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The reptile species assemblage of the Soutpansberg (Limpopo Province, South Africa) and its characteristics

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Abstract. The Soutpansberg situated in north-eastern South Africa was investigated with respect to its reptile species diversity, geographic range of the species and habitat utilisation. Typical inselberg characteristics are discussed in the context of the herpetofauna and compared with the Blouberg, an isolated mountain range to the west of the Soutpansberg. Possible biogeographic links between the species assemblage of the Soutpansberg and adjacent areas are discussed in the context of present geological and climatic conditions within the area. The Soutpansberg reptile community clearly shows effects of isolation. The mistbelt and the grassland on the summits, which both withstood climatic oscillations in the past, harbour the majority of species and most of the endemic taxa in particular. Hence, these areas are of significant ecological value for the reptile community. Rocky habitats and the cooler and moister climate on the mountain provide exceptional conditions within this area. Most of the Soutpansberg endemics exhibit a rupicolous lifestyle and a large number of species are adapted to mesic conditions. A high proportion of Afromontane species was detected. Furthermore, eastern coastal and Lowveld elements exert an influence on the species composition whereas the Kalahari elements are of lesser importance. Tropical forest species are completely absent. The Soutpansberg harbours more endemics (nine taxa) compared to the Blouberg (three taxa) due to its larger size and the resultant decreased risk of extinction.

Key words. Biogeography, checklist, endemics, inselberg, mistbelt, relicts.

Introduction

The poorly studied Soutpansberg mountain range is situated in the northern Limpopo Province of South Africa. In recent years, this area has received greater scientific attention, which has lead to the recognition of its exceptionally high biodiversity and high degree of endemism (e.g., Hahn 2002, 2006, Mostert 2006, Foord et al. 2008). In May 2009, the area was included in the proclamation of the Vhembe Biosphere Reserve as part of UNESCO's Man and the Biosphere programme. The vegetation of the Soutpansberg has been well studied (e.g., Hahn 2002, 2006, Mostert 2006). Hahn (2006) recognized at least eight major elements that exert an influence on the flora of the mountain range. In terms of its floristic diversity and high degree of endemism, the Soutpansberg mountain range – despite its size – has been shown to display the typical characters of an inselberg (Hahn 2006). Generally, inselbergs are defined as isolated rises above a plain that consist of hard bedrock (Bremer & Sander 2000). Inselbergs are usually remnants of erosion processes and can vary greatly in size (Burke 2003). They include rocky outcrops of only several meters in height and diameter as well as mountain massifs (Jürgens & Burke 2000). Inselbergs often harbour unique species assemblages, including a considerable number of relict species as a result of habitats contrasting to those of the surrounding landscape and acting as refuges. Furthermore, inselbergs, like oceanic islands, often stimulate speciation processes and hence can harbour a considerable number of endemic species (e.g., Groger & Barthlott 1996, Parmentier 2003, Parmentier et al. 2005).

Information on the reptilian fauna of the area is limited as no inventories have been published. Egan et al. (2005), in a literature review, proposed that regional influences affecting the reptile species composition of the Vhembe Biosphere Reserve area comprise temperate or Afromontane, Kalahari or xeric, Lowveld, eastern coastal and tropical elements. The most extensive field study, which included the Soutpansberg area, was conducted by Jacobsen (1989) who surveyed the entire former Transvaal Province, cataloguing reptiles and amphibians on a quarter-degree grid square base. Also, a long-term study of the diversity of reptiles in the Blouberg Nature Reserve (BNR) (9360 ha), a neighbouring mountain situated about 20 km west of the Soutpansberg (Fig. 1), was carried out between 1993 and 2001 (Schmidt et al. 2005). Although the Soutpansberg and Blouberg belong to the same geological system (McCarthy & Rubidge 2005), they are separate, isolated mountains. Topographical links

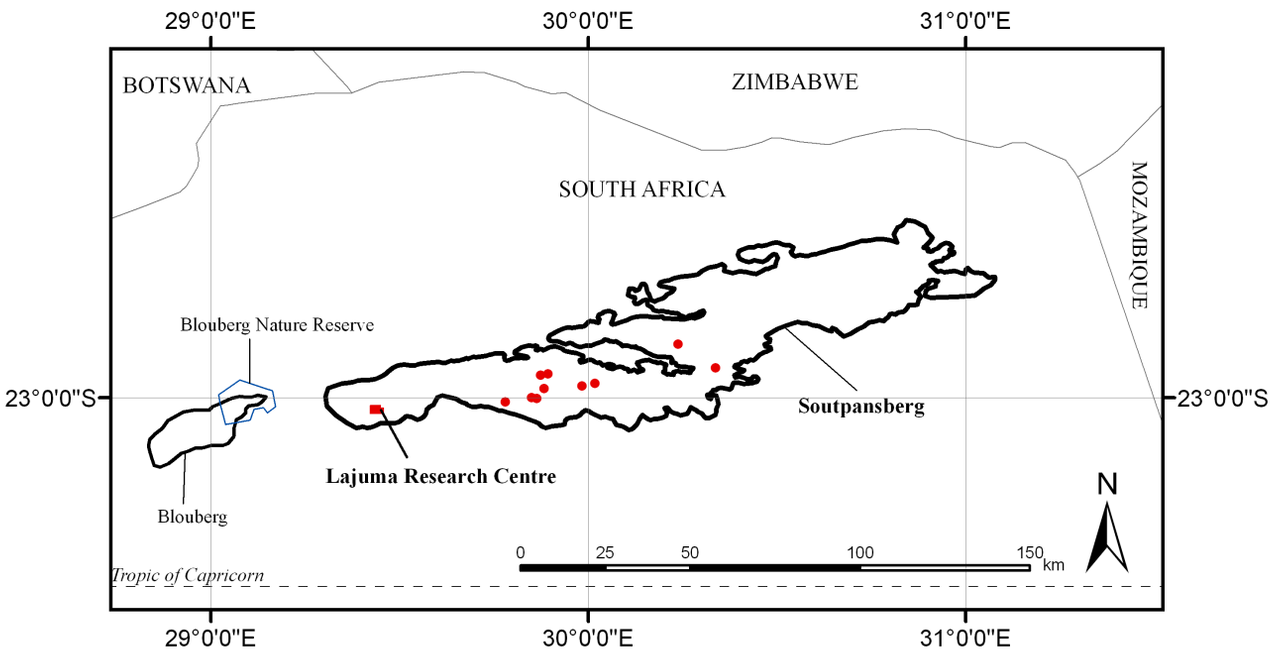

Figure 1. Locality of the sampling sites (red dots) on the Soutpansberg including the main study area, the Lajuma Research Centre, and the neighbouring Blouberg with the Blouberg Nature Reserve (blue).

between them are missing, indicating that the separation of the two mountains is an ancient one and is most likely to have existed in the Pliocene or even earlier (A.J. Bumby pers. comm. 2007).

The present study is based on an extensive survey conducted at the Lajuma Research Centre property in the Western Soutpansberg and numerous field trips to the Eastern Soutpansberg. The aim was to compile a preliminary species list of Soutpansberg reptiles and reveal endemic species. For the purpose of this study, Soutpansberg endemics are defined as taxa restricted to the Soutpansberg sensu stricto. It was assumed that the reptile species assemblage of the Soutpansberg sensu stricto displays typical characteristics of an inselberg. Special attention was also paid to habitat preferences of the recorded taxa. Possible impacts of past geological and climatic changes on the species composition of the Soutpansberg are discussed. Finally, the reptile community of the Soutpansberg is compared to that of the Blouberg Nature Reserve based on the results of Schmidt et al. (2005).

Study area

Geography, geology and climate

The Soutpansberg with its maximum elevation of 1748 m a.s.l. is situated in the arid northern region of the Limpopo Province in north-eastern South Africa (Fig. 1). It is surrounded by slightly undulating plains and lowlands of 400 to 900 m a.s.l., including the dry Limpopo River valley in the north. The appearance of the Soutpansberg topographical feature most probably has been sculpted by erosion processes (Partridge & Maud 1987). The mountain is situated within the summer rainfall region of Southern Africa. As a result of its east-west orientation, the mountain range represents an effective barrier between the south-eastern maritime climate and the northern continental climate (Egan et al. 2005). Average annual rainfall ranges from around 400 mm on the northern slopes and 550 mm in the east to 1800 mm on the central southern slopes (Schulze 1997). Most of the precipitation can be classified as orographic rainfall, which is the result of moisture-laden air carried by the prevailing south-easterly winds from the Indian Ocean into the southern scarp of the Soutpansberg (Hahn 2006). Hence, the higher parts of the Soutpansberg, especially on the southern and eastern slopes, are characterised by mistbelt areas with frequent cloud cover and mist precipitation (Kabanda 2003).

Vegetation

The classification follows the latest vegetation atlas of South Africa (Mucina & Rutherford 2006). The Soutpansberg is dominated by Soutpansberg Mountain Bushveld, which is very heterogeneous and comprises a mosaic of different kinds of vegetation. Mistbelt bush clumps, characterised by the presence of orchids and other epiphytes, can be found on the high crests of southern and central, east-west orientated ridges, growing on outcrops with shallow sandy soils. In sheltered gorges and at the foot of vertical cliffs on the high southern and eastern slopes of the Soutpansberg, Northern Mistbelt Forest with tree species such as *Podocarpus latifolius* and *Xymalos monospora* occurs. Soutpansberg Summit Sourveld occurs on the summits of the mountain range, bordering the pockets of Northern Mistbelt Forest. This vegetation type is restricted to the high altitudes of the Blouberg and Soutpansberg above 1200 m a.s.l. where frost is not uncommon. The mistbelt and the high-altitude grassland withstood climatic oscillations in the past and provided cool and moist conditions throughout the Neogene (Hendey 1983, Coetzee 1986, Mucina & Rutherford 2006).

Lajuma Research Centre

The main survey over the course of this study was conducted at the Lajuma Research Centre property, situated on the southern slopes of the Western Soutpansberg (farm Bergplaats 40LS, quarter-degree grid square 2329AB; henceforth simply called Lajuma) (Fig. 1). The area includes altitudes from 1200 to 1748 m a.s.l. (Lajuma peak) on a total surface area of 430 ha. Average rainfall within this area is approximately 700 mm per year (I. Gaigher pers. comm. 2007). High amounts of precipitation and frequent mists lead to the formation of a few permanent streams, pools and peat wetlands. The vegetation map of Mucina & Rutherford (2006) was slightly modified and additional subcategories were determined: Northern Mistbelt Forest, Northern Mistbelt Forest (regrowth), Soutpansberg Mountain Bushveld, Soutpansberg Mountain Bushveld (*Coleochloa* association), Soutpansberg Mountain Bushveld (Mistbelt bush clumps), Soutpansberg Mountain Bushveld (Patches), Soutpansberg Summit Sourveld and Wetland (Fig. 2).

