

Early botanical exploration in the
Kaokoveld
(northwestern Namibia)
1957

Otto A. Leistner





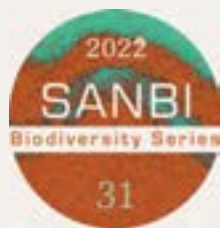


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Pretoria
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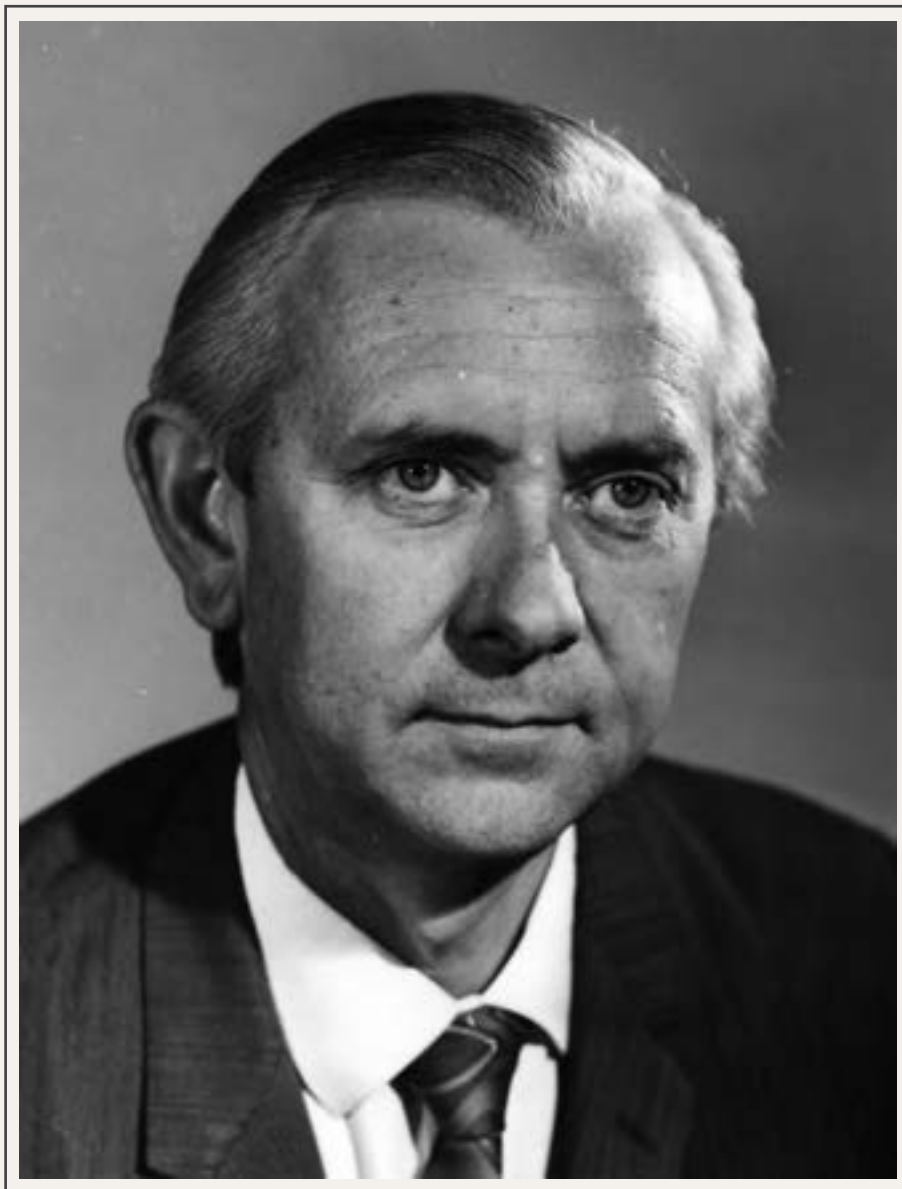
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Dedicated to
Bernard de Winter
(1924–2017)



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In the year 2000 we published Seed plants of southern Africa: families and genera (*Strelitzia* 10). Under Editor's Acknowledgements I wrote: 'Nicole Meyer, technical editor, co-ordinator and typesetter, was the king-(or rather queen-)pin of the entire operation; she performed her painstaking work with great dedication, expertise and patience; she also contributed several monocot families'. May I add that I have since then often thought the work should have been published as: O.A. Leistner and N.L. Meyer (Editors). Unfortunately it's a bit too late for that now, but I wish to repeat much of what I said above, and I thank the Good Lord for the wonderful opportunity to launch another publication, my last and final one, with Nicole.

Introduction

Dear reader, the author's penchant for old-fashioned words and phrases, for intricate, long-winded tapeworm sentences richly endowed with commas (which may be a schlepp for the writer, but which may be welcomed by the reader), also for brackets, round and square, opening and closing, roman and italic, for mixing fonts and for sentences beginning with 'And', is to be seen/understood/forgiven/endured as a reaction, by way of light comic relief, to many moons of kneading, trimming, tanning, cutting and pasting deadly serious, linguistically sterile scientific communications; to say nothing of a generous helping of German heritage.

Being in introspective mode, let me tell you where I found the ambiance for this leisurely stroll among memories of days long gone by: at the home of Daniel and Elke and my dear grandchildren, Mark and Nadia.

It had been our intention, over the years, to write up some of our pioneering experiences in the far northwest of Namibia (then South West Africa, or SWA for short) but we never got that far until a day in 2012. Many, many miles into our retirement, Peter Bridgeford who had been active in Nature Conservation in Namibia and contributed to the *Tree Atlas of Namibia* by Curtis & Mannheimer (2005; cited hereafter as just 'Tree Atlas'), inspired us to put finger to keyboard.

Motivation

The year is 1957. The *Flora of southern Africa*, an authoritative work on the flora of South Africa, Namibia, Swaziland (now Eswatini), Lesotho, and later also Botswana, had been established by Dr R.A. Dyer, Dr L.E. Codd and Dr I.C. Verdoorn of the Botanical Research Institute in Pretoria (and Prof. H.B. Rycroft of the National Botanical Gardens, Kirstenbosch, pro forma). Before the first volume of the work could be completed it was considered essential that the very poorly known flora of the far northern regions of Namibia, namely the Kaokoveld and the Caprivi, should be explored.

In August of 1956 Dr Robert Story, Officer in Charge of the Botanical Survey Section of the Botanical Research Institute, undertook an expedition to the Kaokoveld. He returned with about 250 numbers, including 13 species undescribed at the time, having collected essentially only along one long, well-chosen route similar to that taken on our third trip (see p. 84).

This calls for further investigation, and Bernard de Winter and myself were chosen to undertake a more extended botanical exploration of this remote neck of the wilderness.

Kaokoveld defined – geographically and biologically

The Kaokoveld of our story of exploration and adventure in 1957 lies in the northwesternmost corner of South West Africa (*now called Namibia*) (Figure 1).

The Kaokoveld was proclaimed in 1947 as the Kaokoveld Native Reserve (on Figure 1 it is indicated as the Kaoko Region). Three of its borders are more or less neatly defined by nature: the Atlantic Ocean with its Skeleton Coast in the west, the Kunene River which separates the region from Angola in the north, and the Hoanib River in the south which is the northern border of Damaraland (Damara Region on Figure 1). The eastern border is the Red Line drawn by human hand on a map, which separates the Kaokoveld Reserve from the Ovamboland Reserve in the north and from the western extension of the Etosha Game Reserve in the south. It runs from the point where the 14th degree longitude crosses the Kunene River, in a south-southeasterly direction across the more or less sand-covered Kaoko calcrete plateau to a point about 10 miles (16.1 km) northwest of Kamanjab, and from there in a west-northwesterly direction to just south of Sesfontein and then following the course of the Hoanib River to its mouth. The region is shown on the map of Van Warmelo (1951) (Figure 2) and is likened by Green (1952: 25) to 'a rough parallelogram leaning towards the sea; an area of 23 000 square miles (59 570 km²) with one white family and about 9 000 natives'. The Shell map of Kaokoland (1996) gives the area as about 49 000 km², which is the generally accepted figure.

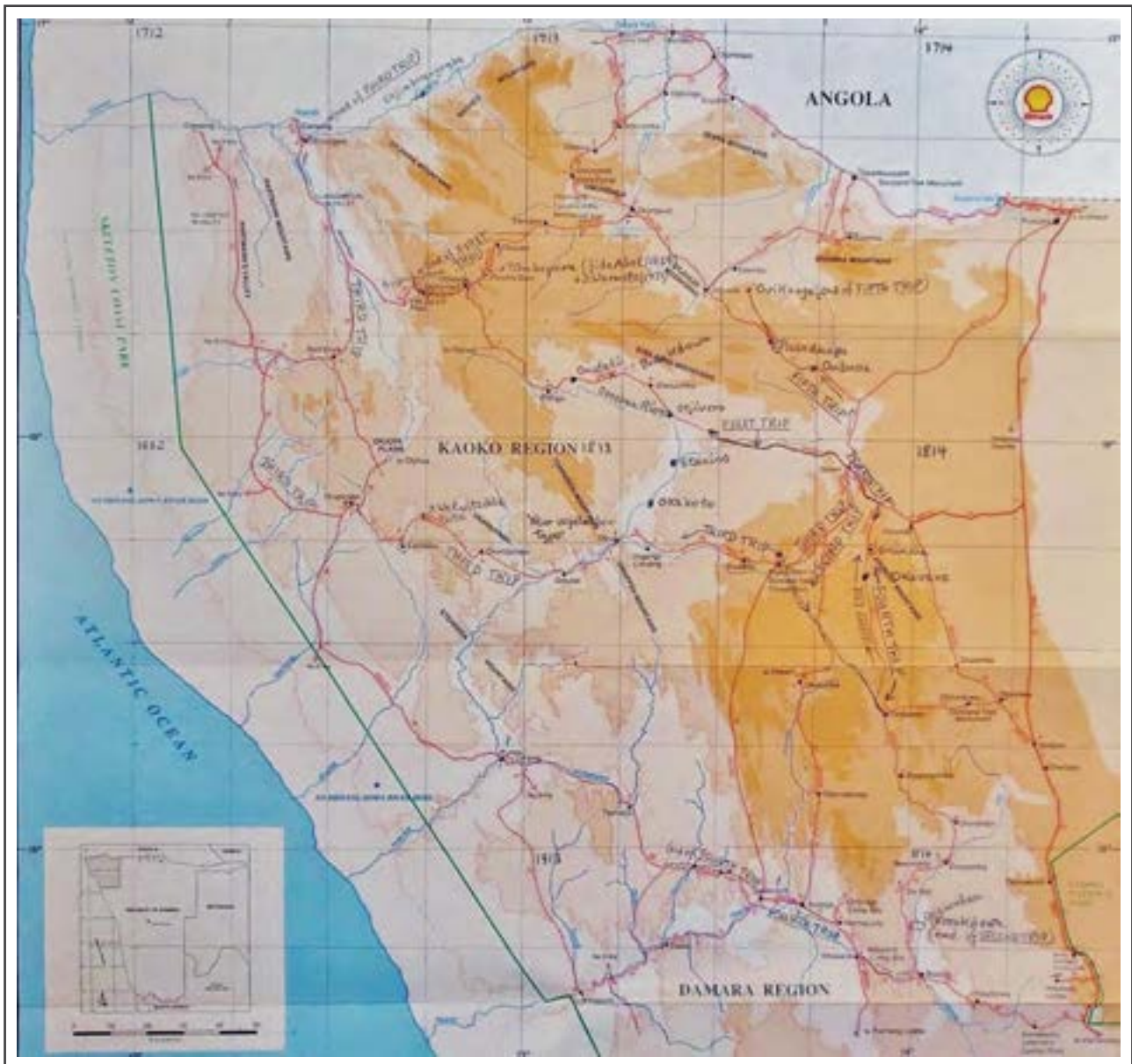


Figure 1. *Kaokoland Kunene Region Tourist Map* (Shell, Namibia 1996). The insert, showing the outlines of Namibia, indicates the Kaokoveld in the northwestern corner. Maps from Mendelsohn et al. (2002) of the relevant portions, at a more legible magnification, are given with each of the five trips undertaken. Opuwo = Ohopoho is situated at 18°03.66 S 13°49.85 E from where the five trips begin.

Viljoen (1988) refers to ‘our’ Kaokoveld as Kaokoland. He calls the Kaokoveld the entire region between the Kunene and the Ugab River, which are the Kaokoveld and Damaraland together. (*This is the first indication that place names in the region are distinctly less well established than ‘amen’ in church, as the German saying goes.*)

Thanks to the invasion of South Africa by the British many years ago, South Africa and South West Africa, which was administered by South Africa, used the Imperial System for measuring things. Kilometres

were therefore not in official use, and, as our vehicles, which gave us our distances, indicated miles, we shall remain with them (with translations in kilometres) throughout this story. Feet (‘) and inches (‘’) and other such abhorrences are also still in use outside the sciences. And sometimes even in our field notebooks, as you will notice later.

The above definition or delineation of the Kaokoveld may satisfy the geographers who have a ruler in their toolbox, but not the biologists who love to encounter nature untouched by human hand. They marvel at the

Kaokoveld as the core of one of Africa’s most species- and endemic-rich areas, which they refer to as centres of endemism. It appears that the first person to record this revelation was Captain G.C. Shorrtridge, a mammologist at the Kaffraria Museum in King William’s Town, who explored the mammal fauna of Namibia in the twenties and early thirties of the last century with an ox-wagon pulled by a *span* of donkeys. His pioneering work culminated in the publication of his classical *The mammals of South West Africa* (Shortridge 1934). Botanists confirmed his observations, and Volk (1964, 1966) included southwestern Angola in the centre. More recent publications on the so-called Kaokoveld Centre of Endemism include

Beentje (1994), Hilton-Taylor (1994), Van Wyk & Smith (2001) and Craven (2009).

The geographical extent of such a centre is obviously determined by the distribution areas of its constituent endemic species. It will therefore vary according to the species included and to the knowledge of their taxonomic identity and distribution. In other words, such a centre can not be exactly delineated, not even by a blinkered statistician. There is general agreement that the Kaokoveld Centre of Endemism extends from the arid Namibe and Cunene provinces in southwestern Angola, southwards through the area outlined as ‘our’ Kaokoveld but reaching further east into the western

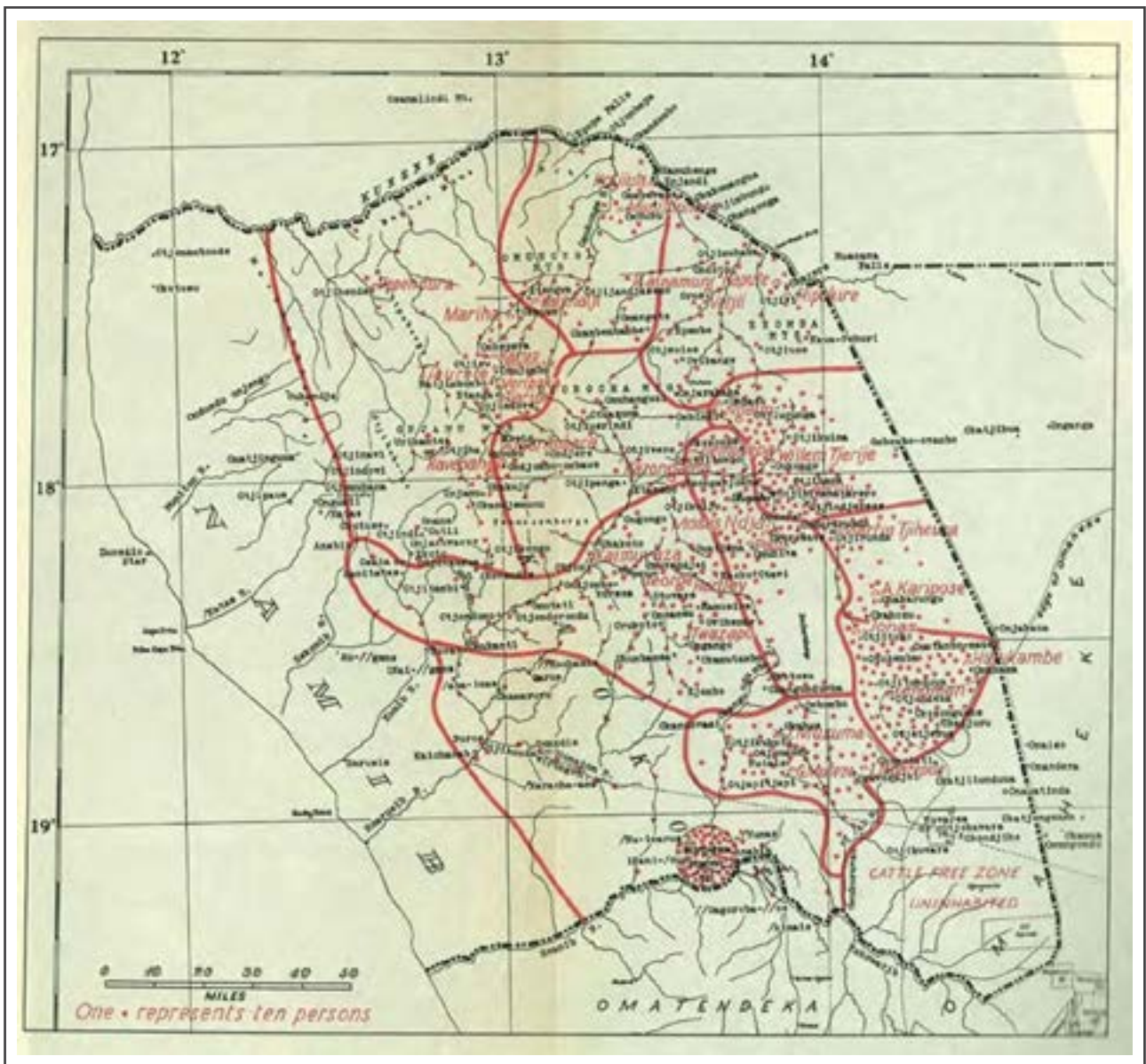


Figure 2. Ethnographic map of the Kaokoveld from Van Warmelo (1951), with an indication of names of headmen (in red letters) and their areas of influence; one red dot represents 10 persons.

Etosha National Park. Van Wyk & Smith (2001) take the centre of endemism down to the Koichab (also Koigab) River in Damaraland in the south with an outlier in the Brandberg Massif.

Craven (2009) increases the area of the centre to accommodate its western desert component. She distinguishes three floristic elements in the centre of which two are relevant in the present context: a Welwitschia-Desert Group and a Kaoko Group. The following is an almost verbatim quote from Craven (2009: 93):

The Kaoko Group is based on the distribution of *Sesamothamnus guerichii*. It extends from Benguela in Angola in the north to about 20°S and 15°E. The western limit of the group is the escarpment, the eastern border coincides with the 1 500 m contour and the Karstveld. The group does not extend as far south as the Welwitschia-Desert Group but some species such as *Cissus nymphaeifolia*, *Pachypodium lealii* and *Stigmatorhynchus hereroensis* extend to the 19°E longitude following the 1 500 m contour. The altitude ranges between 1 200 and 1 500 m except just south of the Kunene where the Baynes and Otjihipa Mountains reach 1 800 m. Rain falls in summer with about 200 mm in the west and up to 350 mm in the east. There is no frost in winter.

More than 150 species have distributions congruent with that of *Sesamothamnus guerichii*.

The most speciose family is Acanthaceae followed by Leguminosae (Fabaceae), Euphorbiaceae and Asteraceae. [See the discussion on p. 36, 27 March]. At least six species of Lamiaceae occur. Only one endemic genus (*Baynesia* – Apocynaceae) has been recorded, but 40 species are endemic to Namibia and a further ± 60 species are also found in southern Angola.

Our expeditions took us only to the outer Namib Desert but I quote further from Craven (2009: 91), as far as it is relevant to our venture:

The Welwitschia-Desert Group is based on the distributions of *Welwitschia mirabilis*, *Adenia pechuelii* and *Zygophyllum orbiculatum/stapffii*. Its area extends from the Atlantic to the northern escarpment. Fog penetrates to about 60 km inland, but deeper in water courses. The most speciose families are: Acanthaceae, Leguminosae (Fabaceae) and Poaceae. The group encompasses

over 200 species with corresponding distribution. More than 100 of these are endemic to Namibia, and an additional 55 species only co-occur in Angola. One family is endemic: Welwitschiaceae. Six genera are endemic: *Arthraerua*, *Dewinteria*, *Kaokochloa*, *Lavrania*, *Phlyctidocarpa* and *Strepitolophus* (Angola only). *Eremiolirion* may also be included. The most species-rich genera are: *Petalidium* (Acanthaceae), *Commiphora* (Burseraceae), *Stipagrostis* (Poaceae), and *Salsola* (Chenopodiaceae). *Merremia* (Convolvulaceae) comprises three endemic species. Euphorbiaceae and Asteraceae are both represented with at least 10 endemic species. Amaranthaceae comprises four endemic species, two of these are perennial members of *Marcellioopsis* (the third species of this genus belongs in the Kaoko Group). The species composition of the inner drier section tends to differ from that in the fog zone. The eastward extension of some species such as *Welwitschia* is undoubtedly due to sea mist penetrating further inland up westward-flowing river catchments and where the escarpment poses no physical barrier. Life strategies for coping with the environment are varied. Many species are short-lived, concentrating growth and reproduction in periods of good rain, even if this occurs only a few times during a decade. Dwarf shrubs or shrubs display various attributes such as rod-like stems (*Euphorbia damarana*) or remaining leafless under adverse conditions with young stems covered in blue-green bloom. Many genera are dioecious (*Commiphora*, *Welwitschia*).

The Welwitschia-Desert Group has been shown to be linked to the Arid Corridor thought to have existed between the arid regions in southwest and northeast Africa.

As long ago as 1921, Engler (see p. 18: *Petalidium englerianum*) pointed out that some genera and species of plants and animals occur in both southwest and northeast Africa but are absent in the intermediate region (Thulin 1994, cited by Craven 2009). Examples among animals are bat-eared foxes, oryx, and the dik-dik. Such disjunct distributions are usually explained by the existence of an 'arid corridor' which linked these separate regions during one or more arid periods during the Pleistocene (the last two million years) or even as far back as the late Tertiary (two to 65 million years ago). Numerous genera, as well as species of plants, display this 'arid corridor' syndrome and have been referred to as disjunct Afro-arid elements. Several authors, including Bernard de Winter,

have devoted papers to them. We have encountered several species in question, such as: *Dactyliandra welwitschii* (Cucurbitaceae), *Indigofera trigonelloides* (Fabaceae), *Kalanchoe laciniata* (Crassulaceae) and *Geigeria alata* (Asteraceae). Genera represented here and again in northeast Africa by species closely related to ours, include *Moringa* (Moringaceae), *Thamnosma* (Rutaceae), *Sesamothamnus* and *Pterodiscus* (Pedaliaceae) and *Wellstedtia* (Boraginaceae).

Geomorphology

Let us approach the 'geographical' Kaokoveld, tourist brochure-style, from the west in a satellite such as the one which has provided the magnificent image on the inside of the front cover of the *Tree Atlas of Namibia* (Figure 3).

Leaving behind the Atlantic Ocean with its cold Benguela Current we cross the Skeleton Coast and the sand dunes and wide gravel plains of the Namib Desert. If you approach the country in the northern sector south of the Kunene Mouth you will find sand dunes from the coast to the Hartmann Mountains some 60 km inland (Figure 4):

These mountains represent a major occurrence of old (Pre-Sinclair) granites.

When approaching the country further south from the sea, wide sand and gravel plains extend to the foot of the Etendeka Mountains, a range of table mountains, on average roughly 50 km from the coast, dating back to the Stormberg Series of the Karoo period (Figure 5):

The end of the Karoo period was marked by a vast outpouring of lava, estimated at 3 million cubic kilometres (McCarthy & Rubidge 2005: 246), covering much of the subcontinent. Outliers of this lava sheet in Namibia are referred to as Etendeka basalt, named after the local mountain range. The mountains of this age differ clearly in their relatively gentle, smooth slopes from the steep rocky slopes of the older mountains. Much of the eastern part of the region is composed of limestone and dolomite of the Otavi Group forming the Kaoko calcrete plateau. Most of the rest of the country, including the Tonnesen (Tonnes) and Giraffen Mountains, about 100 km inland, which constitute the middle part of the main escarpment, are composed of ancient metamorphic rocks such as gneiss and schists. The northern part of the main escarpment is represented by the Otjihipa Mountains which tower over the Marienfluss and are

constituted mainly of quartzite of the Nosib Group. The mountains of the western edge of the Kaoko calcrete plateau in the Warmbad (now mostly called Warmquelle) Region represent the southern part of the main escarpment.

There is strong geological evidence that the continents, Africa and South America in this context, were once joined. Old mountain belts and rocks of similar age in these adjacent continents link up when they are reassembled like a jigsaw puzzle. The reassembly of continents also explains distribution of fossil reptiles and plants (McCarthy & Rubidge 2005: 23) (see p. 96: *Welwitschia mirabilis*).

Climate

As one proceeds westwards the average annual rainfall decreases and this is demonstrated in the diminishing size and density of trees and shrubs. The average annual rainfall at Ohopoho is 343 mm, and at Sesfontein, on the edge of the Namib it is 101 mm (Malan & Owen-Smith 1974). Further west in the inner Namib or pro-Namib it decreases to about 30 mm, and beyond, in the true desert extending to the coast, life depends largely on moisture derived from mist from the Atlantic, or water hidden underground in riverbeds or drainage lines. At Kamanjab the average annual rainfall is 328 mm (Von Koenen 2001). For Ohopoho Van Warmelo (1951) records a maximum of 457.5 mm for the period 1943–44 and a minimum of 154.5 mm for the period 1945–46. A few further readings were deduced from maps in Mendelsohn et al. (2002): at Otjiwero the annual average is estimated to be around 250 mm, at Etanga \pm 200 mm and at Ombepera, the end station of our first trip, close to the escarpment, probably little more than 150 mm. At Ohopoho, situated at an altitude of 1 154 m, in December the mean maximum temperature is 34.1°C and the mean minimum 14.9°C; in June the mean maximum is 26.6°C and the mean minimum 6.1°C (Malan & Owen-Smith 1974). It should be noted that the current average rainfall in the region appears to be significantly lower than during the period covered by this report.

Viljoen (1980) provides the following overview of the climate: On the basis of the combined ecological and climatological data, three seasons can be distinguished in the Kaokoveld: the wet season from January to the middle of May; the cold dry season from the middle of May to the middle of August; and the hot dry season from the middle of August to December. A portion of May is included in the wet season because



Figure 3. Satellite image, in part, from *Tree Atlas of Namibia* (Curtis & Mannheimer 2005):

1. **Kunene River:** proceeding \pm 70 km eastwards from the coast, the long, green, \pm N–S-extending area is the Marienfluss (two gaps in the mountains forming the eastern edge of the Marienfluss are visible: one, about $\frac{1}{4}$ way down from the Kunene marks the entrance of the Kapupa River, the second one, about $\frac{3}{4}$ way down, the entrance of the Van Zyl's Pass); W of the Marienfluss are the Hartmann Mountains; to the E the:
2. **Otjihipa and Baynes Mountains;**
3. **Hoarusib River:** following its course NE to the confluence with the Gomadommi River which enters from the E, then NW and later E through the Etendeka Mountains to the gap in the SSE-trending main escarpment (Toennesen Mountains to the N and Giraffen Mountains to the S), the site of Otjiu, and then onto Opuwo (= Ohopoho);
4. **Hoanib River:** following its course inland through the mountains to its northernmost point one has reached the Sesfontein Basin; further E it cuts through the Anabib Poort into the Warmbad (Warmquelle) Basin; further SE it forms the long narrow Khowarib Schlucht (gorge) which leads into the Beesvlakte.

(Distance along a latitude from the coast to Opuwo [= Ohopoho]: 212 km)



Figure 4. Hartmann Mountains seen from the Marienfluss; the tree: *Colophospermum mopane*.

the effect of April rains is still evident in green vegetation and rainwater pools. Although rain normally starts to fall in October in the eastern regions the precipitation is still much lower than the evaporation with the result that the rains until December have little or no effect on the general ecology. The period from the middle of August to December is therefore included in the hot dry season. The wet season is delayed from east to west and the western region therefore receives its rain about two months later than the east.

Inhabitants

There are four culture groups in the Kaokoveld: the Herero-speaking Tjimba, Himba and Herero; the Hot-tentots; the Bergdama [= Damara], and the Bushmen. The last three are centred only in the south, in the Sefontein Region. The rest of the country may be regarded as entirely belonging to the Herero-speaking group, most of whom are cattle people (Van Warmelo 1951) (see Figure 55, p. 91).

'It is said that when the Herero moved southwards into the Kaokoveld from their ancestral homelands in Angola in about 1550 the Kunene River was on their

right, or to the northwest, so they called the river *oku-nene*, meaning the right arm. The land to their left they called *okaoko*, from which Kaokoland [= Kaokoveld] takes its name' (Hall-Martin et al. 1988).

'For centuries the Herero lived in the Kaokoveld with their cattle in small dispersed nomadic groups. Between 1850 and 1870 marauding groups of Hot-tentots, known as Topnaar and Swartboois, from the south, armed with guns, raided their cattle which provided their livelihood and were central to their culture and tradition. Those that did not flee to Angola were therefore forced to go back to an existence of hunter-gatherers and became known as Tjimba Herero. After the outbreak of the first World War and the surrender of the German forces in South West Africa in 1915, a group of Herero-speaking people known as Himba, under the leadership of Chief Oorlog, trekked with their cattle from Angola and settled in the northern and eastern Kaokoveld' (Hall-Martin et al. 1988).

'The Himba and Tjimba have never been subject to missionary or educative influence. They have never had to go out to work. Their menfolk rarely left the country. They have therefore had very little reason to modify their traditional institutions, and these are very



Figure 5. Etendeka (Karoo) Mountains near Orupembe; the vegetation dominated by *Stipagrostis* species, with their white feathery awns, and *Commiphora* shrubs, especially *C. krauseliana* with yellowish finely feathery leaves. Bernard in the middle.

much the same as those described for the Herero of pre-European days' (Van Warmelo 1951).

The Himba display some Hamitic features. Eloff (2010) calls them beautiful people, tall and slender with a proud and dignified bearing. The women he describes as dignified, serene and handsome. This had also struck the two young botanists featured in this story and, of late, the tourists to this region.

Looking further back into the prehistory, there is ample evidence of ancient Stone Age cultures in many parts of the Kaokoveld. Until recently groups of San, calling themselves Kubun (with click: //ubun), lived along the Skeleton Coast. They ate what veldkos they could get, especially fish found along the shore. They had no bows and arrows (Van Warmelo 1951). And in the most remote, inhospitable part of the Kaokoveld, the Baynes Mountains, there still lives a tribe of hunter-gatherers using stone implements. The existence of this tribe was scientifically confirmed and recorded as late as 1964.

The same mountains have begun to yield their botanical secrets only in recent years thanks to the efforts of Ernst van Jaarsveld and Braam van Wyk (2006), who

have even found a species of *Pelargonium*, one of the largest genera in southern Africa but absent from our list. The family to which this genus belongs, Geraniaceae, is represented on our list only by two species of *Monsonia* (see Figure 7) out of a total of about 600 species collected. In southern Africa overall, with a total of about 220 families of flowering plants, Geraniaceae is in the 17th position according to the number of species per family (Koekemoer et al. 2013).

History of exploration

The modern history of southern Africa begins with the voyages of the Portuguese navigators down the west coast of Africa. Diogo Cão set out in the autumn of 1484 and sailed along the coast of the Kaokoveld and in early 1486 planted a *padrão*, a stone pillar, surmounted by a cross, at Cape Cross. This cape (at 21°46'S 13°57'E) north of Henties Bay in the present day National West Coast Recreational Area, lies well south of the geographical Kaokoveld. If these early pioneers landed on the Kaokoveld coast they would have found a hostile waterless desert without

safe anchorage for their ships. They might however have encountered the San people who lived along the coast.

The earliest information on the Kaokoveld was made available by missionaries of the Rhenish Mission Society, such as F. Bernsmann and J. Böhm, who were active in the Sesfontein area since 1842 (Abel 1954). But their knowledge of the region seems to have been largely restricted to the southern parts: they reported that *Adansonia digitata* did not occur in the Kaokoveld, a statement that Schinz (see below) accepted. We encountered conspicuous specimens only about 38 miles (61.1 km) north of Sesfontein.

Well-known early plant collectors in Namibia such as Galton (during 1851) and Wahlberg (during 1854) did not come near the Kaokoveld (Gunn & Codd 1981). Hans Schinz, the Swiss botanist well known, at least by name, to all botanists involved with the southern African flora, collected in Namibia between 1884 and 1886. His journeys took him as far as the Kunene River and briefly into Angola but not westwards into the Kaokoveld. On his travels he met and befriended Martti Rautanen, a missionary of the Finnish Mission Society who was stationed at Olukonda in Ovamboland. Rautanen contributed significantly to our knowledge of the flora of Ovamboland by his numerous collections, some of which he sent to Georg Hartmann (Gunn & Codd 1981), who left considerable footprints in the country, so to speak (see below). Georg Gürich, a German geologist visited South West Africa in 1888 and explored as far north as Otjitambi (Gunn & Codd 1981), some 50 km southeast of Kamanjab and therefore not yet in the 'geographical' Kaokoveld, but most definitely in the 'biological' one. We collected five species honouring his name, including *Sesamothamnus guerichii*, which Craven (2009) chose as character species of the eastern Kaoko Centre of Endemism. Gürich sent his plant specimens to Berlin, as evidenced by the authors who named his collections like Engler and Pax, among others. Another German geologist, Georg Hartmann was the first scientist to explore the Kaokoveld. He undertook several expeditions between 1894 and 1901 on behalf of the '*Kaoko-Land und Minen-Gesellschaft*' (Abel 1954). With his oxcart he progressed as far as the mouth of the Kunene River in the extreme NW corner of the Kaokoveld. The Hartmann Mountains and the Hartmann zebra were named after him. Garth Owen-Smith (2010) writes that, looking at the Marienfluss, it is easy to see why Hartmann was so enchanted by this magnificent valley adjoining the mountains, now bearing his name, that he named it after the mother of Jesus. Hartmann collected plants for the Berlin Herbarium, and some of his collections are deposited in

the Natural History Museum in London (JSTOR [Internet]). He also received plants from Rautanen, mentioned above, and another missionary, August Wulfhorst (Gunn & Codd 1981). I have not established whether Hartmann contributed any plants new to science at the time in the Kaokoveld.

It appears that in the following 50 years no significant botanical exploration took place in the Kaokoveld. This can be explained partly by the remoteness of the region, but mainly by the fact that it was proclaimed as a reserve and could only be accessed by permission of the authorities (which was very difficult to obtain). Consequently the Kaokoveld is known as southern Africa's last wilderness. (*Since 1978 the Kaokoveld can be visited without a permit.*)

Kurt Dinter, the doyen of South West African/Namibian botanists, came to SWA in 1897. At first he worked as an independent plant collector but in 1900 he was appointed '*Botaniker des Kaiserlichen Gouvernements von Deutsch-Südwest-Afrika*'. He travelled by oxcart and by train and collected widely in the country and wrote several publications on its flora. The northernmost area he visited during his journeys was Fran(z)sfontein just north of Khorixab in Damaraland (Gunn & Codd 1981) which lies to the south of the 'geographical' Kaokoveld.

(Read more about Dinter later.)

In 1947 and again in 1948 the Government Ethnologist, N.J. van Warmelo, was permitted by the Administration of South West Africa to visit the Kaokoveld. He made only a few notes on the vegetation, some of which I shall quote, but his thorough work was a great source of information on the area in general.

In 1951 the enterprising Bernard Carp from the Netherlands set out on an expedition into the Kaokoveld. He probably managed to obtain a permit from the authorities because he included a member of the police force in his troupe. Carp was accompanied by about 30 men, 15 of them White, including: Dennis Woods, a surveyor and mountaineer who had visited the Kaokoveld five times before; Charles Koch, world authority on tenebrionid beetles and later one of the founders of the Gobabeb Desert Research Station; Eberhardt von Koenen an artist and naturalist with a jeep; Heinz Roth a photographer; Henry Voget, a diamond prospector; Byleveldt, a policeman; Bengt Lundholm, a Swedish mammologist; Rudebeck, an ornithologist; Walter Hoesch, an authority on SWA birds; the writer Lawrence Green (1952), from whom I have gleaned anecdotes and facts about the Kaokoveld; and Harry Hall, the succulent boffin of the National Botanic Garden at

Kirstenbosch. Green (1952) mentions that Hall collected the northernmost record of *Lithops* (probably *L. ruschiorum*), a new species of *Euphorbia* and a new *Ceraria*, the latter near the waterhole at Orupembe, obviously *Ceraria longipedunculata*, not yet described at the time of our visit.

At the beginning of 1953 Heinrich Walter (1980), the well-known German ecologist visited the spring at Kaross in the southeastern Kaokoveld to advise on the suitability of the area for farming purposes. His role in the promotion of Botany and especially pasture management in SWA is briefly mentioned under *Eragrostis walteri* (see p. 123, Sesfontein).

Herbert Abel (1954), a German geographer, one of my major sources of information, as well as inspiration, visited the Kaokoveld during June and July 1952. He mentions the vegetation in connection with overgrazing and soil erosion. Abel was accompanied by the zoological collector Walter Hoesch and two farmers: Eberhardt von Koenen, known for his knowledge of the South West African veld, who drove a Jeep, as he had done during the Carp expedition in the previous year, and J. Cranz jr. who drove a Unimog with a trailer, both men, so we read, mastering their vehicles with great elan and expertise. Von Koenen had been interned during the war (together with my father and my oldest brother Erich to whom I sent my letters from the Kaokoveld) at Andalusia, today Jan Kempdorp, north of Warrenton, a fair distance north of Kimberley, where he attended lectures in Botany by, among others, Prof. Otto Volk, mentioned before in connection with the Kaokoveld centre of endemism. In 1996 Von Koenen published *Heil-, Gift- und essbare Pflanzen in Namibia* which was translated by myself and others to produce *Medicinal, poisonous and edible plants in Namibia* (Von Koenen 2001).

As mentioned before, Robert Story undertook a successful botanical exploration in 1956 (see p. 1).

The Angolan part of the Kaoko Centre of Endemism was visited before 1957 by many more plant collectors than the Namibian part. An obvious reason was that the Moçâmedes region (now known as Namibe), which encompasses the heart of the Centre in Angola, was more accessible. The region was claimed by L.C.C.P. Furtado on behalf of Portugal in 1785 and a fort was built and a factory established at the town Moçâmedes (also known as Namibe) in 1840 (Wikipedia 2020). It gradually developed into a major fishing port and its hinterland was colonised mainly by Portuguese from Madeira and Brazil, and by Germans. The three most prolific botanical collectors in Angola were: Friedrich Welwitsch (between 1853 and 1861; more

about him later), John Gossweiler (between 1900 and 1950; two of the taxa we collected honour his name) and Hugo Baum (1899–1900; explored mostly east of the centre), all collected in the Kaoko Centre of Endemism. Other collectors who visited the centre before 1957 include J.A. de O. Anchieta (between 1866 and 1897; remembered in *Python anchietae*, the Anchieta's dwarf python which we met briefly, p. 68), G. Boss (between 1932 and 1937; a German Botany teacher at the High School, Swakopmund), H.C. de B. Capello, L.W. Carisso, A.B. Curror, A.W. Exell, K. Hoepfner, E.J.S.M. Mendes, F. de A. Mendonça, H.H.W. Pearson, H. Schinz and J.M.L. de B. Teixeira (Figueiredo & Smith 2008). Even so, the flora of the Angolan part of the Kaoko Centre was probably even less well known in 1957 than its Namibian counterpart.

This is where our botanical exploration of the Kaokoveld begins.

Dramatis personae

Let me now introduce the main actors in this story.

The leader of the expedition:

Bernard de Winter

Bernard (see Figure 11, p. 25) had joined the Division of Botany (later the Botanical Research Institute) in 1947. I came to know him as a grass specialist who had just greatly extended and sharpened his knowledge of that group during a stint at the Herbarium of the Royal Botanic Gardens, Kew. Here he had worked under the mentorship of Charles Hubbard, a world-renowned graminologist, known to his younger colleagues as 'Mother Hubbard' due to his gentle manner. Bernard began collecting mainly in the Pretoria region, later around Dongola in what was then the Northern Transvaal (now Limpopo) and the Kruger National Park where he focussed mainly on grasses and sedges. He had previous experience of botanising in SWA. On his first visit to that country, during February to May 1955 he botanised, among others, in Damaraland and the Kamanjab Region. Later that year, from November to March 1956, he collected in the Okavango and in Ovamboland, at first in the company of Hans-Joachim Wiss, a farmer and naturalist who farmed near Windhoek, and later with Wessel Marais also of the Institute. These previous experiences proved to be most valuable. Bernard

knew many of the plants we encountered by name and he knew from his visit to the Okavango that dry grass seeds tend to collect in the radiators of cars and are very difficult to remove from there. If not attended to, they will very quickly cause the engine to overheat. Therefore he saw to it that our International *bakkie* (light pick-up truck) had mosquito gauze installed in front of the radiator. The tracks on which we crossed the flat basins so common in Kaokoveld were often totally overgrown by bonnet-high grasses. So we cleared the gauze in front of the radiator regularly and cleaned the radiator with a pressure pump in Ohopoho. Bernard also knew, fortunately only from hearsay that grass seed stuck underneath a vehicle can easily catch fire on the exhaust system. We therefore inspected also the underside of our vehicles regularly.

On one of his previous collecting trips in SWA he had permission to visit the Sperrgebiet in southwestern SWA under control of the De Beers Mining Company. Here he had the honour to drive with a Security Officer of the mine in his Dodge Powerwagon. This miracle automobile with high ground clearance, complete with its high-lift jack, spooked in our daydreams whenever our calamity vehicles gave in.

When Bernard returned from a collecting trip to the Eastern Transvaal (now Mpumalanga) in February 1957, it was time to prepare for our venture.

Second in command:

Otto Albrecht Leistner

Otto Albrecht Leistner (see Figure 83, p. 128) (called Otto because my second name, the name my family calls me, is too difficult to pronounce correctly in the German way) joined the Institute in 1955. My first serious task was to survey the vegetation of the S.A. Lombard Nature reserve near Bloemhof. For a Capie, like I was, this required a fair amount of adjustment. Here they bred and trained dogs for the jackal hunt, but more significant for me was their crop of springbok and impala lambs. Have you ever looked at close range into the eyes of these delightful creatures? So I confirmed my love of nature, in its various facets. And it was here that I became aware of a certain flair for editing when Jan van Zyl, the zoologist in charge of the reserve, showed me an early version of one of his publications.

At the University of Stellenbosch my main focus had been on succulents. I frequented the botanical garden of the university where 'Hans' (his initials: A.G.J.) Herre was Hortulanus (Garden Curator). In this garden I had the first glimpse of live *Welwitschia* plants growing in earthenware sewage pipes. I remember the argument Mr Herre had with his assistant, Hellmut Meyer (the son of the German missionary G. Meyer in Namaqualand, also not unknown in the annals of South African botany), about the watering of their innumerable succulent children. Mr Herre was in favour of frequent light applications, Mr Meyer of infrequent heavy doses. Mr Herre also suggested that I study *Skiatophytum*, a monotypic mesemb genus, for my M.Sc., written in choice Afrikaans and typed with three copies with the aid of carbon papers and great care (because erasing was a major pain) on a manual typewriter (see your nearest museum of technology). In spite of my illustrations of its substantial rhizomes (Leistner 1958) it is still generally regarded as an annual. The moral of this is to rather publish in English. But it led to the discovery of *Caryotophora*, a rare endangered monotypic genus of the vygies, as well as a quicker way of germinating thick-skinned mesembs.

The drawings of the fruits of *Skiatophytum* (which means 'shade plant', somewhat unusual for a vygie, but well chosen by Louisa Bolus, then of the Bolus Herbarium founded by her father-in-law), were patched together by me with the help of an improvised camera contraption on the floor of the Henderson household in 40 Carrington Road, Kimberley. Mayda, one of the daughters of the family, was a stalwart of the Botanical Research Institute and had arranged a sojourn for me with her parents. Mayda became matrimonially attached to Bernard in my presence, not long after our venture.

I was also present on the day when Mr Herre opened a parcel from Emil Jensen, in the employ of De Beers Diamond Company in Lüderitz, which revealed, among a hefty wad of newspapers, the long brown branches with clusters of almost spherical grape-like succulent leaves of what was to be called *Jensenobotrya lossowiana*. This species is one of the (if not *the*) northernmost representatives of the Succulent Karoo, a biome which I had been briefly introduced to on a hitchhiking tour to Lüderitzbucht in 1950. As a result I lived with the misconception that the whole Namib was dominated by succulents,

and I must admit, I missed them on our Kaokoveld (ad)venture.

And to complete the *dramatis personae*: the two assistants that Ben van Zyl, the Native Commissioner at Ohopoho, chose for us. Unfortunately we never learned their surnames.

Abner

Abner was three-quarter Ovambo (the rest Herero), resident at Okaware some 20 miles (32.2 km) south of Ohopoho. He had a light reddish brown complexion, usually wore a brown overall and an old shapeless felt hat. He had two wives and was considered a man of means ('*ek dink ek het sewe-en-twintig bees*' = 'I think I have twenty-seven cattle'). He was probably in his early forties and performed the more physical, menial tasks such as digging out plants and wheels stuck in the sand and walking many miles solo through elephant-infested bushveld to call for help. He took a great interest in plant collecting and learnt how to prepare herbarium specimens. On our departure from the Kaokoveld we left him some collecting material which he put to good use: he is the second person recorded in *Botanical exploration of southern Africa* on page 77 of Gunn & Codd (1981): 'Abner (*fl.* 1958) Herero assistant to Dr. B. de Winter while collecting in the Kaokoveld in 1958 [*both dates should, of course, be 1957*] and made independent collections later. Specimens \pm 200, in PRE.'

Andreas

Andreas was by far the most senior member of our group but still served as a Native Constable. He was of markedly darker complexion than Abner. In order to put him into historical context one has to consider that he swore allegiance to the German Kaiser and served as a sergeant in the German Schutztruppe which surrendered to the South African forces in 1915. So he must have been in his sixties and he walked with a slight stoop. He considered himself a German and was known as 'die Duitser'. In a discussion with one of the Hartley brothers (see 22 April, p. 77) he was overheard to state: '*Es gibt auch schwarze Deutsche.*' = 'There are also black Germans.' (*If you watched the recent Soccer World Cup you saw his statement repeatedly confirmed.*) He usually wore long dark trousers and a khaki or light shirt with rolled-up sleeves, and on occasion

also an old Schutztruppe-type felt hat, and spoke a basic German with a distinct regional German, rather than SWA-German, accent. He was a font of information on the Kaokoveld, its place names, its inhabitants and its plants. In addition he was our cook, protector and hunter of springbok for the pot (with a much pre-loved 303 rifle and 10 cartridges per trip). During preparations for a trip we told Andreas how many days we were planning to be away and we could leave the provisioning to him. Cooking and fire making are almost synonymous in the bush and Andreas excelled in both: after a heavy thunderstorm it was time to light a fire in order to prepare a refreshing mug (white enamel, with a black rim) of *boere-troos* (= farmers' consolation). Andreas selected a tree with a dense canopy and started removing the sopping wet dead leaves at the base of the trunk. After removing several layers of leaves he retrieved enough dry combustible material for a fire hot enough to dry the wet twigs which he put onto it. And within minutes it was coffee time.

Andreas could also be described as a literary figure. He figured in two books I know of, and I am sure there must be more:

Green (1952) wrote about the Kaokoveld experiences of 'Colonel Deneys Reitz who set out in July 1925, with the idea of driving the first car through the territory; but before reaching Kamanjab decided that the era of petrol had not yet dawned, and abandoned his car. ... He trekked on with a light cart and a team of donkeys. ... After calling at Zessfontein [the old spelling] he was joined by a helmeted Herero in military tunic, one Andreas, who had served as sergeant in the German police'.

The other author who mentioned Andreas was Prof. D.M. Joubert (in *Klip'kedis en ander Afrikareise*, 1991), of the Department of Agriculture and later vice-chancellor of the University of Pretoria, who visited the Kaokoveld at an unspecified time but probably well after our adventure, during a fact-finding tour of agriculture in Africa. He wrote (freely translated): 'we are stimulated by many facts and traditions [of the Herero] related to us enthusiastically by Andreas the Herero cook who speaks German with a Berlin accent'.

But the best reminiscences of Andreas's illustrious life came straight from the horse's mouth, so to speak.

One of his greatest experiences was a reconnaissance into Angolan territory in search of

provisions with three German soldiers during the First World War. Unbeknown to them the Portuguese had in the meantime joined the British and wanted to take them prisoner. Upon which they fled, and all of them, except Andreas, were shot dead. Andreas in great haste returned to the German troops to report the matter. He was called to Major Franke (later Colonel, who surrendered to the South African troops in 1915) who praised him: *'Das hast du gut gemacht mein Junge'* = 'You have done well my boy.' And he was given a fortnight's leave during which his only duties were *'zu essen und zu scheißen'* = 'to eat and go to the toilet'.

Preparations

Bernard had returned from a collecting trip to the Eastern Transvaal (now Mpumalanga) and it was time to prepare for an expedition of three months to the last wilderness in southern Africa, a region without shops, petrol stations, water taps (correction: see p. 48), let alone telephones or hospitals. So we had to be largely self-sufficient for 90 days. Bernard, who saw to all the preparations, amassed mountains of tinned food in a massive wooden box with a hinged lid, paraffin in the square 5 gallon (22.73 l) Laurel paraffin tins in general use at the time, a cooler box made of a Laurel paraffin tin covered with charcoal, hessian and wire mesh (which was cooled by evaporation of water sprinkled upon the hessian), a large, heavy, round tent about 4 m in diameter with a central wooden pole about 12 cm in diameter (see Figure 49, which shows a similar but later model acquired in Windhoek, p. 81), tarpaulins (floor cover in tent, cover for roof carrier), a wooden camp stretcher (I brought my metal one from Kimberley where I was stationed at the time), a metal square (1 × 1 m) folding table, two wooden folding chairs (see Figure 85), petroleum pressure lamps, ordinary storm paraffin lamps (still available, thanks to Chinese enterprise), large glass bottles for sugar, oats and suchlike, mosquito nets (attached to the central wooden pole in the tent), water bags (later generations will never have the privilege of tasting ice-cold, wind-cooled water with a hint of canvass from one of these marvels dangling from the outside mirror of your truck – see Figure 10, p. 24), mountains of wooden plant presses (see one specimen on Figure 49), temporary presses, drying paper and white paper, mountains of corrugated cardboard boxes (see two specimens on Figure 49), bottles for spirit material, paper bags for seeds, succulents and bulbs, poison bottles (for killing moths) and empty cigarette boxes with cotton wool padding for safe keeping of the perished moths (for Dr Laios Vari of the

Transvaal Museum, now Ditsong Museum of Natural History, Pretoria), to say nothing of medical supplies, including snake bite serum, malaria pills, aspirin, charcoal pills (I don't think immodium had been invented), petroleum jelly or Vaseline (see much later), (I don't think there was such a thing as sunblock), spare parts for the vehicle, including two springs, a coil, distributor cap and contact points, as well as odds and ends such as rubber bands and paper clips – the list was endless.

The best available map of the Kaokoveld was one drawn up by the German 'Schutztruppe'. It also served later as the basis for the map Bernard drew up for use on herbarium sheets (in reduced format) to pinpoint collecting localities in this region for which no detailed maps were available (GPS was a twinkle in the eye of science fiction writers) and in which the naming of places, as mentioned before, was very far from standardised.

Clothing

I have briefly described the clothing of our two assistants. Our own consisted of Kaunda jackets (then called safari jackets; why they have gone out of fashion I would like to know, they certainly look much smarter than creased shirt bottoms hanging over your pants) or unicoloured or khaki shirts, khaki shorts, solar topee, boots, normal shoes.

Vehicles

The Government Garage in Pretoria had provided us, by way of an experiment, with an International 1.5-ton pick-up truck, freshly imported from USA, brand new with ± 40 miles (± 64 km) on the clock. It was locally untested, left-hand drive, with a totally unsynchronised 3-ton gear box, so that one had to double declutch every time you wanted to change any of its four forward gears, and, as would emerge later, of very inadequate technical construction. Its registration number was GG 18461 and it was fitted with a metal canopy of four pillars, a tin roof covered by a sturdy roof rack, and square wire-mesh sides and back opening by double doors swinging outwards and with a padlock, the sides and back with roll-down canvas curtains, an extra spare wheel, two 44 gallon (200 L each) drums: one for water (left front), one for petrol (right front – nearest petrol inlet), both with a rubber hose for sucking/levering out its contents (*Jerry cans* [for the younger readers: *jerry* = German] which were used by the German troops under General Rommel

in the North Africa campaign during World War Two [1939–1945], were not yet in general use in South Africa), a spare wheel housed between the drums, a bottle jack and tarpaulins for covering the roof rack. A frame with mosquito gauze in front of the radiator, as mentioned before, was constructed and provided by Bernard. We also had a tyre pump which was operated by the engine. One had to remove a spark plug and replace it with a rubber pipe of which one end was screwed into the hole left by the spark plug and the other connected to the valve of the tyre. The end of the pipe that was screwed into the engine block contained a non-return valve through which air was sucked in when the engine was running (somewhat irregularly as it could run on only three cylinders), and when the relevant cylinder reached the compression phase the air, rather than the petrol/air mixture, was pumped into the tyre. That was the theory, and at the time we were led to believe that few or no petrol fumes, known

to be harmful to rubber, would end up in the tyre. True or not, we had no tyre problems after using this type of pump. As this great invention appears to have vanished off the face of the Earth, one may assume that it was not considered the answer to all motorists' dreams. We also carried with us a block and tackle, which was to come in more than handy.

From the South West African Administration in Windhoek we had the loan of a Ford 1-ton pick-up truck (see Figure 49). Its gears were beautifully synchronised but the lever was on the steering column and, as was customary in those days, gear changing was a rather wobbly affair or, more positively put, not very positive. Its mileage: 33 600 (53 760 km). It had no canopy but presumably a spare wheel and a jack.

So, at last, we come to the *Ding an sich* = the adventure itself.

Getting to the Kaokoveld

3–7 March: Pretoria–Windhoek

The almanac reads Sunday, the 3rd of March in the year 1957, the clock reads 7:45 and Bernard and I are on the road in our International from Pretoria to Windhoek via Johannesburg, where we get slightly lost for a while but soon find our way via Roodepoort to Potchefstroom and Klerksdorp. We have to drive very slowly because our steed (*literary or humorous according to my dictionary*), as mentioned before, has only 40 miles (64.4 km) on the clock and is, after all, a guinea pig. Nevertheless, we reach Schweizer-Reneke by nightfall where we rest our weary heads. The next morning we take our vehicle to the local garage for its first (300 mile = 483 km) service. Then westward on to Kuruman and into the bed of the Kuruman River which serves as the northernmost road to SWA. As the sun goes down we pitch our tent near the road while rain is threatening. In the morning, or perhaps even before, we learn two things: the river has not come down in flood, and the tent is leaking. Proceeding with the Kuruman River we splash through many a puddle. But we are now allowed to travel at a less leisurely pace, and in spite of less favourable road conditions we make good progress. In the afternoon we cross the huge Koppiesdraai Pan adjoined by a pitch-black stone ridge. There is light drizzle in the distance with rising clouds of dust and moisture: a memorable sight (*I know all this thanks to a letter of 9 March I wrote from Windhoek to my brother in Pretoria whose wife, Inge, had kindly archived. Often, during the 42 years of my bachelorship, the house of Erich and Inge and their four children was my second home. I wish I had written more letters to them to give this story some more life*). The first town in SWA we reach is Aroab where we spend the night. On the road (= two deep furrows in the sand produced by motor vehicles and improved occasionally by a road ‘scraper’ consisting of two hefty straight tree trunks held apart parallel to each other by some cross members, which is dragged along the spoor by a powerful tractor) to Koës we have to bounce over some red Kalahari Dunes, and all of a

sudden our International is on total strike. Superficially everything looks fine but the engine is dead as a door-nail. Bernard sets out to look for help. As good fortune will have it, he finds a farm not too far from the road with a friendly farmer. The problem is soon diagnosed: the plates of the middle cell of the battery have shaken loose, making the battery, and therefore the vehicle (which, as mentioned before, is not a diesel which in the good old days could operate without a battery, once in operation) an inoperational International. The badly corrugated roads, bounding (= moving enthusiastically forwards by leaps or jumps) over dunes, and our tyres which are pumped too hard, have obviously put too much strain on the battery. Our good fortune exceeds itself to the almost unbearable: our friendly farmer can provide us with a battery. We decide to take the dead battery with us back to Pretoria as evidence that we have not misappropriated it. But we can not possibly stretch the limits of good fortune any further and thus we forget to empty the acid from the battery before loading it into the back of our bouncing bakkie. Arriving at Aroab for our third overnight stop we look into the back of our bakkie and – o horror! as the *Pretoria News* would say – we are confronted by utter chaos: an overturned battery with battery acid munching away merrily at our precious, disarranged belongings, plus the overpowering smell of paraffin leaking from hairline cracks on the corners of our square paraffin tin and oozing over, or soaking into any and every object in its all-pervading path. After an exhaustive and exhausting cleaning operation which disturbs the peaceful *dorp* (small village) until deep into the night we flop into the bed of the Royal, Masonic, Grand (or similar) Hotel. The next morning we are on our way to Mariental, and, believe it or not, we arrive in Windhoek before too much of the night has fallen.

8–12 March: Windhoek

Namibia was known as South West Africa and administered by South Africa. The *linguae francae*

were German and Afrikaans. English was a foreign language. In Windhoek, in which the main street was Kaiserstrasse and the Government Buildings were endearingly known as Tintenpalast (Ink Palace), we stay at the Thüringerhof Hotel which, as its name suggests, could just as well be in Germany. As we sit down to our first dinner, Bernard remarks that all German dishes are sour. (*He had stayed at this establishment before and was speaking from experience.*) For me, German food means food as my mother had prepared it for our family ever since I can remember; and that was not particularly sour. There were of course *saure Gurken* (gherkins) and *Sülze* (brawn) and *Sauerkraut* (sauerkraut) and *Rollmops* (pickled herring), but what's so unusual about that? So I reply: no, that's not true. And what are we served? Sour soup, a sour meat dish and, to crown it all, sour sweets.

Our International bakkie, bless its rubber boots, is due for its 1 000 miles (\pm 1 600 km) service.

So we take it to the local International agents, Metje & Ziegler, who have never heard of or seen a vehicle of this description before. A German mechanic, who could have come directly from München, Wolfsburg or Stuttgart, takes it round the block for a test drive, coping splendidly with the unsynchronised gearbox, and on completion informs us that there are 11 squeaks or rattles in the bodywork. (*I can't remember whether he diagnosed any other blemishes, and I don't know whether he did, or should have according to the service manual, tightened all the nuts on the vehicle that can or should be tightened, especially those that were to rattle loose, to our great chagrin, in the not too distant future.*)

Hardy Joubert, an agricultural researcher, whom Bernard knows from his earlier visits to SWA, shows us around the Agricultural College Neudamm, near Windhoek, where he is working. I admire and envy the synchronised gearbox of his aged Land Rover bakkie.

He introduces us to the 1-ton Ford bakkie mentioned above. Its registration number is A 321 L, the A standing for *Administrasie* (Administration) and the L for *Landbou* (Agriculture), referring to the government department which provides us with this vehicle (*which was to provide us with rather poor service but which, in later years, according to Bernard, served the cause of botany on several more occasions*).

At 12:10 I send a telegram to my brother in Pretoria: '*Gut in Windhoek angekommen Brief folgt Grusse Albrecht*' (= 'Arrived safely in Windhoek Letter to follow Greetings Albrecht') [it should, of course, be *Grüsse*, or in the revised spelling *Grüße*, but maybe

the operator was not familiar with the ü in Morse code]. For the readers unfamiliar with a telegram, this was a message sent electronically through telephone wires in Morse code or by telewriter (an apparatus looking rather like a typewriter on steroids which can convert QWERTY to Morse code) from one post office to another.

On a hill overlooking the town, not far from the Tintenpalast, we make our salaams to Willy Giess, the Curator and co-founder of the Windhoek Herbarium. He has played an important role in the botanical exploration of the country and as an authority on names, distribution and characteristics of SWA plants. (*The more than 15 000 numbers which he has collected, some 5 000 of them in conjunction with others [Gunn & Codd 1981], cover all parts of the country, and nineteen of them were named in his honour. Four of them we will meet on our expedition.*)

We pay a visit to Bernabie de la Bat, the Director of Nature Conservation. With his thick dark eyebrows he still looks as stern and serious as he did when I was a *sot* (fresher) and he an *ou man* (= old man) in Wilgenhof, the student hostel at the University of Stellenbosch. He knows about our venture and wishes us well.

In Klein Windhoek, over the hill, we visit Richard F. Logan, professor of Geography at the University of California, Los Angeles, who is studying the desert regions of South West Africa. (*In 1969 he published a bibliography of South West Africa covering geography and related fields. It comprises 2009 entries, including eight of his own publications on SWA, and about 50 on the Kaokoveld sens. lat.*) He is accompanied by a very attractive wife and two even more attractive teenage daughters, aged 15 and 16. In addition he has a good knowledge of the Kaokoveld and, if the opportunity arises, will join us at some stage on our tour (*with his daughters?*).

Ever aware of the remoteness of the region we are planning to explore for three months, we also supplement our supplies and equipment. Most additional edibles we acquire from Wecke & Voigts where we get a discount of 25% (being good civil servants) but still leave more than £60 (sounds a bit like R6 000 in today's currency) on their counter. We also acquire a new tent, a compass, more spare parts for the vehicles, distilled water for the batteries from the Windhoek brewery, as well as more medicine and more photographic film (Ilford for black-and-white prints, Kodachrome for colour transparencies). (*All illustrations accompanying this story, except the maps and Figure 3, Figure 37, Figure 38 and Figure 43, were reproduced from*

Kodachrome slides or diapositives taken on our journey with the assistance of an exposure meter, long before the days of digital cameras.)

13 March: Windhoek–Otjiwarongo

On this lucky 13th of March 1957 we set out in our two bakkies on the road northwards to Okahandja and far beyond. About 15 miles (24.1 km) north of Windhoek we make our first collection on white calcareous soil on low-lying flats:

Momordica humilis (Cogn.) C. Jeffrey (5087) (Figure 6), a climbing annual with tendrils; ♀ and ♂ flowers on same plant, flowers orange-yellow, calyx and centre blackish; common (*genus name from Latin mordeo, I bite, referring to the jagged seeds, which we were to meet twice again in the Kaokoveld; Latin humilis = low-growing*).

(The plant names used throughout in the text have obviously been checked in the herbarium and are not necessarily the names as written in our field

notebooks. The plant descriptions, however, are taken straight from the field notes.)

(Information on the origin of scientific names was gleaned from Adamson & Salter [1950]; Zander [1950]; Stearn [1966]; Plowden [1970]; Pooley [1998]; Collins English Dictionary, Millenium edition [‘Voted the world’s best dictionary’] [1999]; Gunn & Codd [1981]; Glen [2004]; Müller [2007]; Clifford & Bostock [2007]; Mannheimer et al. [2008] and Clarke & Charters [2016]. The occasional repetition of information is to be excused. As the Romans used to say: Repetitio est mater studiorum [= practice makes perfect]).

On the Otjihavera Mountains, between Windhoek and Okahandja, on a mountain slope above the road on schist-like formations we see the characteristic outlines of:

Moringa ovalifolia Dinter & A. Berger (5088) which, we note, shows marked preference for rocky situations; a large soft-wooded tree 20’ (6 m) high with very thick trunk; bark smooth, greyish white (*this is the most easterly area the species reaches in central Namibia according to the Tree Atlas; the genus name is derived from the Sinhalese [Sri*



Figure 6. *Momordica humilis* climbing on *Colophospermum mopane* and others.

Lanka] vernacular name *marunga*; the leaves [strictly speaking the leaflets] are oval).

In Otjiwarongo we stay the night with the family of an agricultural officer whom Bernard knows from a previous visit to SWA.

14 March: Otjiwarongo–Outjo

We pay a visit to the Experimental Farm Omatjenne about 15 miles (24 km) WNW of Otjiwarongo (*the prefix otji-. which in Herero, like the kwa- in Zulu, or the suffix -ung in Tswana and Sotho, means 'place of-', is found numerous times in this story*). (*Otjiwarongo = a good, favourable place [Raper 2004].*)

Here we collect on reddish calcareous sand:

Petalidium englerianum (Schinz) C.B. Clarke (5089), a virgate, silvery grey shrub up to 3' (90 cm) high; flowers with upper four lobes pinkish brown fading light brown, lower lobes bright yellow (*which we were not to meet again although the genus is very well represented in the Kaokoveld, in numbers of species as well as specimens in the veld. The specific epithet honours Heinrich Gustav Adolf Engler [1844–1930], from 1889 to 1921 professor of Botany and director of the Botanical Garden in Berlin, regarded as the leading botanical post in Germany. Gunn & Codd [1981] describe him as one of the most productive botanists known, and mention that he developed the 'Engler System' according to which many herbaria are arranged; he visited southern Africa three times including a journey through SWA accompanied by Kurt Dinter*).

On to Outjo where we honour a hotel with our presence. Outjo is the last outpost of higher civilisation for people living in the Kaokoveld and its vicinity. It has a hospital, a post office, electricity, water on tap, schools and other such luxuries. (*The meaning of the name Outjo is variously given as 'place of rocky hills'; 'deep cave'; 'sweet water' or 'place without evil' [Raper 2004].*)

15 March: Outjo–Kamanjab

On route to Kamanjab we pass through Otjikondo (*Herero: 'the place with the kondo-coloured cattle',*

i.e. red or black with a strip of white across the back [Raper 2004]) and Otjitambi (the place to which Gürich, of Sesamothamnus guerichii fame, progressed. Today Otjitambi is a guest farm and Otjikondo a small centre with post office, shops and hotel.)

Nineteen miles (30.6 km) NW of Otjikondo on coarse gravelly red sandy soil we find:

Cleome foliosa Hook.f. var. *foliosa* (5090), an annual or occasional perennial with stems soft and viscid-glandular with striking chrome-yellow flowers with ascending pinkish purple style, lower long filaments purplish below but yellow in upper third, short filaments yellow throughout. We collect twigs with large and with small flowers to show variation in leaf and flower size in one population (*we will meet it again in the Kaokoveld; genus name from cleoma, a plant name used in the Middle Ages; Latin foliosus = leafy*).

Some 39 miles (62.8 km) from Otjikondo we arrive at Kamanjab (*meaning 'place of stones' or 'large stones' [Raper 2004]*).

