

## Annotated checklist of amphibians, reptiles and mammals of the Brandberg, central Namib Desert, Namibia

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This paper records five species of frogs, 86 species of reptiles and 82 species of mammals currently known or expected to occur on the Brandberg Massif, Namibia or in closely adjacent habitats. These species are placed in national, regional, continental and global perspective. An annotated checklist of the Brandberg fauna is presented and provisional national conservation status, predicted habitat and temporal occurrence within the area are provided. Although the Brandberg and its environs are shown to be relatively species poor in Namibian terms, with no species currently known to be entirely restricted to the Brandberg, the area is identified as a centre of richness for endemic Namibian species.

### INTRODUCTION

The Brandberg study area is here considered to comprise the entire Brandberg Massif, surrounding pediplain and the adjoining section of the Ugab River, as delimited by the Brandberg National Monument Area (Anon 1951) (c. 1110 km<sup>2</sup>). Lenssen-Erz & Erz (2000), Loutit (1996), Pager (1989) and the introduction to this volume present background information, maps and physiographic descriptions of the study area. The Brandberg is situated within the Nama-karoo Biome as defined by Irish (1994), who considered the upper elevations to be a Savanna Biome outlier.

Very little specific information on the groups dealt with here occurring in the Brandberg area has been previously published. Elzen (1983) presented a description of the Brandberg herpetological fauna, discussing five amphibians, 26 lizards and 10 snakes. Nothing comprehensive has been published on the mammal fauna. Coetzee (1969), however, included this area in his biogeographical review of Namib Desert mammals. Regionally, the Brandberg is included in a plethora of contemporary southern African accounts, ranging from encyclopedic treatments on mammals (e.g.

Skinner & Smithers 1990), to field guides on reptiles (e.g. Branch 1998).

Table 1 places the amphibian, reptile and mammal fauna in national, regional, continental and global perspective. Table 2 summarises the biogeographic affiliations of the Brandberg fauna. Appendix 1 lists the national provisional conservation status for each species. It also lists the general habitat and substrate in which every species is expected to occur in the study area. An annotated checklist of the species known or expected to occur within the proclaimed National Monument area is presented in Appendix 2

Information used in this paper was extracted from a comprehensive database of voucher specimens, literature records, questionnaire surveys and personal communications (Biodiversity Inventory Programme, Ministry of Environment & Tourism, Namibia). Provisional national conservation statuses were extracted from Griffin (1999a). No specific fieldwork was conducted for this review.

As no coherent management plan has yet been adopted, or responsible and capable authority identified, to manage the Brandberg, the area currently lacks adequate protection. This base-

**Table 1.** Expected diversity of amphibians, reptiles and mammals in the Brandberg area. SASR = South African sub-region, i.e., south of the Kunene, Okavango and Zambezi Rivers. Ethiopian i.e. entire continent exclusive of the Arabian Peninsula and the south eastern Atlantic offshore complex (data drawn from Broadley *in litt.*; Cole *et al.* 1994; Curtis *et al.* 1998; Drewes *in litt.*; Duellman 1993; Griffin 1998b; Griffin 1998c; Griffin 2000; Skinner & Smithers 1990).

	Brandberg	Namibia	SASR	Ethiopian	Global
AMPHIBIANS					
Species	5	50+	140+	589+	4522+
Genera	4	17	31+	77+	428+
Families	3	7	9+	9+	41+
Orders	1	1	1	3	3
REPTILES					
Species	86	247	470	1800+	6550
Genera	43	88	113	215	905
Families	18	22	22	26	48
Orders	2	3	3	3	4
MAMMALS					
Species	82	250	338	1052	4629
Genera	58	147	178	301	1135
Families	31	45	46	54	136
Orders	12	14	15	15	26

**Table 2.** Primary biogeographical affiliations (after Irish (1994) for defined boundaries).

	Amphibians	Reptiles	Mammals
Namib Desert	0	8	1
Nama-karoo	2	18	2
Broad regional	3	60	79

line review was compiled in order to help in the development of an integrated management plan for this unique area. The proposal currently considered, is the concept of a 'People's Park' or 'Contractual Park', incorporating a Biosphere Reserve/World Heritage Area (Loutit 1996). The proposed extension of existing boundaries for the area (J. Walters in Loutit 1996) may increase the size of the protected area, but would probably not add additional habitat types for amphibians, reptiles and mammals.

Five species of amphibians (frogs only), 86 species of reptiles and 82 species of mammals are known or expected to occur in the study area. At least three additional species are known to have become extinct within historic times. The Brandberg (study area) fauna potentially represents 10% of national amphibian species diversity, 34% of the national reptile species diversity and 32% of the national mammal species diversity (Griffin 1998c, Griffin *in press*; Griffin *in prep.*) (*vide* Table 1).