Material and methods

Reptiles were located by thorough visual searching and examination of hiding places (e.g., rocks, rock cracks, caves, loose bark and leaf litter) during daylight hours and sometimes at night between April and September 2005, February and March 2006, and from April to December 2007. Addi-

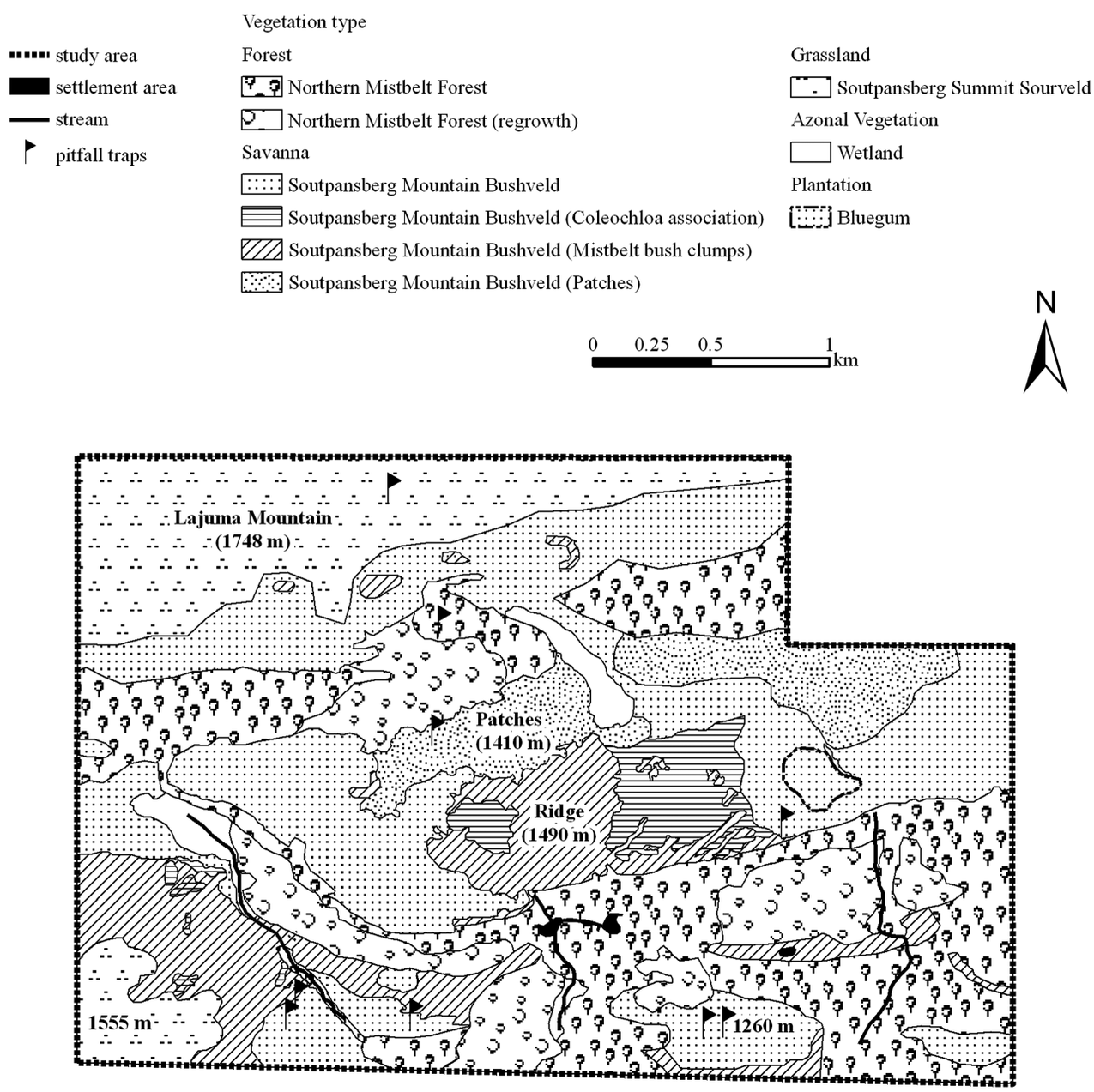

Figure 2. Vegetation map of the Lajuma Research Centre showing the position of the pitfall traps. Map modified from Mucina & Rutherford (2006).

Table 1. List of reptile taxa recorded on the Soutpansberg that were absent from the Lajuma Research Centre and represent new quarter-degree grid records (see text). The table also provides decimal degree coordinates, locality and quarter-degree grid squares (QDS) for each taxon.

Taxon	Longitude	Latitude	Locality	QDS
Atractaspis bibronii	29.93204	-22.97383	Punchbowl 799MS	2229DD
	30.23468	-23.00327	Entabeni	2330AA
Dasypeltis inornata	30.23468	-23.00305	Entabeni	2330AA
Stigmochelys pardalis	29.93329	-22.97395	Punchbowl 799 MS	2229DD
Varanus a. albigularis	29.92567	-22.97193	Punchbowl 799 MS	2229DD

tionally, nine 25 m-long pitfall trap lines on deep loose soil connected by drift fences were employed in April and May 2005 and in June/July 2007 in different altitudes on the Lajuma Research Centre property (Fig. 2). Each trap line consisted of six 10-litre buckets (diameter 25 cm, depth 30 cm), sunk at intervals of about five metres, and a 20 cm high black plastic drift fence sunk 5 cm into the ground. For each specimen detected, the following parameters were documented: date and time, weather conditions, and geographic coordinates including altitude determined with a GPS. The habitat description for each record from Lajuma Research Centre comprises elevation, exposition and vegetation type (macroscale), and structural features of the locality (microscale). Later, microhabitat descriptions were generalized and sorted into eight different habitat classes (HC) (Appendix 1). Individual numbers of species recorded in the different vegetation types as well as microhabitat use are analysed only in the case of potential endemics, threatened and otherwise interesting taxa. In addition, every specimen collected was photographed (Figs. 3, 4) and measured, and species-specific characteristics (e.g., pholidosis, colouration) were noted. Specimens were subsequently released at the place of capture. Species detected during field trips along the Eastern Soutpansberg were added to the species list and distribution maps (Fig. 5), but not included in the habitat analysis. Furthermore, additional species records were obtained from published references. Identification of species and scientific nomenclature follow FitzSimons (1933), Jacobsen (1987a, 1987b, 1989, 1992a, 1992b, 1994a, 1994b), Branch (1998) as updated by Uetz et al. (2010).

Results and discussion

Selected species accounts

In total, 38 reptile species belonging to 32 genera and 13 families were recorded at the Lajuma Research Centre. These represented 18 snake and 20 lizard species. Three more species were added from the literature,and 12 additional species were found during field trips to the Soutpansberg east of Lajuma, extending the species list to 53 species (41 genera, 17 families), including one chelonian, 26 snakes, one amphisbaenian, and 25 lizards (Appendix 2). Coordinates of species recorded on the Soutpansberg that were absent from Lajuma Research Centre and represent new quarter-degree grid records are listed in Table 1. The following notes refer to selected species, comprising potential endemics, threatened and otherwise interesting taxa.

Typhlopidae

Afrotyphlops bibronii (A. Smith, 1846)
Distribution: From the Albany District (Eastern Cape) and southern KwaZulu-Natal to the northern provinces (North West Province, Gauteng, Mpumalanga, Limpopo Province) of South Africa. Habitat: Highveld, coastal grasslands (Branch 1998).

Most of the 19 records were made in bushveld, including mistbelt bush clumps, at altitudes of 1278-1546 m a.s.l. The species also occurred in open patches of Northern Mistbelt Forest and Soutpansberg Summit Sourveld. All specimens of this fossorial species were found on loose soil under stones in HC 4 and 5.

Colouration varied from uniform beige to dark brown (almost black) with pale, beige bellies. Seven specimens were hatchlings or juveniles found as late as to the middle of July, although Branch (1998) mentions that the young would hatch only until late March. All of them were of a uniform pale beige colour. The smallest specimen measured only 10.0 cm total length (ToL) (Branch 1998: min. 10.9 cm) and was found together with two other hatchlings (ToL 11.3 cm and 11.4 cm) under a stone in moist bushveld close to a peat marsh.

Boidae

Python natalensis A. Smith, 1840
South African Red Data Book (SARDB): Vulnerable (Branch 1988). Distribution: From the KwaZulu-Natal south coast to Burundi. Habitat: In Southern Africa mainly Lowveld, fond of water, often in riverine scrub (Branch 1998).

Two records at altitudes of 1300-1350 m a.s.l. A juvenile specimen was found in mistbelt bush clumps of Soutpansberg Mountain Bushveld, and an adult was detected basking near a peat marsh in Soutpansberg Mountain Bushveld. Both records were made in HC 4.

Atractaspididae

Amblyodipsas microphthalma nigra (Bianconi, 1850)
SARDB: Restricted (Jacobsen 1988a). Distribution: Vicinity of the Soutpansberg (Jacobsen 1986). Habitat: Under stones on loose soil in rocky terrain (Branch 1998).

One adult and one juvenile (Fig. 3A) were found at Lajuma in June and July in the mistbelt bush clumps, both in HC 4 at altitudes of 1300-1320 m a.s.l. *Scelotes* sp. and *Ty-*