It marks the utter end of what one generally considers to be civilisation and consists of a police station, a garage and a store. (*In 1958, one year after our historic visit, it was declared a township [Raper 2004]*). The farming area around it is known as the Karos Block (from the name of a spring about 25 miles (40 km) NW of Kamanjab on the road to Ohopoho). The border between the Kaokoveld Reserve and the farming area runs some 11 miles (17.7 km) northwest of Kamanjab. As mentioned above, it is known as the Red Line because it is marked as a red line on the maps. On the ground it takes the form of a 5' (1.5 m) high barbed wire fence (see Figure 10, p. 24). Permission to enter the reserve must be obtained from Windhoek and all persons have to report to the police station before crossing the line. This border serves not only to keep unwanted elements, such as illegal hunters and diamond diggers, out of the Kaokoveld, but it is also a quarantine line to prevent contagious stock diseases, such as *longsiekte* (= lung disease), from spreading into the farming area.

At Kamanjab we collect:

Vachellia reficiens (Wawra) Kyal. & Boatwr. subsp. *reficiens* (= *Acacia reficiens* Wawra subsp. *reficiens*) (5091), a flat-topped, one- to many-stemmed shrub or tree; thorns mainly hooked but straight white thorns also present; pods about 5 × 1 cm, linear-oblong but vary in same community; the Klip Damara name: *no's*; Ovambo name: *enos*. (*According to Joubert [1971] the*

species is widespread and a component of the Colophospermum mopane–Vachellia reficiens–Terminalia prunioides association which is one of the major vegetative cover types found in the Kaokoveld between the 100 and 300 mm isohyets. It also carries the richest mammal and bird life of the region. The Tree Atlas gives the name rooihaak and states that the species is regarded as a very aggressive invader in many places.)

Having replenished our petrol tank and reported our presence to the police we head for Ohopoho, the ‘capital’ of the Kaokoveld. We had been advised to enquire about the condition of the track (*‘die Ohopoho-pad’*). We knock on the door of the farm Hazeldene which lies a few kilometres NW of Kamanjab on the road to Ohopoho. Hennie van Niekerk, the owner of the farm, informs us that parts of the track are still impassable due to the rains which have fallen recently (it is the end of the local rainy season). Seeing that our plans for the immediate future have thus bogged down, Hennie and his wife offer to accommodate us for the next few days until the track has dried out sufficiently. As a quid pro quo we contribute to the culinary upkeep of the household from our voluminous reserves of tinned food. The spontaneity and friendliness with which the Van Niekerk family accepts us makes us think there is good reason to talk of the Good Old Days, a time when the world was less overpopulated, when people still had time to care for each other, when *ubuntu* was not just a buzzword. Another case in point: during the days we spend on farm Hazeldene we botanise in the Kamanjab area. One morning we set off in a southeasterly direction to do some collecting after we had replenished our petrol tank at the local garage. We progress no more than a mile or so (± 1.6 km), when our International splutters to a dead stop. A glance under the bonnet reveals that the glass container next to the petrol pump is filled with a colourless liquid looking more like water than petrol. And water it is.

The very first car coming our way stops and enquires whether we need assistance. As a result we are back at the filling station within the hour. Here we receive quick attention and our petrol lines are soon cleared of water. We establish that the drum from which our petrol had been drawn had been standing in the rain and that some of this celestial liquid must have leaked into the drum.

Petrol is delivered to the garage by one of the many large red trucks, often with equally large trailers, of the Road Service, a branch of the SAR & H (South African Railways & Harbours) in the same type of 44 gallon (200 l) drum which we have on our truck. A hand pump is inserted into the drum and after some

vigorous to-and-froing of a long handle it delivers the petrol, one precious gallon at a time, after uttering a loud ping, to indicate that one of the two glass containers is full. If more than one gallon is desired, the to-and-froing continues in order to fill the second glass container, and so forth.

16 March: Kamanjab/Farm Hazeldene

We slowly make peace with the thought that the Kaokoveld is still closed to visitors, even wanted elements, and we set out to collect on a rocky koppie consisting of weathered granite, 5 miles (8 km) N of Kamanjab on the road to Ohopoho. Our collections include:

Sterculia quinqueloba (Garcke) K.Schum. (5099), a large erect tree up to 18 m high with smooth, creamy white bark peeling in thin strips; slash brownish red; flowers small, greenish, unisexual, with sexes borne on same individual (*a typical Kaoko endemic indicating that we are already in the ‘biological’ Kaokoveld; the genus name after Sterculius, Roman god of toilets [stercus = dung]: the leaves [5-lobed in this case] of some species of this large pan-tropical genus with about 150 species stink, but not ours*);

Crotalaria heidmannii Schinz (5093), a small somewhat glaucous annual with yellow flowers, standard with purplish brown veins above, pure yellow inside, wings narrow, pure yellow, keel greenish cream with purplish veins and speckles (*genus name after the Greek krotalon, a castanet, referring to the rattling seeds in the ripe pod; J.C. Heidmann, a German missionary who sent specimens to Schinz*);

Rogeria adenophylla J.Gay ex Delile (5097) (Figure 79) a tall erect annual with cordate leaves, flowers pinkish mauve outside, maroon inside upper half of tube, the lower half yellow (*a member of the Pedaliaceae, a family represented with several endemics; one is tempted to regard the Kaokoveld or related regions as one of the centres of origin of the family*);

Anthephora pubescens Nees (5100), a rhizomatous perennial growing in rock crevices (*one of the ‘star’ grasses of Namibia, highly palatable and widespread [also in the rest of southern Africa north of the Orange River], including localities in the Namib [Müller 2007]*);

Abutilon ramosum (Cav.) Guill. & Perr. (5101), a perennial herb with yellow flowers, growing in protection of large boulders (*genus name derived from the Arabic word for mulberry, presumably because of the resemblance of the leaves; ramosus = branched*);

Cissus nymphaeifolia (Welw. ex Baker) Planch. (5102), a soft-wooded scandent shrub growing in rock crevices, tendrils present but not plentiful (*partly with a Kaoko distribution but extending eastwards into the Karstveld and with isolated records from the Caprivi [Tree Atlas]*).

17 March: Kamanjab/Farm Hazeldene

On a rocky koppie 6 miles (9.6 km) N of Kamanjab, consisting of weathered granite, we collect:

Amphiasma merenskyanum Bremek. (5103), a much-branched shrublet with pure white flowers and grey to reddish brown bark, growing in rock crevices (*which we will meet again; also found in Namibe Province in Angola; its family [Rubiaceae] very well represented in more mesic parts of Angola but very poorly so in the Kaokoveld that we experienced; the specific epithet honours Hans Merensky, the well-known geologist, conservationist and benefactor who supported many causes, including botany*).

For the rest of the day we accompany Hennie van Niekerk who inspects his farm and drives away an elephant, which has destroyed a part of a fence adjoining a mealie land.

In a remote area like this there is obviously no suitable market for milk, and therefore the Van Niekerks use their surplus milk to produce casein, a product used in the plastics industry, and which is much less problematical to market.

18 March: Kamanjab/Farm Hazeldene

We spend the day collecting on the red gravelly sandy flats of Farm Hazeldene. Our collections include two

species of *Commiphora* (*a preview of the numerous species of this genus we will come across; Malan & Owen-Smith [1974] list 11 species of Commiphora which play a role in the life of the inhabitants of the Kaokoveld*):

Commiphora angolensis Engl. (5105), usually a shrub, rather sprawling with a thick knotty base from which the branches arise; bark ash-grey, not peeling; widespread in northern Namibia (*Malan & Owen-Smith [1974] give the Herero name omuhangorwa and mention that the wood is used to carve household utensils*);

Commiphora pyracanthoides Engl. (5115), a spiny shrub with light grey bark and spine-tipped branchlets, leaves on young branches trifoliate, on older branches simple and sessile, leaves and bark with milky sap (*the roots have a high sugar content and are dug up by animals such as elephants and porcupines; even more widespread than C. angolensis; Malan & Owen-Smith [1974] mention the Herero name omukange and list numerous uses: the gum when boiled with water forms a lather which is used to wash clothes; an extract of the bark is used as hair straightener and as a remedy for gall sickness; the wood is regarded as too soft for utensil carving but very suitable for the otjiya slab on which a harder rod (ongune) is twirled to make fire; a game warden in the Lowveld, South Africa, recently demonstrated that hard vigorous rubbing is much quicker than twirling: he used a substantial \pm straight branch of *Dichrostachys cinerea* with one end sharpened into a \pm 10 mm broad, 4 mm thick point on *Commiphora pyracanthoides* and had smoke rising from the contact area in less than 30 seconds*);

Pterodiscus aurantiacus Welw. (5104), a succulent perennial herb with succulent tuber and bright orange-red flowers, fruits cream-coloured with purplish tinge (*genus putatively derived from *Sesamothamnus stock* [Ihlenfeldt 2010]; Greek pteron = wing, and Latin discus = a round disc, referring to the round winged fruit; Latin aurantiacus = orange-red*);

Monsonia senegalensis Guill. & Perr. (5106) (Figure 7), a procumbent perennial herb with small flowers, with pink petals with maroon nerves (*the genus name honours Lady Anne Monson [1714–76], great granddaughter of Charles II, known for her botanical knowledge, visited the Cape about 1775; judging by its specific epithet the species is also found in far NE Africa*);



Figure 7. *Monsonia senegalensis*.

Limeum pterocarpum (J.Gay) Heimerl var. *pterocarpum* (5107), a small semisucculent annual herb usually not more than 1' (30 cm) high with green flowers (Greek pteron = wing, and karpos = fruit);

Macrotyloma axillare (E.Mey.) Verdc. var. *axillare* (5108) which we record as a small erect annual (but which is usually a climbing perennial herb) with sessile, cream flowers with a purple spot in the centre (makros = long, and tyloma = swelling, probably referring to the large rootstock of some species); and another papilionaceous species:

Neorautanenia mitis (A.Rich.) Verdc. (5109), a prostrate perennial with runners up to 10' (3 m) long, leaves very variable in shape, inflorescences erect, arising from the runners, flowers deep violet (Malan & Owen-Smith [1974] report that it grows in sandy situations, which may explain why the plant manages to develop large tubers, which are dug up and eaten by gemsbok, but does not explain why it is regarded as inedible by humans);

Cienfuegosia digitata Cav. (5110), a small perennial with lemon-yellow flowers with a purple centre,

calyx with rows of black oil glands along the nerves (after Bernardi Cienfuegos, a Spanish botanist);

Sesuvium sesuvioides (Fenzl) Verdc. (5111), a small annual with bright magenta flowers growing in brackish places (*Sesuvium*, the land of the Sesuvii, a Gallic tribe);

Tinnea rhodesiana S.Moore (5113), a much branched shrub about 4' (1.2 m) high, flowers with a bladder-shaped calyx, the corolla deep liver-coloured with bright yellow anthers (after Henrietta Tinne, a Dutch woman who collected along the Nile in 1861; Zimbabwe was previously called Southern Rhodesia);

Petalidium rossmannianum P.G.Mey. (5114), a sprawling dwarf shrub about 2' (60 cm) high, bark grey, flowers white, upper corolla lobes each with two parallel mauve stripes in the throat, lower lobe with two yellow stripes (the first species collected on our expedition not known to science at the time; it is one of the commonest, if not the commonest dwarf shrub in the region; Malan & Owen-Smith [1974] give the Herero name otjipembati and mention that it is a dry season stock feed).

19 March: Kamanjab/Farm Hazeldene

We spend another day collecting on Farm Hazeldene. On a N-facing hill slope with gravelly red loam derived from quartzite we bag two more *Commiphora* species:

Commiphora crenato-serrata Engl. (5121), an erect tree with very straight trunk branching only in the upper half, with smooth bark, leaves borne at ends of branches, seeds pitch black with scarlet arillus covering the lower third, growing on top of the hill in rocky situations (a Kaoko endemic) (Figure 8);

Commiphora africana (A.Rich.) Engl. var. *africana* (5122), a many-stemmed shrub up to 4' (1.2 m) high with spine-tipped branches, the bark whitish grey, peeling off in papery strips, leaves trifoliolate throughout (widespread in northern parts of southern Africa and host to the larvae of *Diamphidia vittatipennis* used by the San to prepare their arrow poison. The concentration of *Commiphora* species – four in one small area

– is a further indication that we are well inside the Kaokoveld Centre of Endemism);

Dalechampia scandens L. var. *cordofana* (Hochst. ex Webb) Müll.Arg. (5116), a euphorbiaceous climber with irritating hairs, greenish flowers and large pale green bracts;

Pavonia burchellii (DC.) R.A.Dyer (5117) (= *Pavonia calycina* (Cav.) Ulbr., the older name which should be used), a soft-leaved sprawling dwarf shrub with yellow flowers with a dark centre; growing in the shade of trees (named after José Antonio Pavón [1754–1840], a Spanish botanist and traveller);

Boerhavia coccinea Mill. var. *coccinea* (5118), a prostrate annual or perennial herb with a diffuse inflorescence and small pinkish mauve flowers;

Lantana dinteri Moldenke (5119), an aromatic dwarf shrub with white berries (Lantana is an Italian dialect name for Viburnum which has similar leaves);

Gossypium anomalum Wawra ex Wawra & Peyr. subsp. *anomalum* (5120), a soft-leaved virgate shrublet 2' (60 cm) high, leaves and calyx dotted with black glands, flowers mauve suffused with



Figure 8. Bernard on a hill at Kamanjab. *Commiphora crenato-serrata* (5121) in the foreground.

red (the genus name derived from goz the Arabic word for a soft substance; anomalous = abnormal);

Grewia villosa Willd. var. *villosa* (5124), a small virgate shrub up to 3' (90 cm) high with almost round rugose hairy leaves and globose to slightly 4-lobed hairy berries (genus name after Nehe-miah Grew [1641–1712], pioneer plant anatomist);

Cardiospermum corindum L. (5125), a creeper with tendrils, creamy white flowers over 5 mm in diameter, fruit an inflated membranous capsule (from Greek kardia = heart and sperma = seed, referring to the shape of the seeds).

On red gravelly loam near the farmhouse we collect:

Crotalaria podocarpa DC. (5126), an erect annual with hairy stem and leaves and purplish pods (after the Greek krotalon, a rattle, referring to the rattling seeds in the ripe pod);

Euphorbia insarmentosa P.G.Mey. (5127), a small subsucculent annual 1' (30 cm) high, cyathia greenish yellow (unknown to science at the time; insarmentosus = not producing long runners).

20 March: Kamanjab/Farm Hazeldene

Farm Hazeldene. Bernard compiles here the first of numerous lists of sight records, partially arranged according to growth form (they were later brought up to date and corrected where necessary or possible and largely arranged according to growth form):

Trees: *Colophospermum mopane*, *Combretum apiculatum*, *Terminalia prunioides*.

Shrubs: *Catophractes alexandri*, *Gossypium triphyllum*, *Grewia bicolor*, *Helinus integrifolius*, *Montinia caryophyllacea*.

Dwarf shrubs: *Leucosphaera bainesii*, *Melhaniania rehmannii*, *Petalidium rossmannianum*.

Perennial herbs: *Commicarpus pentandrus*, *Cyathula cylindrica* var. *cylindrica*, *Monsonia senegalensis*.

Succulents: Nil.

Geophytes: *Cyperus esculentus*.

Perennial grasses: *Antheophora pubescens*, *Cenchrus ciliaris*, *Eragrostis echinochloidea*, *Fingerhuthia africana*, *Oropetium capense*, *Schmidtia pap-pophoroides*, *Sporobolus festivus*, *Stipagrostis uniplumis*.

Annuals: *Aristida effusa*, *Chloris virgata*, *Emilia ambifaria*, *Enneapogon cenchroides*, *Eragrostis nindensis*, *Eragrostis porosa*, *Euphorbia insarmentosa*, *Euphorbia peplus*, *Geigeria ornativa*, *Gisekia pharnaceoides*, *Melinis repens* subsp. *grandiflora*, *Sesamum triphyllum* var. *triphyl-lum*, *Tragus berteronianus*, *Tragus racemosus*, *Tribulus terrestris*, *Urochloa brachyura*.

A splendid specimen of *Harpagophytum procumbens* (Burch.) DC. ex Meisn. offers itself for a photo (Figure 9) (harpago = hook [Latin], used to tear down walls or climb onto ships) (strangely we never met this member of the Pedaliaceae in the geographical Kaokoveld).

21 March: Aborted trip in the direction of Ohopoho

We pack our things, say our fond farewells to the Van Niekerk family and hit the road to Ohopoho. The gate through the Red Line (Figure 10) is not locked and we proceed with our two bakkies, Bernard in the lead.

The track heads north across the very extensive Kaoko calcrete plateau (of which we shall see and say a lot more). The calcrete is generally covered by a layer of red sandy loam of varying thickness. In the depressions the soil is relatively thick but in the rises the calcrete is often exposed. The calcrete is hard and not as porous as one might think. As a result, the rainwater accumulates in the depressions and the soil becomes waterlogged and just the stuff that a car tyre tends to sink into and, with any luck, gets stuck in. Which is what almost happens. The International treads deep channels in the mud, so deep that cones of glorious mud build up on the hub caps and the vehicle, four wheels and all, has great difficulty progressing (Figure 11).

We decide that if the 4-wheeler has great problems, the 2-wheeler will definitely not make it. So we abort our venture, find as dry a spot as possible and laboriously erect our heavy, user-unfriendly round tent, complete with centre pole and loose tarpaulins as floor



Figure 9. *Harpagophytum procumbens*.



Figure 10. Bernard with our two bakkies in front of the gate through the Red Line.



Figure 11. Bernard with the International ploughing through the mud.

cover. Having progressed some distance from what might be considered civilisation, the night is still and peaceful but in the dark Bernard catches a fleeting glimpse of a major quadruped, ambling unperturbed past our tent, presumably a hyaena.

22 March: Kamanjab/Farm Hazeldene

Back to Hazeldene and we prepare for a few more days of local botanising.

On a koppie at Kamanjab with almost perpendicular outcrops of granite Bernard compiles the following sight list (the more '+', the more abundant):

Trees: *Combretum apiculatum* +, *Commiphora crenato-serrata*, *Commiphora mollis* ++ (bark not peeling), *Colophospermum mopane* (occasional), *Kirkia acuminata*, *Terminalia prunioides* +, *Sterculia africana* var. *africana* ++.

Shrubs: *Croton gratissimus* var. *subgratissimus*, *Grewia bicolor*, *Helinus integrifolius*, *Montinia*

caryophyllacea, *Senegalia mellifera* subsp. *detinens* (= *Acacia detinens*).

Dwarf shrubs: *Aptosimum angustifolium*, *Barleria lancifolia* + + +, *Melhania rehmannii*, *Solanum tettense*.

Perennial herbs: *Cyathula cylindrica* var. *cylindrica*, *Lefebvrea grantii*.

Succulents: *Euphorbia virosa* (Figure 12), *Tavaresia barklyi*.

Geophytes: *Cyperus esculentus*, *Lapeirousia otavien-sis*.

Perennial grasses: *Anthephora pubescens*, *Eragrostis nindensis*, *Triraphis ramosissima* + + +.

Annuals: *Aristida adscensionis*, *Aristida effusa*, *Crotalaria heidmannii*, *Crotalaria ulbrichiana*, *Enneapogon cenchroides*, *Eragrostis porosa*, *Melinis repens* subsp. *grandiflora*, *Mollugo cerviana*, *Sesamum triphyllum* var. *grandiflorum*, *Tribulus terrestris*, *Urochloa brachyura*.

We collected some of the species listed by Bernard:

Lefebvrea grantii (Kingston ex Oliv.) S.Droop (5128), an apiaceous perennial herb up to 3' (90 cm) high with upper leaves smaller but similar to



Figure 12. *Euphorbia virosa*.

lower ones, deep liver-coloured flowers, growing in rock crevices (*W.B.L. Grant collected it in the former Natal*);

Crotalaria ulbrichiana Harms (5129), a glaucous annual, flowers with a greenish yellow keel and hairy pods (*specific epithet presumably after O.E. Ulbrich [1879–1952] who worked in the Berlin Herbarium*);

Aptosimum angustifolium F.E.Weber & Schinz (5130), a more or less erect perennial with narrow leaves and maroon flowers (*a Kaoko endemic. Aptosimum, Greek for 'not falling off', referring to the leaves persisting after drying; angustifolium = narrow-leaved*).

Other collections include:

Tavaresia barklyi (Dyer) N.E.Br. (5133), a spiny columnar succulent with partly tubular flowers 6" (15 cm) long, cream-coloured with maroon spots, growing in rock crevices (*genus name after José Tavares de Macedo, 19th century Portuguese botanist, who collected in Africa*).

We found succulents in general to be rather rare, even though, as Van Wyk & Smith (2001) state,

succulent endemics are particularly common in the Kaokoveld Centre of Endemism. They do however count large woody species with soft spongy wood, such as *Commiphora* species, under succulents. It also appears that the northeastern Kaokoveld, including the Baynes Mountains, which we did not visit, is relatively richer in what are usually considered succulents than the region in which we collected. During 1976 E.G.H. (Ted) Oliver, P. (Flip) Steenkamp, P.J. (Piet) Vorster and myself undertook a collecting expedition to the northeastern Kaokoveld with the compliments of the South African Defence Force. During this venture we covered about 500 km in a Unimog, accompanied by three soldiers: a driver, a diesel mechanic and a general protector and helper. We collected six species of succulent euphorbias, including the new endemic *Euphorbia leistneri* and the Kaoko tree-euphorbia, *Euphorbia eduardoi*, a typical Kaoko endemic confined to the northern Kaokoveld and Namibe Province in Angola. On the current trip, which covered more than four times the distance, we collected only four species of succulent euphorbias. In 1976 we collected three stapeliads: the common endemic *Hoodia parviflora*, first found by Welwitsch in Moçâmedes, *Huernia oculata* and the endemic *Stapelia remota* discovered by us. *Baynesia lophophora*, another endemic stapeliad, recently

described by Peter Bruyns, also occurs in the north-east, more specifically the Baynes Mountains, as its name indicates. On the current trip we collected only two identified stapeliads.

At the same locality we bag:

Lapeirousia otaviensis R.C.Foster (5132), a geophyte with white flowers (we also find geophytes to be a rather rare commodity on our expedition. Monocots in general, apart from the grasses, are poorly represented on our list of species collected or recorded. Among the 589 species we collected there is one member of the Amaryllidaceae [only a sight record], two members of Asphodelaceae, one of Anthericaceae, one of Asparagaceae, one of Commelinaceae, nine of Cyperaceae, two of Hyacinthaceae, one of Iridaceae and no orchids);

Justicia platysepala (S.Moore) P.G.Mey. (5134), a shrub 6' (1.8 m) high with pale cream flowers (genus name after James Justice [1730–1763], a Scottish gardener);

Aizoon virgatum Welw. ex Oliv. (5135), a low annual or weak perennial (Greek aei = always, ever, and zoon, a living being, referring to the longevity of the species);

Melinis longisetata (A.Rich.) Zizka subsp. *bellespicata* (Rendle) Zizka (5136), a tufted perennial growing in crevices (Greek meline, the name for millet).

23 March: Kamanjab/Farm Hazeldene

About 3 miles (4.8 km) N of Kamanjab (on the road to Ohopoho) on probably somewhat overgrazed red sandy loam flats between granite koppies Bernard compiles the following list of sight records:

Trees: *Colophospermum mopane* (scattered), *Senegalia mellifera* subsp. *detinens* (= *Acacia detinens*) ++++, *Vachellia reficiens* (= *Acacia reficiens*) ++.

Shrubs: *Boscia foetida*, *Catophractes alexandri* ++++, *Dichrostachys cinerea* +, *Gossypium triphyllum* +, *Grewia bicolor*.

Dwarf shrubs: *Leucosphaera bainesii*, *Solanum tetense*.

Perennial herbs: *Aptosimum angustifolium*, *Evolvulus alsinoides*, *Ipomoea obscura* var. *obscura*, *Neorautanenia mitis*, *Ocimum americanum*.

Succulents: Nil.

Geophytes: *Cyperus esculentus*, *Pseudogaltonia clavata*.

Perennial grasses: *Cenchrus ciliaris*, *Eragrostis nindensis*, *Eragrostis rotifer*, *Eragrostis superba*, *Eragrostis trichophora*, *Stipagrostis uniplumis* +++.

Annuals: *Aristida rhiniochloa*, *Enneapogon cenchroides*, *Eragrostis porosa* ++++, *Erucastrum arabicum*, *Geigeria acaulis* ++, *Geigeria ornativa*, *Gisekia pharnaceoides*, *Tribulus terrestris*, *Urochloa brachyura*, *Melinis repens*, *Mollugo cerviana*, *Pogonarthria fleckii*.

And we collect:

Aristida rhiniochloa Hochst. (5138), a rough, tufted annual (according to Müller [2007] 'its presence indicates pioneer conditions, whether as a result of drought, overgrazing or other disturbances of the veld'; this seems to support our assumption that the veld is somewhat overgrazed, probably even more than somewhat; Latin aristatus: awned, with awns on spikelets);

Hermannia rautanenii Schinz ex K.Schum. (5139), we found only two specimens of this small perennial with sticky leaves and greenish cream flowers (Paul Hermann [1646–1695], born in Germany [therefore with two 'n's], joined the Dutch East India Company and worked as a medical officer in Ceylon; in 1672 he called at the Cape and made the first known herbarium collection of local plants);

Kyphocarpa angustifolia (Moq.) Lopr. (5140), an erect annual herb with linear leaves and flowers in white prickly spikes (Greek kyphos = bent, and karpos = fruit; angustifolius = with narrow leaves);

Barleria kaloxytona Lindau (5141), a small dwarf shrub with showy yellow flowers (and a Greek-sounding name probably derived, among others, from kalos = beautiful).

About 7 miles (11.3 km) N of Kamanjab (still on the road to Ohopoho) on a very dry outcrop of limestone forming a ridge through the red loam flats we take:

Petalidium rossmannianum P.G.Mey. (5147), a glaucous dwarf shrub with white flowers grading into pink in the throat and with two yellow bands on the lower lip (we collected it seven times, more

than any other species, which is also an indication of its wide distribution in the region);

Triaspis hypericoides (DC.) Burch. subsp. *nelsonii* (Oliv.) Immelman (5148), a shrublet with crooked branches and fruits resembling those of *Combretum* (Latin tri- = three, and aspis = shield, referring to the shield-like winged fruits; hypericoides = resembling Hypericum).

On another limestone dyke running through red sandy loam flats 2 miles (3.2 km) further north we find:

Eriocephalus luederitzianus O.Hoffm. (5149), a dwarf shrub with yellow heads without rays but with the typical hairy fruits (Greek erion = wool, and kephale = head, referring to the woolly flower heads; the specific epithet after Franz Adolf Eduard Lüderitz [1834–1886], a German merchant and colonial pioneer);

Aptosimum glandulosum F.E.Weber & Schinz (5150), an erect herb, woody at the base.

At the same locality Bernard compiles a list of sight records:

Trees: *Colophospermum mopane*, *Combretum hereroense*, *Philenoptera nelsii*.

Shrubs: *Boscia foetida*, *Catophractes alexandri* +++, *Gossypium triphyllum*, *Grewia flava*, *Montinia caryophyllacea*, *Triaspis hypericoides* subsp. *nelsonii*, *Searsia* sp. 'engleri' (= *Rhus* sp. 'engleri'), *Senegalia mellifera* subsp. *detinens* (= *Acacia detinens*).

Dwarf shrubs: *Barleria lanceolata*, *Eriocephalus* sp. +++, *Leucosphaera bainesii*, *Monechma genistifolium* +++++ (seeing that we never

collected this species it was perhaps rather *M. cleomoides* or *M. divaricatum*), *Petalidium rossmannianum*, *Plinthus* sp., *Vernonia* sp. (shrubby one).

Perennial herbs: *Aptosimum* sp., *Hibiscus* sp. (white flowers), *Monsonia senegalensis*, *Sida ovata*.

Succulents: Nil.

Geophytes: Nil.

Perennial grasses: *Cenchrus ciliaris*, *Enneapogon desvauxii*, *Eragrostis echinochloidea*, *Eragrostis nindensis* (a soft tufted valuable climax grass [Müller 2007]), *Fingerhuthia africana*, *Heteropogon contortus*, *Oropetium capense*, *Stipagrostis hirtigluma*, *Stipagrostis hochstetteriana* var. *secalina* (naked glumes).

Annuals: *Aristida effusa*, *Enneapogon cenchroides*, *Eragrostis annulata*, *Geigeria ornativa*, *Melinis repens* subsp. *grandiflora*, *Tribulus terrestris*.

Ten miles (16 km) N of Kamanjab, on brackish calcareous flats with grey gravelly soil we collect:

Eragrostis glandulosipedata De Winter (5151), a small annual (described by Bernard in *Bothalia* 7: 469 [1961]; genus name from Greek era = earth or field, and agrostis, a kind of grass; Latin glandulosipedata = pedicels with abundant glands);

Heliotropium lineare (A.DC.) Gürke (5152), a perennial herb with yellow-green leaves and small cream flowers (the genus name refers to the old belief that the inflorescences turn with the sun);

Heliotropium ovalifolium Forssk. (5153), an annual or perennial herb.

Arriving in the Kaokoveld

24 March: Farm Hazeldene–Ohopoho

The past few days have been warm and sunny without a drop of rain, so we decide to brave the road to Ohopoho once more.

We drive through the Farm Khoabendus, the last farm in the Karos Block lying against the Red Line. We cross into the Kaokoveld Reserve and hope for the best. (*Lawrence Green [1952] writes: 'cross the line without a permit, and you may not even receive the option of a fine; and permits are rarely issued.'*) Fortunately we have a permit and fortunately the track has dried out sufficiently and we make good progress traversing many a muddy stretch. The track leads northwards past the waterholes Kaross and Otjovasandu of which the latter, Bernard mentions, falls in the western part of the Etosha Game Park (*fittingly, the Koi name of Otjovasandu is Khoabendus 'the place where the elephants come through'. How the last farm mentioned above came to be known by the same name is not clear; the two places are a good 40 km apart.*) The vegetation (*as confirmed by Joubert [1971]*), is a *Colophospermum mopane*–*Vachellia reficiens*–*Terminalia prunioides* association forming a very open tree and shrub savanna. (*A profile pit dug in the area strikes a layer of calcrete rubble, 3" [7.5 cm] thick, at a depth of about 21" [52 cm] and a solid sheet of calcrete underneath.*) As we proceed on our wet to soggy path, I follow Bernard in circumnavigating another depression in the track which is filled with muddy water and mud and, perhaps, who knows, deep holes dug by a previous road user. In this case the holes would be old because there are no recent spoors on the track, and we assume that we are the first travellers along this route since the beginning of the rainy season, or at least since the last heavy downpour. The area along the track around the muddy patch is also soaked but has the tracks of the International which Bernard has taken safely around the obstacle. As I follow the new track things go well until I come to a very abrupt stop. And Bernard may think: what else

can you expect from such a greenhorn? Out comes a length of *bloudraad* to hitch the Ford to the International, and it isn't long before the Ford is mobile again. And we discover that the front axle of the Ford, which is appreciably lower than anything the International has between its front wheels, had got stuck on a tree stump hidden in the mud.

A few miles before reaching Ohopoho the track, lined with, and in parts filled with calcrete rubble and small rocks, descends steeply from the calcrete plateau in high, sharp, rocky steps into a valley leading into the Ohopoho basin. With experience of the limited ground clearance of the Ford I take a slightly zigzag course down the slope and arrive safely at the bottom without scraping my front axle or any other precious part of my underbelly on the rock ledges.

Before we reach the level of the flat we drive through a 'suburb', a small Herero settlement among sparse stunted and browsed mopane trees on largely bare ground (Figure 13).

The Ohopoho basin, as flat as a table top, seems almost endless, until the eye reaches the distant hills on the opposite side. The surface is treeless, the vegetation dominated by low shrubs and shrublets with a ground layer of short grasses and annuals. An occasional termite mound, up to 6' (1.80 m) high, rises above the vegetation (Figure 14).

At the far rim of the basin we come to a small group of houses (Figure 15).

First, and still on the plain, we come to a white square house next to a tall mast, and beyond, on a slightly raised terrace, about 10 houses of different size and shape. (*As we were to learn later, these are the house and office of the Commissioner, a clinic and workshops, and the white building on the flat, a wireless station for the local air field, complete with radio mast.*)

We have arrived in the metropole of the Kaokoveld: Ohopoho (*now known as Opuwo; but since our past is now our present we shall continue with the old name*).



Figure 13. Herero settlement near Ohopoho.



Figure 14. Ohopoho flats dominated by *Petalidium rossmannianum*.



Figure 15. Ohopoho village in the far distance seen from a dolomite koppie; *Terminalia prunioides* in the foreground.

The name Opuwo provides a glimpse into the history of the country and the mindset of most of its inhabitants: The Council of Headmen which had been set up to hear serious cases and manage the Kaokoveld's affairs had always strongly opposed the presence of a permanent European administrator. When a [weekly] airlink was projected between Johannesburg and Luanda [by South African Airways], a refuelling station had to be established between Windhoek and Luanda because aeroplanes [of the make Junkers] had a very limited range. The Ohopoho basin was proposed for both an airfield and the station for a Native Commissioner. But before any plans could be put into operation the Council of Headmen had to sanction the matter. After tough negotiations the traditional leaders eventually agreed to the proposal but insisted that no further land would be given to the government. To emphasise this they named the place they had given to the whites Opuwo, which, translated into English, means 'no more' (Owen-Smith 2010).

The popular Afrikaans version of the name Ohopoho, as we soon learned, is not to be mentioned in polite

company; it relates to the stress experienced by the area on which one sits when driving over the rough tracks in the area. But then, emboldened by a recent reading from André P. Brink, and at the risk of having you, dear reader, considered impolite company, I shall whisper it in your ear: (*sotto voce*) hou poephol hou!

25 March: Ohopoho

Ohopoho is the administrative centre of the Kaokoveld where a Native Commissioner holds sway (Afrikaans: *swaai sy septer*) over the entire region. (*The Native Affairs office was opened at Ohopoho in April 1939 with an Officer-in-Charge of Native Affairs, directly responsible to Windhoek. The first officer was A.M. Barnard, till June 1942, followed by J.B. Wessels [Van Warmelo 1951]. According to Owen-Smith [2010] B. van Zyl took over in 1949 after he had been stationed in Ovamboland. This appears to be incorrect: Herbert Abel [1954], the German geographer, whom I have mentioned before, who was in Ohopoho in the winter of 1952, expresses in his acknowledgements sincere gratitude to Commissioner*

Jonker and his wife for the active [a poor translation of tatkraäftig] help and cordial hospitality awarded him and his companions. De Klerk [2009], another visitor to Ohopoho in the winter of 1952, also mentions the hospitality of the Jonker family. Green [1952], who had been a member of the Carp expedition in 1951, mentions that Van Zyl had been at Ohopoho for about two years when Carp and Co. paid them a visit. This bears out the original information by Owen-Smith [2010]. One may therefore accept that Jonker and his wife were at Ohopoho only in a caretaker capacity when Abel and De Klerk visited the capital.)

Ben van Zyl, in his late thirties, and his wife, Babs, pregnant with their first child, welcome us. They are both very sympathetic to our cause, supportive and ready to assist. They accommodate us in a separate building but we eat at their table and they see to our general wellbeing. Ben chooses Andreas and Abner as assistants for our undertaking and gives advice on routes to take and on technical matters.

When the time came for Babs to give birth, she, accompanied only by one of their assistants, drove down to the hospital in Outjo, some 400 km of rough tracks and gravel roads away (as we could vouch for). At the same time she picked up the post at Kamanjab on the way, which had to be done once a month in any case. In a postcard I sent to my brother in Pretoria on the third of April I wrote: 'Last night brought us Mr van Zyl, who had with 3 cars (one of which driven by his wife – with a 4-week-old little boy) battled through to here, your post.' (Literal translation with the exact word sequence as in a quite acceptable German.) Ben and a certain Mr Hengelaar (not his real name, and not a Hollander) had joined Babs at the hospital at a later stage and returned with her.

This Mr Hengelaar does not figure largely in my memory but I remember that he was tall, dark-haired and slender, quiet and soft-spoken, and he performed some function at Ohopoho which we never enquired about. No – he does figure largely in my memory: one day Ben had asked him to shoot a springbok for the pot and Mr Hengelaar enquired if we would like to join him. Which we did – perilously close to disaster. Off we went and soon spotted a herd of springbok, which were common in the area. Being the only armed member of the party he asked us to stay with the bakkie while he went on foot after his prey. It was not long before we heard him shooting. Not just one shot but several, and some more, and we heard bullets whistling over our heads and we considered taking cover. Eventually the shooting stopped and one (or was it more?) springbok had been felled. And I

wondered how a man with such gentle manner could morph into such a Mr Hyde.

I saw the Van Zyls again, sitting on a rock at Swartbooisdrift during my second visit to Kaokoveld in 1976. They were still hale and hearty. I believe Ben has since died. Bernard mentioned that one of his sons (Dr Japie van Zyl) is today a prominent scientist in the Space Programme of the USA (Jet Propulsion Laboratory). I recently contacted Japie after listening to him on the programme 'Sterre en Planete' on Radio Sonder Grense. He confirmed that he was the 4-week-old little boy who arrived in Ohopoho with his mother on the third of April 1957. He also told me that his mother had died relatively young and that at her funeral she was referred to as Mother of Kaokoland.

The Ohopoho basin was the first of the wide valleys or basins, flat as a table top, not to say pancake, surrounded by hills or mountains, of which we were to cross a fair number. It had been speculated that these valleys were originally lakes, during a pluvial period, formed by dammed up rivers such as the Hoarusib (in the case of Ohopoho) or the Hoanib further south. These lakes eventually overflowed, creating a gap (Afrikaans: poort; German: Pforte) in the surrounding mountains. Abel (1954) argues that this hypothesis does not hold water because no lake deposits are found in these basins. Furthermore he points out that in semi-arid regions land formation and erosion typically take the form of sheet flooding and sheet or lateral erosion, often leading to the formation of broad-based valleys. Soil erosion or vertical erosion, as he also calls it, the formation of gulleys, is in the Kaokoveld observed only where the vegetation cover has been destroyed by overgrazing.

We have hardly settled in when the urge to explore drives us onto the brackish flats below the houses which (except the radio building) are built, as mentioned before, on a slightly raised natural terrace. The soil is a fine powdery brownish clayey loam.

The very first plant we collect is new to science but not to us; we have collected it already in the Kamanjab area:

Petalidium rossmannianum P.G.Mey. (5154), a glaucous dwarf shrub to low shrub with pinkish mauve flowers. It bears the Herero name *tjipambati* (or *otjipembati*, as Malan & Owen-Smith [1974] have it. They also mention that it is widespread in the whole country. As Hall-Martin et al. [1988] surmise, its abundance is probably due to overgrazing even though Malan & Owen-Smith [1974] mention that it is a dry

season stock feed. This leads to the conclusion that it is not unpalatable but, as long as better feed is available, stock will prefer better-tasting morsels); other collections include:

Indigofera cryptantha Benth. ex Harv. var. *occidentalis* Baker f. (5155), a virgate perennial, its \pm globose pods borne in clusters (its roots are used as toothbrushes by Hereros and its Herero name is olukohotjintjo; *cryptantha* = with hidden flowers); and two species of *Cucumis*:

Cucumis anguria L. var. *longaculeatus* J.H.Kirkbr. (5156), a small erect annual with runners, its fruits subglobose with long soft spines (*Cucumis* is an old Latin name for a cucumber; *longaculeatus* = with long spines);

Cucumis meeusei C.Jeffrey (5157), a perennial herb, its fruit oblong with long prickles, its Herero name: oukungu (another species new to science, published in Kew Bulletin 19: 218 [1965]; Dr A.D.J. Meeuse, who was working on contract for the Institute at the time, and who later became Professor of Systematic Botany and Plant Geography at the Hugo de Vries Laboratory of the University of Amsterdam, described four of our collections: two species of *Petalidium*, a *Merremia* and a *Priva*. Two of our collections were named after him: a *Barleria* and this *Cucumis*);

Nidorella resedifolia DC. subsp. *resedifolia* (5158), erect annual, typical of disturbed areas here and also in the States (= RSA), as the soldiers of the Border/Angola war would have said (*Nidorella* from Latin *nidor* = vapour, smell; with leaves resembling those of *Reseda*, the wild mignonette);

Lessertia benguellensis Baker f. (5159), a perennial herb (originally described from a Welwitsch specimen; after Jules de Lessert [1773–1847], French industrialist, banker, amateur botanist with a private herbarium);

Panicum simulans Smook [field note: 'P. novemnerve'] (5160), an annual with hairy sheaths, (another species new to science, described in *Bothalia* 23(1): 59 (1993); Latin *simulans* = resembling, presumably *Panicum novemnerve*);

Aerva leucura Moq. (5161), a perennial herb (Latinised form of the Arabic name for the plant; the specific epithet alludes to the white woolly flower spikes);

Sesbania macowaniana Schinz (5162), an annual with long composite leaves and yellow flowers with dark stripes on the back (Peter MacOwan

[1830–1909] botanist and educator, inter alia Curator of the Cape Government Herbarium and Professor of Botany at the South African College [now the University of Cape Town]).

Driving to the centre of the Ohopoho basin we are swallowed up in a very dense stand of:

Sorghum bicolor (L.) Moench subsp. *arundinaceum* (Desv.) de Wet & Harlan (5163), a robust tufted annual or perennial about 10' (3 m) high covering a large area (our specimen was so good that Blythe Loutit used it for the illustration in Müller [2007]).

26 March: Ohopoho and surroundings

A few days are earmarked for collecting in the Ohopoho area and for preparing for the first trip into the unknown.

We collect on hard gravelly calcareous soil on the slope of a hill N of Ohopoho on which the vegetation shows signs of intense grazing (and turns out to be a textbook example of deteriorated veld, or, with a more optimistic view, veld with good potential for improvement): many annuals and few substantial perennials for stock to get their teeth into; our bag includes:

Sesamum triphyllum Welw. ex Asch. var. *triphyllum* (5164), an erect annual with pinkish flowers, its seeds with two small wings at the lower end (*Sesamum* is the Greek and Latin name for sesame);

Hermannia modesta (Ehrenb.) Mast. (5166), an erect annual with flame-red, pendulous flowers;

Erucastrum arabicum Fisch. & C.A.Mey. (5167), an annual herb with small yellow flowers (the only member of *Brassicaceae* we collected, and judging by its specific epithet, a candidate for the 'arid corridor');

Aptosimum lugardiae (N.E.Br. ex Hemsl. & Skan) E.Phillips (5168), a small perennial herb with woody base (the female ending of the specific epithet indicates that it honours Charlotte Eleanor Lugard, the wife of Edward James Lugard who is also commemorated in a number of plant names, including *Sesamothamnus lugardii*); as well as a number of annual grasses:

Antheophora schinzii Hack. (5169), an annual pioneer grass (Greek anthos = flower, and phoros = bearing; it is tender and palatable and well utilised by game and stock [Müller 2007]);

Melinis repens (Willd.) Zizka subsp. *grandiflora* (Hochst.) Zizka (5173), another pioneer, also largely concentrated in Namibia (Gibbs Russell et al. 1990);

Aristida effusa Henrard (5174), (which indicates retrogression of the veld [Gibbs Russell et al. 1990]);

Chloris virgata Sw. (5177), indicator of disturbed veld (*Chloris* was the Greek goddess of flowers);

Eragrostis annulata Rendle ex Scott-Elliot (5179), often found in disturbed areas;

Urochloa brachyura (Hack.) Stapf (5180), (usually in somewhat degraded veld; the genus name from Greek oura = tail, and chloa = grass, referring to the sharp-pointed lemma; Greek brachys = short, and oura = tail, probably refer to the length of the point on the lemma [Müller 2007]);

Tragus racemosus (L.) All. (5182), (pioneer grass, common in disturbed areas [Müller 2007]; *Tragus* possibly after Hieronymus *Tragus*, author of 'De stirpium' = about plants);

Entoplocamia aristulata (Hack. & Rendle) Stapf (5183), (a valuable, palatable annual grass [Müller 2007]; Greek entos = inside, ploc = anything twisted, referring to the spikelets which become twisted when mature);

but also two perennial grasses which may be part of a recovery:

Eragrostis echinochloidea Stapf (5178), (a fairly palatable, perennial pioneer or subclimax grass; resembling the grass genus *Echinochloa*; this specimen was used for the illustration in Müller [2007]);

Monelytrum luederitzianum Hack. (5181), (a reasonably palatable perennial pioneer grass found also in disturbed areas; Greek monos = one, and lytrosis = detachment, probably refers to the habit of the plant: the formation of stolons and the development of a new plant where the nodes strike root [Müller 2007]);

among the forbs also nothing of much value to the four-legged herbivores:

Abutilon fruticosum Guill. & Perr. (5170), a dwarf shrub 2' (60 cm) high with yellow flowers (*Abutilon* is the Arabic name for a plant resembling a mallow; Latin *fruticosus* = shrubby);

Leucas pechuelii (Kuntze) Gürke (5188), a perennial with white flowers (*Eduard Pechuël-Loesche*, a German geographer, visited Hereroland in 1884–85 [Gunn & Codd 1981]);

all the rest are annuals:

Abutilon hirtum (Lam.) Sweet var. *hirtum* (5171), a 5' (1.5 m) tall soft annual with viscid leaves and yellow flowers;

Launaea intybacea (Jacq.) Beauverd (5172), with a basal rosette, milky latex and pale yellow discoid heads (the genus called after *J. Mordant de Launey* [1750–1816], French lawyer, librarian at the Museum d'Histoire Naturelle in Paris);

Indigostrum parviflorum (B.Heyne ex Wight & Arn.) Schrire subsp. *parviflorum* var. *parviflorum* (5176), with reddish pink flowers and pods reflexed (genus name from *Indigofera* and -astrum = indicating resemblance; Latin *parviflorum* = small-flowered);

Geigeria acaulis (Sch.Bip.) Benth. & Hook.f. ex Oliv. & Hiern (5185), a small grey annual with small yellow heads (the most widely distributed species of the genus in the region, generally found in heavily grazed areas);

Acalypha indica L. var. *indica* (5186), a small erect annual (genus name from Greek *akalephe* = a nettle, referring to the leaves which resemble those of a nettle);

Tripterys nervosa Hutch. (5187), with viscous leaves and yellow heads (genus name from Greek *treis* = three-, and *pteron* = wing, referring to the three-winged fruits);

Hirpicium gazanioides (Harv.) Roessler (5184) with showy bright yellow radiate heads, completely dominating extensive areas to give a real 'Nam-aqualand' effect (Figure 16 and Figure 17) (genus name from *hirpex* = a harrow; *gazanioides* = resembling a *Gazania*):

Our observations are echoed by Hall-Martin et al. (1988): 'Around Opuwo there are areas with few trees where the dominant vegetation is a dwarf shrubveld, mostly of *Petalidium rossmannianum* and *Hirpicium gazanioides*. This community is thought to have been caused by overgrazing, as it was traditionally known as grassveld.'

Ben van Zyl mentions that he is of the opinion that the Kaokoveld in general is overstocked (and it was presumably partly due to his recommendations that the Department of Bantu Administration and



Figure 16. Ohopoho flats dominated by *Hirpicium gazanioides* and *Petalidium rossmannianum*.



Figure 17. *Hirpicium gazanioides*.

Development decided to embark on a major livestock marketing programme in the Kaokoveld. One of the officials employed to implement this scheme was Garth Owen-Smith [2010] who took up the post of agricultural supervisor in July 1968 and who later was to play a crucial role in the conservation programmes of the region.)

27 March: Ohopoho and surroundings

About 2 miles (3.2 km) SW of Ohopoho on flats of fine brown loam between mountains in *Colophospermum mopane*–*Boscia foetida* scrub, the ground layer dominated by *Hirpicium gazanioides*; we collect two species of *Hibiscus*:

Hibiscus calyphyllus Cav. (5189), erect perennial herb with irritating stellate hairs with showy lemon-yellow flowers with dark wine-red centre (*Hibiscus* is the Greek name for the marsh mallow; the specific epithet means 'with beautiful leaves' which is usually written *calophyllus*,

derived from Greek *kalos* = beautiful and *-phyllus* = -leaved; the author, Antonio José Cavanilles [1745–1804] is well known for his work on *Malvaceae*);

Hibiscus palmatus Forssk. (5190), prostrate perennial herb with pale yellow flowers with a red centre (Figure 18) (judging by the author of its name it is also found on the Arabian Peninsula and probably in NE Africa; Latin *palmatus* = shaped like a hand);

Achyranthes aspera L. var. *sicula* L. (5192), a small annual with prickly spikes of green flowers, growing in the shade of trees (Greek *achyr* = chaff and *anthos* = flower);

Cyathula cylindrica Moq. var. *cylindrica* (5194), an annual with green flowers with filaments greenish, anthers yellow, growing in shade of trees (genus name from Greek *kyathos* = cup, refers to the stamens which may be reduced to a cup at the base);

five members of *Acanthaceae* (which is the most speciose family of the Kaoko Group of the Kaoko Centre of Endemism, the second is *Leguminosae*, then *Euphorbiaceae* and then *Asteraceae* [Craven 2009]). It may be of interest to compare these findings with



Figure 18. *Hibiscus palmatus*.

the family representation among the \pm 590 species collected by us, mostly in the area covered by the Kaoko Group: Fabaceae (Leguminosae) 79 spp., Poaceae 77 spp., Acanthaceae 42 spp., Asteraceae 40 spp. The prominence of Acanthaceae and the relative scarcity of Asteraceae are striking. Looking at the flora of southern Africa as a whole the situation is remarkably different: Asteraceae 2 481 spp., Mesembryanthemaceae 1 761 spp., Fabaceae 1 516 spp., Iridaceae 1 204 spp. and Poaceae 1 016 spp.; Acanthaceae, with a total of 373 species is in 16th position (Koekemoer et al. 2013); in Namibia Acanthaceae is the 6th largest family (Craven 2009);

Megalochlamys marlothii (Engl.) Lindau (5195), a small shrublet with large, sky-blue flowers (megalos- = big, and chlamys = covering, referring to the large bracts which obscure the calyx);

Monechma divaricatum (Nees) C.B.Clarke (5197), a small bush 1' (30 cm) high with grey-green leaves and pale mauve flowers;

Barleria senensis Klotzsch (5199), an erect shrublet 2' (60 cm) high with orange-yellow flowers (Figure 19) (genus name after Jacques Barrelier [1606–1673], a French Dominican monk and botanist);

Barleria lancifolia T.Anderson subsp. *lancifolia* (5200), a small shrublet with deep maroon flowers;

Barleria lugardii C.B.Clarke (5206), a small shrublet with white flowers (Edward James Lugard [1865–1944] collected plants in Botswana and sent them to Kew).

Other collections include:

Pupalia lappacea (L.) A.Juss. var. *lappacea* (5196), a herb growing in protection of other bushes, flowers pale greenish cream with purple filaments and white anthers (*Pupalia from the eastern name pupali*; lappaceus = burr-like);

Pavonia burchellii (DC.) R.A.Dyer (5202) (= *Pavonia calycina* (Cav.) Ulbr. the older name which should be used), a perennial herb with woody base and pale yellow flowers (after the famous naturalist and collector William John Burchell [1781–1863]);

Heliotropium giessii Friedr.-Holzh. (5203), a soft perennial herb up to 3' (90 cm) high with dark green, rugose leaves and small white flowers with crinkled petals and a dark centre (unknown to science at the time);



Figure 19. *Barleria senensis*.

Ocimum filamentosum Forssk. (5204), a small perennial herb with pale mauve flowers with a short corolla and long exerted stamens (*genus name from Greek okimon, an aromatic plant*);

Vernonia fastigiata Oliv. & Hiern (5205), an annual or weak perennial with royal blue heads;

Grewia tenax (Forssk.) Fiori var. *tenax* (5207), a shrub 8' (2.4 m) high, its fruits deeply 4-lobed, bright orange when ripe and edible, the Herero name: *omundjendjehre* (*the Tree Atlas spells it omundjebele*).

Leucosphaera bainesii (Hook.f.) Gilg (5208), dwarf shrub with grey leaves with greenish white flowers in clusters, widespread, especially on calcareous soil (*a dry season stock feed [Malan & Owen-Smith 1974]; from leucos = white, and sphaera = sphere, alluding to the white spherical inflorescence*).

At the same locality Bernard compiles a list of sight records:

Trees: *Colophospermum mopane* + + + +, *Terminalia prunioides* +.

Shrubs: *Boscia foetida* ++, *Gossypium triphyllum*, *Grewia bicolor*, *Leucas pechuelii*, *Ximenia americana* var. *microphylla*.

Dwarf shrubs: *Abutilon fruticosum*, *Aptosimum lineare*, *Barleria senensis*, *Leucosphaera bainesii*, *Monechma divaricatum*, *Petalidium rossmanianum* + + +.

Perennial herbs: *Abutilon hirtum* var. *hirtum*, *Cyathula cylindrica* var. *cylindrica*, *Hibiscus calyphyllus*, *Hibiscus palmatus*, *Ocimum americanum*?

Succulents: Nil.

Geophytes: *Ammocharis* cf. *coranica*.

Perennial grasses: *Cenchrus ciliaris*, *Enneapogon scoparius*.

Annuals: *Aizoon virgatum*, *Antheophora schinzii*, *Aristida effusa*, *Bidens* sp., *Chloris virgata*, *Eragrostis porosa*, *Erucastrum arabicum*, *Geigeria ornativa*, *Hermannia modesta*, *Hirpicium gazanioides*, *Panicum simulans*, *Pupalia lappacea* var. *lappacea*, *Tribulus terrestris*, *Urochloa brachyura*.

Six miles (9.6 km) W of Ohopoho on flats of a powdery brown brackish loam with *Colophospermum mopane* and some *Catophractes*. Our harvest includes:

Leucas martinicensis (Jacq.) R.Br. (5209), annual with white flowers clustered minaret-like (*the genus name from Greek leukos = white*);

Withania somnifera (L.) Dunal (5210), a perennial herb or dwarf shrub (*Herero name: otjindumbu, an extract of the roots is used as a remedy for diarrhoea in calves [Malan & Owen-Smith 1974]*);

Lantana angolensis Moldenke (5211), a shrub with purple berries (*apparently better adapted to arid conditions than Lantana camara, the widespread invader in more mesic subtropical to tropical Africa*);

Kedrostis hirtella (Naudin) Cogn. (5212), perennial climber with tendrils, fruits bright orange-red when ripe, \pm 50 mm long and lanceolate in outline (*Kedrostis is the Greek name for the plant Bryonia dioica*);

Corallocarpus welwitschii (Naudin) Hook.f. ex Welw. (5213), perennial climber with a large tuber and branches with tendrils; leaves and stems eaten as spinach; Herero name: *oluhona*; (*Malan & Owen-Smith [1974] spell it 'ohona' and report that the tuber is roasted and eaten, and that the fruits: 'omakungu', are eaten cooked or raw*);

Justicia odora (Forssk.) Vahl (5214), shrublet with bright green foliage, flower with lower lip bright yellow;

Baccharoides anthelmintica (L.) Moench (5215), annual with purple flowers in discoid heads (= resembling *Baccharis* = a South American genus of Asteraceae; Greek *anti* = against, and *helminthos* = worm: used as vermifuge);

and two more Acanthaceae not collected before:

Ruellia patula Jacq. (5216), a perennial herb in fruit; seed collected;

Barleria lanceolata (Schinz) Oberm. (5217), a dwarf shrub in fruit; seed collected.

28 March: Ohopoho and surroundings

On a mountain 4 miles (6.4 km) SW of Ohopoho, with loose stones of various sizes, probably dolomite, with brown loam in between, we collect:

Marcellioopsis welwitschii (Hook.f.) Schinz (5219) (Figure 20), an erect annual with narrow leaves and brilliant reddish purple spikes, common in the area (*a Kaoko endemic; further evidence to the prominence of Amaranthaceae in the region; Friedrich*



Figure 20. *Marcellipsis welwitschii*.

Welwitsch [1806–1872], an Austrian, was sent to Angola in 1853 by the Portuguese government to assess the economic potential of the plants and animals of the territory. He returned to Portugal in 1861 with over 6 000 botanical collections referable to about 5 000 species, perhaps the most significant single collection ever made in tropical Africa [Figueiredo & Smith 2008]. Welwitsch is immortalised in the name of more than 370 species, to say nothing of the most famous monotypic genus and family.)

Bernard compiles a list of sight records:

Trees: *Colophospermum mopane* +, *Combretum apiculatum*, *Commiphora mollis* +, *Commiphora glandulosa*, *Commiphora glaucescens*, *Sterculia africana* var. *africana* +, *Terminalia prunioides* +++.

Shrubs: *Commiphora angolensis*, *Cyphostemma congestum*, *Grewia bicolor*, *Montinia caryophyllacea*, *Tarchonanthus camphoratus* ++.

Dwarf shrubs: *Myrothamnus flabellifolius*, *Xerophyta squarrosa*.

Perennial herbs: *Hibiscus palmatus*, *Neorautanenia amboensis?*.

Succulents: Nil.

Geophytes: Nil.

Perennial grasses: *Eragrostis nindensis*, *Stipagrostis uniplumis*, *Triraphis ramosissima*.

Annuals: *Aristida effusa*, *Brachiaria deflexa*, *Brachiaria grossa*, *Marcellipsis welwitschii* ++, *Melinis repens* subsp. *grandiflora*, *Pupalia lappacea*, *Schmidtia kalahariensis*, *Tragus racemosus*, *Urochloa brachyura*.

About 6 miles (9.6 km) SW of Ohopoho on a mountain slope facing east; mainly dolomite. Our collections include:

Myrothamnus flabellifolius Welw. (5220), the 'resurrection shrub' (used by the Hereros to prepare a tea; their name: ohandukaze [Malan & Owen-Smith 1974]; Greek myron = a balsamic juice, thamnus = bush; flabellifolius = leaves in the shape of a small fan);

Blepharis obmitrata C.B. Clarke (5223), a prickly dwarf shrub with pale blue flowers;

Crotalaria barnabassii Dinter ex Baker f. (5226), an erect annual with yellow flowers and strongly inflated pods;



Figure 21. *Petalidium coccineum*.

Montinia caryophyllacea Thunb. (5228), a widespread shrub on rocky slopes, the leaves, when rubbed, emit a very acrid stinging vapour (when inhaled); (Herero name: omutete; an extract from the bark is used to treat open wounds in man and beast; the soft centre pith of thin branches is pierced to make small pipes used to administer medicine rectally; beads cut from the bark are worn around the waist by young Herero and Himba children [Malan & Owen-Smith 1974]);

Amphiasma benguellense (Hiern) Bremek. (5229), a rubiaceous dwarf shrub (the old spelling of Benguela);

Petalidium coccineum S.Moore (5231), a straggly shrublet with brittle stems and bright scarlet flowers (Figure 21) (from Greek petalon = leaf, in modern botany a petal, and -idium, diminutive suffix, implying 'false', refer to the large bracts which resemble petals);

Corchorus angolensis Exell & Mendonça (5232), a fine-stemmed shrublet 1–2' (30–60 cm) high with yellow flowers (the genus name from Greek koreo = to purge, refers to the laxative properties of some species);

Commiphora multijuga (Hiern) K.Schum. (5233), a single-stemmed tree with very smooth, not peeling, bark and multicomponent leaves with a faint smell of citronella oil;

Sterculia africana (Lour.) Fiori var. *africana* (5234), a large tree, widely branched with rounded canopy, smooth brownish grey bark, here and there peeling in papery flakes but usually of a uniform almost metallic grey-brown colour; wood very soft and light;

Grewia villosa Willd. var. *villosa* (5236), a shrub with almost rotund, rugose, hairy leaves and edible fruits, Herero name: *ohamati*;

Clerodendrum ternatum Schinz (5237), a small aromatic shrublet, not in flower at the time (from Greek kleros = chance, and dendron = tree, refer to the uncertainty of medicinal qualities; Latin ternatus = with parts in threes);

Commiphora mollis (Oliv.) Engl. (5240), a widely branched tree, about 3–8 m high; bark grey-black, not flaking or only in round hard flakes (kommi = gum, phoros = bearing, both from Greek);

Commiphora tenuipetiolata Engl. (5241), erect tree with rather gnarled trunk; bark white or greenish white, flaking in thin papery flakes;

Cyperus fulgens C.B.Clarke (5244), geophyte with edible tubers (genus name from Greek kupeiros, a marsh plant, probably of Semitic origin; fulgens = shining);

Eragrostis nindensis Ficalho & Hiern (5245), (a valuable, palatable, drought-tolerant climax grass; aging leaves often turn a reddish brown colour and are therefore sometimes misnamed rooi-gras; specific epithet after the Ninda River in Angola [Müller 2007]).

29 March: Ohopoho and surroundings

We spend all day in an area about 3.5 miles (5.6 km) NNE of Ohopoho. On the slope of a koppie with dolomite and calcareous conglomerate in *Colophospermum*–*Catophractes*–*Terminalia prunioides*–*Commiphora* association (Figure 22).

Here we bag:

Dactyliandra welwitschii Hook.f. (5246), an annual climber with large stipules, small white flowers and globose, *Solanum*-like fruits (another 'arid corridor' species, found in the Kaoko Centre of Endemism and in the Thar Desert in India);

Monechma cleomoides (S.Moore) C.B.Clarke (5248), a dwarf shrub about 1' (30 cm) high, softly hairy leaves and flowers with a pale blue lower lip (*Monechma* from Greek mon- = one and echma = contents, because only one seed ripens per locule; specific epithet = resembling a *Cleome*);

Terminalia prunioides M.A.Lawson (5249) (but apparently not taken up in the herbarium); tree 10–15' (3.0–4.5 m) high, branchlets almost spinescent, branching \pm at 90°; fruits winged, deep wine-red; Herero name: *omuhama*, one of the dominant trees in the region (when a Herero girl menstruates for the first time, a long branch of this tree, preferably with red fruit on it, is wound around the supporting pole of the otjiranda, the ceremonial shelter for ritually impure women [Malan & Owen-Smith 1974];



Figure 22. View from a koppie near Ohopoho with *Commiphora tenuipetiolata* (right) and *Terminalia prunioides* (left).



Figure 23. *Barleria prionitoides*.

genus name from Latin terminus = end, because the leaves are clustered at the end of the branches);

Barleria prionitoides Engl. (5250) (Figure 23), a shrublet 3' (90 cm) high with pale yellow flowers;

Cleome angustifolia Forssk. subsp. *petersiana* (Klotzsch ex Sond.) Kers (5251), erect annual with leaves divided into linear segments; flowers yellow with purple centre;

Commiphora tenuipetiolata Engl. (5253), a tree 10 m high, with spreading crown; trunk and bark of older branches white, peeling in papery flakes and also in hard, half-crown (32.3 mm diam.) flakes;

Zanthoxylum ovatifoliolatum (Engl.) Finkelstein (5254), a shrubby tree 8' (2.4 m) high with paired curved thorns, leaves are highly aromatic with the smell of citronella oil; the Herero name: ohandua (a *Kaoko* endemic also reported from southwestern Angola where it was collected by Welwitsch).

In the same area in, and next to, a washed out donga with red gravelly calcareous soil:

Hibiscus dongolensis Delile (5255), a perennial herb with long virgate branches and large lemon-yellow flowers (the name is derived from the locality Dongola in the far Northern Transvaal [= Limpopo Province], not from the South African word donga or a putative diminutive: dongola [ha-ha!]; Raper [2004] has the answer: dongola means 'very far' in Venda);

Croton gratissimus Burch. var. *subgratissimus* (Prain) Burt Davy (5256), erect shrubs 2–5' (60–150 cm) high, leaves grey-green above, silvery below; (Malan & Owen-Smith [1974] report that knobkieries and walking sticks are carved from the stems. Eloff [2010] notes that 'his knobkierie is the Ovahimba's most treasured and sometimes only earthly possession'; Malan & Owen-Smith [1974] also mention that small stock browse the leaves);

Rhynchosia minima (L.) DC. var. *minima* (5257), a small prostrate or rambling perennial herb, the standard of its flowers is striped with brownish purple;

Sesuvium sesuvioides (Fenzl) Verdc. (5258), a prostrate, slightly succulent perennial herb with deep magenta flowers;

Talinum arnotii Hook.f. (5259), erect succulent perennial herb with a thick, semisucculent root (*Talinum* from a native Senegalese name.)

Two Himba men (Figure 24) approach us requesting medicine for some ailment. Both are married, as is evident from their sheep- or lamb skin caps (*ombuja*). They also wear the traditional aprons (*ombuku*) back and front, made of goat or sheep skins (Van Warmelo 1951). Sandals, usually made of giraffe leather, as Van Warmelo also mentions, are essential in this country. No sticks or knobkieries are in evidence (perhaps they left them out of sight so as not to scare us), but they have short knives. Even so, we can only help them with some aspirins (*this was long before the days of Panado, which was not in general use at the time, so my medical daughter Elke informs me, but it did exist under the name Panadol*).

Still at 3.5 miles (5.6 km) N of Ohopoho but on flats consisting of a coarse gravel formed by small pieces of baked shale mixed with granite and limestone fragments:

Cleome laburnifolia Roessler (5260), a small erect viscous annual with trifoliolate leaves and yellow flowers, the upper 5 stamens and anthers yellow,

the lower 5 stamens purplish with blackish anthers (Figure 25) (*a Kaoko endemic unknown to science at the time*);

Monsonia umbellata Harv. (5261), a small erect annual, leaves aromatic with a smell reminiscent of some Labiates;

Barleria rogersii S.Moore (5262), a shrublet 2' (60 cm) high, the inflorescence with its large bracts is a strobilus-like structure, the flowers are large and deep blue, growing in sheltered places;

Indigofera pechuelii Kuntze (5264), an erect shrublet with greyish leaves and pale salmon flowers; browsed by animals;

Plumbago zeylanica L. (5266), a rounded herbaceous perennial with white flowers, growing in sheltered places (*Linnaeus chose the type from Sri Lanka [formerly Ceylon], sometimes spelled Zeylona in old documents*).

At the same locality Bernard compiles a list of sight records:

Trees: *Colophospermum mopane* + + + +, *Terminalia prunioides* + +.



Figure 24. Himba men near Ohopoho.



Figure 25. *Cleome laburnifolia*.

Shrubs: *Boscia foetida* ++, *Catophractes alexandri* ++, *Gossypium triphyllum*, *Grewia bicolor*, *Rhigozum brevispinosum* (which we didn't collect, because we didn't find it in flower; according to the Tree Atlas its main flowering period is from September to February), *Ximenia americana*.

Dwarf shrubs: *Barleria lancifolia*, *Barleria prionitoides*, *Justicia odora*, *Leucosphaera bainesii* ++, *Monechma cleomoides*, *Petalidium rossmannianum* (all either *Acanthaceae* or *Amaranthaceae*, two of the character families of the region).

Perennial herbs: *Hibiscus palmatus*, *Talinum arnotii*, *Vernonia* sp.

Succulents: Nil.

Geophytes: *Cyperus fulgens*.

Perennial grasses: *Cenchrus ciliaris*, *Stipagrostis hirtigluma* subsp. *patula*.

