The herpetofauna of the Kamanjab area and adjacent Damaraland, Namibia

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ABSTRACT

The reptiles and amphibians of the Kamanjab area and adjacent Damaraland, Namibia, are discussed, based on a series of nearly 500 specimens collected during recent field work in the region and information derived from more than 900 museum records and a survey of the literature. A total of 14 amphibian and 88 reptile species are known to inhabit the region.

Representatives of psammophine snakes and the lizard genera *Pachydactylus* and *Mabuya* constitute an especially significant proportion of the local fauna. The fauna is transitional between southern arid and tropical and is similar to that of southwestern Angola. The well-defined edge of the Great Escarpment, emphasized in the region by the Grootberg, divides the study area into discrete eastern (mesic, high elevation) and western (xeric, low elevation) portions, characterized by the presence of some closely related species pairs.

INTRODUCTION

The accumulation of distributional data has led to advances in our understanding of zoogeographic and ecological patterns of the herpetofauna of many regions of southern Africa (e.g. Auerbach 1987; Broadley 1983; Branch 1988; Branch *et al.* 1988; Poynton & Broadley 1985, 1988, etc.). Some regions within the subcontinent, however, remain relatively poorly known. This is particularly true of portions of Namibia. Herpetological studies in the region began in the German colonial era, but these were mainly concerned with taxonomic descriptions (e.g. Peters 1862, 1867, 1869, 1870; Boettger 1886, 1887, 1894; Fischer 1888; Siebenrock 1910; Sternfeld 1910a,b, 1911a,b; Werner 1910, 1915; Nieden 1913), and rarely included much biological data or reflected a knowledge of species' distributions and habitat requirements. Subsequent research, in addition to yielding many new taxa, has focused on the biological attributes of the herpetofauna and on providing a more synthetic view of distributional patterns within Namibia. Such work, however, is far from complete. The monographs of Mertens (1955, 1971) remain the only synopses of the country's reptiles and amphibians, but the taxonomy and distributional information in these publications are now out of date.

Additional publications have concentrated on the fauna of some of the more spectacular or well-known regions of the country, e.g. the Brandberg (van den Elzen 1983), Etosha (Jurgens 1979; Hoffmann 1989), and the dunes, gravel plains and rock islands of the Namib Desert (FitzSimons 1935, 1938; Channing 1976; Haacke 1964, 1965, 1970; Werner 1977; Haacke & Odendaal 1981). Biological data on the herpetofauna remain sparse, with only a few of the more striking or unusual species, e.g. *Angolosaurus skoogi* (Hamilton & Coetzee 1969; Pietruszka et al. 1986; Mitchell *et al.* 1987; Pietruszka 1987, 1988; Seely *et al.* 1988), *Meroles* (= *Aporosaura*) *anchietae* (Louw & Holm 1972; Cooper & Robinson 1990; Robinson 1990), *Palmatogecko rangei* (Proctor 1928; Haacke 1975; Russell & Bauer 1990) and *Rhoptropus* spp. (Odendaal 1979; Haacke & Odendaal 1981; Petersen 1990) receiving much attention.

The northwestern region of Namibia, comprising Kaokoland and northern Damaraland, has remained relatively poorly documented, with only a few scattered species descriptions (e.g. Steyn & Mitchell 1965, 1967; Steyn & Haacke 1966; McLachlan & Spence 1967) and reports of collections (Hewitt 1926; Haacke 1965). The same is true for much of the inland farming areas of the north, such as the Outjo District. This lack of even basic locality data is best exemplified by the latest detailed distribution maps for the common and widespread adder, *Bitis caudalis*, (Visser 1981; Broadley 1983) which contain only 19 and 12 quarter-degree records, respectively, for the 16 degree squares from 17-21S and 13-17E. In this paper we report on the herpetofauna of the region straddling the boundary between Damaraland and the Outjo District, centered around the village of Kamanjab.

The Kamanjab region sits near the junction of a number of important biogeographic regions, and for this reason may be expected to have an interesting and unusual herpetofauna. To the west it abuts the gravel plains of the Pro-Namib, whilst in the north and east it shows a rapid transition into *mopane* savanna which extends, via the

Guineo-Congolian transition (White & Werger 1978), into central Africa. The isolated granite and basalt rock outcrops and ridges may also harbour endemic rupicolous species, as was suggested for the Brandberg (Mertens 1955; although subsequent work by van den Elzen [1983] did not support this).

This report was initiated and is largely based on the specimens collected and observed during a series of recent visits of two of the authors (noted by initials) and assistants (see acknowledgements) during October 1987 (AMB), August 1989 (AMB) and May-June 1990 (AMB and WRB). However, significant material, including specimens from the majority of the localities listed, are based on the holdings of the Transvaal Museum. The oldest of this material was collected by the late V.F.M. FitzSimons in 1937 (FitzSimons 1938). Additional material was accummulated by one of the authors (WDH) in the course of several collecting trips since 1965. Most of the State Museum records from western Damaraland and the farms of the lower Huab Valley were collected by Karl Peter Erb, while working for rhinoceros and elephant conservation. Supplementary information was derived from the collections of the Port Elizabeth Museum and the South African Museum, primarily from material collected by Geoff McLachlan, from the collections of Paul Freed housed at the Carnegie Museum, and from literature sources.

STUDY AREA

The region surveyed is an arbitrary area comprising the Kamanjab area of the Outjo District and adjacent Damaraland in northwestern Namibia. (Figure 1). In the northwest the region is bounded by the southern border of Kaokoland (defined by the Hoanib river, except for the region around Sesfontein which, administratively, lies in Damaraland); in the west it abuts the eastern border of the Skeleton Coast National Park; the southern boundary is the Huab river: and it is bounded in the northeast by the Etosha National Park. The eastern border corresponds to the Otjikondo north-south road (Routes 2666 and 2694). For the purposes of this study the eastern and southern boundaries have been approximated by the nearest quarter degree grid squares. The majority of the region falls within the grid squares 1913, 1914, 1915, 2013 and 2014. Much of the recent collecting was based on a mixed cattle and game farm situated 10 km SW from Kamanjab. It comprises the consolidated farms Franken (No. 242), Katemba Autsaub (No. 210) and Gauss (No. 265) which total 17 000 ha in the Outjo District (Figure 2).

Topography and Geology — In general terms the study area covers a well-defined transect across the Great Western Escarpment of southern Africa, rising from the Pro-Namib plains (approximately 500 m elevation) in the west to the relatively flat highland plains (1000-1200 m) (Figure 3) in the east. These are covered with red sands derived from decomposed granite, or whiter, clayey soils with scattered calcrete exposures. High termitaria are common in the latter areas. Von Harmse (1978) characterized the soils of the region as calcareous, weakly-developed and shallow in the west, mixed in the east with lithosols derived from acid igneous and metamorphic rocks. The eastern part of the region, particularly around Kamanjab, has numerous scattered granite koppies that reach elevations of up to 1500 m. In the west the basalt ridges of the Grootberg rise up to 1645 m, and are surround by a rocky plain of eroded basalt rock (Figure 4).

Climate — The region falls in the summer rainfall region, and rain may fall at anytime from October to April, but usually comprises two minor peaks in October-November and March-April. Most precipitation falls during short thunderstorms, with up to 50-80 mm of rain in a single downpour, yielding a yearly average of ap-

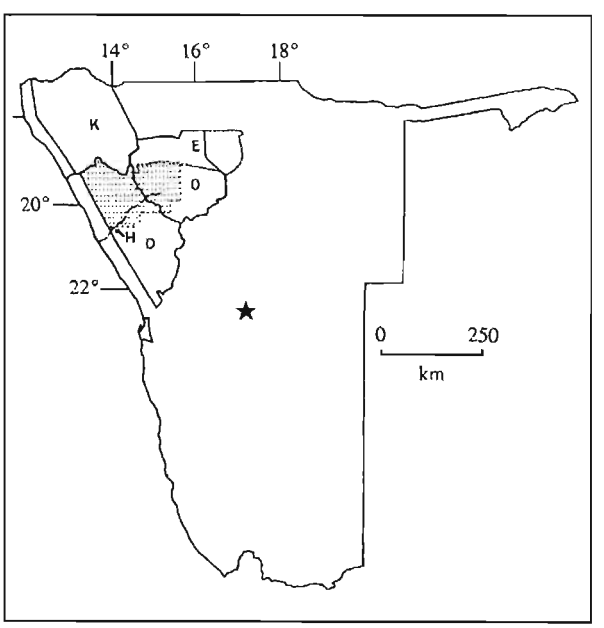

FIGURE 1: Map of Namibia showing the region treated in this paper (stippled). The borders of Kaokoland (K), Damaraland (D) and the Outjo District (O) are demarcated by solid lines and those of Etosha (E) by a dashed line. The location of the Huab River (H) is also indicated as a broken line and the position of Windhoek is marked by a star.

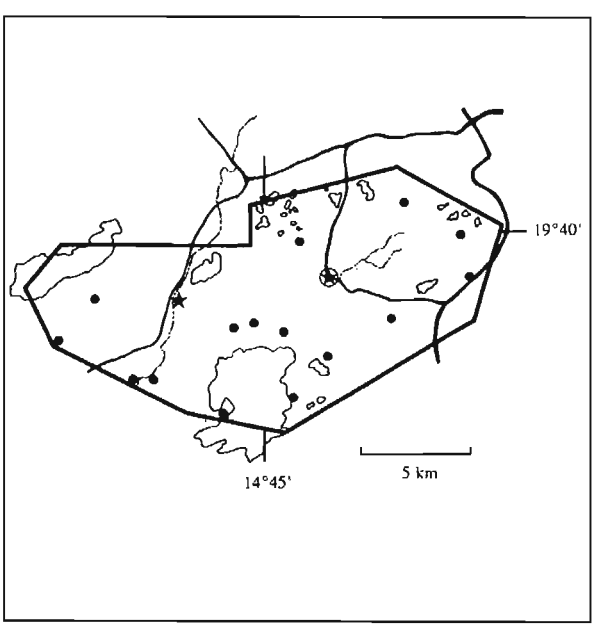

FIGURE 2: Map of Farm Franken. Thick black lines represent roads and broken lines rivers. Black circles are water tanks. Haus Franken (circled star) and Haus Katemba (star) are indicated. Irregular outlines mark areas of extensive koppies or rocky elevations. Road distances from Farm Franken were measured from the "T" junction intersection due north of Haus Franken.

proximately 300 mm in the highlands around Kamanjab. As a consequence of the cold Benguella Current, a rain shadow forms west of the escarpment, with a precipitous decline in rainfall from east to west within the study area. Known mean annual rainfall figures in the study area are: Farm Franken, 300 mm/yr; Grootberg Pass, 240 mm/yr; Farm Palmwag, 130 mm/yr, while the Pro-Namib along the border of the Skeleton Coast Park receives 50-100 mm/yr. This gradient continues eastwards with eastern Etosha receiving approximately 500 mm/yr, a 200 mm/yr increase relative to Otjovasandu at the southwestern corner of the park (Jensen & Clinning 1976). In recent years rainfall has been erratic, and in 1989-90 rains were very heavy (Farm Franken 405 mm, Farm Katemba 575 mm) but fell only in the period 20 January-20 April. On Farm Franken, the Okatemba River flooded three times during this period, for a maximum period of 37 hours and virtually all farm dams in the region remained full well into the winter. Despite its relative proximity to the equator, the cooling effects of the off-shore Benguela current moderate mean annual temperatures (16-18C) and the mean annual range of temperatures (6-8C) in this region of Namibia (Schulze & McGee, 1978). There is a distinct seasonality; warm season (October-April), maximum temperatures 33-34C, minimum temperatures of 17-18C; cold season (June-July), maximum temperatures 24-26C, minimum temperatures of 9-10C. The advective fogs of the coastal Namib desert occasionally extend exceptionally far inland, and on at least three winter days (June-July) advective fogs may even reach Kamanjab. From 2-3 nights of frost may occur in winter, with temperatures reaching a minimum of approximately -5C.

Vegetation - Kamanjab and Damaraland form part of the Karoo-Namib phytochorological region, at the junction of the Namaqualand and Namib Domains, respectively (Werger 1978). White (1983) placed Kamanjab in the transition between *mopane* scrub woodland to Karoo-Namib scrubland, whilst the western part of the study region would fall in the Bushy Karoo-Namib scrubland. To the northeast of Kamanjab lies the Guineo-Congolian Transition (White & Werger 1978). Most of the highland region is covered in open xeric savanna (Figure 3) which, depending upon the underlying soils and topography, may be dominated by *mopane* (*Colophospermum mopane*) or thorn trees (*Acacia* sp.). *Mopane* (Fam. Caesalpinioideae) is a medium to large tree may form dense stands ('*mopane* woodland') on alluvial soils, but that also tolerates alkaline and poorly drained soils. The leaves of the tree hang down and during the heat of the day the leaflets move close together thus casting little shade (Coates Palgrave 1977). It thus forms a hot, dry habitat. Around Kamanjab *mopane* predominates on the red sandy soils and may form relatively dense stands, often in association with the red bushwillow or kudubush (*Combretum apiculatum*). A number of different species of *Acacia* are found. Within the dry water courses, with access to good ground water, grow large stands of ana trees (*Acacia albida*), water *Acacia* (A. *nebrownii*), and camelthorn (A. *erioloba*). Similar assemblages characterize the water courses in the far north of the region, near Sesfontein (Figure 5), while further west *mopane* may extend along river courses beyond its normal range into the Namib. Blackthorn (A. *mellifera*) is common on the clayey-calcrete soils, and may form mixed stands with a low, erect shrub, the trumpet thorn or silverbush (*Catophractes alexandrii*). The African star-chestnut (*Sterculia africana*) and the large-leafed star-chestnut (S. *quinqueloba*) are common on larger granite koppies.

The dark basaltic rocks of the Grootberg and adjacent Pro-Namib receive less rain and consequently have a more arid-adapted flora, with numerous succulent species, such as *Pachypodium lealii* (Figure 6), *Sesamothamnus benguellensis*, *Cyphostemma currorii*, and *Moringa ovalifolia*. *Euphorbia damarana* is the dominant plant on the rocky basalt plains (Figure 4), where in the west the Namib endemic *Welwitschia mirabilis* may occur. The large palm, *Hyphaene benguellensis*, also occurs sporadically in this region, usually along dry water courses in association with isolated springs.

The presence of grass depends upon the season and prevailing rainfall. The red sand flats are dominated by two climax species of grasses, *Stipagrostris uniplumis* var. *uniplumis* and *S. hirtigluma patula*, whilst *Cenchrus ciliaris* climaxes in the dry river beds and vlei bottoms (Müller 1985). The climax grass on the granite outcrops is *Anthephora ramosa* (Müller 1985).

