



Beautiful plants from the time of the dinosaurs now threatened by thieves in South Africa

By Erin Conway-Smith

JOHANNESBURG, South Africa — The thieves knew exactly what they were looking for when they broke into the Durban Botanic Gardens on a Saturday night. They smashed open the lock on a gate, drove past where security guards should have been patrolling and headed straight for some of the rarest varieties of cycads in the world.

They roughly but selectively dug up 20 of the most highly endangered plants of a collection of 150, a haul worth \$65,000, loaded them into their vehicle and rolled out.

It was a brazen theft but not at all uncommon in South Africa, where demand from collectors at home, in the United States and Asia is behind the widespread plundering of rare cycad varieties.

Cycads are the oldest seedling plants on earth, with fossil records dating them to before the time of the dinosaurs. During the Jurassic period they were spread across the earth, but today they are found only in diminishing numbers in certain tropical and subtropical areas of the world.

Now, in a high-tech bid to fight the cycad smugglers, scientists at the University of Johannesburg have launched a DNA barcoding project that aims to create a database of cycad species. The project could eventually help police and customs officials to identify specimens being stolen and trafficked across borders, with the hope of deterring crimes like the one in Durban late last year.

"They knew exactly which ones to go for," said Philip Rousseau, a graduate student in botany at the University of Johannesburg who started the cycad barcoding project. "These are sophisticated people that know what they're doing because these plants are worth so much."

Collectors will pay up to \$10,000 for a large specimen of a rare species. Some botanical gardens have put in place security to protect their cycads, but these tough measures aren't foolproof because guards can be bought off. "Cycads are such popular plants, and there is such great demand, it's insane what people will pay," says Rousseau.

His project is focused on cycads from the *Encephalartos* genus, which are endemic to Africa. South Africa has an exceptionally high number of cycad species classified as endangered, despite having strict laws regulating the trade of the plant. To own a cycad in South Africa requires a permit, but this is difficult to monitor. Limited use of cycads is allowed for indigenous purposes such as "muti," or traditional African medicine.

Global trade in the plant is restricted under the Convention on International Trade in Endangered Species (CITES), with all cycad species in South Africa falling under CITES Appendix I, which deals with species that are the most endangered. This means that trade in plant material collected from the wild is banned and trade of cultivated plants is strictly regulated.

But these restrictions haven't stopped the pilfering of the plants from botanical gardens, nature reserves and the wild, where species may become extinct before they are even formally identified. When a new cycad species was identified in South Africa in 1995, within weeks of being discovered it was wiped out in the wild by thieves.

"The demand for this cycad is absolutely ridiculous," says Rousseau. "If it's new and endangered, people just love it."

When cycads are smuggled across borders, they are stripped of their leaves for transport, making it extremely difficult to determine the species, especially with a shortage of trained experts at hand.

The ultimate goal would be a handheld device that would allow customs official to take a tiny sample of a plant and almost instantaneously have a reading of its species by matching its DNA barcode against the database.

Such a device, which would have widespread application, is under development by scientists in Canada but still a long way off, maybe a decade or more, said professor Michelle van der Bank of the UJ's department of botany and plant biotechnology. However she says that it could be produced more quickly if private companies get involved.

"It's quite urgent. We're losing endemic species that haven't been discovered yet," said van der Bank.

To get the DNA barcode of a plant, scientists take a tiny sample and treat it with chemicals. The machine that currently sequences DNA in the UJ botany lab is worth more than \$150,000 and the process takes a day. But the plant can only be identified as long as there is a database to match it against.

The cycad barcodes will be included in an international initiative called TreeBOL (Barcode of Life) which aims to catalogue all the world's trees, with van der Bank and the University of Johannesburg behind efforts to barcode all the trees of Africa.

All of this is part of the International Barcode of Life initiative based at Canada's University of Guelph, which is working to catalogue the earth's biodiversity in an online database that currently holds nearly 70,000 barcodes from more than 800,000 specimens.

While they are becoming increasingly rare in the wild, cycads can still be often found in South Africa on the grounds of hotels and universities, including at the University of Johannesburg, as well as in the gardens of private homes. Rousseau became interested in cycads while growing up in Pretoria with a father who was a keen collector.

The Cycad Society of South Africa aims to promote the legal collection of cycads — since the trade of cultivated cycads is legal — and foster

knowledge about the plant. At the top of the society's website is a link to a police crime line, for reporting the illegal trade of cycads.

At the Durban gardens, some of the plants stolen by thieves in November had been growing there for 75 years. Cycads can grow for hundreds or even thousands of years — for example, it can take up to 800 years for a plant to grow a long stem.

"They survived all this time," says Rousseau, "but they're barely hanging on."

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