Annuals: *Antheophora schinzii*, *Cleome laburnifolia*, *Enneapogon desvauxii*, *Eragrostis annulata*, *Geigeria acaulis*, *Mollugo cerviana*, *Monsonia umbellata*, *Portulaca oleracea*, *Tribulus terrestris*, *Urochloa brachyura*.

Still at 3.5 miles (5.6 km) N of Ohopoho on the banks of an erosion channel in deep red loam soil:

Indigofera trita L.f. subsp. *subulata* (Vahl ex Poir.) Ali (5267), an erect, virgate shrublet with small salmon-pink flowers (*Latin* *subulatus* = with a fine sharp point);

Seddera schizantha Hallier f. (5268), a convolvulaceous twining perennial herb with globose capsules (the type of the genus was collected on Mt Sedder on the Arabian Peninsula).

At the same locality but on hard red loamy flats with dense scrub:

Heliotropium hereroense Schinz (5269), a rounded, low shrublet with bark typically peeling in strips;

Opilia campestris Engl. var. *campestris* (5270), a shrub without spines but with stiff branches, usually about 2 m high, the berries are cream-coloured, edible with a sweet juice and a small amount of pulp around a large seed; they are much liked by the Herero; Herero name: *ondumithe* (omudize according to the Tree Atlas, in Namibia found mainly in the Karstveld and sparsely in the Kaokoveld but also in Angola, mainly in the southwest);

Crotalaria barnabassii Dinter ex Baker f. (5271), single-stemmed, erect annual with yellow flowers;

Calostephane divaricata Benth. (5272), *Bidens*-like annual with yellow radiate heads (*Greek kalos = beautiful, stephane = crown, referring to the flowerheads*);

Marsdenia macrantha (Klotzsch) Schltr. (5273), apocynaceous scandent or twining perennial herb with pliable, grey, tough stems, only in fruit at the time (*also collected by Baum in 1899 on his Angola expedition*);

Brachiaria grossa Stapf (5274), a tufted annual with few basal leaves (*genus name from Latin brachium = arm, alluding to the arm-like branches of the inflorescence; grossus = very large*).

30 March: Ohopoho

No collecting. We see to our bulging presses, exchange the moist drying papers for dry ones and let the sun do the rest. Coming to think of it: I can't remember that we ever perceived our celestial source of energy as excessive or unduly troublesome.

But that's not all we did. As described above, Ohopoho started as an airbase and its airfield is still flat and even enough for a small plane to land on. The trouble is that the pilot may not see the ground, and holes that he might land on/in because of a healthy covering of grass and bushes. And Ohopoho expects the visit of a plane in the near future. A white, fairly conspicuous plate on the back of our International (behind Bernard on Figure 85) reads: In Regeringsdiens/On Government Service. So, here is a service to be done for the Government: clear the field for an official landing. And so the International does its official duty by pulling a mower over the green Ohopoho basin.

1 April: Ohopoho and surroundings

We collect on the slopes of a table mountain about 3 miles (4.8 km) NNE of Ohopoho with a plateau consisting of a harder limestone top causing the table effect. The table mountains of the Etendeka Mountains on the Namib border to the west (*the name Etendeka is of Herero origin and is said to mean 'large rock'*

[Raper 2004]), by contrast, are 'real' Karoo table mountains of sandstone with a capping of harder rock of volcanic origin (see Figure 5). The surface of the present mountain is covered with red gravelly loam with large limestone boulders. The woody vegetation of the mountain is dominated by: *Colophospermum mopane* + + + +, *Combretum apiculatum*, *Terminalia prunioides*, *Commiphora mollis*, *Ximenia americana* and others, and is of the same type as on the flats below, with the same species, except that the *Commiphora* species are mainly concentrated on the slopes rather than the top.

On brown gravelly loam on the flats below we collect, among others:

Ipomoea obscura (L.) Ker Gawl. var. *obscura* (5275), a prostrate perennial herb with cream flowers (*ips = worm, homoios = like, alluding to the creeping habit*);

Convolvulus sagittatus Thunb. (5276), another prostrate perennial herb, with linear-lanceolate leaves and small flowers with pale pink crinkled petals;

Lablab purpureus (L.) Sweet subsp. *uncinatus* Verdc. (5277), a perennial twiner with purple flowers and pods banded dark green (*uncinatus = with a hooked end*);

Ipomoea sinensis (Desr.) Choisy subsp. *blepharosepala* (Hochst. ex A.Rich.) Verdc. ex A.Meeuse (5278), semi-erect or prostrate climbing annual with white flowers with purple centre (*sinensis = from China; blepharosepala = with sepals fringed with hairs*);

Momordica welwitschii Hook.f. (5279), an annual climber with tendrils and pale yellow flowers with a darker centre and 2–7 black spots at the base of the petals, the fruits ovoid with blunt soft spines;

Commicarpus plumbagineus (Cav.) Standl. var. *plumbagineus* (5280), ± erect herb with strong woody base and whitish flowers;

Cullen tomentosum (Thunb.) J.W.Grimes (5281), ascending or semiprostrate perennial herb, its flowers with a mauve standard;

Abutilon angulatum (Guill. & Perr.) Mast. var. *angulatum* (5282), erect annual 7–8' (2.2–2.4 m) high, stem markedly angled, often purplish, flowers yellow, conspicuous;

Leonotis nepetifolia (L.) R.Br. (5283), erect herb ± 6' (1.8 m) high, flowers deep reddish orange (*with leaves like a Nepetia, a large genus, also of the Lamiaceae, widespread in the Old World*);

Hibiscus castroi Baker f. & Exell var. *castroi* (5284), much-branched, erect dwarf shrub with small white flowers;

Lippia pearsonii Moldenke (5285), an erect shrub-by herb with woody base, aromatic lanceolate leaves and white flowers with a yellow centre (named after Harold Pearson, founder of Kirstenbosch Botanic Garden and the first scientist to undertake an in-depth study of Welwitschia during expeditions to the Namib in Namibia and Angola).

We collect on brown loamy flats at foot of koppies, about 3 miles (4.8 km) NE of Ohopoho:

Colophospermum mopane (J.Kirk ex Benth.) J.Kirk ex J.Léonard (5293), the ever-present mopane, here mainly in the habit of large trees up to 30' (9 m) high with rough grey bark (the scientific name [referring to the large resin-dotted seeds] of this tree/shrub reminds me of my early violin lessons and my German teacher who called the resin used to roughen the horse hairs of the bow 'Colophonium');

Vachellia hebeclada (DC.) Kyal. & Boatwr. subsp. *tristis* (A.Schreib.) Kyal. & Boatwr. (= *Acacia hebeclada* DC. subsp. *tristis* (Welw. ex Oliv.) A.Schreib.) (5305), (*Vachellia* for Rev. George Harvey Vachell [1798–1839], British priest and plant collector in China; hebe = youth; cladus = branch, young branches with downy hairs; Latin *tristis* = sad), a shrubby tree with slender branches with straight, fairly long thorns, whitish bark on young branches and densely velvety pendulous pods (according to the distribution map in Van Wyk & Van Wyk [2013] only found in northernmost Namibia, not even as far south as the present specimen);

Grewia schinzii K.Schum. (5292), a virgate shrub up to 10' (3 m) high with leaves borne mostly in one plane, $\pm 10 \times 3$ cm, fruit large, single fruit (usually deeply bilobed [Tree Atlas]) hairy, edible but not very tasty; Bernard makes a point of tasting every ripe *Grewia* drupe we collect;

Mundulea sericea (Willd.) A.Chev. subsp. *sericea* (5294), a branched shrublet about 6' (1.8 m) high with whitish bark on young branches, flowers purplish mauve, rather like a *Virgilia*, and yellow-brown linear pods (known as visgif [Tree Atlas]; crushed bark and roots are used as fish poison, also known as omukeka by the Herero who use the branches as tooth brushes [Malan & Owen-Smith 1974]; the species contains rotenone [Von Koenen 2001] which is used, not only in piscicides, but also in insecticides and

pesticides and is poisonous to man; however, as it is known to numb mucous membranes it may be effective against sore gums with the risk of poisoning yourself while cleaning your teeth);

Barleria senensis Klotzsch (5287), a shrublet with pale orange flowers (*senensis* = from Sena on the Zambezi River, in Mozambique);

Barleria mackenii Hook.f. (5297) (Figure 26), a bushy perennial with woody base, 2–3' (60–90 cm) high, with large floral bracts and large mauve flowers with purple base;

Sesbania pachycarpa DC. subsp. *dinterana* J.B.Gillett (5290), a perennial with woody base, here only 3' (90 cm) high but probably growing much taller under favourable conditions, standard yellow inside, densely speckled with blackish purple spots on the back, wings pure yellow, keel greenish white with fine dark blue speckles (genus name derived from the Arabic vernacular name of *Sesbania sesban*, a cultivated plant; Greek *pachys* = thick, fat; *carpos* = fruit);

Senna italica Mill. subsp. *arachoides* (Burch.) Lock (5291), perennial herb with prostrate branches (a weed around kraal sites; an extract from the roots is drunk for stomach aches [Malan & Owen-Smith 1974]);

Justicia betonica L. (5288), a small perennial herb, floral bracts large, white with green venation forming a strobilus-like inflorescence, flowers labiate-like, white with mauve palate (*Betonica*, a genus now placed under *Stachys*);

Corchorus asplenifolius Burch. (5298), prostrate perennial herb with yellow flowers (*koreo* = to purge, refers to the laxative properties of some species);

Eragrostis superba Peyr. (5300), a densely tufted perennial with ascending culms (a fairly palatable climax grass [Müller 2007]);

Eragrostis rotifer Rendle (5302), a tufted erect perennial, growing in moist places (Latin *rota* = wheel, and *fero* = I bear, refer to the whorled arrangement of the secondary axes on the main culm);

Urochloa oligotricha (Fig. & De Not.) Henrard (5303), a densely tufted erect perennial with somewhat thickened hairy base, growing near a watercourse (*Urochloa* from Greek *oura* = tail, and *chloa* = grass, refer to the sharp-pointed lemma of the floret; Greek *oligos* = few and *trichos* = hair, refer to the sparse hairs on the vegetative parts of the plant; this specimen was used for the illustration in Müller [2007]);

Cenchrus ciliaris L. (5304), a shrub-like, tufted perennial climax grass (*Herero name*: orurenda, *widespread in the highlands but now scarce in heavily grazed areas* [Malan & Owen-Smith 1974]; *genus name from Greek kenchros = manna, presumably referring to its pasture value*; *ciliatus = with cilia, refers to the hairs that surround the spikelet*);

Dicoma tomentosa Cass. (5289), a small annual herb with dirty yellow discoid capitula with spiny involucre bracts; we note that it is very common throughout *Colophospermum mopane-Terminalia* veld, but have collected it only once;

Limeum argute-carinatum Wawra ex Wawra & Peyr. var. *argute-carinatum* (5295), a small prostrate annual with linear-lanceolate leaves and small white flowers (*Limeum is apparently a name used by the ancient Gauls; Adamson in Adamson & Salter [1950] derives it from Greek loimos = a plague*);

Ocimum americanum L. var. *americanum* (5296), an annual herb with lanceolate somewhat aromatic leaves, flowers with a short corolla with mauve petals, the lip deep mauve, stamens much exerted (*from okimon, an aromatic plant*);

Geigeria ornativa O.Hoffm. subsp. *ornativa* (5299), a low annual with yellow florets (*after Prof. Geiger, a German pharmacist*);

Eragrostis sp. (5301), noted in the field books as: *E. micrantha*, a soft annual, growing in moist places.

The veld looks beautiful and the bag below is arranged according to growth forms to convey a more visual impact:

Trees: *Colophospermum mopane*, *Vachellia hebeclada* (= *Acacia hebeclada* subsp. *tristis*).

Shrubs: *Grewia schinzii*, *Mundulea sericea* subsp. *sericea*.

Dwarf shrubs: *Barleria senensis*, *Justicia betonica*, *Sesbania pachycarpa* subsp. *dinterana*, *Barleria mackenii* (Figure 26).

Perennial herbs: *Corchorus asplenifolius*, *Ocimum americanum* var. *americanum*, *Senna italica* subsp. *arachoides*.

Succulents: Nil.

Geophytes: Nil.

Perennial grasses: *Cenchrus ciliaris*, *Eragrostis superba*, *Eragrostis rotifer*, *Urochloa oligotricha*.



Figure 26. *Barleria mackenii*.

Annuals: *Dicoma tomentosa*, *Eragrostis micrantha*, *Limeum argute-carinatum* var. *argute-carinatum*, *Geigeria ornativa* subsp. *ornativa*.

At Ohopoho, in the garden of Ben van Zyl, we take specimens of:

Cyphostemma uter (Exell & Mendonça) Desc. (5286) (Figure 27), a shrub or dwarf tree with a massive succulent stem spreading mainly over the ground surface, with smooth white to yellow bark peeling in paper-like flakes, leaves 5-palmate, covered in papilla-like excrescences, fruits in clusters of scarlet berries with black hairs (a typical *Kaoko* endemic also known from *Namibe Province* in southwestern Angola).

Near this beautiful specimen, of what the Tree Atlas calls *Kaoko Kobas* or in Herero *omutindi*, is a water tap with a somewhat aged washer, with the result that the tap drips, and there is a little puddle at the base of it, where *mossies* (sparrows) and the like come to drink. This situation has been observed by a Green-backed Heron, surely the brainiest of herons. A specimen of this species assumes its totally immobile position next to the tap and persists in this manner until an unsuspecting birdie lands within beak's reach, with the result that it rediscovers itself in heron's belly.

(If you should doubt this brainiest-of-herons bit: have you seen the video of the Green-backed Heron catching fish by depositing bread in the water?)

2 April: Ohopoho and surroundings

Two miles (3.2 km) E of Ohopoho on a small koppie topped by weathered granite boulders; our collections include, in growth form sequence:

Trees: *Vachellia nilotica* (L.) P.J.H.Hurter & Mabb. subsp. *kraussiana* (Benth.) Kyal. & Boatwr. (= *Acacia nilotica* subsp. *kraussiana*) (5311) (*Christian Ferdinand Friedrich von Krauss* [1812–1890], a German scientist, traveller and collector, amassed more than 2 300 species of which 340 species and 34 genera were described as new, of which many were called after him).

Dwarf shrubs: *Monechma divaricatum* (Nees) C.B. Clarke (5310); a small bush 1' (30 cm) high with grey-green leaves and pale mauve flowers.



Figure 27. *Cyphostemma uter*.

Perennial herbs: *Ruellioipsis setosa* (Nees) C.B. Clarke (5321), prostrate, hairy, leaves dirty green, flowers blue, growing in an eroded watercourse.

Geophytes: *Oxalis purpurascens* T.M. Salter (5314), bulbs elongated with brown tunic, flowers pinkish mauve (*Oxalis* derived from Greek *oxys* = acid, and *als* = salt, referring to the acid taste of the leaves; *purpurascens* = becoming purple [Latin]).

Perennial grasses: *Fingerhuthia africana* Lehm. (5313), a densely tufted perennial (reasonably palatable to stock, can be regarded as a climax species in dry regions of Namibia [Müller 2007]);

Triraphis ramosissima Hack. (5315); shrub-like, densely tufted with hard, brittle, much-branched culms, inflorescence brownish purple (subclimax grass, due to hardness of culms only young plants are grazed [Müller 2007]; genus name from Greek *tri* = three, and *raphis* = needle, referring to the three-awned lemma);

Enteropogon rupestris (J.A. Schmidt) A. Chev. (5317), an erect, bushy perennial with worm-like inflorescence (genus name from Greek *enteron* = interior, and *pogon* = grass, possibly alluding to the awned florets; *rupestris* = associated with rocks).

Annuals: *Stipagrostis hirtigluma* subsp. *pearsonii* (Henrard) De Winter (5307), a fine-leaved erect to geniculate annual (not highly palatable but utilised nevertheless [Müller 2007]);

Polygala pallida E. Mey. (5312), a small, erect annual with linear leaves and mauve flowers;

Enneapogon cenchroides (Licht. ex Roem. & Schult.) C.E. Hubb. (5316), a tufted annual covered with short glandular hairs, growing in rock crevices (a pioneer grass, very valuable as a forage grass and contributes substantially to the grazeable material of the veld; Greek *ennea* = nine, *pogon* = beard, refers to the nine awns on the lemma [Müller 2007]);

Enneapogon desvauxii P. Beauv. (5306), a small, tufted annual or perennial with cleistogamous basal sheaths (a pioneer or subclimax grass, plays an important role in preventing soil erosion, valued as grazing in degraded areas; Nicaise August Desvaux [1784–1856] was a French botanist [Müller 2007]);

Euphorbia inaequilatera Sond. var. *inaequilatera* (5308), a small, prostrate annual with ovate-lanceolate leaves;

Triraphis purpurea Hack. (5309), densely hairy, sparsely tufted annual, on bare patches under

trees (widespread pioneer grass, unpalatable [Müller 2007]);

Brachiaria malacodes (Mez & K. Schum.) H. Scholz (5318), very loosely tufted annual, rooting at the nodes, growing between rocks (valuable pasture grass; in northern Namibia and Angola [Gibbs Russell et al. 1990]; Greek *malakos* = soft or gentle, refers to the soft habit);

Kohautia caespitosa Schnizl. subsp. *brachyloba* (Sond.) D. Mantell (5319), a small annual with greenish flowers;

Justicia heterocarpa T. Anderson subsp. *dinteri* (S. Moore) Hedrén (5320), a small annual with mauve flowers, growing in shade (the genus name honours James Justice [1698–1763], a Scottish horticulturist).

On flats at Ohopoho with fine powdery, grey-brown loam, dominated by annuals:

Indigofera holubii N.E. Br. (5322), a prostrate annual with flame-red flowers and linear pendent pods (widely distributed);

Eragrostis sp. (5323), an erect annual with ample drooping inflorescence (not identified);

Aristida adscensionis L. (5324), an erect tufted annual (widespread pioneer grass only grazed in vegetative stage, otherwise undesirable [Müller 2007]).

Six miles (9.6 km) E of Ohopoho on road to Ovamboland; on the banks of a dry watercourse with light brown powdery loam:

Berchemia discolor (Klotzsch) Hemsl. (5325), a large tree 25' (7.5 m) high with rough dark grey bark, leaves discolorous, berries ovoid, yellow-orange, edible; Herero name: *othombe* (omuve according to *Tree Atlas and Malan & Owen-Smith [1974]*, the latter also report that large quantities of the fruit are collected in the late summer of which many are dried and stored for later use; a strong alcoholic drink is distilled from the fruit; M. Berchem was a 17th century French botanist);

Momordica humilis (Cogn.) C. Jeffrey (5326), a scandent or prostrate herb with cylindrical fleshy fruit (Latin *humilis* = low-growing);

Marsdenia sylvestris (Retz.) P.I. Forst. (5327), apocynaceous climber with woody base, young branches twining, with small yellow flowers (genus name after William Marsden, a 19th century secretary to the Admiralty, orientalist and plant collector; *sylvestris* = dwelling in forest, wild);

Heteropogon contortus (L.) Roem. & Schult. (5328), an erect tufted perennial (*subclimax grass, reasonably good grazing until it starts flowering; Greek heteros = different, pogon = beard, referring to the male spikelet that is awnless and the female spikelet that is awned; Latin contortus = twisted, refers to the twisted awn [Müller 2007]*);

Bothriochloa insculpta (A.Rich.) A.Camus (5329), a caespitose, perennial grass, (*found throughout Africa but apparently rare in Namibia [Gibbs Russell et al. 1990]; bothros [Greek] = pit, refers to the pit on the back of the glumes [Müller 2007]*);

Hermbstaedtia angolensis C.B.Clarke (5330), an annual, its flower spikes white, tinged pink (*Sigismund Friedrich Hermbstädt [1760–1833] was a professor of Chemistry and Pharmacy in Berlin*);

Oropetium capense Stapf (5331), a small, densely tufted perennial, 10 cm high, on shallow soil (*plays an important role in soil formation; the genus name derived from Greek oros = mountain, and peto = to seek, possibly referring to a habitat preference [Müller 2007]*);

Zehneria marlothii (Cogn.) R.Fern. & A.Fern. (5332), an annual cucurbitaceous climber with tendrils and ± cordate leaves, very small white flowers and globose fruit, still green, about 0.6 cm in diameter (*Joseph Zehner was a botanical artist*).

Half a mile W of Ohopoho on a dolomite outcrop:

Monsonia senegalensis Guill. & Perr. (5333), a small, ascending annual with pink flowers;

Commelina forskalii Vahl (5334), a herbaceous perennial rooting at the nodes, with cleistogamous underground flowers on the rhizomes, flowers light blue (*named by Linnaeus after two Commelin brothers and a nephew*);

Euphorbia inaequilatera Sond. var. *inaequilatera* (5335), erect, much-branched annual with pinkish stems and yellow-green flowers (*Latin inaequilaterus = with unequal sides, referring to the shape of the leaves*);

Hibiscus fleckii Gürke (5336), an erect annual with dagga-like leaves, flowers white, pink when fading (*named after Dr Eduard Fleck [fl. 1890] a German geologist who collected plants around Rehoboth in 1888 [Gunn & Codd 1981; Müller 2007]*);

Tinnea rhodesiana S.Moore (5337), erect shrublet 2' (60 cm) high, flowers with inflated calyx, liver-coloured corolla, seeds winged (*after Henrietta Tinne, a Dutch woman who collected along the Nile in 1861*);

Dalechampia scandens L. var. *cordofana* (Hochst. ex Webb) Müll.Arg. (5338), a perennial twiner with

irritating hairs, flowers greenish (*cordofana = from Cordoba, Spain*);

Pegoletia oxydonta DC. (5339), erect perennial with woody base, viscous, capitula discoid with yellow-orange florets (*F.B. Pegoletti was a 14th century Italian; the specific epithet from Greek oxus = sharp, and odontos = tooth, referring to the sharply toothed leaves*);

Marsdenia macrantha (Klotzsch) Schltr. (5340), perennial twiner with tough pliable stems with white latex.

Four miles (6.4 km) W of Ohopoho, on red sandy flats at foot of mountain in *Colophospermum mopane–Terminalia prunioides–Stipagrostis uniplumis–Schmidtia* association:

Sesamum pedalioides Welw. ex Hiern (5341), erect annual with pinkish mauve flowers;

Tephrosia villosa (L.) Pers. subsp. *ehrenbergiana* (Schweinf.) Brummitt var. *ehrenbergiana* (5343), erect bush with woody rootstock, calyx ferruginous, corolla violet (*genus name from tephros = ash-grey, referring to the grey-green or silvery leaves of many species; Latin villosus = softly hairy*);

Acrotome inflata Benth. (5344), erect, weedy annual with white flowers (*Greek akron = summit, and tomos = to slice*);

Oxygonum alatum Burch. var. *alatum* (5345), a semiprostrate annual with white flowers and 2-winged fruits (*Greek oxys = sharp, and gonia = an angle, referring to the 3-angled fruit*);

Hermannia tigrensis Hochst. (5346), an annual with thin stems and branches, soft leaves and orange flowers; much like *Hermannia modesta* (5166);

Acalypha ciliata Forssk. (5347), annual (*widespread in Africa including Angola*);

Hibiscus rhabdotospermus Garcke (5348), a soft annual with irritant hairs and pink flowers (*also recorded from Namibe Province in Angola [Leistner in Figueiredo & Smith 2008]*);

Brachiaria deflexa (Schumach.) C.E.Hubb. ex Robyns (5350), annual, growing in shade (*a palatable pioneer grass mainly in shaded areas [Müller 2007]; also found in Angola, particularly in the southwestern provinces [Leistner in Figueiredo & Smith 2008]*);

Alectra orobanchoides Benth. (5352), perennial parasite on roots of *Myrothamnus flabellifolius*, with purple stem and yellow flowers (*genus name derived from alektor/alektruon = a cock, alluding to a cock's comb*).

First trip

(to Otjihende [Ombepera], 3–15 April)

3 April: Ohopoho–Otjiwero

The great day has arrived to venture further into the unknown, now that Ohopoho and surroundings have been fairly exhaustively investigated. This first trip (Figure 28) is to take us in a roughly northwesterly direction to near the top of the Van Zyl's Pass, which was then still under construction. All ready and rearing to go, we are off, late in the day, one well-laden, (still) trusted International bakkie and its four occupants. (*On a postcard written to my brother in Pretoria on*

the third of April I mention that 'we have rather suddenly decided to leave probably still today on a tour of three weeks into the interior during which you will obviously not hear from us. We are well equipped, have two very good assistants, the car is in good condition, therefore everything should be fine'.)

Why did we take only one vehicle and leave the Ford in Ohopoho? Well, two vehicles means double your petrol consumption, double the potential of breakdowns, tyre problems, you name it. And I suppose we rely on the quiet confidence that things will work out alright.

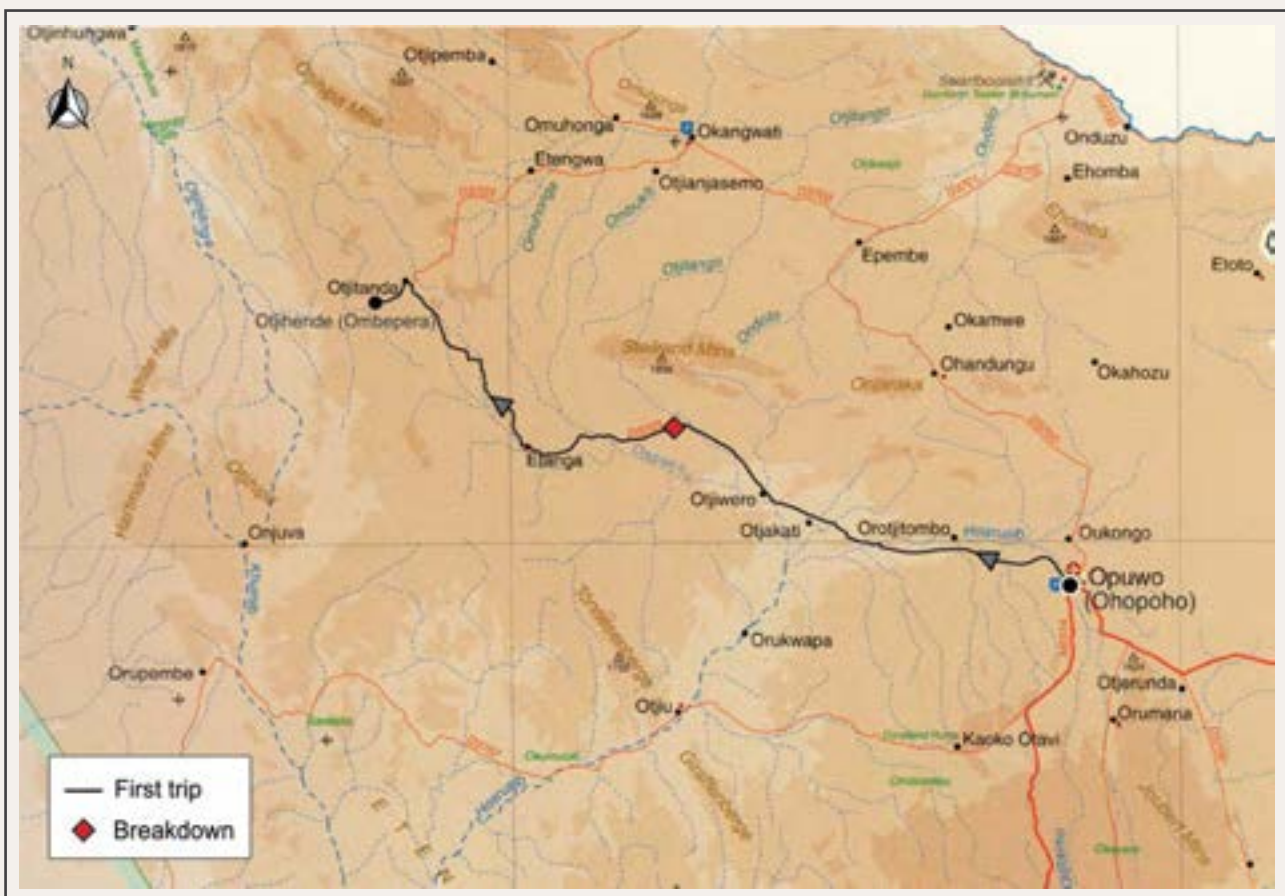


Figure 28. Map showing our first trip, starting at Ohopoho (Opuwo) in the SE corner. Basemap from Mendelsohn et al. (2002) edited with QGIS.

From the Ohopoho basin, surrounded on all sides, except the north, by the Kaoko calcrete plateau, we set off on a track that leads into the broad valley of the upper Hoarusib River, south of the Steilrand Mountains. For the first 15 miles (24.1 km) the track runs NW and then \pm W, roughly parallel to the Hoarusib River, after which it crosses the riverbed to continue in a west-north-westerly direction to Otjiwero, a small Himba settlement some 30 miles (48.3 km) from our place of departure.

Seeing that we left late and wanted to reach Otjiwero, and the track was no highway, we had no time for collecting. Before the sun exhausts its last rays we pitch our tent on the sandy banks of the Ososonu (Onene Ondonthu) River, a tributary of the Hoarusib (Abel [1954] calls it the western Hoarusib) which runs past Otjiwero. (*The name Ososonu was at the time not found on any map; but, as mentioned before, the names in the Kaokoveld were very far from standardised at the time due to its remoteness and especially its tightly closed borders.*) Whatever you call it, the river offers us not only a friendly sandy bank to pitch our tent on, and thus a temporary home, it even boasts an en suite bathroom with running water – most welcome and refreshing and utilised more than once.

4 April: Otjiwero

We have hardly rubbed the sleep out of our eyes when two Himba men and juveniles approach our tent: 'Môôle', they greet us and inform us with wide grins that we had visitors last night: four lions have come to within 25 m of our tent, as we can confirm by their spoors (Figure 29). (*Otjiv(w)ero apparently means 'large gap' or 'wide entrance' [Raper 2004]*).

Invigorated by such interest in our affairs we make our first botanical records of this trip on the sandy bank of the Ososonu River near our camp.

We record trees typical of the major rivers/riverbeds in the Kaokoveld: *Faidherbia albida*, *Combretum imberbe*, *Vachellia erioloba* (= *Acacia erioloba*), *Ziziphus mucronata*, *Euclea pseudebenus*, *Tamarix usneoides* and:

Hyphaene petersiana, a species restricted to localities with ample ground water. The swollen portions seen in the upper half of the stem of many specimens of these palms make me wonder whether they are perhaps due to a period of seven years of



Figure 29. Inspecting the lion spoors. In foreground (from left to right): Abner, Bernard, Andreas.

great plenty in the distant past (Figure 30), (*Hyphaene* from Greek *hyphainein* = to entwine, referring to the fibres surrounding the seeds; Wilhelm Carl Hartwig Peters [1815–1883] was a German zoologist who collected animals and plants in Mozambique).

We collect, among others:

Dactyloctenium aegyptium (L.) Willd. (5355), an ascending, soft annual, recently seen as a weed in a Windhoek garden (a palatable pioneer grass; Greek *daktylos* = finger, *ktenos* = a little comb, referring to the digitate inflorescence composed of comb-like spikes; *aegyptium* = from Egypt [Müller 2007]);

Eleusine coracana (L.) Gaertn. subsp. *africana* (Kenn.-O'Byrne) Hilu & de Wet (5356), an erect annual (eleusine, probably not after Eleusis, an industrial suburb of Athens but rather after the mystical religious festival held there every September in Classical times);

Tamarix usneoides E.Mey. ex Bunge (5358), a shrub on bank of river, flowers small dirty white (the genus name is the Classical Latin name for tamarisk trees; some references derive the name

from the river *Tamaris*, now known as *Tambro*, in the Pyrenees, the mountain range between France and Spain; *usneoides* = resembling the old man's beard lichen *Usnea*);

Panicum maximum Jacq. (5359), a tufted perennial with soft leaves (one of the most palatable and most valuable climax grasses [Müller 2007]);

Euclea pseudebenus E.Mey. ex A.DC. (5360) a shrub-by tree up to 5 m high, berries black when ripe (genus name from the Greek *eukleia* = fame, referring to the good wood, which according to the specific epithet, resembles the true ebony);

Vachellia erioloba (E.Mey.) P.J.H.Hurter (= *Acacia erioloba*) (5361), a tall tree with roughish grey bark (the most widespread tree in Namibia, locally extending into the Namib, recorded 3 376 times in 883 of the 1 140 quarter degree squares containing trees or large shrubs in the country, by 179 persons taking part in the atlasing project [Tree Atlas]; and, of course, the tree in the old Südwest Lied: 'So hart wie Kameldornholz ist unser Land...' = 'Our country is as hard as camel thorn wood...');

Sesamum schinzianum Asch. (5362), a perennial herb with narrowly lanceolate leaves and



Figure 30. *Hyphaene petersiana*.



Figure 31. Where *Terminalia prunioides* is dominant the colour of the fruits imparts a reddish hue to the landscape.

smallish pinkish mauve flowers (*Sesamum* is the Greek and Latin name for sesame);

Ipomoea tuberculata Ker Gawl. (5365), a twiner with shiny leaves and large whitish flowers (*Ipomoea* derived from *ips* = worm, and *homoios* = like, alluding to the creeping habit);

Jamesbrittenia canescens (Benth.) Hilliard var. *laevior* (Dinter) Hilliard (5366), dense, aromatic dwarf shrub with small yellow flowers (*James Britten* [1846–1924] was Keeper of Botany at the British Museum of Natural History).

The vegetation of the granite and quartzite mountains at Otjiwero differs little from that recorded on the dolomite hills around Ohopoho. We record:

Trees: the two most common species are the almost ubiquitous *Colophospermum mopane* and *Terminalia prunioides*, the latter known as the *Blutfruchtbaum* (= bloodfruit tree) in Namibia because of its bright red to purplish, winged fruits which often cover the entire tree, and may impart their hue to whole tracts of the landscape (Figure 31). Other trees include *Croton gratissimus* and *Combretum apiculatum*.

Shrubs include the following very widespread species: *Boscia foetida*, *Catophractes alexandri*, *Grewia villosa*, *Montinia caryophyllacea*, *Rhigozum brevispinosum* and *Sesamothamnus guerichii*. (Here again, as Dinter [1909] remarks: 'where *Catophractes alexandri* occurs, you will almost always find *Montinia acris* [its former name]. This is obviously not always the case elsewhere).

Small perennial **succulents** and **geophytes**: none are recorded.

The commonest **annuals** by far are four grasses: *Eragrostis annulata*, *Eragrostis porosa*, *Monelytrum luederitzianum* and *Schmidtia kalahariensis*. Non-graminoid annuals include *Geigeria ornativa*, *Gisekia pharnaceoides* and *Tribulus terrestris*.

Still at Otjiwero on red sandy flats at the foot of the mountain, in *Colophospermum mopane*–*Terminalia prunioides*–*Catophractes* association we photograph:

Pterodiscus aurantiacus Welw. (5375) with bright orange-red flowers and straw-coloured, winged fruits growing among stones (Figure 32). Its caudex is partly above and partly below ground. (According to Ihlenfeldt [2010] the above-ground



Figure 32. *Pterodiscus aurantiacus*.

part is covered by a transparent papery bark which is very similar to that of *Sesamothamnus*. He speculates that the caudex may be derived from a small [neotenic?] bottle tree with a thickened, water-storing root.)

Bernard compiles a list of sight records of mountain vegetation on a mixture of granite and quartzite:

Trees: *Colophospermum mopane* +++++, *Combretum apiculatum*, *Commiphora glaucescens*, *Commiphora tenuipetiolata*, *Hyphaene petersiana*, *Pachypodium lealii*, *Terminalia prunioides* +++++.

Shrubs: *Boscia foetida*, *Catophractes alexandri*, *Commiphora* sp. nov. (eaten by elephants), *Commiphora* sp. (succulent leaves), *Commiphora pyracanthoides*, *Grewia bicolor* group, *Grewia tenax* var. *tenax*, *Grewia villosa*, *Gossypium anomalum* subsp. *anomalum*, *Montinia caryophyllacea*, *Rhigozum brevispinosum*, *Senegalia ataxacantha* (= *Acacia ataxacantha*), *Sesamothamnus guerichii*.

Dwarf shrubs: *Forsskaolea candida*.

Perennial herbs: *Cleome angustifolia* subsp. *diandra*, *Leonotis nepetifolia*, *Neorautanenia mitis*.

Succulents: Nil.

Geophytes: Nil.

Perennial grasses: *Eragrostis nindensis*, *Stipagrostis uniplumis*.

Annuals: *Antheophora schinzii*, *Aristida effusa*, *Eragrostis annulata* +++, *Eragrostis porosa* +++, *Geigeria ornativa*, *Gisekia pharnaceoides*, *Melinis repens* subsp. *grandiflora*, *Monelytrum luederitzianum* +++++, *Pogonarthria fleckii*, *Pupalia lappacea*, *Schmidtia kalahariensis* +++++, *Tribulus terrestris*, *Urochloa brachyura*.

5 April: Otjiwero

On a granite and sandstone koppie at Otjiwero we collect and photograph:

Sesamum rigidum Peyr. subsp. *merenskyanum* Ihlenf. & Seidenst. (5391), its flowers are like those of foxglove in shape and unlike those of other species of *Sesamum* in this respect (a subspecies,

undescribed at the time, of a species considered the most primitive representative of its section and putative ancestor of species that colonised NE Africa [Ihlenfeldt 1994];

Cryptolepis decidua (Planch. ex Benth.) N.E.Br. (5389), a rounded shrublet about 2' (60 cm) high with narrow glaucous leaves, fruits purplish brown (Greek *krypto* = hidden and *lepis* = scale).

Here we also collect the almost ubiquitous *Catophractes alexandri*, surprisingly not in the company of *Montinia caryophyllacea*. We also bag two Cyperaceae, a family not much in evidence in the region. Both are growing in pockets of soil on large granite boulders:

Kyllinga welwitschii Ridl. (5393) a small perennial with white heads of flowers (Peder Kylling [c. 1640–1696] was a Danish botanist); and:

Cyperus squarrosus L. (5396), a small annual with chestnut-brown spikelets (Cyperus = a sedge).

As one proceeds westwards the average annual rainfall decreases, which is demonstrated in the diminishing size and density of trees and shrubs. (The average annual rainfall at Ohopoho is in the vicinity of 340 mm [as mentioned earlier], at Otjiwero around 250 mm, and, continuing on our track, at Etanga \pm 200 mm and at Ombepera, the end station of this trip, situated on the northern escarpment, probably little more than 150 mm. As will be mentioned later, the latter figure, deduced from rainfall maps [Mendelsohn et al. 2002] is probably too low). As mentioned under Climate (p. 5), the current average rainfall in the region appears to be significantly lower than during the period under review.

And, as Van Warmelo (1951: 7) reports: [Rainfall] 'figures are deceptive insofar as the rain often falls in patches, so that some parts get five times, and it may well be, fifty times as much as other areas, in the same season. Distribution and rate of precipitation are thus the main factors which cause the tremendous variations and make each year seem different from all preceding ones'.

6 April: Otjiwero–Etanga

From Otjiwero the track continues in a northwesterly and later westerly direction to a small settlement which we record as Omutati, probably on the advice of Andreas. (The Omutati on the Shell Namibia [1996]

map lies some 35 miles [56.3 km] to the south on the Hoarusib River; we will pass through the area on our third trip but it is not mentioned in our notes.)

Two miles (3.2 km) W of Omutati we collect:

Adenium boehmianum Schinz (5406), a striking erect shrub with one or two somewhat succulent stems rooted in rock fissures. Its leaves are very shiny and the tubular flowers are pinkish red with a darker throat. Andreas tells us that the Hereros used its sap to poison their arrows for lion hunting. We record the Herero name as *ouzuoo* (in the *Tree Atlas* it is spelled *ouzuwo*). (According to Codd in *Flora of southern Africa* Vol. 26 the genus name was derived from *Oddaejn* or *Aden* which Forsskål recorded as the common name for *Adenium obesum* on an expedition to the Arabian Peninsula. Pehr Forsskål, a Danish student of Linnaeus, died in 1763 before he could complete his venture but not before he named many new plants, a fair number of which we collected on our expedition. *Aden*, the commercial capital of Yemen, was presumably named after the plant; or did Forsskål record the name as a locality and not as a common name? The rather similar genus name *Adenia* belongs to a genus of *Passifloraceae* represented in the *Welwitschia Desert Group* by *Adenia pechuelii* which we did not encounter. Its genus name is derived from the Greek *aden* = gland and refers to glands on the leaf stalk and flowers.)

A few miles further down the track we arrive at Etanga, a major settlement on the Etanga River (Figure 33), a tributary of the Hoarusib, which is just coming down in fairly gentle flood.

Soon after our arrival we are greeted by some local men and youths who take the opportunity to admire themselves in our outside rearview mirror. Our field notebook records them as being Herero (but that is a mistake: they are clad in traditional Himba garb [Figure 34] and Van Warmelo [1951] remarks that: 'all the Herero in the Kaokoveld wear European clothing').

(In a letter from Ohopoho dated 17 April, after completion of this, the first trip, I write that the Himba speak Herero, which reminds me, time and again, of 'our East African languages' [my five young years in the green hills of the Usambara Mountains were still very vivid in my memory]. Men and women wear leather aprons, front and back. Unmarried men shave their heads bare except for a central crest which they fashion with all sorts of ingredients into a long plait. Thus these fellows often look exactly like Native Americans especially since their features are



Figure 33. Etanga River with Bernard testing the water.



Figure 34. Himba youths.

not markedly negroid. When they gallop past you on their horses you can really imagine you are seeing *Winnetou in the Wild West*. The married men wear their hair long but covered by a leather cloth. The Himba are a proud people.)

7 April: Etanga

From Etanga the track leads westwards, veering gradually in a northwesterly direction. Three miles (4.8 km) from Etanga, at the foot of the Steilrand Mountains, on brown sandy slopes with perpendicular weathered granite outcrops and loose quartz pebbles Bernard compiles the following list:

Trees: *Bridelia tenuifolia* var. *tenuifolia* and, as to be expected, *Colophospermum mopane* + + + +, *Combretum apiculatum* + + +, *Commiphora* species, in this case *C. glaucescens* with striking reddish brown papery bark peeling off in strips and *C. mollis* with a rounded crown, *Terminalia prunioides* + + +.

Shrubs: again the 'species pair' *Catophractes alexandri* and *Montinia caryophyllacea*, *Commiphora pyracanthoides*, *Elephantorrhiza suffruticosa*, *Grewia bicolor*, *Grewia tenax*, *Rhigozum brevispinosum*, *Ximenia americana* var. *microphylla*.

Dwarf shrubs: *Barleria* sp. (koppie-type), *Melhania damarana* (which is very common in central Kaokoveld), *Myrothamnus flabellifolius*, *Xerophyta squarrosa*.

Perennial herbs (sometimes annual): *Aizoon fruticosum* (now split into three species of which two occur in Namibia), *Aizoon schellenbergii*, *Crotalaria* sp., *Dicoma tomentosa*, *Evolvulus alsinoides*, *Galenia fruticosa*, *Hermannia modesta*, *Indigofera* sp. (heterotricha-type), *Monsonia* sp. cf. *senegalensis*, *Phyllanthus* sp. and *Vernonia* sp.

Small perennial succulents: Nil.

Geophytes: Nil.

Perennial grasses: *Aristida meridionalis* (+ + in parts), *Eragrostis nindensis* + +, *Stipagrostis uniplumis* and *Triraphis ramosissima*.

Annuals are mostly grasses: *Anthephora schinzii*, *Aristida effusa* + + +, *Cleome rubella*, *Cyathula orthacantha*, *Entoplocamia aristulata*, *Eragrostis dinteri*, *Geigeria acaulis*, *Marcellipsis welwitschii*, *Melinis repens* subsp. *grandiflora*, *Urochloa brachyura*.

On a small granite outcrop with *Commiphora mollis*, *Combretum apiculatum* and *Myrothamnus flabellifolius* we collect:

Grewia flavescens Juss. (5415), a shrublet with square grooved stems about 4' (1.2 m) high, berries edible; the Herero name: *omuhe*;

Lepidagathis scariosa Nees (5418), an acanthaceous shrublet about 1' (30 cm) high with grey leaves, flowers bluish mauve; growing in rock crevices (Greek *lepis* = *scale or flake*, and *agathos* = *good*; Latin *scariosus* = *of thin dry membranous texture*).

Nearby, on a stony slope with brown loam in *Colophospermum mopane*–*Terminalia prunioides* association we encounter the first small perennial succulents seen on the current trip:

Ceropegia lugardiae N.E.Br. (5426), a perennial climber (Greek *keros* = *wax*, *pege* = *fountain*, referring to the appearance of the flowers; the epithet honours Charlotte Eleanor Lugard who accompanied her husband, Edward James Lugard on an expedition to Ngamiland [1897–99], during which she collected and made watercolour paintings of a number of species); and:

Ceropegia carnosia E.Mey. (5426A), a perennial climber with fleshy leaves.

But still nothing that one would describe as a geophyte. Are we here at the wrong season, did we not look critically enough, or is the Kaokoveld not a good place for geophytes?

On a small granite outcrop nearby we collect two species, undescribed at the time:

Aeollanthus namibiensis Ryding (5414A) a very aromatic annual labiate with slightly succulent pinatifid leaves and small pale mauve flowers growing in pockets of soil (*genus name from Aiolos, the Greek god of wind*, *anthos* = *flower*); and:

Euphorbia caperonioides R.A.Dyer & P.G.Mey. (5420), an erect annual to weak perennial with linear leaves and rugose fruits (*described by R.A. Dyer and P.G. Meyer of the Botanische Staatssammlung, München in 1966*).

On the flat sandy banks of the wide shallow sandy bed of what we call the Etanga River, near our camp site:

Diospyros lycioides Desf. subsp. *lycioides* (5437), a widespread tall shrub with ripe scarlet fruits and the Herero name *omundumbili*; (*Malan & Owen-Smith [1974] spell it: omundumbiri; the suffix mbili is the Kisuaheli word for 'two' which*

is similar to the isibili of Zulu, and may refer to the large seeds of which there are usually two; Greek dios = divine, pyros = wheat, literally 'celestial food', referring to the fruit which include the persimmon);

Pavonia senegalensis (Cav.) Leistner (5428), a shrubby perennial herb with woody base and large striking yellow flowers with a purplish eye; as the name indicates also widely distributed (transferred from *Hibiscus* to *Pavonia* because it has 10 stigmas, not only 5);

Melanthera triternata (Klatt) Wild (5430), an exotic annual with attractive yellow radiate heads, resembling a *Bidens* (seeing that the Himba in general plant no crops, least of all ornamentals, it is a mystery how the seed got here. If it was found downstream of Ohopoho you might think of water-dispersal but that hypothesis would be false seeing that the Etanga River rises on the western lofty Steilrand Mountains [up to about 1 800 m high], not in the Ohopoho region; perhaps its fruits, although not with persistent barbed awns, can attach themselves to passers-by, e.g. a headman returning from tribal council at Ohopoho. We will collect it again (5850) near the fountain at Warmbad, also in the shade. Seeing that

shade is a rather rare commodity, at least in the western regions, it is unlikely that *Melanthera triternata* will spread here as readily as, for example, *Verbesina encelioides*, also a garden escape, did on farms in the dune Kalahari).

Nearby on the flat sandy banks of the river we erect our camp underneath huge specimens of *Faidherbia albida*. We estimate their height at 18 m and the diameter more than 1 m. Bark rough, grey; young branches grey-green. The photo taken of the sunset with the silhouettes of Bernard and the massive *Faidherbia* in the foreground, the glistening streaks of water in the riverbed and the dark trees in the background, is almost fit for a travel brochure (Figure 35) (Louis Léon César Faidherbe [1818–1889] was a French army officer who served in West Africa).

8 April: Etanga

At Etanga on a brown sandy loam slope covered with granite fragments in *Colophospermum mopane*–*Terminalia prunioides* association we collect:



Figure 35. Bernard with sundown (but without -er).

Microchloa caffra Nees (5443), (the specimen used by Blythe Loutit to illustrate the species for M.A.N. Müller's [2007] Grasses of Namibia. As stated in that work, it is a short, tufted perennial pioneer grass usually found on shallow, stony soil on slopes, where it plays an important stabilising role; Greek micro- = small, and chloa = grass).

Nearby we collect and photograph a plant also typically found on shallow soil over rocks and also able to survive extreme desiccation:

Craterostigma plantagineum Hochst. (5444), a low perennial with a basal rosette of broadly ovate-lanceolate leaves purplish below, ± adpressed to the ground and with creamy flowers with royal blue markings (genus name from Greek krateros = mouth of a volcano, which refers to the cup-shaped stigma; plantagineus = resembling a *Plantago*, referring to the leaves).

On a hillock consisting of large slabs of weathered granite we collect:

Alectra orobanchoides Benth. (5449), a hemiparasite on the roots of *Rhigozum brevispinosum* with stems orange-yellow underground, and deep blackish purple above ground; its flowers are deep yellow with 3 faint purple nerves on each petal; the calyx yellow-green (rhigios = stiff, ozos = a branch; orobanchoides = resembling *Orobanche*, a large cosmopolitan genus of parasitic plants represented in southern Africa by two introduced weeds).

Other trees or shrubs on the sandy riverbank include:

Searsia pyroides (Burch.) Moffett var. *pyroides* (5450) (genus name honours Paul B. Sears, a 20th century botanist and head of Yale School of Botany; pyroides = resembling a pear);

Commiphora africana (A.Rich.) Engl. var. *africana* (5452), a much-branched shrublet 3 m high with bark grey, not peeling, branchlets spinescent, ripe berries red, with an arillus enveloping practically the whole seed;

Spirostachys africana Sond. (5453) (speira = spiral, and stachys = spike);

Combretum hereroense Schinz (5457) (the mouse-eared combretum [Tree Atlas]), and a twiner with milky latex;

Pergularia daemia (Forssk.) Chiov. subsp. *daemia* (5456), with pendulous flowers (Latin pergua =

trellis work, referring to the climbing pattern of these plants).

9 April: Etanga–Otjihende/ Ombepera

We set off in a general northwesterly direction heading for Ombepera. At about 10.5 miles (16.9 km) from Etanga we have to cross a dry sandy riverbed some 20 m wide with steep sandy banks some 3 m high. In spite of 4-wheel drive and high engine revs, we get stuck in the far bank (Figure 36):

(Had we deflated our tyres we would probably have made it without much trouble but then we would have had to inflate them straight away after crossing the river because of the rocky track that can be expected ahead.) With the help of Andreas and Abner and a few local men we are soon moving again. Unshaken by the mishap we collect a few specimens including three composites:

Helichrysum candolleianum H.Buek (5461), a perennial herb about 1' (30 cm) high, leaves, whitish tomentose, involucre bracts pinkish white (Greek helios = sun, and chrysos = gold);

Emilia marlothiana (O.Hoffm.) C.Jeffrey (5462), with white capitula; and:

Ursinia nana DC. subsp. *nana* (5462A) (genus name after Johann Heinrich Ursinus [1608–1667], author of a book on plants in the Bible).

The track now climbs to an altitude of 1 200 m and more, above the level of Ohopoho.

After some 22 miles (35.4 km) in a northwesterly direction we come to Otjitanda where we collect:

Plectranthus hereroensis Engl. (5463) on a rocky granite outcrop (genus name from Greek plektron = spur, and anthos = flower, referring to the spurred flowers).

Some eight miles (12.8 km) to the west brings us to Otjihende which we take to be Ombepera. (Seeing that the name Ombepera has been used consistently for all records from here I shall continue to use it throughout this story. Among the maps at my disposal at present the name Ombepera appears only on two rather basic maps from the early 1950s: Van Warmelo [1951] and Abel [1954], on which it would appear to be situated a few miles northeast of Otjitanda.)



Figure 36. Stuck in sandy riverbank with (from left to right): Bernard, Abner, Andreas, unknown Himba man.

10 April: Otjihende/Ombepera

Otjihende or Ombepera (*as we shall continue calling it*), is the point of return of our first trip from Ohopoho into the wild Kaokoveld. It lies close to the escarpment, formed here by the Otjihipa Mountains, near the beginning of what will be the famous/infamous Van Zyl's Pass which is still under construction. The creator of this pick-and-shovel marvel is Ben van Zyl. He has no 4-wheel drive vehicles or any kind of earth-moving machinery at his disposal. The only mobile equipment available is a 3-ton lorry with extra large rear wheels and with the good ground clearance typical of these vehicles. The same was soon to come to our rescue. Ben and his men work on the pass over the years whenever they are in the vicinity. The main incentive for building the pass, he told us, was to shorten the route of his regular inspection tours of the region. The pass leads down from the edge of the escarpment into the magnificent Marienfluss: a sight, once seen – never forgotten, and to be visited on our third trip.

On a rocky hillock at Ombepera we collect, amongst others:

Sterculia quinqueloba (Garcke) K.Schum. (5474), an erect tree with smooth creamy white bark which leaves a fine white powder on your hand as you rub over it (which earned it the name *meisieboud* or *vrouensboud* [= *girl's buttocks* or *lady's buttocks*], as Bernard informs me unblushingly) (*but which the Tree Atlas, in more serious mood, calls the large-leaved sterculia*) and which peels in strips;

Cucumis africanus L.f. (5468), a prostrate perennial, rooted in crevices in rocks, its ripe fruit with the odour of cantaloupe (sweet melon) but rather insipid; two species of *Solanum*:

Solanum catombelense Peyr (5469), a dwarf shrub with spiny young stems, leaves velvety below, and with orange fruit (*Solanum is the Latin name for plants of the nightshade family, perhaps derived from Latin solamen = comforting [medicine]: several species have sedative qualities; catombelense probably refers to a locality*); and:

Solanum multiglandulosum Bitter (5470), a woody perennial with orange spines on young branches and small, globose orange fruit; as well as:

Tylophora fleckii (Schltr.) N.E.Br. (5471), an erect virgate perennial with grey-green leaves, flowers

greenish yellow with dark corona, fruits usually single (Greek *tylos* = knob or lump, and *phoreo* = bearing, referring to the corona lobes);

Kalanchoe lanceolata (Forssk.) Pers. (5473), its Herero name: *ombukapuke*; at last, another small succulent!

Ombepera, being the last and most westerly locality of this our first trip, it may be of interest to give a complete list of plants collected and/or recorded on a steep, very rocky slope, with large weathered granite boulders. The commonest tree is:

Sterculia africana var. *africana* (5474), a very large tree 40' (\pm 12 m) high with rounded canopy, bark creamy white or russet in parts, flowers greenish cream. Like its sister species, *S. quinqueloba*, the *meisieboud* referred to on p. 61, which also occurs here, it stirs the imagination of two unwed botanists starved of female companionship by its smooth white bark which peels or flakes off to reveal a green underbark. (*The Tree Atlas* calls *Sterculia africana* var. *africana* bluntly *Sterculia*, the southern tree fraternity somewhat misguidingly African star-chestnut because its fruit resemble a chestnut);

Colophospermum mopane (J.Kirk ex Benth.) J.Kirk ex J.Léonard, as was to be expected, is also well represented.

As we begin to realise, the escarpment zone is particularly rich in *Commiphora* species (from Greek *kommi* = gum, and *phora* = bearer) and we list the following: *C. mollis*, *C. glaucescens*, *C. multijuga* and:

Commiphora discolor Mendes (5490) (undescribed at the time), an erect 10 m tall tree with deep green foliage and bark peeling in papery horizontal strips; its Herero name: *omulele*, as Andreas tells us (spelled in the *Tree Atlas* as 'omurere') (four *commiphoras* in one locality is no great shakes in the Kaokoveld);

Combretum apiculatum subsp. *leutweinii* (5498) (*Combretum* is the Classical name of a climbing plant of another genus; *apiculatus* = ending abruptly in a short sharp point, referring to the leaves; Theodor Leutwein was the first governor of Deutsch Südwestafrika);

Combretum hereroense Schinz (5457) (= from Hereroland);

Vachellia reficiens (Wawra) Kyal. & Boatwr. subsp. *reficiens* (= *Acacia reficiens* subsp. *reficiens*) with the Herero name: *omungondo* and:

Senegalia robynsiana (= *Acacia robynsiana*) (a Kaoko endemic also not yet described at the time),

and known to Afrikaans-speaking Namibians as *hemelbesem* and to German-speaking Südwest-er as *Antennenakazie* because of its bizarre habit (which the *Tree Atlas* describes as an untidy open shrub with a few very long, slender, whip-like branches reaching to the sky; there is no record of it from 1712 DB, the Ombepera area, in the *Tree Atlas*).

Two well-known and loved trees of the bushveld are also here:

Sclerocarya birrea subsp. *caffra*, the marula (known to the Hereros as *omungongo*, and used by them to make utensils such as wooden pails or the otjiya-slab on which a harder rod [ongune] is twirled to make fire; the marula fruits are eaten or used to brew beer; but fruit-bearing trees are seldom felled [Malan & Owen-Smith 1974]); and:

Spirostachys africana, the tamboti (its strongly scented heartwood is carved into beads [otupapa], used in necklaces by Herero women [Malan & Owen-Smith 1974]).

Also on the list is a species of:

Maerua, perhaps *M. schinzii*, known as *lammerdrol* (= lamb's droppings) in Namibia, because of the appearance of its fruits.

Among the shrubs, again the three stalwarts, or may one say musketeers?: *Montinia caryophyllacea*, *Catophractes alexandri* and *Rhigozum brevispinosum*; also common is a species of the *Grewia bicolor* group.

Species less often seen are:

Thamnosma africana Engl. (5484), an erect, broom-like, strongly aromatic member of the Rutaceae with small greenish yellow flowers, its Herero name: *odjehale* (genus name from Greek *thamos* = bush, and *osme* = fragrance);

Cissus nymphaeifolia (Welw. ex Baker) Planch., an erect, shrubby or scandent shrub with large \pm cordate leaves and scarlet berries;

Adenium boehmianum Schinz with its shiny leaves which are large compared to the average leaf in the community (Herero name: *ouzuwo*, meaning poison; the plant produces a powerful blood poison, well known and widely used; the milky root latex in which the toxin is most concentrated is extracted, heated until viscous and then applied to arrow heads; this poison becomes more potent if mixed with the sap of *Euphorbia kaokoensis*. Depending on where the arrow strikes, a large animal will usually collapse

within two to twelve hours after being hit. Apart from the immediate vicinity of the wound, which is cut out, the meat of animals killed in this fashion is regarded as safe for eating [Malan & Owen-Smith 1974];

Ozoroa crassinervia (Engl.) R.Fern. & A.Fern. (not recorded from 1712 DB in the Tree Atlas) and:

Senegalia ataxacantha (DC.) Kyal. & Boatwr. (= *Acacia ataxacantha*), an erect shrub up to 3 m high, consisting of several slender pliable stems, with thorns scattered at random on the stems; its Herero name: *oluejo* (or *oruweyo* as it is given in the Tree Atlas).

The commonest dwarf shrub is *Acalypha fruticosa* var. *fruticosa*; other dwarf shrubs or low shrubs are *Myrothamnus flabellifolius*, *Corchorus angolensis*, *Helichrysum tomentosulum* (Klatt) Merxm. subsp. *tomentosulum* (5448), *Barleria lancifolia*, *Blepharis obmitrata* with the Herero name: *onjenja*, *Barleria meeuseana* (unknown to science at the time) and *Indigofera adenoides*.

Perennial herbs or suffrutices are rather poorly represented: *Forsskaolia candida*, *Sesamum schinzianum*, *Cienfuegosia digitata*, *Artemisia afra*, ?*Lefebvrea grantii*, *Commelina* sp. and *Pavonia gossweileri*.

No small perennial succulents are recorded, but, at last, a genuine geophyte (!):

Lapeirousia otaviensis R.C.Foster (5481), with edible corms and the Herero name: *onzondungua* (this is probably the *Lapeirousia* sp. that Malan & Owen-Smith [1974] record as 'widespread on the highlands', under the Herero name *onduvi*; genus name after Philippe Isidore Picot de Lapeyrouse [1744–1818], botanist).

The presence of a fair number of perennial grasses indicates that the average annual rainfall here is probably significantly higher than ± 150 mm which one could deduce from the rainfall map in Mendelsohn et al. (2002): *Enneapogon scoparius*, *Anthephora pubescens* with the Herero name *otjimbele*, *Oropetium capense*, *Heteropogon contortus*, *Stipagrostis uniplumis*, *Eragrostis nindensis*, *Triraphis ramosissima*, *Aristida meridionalis*, *Andropogon chinensis*, Herero name: *edjangolo*, *Eragrostis rotifer* with the Herero name *olueo*, and *Melinis longisetata* subsp. *bellespicata*.

As mentioned under Climate (p. 5), the current average rainfall in the region appears to be significantly lower than during the period under review.

Annuals are well represented (all known to science at the time). The majority are again grasses: *Aristida effusa*, *Melinis repens* subsp. *grandiflora*, *Schmidtia kalahariensis*, *Eragrostis porosa*, *Danthoniopsis dinteri*, *Aristida* cf. *rhiniochloa*, *Eragrostis rogersii*, *Enneapogon cenchroides* (is it a true annual?), *Urochloa brachyura*, *Eragrostis annulata* and *Anthephora schinzii*; the legumes *Leobordea platycarpa* (5440) and *Tephrosia dregeana* var. *dregeana* (5442), two Amaranthaceae species: *Nelsia quadrangula* and the weedy *Pupalia lappacea*; the rest of the species each representing a different family: *Evolvulus alsinoides*, *Hermannia modesta*, *Gisekia pharnaceoides*, *Geigeria acaulis*, *Tribulus terrestris*, *Aeollanthus neglectus* and *Ceratotheca integribracteata* subsp. *elliptica*.

11 April: Otjihende/Ombepera

On the last day in the Ombepera area Bernard compiles a long list of species on a SE-facing mountain slope consisting of brown loam with moderately large loose boulders of granite with smaller quartzite pebbles, with the dominant trees: *Colophospermum mopane*, *Combretum apiculatum* and *Terminalia prunioides*.

Species not recorded yesterday include the rutaceous tree:

Zanthoxylum ovatifoliolatum (not recorded from 1712 DB in the Tree Atlas).

Shrubs or shrubby perennials like *Azima* sp., most probably *A. tetracantha* (also not in the Tree Atlas from here), *Grewia villosa*, *Helinus integrifolius*, *Amphiasma merenskyanum* of the Rubiaceae, a family rather sparsely represented in 'our' Kaokoveld, *Otop-tera burchellii*.

Dwarf shrubs such as *Petalidium rossmannianum*, a species of *Xerophyta*, the perennial grass *Triraphis ramosissima*, and surprise, surprise – two geophytes: *Cyperus esculentus* and *Oxalis purpurascens*.

We take note of so much more than we record in our notebooks (*I sorely wish we had!*), such as our feathered friends (*of which I knew not many more than* *Motacilla capensis* – *Cape Wagtail*, and *Passer melanurus* – *Cape Sparrow*). The two bushveld birds, indelible in my mind: the Yellow-billed Hornbills with the perfectly fitting scientific name: *Tockus leucomelas* with their haunting tok-tok-tocking and their preposterous yellow nose-piece; and the ever-present *Corythaixoides concolor* with the perfectly fitting

common name: Grey Go-away-bird (*then the Grey Lourie*) which at first makes you feel guilty for transgressing on its peaceful bushveld idyll, but eventually let's you wish *he* would go away and stop mocking you with your insignificant quest.

And for the melancholy moments, which I can not specifically recall but which there must have been on occasion, what better accompaniment than the *doo, doo, doodo, doo, doo, doo, doodo-do-do-do* of the Emerald-spotted Wood Dove, descending in pitch and accelerating towards its lamenting conclusion; or the Heimweh-inducing call of its nocturnal counterpart, also embellished with characteristic spots, the Pearl-spotted Owllet: *phú, phú, phú, phú, phú, phú* rising in pitch and ending clear and wide-ranging: *éééoo, éééoo, éééoo, éééoo* fading into the silent night.

Collections of the day at Ombepera include the trees:

Euphorbia guerichiana Pax (5501), an erect, very slender tree 3 m high, with cream-coloured bark peeling horizontally in papery flakes, with a little latex (genus name after *Euphorbus*, 1st Century physician to King Juba of Mauretania);

Combretum apiculatum Sond. subsp. *leutweinii* (Schinz) Exell (5498) (*Theodor Leutwein* was the first governor of German SWA [1898–1905] and was greatly interested in the vegetation of the territory);

Sclerocarya birrea (A.Rich.) Hochst. subsp. *caffra* (Sond.) Kokwaro (5499) (Greek *skleros* = *hard* and *karya* = *nut*, refers to the hard kernel of the fruit; the specific epithet derived from *birr*, the vernacular West African name of the marula; *caffra* from 'British Caffraria', a former region in the Eastern Cape. The name is derived from Chaldean *cofar*, 'infidel'. The eastern section of Africa was called *Cofar* by the Arabs because the inhabitants did not have the same religion as theirs; these people they called *Cofars* or *Caffers* [Raper 2004]);

Croton gratissimus Burch. var. *subgratissimus* (Prain) Burt Davy (5500) (Greek *kroton* = *tick*, because the seeds resemble ticks);

Ozoroa crassinervia (Engl.) R.Fern. & A.Fern. (5497), with leaves smelling like the fruits of *Searsia* (= *Rhus*) species, and having thick, conspicuous nerves;

Obetia carruthersiana (Hiern) Rendle (5503), an urticaceous soft-stemmed perennial up to 12' (3.6 m) with very irritating stinging hairs and prickles; rooted in rock crevices;

Sesamothamnus sp. (5504) a new species, described in our notes as: a tall, branched tree with angular, rather flattened branches and trunks, the bark cream, coming off in small irregular papery flakes. (*Ihlenfeldt [2010]* deals with it under the name *Sesamothamnus leistneri* [ined.] [Figure 37] and mentions that the species has a small distribution area, and that it was only discovered in 1957 and is still awaiting formal description. In an email of 12 June 2011 *Ihlenfeldt* mentions two reasons for this delay: an uncertainty regarding the exact locality where our number 5504 was found, and the fact that he could not trace the prospective holotype: Giess 9381. The GPS given for 5504 in the Excel list of the De Winter & Leistner collection kindly provided by Hester Steyn of SANBI Pretoria is very close to that given for *Otjitanda* [17° 37' 23" S 12° 51' 36" E] on the 1:620 000 map of Kaokoland by *Info Map [2003]* and by *Joubert [1997]*. But the GPS readings in the Excel list of the De Winter & Leistner collection were obviously not taken in the field but were later assigned when the collection was computerised by herbarium staff. We had progressed westwards beyond *Otjitanda* to the area we considered to be *Ombepera* but which is really *Otjihende*, and it is here that we collected our number 5504. A specimen of the new species was collected by *Ihlenfeldt* at 17° 38' 48.5 S 12° 45' 737 E, almost exactly the position which *Joubert [1997]* gives for *Otjihende* [our *Ombepera*], namely: 17° 38' 33" S 12° 45' 28" E.



Figure 37. *Sesamothamnus leistneri* (ined.). Photo kindly provided by Hans-Dieter Ihlenfeldt.