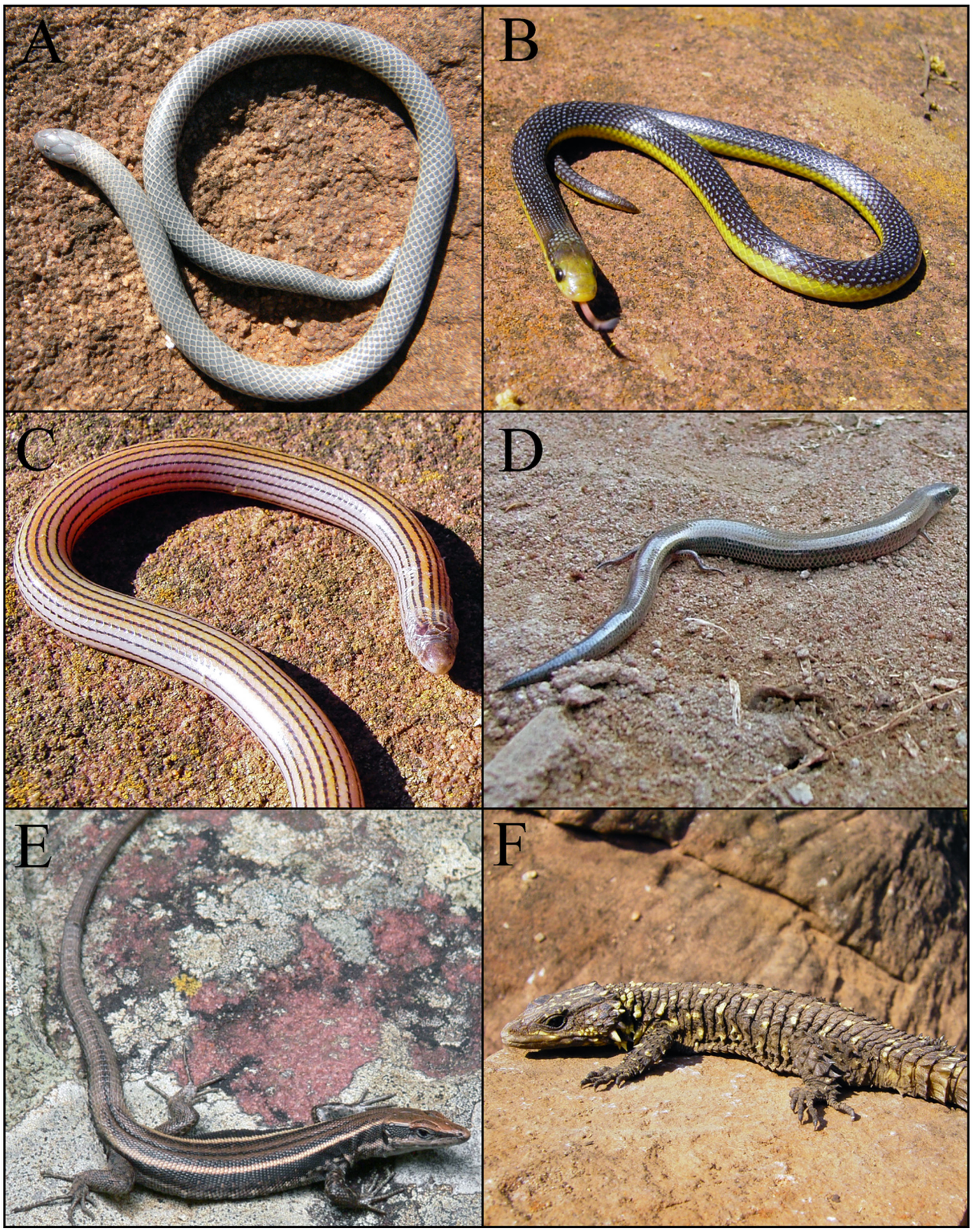

Figure 3. Photographs of taxa collected at the Soutpansberg: (A) *Amblyodipsas microphthalma nigra*; (B) *Prosymna stuhlmannii*, (C) *Typhlosaurus cregoi cregoi*, (D) *Scelotes limpopoensis limpopoensis*, (E) *Australolacerta rupicola*, (F) *Cordylus warreni depressus*. Photos: S. Kirchhof.

phlosaurus sp. were found syntopically, both of which are typical prey of *Amblyodipsas* (Branch 1998). These are the westernmost records (see Jacobsen 1986, Egan et al. 2005) and the first records from west of the Sand River (Fig. 6). Previously, the distribution of *A. m. nigra* was known to range as far west as 29°46'E.

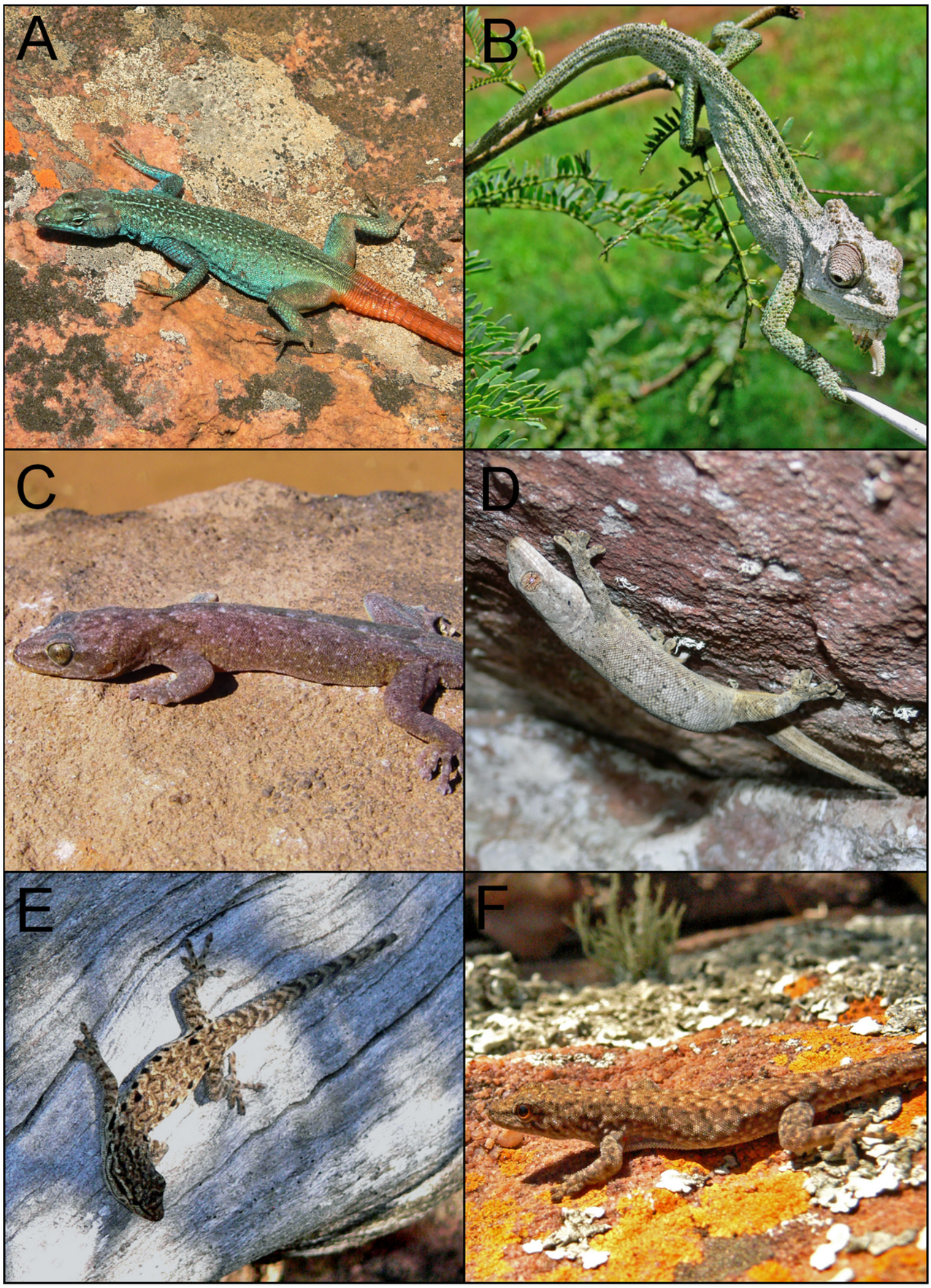

Figure 4. Photographs of taxa collected at the Soutpansberg: (A) *Platysaurus relictus*, (B) *Bradypodion transvaalense*, (C) *Afroedura* cf. *langi* 'Waterpoort', (D) *Homopholis walbergii*, (E) *Lygodactylus nigropunctatus incognitus*, (F) *Lygodactylus ocellatus soutpansbergensis*. Photos: S. Kirchhof.

Colubridae

Prosymna stuhlmannii (Pfeffer, 1893)
Distribution: Southern Somalia through East Africa to Zimbabwe and Mozambique, entering South Africa in northern Zululand and Mpumalanga. Habitat: Savannah, extending into wooded hills (Branch 1998).

Six specimens of this fossorial species were found under stones in winter and early spring (April to September). Predominant habitats were rocky bushveld and open rocky areas in Soutpansberg Summit Sourveld at 1274 to 1584 m a.s.l., but always on loose soil (HC 4 and 5). Specimens were even found in *Coleochloa* vegetation where the soil layer is exceptionally shallow. Juveniles were caught on 30 April (ToL 13.0 cm) and 30 July (ToL 12.8 cm). The longest adult specimen had a snout-vent length (SVL) of 24.8 cm (ToL 29.0 cm). Dorsal colouration was metallic blue-black with pale-centred scales. All adult individuals were bright yellow ventrolaterally with a yellow-white belly (Fig. 3B) and not white or brown-black as mentioned in Branch (1998).

Psammophis crucifer (Daudin, 1803)
Distribution: From the Cape Fold Mountains to the Highveld of the Free State along the escarpment of Mpumalanga and Limpopo Province, with a relict population persisting in the highlands of eastern Zimbabwe. Habitat: Highveld, montane grasslands, enters Fynbos (Branch 1998).

A recent molecular study of the family reveals that *P. crucifer* is the earliest diverging lineage in the genus *Psammophis* together with a sister clade of two exclusively Eurasian taxa (*P. condanarus* and *P. lineolatus*) (Kelly et al. 2008), which might indicate a relict state of *P. crucifer*.

Three adult specimens were recorded in May and November in HC 4 at altitudes of 1420-1580 m a.s.l. One of them was actively moving through vegetation in Soutpansberg Summit Sourveld, and one was moving through a patch of sedge land in open bushveld. The specimen found in November was a gravid female (SVL = 57.2 cm, tail length (TL) = 13.5 cm) sheltering under a rock. The species finds ideal habitats in the higher reaches of the Soutpansberg and is probably widely distributed.

Scincidae

Typhlosaurus cregoi cregoi Boulenger, 1903
Distribution: From the Soutpansberg into the northern parts of Kruger National Park, slightly farther south along the escarpment. Habitat: Montane rocky hillsides (Branch 1998).

During the survey, 11 specimens of this near-endemic species were recorded in the study area, all sheltering beneath stones on loose sandy soil, mostly in grassy patches near bedrock with shrubs (HC 4), but also with denser tree or bush cover (HC 5). Most records were made in the mistbelt bush clumps of Soutpansberg Mountain Bushveld at around 1300 m a.s.l., but open patches in moist Northern Mistbelt Forest regrowth were also frequently used. One individual was recorded at an elevation of 1537 m a.s.l., together with an adult *Afrotyphlops bibronii*. Only the typical striped belly form was found (Fig. 3C).

Scelotes limpopoensis limpopoensis FitzSimons, 1930
Distribution: Limpopo valley and adjacent regions. Habitat: Alluvial sand with mesic savannah (Branch 1998).

Jacobsen (1989) suggested that *S. l. limpopoensis* ranges from southern Zimbabwe and north-eastern Kruger National Park westwards along the Soutpansberg and the low-lying country, to the foothills of the Waterberg (Fig. 7). Two isolated groups of this subspecies surround *S. l. albiventris* and they have never been recorded in sympatry (Schmidt et al. 2005). The south-westernmost record of the eastern group is from Farm Capesthorne 233 (2329BA) near the Happy Rest Nature Reserve east of the Sand River (Jacobsen 1987a). All specimens collected by Jacobsen (1989) were from altitudes between 300 and 1100 m a.s.l., and this taxon was stated to be absent from the lowlands south of the Soutpansberg.

Over the course of this study, 27 specimens were recorded (most of them in Soutpansberg Mountain Bushveld including the mistbelt). Preferred habitats belonged to HC 4 (18 individuals), seven individuals were recorded in HC 5, and two in HC 3. All collected specimens were identified as *Scelotes l. limpopoensis* according to the taxonomy of Jacobsen (1987a) and Branch (1998), as they all showed very reduced tridactyl fore limbs, slightly longer, usually tetradactyl hind limbs, five supraciliaries, and 22-23 midbody scale rows. These records from the southern slope of the Soutpansberg west of the Sand River deserve special attention. Some peculiarities in the recorded specimens are apparent: (i) Two colour morphs of *S. l. limpopoensis* are known (Jacobsen 1989). Most common is a broad, dark brown longitudinal stripe on the back, flanked on each side by a buff dorsolateral streak, which again has a broad dark brown stripe below it (Jacobsen 1989, Branch 1998). However, some specimens have a more uniform brown ground colour with a lighter dorsolateral stripe (Jacobsen 1989). All 27 specimens collected at Lajuma showed the latter colour pattern (Fig. 3D). (ii) In our study area, *S. l. limpopoensis* was found at altitudes of 1240-1578 m a.s.l., which is much higher than the maximum elevation of the records made by Jacobsen (1989). (iii) Two individuals had five toes on each hind limb. Jacobsen (1989) mainly recorded specimens with tetradactyl hind limbs and tridactyl fore limbs and a few individuals even had mono- or didactyl fore limbs. (iv) Scale counts were taken from five specimens from Lajuma: , one had 22 scale rows at midbody; and four specimens had 23, which is usually less common according to Jacobsen (1989) and more than mentioned by Branch (1998) (20-22 scale rows at midbody). A relict distribution of the Soutpansberg population is presumed, but further research is necessary to confirm this.

