



# A bar-code for every plant species

Imagine being able to walk up to any plant anywhere – be it a seedling or a 40m tree – and know its scientific name within a few seconds.

Such ability would be to botany what the World Wide Web is to humankind.

A project setting out to do exactly this by tracking down the earth's plant species, through DNA sequencing and genetic bar-coding technology, is currently being conducted at the University of Johannesburg (UJ). The endeavour – headed up by Dr Michelle van der Bank of the UJ's Department of Botany and Biotechnology and Dr Vincent Savolainen from the Royal Botanic Gardens in the United Kingdom (UK) – aims to collect samples of all the plants found in the Kruger National Park. This project is the largest and most diverse sampling ever to be undertaken for bar-coding purposes in a protected area.


DNA sequencing has become a popular tool to study organisms. In plants, the technique is used to track down the history of species diversification by drawing the "genealogical trees" of groups of organisms.

The science of DNA bar-coding depends on analysing part of just one gene – the same gene in all cases – for every species. In the case of plants we would need to analyse at least three different genes. If, and when, a DNA bar-code database of all plant species is established, a field biologist could take a tiny sample of tissue, like a leaf, from the unknown specimen and feed it into a hand-held device for analysis. Such a device would help field biologists identify known species and assist immensely in the urgent task of classifying unknown species before they are decimated by extinction.

In 2004, the Consortium for the Bar-code of Life launched an initiative to promote DNA bar-coding, a process enabling the rapid and inexpensive identification of the estimated 10-million species found on earth. While the technique has been successfully applied to animals, in the case of organic species the search for short fragments of DNA, to act as a "bar-code", has so far proved unsuccessful. The launch of this project brings that possibility so much closer and now, with the assistance of the UJ's project team, scientists from institutions around the world are searching for the elusive gene that will enable them to bar-code all 300 000 plant species on earth.

As part of their effort, Van der Bank and Savolainen, together with UJ's post-graduates students Olivier Maurin, Renaud Lahaye and Sylvie du Toit, started collecting plants in the Kruger Park in September 2005. Up to now they have collected 1 600 specimens.

All collected samples are taken to the University where they are analysed, categorised and stored. DNA duplicates will also be stored in the DNA Bank at the Royal Botanic Gardens in the UK. Plans are also underway to have this data placed on the website of the Consortium for the Barcode of Life where it will be available for other scientists.

"The plant specimens provide a documented source for building the library of plant bar-codes. Scientists found that one could obtain DNA bar-codes from plant specimens over 100 years old. We hope to be the team that will identify the genetic bar-code for plants of the Kruger National Park. Such a discovery would allow botanists to do groundbreaking identification of species using the bar-coding method," says Van der Bank. 

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Photo: Olivier Maurin

A successful DNA bar-code from a tiny tissue sample of a leaf or flower must be:

- a. Short enough to be quickly sequenced;
- b. Easily identified in all plant species; and
- c. Variable enough to provide a unique sequence for each species.