

Michelle van der Bank and the quest to barcode Africa's flora

IN THE REMOTE NORTHEAST OF KRUGER NATIONAL PARK, NEAR THE MOZAMBIKAN BORDER, THE SHRUBVELD IS NOTORIOUSLY TALL AND THICK. It's easy to get lost and getting trampled by a surprised elephant is a real possibility. Two rangers armed with rifles provided protection for botanists Michelle van der Bank and Olivier Maurin. Together, the rangers and botanists were going hunting – for a new species.

It didn't take long to locate the target. "There it is!" said Michelle excitedly. "That's what we've been looking for!" In the middle of a dense thicket was a tree that looked to the untrained eye like all the others. "It may not look special, but this is a new species of *Combretum*!"

It's a common thorn in the side of botanists. With 20 000 plant species in South Africa and 2 000 in Kruger alone, different plants can often appear the same. Sometimes even experts can't distinguish between them. Now, DNA testing is proving to be invaluable.

For five years, Michelle has led a team of botanists on a project, named self-evidently as 'DNA Barcoding the Flora of the Kruger National Park'. The goal is to identify accurately all plant species in South Africa's largest park, using DNA sequencing technology.

It was initially in the university lab that Michelle and her team had stumbled across this 'new' *Combretum* or bush-willow. She and Olivier had run some genetic tests, thinking it was another *Combretum* species called *mkuzense*, but then they noticed a difference in the DNA structure. There could only be one explanation: it was a new species that had never been accurately described.

Though their laboratory work had 'discovered' a new species, they still wanted to see the *Combretum* for themselves during flowering season. Every species of plant has a flower which looks unique. Even if the differences are almost imperceptible, the flower is visual proof it belongs to a separate species. A trip back to this remote section of Kruger was critical.

To her relief, the new *Combretum* was flowering. It's not always possible to predict exactly when a plant, especially an unknown one, will flower. But there it was, seemingly unspectacular and nondescript. Yet its flower *was* different, albeit only slightly, to other *Combretum* species and it confirmed what science had already proved.

Later that evening, around a braai under a new moon at Shingwedzi, a toast was drunk and a new species celebrated: *Combretum nwambiyana*, after the Nwambia Sandveld eco-zone in which it had been found. The new tree is number 400 on the list of Kruger's plant species which Michelle and her team have bar-coded so far.

The project initially focused on trees only, but now extends to all plants, including herbs, grasses and bulbs. The team have several hundred more species to barcode, but they've come a long way since Michelle started in 2005.

Kruger has more than 400 tree species. In the whole of Europe there are only about 340 species.

It didn't begin on a good note. While planning the project, she spent some time hiking the Wolhuter Wilderness Trail near Berg-en-Dal. She was charged by a rhino, which was shot by the ranger as it rumbled towards the group of botanists. "That was really traumatic, obviously," said the quietly spoken, ever-smiling scientist.

As a university student, Michelle abandoned her zoology studies because she became too upset when she was required to dissect frogs. Her pharmacist father suggested she change to botany, because "you didn't have to kill plants to study them."

"My father inspired me," Michelle remarked, adding that he would sometimes spend the whole day collecting creatures and plants from the veld. "But my mother wasn't too happy when he knocked down the dining room wall to build an observation tank for his collection!"

The change to botany would prove momentous in Michelle's life. She is now the Professor of Botany and Plant Biotechnology at the University of Johannesburg, has won numerous awards, worked at the illustrious Kew Gardens in London and is one of South Africa's Top 20 Woman Scientists. Although she is now sometimes confined to the lecture rooms, it's the surprise and unpredictability of fieldwork she still lives for. "Except charging rhinos," Michelle added.

"When I started, I never in my wildest dreams thought I'd discover so much diversity in Kruger, which has more than 400 tree species. Compare this to the whole of Europe, where there are only about 340 species."

The Kruger project has proven such a success, Michelle has been selected by the international organisation TreeBOL as one of two representatives from Africa. Their goal is to create a database of DNA information of all tree species on the continent. Already Michelle's team has collected and sequenced 80 per cent of the roughly 1 700 tree species in Southern Africa. Ultimately, the information will play an important role in conservation.