Lacertidae

Australolacerta rupicola (FitzSimons, 1933)
IUCN Red List: Near Threatened (World Conservation Monitoring Centre 1996a). SARDB: Restricted (Jacobsen 1988b). Distribution: Soutpansberg (Jacobsen 1989, Branch 1998). Habitat: Sparsely vegetated mountain summits (Branch 1998).

About 135 observations, for the first time including 16 juveniles, were made during this study (Kirchhof & Richter 2009). Records from three new quarter-degree grids

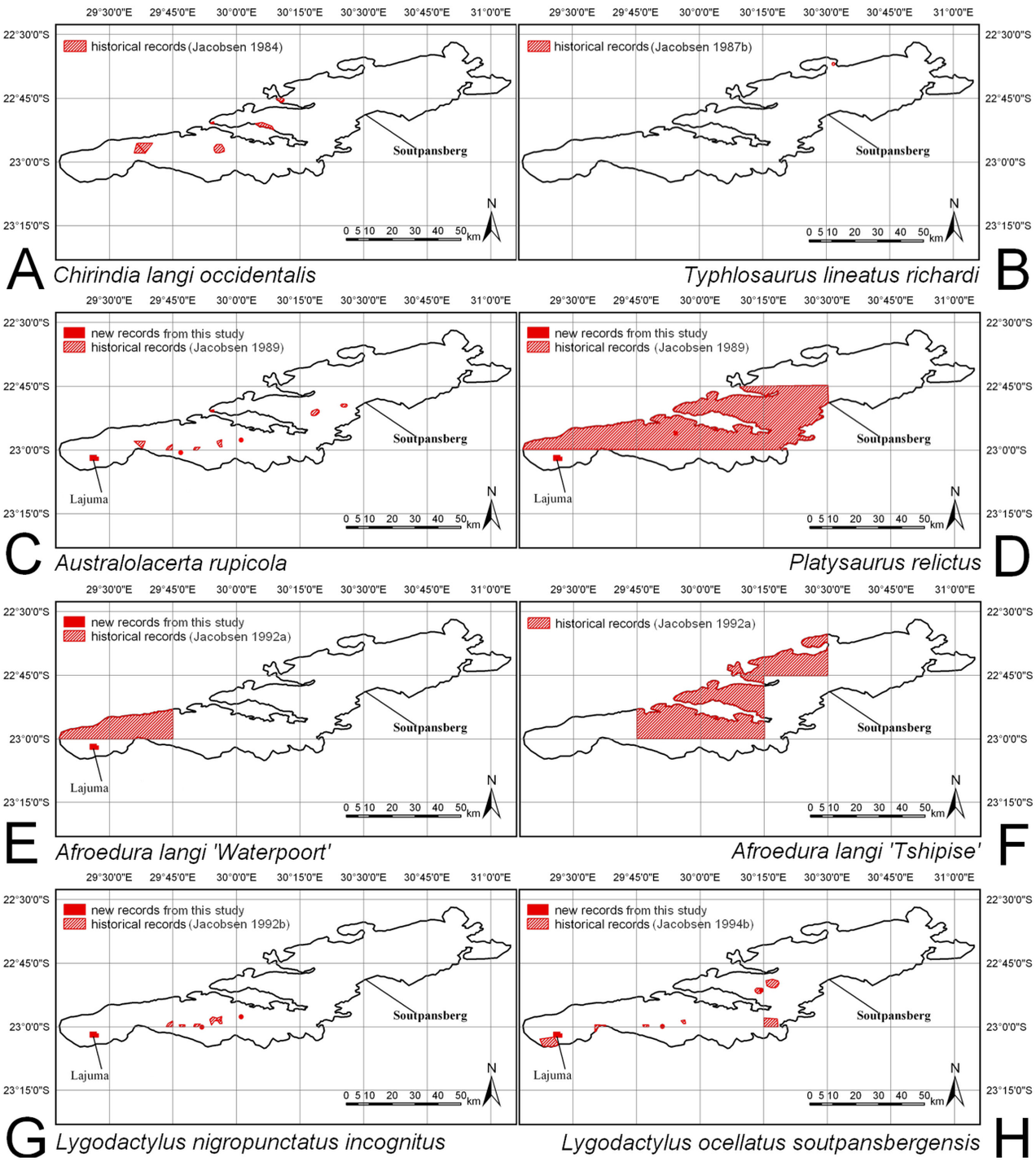

Figure 5. Distributions of the reptile taxa endemic to the Soutpansberg sensu stricto: (A) *Chirindia langi occidentalis*, (B) *Typhlosaurus lineatus richardi*, (C) *Australolacerta rupicola*, (D) *Platysaurus relictus*, (E) *Afroedura langi* 'Waterpoort', (F) *Afroedura langi* 'Tshipise', (G) *Lygodactylus nigropunctatus incognitus*, (H) *Lygodactylus ocellatus soutpansbergensis*.

extend the known distribution range (FitzSimons 1933, Jacobsen 1989) of the species some 20 km to the south-west: Studholme 229MT (2230CC), Bluegumsport 779MS (2329BB), and Bergplaats 40LS (2329AB), which is now the western- and southernmost record (Fig. 5C). In contrast to the habitat descriptions in Branch (1998), adults (Fig. 3E) were found in all available vegetation types of the study area with exception of the grassland-woodland mosaic on deep sand, the so-called 'Patches'. The species showed a predilection for mistbelt bush clumps of Soutpansberg Mountain Bushveld where it foraged in leaf litter and sheltered in cracks between the rocks at night (Kirchhof et al. in press). No records were made at the mountain summit at altitudes between 1600 and 1748 m a.s.l. Habitat classes 1, 2, 4, 5 and 6 were occupied by adults; juveniles were recorded in HC 3 (with no adults) and 6 only. The smallest hatchlings measured 2.0 cm SVL. Individuals with an SVL as small as 2.1 cm were caught in April and surprisingly

even at the beginning of June. A relict distribution of this species is presumed, but further research is necessary to confirm this (Kirchhof & Richter 2009).

Nucras intertexta A. Smith, 1838
Distribution: Southern Mozambique and extreme northern KwaZulu-Natal through the Kalahari to northern Namibia. Habitat: Arid savannah, usually on Kalahari sand (Branch 1998).

The second member of the family Lacertidae recorded in the study area. In total, 24 specimens were caught at altitudes between 1259 and 1578 m a.s.l. Specimens were mainly found in open, often north-facing habitats on shallow stony ground or deep sand within sparse bushveld with a dense grass cover of up to 70% (HC 3 and 4). A few individuals were recorded in areas with tree or shrub cover of up to 70% (HC 5). The preferred vegetation type was Soutpansberg Mountain Bushveld with a few individuals in the mistbelt bush clumps, but occasional records were also made from Northern Mistbelt Forest and Soutpansberg Summit Sourveld. Twelve specimens were juvenile, which were exclusively caught in the pitfall traps. SVL of hatchlings and juveniles ranged from 2.8 to 3.6 cm. The earliest record of a juvenile was from 24 April (SVL = 2.9 cm).

Cordylidae

Cordylus warreni depressus (FitzSimons, 1930)
Distribution: Northern parts of the Limpopo Province to the western Soutpansberg. Habitat: Montane, well-wooded rocky outcrops (Branch 1998).

Warren's Girdled Lizard (Fig. 3F) was quite abundant in the research area. This lizard prefers rock outcrops with vertical and horizontal cracks, however, in the case of juveniles, single stones and larger rocks on soil apparently sufficed as shelter, at least during the day. Habitats comprised well-vegetated areas, often with shrubs shading cracks. Habitat classes 1, 2, 4, 5 and 7 were inhabited, with a predilection for HC 4. This species occurred in almost all vegetation types and was only absent from the grassland-woodland mosaic, the *Coleochloa* associations and the wetlands. Records were made at altitudes ranging from 1250-1551 m a.s.l. Juveniles were found from mid-February onwards. The smallest individual measured only 5.5 cm SVL and was recorded on 1 March.

Platysaurus relictus Broadley, 1976
IUCN Red List: Near Threatened (World Conservation Monitoring Centre 1996b). SARDB: Restricted (Jacobsen 1988c). Distribution: Soutpansberg (Jacobsen 1988c, 1989). Habitat: Arid savannah (Branch 1998).

The phylogenetic status of *P. relictus* within the genus remains unresolved. The taxonomy of *Platysaurus* has recently been reviewed by Scott et al. (2004), but material of *P. relictus* was not included in their study. Following Jacobsen (1994a), the species belongs to the *intermedius* complex with which it shares several morphological similarities, but Scott et al. (2004) rejected the general hypothesis of a monophyletic *intermedius* complex sensu Jacobsen (1994a) based on the results of their molecular study. However, the taxa distributed in the eastern part of the range of *Platysaurus* (including those from northeastern South Africa) represent the greatest diversity in the genus and speciation events most probably occurred prior to the Plio-Pleistocene (Scott et al. 2004). Interestingly, two further *Platysaurus* taxa, although not endemic, have been recorded on the Soutpansberg: *Platysaurus intermedius intermedius* and *Platysaurus intermedius rhodesianus* (Jacobsen 1989).

Platysaurus relictus is quite abundant in the research area with a total of 54 records. They represent the first records for the quarter-degree grid 2329AB (Jacobsen 1989) (Fig. 5D). The species preferred sourveld at high altitudes (up to 1600 m a.s.l.), but was also found in Soutpansberg Mountain Bushveld at altitudes as low as 1420 m a.s.l. Habitat classes 1, 2 and 4 were inhabited. Colouration of males (Fig. 4A) included distinct black spots on the blue-white throat. The belly of females was bright orange with black spots. Neither of these features are mentioned in Branch (1998).

Chamaeleonidae

Bradypodion transvaalense (FitzSimons, 1930)
Distribution: Vicinity of Haenertsburg and Woodbush Forest (Limpopo Province escarpment), isolated populations along the escarpment from Barberton to Soutpansberg. Habitat: Wet forest of escarpment kloofs (Branch 1998).

The genus *Bradypodion* is endemic to South Africa, and the distribution ranges of the species are completely allopatric (Tolley et al. 2006). Relationships of the *transvaalense* complex remain unresolved. Isolated populations are currently still included in *transvaalense*, but it was proposed that nine different species forming two groups might occur (Jacobsen 1989). During a revision of the genus, *transvaalense* specimens from the Wolkberg (Haenertsburg, Hendriksdal) were suggested to be monophyletic (Tolley et al. 2004). However, no specimens from the Soutpansberg were included in this revision. *Bradypodion transvaalense* sensu stricto appears to be a relatively young species. The lineage presumably split between 4-3 Ma (Tolley et al. 2006).

