Australia & New Zealand

http://www.Arabidopsis.org/info/2010_projects/Australia.jsp
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Australia has a strong tradition in plant scientific research with most institutions across all states of Australia having some research involved *Arabidopsis* as a model system. Major areas of *Arabidopsis* research and functional genomics are Canberra, Melbourne and Perth. Major sites of plant science with foci on crops such as grains, grapes and legumes include Queensland, Tasmania, South Australia and NSW.

Major Research Institutions involved in Functional Genomics of *Arabidopsis*

- Australian Research Council (ARC) Centre of Excellence in Plant Energy Biology (www.plantenergy.uwa.edu.au/). The focus of the Centre is *Arabidopsis* functional genomics as it pertains to the roles of the chloroplast, mitochondria and peroxisome in energy metabolisms and plant development. This new knowledge will aid improvement of plants by enabling better management of: (1) the timing and rate of plant growth and development; (2) biomass and yield; (3) efficient use of water and mineral nutrients; (4) tolerance of plants to environmental stresses such as excess light and drought; and (5) synthesis of plant metabolites important for human nutrition. Investigators are: Ian Small, Murray Badger, David Day, Barry Pogson , Harvey Millar, Jim Whelan and Steven Smith.
- CSIRO Plant Industry (www.pi.csiro.au). Liz Dennis leads a major Program on Genomics and Plant Development. This program investigates several aspects of plant function and, importantly, is developing major facilities for *Arabidopsis* functional genomics work. Gene Discovery by Functional Genomics (Peter Waterhouse) has a 10,000-plus non-redundant cDNA microarray facility (Iain Wilson) and activation tagging (Chris Helliwell). These facilities are being used intensively in CSIRO's subprograms in reproductive development (Abed Chaudhury), floral initiation (Jean Finnegan), Genetic Engineering for Plant Improvement (Jeff Ellis), and Hormonal Control of Gene Expression (Frank Gubler).

Genomics Companies

- CAMBIA (www.cambia.org)
- Diversity Arrays Technology Pty Ltd (www.diversityarrays.com).

Examples of Australian Universities with substantial research on *Arabidopsis*

- Monash University (www.biolsci.monash.edu.au/)
- University of Melbourne (www.unimelb.edu.au/)
- The Australian National University (www.anu.edu.au/bambi/; www.rsbs.anu.edu.au/)
- The University of Queensland (www.uq.edu.au/)
- The University of Adelaide (www.adelaide.edu.au/)

Examples of Research Projects Using Functional Genomics Approaches

- Aluminum and manganese stress tolerance- Peter Ryan
- Arabinogalactan proteins - Carolyn Schultz and Tony Bacic
- Boron tolerance- Robert Reid
- CesA- related genes and cellulose synthesis- Richard Williamson
- Chloroplast development and function, oxidative stress and photoprotection - Barry Pogson
- Dehydrin genes - Roger W. Parish
- Fimbrin gene family - David McCurdy
- Flowering time control - Alan Neale and John Hamill
- Heterotrimeric G-proteins - Jimmy Botello
- Mechanical impedance in roots - Josette Masle

- Microtubule associated proteins - Geoffrey Wasteneys
- Mitochondria - Jim Whelan David Day, Harvey Millar
- Myb gene function - Roger W. Parish
- Nodulation related control mechanisms - Peter Gresshoff
- Phosphorus-use efficiency - Peter Ryan
- Photosynthetic capacity regulation - Murray Badger
- Plant Natriuretic Peptide immunoanalogues (PNPs) - Helen R. Irving and David Cahill
- Plasmodesmata functional proteomics - Robyn Overall
- Respiration: non-phosphorylating pathways of associated with the mitochondrial electron transport chain - Kathleen Soole
- Sodium efflux systems in the plasma membrane - Ian A. Newman
- Defense gene expression - Karam Singh

Major funding sources for *Arabidopsis* functional genomics:
Funding is mainly available through the Australian Research Council's (ARC's) Discovery and Linkage Grant Schemes and its Centre of Excellence Scheme (www.arc.gov.au).

- Discovery Grants and Fellowships - supporting fundamental research
- Linkage Grants - supporting projects between academic institutions and industry
- Linkage-International - In the context of the International *Arabidopsis* Research Community, the Linkage-International Scheme is particularly relevant. It provides funding for movement of researchers at both senior and junior levels between Australian research institutions and centers of research excellence overseas. Two types of awards include (1) Fellowships, under international agreements for the reciprocal exchange of postdoctoral researchers, (2) Awards, to build links between research centres of excellence in Australia and overseas by funding extended collaborations.
- The Genome-Phenome Link is one of 4 Priority Area Research Programs for ARC funding in 2003. Under the direction of the Minister responsible for the ARC, these program areas are to receive no less than 33% of the total funds allocated under the National Competitive Grants Scheme in the 2003 funding round.

Other major sources of funding for Plant Science are the Research Development Councils. The funding for these organizations is based to a substantial degree on Industry levies and therefore the research is targeted to particular industries. The largest is the Grains Research and Development Corporation of Australia (GRDC). A list of the RDCs is given at www.grdc.com.au/sites/rdcorp.htm.

Increasing numbers of New Zealand plant scientists are incorporating *Arabidopsis thaliana* into their research, and several are using functional genomics approaches. Funding is principally available through the Royal Society of New Zealand's Marsden Fund and the New Zealand Foundation for Research, Science and Technology. In addition to the projects being conducted at the universities, research programs are carried out at the Government-owned Crown Research Institutes, including Horticulture and Food Research Institute of New Zealand (HortResearch), and the New Zealand Institute for Crop & Food Research Limited (Crop & Food Research).

Major funding sources for *Arabidopsis* functional genomics:
- Royal Society of New Zealand Marsden Fund: (www.rsnz.org/funding/marsden_fund/)
- New Zealand Foundation for Research, Science and Technology: (www.frst.govt.nz/)

Major Locations involved in Functional Genomics of *Arabidopsis*
- University of Auckland: (www.auckland.ac.nz/)
- Association of Crown Research Institutes, including AgResearch and HortResearch: (www.acri.cri.nz/)
- University of Otago: (www.otago.ac.nz/)