MATERIALS AND METHODS

For the purposes of searching museum records we included the following grid squares in our study area: 1913 (all); 1914 (all); 1915Ac, Ad, Ca, Cb, Cd; 2013 (all); 2014Aa, Ab, Ac, Ad, Ba, Bb; 2015Aa. Discussion is limited chiefly to the regions in this area excluding the Etosha and Skeleton Coast National Parks, but near records outside of the region (herein designated as "regional extralimital") are mentioned if they suggest the possible occurrence of taxa within the Kamanjab/Damaraland border area proper. Well-collected localities immediately adjacent to the region as defined (e.g. Warmquelle, on the north side of the Hoanib River) are also included. Except where noted, the majority of specimens resulting from the recent field work conducted by the senior author has been deposited in the herpetological collection of the California Academy of Science (CAS), San Francisco. These form the bulk of the "material examined". The majority of locality records from the region have been abstracted from the collections of the Transvaal Museum (TM), Pretoria; Port Elizabeth Museum (PEM); South African Museum (SAM), Cape Town, State Museum, Windhoek (SMW), and Carnegie Museum, Pittsburgh (CM). Additional literature references from the above collections as well as the Senckenberg Museum (SMF), Frankfurt have also been incorporated into the remarks and museum records. Specimens listed under "museum records" have been examined only in cases of questionable identifications or suspect localities, but localities have been obtained directly from original museum catalogues or files. Some museum localities,

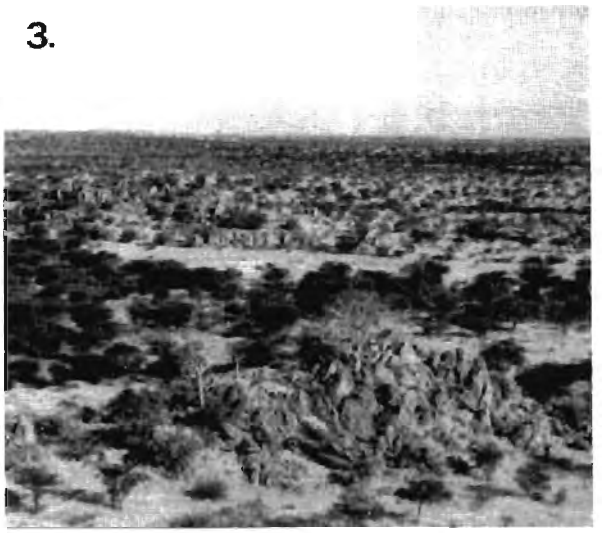

FIGURE 3: Open mopaneveld habitat on flat plains 5 km E Kamanjab.

FIGURE 4: *Euphorbia damarana* on rocky basalt plain west of Grootberg Pass.

FIGURE 5: Hoanib River at the Sesfontein Road. August 1989.

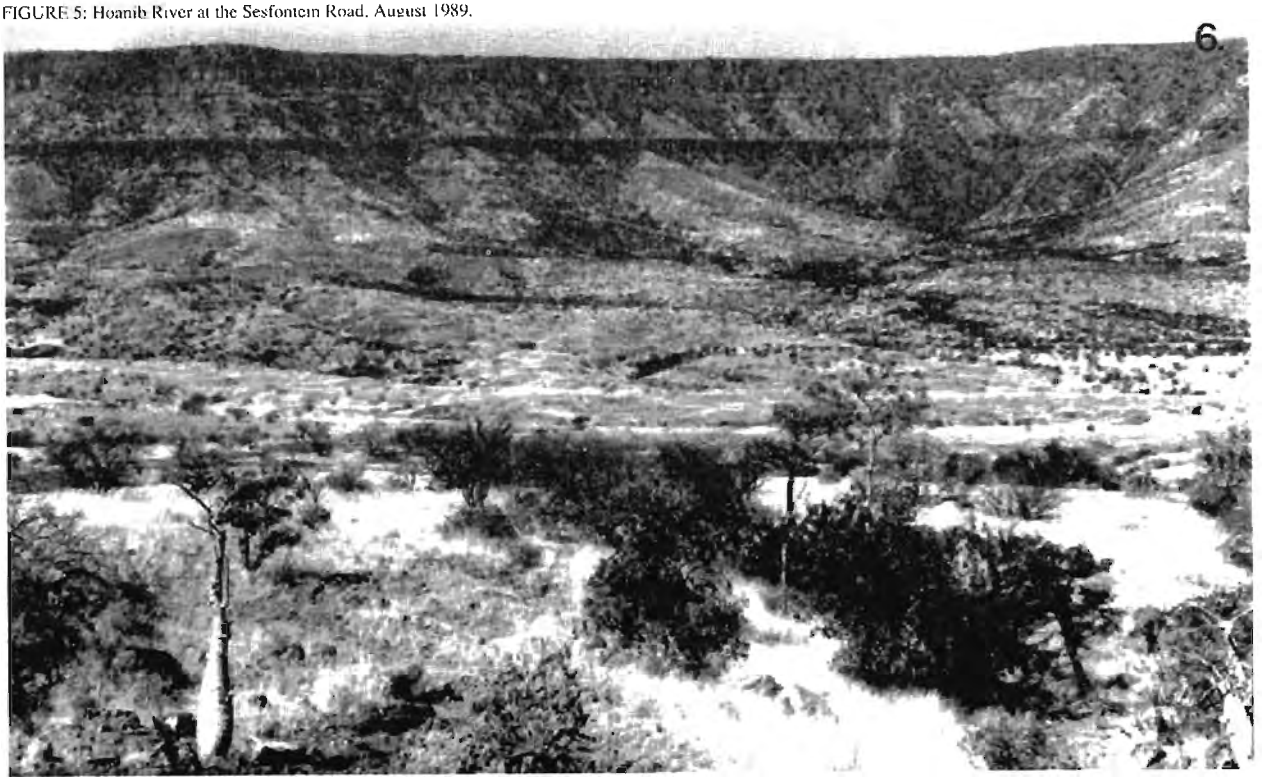

FIGURE 6: Western side of Grootberg Pass showing general topography and vegetation. In left foreground is a *Pachypodium lealii*.

especially those from SAM records, may not be exact, i.e. a record from "Kamanjab" may refer to either the village or the region as a whole. In the absence of additional information we have treated such records as referring to the village.

"Remarks" include literature records of additional localities as well as notes on natural history and taxonomic status. Where determinable, quarter degree square references have been provided parenthetically in increasing numerical and alphabetical order. Spellings of localities have, in some cases, been altered to conform to those used on the Namibian topographic map series (1:250 000). Most museum localities are in the form of farm names, while those specimens collected by the authors are typically given as road distances from known points (usually from the northern entrance to Farm Franken).

RESULTS

AMPHIBIA
ANURA
BUFONIDAE

Bufo dombensis Bocage 1895
pygmy toad

Museum records: SAM 17555, Sesfontein (1913Ba); TM 48687, 1919'S 1406'E (1914Ac); TM 52798, 52805-12, 50816, Farm Humor (1914Cc).

Remarks: The systematic status of the Namibian dwarf toads is in a state of flux. Poynton & Broadley (1988) regarded material from Outjo and the Brandberg as referable to *B. dombensis*. Jurgens (1979) regarded *B. hoeschi* as widely distributed in northern Namibia and referred to specimens taken at Warmquelle. Channing (pers. comm.) regarded specimens from north western Namibia as referrable to the former taxon, while those in west central Namibia, to the south of the study area, were referrable to the latter. *B. dombensis* and *B. hoeschi* are very similar to each other and to *B. damaranus* and the identity of the specimens listed for all taxa is best regarded as tentative. The ecology of the arid-adapted toads referred to *B. hoeschi* has been reviewed by Channing (1976). Eggs hatch in 18-36 hrs (Channing 1976) or approximately 52 hrs (Jurgens 1979) and have been taken in Etosha from November to March. Tadpole morphology has been described by van Dijk (1971).

Bufo fenoulheti Hewitt & Methuen 1913
Damara toad

Museum records: [?] TM 49367-70, Axab Springs (1913Db).

Remarks: Poynton & Broadley (1988) regarded this taxon (as *Bufo damaranus*) as a northern species, occurring from the Kaokoveld to the Waterberg, but indicated that numerous specimens are intermediate between this taxon and *B. dombensis* and called for further study. Channing (pers. comm.) reported scattered locality records in northern Namibia but regarded 1912Bd as the nearest locality to the study area. The museum record listed above is tentatively assigned to this species pending a more complete revision.

Bufo gutturalis Power 1927
guttural toad

Museum records: SAM 17285, TM 48828-33, Sesfontein (1913Ba); SMF 66500, Warmquelle (1913Bb) [Mertens 1971, as *B. regularis*].

Remarks: Like all *Bufo* species, the distribution of this species in the Kamanjab area is poorly known. The identity of many specimens attributed to this and other northwestern Namibian toads requires reconfirmation.

Bufo maculatus Hallowell 1854
flat-backed toad

Museum records: TM 47722-3, Warmquelle (1913Bb); SMF 66297-8, Kaokoveld (?) [Mertens 1971]. Regional extralimital: SMW 25041, Kowares (1914Ab).

Remarks: The name *B. maculatus* is here retained in favor of *B. pusillus*, the name traditionally applied to the northern Namibian populations of this taxon, on the basis of Poynton and Broadley's (1988) suggestion that a complete review of *maculatus*- like toads will be necessary to correctly allocate populations of this lineage. Tadpoles have been described by Channing (1972).

Bufo poweri Hewitt 1935
Power's toad

Museum records: TM 28639-42, Warmquelle (1913Bb); CM 119347-9, 85,5 km WSW Kamanjab (1914Cb); CM 119350-5, 108,5 km WSW Kamanjab (1914Cc).

Remarks: Poynton (1964) recorded additional specimens from Sesfontein (SAM). This species is frequently confused with *B. gutturalis*. Other taxonomic problems also exist (see Poynton 1964; Hulselmans 1969; Mertens 1971; van Dijk 1971; Channing and van Dijk 1976; Jurgens 1979; Poynton and Broadley 1988; Channing 1991). Jurgens (1979) reported the presence of toadlets in Etosha in November.

HYPEROLIIDAE

Kassina senegalensis (Duméril and Bibron 1841)
Senegal running frog

Museum records: CM 119375-6, Kamanjab (1914Db).

MICROHYLIDAE

Breviceps adspersus adspersus Peters 1882
rain frog

Museum records: CM 119377, 1,7 km N Kamanjab (1914Db).

Remarks: Channing & van Dijk (1976) indicated the presence of this species in the region and Jurgens (1979) found it at Otjovasandu, just outside the limits of our region.

Phrynomantis annectens (Werner 1910)
marbled rubber frog

Material examined: CAS 165756, 173474, 175422-3, 175450-2, 175469-75, 175925, Farm Franken (1914Db).

Museum records: TM 48824, Warmquelle (1913Bb); TM 49370, Axab Springs (1913Db); TM 48688, Kaokoland (1914Ac); TM 452813, Farm Humor (1914Cc); CM 119413, 14,7 km SE Kamanjab (1914Db); SMF 41330-4, Otjitambi (1915Cc). Regional extralimital: CAS 156610-3, Khorixas (2014Ad).

Remarks: This species is widespread in northern Namibia (Channing & van Dijk 1976). Literature records exist from southwestern Etosha (Jurgens 1979) and Sesfontein (Poynton 1964). These frogs are usually associated with granite (Channing 1976) and retreat to cracks in stones (Channing 1975), or as at Farm Franken, to moist seeps under stones. The tadpoles of this species were described by van Dijk (1966) and possess distinctive gold flecks on their lateral surfaces. Eggs in the region under consideration are laid in granite rock pools or in cattle tanks. Hatching has been reported to occur in 18-36 hrs and metamorphosis in 4-8 weeks (Channing 1975, 1976). Channing (1976) reported that tadpoles aggregate in large numbers and that more than one size class is usually represented in a group. Our observations support this. Although adults naturally emerge following the first rains (Channing 1975), the apparent year-round presence of tadpoles in artificial cattle tanks in the Kamanjab regions suggests that breeding may occur in any season if sufficient water is available. Calling, however, is most active during the summer rains (K. Fleißner pers. comm.). Both tadpoles and adults are toxic, as are other members of the genus (Jaeger 1971). Mertens (1955) reported total lengths of *P. annectens* tadpoles of 45 mm, while adult SVL reaches 40 mm (Channing & van Dijk 1976). Tadpoles collected at Farm Franken in October 1987 averaged 10,0 mm total length. Those collected in August 1989 ranged from 36,0 to 40,0 total length, but represented several developmental stages. The May 1990 material consisted of three age classes, the smallest animals averaged 22,0 mm and lacked visible limbs. The largest individuals (61 mm) were intermediate in stage, possessing free hindlimbs. The oldest individuals (forelimbs nearly free) averaged only 48,0 mm total length.

PIPIDAE

Xenopus laevis (Daudin 1802)
common platanna

Museum records: SAM 17288, Caimaeis (1913Bd); SAM 47414, Palmwag (1913Da).

RANIDAE

Cacosternum boettgeri (Boulenger 1882)
Boettger's froglet

Museum records: SAM 17286, Sesfontein (1913Ba); CM 119365-6, Kamanjab (1914Db); SMF 43128-9, Otjitambi (1915Cc).

Remarks: Poynton (1964) and Channing & van Dijk (1976) recorded additional specimens from Sesfontein and Kamanjab (SAM). The species is most commonly encountered in flooded pans or grassland (Poynton & Broadley 1985) and thus was not encountered by us during our dry season collecting. Tadpoles have been described by van Dijk (1966).

Phrynobatrachus natalensis (Smith 1849)
toad frog

Museum records: SMF 66567-70, Warmquelle (1913Bb) (Mertens 1971); SAM 17287, Caimaeis (1913Bd).

Pyxicephalus adspersus adspersus Tschudi 1838
bullfrog

Museum records: CM 119372-4, Kamanjab (1914Db).

Remarks: Parry (1982) reviewed the genus and referred a specimen from Grünewald, Etosha (1915Ba) to this subspecies, but listed no specimens from the study area. The subspecies *edulis* occurs in northeastern Namibia and the Caprivi Strip. Jurgens (1979) recorded this species at Sterkelia in southwestern Etosha and Hoffmann (1989) found large numbers of small adults at temporary vleis in the Etosha National Park at 1914Ab, 1914Ba, and 1914Bb in March and May 1984. Tadpoles have been described by van Dijk (1966).

Tomopterna cryptotis (Boulenger 1907)
sand frog

Material examined: CAS 175453-55, 62,9 km W Farm Franken (Farm Grootberg) (1914Cd); CAS 175456-68, 63,8 km W Farm Franken (Farm Grootberg) (1914Cd); CAS 175424-46, Farm Franken (1914Db); SAM 17516, Kamanjab (1914Db); CAS 175447, 11,9 km E Kamanjab (1914Db); CAS 175449, 36,3 km E Kamanjab (1915Ca); CAS 175448, 43.3 km E Kamanjab (1915Ca).

Museum records: TM 48827, Sesfontein (1913Ba); TM 28643-7, Warmquelle (1913Bb); TM 49371-2, Axab Spring (1913Db); TM 68550-6, Palmwag (1913Dd); TM 48680-6, (1914Ac); TM 52799-803, 52814-5, 57343, Farm Humor (1914Cc); CM 119361-3, TM 17210-15, 17275, 47721 Kamanjab (1914Db). Regional extralimital: SMW 25046, Kowares (1914Ab).

Remarks: Poynton & Broadley (1985) outlined some of the taxonomic difficulties in the genus *Tomopterna*. Although our specimens appear to be unambiguously attributable to *T. cryptotis*, *T. krugerensis* has also

recently been identified from northwestern Namibia. Jurgens (1979) reported the *T. cryptotis* as widespread in Etosha. Hoffmann (1989) reported an unidentified *Tomopterna* from Otjovasando (1914Ba) breeding in June 1984, and a further record from Zebrapomp in Kaross (1914Bc), may be referable to this species. FitzSimons (1938), Mertens (1955) and Poynton (1964) had previously reported the species from the region and Channing & van Dijk (1976) illustrated several localities. These frogs prefer sandy substrates and in the Kamanjab region probably breed in dams, rock pools and artificial tanks and ponds on farms. Jurgens (1979) reported that metamorphosis occurs after approximately five weeks and that adults reach lengths of 51 mm. The largest specimen examined, CAS 175449, measured 42.4 mm in length. Channing (1976) recorded an eight week development period. The tadpoles of this species have been described by van Dijk (1977) and Grillitsch *et al.* (1988).

Tomopterna tuberculosus (Boulenger)
tuberculate sand frog

Museum records: SMF 66641, Warmquelle (1913Bb).
Remarks: Mertens (1971) reported this species from extreme southern Kaokoland, but we have not examined the specimen.

