

Mineral explorers use plants and animals to unveil Australia's desert wealth

Mineral Discovery and Environmental Management Using Flora and Fauna Biogeochemistry in Australian Landscapes

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Invited Presentation: CRC Association Conference, May 2006, Brisbane, Qld.



CRC LEME students sample scrub in their search for buried mineralisation.

Explorers are now using leaves, flowers and bark to look for mineral deposits in Australia thanks to a new exploration technique developed by the Cooperative Research Centre for Landscape Environments and Mineral Exploration (CRC LEME).

CRC LEME's research, which has found an association with trace metals stored in plant and animal structures and local geochemistry, is helping mineral explorers save money by making their exploration programs more efficient and effective. Already at the Pinnacles near Broken Hill, ancient river red gum leaves have played an important role in the discovery of a buried zinc-lead-silver deposit which has eluded mineral explorers for more than 100 years.

Mulga twigs have been able to detect gold mineralisation from beneath the vast sandplains on the margins of the Strzelecki Desert in South Australia. Mallee trees have also been shown to be effective at expressing gold and other metal deposits beneath ancient sand dune systems of central South Australia. While in the Tanami Desert, the tough and spiky spinifex grass has root systems that extend many tens of metres deep. Chemical analyses of their leaves have been able to successfully detect gold deposits that otherwise would have remained untouched.

Research Leader Dr Steve Hill from the University of Adelaide Geology and Geophysics Department said Australia is a highly-weathered continent that has also undergone extensive erosion and deposition. This has meant the material on or near the surface often bears no physical or chemical relationship with the rocks beneath – a problem that has plagued mineral explorers for decades.

“However, CRC LEME's research is paving the way for the development of new mineral exploration techniques best suited to detecting areas of mineralisation obscured by thick blankets of soil, sediment and weathered rock known as regolith,” Dr Hill said.

This presentation provides an overview of the techniques created by CRC LEME researchers in the development and effective use of Australian plants and animals as biogeochemical indicators in areas of regolith. The research project is part of CRC LEME's greater objective to assist mineral explorers and environmental managers in the generation and application of new information about the physical, chemical and biological processes operating within regolith environments.

Successful outcomes from this research have come from the result of rigorous and dedicated studies, and testing by multi-disciplinary teams of researchers and students within CRC LEME.

“The New South Wales (NSW) Department of Primary Industries, Primary Industries and Resources of South Australia, the Commonwealth Scientific Research Organisation (CSIRO), Geoscience Australia, the Minerals Council of Australia, Australian National University and Curtin University of Technology all have provided invaluable input and support for the project,” Dr Hill said.

“Our major successes have come from a team of PhD and Honours students working near Broken Hill and Tibooburra in NSW, the Gawler Craton and Olary regions of South Australia, and the Tanami Desert region of Western Australia and the Northern Territory.”

Their research has shown that plants, as well as animals, are good indicators of the local geochemistry in that they store trace metals in their cells brought up by water through plant root systems.

“These readings, some of which are relatively high, provide important clues to the type of minerals that may be present at depth,” Dr Hill said.

Resources companies Newmont Australia and Tanami Gold have incorporated CRC LEME's biogeochemical sampling techniques into some of their tenements exploration programs in the Tanami. Minotaur is now using biogeochemical sampling techniques with its central South Australian tenements, while Anglo American is planning a bluebush sampling program near Broken Hill. Small companies, such as Cazaly Resources, have sampled bluebushes and eucalypts near Kalgoorlie in Western Australia.

“Our research has also been examining the chemical signatures associated with animals that eat these plants, such as the termite mounds of the Tanami and the droppings from kangaroos near Broken Hill,” Dr Hill said.

In a recent report entitled *The Economic Impact of Cooperative Research Centres in Australia* commissioned by the Cooperative Research Centre Association, it has been estimated that CRC LEME's mineral exploration related scientific outputs have played a significant role in the discovery of gold deposits with an in-ground value of more than \$3 billion.