
DNA Barcoding all Africa's Cycads

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Most botanists would agree that the identification of species is one of the most challenging arts in science, especially in complex groups such as cycads. In cycads a marked similarity is found between species while between individuals of the same species a large amount of variation exist. It is the role of a plant taxonomist to study and order this diversity and he/she does so by employing various "lines of evidence" to draw conclusions. One of the most recent and currently most used is molecular evidence. One very promising and exiting new tool for taxonomic research is DNA barcoding. It is relatively simple to apply and yet can distinguish even between closely related species. It works by comparing the sequence of DNA bases from a short part of the genome that is standardised between taxa. For land plants, a combination of two plastid gene regions (*rbcL* and *matK*) is used as barcodes. In the long-term barcoding scientists envisage something called a "barcoder". It will be a hand-held device that would only need a small piece of the plant tissue. It will read the barcodes on the spot and tell you its identity. Though we are far from this stage, cycad samples can already be identified off-site within 48 hours at the Molecular Systematics Laboratory at the University of Johannesburg.

The implication and importance of the above-mentioned to cycad conservation cannot be overstated. As there is great difficulty in determine species (especially with juveniles) and even deciding what constitutes a species, DNA barcoding would provide some resolution

towards this. More importantly the identification of otherwise indistinguishable plants or fragments would be possible by non-taxonomists, the application of which ranges from correct pollination to law enforcement.

Based on these consideration, and a chance to work on these wonderful plants, a masters level project has been launched at the University of Johannesburg of which I will be the main researcher under the supervision of one of the leading South African scientist in the field, Prof. Michelle van der Bank. I will build a DNA barcoding library for all *Encephalartos* species and *Stangeria eriopus* sampling as many individuals as possible aiming at approximately 5-10 samples per species encompassing as much of the natural diversity as possible. The barcode of an unidentified specimen can then be compared with the reference barcodes to find the matching species. Another aim of my study is to reconstruct a molecular phylogeny for African cycads from which the major lineages (clades) and relationships will be assessed. These will then be compared to the current taxonomy in order to provide a better understanding of the taxonomy and evolutionary relationships within the group.

The Project thus far has progress extremely well, due in no small way, to the support of the Cycad Society and its members to which I am very grateful. The first round of sampling has been completed and analysis of these samples is under way. Preliminary results will be presented at the TreeBOL symposium in New York in April while the project aims to be concluded end of 2010. It is my sincere hope that this will provide a great service to the Cycad Society and its members along with government (custom officials) and the scientific community.

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