

Fertile ground for science: terrestrial studies in Antarctica

MOST PEOPLE'S VISIONS OF Antarctica are of immense lifeless ice sheets stretching to the horizon. But there are small ice-free places on the continent where you can find life, such as mosses, as well as freshwater bodies like meltwater streams, tarns and lakes. The subantarctic Heard and McDonald Islands group (substantially ice-free) and Macquarie Island (totally ice-free) are home to more complex tundra-like ecosystems. There are currently about 20 projects in the Australian Antarctic Program on Antarctic and subantarctic terrestrial and freshwater ecosystems.

Investigating the biodiversity of ecosystems is fundamental to any biological research. Biodiversity is an all-encompassing term that describes variation at three levels: taxonomic, genetic, and ecosystem. At the taxonomic level, Rod Seppelt and Hau Ling from the Australian Antarctic Division and their colleagues have been researching variation in species diversity in subantarctic and Antarctic bryophytes, lichens, terrestrial and freshwater algae, fungi and microbes. Ling is close to completing the non-marine algal flora for the Windmill Islands, the region around Casey Station, during which he has discovered several new species of algae. Patrick McBride (Macquarie University) has been working on the taxonomy and ecology of subantarctic freshwater diatoms.

Subantarctic invertebrates are receiving attention from Rieks van Klinken and Penny Greenslade (CSIRO and Australian Quarantine Inspection Service), who are close to completing an invertebrate fauna for Macquarie Island. Herbert Dartnall (Great Britain), Steven Chown, Mick Marshall (South Africa) and Yves Frenot (France) have been documenting new invertebrate species on Heard Island, with new records for freshwater invertebrates, weevils, flies and mites. Dartnall has also found two new species of rotifer.

Mary Skotnicki (ANU) and Patricia Selkirk (Macquarie University) have been investigating the extent of genetic diversity in plants. They have demonstrated that mosses in Antarctica exhibit extensive genetic variation (with levels similar to temperate regions) and that variation within colonies is apparently caused not only by immigration and establishment of plants from elsewhere but also by genetic mutation. These studies are assisting in the understanding of evolution, origins and dispersal mechanisms of Antarctic plants, and their response to climate change. This



Studying Pringlea on Heard Island: attaching thermocouples to measure leaf temperature

DANA BERGSTROM

(France) and Kendi Davies and Brett Melbourne (CSIRO), are comparing plant and invertebrate species performance and ecosystem function across Heard, Marion, Kerguelen and Macquarie Islands. Jenny Scott (University of Tasmania) is documenting long term changes in subantarctic vegetation, including vegetation mapping for Heard Island. Andrew Kennedy (University of Western Australia) is examining big patterns in species richness and constructing models that will predict changes in species distributions with climate change.

A number of researchers are concentrating on human impacts. Ian Snape (AAD), with CSIRO and university researchers, is conducting trials on remediation of extensive petroleum-contaminated sites at Casey and Wilkes stations. Joanna Laybourn-Parry (Great Britain) is seeking to identify if humans have introduced species of fungi to Antarctica. In the subantarctic, Clive Crossley (University of Tasmania) is documenting the invasion of two introduced slater-like invertebrates on Macquarie Island, Penny Greenslade (CSIRO) is preparing a comprehensive database of introduced species of spingtails and Jennie Whinam (Nature Conservation, Tasmania) and Dana Bergstrom (AAD), with Australian Quarantine Inspection Service, are identifying potential sources of introduced animals (such as spiders and snails) and weeds with regard to ANARE activities. Such studies are leading to changes in ANARE operations to minimise our impact on our precious Antarctic and subantarctic environments.

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