Three specimens were recorded in the area, two of them on branches of *Syzygium cordatum*, all of them in the well-wooded garden of the farmhouse, which harbours many alien plant species. Individuals found at Lajuma (Fig. 4B) had a dorsal crest with 13-15 tubercles that was less prominent and never extended to the tail as described for typical *B. transvaalense* specimens (Branch 1998).

Gekkonidae

Afroedura cf. *langi* (FitzSimons, 1930)
Distribution: Vicinity of the Olifants River valley; isolated populations related to this species are know from the Leolo Mountains, Soutpansberg, Waterberg, Mica. Habitat: Schist outcrops in mixed deciduous woodland (Branch 1998).

Following Jacobsen (1992a), it seems that at least three groups of *Afroedura langi* occur on the Soutpansberg: *Afroedura l.* 'Soutpansberg', *A. l.* 'Waterpoort' and *A. l.* 'Tshipise'. *Afroedura langi* 'Soutpansberg' occurs on the southern slopes of the Soutpansberg and on Blouberg, *A. l.* 'Waterpoort' and *A. l.* 'Tshipise' are restricted to the north-

ern slopes of the Soutpansberg (Fig. 5E) (Jacobsen 1992a). He proposed that the ancestor of *Afroedura* was probably distributed along the coast and later penetrated farther inland. A second radiation of the inland form occurred when populations from the Lebombo Mountains dispersed northwards and became isolated.

A total of 11 specimens of a medium-sized *Afroedura* were detected at three locations in the study area (Fig. 4C). They resemble *A. l.* 'Waterpoort' sensu Jacobsen (1992a) by lacking an internasal, exceeding 4.6 cm SVL, tails being feebly verticillate, scales between eye and anterior margin of ear ranging from 17-18, and precloacal pores being present in males only and ranging from 18-19 (n = 3). However, these records fall within the distribution range of *A. langi* 'Soutpansberg' (Jacobsen 1992a).

Most specimens inhabited cracks and fissures in vertical rock walls and caves on the southern slopes of the mountain (HC 1), and only three were found in an electrical junction box in a human settlement (HC 7). Specimens in cracks were usually found clinging to the surface belly up. All localities are situated in the mistbelt bush clumps of Soutpansberg Mountain Bushveld. If *A. l.* 'Waterpoort' is in fact a valid species, it is probably endemic to the Soutpansberg (Jacobsen 1992a).

Homopholis walbergii (A. Smith, 1849)
Distribution: Zimbabwe and Mozambique to adjacent Zululand, Limpopo Province and eastern Botswana (Branch 1998). Habitat: Coastal bush, mesic and arid savannah, arboreal and/or rupicolous (Jacobsen 1989, Branch 1998).

Recent investigations reveal that *Homopholis walbergii* is not monophyletic and will likely be divided into two species, with one being distributed south of the Soutpansberg and the other one inhabiting the range north of the Soutpansberg (Greenbaum et al. 2007).

In total, 13 records of *Homopholis walbergii* were made during this survey (Fig. 4D). Many of the individuals recorded at Lajuma were found in areas of human settlement on house walls (HC 7). Records made in natural habitats include specimens found at the summit of Lajuma under rocks (HC 2), beneath loose bark in low forest (HC 6), in cracks of rock outcrops (HC 1), and under rocks on soil in bushveld (HC 4). *Homopholis walbergii* occurred at altitudes from 1214-1747 m a.s.l. in three vegetation types: Northern Mistbelt Forest (four individuals), Soutpansberg Mountain Bushveld (mistbelt bush clumps) (five individuals) and Soutpansberg Summit Sourveld (four individuals). Juveniles were only found in May.

Lygodactylus nigropunctatus incognitus Jacobsen, 1992
Distribution: Soutpansberg. Habitat: Wet and dry savannah and subtropical thicket (Branch 1998).

The morphological differences between the three subspecies of *L. nigropunctatus* are only poorly defined (Branch 1998). Jacobsen (1992b) states that the rupicolous lifestyle of Southern African *Lygodactylus* taxa is newly developed after the arboreal parental stock from Central Africa moved southwards and climatic fluctuations during the Pleistocene resulted in a temporary decrease in the number of available trees. The adaptive zone has most

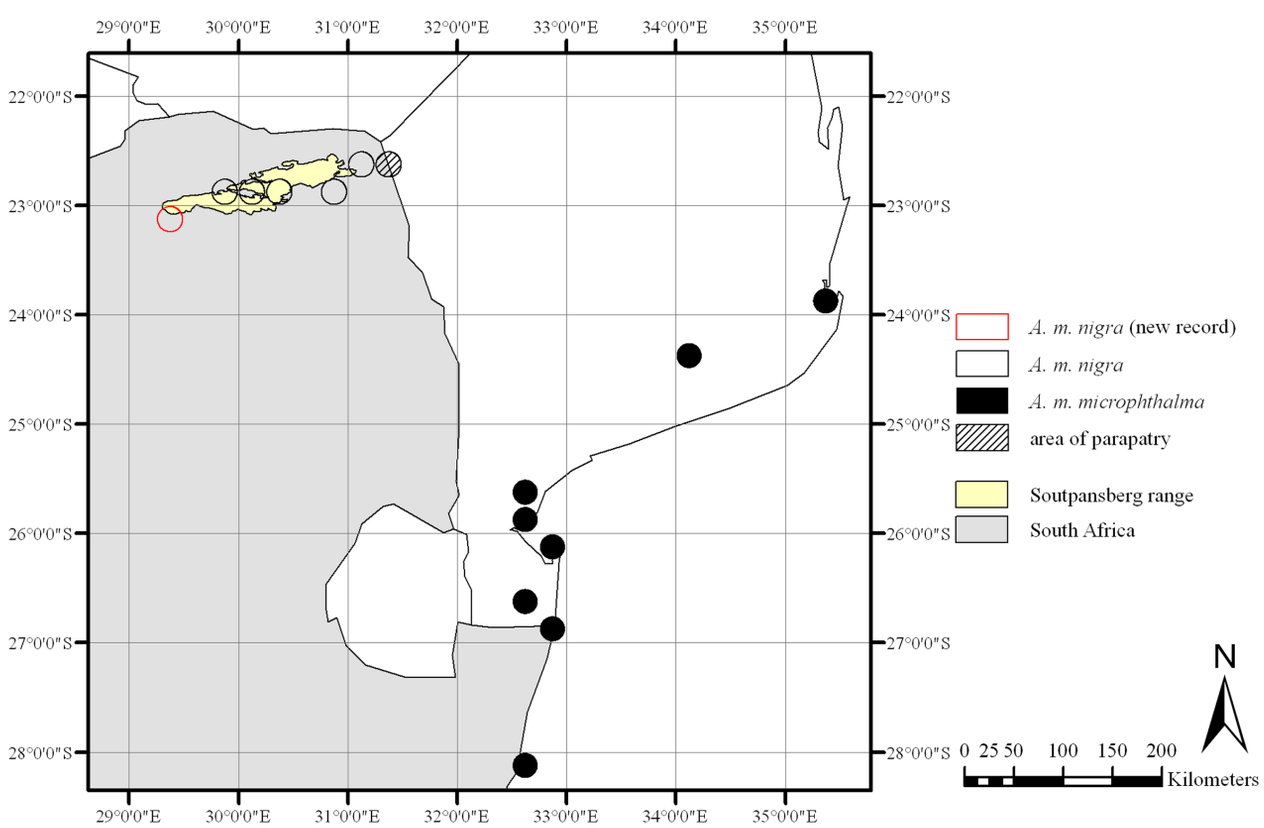

Figure 6. Current distribution of *Amblyodipsas microphthalma*. The map shows the quarter-degree grid squares of historical records as presented by Jacobsen (1986) and of new records from the Lajuma Research Centre.

probably been along the eastern escarpment (Jacobsen 1992b). The divergence of the two *nigropunctatus* subspecies *incognitus* and *montiscaeruli* from the nominate form might be the result of the isolation of the Soutpansberg and Blouberg.

A total of 34 individuals of *L. n. incognitus* were recorded (Fig. 4E). The specimens from Bergplaats 40LS (2329AB) and Studholme 229MT (2230CC) represent the first records for these quarter-degree grids (Jacobsen 1992b) (Fig. 5G). The species is common on house walls (HC 7). In natural habitats, it was recorded in HC 2, 4 and 5. Specimens were found in mistbelt bush clumps of Soutpansberg Mountain Bushveld and Soutpansberg Summit Sourveld at altitudes ranging from 1282-1747 m a.sl.

Their pholidosis generally resembled the description given by Jacobsen (1992b), although specimens with three postmentals were also found, which was a trait so far only known from the other two subspecies and regarded as one of the distinguishing features of *L. n. incognitus* (Jacobsen 1992b). Furthermore, various specimens were found that lacked lateral black spots, but could not be assigned to either *L. capensis capensis* or *L. ocellatus soutpansbergensis*, which are the other two *Lygodactylus* taxa occurring on the Soutpansberg.

Lygodactylus ocellatus soutpansbergensis Jacobsen, 1994
Distribution: Limpopo Province, Gauteng, North West Province, Mpumalanga and Swaziland (Branch 1998). Habitat: Open Highveld grasslands (Jacobsen 1994b).

The two known subspecies of *L. ocellatus* seem to be allopatric and are separated by 175 km (Jacobsen 1994b). Jacobsen (1994b) assumed that *L. o. soutpansbergensis* diverged from the nominate form after the last major uplift of the African surface (5-3 Ma; Partridge et al. 2006). He suggested a relatively recent divergence, possibly in the Pleistocene, because of the similarity of the two subspecies. *Lygodactylus o. soutpansbergensis* is most likely an isolated endemic subspecies of the Soutpansberg (Fig. 5H). The species can be found on rock outcrops in montane grassland and mixed grassland/forest as well as in subtropical deciduous woodland in the Soutpansberg (Jacobsen 1994b).

At Lajuma, 28 individuals (Fig. 4F) were recorded in Soutpansberg Mountain Bushveld and Soutpansberg Summit Sourveld, where HC 1, 2 and 4 were inhabited. The ecotones between the three habitat classes were especially preferred. Altitude levels ranged from 1268-1584 m a.s.l.

Habitat use of the reptiles of Lajuma Research Centre

Macrohabitat

The vegetation units at Lajuma differ clearly in the composition of reptile species (Fig. 8, Table 2). *Bradypodion transvaalense* and *Trachylepis punctatissima* are excluded from the analysis, as they were never recorded in natural habitats but only on house walls or in gardens.

