimmermann, 1783) Klipspringer

Because of the abundance of rocky habitat in the Park, this is one of the more common antelopes. Small family groups can be seen grazing throughout the Park, especially during early mornings and late afternoons. Prior to proclamation of the Park in 1966 the resident animals were very wild, probably enhanced by heavy hunting pressure. Since 1966 they have settled down well and groups of six to nine animals are a common sight.

Records of Occurrence: Additional records: Personal sight records at Augrabies Falls National Park.

Raphicerus campestris (Thunberg, 1811) Steenbok

Widespread and common throughout most parts of southern Africa. Primarily diurnal, but may switch to a nocturnal life style in heavily disturbed areas. Prefers the open grassy aspects of its environment. Encountered singly or in pairs.

Records of Occurrence: Additional records: Annual reports of the Park Warden, National Parks Board of Trustees, Pretoria.

Discussion

Faunal diversity

Mr C. J. Skead, formerly from the Kaffrarian Museum, has compiled extensive files on the zoohistorical occurrences in southern Africa of species of large mammals, based on the travel accounts of previous century hunters and explorers. Du Plessis (1969) has independently researched the past and present distribution of Perissodactyla and Artiodactyla in southern Africa. From these accounts, the following species can be listed with a reasonable degree of certainty to have occurred in the vicinity of the AFNP during historical times: *Vulpes chama* (A. Smith, 1833); *Mellivora capensis* (Schreber, 1776); *Hyaena brunnea* Thunberg, 1820; *Crocuta crocuta* (Erxleben, 1777); *Felis nigripes* (Burchell, 1824); *Acinonyx jubatus* (Schreber, 1776); *Panthera leo* (Linnaeus, 1758); *Ceratotherium simum* (Burchell, 1817); *Diceros bicornis* (Linnaeus, 1758); *Equus burchelli* (Gray, 1824); *Equus quagga* Gmelin, 1788; *Phacochoerus aethiopicus* (Pallas, 1766); *Hippopotamus amphibius* Linnaeus, 1758; *Giraffa camelopardalis* (Linnaeus, 1758); *Syncerus caffer* (Sparrman, 1779); *Taurotragus oryx* (Pallas, 1766); *Oryx gazella* (Linnaeus, 1758); *Connochaetes gnou* (Zimmermann, 1780); *Connochaetes taurinus* (Burchell, 1823); *Alcelaphus buselaphus* (Pallas, 1766); and *Pelea capreolus* (Forster, 1790).

It is unlikely that all of these species, together with those larger mammals listed in the main text, were represented by resident populations during historical times in what is today the Augrabies Falls National Park. Most of the larger mammals of arid areas rely on opportunistic migrations to more favourable areas for their survival. It is therefore probable that the Park in its present restricted context could not support the full complement of species diversity as mentioned above in any substantial population densities.

Based on available distribution records housed in the Transvaal, Carnegie and United States National Museums, the following species may in time be proved to occur in the AFNP or in surrounding areas: *Macroselides proboscideus* (Shaw, 1800); *Rhinolophus darlingi* Anderson, 1905; *Lepus capensis* Linnaeus, 1758; *Dendromus melanotis* Smith, 1834; and *Malacothrix typica* (Smith, 1834).

The above lists, together with the species discussed in the main text, brings the total potential faunal diversity of the Augrabies district to 68 species.

The zoogeographical impact of the Orange River

The Orange River is the largest perennial river in southern Africa. Together with its main upstream tributaries, particularly the Vaal, it bisects more than 75% of southern Africa. Theoretically such a major waterway could be expected to exert considerably influence on the zoogeography of the subcontinent. The river and its associated riverine woody vegetation could for instance either serve as a dispersal corridor, or it could act as a barrier against southwards or northwards dispersals.

Only five species, i.e. *Tadarida pumila*, *Cercopithecus pygerythrus*, *Thallomys paedulus*, *Tatera leucogaster* and *Herpestes sanguineus* can be illustrated to utilize the riverine woodland of the Orange River as a dispersal corridor. These five species are adapted to the Southern Savanna Woodland biotic zone. They thus penetrate deep into areas otherwise ecologically inhospitable to them. The Southern Savanna Woodland biotic zone has a species complement of 209, and these five mammals therefore represent only a small fraction of the number of species that could potentially utilize such a corridor.

The northern Cape Province and southern SWA/Namibia are poorly surveyed, with the result that known distribution patterns of most mammals are fragmentary. This renders it somewhat difficult to speculate on the role of the Orange River as a faunal barrier. However, as far as can be assessed, the distributions of only two species appears to be affected by the Orange River. The first is *Elephantulus intufi* (A. Smith, 1836) which occurs only in wooded areas some distance to the north of the Orange and the Vaal Rivers. It is therefore likely that its dispersal is limited by the availability of woodland rather than by the river itself. *Otomys unisulcatus* Cuvier, 1829, is not known from the vicinity of the Augrabies Falls. However, elsewhere it occurs exclusively to the south of the river, in some instances up to the south bank of the river. What appears to be suitable habitat exists also to the north of the Orange River. It would thus appear that the Orange River yields an insignificant influence on the dispersion of mammals, particularly as a barrier.

