

Called by the mountains

Exciting plant finds happen when you answer the call of Griqualand West's mountains

TEXT & PHOTOGRAPHS:
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CAROLÉ SMALL

The majestic landscape of Griqualand West's Langberg near Olifantshoek.

LIKE THE MARTIAL EAGLE soaring fearlessly high above in the blue Kalahari sky, as I stand on top of the Langberg in the Northern Cape's Griqualand West I feel safe, free and thrilled at the prospect of getting to know the region's unique plant diversity – and possibly discovering new plant species in such an under-explored area.

Mountains make my heart pound, I found while working on the diversity of non-woody plants on the Phalaborwa region's syenite koppies (inselbergs) during my honours project. I fell in love with Griqualand West, its unique topography and fascinating plant life during our first exploration trip in 2014. Looking out from the Langberg over the little town of Olifantshoek and the valleys of camel-thorn trees (*Vachellia*

erioloba) among red Kalahari sand, I knew this was where I wanted to conduct my research.

The region west of Douglas and northwest of the confluence of the Orange and Vaal Rivers is semi-arid yet has a rich history and heritage, having been named Griqualand West after the Griqua (Khoekhoe) people. I was following in famous footsteps. Maria Wilman (1867-1957), South African botanist and geologist, was the first to explore the fascinating plant life of this part of the eastern Kalahari from 1908 onwards. I hope to continue her work by compiling a photographic field guide to the area's plants.

In the mid-20th century, renowned field botanist John Acocks (1911-1979) reported during his SA

botanical survey more different species in one sampling point on the Asbestos Hills than at any other point in the country. In 1997, Braam van Wyk and Gideon Smith mapped 13 centres of endemism in southern Africa, including one of about 90 000 square kilometres in Griqualand West, falling mainly in the Northern Cape but extending into North West.

SECRET PLANT RICHES?

The nomination suggested that this vast area – about the size of KwaZulu-Natal – was one of SA's best-kept botanical secrets. Yet it was controversial as the area had only 1 800 known plant species, of which 24 plant species



are endemic and another two are near-endemic. Arnold Frisby has since proposed refining the Griqualand West centre of endemism to a priority core area for effective conservation and future botanical study. Endemic plant species are highly abundant in this core area and it corresponds to the most prominent geologies – banded iron formation, quartzite and dolomite – of the Griqualand West centre of endemism.

I was determined to study this tantalising area despite being offered other, more easily funded projects. I want to help chart its poorly understood flora by contributing to specialist botanical studies that go beyond the current descriptive environmental impact assessments. There is a dire need to

guide the region's future environmental management and conservation. Its special endemics are seriously threatened by habitat degradation, particularly from proposed hydraulic fracking and looming climate change.

At the moment, Griqualand West's flora is conserved only in three protected areas around the region's centre – Witsand Nature Reserve, Tswalu Kalahari Reserve and Mokala National Park. Fortunately, more scientists are becoming interested in the region. It is now a research priority area for studies by: the South African Environmental Observation Network Arid Lands Node; Kimberley's McGregor Museum; and North-West University working with the Northern Cape Department of Nature and Environmental Conservation.

From top: Blue tulip (*Moraea polystachya*), stomach bush (*Dicoma anomala*) and grassland gazania (*Gazania krebsiana*).

MAKING A PLAN

When drought postponed our fieldwork planned for February 2018, we immediately faced the reality of how rainfall is one of the key drivers of plant diversity in the mountains of the Griqualand West centre of endemism. The first good summer rains did not fall until the third week of February and were erratic and patchy, as you would expect for an El Niño year. We finally started our fieldwork in mid-March 2018 but even then, we had to face the disappointment that we could not sample the southern Langberg as it was too dry.

Fieldwork means exploring difficult terrain and long hours in the field, making it physically and mentally challenging. The weather ranged from windy and cold to extremely hot. We worked on through rain at times but when a heavy thunderstorm hit, we raced each other to the safety of the vehicle.

Landowners generously opened their homes and hearts to us. Often, they would shake their heads over this crazy woman and her research but sometimes they came to assist us in the field, helping us work faster and more efficiently. Even though we had brought our own provisions, they treated us to

wonderful, welcome home-cooked meals after a hard day's work in the field.

Our fieldwork lasted 48 days, working seven days a week. During this time, I travelled 7 915 kilometres, scouting for vegetation sampling sites on farms and commuting between the Griqualand West study areas and Potchefstroom once a week to pick up the next volunteer group. Although the schedule was so tight that no follow-up field trips could be added, we succeeded in collecting enough data for statistical analysis – and were delighted to find several Griqualand West centre endemics.

