Massey News

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An electronic inventory of all living things

Massey scientists are leading the way in a landmark international research project that aims to identify every living creature in the world using genetic 'barcodes'.

Borrowing a concept from scannable barcodes on supermarket products, this project will develop an electronic inventory to identify every organism in the world, but will use a molecular barcode instead of a black and white stripe.

At the forefront of the project is a group of New Zealand scientists led by Professor David Lambert from the Allan Wilson Centre for Molecular Ecology and Evolution.

With a cost of US$2.5 million and a time-frame of 20 years, DNA barcoding rivals the Human Genome Project. The practical benefits will be wide reaching, says Professor Lambert. Data will be stored for fast and easy retrieval and is expected to have valuable application in health, national border control, conservation management, food safety and environmental monitoring. These codes could also have a vital role in foiling bioterrorism.

Professor Lambert's team at the Allan Wilson Centre for Molecular Ecology and Evolution will create DNA barcodes for New Zealand's flora and fauna, beginning with native birds and later including other animals, plants, insects and fungi.

The team will also use DNA from ancient bones and soft tissues to identify extinct birds, such as moa, and their genetic similarity to modern species.

"DNA barcoding to go backwards in time" is an important tool to measure past levels of biodiversity, Professor Lambert says.

"We can only interpret the effects that humans are having on the plants and animals of the Earth by knowing precisely what was here in the past," he says.

DNA barcoding makes use of the cytochrome oxidase gene (CO1), which codes for an enzyme involved in the cell's energy conversion system.

The CO1 gene is present in all animals and, in most cases, has a species-specific DNA sequence that varies between, but not within, different species.

Initial research by Canadian biologists showed that a portion of this gene can be 'scanned' to identify species, similar to using a barcode to classify supermarket products.

Allan Wilson Centre researchers will sample these genetic barcodes from every New Zealand bird species and use them to assist the conservation of endangered species, including the kiwi, the North Island Saddleback, and black robins. Their results will be combined with other research groups from around the world to create a standardised electronic database.

"Biodiversity, conservation, and biosecurity management can only be conducted against a background of the known species composition of ecosystems, habitats, or countries," Professor Lambert says.

The international DNA barcoding project is expected to be completed in 2025.

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