REPTILIA
TESTUDINES
PELOMEDUSIDAE

Pelomedusa subrufa (Lacépède 1788)
marsh terrapin

Material examined: CAS 175099, 25,6 km W Farm Franken (Farm Bruno) (1914Da).
Museum records: TM 64260, Hoanib River (1913Ab); TM 48826, Kowarib Spring (1913Bd); TM 63151-3, Kowarib Schlucht (1913Bd); TM 498323, Makukous Spring (1913Db); TM 52817, Farm Humor (1914Cc); SMW 5759, Farm Welkom Spring (680) (2014Ba).
Remarks: This species was found to be common in virtually all dams on Farm Franken and in the Kamanjab area . Hoffmann (1989) reported it as common at Klippan (1914Ba) in southwestern Etosha. The specimen examined is an adult female with carapace length 147 mm and was captured crossing a dirt road on a warm clear day.

TESTUDINIDAE

Geochelone pardalis babcocki (Loveridge 1935)
leopard tortoise

Material examined: PEM R6219, Farm Franken (1914Db).
Museum records: TM 48691, Kaokoland (1914Ac); TM 64364, Farm Wêreldsend (2013Bb); SMF 66268, 10 mi. W Fransfontein (2014Bb) [Mertens 1971].
Remarks: Relatively common during the rainy season. A large, scuteless shell was found in the dried bed of a tributary of the Okatemba River, Farm Franken, following heavy rains in March 1990 (K. Fleißner, pers. comm.). Hoffmann (1989) recorded the species at Kaross (1914Bc). Although some recent reviews of tortoises (e.g. Boycott & Bourquin 1988) do not recognize subspecies of the leopard tortoise in southern Africa, Broadley (1989) has resurrected *G. p. babcocki*, to which the specimens from the study area are referrable, on the basis of small adult size and juvenile color pattern. However, there is serious doubt as to the validity of *babcocki* (Branch, in prep.). Of the diagnostic characters, juvenile colouration is variable and the larger adult size may be an ecotypic response of the southern population to lush vegetation types.

Psammobates oculifer Kuhl 1820
serrated tortoise

Remarks: This species has been taken at Kaross (1914Bc) (M. Griffin, pers. comm.).

SAURIA
AGAMIDAE

The most recent treatment of iguanian relationships regards the Agamidae as part of the Chamaeleonidae (Frost & Etheridge 1989). De Queiroz & Gauthier (1990), however, have argued that the use of phylogenetic definitions in taxonomy, rather than reliance on strict priority would allow the retention of the Acrodonta as a monophyletic unit containing two groups, the monophyletic Chamaeleonidae and the paraphyletic "Agamidae." We here retain the commonly used family level names Agamidae and Chamaeleonidae, recognizing the paraphyly of the former taxon.

Agama aculeata aculeata Merrem 1820
ground agama

Material examined: CAS 165732-4; CAS 175589, Farm Franken (1914Db); CAS 175564, 3,6 km E Kamanjab (1914Db); CAS 175576, 5,9 km E Kamanjab (1914Db); CAS 175562, 21,8 km E Kamanjab (1915Ca).
Museum records: SMW 1121, Warmquelle (1913Bb); SMW 1719, Farm Vlakwater (652) (1914Bd); SMW 5758, Farm Welkom Spring (680) (2014Ba); SAM 17263, Otjikondo-Kamanjab (1915Ca?); SAM 17290, Otjitambi (1915Cc); SMF 47214, Farm Renosterberg (?) [Mertens 1955]. Regional extralimital: SMW 1120, NW Otjovasando (1914Ab); SMW 1159, Otjovasando (1914Ad); SMW 6959-6965, Petrified forest, Damaraland (2014Bc).
Remarks: Visser (1984k) mapped five records in the study area (1913Bb, 1914Ab, 1914Db, 1915Ca, 1915Cc). Hoffmann (1989) recorded the species at Karossdrink (1914Bc). Mertens (1955) also listed Kowares and Kamanjab as additional localities. The specimens examined from the study area are juveniles.

Agama anchietae Bocage 1896
Anchieta's agama

Material examined: CAS 175568, 120,6 km W Farm Franken (Farm Palm 708) (1913Dd); CAS 175569-70, 101,7 km W Farm Franken (Farm Palm 708) (1913Dd); CAS 175567, 101,5 km W Farm Franken (Farm Palm) (1913Dd); CAS 175572-3, 29,9 km N Kamanjab (Farm Voorspoed) (1914Bc); CAS 175565, 54,6 km W Farm Franken (Farm Grootberg) (1914Cb); CAS 175566, 62,9 km W Farm Franken (Farm Grootberg) (1914Cd); CAS 175571, 63,2 km W Farm Franken (Farm Grootberg) (1914Cd); CAS 165736, 173419-20, Farm Franken (1914Db); CAS 175574, 11,4 km N Kamanjab (Farm Kamanjab Nord) (1914Db).

Museum records: SMW 1036-1037, Sesfontein (1913Ba); SMW 5634, Palmwag (1913 Dd); SMW 5711, TM 57574, Carcabin, Palmwag (1913Dd); SMW 5609, Aub Ngabis (1913Dd); TM 56959, Goabis (= Koabes) Spring (1913Dd); SMW 5720-5721, Farm Otjihavera (703) (1914Cc); SMW 1054-1056, west of Kamanjab (1914Da); PEM R 2060, TM 17279, Kamanjab (1914Db); TM 17297-8, 17313-4, Farm Paderborn (1914Dd); SMW 5704, Axab-Uniab junction (2013Ba); PEM R2076, 68 miles E Torrabaai (2013Bb); SMF 46065, Farm Renosterberg (?) [Mertens 1955]. Regional extralimital: SMW 1053, Omvugondo (?) (1914Ba); SMW 6422, Doros Crater, Damaraland (2014Cb); SMW 6825, Farm Duineveld (529) (2014Da); SMW 6826, Farm Granietkop (522) (2014Da).

Remarks: Visser (1984k) mapped only four records from within the study area, in grid squares 1914Bd, 1914Db, 1915Ca and 2013Db. Hoffmann (1989) recorded the species at Karossdrink (1914Bc). Mertens (1955) reported a specimen from Farm Beulah. Most of the specimens collected from the study area in 1990 were juveniles or hatchlings. The largest specimen examined, CAS 175565, measured SVL 57,6 mm + TL 94,5 mm, although specimens in excess of SVL 80,0 mm were collected elsewhere in northern Namibia.

Agama planiceps planiceps Peters 1862
Namibian rock agama

Material examined: CAS 175560-1, 175563, 175588, Farm Franken (1914Db); USNM 154124-7, Kamanjab (1914Db); CAS 175575, 5,0 km E Kamanjab (1914Db); CAS 173382, Farm Hohenstein (1915Cd).

Museum records: TM 68484, Mudorib River (1913Ad); SMW 965-967, Warmquelle (1913Bb); (1914Aa); TM 49313-22, Makukous Spring (1913Db); TM 68542, Van Zyls Gat waterhole (1913Dd); TM 48675-7, (1914Aa); TM 48665, Farm Kamdescha (624) (1914Ad); TM 48643, Farm Arendsnes (627) (1914Bc); SAM 17259, 17522, SMW 945-946, TM 17224-35, 17249, 17251-5, 17281, Kamanjab (1914Db); SMW 5766-5767, TM 36471, Farm Annabis (1914Dc); TM 17327-9, 17332, Farm Paderborn (1914Dd); TM 17360, Farm Huab (1914Dd); TM 31574, Farm Hirabis Süd (1915Ca); TM 17172, 17192-4, between Otjikondo and Kamanjab (1915Ca ?); TM 48632-3, Farm Otjitambi (25) (1915Cc); TM 48621-4, Farm Oenitzaub (38) (1915Cd); TM 49382-4, Farm Spaarwater (711) (2014Aa); TM 32964, Farm Kuyper (666) (2014Ab). Regional extralimital: TM 49269, Giribis Plains (1913Ab); SMW 1006, Otjovasando (1914Ab).

Remarks: Visser (1984j) illustrated this lizard as present throughout northwestern Namibia, except in coastal dune fields. Hoffmann (1989) recorded the species at Karossdrink (1914Bc) and Otjovasando (1914Ba). Mertens (1955) listed Kowares as an additional locality. Most of the specimens collected in the study area during 1990 were juveniles (mean SVL 47,9 mm, N=6; TL 92,6 mm, N=5). It is strictly rupicolous. Along with *Mabuya sulcata* and *Rhoptropus boultoni*, this is one of the most conspicuous inhabitants of koppies (Figure 5) and rock faces throughout the study area to the east of the Grootberg Pass.

CHAMAELEONIDAE

Chamaeleo dilepis Leach 1819
flap-necked chamaeleon

Museum records: TM 68751, Palmwag (1913Dd); CM 119384, 119411, 119428, Kamanjab (1914Db); TM 52784, Farm Vryheid (1914Dd).

Remarks: This species is uncommon on Farm Franken. A specimen was found on the road next to Haus Katemba in March 1990 (K. Fleißner, pers. comm.).

Chamaeleo namaquensis Smith 1831
Namaqua chamaeleon

Museum records: SMW 5652, Urunendis (1913Dc). Regional extralimital: TM 63453, Giribis Plains (1913Ab); TM 52846, 7 km NW Hunkab River, SCP (1913Ca).

Remarks: This species appears to be restricted to the low rainfall areas to the west of the Grootberg and escarpment.

GEKKONIDAE

Lygodactylus bradfieldi Hewitt 1932
Bradfield's dwarf gecko

Museum records: SMW 5600, 5602, Farm Wêreldsend (715) (2013Bb).

Remarks: Broadley (1991) noted parapatry between this taxon and *Lygodactylus capensis* in Zimbabwe, confirming full specific status for both. Visser (1984h) illustrated two records to the south of the study area (2014Db, 2014Cd).

Lygodactylus lawrencei Hewitt 1926
Lawrence's dwarf gecko

Museum records: SMW 117, TM 50803, Sesfontein (1913Ba); SMW 118, Warmquelle (1913Bb); SMW

6432, Upper Obob River (1913Da);SMW 5635, Palmwag (1913Dd); PEM R 2142, 60 miles E Torrabaai (2013Bb); SMW 5601, Farm Bergsig Pos (714) (2014Aa).

Remarks: Visser (1984h) mapped four records in study area (1913Bb, 1914Ab, 2013Ba, 2014Ac). Mertens (1955) mentioned specimens from Otjitambi (the type locality) and Kowares.

Pachydactylus bibronii (Smith 1846)
Bibron's gecko

Material examined: CAS 176120, 101,7 km W Farm Franken (Farm Palm 708) (1913Dd); CAS 176156, 54,3 km W Farm Franken (Farm Grootberg) (1914Cb); CAS 176283, 56,7 km W Farm Franken (Farm Grootberg) (1914Cb); CAS 176089, 54,6 km W Farm Franken (Farm Grootberg) (1914Cb); CAS 176100, 62,9 km W Farm Franken (Farm Grootberg) (1914Cd); CAS 176296-300, 37,8 km W Farm Franken (Farm Condor) (1914Cb); CAS 176167, Farm Franken (Haus Katemba) (1914Da); CAS 176189-94, Farm Franken (Grootbergpos) (1914Db); CAS 176265-6, Farm Franken (Kalkpos) (1914Db); SAM 17278, Kamanjab (1914Db); CAS 173416-8, 173471, 175356-7, AMB 8760, 5,0 km E Kamanjab (1914Db); AMB 8761, 7,4 km E Kamanjab (1914Db); AMB 8762, 8.8 km E Kamanjab (1914Db); CAS 176070, 11,9 km E Kamanjab (1914Db); CAS 176072, 28.6 km E Kamanjab (1915Ca).[AMB specimens listed above were given on live loan to Dr. H. Berger-dell'Mour and are presently in Vienna, Austria. They will ultimately be catalogued as CAS specimens].

Museum records: PEM R 1963, Sesfontein (1913Ba); TM 68544-6, Palmwag (1913Dd); TM 17257-8, Kamanjab (1914Db). Regional extralimital: TM 687768, 7 km E Gaias (2014Ca).

Remarks: Visser (1984e) mapped nine records scattered throughout the study area. Hoffmann (1989) recorded the species at Karossdrink (1914Bc) and Otjovasandu (1914Ba). This species is probably a complex of several independently evolving units and is presently under revision. Branch (1988) did not recognize subspecies, although FitzSimons (1938) and Mertens (1955) recorded specimens from Kamanjab as *P. b. turneri*. This species is extremely catholic in its habitat preferences and was collected in rock crevices, under stones on soil and in association with houses and cattle tanks. The largest catalogued specimen examined, CAS 176194, measured SVL 85,8 mm. Another specimen, living at the time of writing, measured SVL 97,5 mm + TL 92,5 mm. The mean SVL of 20 adults collected in 1990 was 72,8 mm.

Pachydactylus bicolor Hewitt 1926
velvety gecko

Material examined: CAS 175344, 19,3 km N Palmwag Rest Camp (1913Db); CAS 176116-9, 101,7 km W Farm Franken (Farm Palm 708) (1913Dd); CAS 176284-5, 56,7 km W Farm Franken (Farm Grootberg) (1914Cb); CAS 176151, 44,0 km W Farm Franken (Farm Condor) (1914Cb); CAS 176292-3, 37,8 km W Farm Franken (Farm Condor) (1914Cb); CAS 176126-31, 95,9 km W Farm Franken (Farm Otjihavera) (1914Cc); CAS 176101-8, 62.9 km W Farm Franken (Farm Grootberg) (1914Cd); CAS 175347-53, 175360-74, 176066-8, 176176-7, 176261-2, 176278, Farm Franken (1914Db); CM 119364, Kamanjab (1914Db).

Museum records: TM 68549, Palmwag (1913Dd); SAM 46952-3, Farm Tevrede (643)(1914Ad); TM 17203-8, 17238-42, 17244-5, 17263-4, Kamanjab (1914Db) [FitzSimons 1938]; TM 17319, Farm Paderborn (1914Dd) [FitzSimons 1938]; SMW 168, TM 17343-5, 17359, Farm Huab (261) (1914Dd); SMF 41344-8, Otjitambi (1915Cc) [Mertens 1955].

Remarks: Visser (1984d) mapped ten records from study area, concentrated in eastern regions. All localities from the study area are mapped in Figure 7. CAS 85944, from 17 mi south of Outjo, lies outside the study area but represents a southeastern range extension for the species. Mertens (1955) mentioned additional specimens from Kowares. The largest specimens examined, CAS 176101 and 176292, both measure SVL 40,9 mm. The average SVL of 24 adult specimens collected in 1990 was 35,5 mm. Although juveniles of this taxon exhibit a characteristic bold banded pattern, the adult coloration is labile and individuals change colour in association with environmental characteristics, possibly temperature. Branch (1988) mistakingly suggested that the two major patterns observed in subadults and adults reflected a further ontogenetic shift. Two eggs of *Pachydactylus bicolor* were collected along with *Pachydactylus punctatus* eggs on sandy soil under calcrete. They measure 8,5 x 6,5 and 9,0 x 6,3 mm and contain near term embryos.