Figure 38. Flowers of *Sesamothamnus leistneri* (ined.). Left: Hawk moth's-eye view; right: side view, length of tube ± 100 mm. Photos kindly provided by Hans-Dieter Ihlenfeldt.

As Ihlenfeldt (2010) mentions, flowers provide the most reliable characters for distinguishing *Sesamothamnus* species. Of the three species found in the Kaokoveld *S. benguellensis* has a distinct long spur and the flowers are typically in a \pm horizontal position and the basic colour is white; *S. guerichii* stands out by its yellow dependent flowers with exserted anthers, whereas in *S. leistneri* [ined.] the flowers are basically white [Figure 38], without a spur and are borne in an upright position. Ihlenfeldt [2010] mentions that the species of *Sesamothamnus* grow slowly and are confined to shallow arid [only edaphically arid in the case of *S. lugardii*] soil in relatively undisturbed vegetation. Two species are confined to NE Africa.

In a discussion of the putative phylogeny of *Sesamothamnus* Ihlenfeldt [2010] writes: 'It is tempting to consider *S. leistneri* as the most primitive living species due to the tree-like appearance, the lack of a nectar storing device, flowering during the season with fully developed leaves and an indumentum with sparse mucilage hairs with rectangular heads; one could also add the apparently relict type of distribution'. In a phylogenetic tree of the Pedaliaceae, mainly based on morphological data and some plausible assumptions, Ihlenfeldt [2010] places the tribe

Sesamothamneae with sole genus *Sesamothamnus*, in a basal position. And he mentions that recent preliminary molecular data from 11 genera are congruent with that phylogenetic tree.)

We also collect *Albizia brevifolia* Schinz (5510), a very lax, spreading shrub with dull dark green leaves and large flat, pendulous pods; *Grewia bicolor* Juss. var. *bicolor* (5507); *Tinnea rhodesiana* S.Moore (5508); *Petalidium coccineum* S.Moore (5509); and *Chascanum pinnatifidum* (L.f.) E.Mey. var. *pinnatifidum* (5511).

12 April: Otjihende/Ombepera– Etanga–(Breakdown 1)

We break camp at Ombepera (or rather Otjihende) and begin our return to Ohopoho along the route we came on. Having lost precious time at the beginning of our expedition, due to impassable tracks, we limit our collecting and rather make for Ohopoho and new fields.

Nine miles (14.5 km) E of Ombepera, at the foot of a mountain in a kloof, on granite, we collect:

Cyphostemma currorii (Hook.f.) Desc. (5517) (Figure 86), a very large tree 6 m tall with thick succulent stem and light brown papery bark flaking in large irregular pieces (as mentioned in the *Tree Atlas*, it is potentially threatened by the pachycaul trade).

Two miles (3.2 km) further we collect on sandy flats with granite outcrops:

Euphorbia mauritanica L. var. *namaquensis* N.E.Br. (5513), an erect, many-stemmed, leafless, spineless succulent, 60 cm high (specific epithet meaning 'from Mauritania', a name used for NE Africa sens. lat.).

At Otjitanda we turn southeast on the track to Etanga. Past Etanga and about nine miles (14.5 km) east of Omutati we have to cross a rocky dip, when we hear a loud cling and crunch, and our International refuses further cooperation. When we jump out we see that the rear wheels are no longer in the position where they ought to be (Figure 39).

Looking under the truck we discover that the nuts of the shackles attaching the back axle to the right-hand leaf

spring have worked loose with the result that the axle has shifted its position and the universal joint in front of the differential on the back axle has broken, scattering small silver balls all over the show and leaving the drive shaft dangling on the ground. There is no point in collecting the balls, except perhaps for sentimental reasons. A much larger part has also fallen out and has to be found because it still has a job to do. It is a small metal block, about 10 × 6 cm and 3 cm thick which fits between the axle and the spring and has the function of increasing the distance between these two items by 3 cm, thus raising the spring and thus the chassis, 3 cm higher above the ground. We search, all four of us, for hours but the block has mysteriously vanished. Fortunately the block under the left-hand spring is still more or less in place. And Bernard copies it to a T, in hard mopane heartwood, with the help of a small saw and a folding knife. But the block is not just a block: it has a hemispherical recess on its underside into which a peg on the axle fits. A drill we have not got. So we heat a short iron rod, and bit by bit burn the required recess into the mopane block. And, if it hasn't been forcefully removed, it still raises our poorly assembled and badly designed International bakkie 3 cm extra above this Earth; bless its rubber boots, as remarked before! Neither the axle, nor the springs, nor the shackles are damaged and all nuts are still present. So it is merely



Figure 39. Breakdown 1 with Bernard and Andreas.



Figure 40. The pyramid with Otto and Andreas.

a matter of removing the drive shaft and fixing the axle back in position, and our front-wheel drive International is mobile, albeit with surprisingly diminished effectivity. (*Daniel Smit, my son-in-law, produced technical drawings that his lecturer would have been proud of to reconstruct the crime scene, and he was not surprised that we didn't find the missing block. He is convinced that we lost it some way back and that the drive shaft plus universal joint held the axle precariously in position until we drove through the rocky dip.*)

Whenever we have to remove a wheel for a lengthy period we boost (or is it rather 'underpin'?) our confidence in our bottle jack by constructing a stone pyramid under the chassis (Figure 40).

Before Bernard has produced the spare part and before we have established that our bakkie is again potentially self-propelled, we are under the impression that we can not get home without assistance. (*Satellite phones were obviously unheard of and radio connections were dicey, and we didn't have whatever elaborate radio apparatus we might have needed, in any case. There was only one radio in the Kaokoveld, namely in Ohopoho, with which contact could be made, with a bit of luck, with the police at Kamanjab.*) The lot falls upon Abner to walk to Ohopoho and

call for help. Armed with a blanket and some provisions he, somewhat reluctantly, sets off on a solo hike of 52 miles (= 83.7 km) to Ohopoho through largely uninhabited country known to harbour elephants and, who knows? – the odd lion. (*It takes Abner less than 48 hours to reach Ohopoho, obviously not wasting much time with sleeping. And fortunately his epic march is accomplished without any mishaps*). Meanwhile we continue work on the International and hold thumbs for Abner. Three days later, in the middle of the day, 15 May 1957, Ben van Zyl and Abner arrive with the indefatigable Chevrolet truck with the super-sized back wheels. (*Bernard relates that he will never forget the look on Abner's face when he sees that the International is again mobile.*)

We limp home following Ben. The front-wheel drive bakkie feels very unstable and is difficult to keep straight. We have to ford a wide riverbed with nearly vertical sandy banks complete with rounded boulders embedded in the compacted sand during a major flood many moons ago. Our International has very little traction on his (her?) front wheels, and obviously none on the back, and although Ben carries all our heavy possessions on his truck we have great trouble mounting the far bank. With one attempt we hit a very substantial boulder. The impact is so violent that the differential is

dented (can cast iron dent?) and we fear the worst. But fortunately there are no grinding noises from the front. After the third or fourth fruitless attack Bernard asks Ben to have a go. Ben replies (freely translated): 'It's your car; you get it out'. And Bernard does so at the next attempt. Without further mishaps and without further botany we arrive at Ohopoho late on the same day.

16–18 April: Ohopoho

Back at base and time for a thorough bath, rather than the veld-style spit and polish with a moist face cloth or, surreptitiously, soapless, in a waterhole to the chagrin of the resident water consumers such as elephants, giraffes, rhinos and untold other four-, six-, eight- and poly-footers, as well as feathered friends. But then, thankfully, as every serious hiker knows: if you give your body bacteria the chance to sort themselves out, rather than interfering daily with soap and other detergents, the good ones tend to get the upper hand over the bad, smelly ones.

(In a letter of 17 April, sent from the wilderness to Pretoria I write [partly lost in translation]: 'The Kaokoveld as it looks at present, and as far as we know it, is definitely not the Kaokoveld as I had imagined it from photos in a supplement of the Cape Argus nor from descriptions by Dr Story [who was here last year]. The former rag presented only photos of the desert region – Skeleton Coast and the like – and Dr Story was here during the dry season. The part of the Kaokoveld that we know is something of a high plateau with intermittent hills and mountains. Of dry riverbeds and rivulets there are more than one would like [most rivers carry water only two or three days after rain]. The vegetation, as far as we know it, is pretty uniform and consists of open mopane forest. The grass cover comprises so few perennials that one can well image that the earth may be 'wüst und leer' [see Genesis 1: 2] during the dry season.

The Commissioner here in Ohopoho [Ben van Zyl] is of the opinion that most of the Kaokoveld is overstocked and that this explains the condition of the vegetation. We are making good progress with our collecting – we have already bagged about 400 different species. We are also busy with the cameras, black & white as well as colour. I am sending a few spools of colour films to Kodachrome with the request to send the developed and framed slides to your address.'

(During our Kaokoveld expedition we made no notes regarding animals encountered, but I see in the

above letter that we saw on this trip herds of springbok, impala and ostriches, a few steenbok and an elephant which escaped to safety 'in panischer Angst', when he saw us. Fortunately we have not encountered any rhino because they are the most dangerous big game in the region [and we might have done what the above elephant did had we been accosted by one of these horny beasties].)

Talking about animals: Bernard had promised a friend in Pretoria that he would look out for snakes and that he might bring some home if at all possible. But we carry no suitable containers with us apart from mountains of rather unsuitable corrugated cardboard boxes (size 440 × 300 × 300, or thereabouts) for housing plant specimens (see Figure 49). As luck would have it we come across a specimen of a species high on the list of desirables: an Angola or Anchieta's Dwarf Python: *Python anchietae*. Wulf Haake, the reptile fundi at the Transvaal Museum, had asked us to look out for just such an animal. When it sees us it escapes up a mopane tree, and, in a split second finds a hole in the stem in which it disappears (*maybe it was its habitual hole*). As another bit of luck would have it, there were two strapping Himba men on the scene who, armed with our axe (Figure 41), split open the stem to expose and grab the reptile.

Now, where shall we put it? Into a cardboard box meant for dry plant specimens, of course. The prisoner is peaceful and calm enough and we close the box and tie it with string. Now, how shall we feed it?

In the course of the next day we encounter some young boys who are ready and willing and able to catch some of the ubiquitous tree rats (*Thallomys pedulcus*) for our dwarf which is only a dwarf by python standard. And we put them in the box, and a day or two later they have disappeared, presumably into the other prisoner.

At one stage we had three snakes in boxes with us. The second one was a *Bitis caudalis*, the Common Single-horned Adder, (which has two 'horns': a small, erect scale above each eye) that I almost stepped on barefoot one morning where it was lying hidden under red sand perfectly matching its colour, except for the top of its horned head, patiently waiting for its prey to approach. I only became aware of it when, from the corner of my eye, I perceived a slight movement in the sand where I was about to plant my foot. Whereupon my foot more than hastily altered its plans. (*By way of consolation I read [Isemonger 1983] that very few bites by horned adders have been recorded and that too small a quantity of venom is injected to be lethal to man, and symptoms usually clear up within a few weeks.*) I can't remember for sure what the third



Figure 41. Himba men hacking open a mopane tree to release a pygmy python.

snake was; I don't think it was poisonous. I do know that they all vanished before we could bring them home and we had a suspicion that the human hand had had a hand therein.

Back to important matters: transport for the next trip. The International in front-wheel drive is obviously

unsuitable and must be repaired. A new universal joint is ordered via radio via Kamanjab from far-away Windhoek and we may expect it within the next fortnight. So, out with the Ford bakkie, without canopy and with rather less loading space, but enough room for the 44 gallon water and petrol drums, the tent and other essential camping gear and provisions.

Second trip

(to Onguruahu [Beesvlakte], not Sesfontein, 19–26 April)

19 April: Ohopoho–Kaoko Otavi

All set and rearing to go on the second trip of exploration and adventure, this time in a southerly direction, with the destination Sesfontein (Figure 42), the place where the first Europeans, German missionaries, were resident in the Kaokoveld in 1845 (Abel 1954).

The track leads south and rises from the Ohopoho basin, at 1 154 m altitude, to the Kaoko calcrete plateau from about 1 200 m upwards. Further on it turns in a southwesterly direction towards Kaoko Otavi. But before we reach that centre we turn around and head back to Ohopoho for reasons unremembered. Later the same day we make again for Kaoko Otavi some 25 miles (\pm 40 km) from Ohopoho. Not far from our destination we see a large heap of stones. Our assistants tell us that these heaps mark a special place and that every passer-by adds another stone.

Kaoko Otavi is situated in a vast limestone basin at an altitude of 1 380 m.

On red sandy calcareous flats with *Colophospermum mopane* just north of the settlement we collect:

Hypoestes forskoolii (Vahl) R.Br. (5525), a small perennial herb with a tough base, branches erect or trailing and rooting at nodes, flowers white with upper lip with purple markings around the throat (Greek hypo = beneath, estia = house, or an undergarment, refers to the calyx being covered by bracts);

Pentarrhinum abyssinicum Decne. subsp. *abyssinicum* (5529), a twiner with greenish, sweetly scented flowers with a cream corona (Greek penta = five, and rhinos = nose [see rhinoceros], referring to corona lobes with horned appendages); two annuals:

Priva auricoccea A.Meeuse (5532), an erect perennial herb with rough, \pm ovate leaves (unknown to science at the time) (Priva from privus = individual; and aureus = gold, and coccus = one of the one-seeded parts into which the fruit splits); and:

Indigofera holubii N.E.Br. (5533), a prostrate perennial herb with flame-red flowers (honouring Dr Emil Holub, [1847–1902] a Czechoslovakian physician, one of the most renowned and versatile collectors to visit South Africa, active especially in the Kimberley area and in the present Botswana [Gunn & Codd 1981]); as well as:

Polygala leptophylla Burch. var. *leptophylla* (5535), a virgate perennial herb with erect branches and pale greenish cream flowers; only one specimen found (*Polygala* from Greek poly = much, and gala = milk, referring to the old belief in Europe that grazing certain species would increase the milk yield of cows);

Cuscuta planiflora Ten. var. *planiflora* (5536), a parasite with greenish cream flowers twining over *Barleria lancifolia* T.Anderson subsp. *lancifolia* (5536A).

About two miles (3.2 km) further north, on red rich loamy flats with a dense cover of grasses, such as *Brachiaria malacodes*, species of *Eragrostis* and *Cymbopogon pospischilii*, our haul includes three perennial herbs:

Asystasia welwitschii S.Moore (5537), another widespread member of the Acanthaceae (from Greek a = without, and stachys = spike, thus not having the flower spike commonly found in the family); the rhizomatous:

Chlorophytum longifolium Schweinf. ex Baker (5545), erect perennial herb 2–3' (60–90 cm) high with linear leaves and 3-winged fruit, not in flower; the first and only member of the Anthericaceae encountered on the trip (Greek chloros = green, and phyton = plant); and:

Lefebvrea grantii (Kingston ex Oliv.) S.Droop (5542), an erect perennial 1.0–1.2 m high, with tuberous roots which, Andreas tells us, are roasted in fire and eaten, tasting somewhat similar to potatoes; their Herero name is *ondunda*.

The dwarf shrub *Eriocephalus luederitzianus* O.Hoffm. (5539) and the annual *Crotalaria barkae* were also collected.

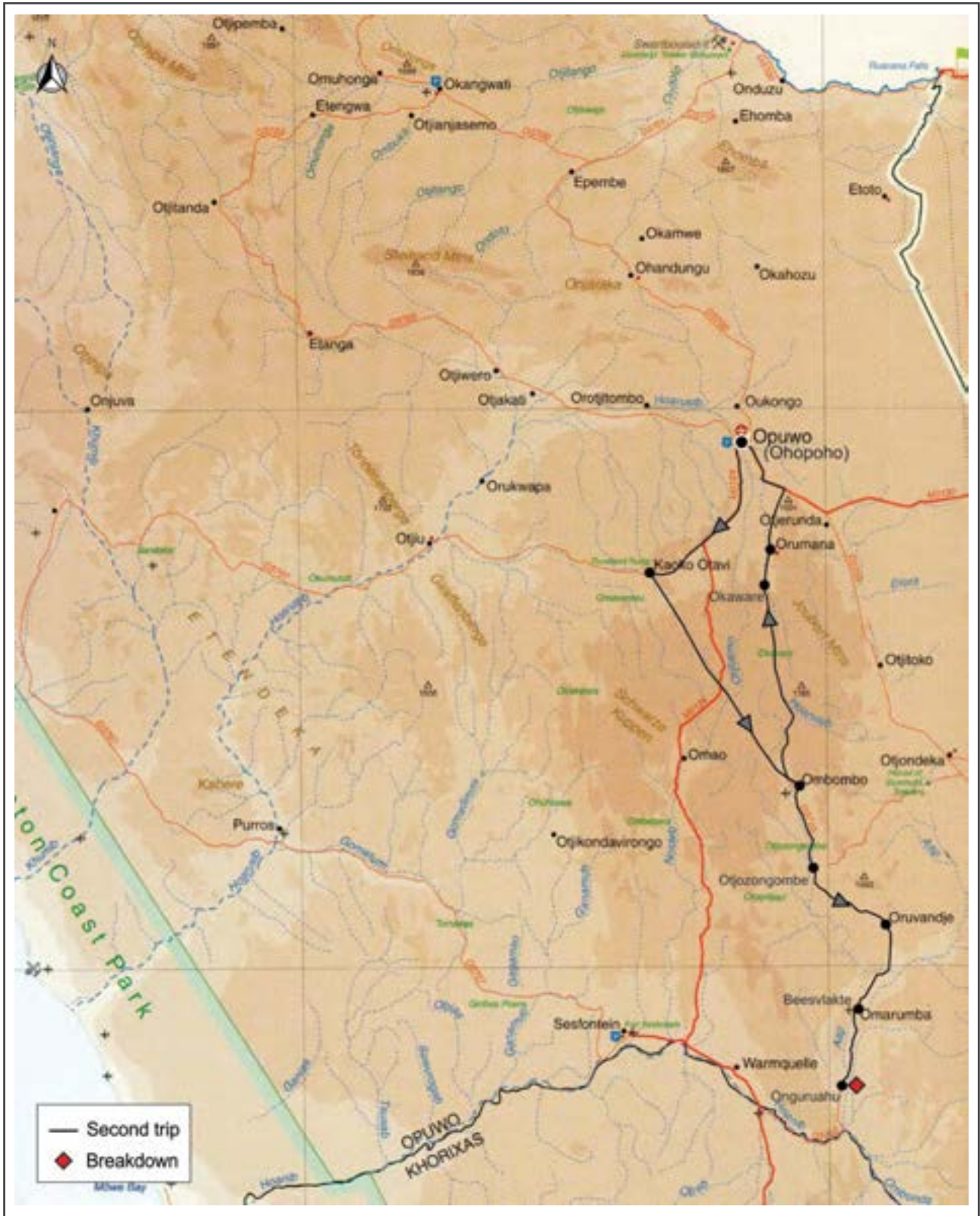


Figure 42. Map with route of second trip starting at Ohopoho (Opuwo). Basemap from Mendelsohn et al. (2002) edited with QGIS.

20 April: Kaoko Otavi

The Kaoko calcrete plateau on which Kaoko Otavi is situated is rich in springs, or waterholes as they are called. The regions to the north and west of the plateau, with older basic rock formations, are less well endowed but also not without springs. In the Kaokoveld as far south as the Ugab River, i.e. including Damaraland, Abel (1954) lists 96 'Wasserstellen' (watering places) of which 63 deliver water even during the dry period. As Abel also mentions, most of the springs are found in the contact zone between dolomite and sandstone. Kaoko Otavi boasts what is thought to be the strongest spring in the Kaokoveld delivering more than 200 000 litres per hour (Malan & Owen-Smith 1974), probably rivalled only by the six springs at Sesfontein which deliver a combined total of 95 000 litres per hour (Hall-Martin et al. 1988).

The spring here at Kaoko Otavi reminds me of Die Oog in Kuruman: in both places the crystal-clear water emerges underneath calcrete or dolomite plates and is overshadowed by impressive trees, here in Kaoko

Otavi by a stately specimen of *omumborongbonga* (*Combretum imberbe*) (Figure 43), a tree of great cultural and religious significance to the Hereros as it is seen as a mediator or link to the spirit of the ancestors or even the originator of the Herero people – thus the wisely chosen German vernacular name *Ahnenbaum*.

W.A. de Klerk, in his book cited earlier (2009 reprint based on an expedition undertaken in 1952), mentions a use of the Ahnenbaum that was new to me: in days gone by inhabitants of the Bushveld mixed its snow-white ash with milk or buttermilk to whitewash walls, thus creating a durable, perfectly impermeable coating.

The emerging stream is dammed up by a low wall, presumably built by the Dorsland Trekkers who settled here in 1879 (Green 1952: 167), creating a shallow dam overflowing into a furrow. It harbours, among many others, a horde of terrapins, perhaps the only creature that I find almost – if I may say so – disgusting. Try and pick one up. Not only, like your common old garden tortoise, will it deploy its liquid chemical weapons, but it also reeks to high heaven and its head and limbs are much more manoeuvrable than in the land version, enabling it to scratch you, however you



Figure 43. Kaoko Otavi fountain with the stately *Ahnenbaum* (*Combretum imberbe*), from W.A. de Klerk (2009), *Drie swerwers oor die einders*. Photo taken in 1952.



Figure 44. Ruins of the church of the Dorsland Trekkers at Kaoko Otavi.

hold it, and to give you a vicious bite if you are not careful. (*Leave the poor animal in peace! Why must you pick it up?*)

The ruins of the church building of the Dorsland Trekkers are still in evidence, consisting of limestone walls about a metre to two high. Some old fig trees in the vicinity (Figures 44, 45) must have been present when the trekkers assembled here for prayers.

In the vicinity of the fountain we collect:

Nesaea luederitzii Koehne var. *luederitzii* (5546), a small perennial growing in mud on the water's edge; its flowers are magenta, the roots covered with a white spongy outer layer.

Nearby grow the small creeping:

Lobelia thermalis (5547) (*named after Matthias de l'Obel [1538–1616], Flemish nobleman, botanist, physician to King James I*);

and the erect annual:

Chenopodium schraderianum (5548), smelling somewhat like *Artemisia* (*Greek cheno = goose, and podion = little foot, referring to the shape of the leaves*).

Along the water furrow below the fountain:

Veronica anagallis-aquatica L. (5556), an annual or short-lived perennial (*honouring St Veronica; Anagallis is a genus of the Primulaceae, aquatica = found in water*); and the annuals:

Bergia polyantha Sond. (5557) belonging to the Elatiaceae; and:

Ammannia baccifera L. subsp. *baccifera* (5558) of the Lythraceae, both families poorly represented or absent in the dry to arid Kaokoveld in our experience;

also two Cyperaceae, a family largely absent in the veld away from water:

Pycnus betschuanus (Boeckeler) C.B. Clarke (5566), a small, rhizomatous perennial herb with chestnut-brown spikelets (*Pycnus is an anagram of Cyperus; the specific epithet obviously chosen by a German-speaker: Betschuana rather than Bechuana*); and:

Cyperus longus L. var. *tenuiflorus* (Rottb.) Boeck. (5567), perennial herb, 3' (90 cm) high with flat leaves and dark brown spikelets (*Cyperus from the ancient Greek name kyperus*).



Figure 45. A Himba man inspires Bernard to record him on film (*Kodachrome, not digital*), with linguistic support by Andreas.

On a dry calcareous slope near the settlement, rather trampled by the cattle of the resident Hereros:

Kalanchoe lanceolata (Forssk.) Pers. (5559), an erect succulent annual, leaves with wavy margins, flowers reddish orange (we collected only two species of *Kalanchoe* in the [summer-rainfall] region covered by our adventure, and these were the only *Crassulaceae* seen – not a single species of *Crassula*, a genus represented in the winter-rainfall Succulent Karoo of the southern Namib by at least 10 species [Mannheimer et al. 2008], and in Angola by at least six taxa [Figueiredo & Smith 2008]);

Cyphostemma omburense (Gilg & M.Brandt) Desc. (5560), a climber with secund branches and tendrils, with scarlet fruits yellow inside when ripe (from the Greek *kyphos* = bent, and *stemma* = wreath or garland; apparently referring to the leaves arising at grotesque angles from the swollen stem [Glen 2004]);

Oxygonum sinuatum (Hochst. & Steud. ex Meisn.) Dammer (5561), an annual with pleasantly sourish leaves which, I am surprised, the goats have left untouched;

Acrotome inflata Benth. (5562), an annual with white flowers in dense globose clusters, a species typical of overgrazed areas;

Boscia albitrunca (Burch.) Gilg & Gilg-Ben. (5563), the stalwart tree of the dry and arid regions of southern Africa, growing often where no other tree can (the second most common large woody species in Namibia [Tree List]; named after Louis Augustin Guillaume Bosc [1759–1828], French botanist, zoologist, entomologist, later horticulturist at Versailles near Paris);

Ipomoea adenioides Schinz var. *adenioides* (5564), a woody shrublet, past flowering but with dry globose fruits containing four seeds with long silky hairs; and:

Steganotaenia araliacea Hochst. var. *araliacea* (5565), a small deciduous tree with leaves smelling of carrots when crushed, with smooth, greenish yellow bark flaking off in small irregular papery pieces when mature (Greek *steganos* = covered, *tainia* = a band, perhaps referring to the bark flaking off in pieces; *araliacea* = resembling members of the genus *Aralia* [Araliaceae] found in North America and Asia; *Steganotaenia* belongs to the *Apiaceae* [carrot family], of which we collected only three species including the new endemic *Phlyctidocarpa flava*).

We have pitched our tent on a calcareous slope under a 40' (13.3 m) high fig tree, its trunk irregularly fluted, the bark smoothish grey, the ultimate branches drooping:

Ficus cordata Thunb. subsp. *cordata* (5570) (*Ficus* is the Classical Latin name for the fig tree); another tree nearby:

Combretum imberbe Wawra (5571), *hardekool* or *Ahnenbaum*, which we estimate at 30' (\pm 10 m) high (imberbe = *beardless*);

Cynodon dactylon (L.) Pers. (5572) which reminds us of the garden at home and which generally grows in dampish, rather than bone dry places (*from the Greek kynos = dog, and odontos = tooth, referring to the tough, scale-like sheaths at the end of the rhizome which look like a dog's teeth*); and another species one expects to find in a garden rather than in the wild veld:

Amaranthus dinteri Schinz subsp. *dinteri* (5574), an erect or ascending annual (*genus name from Greek a = not, and mairaino = to wither, referring to the durability or 'everlastingness' of some species; or if you like a slightly different explanation: Greek amarantos = immortal, refers to the long-lasting qualities of the flowers*); and, surely, a remnant of the gardens of the Dorsland Trekkers:

Physalis peruviana L. (5568), originally from Peru (*and cultivated by the Inca?*), a soft erect annual with brownish yellow flowers with three black spots in the centre, unfortunately without fruit at present, and known as Cape gooseberry, not because it comes from our Cape but because its fruits are hidden under a cape (*Greek physa = a bladder, referring to the inflated calyx surrounding the fruit*); and, who says there are so few geophytes in Kaokoveld?:

Albuca pulchra (Schinz) J.C.Manning & Goldblatt (5573A), an erect herb about 5' (\pm 1.5 m) high with light green leaves and greenish yellow flowers with spreading outer segments (*albus = white, albicans = tending to white, referring to flower colour; pulcher = beautiful*).

21 April: Kaoko Otavi (Easter Sunday and birthday of Otto)

I wake up to a mug of steaming coffee delivered by Bernard to my camp bed: it's my birthday! The first one away from home and in the wild. And not only that – it's Sunday, and not only that – it's Easter Sunday!

Searching for Easter eggs is out – we do enough searching as it is.

But we decide to first earn our keep and to celebrate later.

On a very rough, much-weathered dolomite koppie near the fountain we collect:

Kirkia acuminata Oliv. (5585), a tree 12–30' (3.6–9.0 m) high with a spreading rounded crown and compound leaves crowded at the ends of branches, first seen on Hazeldene, the farm near Kamanjab (*the Tree Atlas mentions that it can be confused with Commiphora crenato-serrata, a Kaokoveld endemic; the genus name honours Sir John Kirk [1832–1922] who accompanied Livingstone and was later British Consul in Zanzibar for many years*);

Zehneria marlothii (Cogn.) R.Fern. & A.Fern. (5578), an annual cucurbitaceous climber with tendrils and \pm cordate leaves, very small white flowers and globose fruit, still green, about 0.6 cm in diameter (*after J. Zehner, a botanical artist*); a second record of:

Kalanchoe laciniata (L.) DC. (5579), an erect perennial with deeply lobed fleshy leaves, flowers cream with yellowish centre; mostly growing in shady places (*when Hellmut Tölken wrote up this species for Flora of southern Africa vol. 14 in 1985, this was the only specimen known from the region but he also records it from SW Angola, Tanzania, NE Africa and beyond to the Arabian Peninsula and India; it is thus a typical disjunct Afro-arid element. The genus name is derived from the Chinese name of one of the species; Latin laciniata = slashed, deeply cut; referring to the leaves*); and three grass species:

Melinis repens (Willd.) Zizka subsp. *grandiflora* (Hochst.) Zizka (5581), as usual in annual habit (*Malan & Owen-Smith [1974] mention that species of Melinis [formerly Rhynchelytrum] are roughly woven into baskets for carrying berries, especially those of Berchemia discolor, for which purpose the soft fluffy spikelets of the genus make them particularly suitable*);

Sporobolus festivus Hochst. ex A.Rich. (5586), a tufted reddish perennial (*from the Greek spora = seed, and ballein = to throw, referring to the pericarp that swells when wet and aids in dispersal of seeds; from Latin festivus = gay or with bright colours, referring to the colour of the grass*);

Eragrostis aspera (Jacq.) Nees (5584), an annual (in Namibia largely confined to the northern regions [Russell Gibbs et al. 1990]);

Flueggea virosa (Roxb. ex Willd.) Voigt subsp. *virosa* (5580), a dense rounded shrub about 6' (1.8 m) high with bright green leaves and small, globose, waxy white berries (formerly placed in Euphorbiaceae, now in Phyllanthaceae; genus name after Johann Flügge [1775–1816], physician and botanist in Hamburg; Latin *virusus* = poisonous, *stinking*);

Hibiscus sidiformis Baill. (5583), an erect annual with irritant stellate hairs and yellow flowers, all features found in the majority of species of the genus (*sidiformis* = with the habit of a *Sida*);

Macrotyloma axillare (E.Mey.) Verdc. var. *axillare* (5587), a leguminous twiner with 3-partite leaves and cream flowers with a purple spot at the base of the standard; and:

Calostephane divaricata Benth. (5588), an erect annual composite with leaves clasping the stem at the base, and small, globose heads with a few yellow rays (from Greek *kallos* = beauty or *kalos* = beautiful, and *stephanos* = crown, referring to the inflorescence).

We celebrate the double occasion by allowing ourselves an afternoon off and indulge in some light reading. Bernard settles down to a copy or two of the *Saturday Evening Post* (on loan from the Van Zyls) and I, generally not a great lover of fiction, take delight in *A many-splendoured thing* by Han Suyin (on loan from Bernard): a strange experience to be transported from wildest Africa to a hybrid world between China and England.

22 April: Kaoko Otavi–Ombombo

We are off to Sesfontein (so we think). Our track winds its way in a southeasterly direction gradually climbing up the Kaoko calcrete plateau. The soil is mostly calcareous, the rock typically dolomite. In parts the track is badly damaged by previous rains and by struggling motor vehicles, and since it is in parts overgrown by tall grass, I have difficulties keeping the Ford out of ruts and holes up to 50 cm deep. (After some 10 km we have reached an altitude of about 1 500 metres.)

In a depression at the foot of a hill we collect two members of the Acanthaceae:

Petalidium rossmannianum P.G.Mey. (5590) the dwarf shrub we have already seen on numerous occasions; and:

Blepharis leendertziae Oberm. (5592) (an annual honouring the memory of Mrs Reino Leendertz, who came from Holland in 1897 to become the first official botanist and, at the same time, the first woman civil servant of the Transvaal Government under Paul Kruger);

Ormocarpum kirkii S.Moore (5593), a dark green shrub about 5' (\pm 1.5 m) high, with compound leaves, not in flower at the time (a tropical species, in Namibia largely restricted to the Kaokoveld) (the genus name from Greek *hormos* = necklace, and *karpos* = fruit: the fruits are constricted necklace-like between the seeds);

Eragrostis rotifer Rendle (5591) a perennial grass often associated with relatively moist sites; and a small live specimen of:

Cyphostemma juttae (Dinter & Gilg) Desc. (not numbered), a shrub or small tree with a swollen stem (according to the *Tree Atlas* it is common to abundant in the present degree square but it is recorded from only three other squares in the Kaokoveld; the *Tree Atlas* also records it as vulnerable to illegal collecting for the pachycaul trade). (Helena Jutta was the wife of Kurt Dinter; she accompanied him on many expeditions and was an energetic and enthusiastic collaborator but none of the plants she discovered were recorded as her collections).

Nearby on an undulating plateau with fragments of limestone and weathered dolomite, in a *Colophospermum mopane*–*Combretum apiculatum*–*Vachellia reficiens* association, we collect:

Plectranthus unguentarius Codd (5595A), an erect, slightly aromatic herb 3–4' (\pm 90–120 cm) high with dirty white flowers. Our assistants tell us that the roots are dried and crushed, together with leaves of what is probably *Zanthoxylum ovatifoliolatum*, plus some other ingredient, to form a pomade highly rated by women; its Herero name: *otjiuḡunḡu* (the species was unknown to science at the time; when Dr Codd had read our notes he chose the epithet *unguentarius*, derived from the Latin *unguentum* = ointment) (Figure 46).

We collect two more useful plants in the same locality:

Tylosema fassoglense (Schweinf.) Torre & Hillc. (5596) a leguminous perennial herb with prostrate runners bearing broad, flat pods; its tubers



Figure 46. *Plectranthus unguentarius*.

are used for medicinal purposes, its Herero name: *otjipiwa* (Greek *tylos* = swelling, and *sema* = [identification-] mark, referring to the twisted knobby seeds; *fassoglense* = coming from *Fazoghli*, a place in the Sudan where it was first collected); and:

Coccinia rehmannii Cogn. (5598) a climber with tendrils and ellipsoid fruit which are scarlet and $1.5 \times 1'' (\pm 38 \times 25 \text{ mm})$ and edible when ripe, and with large tubers which are eaten after roasting in hot coals; Herero name: *otjimaka* (Latin *coccinus* = deep red, referring to the colour of the ripe fruit).

As we stumble over fair-sized limestone stones, Bernard walking in front, almost steps on a snake which raises its head with inflated neck and spits, aiming at his eyes. Fortunately he is wearing sunglasses and is unharmed. And, being passionate nature lovers, we retreat and allow the frightened reptile to take cover. It is obviously a cobra and it has numerous dark bands on a grey-pink body and the head and first part of its long slender body are black. Bernard recognises it as a zebra snake (*western barred spitting cobra*, *Naja nigricincta nigricincta* which is well known to occur in northern Namibia).

Some 17 miles (27.3 km) southeast of Kaoko Otavi we come to the site at which William Hartley is building a dam with the help of some Herero men. The dam, as Ben van Zyl had told us, had been surveyed by a certain Günter Ruppel (*who had been in the internment camp in Southern Rhodesia [now Zimbabwe] with me during the war*). William Hartley is one of the two best known persons in the Kaokoveld at the time, the second being our Andreas. (*William Hartley is the son of George Hartley, a headman of considerable local standing, now deceased, born in c. 1860 at Otjimbingwe, some 100 km northwest of Windhoek. William was the grandson of a White man with the same name and Konḡuu, a Mbandera woman. He came to the Kaokoveld in 1917 after living in Angola and in different places in Namibia. William was born in July 1890 and was, among others, an interpreter at Ohopoho [Van Warmelo 1951]*). William has the appearance and manner of a White person and speaks fluent Afrikaans, German and Herero (*and presumably others, such as Portuguese, as well*).

On the slope of a dolomite outcrop we collect:

Kedrostis foetidissima (Jacq.) Cogn. (5600), a perennial, cucurbit climber emitting, as its specific

epithet indicates, a very foetid odour; next to it, another plant with an epithet in the superlative:

Commicarpus fallacissimus (Heimerl) Heimerl ex Oberm., Schweick. & I. Verd. (5602), a perennial herb belonging to the same family as the four-o'clocks from tropical America (*the epithet from the Latin fallax, meaning wrong, deceptive or fallacious; whether the plant is very deceptive or misleading by closely resembling another species or whether the author was misled to be very wrong in his original assessment is not clear*);

Euphorbia transvaalensis Schltr. (5603), an erect dwarf shrub with lanceolate succulent leaves growing in rock crevices (*Transvaal, a province of the old South Africa, now covered by Gauteng, Limpopo, North-West and Mpumalanga*);

Triaspis hypericoides (DC.) Burch. subsp. *nelsonii* (Oliv.) Immelman (5606), a scandent shrub with twining stem and with fruits breaking up into two or three carpels, each surrounded by a conspicuous shield- or saucer-shaped wing which turns brown to maroonish when ripening, somewhat reminiscent of a *Combretum* fruit;

Crotalaria argyraea Welw. ex Baker (5605), an erect, virgate perennial herb with grey-green leaves (*argyr- = silver-, referring to the silvery hair cover*); as well as two small trees or shrubs:

Erythrina decora Harms (5601), with its distinctive moniliform pods with scarlet seeds with a black spot at the point of attachment (*Greek erythros = red, referring to the showy red flowers; decorus = attractive, decorative*); and:

Searsia ciliata (Licht. ex Schult.) A.J. Mill. (5608), a shrub about 5' (\pm 1.5 m) high with leathery, lanceolate leaflets and branches sometimes spine-tipped.

At about 20 miles (32.2 km) southeast of Kaoko Otavi we collect two woody species on red loamy flats near a watercourse:

Vachellia arenaria (Schinz) Kyal. & Boatwr. (= *Acacia arenaria*) (5609), a many-stemmed shrub with grey bark and long slender, sickle-shaped reddish brown pods (*found usually on sandy soil, as its specific name indicates, recorded from northern Namibia, NE Botswana and Zimbabwe*); and:

Ziziphus mucronata Willd. subsp. *mucronata* (5610), the well known buffalo-thorn (*the fourth most widespread woody species in Namibia, after Vachellia erioloba (= Acacia erioloba), Boscia*

albitrunca and *Senegalia mellifera subsp. detinens* (= *Acacia mellifera subsp. detinens*) [*Tree Atlas*]; *Ziziphus* from the Arabic name *zizouf* for *Ziziphus jujuba*, *the jujube, a dark red edible fruit; mucronata = with a hard, sharp point*).

Near the junction with the Ohopoho–Ombombo road we collect:

Oncocalyx welwitschii (Engl.) Polhill & Wiens (5611), a parasitic dwarf shrub with bright orange flowers growing on *Vachellia reficiens* (= *Acacia reficiens*) (*from Greek onkos = swelling, with swollen calyx*).

About 5 km after joining the main Ohopoho–Ombombo road we arrive at Ombombo, a major settlement with a strong fountain, where we make camp for the night.

23 April: Ombombo

On sandy flats 8.4 miles (13.5 km) south of Ombombo on the road to Sesfontein we collect two species of *Hermbstaedtia* of the Amaranthaceae:

Hermbstaedtia odorata (Burch.) T. Cooke var. *odorata* (5613), the cat's tail or *rooiarbossie*, an erect perennial herb with red flower spikes (*which Koekemoer et al. [2013] have chosen as flagship species of the family due to its wide distribution in southern Africa*); and:

Hermbstaedtia angolensis C.B. Clarke (5612), a tall annual with white flowers with a pinkish tinge (*its name based on a specimen collected by Welwitsch in Angola*); as well as:

Cleome angustifolia Forssk. subsp. *petersiana* (Klotzsch ex Sond.) Kers (5614), an erect perennial herb with showy yellow flowers with a purple spot at the base of the petals.

About 15 miles (24.1 km) south of Ombombo we begin to descend from the calcrete plateau, and some three miles (4.8 km) further we come to a vast plain, flat as a table top, with scattered hills or small mountains, the so-called Beesvlakte formed by the upper Hoanib River or Aap River and its tributaries. (*The Beesvlakte lies at an elevation between about 800 and 1 000 m. Abel [1954] refers to it as the Hundskopf-Fläche [= dog's head plain], the name derived from a mountain 1 538 m high on the northern, upper end of the plain*).



Figure 47. *Aloe hereroensis*.

Having travelled over the dolomite and limestone plateau (geologically belonging to the Otavi Group) we come to a stony dry slope with outcrops of quartzite (of the Nosib Group, a few hundred million years older than the Otavi Group), a type of rock favoured by succulents, a growth form much less frequently encountered on limestone:

Aloe hereroensis Engl. var. *hereroensis* (5615), (Figure 47) with grey-green leaves with a pinkish tinge, longitudinal stripes and whitish spots, the branched inflorescence bearing salmon-pink flowers (genus name from the Arabic name *alloe*; Malan & Owen-Smith [1974] mention that its sap, mixed with warm water is drunk as a remedy for chest and stomach pains):

Sansevieria aethiopica Thunb. (5616), its leaves crescent-shaped in cross section, about 1 cm thick and mottled pale green on dark green background, its berries dark green (according to Malan & Owen-Smith [1974] the roots are placed in milk calabashes to promote [chemical] separation – also for separating butter fat for body ointment; genus name honours Raimondo de Sangro, Prince of San Severo [1710–1771], an Italian scholar);

Stapelia schinzii A.Berger & Schltr. var. *schinzii* (5617) with grey-green, 4-angled stems and liver-coloured flowers 12 cm in diameter (Figure 48) (the genus name after Johannes Bodaerus van Stapel, 17th century Dutch botanist and physician; the specific epithet honours Hans Schinz, the Swiss botanist who figures prominently in our story).

Some 10 miles (16 km) further south, direction Sesfontein, on red sandy flats with soil derived from quartzitic rocks, we collect *Adenium boehmianum* Schinz (5618) which we have recorded several times before, also not on limestone.

About 36 miles (58 km) south of Ombombo we reach Onguruahu on the Beesvlakte, where we camp for the night. (I have seen the name Onguruahu – which we have learnt from Andreas – nowhere except on the map in Van Warmelo [1951] where it is spelled Omukuru-vau [for the eagle-eyed reader: see Figure 2]; there is no indication whether it is a settlement or a spring. It may therefore be an old name of this area on the Beesvlakte. The entire southeastern corner of the Kaokoveld, including the Beesvlakte, is indicated in the work by Van Warmelo as 'Cattle free zone - Uninhabited' [see Figure 2], which rhymes oddly with 'Cattle Flats'.)



Figure 48. *Stapelia schinzii*.

24 April: Onguruahu (Breakdown 2)

Onguruahu has grey-brown brackish flats dominated by annual grasses such as:

Stipagrostis hirtigluma subsp. *pearsonii* (Henrard) De Winter (5621) (densely tufted but not highly palatable; the genus name from *Stipa*, a grass genus, and Greek *agrostis* = grass [Müller 2007]; and:

Panicum simulans Smook (5624) (undescribed at the time), erect with subsucculent culms.

We also record some dwarf shrubs such as the very common *Leucosphaera bainesii* and *Hirpicium gaza-nioides*, also:

Monechma salsola (S.Moore) C.B.Clarke (5620);

Cephalocroton mollis Klotzsch (5619), a branched ± rounded shrublet; and species of *Petalidium*; as well as the annual:

Nelsia quadrangula (Engl.) Schinz (5625) (Amaranthaceae), erect, up to 2' (60 cm) high, its inflorescence with sharp prickles among the white silky hairs (Louis Nels was personal assistant

to Dr Heinrich Göring when the latter came to S.W. Africa in August 1885 to negotiate with Herero and Nama chiefs for land concessions).

Palatable perennial grasses are present:

Anthephora pubescens Nees (5622), with dense leafy tufts apparently much grazed by cattle or game; and:

Panicum lanipes Mez (5623) a robust grass with a woolly base (considered to be a palatable climax grass [Müller 2007]).

All in all, we are surrounded by vegetation giving evidence of medium to heavy use by stock and/or game.

Looking at the grassveld of the Kaokoveld in general, it consists of, what in South Africa would be described as sweet grassveld, which remains palatable even when dry, is easily damaged by persistent grazing but can recover rapidly.

(On the vegetation map of the Kaokoveld by P.J. ['Slang'] Viljoen [1980] [of which I have only seen the miniature copy on the back of the Shell map of Kaokoland, 1996] the area is marked as 'Grassveld of the Beesvlakte'.)



Figure 49. Bernard with the humming Ford, our tent, a full plant press and two cardboard boxes used to store dry specimens and live snakes.

During the trip we have become aware of an intermittent hum in the gearbox which is more and more worrying. It has now become unintermittent and we think that we may ruin the gearbox into a complete standstill, and tempt another long hike if we don't take action. So, like the proverbial fools, we rush in. Beyond our (normally) wildest ambitions (and abilities?), we decide to open the gearbox. And to call it a day. As the sun approaches the horizon and throws long shadows of our tent and our humming bakkie across the short grasses of the Beesvlakte, Bernard stands in pioneer pose gazing towards the far distant mountains of the Kaoko calcrete plateau on the horizon and the southern outlier of a low mountain running through part of the Beesvlakte in a N–S direction in the middle distance (Figure 49).

25 April: Onguruahu (Breakdown 2)

In order to open the gearbox we have to lift the engine with the gearbox off its mountings, which looks like a gargantuan, hopefully not zizyphusian (is that

the mythological character who tried in vain to roll a heavy boulder up a hill which always slipped out of his control when he was almost up?) undertaking. Fortunately we have with us a block-and-tackle, and we can cut sturdy wooden mopane poles in the vicinity. We fear that we may end up with too many or, equally ominous, with too few parts, especially bolts and nuts. So whatever small part we undo is neatly sorted into marked paper bags, of which we have plenty (for seeds, bulbs and small succulents, of which we find but few). On the ground under the engine we lay a tarpaulin to catch any part that may fall and disappear in the sands of the wide, lonely Beesvlakte. When we open the gearbox we discover that one of the balls of the ball-race is lying at the bottom of the box, all dark blue to almost black. It had obviously got in the way of the cogwheels, becoming very hot in the process and creating the humming which had alerted us to the problem. And it is not surprising that the mechanic who had last worked on the box managed to get the ball out of place. The ball bearing in the gearbox is of the type in which the balls are loose and run in a groove. Until the axle, around which the balls are meant to run, is in place, the balls are held in position only by thick grease. During previous work on the box a ball

must have been dislodged when the axle was inserted into the gearbox. But grease we have not; so how to get the balls back in place? Fortunately we have some Vaseline with us which is just viscous enough to hold the fair-sized balls in position (*or at least so we think*).

26 April: Onguruahu–Ohopoho

After a somewhat restless night and during further long hours of playing mechanics we put everything together again and screw it tight, and, *mirabile dictu* (wonderful to relate), we end up without any over- or undersupply of parts. Will she start again? Yeah, she does, first shot; take her for a drive. Hardly have we done a few hundred metres, oh horror (as the *Pretoria News* would again say), there is that hum again. We are highly disappointed but not unduly worried, seeing that we have had a thorough insight into the matter and its causes. (*And the intermittent hum stayed with us to Ohopoho and even back, all the way, to Windhoek; one just got used to it.*)

We decide not to tempt fate and turn back northwards to Ohopoho.

About 13 miles (21 km) north of Onguruahu, on a fairly bare slope of almost solid calcareous conglomerate, we slowly ascend the Kaoko calcrete plateau again, following the narrow valley of the Oruwandjai River, a tributary of the Hoanib.

Among mopane and *Terminalia prunioides* we collect an erect shrubby perennial with *Equisetum*-like lower stems and pale blue flowers belonging to the Acanthaceae:

Ecbolium clarkei Hiern var. *clarkei* (5626) (*genus name from Greek ecbole = expulsion, referring to the manner in which the seeds are released from the dry capsule which opens explosively when wetted*).

Eleven miles (17.7 km) further we reach Otjosongombe. Andreas fells a springbok for our larder. I may add here that our Laurel Paraffin tin cooler box in the end proved to be a nuisance rather than an asset and we discarded it at some stage. Under the ambient tropical conditions the fresh meat therefore does not indulge in an extended shelf life and begins to develop a sweetish pong after a day or two (three?). At which stage we decide to turn tinnarian or conservarian, or whatever a person

is called who derives much of his/her sustenance from tins. Our trusted assistants know better and delight in the carnivorous (not to be confused with 'carnal') delicatessen for a day or two longer. (*Apparently, as every good pheasant hunter knows, and as my veterinarian daughter Ninette assures me, there is nothing wrong or risky about that. May I take this opportunity to thank her for also confirming that this story and its illustrations can survive an instantaneous wireless transfer over a distance of some 350 km without harm or significant loss of definition.*)

On red loamy flats we collect our last specimen, yet another acanth, of this abbreviated trip (*the family Acanthaceae derives its name from the genus Acanthus, its name from Greek akanthos = thorn, because several species are prickly*):

Ruelliopsis setosa (Nees) C.B. Clarke (5627), a prostrate perennial rooting at the nodes, with deep blue flowers looking rather like those of *Aptosimum* (*Ruelliopsis = resembling a Ruellia, a genus of which we have collected three species; setosus = bristly*).

Fourteen miles (22.5 km) further north we reach Ombombo. We decide to take the more direct northern route to Ohopoho via Okaware, rather than the longer track we came on, via Kaoko Otavi.

Okaware lies some 28 miles (45 km) to the north of Ombombo and is the home of Abner. Along the road we meet a herd of very healthy-looking cattle drinking at a trough which is fed by a pump operated by cattle power by means of a horizontal beam to which an ox is harnessed which is encouraged/enticed/(en-)forced(?) to go round and round (Figure 50).

About 16 miles (25.7 km) south of Ohopoho we pass through a settlement in which new buildings are being erected (*as we learned later it was Orumana, the Dutch Reformed Mission station and clinic established in 1954 [Owen-Smith 2010]*).

Concerning mission work in the Kaokoveld: Van Warmelo (1951) who visited the area in 1947 and 1948, writes: 'There are no missions or schools in the Kaokoveld proper, though there is one at Sesfontein. ... The Finnish Mission's applications for leave to work in the Kaokoveld, made more than once, have in the past been consistently opposed by both Christians and heathen. The more educated people want schools, but no mission schools and no missionaries. ... Only poor and young men now have only one wife. The wealthier men of standing all



Figure 50. Herero cattle at a water pump.

have more. This fact is given as one of the reasons why they have in the past been unanimous about wanting government (that is, secular) schools for their children but equally emphatic in wanting no missionaries in the Kaokoveld.'

Owen-Smith (2010), who came to Opuwo in 1968, mentions that the missionaries were merely tolerated by the traditional Herero and Himba, and very few conversions to Christianity were made. The pupils attending the school at Orumana were mainly orphans or children of Black government employees. The territory's wealthy pastoralists were quite comfortable with their old ways and saw little need for the White man's religion or book learning. The last sentence applies to the Himba not to the less traditional Herero who are mostly practising Christians, with African modifications, and some of whom are literate.

Fifteen miles (24.1 km) further we reach Ohopoho and the end of our second, rather abbreviated, trip.

27–30 April: Ohopoho

The universal joint has arrived from Windhoek; it has been fitted to the International and it is time to undertake a new (ad-)venture into the wild Kaokoveld. We have been to the northwest, almost as far as the steep escarpment of the Otjihipa Mountains which had not yet been conquered by the Van Zyl's Pass. We have been south as far as the Ford would carry us, on to the Beesvlakte. Now it is time to head west and then north as far as the Kunene River, the northern boundary of the Kaokoveld.

But, hang on, before we depart there is an important duty to be performed: the progress report for the bosses back home. We take turns in producing these important documents which are handed to Ben van Zyl, with the request to have them delivered to the nearest Post Office when the opportunity arises.

Third trip

(to Otjinungwa [Otjinhungwa] on the Kunene River, 1–12 May)

This trip is to take us west into the Namib and then northwards to the lower Kunene River (Figure 51).

Looking at a map with indications of altitudes one might consider a route remaining at the level of the Ohopoho basin (1 120–1 150 m) and simply following the Hoarusib River westward to the gap which it has cut through the mountains of the escarpment at Otjiu. Before reaching the escarpment, however, the Hoarusib had to carve its way through another

mountain forming a gorge (not evident on Figure 3) which can only be traversed on foot or on animal-back (Abel 1954). So we will take the track which follows an old trail which Georg Hartmann, took in 1894, the first scientist, and perhaps the first White man to do so. As mentioned under History of exploration (p. 8) he was on his way to discover many things for science and general knowledge including the Hartmann Mountains, the Hartmann River, now known as Marienfluss and Hartmann's zebra. Rather than going west, the track

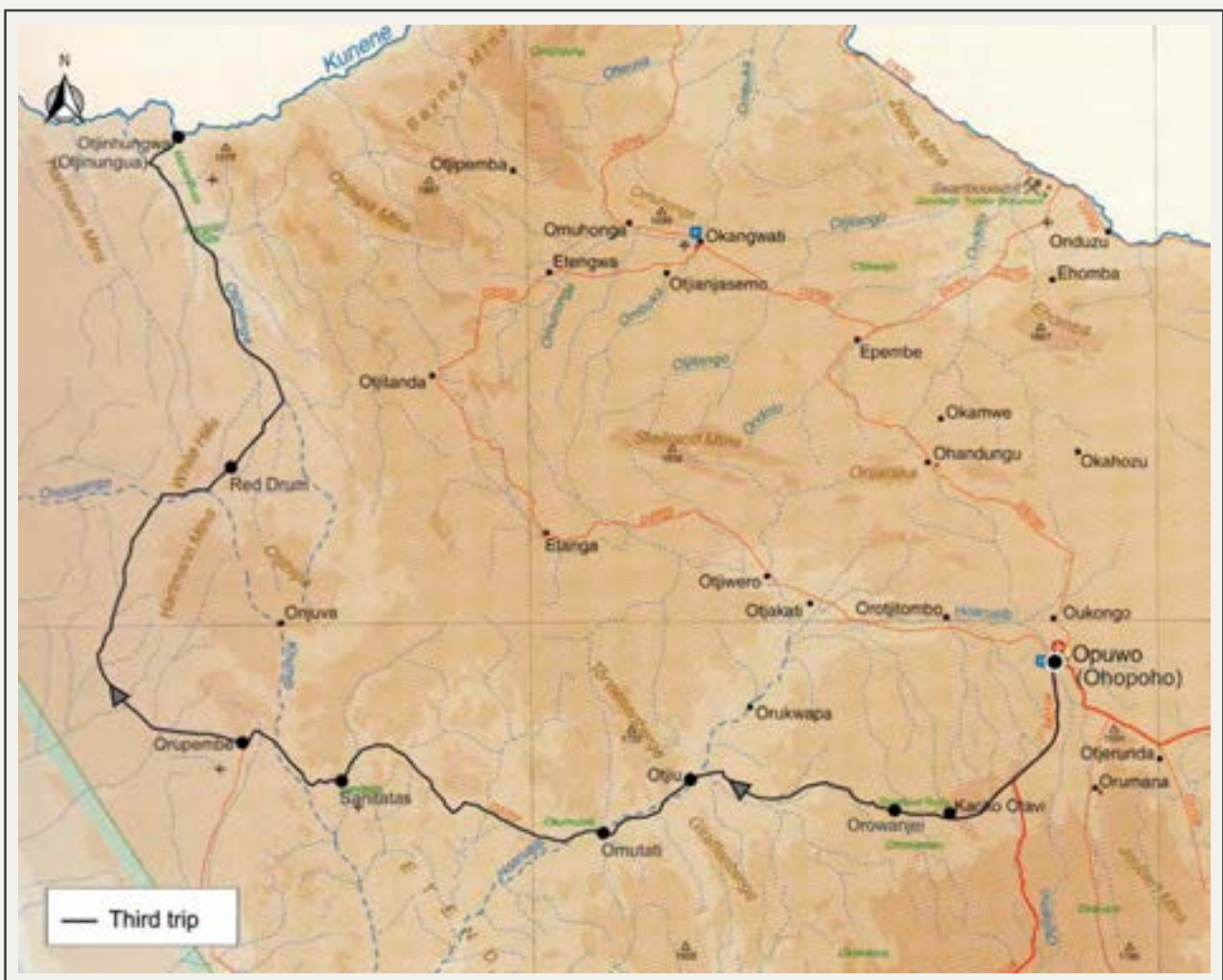


Figure 51. Route of third trip starting at Ohopoho (Opuwo) near the SE corner. Basemap from Mendelsohn et al. (2002) edited with QGIS.

starts to the southwest, climbing onto the northern end of the Kaoko calcrete plateau to the Kaoko Otavi basin (1 380 m) with its strong fountain. From there it follows a river (nameless on my maps) down the plateau via Orowanjai (or Oruanje as Raper [2004] spells it) (1 250 m) to its confluence with the Hoarusib at the gap in the escarpment at Otjiu (850 m) and further westwards to the Namib. Abel (1954: 56) mentions that this track was constructed (meaning upgraded) 'vor einigen Jahren', and it was therefore presumably still roughly in pristine condition when we had the privilege of following its historic meanders.

1 May: Ohopoho–Orowanjei (Orowanje)

It is Wednesday, no time to celebrate Worker's Day by loafing. The International is loaded to the brim, (or should it rather be the rafters?) with a 44 gallon (200 l) drum and a full tank of petrol and 200 l of fresh water from the borehole at Ohopoho, plenty of dry plant presses, tinned provisions, Bernard (complete with solar topee (*my dictionary says: 'also topi, a light hard hat worn to give protection from the sun in very hot countries'*), Andreas with .303 and fresh ammo, Abner in his brown overall and his weathered felt hat and yours truly, all bright-eyed and bushy-tailed, and we are on our way to Kaoko Otavi.

After 12 miles (19.3 km) we stop and return to Ohopoho. We decide that our petrol reserves may be insufficient and we rather load an additional 200 l drum. This we acquire from Ben by means of a Government requisition form which is a bit like a magic wand although some petrol stations are hesitant to accept them because it tends to be a time-consuming schlepp to get them redeemed from Government Garage. With the additional load we are off again. 22 miles (35.4 km) from Ohopoho, shortly before Kaoko Otavi, we collect on red loam flats with grass and scrub mopane two perennial herbs with prostrate runners:

Cucumis africanus L.f. (5628), with small yellow flowers and cream-coloured fruits with dark greenish brown stripes with soft spines only in the dark areas (*cucumis = the Latin word for a cucumber*); and:

Merremia palmata Hallierf. (5629) with showy, lemon-yellow flowers with a dark red centre (*named after Basius Merrem [1761–1824] a German professor of political economy and maths and a*

patron of zoology; Latin palma = the palm of a hand, because the leaves are incised to resemble a hand with its fingers); as well as:

Asystasia schimperi T.Anderson (5630), an acanthaceous annual with subsucculent stems and small white flowers.

About 10 miles (16 km) (*on both my maps it is only about 10 km*) west of Kaoko Otavi we reach Orowanjai, a settlement with another strong spring, similar to the one we have just left behind. (*Orowanje is thought to mean 'exposed fountain', one not surrounded by vegetation [Raper 2004].*) On calcareous red loam flats Bernard compiles a list of sight records including the following:

Trees: *Berchemia discolor*, *Colophospermum mopane* + + +, *Combretum apiculatum* + +, *Combretum imberbe*, *Euclea pseudebenus*, *Terminalia prunioides* + + +, *Ziziphus mucronata*.

Shrubs: *Boscia* cf. *foetida*, *Catophractes alexandri*, *Dichrostachys glomerata* (= *D. cinerea*), *Grewia bicolor* group, *Grewia flavescens*, *Grewia villosa*, *Gymnosporia buxifolia* or *G. senegalensis*, *Montinia caryophyllacea*, *Mundulea sericea*, *Pechuel-Loeschea leubnitziae* (= *Pluchea leubnitziae*) (common), *Rhigozum brevispinosum*.

Dwarf shrubs including: a species of *Heliotropium* and *Leucas pechuelii*.

Perennial herbs: species of the following genera: *Acalypha*, *Barleria*, *Hibiscus*, *Indigofera* (erect perennial, small pods), *Lotononis*, *Tragia* and *Vernonia*.

Perennial grasses: *Cenchrus ciliaris*, *Enteropogon macrostachyus*, *Eragrostis echinochloidea*, *Eragrostis trichophora*, *Oropetium capense*, *Urochloa mosambicensis*.

Succulents: Nil.

Geophytes: Nil.

Annuals: *Achyranthes* sp. (small), *Acrotome inflata*, *Antheophora schinzii*, *Aristida adscensionis*, *Aristida effusa*, *Aristida rhyniochloa*, *Enneapogon desvauxii* + + +, *Eragrostis annulata*, *Eragrostis pilgeriana*, *Eragrostis porosa* + +, *Euphorbia* (small, prostrate annual), *Geigeria ornativa*, *Melinis repens*, *Entoplocamia aristulata*, *Eragrostis* sp. nov. and *Pupalia lappacea*.

The list shows grazing pressure: *Pechuel-Loeschea leubnitziae*, which is not palatable, is common (*and a sure sign of overgrazing [Hall-Martin et al. 1988]; and is used for cosmetic and medicinal purposes [Malan & Owen-Smith 1974]. We never collected*

this species which commemorates simultaneously husband and wife, perhaps the only plant name to do so – Mrs Pechuel-Loesche, named Elsbeth, was a born Von Leubnitz [Gunn & Codd 1981]; perhaps it was too common to collect, even though it honours a respected Professor of Geography and a member of the nobility). Annuals, especially grasses, are common (or should one classify *Enneapogon desvauxii* rather as a perennial?).

At the same locality we collect four more species, three of them not known for their pasture value:

Chrysanthellum indicum DC. (5631), a small annual (Asteraceae) with yellow discoid heads and incised leaves (Greek chryso- = gold-, anthos = flower, used in the diminutive form, therefore a small flower head);

Indigofera trigonelloides Jaub. & Spach (5633), an inconspicuous prostrate to suberect perennial with fine irritating hairs (with a disjunct distribution in Namib and the Horn of Africa; indigo = a blue dye, and fero = I bear, referring to species like *Indigofera tinctoria* from which the dye was extracted; trigonelloides = resembling *Trigonella*, a wide-spread genus, also of the Fabaceae, represented in southern Africa by three annual species);

Orbivestus cinerascens (Sch.Bip.) H.Rob. (= *Vernonia cinerascens*) (5634), an erect shrublet about 3' (90 cm) high, with woody base and brittle stems, capitula purple; and:

Sporobolus panicoides A.Rich. (5632), an annual grass (described by Müller [2007] as a pioneer grass with low biomass yield which is never abundant and thus of little value as forage; the seeds are regarded as a famine food).

It is a pleasant warm night here at Orowanjei and we skip the tent; we place our camping stretchers under a large *wag-'n-bietjie* (*Ziziphus mucronata*) about 100 m from the water and attach our mosquito nets to its branches. Mosquitos, including *Anopheles* are almost everywhere more abundant than one would like. And we remember to take our weekly anti-malaria pill. I am always reminded for a while after ingestion that I have two kidneys, but this is no cause for alarm (and I can't remember the name of the muti). Bernard seems to feel no side effects.

In the middle of the night I wake up (rather surprising when you read the episode on 11 May) from an almighty thunder of hooves. Bernard had got up and shone with his torch in the direction of the water-hole to see what had disturbed his slumber. This had aroused some 50 Burchell's zebras from their drink. Can you imagine the commotion of half a centurion

of pyjama donkeys on the run over loose stones, with the stallions barking their dog-like bark in the night air otherwise almost devoid of sound waves?

Abner, totally unenamoured of lions, asserted that he hadn't slept a wink for fear of these carnivores which are known for their special penchant for the striped donkeys. I might add that even I had heard him snoring several times.

About zebras: two species occur in the Kaokoveld: Burchell's zebra (*Equus burchelli*) is found (like the rain in Spain) mainly on the plains, and Hartmann's mountain zebra (*Equus zebra hartmannae*), as the vernacular (my British dictionaries appear to despise 'common') name indicates, well adapted to life on steep rocky slopes and encountered throughout the escarpment region. The stripes on Hartmann's are thinner and therefore more plentiful than on Burchell's and there are no shadow lines in the white stripes. But the two are best distinguished when seen from slightly below or above: In Hartmann's the lower stomach is white and the stripe pattern continues down the back tapering towards the tail. In Burchell's the stripes continue down to the stomach and a dark line runs down the middle of the rump into the tail. According to Eloff (2010) the two species may be seen at the same waterhole but they do not associate. Hartmann's is closely related to the Cape mountain zebra (*Equus zebra zebra*).

2 May: Orowanjei–Otjiu

About 5 miles (8 km) west of Orowanjei we descend down a step of 150 m from the Kaoko plateau through the valley of the nameless river we have been following. On grey calcareous soil on the banks of the dry riverbed we collect three species of *Grewia*:

Grewia schinzii K.Schum. (5638) with fruits cream, turning brown when ripe, usually 2-lobed; rather fleshy for a *Grewia*; edible but very astringent. Herero name: *omaole*;

Grewia flavescens Juss. (5639), fruits simple or lobed, yellow when ripe with a dry skin which is rubbed off before eating, Herero name: *omuhe*; and:

Grewia bicolor Juss. var. *bicolor* (5640), fruits brownish when ripe, rather fleshy and sweetish, slightly astringent, Herero name: *omandjembere*.

Other collections include:

Tarchonanthus camphoratus L. (5636), shrubs 6–10' (1.8–3.0 m) high, male and female specimens

seen, uncommon in the Kaokoveld (*the most common explanation of the origin of the genus name: Greek tarchos = funeral rite, and anthos = flower; presumably from the camphor smell of the leaves; or a different explanation: from Tarchoon, the Arabic name for Artemisia dracunculus (tarragon), also a fragrant plant, referring to the flower heads resembling those of tarragon*);

Polygala pallida E.Mey. (5641), a small, erect annual with linear-lanceolate leaves and purple flowers (*we have collected only three species of this genus but it is known from Angola, mainly the more northerly regions, with some 45 species [Figueiredo & Smith 2008]*);

Phyllanthus maderaspatensis L. (5637), a small perennial herb with sprawling habit and deep green discolorous leaves (*Greek phyllon = leaf, and anthos = flower: the flowers are borne on leaf-like cladodes; maderaspatensis = from the Madras Region in India*); and:

Ruellia otaviensis P.G.Mey. (5642), an erect, soft-leaved perennial with blue, bell-shaped flowers.

