DNA "BARCODE" IDENTIFIED FOR PLANTS

Researchers' discovery astonishes world-wide

OLIVIER MAURIN

Gloriosa superba – Lilium family.

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Plectroniella armata – coffee family.

Barcoding is no longer a term only affiliated to consumer goods. Thanks to the research efforts of Dr Michelle van der Bank of the University of Johannesburg (UJ), and a group of international scientists, a gene has been identified to distinguish between the majority of plant species on Earth.

This gene, which can be used to identify plants using a small sample, could lead to new ways of easily cataloguing different types of plants in species-rich areas like rainforests. It could also lead to accurate methods of identifying plant ingredients in powdered substances, such as traditional Chinese medicines, and could help to monitor and prevent the illegal transportation of endangered plant species.

The team behind the discovery found that DNA sequences of the gene "*matK*" differ among plant species, but are nearly identical in plants of the same species. This means that the *matK* gene can provide scientists with an easy way of distinguishing between different plants – even closely related species that may look the same to the human eye.

The researchers made this discovery by analysing the DNA of different plant species. They found that when one plant species was closely related to another, differences were usually detected in the *matK* DNA.

The researchers carried out two large-scale field studies: one on the exceptionally diverse orchid species found in the tropical forests of Costa Rica, and the other on the trees and shrubs of the Kruger National Park.

This was a collaborative project between teams from South Africa led by Dr Michelle van der Bank of the Department of Botany and Plant Biotechnology at the UJ; the United Kingdom by Dr Vincent Savolainen, dual appointee at Imperial College London's Department of Life Sciences and the Royal Botanic Gardens, Kew; and Costa Rica by Diego Bogarin, Lankester Botanical Garden, University of Costa Rica. The scientists' findings were published in the *Proceedings of the National Academy of Sciences* journal in February 2008 and in *Nature precedings* in May 2008.

Using specimens collected from Costa Rica, Dr Savolainen and colleagues were able to use the *matK* gene to identify 1 600 species of orchid. In the course of this work, they discovered that what was previously assumed to be one species of orchid was actually two distinct species living on different slopes of the mountains, with differently shaped flowers adapted for different pollinating insects.

"In the future we'd like to see this idea of reading plants' genetic barcodes translated into a portable device that can be taken into any environment, which can quickly and easily analyse any plant sample's *matK* DNA and compare it to a vast database of information, allowing almost instantaneous identification," Dr Savolainen says.

The *matK* gene may not, however, be able to be used to identify every plant species on Earth. In a few groups of species, additional genetic information may be required for species-level identification because hybridisation – where species crossbreed and genetic material is rearranged – may confuse the information provided by matK.

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FLY-BY-NIGHT SOLUTION TO CITY VERMIN PROBLEM

So far about 3 500 owl boxes have been set up in gardens in Gauteng and throughout North West Province, and now Cape Town could soon find the answer to its rat problem with the introduction of the Urban Owl Box Project.

The project was launched in Cape Town by Jonathan Haw, who is one of South Africa's foremost raptor experts and is based at the Gold Fields Environmental Education Centre at Kirstenbosch.

Haw said the project, which is run by EcoSolutions, provides nesting boxes for owls which are then able to catch and kill rats for food. The project does not provide the owls, but relies on natural occupancy. An owl family of six could prey on 2 500 rats.

Initially 600 boxes would be set up in various Cape Town areas that are home to numerous pairs of both Eagle Owls and Barn Owls, which live and breed within the green belts. The Urban Owl Box Project aims to provide breeding sites for these owls within suburban gardens, while its educational arm aims to educate people about responsible use of rodenticides and to offer alternatives.

Through the strategic positioning of owl boxes, it is expected that pairs of owls will begin to use them to rear new generations of owls, which will contribute significantly to controlling the spread of insects, vermin and related diseases.

Haw said the chief function of the project was to alleviate nest-site shortages in urban and suburban areas. The project had been originally motivated by the fact that more than 180 young owls were rescued by EcoSolutions and its partner shelters annually because they had fallen out of badly chosen nest sites.

An owl box costs about R800.00, and a maintenance subscription is R350.00 annually. This covers re-varnishing, treating the box with bee-repellent, replacing the pea gravel, box repair where necessary, as well as ringing and monitoring chicks in occupied boxes.

For more information, contact EcoSolutions, Tel. 072-365-9777 or E-mail: *ecosolutions@absamail.co.za*.

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Initially 600 boxes will be set up in various Cape Town suburbs, creating suitable nest sites for owls such as this Barn Owl.