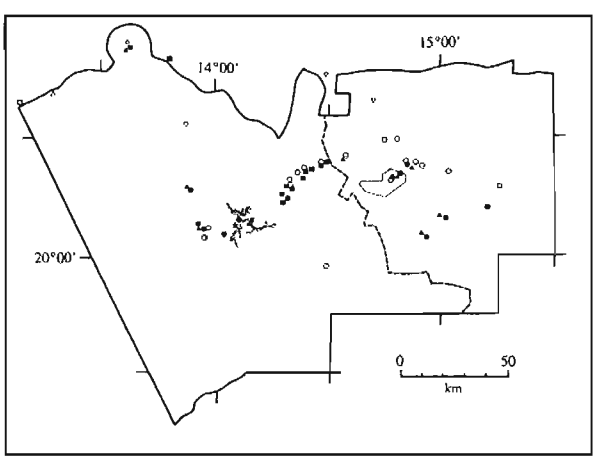

FIGURE 7: Map of the study area showing known localities for species of the genus *Pachydactylus*: *P. bicolor* (solid circles), *P. punctatus* (open circles), *P. fasciatus* (solid squares) *P. kochii* (open squares), *P. scutatus* (solid triangles), *P. oreophilus* (open triangles), *P. rugosus* (inverted open triangles), *P.* cf. *punctatus* (star). Note that the exact collection locality for the specimens of *Pachydactylus oreophilus* is uncertain. The locality indicated along the Hoanib River may in fact lie to the north, outside the study area on the track to Purros. In this and subsequent maps (Figures 16, 18 and 21) the thick dashed line is the border between the Kamanjab district and Damaraland and the thin dashed lines delineate Farm Franken. The stippled area represents the Grootberg.

Pachydactylus fasciatus Boulenger 1888
banded gecko (Figure 8)

Material examined: CAS 176280, 48,6 km W Farm Franken (Farm Atlanta) (1914Cb); CAS 176147, 49,5 km W Farm Franken (Farm Atlanta) (1914Cb); CAS 176159-66, 54,3 km W Farm Franken (Farm Atlanta) (1914Cb); CAS 176093-5, 54,6 km W Farm Franken (Farm Grootberg) (1914Cb); CAS 176109, 62,9 km W Farm Franken (Farm Grootberg) (1914Cd); CAS 176286-9, 64,9 km W Farm Franken (Farm Grootberg) (1914Cd).

Museum records: TM 29668-73, Sesfontein (1913Ba); SMW 187-188, TM 29667 Warmquelle (1913Bb); TM 68547, Palmwag (1913Dd).

Remarks: Since its description by Boulenger (1888), *P. fasciatus* has been collected only rarely. It has previously been confused with *P. weberi* (Werner 1915) and *P. formosus* (Sternfeld 1911a). Haacke (1965) reported seven specimens from Sesfontein and Warmquelle, which at the time represented the largest series from one locality, and noted that the species reaches its southern limit at Karibib. Locality records within the study area are mapped in Figure 7. A fuller discussion of the taxonomic history and distribution of this species is given by Bauer & Branch (1991). The largest specimen examined, CAS 176288, measured SVL 54,5 mm. Animals from all size classes from 21,0 mm to 54,5 mm were collected on sandy soil under roadside calcrete. The smallest specimens (< 25,0 mm) are clearly hatchlings. In addition to the specimens listed above two eggs were also collected. The eggs contain near term embryos and measure 11,3 x 9,0 mm and 11,5 x 8,9 mm and were found under a calcrete boulder along with eggs of *Pachydactylus punctatus*.

Pachydactylus kochii FitzSimons 1959
Koch's gecko

Museum records: TM 63407, Hoanib River Valley (1913Ac).

Remarks: Endemic to the gravel plains of the central Namib. This is the most northern and furthest inland record for the species (Figure 7).

FIGURE 8: *Pachydactylus fasciatus* (juvenile) from Farm Grootberg showing bold pattern typical of young individuals. Colour plate on page 145.

Pachydactylus laevigatus fitzsimonsi Loveridge 1947
button-scaled gecko

Material examined: CAS 176121-2, 101,7 km W Farm Franken (Farm Palm 708) (1913Dd): CAS 176125, 95,9 km W Farm Franken (Farm Otjihavera) (1914Cc); CAS 176181, 9,1 km S Kamanjab (Farm Beulah) (1914Db); CAS 176273, Farm Franken (Kamanjabpos) (1914Db).

Museum records: SAM 17260, TM 17200-2, 17250, Kamanjab (1914Db); SMW 6430-6431, Agab River (2013Bb)

Remarks: Visser (1984e) mapped 10 records scattered throughout the study area. Hoffmann (1989) recorded the species at Karossdrink (1914Bc) and Otjovasando (1914Ba). The type locality for *Pachydactylus laevigatus fitzsimonsi* (nomen novum Loveridge 1947 pro *P. l. tessellatus* FitzSimons 1938; type series TM 17200-2, 17250) is Kamanjab and Mertens (1955) recorded Kowares as another locality. Although this species occurs syntopically with *P. bibronii*, it appears to be restricted, in this region, to rock crevices. It is unclear how ecological segregation is maintained between these two nearly identically sized and morphologically similar geckos. The largest specimen examined, CAS 176273, measured SVL 89,3 mm.

Pachydactylus oreophilus McLachlan & Spence 1967
Kaokoland rock gecko

Museum records: TM 56889, 64185, Hoanib River, 4 km E Mudorib River (1913Ac); PEM R 1919-21, Sesfontein (1913Ba).

Remarks: PEM R 1919-1921 are the recatalogued types. The type description, however, provided more explicit locality data than the PEM catalogue. The holotype (PEM R 1921) and one paratype (PEM R 1920) were collected 20 mi (32 km) W Sesfontein, and the remaining paratype (PEM R 1919) was taken from 5 mi (8 km) W Sesfontein (see Figure 7).

Pachydactylus punctatus Peters 1854
speckled gecko

Material examined: CAS 176123, 101,7 km W Farm Franken (Farm Palm 708) (1913Dd); CAS 176090-2, 54,6 km W Farm Franken (Farm Grootberg) (1914Cb); CAS 176157, 54,3 km W Farm Franken (Farm Grootberg) (1914Cb); CAS 176281, 50,9 km W Farm Franken (Farm Atlanta) (1914Cb); CAS 176144-6, 49,5 km W Farm Franken (Farm Atlanta) (1914Cb); CAS 176294, 37,8 km W Farm Franken (Farm Condor) (1914Cb); CAS 176142-3, 25,2 km W Farm Franken (Farm Bruno) (1914Da); CAS 176169, 176267, Farm Franken (1914Db); CM 119370, Kamanjab (1914Db); CAS 175380, 3,2 km E Kamanjab (1914Db); CAS 176083, 5,5 km E Kamanjab (Farm Beulah) (1914Db); CAS 176187, 11,4 km N Kamanjab (Farm Kamanjab Nord) (1914Db); CAS 176071, 19,0 km E Kamanjab (Farm Cauas-Okawa) (1915Ca); CAS 176195, 38,6 km E Farm Franken (Farm Westfalen) (1915Ca).

Museum records: SMW 5744, Urunendis (1913Dc); SMW 5659, Uniab, Old red line (1913Dd); TM 68548, Palmwag (1913Dd); SAM 17301, 17558, Kamanjab (1914Db); TM 17304-5, Farm Paderborn (1914Dd); TM 68752-3, 2030'S 1349'E (2013Bd); SMW 5769, Farm Ruspoort (669) (2014Ab).

Remarks: Visser (1984b) mapped 19 records scattered throughout the study area. Mertens (1955) listed Kamanjab and "zwischen Otjikondo und Kamanjab" as additional localities and FitzSimons (1957) reported on *P. p. amoenoides* from Kowares. Localities are plotted on Figure 7. The largest specimen examined, CAS 176145, measured SVL 34,9 mm. Fifteen adult specimens from the study area averaged SVL 30,8 mm. Twelve eggs of this species were collected under calcrete on 28 and 30 May 1990 and contained embryos ranging from early stages to near term. Measurements of the eggs (in mm) collected ranged from 7,2-9,0 x 5,7-7,6 (mean 8,4 x 6,4). It should be noted that not all of the specimens examined belong to the nominate form of the species. A reevaluation of the status of the forms of *Pachydactylus punctatus* is currently being undertaken by the authors (AMB, WRB). Specimens from the Grootberg Pass bear some resemblance to *P. p. scherzi*, described by Mertens (1954) from the Brandberg.

Pachydactylus rugosus rugosus Smith 1849
rough-scaled gecko

Museum records: SMW 1583, Farm Hazeldene (237) (1914Bc). Regional extralimital: TM 38221, Otjovasando (1914Ba).

Remarks: Visser (1984c) mapped a single record from the study area (1914Bc). Mertens (1955) noted specimens from Kowares. McLachlan (1979) reviewed the status of this species and its distribution (see Figure 7). It is likely that the phylogenetic position of the other recognized subspecies needs to be reevaluated and that *P. rugosus* is monotypic.

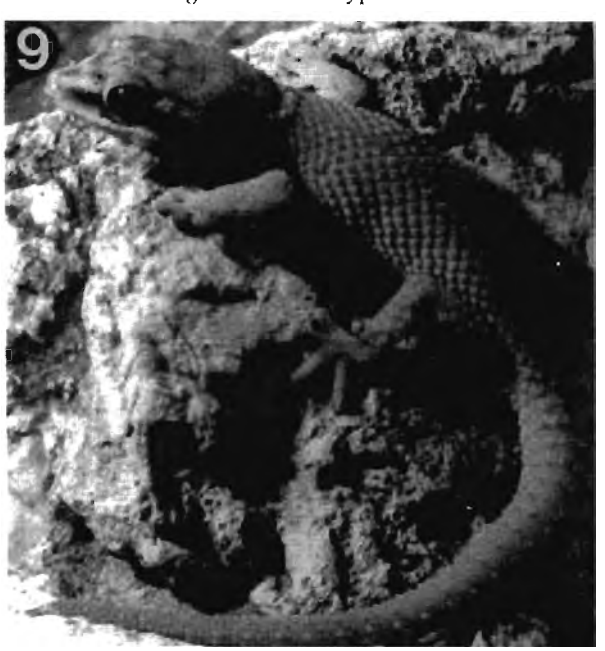

FIGURE 9: *Pachydactylus scutatus* from Farm Franken. Note the enlarged imbricating scales typical of this species. Colour plate on page 145.

Pachydactylus sansteyni Steyn and Mitchell 1967
San Steyn's gecko

Museum records: SMW 4478/3-7, vic. Kuidas waterhole (2013Db).

Remarks: All other specimens of this species derive from more coastal localities within the Skeleton Coast National Park.

Pachydactylus scutatus Hewitt 1927
large-scaled gecko (Figure 9)

Material examined: CAS 176112, 24,9 km W Farm Franken (Farm Bruno) (1914Da); CAS 176081, Farm Franken (1914Db).

Museum records: PEM R 1964-5, Sesfontein (1913Ba); TM 56865, Anvo Safari Camp (1913Db); SMW 5722, Farm Palmwag (703) (1913Dd); TM 17209, 17270, SMW 183, Kamanjab (1914Db); TM 17302, Farm Paderborn (1914Dd); TM 17338, Farm Huab (1914Dd); TM 56936, Agab Spring (2013Bb); TM 68754, 2030'S 1349'E (2013Db). Regional extralimital: TM 49708, Ugab River (2014Ca); TM 49419, Farm Blaaupoort (2014Cb).

Remarks: The type locality of this taxon is Kowares. All regional localities are plotted on Figure 7. FitzSimons (1943) reported the presence of eggs (7,0-7,4 x 5,4-5,6 mm) in mid-June. The specimens examined measured SVL 33,3 mm (CAS 176081) and SVL 35,2 mm (CAS 176112). The specimens collected during the study were found under exfoliating flakes on low granite outcrops.

Palmatogecko rangei Andersson 1908
Web-footed gecko

Museum records: TM 56891, Hoanib River, E Mudorib River (1913Ad); SMW 6387, TM 493856, 49388-9, Farm Vrede (719) (2014Ac). Regional extralimital: TM 54822, Hoanib River, 35 km from mouth (1913Ac); TM 52857-8, 18 km NW Hunkab River (1913Ca); TM 52825-6, Uniab River (2013Ab).

Remarks: Visser (1984a) mapped three records from the most western regions of study area, the easternmost at 2014Ac. This Namib dune specialist enters the region only along sandy river courses.

Ptenopus garrulus maculatus Gray 1865
common barking gecko

Museum records: TM 56859-61, 2 km E Amspoort (1913Ac); TM 56890 Hoanib River 4 km E Mudorib River (1913Ad); TM 57691, Hoanib-Obias R. jct. (1913Ad); SMF 49538, Farm Franken (1914Db) [Mertens 1971]; SAM 17298a,b, Otjitambi (1915Cc); SMW 5658, Duncan trail on Aandgloed (2014Ab); TM 42229, Farm Fonteine (2014Ac). Regional extralimital: SMW 6404-6406, 32 km N Brandberg west mine (2014Ca); TM 56327-30, 1 km E jct. Ugab-Goantagab (2014Ca); TM 42183, Twyfelfontein (2014Cb).

Remarks: Visser (1984f) mapped numerous records from

the study area, all in extreme southeast. Hoffmann (1989) recorded the typical race at Otjovasando (1914Ba). One of the authors (AMB) noted calling activity at Farm Franken in October 1987 and August 1989, although no specimens were collected at those times. Farm Franken is listed in Haacke's (1975) gazetteer of *Ptenopus* localities, but no specimens are mentioned in the text. Barking geckos appear to be patchily distributed in the Kamanjab district, in association with the distribution of suitable sandy soil substrates.

Rhoptropus afer Peters 1869
Namib day gecko

Museum records: TM 52924-5, 5 km N Hunkab River, E border SCP (1913Cb); TM 52934, Hunkab River (1913Cb); PEM R2244, Farm 710 (2013Bb); PEM R2243, 2252, 15 miles W Farm Rooiplaat (710) (2013Bb). Regional extralimital: TM 63436-9, Ganias Plains (1913Aa); TM 54821, Hoanib River, 35 km NE mouth (1913Ac); TM 52852, 7 km NW Hunkab River (1913Ca); TM 52821-2, Uniab River (2013Ab); TM 52831-6, Samanab River (2013Ab);

Remarks: Visser (1984g) mapped three records from the area to the west of that under consideration here, all in the coastal region (1913Ca, 1913Cc, 2013Ab). This is a Namib species and enters the study area only marginally on the plains of the Pro-Namib below the escarpment (Figure 10).

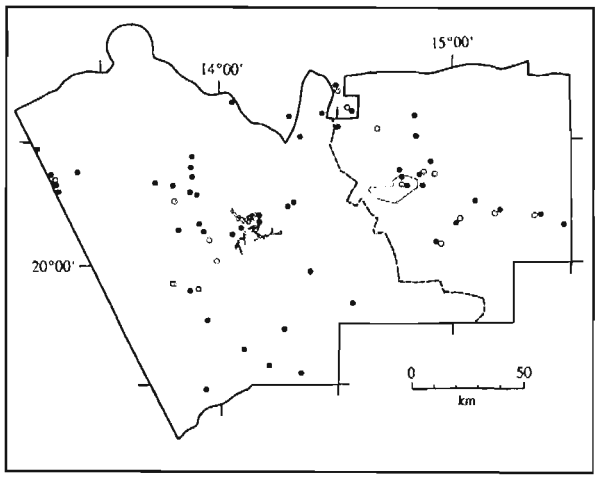

FIGURE 10: Distribution in the Kamanjab/Damaraland region of species of *Rhoptropus*: *R. afer* (open squares), *R. bradfieldi diporus* (solid squares), *R. boultoni* (open circles), *R. barnardi* (solid circles).

Rhoptropus barnardi Hewitt 1926
Barnard's Namib day gecko

Material examined: CAS 175343, 19,3 km N Palmwag Rest Camp (1913Db); CAS 175339-41, 0,2 km N jct D2620 on D3706 (Farm Palm) (1913Dd); CAS 175342, 4,4 km N Palmwag Rest Camp (1913Dd); CAS 175338, 28,2 km N jct D3254 on D2620 (Farm Humor) (1914Cc); CAS 176124, 95,9 km W Farm Franken (Farm Otjihavera) (1914Cc); CAS 176098-9, 62,9 km W Farm Franken (Farm Grootberg) (1914Cd); CAS 167663-5, 175345-6, 175354-5, 175358, 175375-7, 175381, 176061-4, 176077, 176172, 176178, 176274-5, Farm Franken (1914Db); CAS 176182, 9,1 km S Kamanjab (Farm Beulah) (1914Db); CAS 167666-70, 175329-30, 175333-7, Farm Hohenstein (1915Cd).