Eight miles (12.8 km) west of Orowanjei waterhole, on the road to Orupembe (formerly called Anabib) on greyish soil of a mica schist slope we collect:

Momordica humilis (Cogn.) C.Jeffrey (5643), a scandent or prostrate herb with cylindrical fleshy fruit;

Tapinanthus oleifolius (J.C.Wendl.) Danser (5644), growing on *Terminalia prunioides* (*Greek tapeinos = humble, and anthos = flower, referring to the flowers*);

Dactyliandra welwitschii Hook.f. (5645), a prostrate or climbing annual cucurbit which, as the name indicates, was originally described from Angola (*all African Welwitsch collections are from Angola, to the best of my knowledge*);

Cissus nymphaeifolia (Welw. ex Baker) Planch. (5646), a climbing shrub with \pm cordate leaves and scarlet fruits, collected before by us (5102) (*Cissus from Greek kissos = ivy*);

Eragrostis dinteri Stapf (5647), a tufted annual, erect (*or occasionally geniculate and rooting at nodes, with unpleasant smell, similar to E. rogersii, recorded from northern Namibia and Angola [Gibbs Russell et al. 1990]*);

Petalidium coccineum S.Moore (5648), a dwarf shrub, collected by us several times before;

Stipagrostis uniplumis (Licht.) De Winter var. *uniplumis* (5649); and:

Cyamopsis senegalensis Guill. & Perr. (5649A), an annual legume with purple flowers (*we collected three other species with this epithet, a Monsonia, a Pavonia and a Pegolettia*).

On a calcareous outcrop, a mile (1.6 km) further, we stop to collect:

Fingerhuthia africana Lehm. (5650), a densely tufted perennial (*reasonably palatable and can be regarded as a climax species in the dry regions of Namibia; called after Carl Anton Fingerhuth, and commonly known as thimble grass, vingerhoedgras or Fingerhuthgras [note the 'H' in the Namibian German vernacular name [Müller 2007]; the German word for a thimble is Fingerhut*).

Having descended from the Kaoko plateau we arrive on the Hoarusib River flood plain (Figure 52).

Some 26 miles (41.8 km) from Orowanjei, we arrive at Otjiu situated near the confluence of our river with the Hoarusib at the Otjiu spring/waterhole (altitude 782 m).

On the grey, rather brackish soil on the banks of the Hoarusib our collections include:

Phragmites mauritianus Kunth (5658), a very tall rhizomatous perennial (*very poorly represented in dry to arid Namibia [Gibbs Russell et al. 1990]; mauritianus = from Mauritius*);

Commicarpus decipiens Meikle (5653), a soft perennial herb with white flowers and sticky fruit designed for dispersal by animals (*new to science at the time; Greek kommi = gum, and carpus = fruit: there are large brown sticky glands on the fruit; Latin decipiens = cheating or deceptive*);

Sphaeranthus peduncularis DC. subsp. *rogersii* (N.E.Br.) Wild (5654), a soft perennial herb with discoid purplish heads (*genus name from Greek sphaera = sphere, and anthos = flower*);

Datura inoxia Mill. (5659), an introduced weed (*Datura from the Arabic tatorah, name of a species of the genus; inoxia presumably from innocuus = harmless*); and other inedibles such as:

Pluchea bojeri (DC.) Humbert (5657), a tall shrubby perennial with pale pink heads (*the genus name after Abbé Noel-Antoine Pluches, an 18th century French naturalist*).

On the wide plains of the Hoarusib River we encounter a large herd of springbok. As usual they are not very



Figure 52. Hoarusib flood plain.

shy, having had few, if any, encounters with hunters, and Andreas shoots a specimen for our pot.

Near Otjiu, our destination for the day, Bernard compiles a lengthy list of sight records on the gravelly flats (evidence of the last Pluvial period [Abel 1954]) with calcareous soil, and on an adjacent mica schist hill slope:

Trees and shrubs: *Catophractes alexandri*, *Colophospermum mopane*, *Commiphora glaucescens*, *Commiphora virgata* (Figure 53), *Commiphora* sp. '(Fransfontein)', *Myrothamnus flabellifolius*, *Terminalia prunioides*, *Senegalia senegal* var. *rostrata* (= *Acacia senegal* var. *rostrata*), *Sterculia africana* and *Ximenia americana*.

Dwarf shrubs: Acanthaceae, as usual, are well represented: *Barleria lancifolia*, *Monechma* sp., and *Petalidium coccineum*; other dwarf shrubs: *Aptosimum decumbens*, *Aptosimum lineare*, *Cryptolepis decidua*, *Hermannia* sp., *Hiernia angolensis* and *Tragia* sp.

Perennial grasses: *Oropetium capense*, *Stipagrostis hirtigluma*, *S. hochstetteriana* and *S. uniplumis*.

Annuals: grasses are again the most prominent element: *Antheophora schinzii*, *Aristida effusa*,

Enneapogon cenchroides, *Eragrostis annulata*, *Melinis repens* and *Pogonarthria fleckii*; and of other families: *Geigeria acaulis*, *Mollugo cerviniana*, *Pupalia lappacea* and two members of the Zygophyllaceae: *Tribulus excrucians* and *Zygophyllum simplex* (could be classified as a succulent).

The sun is still high in the sky, around four o'clock, and we pitch our tent at Otjiu on the banks of the Onḏonḏu Otjiu River (the 'ḏ' sounds like a mixture of a 'd' and a 'th'). It is the second time that this river has offered us friendly accommodation. The first time was on our first trip further north where the river was called Onḏonḏu Otjiwero. (Do you get the drift? The river is simply called after the settlement where you happen to be, and 'onḏonḏu' means a major river which carries water for some time during the year).

Our tent is pitched but we are far from calling it a day. A busy evening and a latish night await us, what with the contents of temporary presses to be placed in permanent presses, presses to be changed and moths to be caught and dropped into the poison glass bottles with wide mouths closed by a large cork stopper and partially filled by a layer of plaster of Paris saturated with evil-smelling prussic acid or such-like.



Figure 53. Near Otjiu, *Commiphora virgata* in foreground.

Next to our camp site the Otjiuvians had caught a lion in a trap the previous night but he had come loose after dragging the trap some 20 m. He had been cleverly outwitted. Two nights before he had killed a donkey. This, we are told, had happened in the early hours of the morning which did not leave Senior Leone enough time to complete his feast before sunrise. Some three-quarters of the 'nonsiesperd' (= freakish/whimsical/capricious horse) had therefore been left behind. The locals had surrounded it with a dense wall of branches in which they had left only a gap in which they hid the trap. (The word 'nonsiesperd' I had learnt from Mr Hengelaar at Ohopoho). Strictly speaking we didn't see three-quarters of the poor beast; we saw a spine-chilling, seething wriggling mass of fly maggots of a magnitude never before envisaged, let alone encountered.

3 May: Otjiu–(Sanitatas)

It is Friday and we are set for our first venture beyond the main escarpment into the Namib (a region receiving less than 100 mm of rain per annum, on average).

The spring at Otjiu marks the beginning of a narrow valley which the Hoarusib River has cut between the Toennesen Mountains in the north and the Giraffen Mountains to the south. These roughly NW–SE-oriented mountain ranges, as mentioned before, constitute the main escarpment in the central Kaokoveld. (Toennesen was a Norwegian railway engineer who joined Hartmann on his last trip through the region [1900/01] with the main aim of finding a route for a west to east railway line. It was known at the time that there are significant deposits of iron ore in the region [Abel 1954: 11]. W.A. de Klerk [2009] who visited the Kaokoveld in 1952, mentions that the whole of SWA talks about the great interest shown in these deposits by the American Bethlehem Steel Corporation, and he speculates on the impact mining activities could have on the region.) The name of the other escarpment mountain is easier to explain. We saw only one of these long-necked beauties on our journeys, and at a great distance, near Orupembe, in the haze of a light mist on an endless Namib plain covered in snow – impossible – then it must be a white blanket of *Stipagrostis* plumes (Figure 54).

According to Eloff (2010) giraffes go entirely without water in this part of the world. (When you watch them daintily browsing acacia leaves and shoots you



Figure 54. Giraffe in the mist, near Orupembe.

wonder how they can accumulate sufficient moisture for such a towering body.)

Some 6 miles (10 km) further on the river enters a wide floodplain which extends for some miles and in which we encounter a Himba kraal (Figures 55, 56).

About 11 miles (17.7 km) southwest of Otjiu, down the valley of the Hoarusib River, demarcated on both sides by steep hills or mountains, we collect three *Commiphora* species on a 60° slope consisting of practically pure, slightly weathered mica schist (Figure 57):

Commiphora virgata Engl. (5668), a shrubby tree with bark flaking in horizontal strips;

Commiphora anacardiifolia Dinter & Engl. (5671), a tall, 10 m high tree with brownish bark flaking in papery strips, and also deeper into corky roundish pieces (a *Kaoko* endemic); and an unidentified:

Commiphora sp. (5670), a small tree 2–3 m high, with smooth, not flaking, grey bark; also:

Helichrysum roseo-niveum Marloth & O. Hoffm. (5669), a rounded, densely villous annual with pinkish heads (shall we call it '*Kaoko edelweiss*?'); and two almost ubiquitous non-graminoid species:

Tribulus exrucians Wawra (5666) (Latin *tribulus* = a caltrop, an iron ball with four spikes, one of them always pointing upwards); and:

Petalidium rossmannianum P.G. Mey. (5667).

Again on mica schist hillocks and mountain slopes with coarse quartz and limestone gravel, some 18 miles (29 km) southwest of Otjiu, we collect two species of Pedaliaceae:

Sesamum sp. (5673), erect, with 4-ranked leaves and striking pale mauve flowers with a deep maroon throat and the lower palate with maroon veins; and:

Rogeria adenophylla J. Gay ex Delile (5675), a stout, erect annual, up to 6' (1.8 m) high (the genus name honours Baron Jacques Francois Roger du Loiret [1787–1849], a lawyer and governor of Senegal from 1821 to 1827; *adenophylla* from Greek *aden* = gland, and *phyllon* = leaf, referring to the extrafloral nectaries on the leaves typical of the genus); also:

Anticharis inflata Marloth & Engl. (5672), small, erect annual scroph (one of the '*desert violets*' [Mannheimer et al. 2008]);

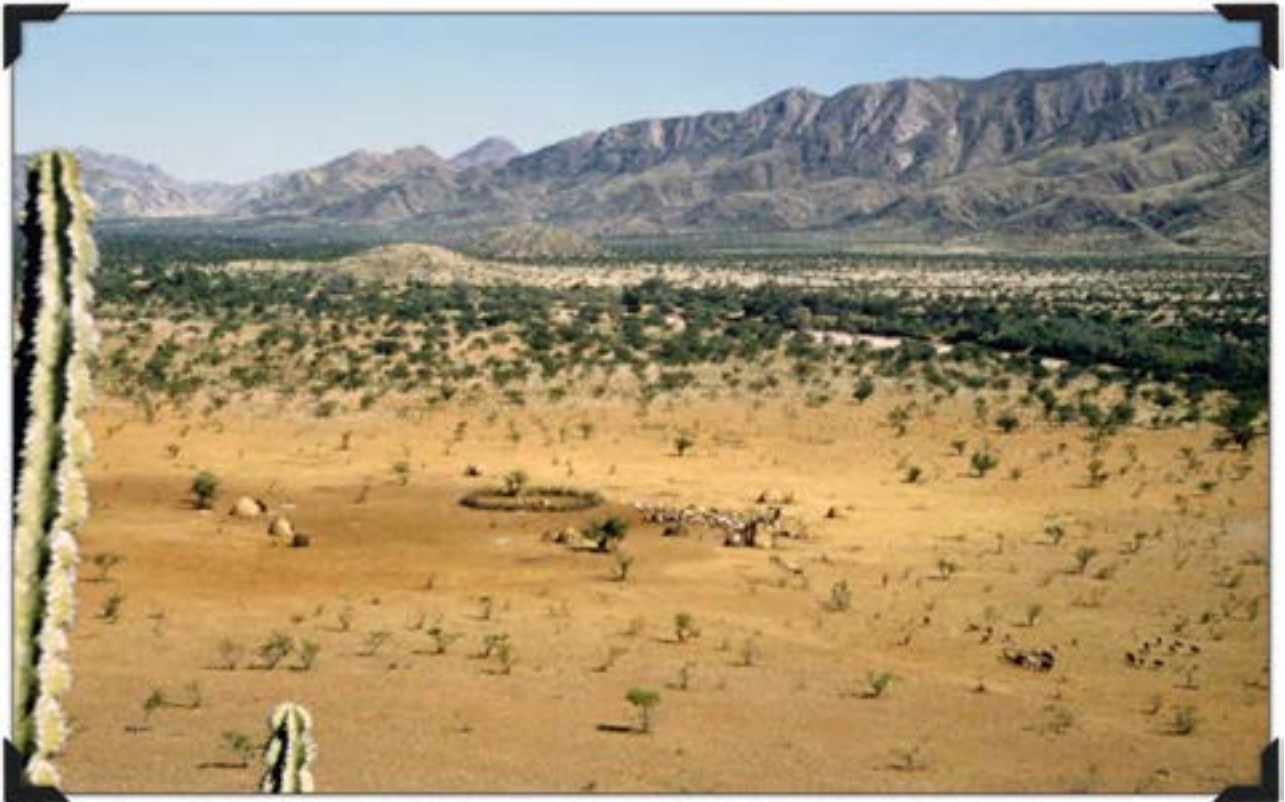


Figure 55. Hoarusib River Valley with Himba kraal.

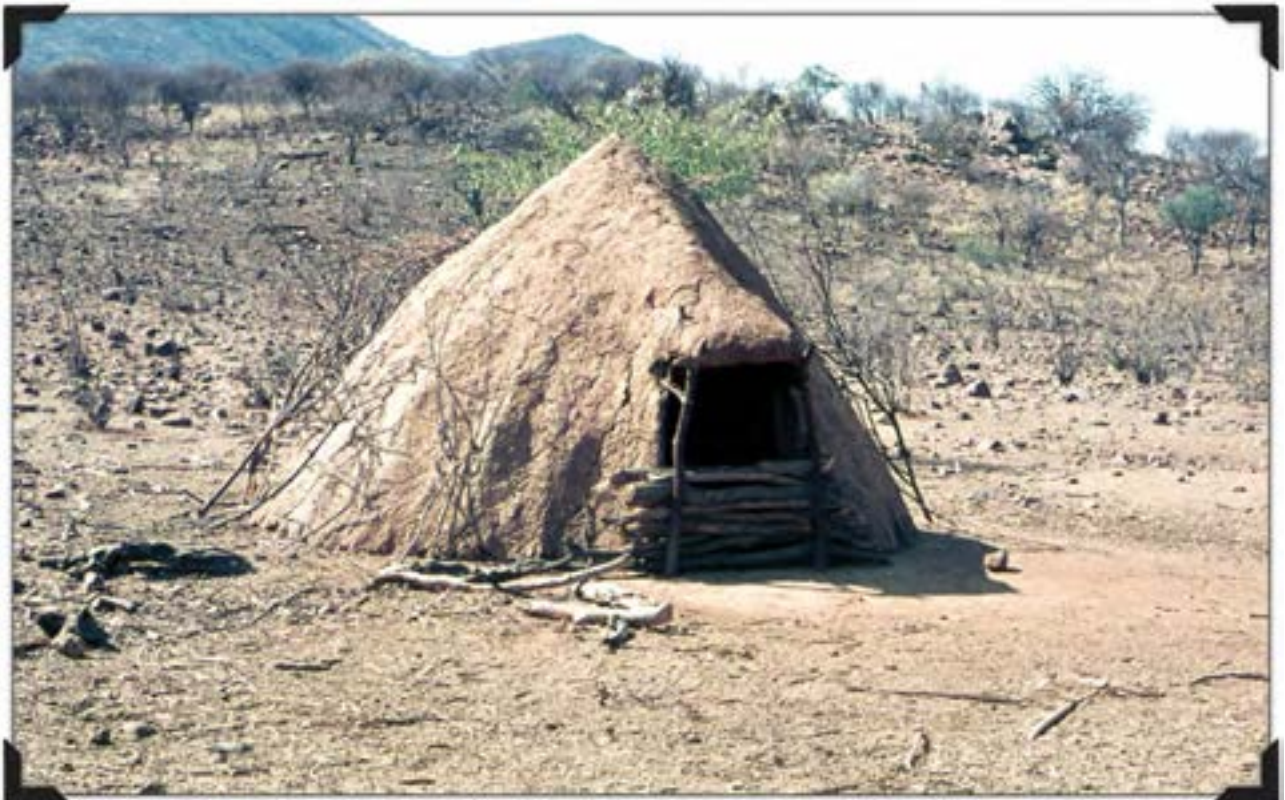


Figure 56. Himba hut (not in the kraal shown above) constructed of mopane saplings and branches smeared with mud and cattle dung.



Figure 57. Mica schist slopes.

Euphorbia glanduligera Pax (5678), a small annual with glaucous, somewhat succulent leaves; and we find an unknown grass noted as:

'5679 *Pappophoreae*, erect, annual, near *Schmidtia*, dominant in this locality' (*This was the first time I became aware of this new grass with a striking resemblance to *Schmidtia kalahariensis* in both its general habit and its ecology*): I have to temporarily retreat behind a bush and am accordingly in a convenient position to have my cheeks gently tickled by the short awns on the inflorescences in a dense stand of the grass. It appears to be different from the said *Schmidtia* of which we have seen much before. I pick a culm and, with some excitement, show it to Bernard. He gives it a quick glance and then coolly, calmly and matter-of-factly points out that the awns on the lower lemma differ from those of *Schmidtia*. (*And so it came to pass that, in 1961, Bernard published this new grass as *Kaokochloa* (= 'Kaoko grass') *nigrirostris* (= 'black-beaked') in *Bothalia* 7, the house journal of the former Botanical Research Institute. The genus *Kaokochloa* is monotypic, and its only species is an annual, common on, but restricted to, flats in the pro-Namib or inner Namib of the Kaokoveld*

[and possibly southwestern Angola] with an average annual rainfall of no more than 100 mm); we also collect:

Indigastrum argyroides (E.Mey.) Schrire (5681), a small, erect to ascending perennial herb with pinkish mauve flowers;

Hermannia amabilis Marloth ex K.Schum. (5680) (*amabilis* = lovely) (Figure 70), a perennial herb with striking pale pink pendent flowers with a purple mouth (*which we refer to as 'Story's Hermannia' because Bob Story had collected it on his Kaokoveld tour a year before us*); and:

Euphorbia guerichiana Pax (5682), a deciduous shrub or tree with milky latex and bark peeling \pm horizontally (*one of the four species we collected named after Georg Gürich*).

About 18 miles (28.8 km) W of Otjiu we enter a grandiose, deep ravine through which the track meanders along a riverbed. To both sides of the track the mica schist slopes (Figure 58) rise steeply to a height of some 500 m. They are densely covered by a golden-yellow velvet blanket of grass interspersed with numerous widely branched, red-barked trees and dark rock formations: 'ein überirdisch-unwahrscheinlicher

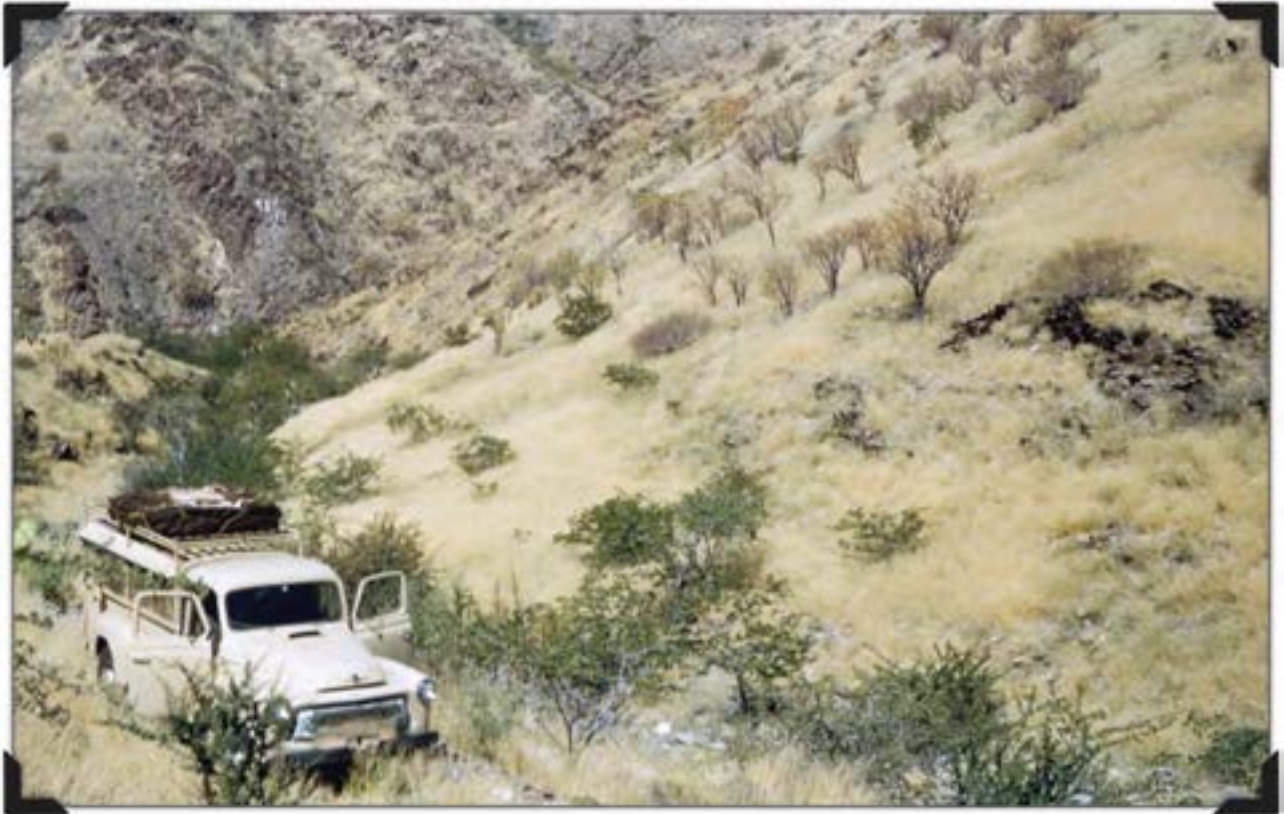


Figure 58. Ravine 18 miles W of Otjiu.

Anblick' (an unearthly, unlikely sight), as I wrote in one of my letters.

Twenty miles (32.2 km) W of Otjiu we collect:

Seddera schizantha Hallier f. (5684), a small soft, prostrate perennial with white flowers (*the type species was collected on Mt Sedder in Arabia*); and another species new to science:

Petalidium luteo-album A.Meeuse (5683); and:

Trichodesma africanum (L.) Lehm. (5685), a prickly perennial herb, belonging to the Boraginaceae (in German: *Rauhblattgewächse* = rough-leaved plants, or forget-me-not family), flowers with greenish brown centre, petals pale mauve, strongly reflexed; growing in the shade of trees (*also in SW Angola and then again in NE Africa*; *genus name from Greek trichos = hair, and desmos = bond: hairs unite the stamens*).

We stop further along in the ravine, 24 miles (38.6 km) west of Otjiu (Figure 59), on the track to Sanitatas, on mica schist slopes:

Here we collect and/or record several species characteristic of the escarpment zone:

Hermannia viscosa Hiern (5691), a small shrublet with scarlet flowers (*a Kaoko endemic; Hiern wrote up the Welwitsch collection from Angola; one can therefore deduce that the name is based on a specimen found by that prolific collector*);

Stipagrostis giessii Kers (5692), (*new to science at the time*) which we record as '*Aristida ?secalina*' (*since Bernard had not yet raised Stipagrostis from subgenus level under Aristida to genus rank*);

Pachypodium lealii (*which Welwitsch had described from Angola*);

Ceraria longipedunculata Merxm. & Podlech (5694), an erect succulent shrub, leaves succulent, elongate, club-shaped (*also undescribed at the time, although Story had collected it in a similar locality the year before, and, as already mentioned, apparently also Harry Hall on the Bernard Carp Expedition in 1951, because Green [1952: 291] reports that Hall collected 'a new species of Ceraria near Orupembe waterhole on the fringe of the Namib; this small genus had previously been recorded only in the lonely Richtersveld to the south of the Orange*



Figure 59. Ravine 24 miles W of Otjiu.

River. Green was not quite correct: *Ceraria carissoana* had been described in 1930 by Exell & Mendonça from Angola but it was not known from the Kaokoveld at the time. It is a proper Kaoko endemic confined to the 1712 degree square in northernmost Kaokoveld [Tree Atlas] and the southwesternmost Namibe Province in Angola [Figueiredo & Smith 2008], and it escaped our eagle eyes although we probably crossed its realm on our first trip in the Ombepera region or at the foot of the Otjihipa Mountains in the Marienfluss which we shall enter shortly.) (Donald Killick, the Institute's guardian of the Queen's English, Linnaeus's Latin and the ICBN of the IAPT [International Code of Plant Taxonomy of the International Association for Plant Taxonomy] would most certainly not have approved of these tapeworm sentences).

We pitch our camp on brown gravelly loam flats near a dry watercourse and a mica schist mountain slope. Being aware of the danger of rivers coming down in flood during the rainy season we pitch our tent well clear of riverbeds (only on a rare occasion too near to a waterhole; see later).

4 May: (Sanitatas)–Orupembe (formerly Anabib)

Trees in the area include mopane and a few commiphoras but no *Terminalia prunioides* (the Tree Atlas records the species in this region still as common to abundant).

Grasses form an association comprising *Stipagrostis uniplumis*, *S. hochstetteriana* and *S. giessii*.

In the vicinity of our camp site we collect 13 species, 11 of them for the first time on this venture (as it turned out, four of them were undescribed at the time). The collections include two *Euphorbia* species:

Euphorbia damarana L.C.Leach (5709) (Figure 60) (unknown to science at the time), a hemispherical blue-green spineless and leafless succulent shrub up to 2 m high, with globose fruits (endemic to the Kaoko Centre of Endemism, including its Angolan portion); and:



Figure 60. *Euphorbia damarana*. Question for the eagle-eyed reader: on the horizon near the NW corner – *Pachypodium lealii*?

Euphorbia phylloclada Boiss. (5698), a succulent dwarf shrub.

Two annual species of *Indigofera* (both of them undescribed at the time):

Indigofera anabibensis A.Schreib. (5705), called after the waterhole Anabib, later (and in our story) known as Orupembe, the former name probably derived from a San name, the latter a Herero name (said to mean either 'mirage' or, more probably, 'brackish water' [Raper 2004]; judging from our experience the locality had terrain and climate likely to induce mirages, and the water was not brackish; we would therefore opt rather for the first meaning); and:

Indigofera teixeirae (5697) (honouring J.M. Teixeira, a Portuguese botanist who worked and collected in Angola between 1949 and 1969 [Figueroa & Smith 2008]); and:

Phyllanthus dinteri (5706), a dwarf shrub; and the grasses:

Aristida parvula (Nees) De Winter; two species of *Stipagrostis*:

S. giessii Kers (5702); and *S. hochstetteriana* (Beck ex Hack.) De Winter var. *secalina* (Henrard) De Winter (5707); and:

Tricholaena monachne (Trin.) Stapf & C.E.Hubb. (5704) (*Tricholaena* derived from Greek *thrix* = hair, and *chalina* = mantle cloak, referring to the hairy spikelets; *monachne* from Greek *monos* = single and *achne* = chaff, referring to the spikelet that appears to have only one glume, as the lower one is poorly developed [Müller 2007]).

On a stony mica schist slope 44 miles (70.8 km) west of Otjiu we collect two *Commiphora* species (both undescribed at the time):

Commiphora wildii Merxm. (5712), a thick-stemmed shrub branched near the base, with branches spreading at ground level covering an area of up to about 15' (4.5 m), with reddish brown bark, smooth or peeling in papery strips, leaves resembling oak leaves with rachis and petiole apparently winged (a *Kaoko* endemic also recorded from Angola); and:

Commiphora giessii J.J.A.van der Walt (5713), a many-stemmed shrub with fairly slender, ± erect

stems with reddish brown bark and trifoliolate leaves, fruits brown-red when ripe; arillus 4-pronged, clasping seed right to the tip (*also a Kaoko endemic*).

Our first sighting of *Welwitschia mirabilis* is 47 miles (75.6 km) west of Otjiu and 19 miles (30.6 km) east of Orupembe. It is a small local colony of relatively small individuals (*this locality lies in the northernmost grid [1812 BA] from which the species has been recorded in Namibia [Tree Atlas]*).

(*The dictionary translates mirabilis as wonderful, astonishing, extraordinary and unusual. And it is indeed all this, and more. The tree fundis consider it one of their flock [a dwarf tree]; the succulent f(r)iends list it as a member of their congregation; it sits somewhere between gymnosperms and angiosperms and it has existed in apparently much the same habit in what is generally considered the oldest desert on Earth; or is it? The Benguela Current, and therefore the Namib Desert, are thought to be 'only' 14 million years old [McCarthy & Rubidge 2005]. However, fossils of more than one Welwitschia species dating back about 115 million years were discovered in the Lower Cretaceous sediments in northern Brazil at a time when Africa was separating from South America. Amazingly these fossils indicate a growth form not very different from the two-leaf form which we know today [Van Jaarsveld 2013]. If they existed in Gondwana in what was then presumably a continental, and presumably rather more mesic region, one wonders how one of them developed into a very specialised desert plant. Welwitschia can be considered a Kaoko endemic, if one stretches the concept a bit southwards. Craven [2009], as mentioned before, has chosen it as character species of the western part of the Kaoko Centre of Endemism. Welwitschia is found in relatively small disjunct patches from just north of Namibe in Angola to the vicinity of Swakopmund [a range of 1 000 km], as far inland as the fog created by the cold Benguela Current will reach. As the Tree Atlas states: it is locally abundant in places; often the dominant woody species*).

Some 48.5 miles (78 km) W of Otjiu on the road to Orupembe in a dry watercourse we collect:

Sesbania sphaerosperma Welw. (5714), an erect annual 2–4' (0.6–1.2 m) high with glaucous leaves, yellow flowers and erect pods up to 20 cm long.

Near the watercourse:

Geigeria spinosa O.Hoffm. (5715), an annual with radiate, yellow heads; and:

Calicorema capitata (Moq.) Hook.f. (5716), a dense, much branched, grey shrublet, leafless at the time with purple flowers (*genus name from Greek kalos = beautiful, and corema = broom, referring to the broom-like habit*).

In a dry riverbed with fine mica schist gravel, 14 miles (22.5 km) east of Orupembe:

Stipagrostis damarensis (Mez) De Winter (5717), a robust perennial (*which could almost be considered a Kaoko endemic but it extends rather far southward and inland; the seeds are ground and eaten as porridge by the Damara people; our specimen was used to illustrate the species in Müller [2007]*); and:

Petalidium halimoides (Nees) S.Moore (5718) (Figure 61), (*halimoides = resembling an Atriplex*), a low grey shrublet growing in coarse gravel:

On a stony mica schist slope 10.5 miles (16.9 km) east of Orupembe we collect:

Commiphora kraeuseliana Heine (5719), a soft-stemmed shrub branching close to the ground with ascending stems, brown to yellowish peeling bark and fine feathery leaves; flowers yellowish; only males found (*one of the few endemic members of this very well represented genus that had been published [in 1956]*).

At Orupembe (Anabib), one of the best known and well frequented (only by wild animals, when we were there) watering places in the Kaokoveld, partly shaded by an ancient fig tree with bark well polished by itchy, and therefore rubbing, rhinos and elephants. Some 30 m from the water we pitch our tent (Figure 62).

Bernard describes the geology of the surroundings of the waterhole as 'an outcrop of volcanic origin with amygdaloidal diabase and 'blue ground'-type of rock with overlying limestone'. Orupembe is surrounded to the north, east and partly to the south by mountains capped by diabase, forming the Etendeka Table Mountain chain, hailing back to the Stormberg Group of the Karoo Supergroup (see also Figure 5). It is situated on a terrace below the main mountain range slightly higher than the niveau of the Namib to the west (Abel 1954).

With all this beautiful (somewhat muddy) water to hand we prepare to fill up our water drum. The water in the natural basin is shallow and well trodden, especially by rhino. How does one prepare a pool deep enough for scooping the water out and clean enough for drinking? We build a low mud wall to separate a small pool from the rest of the water. Like good boy



Figure 61. *Petalidium halimoides*.



Figure 62. Orupembe waterhole.

scouts we sprinkle alum powder into it to clear the water by flocculation. We leave it over night and hope that the rhinos will not wallow through it.

Having accomplished this and having filled our permanent presses from the temporary ones and having exchanged the moist papers for dry ones in the presses of the previous days, and having caught our moths, Bernard makes the following entry in his field notebook (*new names have been added*):

'From mileage IM 2233 (10.5 miles [16.9 km] W of Otjiu) a new vegetation types emerges. It consists of a belt of mountains with mainly steep valleys with flats in between. Dominant trees of this type are the following: Mopane, various *Commiphora* species of which *Commiphora virgata*, *Commiphora anacardiifolia* and no. 5670 (*not identified*) are the most common and especially *Commiphora virgata* is a feature (in parts) of the vegetation, while *Commiphora anacardiifolia* dominates in others. Typical also are various members of Acanthaceae which are not found elsewhere, such as 5683 (*Petalidium luteo-album*). Other remarkable species are *Pachypodium lealii* (scattered and local), *Cissus* sp. (papillate leaves) (= *Cyphostemma uter*) and *Ceraria* (5694) (= *C. longipedunculata* (5694) which is more common. Very typical is the complete dominance of hairy-awned *Stipagrostis* species such as *Stipagrostis giessii* (5702) which cover the mountains in a velvety cream cloak, *Stipagrostis hirtigluma* subsp. *pearsonii* (= *Aristida hirta*) (5693), *Stipagrostis hochstetteriana* var. *secalina* (= *Aristida secalina*) (5692).

At mileage IM 2269 (44 miles [70.8 km] W of Otjiu; sighting of first *Welwitschia*) I propose to provisionally draw the boundary between the previous and the typical Namib flora.

In the marginal area *Commiphora wildii* (5712) and *C. krauseliana* (5719) are conspicuous. Other features to be studied tomorrow.'

In the meantime yours truly decides it is time for a bath. So I grab one of the paraffin lamps and head off into the dark. The legend (or is it true?) that rhinos like to attack light and fires in the dark enters my mind. As I approach the water a few zebras retreat into the night. I have barely started to prepare for my ablutions when Bernard approaches in a less than amicable frame of mind to enquire about my mental wellbeing and whether I am aware of the fact that rhino and elephants come to drink here. Half-clad, half-washed and half-guilty-feeling I return to our tent and a half-filled water basin. Not long after settling in we hear rhinos drinking at and wallowing in the water.

Talking about these horny beasts: we saw many spoors and dung scratchings; whether they try to bury their excrements or whether they want to spread them and their scent far and wide is not clear to me but they certainly don't leave them unscratched. (*It has been suggested that they use their dung to mark their territory, and that their smelly feet may facilitate contact with each other*). We saw none on the hoof in daytime (fortunately).

5 May: Orupembe

Sunday. The sun is up and flocks of hundreds of Namaqua Sandgrouse (*Pterocles namaqua*) circle over the waterhole filling the morning air with a rousing symphony on the theme of 'kelkiewyn', 'kelkiewyn'. Ever aware of the prowling Peregrine and other falcons (*or can only featherless bipeds and quadrupeds prowl?*) they settle around the edge of the water, quickly quench their thirst and soak up in their breast feathers a supply for their chicks somewhere on the endless plains of the Namib. They take flight, as one, with a thunder of wings, circle a few times to find their bearings and disappear in the distance.

The rhinos have not touched our special water pool which is now filled with the clearest of water and we proceed to scoop it into a bucket for transfer via funnel and garden hose into our 44 gallon (200 l) drum; and consider it fit for human consumption without further treatment. (*I can not recall that either of us suffered from gyppo or gippy tummy – an expression I picked up in the UK – which my dictionary lovingly describes as 'an illness in which waste matter is emptied from the body in liquid form'; and which I always associated with Egypt, an inkling which agrees with that of my dictionary, but to which it also adds 'gypsy' and mentions that it is informal, old-fashioned and British English*). Extraction of water, as well as petrol, from these drums is performed by the age-old method of suction, not with a pump but by man(lung)power and, hopefully (*Donald would not have approved of the informal but fashionable use of the word*), leaving the rest to gravity and cohesion.

In the vicinity of the water we collect, among others:

Salvadora persica L. var. *persica* (5726), a dense, yellow-green evergreen shrub typically found on riverbanks and flood plains in dry regions (*after Juan Salvador y Bosca [1598–1681], apothecary and plant collector from Barcelona; persica = from Persia*); and two acanthus:

Blepharis ferox P.G.Mey. (5727) (a Kaoko endemic unknown to science at the time), a very prickly (as the specific epithet indicates: Latin *ferox* = fierce, strongly armed) dwarf shrub or shrub with dirty white flowers (Greek *blepharis* = eyelash); and:

Monechma salsola (S.Moore) C.B.Clarke (5729), collected before by us on the much more mesic Beesvlakte (a Kaoko endemic; Greek *mon* = one, and *echma* = contents: only one seed per locule ripens); also:

Boerhavia deserticola Codd (5722), a perennial herb with prostrate brittle stems and small white flowers (described in 1966; after Herman Boerhaave [1668–1738], Professor of Botany, Medicine and Chemistry at the University of Leiden, who played a major role in bringing the botanical treasures of South Africa to the attention of the world; *deserticola* = living in the desert);

Cucumis sagittatus Peyr. (5724), a prostrate perennial herb with cordate asperulous, grey-green leaves and ellipsoid fruit;

Centropodia mossamedensis (Rendle) Cope (5725), a perennial grass growing in dense erect glaucous tufts, branched only at the base, forming a knotty system of short rhizomes (a Kaoko endemic; genus name from Greek *kentron* = sharp point, and *podion* = small foot, possibly refers to the short awn; *mossamedensis* by way of a reminder that the inner Namib extends into Angola; the former Mossamedes, or rather Moçâmedes, as mentioned before, is now called Namibe).

On gravelly calcareous flats near the waterhole we find, at last, a true geophyte:

Albuca stapffii (Schinz) J.C.Manning & Goldblatt (5732), a small, bulbous plant with glaucous leaves (Friedrich Moritz Stapff was a German mining engineer who was a consultant to the Deutsche Kolonialgesellschaft für Südwestafrika in the mid-1880s); and, almost equally exciting, two small succulents:

Aizoanthemum dinteri (Schinz) Friedrich (5731), a soft, semi-erect annual with succulent papillate leaves up to 8" (20 cm) high (from Aizoon: Greek *aei* = always, and *zoos* = alive, and *anthesis* = flower); and:

Trianthema parvifolia E.Mey. ex Sond. var. *parvifolia* (5730), an annual with reddish, prostrate to ascending branches with succulent leaves ovate in cross section, and with purplish pink flowers (widespread in the dry regions of western southern Africa, and extending into southwestern

Angola; genus name from Greek *treis* = three, and *anthesis* = flower); also:

Dyerophytum africanum (Lam.) Kuntze (5730A), a shrub up to about 1 m high with glaucous branches and cuneate leaves coated with calcareous granules (also widely distributed in dry and arid regions, including Angola and beyond, as far as India).

The wide terrace, on which the Orupembe waterhole is situated, slightly above the vast plains of the inner Namib, is a feast of commiphoras (Figure 63).

We collect in an area with loose round boulders and pebbles on reddish loamy soil sloping down to a drainage line in the upper reaches of either the Sechomib or the Khumib River, both of which appear to rise vaguely in the Orupembe region (Abel 1954). Is 'rise' the correct term for desert rivers which flow only, at least above ground, when it has rained sufficiently somewhere in more mesic regions further inland for the water to reach the desert? If they don't rise, do they originate or congregate or assemble, or just simply come about? And can one consider a water hole, like the one here at Orupembe to be the source of a river? The Oog at Kuruman is obviously the source of the Kuruman River but that is hardly a typical desert river. One thing is certain: the drainage line shown on Figure 63 was created by water, and by quite a lot of it, albeit over the course of many years.

We find male and female specimens of:

Commiphora kraeuseliana Heine (5733) (Figure 64), the species with ascending stems and fine feathery, aromatic leaves which we collected yesterday (named after Richard Kräusel, an eminent German palaeobotanist who visited Namibia in 1953/54 and 1963 [Gunn & Codd 1981]).

Here we also collect:

Commiphora dinteri Engl. (5737), a shrub branching at and spreading from ground level to a diameter of about 5–6' (1.5–1.8 m), and a height of only about 2' (60 cm), with scalloped trifoliolate leaves.

Other *Commiphora* species recorded from the Orupembe area (Tree Atlas):

Commiphora anacardifolia, *C. crenato-serrata*, *C. giessii*, *C. glandulosa*, *C. glaucescens*, *C. multi-juga*, *C. oblanceolata*, *C. pyracanthoides*, *C. saxicola*, *C. tenuipetiolata*, *C. viminea*, *C. virgata*, *C. wildii*.

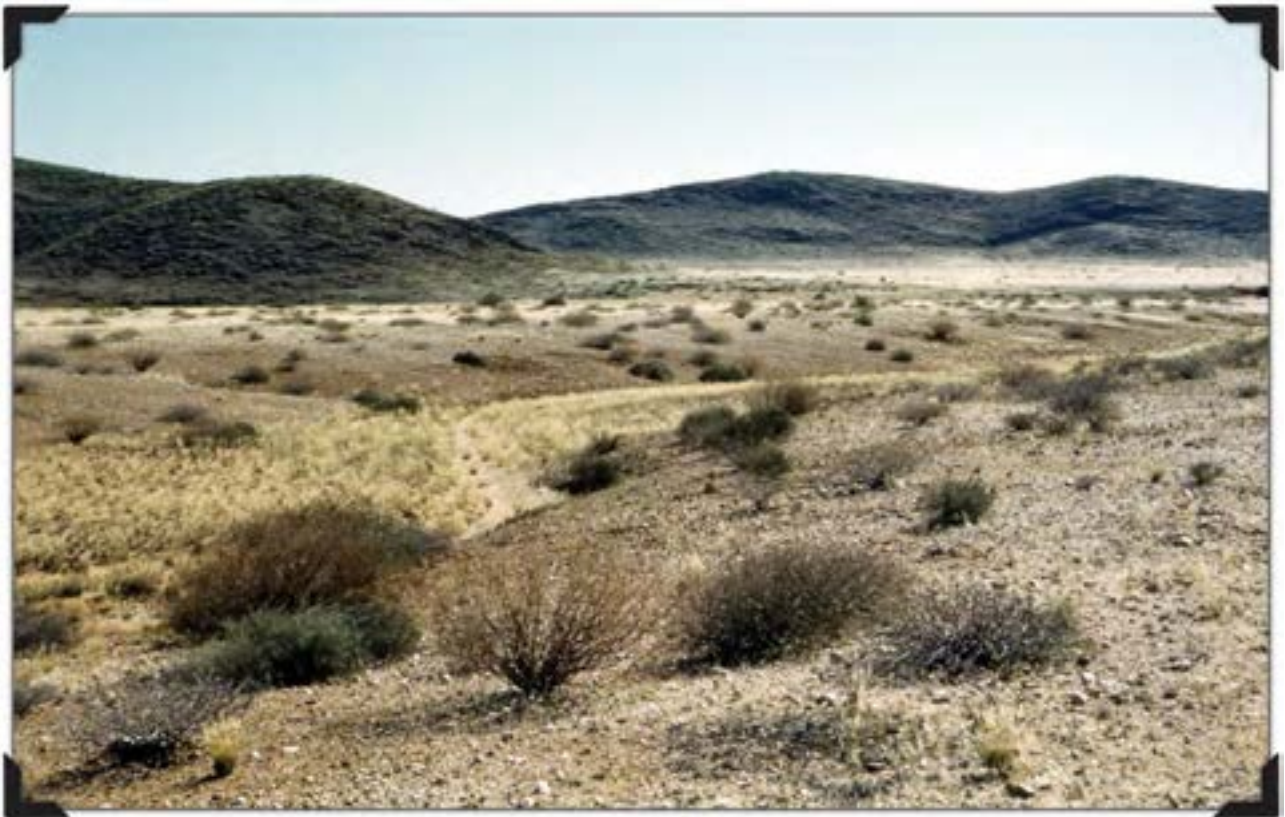


Figure 63. Orupembe: a feast of commiphoras (see also Figure 5 under Geomorphology).



Figure 64. *Commiphora krauseliana*.

We also collect:

Megalochlamys marlothii (Engl.) Lindau (5735), an acanthaceous dwarf shrub with blue flowers and, as the name indicates, large bracts (named after Rudolf Marloth [1855–1931], one of the ‘fathers of South African botany’); and:

Eriocephalus pinnatus O.Hoffm. (5734), one of the ‘kapokbosse’, presumably to the delight of nest-building birds;

Abutilon pycnodon Hochr. (5738), with white flowers (specific epithet from Greek *pyknos* = compact, dense, and *odontos* = tooth, presumably referring to the toothed leaves); and only a single specimen of:

Phlyctidocarpa flava Cannon & W.L.Theob. (5739), a strange erect annual member of the Apiaceae with yellow flowers (a Kaoko endemic, presented to the world during an AETFAT [Association pour l’Étude Taxonomique de la Flore d’Afrique Tropicale] congress and published in 1967 in Mitteilungen der Botanischen Staatssammlung, München; the genus name from Greek *phluktaina* = a small pustule, and *carpon* = fruit, referring to the rows of cone-shaped papillae on the fruit; Latin *flavus* = yellow, the colour of the flowers).

6 May: Orupembe–Marienfluss

Replenished and refreshed we set off on the track heading west towards the outer or true Namib. Before leaving we deposit a drum of petrol next to the waterhole: our supply for the way home. About 3 miles (4.8 km) from Orupembe we come to a crossroads: one track running in a southerly direction to Rocky Point (where two European and 15 locals are digging for diamonds (mainly of industrial quality)). We continue westwards.

About 12 miles (19.3 km) from Orupembe we stop at a dry watercourse on extensive flats. The area is covered with coarse gravel consisting of wind-worn fragments of amygdaloidal basalt, quartz and limestone. The vegetation is dominated by *Stipagrostis* species, mainly *S. giessii* (not known to science at the time) and *S. uniplumis*. We collect the latter, as well as:

Merremia guerichii A.Meeuse (5741) (not described at the time), a low perennial herb with prostrate branches and white flowers with a deep red centre; and:

Kissenia capensis Endl. (5742), an erect, prickly perennial herb with white flowers, (which has a

sister species, *K. arabica*, at the other end of the ‘arid corridor’ in Somalia; the genus name derived from Kishin on the south coast of the Arabian Peninsula).

Our track has gradually veered to the north. Some 23 miles (37 km) from Orupembe a track branches off in a westerly direction. Bernard mentions that it leads to the wreck of the *Dunedin Star* (a British cargo liner which stranded in November 1942 about 10 km north of Angra Fria [find site of Dunedin Star on Figure 2]. As Green [1952] relates: ‘Those who remained on board were soon rescued by ships; but 63 people who had reached shore in a lifeboat presented a serious problem’. As Ben van Zyl told us, if the authorities had discussed the matter with people who knew the country, the castaways could have been rescued speedily on the established route via Kaoko Otavi, Otjiu and Orupembe [which we took and which Hartmann took in 1894]. But the shipwreck occurred in war time, when everything concerned with shipping was top secret [‘Don’t talk about ships or shipping!!’] and the Admiralty was presumably not prepared to discuss the matter with persons who might misuse the information. [German U-boats were on the prowl along the African coast.] As a result it took several weeks before the castaways were rescued, and a tug and an aircraft were lost in the rescue attempts. Eventually they were reached by a convoy of vehicles which took an almost impassable route via Sesfontein and then northward along the coast [read also under 20 May, p. 122].)

We pass the turn-off to the ill-fated *Dunedin Star* and Bernard says we won’t go there, namely deeper into the Namib, as our petrol supplies are limited. (Six of the nine species which Giess [1971] lists as typical for the northern Namib were unknown to science at the time: *Indigofera cunenensis* Torre [published 1960], *Barleria solitaria* P.G.Mey. [published 1967], *Petalidium angustitubum* P.G.Mey. [published 1967], *Petalidium giessii* P.G.Mey. [published 1971], *Stipagrostis giessii* Kers [published 1971] and *Stipagrostis ramulosa* De Winter [published 1964]).

In a dry gravelly watercourse 31 miles (49.9 km) from Orupembe we collect:

Balanites angolensis (Welw.) Welw. ex Mildbr. & Schltr. subsp. *welwitschii* (Tiegh.) Sands (5743A), an erect, yellow-green thorny shrub 2.5 m high with orange-yellow fruits (a Kaoko endemic; its branches, armed with sharp spines, are used to build fences [Malan & Owen-Smith 1974] and favoured by elephants [Viljoen 1988]; Greek *balanos* = an acorn, referring to the shape of the fruits) (Figure 65).

Some 42 miles (67.6 km) northwest of Orupembe in a watercourse on red gravelly quartzitic flats we collect:

Phaeoptilum spinosum Radlk. (5744), an erect spinescent shrublet with grey-green leaves and 4-winged fruits, resembling *Lycium* but belonging to Nyctaginaceae (*in the Kaokoveld it is more common in the Namib than in the more mesic parts [Tree Atlas]; Greek phaeos = dark, and ptilon = wing, referring to the 4- or 5-winged fruits which are darkish brown when mature*).

About 3 miles (4.8 km) further the track turns eastwards and leads gradually into a hilly landscape with hard gravelly soil with a thin grass cover under which the track becomes increasingly faint until it fizzles out altogether. So we all scout around looking for the lost way, with Abner putting in a particularly strong effort, running off into the distance.

We could proceed without a guiding path, as the general direction towards the Kunene River is obvious. But that would mean that our progress would be very slow and hazardous, dodging shrubs and antbear holes. During our trackless search we must have driven over a mopane stump hidden among the grass, the remnants of a tree which had broken off in such a manner that strong sharp pieces of wood were standing

upright in the middle of the stump. And how hard the heartwood of a mopane is, Bernard had demonstrated on our first trip. One of these pieces has penetrated the tyre and the tube of, fortunately, only one wheel. (*Coming to think of it: in those days tyres without tubes had not been invented or were not available, and even when they came on the market they were at first not considered suitable for a trip in the rough. And it was not unheard of that they did come off the rim when cornering, usually because they were not fitted correctly or on unsuitable rims.*) So, our spare wheel comes into action. (*Looking back, we had very few tyre problems.*) At last we discover the very faint track and are on course due north towards the Kunene.

After crossing another ridge the magnificent Marienfluss opens up before us, a huge level valley, some 30 miles (48.3 km) long and about 5 miles (8 km) wide at its widest, gently sloping north towards the Kunene (Figure 3). It borders on the Hartmann Mountains in the west and the Otjihipa Mountains to the east. A green band of shrubs and trees, down the middle of the valley marks the course of the Otjinjange River (Figure 66).

About 27 miles (43.4 km) south of the river we find a spot to pitch our tent (*today camping is not allowed in*



Figure 65. *Balanites angolensis* and Bernard with Abner hidden behind the shrub.

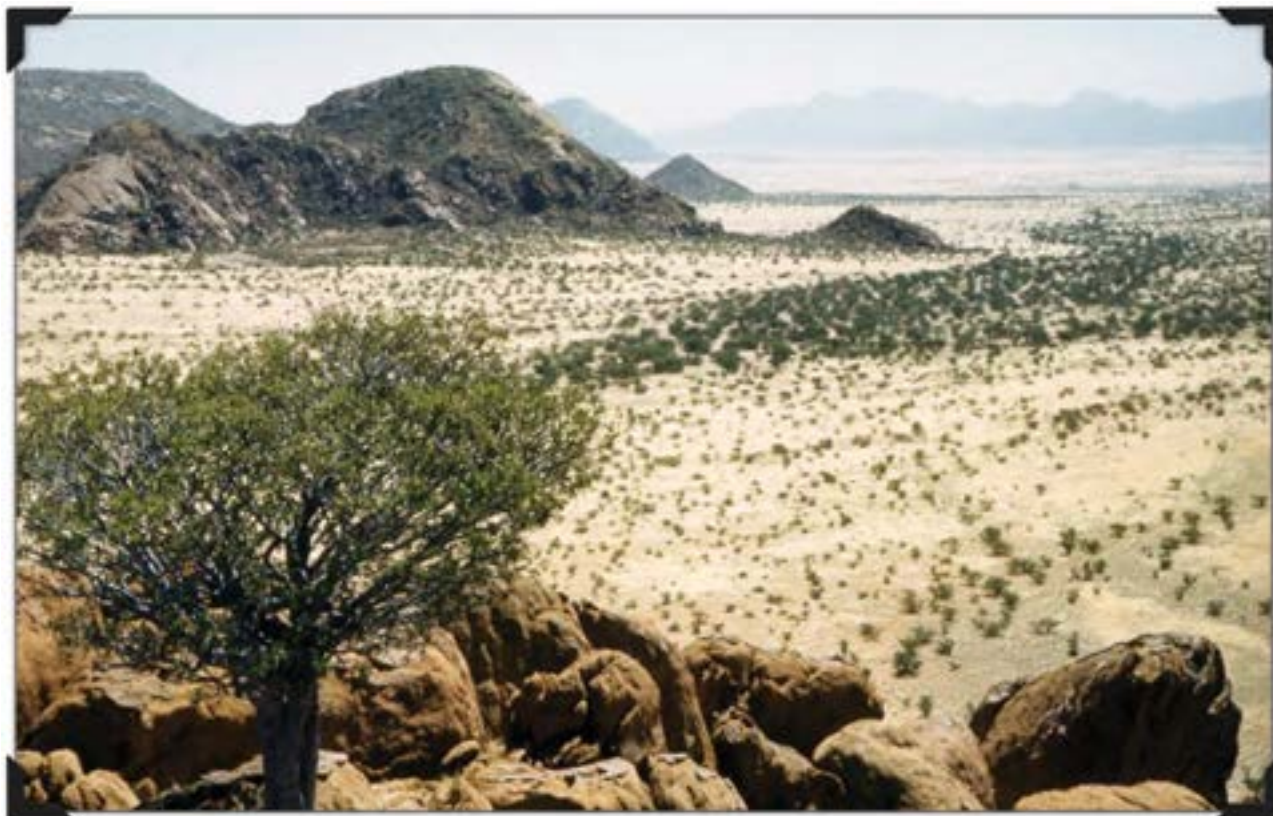


Figure 66. Marienfluss, looking north towards the Kunene River and mountains of Angola on the far horizon. In the foreground red granite rocks at the foot of the Otjihipa Mountains. In the middle distance on the left the granite domes of the Hartmann Mountains.

the *Marienfluss*). Before settling down we collect two species of *Stipagrostis*:

Stipagrostis sp. (5745); and *Stipagrostis hochstetteriana* (Beck ex Hack.) De Winter var. *secalina* (Henrard) De Winter (5746) (*Christian Gottlob Ferdinand Hochstetter [1829–1884], a geologist and anthropologist who described new plants from Africa*).

7 May: Marienfluss–Otjinungwa (Otjinhungwa) on Kunene River

As we progress down the vast, one is tempted to call it majestic, *Marienfluss*, we soon stand in amazement before the countless, much-discussed fairy rings. These are circular patches devoid of all visible plant life. (*I seem to remember that we considered past poisonous*

*euphorbias and termites as possible causes. Van Wyk & Smith [2001] observe that the average diameter of the cushion-like *Euphorbia damarana* is in some localities remarkably similar to that of the fairy rings in the proximity. The rings are apparently not permanent because there are old rings in different stages of colonisation by plants. Norbert Jürgens, a German plant ecologist [cited in Höflinger 2013] has observed the life cycle of these rings and found that they develop a circular shape only in their third year. Within decades they grow to a size of up to 12 m in diameter. Viljoen [1980] found the diameter of the circles to vary from 2 to 5 m, with an average density of 11 circles per hectare in the *Marienfluss*.*

*Van Wyk & Smith [2001] report that the rings normally have a fringe of the tall perennial *Stipagrostis giessii* or *S. hochstetteriana*, whereas the annual grasses *Stipagrostis uniplumis* [presumably var. *intermedia*, which is annual, not the perennial var. *uniplumis*] and *Eragrostis porosa* are the more common grasses between the rings.*

According to Van Wyk & Smith [2001] there is experimental evidence suggesting that there is a biological

factor in the inner soil of the circles that inhibits the resistance of grasses to dehydration, possibly by suppressing the development of the so-called rhizosheath which is typical of perennial grasses growing in loose sand. In my experience this sheath surrounding actively growing roots is usually about 5–10 mm in diameter and consists of sand grains stuck to a web of white root hairs. I have never seen it on South Africa's most common grass, *Themeda triandra*, which does not grow on loose sand.

But perhaps it is not a biological factor but rather a chemical one that is active here. Scientists with a chemical bent have detected life-suppressing gasses being burped from the underworld in circular patterns [a bit like smoke rings in the good old days?] [Naudé et al. 2011].

In almost all rings Jürgens [cited in Höflinger 2013] detected evidence of the sand termite, *Psammotermes allocerus*, which constructs fist-size nests connected by passages. Why none of the other scientists who have studied the 'Hexenringe' have found these insects, is, like the circles themselves, more than a bit of a mystery. It has also been proposed that the barren patches act as water reservoirs for the termites. After good rains soil samples from inside the patches have been reported to contain five times more water than samples from the vegetated areas between them [Van Wyk & Smith 2001].

Having looked at these mysterious circularities in the Marienfluss and at the heuweltjies on hills in Namaqualand, and having listened to and read many wise words about them, even in news journals like *Der Spiegel* [Höflinger 2013], and more recently in *Mail & Guardian* [25 April to 1 May 2014: 52], one comes to the conclusion that they are most likely the result of the interaction of various factors, of which the crucial one are termites. The role these ancient, almost ubiquitous insects play in the African ecology is poorly understood and generally underestimated. Without them, numerous animals would not have evolved, and many others would probably struggle to survive without this readily available all-year energy supplement. Looking at more mesic Africa, *termitaria* are obvious, their ecology is not.

Who knows? Maybe the Himba people have the last and final wisdom: below the sand lives a dragon [that's what Höflinger (2013) in *Der Spiegel* calls it] which sometimes blows bubbles of fire which rise up and leave burnt patches on the surface: voila, fairy circles.

But this is obviously not the last word on the subject: very recently Meyer et al. [2015] have provided

evidence that some circles in Namibia are caused by large *Euphorbia* shrubs.)

And being in the Marienfluss and continuing on a mysterious note: Andreas, our cook and protector, tells us that a long time ago a battle was fought here, and as a result, the valley is haunted, so that bullets do not hit their mark. And, who knows? Perhaps the story is true.

It is time again to shoot a springbok for our pot but Andreas is not prepared to risk a shot in this haunted valley. So Bernard volunteers to be the hunter. With the first shot the left hind leg is almost severed and the buck runs off on three legs. We follow the animal with the truck until it lies down exhausted. At a range of no more than a few metres we fire two or three more shots at the buck but the bullets hit the ground, missing their mark. Eventually Andreas creeps up to the animal and cuts its throat. Haunted or accidental?

In spite of all this mystery, botany is not altogether forgotten: on a koppie about 7 miles (11.3 km) south of Otjinungua (Raper [2004] spells it: *Otjinhungwa*, which is said to be Herero for 'water', referring to the Kunene River) on the Kunene we collect:

Sesamothamnus benguellensis Welw. (5747), a rigid shrub with succulent trunk with pale cream bark and white flowers (Greek sesamon = sesame, and thamnus = shrub; differs from sesame in being woody; *S. benguellensis* appears to be the rarest of the three *Sesamothamnus* species known from the Kaokoveld. Confirmed records of this species are confined to the hills and mountains south of the Kunene in the region of the Marienfluss and Hartmann's Valley [Tree Atlas]. It is the only *Sesamothamnus* species recorded from Angola where it is known from the three arid southwestern provinces: Benguela and Namibe on the coast and Cunene bordering on the Kunene River [Figueiredo & Smith 2008]).

8 May: Otjinungua and Kunene

We camp in the shadow of massive *Faidherbia albida* trees on the bank of the Kunene at Otjinungua, near a small Himba settlement. The river is here on average about 30 m wide and placid (Figure 67) but one can hear the rapids not far downstream. The water tastes a bit like distilled water and leaves a metallic-sweetish taste in your mouth. It improves markedly if you add some salt or even Eno.



Figure 67. Kunene River at Otjinungua.

On a hillside consisting of a mixture of mica schist and red granite, about 7 miles (11.3 km) south of Otjinungua we collect the exotic, declared (in South Africa) invader:

Acacia dealbata Link (5755) (*dealbatus* = *whitened* or *covered with white powder*); and:

Boscia tomentosa Toelken (5749) (*described in Bothalia in 1969*), an erect shrub with white bark and greenish flowers (*endemic to the Kaokoveld*);

Adenolobus garipensis (E.Mey.) Torre & Hillc. (5752), a tall virgate shrub with bilobed grey-green leaves (*browsed by stock and game [Malan & Owen-Smith 1974]*);

Turnera oculata Story var. *paucipilosa* Oberm. (5751), a small perennial shrub 30 cm high; (*a Kaoko endemic also known from Angola; the genus occurs mainly in warm and tropical America, with a 'Gondwana' feeling. Bob Story discovered T. oculata on his tour the year before us and described it in Bothalia 7: 493 [1961]; Mrs Mauve [née Obermeyer] described subsp. paucipilosa at a later stage*). We also bag:

Dicoma cuneneensis Wild (5750) (*described in 1972*), a prostrate grey perennial with very pale mauve heads (*di = two, kome = a tuft of hairs*);

Phyllanthus maderaspatensis L. (5753), a small perennial herb with woody base; and:

Marcellioopsis welwitschii (Hook.f.) Schinz (5754), an amaranthaceous annual up to about 60 cm high with keeled linear leaves, green perianth and pale red filaments.

In a dry gravelly watercourse at the foot of red granite mountains we collect:

Senna italica Mill. subsp. *arachoides* (Burch.) Lock (5756), a small, semi-erect shrublet (= *looking like an Arachis, the good old peanut*);

Indigofera rautanenii Baker f. (5757), a shrublet with whitish leaves and small red flowers (*one of the few species we recorded in the Kaokoveld honouring Rautanen*); and:

Hermbstaedtia angolensis C.B.Clarke (5758), an annual, its flower spikes white, tinged pink (*based on a Welwitsch collection*).

Five miles (8 km) south of the Kunene in a dry gravelly watercourse we bag three species also recorded from Angola, two of them Kaoko endemics:

Monechma cleomoides (S.Moore) C.B.Clarke (5759), a dwarf shrub we have met several times before (= *resembling a Cleome*);

Combretum wattii Exell (5760) (described in 1961 in *Mitteilungen der Botanischen Staatssammlung München* 4: 5), a very dense tangled shrub with branches often drooping, leaves grey-green (a Kaoko endemic; Dr James Watt was a veterinarian, particularly interested in poisonous plants, and became Director of Agriculture in Namibia);

Centropodia mossamedensis (Rendle) Cope (5761), a tall, tufted, erect perennial (a Kaoko endemic, known in Angola only from Namibe, the southwesternmost province [Leistner in Figueiredo & Smith 2008]).

On the sandy banks of the Kunene at our Otjunungwa camp we collect the exotic gooseberry:

Physalis angulata L. (5763), a spreading, soft annual herb with yellow flowers with a brownish centre, the calyx veined with purple (from Greek *physa* = bladder, referring to the inflated calyx); and:

Phyllanthus reticulatus Poir. var. *reticulatus* (5762), a somewhat virgate shrub about 10' (3 m) high, leaves with reddish reticulations below, with purple fruit (found in the Kaokoveld mostly in the northernmost region [Tree Atlas]).

Extremely dry slopes of red granite and mica schist mountains at Otjunungwa on the Kunene River (Figure 68).

Here Bernard compiles a list of sight records which includes the following:

Trees or shrubs: *Boscia foetida*, *Maerua* sp., *Phaeoptilum spinosum*.

Dwarf shrubs: *Marcelliaopsis welwitschii*, *Monechma cleomoides*, *Petalidium rossmannianum*.

Perennial herbs: *Cucumis ?sagittatus*, *Hermannia amabilis*; and, at last, another:

Geophyte: *Albuca stapffii*.

Perennial grasses: *Enneapogon scoparius* and *Stipagrostis uniplumis*, and:

Annuals: *Corbichonia decumbens*, *Enneapogon cenchroides*, *Hermbstaedtia angolensis*, *Melinis repens* and *Sesamum schinzii*.

In the same locality we collect:

Antiphonia fragrans (Merxm.) Merxm. (5764), a shrub with sweetish odour (our collections from the Kaokoveld include many plants named by

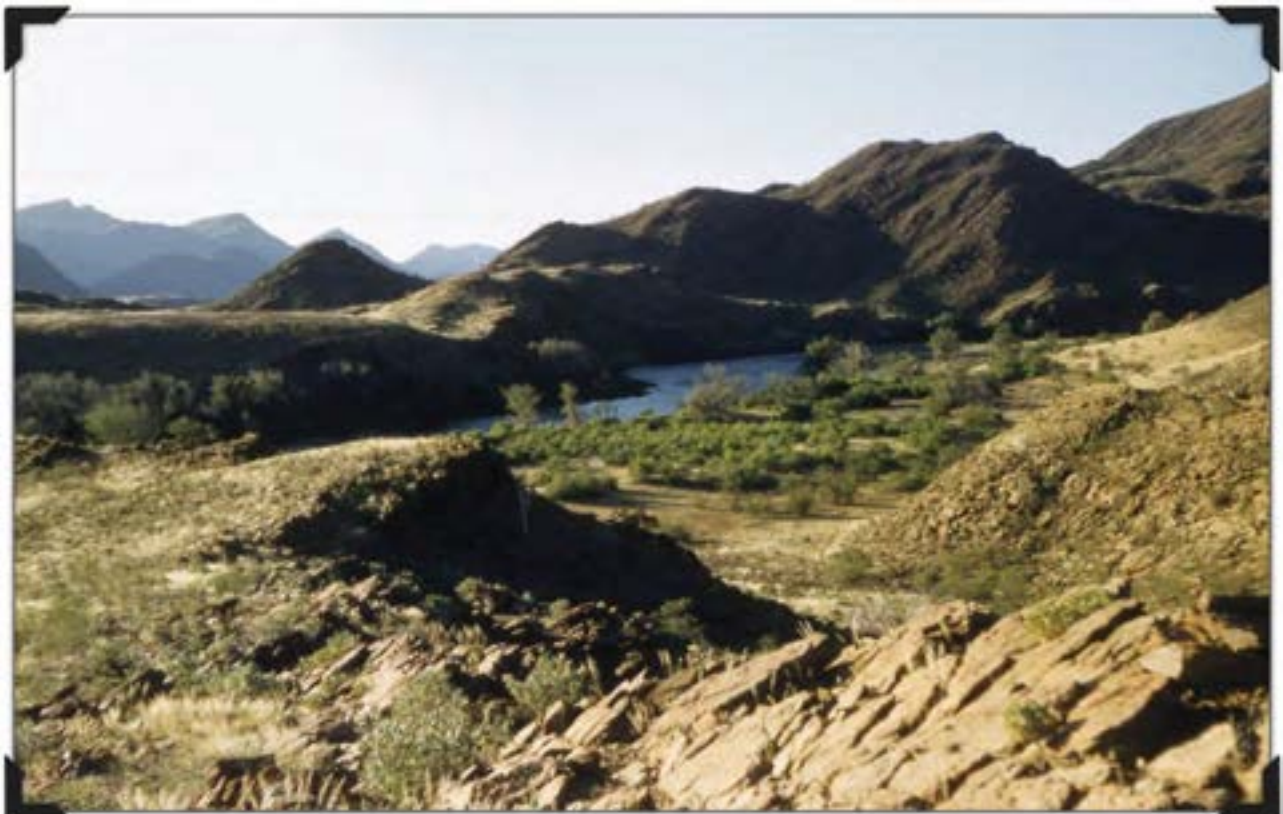


Figure 68. View over the Kunene River to mountains in Angola.