KURUMAN'S RED HILLS

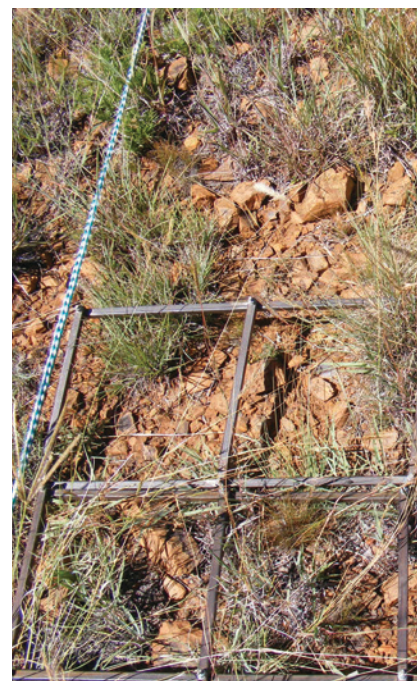
Our trek started in the Northern Cape's banded ironstone Kuruman Hills, running north from Kuruman to Daniëlskuil, where our highest sampling point was 1 766 metres above sea level. Locally, farmers call them the Red Hills, from the Afrikaans name *Rooirante*, thanks to the red grass (*Themeda triandra*) and stab grass (*Andropogon schirensis*) that cover them with their characteristic red hue.

As you climb the hills, the grass layer becomes more conspicuous and woody species become very sparse. At lower

altitudes, scattered shrubs are prominent – and often spiny. These included the endemic pungent pea (*Calobota cuspidosa*), a painful plant to encounter as it has only small or no leaves to shield you from its stem spines where photosynthesis happens.

Another spiny endemic that we recorded frequently was the deceptive prickly devil's pincushion (*Blepharis marginata*), a member of the pistol bush family (Acanthaceae). It grows flat on the ground rather like alpine cushion plants and has pretty, purple-blue flowers shaped like ballet shoes. Two photogenic daisy species (Asteraceae) also caught our eye – the white and purple pompom flowers of the stomach bush (*Dicoma anomala*) and the bright-faced, grassland gazania (*Gazania krebsiana*).

At another site, we spotted bright scarlet flowers lurking among grasses – the parasitic elegant witchweed (*Striga elegans*) from the ink flower family (Orobanchaceae). Ink flowers turn black when damaged or pressed. Plants in this family have well-developed roots to absorb nutrients from their host plants, usually grasses. Other attractive plant species were klapperbossie (*Triaspis hypericoides*), dainty trumpets (*Chascanum pinnatifidum*) and crane's bill (*Monsonia angustifolia*).



Leandra Knoetze collects biomass from one of the plots after counting all rooted plants within the one-square-metre plot and measuring up to three individuals of each species within the quadrat (right).

ON LANGBERG

Our next stop was Olifantshoek for a week sampling on the majestic Langberg quartzite that reaches 1 836 metres above sea level. The Langberg is the longest range in the Griqualand West centre of endemism, stretching south about 160 kilometres from Olifantshoek, passing west of Postmasburg to near Boegoeberg. North of Olifantshoek, the Langberg extends into the Korannaberg.

We were able to sample as high as 1 804 metres. The landowner of this site was adamant that it had snowed there in the past which, for the Kalahari, would have been a sight to remember. Here we found the charming, small aromatic pepper bush (*Heliophila sauvissima*), a member of the mustard family (Brassicaceae). This pepper bush's lilac flowers seemed cinnamon scented, prompting an early-morning craving for hot cross buns. No wonder that this plant is so palatable to livestock and game.

Nearby, textbook specimens of the gorgeous starfish lily (*Ferraria glutinosa*) greeted us among the rocks. Two dwarf shrubs were quite common on the crest of the Langberg – blue haze (*Evolvulus alsinoides*), hairy and scrambling along the ground, carrying lovely sky-blue flowers on long delicate stalks; and the dye bush (*Phyllanthus parvulus*), small and erect with little flowers on short stalks underneath dark green leaves. Both these species are perennial, with well-developed taproots to assist in withstanding the dry and nutrient-poor exposed quartzite ridges.

Another Griqualand West centre endemic was also another member of the pistol bush family, hairy justicia (*Justicia puberula*), so called because all its parts are densely covered with minute hairs (puberulous). Its small white flowers are two-lipped (bilabiate) and have mauve stripes on the palate. Just as earlier botanical records noted, we found this plant growing in shaded, rocky areas with sandy soil.

GHAAP PLATEAU

We moved on to the Ghaap, a dolomite plateau about 130 kilometres wide and ranging from 1 100 metres to our highest site at 1 512 metres. It is bounded by the Harts River in the east and the Kuruman Hills in the west. Its name is derived from the Khoekhoen

word meaning a flat mountain. Local farmers believe the plateau got its name from the local bitter ghaap (*Hoodia gordonii*). Afrikaans names for this region are based on Ghaap or a corruption of it, such as *Ghaapseberg* or *Kaapseberg* and *Ghaap Plato* or *Kaap Plato*.

The Ghaap plateau stretches from Vryburg to the confluence of the Orange and Vaal Rivers in the south. It is characterised by the blue tulip (*Moraea polystachya*), a plant with lovely purplish flowers that farmers loathe because its leaves contain poisonous glycosides that can kill livestock.

The Ghaap was also full of succulent surprises. After a thunderstorm, three spectacular succulent plants stood out in the glistening veld. Lion spoor (*Euphorbia bergii*) is a spineless euphorbia with a large underground tuber. As the plant matures, several thick

stems grow from this tuber.