Museum records: TM 52902, 19 km along SCP E border from Hoanib River (1913Ca); TM 52903-5, 10 km N Hunkab River (1913Ca); TM 52923, 5 km N Hunkab River, E border SCP (1913Cb); TM 52932-3, 52945, Hunkab River, E border SCP (1913Cb); TM 68502-7, 68513, Hunkab Spring (1913Cb); TM 68538-40, Kai-As Spring (1913Da); TM 49320, Makukous Spring (1913Da); TM 49306-7, 6 km N Makukous Spring (1913Da); SMW 5740, Aub (1913Db); SMW 5701 Barab (Palmwag) (1913Da); TM 45841, 46035, 46105, 65 km S Sesfontein (1913Db); TM 68750, Palmwag (1913Dd); SMW 5605, Aub-Barab junction (1913Dd); TM 49365-6, Axab Spring (1913Dd); TM 56947-8, 5 km E Urunendis Spring, 1954'S 1345'E (1913Dd); TM 48679, 1919'S 1406'E (1914Ac); TM 63142, 5 km W Kamdescha Gate (1914Ad); TM 48662-4, Farm Kamdescha (642) (1914Ad); TM 45842, 50 km N Kamanjab (1914Bc); SMW 733-734, 15 km N Kamanjab (1914Bd); TM 45769-73, Rustig (1914Bd); TM 52785-6, Farm Humor (1914Cc); TM 55464, Farm Grootberg (1914Cd); CM 119458-9, SAM 17262, 17302, 17523, SMW 718-719, 745-746, 793-794, TM 17243, 17265-9, 17278, 17284, 36371, 46104, 48642, Kamanjab (1914Db); TM 486367, Peet Alberts Koppie (1914Db); TM 17290, 17303, 17318, Farm Paderborn (1914Dd); TM 17334-9, 17346-8, 17350-6, Farm Huab (1914Dd); SMW 703-4, Farm Hirabis Sd (28) (1915Ca); TM 17190-1, between Otjikondo and Kamanjab (1915Ca ?); SMF 41341, Otjitambi (1915Cc) [Mertens 1955]; TM 56922-3, 57707, 57709-11, Farm Wêreldsend (2013Bb); SMW 6429, Agab River, Damaraland (2013Bb); TM 55465, Farm Leeufontein ? (2013Bc); TM 68755, 2030'S 1349'E (2013Db); SMW 780-787, TM 32940, Farm Kuyper (666) (2014Ab); TM 42241, Farm Fonteine (717) (2014Ac); TM 49397-9, 49404-6, Farm Bethanie (514) (2014Ad); SMW 5771, Huab River at Nil Desperandum (2014Ad); SMW 5763, Soutrivier/Huab junction (2014Ba). Regional extralimital: TM 49254-8, Giribis Plains, 1903'S 1327'E (1913Aa); TM 56902, Ganamub River, 6 km from Hoanib River (1913Ab); TM 52898-900, Hoanib River, 3 km S SCP E border (1913Ac); PEM R2235, 2237, Kowares, Kamanjab (1914Ab); TM 48869, 20 km N Farm Kaokoveld, 1923'S 1417'E (1914Ad); PEM R 2242, 2 miles S Otjovasando (1914Bc); TM 42202-9, 49422, Farm Twyfelfontein (534) (2014Cb); TM 49469-73, Doros Crater (2014Cb); TM 49430, Farm Blaauwpoort (520) (2014Cb); TM 49489-91, 49701, 2052'S 1419'E (2014Cc); TM 52980-6, Gaias (2014Cc); TM 49486-8, Goantagab River (2014Cc); TM 42164-5, Granietkop (522) (2014Da);

Remarks: Visser (1984g) mapped numerous records from the study area. Hoffmann (1989) recorded the species at Karossdrink (1914Bc). This is the most common gecko throughout the region (Figure 10). It prefers small stones and boulders and thus avoids *Rhoptropus boultoni*. Odendaal (1979) described communal egg

laying in this species and illustrated a group of egg shells. FitzSimons (1938) found eggs in several stages of development during June 1937. Near term embryos were collected from the vicinity of Palmwag in August 1989. The largest specimen examined, CAS 176099, measured SVL 45,0 mm. Ten adult specimens collected in 1990 averaged SVL 39,0 mm.

Rhoptropus boultoni boultoni Schmidt 1933
Boulton's Namib day gecko

Material examined: CAS 176188, 27,2 km N Kamanjab (Farm Voorspoed) (1914Bc); CAS 167662, 167671-2, 175359, 175378-9, 176065, 176078-80, 176136, 176174-5, 176264, 176295, Farm Franken (1914Db); CAS 175328, Farm Hohenstein (1915Cd).

Museum records: SMW 5739, Aub (1913Db); SMW 5604, Aub-Barab junction (1913Dd); SMW 5603, Uniab, Old red line (1913Dd); TM 68543, Van Zyls Gat waterhole (1913Dd); SMW 800-801, TM 17195-9, 17236-7, 17260-2, Kamanjab (1914Db); TM 17289, 17291-2, 17317, Farm Paderborn (1914Dd); TM 17337, 17357-8, Farm Huab (1914Dd); TM 17177-89, between Otjikondo and Kamanjab (1915Ca ?); SMF 41342-3, Otjitambi (1915Cc) [Mertens 1955]. Regional extralimital: PEM R 2190, 3 miles S Otjovasando (1914Bc).

Remarks: Visser (1984g) mapped numerous records from the study area and Mertens (1955) listed specimens from Kowares and Farm Beulah as additional localities (see Figure 10). Hoffmann (1989) recorded the species at Karossdrink (1914Bc). Odendaal (1979) regarded this species as very similar in morphology and behavior to *R. bradfieldi*. Although both inhabit boulder piles, *boultoni* has a distinct preference for large cracks and is only rarely encountered away from very large boulder groups or koppies. The largest specimen examined, CAS 176065, measured SVL 70,9 mm. The average SVL of 10 specimens collected in 1990 was 60,6 mm.

Rhoptropus bradfieldi diporus Haacke 1965
Bradfield's Namib day gecko

Museum specimens: TM 68758, Huab River at 2030'S 1349'E (?) (2013Db); TM 49387-92, Farm Vrede (719) (2014Ac). Regional extralimital: TM 25819, 28235-40, 42184-97, 42198-201, 47035-57, 47070-3, 48146, 49531, 51260, 52511, 51246-9, Farm Twyfelfontein (2014Cb); TM 49492-3, 49702-4, 2052'S 1419'E (2014Cd); TM 52968, 9 km from Brandberg West towards Gaias (2014Cc); TM 52969, 7 km from Brandberg West towards Gaias (2014Cc); TM 52970-2, 11 km from Brandberg West towards Gaias (2014Cc); TM 53790, 11 km ESE Gaias (2014Cc); TM 53946, 55322, 18 km ESE Gaias (2014Cc).

GERRHOSAURIDAE

The recognition of the Gerrhosauridae as a family distinct from the Cordylidae is based on the recent phylogenetic work of Lang (1991).

Cordylosaurus subtesselatus (Smith 1844)
dwarf plated lizard

Material examined: Regional extralimital: CAS 173384, Farm Kleinbegin (1915Dc).

Museum records: SAM 17256, SMW 1857, Sesfontein (1913Ba); TM 49286, NE Sesfontein (1913Ba); SMW 1853, 10 miles N Kamanjab (1914Db); SMF 49631, Farm Beulah (1914Db) [Mertens 1971]; TM 39914, 39980, Farm Hoas (1914Dd).

Remarks: A specimen was clearly seen but evaded capture, whilst active at 09h30 in a low granite koppie near Haus Franken (1914Db), 26 May 1990. Visser (1984o) illustrated localities at 1914Db, 1914Bd, 1914Cb, and 1914Ad. Hoffmann (1989) recorded the species at Otjovasando (1914Ba). This species is extremely common in the koppies to the east of Kamanjab.

Gerrhosaurus multilineatus auritus Boettger 1887
Kalahari plated lizard

Museum records: SAM 17256, Sesfontein (1913Ba); SAM 17566, Kamanjab (1914Db).

Remarks: There are no other records from the study area. Visser (1984n) maps two records in the Damaraland-Kaokoveld region, the nearest being at 1814CA.

Gerrhosaurus nigrolineatus Hallowell 1857
black-lined plated lizard

Museum records: TM 48853-6, 49364, Sesfontein (1913Ba); TM 48820-2, Warmquelle (1913Bb); TM 41318, Farm Hoas (273) (1914Dd).

Remarks: Mertens (1955) listed Kamanjab as a locality for this species.

Gerrhosaurus validus maltzahni de Grijs 1938
giant plated lizard

Museum records: TM 17277, Kamanjab (1914Db); TM 17287-8, Farm Paderborn (1914Dd).

Remarks: Visser (1984n) recorded specimens from the quarter-degree grids 1914Bd and 1914Db, the latter including Kamanjab. Hoffmann (1989) noted that in Etosha the species is confined to the southwestern portion of the park and reported observations at Karossdrink (1914Bc) and Otjovasando (1914Ba). Lizards probably referrable to this species were sighted basking in protected boulder crevices near the dam east of Haus Franken during May 1990 (R. Castanzo, pers. comm.).

LACERTIDAE

Heliobolus lugubris (Smith 1838)
bushveld lizard

Material examined: CAS 176158, 54,3 km W Farm

Franken (Farm Grootberg) (1914Cb); CAS 165635, 176060, 176301, 176306-7, Farm Franken (1914Db); CAS 176179, 25,7 km S Kamanjab (Farm Blydskap) (1914Dd).

Museum records: SMW 2133, Warmquelle (1913Bb); SMW 2727, 2732, Aub (1913Db); SMW 5606, Aub-Barab junction (1913Dd); SMW 5707-5708, Palmwag (1913Dd); SMW 5715, TM 68749, Carcabin Spring, Palmwag (1913Dd); SMW 5716, Farm Otjihavera (703) (1914Cc); SAM 17562, 17525, Kamanjab (1914Db); SMW 2142, Kakatswa Onguati (1914Dc); SMW 5654-5655, Duncan trail on Aandgloed (2014Ab); SMW 5760-61, Farm Welkom Spring (680) (2014Ba). Regional extralimital: SMW 2141, Kowares (1914Ab).

Remarks: Visser (1984q) mapped only a single record in study area (1914Bd). Hoffmann (1989) recorded the species at Karossdrink (1914Bc) and Otjovasando (1914Ba). FitzSimons (1943) and Mertens (1955) also listed Kamanjab and Otjitambi as localities. Although widely distributed in the study area, this species is generally less abundant than the syntopic *Pedioplanis undata*. The conspicuously patterned juveniles of *Heliobolus lugubris* were frequently seen around human habitations during May-June 1990. The largest specimen examined, CAS 176158, measured SVL 38.3 mm.

Nucras intertexta (Smith 1838)
spotted sandveld lizard

Material examined: CAS 176170, Farm Franken (1914Db).

Museum records: SMW 2085, Sesfontein (1913Ba); TM 49284, NE Sesfontein (1913Ba); SMW 2084, Warmquelle (1913Bb); TM 45843, 50 km SE Sesfontein (1913Bb); SMW 5738, Aub (1913Db); SMW 5717, Farm Otjihavera (703) (1914Cc).

Remarks: Visser (1984p) mapped only two records for study area (1913Ab, 1913Bb). The only specimen collected in the study area is a juvenile, measuring 37.2 mm SVL, found under a granite slab on red sand.

Pedioplanis breviceps (Sternfeld 1911)
short-headed sand lizard

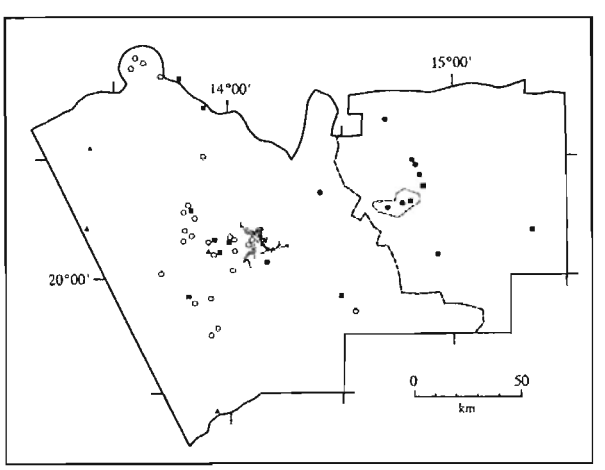

FIGURE 11: Distribution in the Kamanjab/Damaraland area of species of *Pedioplanis*: *P. undata* (solid circles), *P. gaerdesi* (open circles), *P. namaquensis* (solid squares), *P. breviceps* (solid triangles).

Museum records: TM 68496, Mudorib River (1913Ad); TM 68524, Kharu-Gaiseb River (1913Cd); SMW 5640-5642, Palmwag (1913Dd); TM 68761, Huab River (2013Db).

Remarks: This is essentially a Namib species that reaches its eastern limit in the study area against the slopes of the escarpment (Figure 11).

Pedioplanis gaerdesi (Mertens 1954)
Kaokoland sand lizard (Figure 12)

Material examined: CAS 173411-2, 4,3 km N Sesfontein on D3707 (1913Ba); CAS 173409-10, 48,5 km N Palmwag Rest Camp (1913Bd); CAS 176110-1, 120.6 km W Farm Franken (Farm Palm 708) (1913Dd); CAS 176113-5, 101,7 km W Farm Franken (Farm Palm 708) (1913Dd); CAS 176139-41, 7,5 km W Grootberg Pass (Farm Otjihavera) (1914Cc); CAS 173408, 28,2 km N jct D3254 on D2620 (Farm Humor) (1914Cc); CAS 173404-7, 75,6 km E jct D2301 on D3254 (Farm Wêreldsend) (2013Bb).

Museum records: SMW 2223, 6 km W Sesfontein (1913Ba); SMF 67040-1, Berge von Sesfontein (1913Ba) [Mertens 1971]; SMW 2195, between Sesfontein and Warmquelle (1913Ba); SMW 2222, Warmquelle (1913Bb); TM 68537, Kai-As Spring (1913Da); SMW 5728, 5730-5731, 5743, Aub (1913Db); SMW 5745-5746, Upper Urunendis River (1913Dc); SMW 5630-5633, Carcabin Spring, Palmwag (1913Dd); SMW 5637-5638, 5643, SAM 47413, Palmwag (1913Dd); SMW 5697-5698, Barab, Palmwag (1913Dd); SMW 5614-5615, Aub-Ngabis (1913Dd); SMW 5615-5618, 4 km W Awaxas (1913Dd); SMW 5602, Aub-Barab junction (1913Dd); SMW 5719, Farm Otjihavera (703) (1914Cc); SMW 5624-5626, Windpump E Carcabin Spring, Palmwag (1914Cc); SMW 6428, Agab River, Damaraland (2013Bb); PEM R 2211, 2213-2215, 68 miles E Torrabaai (2013Bb); SMW 5706, Axab tributary (2013Bb); TM 68756-7, Damaraland (2013Db); SMW 5195, 13 km on road 2620 from 3245 (2014Ac); SMW5765, Farm Eersbegin (625) (2014Ba). Regional extralimital: SMF 52982, Farm Twyfelfontein (2014Cc) [Mertens 1971].