Hermann Merxmüller, but not a single one named after him, of which there are at least 43, mostly from Namibia, including Kaoko endemics like *Corchorus merxmuelleri* and *Hermannia merxmuelleri*; Prof. Merxmüller was the Director of the Botanische Staatssammlung in München and editor of the Prodröm einer Flora von Südwestafrika; he visited SWA on five occasions during which he collected about 6 000 numbers; as far as I know he did not visit the geographical Kaokoveld);

Tephrosia dregeana E.Mey. var. *dregeana* (5765); and two species of *Enneapogon*:

Enneapogon scoparius Stapf (5766); and *E. scaber* Lehm. (5768);

Ruellia diversifolia S.Moore (5767), an erect shrublet with dark green hairy leaves, only with last year's inflorescences (named after Jean de la Ruelle [1474–1537], dean of the medical faculty at the University of Paris and later became a priest, author of *De natura stirpium libri tres*, 1536); and:

Senegalia mellifera (Vahl) Seigler & Ebinger subsp. *mellifera* (= *Acacia mellifera* subsp. *mellifera*) (5769), a many-stemmed, rather broom-like,

erect shrub with stems slender with strikingly red bark.

Not far from our camp on the sandy banks of the Kunene River we photograph and collect:

Turnera oculata Story var. *oculata* (5770) which Bernard identifies as a *Loewia* species, a genus also belonging to Turneraceae but restricted to northeast tropical Africa; it is an erect shrub with branches very erect and appressed to the main stem, its striking orange flowers have a dark centre (Figure 69); (the genus name honours William Turner, the 16th century 'Father of English botany' who published the first original botanical work in English; *oculata* is derived from the Latin 'eye', referring to the dark centre of the flowers); the variety *paucipilosa* we collected earlier in the day (5751); also:

Ficus capreifolia Delile (5771), a dense shrub with rough but hairless leaves (hence its name river sandpaper fig), and globose figs about 20 mm in diameter (in Namibia it is apparently confined to the banks of the Kunene [Tree Atlas] but Van Wyk & Van Wyk [2013] show it also in the Caprivi; Figueiredo & Smith [2008] do not record it from Angola, but one must assume



Figure 69. *Turnera oculata* var. *oculata*.



Figure 70. *Hermannia amabilis* with *Stipagrostis* awns attached to the sticky stems.

that it grows also on the north bank of the Kunene); and:

Hermannia amabilis Marloth ex K.Schum. (5772), (the 'lovely' species with pendent white flowers with a pink centre, which we had first met some 38 km west of Otjiu, together with *Kaokochloa*, as we entered the inner Namib) (Figure 70).

9 May: Otjinungua and Kunene

We continue collecting on the banks of the Kunene at our camp site:

Cordia sinensis Lam. (5773), a shrub with whitish bark and very rough leaves; its orange-yellow berries are edible; its Herero name: *musepa* (omusepa in *Tree Atlas*; genus name after *Euricius Cordus* [1486–1535] and his son *Valerius* [1515–1544], German pharmacists and botanists; *sinensis* = from China); two species of *Ipomoea*:

Ipomoea rubens Choisy (5774), a twiner with showy pinkish purple flowers on the water's edge (*rubens* = reddish); and:

Ipomoea tenuipes Verdc. (5777) with small mauve flowers;

Sporobolus consimilis Fresen. (5778) a perennial with rhizomes forming dense patches, the moisture-loving *vleigras* (*consimilis* = similar in all respects); and:

Mimosa pigra L. (5779), a thorny shrublet about 1 m high, with leaves collapsing when touched (*from Greek mimos = mimic, because the plant's sensitivity to touch imitates the similar reaction of animals*).

On mica schist and granite koppies overlooking the Kunene River at Otjinungua we collect four taxa undescribed at the time and all of them Kaoko endemics:

Leucas ebracteata Peyr. var. *kaokoveldensis* Sebald (5781), a grey annual herb with white flowers with red anthers (*Sebald described the var. in 1980, based on a specimen collected by Kers*);

Ceraria longipedunculata Merxm. & Podlech (5782), a much-branched shrub with succulent, elongate, club-shaped leaves; flowers are borne at ends of branches and have a pinkish, nebulous appearance (Figure 71) (*we have collected it before (5694) and commented on it; the*



Figure 71. *Ceraria longipedunculata*.

species was described only in 1961; Greek *ceras* = horn, referring to the appearance of the branches);

Rhigozum virgatum Merxm. & A.Schreib. (5783), a lax twiggy shrub very common in these parts, bearing only remnants of fruits which appear like those of Asclepiadaceae or Apocynaceae or possibly Pedaliaceae (a *Kaoko* endemic also known from Namibe and Cunene provinces in southwestern Angola; according to the *Tree Atlas* it is in Namibia restricted to an area just south of the Kunene where it is common to abundant; it has yellow, trumpet-shaped flowers); and:

Maerua schinzii Pax (5784), a tree 12' (3.6 m) high with reddish grey bark and yellow-green leathery leaves (the genus name is probably derived from the Arabic name for this genus);

Boscia tomentosa Toelken (5785), the hairy shepherds-tree (as the *Tree Atlas* has it; who is hairy: the tree or the shepherd?), erect, up to 15' (4.5 m) high with strikingly white, smooth bark and grey-green hairy leaves (not yet recorded from Angola [Figueiredo & Smith 2008]); we also bag:

Lophiocarpus polystachyus Turcz. (5786), a small perennial with semisucculent grey-green leaves and small green flowers borne in a narrow spike (Greek *lophos* = crest and *carpos* = fruit, referring to the ridged fruit); and:

Cucumis sagittatus Peyr. (5786/A) (collected before at Orupembe).

10 May: Otjinungua–Orupembe

Time to say farewell to Otjinungua and the Kunene River and head south, up the Marienfluss en route back to Orupembe.

Twelve miles (19.3 km) south of the Kunene on red gravelly flats we find:

Kohautia angolensis Bremek. (5787), a small annual herb with pale pinkish mauve flowers (*Franciski Kohaut* was a Czech plant collector and inventor).

Thirty miles (48.3 km) south of the Kunene, on red granite of the Otjihipa Mountains bordering the



Figure 72. *Dewinteria petrophila* (the general habitat is shown in the foreground of Figure 66).

Marienfluss to the east and consisting of large slabs and boulders on which soil is found only in crevices and cracks we collect:

Petalidium crispum A.Meeuse ex P.G.Mey. (5788), a dense bush with viscous leaves and red, honey-scented flowers (*undescribed at the time*);

Momordica welwitschii Hook.f. (5789), which we had also collected near Ohopoho (5279); and, perhaps **the** discovery of our expedition:

Dewinteria petrophila (De Winter) Van Jaarsv. & A.E.van Wyk (5790), a perennial growing in minute fissures on solid perpendicular rock faces, with cream flowers with a long tube which is purplish inside (Figure 72).

Bernard recognises the plant as a species of *Rogeria* (and described it as *Rogeria petrophila*, 'the rock-loving one', in the first number of the journal *Kirkia* in 1961. Recognising the differences between this species and those placed under *Rogeria*, Ernst van Jaarsveld and Braam van Wyk [2007] created the new genus *Dewinteria* to accommodate *Rogeria petrophila*. In a table listing certain characters of the 14 genera of *Pedaliaceae* Ihlenfeldt [2010] compares the basic **fruit characters** of the two genera:

- *Rogeria*: woody capsules with spines or narrow wings; only abaxial carpel incompletely dehiscent;
- *Dewinteria*: pergamentaceous capsules, dehiscent; heterocarpy, partly of cleistogamous origin; and their **mode of dispersal**:
- *Rogeria*: anemochorous, wind ballists.
- *Dewinteria*: dust seeds; cleistogamous capsules deposited in rock crevices.

In a phylogenetic tree Ihlenfeldt (2010) places *Dewinteria* in the *Pedalieae* where it arises from *Rogeria*.

The second known collection of *Dewinteria* was made by Davies, Thompson & Miller (collection no. 62) during their expedition to the Kaokoveld in July 1959 which focused on the Otjihipa Mountains and the gorge of the Kunene River in the vicinity of Otjinungua. In spite of their mountaineering feats it appears that the ± 160 numbers they collected do not include any species not described or collected at the time.)

At the same locality 30 miles (48 km) south of the Kunene, on red granite, we collect three composites:

Distephanus angolensis (O.Hoffm.) H.Rob. & B.Kahn (5791), an erect shrub 6–10' (1.8–3.0 m) high

with yellow discoid heads, which we also collected near Ombepera on our first trip (*Greek: di = two, and stephanos = crown, referring to the two whorls of pappus bristles: the outer ones short, the inner ones longer*);

Helichrysum roseo-niveum Marloth & O.Hoffm. (5792), an annual, also collected earlier; and

Vernonia obionifolia O.Hoffm. subsp. *dentata* Merxm. (5794), an erect perennial with leaves with crinkled margin (*genus name after William Vernon, an English botanist, 1666–1711*).

We also collect:

Jamesbrittenia heucherifolia (Diels) Hilliard (5795), a low perennial with a slightly woody base and viscous leaves, the flowers have mauve petals and the tube is yellow inside with purple stripes in the throat (*a Kaoko endemic*);

Blepharis obmitrata C.B.Clarke (5793), a widespread rounded dwarf shrub, its leaves with spiny white margins, its flowers white;

Cucumella aspera (Cogn.) C.Jeffrey (5796), a perennial with often almost woody base and rooted in rock crevices; fruits oblong with roughened asperulous surface (quite distinct from *Cucumis sagittatus*) (*the genus name is a diminutive of Cucumis*); and an unidentified species of *Anticharis* (5797) (*a genus mainly of arid regions extending from southern Africa to the Arabian Peninsula and India*).

Having reached Orupembe, our favourite waterhole with the well-rubbed fig tree (Figure 62), we settle down for the night and to our presses and moths, to say nothing of Andreas's culinary magic.

11 May: Orupembe–Kaoko Otavi

We pick up our spare petrol drum, fill our tank and prepare for the journey to Sanitatas, the next major waterhole on our way, and beyond, to Kaoko Otavi. But before we leave we collect a member of Cyperaceae, a family represented in our collection by a mere eight species, more than half of which were described in the seventeen hundreds:

Scirpoides dioeca (Kunth) Browning (5799), erect, very dense round tufts with round culms, growing in brackish shallow pans (*scirpoides = resembling a rush or bulrush; dioecus = dioecious: with sexes on separate plants*).

It is striking how game use well-trodden paths, especially those leading to water holes. Particularly conspicuous are the elephant paths. As Eloff (2010) writes: 'When on the move, elephants usually walk in single file and over the years they have created a network of permanent paths on the desert plains or over the mountains to food and water resources within their home range'. These paths are surprisingly narrow, often no wider than about a metre and look much like a well-trodden human path. Even springbok, a typical animal of the wide plains, tend to walk in a line following a set path when walking to a waterhole. The most typical 'padlopers', however, are the Hartmann's zebras. Everywhere over hills and mountain ranges you see their well-marked paths, sometimes scaling steep rocky slopes and looking exactly like human footpaths.

After about 14 miles (22.5 km) we reach Sanitatas (Figure 73).

On brackish shallow pans on flats between mountains we collect:

Tamarix usneoides E.Mey. ex Bunge (5800), shrub with pale mauve inflorescences (*Tamarix is the Classical Latin name for the tamarisk; usneoides = resembling the lichen Usnea*);

Cyperus laevigatus L. (5801), a perennial with long rhizomes, at the water's edge (*Latin laevigatus = smoothed*); and three grasses:

Sporobolus engleri Pilg. (5802), a tufted annual;

Paspalidium geminatum (Forssk.) Stapf (5803), a rhizomatous perennial (*in southern Africa apparently very largely confined to northernmost Namibia [Gibbs Russell et al. 1990] and in Angola found in the arid regions and also in the mesic Moxico Province [Leistner in Figueiredo & Smith 2008]; genus name from Paspalum and Greek – idion, a diminutive suffix, therefore 'a small Paspalum'; Latin geminatus = paired*); and:

Sporobolus consimilis Fresen. (5804), a robust, rhizomatous perennial (*also recorded from Namibe, the desert province in southwestern Angola*).

In a dry riverbed 4.5 miles (7.2 km) north of Sanitatas we collect:

Helichrysum candolleianum H.Buek (5805), an erect shrublet with white heads, which we have also collected near Etanga on our first trip.

Nine miles (14.5 km) from Sanitatas on the road to Ohopoho we stop at a mica schist hillock and collect:

Ruellia diversifolia S.Moore (5806), a sticky dwarf shrub with yellowish to purplish flowers, which,



Figure 73. Sanitatas waterhole with (from left to right): Abner, Bernard, Andreas.

judging by our collections, is widespread in the region west of the main escarpment.

On reddish gravelly quartzite flats some 12 miles (19.3 km) northeast of Sanitatas we collect three live specimens of *Cyphostemma uter* for the garden.

Bernard gives the (trusted?) International the spurs and it flies us to Kaoko Otavi which we left behind us 11 days ago.

Time to look for a camping site near the famous waterhole. But, how near?

(Let me state quite categorically that in the following lines 'I' means 'I' and definitely not 'we'. I had not read Lawrence Green [1952] on page 48 where he writes – and I digress – 'Otavi comes from an expressive Herero word describing "the pressing of the calf on the udder of the cow to make the milk flow strongly". Bubbling water always reminded the Hereros of that sight and so you find several Otavis in South West Africa'. But back to the choice of a camping site and to Green who quotes the Herero headman Thomas Mutati who lived at Kaoko Otavi for many a year: 'this is a bad place for elephants ... if you come here in September they will kill you. I have

seen them come through the village, between our houses, breaking down the walls and killing my people, ten or twelve people, men, women and children'. Nor had I read 'Precautions, Trail etiquette and tips' given in Getaway of November 1997 [which was criticised for 'opening the Kaokoveld to tourists']: 'Garth Owen-Smith of Integrated Rural Development and Nature Conservation urges visitors to stay well clear of waterholes which are used by elephants and other animals.' Nor had I switched on the compartment in my brain marked 'common sense'.)

I suggest a site close to the water (on what turns out to be an elephant path. How I convinced Bernard that this was an acceptable choice I can not remember. He was probably tired from the long drive and in no mood for discussions.)

Night falls, the sounds from the nearby village, which Abner has chosen for his night's rest, die down, and having performed my duties I snuggle up in my sleeping bag. The last thing I remember is Andreas popping his head into our tent saying: 'Die Elefanten kommen. Die Herren müssen ruhig schlafen. Ich passe auf' (or words to that effect) ('The elephants are coming. You gentlemen should sleep peacefully. I will look out.'). Over to Bernard, or rather to what I can recall of his

tale of horror the next morning. The elephants did indeed approach the waterhole on their accustomed path. Finding it blocked by our tent they become *moltissimo agitato* and their high-pitched trumpeting tears the silence of the night into terrifying tatters. The inhabitants of the village, alarmed by the pandemonium, are convinced that the strangers at the waterhole have drawn their last breath. On awaking from my peaceful slumber the next morning Bernard utters words like: This was terrible! I haven't slept a wink! I reply: What was so terrible? Why couldn't you sleep? He: What?! You didn't hear the elephants?!

Hereby my apologies to Bernard, to Garth Owen-Smith and to all nature lovers out there (as they say). *Ek sal nie weer nie.* (I won't do it again.)

12 May: Kaoko Otavi–Ohopoho

Having survived/slept through the horrors of the night we pack up, say a fond farewell to the placid waters of Kaoko Otavi and head towards Ohopoho which we reach safely.

13–16 May: Ohopoho

Time to refresh, repair, replenish.

Fourth trip

(to Sesfontein, 17–23 May)

17 May: Ohopoho–Ombombo

Clean and rested, and full of (baked) beans (*I am joking: we ate very well with the Van Zyls, although every now and then one of our many tins of baked beans was opened*), the International is in good shape (*so we hope*) and it is time to complete our aborted trip to Sesfontein (Figure 74), the ‘capital’ of the Kaokoveld until about 1915 when German South West Africa changed to South West Africa.

We take the southward track via Orumana and Ombombo, the same we returned on after our aborted trip. After about 3.8 miles (6.1 km) in the Ohopoho basin the track rises to about 1 200 m onto the Kaoko calcrete plateau. Four miles (6.4 km) further on the road to Kamanjab that we came on when we approached Ohopoho for the first time, we branch off due south to Orumana.

About 12 miles (19.3 km) south of Ohopoho we stop solely for a particularly striking specimen of:

Dichrostachys cinerea (L.) Wight & Arn. subsp. *africana* Brenan & Brummitt var. *setulosa* (Welw. ex Oliv.) Brenan & Brummitt (5810) growing on red sandy loam in mixed *Colophospermum mopane*–*Terminalia prunioides* association. It is a very common shrub but one tends to overlook it on purpose when collecting because it is such a schlep to tame it in your temporary press with its sturdy spinescent side branches punching holes in the paper and the delicate mauve or pink and yellow, catkin-like inflorescences being ruined in the fight (*Greek dis = two, chroos = colour, stachys = spike, referring to the flower spikes*).

Twenty miles (32.2 km) south of Ohopoho we reach Orumana, the Mission station.

On a dolomite koppie we collect:

Ficus glumosa Delile (5811), a gnarled tree about 12’ (3.6 m) high with cream to grey bark, often a rock-splitter, in this case dolomite rocks (*there is a massive gap in its distribution from the eastern*

Kaokoveld and Angola to Zimbabwe and northern South Africa; are there not enough rocks to split in the rest of Namibia and in Botswana?);

Entandrophragma spicatum (C.DC.) Sprague (5813) (*the uncommon to rare Owambo Wooden-banana, as the Tree Atlas calls it*), an erect tree about 30’ (9 m) high, with grey, fairly smooth bark peeling off in large pieces, large compound leaves and large, pendent, narrowly ellipsoid to almost cylindrical dry capsules splitting open into 5 valves to reveal a thick central column to which the seeds are attached, looking rather like a peeled banana; the Herero name: *omataki* (*Greek en- = in, and andro- = male, and phragma = fence or screen; the stamen filaments are joined to form a tube*).

Having gradually ascended further up the Kaoko calcrete plateau we reach an altitude of about 1 500 m near Okaware, some 7 miles (11.3 km) south of Orumana (*on what could be considered the foothills of the Joubert Mountains which are not very well defined on my maps*).

Bernard compiles a list of plants on red calcareous gravelly loam in *Colophospermum mopane*–*Catophractes*–*acacia* scrub:

Trees: *Boscia foetida*, *Colophospermum mopane*, *Euclea pseudebenus* (very rare), *Vachellia hebeclada* subsp. *tristis* (= *Acacia hebeclada* subsp. *tristis*), *Ziziphus mucronata*.

Shrubs: *Catophractes alexandri*, *Helinus integrifolius*, *Montinia caryophyllacea*, *Mundulea sericea*, *Senegalia mellifera* subsp. *detinens* (= *Acacia detinens*), *Tarchonanthus camphoratus*, *Vachellia reficiens* (= *Acacia reficiens*).

Dwarf shrubs: *Eriocephalus* sp., *Hiernia angolensis*, *Leucas pechuelii*, *Leucosphaera bainesii*, *Petalidium rossmannianum*.

Perennial herbs: *Gossypium triphyllum*, *Pegolettia oxyodonta*.

Perennial grasses: *Anthephora pubescens*, *Aristida meridionalis*, *Cymbopogon caesius* (= *Cymbopogon excavatus*), *Eragrostis rotifer*, *Eragrostis superba*, *Stipagrostis uniplumis*, *Triraphis ramosissima*.

The sun is getting low and we decide to pitch our tent for the second time at Ombombo.

18 May: Ombombo–Khowarib Schlucht

Saturday, the 18th of May, and we are on our way to Sesfontein. We are steadily descending from the plateau and are again at an altitude of about 1 000 m. At Otjozongombe (*the 'z', as the maps have it, is pronounced with the tongue between the teeth somewhat like the English 'th' and we write it in our notebooks as 'd'*), 12 miles (19.3 km) south of Ombombo we have reached the edge of the Beesvlakte. Again the view over this wide plain, level almost as a snooker table.

Growing parasitically on *Ruellioopsis setosa* (Nees) C.B. Clarke we collect:

Cuscuta planiflora Ten. var. *planiflora* (5821) for the second time, again growing on a species of Acanthaceae (*Cuscuta* the Latin name for dodder); and:

Tetragonia calycina Fenzl (5822), a shrub 5' (1.5 m) high with small yellow flowers and 4-winged fruits (*from Greek tetra = four, and gonia = angle, referring to the fruit; calycinus = with well-developed calyx*).

Eight miles (12.8 km) further, on the red loamy soil of the Beesvlakte, we collect:

Ehretia namibiensis Retief & A.E. van Wyk subsp. *kaokoensis* Retief & A.E. van Wyk (5823) (*only recently described and largely restricted to the Kaokoveld*), a shrub about 10' (3 m) high (*after Georg Dionysius Ehret [1708–1770], a celebrated German botanical artist*); and:

Crotalaria teixeirae Torre (5824), a glaucous annual with yellow flowers, the standard reddish brown at the base and with subglobose pods (*described in 1960 from Angola, where the genus is represented by more than 130 species; named in honour of the Portuguese agronomist and botanist J.M. Teixeira who collected in Angola between 1949 and 1969 [Figueiredo & Smith 2008]*).

Another 7 miles (11.3 km) on, some 37 miles (59.5 km) from Otjozongombe, we leave the Beesvlakte and the breakdown site of our first attempt

behind us and come to the entrance of the Elephant Ravine (Figure 75) (*as we call it, officially known as the Khowarib Schlucht, one of the well-known geographical features of the Kaokoveld*).

It is a dramatic, narrow, winding, steep-sided gorge with rock faces up to 100 m high towering above you in places, about 15 km long (*clearly visible on the satellite image of Namibia in the Tree Atlas; see Figure 3 on p. 6*). On its westward flow to the Atlantic the Hoanib River has here cut its way through the dolomite and the underlying sandstone and older rocks of the narrow southern extension of the Kaoko calcrete plateau and thus of the main escarpment. The name of this gorge or canyon is derived from the Nama language (khowarib = zebra) and German (Schlucht = gorge, ravine).

At the entrance to the gorge, on a much-weathered dolomite koppie we collect:

Monechma cleomoides (S. Moore) C.B. Clarke (5825), a dense, deep green, hairy dwarf shrub which we collect twice because the flowers on one specimen are pure white, on the other blue (5826);

Senegalia robynsiana (Merxm. & A. Schreib.) Kyal. & Boatwr. (= *Acacia robynsiana*) (5827), the 'Antennenakazie' (*a Kaoko endemic described in 1957*), first encountered at Ombepera on our first trip, a tall, very slender, whipstick-like tree with a few scattered branches at the top and base; often only single-stemmed but occasionally with a few arising from the same stock (Figure 75) (*named after Frans Hubert Edouard Arthur Walter Robyns [1901–1986], Belgian botanist, director of the Jardin Botanique Nationale, Brussels, 1931–1966, expert on central African flora*);

Peristrophe namibiensis K. Balkwill subsp. *brandbergensis* K. Balkwill (5828), a small, white-stemmed acanthaceous bush with large heart-shaped bracts and pale magenta flowers, (*undescribed at the time; from the Greek peri = around, and strophos = a twisted band, referring to the twist in the flower stalk; the species displays the 'arid corridor' pattern [Craven 2009]*);

Dalechampia scandens L. var. *cordofana* (Hochst. ex Webb) Müll. Arg. (5829), a herbaceous climber with woody base (*named after Jacques Dalechamps [1530–1588], a French botanist*); and:

Indigofera rautanenii Baker f. (5830), a dwarf shrub with curled pods, one of the many plants named in honour of Rautanen (*surprisingly we have recorded only three of them in the Kaokoveld: the genus Neorautanenia, Hermannia rautanenii and the present Indigofera*).



Figure 75. *Senegalia robyniana* (tallest tree in the middle) before the entrance to the Khowarib Schlucht.

On the crown of a high ridge consisting of pure blue-green dolomite:

Caesalpinia rubra (Engl.) Brenan (5831), a thorny shrublet 3–4' (90–120 cm) high with sharply pointed pods (*not recorded in the Tree Atlas from this degree square [1913 AC]; named after Andrea Cesalpino [1519–1603], Italian botanist and physician to Pope Clement VIII*);

Marcellioopsis denudata (Hook.f.) Schinz (5832), an amaranthaceous shrub about 5' (1.5 m) high with thick woody basal stems and herbaceous young twigs, the flowering spikes deep brown at the apex, silvery below (*a Kaoko endemic*); and:

Hiernia angolensis S.Moore (5835), a small straggling shrublet with mauvish pink flowers (*type specimen: Welwitsch 5001; W.P. Hiern wrote the Catalogue of the African plants collected by Dr Friedrich Welwitsch in 1853–1861 which was published by the British Museum [Natural History], London*).

Time to settle down, pitch our tent, work on our presses, feed our faces, by means of the culinary works of

art produced by Andreas (in case of doubt: springbok [first the liver, then the rest, inners excluded], rice and tinned veggies) and catch some of the myriads of moths swarming around our Petromax paraffin lamp for Laios Vari, entomologist at the Transvaal Museum. Butterflies we see (*but do not catch*) during the day, in swarms on and around any moist spot, including our bodies, where exposed, and on dung patches (*second best?*). Our perspiration is also in demand from another kind of insect, friendlier perhaps, to begin with, but no less insistent than the clouds of flies in the vicinity of settlements. These are very small, blackish stingless bees, known as mopane bees or sweat bees, *with a scientific name containing a warning*: *Plebeina hildebrandti*. Does *plebeian* not mean as much as *vulgar* or *common*? And *common* they most certainly are, exploring every moist spot on your face, especially the eyes. If they are *vulgar*, then obviously not in the sense of having bad taste. But most certainly in the sense of not being well behaved and likely to offend. Whatever the source of their moisture, they produce a dark very sweet honey which they store in small nests of wax with a small opening in tree trunks, especially those of mopane.

Writing about this friendly, highly bothersome insect takes me back to the late 1950s when our Institute was small enough to have the ambience of a family affair, with Dr Dyer as the boss and Dr Codd a friendly second-in-command. One fine day we receive a parcel, I think from the police, containing mysterious dark brownish-yellowish waxy lumps of something, retrieved, so we are informed, from the fuel system of an aeroplane that had crashed/crash-landed somewhere in Botswana. Sabotage? Please identify. One glance under the microscope reveals masses of composite pollen grains typically found in acacia species.

How did they get into the thirsty tank of a small plane refuelled at an airstrip somewhere in the bush? You have guessed our diagnosis: The seldom used funnel instrumental in coaxing the fuel into the plane had attracted our little friends who had constructed their nest within its ready-made bowl.

19 May: Khowarib Schlucht– Warmbad

Today is Sunday. (*How I wish we had made more notes other than the purely botanical ones!*)

Some five miles (8 km) into the Schlucht – hang on, what is that tree with the broom-like habit on the rocky dolomite ridge over there? Bernard out like a shot: a new species of *Kirkia*!

Kirkia dewinteri Merxm. & Heine (5837), a tree about 10 yards (\pm 9 m) high, the bark yellowish with small, scattered black spots, its crown rounded or flattish (Figure 76) (published in Mitt. Bot. Staatssamml. Münch. 3: 617 [1960]; the *Tree Atlas* refers to it as the *Kaoko Kirkia* and lists only four records from three adjacent degree squares; thus a *Kaoko* endemic).

Bernard's appetite is whetted for more and he sets off, notebook and pencil in hand, temporary press over the shoulder, with a determined look on his face and with the intention of compiling as complete a list of plants as possible. He records geology: outcrops of pure lava and ridges of pale cream to rosy dolomite and slopes of baked shale but mainly outcrops of ordinary grey-blue dolomite; and the following botany:

Trees and shrubs: *Adenolobus garipensis*, *Berchemia discolor*, *Boscia foetida*, *Catophractes alexandri*, *Ceraria longipedunculata*, *Colophospermum mopane*, *Combretum apiculatum*, *Combretum* sp. (Story) (= *Combretum wattii*), *Commiphora glaucescens*, *Commiphora* (Fransfontein), *Commiphora* (white bark, Ohopoho = *C. tenuipetiolata*), *Commiphora* (peeling bark, Otjithu), *Croton* sp., *Cyphostemma currorii*, *Euphorbia virosa*, *Grewia bicolor* group, *Grewia villosa*, *Kirkia* sp. nov. (= *Kirkia dewinteri*), *Leucas pechuelii*, *Maerua* sp., *Montinia caryophyllacea*, *Moringa ovalifolia*, *Myrothamnus flabellifolius*, *Pachypodium lealii*, *Rhigozum brevispinosum*, *Senegalia mellifera* subsp. *detinens* (= *Acacia detinens*), *Senegalia montis-usti* (= *Acacia montis-usti*), *Senegalia robynsiana* (= *Acacia robynsiana*), *Senegalia senegal* var. *rostrata* (= *Acacia senegal* var. *rostrata*), *Sesamothamnus guerichii*, *Sterculia africana* and *Terminalia prunioides*.

Dwarf shrubs: *Aptosimum* cf. *lineare*, *Barleria* (= *B. damarensis*); *Helichrysum* sp., *Leucosphaera bainesii*, *Monechma cleomoides* and *Petalidium* sp. (Ohopoho = *P. rossmannianum*).

Perennial herbs: *Abutilon* sp., *Achyranthes* sp. (green leaf, lobed), *Barleria* (*Equisetum* stems) (= *Ecobolium clarkei* var. *clarkei*); *Cienfuegosia* sp., Crucifer (white flowers, shrubby), *Hibiscus* (white flowers, shrubby) and *Otoptera burchellii*.

Perennial grasses: *Enneapogon scoparius*, *Eragrostis nindensis*, *Oropetium capense*, *Stipagrostis hochstetteriana*, *Stipagrostis uniplumis* and *Triraphis ramosissima*.



Figure 76. *Kirkia dewinteri* with Andreas.

Annuals: *Acalypha* sp., *Aristida adscensionis*, *Entolpocamia aristulata*, *Eragrostis micrantha*, *Eragrostis* sp. nov., *Geigeria ?alata*, *Melinis repens* subsp. *grandiflora*, *Sesamum schinzianum*, *Sesbania* sp. (Elephant waterhole), *Setaria verticillata*, *Stipagrostis hirtigluma* and *Triraphis* sp.

(Looking at this list, what can one comment? Well, it is a pretty long list and vouches for the excellent botanical knowledge of the compiler who has botanised in the neighbouring Damaraland before but not in the Kaokoveld. A very striking feature is the large number of trees and shrubs, the 'large woody species' as the *Tree Atlas* calls them, seeing that so many of them can take the form of trees or shrubs depending on their habitat. If one wants to classify the Kaokoveld flora east of the Namib Desert in terms of its characteristic growth form, it would most certainly be this tree/shrub element, its succulent members in particular. Craven [2009] when selecting a plant as character species of the Kaoko portion of the Kaoko Centre of Endemism chose a shrub/tree

with a succulent stem: *Sesamothamnus guerichii*, with a distribution area almost perfectly delineating the centre [if such is possible for an imaginary area]. This floristic element is only dominant on the rocky mountains, hills and koppies. The flat sandy to loamy plains and basins belong to the grasses. The grass species constituting the Kaoko portion of the centre, that is those found to the east of the escarpment, are much the same one can find in the summer-rainfall region elsewhere on the subcontinent. The trees and shrubs of the plains, especially along river courses are also species we know from elsewhere in our part of the world. Where the plains are raised and gravelly, dwarf shrubs come to their own, including Kaoko endemics such as species of *Petalidium*. Dwarf shrubs also increase on plains under grazing pressure. Acocks might have called it Karoo invasion [e.g. *Petalidium rossmannianum* around Ohopoho and *Pegolettia senegalensis* on the Warmbad flats].

Bernard's list seems to describe a balanced vegetation untouched by human activity: the presence of perennial grasses, such as *Enneapogon scoparius* and *Eragrostis nindensis*, very palatable and likely to disappear in intensively grazed areas, as well as the absence or apparently low profile of weedy annuals. Not even *Schmidtia kalahariensis* was recorded; it was probably present but not in evidence.

But what about the elephants that are known to walk through the Schlucht regularly? We know from Eloff [2010] that the Kaoko elephants in general treat trees and shrubs more gently than those in the Kruger National Park; and one of their favourite morsels, *Pachypodium lealii*, was still hale and hearty on Bernard's list. So I deduce, highly scientifically, that they have little impact on the vegetation of the Schlucht.)

Meantime, while Bernard is busy listing, I compile my own list, which shall be forever kept secret except to reveal that it contained nothing that Bernard had not picked up.

Two miles (3.2 km) further down the canyon, we stop to collect and photograph:

Senegalia montis-usti (= *Acacia montis-usti*), (5841) (named by Hermann Merxmüller and his close assistant Anneliese Schreiber of the Botanische Staatssammlung in Munich after the Brandberg (mons = mountain; ustum = burnt), another Kaoko endemic, recently recorded from Angola [Van Jaarsveld (2010)]. Bernard calls it 'Besenakazie' (= Broom acacia), a name he has heard from a German-speaking colleague on his

trip to Damaraland and the Brandberg region. It is a shrub or tree, branching in a V-shaped, broom-like manner with the branches either arising from ground level or, in older specimens, from a bole 3' (90 cm) high or higher and it has a spreading flattish crown. (*The Tree Atlas calls it Brandberg Acacia*) (Figure 77).

After some 4 miles (6.4 km) the gorge opens up into the wide Warmbad plain or basin (Figure 78) at an altitude below 900 m, formed by the Hoanib River and tributaries from north and south. (On our route map (Figure 74) Warmbad is called Warmquelle = warm fountain.)

On the calcareous Warmbad flats we collect:

Pegolettia senegalensis Cass. (5844), an erect aromatic annual which is very common, most probably due to the endeavours of *Homo sapiens* and his animals.

At the beginning of the previous century a German farmer, Carl Schlettwein, had a farm here where various experimental crops, such as tobacco, wheat, barley and mealies were grown on irrigated fields (Abel 1954; Green 1952). At one stage the Reichstag in Berlin debated the rates of pay of Schlettwein's workers (Green 1952: 39). Van Warmelo (1951) mentions that: [In German times] ... 'the intention was to settle it [the Kaokoveld], as is shown by the fact that the whole country was surveyed and some concessions were given out'. De Klerk (2009; but recorded in 1952) relates that an Italian, Batista Oldani, formerly employed by SWA Railways, later lived here and constructed a masterfully crafted aqueduct, shadowing those of his ancient forebears, to irrigate his lands.

Here we also collect:

Gossypium anomalum Wawra ex Wawra & Peyr. subsp. *anomalum* (5845), wild cotton; perhaps Schlettwein experimented with that too; and:

Rogeria adenophylla J.Gay ex Delile (5846) (Figure 79), a stout, rigidly erect annual up to 5' (1.5 m) high with pinkish purple flowers shading to cream towards the base of the tube; it is a member of the Pedaliaceae, one of the 'character' families of the Kaokoveld.

Rogeria is the genus into which Bernard placed one of our wow discoveries made next to the Marienfluss on our third trip (5790). It was later transferred to the monotypic genus *Dewinteria* by Braam van Wyk and Ernst van Jaarsveld (Figure 72).



Figure 77. *Senegalia montis-usti* with Bernard.



Figure 78. Warmbad basin, on the horizon the poort to the Sesfontein basin. In the far distance on the flats traces of old lands.



Figure 79. *Rogeria adenophylla*.

On a dolomite slope with quartz intrusions:

Tribulus exrucians Wawra (5847), with a name that hurts almost as much as its thorny fruits under your bare feet; and:

Kaokochloa nigrirostris De Winter (5848), the new annual grass discovered on our third trip on the edge of the Namib (5679), forming almost pure stands (*which may here be seen as a Namib element encroaching eastwards where the original vegetation has been disturbed*); and another Kaoko endemic:

Cadaba schroepelii Suess. ex Suess. & Merxm. (5849), an evergreen shrub of the Capparaceae with black bark, both leaf surfaces silver-grey scaly (*and with worm-like cylindrical fruits up to 20 cm long covered with dense grey scales, carried on a slender stalk, which have given rise to the common name silver-leaved worm-bush [Tree Atlas]; a Kaoko endemic also recorded from Angola. Prof. Karl Suessenguth [1893 (also my father's birth year)–1955] was Hermann Merxmüller's mentor and predecessor and started their work on African plants; Adolf Schroepel, the third proud Bavarian in this league, was an apothecary and patron of*

botany; Cadaba from kadhab, the Arabic name for Cadaba farinosa).

On the grey calcareous flats near the fountain at Warmbad (*as mentioned above sometimes called Warmquelle (German: Quelle = spring)*) we collect two annuals indicating previous human endeavours:

Melanthera triternata (Klatt) Wild (5850), an exotic annual composite with \pm rhomboid leaves and attractive yellow radiate heads, previously collected on our first trip at Etanga where it was also growing in the shade (*the genus name from the Greek melas = black, and the Latin anthera = anther*); and:

Eragrostis tef (Zuccagni) Trotter (5852), an annual growing as a weed under trees (*for some reason not taken up in our list of collections*).

We pitch our tent near the fountain which feeds crystal-clear, bath-temperature water into a rock basin shaded by a massive fig tree some 50' (15 m) high, with cream to grey bark, and a wide, spreading crown:

Ficus sycomorus L. subsp. *sycomorus* (5851).

The basin is large and deep enough to invite several bathers.

20 May: Warmbad–Sesfontein

We follow the Hoanib River on its westward journey (underground except after good rains) to the western edge of the Warmbad basin some 7.5 miles (12 km) from the warm fountain.

On a dolerite ridge at the gap in the mountains leading to yet another vast basin, the Sesfontein basin, we collect:

Ceraria longipedunculata Merxm. & Podlech (5853), (a Kaoko endemic undescribed at the time), collected twice before (5694, 5782), an erect shrub of the Portulacaceae with reddish to brownish bark and cylindrical succulent leaves (the second *Ceraria* species endemic to the Kaokoveld: *C. carrissoana*, is confined to southern Angola and is otherwise known only from four records from the northernmost Kaokoveld [Tree Atlas]; we did not enter its realm but it honours Luiz Wittnich Carrisso, a Portuguese professor at the University of Coimbra who collected in Angola in 1927 and 1937);

Sericocoma heterochiton Lopr. (5854), a perennial herb of the Amaranthaceae with ± *Centella*-like leaves and grey flower spikes (the genus name from Greek *serikos* = *silken*, and Latin *coma* = a tuft of hairs, referring to the pappus on the fruits; Greek *hetero* = *different*, and *chiton* = *covering or dress*; allusion not clear);

Hibiscus castroi Baker f. & Exell var. *castroi* (5855) with white flowers (named after Mário de Castro, a Portuguese who collected in Angola between 1929 and 1933 [Figueiredo & Smith 2008]);

Tripteris nervosa Hutch. (5857) with semisucculent leaves and yellow rays; and:

Lycium bosciifolium Schinz (5858), a spiny shrub 6–8' (1.8–2.4 m) high with glaucous leaves and greenish cream flowers (lykion is the name of a thorny bush from Asia Minor; with leaves resembling those of a *Boscia*; heavily browsed in places and eaten by insects such as 'dikpens' [koringkrieke/armoured ground crickets, Tree Atlas]).

We also collect a live specimen of a sterile *Aloe* with a pinkish shine on the leaves for the garden (which turned out to be a new species, named by Willy Giess after Bernard: *Aloe dewinteri*.)

(Lawrence Green [1952] and W.A. de Klerk [2009] in his Drie swerwers oor die einders refer to the 'poort'

which leads from the Warmbad basin to the Sesfontein basin as the Anabibpoort, and De Klerk describes it as: 'die enigste breuk in die vaste muur van berge' [= the only break in the solid wall of mountains]. The route map [Figure 74] spells it Anabeb. The Drie swerwers visited the Kaokoveld in the winter of 1952 by permission of the Administrator of South West Africa, The Honourable Dr A.J.R. van Rhyn, and they still use the old spelling of Zessfontein. They also mention the ill-equipped and ill-advised convoy of vehicles that was to rescue the castaways of the wrecked Dunedin Star which had passed through Sesfontein: 'Die Zessfonteiners praat nog altyd van die tamaai konvooi wat hier [tien jaar gelede] deur is op pad na die Namib en die verlate verraderlike kus' ['The Zessfonteiners still talk about the enormous convoy that passed through here (ten years before) on the way to the Namib and the deserted, treacherous coast']. They continue to inform us that there was no track beyond Sesfontein and even less up north along the coast. And they mention that the convoy returned on the track via Orupembe and Kaoko Otavi which they should have taken in the first place. One of the swerwers, if I may digress, Helmuth Andrag, was co-owner and co-founder with his four brothers of the firm Andrag & Seuns which sold agricultural machinery and equipment. They provided employment to my two brothers and my sister, and even to me during university holidays, after our family had arrived penniless in South Africa in 1947 after an internment of six years at Andalusia [my father and oldest brother Erich], now Jan Kempdorp near Warrenton. The rest of the family was interned near Salisbury [now Harare] in Southern Rhodesia [now Zimbabwe] during the war, in which the Dunedin Star had come to grief.

And so to Sesfontein with its six fountains. (Allow me to quote verbatim from Dr N.J. van Warmelo [1951], the Government ethnologist, who visited the area during short visits in 1947 and 1948, [most probably during the dry season because then you won't get stuck in the mud] and who needn't have had overgrazing professionally on his mind: 'Almost on the edge of the Namib, in a large level sandy basin, surrounded by bleak and broken mountains, lies the desert oasis !nani/ous or Sesfontein, so-called because of the six strong perennial springs issuing there. A few black bare hills stand within the basin. The oasis itself presents a refreshing picture of wheat, tobacco and vegetable gardens, enormous fig and thorn trees in luscious green leaf, a stately row of date palms planted by the Germans, and the white walls of their old fort now fallen into ruin. The whole surrounding area has been overgrazed so thoroughly that only the

large trees remain in a level plain of bare sand. There are no young trees nor can any raise its head owing to the intensive browsing of the numerous cattle, goats and donkeys perpetually on the lookout for a nibble of green leaf or twig’).

So we turn tourist, photograph and admire the old castle (Figure 80), rest in the shade of its crumbling walls and lie under the nearby giant sycomore tree with its buttressed roots:

Ficus sycomorus L. subsp. *sycomorus* (5861).

(Looking at our slide of the Sesfontein basin [Figure 81], the area around the fountains is bare with little woody growth, but gazing into the distance the area appears to be covered in forest or at least dense savanna. I can’t recall how much edible vegetation there was under the trees away from the centre but I presume there was very little, otherwise we would have stopped for collecting.)

Eventually the call of duty gains the upper hand and we find some collectables in the vicinity of the fountains.

On a calcrete slope:

Ruellia diversifolia S.Moore (5859), a viscous aromatic dwarf shrub with white to pale blue flowers, which we have collected twice before and described its smell as either like citronella or like jackal, and note that it is common in the Kaokoveld (one may assume that it is rather to very unpalatable); at the water’s edge:

Eragrostis walteri Pilg. (5860), a semidecumbent perennial grass rooting at the nodes (apparently confined to the escarpment zone throughout Namibia. Based on an anatomical study of this grass Roger Ellis, at the time plant anatomist at the Botanical Research Institute, published in 1984 in the South African Journal of Botany, the first record of non-Kranz leaf anatomy for the sub-family Chloridoideae; this implies that the species utilises the C₃-photosynthetic pathway [Gibbs Russell et al. 1990]; the specific epithet honours Heinrich Walter, Professor and Director of the Botanisches Institut und Garten der Landwirtschaftlichen Hochschule Stuttgart-Hohenheim. He visited SWA three times: in 1935 with the main focus on the Namib Desert, where he was accompanied by Dr Georg Boss who taught Physical Sciences at the Deutsche Höhere Schule at Swakopmund at the



Figure 80. The ruins of Sesfontein fort.



Figure 81. Sesfontein basin, with Bernard looking towards the Anabib Poort leading into the Warmbad basin.

time. In 1937–38 he visited numerous farms in SWA and at the invitation of Dr Marguerite Gertrude Anna Henrici, a Swiss plant physiologist, working for the Department of Agriculture, he included the Fauresmith Veld Reserve in his itinerary. In 1952–53 he paid special attention to the bush encroachment problem, and as mentioned before, he visited the spring at Kaross near Kamanjab. He was largely instrumental in getting an official herbarium established in Windhoek. This herbarium, with the international code name WIND, housed in the National Botanical Research Institute, was further developed by Willy Giess, and Bernard made a major contribution to it. Prof. Walter also did me the honour of assessing my DSc. thesis on the Southern Kalahari; and in the water:

Schoenoplectus subulatus (Vahl) Lye (5864), a tall perennial herb (from Greek *schoinos* = a rush, and *plektos* = twisted); and near the fountain:

Orphanthera albida Schinz (5862) a virgate, almost leafless bush, 2' (60 cm) high with yellowish flowers in clusters and ash-grey follicles with dark markings (from Greek *ortho* = erect and Latin *anthera* = anther);

Cucumis sagittatus Peyr. (5863), a prostrate perennial with yellow flowers and yellow fruits with longitudinal stripes.

(On the older maps there is a circle around Sesfontein. Van Warmelo [1951] explains it as follows: 'Government Notice No. 122 of 1923 confirmed the grant of land made by the German Government. ... The farm Zesfontein ... being the area assigned ... to the Topnaar Swartbooi Hottentots for grazing purposes ... and bounded as follows: 10 kilometre radius from waterhole Zesfontein.' Van Warmelo, in the same publication, states that: 'In German times the Kaokoveld was not under control, though a military post was placed at Sesfontein in 1902.')

We close the day in the comforting proximity of the fort ruins and of bottomless water fresh from mother Earth. (Today, or rather in 1997, as I have just read in the November number of *Getaway* of that year, we could book into the rebuilt Fort Sesfontein for R245 pps, including bed and breakfast. We could also fill the tank of our thirsty International from an electrically operated petrol pump, not to mention our own tanks and their capacity for more than one cold Windhoek Lager.)

21 May: Sesfontein–Purros Road–Sesfontein

We look for greener pastures (in the desert) towards the west in the so-called inner or pro-Namib with an average annual rainfall of less than 100 mm where the vegetation depends rather on more reliable moisture in the form of mist from the Atlantic or conserved underground in drainage lines. We follow the broad valley of the Hoanib River in a southwesterly direction. After about 3 miles (4.8 km) we turn NW on the track to Purros, soon rising slightly above the level of the river plain.

Seven miles (11.3 km) from Sesfontein (*we come into a vegetation type which Viljoen [1980] refers to as: 'Commiphora spp. – Euphorbia guerichiana vegetation of the escarpment ecotone area'*). We stop at the foot of a mountain; on its mica schist slope Bernard compiles a list including the following: *Commiphora* sp. 5713 (= *Commiphora giessii*), very common – a feature of the landscape; *Boscia albitrunca*; *Commiphora* sp. (Welwitschia loc. nr Sanitatas) (= *Commiphora kraeuseliana*); *Commiphora* sp. (Otjiu, peeling bark) (= *Commiphora virgata*); *Forsskaolea candida*; *Cryptolepis* sp. 5389 (= *Cryptolepis decidua*); *Petalidium* sp. 5865 (= *Petalidium rosmannianum*); *Calicorema capitata*; *Enneapogon scoparius*; Pappophoreae (almost pure stands of very great extent (= *Kaokochloa nigrirostris*); *Tribulus* sp. 5847 (= *Tribulus excrucians*).

On the adjoining grey, calcareous flats he records, amongst others: *Colophospermum mopane* (few, scattered); *Salvadora persica* (few, scattered); *Stipagrostis uniplumis*; *Stipagrostis hochstetteriana*; *Monelytrum luederitzianum*; *Zygophyllum simplex* and *Gisekia pharnaceoides*.

Our collections at the same locality include *Petalidium rosmannianum* P.G.Mey. (5865); *Schmidtia kalahariensis* Stent (5866) (*genus name honours Johan Anton Schmidt [1823–1905], a German botanist*); and *Euphorbia glanduligera* Pax (5867).

Ten miles (16 km) from Sesfontein we stop to collect:

Commiphora giessii J.J.A.van der Walt (5869), a many-stemmed shrub with deep golden-brown bark, brownish red fruit and a 4-pronged arillus clasping the seed up to the top (Figure 82) (*new to science at the time; we have collected it before on our third trip, also on the Namib edge*).

Next to a dry, gravelly water course about 12 miles (19.3 km) out of Sesfontein on the Purros Road we

settle down to a light lunch and we decide to consider this the terminus of our fourth trip.

Before we turn around we collect on a slope:

Commiphora sp. (5876), a tree with distinct trunk, branched about 1.2 m from ground level; bark smooth, grey, not peeling (Figure 83) (*not identified, but looking at the slide, it appears to be C. crenato-serrata which is known from the degree square [Tree Atlas]*);

Heliotropium hereroense Schinz (5877), a dense, rounded, much-branched dwarf shrub about 30 cm high with typical deep brown, flaking bark, flowers small, cream, seen often before; and the following, all of which we have also seen several to many times before, two acanth dwarf shrubs:

Monechma divaricatum (Nees) C.B.Clarke (5875); and *Petalidium coccineum* S.Moore (5871);

Hermannia amabilis Marloth ex K.Schum. (5872); and *Sesamum rigidum* Peyr. subsp. *merenskyanum* Ihlenf. & Seidenst. (5870); as well as the usually annual grasses:

Tricholaena monachne (Trin.) Stapf & C.E.Hubb. (5873); and *Aristida parvula* (Nees) De Winter (5874).

Back to Sesfontein and our camping site near the castle (not ice-cold).

22 May

We are on our way back to Ohopoho, the way we came. About three miles (4.8 km) on the grey brackish flats east of the fountain in a *Vachellia tortilis* (= *Acacia tortilis*) park landscape (*which Viljoen [1980] refers to as Colophospermum mopane–Vachellia tortilis vegetation unit of Sesfontein and Warmquelle*) we duly collect *Vachellia tortilis* (Forssk.) Galasso & Banfi subsp. *heteracantha* (Burch.) Kyal. & Boatwr. (5881). Nothing else.

On the flats at Warmbad, with *Colophospermum mopane* and *Vachellia tortilis*, we collect in a gravelly watercourse:

Adenolobus garipensis (E.Mey.) Torre & Hillc. (5882) (*from Greek aden = gland, and lobos = capsule or pod, referring to the sticky-glandular pods*); and on a dolomite outcrop, in what we call the 'Sesfontein Kloof':

Moringa ovalifolia Dinter & A.Berger (5883) (Figure 84) (*which the old Southwesterners called 'Mehlsackbaum' or 'meelsakboom'; the Tree*



Figure 82. *Commiphora giessii*.



Figure 83. *Commiphora ?crenato-serrata*, 12 miles (19.3 km) NW of Sesfontein on Purros Road, with Bernard looking into the distance.



Figure 84. *Moringa ovalifolia*. (Photo not taken in the Khowarib Schlucht).

Atlas, in a more romantic mood, calls it 'sprokiesboom'.

We collect seed of:

Leptochloa eleusine (Nees) Cope & N.Snow (5884) (from Greek leptos = slender or thin, and chloa = grass, referring to the habit; and eleusine, probably not derived from Eleusis, an industrial suburb of Athens; perhaps rather from the mystical religious festival held there every September in Classical times).

On the red sandy flats of the Beesvlakte, with mopane scrub we collect:

Barleria senensis Klotzsch (5885); and *Laggera decurrens* (Vahl) Hepper & J.R.I.Wood (5886), both not what you would regard as prime fodder plants.

At Ombombo we call it a day.

23 May

Ohopoho, here we come. On the red loamy flats of the calcrete plateau, 5 miles north of Ombombo, we collect:

Vachellia hebeclada (DC.) Kyal. & Boatwr. subsp. *tristis* (A.Schreib.) Kyal. & Boatwr. (= *Acacia hebeclada* subsp. *tristis*) (5887), which is here a tree with a distinct trunk and a spreading rounded crown; as its pods are hanging, in contrast to the erectly-podded subsp. *hebeclada*, we refer to it as 'hangpeul', (the Tree Atlas as 'weeping candle-pod acacia'). We are not in a weepy mood: no mishaps, so far!

Sixteen miles (25.7 km) N of Ombombo, on a mountain ridge consisting of outcrops of dolomite and amygdaloidal basalt, we stop for lunch (Figure 85).

We collect:

Manuleopsis dinteri Thell. (5890) (called 'Dinter's bush' in the Tree Atlas), an erect shrub 6–7' (1.8–2.1 m) high, with white tubular flowers with dark blue lines in the throat (from Greek *opsis* = appearance, thus having the appearance of a Manulea; Prof. Kurt Dinter, as mentioned under History of exploration, the doyen of SWA botanists; 164 species proudly bear the specific epithet 'dinteri' and at least three 'dinteriana' to his honour);

Senecio pleistocephalus S.Moore (5891), an erect perennial herb with yellow discoid heads (from



Figure 85. Lunch on the road; Bernard left, Otto right.

Latin senex = old man, referring to the whitish grey hairy pappus, and Greek pleistos = most, and kephale = head, referring to the many capitula);

Clematis brachiata Thunb. (5892), scandent over shrubs (from Greek klema = a [vine] branch or twig, used as a cutting or graft; Latin brachiatus = branches decussate = spreading at right angles).

We also collect seed of *Commiphora mollis* (5893) a tree (with wood used for carving utensils; it also provides an 'omupande wotjoto', a two to three metre long pole which is smeared with fat and pigmented red by the Himba and planted next to the cattle enclosure during ceremonies of religious significance to attract the attention of the spirits [Malan & Owen-Smith 1974]); and a live specimen of *Cyphostemma currorii* (5894) (Figure 86) for the garden (Garden no. 12557), (A.B. Curror, a medical doctor, collected in Angola in 1840, i.e. before Welwitsch).

We arrive hale and hearty (my dictionary says: 'especially of an old person'; maybe a prediction? Predicting into the past is easy) at Ohopoho.

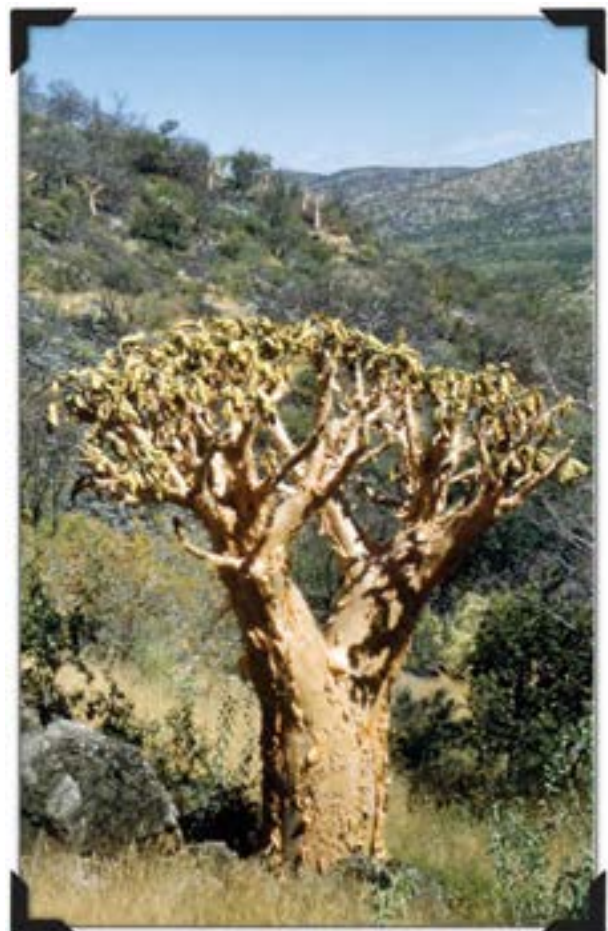


Figure 86. *Cyphostemma currorii*.

Fifth and last trip

(to Ovikange, not Swartbooisdrif, 28–31 May)

28 May: Ohopoho–Handungu

Time is running out but a quick trip to the north can still be fitted in. So we are off to Swartbooisdrif on the Kunene (*or so we think*) in our trusted (?) International bakkie (Figure 87).

After travelling about 16 miles (25.7 km) we begin to rise from the broad valley of the upper Hoarusib River

to an altitude of 1 200 m and higher on the foothills of the Steilrand Mountains, thus entering the so-called Ovahimba highlands of the northern Kaokoveld. The Steilrand Mountains, running in a west-northwesterly direction, form the watershed between rivers flowing more or less southwards into the Hoarusib and those flowing northwards into the Kunene. We make the first collection of the day at a spring next to a dolomite outcrop at Ombazu. Here again the spring is found at a contact point between the dolomite of the Otavi formation, which is here near its northwestern limit, and quartzite of the Nosib complex. Our collection:

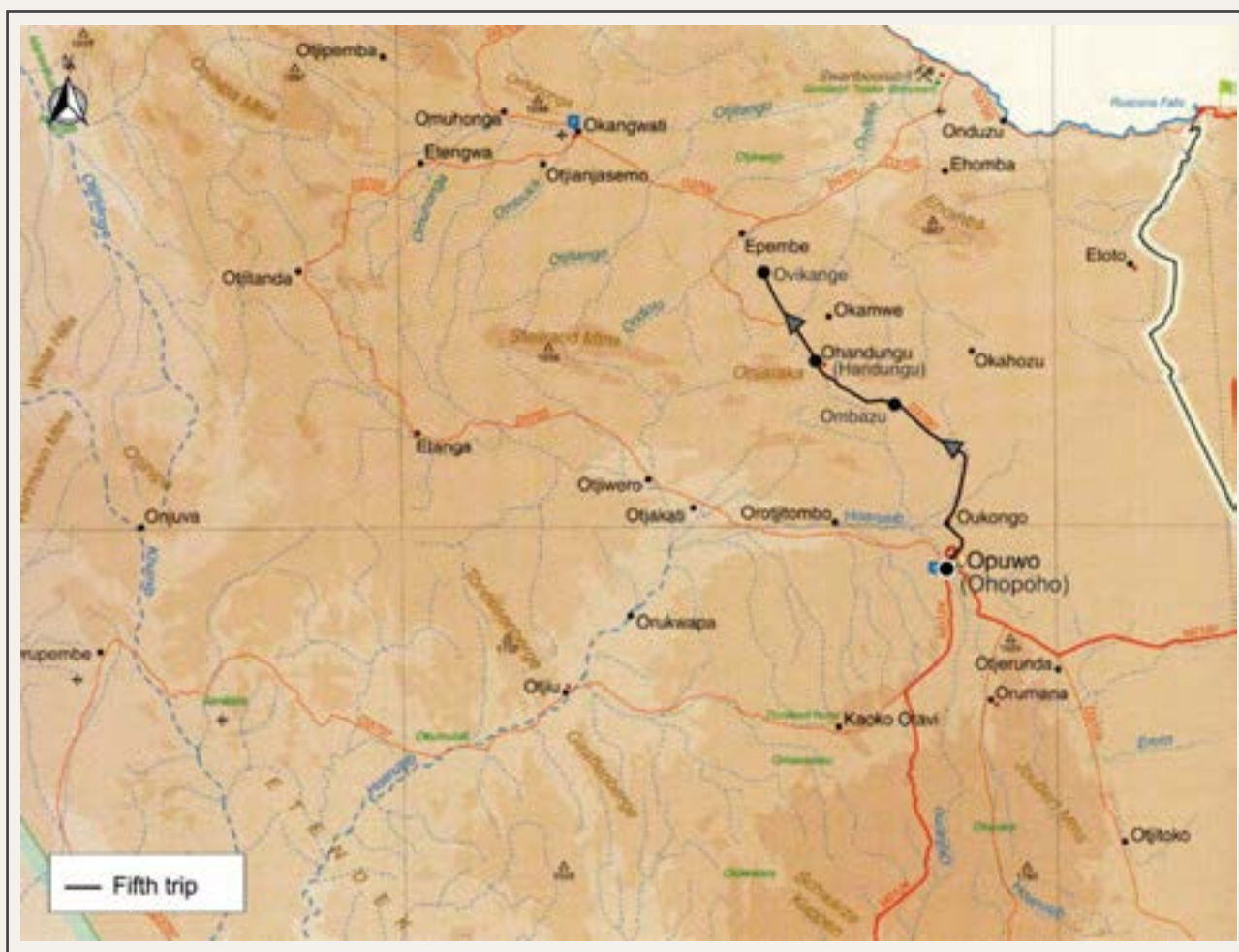


Figure 87. Route of our fifth trip starting at Ohopoho (Opuwo) at bottom. Basemap from Mendelsohn et al. (2002) edited with QGIS.

Faidherbia albida (Delile) A.Chev. (5895), the Ana tree, often seen before on previous trips, with a 'reverse' annual cycle (as *the Tree Atlas* calls it), the tree losing its leaves during the wet season and developing new leaves and flowers during the dry season. It is widely distributed in tropical Africa, and its pods and leaves are eaten by livestock and game.

Here at Ombazu we meet three veterinarians who are busy inoculating cattle. (*They were to save our bacon [not literally] very soon*, see below). As the day draws to a close we pitch our tent not far from theirs and see to our duties. When we break camp the next morning we establish that the tarpaulin covering the floor of our tent is very substantial because not one of the 20-odd scorpions that had been attracted to our warm personalities had managed to make its presence felt. And the vets draw our attention to the crop of scorpions under their tent which even exceeds ours. (*Many years later, camping in a tent with an obviously thinner ground sheet, a scorpion succeeded in stinging me through it. The venom must have been mostly absorbed by the material because I felt no pain but it induced a period of strange incoherence, which I attributed to a spider bite. Only the next morning revealed the real culprit: a rather groggy Parabuthus granulatus.*)

Nine miles (14.5 km) on, we reach Handungu (or *Ohandungu*). On whitish sandy flats we collect:

Vachellia kirkii (Oliv.) Kyal. & Boatwr. subsp. *kirkii* var. *kirkii* (= *Acacia kirkii* subsp. *kirkii* var. *kirkii*) (5896), the flood-plains thorn, with peeling bark and white flowers, its seeds visible as a row of knobs on the pods; the common name of the tree strengthens the notion that the sand, presumably derived from quartzite, and originally covered with red iron oxide, has been washed clean by water action. A second collection:

Blepharis leendertziae Oberm. (5897), an acanthaceous annual with white flowers we have collected before south of Kaoko Otavi, where we recorded the colour of the flowers as sky blue.

We make camp at Handungu.

29 May: Handungu–Ovikange (Breakdown 3)

We set off northwards towards Swartbooisdrif on the Kunene.

On previous trips it had become obvious that the steering of our International was not as tight as it should be. An inspection had shown that the arm turning the front wheels was attached to the wheel housing by four small bolts with a totally flat, smooth contact area of some 75 × 50 mm (or rather 3 × 2 inches). Tightening the four nuts alleviated the problem for the time being. But we had no split washers or other means of preventing the nuts from shaking loose again. On this trip we must have forgotten to tighten the nuts yet again and one of the bolts brakes off level with the contact area on the wheel housing. So, at a place named Ovikange (some 40 miles [64.4 km] south of Swartbooisdrif) we have to pitch our tent next to our third breakdown. (*On self-respecting 4x4s, as far as I know, the contact area between steering arm and wheel housing is interrupted by a channel in the wheel housing into which a ridge on the steering arm fits snugly, and the bolts therefore don't have sole responsibility for keeping the two items together.*)

Where is our nearest help? We have to get back to the vets at Ombazu as quickly as possible before they depart for Ohopoho. Bernard decides not to send Abner on another long lonely march, and he joins him. So, after picking up some provisions, especially water, they depart straight away, back to Ombazu, a distance of about 21 miles (33.7 km). (*Bernard recalls that they set off at a blistering pace [whether literally, I don't know]. Soon Abner advised him to slow down a little, lest they run themselves into trouble. Bernard's legs, I believe, cramped badly. After a brief rest, however, they had relaxed sufficiently and the two athletes reached Ombazu before sunset; and the vets had not yet left.*)

What am I to do in the meantime? Botany, of course. Our breakdown site is on whitish sandy flats with weathered quartzite boulders which had presumably, in the long distant past, tumbled down the W-facing slope of an adjacent quartzite koppie. The flora of these two habitats is now challenging me to show that I have learnt something on the trip. Bernard has compiled all the lists so far – here is my chance (*with later corrections*):

On the flats:

Trees: *Colophospermum mopane*, *Hyphaene petersiana* (indicating greater availability of water), *Terminalia prunioides*.

Shrubs: *Commiphora* sp., *Croton* sp., *Dichrostachys glomerata* (= *D. cinerea*) and *Salvadora persica*.

Dwarf shrub: *Solanum* sp.

Geophyte: *Cyperus* sp.

Perennial herbs: *Achyranthes aspera*, *Ipomoea* sp., *Leonotis* sp., *Litogyne gariepina* (belonging to the Asteraceae).

Perennial grasses: *Antheophora pubescens* and *Eragrostis rotifer*.

Annuals, as usual, mostly grasses: *Chloris virgata*, *Dactyloctenium aegyptium*, *Eragrostis annulata*, *Melinis repens*, *Schmidtia kalahariensis*, and the non-grasses *Cleome* sp., *Geigeria ornativa*, *Polydora angustifolia*.

Plants recorded on the koppie not seen on the sandy flats were:

Trees: *Combretum apiculatum* and *Senegalia robyniana* (= *Acacia robyniana*).

Shrubs: two *Grewia* species and *Rhigozum brevispinosum*.

Perennial herbs: a *Helichrysum* and a species of *Pavonia*.