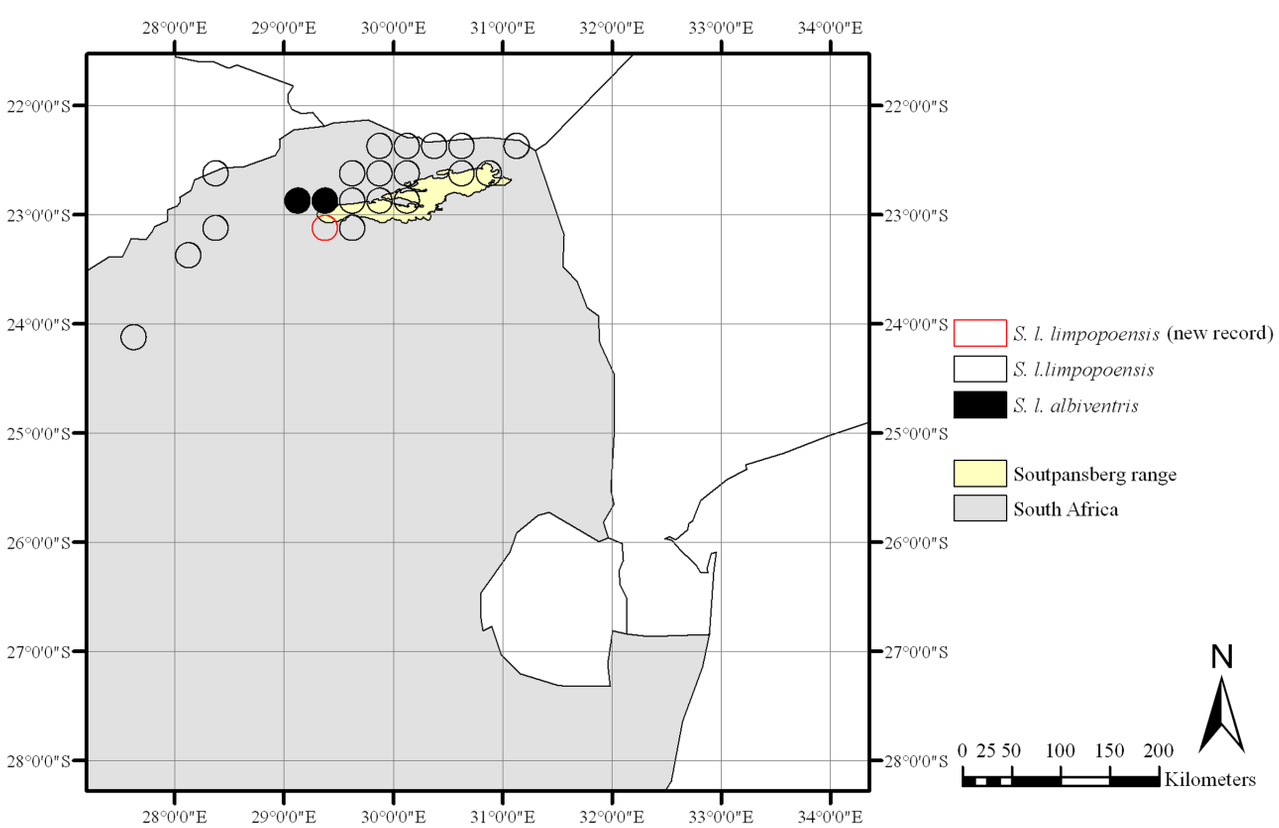

Figure 7. Current distribution of *Scelotes limpopoensis*. The map shows the quarter-degree grid squares of historical records as presented by Jacobsen (1987a) and of new records from the Lajuma Research Centre.

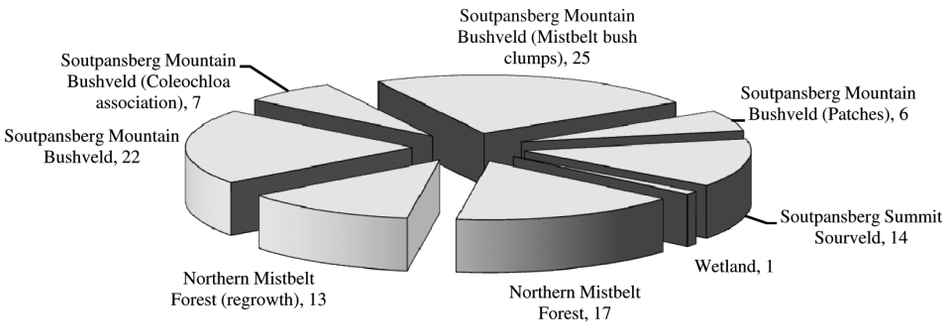

Figure 8. Number of reptile species in the different vegetation types.

A total of 25 species were found in the mistbelt bush clumps of Soutpansberg Mountain Bushveld, indicating the relative importance of this particular habitat. This includes all Red Data Book species and four of the endemics. Five species were exclusively recorded in the mistbelt (*Afroedura* cf. *langi*, *Agama armata*, *Amblyodipsas microphthalma nigra*, *Lamprophis guttatus* and *Philothamnus semivariegatus*), and only four species were absent from bushveld (*Dispholidus typus typus*, *Lycodonomorphus rufulus*, *Philothamnus hoplogaster* and *Thelotornis capensis capensis*).

Seventeen species were found in Northern Mistbelt Forest, but none of them seem to be restricted to it. The sample sizes of the two arboreal snakes *D. t. typus* and *T. c. capensis* are too small to allow for certain conclusions, but both are typical savannah species that have close relatives or even subspecies in the tropical rain forests of Central Africa (Branch 1998). *Lycodonomorphus rufulus* is a semi-aquatic snake that was found alongside a small pond. All other species showed a predilection for other vegetation types. Records from Northern Mistbelt Forest were mostly made in open patches or at forest margins. This applies in particular to individuals of *Australolacerta rupicola*, *Cordylus warreni depressus* and *Afrotyphlops bibronii*.

The high-altitude Soutpansberg Summit Sourveld is an important habitat for 14 reptile species. The records of the fossorial species *Prosymna stuhlmannii* and *Scelotes limpopoensis limpopoensis* at altitudes above 1500 m a.s.l. are remarkable.

The grassland-woodland mosaic (Patches) and *Coleochloa* associations were found to be rather poor in reptile diversity. Of the six species recorded on the 'Patches', *Aparallactus capensis*, *Gerrhosaurus flavigularis*, *Panaspis wahlbergii* and *Trachylepis varia* find suitable conditions here, since all woodland patches contain at least one termite mount where these species find their preferred prey (Branch 1998). In *Coleochloa* fields, the most common species were *Platysaurus relictus* and *Trachylepis margaritifer*. At forest margins, which grade into steep bedrock slopes dominated by the sedge *Coleochloa setifera* and the shrub *Myrothamnus flabellifolius, A. rupicola* was found frequently. The wetlands in the study area provide habitats for species like *Philothamnus hoplogaster*, which feeds mainly on frogs and fish (Branch 1998). Although never recorded directly in wetlands, *Python natalensis* and *Causus defilippii* use wetlands as an important food source, and both species were found near peat marshes.

Microhabitat

Although reptiles may be dependent on certain vegetation, broad-scale vegetation types only give an indication of the general ecological properties of a habitat complex. At least as important is the structural setting of habitats on a microscale. Of the 15 taxa of special interest (Table 3), the following seven are regarded as rupicolous (Branch 1998, Jacobsen 1989): *Afroedura* cf. *langi*, *A. rupicola*, *C. w. depressus*, *H. walbergii*, *L. n. incognitus*, *L. o. soutpansbergensis* and *P. relictus*. Therefore, they would predominately be expected in HC 1 and 2. Indeed, *A.* cf. *langi* 'Waterpoort' exclusively inhabited HC 1 when found in natural habitats. This species is highly dependent on cracks in expansive rock walls or caves. *Australolacerta rupicola*, *H. walbergii*, *L. o. soutpansbergensis* and *P. relictus* were frequently observed on bare rock, but showed a definite predilection for HC 4. In contrast to *L. o. soutpansbergensis*, the other endemic dwarf gecko *L. n. incognitus* was almost completely absent from bare rocks. Although both species showed a predilection for the structurally heterogeneous HC 4, *L. o. soutpansbergensis* favoured the much drier areas and was absent from mistbelt bush clumps (Table 3). Only at higher altitudes did they co-occur in the sourveld.

Five of the 15 taxa analysed show a fossorial lifestyle, namely *A. m. nigra, P. stuhlmannii, S. l. limpopoensis*, *T. c. cregoi* and *A. bibronii*. Interestingly, only one single individual of *S. l. limpopoensis* was recorded from deep-sand habitats (HC 3). All other records of *S. l. limpopoensis* and the other fossorial species were made in rocky areas with small patches of shallow loose soil (HC 4 and 5). Of these species, *A. bibronii* and *A. m. nigra* seem to be most dependent on relatively open areas as they were absent from HC 5 (vegetation cover up to 70%). The deep sand areas (HC 3) were actually most important for the offspring of the two lacertid lizards *A. rupicola* and *N. intertexta*. All records of these species in HC 3 (Table 3) were those of hatchlings and juveniles. Adult individuals of both species were most abundant in open areas with rocks (HC 4) where *A. rupicola* prefers extensive rock outcrops and bedrock and *N. intertexta* grass-dominated patches with single loose rocks.

Most of the species analysed showed a predilection for areas with the highest structural heterogeneity (HC 4), where 14 of the 15 species were recorded. Only *A.* cf. *langi* 'Waterpoort' was absent. Sites categorized as HC 4 were often ecotones, characterized by a mosaic of both open and vegetated areas with a combination of different grain sizes

in the substrate and different strata in the cover of vegetation (herb, shrub and tree layer). A reduction in the species richness was evident with increasing shade. This becomes apparent in HC 5 (increasing tree cover as main difference) with only five species recorded. In forests with tree coverage above 70% (HC 6), only a few specimens of *A. rupicola* and *H. walbergii* were found.