Remarks: This taxon was regarded as specifically distinct from *P. undata* by Mayer & Berger-Dell'mour (1987) and Arnold (1989). The escarpment appears to form a geographic boundary between this taxon and *P. undata* in this area of Namibia (Figure 11). This species is very common on the stony plains between the escarpment and the Skeleton Coast Park. The correct allocation of some specimens from the

FIGURE 12: *Pedioplanis gaerdesi* from the Grootberg Pass, Damaraland. Compare with Figure 13. Colour plate on page 145.

Sesfontein area awaits confirmation, but we have treated questionable records of members of the *P. undata* complex from the area as tentatively referrable to *P. gaerdesi*. Individuals generally retreat to salt bushes when pursued. The largest specimen examined, CAS 176110, measured SVL 48,3 mm.

Pedioplanis lineoocellata (Duméril and Bibron 1839)
spotted sand lizard

Remarks: This species has been collected at Kaross (1914Bc) (M. Griffin, pers. comm.).

Pedioplanis namaquensis (Duméril and Bibron 1839)
Namaqua sand lizard

Material examined: CAS 165738; CAS 173413-4, D3706 at Hoanib River (1913 Bd); CAS 176263, 176271-2, 176276, Farm Franken (1914Db).

Museum records: SAM 46961, Sesfontein (1913Ba); SMW 5729, Aub (1913Db); SMW 5612-5613, Aub-Ngabis (1913Dd); SMW 5623, Windpump E Carcabin Spring, Palmwag (1913Dd); SMW 5640-5642, Palmwag (1913Dd); SAM 17529, Kamanjab (1914Db); PEM R 2226-2228, 15 miles W Farm Rooiplaat (710), Kamanjab District (2013Bb); SMW 5768, Farm Ruspoort (669) (2014Ab).

Remarks: Visser (1984q) mapped only two records for the study area (1913Bb, 1914Db). FitzSimons (1943) and Mertens (1955) listed Warmbad Nord (= Warmquelle) as an additional locality (see Figure 11). The largest specimen examined, CAS 176276, measured 37.3 mm SVL. The specimens from the Hoanib River require further analysis and more collecting in the Sesfontein region may reveal the existence of another species of *Pedioplanis*.

Pedioplanis undata (Smith 1838)
western sand lizard (Figure 13)

Material examined: CAS 176279, 48,6 km W Farm Franken (Farm Atlanta) (1914Cb); CAS 176135, 176073-6, 176302-4, Farm Franken (1914Db); CAS 176305, Farm Franken (Haus Katemba) (1914Da); CAS 176185, 11,4 km N Kamanjab (Farm Kamanjab Nord) (1914Db); CAS 173391, Farm Hohenstein (1915Cd).

Museum records: SMW 2202, Farm Hazeldene (237) (1914Bc); SMW 2181, Farm Kliprivier (707) (1914Cc); SMW 5718, Farm Otjihavera (703) (1914Cc); SMW 3376, 10 km N Kamanjab (1914Db); PEM R 2207, 6 miles N Kamanjab (1914Db/c).

FIGURE 13: *Pedioplanis undata* from Farm Franken. This is a sister species of *P. gaerdesi*. Colour plate on page 145.

Remarks: FitzSimons (1943) and Mertens (1955) listed Kamanjab, Kowares and Paderborn as additional localities. Visser (1984q) showed several records from the region. More coastal records are referrable to *Pedioplanis gaerdesi* (see Figure 11). The largest specimen examined, CAS 176073, measured SVL 53,9 mm.

SCINCIDAE

Lygosoma sundevallii (Smith 1849)
Sundevall's writhing skink

Material examined: CAS 175600, 44,6 km W Farm Franken (Farm Condor) (1914Cb); CAS 175604, Farm Franken (Haus Katemba) (1914Da).

Museum records: SMW 6460, 30 km SW Sesfontein (1913Ad); TM 50806, 50808, Sesfontein (1913Ba); SMF 66173 [Mertens 1971], SMW 1944, Warmquelle (1913Bb); TM 50800-2, 53587, 12 km WSW Sesfontein (1913Bc); TM 36466, Farm Palmfontein (1914Ca); TM 36369, Kamanjab (1914Db); CM 119426, 14,7 km SE Kamanjab (1914Db); TM 37619, Farm Franken (1914Db); TM 41316-7, Farm Hoas (273) (1914Dd); SMF 67086-7, Otjitambi (1915Cc) [Mertens 1971].

Remarks: Visser (1984m) showed this savannah species as absent from Namib and Pro-Namib with only a single record (1913Bb) for the study area (1920'S 1314'E). The larger specimen examined, CAS 175604, measured SVL 82,3 mm + TL 76,4 mm (partially regenerated tail).

Mabuya acutilabris (Peters 1862)
wedge-snouted skink

Material examined: CAS 176282, 56,7 km W Farm Franken (Farm Grootberg) (1914Cb); CAS 17619, 44,0 km W Kamanjab (Farm Condor) (1914Cb); CAS 176096-7, 62,9 km W Farm Franken (Farm Grootberg) (1914Cd); CAS 176148, 23,6 km E jct D2620 on D2650 (Farm Moria) (1914Cd); CAS 165701-3, 176058-9, 176069, 176133-4, 176268-70, 176277, 176308-35, 176337-57, Farm Franken (1914Db); CAS 176184, 31,8 km S Kamanjab (Farm Helia) (1914Dd); CAS 173400-3, 75,6 km E jct D2301 on D3245 (farm Wêreldsend) (2013Bb). Regional extralimital: CAS 160883, Petrified Forest (2014Bc).

Museum records: SMF 67058, Berge bei Sesfontein (1913Ba) [Mertens 1971]; SMW 5733-4, Aub (1913Db); SMW 5699, Barab, Palmwag (1913Dc); SMW 5636, TM 68746, Palmwag (1913Dd); SMW 5620, Spring on Sesfontein Road (1913Dd); SMW 5610-1, Aub-Ngabis (1913Dd); SMW 5628, 5714, Carcabin Spring, Palmwag (1913Dd); SMW 5656-7, Duncan Trail on Aandgloed (1914Ab); SMW 1508, 6342, Otjovasando (1914Ab); SMW 5621-2, windpump E Carcabin Spring, Palmwag (1914Cc); SAM 17528, Kamanjab (1914Db); SMF 46725, Farm Beulah (1914Db) [Mertens 1955]; SMW 5776, Farm Paderborn (263) (1914Dd); PEM R 2120, 2122, Farm Rooiplaat (710) (2013Db); SMW 5755, Farm Hewel

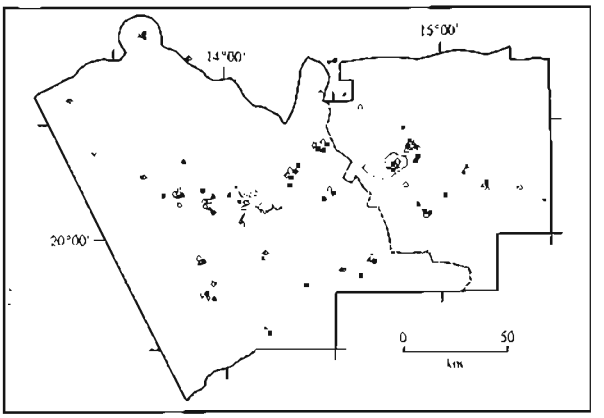

FIGURE 14: Distribution in the Kamanjab/Damaraland area of the species of *Mabuya*: *M. acutilabris* (solid circles), *M. variegata* (open circles), *M. sulcata* (solid squares), *M. sulcata* cf. *ansorgii* (open squares), *M. binotata* (solid triangles), *M. striata* (open triangles), *M. spilogaster* (solid inverted triangles), *M. occidentalis* (open inverted triangles), *M. laevis* (stars), *M. hoeschi* (half solid diamonds).

(681) (2014Ba); PEM R 2144, 2119, 2121, 68 miles E Torrabaai (2014Bb). Regional extralimital: SMW 6821, Farm Oas (486) (2014Bc); SMF 66011, Farm Twyfelfontein (2014Cb) [Mertens 1971]; SMW 6824, Duineveld (529) (2014Da); SMW 6827, Farm Granietkop (522) (2014Da).

Remarks: Visser (1984l) showed this species distributed throughout the study area, with a gap along the coastal region. Hoffmann (1989) recorded the species at Karossdrink (1914Bc). FitzSimons (1943) and Mertens (1955) also listed Kowares and "between Otjikondo and Kamanjab" as localities (see Figure 14). A large series collected at Farm Franken in May-June 1990, contained relatively few large adults, and consisted primarily of juvenile animals. A sample of 49 specimens collected in 1990 averaged SVL 29.8 mm. The ecology and natural history of this species have been investigated by Castanzo (1991).

Mabuya binotata (Bocage 1867)
Ovambo tree skink (Figure 15)

Material examined: CAS 165700, 175619, 175628-9 Farm Franken (1914Db).

Museum records: SAM 172555, Sesfontein (1913Ba); SMW 5724, Aub (1913Db); SMW 5639, Palmwag (1913Dd); TM 63139, 5 km W Kamdescha Gate (1914Ad); SAM 17527, Kamanjab (1914Bd); SMF 41340, Otjitambi (1915Cc) [Mertens 1955]; SMW 5705, Axab tributary (2013Bb); PEM R 2789, Farm Rooiplaat (710) (2013Bb); SMW 5770, Farm Tweespruit (712) (2014Aa); SMW 6819, Khorixas Rest Camp (2014Ac); SMW 5754, Farm Hewel (681) (2014Ba). Regional extralimital: SMW 5853, Farm Kowares (276) (1914Ab).

Remarks: FitzSimons (1943) and Mertens (1955) listed Farm Paderborn as an additional locality. Hoffmann (1989) recorded the species at Otjovasando (1914Ba). All regional localities are plotted in Figure 14. Although generally regarded as a tree dwelling species, the single juvenile collected was found in tall grass and one adult was sighted crossing the main road between Kamanjab and the Grootberg Pass. Two others were found sheltering in vertical granite cracks in small koppies in mopaneveld. *Mabuya binotata* is most often encountered under bark, in tree holes and in deep cracks in granite boulders. The largest specimen examined, CAS 175619, measured SVL 140,3 mm + TL 136,5 mm with a preserved weight of 86,97 g.

FIGURE 15: *Mabuya binotata* (adult female) from Farm Franken. Colour plate on page 145.

Mabuya hoeschi Mertens 1954
Hoesch's skink

Museum records: TM 68494, Mudorib River (1913Ad); SMW 5891, E of Warmquelle (1913Bb); TM 68541, Kai-As Spring (1913Da); SMW 5894, Kamanjab (1914Db); SMW 5770, Farm Tweespruit (712) (2014Aa); SMW 5876-5882, Tsawisis (2014Ac); SMW 5764, Farm Eersbegin (625) (2014Ba). Regional extralimital: SMW 5890, 32 km W Sesfontein (1913Ab); SMW 6820, Farm Kaokokroon (487) (2014Bd); SMW 6747, Rhinowasser, Damaraland (2014Cb).

Remarks: A single individual was observed at 101.7 km W Farm Franken, on the western approach to the Grootberg Pass, but escaped into a small rubble heap.

Mabuya laevis Boulenger 1907
Angolan blue-tailed skink

Museum records: SMF 66171 [Mertens 1971], SMW 6436-6441, Farm Hirabis Süd (28), Outjo District (1915Ca); TM 41315 Farm Hoas (273) (1914Dd).

Remarks: These specimens were the first Namibian records for this Angolan species, which was placed in the new genus *Oelofsia* by Steyn & Mitchell (1965). The distribution of this northern species in the Kamanjab region remains unknown. It is likely that it occurs on the koppies of much of the surrounding mopaneveld.

Mabuya occidentalis (Peters 1862)
western three-striped skink

Museum records: TM 68512, Hunkab Spring (1913Cb); SMW 6000-6001, 6027, 77 km E Torrabaai (2013Bb); PEM R 2168, Farm Rooiplaat (710) (2013Bb).

Mabuya spilogaster (Peters 1882)
Kalahari tree skink

Material examined: CAS 175606, 175630, 176168, Farm Franken (1914Db); CAS 176186, 11,4 km N Kamanjab

(Farm Kamanjab Nord) (1914Db); CAS 173394, Farm Otjikondo (1915Cd). Regional extralimital: CAS 173383, Farm Chamkubis (1915Dc).

Museum records: SAM 17242, Sesfontein (1913Ba).

Remarks: Hoffmann (1989) recorded the species at Karossdrink (1914Bc) and Otjovasando (1914Ba). All localities in the study area are presented in Figure 14. Our observations of the broad habitat spectrum employed by this species are in agreement with those of Hoffmann (1989). Specimens were collected on or near trees and in association with human habitations, or more rarely in rock piles. The largest specimen examined, CAS 175630, measured SVL 76,8 mm + TL 83,2 mm.

Mabuya striata wahlbergii (Peters 1869)
striped skink

Museum records: TM 31579, Hirabis Süd (28) (1915Ca).

Remarks: FitzSimons (1943) and Mertens (1955) listed localities for this species (as *M. striata striata*) including Kamanjab, between Otjikondo and Kamanjab, and Otjitambi.

Mabuya sulcata (Peters 1867)
western rock skink

Material examined: CAS 175594-6, 54,6 km W Farm Franken (Farm Grootberg) (1914Cb); CAS 175603, 44.0 km W Farm Franken (Farm Condor) (1914Cb); CAS 175614, 37,8 km W Farm Franken (Farm Condor) (1914Cb); CAS 175601, 63,2 km W Farm Franken (Farm Grootberg) (1914Cd); CAS 175602, 29,6 km E jct D2620 on D2650 (Farm Anker) (1914Cd); CAS 165695-7, 175592-3, 175605, 175613, 175615, 175624-7, Farm Franken (1914Db); CM 119369, Kamanjab (1914Db).

Museum records: TM 49310-2, Makukous Spring (1913Da); TM 48676, Kaokoland (1914Ac); TM 48626-9 Farm Oenitzaub (1914Ac); TM 48666-7, Farm Kamdescha (1914Ad); TM 52790, 52797, Farm Humor (1914Cc); SAM 17261, 17526, SMW 6223-6224, TM 17217-23, 17246-7, 17282-3, 45782, Kamanjab (1914Db); TM 17173-6, between Otjikondo and Kamanjab (?); SMF 41355-7, Otjitambi (1915Cc) (Mertens 1955); TM 17293-5, 17311-2, 17320-4, 17330, Farm Paderborn (1914Dd); TM 17340-2, Farm Huab (1914Dd); SMW 6818, Khorixas Rest Camp (2014Ac); SMW 5756, Farm Hewel (681) (2014Ba); SMW 5762, Farm Welkom Spring (680) (2014Ba).

Remarks: Hoffmann (1989) recorded the species at Otjovasando (1914Ba). This species is highly variable in color pattern and in some aspects of head scalation. Although one of the authors (WDH) has found no evidence for the recognition of the Angolan form *M. s. ansorgii* in Namibia on the basis of scale characters, specimens examined by the other authors from west of the escarpment (SMW 5726, 5735-5737, 5741-5742, Aub [1913Db]; SMW 5627, 5712-5713, Carcabin Spring, Palmwag [1913Dd]; CAS 175597, 101,7 km W Farm Franken [Farm Palm 708] [1913Dd]; CAS 175598-9, 95,9 km W Farm Franken [Farm Otjihavera] [1914Cc]) have the pinkish or orange throat and infralabials typical of *M. sulcata ansorgii* (the localities of these specimens have segregated an appear as *Mabuya sulcata* cf. *ansorgii* in Figure 14). It appears that the patterns of variation and distribution of the forms of *M. sulcata* in southwestern Africa are too incompletely known to justify a taxonomic decission at this time. Intergrades between the nominate subspecies and *M. s. ansorgii* have been proposed (Mertens 1971).