This is crucial, Michelle emphasised, because vast amounts of protected hardwood species are being chopped down illegally in Southern Africa and exported, mostly to the East. "DNA information is the only foolproof way for police to enforce the law."

With DNA identification, plant species can be identified more easily and their ongoing protection ensured, whether it's a highly localised endemic or one of the 50 protected tree species under the National Forest Act. Currently, when a shipment of wood is exported from the continent, customs officials are unable to accurately identify the timber, which is usually cut and stripped. In time, Michelle says, a hand-held DNA 'barcode device' will allow identification of any plant species in a matter of minutes. All that will be required is a tiny piece of leaf or wood.

It will also make life easier for botanists who come across rare species in the field, ▶



GREEN TEAM Ranger Jacob Mlangeni, botanist Michelle van der Bank, section ranger Stephen Midzi and botanist Olivier Maurin after successfully identifying the new species of *Combretum*.

FIGURING OUT WHAT IS WHAT

Okay, so not everyone can distinguish between *Combretum nwambiyana* and *Combretum mkuzense*, but Piet van Wyk's excellent book *Field Guide to the Trees of Kruger National Park* (R153, www.kalahari.net) will certainly help you. It features more than 200 species, with close-up photographs of leaves and flowers to aid identification.



NEW FIND The leaves of *Combretum nwambiyana*, the new tree species identified by DNA testing.

REMARKABLE Botanist Michelle van der Bank admires a sycamore fig (*Ficus sycamorus*) in Kruger.

BOTANY

such as *Combretum nwambiyana*. "You'd think that because Kruger is Africa's oldest park, everything would already have been discovered and documented," Michelle said. "It amazes me how we're still discovering new plants here." 🐾

FIND OUT MORE

Michelle's DNA barcoding project in Kruger: www.florakrugerpark.org
TreeBOL Africa: www.uj.ac.za/botany

THREE WAYS TO ENJOY THE FLORA IN KRUGER

Kruger National Park hosts more than 400 species of trees, 250 grasses, 1000 herbs and hundreds of different types of bulbs. Most of these are preserved at the Skukuza herbarium, which can be visited by appointment. Call Guin Zambatis on 013-735-4140, quinz@sanparks.org

Michelle recommends a guided bush walk if you're interested in flora. "It's difficult to appreciate the trees and plants from your car," she says. Several of Kruger's camps offer daily walks with a trained field guide, costing R310 a person for a morning walk and R240 a person for an afternoon walk. Walks usually last between two and three hours.

Visitors can also do the guided wilderness trails, which last four days. Nights are spent at a central base camp and each day you explore the area with a guide. R3120 a person.

North: Pafuri and Punda Maria

This area has the highest rainfall in the park, as well as a diversity of different soil types, making it a fascinating region for plant enthusiasts. The Nyalaland Wilderness Trail is near Pafuri gate, the base camp being the northern-most accommodation in the park. Look out for rare endemics such as the sesame tree, as well as impressive fever tree forests.