It may be argued that another measure of the effectiveness of a faunal barrier could be the degree of differentiation within taxa on either side of the barrier. If expressed in taxonomic terms, evidence of subspeciation would be sought – in this instance, on opposite banks of the Orange River. It is a well known fact that subspeciation of southern African mammals is inadequately studied in modern context, especially after the frenzy to describe new races earlier this century. Yet, an instance as dramatic as subspecific differences as a result of prolonged gene pool isolation by the Orange River is unlikely to miss the attention of taxonomists. No such evidence that can comply with the requirements of modern taxonomy is known to us.

However, Ehrlich & Raven (1969) argue convincingly that a limitation of gene flow between populations is unlikely to result in differentiation. They express the opinion that different selective regimes play a far more

important role in differentiation between populations. It is also postulated that local populations are far more stationary than was formerly believed, with the result that intra-population gene flow as such is much restricted. Even if the Orange River is proved to have been an effective faunal barrier for a significantly long time span, differentiation is therefore unlikely to occur on opposite banks, since selective regimes must be very similar. Whatever the case, the mammals occurring on either side of the Orange River offer an ideal opportunity to study evolutionary mechanisms such as dispersion ability, rates of gene flow, differential reactions to varying selective regimes, and to identify various selective pressures.

We are nevertheless led to conclude on the available evidence that the Orange River plays an insignificant role in the zoogeography of southern African mammals, in spite of its formidable appearance. Its low key role in mammal zoogeography could be explained in two ways. The first is that the river as such is much younger than the Recent mammal fauna, having become established after species dispersions have settled. However, this would necessitate a re-explanation of the ancient watershed of the entire subcontinent, which is unlikely to be grossly incorrect as presently understood. The second explanation is that the river may not always have been a permanent stream of such proportions as today, thus allowing northwards and southwards dispersals during dry periods. We find the latter explanation more acceptable.

The biotic zone status of the Augrabies district

Moreau (1952), Davis (1962) and Meester (1965) subdivide southern Africa into zoogeographical regions, which they term "Biotic zones". Rautenbach (1978) statistically tests the validity of these biotic zones, employing not, as before, only exclusively endemic species as criterion; but also the overall subcontinental distribution patterns of all mammals occurring in southern Africa. For this, Rautenbach (*op. cit.*) employs the Faunal Resemblance Factor (FRF) analysis of Duellman (1965), which is also discussed in detail by Armstrong (1972). Rautenbach (1978) concludes, *inter alia*, that the Namib should be regarded as a biotic zone of full rank.

Earlier maps depicting the Namib biotic zone (formerly subzone), shows a peculiar fingerlike eastwards extension along the Orange River (see for instance Meester 1965) which includes the AFNP and its surrounding areas further towards the east. However, Coetzee (*pers. comm.*), in our opinion quite correctly, points out that this eastwards extension of the Namib biotic zone is the result of incorrect interpretation, and that this area is in fact floristically strongly reminiscent of the South West Arid biotic zone. This affects the zoogeographical status of the Augrabies Falls district, and this study offers the ideal opportunity to examine the situation more closely.

The faunal resemblances between the Augrabies Falls district, and the Namib and South West Arid biotic zones respectively, as expressed by

Duellman's FRF indices, are derived below. However, in spite of the fact that the FRF analysis partly compensates for disparate faunal diversities, the differences between the faunal sizes of the three areas are so great that the indices derived are strongly biased.

When only those 36 species listed in the main text as recorded by direct means from the Augrabies district (exclusive of the five species typical of the Southern Savanna Woodland biotic zone), are tested against the faunal diversities of the two biotic zones in question, the Augrabies district shows a closer relation to the Namib (FRF = 0,52) than to the South West Arid (FRF = 0,43). This is in spite of the fact that all 36 species of the Augrabies district also occur in the South West Arid, whereas only 21 of these 33 species are shared with the Namib zone. The disparity between the two smaller faunas (Augrabies = 36 in this particular consideration; Namib = 43) and the South West Arid (136) is just too great, resulting in an inferred closer relationship with the Namib (since respective faunal diversities are about equal) than with the South West Arid (Faunal diversity much larger, resulting in an abnormal low FRF index). This disparity obscures what we believe is in fact a closer relationship with the South West Arid biotic zone.

However, when the full potential faunal diversity of the AFNP and surrounding areas (i.e. including all species known to occur, may occur, or have occurred in the past), are compared with the two biotic zones in question, we believe a less biased, truer picture emerges. The potential species complement of the Augrabies is 68, of which only 31 species are shared with the Namib biotic zone, and no less than 65 with the South West Arid biotic zone. Considering the potential faunal diversity of the Augrabies district, a closer faunal resemblance with the South West Arid (FRF = 0,64) than with the Namib (FRF = 0,56) is derived. Yet, again these indices are biased towards a closer than true resemblance with the Namib as a result of the disproportionately large faunal diversity of the South West Arid, thus obscuring an even stronger affinity between the latter and the Augrabies district. The latter statement is largely substantiated by the fact that so much more of the Augrabies district species complement are shared with the South West Arid than with the Namib.

Although the FRF analysis through its inherent shortcomings in this particular case, fail to succinctly illustrate it, we postulate that the fauna of the Augrabies Falls district is very typical of the South West Arid biotic zone. In part we base this view on the fact that the Namib is considered a biotic zone of full rank particularly since it has a depauperate faunal diversity as a consequence of its relatively inhospitable and undiversified abiotic and biotic environment. As it is, the potential faunal diversity of the Augrabies district is *ca* 50% more diverse than that of the Namib.

We therefore suggest that the true western border of the southern Namib biotic zone is somewhere downriver towards the west of the AFNP, and that the latter area falls within the South West Arid biotic zone.

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