Regional influences

Although the Soutpansberg lies north of the Tropic of Capricorn and is surrounded by subtropical savannah and shrubland, temperate species find ideal habitats in the high-altitude Soutpansberg Summit Sourveld and in the moist mistbelt. The neighbouring escarpment and other mountains in the vicinity, such as the Wolkberg, Waterberg, Blouberg, and even the highlands of eastern Zimbabwe to the north provided stepping stones of suitable habitats for the migration of temperate and Afromontane reptile species. A similar scenario was demonstrated for the floristic composition of the Soutpansberg (Hahn 2006). With *A. rupicola*, one temperate species is endemic to the Soutpansberg. Two temperate species reach their northernmost distribution in the Soutpansberg (*L. guttatus*, *P. b. brevirostris*). The snake species *P. crucifer* and *A. bibro-*

Table 2. Records of reptile taxa in the different vegetation types at the Lajuma Research Centre. Abbreviations: NMF – Northern Mistbelt Forest, NMF(re.) – Northern Mistbelt Forest regrowth, SMB – Soutpansberg Mountain Bushveld, SMB(C) – Soutpansberg Mountain Bushveld (*Coleochloa* association), SMB(m) – Soutpansberg Mountain Bushveld (mistbelt bush clumps), SMB(p) – Soutpansberg Mountain Bushveld (Patches), SSS – Soutpansberg Summit Sourveld, WL – Wetland. *Bradypodion transvaalense* and *Trachylepis punctatissima* are excluded (see text):

Taxon	NMF	NMF(re.)	SMB	SMB(C)	SMB(m)	SMB(p)	SSS	WL
Afroedura cf. *langi* 'Waterpoort'					x			
Afrotyphlops bibronii	x		x		x		x	
Agama armata					x			
Amblyodipsas microphthalma nigra					x			
Aparallactus capensis	x		x	x	x	x	x	
Australolacerta rupicola	x		x	x	x		x	
Bitis a. arietans		x	x					
Causus defilippii			x		x			
Chamaeleo dilepis	x	x	x		x			
Cordylus warreni depressus	x	x	x		x		x	
Dendroaspis polylepis			x					
Dispholidus t. typus	x							
Gerrhosaurus flavigularis	x	x	x		x	x		
Homopholis walbergii	x				x		x	
Lamprophis guttatus					x			
Lycodonomorphus rufulus	x							
Lycophidion c. capense			x		x			
Lygodactylus c. capensis	x	x			x		x	
Lygodactylus nigropunctatus incognitus					x		x	
Lygodactylus ocellatus soutpansbergensis			x			x	x	
Naja mossambica	x	x	x					
Nucras intertexta	x	x	x		x		x	
Pachydactylus vansoni	x		x	x	x		x	
Panaspis wahlbergii	x	x	x		x	x		
Philothamnus hoplogaster								x
Philothamnus semivariegatus					x			
Platysaurus relictus			x	x	x		x	
Prosymna stuhlmannii		x	x				x	
Psammophis b. brevirostris			x					
Psammophis crucifer				x			x	
Python natalensis			x		x			
Scelotes l. limpopoensis		x	x		x		x	
Thelotornis c. capensis	x							
Trachylepis margaritifer	x	x	x	x	x	x		
Trachylepis varia	x	x	x	x	x	x		
Typhlosaurus c. cregoi		x			x			
Total	17	13	22	7	25	6	14	1

nii, which depend on mesic grasslands, have their northernmost South African limit in the Soutpansberg, with isolated populations occurring in the highlands of eastern Zimbabwe. Another temperate species (*D. inornata*), with a distribution in the eastern coastal woodland regions of South Africa and along the eastern escarpment, has an isolated population on the Soutpansberg. The mesic-adapted snake *D. l. lutrix* reaches its northernmost limit in the Soutpansberg, while the nearest relative (*D. l. rhodesiana*) is distributed in the high-altitude areas of eastern Zimbabwe. A similar scenario appears to apply for the near-endemic montane skink *T. c. cregoi*.

The sandy areas on the Soutpansberg are of great importance for psammophilous species of the Lowveld and the eastern coastal regions, including species from tropical and subtropical savannah and shrublands. The dry, low-lying Limpopo Valley can act as a migration corridor of suitable habitat, especially for fossorial species with distributions centred in the eastern parts of the subcontinent. Examples are the fossorial and semi-fossorial *P. stuhlmannii*, *A. microphthalma*, *C. langi* and *S. limpopoensis,* which occur even at the high altitudes of the Soutpansberg.

A Kalahari influence resulting from the eastern migration of the Kalahari sands in the Plio-Pleistocene (Scott et al. 2004) is evident by the occurrence of *N. intertexta* and *T. l. richardi*. More Kalahari species could be expected to be found on the northern slopes of the mountain, an area that was only poorly surveyed.

Typical species of tropical forests have not been recorded from the Soutpansberg.

Endemic species

With nine different taxa being restricted to the mountain, the Soutpansberg harbours a comparably high number of endemic reptiles. Most of the endemic taxa have a more or less rupicolous lifestyle, such as *P. relictus*, *A. rupicola*, *L. n. incognitus*, *L. o. soutpansbergensis*, *A. langi* 'Waterpoort' and *A. langi* 'Tshipise'. Two taxa are fossorial (*C. l. occidentalis*, *T. l. richardi*), and one is arboreal (*B. transvaalense*). The lithophilous taxa are probably restricted to the mountain as a result of their substrate specialisation, as the surrounding environment lacks more expansive rocky areas. Most certainly, different mechanisms apply for the two fossorial taxa, since they find an ideal substrate on the foot of the mountain. Climatic influences, even though with different effects, might have an additional impact on their distribution ranges. Unlike *C. l. occidentalis*, which inhabits both low and high altitudes, *T. l. richardi* is restricted to a small area in the foothills of the mountain (600-700 m). The gradual aridification of the subcontinent since the

Table 3. Relative abundance of selected reptile taxa in different vegetation types and microhabitat classes (HC 1-8, Appendix 1) at the Lajuma Research Centre. Abbreviations: NMF – Northern Mistbelt Forest, NMF(re.) – Northern Mistbelt Forest regrowth, SMB – Soutpansberg Mountain Bushveld, SMB(C) – Soutpansberg Mountain Bushveld (*Coleochloa* association), SMB(m) – Soutpansberg Mountain Bushveld (mistbelt bush clumps), SMB(p) – Soutpansberg Mountain Bushveld (Patches), SSS – Soutpansberg Summit Sourveld, WL-Wetland). Legend: x – one individual, xx – up to 33.32%, xxx – 33.33 to 99.99%, xxxx – 100%, 1,2,3, …10 – absolute numbers (for all n < 11).

	Taxon (n)	*A. bibronii* (19)	*A.* cf. *langi* 'Waterpoort' (11)	*A. rupicola* (134)	*C. warreni depressus* (33)	*H. walbergii* (10)	*L. n. incognitus* (19)	*L. o. soutpansbergensis* (28)	*N. intertexta* (24)	*P. relictus* (50)	*S. l. limpopoensis* (27)	*T. cregoi cregoi* (11)	*A. m. nigra* (2)	*P. stuhlmannii* (6)	*P. crucifer* (3)	*P. natalensis* (2)
Microhabitat	HC 8															
	HC 7		xx		xx	xxx	xxx									
	HC 6			x		xx										
	HC 5			xx	xx				xx		xx	xx		*2*		
	HC 4	xxxx		xxx	xxx	x	xxx	xxx	xxx	xxx	xxx	xxx	*2*	*4*	*3*	*2*
	HC 3			xx					xxx		x					
	HC 2			xx	xx	xx	x	xx		xx						
	HC 1		xxx	xx	x	xx		xx		xx						
Macrohabitat	WL															
	SSS	x		xx	xx	xx	xxx	xxx	x	xxx	xx			*2*	*2*	
	SMB (p)							x								
	SMB (m)	xx	xxxx	xxx	xxx	xxx	xxx		xx	xx	xx	xxx	*2*			*1*
	SMB (C)			xx						xx						
	SMB	xxx		xx	xxx			xxx	xxx	xx	xxx			*3*	*1*	*1*
	NMF (re.)				xx				xx		x	xxx		*1*		
	NMF	xx		xx	xx	xx			x							

mid-Miocene (Coetzee 1986) seems to be responsible for its isolation. The alternating cycles of dry and wet periods during the Pliocene and Pleistocene (Deacon 1983) resulted in expansion and contraction of sand-covered areas and finally in the isolation of populations of the species in remnants of suitable habitat. For the rupicolous taxa, increased erosion processes resulting from the two uplift events at about 20-18 Ma and between 5-3 Ma (Partridge et al. 2006) were probably of great impact on their isolation. Erosion led to the elimination of possible migration routes between the Soutpansberg and neighbouring mountains, including the escarpment. However, once again climatic factors should not be neglected. Firstly, the magnitude of erosion was probably greatest during pluvial periods, which were most frequent prior to the Miocene and during the Pliocene/Pleistocene. Secondly, the relatively stable cool and moist conditions on the Soutpansberg provided refuge for mesic-adapted taxa throughout the aridification process in the Neogene.

Comparison to the Blouberg

In the BNR, 62 reptile taxa were recorded during nine years of field survey, including five chelonians, 29 snakes, one amphisbaenian and 27 lizards (Schmidt et al. 2005). At least 87 different reptile taxa are known from both areas (Appendix 2). Twenty-five taxa are confirmed only for the Soutpansberg, 28 taxa occur in both areas, and another 34 taxa are known only from the BNR.

Of the 53 taxa from the Soutpansberg, 47.2% were not recorded in the BNR. This is a very high degree of differentiation between the species assemblages, which reinforces the statement that the two mountains have been isolated for a long time. However, it must be kept in mind that complete species list of the reptilian fauna of the Soutpansberg and the Blouberg, respectively, do not exist. Especially the northern and far eastern slopes of the Soutpansberg were poorly surveyed during this study and are certainly inhabited by various additional species. The high altitudes of the Blouberg mountain range (1500-2050 m a.s.l.) are not included in the BNR. However, as no species recorded on the Soutpansberg was restricted to these high elevations, all species should find comparable conditions in the BNR. Patches of Northern Mistbelt Forest and Soutpansberg Summit Sourveld surrounded by Soutpansberg Mountain Bushveld can be found just as in the Soutpansberg. Furthermore, the reserve includes large areas of Roodeberg Bushveld on deep red Kalahari sand, at approximately 900 m a.s.l. altitude at the base of the mountain. Three of the exclusive Soutpansberg taxa (*Lamprophis guttatus*, *Prosymna sundevallii lineata* and *Typhlosaurus cregoi cregoi*) were verified from just outside the border of the BNR by either A. Schmidt or N. H. G. Jacobsen, or through museum records from the Transvaal Museum (see Jacobsen 1989, Schmidt et al. 2005), although it is unclear whether they were recorded in the mountainous area or in the lowlands.

The apparent absence of eastern coastal and Lowveld taxa (*Prosymna stuhlmannii*, *Amblyodipsas microphthalma nigra*, *Chirindia langi occidentalis* and *Scelotes limpopoensis limpopoensis*) from the Blouberg is not surprising. Most of the species probably never migrated farther west than the Soutpansberg during interpluvial periods. Only *S. l. limpopoensis* is distributed farther west, but in the Blouberg area it is replaced by another subspecies (*S. l. albiventris*). The two subspecies have never been recorded in sympatry (Schmidt et al. 2005). The Kalahari species *Typhlosaurus lineatus* has a disjunctive distribution, and extinction processes possibly played a major role in its current distribution. *Typhlosaurus lineatus richardi* is restricted to a small area in the north-eastern Soutpansberg. Closer to the Blouberg, *T. l. subtaeniatus* is restricted to the Langjan Nature Reserve situated between the two mountains to the north (Schmidt 2002), although the habitat conditions in the BNR seem to be suitable for the taxon. A large number of temperate and Afromontane taxa are absent from the BNR. These include *Afrotyphlops bibronii*, *Duberria lutrix lutrix*, *Psammophis crucifer*, *Dasypeltis inornata* and *Australolacerta rupicola*. Of these, *A. bibronii* and *P. crucifer* and possibly even *A. rupicola* might inhabit the as yet unsurveyed higher altitudes of the Blouberg Mountain. Beside *A. rupicola*, eight other rupicolous lizard taxa occurring on the Soutpansberg were not recorded from within the boundaries of the BNR (*Cordylus warreni depressus*, *Platysaurus intermedius intermedius*, *Platysaurus relictus*, *Lygodactylus nigropunctatus incognitus*, *Lygodactylus ocellatus soutpansbergensis*, *Afroedura langi* 'Waterpoort', *A. langi* 'Tshipise' and *Pachydactylus vansoni*). Five of these are endemic to the Soutpansberg sensu stricto (see above). High substrate specialisation and the resultant isolation on this inselberg seem to have a major influence on their distribution patterns. The large number of patchily distributed 'islands' of rocky habitat over the subcontinent has already been linked to the large number of species (especially endemics) of gekkonine geckos and cordylid lizards in South Africa by Bauer (1999), Bauer & Lamb (2003) and Mouton & Van Wyk (1994). Most of the rupicolous taxa from the Soutpansberg have close relatives or subspecies occurring on the Blouberg. The genus *Afroedura,* which is represented by two apparently endemic groups on the Soutpansberg, is presumed to contain one other taxon, which is restricted to the combined Soutpansberg and Blouberg (*Afroedura langi* 'Soutpansberg' sensu Jacobsen 1992a). *Platysaurus* is represented on the Blouberg by two, maybe three, endemic taxa, namely *P. intermedius parvus*, *P. monotropis,* which is distributed between the Blouberg and the Makgabeng, and *P. intermedius inopinus*, which occurs southwest of the Blouberg. *Lygodactylus nigropunctatus* includes another subspecies endemic to the Blouberg (*L. n. montiscaeruli*). *Lygodactylus ocellatus* might inhabit the high altitudes of the Blouberg. *Pachydactylus vansoni* has recently been recorded at the Blouberg (A. Turner pers. comm. 2010). The ancestor of *Cordylus warreni depressus* may have never crossed the gap between the Soutpansberg and the Blouberg. Of course, even after nine years (Schmidt et al. 2005), the lack of records of certain species may simply be a sampling artefact.

