DNA 'barcode' identified for plants

Gene could be used to distinguish between species - *New Release*

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A 'barcode' gene that can be used to distinguish between the majority of plant species on Earth has been identified by scientists who publish their findings in the *Proceedings of the National Academy of Sciences* journal today (4 February 2008).

Scientists from the research team examine orchid samples in Costa Rica

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 for identifying plant ingredients in powdered substances, such as in 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 from 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, led by Dr Vincent Savolainen, dual appointee at Imperial College London's Department of Life Sciences and the Royal Botanic Gardens, Kew, carried out two large-scale field studies: one on the exceptionally diverse species of orchids found in the tropical forests of Costa Rica, and the other on the trees and shrubs of the Kruger National Park in South Africa. Dr Savolainen and his colleagues in the UK worked alongside collaborators from the Universities of Johannesburg and Costa Rica who played a key role in this new discovery.

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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 that live on different slopes of the mountains and have differently shaped flowers adapted for different pollinating insects.

In South Africa the team was able to use the matK gene to identify the trees and shrubs of the Kruger National Park, also well known for its big game animals.

Dr Savolainen explains that in the long run the aim is to build on the genetic information his team gathered from Costa Rica and South Africa to create a genetic database of the matK DNA of as many plant species as possible, so that samples can be compared to this database and different species accurately identified.

"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," he says.

Although Dr Savolainen concedes that such technological applications may be some years away from realisation, he says the potential uses of the matK gene are substantial: "There are so many circumstances in which traditional taxonomic identification of plant species is not practical – whether it be at ports and airports to check if species are being transported illegally, or places like Costa Rica where the sheer richness of one group of plants, like orchids, makes accurate cataloguing difficult."

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 hybridization – where species cross-breed and genetic material is rearranged - may confuse the information provided by matK.

This research was funded by the Defra Darwin Initiative, the Universities of Johannesburg and Costa Rica, the South African National Research Foundation, the Royal Botanic Gardens, Kew, and the Royal Society.

Joan Ruddock, Minister for Climate Change and Biodiversity said: "This is a great breakthrough that could save many endangered plants. The Defra-funded Darwin Initiative has a reputation for producing real and lasting results and I congratulate everyone involved in this project which could have huge benefits for plant identification and conservation in the future."

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Notes for editors:

1. 'DNA barcoding the floras of biodiversity hotspots' *Proceedings of the National Academy of Sciences*, Online Early Edition, Monday 4 January 2008.

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2. About Imperial College London:

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3. About the Royal Botanic Gardens, Kew:

The Royal Botanic Gardens, Kew is a world famous scientific organisation, internationally respected for its outstanding living collection of plants and world-class herbarium as well as its scientific expertise in plant diversity, conservation and sustainable development in the UK and around the world. Kew Gardens is a major international visitor attraction and its 132 hectares of landscaped gardens attract over one million visitors per year. Kew was made a UNESCO World Heritage Site in July 2003 and represents over 250 years of historical landscape. For further information please visit www.kew.org

4. About the Defra Darwin initiative:

The Defra funded Darwin Initiative provides financial support and specialist advice for short term wildlife projects in countries rich in biodiversity but poor in financial resources. Since its launch in 1992, the Darwin Initiative has committed over £60million to 464 projects in more than 100 countries.

Further details on the Darwin Initiative can be found at www.darwin.gov.uk