Giant claret cup (*Prepodesma orpenii*) is widely distributed through the Griqualand West centre of endemism. This greyish-green and dark-spotted succulent belongs to the vygie family (Mesembryanthemaceae) and forms small colonies close to the parent plant. The giant claret cup's characteristic bright yellow flowers open for only a few hours during the afternoon. Its capsules open during rain and seeds are washed out (hygrochastic).

We regularly found hare's food (*Anacampseros filamentosa*), a South African endemic and member of the purslane family (Portulacaceae), protruding from between dolostone pebbles. Its leaves look rather like berries and are covered with white hairs. Pink star-shaped flowers on extraordinary long stalks appear after the rain.



Leandra Knoetze uses a 50-metre tape to measure a line transect. Every two metres along this, each nearest grass, non-woody flowering plant, dwarf shrub, shrub and tree is identified.



Looking left and right in the valley, deciding which side to go – that day was hot!



Starfish lily (*Ferraria glutinosa*).

ASBESTOS HILLS

We completed our survey at the Asbestos Hills (Asbesberg), a southern extension of the banded ironstone Kuruman Hills, with similar vegetation and altitude but a more developed woody layer and lower mean annual rainfall. The Asbestos Hills run south from Daniëlskuil, west of Griquatown, arching around Niekerkshoop towards the Middelkoegas and Westerberg area. Our highest site was at 1 733 metres.

We started our fieldwork on hills behind the derelict mining town of Owendale and then worked our way towards Postmasburg. The Asbestos Hills lived up to Acocks's tag of having 'high alpha diversity' as our surveys here provided the highest species richness per unit area in the entire Griqualand West centre of endemism.

One of our target species on the Asbestos Hills was its namesake the asbestos bacon fig (*Aizoon asbestinum*). This plant from the kraalbos family (Aizoaceae) has conspicuous hairy leaves and yellow flowers. It was originally described from the Asbestos Hills but is now known to occur

elsewhere in the Northern Cape and further north in Namibia.

Another Griqualand West centre endemic was the intriguing and beautiful member of the pistol bush family, *Glossochilus burchellii*. With its eye-catching soft succulent leaves and prominent light purple flowers, it can be found on gravelly banded ironstone slopes and rarely also on Ghaap calcrete.

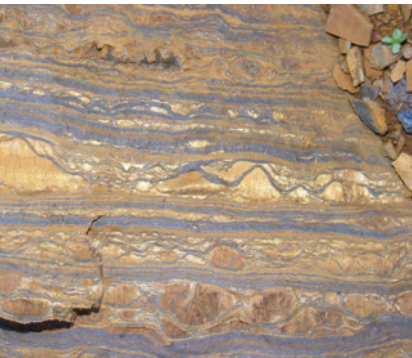
The Griqualand West centre of endemism treated us to a spectacular feast of flora right to the end of our field trip – and we shall be back. In the words of the famous American botanist and wilderness pioneer John Muir: 'The mountains are calling and I must go'. 🌿

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JEWELS OF THE VELD

Left to right from top: crane's bill (*Monsonia angustifolia*), klapperbossie (*Triaspis hypericoides*), asbestos bacon fig (*Aizoon asbestinum*), pistol bush (*Glossochilus burchellii*), devil's pincushion (*Blepharis marginata*), giant claret cup (*Propodesma orpenii*), red witchweed (*Striga asiatica*), hare's food (*Anacampseros filamentosa*) and pepper bush (*Heliophila sauvissima*).





Photos above: The banded ironstone of the Kuruman Hills (top) and Asbestos Hills (bottom). As the dolomite on the Ghaap plateau (centre) weathers into gnammas or pits, formed by rain water that freezes during cold temperatures and dries out during hotter conditions, it provides some plant species with microhabitats.

PLANT PROSPECTING

Our intensive sampling method took a long time to complete, especially when the team consisted of only two people. We succeeded in sampling eight 20-metre by 50-metre plots (modified Whittaker plots) per mountain range by sampling two sections of one metre square each (quadrats) in opposite corners of the plot.

Canopy cover: In each quadrat, we first visually estimated the percentage of canopy cover for grasses, non-woody flowering plants, dwarf shrubs, rock, bare soil and debris.

Plant census: We identified and counted each rooted non-woody (herbaceous) individual within the quadrat, measuring a maximum of three individuals of each species present to obtain plant height.

Biomass sampling: All standing organic material (biomass) was cut off and placed into brown paper bags labelled for grasses, forbs, dwarf shrubs, legumes, debris and leaf litter. After the material was dried and weighed, we calculated and compared how much biomass in kilograms per hectare each mountain range produced (primary productivity).

Calculating frequency of plant species: In each plot, we sampled two 50-metre-long transects, each two metres away from the quadrats. Every two metres along these transects, we recorded the nearest grass, non-woody plant, shrub and tree within a two-metre radius. For woody plants, we measured plant height and its canopy diameters both from the front and side.

Soil samples: We randomly collected soil samples at five different areas within the sample plots.





CAROLE SMALL

Nanette van Staden enjoys the peace of watching the sun set in the freedom of the Langberg.