Mabuya variegata (Peters 1869)
variegated skink

Material examined: CAS 176180, 31,0 km N Kamanjab (Farm Blyerus) (1914Bc); CAS 176084-8, 54,6 km W Farm Franken (Farm Grootberg) (1914Cb); CAS 176152-5, 54,3 km W Farm Franken (Farm Grootberg) (1914Cb); CAS 176150, 44,0 km W Farm Franken (Farm Condor) (1914Cb); CAS 176290-1, 37,8 km W Farm Franken (Farm Condor) (1914Cb); CAS 176137-8, 29,6 km E jct D2620 on D2650 (Farm Anker) (1914Cd); CAS 165698-9, 173415, 176082, 176132, 176171, 176173, Farm Franken (1914Db); CAS 176183, 22,8 km S Kamanjab (Farm Vryheid) (1914Dd); CAS 173392-3, Farm Hohenstein (1915Cd).

Museum records: SMW 5725, Aub (1913Db); SMW 5696, Urunendis (1913Dc); SMW 5709, 5723, Palmwag (1913Dd); SMW 5747, Upper Urunendis River (1913Dc); SMW 5619, 5629, Carcabin Spring, Palmwag (1913Dd); SMW 5608, Aub-Barab junction (1913Dd); CM 119360, 35,5 km W Kamanjab (1914Da); SMW 5943, 5956, 6000-6001, Kamanjab (1914Db); SMW 6426-6427, Agab River, Damaraland (2013Bb); SMW 5599, Farm Wêreldsend (715) (2013Bb); SMW 5757, Farm Hewel (681) (2014Ba).

Remarks: Additional localities listed by Mertens (1955) include Kowares, Farm Paderborn and "zwischen Otjikondo und Kamanjab" (under *M. l. longiloba*) and Otjitambi (SMF 41339, as *M. l. triebneri*). Visser (1984l) showed a gap in the ranges of *M. v. punctulata* (1914Ba, 1914Bd, 1914Db) and M. v. *variegata* (2013Aa, 2013Ab, 2013Db). However, SMW specimens from Carcabin Spring, Palmwag are catalogued under both names. Broadley (1975b) recorded the specimens from the Kamanjab region as *M. v. punctulata*, with the nominate form occurring in more coastal regions and intergrades in 2013Aa, 2013Ab. Although van den Elzen (1983) noted habitat differences between the forms around the Brandberg, no such distinctions could be made about the specimens collected by the authors in the Kamanjab-Damaraland region. Both morphs are represented at single localities and it appears impossible and undesirable to apply subspecific appellations to this material at this time. The range of variation within the species as a whole should be examined and the status of the subspecies reevaluated. The largest specimen examined, CAS 176152, measured SVL 54,2 mm.

Panaspis wahlbergii (Smith 1849)
Wahlberg's snake-eyed skink

Museum records: TM 56862, 2 km E Amspoort (1913Ac); TM 50804, Sesfontein (1913Ba); SMF 66144 [Mertens 1971], TM 48817, Warmquelle (1913Bb); SMW 5700, Barab, Palmwag (1913Da); TM 39915, Farm Hoas (273) (1914Dd); SMF 46570, Farm Beulah (1914Db) [Mertens 1955]; TM 56996, Wêreldsend (715) (2013Bb).
Remarks: Visser (1984m) mapped only six records from Namibia including localities in grid squares 1913Bb and 1914Db.

Sepsina alberti Hewitt 1929
Albert's burrowing skink

Museum records: TM 36467, Farm Palmfontein (1914Ca); SMF 66174, Kamanjab (1914Db) [Mertens 1971]; SMW 7057, 12 km W Kamanjab (1914Db); TM 36343, Farm Franken (1914Db); SMF 66004, Otjitambi (1915Cc) [Mertens 1971].

VARANIDAE

Varanus albigularis (Daudin 1802)
rock monitor

Museum records: SAM 17524, Kamanjab (1914Db). Regional extralimital: TM 56907, Ganamub River, 6 km from Hoanib River (1913Ab).
Remarks: Hoffmann (1989) recorded the species at Otjovasando (1914Ba). Mertens (1955) listed "zwischen Fransfontein und Eduardsfelde" as an additional locality. The rock monitor is known from few, scattered localities in northern Namibia. Visser (1984i) indicated a single locality in 1914Db. This species is relatively uncommon on Farm Franken. A large specimen was seen walking in the veld along the southwestern boundary of Farm Franken (Fig. 3, 23) in April 1990, and another was foraging near the swimming pool at Haus Franken in February 1990 (K. Fleißner, pers. comm.).

AMPHISBAENIA
AMPHISBAENIDAE

Monopeltis anchietae (Bocage 1873)
Angolan spade-snouted worm lizard

Museum records: Regional extralimital: SMW 1713, Otjovasando (1914Ad).
Remarks: FitzSimons (1943) listed Warmbad (=Warmquelle) as an additional locality.

SERPENTES
LEPTOTYPHLOPIDAE

Leptotyphlops labialis (Sternfeld 1908)
Damara thread snake

Material examined: CAS 175081, 23,6 km E jct D2620 on D2650 (Farm Moria) (1914Cd); CAS 175096, Farm Franken (1914Db).
Museum records: SAM 17294, 17300, TM 45844, 63554, Sesfontein (1913Ba); SMF 66141, Otjitambi (1915Cc) [Mertens 1971].
Remarks: The two specimens examined both measured SVL 250 mm + TL 10 mm.

Leptotyphlops occidentalis FitzSimons 1962
western thread snake

Museum records: SMW 7171, 6 km SE Sesfontein (1913Ba).
Remarks: The SMW specimen extends the range some 75 km south from the Kaoko Otavi record published by Broadley (1983).

Leptotyphlops scutifrons scutifrons (Peters 1854)
Peters's thread snake

Remarks: Broadley (1983) mapped an isolated record at 1915ca.

TYPHLOPIDAE

Typhlops schinzi Boettger 1887
beaked blind snake

Museum records: TM 33058, Farm Kuyper (2014Ab). Regional extralimital: TM 49421, Farm Blaaupoort (534) (2014Cb).
Remarks: Broadley (1983) mapped a locality in 1914Db.

Typhlops schlegelii schlegelii (Bocage 1873)
Schlegel's blind snake

Museum records: SMW 7062, Farm Franken (242) (1914Db).

BOIDAE

Python anchietae Bocage 1887
Anchieta's dwarf python

Museum records: TM 53879, Warmquelle (1913Bb); TM 57146, Farm Driefontein (2013Bd).
Remarks: Unpublished records of this protected species are known for quarter-degree squares 1914Ab, 1914Ad, 1914Bc, 1914Bd, 1914Da, 1914Dd, 2013Bb, 2014Aa, 2014Bb and 2014Db, as well as several neighboring grids outside of the study area (Griffin & Branch, unpubl. obs.).

Python sebae natalensis Smith 1840
African rock python

Remarks: Broadley (1983) listed specimens from quarter degree square 1915Cc and Hoffmann (1989) recorded this species at Karossdrink (1914Bc), Khoabendus (1914Ba) and Otjovasando (1914Ba). Large specimens are relatively common on Farm Franken, and are frequently found near water sources (dams and

rock pools) where they appear to ambush birds and small mammals coming to drink. They may be present in one spot for several weeks or months. In November 1988 a large (3 m) specimen was regularly seen at the dam next to Farm Franken (K. Fleißner, pers. comm.).

COLUBRIDAE

Atractaspis bibronii Smith 1849
southern stilletto snake

Museum records: SMW 347, Sesfontein (1913Ba).
Remarks: Broadley (1983) recorded no localities within the study site, the nearest being 1813Bb (perhaps a misprint for the Sesfontein record).

Dispholidus typus typus (Smith 1829)
boomslang

Material examined: CAS 175100, Farm Franken (1914Db).
Remarks: Broadley (1983) recorded no localities within the study area. The single specimen examined was killed by farm workers, who mistook it for *Dendroaspis*. The specimen is large, SVL 1330 mm + TL 367 mm, and nearly black in coloration. The SVL of the Franken specimen exceeds the maximum listed by Broadley (1983) by 40 mm. Boomslangs are common on Franken and nearby farms, as the habitat, i.e. *mopane* bushveld, is generally suitable for this species.

Hemirhagerrhis nototaenia viperinus (Bocage 1873)
western bark snake

Material examined: CAS 175094, 175097, Farm Franken (1914Db).
Museum records: SMW 2365, Kamanjab (1914Db); TM 17301, Farm Paderborn (1914Dd).
Remarks: The larger specimen examined, CAS 175097, measured SVL 407 mm + TL 89 mm. This represents a substantial size increase over the maximum of (295 + 72) mm reported by Broadley (1983). This species is commonly found basking on granite koppies. This association with rocky habitats rather than bark, as in the eastern subspecies, appears to by typical (van den Elzen 1980).

Lamprophis fuliginosus (Boie 1827)
brown house snake

Museum records: SMW 294, Sesfontein (1913Ba); SMW 5653, Farm Wêreldsend (715) (2013Bb).

Lycophidion capense capense (Smith 1831)
Cape wolf snake

Remarks: Broadley (1983) listed a single locality in the east of the study area in grid 1915Ac.

Mehelya vernayi Bogert 1940
Angola file snake

Museum records: SMF 46845, Farm Otjitambi (1915Ca) [Mertens 1955].
Remarks: Haacke (1981) provided the most recent review of this species in Namibia.

Philothamnus semivariegatus (Smith 1847)
spotted bush snake

Material examined: CAS 173397-8, 175071, 175095, Farm Franken (1914Db).
Museum records: SMW 489, TM 48823, Warmquelle (1913Bb); TM 17315, Farm Paderborn (1914Dd); TM 41320-1, Farm Hoas (273) (1914Dd).
Remarks: Literature records for this species include Karossdrink (1914Bc) (Hoffmann 1989), 1914Db (Broadley 1983), and a single locality in the southern Kaokoveld (Haacke 1985). The largest of the specimens examined, CAS 175095 measured SVL 637 mm + TL 196 mm.

Prosymna bivittata Werner 1903
two-striped shovel-snout

Museum records: TM 55041-2, Otjitambi (1915Cc).
Remarks: Broadley (1983) recorded a single locality within the study area, 1915Ca.

Prosymna frontalis (Peters 1867)
western shovel-snout

Museum records: TM 39913, Farm Hoas (273) (1914Dd).
Remarks: Broadley (1983) recorded a single locality within the study area, 2014Bb.

Prosymna visseri
Visser's shovel-snout

Museum records: SAM 46951, Farm Tevrede (643) (1914Ad).
Remarks: The museum record listed is the only record of this poorly-known species from Namibia (McLachlan 1987). The species is apparently restricted to granite outcrops. It was collected in association with two *Pachydactylus bicolor*.

Psammophis leightoni namibensis Broadley 1975
Namib sand snake

Material examined: CAS 175080 (intermediate), 49,0 km W Farm Franken (Farm Atlanta) (1914Cb).
Museum records: SMW 1681, Farm Hazeldene (237) (1914Bc).
Remarks: Broadley (1975a, 1983) recorded only the Farm Hazeldene locality listed above. The specimen examined measured SVL 594 mm + TL 293 mm.

Psammophis leightoni trinasalis (Werner 1902)
fork-marked sand snake

Material examined: CAS 175093, Farm Franken (1914Db).
Museum records: SMW 1735, Warmquelle (1913Bb);

FMNH 77617, between E border of Kaokoveld and S border Etosha Pan; SMW 1670-1676, Kamanjab (1914Db).

Remarks: Broadley (1975a, 1983) recorded a single locality within the study site, 1914Db. The specimen examined measured SVL 571 + TL 276.

Psammophis notostictus (Peters 1867)
Karoo sand snake

Museum records: SMW 5703, West of Goabis (1913Dc).

Remarks: Broadley (1983) recorded a single locality at the southern limit of the study area in grid 2014CA.

Psammophis sibilans leopardinus Bocage 1887
leopard sand snake

Material examined: CAS 175078, 101,7 km W Farm Franken (Farm Palm) (1913Dd); CAS 175079, 44.6 km W Farm Franken (Farm Atlanta) (1914Cb); CAS 175082, Farm Autsaub (1914Da).

Museum records: SMW 2412, Sesfontein (1913Ba); SMW 2400, Warmquelle (1913Bb). Regional extralimital: SMW 1700, Otjovasando (1914Ad).

Remarks: Broadley (1983) recorded four localities within the study site, including 1913Bb, 1914Bc, 1914Db, and 1914Dd. Mertens (1955) listed Kamanjab and Farm Paderborn as additional localities. All three specimens examined measured in excess of 800 mm SVL. The largest specimen, CAS 175078, measured SVL 866 + TL 123 (broken tail). CAS 175082 also possessed a broken tail. The remaining specimen, with intact tail, measured SVL 812 mm + TL 388 mm. Broadley (1987) remarked on the high incidence of tail breaks in this and other species of *Psammophis*.

Psammophis subtaeniatus subtaeniatus Peters 1882
stripe-bellied sand snake

Material examined: CAS 173396, Farm Franken (1914Db).

Museum records: SMW 2428, Farm Hazeldene (237) (1914Bc).

Remarks: Hoffmann (1989) recorded the species on the Otjovasando-Miernes road (1914Ba). Broadley (1983) mapped no localities nearer than 1813Bb.

Psammophis trigrammus Günther 1865
western sand snake

Material examined: CAS 175083, 1,7 km S Kamanjab (1914Db); CAS 175085, 9,1 km S Kamanjab (1914Db).

Museum records: TM 56906, 57606, Ganamub River, 4 km from Hoanib River (1913Ab); SMW 5644, Palmwag (1913Da); TM 63148, SE Kaokoland (1914Ac); TM 52788, Farm Humor (1914Cc).

Remarks: Broadley (1983) recorded two localities within the study area, including 1913Bb and 1914Cb, and Mertens (1955) listed Sesfontein (1913Ba) as an additional locality. The largest specimen examined, CAS 175085, measured SVL 675 mm + TL 443 mm.

Psammophylax rhombeatus rhombeatus (Linnaeus 1758)
spotted skaapsteker

Museum records: SAM 17520, Kamanjab (1914Db).

Remarks: Broadley (1977) listed SAM 17520 from Kamanjab, but later (Broadley 1983) recorded only one locality in the study area (1913Db), which may be in error for the Kamanjab record. Hoffmann (1989) documented two specimens north of Soutputs watering point at Kaross (1914Bc).

Psammophylax tritaeniatus (Günther 1868)
striped skaapsteker

Material examined: CAS 173381, Farm Hohenfelde (1915Cc).

Remarks: The nearest locality recorded by Broadley (1983) is 1915Dc. The Hohenfelde record therefore represents a minor range extension to the west.

Pseudaspis cana (Linnaeus 1758)
mole snake

Material examined: CAS 175077, 63,8 km W Farm Franken (Farm Grootberg) (1914Cd); CAS 175076, 30,5 km W Farm Franken (Farm Bruno) (1914Da).

Museum records: SMW 2266, Kamanjab (1914Db).

Remarks: The only records from the study area listed by Broadley (1983) are in quarter degree square 1914Bd. FitzSimons (1962) listed Kamanjab, Kowares and Kaross as specific localities. Hoffmann (1989) recorded the species from the Galton Gate in Etosha (1914Ab). The specimens examined both retained the juvenile pattern. CAS 175076 measured SVL 361 mm + TL 69 mm, whereas CAS 175077 measured SVL 455 mm + TL 120 mm.

Pythonodipsas carinata Günther 1868
western keeled snake

Museum records: SMW 2307, Warmquelle (1913Bb); TM 38218, Otjovasando (1914Ba); PEM 1579/42, 40 km E Torrabaai (2013Bc). Regional extralimital: TM 55700, Farm Twyfelfontein (534) (2014Cb).

