



PROJECT LEADER
PROFESSOR MICHAEL BUNCE

michael.bunce@curtin.edu.au

SYSTEM
MAGNUS

TIME ALLOCATED
100,000 HOURS

AREA OF SCIENCE
Genetics and Zoology

APPLICATIONS USED
BLAST

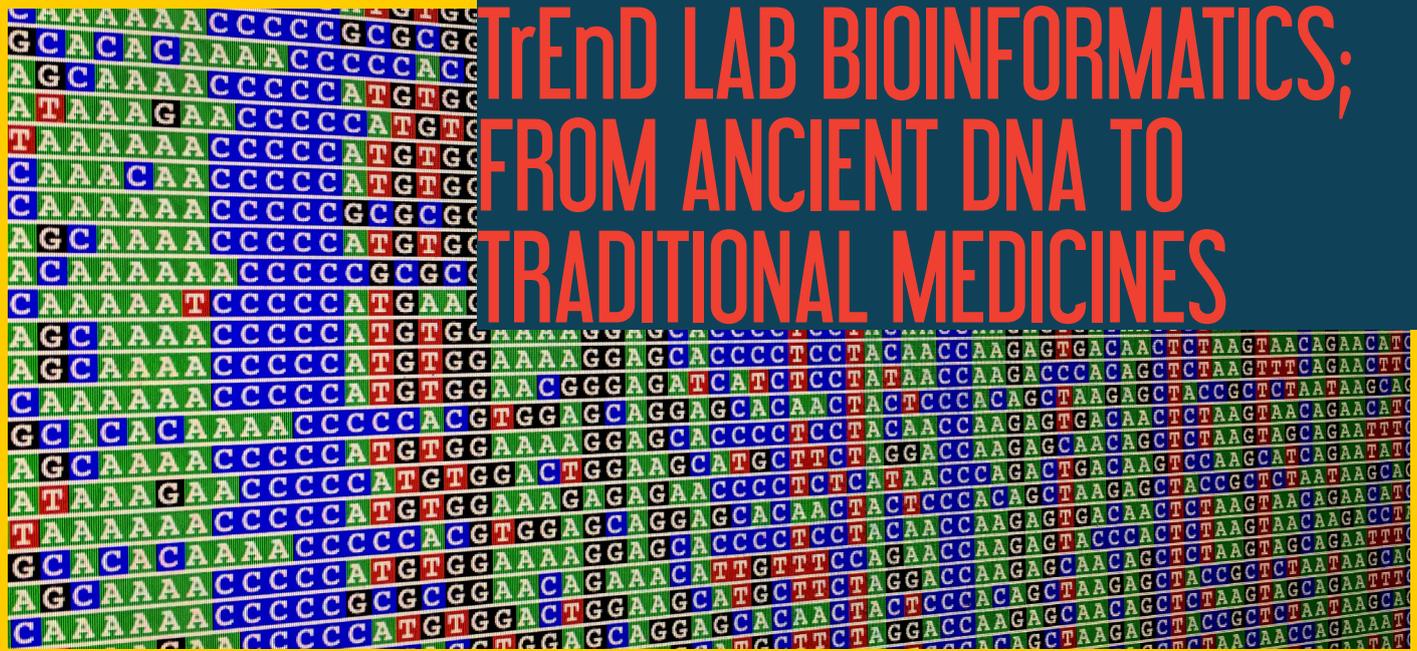
UNCOVERING ENDANGERED SPECIES DNA IN TRADITIONAL CHINESE MEDICINE

In a project funded by the National Health and Medical Research Council (NHMRC), Professor Michael Bunce and his team at the Trace and Environmental DNA (TrEnD) laboratory at Curtin University are at the forefront of harnessing the power of DNA sequencing technologies across a variety of applications from human health to conservation.

This innovative project has been created to seek trace DNA signatures in Traditional Chinese Medicine (TCM) so that we can accurately determine the ingredients used by manufacturers and see if they are being correctly represented. The use of TCMs as an alternative therapy is growing in Australia. The need for clarity of the ingredients on these imported goods is important so that we know where they are being obtained from and if they are safe for human consumption.

The use of the Magnus system at Pawsey Supercomputing Centre has facilitated the auditing of TCM. Using bioinformatics and high performance computing, the researchers are able to develop new approaches that tap into the genetic code.

2016



TrEnD LAB BIOINFORMATICS; FROM ANCIENT DNA TO TRADITIONAL MEDICINES

THE CHALLENGE

Deciphering the composition of different TCMs by analysing and comparing millions of DNA sequences with previously sequenced DNA is a computational challenge.

Determining what species each DNA sequence comes from takes a long time to solve with normal computers. Having access to a supercomputer, which can be used as a DNA sequencing platform, means that bioinformatics research can be done rapidly. A few years back, this rate of data generation and analysis was thought to be out of reach.

"The computing power on offer at Pawsey gives us a real advantage, tasks that used to take weeks can now be accomplished in hours," says Professor Bunce.

THE SOLUTION

Using the Magnus system at the Pawsey Supercomputing Centre has allowed researchers to compare DNA barcodes obtained from the medicines to DNA barcodes recovered directly from known species around the world.

"It is an exciting time in the field of genetics," says Professor Michael Bunce. "With new DNA sequencers and compute power we have the ability to chase genetic 'breadcrumbs' and then use this information across a wide diversity of projects; from DNA in seawater to detect invasive species through to ancient DNA from bone to better understand the archaeology of the southwest".

OUTCOME

The results of the study were both concerning and alarming when DNA was detected from endangered animals (e.g. snow leopard) and plants (e.g. asarum) in some of the TCMs, found with their genetic signatures. These ingredients were not listed on the medicines and consumers need to be made aware of what they are purchasing and consuming.

The poaching, trafficking and smuggling of endangered wildlife is illegal because of their rarity and carries severe penalties.

"A key outcome of this DNA research is to expose those medicines, and manufacturers, that seek financial gain from exploiting endangered species," voiced Professor Bunce.

"For the first time this molecular toolkit is able to inform both the public and regulatory authorities as to the legality of Traditional Chinese Medicine."

Using supercomputing in the innovative field of bioinformatics has brought clarity to consumers on TCMs and will enable the future preservation of endangered wildlife.