I collect the following on the slope of the nearby quartzite koppie: Four trees:

Diplorhynchus condylocarpon (Müll.Arg.) Pichon (5900), the horn-pod tree, with paired, horn-like woody carpels, our only record of the species (recorded from the Kaokoveld only in the northernmost degree squares [Tree Atlas]; the genus name from Greek *diplos* = double, and *rynchos* = a beak: the fruits are twin-beaked pods);

Cassia abbreviata Oliv. subsp. *beareana* (Holmes) Brenan (5901) (not recorded in the Tree Atlas from the Kaokoveld); and:

Pseudolachnostylis ?maprouneifolia Pax (5903), a tree about 16' (\pm 4.8 m) high with globose yellow, slightly fleshy fruits \pm $\frac{3}{4}$ " (\pm 18 mm) in diameter (recorded in the Tree Atlas only from two herbarium records, one of them, perhaps the present one, and as 'occasional' in the degree square of Ruacana Falls; Greek *pseudo* = false: not the real *Lachnostylis*; with leaves like *Maprounea*, the South American magic nut); and:

Pachypodium lealii Welw. (5907A), a sparsely branched tree with a thick succulent stem with smooth, pinkish grey bark, with whitish thorns, the flowers white, flushed with pink (Garden no. 12558) (Greek *pachys* = thick, and *podion* = foot of a vase; Fernando da Costa Leal, the Portuguese defender of Moçâmedes and Huila in Angola, and author of an early map of Angola [Glen 2004]);

Combretum oxystachyum Welw. ex M.A.Lawson (5906), a scandent shrub, about 5' (1.5 m) high with striking red flowers (uncommon in

northernmost Namibia but widespread in southern Angola, the type of its name is a Welwitsch specimen [Figueiredo & Smith 2008]; the Tree Atlas records it from an adjacent degree square but not from ours [1713 DA]);

Tinnea rhodesiana S.Moore (5905), a slender erect shrub, member of the Lamiaceae, up to 5' (1.5 m) high with bladderly fruits but not flowering at the time;

Plumbago zeylanica L. (5907), almost prostrate perennial herb or low shrub, with white flowers;

Pentatrichia petrosa Klatt (5904), a perennial composite with woody base, growing in rock crevices (as the specific epithet confirms: *petrosus* = rocky; see *St Peter*), leaves viscid and aromatic, the heads discoid, yellow (Greek *penta* = five, and *trichos* = hair, referring to the few pappus bristles);

Litogyne gariepina (DC.) Anderb. (5898), an aromatic perennial herb, with purple discoid heads (from Greek *litos* = simple, plain, smooth, and *gyne* = female, possibly referring to the simple, much exerted style; the specific epithet, of course refers to the river that used to be the Orange, which is easy to spell [Oranje in Dutch and Afrikaans], but now you have to remember whether it is 'gariep-' or 'garip-', which occurs in numerous plant names);

Felicia smaragdina (S.Moore) Merxm. (5899), an annual with yellow ray florets, which we have collected before, on sandy to loamy flats at Kamanjab and Ombepera (*Felicia* is called after Felix, a German official in Regensburg who died in 1846. A 'happy lady', which it could also mean, would have been more fun; the specific epithet would definitely be something for our happy lady if she was born shortly after the Middle Ages, when a 'smaragd' in the English of the time was a green gemstone, or if she was German she could even be of current vintage; to us moderners the Latin *smaragdinus* means emerald-green).

30, 31 May: Handungu (Breakdown 3)–Ohopoho

Bernard and Abner are back with the vets who are able and willing to tow our International back to Ohopoho.

We fix the steering mechanism sufficiently and the Land Rover of the vets tows us without any hitches back to our place of departure.

About 7 miles (11.3 km) southeast of breakdown camp we collect:

Petalidium cirrhiferum S.Moore (5908), a somewhat viscous dwarf shrub with the smell of a jackal and purplish pink flowers (*it is not clear to me what tendrils the plant bears*).

Some 8 miles (\pm 13 km) later, on a rough dolomite koppie:

Distephanus angolensis (O.Hoffm.) H.Rob. & B.Kahn (5909), an asteraceous shrub with blackish bark, grey leaves and yellow discoid heads.

In a dry calcareous watercourse near Ohopoho we make our last collection of this, our last trip:

Philenoptera nelsii (Schinz) Schrire (5910) (= *Lonchocarpus nelsii*), an erect tree 30' (9 m) high with grey-green leaves (*uncommon to occasional in the region [Tree Atlas]; the genus name is derived from Greek philenos = tractable, and pteros = wing: the wing helps the pod to disperse; L. Nels was the personal assistant to Dr Heinrich Göring when the latter came to SWA in 1885 to negotiate with Herero and Nama chiefs for land concessions. At least eight species are named after Nels, all from SWA, the majority published by Schinz*).

Back at Ohopoho; the end of our last trip into the wild Kaokoveld.

1–2 June: Ohopoho: preparations for return to South Africa

One of our many jobs is to drill the broken bolt out of the wheel housing of the International with the aid of Ben van Zyl in his excellently equipped workshop, complete with a pit.

3 June: Ohopoho–Farm Hazeldene (Kamanjab)

Ohopoho. It is Monday and time to say our fond farewells to Ben and Baps van Zyl, Andreas and Abner, and the capital of the Kaokoveld.

At Otjitoko \pm 35 miles (\pm 56 km) S of Ohopoho, on the red sandy loam covering the Kaoko calcrete

plateau, which had served to bog down our early entrance into the Kaokoveld, but which now displayed nothing more than harmless bone-dry ruts, we collect:

Barleria damarensis T.Anderson (5910A), an erect bush with woody base with pale mauve flowers speckled with purple in the throat;

Vachellia reficiens (Wawra) Kyal. & Boatwr. subsp. *reficiens* (= *Acacia reficiens* subsp. *reficiens*) (5911), a many-stemmed shrub with flattish crown, \pm 8' (2.4 m) high, common throughout the eastern and central Kaokoveld. This is the very last collection in the Kaokoveld, closing, so to speak, the circle of our collections: *Vachellia reficiens* (Wawra) Kyal. & Boatwr. subsp. *reficiens* (5091) was our first collection at Kamanjab.

(*Latin reficiens means 'refreshing' which is a, if not the, keyword in this our story of days long gone by, in both its forms: as a verb and as an adjective. The verb was a bit like pumping from a dry well for the present author equipped with a memory closely related to a sieve. The adjective was the fun bit: to write botany with tongue firmly planted in cheek, without, I hasten to add, veering one second from the perceived truth.*)

We stop and stay the night at Farm Hazeldene with the friendly Van Niekerk family, closing, so to speak, another circle.

4 June: Farm Hazeldene (Kamanjab)–Outjo

Farewell and sincerest thanks to Farm Hazeldene and inhabitants; we must be on our long way.

At Kamanjab our two petrol tanks are filled by means of the to-and-froing pump handle with downpipe in a petrol drum (hopefully without rainwater).

More farewells and we are off on the splendid gravel road (maybe splendid only by comparison) to Outjo.

We grace the hotel at Outjo with our fleeting presence.

5–6 June: Outjo–Windhoek

Back in Windhoek amidst all the German-speakers (but not Andreas). We are invited to dinner by Prof.

R.F. Logan, the American professor of Geography we had met on our previous visit to the capital. Unfortunately he has not been able to join us during our trip, but the food is great and the sight of his daughters even more so.

We hand back the humming Ford, say farewell to Willy Giess and enjoy our last taste of the sour food of the Thüringerhof.

7–8 June: Windhoek–Pretoria

I have totally forgotten the happy end. We must have travelled well and arrived safely in the capital city, otherwise, as mishaps are in the habit of doing, they would have imprinted on my memory.

I do remember vaguely that we returned the International to Government Garage and told them what we thought of the vehicle. So, one of their mechanics took us on a test drive up Voortrekker Monument Hill to prove to us that we just didn't know how to handle the vehicle. And it didn't take him long to discover that we had a point.

Epilogue

Let's begin where I ended: the International of which I had not seen the last. With the material and information we have brought back from the last wilderness the veil of secrecy over its botanical riches has been lifted sufficiently to justify their inclusion in the *Flora of southern Africa*, which had been the reason for our venture. But the knowledge of the flora of the northeasternmost appendix vermiformis of Namibia to be covered by this Flora, namely the Caprivi, was not yet considered satisfactory. The Institute therefore

decided to launch an expedition to this strip of land so strangely delineated that only a bunch of politicians could have conceived it.

And so it came to pass that our International, complete with considerable improvements, was called up for further botanical duty in the year 1959, over Christmas, manned by Donald Killick (leader) and me (driver), without Abner or Andreas or anybody else.

And the first volume of the *Flora of southern Africa*, volume 26, including records from Kaokoveld and Caprivi, was published in 1963.

Looking back to the Kaokoveld, how can its flora and vegetation, as we experienced it (mainly east of the main escarpment), be sketched in ultra condensed form? Perhaps as follows:

Characteristic growth form: Soft-wooded, 'succulent' trees and shrubs with smooth, often peeling bark, e.g. species of *Commiphora*, *Sesamothamnus*, *Cyphostemma* and *Pachypodium*.

Poorly represented growth forms: geophytes, low succulents.

Characteristic floristic features: Poaceae (all 'white'), especially *Stipagrostis*; Pedaliaceae; Acanthaceae, especially *Petalidium*; Amaranthaceae; *Commiphora* species; relationship to the flora of NE Africa.

Relatively scarce to absent floristic elements: Non-graminoid monocots, Crassulaceae, Mesembryanthemaceae, Geraniaceae.

Prominent feature of the vegetation: the uniform *Colophospermum–Terminalia prunioides* association east of the main escarpment.

If ye should seek a monument to our endeavours you will have to search in herbaria, here and overseas, in the *Flora of southern Africa* and in numerous other publications, from some of which our story has profited richly.

Appendix 1:

Species new to science collected by R. Story (1956)
and B. de Winter & O.A. Leistner (1957)

1. Species collected by Story (August 1956)

- Barleria meeuseana** P.G.Mey. 5489 *Mitt. Bot. Staatssamml. Münch.* 4: 59 (1961)
Blepharis ferox P.G.Mey. 5727 *Mitt. Bot. Staatssamml. Münch.* 4: 60 (1961)
Boerhavia deserticola Codd 5722 *Bothalia* 9: 119 (1966)
Ceraria longipedunculata Merxm. & Podlech 5694 *Mitt. Bot. Staatssamml. Münch.* 4: 73 (1961) [probably also collected by Harry Hall nr. Orupembe in 1951 (Green 1952: 291)]
Combretum wattii Exell 5760 *Mitt. Bot. Staatssamml. Münch.* 4: 5 (1961)
Commiphora giessii J.J.A.van der Walt 5713 *Dinteria* 9: 23 (1973)
Indigofera anabibensis A.Schreib. 5705 *Mitt. Bot. Staatssamml. Münch.* 8: 137 (1970)
Merremia guerichii A.Meeuse 5741 *Bothalia* 7: 415 (1960)
Petalidium crispum A.Meeuse ex P.G.Mey. 5788 *Mitt. Bot. Staatssamml. Münch.* 4: 66 (1961)
Petalidium luteo-album A.Meeuse 5683 *Bothalia* 7: 409 (1960)
Senegalia robynsiana (Merxm. & A.Schreib.) Kyal. & Boatwr. (= **Acacia robynsiana** Merxm. & A.Schreib. 5827 *Bull. Jard. Bot. État Brux.* 27: 270 [1957])
Stipagrostis giessii Kers 5692, 5702, 5708 *Svensk Bot. Tidsskr.* 65(2): 199 (1971)
Turnera oculata Story 5770 *Bothalia* 7: 493 (1961)

2. Species collected by De Winter & Leistner (March–June 1957)

- Aeollanthus namibiensis** Ryding 5414A *Nordic J. Bot.* 2(3): 224 (1982)
Aloe dewinteri Giess PRE 32179, PRE 38580 *Bothalia* 11: 120 (1973)
Boscia tomentosa Toelken 5749, 5785 *Bothalia* 10: 59 (1969)
Cleome laburnifolia Roessler 5260 *Mitt. Bot. Staatssamml. Münch.* 3: 611 (1960)
Commicarpus decipiens Meikle 5653 *Notes Roy. Bot. Gdn. Edinburgh* 36(2): 246 (1978)
Commiphora discolor Mendes 5490 *Bol. Soc. Brot. sér. 2*, 41: 155 (1967)
Commiphora wildii Merxm. 5712 *Mitt. Bot. Staatssamml. Münch.* 3: 609 (1960)
Crotalaria teixeirae Torre 5824 *Mem. Junta Invest. Ultramar*, 2 Ser. 19: 37 (1960)
Cucumis meeusei C.Jeffrey 5157 *Kew Bull.* 19: 218 (1965)
Dewinteria petrophila (De Winter) Van Jaarsv. & A.E.van Wyk 5790 (= **Rogeria petrophila** De Winter) *Bothalia* 37(2): 198 (Oct. 2007)
Dicoma cuneneensis Wild 5750 *Kirkia* 8(2): 168 (1972)
Ehretia namibiensis Retief & A.E.van Wyk subsp. **kaokoensis** Retief & A.E.van Wyk 5823 *Bothalia* 31(1): 18 (2001)
Eragrostis glandulosipedata De Winter 5151 *Bothalia* 7: 469 (1961)
Euphorbia caperonioides R.A.Dyer & P.G.Mey. 5420, 5820 *Mitt. Bot. Staatssamml. Münch.* 6: 245 (1966)
Euphorbia damarana L.C.Leach 5709 *Bothalia* 11(4): 500 (1975)
Euphorbia insarmentosa P.G.Mey. 5127 *Mitt. Bot. Staatssamml. Münch.* 6: 246 (1966)
Heliotropium giessii Friedr.-Holzh. 5203 *Mitt. Bot. Staatssamml. Münch.* 3: 616 (1960)
Indigofera teixeirae Torre 5697, 5919 *Mem. Junta Invest. Ultramar*, 2 Ser. 19: 59 (1960)

- Kaokochloa nigrirostris** De Winter 5679, 5679A, 5848 *Bothalia* 7: 480 (1961)
- Kirkia dewinteri** Merxm. & Heine 5837 *Mitt. Bot. Staatssamml. Münch.* 3: 617 (1960)
- Leucas ebracteata** Peyr. var. **kaokoveldensis** Sebald 5781 *Stuttgarter Beiträge zur Naturkunde A* 341: 141 (1980)
- Panicum simulans** Smook 5160, 5624 *Bothalia* 23(1): 59 (1993)
- Peristrophe namibiensis** K.Balkwill subsp. **brandbergensis** K.Balkwill 5828 *S. A. J. Bot.* 54(1): 53 (1988)
- Petalidium rosmannianum** P.G.Mey. 5114, 5147, 5154, 5590, 5667, 5687, 5865 *Mitt. Bot. Staatssamml. Münch.* 4: 68 (1961)
- Phlyctidocarpa flava** Cannon & W.L.Theob. 5739 *Mitt. Bot. Staatssamml. Münch.* 4: 479 (1967)
- Plectranthus unguentarius** Codd 5595A, 5595B *Bothalia* 11(4): 387 (1975)
- Priva auricoccea** A.Meeuse 5532 *Bothalia* 7: 424 (1960)
- Rhigozum virgatum** Merxm. & A.Schreib. 5783 *Mitt. Bot. Staatssamml. Münch.* 6: 250 (1966)
- Senegalia montis-usti** (Merxm. & A.Schreib.) Kyal. & Boatwr. (= **Acacia montis-usti** Merxm. & A.Schreib. 5841 *Bull. Jard. Bot. État Brux.* 27: 270 [1957])
- Sesamothamnus leistneri** (ined.) 5504 Ihlenfeldt in *Schumanniana* 6 *Biodiversity & Ecology* 3: 151–182 (2010)
- Turnera oculata** Story var. **oculata** 5770 *Bothalia* 7: 493 (1961)
- Vernonia obionifolia** O.Hoffm. subsp. **dentata** Merxm. 5794 *Mitt. Bot. Staatssamml. Münch.* 3: 608 (1960)

Appendix 2:

Species list, alphabetical (plus 7 conspicuous species noted but not collected)

This list comprises 845 collections, including the Kamanjab collections, or 782 collections from the geographical Kaokoveld. The complete list comprises about 600 species (including a few conspicuous species not collected and a few records identified only to genus level).

- Abutilon angulatum** (Guill. & Perr.) Mast. var. **angulatum** 5282
Abutilon fruticosum Guill. & Perr. 5170, 5432
Abutilon hirtum (Lam.) Sweet var. **hirtum** 5171
Abutilon pycnodon Hochr. 5467, 5738
Abutilon ramosum (Cav.) Guill. & Perr. 5101
Abutilon rehmannii Baker f. 5466
Acacia dealbata Link 5755
Acacia sp. (now **Senegalia** sp. or **Vachellia** sp.) 5889 [also used for **Emilia marlothiana**]
Acalypha ciliata Forssk. 5347
Acalypha fruticosa Forssk. var. **fruticosa** 5386
Acalypha indica L. var. **indica** 5186
Achyranthes aspera L. var. **aspera** 5439
Achyranthes aspera L. var. **sicula** L. 5192, 5436
Acrotome inflata Benth. 5344, 5562
Adansonia digitata [not collected]
Adenium boehmianum Schinz 5406, 5618
Adenolobus garipensis (E.Mey.) Torre & Hillc. 5752, 5882
Aeollanthus namibiensis Ryding 5414A
Aeollanthus neglectus (Dinter) Launert 5482
Aerva leucura Moq. 5161
Aizoanthemum dinteri (Schinz) Friedrich 5731
Aizoon virgatum Welw. ex Oliv. 5135, 5198
Albizia brevifolia Schinz 5510
Albica pulchra (Schinz) J.C.Manning & Goldblatt 5573A, 5573B
Albica stapffii (Schinz) J.C.Manning & Goldblatt 5732
Alectra orobanchoides Benth. 5352, 5449
Alectra sp. 5604
Aloe dewinteri Giess PRE 32179, PRE 38580
Aloe hereroensis Engl. var. **hereroensis** 5615
Amaranthus dinteri Schinz subsp. **dinteri** var. **a** 5574
Amaranthus thunbergii Moq. 5589
Ammannia baccifera L. subsp. **baccifera** 5558
Amphiasma benguellense (Hiern) Bremek. 5229
Amphiasma merenskyanum Bremek. 5103, 5833
Andropogon chinensis (Nees) Merr. 5487
Anticharis inflata Marloth & Engl. 5672, 5674
Anticharis sp. 5797
Antiphonia fragrans (Merxm.) Merxm. 5764
Antheophora pubescens Nees 5100, 5486, 5622
Antheophora schinzii Hack. 5169
Aptosimum angustifolium F.E.Weber & Schinz 5130, 5131, 5239, 5447
Aptosimum glandulosum F.E.Weber & Schinz 5150
Aptosimum lineare Marloth & Engl. var. **lineare** 5201, 5385
Aptosimum lugardiae (N.E.Br. ex Hemsl. & Skan) E.Phillips 5168
Aristida adscensionis L. 5324
Aristida effusa Henrard 5174
Aristida meridionalis Henrard 5419
Aristida parvula (Nees) De Winter 5699, 5874
Aristida rhiniochloa Hochst. 5138, 5378
Aristida sp. 5137
Asystasia schimperi T.Anderson 5630
Asystasia welwitschii S.Moore 5537
Baccharoides anthelmintica (L.) Moench 5215
Balanites angolensis (Welw.) Welw. ex Mildbr. & Schltr. subsp. **welwitschii** (Tiegh.) Sands 5743A
Barleria damarensis T.Anderson 5818, 5910A
Barleria kaloxytone Lindau 5141
Barleria lanceolata (Schinz) Oberm. 5217, 5816
Barleria lancifolia T.Anderson subsp. **lancifolia** 5200, 5230, 5502, 5536A
Barleria lugardii C.B.Clark 5206
Barleria mackonii Hook.f. 5297
Barleria meeuseana P.G.Mey. 5489
Barleria prionitoides Engl. 5250
Barleria rogersii S.Moore 5262, 5263, 5576
Barleria senensis Klotzsch 5199, 5287, 5885
Basananthe heterophylla Schinz 5914
Berchemia discolor (Klotzsch) Hemsl. 5325
Bergia polyantha Sond. 5557
Blepharis ferox P.G.Mey. 5727
Blepharis grossa (Nees) T.Anderson 5703
Blepharis leendertziae Oberm. 5592, 5897
Blepharis obmitrata C.B.Clark 5223, 5238, 5485, 5793 [also used for **Cyathula orthacantha**]

- Boerhavia coccinea** Mill. var. **coccinea** 5118
Boerhavia deserticola Codd 5722
Boscia albitrunca (Burch.) Gilg & Gilg-Ben. 5563
Boscia tomentosa Toelken 5749, 5785
Bothriochloa insculpta (A.Rich.) A.Camus 5329
Brachiaria deflexa (Schumach.) C.E.Hubb. ex Robyns 5350
Brachiaria grossa Stapf 5274, 5421
Brachiaria malacodes (Mez & K.Schum.) H.Scholz 5318, 5540
Bridelia cathartica G.Bertol. subsp. **cathartica** 5413A
Bridelia tenuifolia Müll.Arg. var. **tenuifolia** 5413
Cadaba schroepelii Suess. ex Suess. & Merxm. 5849
Caesalpinia rubra (Engl.) Brenan 5831
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Calostephane divaricata Benth. 5272, 5588
Cardiospermum corindum L. 5125
Cassia abbreviata Oliv. subsp. **beareana** (Holmes) Brenan 5901
Catophractes alexandri D.Don 5390
Cenchrus ciliaris L. 5304
Centropodia mossamedensis (Rendle) Cope 5725, 5761
Cephalocroton mollis Klotzsch 5619
Ceraria longipedunculata Merxm. & Podlech 5694, 5782, 5853
Ceratotheca integribracteata Engl. subsp. **elliptica** (Schinz) Ihlenf. 5492
Ceropegia carnosa E.Mey. 5426A
Ceropegia lugardiae N.E.Br. 5426
Ceropegia nilotica Kotschy var. **nilotica** 5518
Chascanum pinnatifidum (L.f.) E.Mey. var. **pinnatifidum** 5511
Chenopodium olukondae (Murr) Murr 5530
Chenopodium schraderianum Roem. & Schult. 5548
Chloris virgata Sw. 5177
Chlorophytum longifolium Schweinf. ex Baker 5545
Chrysanthellum indicum DC. 5631
Cienfuegosia digitata Cav. 5110
Cissus nymphaeifolia (Welw. ex Baker) Planch. 5102, 5646
Cissus sp. 5517 [same number used for **Cyphostemma currorii**]
Clematis brachiata Thunb. 5892
Cleome angustifolia Forssk. subsp. **petersiana** (Klotzsch ex Sond.) Kers 5251, 5614
Cleome elegantissima Briq. 5143, 5409
Cleome foliosa Hook.f. var. **foliosa** 5370, 5686
Cleome gynandra L. 5478
Cleome hirta (Klotzsch) Oliv. 5475, 5815
Cleome laburnifolia Roessler 5260
Clerodendrum ternatum Schinz 5237, 5388
Coccinia rehmannii Cogn. 5598
Colophospermum mopane (J.Kirk ex Benth.) J.Kirk ex J.Léonard 5293
Combretum apiculatum Sond. subsp. **apiculatum** 5381
Combretum apiculatum Sond. subsp. **leutweinii** (Schinz) Exell 5498
Combretum hereroense Schinz 5457
Combretum imberbe Wawra 5571
Combretum oxystachyum Welw. ex M.A.Lawson 5392, 5906
Combretum wattii Exell 5760
Commelina forskoolii Vahl 5334
Commicarpus decipiens Meikle 5653
Commicarpus fallacissimus (Heimerl) Heimerl ex Oberm., Schweick. & I.Verd. 5602
Commicarpus pentandrus (Burch.) Heimerl 5575
Commicarpus plumbagineus (Cav.) Standl. var. **plumbagineus** 5280
Commiphora africana (A.Rich.) Engl. var. **africana** 5122, 5452
Commiphora anacardiifolia Dinter & Engl. 5671
Commiphora angolensis Engl. 5105
Commiphora crenato-serrata Engl. 5121
Commiphora dinteri Engl. 5737
Commiphora discolor Mendes 5490 [same number used for **C. mollis**]
Commiphora giessii J.J.A.van der Walt 5713, 5869
Commiphora glaucescens Engl. 5913
Commiphora krauseliana Heine 5719, 5733
Commiphora mollis (Oliv.) Engl. 5240, 5490 [same number used for **C. discolor**]
Commiphora multijuga (Hiern) K.Schum. 5233
Commiphora pyracanthoides Engl. 5115, 5407
Commiphora sp. 5670, 5876
Commiphora tenuipetiolata Engl. 5241, 5253
Commiphora virgata Engl. 5663, 5668
Commiphora wildii Merxm. 5712
Convolvulus sagittatus Thunb. 5276
Corallocarpus welwitschii (Naudin) Hook.f. ex Welw. 5213
Corbichonia decumbens (Forssk.) Exell 5700
Corchorus angolensis Exell & Mendonça 5232
Corchorus asplenifolius Burch. 5298
Corchorus tridens L. 5402
Cordia sinensis Lam. 5773
Craterostigma plantagineum Hochst. 5444
Crotalaria argyrea Welw. ex Baker 5605
Crotalaria barkae Schweinf. subsp. **barkae** 5538
Crotalaria barnabassii Dinter ex Baker f. 5226, 5271
Crotalaria heidmannii Schinz 5093
Crotalaria podocarpa DC. 5126, 5408
Crotalaria sphaerocarpa Perr. ex DC. subsp. **sphaerocarpa** 5429
Crotalaria teixeirae Torre 5824
Crotalaria ulbrichiana Harms 5129

- Croton gratissimus** Burch. var. **subgratissimus** (Prain) Burt Davy 5256, 5416, 5500
Croton menyharthii Pax 5369
Cryptolepis decidua (Planch. ex Benth.) N.E.Br. 5389
Cucumella aspera (Cogn.) C.Jeffrey 5796
Cucumis africanus L.f. 5468, 5628
Cucumis anguria L. var. **longaculeatus** J.H.Kirkbr. 5156, 5351
Cucumis meeusei C.Jeffrey 5157
Cucumis sagittatus Peyr. 5661, 5724, 5786/A, 5863
Cullen tomentosum (Thunb.) J.W.Grimes 5281
Cuscuta planiflora Ten. var. **planiflora** 5536, 5821
Cyamopsis senegalensis Guill. & Perr. 5649A
Cyathula cylindrica Moq. var. **cylindrica** 5096, 5194
Cyathula orthacantha (Hochst. ex Asch.) Schinz 5193, 5793 [also for **Blepharis obmitrata**]
Cymbopogon pospischilii (K.Schum.) C.E.Hubb. 5541
Cynodon dactylon (L.) Pers. 5572
Cyperus amabilis Vahl 5480
Cyperus fulgens C.B.Clarke 5244
Cyperus laevigatus L. 5801
Cyperus longus L. var. **tenuiflorus** (Rottb.) Boeck. 5567
Cyperus squarrosus L. 5396, 5451
Cyphostemma currorii (Hook.f.) Desc. 5517, 5894 [same number used for **Cissus** sp.]
Cyphostemma omburense (Gilg & M.Brandt) Desc. 5560
Cyphostemma sp. 5505
Cyphostemma uter (Exell & Mendonça) Desc. 5286
Dactyliandra welwitschii Hook.f. 5246, 5645
Dactyloctenium aegyptium (L.) Willd. 5355
Dalechampia scandens L. var. **cordofana** (Hochst. ex Webb) Müll.Arg. 5116, 5338, 5829
Danthoniopsis dinteri (Pilg.) C.E.Hubb. 5379
Datura inoxia Mill. 5659
Dewinteria petrophila (De Winter) Van Jaarsv. & A.E.van Wyk 5790
Dichrostachys cinerea (L.) Wight & Arn. subsp. **afri-cana** Brenan & Brummitt var. **setulosa** (Welw. ex Oliv.) Brenan & Brummitt 5810
Dicoma cuneneensis Wild 5750
Dicoma tomentosa Cass. 5289
Didymodoxa caffra (Thunb.) Friis & Wilmot-Dear 5549
Diospyros lycioides Desf. subsp. **lycioides** 5437
Diospyros mespiliformis Hochst. ex A.DC. [not collected]
Diplorhynchus condylocarpon (Müll.Arg.) Pichon 5900
Distephanus angolensis (O.Hoffm.) H.Rob. & B.Kahn 5506, 5791, 5909
Dyerophytum africanum (Lam.) Kuntze 5730A
Ecbolium clarkei Hiern var. **clarkei** 5397, 5626
Ehretia amoena Klotzsch 5435
Ehretia namibiensis Retief & A.E.van Wyk subsp. **kaokoensis** Retief & A.E.van Wyk 5823
Eleusine coracana (L.) Gaertn. subsp. **africana** (Kenn.-O'Byrne) Hilu & de Wet 5356
Emilia ambifaria (S.Moore) C.Jeffrey 5431
Emilia marlothiana (O.Hoffm.) C.Jeffrey 5462, 5889 [also used for **Acacia** sp.]
Enneapogon cenchroides (Licht. ex Roem. & Schult.) C.E.Hubb. 5316
Enneapogon desvauxii P.Beauv. 5306
Enneapogon scaber Lehm. 5768
Enneapogon scoparius Stapf 5766
Entandrophragma spicatum (C.DC.) Sprague 5813, 5814
Enteropogon rupestris (J.A.Schmidt) A.Chev. 5317
Entoplocamia aristulata (Hack. & Rendle) Stapf 5183
Eragrostis annulata Rendle ex Scott-Elliot 5179
Eragrostis aspera (Jacq.) Nees 5584
Eragrostis dinteri Stapf 5412, 5647
Eragrostis echinochloidea Stapf 5178
Eragrostis glandulosipedata De Winter 5151
Eragrostis micrantha Hack. 5520, 5553, 5554, 5838
Eragrostis nindensis Ficalho & Hiern 5245
Eragrostis pilgeriana Dinter ex Pilg. 5524
Eragrostis rotifer Rendle 5302, 5488, 5591
Eragrostis sp. 5175, 5301, 5323, 5357, 5519, 5552, 5852, 5888
Eragrostis superba Peyr. 5300
Eragrostis trichophora Coss. & Durieu 5527
Eragrostis walteri Pilg. 5860
Eriocephalus luederitzianus O.Hoffm. 5149 5539
Eriocephalus pinnatus O.Hoffm. 5734
Erucastrum arabicum Fisch. & C.A.Mey. 5167
Erythrina decora Harms 5601
Euclea divinorum Hiern 5400
Euclea pseudebenus E.Mey. ex A.DC. 5360
Euphorbia caperonioides R.A.Dyer & P.G.Mey. 5420, 5820
Euphorbia damarana L.C.Leach 5709
Euphorbia glanduligera Pax 5678, 5867
Euphorbia guerichiana Pax 5501, 5682
Euphorbia inaequilatera Sond. var. **inaequilatera** 5308, 5335
Euphorbia insarmentosa P.G.Mey. 5127
Euphorbia mauritanica L. var. **namaquensis** N.E.Br. 5513
Euphorbia phylloclada Boiss. 5698 [also used for **Limeum aethiopicum** var. **lanceolatum**]
Euphorbia transvaalensis Schltr. 5603
Evolvulus alsinoides (L.) L. 5422
Faidherbia albida (Delile) A.Chev. 5455, 5895

- Felicia smaragdina** (S.Moore) Merxm. 5142, 5477, 5899
- Ficus capreifolia** Delile 5771, 5775
- Ficus cordata** Thunb. subsp. **cordata** 5569, 5570
- Ficus glumosa** Delile 5811
- Ficus sycomorus** L. subsp. **sycomorus** 5851, 5861
- Fingerhuthia africana** Lehm. 5313, 5650
- Flueggea virosa** (Roxb. ex Willd.) Voigt subsp. **virosa** 5580
- Forsskaolea candida** L.f. 5868
- Forsskaolea viridis** Ehrenb. ex Webb 5222
- Geigeria acaulis** (Sch.Bip.) Benth. & Hook.f. ex Oliv. & Hiern 5185
- Geigeria alata** (Hochst. & Steud.) Benth. & Hook.f. ex Oliv. & Hiern 5662, 5880
- Geigeria odontoptera** O.Hoffm. 5522
- Geigeria ornativa** O.Hoffm. subsp. **ornativa** 5299
- Geigeria spinosa** O.Hoffm. 5715
- Gisekia africana** (Lour.) Kuntze var. **africana** 5146
- Gnidia polycephala** (C.A.Mey.) Gilg 5555
- Gossypium anomalum** Wawra ex Wawra & Peyr. subsp. **anomalum** 5120, 5342, 5845
- Gossypium triphyllum** (Harv.) Hochr. 5145
- Grewia bicolor** Juss. var. **bicolor** 5380, 5507, 5640
- Grewia flavescens** Juss. 5415, 5639
- Grewia schinzii** K.Schum. 5292, 5638
- Grewia tenax** (Forssk.) Fiori var. **tenax** 5207, 5410, 5840
- Grewia villosa** Willd. var. **villosa** 5124, 5236
- Helichrysum candolleianum** H.Buek 5461, 5805
- Helichrysum roseo-niveum** Marloth & O.Hoffm. 5669, 5792
- Helichrysum tomentosulum** (Klatt) Merxm. subsp. **tomentosulum** 5448
- Helinus integrifolius** (Lam.) Kuntze 5218
- Heliotropium giessii** Friedr.-Holzh. 5203
- Heliotropium hereroense** Schinz 5269, 5877 (with peeling bark)
- Heliotropium lineare** (A.DC.) Gürke 5152
- Heliotropium ovalifolium** Forssk. 5153
- Heliotropium tubulosum** E.Mey. ex A.DC. 5723
- Heliotropium zeylanicum** (Burm.f.) Lam. 5479
- Hermannia amabilis** Marloth ex K.Schum. 5680, 5772, 5872
- Hermannia modesta** (Ehrenb.) Mast. 5166, 5374
- Hermannia rautanenii** Schinz ex K.Schum. 5139
- Hermannia tigrensensis** Hochst. 5340, 5346
- Hermannia viscosa** Hiern 5691
- Hermbstaedtia angolensis** C.B.Clarke 5330, 5612, 5758
- Hermbstaedtia odorata** (Burch.) T.Cooke var. **odorata** 5613
- Hermbstaedtia spathulifolia** (Engl.) Baker 5721
- Heteropogon contortus** (L.) Roem. & Schult. 5328
- Hibiscus calyphyllus** Cav. 5189
- Hibiscus castroi** Baker f. & Exell var. **castroi** 5094, 5284, 5855
- Hibiscus dongolensis** Delile 5255
- Hibiscus fleckii** Gürke 5336
- Hibiscus palmatus** Forssk. 5190
- Hibiscus rhabdotospermus** Garcke 5348
- Hibiscus sidiformis** Baill. 5583
- Hibiscus trionum** L. 5544
- Hibiscus vitifolius** L. subsp. **vulgaris** Brenan & Exell 5460
- Hiernia angolensis** S.Moore 5660, 5835, 5916
- Hirpicium gazanioides** (Harv.) Roessler 5184
- Hyphaene petersiana** [not collected]
- Hypoestes forskoolii** (Vahl) R.Br. 5525
- Indigastrum argyroides** (E.Mey.) Schrire 5681
- Indigastrum parviflorum** (B.Heyne ex Wight & Arn.) Schrire subsp. **parviflorum** var. **parviflorum** 5176
- Indigofera adenoides** Baker f. 5491
- Indigofera anabibensis** A.Schreib. 5705
- Indigofera cryptantha** Benth. ex Harv. var. **occidentalis** Baker f. 5155
- Indigofera charlieriana** Schinz var. **charlieriana** 5403
- Indigofera daleoides** Benth. ex Harv. var. **gossweileri** Baker f. 5383
- Indigofera hofmanniana** Schinz 5367
- Indigofera holubii** N.E.Br. 5322, 5515, 5533
- Indigofera pechuelii** Kuntze 5264
- Indigofera rautanenii** Baker f. 5757, 5830
- Indigofera teixeirae** Torre 5697, 5919
- Indigofera trigonelloides** Jaub. & Spach 5633, 5917
- Indigofera trita** L.f. subsp. **subulata** (Vahl ex Poir.) Ali 5267
- Ipomoea adenioides** Schinz var. **adenioides** 5564, 5736
- Ipomoea hochstetteri** House 5514
- Ipomoea obscura** (L.) Ker Gawl. var. **obscura** 5275
- Ipomoea rubens** Choisy 5774
- Ipomoea sinensis** (Desr.) Choisy subsp. **blepharosepala** (Hochst. ex A.Rich.) Verdc. ex A.Meeuse 5278, 5459
- Ipomoea tenuipes** Verdc. 5777
- Ipomoea tuberculata** Ker Gawl. 5365
- Ipomoea verbascoidea** Choisy 5817
- Jamesbrittenia canescens** (Benth.) Hilliard var. **laevior** (Dinter) Hilliard 5366
- Jamesbrittenia heucherifolia** (Diels) Hilliard 5795
- Jamesbrittenia huillana** (Diels) Hilliard 5551
- Jamesbrittenia** sp. 5808
- Justicia betonica** L. 5288
- Justicia heterocarpa** T.Anderson subsp. **dinteri** (S.Moore) Hedrén 5320, 5434
- Justicia odora** (Forssk.) Vahl 5214
- Justicia platysepala** (S.Moore) P.G.Mey. 5134, 5235, 5252
- Kalanchoe laciniata** (L.) DC. 5579 [same number used for **Kalanchoe** sp.]
- Kalanchoe lanceolata** (Forssk.) Pers. 5473, 5559
- Kalanchoe** sp. 5579 [same number used for **K. laciniata**]

- Kaokochloa nigrirostris** De Winter 5679, 5679A, 5848, PRE 33373
Kedrostis foetidissima (Jacq.) Cogn. 5600
Kedrostis hirtella (Naudin) Cogn. 5212
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Kirkia dewinteri Merxm. & Heine 5837
Kissenia capensis Endl. 5742
Kohautia angolensis Bremek. 5787
Kohautia caespitosa Schnizl. subsp. **brachyloba** (Sond.) D.Mantell 5319, 5433
Kohautia cynanchica DC. 5677
Kyllinga welwitschii Ridl. 5393
Kyphocarpa angustifolia (Moq.) Lopr. 5140
Lablab purpureus (L.) Sweet subsp. **uncinatus** Verdc. 5277
Laggera decurrens (Vahl) Hepper & J.R.I.Wood 5886
Lantana angolensis Moldenke 5211
Lantana camara L. 5476
Lantana dinteri Moldenke 5119, 5423
Lapeirousia otaviensis R.C.Foster 5132, 5481
Launaea intybacea (Jacq.) Beauverd 5172, 5634 [same number as **Orbivestus cinerascens**]
Lefebvrea grantii (Kingston ex Oliv.) S.Droop 5128, 5542
Leobordea platycarpa (Viv.) B.-E.van Wyk & Boatwr. 5440, 5688 [also for **Lotononis** sp.]
Leonotis nepetifolia (L.) R.Br. 5283
Lepidagathis scariosa Nees 5418
Leptochloa eleusine (Nees) Cope & N.Snow 5884
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Leucas martinicensis (Jacq.) R.Br. 5209
Leucas pechuelii (Kuntze) Gürke 5188
Leucosphaera bainesii (Hook.f.) Gilg 5208
Limeum aethiopicum Burm.f. var. **lanceolatum** Friedrich 5698 [also for **Euphorbia phylloclada**]
Limeum argute-carinatum Wawra ex Wawra & Peyr. var. **argute-carinatum** 5295, 5531
Limeum myosotis H.Walter var. **myosotis** 5382
Limeum pterocarpum (J.Gay) Heimerl var. **pterocarpum** 'Semonvillea' 5107
Limeum sulcatum (Klotzsch) Hutch. var. **sulcatum** 5144
Lippia pearsonii Moldenke 5285, 5526
Litogyne gariepina (DC.) Anderb. 5656, 5898
Lobelia thermalis Thunb. 5547
Lophiocarpus polystachyus Turcz. 5786
Lotononis sp. 5688 [also used for **Leobordea platycarpa**]
Lycium bosciifolium Schinz 5858
Macrotyloma axillare (E.Mey.) Verdc. var. **axillare** 5108, 5587
Maerua schinzii Pax 5784
Manuleopsis dinteri Thell. 5890
Marcellipsis denudata (Hook.f.) Schinz 5832
Marcellipsis welwitschii (Hook.f.) Schinz 5219, 5754
Marsdenia macrantha (Klotzsch) Schltr. 5273, 5340
Marsdenia sylvestris (Retz.) P.I.Forst. 5327
Megalochlamys marlothii (Engl.) Lindau 5195, 5735, 5918
Melanthera triternata (Klatt) Wild 5430, 5850
Melhania damarana Harv. 5411
Melinis longiseta (A.Rich.) Zizka subsp. **bellespicata** (Rendle) Zizka 5136, 5496
Melinis repens (Willd.) Zizka subsp. **grandiflora** (Hochst.) Zizka 5173, 5581, 5582
Melinis sp. 5242
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Merremia palmata Hallier f. 5629
Microchloa caffra Nees 5443
Mimosa pigra L. 5779
Mollugo sp. 5265
Momordica humilis (Cogn.) C.Jeffrey 5087, 5326, 5643
Momordica welwitschii Hook.f. 5279, 5789
Monechma cleomoides (S.Moore) C.B.Clarke 5248, 5759, 5825, 5826
Monechma debile (Forssk.) Nees 5398
Monechma divaricatum (Nees) C.B.Clarke 5197, 5310, 5720, 5875
Monechma salsola (S.Moore) C.B.Clarke 5620, 5729
Monelytrum luederitzianum Hack. 5181
Monsonia senegalensis Guill. & Perr. 5106, 5333
Monsonia umbellata Harv. 5261
Montinia caryophyllacea Thunb. 5228
Moringa ovalifolia Dinter & A.Berger 5883
Mundulea sericea (Willd.) A.Chev. subsp. **sericea** 5294
Myrothamnus flabellifolius Welw. 5220
Nelsia quadrangula (Engl.) Schinz 5495, 5625
Neorautanenia mitis (A.Rich.) Verdc. 5109
Nesaea luederitzii Koehne var. **luederitzii** 5546
Nidorella resedifolia DC. subsp. **resedifolia** 5158
Obetia carruthersiana (Hiern) Rendle 5503
Ocimum americanum L. var. **americanum** 5296
Ocimum filamentosum Forssk. 5204, 5446
Oncocalyx welwitschii (Engl.) Polhill & Wiens 5611
Opilia campestris Engl. var. **campestris** 5270
Orbivestus cinerascens (Sch.Bip.) H.Rob. 5634 [same number as **Launaea intybacea**]
Ormocarpum kirkii S.Moore 5593
Oropetium capense Stapf 5331
Orphanthera albida Schinz 5862
Oxalis purpurascens T.M.Salter 5314
Oxygonum alatum Burch. var. **alatum** 5345
Oxygonum sinuatum (Hochst. & Steud. ex Meisn.) Dammer 5561
Ozoroa crassinervia (Engl.) R.Fern. & A.Fern. 5497

- Pachypodium lealii* Welw. 5907A
Panicum lanipes Mez 5623
Panicum maximum Jacq. 5359
Panicum simulans Smook 5160, 5624
Paspalidium geminatum (Forssk.) Stapf 5803
Pavonia burchellii (DC.) R.A.Dyer (= *Pavonia calycina* (Cav.) Ulbr. the older name which should be used) 5117, 5202, 5247
Pavonia gossweileri Exell 5493
Pavonia rehmannii Szyszyl. 5387
Pavonia senegalensis (Cav.) Leistner 5428
Pegolettia oxyodonta DC. 5339
Pegolettia senegalensis Cass. 5844
Peltophorum africanum Sond. 5402
Pentarrhinum abyssinicum Decne. subsp. *abyssinicum* 5529
Pentatrichia petrosa Klatt 5904
Pergularia daemia (Forssk.) Chiov. subsp. *daemia* 5456
Peristrophe namibiensis K.Balkwill subsp. *brandbergensis* K.Balkwill 5828
Peristrophe paniculata (Forssk.) Brummitt 5652
Persicaria attenuata (R.Br.) Soják subsp. *africana* K.L.Wilson 5776
Petalidium cirrhiferum S.Moore 5908
Petalidium coccineum S.Moore 5231, 5509, 5648, 5871
Petalidium crispum A.Meeuse ex P.G.Mey. 5788
Petalidium halimoides (Nees) S.Moore 5718
Petalidium luteo-album A.Meeuse 5683
Petalidium physaloides S.Moore 5748
Petalidium rossmannianum P.G.Mey. 5114, 5147, 5154, 5590, 5667, 5687, 5865
Petalidium welwitschii S.Moore 5740
Phaeoptilum spinosum Radlk. 5744
Philenoptera nelsii (Schinz) Schrire 5910
Phlyctidocarpa flava Cannon & W.L.Theob. 5739
Phragmites mauritianus Kunth 5658
Phyllanthus dinteri Pax 5706
Phyllanthus maderaspatensis L. 5224, 5637, 5753
Phyllanthus parvulus Sond. var. *gariensis* (E.Mey. ex Drège) Radcl.-Sm. 5399
Phyllanthus reticulatus Poir. var. *reticulatus* 5762
Physalis angulata L. 5763
Physalis peruviana L. 5568
Plectranthus hereroensis Engl. 5463, 5812
Plectranthus unguentarius Codd 5595A, 5595B
Pluchea bojeri (DC.) Humbert 5363, 5657
Plumbago zeylanica L. 5266, 5907
Pogonarthria fleckii (Hack.) Hack. 5371, 5372
Polydora angustifolia (Steetz) H.Rob. 5902
Polygala guerichiana Engl. 5689
Polygala leptophylla Burch. var. *leptophylla* 5535
Polygala pallida E.Mey. 5312, 5641
Portulaca quadrifida L. 5441
Priva auricoccea A.Meeuse 5532
Pseudolachnostylis sp. 5903
Pterodiscus aurantiacus Welw. 5104, 5375
Ptycholobium biflorum (E.Mey.) Brummitt subsp. *angolensis* (Baker) Brummitt 5528
Pupalia lappacea (L.) A.Juss. var. *lappacea* 5196
Pycreus betschuanus (Boeckeler) C.B.Clark 5566
Rhigozum virgatum Merxm. & A.Schreib. 5783
Rhynchosia candida (Welw. ex Hiern) Torre 5728
Rhynchosia minima (L.) DC. var. *minima* 5257
Rhynchosia minima (L.) DC. var. *prostrata* (Harv.) Meikle 5543
Rhynchosia sp. 5417, 5534
Rhynchosia sublobata (Schumach.) Meikle 5221, 5458
Rogeria adenophylla J.Gay ex Delile 5097, 5675, 5846
Ruellia diversifolia S.Moore 5711, 5767, 5806, 5859
Ruellia otaviensis P.G.Mey. 5642
Ruellia patula Jacq. 5216
Ruelliopsis setosa (Nees) C.B.Clark 5321, 5627
Salsola arborea C.A.Sm. ex Aellen 5879
Salvadora persica L. var. *persica* 5726
Sansevieria aethiopica Thunb. 5616
Schmidtia kalahariensis Stent 5866
Schoenoplectus subulatus (Vahl) Lye 5864
Scirpoides dioeca (Kunth) Browning 5799
Sclerocarya birrea (A.Rich.) Hochst. subsp. *caffra* (Sond.) Kokwaro 5499
Searsia ciliata (Licht. ex Schult.) A.J.Mill. 5608
Searsia pyroides (Burch.) Moffett var. *pyroides* 5450
Seddera schizantha Hallier f. 5268, 5684
Seddera suffruticosa (Schinz) Hallier f. 5227, 5597
Senecio consanguineus DC. 5438
Senecio pleistocephalus S.Moore 5891
Senegalia ataxacantha DC. 5494
Senegalia erubescens (Welw. ex Oliv.) Kyal. & Boatwr. 5405 [same number used for *Vachellia tortilis*]
Senegalia mellifera (Vahl) Seigler & Ebinger subsp. *mellifera* 5769
Senegalia montis-usti (Merxm. & A.Schreib.) Kyal. & Boatwr. 5841
Senegalia robynsiana (Merxm. & A.Schreib.) Kyal. & Boatwr. 5827
Senegalia senegal (L.) Britton var. *rostrata* (Brenan) Kyal. & Boatwr. 5445
Senna italica Mill. subsp. *arachoides* (Burch.) Lock 5291, 5756
Sericocoma heterochiton Lopr. 5854
Sericorema sericea (Schinz) Lopr. 5376
Sesamothamnus benguellensis Welw. 5747
Sesamothamnus guerichii [not collected]
Sesamothamnus leistneri (ined.) 5504
Sesamum pedalioides Welw. ex Hiern 5341
Sesamum rigidum Peyr. subsp. *merenskyanum* Ihlenf. & Seidenst. 5391, 5870

- Sesamum schinzianum** Asch. 5362
Sesamum sp. 5353, 5673
Sesamum triphyllum Welw. ex Asch. var. **triphyllum** 5164, 5165
Sesbania macowaniana Schinz 5162
Sesbania pachycarpa DC. subsp. **dinterana** J.B.Gillett 5290
Sesbania sphaerosperma Welw. 5714
Sesuvium sesuvioides (Fenzl) Verdc. 5111, 5258, 5651
Setaria sp. 5354
Setaria verticillata (L.) P.Beauv. 5454
Sida cordifolia L. subsp. **cordifolia** 5357
Sida ovata Forssk. 5373
Solanum catombelense Peyr. 5469
Solanum delagoense Dunal 5521
Solanum multiglandulosum Bitter 5470
Solanum nigrum L. 5550
Solanum tettense Klotzsch var. **renschii** (Vatke) A.E.Gonç. 5095, 5516
Sorghum bicolor (L.) Moench subsp. **arundinaceum** (Desv.) de Wet & Harlan 5163
Sphaeranthus peduncularis DC. subsp. **rogersii** (N.E.Br.) Wild 5654
Spirostachys africana Sond. 5453
Sporobolus consimilis Fresen. 5778, 5804
Sporobolus engleri Pilg. 5384, 5802
Sporobolus festivus Hochst. ex A.Rich. 5586
Sporobolus fimbriatus (Trin.) Nees 5401
Sporobolus panicoides A.Rich. 5632
Stapelia [not identified] 5092
Stapelia schinzii A.Berger & Schltr. var. **schinzii** 5617
Steganotaenia araliacea Hochst. var. **araliacea** 5565
Sterculia africana (Lour.) Fiori var. **africana** 5234
Sterculia quinqueloba (Garcke) K.Schum. 5099, 5474
Stipagrostis damarensis (Mez) De Winter 5717
Stipagrostis giessii Kers 5692, 5702, 5708
Stipagrostis hirtigluma subsp. **pearsonii** (Henrard) De Winter 5307, 5377, 5621, 5693
Stipagrostis hochstetteriana (Beck ex Hack.) De Winter var. **secalina** (Henrard) De Winter 5707, 5746
Stipagrostis sp. 5710, 5745
Stipagrostis uniplumis (Licht.) De Winter var. **uniplumis** 5649, 5743
Striga gesnerioides (Willd.) Vatke ex Engl. 5368
Talinum arnotii Hook.f. 5259
Tamarix usneoides E.Mey. ex Bunge 5358, 5800
Tapinanthus oleifolius (J.C.Wendl.) Danser 5644
Tarchonanthus camphoratus L. 5636
Tavaresia barklyi (Dyer) N.E.Br. 5133
Tephrosia dregeana E.Mey. var. **dregeana** 5442, 5696, 5765
Tephrosia oxygona Welw. ex Baker subsp. **oxygona** var. **oxygona** 5364
Tephrosia sp. 5427 [No. used twice for same sp.], 5701
Tephrosia uniflora Pers. subsp. **uniflora** 5225
Tephrosia villosa (L.) Pers. subsp. **ehrenbergiana** (Schweinf.) Brummitt var. **ehrenbergiana** 5343
Terminalia prunioides M.A.Lawson [not collected]
Tetragonia calycina Fenzl 5822
Thamnosma africana Engl. 5484
Tinnea rhodesiana S.Moore 5113, 5337, 5508, 5905
Tragia okanyua Pax 5472
Tragus racemosus (L.) All. 5182
Trianthema parvifolia E.Mey. ex Sond. var. **parvifolia** 5730
Trianthema triquetra Rottler ex Willd. subsp. **triquetra** var. **triquetra** 5690
Triaspis hypericoides (DC.) Burch. subsp. **nelsonii** (Oliv.) Immelman 5148, 5606
Tribulus excrucians Wawra 5655, 5666, 5847, 5878
Tribulus zeyheri Sond. subsp. **zeyheri** 5424
Trichodesma africanum (L.) Lehm. 5685
Tricholaena monachne (Trin.) Stapf & C.E.Hubb. 5704, 5873
Trichoneura eleusinoides (Rendle) Ekman subsp. **eleusinoides** 5395
Triopogon minimus (A.Rich.) Hochst. ex Steud. 5394
Tripteris nervosa Hutch. 5187, 5857
Triraphis purpurea Hack. 5309, 5838A
Triraphis ramosissima Hack. 5315
Turnera oculata Story var. **oculata** 5770
Turnera oculata Story var. **paucipilosa** Oberm. 5751
Tylophora fleckii (Schltr.) N.E.Br. 5471
Tylosema fassoglense (Schweinf.) Torre & Hillc. 5596
Urochloa brachyura (Hack.) Stapf 5180, 5243
Urochloa oligotricha (Fig. & De Not.) Henrard 5303
Ursinia nana DC. subsp. **nana** 5462A
Vachellia arenaria (Schinz) Kyal. & Boatwr. 5609
Vachellia erioloba (E.Mey.) P.J.H.Hurter 5361
Vachellia hebeclada (DC.) Kyal. & Boatwr. subsp. **tristis** (A.Schreib.) Kyal. & Boatwr. 5305, 5887
Vachellia kirkii (Oliv.) Kyal. & Boatwr. subsp. **kirkii** var. **kirkii** 5896, 5912
Vachellia nilotica (L.) P.J.H.Hurter & Mabb. subsp. **kraussiana** (Benth.) Kyal. & Boatwr. 5311
Vachellia reficiens (Wawra) Kyal. & Boatwr. subsp. **reficiens** 5091, 5483, 5911
Vachellia swazica (Burt Davy) Kyal. & Boatwr. 5405A
Vachellia tortilis (Forssk.) Galasso & Banfi subsp. **heteracantha** (Burch.) Kyal. & Boatwr. 5881
Vachellia tortilis (Forssk.) Galasso & Banfi subsp. **spirocarpa** (Hochst. ex A.Rich.) Kyal. & Boatwr. var. **spirocarpa** 5405
Vernonia fastigiata Oliv. & Hiern 5205

Vernonia obionifolia O.Hoffm. subsp. dentata Merxm. 5794	[Not identified] 5595
Veronica anagallis-aquatica L. 5556	[Not identified] 5607
Welwitschia mirabilis [not collected]	[Not identified] 5635
Withania somnifera (L.) Dunal 5210	[Not identified] 5665
Zanthoxylum ovatifoliolatum (Engl.) Finkelstein 5254	[Not identified] 5676
Zehneria marlothii (Cogn.) R.Fern. & A.Fern. 5332, 5578	[Not identified] 5695
Ziziphus mucronata Willd. subsp. mucronata 5610	[Not identified] 5780
Zygophyllum simplex L. 5664	[Not identified] 5798
	[Not identified] 5807
	[Not identified] 5809
	[Not identified] 5819
	[Not identified] 5834
	[Not identified] 5836
[?Scrophulariaceae not identified] 5098	[Not identified] 5839
[Not identified ' Barleria '] 5112	[Not identified] 5842
[Not identified] 5123	[Not identified] 5843
[Not identified] 5191	[Not identified] 5856
[Not identified] 5249	[Not identified] 5893
[Not identified] 5349	[Not identified] 5915
[Not identified] 5414	[Not identified] 5465
[Not identified] 5464	[Not used] 5425
[Not identified] 5573	[Not used] 5512
[Not identified] 5577	[Not used] 5523
[Not identified] 5594	[Not used] 5599

Appendix 3:

Species list, numerical

- 5087 **Momordica humilis** (Cogn.) C.Jeffrey
 5091 **Vachellia reficiens** (Wawra) Kyal. & Boatwr. subsp. **reficiens**
 5092 **Stapelia** [not identified]
 5093 **Crotalaria heidmannii** Schinz
 5094 **Hibiscus castroi** Baker f. & Exell var. **castroi**
 5095 **Solanum tettense** Klotzsch var. **renschii** (Vatke) A.E.Gonç.
 5096 **Cyathula cylindrica** Moq. var. **cylindrica**
 5097 **Rogeria adenophylla** J.Gay ex Delile
 5098 (?Scrophulariaceae) [not identified]
 5099 **Sterculia quinqueloba** (Garcke) K.Schum.
 5100 **Anthepphora pubescens** Nees
 5101 **Abutilon ramosum** (Cav.) Guill. & Perr.
 5102 **Cissus nymphaeifolia** (Welw. ex Baker) Planch.
 5103 **Amphasma merenskyanum** Bremek.
 5104 **Pterodiscus aurantiacus** Welw.
 5105 **Commiphora angolensis** Engl.
 5106 **Monsonia senegalensis** Guill. & Perr.
 5107 **Limeum pterocarpum** (J.Gay) Heimerl var. **pterocarpum**
 5108 **Macrotyloma axillare** (E.Mey.) Verdc. var. **axillare**
 5109 **Neorautanenia mitis** (A.Rich.) Verdc.
 5110 **Cienfuegosia digitata** Cav.
 5111 **Sesuvium sesuvioides** (Fenzl) Verdc.
 5112 'Barleria' [not identified]
 5113 **Tinnea rhodesiana** S.Moore
 5114 **Petalidium rossmannianum** P.G.Mey.
 5115 **Commiphora pyracanthoides** Engl.
 5116 **Dalechampia scandens** L. var. **cordofana** (Hochst. ex Webb) Müll.Arg.
 5117 **Pavonia burchellii** (DC.) R.A.Dyer (= **Pavonia calycina** (Cav.) Ulbr. the older name which should be used)
 5118 **Boerhavia coccinea** Mill. var. **coccinea**
 5119 **Lantana dinteri** Moldenke
 5120 **Gossypium anomalum** Wawra ex Wawra & Peyr. subsp. **anomalum**
 5121 **Commiphora crenato-serrata** Engl.
 5122 **Commiphora africana** (A.Rich.) Engl. var. **africana**
 5123 [Not identified]
 5124 **Grewia villosa** Willd. var. **villosa**
 5125 **Cardiospermum corindum** L.
 5126 **Crotalaria podocarpa** DC.
 5127 **Euphorbia insarmentosa** P.G.Mey.
 5128 **Lefebvrea grantii** (Kingston ex Oliv.) S.Droop
 5129 **Crotalaria ulbrichiana** Harms
 5130 **Aptosimum angustifolium** F.E.Weber & Schinz
 5131 **Aptosimum angustifolium** F.E.Weber & Schinz
 5132 **Lapeirousia otaviensis** R.C.Foster
 5133 **Tavaresia barklyi** (Dyer) N.E.Br.
 5134 **Justicia platysepala** (S.Moore) P.G.Mey.
 5135 **Aizoon virgatum** Welw. ex Oliv.
 5136 **Melinis longiseta** (A.Rich.) Zizka subsp. **bellespicata** (Rendle) Zizka
 5137 **Aristida** sp.
 5138 **Aristida rhiniochloa** Hochst.
 5139 **Hermannia rautanenii** Schinz ex K.Schum.
 5140 **Kyphocarpa angustifolia** (Moq.) Lopr.
 5141 **Barleria kaloxytone** Lindau
 5142 **Felicia smaragdina** (S.Moore) Merxm.
 5143 **Cleome elegantissima** Briq.
 5144 **Limeum sulcatum** (Klotzsch) Hutch. var. **sulcatum**
 5145 **Gossypium triphyllum** (Harv.) Hochr.
 5146 **Gisekia africana** (Lour.) Kuntze var. **africana**
 5147 **Petalidium rossmannianum** P.G.Mey.
 5148 **Triaspis hypericoides** (DC.) Burch. subsp. **nelsonii** (Oliv.) Immelman
 5149 **Eriocephalus luederitzianus** O.Hoffm.
 5150 **Aptosimum glandulosum** F.E.Weber & Schinz
 5151 **Eragrostis glandulosipedata** De Winter
 5152 **Heliotropium lineare** (A.DC.) Gürke
 5153 **Heliotropium ovalifolium** Forssk.
 5154 **Petalidium rossmannianum** P.G.Mey.
 5155 **Indigofera cryptantha** Benth. ex Harv. var. **occidentalis** Baker f.
 5156 **Cucumis anguria** L. var. **longaculeatus** J.H. Kirkbr.
 5157 **Cucumis meeusei** C.Jeffrey
 5158 **Nidorella resedifolia** DC. subsp. **resedifolia**
 5159 **Lessertia benguellensis** Baker f.
 5160 **Panicum simulans** Smook
 5161 **Aerva leucura** Moq.
 5162 **Sesbania macowaniana** Schinz
 5163 **Sorghum bicolor** (L.) Moench subsp. **arundinaceum** (Desv.) de Wet & Harlan
 5164 **Sesamum triphyllum** Welw. ex Asch. var. **triphyllum**

- 5165 **Sesamum triphyllum** Welw. ex Asch. var. **triphyllum**
- 5166 **Hermannia modesta** (Ehrenb.) Mast.
- 5167 **Erucastrum arabicum** Fisch. & C.A.Mey.
- 5168 **Aptosimum lugardiae** (N.E.Br. ex Hemsl. & Skan) E.Phillips
- 5169 **Anthehora schinzii** Hack.
- 5170 **Abutilon fruticosum** Guill. & Perr.
- 5171 **Abutilon hirtum** (Lam.) Sweet var. **hirtum**
- 5172 **Launaea intybacea** (Jacq.) Beauverd
- 5173 **Melinis repens** (Willd.) Zizka subsp. **grandiflora** (Hochst.) Zizka
- 5174 **Aristida effusa** Henrard
- 5175 **Eragrostis** sp.
- 5176 **Indigastrum parviflorum** (B.Heyne ex Wight & Arn.) Schrire subsp. **parviflorum** var. **parviflorum**
- 5177 **Chloris virgata** Sw.
- 5178 **Eragrostis echinoclloidea** Stapf
- 5179 **Eragrostis annulata** Rendle ex Scott-Elliot
- 5180 **Urochloa brachyura** (Hack.) Stapf
- 5181 **Monelytrum luederitzianum** Hack.
- 5182 **Tragus racemosus** (L.) All.
- 5183 **Entoplocamia aristulata** (Hack. & Rendle) Stapf
- 5184 **Hirpicium gazanioides** (Harv.) Roessler
- 5185 **Geigeria acaulis** (Sch.Bip.) Benth. & Hook.f. ex Oliv. & Hiern
- 5186 **Acalypha indica** L. var. **indica**
- 5187 **Tripteris nervosa** Hutch.
- 5188 **Leucas pechuelii** (Kuntze) Gürke
- 5189 **Hibiscus calyphyllus** Cav.
- 5190 **Hibiscus palmatus** Forssk.
- 5191 [Not identified]
- 5192 **Achyranthes aspera** L. var. **sicula** L.
- 5193 **Cyathula orthacantha** (Hochst. ex Asch.) Schinz
- 5194 **Cyathula cylindrica** Moq. var. **cylindrica**
- 5195 **Megalochlamys marlothii** (Engl.) Lindau
- 5196 **Pupalia lappacea** (L.) A.Juss. var. **lappacea**
- 5197 **Monechma divaricatum** (Nees) C.B.Clarke
- 5198 **Aizoon virgatum** Welw. ex Oliv.
- 5199 **Barleria senensis** Klotzsch
- 5200 **Barleria lancifolia** T.Anderson subsp. **lancifolia**
- 5201 **Aptosimum lineare** Marloth & Engl. var. **lineare**
- 5202 **Pavonia burchellii** (DC.) R.A.Dyer (= **Pavonia calycina** (Cav.) Ulbr. the older name which should be used)
- 5203 **Heliotropium giessii** Friedr.-Holzh.
- 5204 **Ocimum filamentosum** Forssk.
- 5205 **Vernonia fastigiata** Oliv. & Hiern
- 5206 **Barleria lugardii** C.B.Clarke
- 5207 **Grewia tenax** (Forssk.) Fiori var. **tenax**
- 5208 **Leucosphaera bainesii** (Hook.f.) Gilg
- 5209 **Leucas martinicensis** (Jacq.) R.Br.
- 5210 **Withania somnifera** (L.) Dunal
- 5211 **Lantana angolensis** Moldenke
- 5212 **Kedrostis hirtella** (Naudin) Cogn.
- 5213 **Corallocarpus welwitschii** (Naudin) Hook.f. ex Welw.
- 5214 **Justicia odora** (Forssk.) Vahl
- 5215 **Baccharoides anthelmintica** (L.) Moench
- 5216 **Ruellia patula** Jacq.
- 5217 **Barleria lanceolata** (Schinz) Oberm.
- 5218 **Helinus integrifolius** (Lam.) Kuntze
- 5219 **Marcelliopsis welwitschii** (Hook.f.) Schinz
- 5220 **Myrothamnus flabellifolius** Welw.
- 5221 **Rhynchosia sublobata** (Schumach.) Meikle
- 5222 **Forsskaolea viridis** Ehrenb. ex Webb
- 5223 **Blepharis obmitrata** C.B.Clarke
- 5224 **Phyllanthus maderaspatensis** L.
- 5225 **Tephrosia uniflora** Pers. subsp. **uniflora**
- 5226 **Crotalaria barnabassii** Dinter ex Baker f.
- 5227 **Seddera suffruticosa** (Schinz) Hallier f.
- 5228 **Montinia caryophyllacea** Thunb.
- 5229 **Amphiasma benguelense** (Hiern) Bremek.
- 5230 **Barleria lancifolia** T.Anderson subsp. **lancifolia**
- 5231 **Petalidium coccineum** S.Moore
- 5232 **Corchorus angolensis** Exell & Mendonça
- 5233 **Commiphora multijuga** (Hiern) K.Schum.
- 5234 **Sterculia africana** (Lour.) Fiori var. **africana**
- 5235 **Justicia platysepala** (S.Moore) P.G.Mey.
- 5236 **Grewia villosa** Willd. var. **villosa**
- 5237 **Clerodendrum ternatum** Schinz
- 5238 **Blepharis obmitrata** C.B.Clarke
- 5239 **Aptosimum angustifolium** F.E.Weber & Schinz
- 5240 **Commiphora mollis** (Oliv.) Engl.
- 5241 **Commiphora tenuipetiolata** Engl.
- 5242 **Melinis** sp.
- 5243 **Urochloa brachyura** (Hack.) Stapf
- 5244 **Cyperus fulgens** C.B.Clarke
- 5245 **Eragrostis nindensis** Ficalho & Hiern
- 5246 **Dactyliandra welwitschii** Hook.f.
- 5247 **Pavonia burchellii** (DC.) R.A.Dyer (= **Pavonia calycina** (Cav.) Ulbr. the older name which should be used)
- 5248 **Monechma cleomoides** (S.Moore) C.B.Clarke
- 5249 [Not identified]
- 5250 **Barleria prionitoides** Engl.
- 5251 **Cleome angustifolia** Forssk. subsp. **petersiana** (Klotzsch ex Sond.) Kers
- 5252 **Justicia platysepala** (S.Moore) P.G.Mey.
- 5253 **Commiphora tenuipetiolata** Engl.
- 5254 **Zanthoxylum ovatifoliolatum** (Engl.) Finkelstein
- 5255 **Hibiscus dongolensis** Delile
- 5256 **Croton gratissimus** Burch. var. **subgratissimus** (Prain) Burt Davy
- 5257 **Rhynchosia minima** (L.) DC. var. **minima**