The distribution ranges of the 39 taxa that were only recorded in the BNR mostly include the vicinity of the Soutpansberg. It can therefore be speculated that, possibly except for true Blouberg endemics (*Platysaurus intermedius parvus*, *Platysaurus monotropis* and *Lygodactylus nigropunctatus montiscaeruli*), all other species might occur on the Soutpansberg sensu stricto, too.

Conclusions

Following the theory of island biogeography (MacArthur & Wilson 1967), the Soutpansberg seems to represent a typical inselberg in respect of the reptile species assemblage. The mountain harbours an exceptional reptile species composition with a high degree of differentiation to that of the Blouberg in spite of the short distance. As a result of the elevated topography and differing surfaces compared to the surroundings, especially the mistbelt of the Soutpansberg provides cooler and moister conditions. Due to the vertical shift in the moisture regime on a mountain, species were able to transpose their distribution ranges vertically in times of changing climate. Hence, the Soutpansberg represents a topographic climate 'buffer' and an 'island' of mesic conditions in an arid region just like other inselbergs. This resulted in a considerable number of reptile species becoming restricted to the mistbelt, including many of the endemic and Red Data Book species. Also, the rocky habitats provide an exceptional substrate for the area, which is indicated by the high number of rupicolous taxa endemic to the Soutpansberg. Moreover, the large size of the Soutpansberg results in a higher total number of endemic taxa (nine) as compared to the smaller Blouberg (three). A fourth taxon might be added if the *Bradypodion* spp. recorded from the Blouberg and Soutpansberg are different taxa.

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Appendix 1
Microhabitat categories (HC).

HC	Description
1	pure rock, no or very little vegetation, 46° to vertical incline
2	pure rock, no or very little vegetation, flat to 45° incline
3	open, sand and/or gravel, more or less covered with grass/sedge, isolated shrubs (up to 30% coverage), no loose stones
4	open with exposed bedrock and rock outcrops, patchy grass/sedge and loose, sandy soil, loose stones, isolated shrubs (up to 30 % coverage)
5	tree/shrub cover 30-70 % coverage, rocks and rock outcrops, patchy grass and loose, sandy soil, loose stones
6	tree/shrub cover 70-100 % coverage, rocks and rock outcrops, nutrient-rich humus soil, sparse herb/grass layer, loose stones
7	house, garden
8	wetland areas, e.g., streams or peat marshes

Appendix 2
Preliminary checklist of reptile taxa occurring on the Soutpansberg sensu stricto and in the Blouberg Nature Reserve (BNR) including endemics (end.).

Sources: [1] Schmidt et al. (2005), [2] own data, [3] Jacobsen (1984), [4] Jacobsen (1987), [5] Jacobsen (1992a)

Taxon	Soutpansberg sensu stricto	BNR
Testudinidae		
Kinixys spekii Gray, 1863		X[1]
Psammobates oculiferus (Kuhl, 1820)		X[1]
Stigmochelys pardalis (Bell, 1828)	X[2]	X[1]
Pelomedusidae		
Pelomedusa subrufa (Bonnaterre, 1789)		X[1]
Pelusios sinuatus (Smith, 1838)		X[1]
Typhlopidae		
*Afrotyphlops bibronii (*Smith, 1846*)*	X[2]	
Megatyphlops schlegelii schlegelii Bianconi, 1847		X[1]
Leptotyphlopidae		
Leptotyphlops scutifrons scutifrons (Peters, 1854)		X[1]
Leptotyphlops sp.	X[2]	
Boidae		
Python natalensis Smith, 1840	X[2]	X[1]
Atractaspididae		
Amblyodipsas microphthalma nigra (Bianconi, 1850)	X[2]	
Aparallactus capensis Smith, 1849	X[2]	X[1]
Atractaspis bibronii Smith, 1849	X[2]	X[1]
Xenocalamus transvaalensis Methuen, 1919		X[1]
Colubridae		
Crotaphopeltis hotamboeia (Laurenti, 1768)	X[2]	X[1]
Dasypeltis inornata Smith, 1849	X[2]	
Dasypeltis scabra (Linnaeus, 1758)	X[2]	X[1]
Dispholidus typus typus (Smith, 1829)	X[2]	X[1]
Duberria lutrix lutrix (Linnaeus, 1758)	X[2]	
Hemirhagerrhis nototaenia nototaenia (Günther, 1864)		X[1]
Lamprophis capensis (Duméril & Bibron, 1854)		X[1]
Lamprophis guttatus (Smith, 1843)	X[2]	
Lycodonomorphus rufulus (Lichtenstein, 1823)	X[2]	
Lycophidion capense capense (Smith, 1831)	X[2]	X[1]
Lycophidion variegatum Broadley, 1969		X[1]

Taxon	Soutpansberg sensu stricto	BNR
Philothamnus hoplogaster (Günther, 1863)	X[2]	
Philothamnus semivariegatus semivariegatus Smith, 1840	X[2]	X[1]
Prosymna bivittata (Werner, 1903)		X[1]
Prosymna stuhlmannii (Pfeffer, 1893)	X[2]	
Prosymna sundevallii lineata (Peters, 1871)	X[2]	
Psammophis brevirostris brevirostris Peters, 1881	X[2]	X[1]
Psammophis crucifer (Daudin, 1803)	X[2]	
Psammophis mossambicus (Peters, 1882)		X[1]
Psammophis subtaeniatus subtaeniatus (Peters, 1882)	X[2]	X[1]
Psammophylax tritaeniatus (Günther, 1868)		X[1]
Pseudaspis cana (Linnaeus, 1758)		X[1]
Telescopus semiannulatus semiannulatus Smith, 1849		X[1]
Thelotornis capensis capensis Smith, 1849	X[2]	X[1]
Elapidae		
Aspidelaps scutatus scutatus Smith, 1849		X[1]
Dendroaspis polylepis Günther, 1864	X[2]	X[1]
Elapsoidea sundevallii longicauda Broadley, 1971		X[1]
Naja annulifera annulifera (Peters, 1854)		X[1]
Naja mossambica Peters, 1854	X[2]	X[1]
Viperidae		
Bitis arietans arietans (Merrem, 1820)	X[2]	X[1]
Causus defilippii (Jan, 1862)	X[2]	X[1]
Amphisbaenidae		
Chirindia langi occidentalis Jacobsen, 1984	X[3] (end.)	
Monopeltis infuscata Broadley, 1997		X[1]
Scincidae		
Mochlus sundevallii sundevallii (Smith, 1849)		X[1]
Panaspis wahlbergii (Smith, 1849)	X[2]	X[1]
Scelotes limpopoensis albiventris Jacobsen, 1987		X[1]
Scelotes limpopoensis limpopoensis FitzSimons, 1930	X[2]	
Trachylepis capensis (Gray, 1831)		X[1]
Trachylepis margaritifer (Peters, 1854)	X[2]	X[1]
Trachylepis punctatissima (Smith, 1849)	X[2]	
*Trachylepis striata striata (*Peters, 1844)		X[1]
Trachylepis varia (Peters, 1867)	X[2]	X[1]
Typhlosaurus cregoi cregoi Boulenger, 1903	X[2]	
Typhlosaurus lineatus richardi Jacobsen, 1987	X[4] (end.)	
Lacertidae		
Australolacerta rupicola (FitzSimons, 1933)	X[2] (end.)	
Heliobolus lugubris (Smith, 1838)		X[1]
Nucras intertexta Smith, 1838	X[2]	X[1]
Gerrhosauridae		
Gerrhosaurus flavigularis Wiegmann, 1828	X[2]	X[1]
Gerrhosaurus validus validus Smith, 1849		X[1]
Cordylidae		
Cordylus jonesii (Boulenger, 1891)		X[1]
Cordylus warreni depressus (FitzSimons, 1930)	X[2]	
Platysaurus intermedius cf. *rhodesianus* FitzSimons, 1941	X[2]	
Platysaurus intermedius parvus Broadley, 1976		X[1] (end.)
Platysaurus relictus Broadley, 1976	X[2] (end.)	
Varanidae		
Varanus albigularis albigularis Daudin, 1802	X[2]	X[1]

Taxon	Soutpansberg sensu stricto	BNR
Agamidae		
Acanthocercus atricollis atricollis (Smith, 1849)		X[1]
Agama armata Peters, 1855	X[2]	X[1]
Chamaeleonidae		
Bradypodion transvaalense (FitzSimons, 1930)	X[2] (end.)	X[1]
Chamaeleo dilepis Leach, 1819	X[2]	X[1]
Gekkonidae		
Afroedura langi (FitzSimons, 1930) ‚Tshipise'	X[5] (end.)	
Afroedura langi (FitzSimons, 1930) ‚Waterpoort'	X[2] (end.)	
Chondrodactylus turneri (Gray, 1864)	X[2]	X[1]
Hemidactylus mabouia (Moreau de Jonnes, 1818)		X[1]
Homopholis walbergii (Smith, 1849)	X[2]	X[1]
Lygodactylus capensis capensis (Smith, 1849)	X[2]	X[1]
Lygodactylus nigropunctatus incognitus Jacobsen, 1992	X[2] (end.)	
Lygodactylus nigropunctatus montiscaeruli Jacobsen, 1992		X[1] (end.)
Lygodactylus ocellatus soutpansbergensis Jacobsen, 1994	X[2] (end.)	
Pachydactylus capensis capensis (Smith, 1846)		X[1]
Pachydactylus punctatus Peters, 1854		X[1]
Pachydactylus tigrinus Van Dam, 1921		X[1]
Pachydactylus vansoni FitzSimons, 1933	X[2]	
Ptenopus garrulus garrulus (Smith, 1849)		X[1]