Remarks: Four records in study area were mapped by Broadley (1983) including 1913Bb (Warmquelle), 1914Ab, 2013Cb and 2013Bc.

Telescopus semiannulatus Smith 1849
eastern tiger snake

Museum records: SMW 1817, Farm Huab (261) (1914Dd).

Remarks: Broadley (1983) recorded both races of this species from localities within the study area: *T. s. semiannulatus* from 1914Db (Kamanjab) and *T. s. polystictus* from 1914Ad.

Thelotornis capensis oatesii (Günther 1881)
twig snake

Museum records: SMW 2360, Kamanjab (1914Db).

Remarks: Hoffmann (1989) recorded the species 3 km S of Otjovasando (1914Ba). Additional records in the region were mentioned by Broadley (1983) (1914Bd) and Mertens (1955) (ɜzwischen Fransfontein und Farm Eduardsfelde).

Xenocalamus bicolor bicolor Günther 1868
bicoloured quill-snouted snake

Remarks: Mertens (1955) listed Warmbad bei Sesfontein (= Warmquelle) as a collection locality. Broadley (1983) recorded a single locality at 1913Bb, apparently based on the same record.

ELAPIDAE

Aspidelaps lubricus infuscatus Mertens 1954
coral snake

Material examined: CAS 173399, 5,6 km E jct D2650 on D2620 (Farm Grootberg) (1914Cb).
Museum records: SMW 2461, Farm Hazeldene (237) (1914Bc); SAM 47027, Kamanjab (1914Db). Regional extralimital: TM 64687, Springbokwasser, SCP (2013Bc).
Remarks: A second specimen, retained alive for breeding purposes was collected at 16,4 km E Kamanjab (1914Db). This species is frequently encountered in the early morning and early evening throughout the study area.

Dendroaspis polylepis (Günther 1864)
black mamba

Remarks: Mambas are relatively common on Farm Franken, and large (2-3 m) specimens were killed 800m south of Haus Franken in March 1988 and at the water point Koppies on Farm Franken (Figure 2) in March 1989 (K. Fleißner, pers. comm.). Hoffmann (1989) recorded the species 1 km S of Soutputs, Kaross, Etosha (1914Bc).

Elapsoidea sundevalli fitzsimonsi Loveridge 1944
Sundevall s Kalahari garter snake

Remarks: Broadley (1983) recorded this species from a single locality within the study area, in grid 1914Bd, just north of Kamanjab.

Naja haje anchietae Bocage 1879
Anchieta s cobra

Museum records: SAM 17565, Kamanjab (1914Db).
Remarks: Broadley (1983) recorded a specimen from 1915Ca in the eastern part of the study area and Hoffmann (1989) reported the presence of this species at Karossfontein (1914Bc) in southwestern Etosha.

Naja nigricollis nigricincta Bogert 1940
western barred spitting cobra

Material examined: CAS 175092, Farm Franken (1914Db).
Museum records: SAM 17241a,b, Sesfontein (1913Ba); SMW 1638, 1646, 1649-1650, Warmquelle (1913Bb); SAM 17277, 17567, Kamanjab (1914Db).
Remarks: The specimen examined measured SVL 678 mm + TL 160 mm. A larger specimen was killed by workers at Farm Franken in February 1989 (K. Fleißner, pers. comm.). Hoffmann (1989) recorded the species at Otjovasando (1914Ba).

VIPERIDAE

Bitis arietans (Merrem 1820)
puff adder

Material examined: CAS 173395, Farm Franken (1914Db), CAS 175098, 4,5 km E Kamanjab (1914Db).
Museum records: SAM 17276, Kamanjab (1914Db).
Remarks: This species is relatively common in the region, although Broadley (1983) listed no localities near the study area and no museum specimens were located from the Kamanjab-Damaraland area. A large specimen was seen in March 1990 at Kalkpos on Farm Franken (Figure 2), and another in April 1990 on the road to Haus Katemba (K. Fleißner, pers. comm.) (1914Da and Db). CAS 175098 (SVL 764 mm + TL 129 mm), a large male, was collected at 19h01 on a warm, windless night crossing the tar road 4,5 km E Kamanjab.

Bitis caudalis (Smith 1839)
horned adder

Material examined: CAS 175075, 10,4 km W Farm Franken (1914Da); CAS 175072, Farm Franken (1914Db); CAS 175073, 3,3 km E Kamanjab (1914Db); CAS 173380, 6,8 km E Kamanjab (1914Db); CAS 175074, 10,9 km E Kamanjab (1914Db); CAS 175084, 29,7 km S Kamanjab (1914Dd).
Museum records: SMW 2563, Sesfontein (1913Ba); SMW 6806, Farm Rasthof (613), Kamanjab (1914Bd); SMW 2568, Farm Kamanjab Nord (212) (1914Cb); SMW 5969, Farm Onguati (236) (1914Dc).
Remarks: Although this species is common throughout the study region, east of the Grootberg, there appear to be relatively few literature references for northwestern Namibia (Visser 1981; Broadley 1983). Hoffmann (1989) recorded the species at Dolomietpunt and 2 km east of Sprokieswoud (1914Ba), both in southwestern Etosha National Park. Broadley (1983) listed an additional specimen from 2014CA. The largest individual measured, CAS 175084, measured SVL 292 mm + TL 35 mm.

POSSIBLE SPECIES

The following species have distributions and habitat requirements that make their occurrence in the Kamanjab/Damaraland area possible or occur in quarter degree squares adjacent to those of the study area.

Chondrodactylus angulifer

The nearest records of this species are to the west [TM 64019-20, 64287, 65006, 65274-5, 65323-4, 65350, Hoanib River Valley 1924 S, 1302 E (1913Ac); TM 52920, 10 km N Hunkab River, SCP (1913Ca)], and to the southeast, in grid 2014Dd (Visser 1984f).

Kaokogecko vanzyli

Nearest museum records are: TM 63421, Ganias Plains (1913Ac); TM 64380-1, Hoanib River Valley (1913Ac); TM 54814, Hoanib-Obias River jct. (1913Ad).

If it occurs in the region this species would be expected in the gravel plains to the west of Sesfontein.

Pachydactylus gaiasensis

Although all of the known specimens of this species come from the south of the Kamanjab region (SMW 4450/1-7, 4456/1-3, 2992, 2994, vic. Gaias (2014Ca); TM 68762-6, 7 km E Gaias (2014Ca); TM 42182, Farm Twyfelfontein (534) (2014Cb), the possibility exists that it may be found in association with isolated sandstone formations occurring in the southern reaches of the study area.

Pachydactylus weberi

A single specimen (SAM 47075) has been taken from the Ugab River (2014Dd). It is possible that this species just enters the study area to the south and west of Fransfontein.

Angolosaurus skoogi

The nearest records provided by Visser (1984l) are in grids 1913Ca and 1913Cd. CAS 106012 is from the Uniab River at 2013Ab, also adjacent to the study area. This species is obviously restricted to dune fields and is highly unlikely to occur in the region, although small regions of potential habitat occur very close to the Skeleton Coast Park eastern border.

Meroles anchietae

Several specimens (CAS 106006, TM 68809-15) have been taken at the Uniab River (2013Ab), in the Skeleton Coast Park, adjacent to westernmost Damaraland. If present in the region it would occur only on shifting dunes, most likely along river courses. The monotypic genus *Aporosaura*, to which the species *anchietae* has been assigned, has recently been synonymized with *Meroles* (Arnold 1989).

Meroles suborbitalis

This species has been collected at Sima Hill (1913Aa), just to the north west of the study area (M. Griffin, pers. comm.) and may be expected to occur in extreme northwestern Damaraland.

Nucras taeniolata ornata

Visser (1984p) showed the nearest record as 1813Dc. Broadley (1972) illustrated localities in both 1813Dc and 1814CA. This species might be expected to occur in the Sesfontein area.

Zygaspis quadrifrons

Visser (1984r) illustrated a locality in grid 1814CA. CAS 85945 was collected in 2016Aa (2 mi NW Outjo). These localities bracket the eastern part of the study area. It is therefore probable that this species occurs in the Kamanjab area.

Dasypeltis scabra

Broadley (1983) recorded no localities within the study area or in adjacent quarter degree grid squares. The closest record is in grid 2114Bb, although no obvious barriers separate this region from appropriate habitat in the study area.

Lycophidion namibianum

The nearest record provided by Broadley (1991) is in grid 1913Ca, just to the west of the study area.

DISCUSSION

The Kamanjab area lies in a transitional zone between the typical southern African fauna and the more tropical herpetofauna of Angola. More importantly with respect to faunal composition, the region straddles the boundary between the Pro-Namib and the more mesic mopaneveld of the interior. Haacke (1984) noted the association between the distribution of certain western arid reptiles and rainfall. The latter shows an obvious east-west decline in the region, and is caused by the rain-shadow effect of the western escarpment. Both diurnal and nocturnal species may be affected. This factor probably

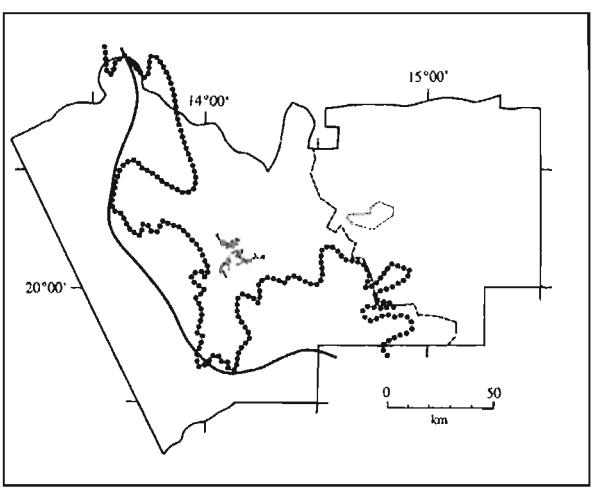

FIGURE 16: Features of biogeographic significance within the study area. The thick solid line is the 100 mm isohyet and the line of circles is the 1000 m contour. The latter provides a rough indication of the position of the western escarpment in the region, although this correlation is only approximate.

influences the distribution of species in the study area, where rainfall decreases from 400 mm p.a. in the east to below 100 mm p.a. in the west (Figure 16). Both the latitudinal transition and rainfall gradient in association with the variety of substrate types contribute to the large number of species found in the region.

A surprising number of amphibians occur in the region. Fourteen species are recorded here, but the taxonomy of a number of groups, most notably *Tomopterna* spp. and the dwarf *Bufo* remain problematic. In part, this results from a paucity of collecting activity in the region during the summer rains. Most species are cryptic (a large number are burrowing forms) and their appearance is opportunistic, following the irregular rains.

The most speciose elements in the reptile fauna are the lizard genera *Pachydactylus* (10 or possibly 11 species in the region plus two in adjacent areas) and *Mabuya* (9 species in the region), and the psammophine colubrid snakes (eight species or subspecies in the region). Both lizard genera include regional endemics as well as Namib and inland species. Of special interest are taxa, such as the Angolan *Mabuya laevis*, which reaches its southern range limit in the Kamanjab area; *Sepsina alberti*, a Kaokoveld species known from a small number of specimens; and *Pachydactylus fasciatus*, which has a broad range in the northern half of Namibia, but to date has only been found in large numbers in the area of Damaraland surveyed in this study.

Strikingly, endemism in Namibia is very low at the specific level. Nearly all species also occur in South Africa and or Angola. This appears to be related to the fact that habitats in Namibia generally run in north-south bands, beginning in South Africa and stretching northwards into central or southern Angola (or through Botswana and Zambia in the east). Although several species are endemic to the sand seas of the Namib Desert, neither the Orange River in the south, nor the Kunene River in the north, appear to form a significant barrier to dispersal. Only in mountainous regions where isolates may occur, does there appear to be intra-Namibian speciation, e.g. *Pedioplanis ruber* and *Cordylus pustulatus*. A comparison with summaries of the Angolan herpetofauna (Hellmich 1957; Laurent 1964) indicates that there is a substantial overlap of taxa with the Kamanjab-Damaraland region, especially when only southwestern Angolan localities are considered (e.g. *Agama planiceps*, *Python anchietae*). Mertens (1955) identified several faunal components in Namibia such as widespread African forms (e.g. *Bitis arietans*, *Python sebae*, *Pelomedusa subrufa*), southwestern regional forms (e.g. *Rhoptropus* spp.) and Pro-Namib endemics (*Pachydactylus punctatus scherzi*, *Pedioplanis gaerdesi*). Mertens (1955) also identified tropical elements, but those taxa constituting this element in the study region are probably best regarded as regional endemics (*Python anchietae*) or northward-expanding southern forms (*Pachydactylus bibronii*).

Hoffmann (1979) noted that the greatest reptile diversity in Etosha was concentrated in the southwestern corner of the park, that region adjoining the Kamanjab District. This is due to the greater variety of available substrate types, as rocky outcrops occur here. Indeed the topography and vegetation of that portion of Etosha is typical of that found throughout most of the region under study to the east of the Grootberg. The western escarpment is an important zoogeographic transition zone separating typical savanna forms in the east from the Namib forms in the west. Mayer & Berger-Dell Mour (1987) demonstrated that some taxa in the *Pedioplanis undata* complex are separated into Pro-Namib and inland forms, e.g. the boundary between *P. undata* and *P. gaerdesi* passes through the study area and coincides with the escarpment, which includes the Grootberg (Figure 11). A similar pattern may apply to the typical race of *Mabuya sulcata* and *M.* cf. *ansorgii* (Figure 14), although this situation requires clarification (see *M. sulcata* species account). Members of the *Pachydactylus punctatus* group likewise exhibit a coastal/inland pattern of differentiation, with local endemism in the Brandberg and perhaps in the Grootberg. In other groups less closely related pairs of taxa also appear to replace one another on either side of the escarpment, or very near it, according to rainfall and substrate type. *Chamaeleo namaquensis* and *C. dilepis* are one such pair. Most other species, however, are not affected by the escarpment. This is especially true of saxicolous forms and many generalists. Those species that are associated with the sandy and/or gravel substrates of the Namib and Pro-Namib (e.g. *Pachydactylus kochii*, *Palmatogecko rangei*) do not occur east of the escarpment, although they do enter the study area in the west (Figures 7, 10). In the case of *Palmatogecko rangei*, river beds may provide corridors of sandy substrate into the interior (Haacke 1976). The composition of the fauna is essentially similar to that noted for the Brandberg, which likewise straddles the transition between the arid Pro-Namib and Namib and the more mesic inland savannas (van den Elzen 1983).

The work presented here reports range extensions for a number of species and a revision of the gekkonid lizards of the *Pachydactylus punctatus* complex is in progress. Clearly, more work is needed to finalize the list of taxa occurring in the study region. It is likely that a few taxa not yet recorded from the region will be added to the list provided above. Large areas have yet to be adequately surveyed (including the region to the south and west of Sesfontein), and it is possible that new taxa will be discovered or recognized as distinct within northern Damaraland. As distributional records become available it may be particularly illuminating to examine the significance of the escarpment as a barrier in the area of the Grootberg and to evaluate more precisely the correlation of herpetofaunal distribution with the east-west dichotomy of habitats produced by the rain shadow.

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FIGURE 8: *Pachydactylus fasciatus* (juvenile) from Farm Grootberg showing bold pattern typical of young individuals.

FIGURE 9: *Pachydactylus scutatus* from Farm Franken. Note the enlarged imbricating scales typical of this species.

FIGURE 12: *Pedioplanis gaerdesi* from the Grootberg Pass, Damaraland. Compare with Figure 13.

FIGURE 13: *Pedioplanis undata* from Farm Franken. This is a sister species of *P. gaerdesi*.

FIGURE 15: *Mabuya binotata* (adult female) from Farm Franken