- 5258 **Sesuvium sesuvioides** (Fenzl) Verdc.
5259 **Talinum arnotii** Hook.f.
5260 **Cleome laburnifolia** Roessler
5261 **Monsonia umbellata** Harv.
5262 **Barleria rogersii** S.Moore
5263 **Barleria rogersii** S.Moore
5264 **Indigofera pechuelii** Kuntze
5265 **Mollugo** sp.
5266 **Plumbago zeylanica** L
5267 **Indigofera trita** L.f. subsp. **subulata** (Vahl ex Poir.) Ali
5268 **Seddera schizantha** Hallier f.
5269 **Heliotropium hereroense** Schinz
5270 **Opilia campestris** Engl. var. **campestris**
5271 **Crotalaria barnabassii** Dinter ex Baker f.
5272 **Calostephane divaricata** Benth.
5273 **Marsdenia macrantha** (Klotzsch) Schltr.
5274 **Brachiaria grossa** Stapf
5275 **Ipomoea obscura** (L.) Ker Gawl. var. **obscura**
5276 **Convolvulus sagittatus** Thunb.
5277 **Lablab purpureus** (L.) Sweet subsp. **uncinatus** Verdc.
5278 **Ipomoea sinensis** (Desr.) Choisy subsp. **blepharosepala** (Hochst. ex A.Rich.) Verdc. ex A.Meeuse
5279 **Momordica welwitschii** Hook.f.
5280 **Commicarpus plumbagineus** (Cav.) Standl. var. **plumbagineus**
5281 **Cullen tomentosum** (Thunb.) J.W.Grimes
5282 **Abutilon angulatum** (Guill. & Perr.) Mast. var. **angulatum**
5283 **Leonotis nepetifolia** (L.) R.Br.
5284 **Hibiscus castroi** Baker f. & Exell var. **castroi**
5285 **Lippia pearsonii** Moldenke
5286 **Cyphostemma uter** (Exell & Mendonça) Desc.
5287 **Barleria senensis** Klotzsch
5288 **Justicia betonica** L.
5289 **Dicoma tomentosa** Cass.
5290 **Sesbania pachycarpa** DC. subsp. **dinterana** J.B.Gillett
5291 **Senna italica** Mill. subsp. **arachoides** (Burch.) Lock
5292 **Grewia schinzii** K.Schum.
5293 **Colophospermum mopane** (J.Kirk ex Benth.) J.Kirk ex J.Léonard
5294 **Mundulea sericea** (Willd.) A.Chev. subsp. **sericea**
5295 **Limeum argute-carinatum** Wawra ex Wawra & Peyr. var. **argute-carinatum**
5296 **Ocimum americanum** L. var. **americanum**
5297 **Barleria mackenii** Hook.f.
5298 **Corchorus asplenifolius** Burch.
5299 **Geigeria ornativa** O.Hoffm. subsp. **ornativa**
5300 **Eragrostis superba** Peyr.
5301 **Eragrostis** sp.
5302 **Eragrostis rotifer** Rendle
5303 **Urochloa oligotricha** (Fig. & De Not.) Henrard
5304 **Cenchrus ciliaris** L.
5305 **Vachellia hebeclada** (DC.) Kyal. & Boatwr. subsp. **tristis** (A.Schreib.) Kyal. & Boatwr.
5306 **Enneapogon desvauuxii** P.Beauv.
5307 **Stipagrostis hirtigluma** subsp. **pearsonii** (Henrard) De Winter
5308 **Euphorbia inaequilatera** Sond. var. **inaequilatera**
5309 **Triraphis purpurea** Hack.
5310 **Monechma divaricatum** (Nees) C.B.Clarke
5311 **Vachellia nilotica** (L.) P.J.H.Hurter & Mabb. subsp. **kraussiana** (Benth.) Kyal. & Boatwr.
5312 **Polygala pallida** E.Mey.
5313 **Fingerhuthia africana** Lehm.
5314 **Oxalis purpurascens** T.M.Salter
5315 **Triraphis ramosissima** Hack.
5316 **Enneapogon cenchroides** (Licht. ex Roem. & Schult.) C.E.Hubb.
5317 **Enteropogon rupestris** (J.A.Schmidt) A.Chev.
5318 **Brachiaria malacodes** (Mez & K.Schum.) H.Scholz
5319 **Kohautia caespitosa** Schnizl. subsp. **brachyloba** (Sond.) D.Mantell
5320 **Justicia heterocarpa** T.Anderson subsp. **dinteri** (S.Moore) Hedrén
5321 **Ruelliopsis setosa** (Nees) C.B.Clarke
5322 **Indigofera holubii** N.E.Br.
5323 **Eragrostis** sp.
5324 **Aristida adscensionis** L.
5325 **Berchemia discolor** (Klotzsch) Hemsl.
5326 **Momordica humilis** (Cogn.) C.Jeffrey
5327 **Marsdenia sylvestris** (Retz.) P.I.Forst.
5328 **Heteropogon contortus** (L.) Roem. & Schult.
5329 **Bothriochloa insculpta** (A.Rich.) A.Camus
5330 **Hermbstaedtia angolensis** C.B.Clarke
5331 **Oropetium capense** Stapf
5332 **Zehneria marlothii** (Cogn.) R.Fern. & A.Fern.
5333 **Monsonia senegalensis** Guill. & Perr.
5334 **Commelina forskoolii** Vahl
5335 **Euphorbia inaequilatera** Sond. var. **inaequilatera**
5336 **Hibiscus fleckii** Gürke
5337 **Tinnea rhodesiana** S.Moore
5338 **Dalechampia scandens** L. var. **cordofana** (Hochst. ex Webb) Müll.Arg.
5339 **Pegolettia oxyodonta** DC.
5340 [No. used twice] **Hermannia tigrensis** Hochst.
5340 [No. used twice] **Marsdenia macrantha** (Klotzsch) Schltr.
5341 **Sesamum pedalioides** Welw. ex Hiern
5342 **Gossypium anomalum** Wawra ex Wawra & Peyr. subsp. **anomalum**

- 5343 **Tephrosia villosa** (L.) Pers. subsp. **ehrenbergiana** (Schweinf.) Brummitt var. **ehrenbergiana**
- 5344 **Acrotome inflata** Benth.
- 5345 **Oxygonum alatum** Burch. var. **alatum**
- 5346 **Hermannia tigrensensis** Hochst.
- 5347 **Acalypha ciliata** Forssk.
- 5348 **Hibiscus rhabdotospermus** Garcke
- 5349 [Not identified]
- 5350 **Brachiaria deflexa** (Schumach.) C.E.Hubb. ex Robyns
- 5351 **Cucumis anguria** L. var. **longaculeatus** J.H.Kirkbr.
- 5352 **Alectra orobanchoides** Benth.
- 5353 **Sesamum** sp.
- 5354 **Setaria** sp.
- 5355 **Dactyloctenium aegyptium** (L.) Willd.
- 5356 **Eleusine coracana** (L.) Gaertn. subsp. **africana** (Kenn.-O'Byrne) Hilu & de Wet
- 5357 [No. used twice] **Sida cordifolia** L. subsp. **cordifolia**
- 5357 [No. used twice] **Eragrostis** sp.
- 5358 **Tamarix usneoides** E.Mey. ex Bunge
- 5359 **Panicum maximum** Jacq.
- 5360 **Euclea pseudebenus** E.Mey. ex A.DC.
- 5361 **Vachellia erioloba** (E.Mey.) P.J.H.Hurter
- 5362 **Sesamum schinzianum** Asch.
- 5363 **Pluchea bojeri** (DC.) Humbert
- 5364 **Tephrosia oxygona** Welw. ex Baker subsp. **oxygona** var. **oxygona**
- 5365 **Ipomoea tuberculata** Ker Gawl. [twice numbered]
- 5366 **Jamesbrittenia canescens** (Benth.) Hilliard var. **laevior** (Dinter) Hilliard
- 5367 **Indigofera hofmanniana** Schinz
- 5368 **Striga gesnerioides** (Willd.) Vatke ex Engl.
- 5369 **Croton menyharthii** Pax
- 5370 **Cleome foliosa** Hook.f. var. **foliosa**
- 5371 **Pogonarthria fleckii** (Hack.) Hack.
- 5372 **Pogonarthria fleckii** (Hack.) Hack.
- 5373 **Sida ovata** Forssk.
- 5374 **Hermannia modesta** (Ehrenb.) Mast.
- 5375 **Pterodiscus aurantiacus** Welw.
- 5376 **Sericorema sericea** (Schinz) Lopr.
- 5377 **Stipagrostis hirtigluma** subsp. **pearsonii** (Henrard) De Winter
- 5378 **Aristida rhiniochloa** Hochst.
- 5379 **Danthoniopsis dinteri** (Pilg.) C.E.Hubb.
- 5380 **Grewia bicolor** Juss. var. **bicolor**
- 5381 **Combretum apiculatum** Sond. subsp. **apiculatum**
- 5382 **Limeum myosotis** H.Walter var. **myosotis**
- 5383 **Indigofera daleoides** Benth. ex Harv. var. **gossweileri** Baker f. [numbered twice]
- 5384 **Sporobolus engleri** Pilg.
- 5385 **Aptosimum lineare** Marloth & Engl. var. **lineare**
- 5386 **Acalypha fruticosa** Forssk. var. **fruticosa**
- 5387 **Pavonia rehmannii** Szyszyl.
- 5388 **Clerodendrum ternatum** Schinz
- 5389 **Cryptolepis decidua** (Planch. ex Benth.) N.E.Br.
- 5390 **Catophractes alexandri** D.Don
- 5391 **Sesamum rigidum** Peyr. subsp. **merenskyanum** Ihlenf. & Seidenst.
- 5392 **Combretum oxystachyum** Welw. ex M.A.Lawson
- 5393 **Kyllinga welwitschii** Ridl.
- 5394 **Tripogon minimus** (A.Rich.) Hochst. ex Steud.
- 5395 **Trichoneura eleusinoides** (Rendle) Ekman subsp. **eleusinoides**
- 5396 **Cyperus squarrosus** L.
- 5397 **Ecbolium clarkei** Hiern var. **clarkei** [twice numbered]
- 5398 **Monechma debile** (Forssk.) Nees
- 5399 **Phyllanthus parvulus** Sond. var. **garipensis** (E.Mey. ex Drège) Radcl.-Sm.
- 5400 **Euclea divinorum** Hiern
- 5401 **Sporobolus fimbriatus** (Trin.) Nees
- 5402 **Corchorus tridens** L.
- 5403 **Indigofera charlieriana** Schinz var. **charlieriana**
- 5404 **Senegalia erubescens** (Welw. ex Oliv.) Kyal. & Boatwr.
- 5405 [No. used twice] **Senegalia erubescens** (Welw. ex Oliv.) Kyal. & Boatwr.
- 5405 [No. used twice] **Vachellia tortilis** (Forssk.) Galasso & Banfi subsp. **spirocarpa** (Hochst. ex A.Rich.) Kyal. & Boatwr. var. **spirocarpa**
- 5405A **Vachellia swazica** (Burt Davy) Kyal. & Boatwr.
- 5406 **Adenium boehmianum** Schinz
- 5407 **Commiphora pyracanthoides** Engl.
- 5408 **Crotalaria podocarpa** DC.
- 5409 **Cleome elegantissima** Briq.
- 5410 **Grewia tenax** (Forssk.) Fiori var. **tenax**
- 5411 **Melhanie damarana** Harv.
- 5412 **Eragrostis dinteri** Stapf
- 5413 **Bridelia tenuifolia** Müll.Arg. var. **tenuifolia**
- 5413A **Bridelia cathartica** G.Bertol. subsp. **cathartica**
- 5414 [Not identified]
- 5414A **Aeollanthus namibiensis** Ryding
- 5415 **Grewia flavescens** Juss.
- 5416 **Croton gratissimus** Burch. var. **subgratissimus** (Prain) Burt Davy
- 5417 **Rhynchosia** sp.
- 5418 **Lepidagathis scariosa** Nees
- 5419 **Aristida meridionalis** Henrard
- 5420 **Euphorbia caperonioides** R.A.Dyer & P.G. Mey.
- 5421 **Brachiaria grossa** Stapf
- 5422 **Evolvulus alsinoides** (L.) L.
- 5423 **Lantana dinteri** Moldenke

- 5424 **Tribulus zeyheri** Sond. subsp. **zeyheri**
5425 [No. not used]
5426 **Ceropegia lugardiae** N.E.Br.
5426A **Ceropegia carnosae** E.Mey.
5427 **Tephrosia** sp. [No. used twice for same sp.]
5428 **Pavonia senegalensis** (Cav.) Leistner
5429 **Crotalaria sphaerocarpa** Perr. ex DC. subsp. **sphaerocarpa**
5430 **Melanthera triternata** (Klatt) Wild
5431 **Emilia ambifaria** (S.Moore) C.Jeffrey
5432 **Abutilon fruticosum** Guill. & Perr.
5433 **Kohautia caespitosa** Schnizl. subsp. **brachyloba** (Sond.) D.Mantell
5434 **Justicia heterocarpa** T.Anderson subsp. **dintერი** (S.Moore) Hedrén
5435 **Ehretia amoena** Klotzsch
5436 **Achyranthes aspera** L. var. **sicula** L.
5437 **Diospyros lycioides** Desf. subsp. **lycioides**
5438 **Senecio consanguineus** DC.
5439 **Achyranthes aspera** L. var. **aspera**
5440 **Leobordea platycarpa** (Viv.) B.-E.van Wyk & Boatwr.
5441 **Portulaca quadrifida** L.
5442 **Tephrosia dregeana** E.Mey. var. **dregeana**
5443 **Microchloa caffra** Nees
5444 **Craterostigma plantagineum** Hochst.
5445 **Senegalia senegal** (L.) Britton var. **rostrata** (Brenan) Kyal. & Boatwr.
5446 **Ocimum filamentosum** Forssk.
5447 **Aptosimum angustifolium** F.E.Weber & Schinz
5448 **Helichrysum tomentosulum** (Klatt) Merxm. subsp. **tomentosulum**
5449 **Alectra orobanchoides** Benth.
5450 **Searsia pyroides** (Burch.) Moffett var. **pyroides**
5451 **Cyperus squarrosus** L.
5452 **Commiphora africana** (A.Rich.) Engl. var. **africana**
5453 **Spirostachys africana** Sond.
5454 **Setaria verticillata** (L.) P.Beauv.
5455 **Faidherbia albida** (Delile) A.Chev.
5456 **Pergularia daemia** (Forssk.) Chiov. subsp. **daemia**
5457 **Combretum hereroense** Schinz
5458 **Rhynchosia sublobata** (Schumach.) Meikle
5459 **Ipomoea sinensis** (Desr.) Choisy subsp. **blepharosepala** (Hochst. ex A.Rich.) Verdc. ex A.Meeuse
5460 **Hibiscus vitifolius** L. subsp. **vulgaris** Brenan & Exell
5461 **Helichrysum candolleianum** H.Buek
5462 **Emilia marlothiana** (O.Hoffm.) C.Jeffrey
5462A **Ursinia nana** DC. subsp. **nana**
5463 **Plectranthus hereroensis** Engl.
5464 [Not identified]
5465 [Not identified]
5466 **Abutilon rehmannii** Baker f.
5467 **Abutilon pycnodon** Hochr.
5468 **Cucumis africanus** L.f.
5469 **Solanum catombelense** Peyr.
5470 **Solanum multiglandulosum** Bitter
5471 **Tylophora fleckii** (Schltr.) N.E.Br.
5472 **Tragia okanyua** Pax
5473 **Kalanchoe lanceolata** (Forssk.) Pers.
5474 **Sterculia quinqueloba** (Garcke) K.Schum.
5475 **Cleome hirta** (Klotzsch) Oliv.
5476 **Lantana camara** L.
5477 **Felicia smaragdina** (S.Moore) Merxm.
5478 **Cleome gynandra** L.
5479 **Heliotropium zeylanicum** (Burm.f.) Lam.
5480 **Cyperus amabilis** Vahl
5481 **Lapeirousia otaviensis** R.C.Foster
5482 **Aeollanthus neglectus** (Dinter) Launert
5483 **Vachellia reficiens** (Wawra) Kyal. & Boatwr. subsp. **reficiens**
5484 **Thamnosma africana** Engl.
5485 **Blepharis obmitrata** C.B.Clarke
5486 **Antheophora pubescens** Nees
5487 **Andropogon chinensis** (Nees) Merr.
5488 **Eragrostis rotifer** Rendle
5489 **Barleria meeuseana** P.G.Mey.
5490 [No. used twice] **Commiphora mollis** (Oliv.) Engl.
5490 [No. used twice] **Commiphora discolor** Mendes
5491 **Indigofera adenoides** Baker f.
5492 **Ceratotheca integribracteata** Engl. subsp. **elliptica** (Schinz) Ihlenf.
5493 **Pavonia gossweileri** Exell
5494 **Senegalia ataxacantha** DC.
5495 **Nelsia quadrangula** (Engl.) Schinz
5496 **Melinis longiseta** (A.Rich.) Zizka subsp. **bellespicata** (Rendle) Zizka
5497 **Ozoroa crassinervia** (Engl.) R.Fern. & A.Fern.
5498 **Combretum apiculatum** Sond. subsp. **leutweinii** (Schinz) Exell
5499 **Sclerocarya birrea** (A.Rich.) Hochst. subsp. **caffra** (Sond.) Kokwaro
5500 **Croton gratissimus** Burch. var. **subgratissimus** (Prain) Burt Davy
5501 **Euphorbia guerichiana** Pax
5502 **Barleria lancifolia** T.Anderson subsp. **lancifolia**
5503 **Obetia carruthersiana** (Hiern) Rendle
5504 **Sesamothamnus** sp. (S. leistneri (ined.))
5505 **Cyphostemma** sp.
5506 **Distephanus angolensis** (O.Hoffm.) H.Rob. & B.Kahn
5507 **Grewia bicolor** Juss. var. **bicolor**
5508 **Tinnea rhodesiana** S.Moore
5509 **Petalidium coccineum** S.Moore

- 5510 **Albizia brevifolia** Schinz
 5511 **Chascanum pinnatifidum** (L.f.) E.Mey. var. **pinnatifidum**
 5512 [Not used]
 5513 **Euphorbia mauritanica** L. var. **namaquensis** N.E.Br.
 5514 **Ipomoea hochstetteri** House
 5515 **Indigofera holubii** N.E.Br.
 5516 **Solanum tettense** Klotzsch var. **renschii** (Vatke) A.E.Gonç.
 5517 [No. used twice] **Cissus** sp.
 5517 [No. used twice] **Cyphostemma currorii** (Hook.f.) Desc.
 5518 **Ceropegia nilotica** Kotschy var. **nilotica** [Given twice]
 5519 **Eragrostis** sp.
 5520 **Eragrostis micrantha** Hack.
 5521 **Solanum delagoense** Dunal
 5522 **Geigeria odontoptera** O.Hoffm.
 5523 [Not used]
 5524 **Eragrostis pilgeriana** Dinter ex Pilg.
 5525 **Hypoestes forskoalii** (Vahl) R.Br.
 5526 **Lippia pearsonii** Moldenke
 5527 **Eragrostis trichophora** Coss. & Durieu
 5528 **Ptychlobium biflorum** (E.Mey.) Brummitt subsp. **angolensis** (Baker) Brummitt
 5529 **Pentarrhinum abyssinicum** Decne. subsp. **abyssinicum**
 5530 **Chenopodium olukondae** (Murr) Murr
 5531 **Limeum argute-carinatum** Wawra ex Wawra & Peyr. var. **argute-carinatum**
 5532 **Priva auricoccea** A.Meeuse
 5533 **Indigofera holubii** N.E.Br.
 5534 **Rhynchosia** sp.
 5535 **Polygala leptophylla** Burch. var. **leptophylla**
 5536 **Cuscuta planiflora** Ten. var. **planiflora**
 5536A **Barleria lancifolia** T.Anderson subsp. **lancifolia**
 5537 **Asystasia welwitschii** S.Moore
 5538 **Crotalaria barkae** Schweinf. subsp. **barkae**
 5539 **Eriocephalus luederitzianus** O.Hoffm.
 5540 **Brachiaria malacodes** (Mez & K.Schum.) H.Scholz
 5541 **Cymbopogon pospischilii** (K.Schum.) C.E.Hubb.
 5542 **Lefebvrea grantii** (Kingston ex Oliv.) S.Droop
 5543 **Rhynchosia minima** (L.) DC. var. **prostrata** (Harv.) Meikle
 5544 **Hibiscus trionum** L.
 5545 **Chlorophytum longifolium** Schweinf. ex Baker
 5546 **Nesaea luederitzii** Koehne var. **luederitzii**
 5547 **Lobelia thermalis** Thunb.
 5548 **Chenopodium schraderianum** Roem. & Schult.
 5549 **Didymodoxa caffra** (Thunb.) Friis & Wilmot-Dea
 5550 **Solanum nigrum** L.
 5551 **Jamesbrittenia huillana** (Diels) Hilliard
 5552 **Eragrostis** sp.
 5553 **Eragrostis micrantha** Hack.
 5554 **Eragrostis micrantha** Hack.
 5555 **Gnidia polycephala** (C.A.Mey.) Gilg
 5556 **Veronica anagallis-aquatica** L.
 5557 **Bergia polyantha** Sond.
 5558 **Ammannia baccifera** L. subsp. **baccifera**
 5559 **Kalanchoe lanceolata** (Forssk.) Pers.
 5560 **Cyphostemma omburense** (Gilg & M.Brandt) Desc.
 5561 **Oxygonum sinuatum** (Hochst. & Steud. ex Meisn.) Dammer
 5562 **Acrotome inflata** Benth.
 5563 **Boscia albitrunca** (Burch.) Gilg & Gilg-Ben.
 5564 **Ipomoea adenioides** Schinz var. **adenioides**
 5565 **Steganotaenia araliacea** Hochst. var. **araliacea**
 5566 **Pycrus betschuanus** (Boeckeler) C.B.Clarke
 5567 **Cyperus longus** L. var. **tenuiflorus** (Rottb.) Boeck.
 5568 **Physalis peruviana** L.
 5569 **Ficus cordata** Thunb. subsp. **cordata**
 5570 **Ficus cordata** Thunb. subsp. **cordata**
 5571 **Combretum imberbe** Wawra
 5572 **Cynodon dactylon** (L.) Pers.
 5573 [Not identified]
 5573A **Albucca pulchra** (Schinz) J.C.Manning & Goldblatt
 5573B **Albucca pulchra** (Schinz) J.C.Manning & Goldblatt
 5574 **Amaranthus dinteri** Schinz subsp. **dinteri** var. **a**
 5575 **Commicarpus pentandrus** (Burch.) Heimerl
 5576 **Barleria rogersii** S.Moore
 5577 [Not identified]
 5578 **Zehneria marlothii** (Cogn.) R.Fern. & A.Fern.
 5579 **Kalanchoe laciniata** (L.) DC. 5579 [same number used for **Kalanchoe** sp.]
 5580 **Flueggea virosa** (Roxb. ex Willd.) Voigt subsp. **virosa**
 5581 **Melinis repens** (Willd.) Zizka subsp. **grandiflora** (Hochst.) Zizka
 5582 **Melinis repens** (Willd.) Zizka subsp. **grandiflora** (Hochst.) Zizka
 5583 **Hibiscus sidiformis** Baill.
 5584 **Eragrostis aspera** (Jacq.) Nees
 5585 **Kirkia acuminata** Oliv.
 5586 **Sporobolus festivus** Hochst. ex A.Rich.
 5587 **Macrotyloma axillare** (E.Mey.) Verdc. var. **axillare**
 5588 **Calostephane divaricata** Benth.
 5589 **Amaranthus thunbergii** Moq.
 5590 **Petalidium rossmannianum** P.G.Mey.
 5591 **Eragrostis rotifer** Rendle
 5592 **Blepharis leendertziae** Oberm.

- 5593 **Ormocarpum kirkii** S.Moore
5594 [Not identified]
5595 [Not identified]
5595A **Plectranthus unguentarius** Codd
5595B **Plectranthus unguentarius** Codd
5596 **Tylosema fassoglense** (Schweinf.) Torre & Hillc.
5597 **Seddera suffruticosa** (Schinz) Hallier f.
5598 **Coccinia rehmannii** Cogn.
5600 **Kedrostis foetidissima** (Jacq.) Cogn.
5601 **Erythrina decora** Harms
5602 **Commicarpus fallacissimus** (Heimerl) Heimerl ex Oberm., Schweick. & I.Verd.
5603 **Euphorbia transvaalensis** Schltr.
5604 **Alectra** sp.
5605 **Crotalaria argyraea** Welw. ex Baker
5606 **Triaspis hypericoides** (DC.) Burch. subsp. **nelsonii** (Oliv.) Immelman [Used twice]
5607 [Not identified]
5608 **Searsia ciliata** (Licht. ex Schult.) A.J.Mill.
5609 **Vachellia arenaria** (Schinz) Kyal. & Boatwr.
5610 **Ziziphus mucronata** Willd. subsp. **mucronata**
5611 **Oncocalyx welwitschii** (Engl.) Polhill & Wiens
5612 **Hermbstaedia angolensis** C.B.Clarke
5613 **Hermbstaedia odorata** (Burch.) T.Cooke var. **odorata**
5614 **Cleome angustifolia** Forssk. subsp. **petersiana** (Klotzsch ex Sond.) Kers
5615 **Aloe hereroensis** Engl. var. **hereroensis**
5616 **Sansevieria aethiopica** Thunb.
5617 **Stapelia schinzii** A.Berger & Schltr. var. **schinzii**
5618 **Adenium boehmianum** Schinz
5619 **Cephalocroton mollis** Klotzsch
5620 **Monechma salsola** (S.Moore) C.B.Clarke
5621 **Stipagrostis hirtigluma** subsp. **pearsonii** (Henrard) De Winter
5622 **Antheophora pubescens** Nees
5623 **Panicum lanipes** Mez
5624 **Panicum simulans** Smook
5625 **Nelsia quadrangula** (Engl.) Schinz
5626 **Ecbolium clarkei** Hiern var. **clarkei**
5627 **Ruelliopsis setosa** (Nees) C.B.Clarke
5628 **Cucumis africanus** L.f.
5629 **Merremia palmata** Hallier f.
5630 **Asystasia schimperi** T.Anderson
5631 **Chrysanthellum indicum** DC.
5632 **Sporobolus panicoides** A.Rich.
5633 **Indigofera trigonelloides** Jaub. & Spach
5634 [No. used twice] **Orbivestus cinerascens** (Sch.Bip.) H.Rob.
5634 [No. used twice] **Launaea intybacea** (Jacq.) Beauverd
5635 [Not identified]
5636 **Tarchonanthus camphoratus** L.
5637 **Phyllanthus maderaspatensis** L.
5638 **Grewia schinzii** K.Schum.
5639 **Grewia flavescens** Juss.
5640 **Grewia bicolor** Juss. var. **bicolor**
5641 **Polygala pallida** E.Mey.
5642 **Ruellia otaviensis** P.G.Mey.
5643 **Momordica humilis** (Cogn.) C.Jeffrey
5644 **Tapinanthus oleifolius** (J.C.Wendl.) Danser
5645 **Dactyliandra welwitschii** Hook.f.
5646 **Cissus nymphaeifolia** (Welw. ex Baker) Planch.
5647 **Eragrostis dinteri** Stapf
5648 **Petalidium coccineum** S.Moore
5649 **Stipagrostis uniplumis** (Licht.) De Winter var. **uniplumis**
5649A **Cyamopsis senegalensis** Guill. & Perr.
5650 **Fingerhuthia africana** Lehm.
5651 **Sesuvium sesuvioides** (Fenzl) Verdc.
5652 **Peristrophe paniculata** (Forssk.) Brummitt
5653 **Commicarpus decipiens** Meikle
5654 **Sphaeranthus peduncularis** DC. subsp. **rogersii** (N.E.Br.) Wild
5655 **Tribulus excurvians** Wawra
5656 **Litogyne gariepina** (DC.) Anderb.
5657 **Pluchea bojeri** (DC.) Humbert
5658 **Phragmites mauritanus** Kunth
5659 **Datura inoxia** Mill.
5660 **Hiernia angolensis** S.Moore
5661 **Cucumis sagittatus** Peyr.
5662 **Geigeria alata** (Hochst. & Steud.) Benth. & Hook.f. ex Oliv. & Hiern
5663 **Commiphora virgata** Engl.
5664 **Zygophyllum simplex** L.
5665 [Not identified]
5666 **Tribulus excurvians** Wawra
5667 **Petalidium rossmannianum** P.G.Mey.
5668 **Commiphora virgata** Engl.
5669 **Helichrysum roseo-niveum** Marloth & O.Hoffm.
5670 **Commiphora** sp.
5671 **Commiphora anacardiifolia** Dinter & Engl.
5672 **Anticharis inflata** Marloth & Engl.
5673 **Sesamum** sp.
5674 **Anticharis inflata** Marloth & Engl.
5675 **Rogeria adenophylla** J.Gay ex Delile
5676 [Not identified]
5677 **Kohautia cynanchica** DC.
5678 **Euphorbia glanduligera** Pax
5679 **Kaokochloa nigrirostris** De Winter
5679A **Kaokochloa nigrirostris** De Winter
5680 **Hermannia amabilis** Marloth ex K.Schum.
5681 **Indigastrum argyroides** (E.Mey.) Schrire
5682 **Euphorbia guerichiana** Pax
5683 **Petalidium luteo-album** A.Meeuse [Given twice]
5684 **Seddera schizantha** Hallier f.
5685 **Trichodesma africanum** (L.) Lehm.

- 5686 **Cleome foliosa** Hook.f. var. **foliosa**
5687 **Petalidium rossmannianum** P.G.Mey.
5688 **Leobordea platycarpa** (Viv.) B.-E.van Wyk & Boatwr. [5688 also as **Lotononis** sp.]
5689 **Polygala guerichiana** Engl.
5690 **Trianthema triquetra** Rottler ex Willd. subsp. **triquetra** var. **triquetra** [listed twice]
5691 **Hermannia viscosa** Hiern
5692 **Stipagrostis giessii** Kers
5693 **Stipagrostis hirtigluma** subsp. **pearsonii** (Henrard) De Winter
5694 **Ceraria longipedunculata** Merxm. & Podlech
5695 [Not identified]
5696 **Tephrosia dregeana** E.Mey. var. **dregeana**
5697 **Indigofera teixeirae** Torre
5698 [No. used twice] **Euphorbia phylloclada** Boiss.
5698 [No. used twice] **Limeum aethiopicum** Burm.f. var. **lanceolatum** Friedrich
5699 **Aristida parvula** (Nees) De Winter
5700 **Corbichonia decumbens** (Forssk.) Exell
5701 **Tephrosia** sp.
5702 **Stipagrostis giessii** Kers
5703 **Blepharis grossa** (Nees) T.Anderson
5704 **Tricholaena monachne** (Trin.) Stapf & C.E.Hubb.
5705 **Indigofera anabibensis** A.Schreib. [Recorded twice]
5706 **Phyllanthus dinteri** Pax
5707 **Stipagrostis hochstetteriana** (Beck ex Hack.) De Winter var. **secalina** (Henrard) De Winter
5708 **Stipagrostis giessii** Kers
5709 **Euphorbia damarana** L.C.Leach
5710 **Stipagrostis** sp.
5711 **Ruellia diversifolia** S.Moore
5712 **Commiphora wildii** Merxm.
5713 **Commiphora giessii** J.J.A.van der Walt [Recorded twice]
5714 **Sesbania sphaerosperma** Welw.
5715 **Geigeria spinosa** O.Hoffm.
5716 **Calicorema capitata** (Moq.) Hook.f.
5717 **Stipagrostis damarensis** (Mez) De Winter
5718 **Petalidium halimoides** (Nees) S.Moore
5719 **Commiphora krauseliana** Heine
5720 **Monechma divaricatum** (Nees) C.B.Clarke
5721 **Hermestaedia spathulifolia** (Engl.) Baker
5722 **Boerhavia deserticola** Codd [Recorded twice]
5723 **Heliotropium tubulosum** E.Mey. ex A.DC.
5724 **Cucumis sagittatus** Peyr.
5725 **Centropodia mossamedensis** (Rendle) Cope
5726 **Salvadora persica** L. var. **persica**
5727 **Blepharis ferox** P.G.Mey. [Recorded twice]
5728 **Rhynchosia candida** (Welw. ex Hiern) Torre
5729 **Monechma salsola** (S.Moore) C.B.Clarke
5730 **Trianthema parvifolia** E.Mey. ex Sond. var. **parvifolia**
5730A **Dyerophytum africanum** (Lam.) Kuntze
5731 **Aizoanthemum dinteri** (Schinz) Friedrich
5732 **Albucca stapffii** (Schinz) J.C.Manning & Goldblatt (= **Ornithogalum stapffii** Schinz)
5733 **Commiphora krauseliana** Heine
5734 **Erioccephalus pinnatus** O.Hoffm.
5735 **Megalochlamys marlothii** (Engl.) Lindau
5736 **Ipomoea adenioides** Schinz var. **adenioides**
5737 **Commiphora dinteri** Engl.
5738 **Abutilon pycnodon** Hochr. [Recorded twice]
5739 **Phylctidocarpa flava** Cannon & W.L.Theob.
5740 **Petalidium welwitschii** S.Moore
5741 **Merremia guerichii** A.Meeuse
5742 **Kissenia capensis** Endl.
5743 **Stipagrostis uniplumis** (Licht.) De Winter var. **uniplumis**
5743A **Balanites angolensis** (Welw.) Welw. ex Mildbr. & Schltr. subsp. **welwitschii** (Tiegh.) Sands
5744 **Phaeoptilum spinosum** Radlk.
5745 **Stipagrostis** sp.
5746 **Stipagrostis hochstetteriana** (Beck ex Hack.) De Winter var. **secalina** (Henrard) De Winter
5747 **Sesamothamnus benguelensis** Welw.
5748 **Petalidium physaloides** S.Moore
5749 **Boscia tomentosa** Toelken
5750 **Dicoma cuneneensis** Wild
5751 **Turnera oculata** Story var. **paucipilosa** Oberm.
5752 **Adenolobus garipensis** (E.Mey.) Torre & Hillc.
5753 **Phyllanthus maderaspatensis** L.
5754 **Marcellipsis welwitschii** (Hook.f.) Schinz
5755 **Acacia dealbata** Link
5756 **Senna italica** Mill. subsp. **arachoides** (Burch.) Lock
5757 **Indigofera rautanenii** Baker f.
5758 **Hermestaedia angolensis** C.B.Clarke
5759 **Monechma cleomoides** (S.Moore) C.B.Clarke
5760 **Combretum wattii** Exell
5761 **Centropodia mossamedensis** (Rendle) Cope
5762 **Phyllanthus reticulatus** Poir. var. **reticulatus**
5763 **Physalis angulata** L.
5764 **Antiphonia fragrans** (Merxm.) Merxm.
5765 **Tephrosia dregeana** E.Mey. var. **dregeana**
5766 **Enneapogon scoparius** Stapf
5767 **Ruellia diversifolia** S.Moore
5768 **Enneapogon scaber** Lehm.
5769 **Senegalia mellifera** (Vahl) Seigler & Ebinger subsp. **mellifera**
5770 **Turnera oculata** Story var. **oculata**
5771 **Ficus capreifolia** Delile
5772 **Hermannia amabilis** Marloth ex K.Schum.
5773 **Cordia sinensis** Lam.
5774 **Ipomoea rubens** Choisy
5775 **Ficus capreifolia** Delile

- 5776 **Persicaria attenuata** (R.Br.) Soják subsp. **africana** K.L.Wilson
5777 **Ipomoea tenuipes** Verdc.
5778 **Sporobolus consimilis** Fresen.
5779 **Mimosa pigra** L.
5780 [Not identified]
5781 **Leucas ebracteata** Peyr. var. **kaokoveldensis** Sebald
5782 **Ceraria longipedunculata** Merxm. & Podlech [Recorded twice]
5783 **Rhigozum virgatum** Merxm. & A.Schreib.
5784 **Maerua schinzii** Pax
5785 **Boscia tomentosa** Toelken
5786 **Lophiocarpus polystachyus** Turcz.
5786A **Cucumis sagittatus** Peyr.
5787 **Kohautia angolensis** Bremek.
5788 **Petalidium crispum** A.Meeuse ex P.G.Mey.
5789 **Momordica welwitschii** Hook.f.
5790 **Dewinteria petrophila** (De Winter) Van Jaarsv. & A.E.van Wyk
5791 **Distephanus angolensis** (O.Hoffm.) H.Rob. & B.Kahn
5792 **Helichrysum roseo-niveum** Marloth & O.Hoffm.
5793 **Blepharis obmitrata** C.B.Clarke [5793 **Cyathula orthacantha** (Hochst. ex Asch.) Schinz]
5794 **Vernonia obionifolia** O.Hoffm. subsp. **dentata** Merxm.
5795 **Jamesbrittenia heucherifolia** (Diels) Hilliard
5796 **Cucumella aspera** (Cogn.) C.Jeffrey
5797 **Anticharis** sp.
5798 [Not identified]
5799 **Scirpoides dioeca** (Kunth) Browning
5800 **Tamarix usneoides** E.Mey. ex Bunge
5801 **Cyperus laevigatus** L.
5802 **Sporobolus engleri** Pilg.
5803 **Paspalidium geminatum** (Forssk.) Stapf
5804 **Sporobolus consimilis** Fresen.
5805 **Helichrysum candolleianum** H.Buek
5806 **Ruellia diversifolia** S.Moore
5807 [Not identified]
5808 **Jamesbrittenia** sp.
5809 [Not identified]
5810 **Dichrostachys cinerea** (L.) Wight & Arn. subsp. **africana** Brenan & Brummitt var. **setulosa** (Welw. ex Oliv.) Brenan & Brummitt
5811 **Ficus glumosa** Delile
5812 **Plectranthus hereroensis** Engl.
5813 **Entandrophragma spicatum** (C.DC.) Sprague
5814 **Entandrophragma spicatum** (C.DC.) Sprague
5815 **Cleome hirta** (Klotzsch) Oliv.
5816 **Barleria lanceolata** (Schinz) Oberm. [Recorded twice]
5817 **Ipomoea verbascoidea** Choisy
5818 **Barleria damarensis** T.Anderson
5819 [Not identified]
5820 **Euphorbia caperonioides** R.A.Dyer & P.G. Mey.
5821 **Cuscuta planiflora** Ten. var. **planiflora**
5822 **Tetragonia calycina** Fenzl [Recorded twice]
5823 **Ehretia namibiensis** Retief & A.E.van Wyk subsp. **kaokoensis** Retief & A.E.van Wyk
5824 **Crotalaria teixeirae** Torre
5825 **Monechma cleomoides** (S.Moore) C.B.Clarke
5826 **Monechma cleomoides** (S.Moore) C.B.Clarke
5827 **Senegalia robynsiana** (Merxm. & A.Schreib.) Kyal. & Boatwr.
5828 **Peristrophe namibiensis** K.Balkwill subsp. **brandbergensis** K.Balkwill
5829 **Dalechampia scandens** L. var. **cordofana** (Hochst. ex Webb) Müll.Arg.
5830 **Indigofera rautanenii** Baker f.
5831 **Caesalpinia rubra** (Engl.) Brenan
5832 **Marcellipsis denudata** (Hook.f.) Schinz
5833 **Amphiasma merenskyanum** Bremek.
5834 [Not identified]
5835 **Hiernia angolensis** S.Moore
5836 [Not identified]
5837 **Kirkia dewinteri** Merxm. & Heine [Recorded three times]
5838 **Eragrostis micrantha** Hack.
5838A **Triraphis purpurea** Hack.
5839 [Not identified]
5840 **Grewia tenax** (Forssk.) Fiori var. **tenax**
5841 **Senegalia montis-usti** (Merxm. & A.Schreib.) Kyal. & Boatwr.
5842 [Not identified]
5843 [Not identified]
5844 **Pegolettia senegalensis** Cass.
5845 **Gossypium anomalum** Wawra ex Wawra & Peyr. subsp. **anomalum**
5846 **Rogeria adenophylla** J.Gay ex Delile
5847 **Tribulus excrucians** Wawra
5848 **Kaokochloa nigrirostris** De Winter
5849 **Cadaba schroepelii** Suess. ex Suess. & Merxm.
5850 **Melanthera triternata** (Klatt) Wild
5851 **Ficus sycomorus** L. subsp. **sycomorus**
5852 **Eragrostis** sp.
5853 **Ceraria longipedunculata** Merxm. & Podlech
5854 **Sericocoma heterochiton** Lopr.
5855 **Hibiscus castroi** Baker f. & Exell var. **castroi**
5856 [Not identified]
5857 **Tripteris nervosa** Hutch.
5858 **Lycium bosciifolium** Schinz
5859 **Ruellia diversifolia** S.Moore
5860 **Eragrostis walteri** Pilg.
5861 **Ficus sycomorus** L. subsp. **sycomorus**
5862 **Orthanthera albida** Schinz
5863 **Cucumis sagittatus** Peyr. [Recorded twice]
5864 **Schoenoplectus subulatus** (Vahl) Lye
5865 **Petalidium rossmannianum** P.G.Mey.

- 5866 **Schmidtia kalahariensis** Stent
5867 **Euphorbia glanduligera** Pax
5868 **Forsskaolea candida** L.f.
5869 **Commiphora giessii** J.J.A.van der Walt [Recorded three times]
5870 **Sesamum rigidum** Peyr. subsp. **merenskya-num** Ihlenf. & Seidenst.
5871 **Petalidium coccineum** S.Moore
5872 **Hermannia amabilis** Marloth ex K.Schum.
5873 **Tricholaena monachne** (Trin.) Stapf & C.E.Hubb.
5874 **Aristida parvula** (Nees) De Winter
5875 **Monechma divaricatum** (Nees) C.B.Clarke
5876 **Commiphora** sp.
5877 **Heliotropium hereroense** Schinz
5878 **Tribulus exrucians** Wawra
5879 **Salsola arborea** C.A.Sm. ex Aellen
5880 **Geigeria alata** (Hochst. & Steud.) Benth. & Hook.f. ex Oliv. & Hiern
5881 **Vachellia tortilis** (Forssk.) Galasso & Banfi subsp. **heteracantha** (Burch.) Kyal. & Boatwr.
5882 **Adenolobus garipensis** (E.Mey.) Torre & Hillc.
5883 **Moringa ovalifolia** Dinter & A.Berger
5884 **Leptochloa eleusine** (Nees) Cope & N.Snow
5885 **Barleria senensis** Klotzsch
5886 **Laggera decurrens** (Vahl) Hepper & J.R.I.Wood
5887 **Vachellia hebeclada** (DC.) Kyal. & Boatwr. subsp. **tristis** (A.Schreib.) Kyal. & Boatwr. [Recorded twice]
5888 **Eragrostis** sp.
5889 **Emilia marlothiana** (O.Hoffm.) C.Jeffrey [5889 **Acacia** sp.]
5890 **Manuleopsis dinteri** Thell.
5891 **Senecio pleistocephalus** S.Moore
5892 **Clematis brachiata** Thunb.
5893 [Not identified]
5894 **Cyphostemma currorii** (Hook.f.) Desc.
5895 **Faidherbia albida** (Delile) A.Chev.
5896 **Vachellia kirkii** (Oliv.) Kyal. & Boatwr. subsp. **kirkii** var. **kirkii**
5897 **Blepharis leendertziae** Oberm.
5898 **Litogyne gariepina** (DC.) Anderb.
5899 **Felicia smaragdina** (S.Moore) Merxm.
5900 **Diplorhynchus condylocarpon** (Müll.Arg.) Pichon
5901 **Cassia abbreviata** Oliv. subsp. **beareana** (Holmes) Brenan
5902 **Polydora angustifolia** (Steetz) H.Rob. (= **Vernonia poskeana** Vatke & Hildebr. subsp. **botswanaica** G.V.Pope)
5903 **Pseudolachnostylis** sp.
5904 **Pentatrichia petrosa** Klatt
5905 **Tinnea rhodesiana** S.Moore
5906 **Combretum oxystachyum** Welw. ex M.A.Lawson
5907 **Plumbago zeylanica** L.
5907A **Pachypodium lealii** Welw.
5908 **Petalidium cirrhiferum** S.Moore
5909 **Distephanus angolensis** (O.Hoffm.) H.Rob. & B.Kahn
5910 **Philenoptera nelsii** (Schinz) Schrire
5910A **Barleria damarensis** T.Anderson
5911 **Vachellia reficiens** (Wawra) Kyal. & Boatwr. subsp. **reficiens**
5912 **Vachellia kirkii** (Oliv.) Kyal. & Boatwr. subsp. **kirkii** var. **kirkii**
5913 **Commiphora glaucescens** Engl.
5914 **Basananthe heterophylla** Schinz
5915 [Not identified]
5916 **Hiernia angolensis** S.Moore
5917 **Indigofera trigonelloides** Jaub. & Spach
5918 **Megalochlamys marlothii** (Engl.) Lindau
5919 **Indigofera teixeirae** Torre
PRE 32179 **Aloe dewinteri** Giess
PRE 33373 **Kaokochloa** sp.
PRE 38580 **Aloe dewinteri** Giess

Appendix 4:

Species list, alphabetical according to family

Acanthaceae

Asystasia schimperi T.Anderson 5630
Asystasia welwitschii S.Moore 5537
Barleria damarensis T.Anderson 5818, 5910A
Barleria kaloxytona Lindau 5141
Barleria lanceolata (Schinz) Oberm. 5217, 5816
Barleria lancifolia T.Anderson subsp. **lancifolia**
 5200, 5230, 5502, 5536A
Barleria lugardii C.B.Clarke 5206
Barleria mackenii Hook.f. 5297
Barleria meeuseana P.G.Mey. 5489
Barleria prionitoides Engl. 5250
Barleria rogersii S.Moore 5262, 5263, 5576
Barleria senensis Klotzsch 5199, 5287, 5885
Blepharis ferox P.G.Mey. 5727
Blepharis grossa (Nees) T.Anderson 5703
Blepharis leendertziae Oberm. 5592, 5897
Blepharis obmitrata C.B.Clarke 5223, 5238, 5485,
 5793 [also used for **Cyathula orthacantha**]
Ecbolium clarkei Hiern var. **clarkei** 5397, 5626
Hypoestes forskalii (Vahl) R.Br. 5525
Justicia betonica L. 5288
Justicia heterocarpa T.Anderson subsp. **dinteri**
 (S.Moore) Hedrén 5320, 5434
Justicia odora (Forssk.) Vahl 5214
Justicia platysepala (S.Moore) P.G.Mey. 5134,
 5235, 5252
Lepidagathis scariosa Nees 5418
Megalochlamys marlothii (Engl.) Lindau 5195,
 5735, 5918
Monechma cleomoides (S.Moore) C.B.Clarke 5248,
 5759, 5825, 5826
Monechma debile (Forssk.) Nees 5398
Monechma divaricatum (Nees) C.B.Clarke 5197,
 5310, 5720, 5875
Monechma salsola (S.Moore) C.B.Clarke 5620,
 5729
Peristrophe namibiensis K.Balkwill subsp. **brand-**
bergensis K.Balkwill 5828
Peristrophe paniculata (Forssk.) Brummitt 5652
Petalidium cirrhiferum S.Moore 5908
Petalidium coccineum S.Moore 5231, 5509, 5648,
 5871
Petalidium crispum A.Meeuse ex P.G.Mey. 5788
Petalidium halimoides (Nees) S.Moore 5718
Petalidium luteo-album A.Meeuse 5683

Petalidium physaloides S.Moore 5748
Petalidium rossmannianum P.G.Mey. 5114, 5147,
 5154, 5590, 5667, 5687, 5865
Petalidium welwitschii S.Moore 5740
Ruellia diversifolia S.Moore 5711, 5767, 5806,
 5859
Ruellia otaviensis P.G.Mey. 5642
Ruellia patula Jacq. 5216
Ruelliosis setosa (Nees) C.B.Clarke 5321, 5627

Aizoaceae

Aizoanthemum dinteri (Schinz) Friedrich 5731
Aizoon virgatum Welw. ex Oliv. 5135, 5198
Sesuvium sesuvioides (Fenzl) Verdc. 5111, 5258,
 5651
Tetragonia calycina Fenzl 5822
Trianthema parvifolia E.Mey. ex Sond. var. **parvifolia**
 5730
Trianthema triquetra Rottler ex Willd. subsp. **trique-**
tra var. **triquetra** 5690

Amaranthaceae

Achyranthes aspera L. var. **aspera** 5439
Achyranthes aspera L. var. **sicula** L. 5192, 5436
Aerva leucura Moq. 5161
Amaranthus dinteri Schinz subsp. **dinteri** var. **a**
 5574
Amaranthus thunbergii Moq. 5589
Calicorema capitata (Moq.) Hook.f. 5716
Cyathula cylindrica Moq. var. **cylindrica** 5096,
 5194
Cyathula orthacantha (Hochst. ex Asch.) Schinz
 5193, 5793 [also for **Blepharis obmitrata**]
Herbstaedtia angolensis C.B.Clarke 5330, 5612,
 5758
Herbstaedtia odorata (Burch.) T.Cooke var. **odorata**
 5613
Herbstaedtia spathulifolia (Engl.) Baker 5721
Kyphocarpa angustifolia (Moq.) Lopr. 5140
Leucosphaera bainesii (Hook.f.) Gilg 5208
Marcelliopsis denudata (Hook.f.) Schinz 5832
Marcelliopsis welwitschii (Hook.f.) Schinz
 5219, 5754
Nelsia quadrangula (Engl.) Schinz 5495, 5625

Pupalia lappacea (L.) A.Juss. var. **lappacea** 5196
Sericocoma heterochiton Lopr. 5854
Sericorema sericea (Schinz) Lopr. 5376

Anacardiaceae

Ozoroa crassinervia (Engl.) R.Fern. & A.Fern. 5497
Sclerocarya birrea (A.Rich.) Hochst. subsp. **caffra**
 (Sond.) Kokwaro 5499
Searsia ciliata (Licht. ex Schult.) A.J.Mill. 5608
Searsia pyroides (Burch.) Moffett var. **pyroides** 5450

Anthericaceae

Chlorophytum longifolium Schweinf. ex Baker 5545

Apiaceae

Lefebvrea grantii (Kingston ex Oliv.) S.Droop 5128,
 5542
Phlyctidocarpa flava Cannon & W.L.Theob. 5739
Steganotaenia araliacea Hochst. var. **araliacea** 5565

Apocynaceae

Adenium boehmianum Schinz 5406, 5618
Ceropegia carnosa E.Mey. 5426A
Ceropegia lugardiae N.E.Br. 5426
Ceropegia nilotica Kotschy var. **nilotica** 5518
Cryptolepis decidua (Planch. ex Benth.) N.E.Br.
 5389
Diplorhynchus condylocarpon (Müll.Arg.) Pichon
 5900
Marsdenia macrantha (Klotzsch) Schltr. 5273, 5340
Marsdenia sylvestris (Retz.) P.I.Forst. 5327
Orthanthera albida Schinz 5862
Pachypodium lealii Welw. 5907A
Pentarrhinum abyssinicum Decne. subsp. **abyssini-**
cum 5529
Pergularia daemia (Forssk.) Chiov. subsp. **daemia**
 5456
Stapelia [not identified] 5092
Stapelia schinzii A.Berger & Schltr. var. **schinzii**
 5617
Tavaresia barklyi (Dyer) N.E.Br. 5133
Tylophora fleckii (Schltr.) N.E.Br. 5471

Asphodelaceae

Aloe dewinteri Giess PRE 32179, PRE 38580
Aloe hereroensis Engl. var. **hereroensis** 5615

Asteraceae

Antiphonia fragrans (Merxm.) Merxm. 5764
Baccharoides anthelmintica (L.) Moench 5215
Calostephane divaricata Benth. 5272, 5588
Chrysanthellum indicum DC. 5631
Dicoma cuneneensis Wild 5750
Dicoma tomentosa Cass. 5289
Distephanus angolensis (O.Hoffm.) H.Rob. & B.Kahn
 5506, 5791, 5909
Emilia ambifaria (S.Moore) C.Jeffrey 5431
Emilia marlothiana (O.Hoffm.) C.Jeffrey 5462, 5889
 [No. also used for **Acacia** sp.]
Eriocephalus luederitzianus O.Hoffm. 5149, 5539
Eriocephalus pinnatus O.Hoffm. 5734
Felicia smaragdina (S.Moore) Merxm. 5142, 5477,
 5899
Geigeria acaulis (Sch.Bip.) Benth. & Hook.f. ex Oliv.
 & Hiern 5185
Geigeria alata (Hochst. & Steud.) Benth. & Hook.f.
 ex Oliv. & Hiern 5662, 5880
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Eragrostis trichophora Coss. & Durieu 5527
Eragrostis walteri Pilg. 5860
Fingerhuthia africana Lehm. 5313, 5650
Heteropogon contortus (L.) Roem. & Schult. 5328
Kaokochloa nigrirostris De Winter 5679, 5679A, 5848
Leptochloa eleusine (Nees) Cope & N.Snow 5884
Melinis longiseta (A.Rich.) Zizka subsp. **bellespicata** (Rendle) Zizka 5136, 5496
Melinis repens (Willd.) Zizka subsp. **grandiflora** (Hochst.) Zizka 5173, 5581, 5582
Melinis sp. 5242
Microchloa caffra Nees 5443
Monelytrum luederitzianum Hack. 5181
Oropetium capense Stapf 5331
Panicum lanipes Mez 5623
Panicum maximum Jacq. 5359
Panicum simulans Smook 5160, 5624
Paspalidium geminatum (Forssk.) Stapf 5803
Pogonarthria fleckii (Hack.) Hack. 5371, 5372
Phragmites mauritianus Kunth 5658
Schmidtia kalahariensis Stent 5866
Setaria sp. 5354
Setaria verticillata (L.) P.Beauv. 5454
Sorghum bicolor (L.) Moench subsp. **arundinaceum** (Desv.) de Wet & Harlan 5163
Sporobolus consimilis Fresen. 5778, 5804
Sporobolus engleri Pilg. 5384, 5802
Sporobolus festivus Hochst. ex A.Rich. 5586
Sporobolus fimbriatus (Trin.) Nees 5401
Sporobolus panicoides A.Rich. 5632
Stipagrostis damarensis (Mez) De Winter 5717
Stipagrostis giessii Kers 5692, 5702, 5708
Stipagrostis hirtigluma (Trin. & Rupr.) De Winter subsp. **pearsonii** (Henrard) De Winter 5307, 5377, 5621, 5693
Stipagrostis hochstetteriana (Beck ex Hack.) De Winter var. **secalina** (Henrard) De Winter 5707, 5746
Stipagrostis sp. 5710, 5745
Stipagrostis uniplumis (Licht.) De Winter var. **uniplumis** 5649, 5743
Tragus racemosus (L.) All. 5182
Tricholaena monachne (Trin.) Stapf & C.E.Hubb. 5704, 5873
Trichoneura eleusinoides (Rendle) Ekman subsp. **eleusinoides** 5395
Triraphis purpurea Hack. 5309, 5838A
Triraphis ramosissima Hack. 5315
Triopogon minimus (A.Rich.) Hochst. ex Steud. 5394
Urochloa brachyura (Hack.) Stapf 5180, 5243
Urochloa oligotricha (Fig. & De Not.) Henrard 5303
- ## Polygalaceae
- Polygala guerichiana** Engl. 5689
Polygala leptophylla Burch. var. **leptophylla** 5535
Polygala pallida E.Mey. 5312, 5641
- ## Polygonaceae
- Oxygonum alatum** Burch. var. **alatum** 5345
Oxygonum sinuatum (Hochst. & Steud. ex Meisn.) Dammer 5561
Persicaria attenuata (R.Br.) Soják subsp. **africana** K.L.Wilson 5776
- ## Portulaccaceae
- Ceraria longipedunculata** Merxm. & Podlech 5694, 5782 [Recorded twice], 5853

Portulaca quadrifida L. 5441
Talinum arnotii Hook.f. 5259

Ranunculaceae

Clematis brachiata Thunb. 5892

Rhamnaceae

Berchemia discolor (Klotzsch) Hemsl. 5325
Helinus integrifolius (Lam.) Kuntze 5218
Ziziphus mucronata Willd. subsp. **mucronata** 5610

Rubiaceae

Amphiasma benguellense (Hiern) Bremek. 5229
Amphiasma merenskyanum Bremek. 5103, 5833
Kohautia angolensis Bremek. 5787
Kohautia caespitosa Schnizl. subsp. **brachyloba**
 (Sond.) D.Mantell 5319, 5433
Kohautia cynanchica DC. 5677

Rutaceae

Thamnosma africana Engl. 5484
Zanthoxylum ovatifoliolatum (Engl.) Finkelstein 5254

Salvadoraceae

Salvadora persica L. var. **persica** 5726

Sapindaceae

Cardiospermum corindum L. 5125

Scrophulariaceae

Alectra orobanchoides Benth. 5352, 5449
Alectra sp. 5604
Anticharis inflata Marloth & Engl. 5672, 5674
Anticharis sp. 5797
Aptosimum angustifolium F.E.Weber & Schinz 5130,
 5131, 5239, 5447
Aptosimum glandulosum F.E.Weber & Schinz 5150
Aptosimum lineare Marloth & Engl. var. **lineare**
 5201, 5385
Aptosimum lugardiae (N.E.Br. ex Hemsl. & Skan)
 E.Phillips 5168
Craterostigma plantagineum Hochst. 5444
Jamesbrittenia canescens (Benth.) Hilliard var. **lae-**
vior (Dinter) Hilliard 5366
Jamesbrittenia heucherifolia (Diels) Hilliard 5795
Jamesbrittenia huillana (Diels) Hilliard 5551
Jamesbrittenia sp. 5808

Manuleopsis dinteri Thell. 5890
Veronica anagallis-aquatica L. 5556

Solanaceae

Datura inoxia Mill. 5659
Lycium bosciifolium Schinz 5858
Physalis angulata L. 5763
Physalis peruviana L. 5568
Solanum catombelense Peyr. 5469
Solanum delagoense Dunal 5521
Solanum multiglandulosum Bitter 5470
Solanum nigrum L. 5550
Solanum tettense Klotzsch var. **renschii** (Vatke)
 A.E.Gonç. 5095, 5516
Withania somnifera (L.) Dunal 5210

Tamaricaceae

Tamarix usneoides E.Mey. ex Bunge 5358, 5800

Thymelaeaceae

Gnidia polycephala (C.A.Mey.) Gilg 5555

Turneraceae

Turnera oculata Story var. **oculata** 5770
Turnera oculata Story var. **paucipilosa** Oberm. 5751

Urticaceae

Didymodoxa caffra (Thunb.) Friis & Wilmot-Dear
 5549
Forsskaolea candida L.f. 5868
Forsskaolea viridis Ehrenb. ex Webb 5222
Obetia carruthersiana (Hiern) Rendle 5503

Verbenaceae

Chascanum pinnatifidum (L.f.) E.Mey. var. **pinnatifi-**
dum 5511
Lantana angolensis Moldenke 5211
Lantana camara L. 5476
Lantana dinteri Moldenke 5119, 5423
Lippia pearsonii Moldenke 5285, 5526
Priva auricoccea A.Meeuse 5532

Vitaceae

Cissus nymphaeifolia (Welw. ex Baker) Planch.
 5102, 5646
Cissus sp. 5517 [same number used for **Cyphostem-**
ma currorii]

Cyphostemma currorii (Hook.f.) Desc. 5517, 5894
[same number used for **Cissus** sp.]

Cyphostemma omburens (Gilg & M.Brandt) Desc.
5560

Cyphostemma sp. 5505

Cyphostemma uter (Exell & Mendonça) Desc. 5286

Zygophyllaceae

Tribulus excrucians Wawra 5655, 5666, 5847,
5878

Tribulus zeyheri Sond. subsp. **zeyheri** 5424

Zygophyllum simplex L. 5664.

Appendix 5:

Herero plant names and uses

The names are written exactly as in our field notebooks. They are compared to the Herero names given in:

- 'C' (Malan & Owen-Smith in *Cimbebasia* ser. B. vol. 2. no. 5: 131–178, 1974); and in:
- 'T' (*Tree Atlas of Namibia* by Curtis & Mannheimer, 2005. The National Botanical Research Institute, Windhoek).
- Trees listed in 'T' without a Herero name are indicated as 'T: -'.

The agreement between our names and those in 'C' is striking, the main difference, in most cases, being the orthography.

Adenium boehmianum Schinz

Erect shrublet with one or two stems rooted in fissures in rock. Leaves very shiny and glaucous. Flowers pinkish red. Used by Hereros to poison arrows for lion hunting. Herero name: *ouzuoo* (C: *ouzuwo*; T: -).

Andropogon chinensis (Nees) Merr.

Herero name: *edjangolo*.

Antheophora pubescens Nees

Herero name: *otjimbele*.

Barleria meeuseana P.G.Mey.

Herero name: *?ohuuti?*

Berchemia discolor (Klotzsch) Hemsl.

Berries yellow when ripe, edible. Herero name: *othombe* (C: *omuve*; T: -).

Blepharis obmitrata C.B.Clarke

Herero name: *onjenja* (C: *onyainya*).

Coccinia rehmannii Cogn.

Edible; has a large tuber which is roasted in fire and eaten. Herero name: *otjimaka* (C uses the name for **C. sessilifolia**: *otjimaka*).

Commiphora discolor Mendes

Erect 10 m tall tree with deep green foliage; bark peeling in papery horizontal strips. Herero name: *omulele* (C: *omurere*; T: *omurere*).

Corallocarpus welwitschii (Naudin) Hook.f. ex Welw.

Leaves and stems eaten as spinach. Herero name: *oluhona* (C: *ohona*).

Cordia sinensis Lam.

Shrub with white bark and very rough leaves. Fruits orange-yellow when ripe. Berries edible. Herero name: *musepa* (T: -).

Cucumis meeusei C.Jeffrey

Herero name: *oukungu*.

Diospyros lycioides Desf. subsp. **lycioides**

Herero name: *omundumbili* (C: *omundumbiri*; T: *omuzeme*).

Entandrophragma spicatum (C.DC.) Sprague

Herero name: *omutaku* (C: do.; T: -).

Eragrostis rotifer Rendle

Herero name: *olueo*.

Grewia bicolor Juss. var. **bicolor**

Fruits brownish when ripe, rather fleshy and sweetish, slightly astringent. Herero name: *omandjembere* (C: *omuvapu*; T: -).

Grewia flavescens Juss.

Shrublet with square, grooved stems, about 1.2 m high. Fruits edible, simple or lobed, yellow when ripe with a dry skin which is rubbed off before eating. Herero name: *omuhe* (C: do.; T: do.).

Grewia schinzii K.Schum.

Fruits cream, turning brown when ripe, usually 2-lobed; rather fleshy for a **Grewia**; edible but very astringent. Herero name: *omaole* (C: *omuhore*; T: -).

Grewia tenax (Forssk.) Fiori var. **tenax**

Fruits often borne in quads, bright orange when ripe; edible. Herero name: *omundjendjehre* (C: *omundjendjere omunene*; T: -).

Grewia villosa Willd. var. **villosa**

Fruits edible. Herero name: *ohamati* (C: *omuhamati*; T: *omanjembere*).

Indigofera cryptantha Benth. ex Harv. var. **occidentalis** Baker f.

Roots used as toothbrushes by Hereros. Herero name: *olukohotjintjo* (C: *orukohatjinyo* derived from: *-koha*, wash and *otjinyo*, mouth).

Kalanchoe lanceolata (Forssk.) Pers.

Herero name: *ombukapuke*.

Lapeirousia otaviensis R.C.Foster

Corms edible. Herero name: *onzondungua*.

Lefebvrea grantii (Kingston ex Oliv.) S.Droop

Erect perennial 1.0–1.2 m high, with tuberous root. Roots roasted in fire and eaten; somewhat similar to potato in taste. Herero name: *ondunda*.

Opilia campestris Engl. var. **campestris**

Shrub without spines, usually about 2 m high. Berries cream-coloured, edible with a sweet juice and a small amount of pulp around a large seed. Much liked by Herero. Herero name: *onḍumithe* (C: *omunḍumise*, alt. *amuḱumise*; T: *omudize*, *omutwimise*).

Petalidium rossmannianum P.G.Mey.

Herero name: *tjipambati* (C: *otjipembati*, alt. *otjingongwe*).

Plectranthus unguentarius Codd

Field notes: Coleus, erect white-flowered herb ... roots aromatic, used as one of three ingredients of a pomade by Black women of these regions; leaves of **Zanthoxylum ovatifoliolatum**, are probably

one of the other ingredients; the third is unknown. Herero name: *otjinḍunḍu*.

Senegalia ataxacantha (DC.) Kyal. & Boatwr.

Erect shrubby growth up to 3 m high, consisting of several slender pliable stems; thorns scattered at random on the stems. Herero name: *oluejo* (C: *orweyo*; T: *oruweyo*).

Terminalia prunioides

Pods deep wine-red. Herero name: *omuhama* (C: do.; T: -).

Thamnosma africana Engl.

Herero name: *odjajele* (C: *omukorikoko*).

Tylosema fassoglense (Schweinf.) Torre & Hillc.

Herero name: *otjipiwa* (C: *omumbanyu* [aerial parts], *otjipiva* or *otjipiya* [tuber], *ozombanyu* [seeds]).

Vachellia reficiens (Wawra) Kyal. & Boatwr. subsp. **reficiens**

Herero name: *omungondo* (C: do.; T: -).

Zanthoxylum ovatifoliolatum (Engl.) Finkelstein

Leaves highly aromatic with smell of citronella oil. Herero name: *ohandua* (T: -).

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About the author:

Dr Otto A. Leistner (1931–) was born in Germany, has lived in various African countries since 1936, and studied botany and zoology at Stellenbosch University. He spent his professional life, spanning some 50 years, in the employ of SANBI and its predecessor organisations, starting in February 1955. His main contributions have been in the administration and development of herbaria, the development and implementation of a system for recording biological distribution, and the editing and printing of botanical publications. Dr Leistner retired in 1996 and now lives in White River, Mpumalanga, with his daughter and her family. After retirement he was appointed in an advisory capacity working on major publications on the plant families and genera of southern and southern tropical Africa. And as the present publication indicates: he is still at it.





This book gives an account of the first impressions and collections of two adventurous South African botanists who travelled to the remote northwesternmost corner of Namibia (then South West Africa) in 1957. Otto Leistner and Bernard de Winter (1924–2017) set off on a journey of three months from Pretoria to the Kaokoveld, returning with 845 collected specimens (of which 32 turned out to be new to science) and a lifetime's worth of memories.

They had no detailed maps of the region, there were no standardised place names. They measured their distances in miles and their precious fuel reserves in gallons. They had no radio at their disposal. They wrote their letters on paper and, where possible, asked someone to take them to a post office 400 km away. They put films in their cameras and sent them away to be developed. Computers were as big as a house, and GPS was a twinkle in the eyes of science fiction writers.

The story takes the armchair botanist on an enterprising journey to a historically underexplored region and provides a snapshot in time of the beautiful region. In diary format, the reader is presented with tales of high adventure, encounters with lions and elephants, mechanical mishaps in the wilderness, and descriptions of this exquisite landscape and its associated vegetation and botanical treasures. From Ohopoho (now Opuwo), the explorers undertake five journeys in different directions to gain a better understanding of the region's natural history. Herero plant names are documented, and detailed botanical notes with local uses of plants and species lists are also included.

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