## DISCUSSION

The pattern of species richness within the Brandberg region can be ascribed to relatively low rainfall (Griffin 1995, 1998a, 1998b) and geographic proximity to distribution ranges, which draws elements from a variety of adjacent biotic zones (Coetzee 1969). The geographical affinities of the fauna are summarised in Table 2. Less than 5% of the fauna is primarily associated with the immediately adjacent Namib Desert, 13% is primarily associated with the Nama-karoo Biome and over 82% have a broader national, regional or continental distribution.

The Brandberg could be considered to be relatively impoverished in species as compared to higher rainfall areas, this being ascribed to its location on the edge of the Namib Desert. Despite this, the array of species is relatively rich in Namibian endemics and includes 60% of endemic Namibian amphibians, 51% of endemic Namibian reptiles and 53% of endemic Namibian mammals ('endemic' is here defined as those species with 75% or more of the population/range within Namibia).

Namibian endemism has been demonstrated to be most pronounced in the arid western areas (Bauer 1999; Crowe 1990; Simmons *et al.* 1998) and although no mammals, reptiles or amphibians are currently known to be exclusively endemic to the Brandberg study area, a significant proportion of Namibian endemic species occur in this region.

This assemblage of Namibian endemics on the Brandberg is primarily due to two factors. Firstly, most Namibian endemics are dependent on rupicolous habitats and substrates, the Brandberg being the major rupicolous feature in the area and secondly, geographically, the Brandberg is situated in a broad zone of overlap between northern Namib/escarpment endemics and southern and central Namib/es-

carpment endemic species (Simmons *et al.* 1998). As a result, the Brandberg stands out as the richest area in Namibia for Namibian endemic species (Griffin 1999b). An undescribed species of colubrine snake, which may be endemic to the Brandberg Massif, is presently under investigation.

The fauna that inhabits the area employs one of several, or a combination of occupational/occurrence strategies. Many of these species only sporadically inhabit the area:

- Large animals such as *Equus zebra*, *Antidorcas marsupialis*, *Giraffa camelopardalis*, *Loxodonta africana* and *Orycteropus afer* migrate as conditions change.
- Large carnivores such as *Crocuta crocuta*, *Parahyaena brunnea*, *Mellivora capensis* and *Acinonyx jubatus* appear to be generally rare, irrespective of environmental conditions, but probably follow their prey species.
- Some species colonise the Ugab River and the plains to the east of the Brandberg Massif during favourable periods and populations are drastically reduced during unfavourable periods. These species immigrate from permanent populations in the east when high rainfall years have improved conditions in the west. Examples may include *Steatomys parvus*, *Mus indutus*, *Saccostomus campestris* and gerbils of the genera *Gerbillurus*, *Tatera* and *Desmodillus* (Griffin 1990).
- Most species however, particularly those dependent on rocky habitats (most reptiles, frogs and smaller mammals on the massif), are permanent inhabitants and their population densities fluctuate according to available resources. During unfavourable periods, these species may occur in densities so low, that they are difficult to observe or detect even in optimal habitats.

Some species may employ a combination of occupation strategies. By using the Ugab River as a refuge, for instance, some species may be able to

maintain a permanent, though low density and limited presence in the area. The occupational strategies of many species are, however, unknown. It is not yet clear, for example, whether some species of Chiroptera, which are highly mobile, maintain populations *in situ*, or else move away completely (to the east) when food availability is low.

The Brandberg is an isolated refuge for rupicolous fauna in an otherwise flat sandy/gravel plain landscape, but thus far, all species found to occur there are distributed regionally. Emigration from permanent, higher density populations to the immediate east presumably allows genetic flow during favourable conditions. The massif is not entirely isolated, but is potentially linked through an array of smaller inselbergs and stony substrates, which may act as a conduit for rupicolous species. *Afroedura africana* occurs in the Erongo Mountains as well as the Brandberg and *Aparallactus capensis*, which occurs as an isolated population in the Erongo's, are expected as a disjunct population on the Brandberg. These may be examples of true isolates, having infrequent contact with other populations and, therefore, their taxonomic affinities require examination.

Comments on the occurrence strategies (e.g. permanent residence, seasonal migrants), are outlined in the annotated species accounts (*vide* Appendix 2).

## CONSERVATION ASPECTS

The Brandberg Massif has long been recognised as an area warranting specific protection status. Historically, rock paintings, engravings and other archaeological aspects have been of primary interest and it was essentially with this background that the massif and immediately surrounding area was proclaimed a National Monument in 1951 (Anon 1951). From a wildlife perspective, the Brandberg has also been recognised as a unique area deserving special protection status (Carter 1990; Loutit 1996) and was recently identified as an area of overall national interest in respect to

biodiversity, particularly Namibian endemism (Griffin 1996b; Simmons *et al.* 1998).

Since before Namibia's independence in 1990, land reform has been a major national issue (Adams & Werner 1990). Despite the fact that the Brandberg region is climatically marginal with regard to traditional land reform issues including agriculture, it nevertheless has high eco-tourism potential and is, therefore, of economic interest to a broad spectrum of entrepreneurs. Many uses and developments have been proposed, several of which may conflict with one another, as well as with the national strategy of sustainable resource management and development (Barnard *et al.* 1998, Loutit 1996).

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