South: Pretoriuskop and Berg-en-Dal

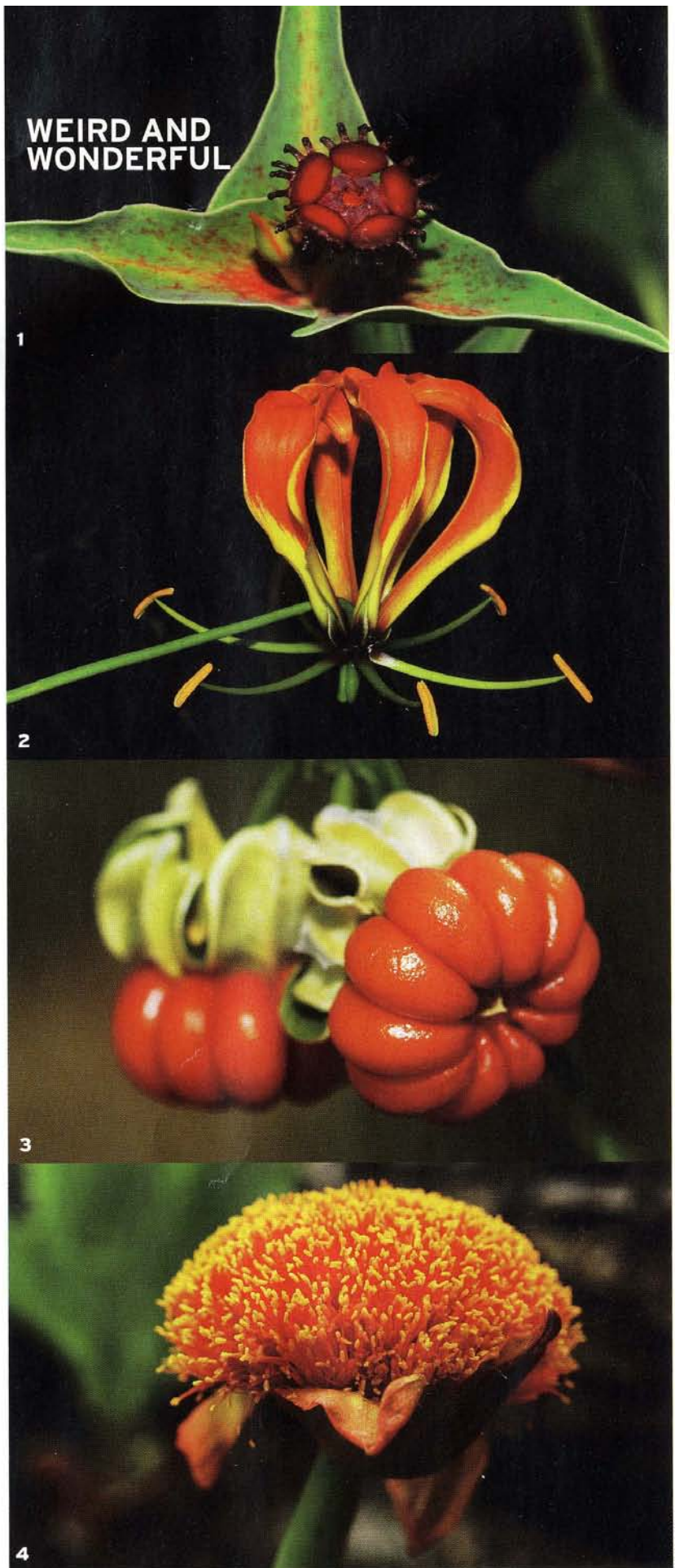
The granite koppies and hills host several highly localised endemic species. The Wolhuter Wilderness Trail (near Berg-en-Dal) and Napi Wilderness Trail (near Pretoriuskop) reward walkers with floral displays in spring. Look out for *Combretum woodii* (large-leaved forest bushwillow) which occurs only on Skip Mountain and *Faurea rochetiana* (broad-leaved beechwood) on Shabeni Hill near Pretoriuskop.

East: Lebombo Mountains

The Metsi-Metsi Wilderness Trail, between Lower Sabie and Satara, takes in the rocky bushveld ecozones of the Lebombo Mountains. Special trees to look out for are the wonderfully named drooping resin-tree, forest iron plum, northern soap berry, Nwanetsi spike thorn, river jujube, sandveld newtonia, small leaved guarri and yellow firebush.

Want to know more about botany research in our parks? Go to www.wildcard.co.za

WEIRD AND WONDERFUL



Kruger National Park has some remarkable flora. 1. *Euphorbia monteiri* sub-species *ramosa* belongs to the euphorbia family. 2. This lily is aptly named *Gloriosa superba*, also known as the flame lily. 3. The bright orange-red fruits of the small honeysuckle tree (*Turraea obtusifolia*) look like miniature pumpkins. 4. The paintbrush lily (*Scadoxus puniceus*) grows slowly and takes four to five years to start flowering.