

The Australian Centre for Plant Functional Genomics Newsletter

'A celebration of the first functional year'

The ACPFG is a \$55 million research centre that uses the techniques of functional genomics (such as proteomics, transcriptomics, bioinformatics and metabolomics) to understand the 'function' of plant genes. Research is focused on determining the genes of wheat and barley (Australia's two largest cereal crops) that help them survive and yield under harsh environmental conditions. This knowledge is then applied to improve the ability of these crops to withstand abiotic stresses such as drought, salinity, frost and mineral deficiencies or toxicities. These stresses are a major limitation of cereal crop yield and quality loss throughout the world and have been recognised as having a large impact on Australian crop production.



Editor: Belinda Barr
Phone: (08) 8303 6725
email: belinda.barr@acpfg.com.au

The History

The funding for the ACPFG was officially approved in May 2002. The science and proposed research in this application, together with the international track records of the key researchers, was judged by an international panel of experts against applications from across Australia. The success of the scientific application was the first step in the establishment of the ACPFG.

Funding of \$27 million over five years was promised from the Australian Research Council (ARC), the Grains Research and Development Corporation (GRDC) and the South Australian Government.

An agreement was also reached between the University of Adelaide, the University of Melbourne, the Department of Primary Industries (Victoria) and the University of Queensland to provide an additional \$30 million in cash and in-kind.

Minister Brendan Nelson in conjunction with Senator Judith Troeth, the Vice Chancellor of the University of Adelaide, Professor Cliff Blake, and the SA Premier the Hon Mike Rann made the funding announcement of the ACPFG in May 2002. Since then, the Plant Genomics Centre Building has been constructed by the University of Adelaide with

funding largely from the SA Government, and the ACPFG research team has moved in.

The Plant Genomics Centre, the building which houses the ACPFG, the Molecular Plant Breeding CRC, the Agriculture node of the Australian Genome Research Facility (AGRF), groups from South Australian Research and Development Institute (SARDI) and BioInnovation SA was opened by Premier Mike Rann on March the 24th 2004.

The Plant Genomics Centre is the headquarters for the ACPFG. Other major ACPFG research nodes are located at the University of Melbourne,

University of Queensland and Department of Primary Industries at LaTrobe University.

We are now celebrating the opening and the first year of research at the ACPFG.

The ACPFG currently employs 85 staff and will grow to employ over 100 scientists and associated staff. The development of ACPFG ensures that Australia continues to play a prominent role in national and international plant genomics research, and that Australia maintains its competitiveness in the cereal cropping industry.

ACPFPG appoints new board member



The ACPFG is delighted to announce that Professor Vicki Sara has accepted a position as an ACPFG Director. She commenced her role on July 1st 2004.

"I am looking forward to contributing to the ACPFG. It is exciting to be involved with such an outstanding group at the cutting edge of plant biotechnology" stated Professor Sara.

Mr Nick Begakis AM, Chairman of the ACPFG said, "We are extremely pleased to have Vicki Sara on board. She brings an extensive knowledge of the research priorities for Australia, excellent contacts to key decision makers and a

sound understanding of the importance of research to the Australian community".

Professor Sara is a former Chief Executive Officer of the Australian Research Council, Chair of the Council and a member of the Prime Minister's Science, Engineering and Innovation Council (PMSEIC). She is Chair of the Bureau of Meteorology Advisory Board, and a member of the Cooperative Research Centres Committee, the Advisory Board of the Rio Tinto Foundation for a Sustainable Minerals Industry, and the Australian Law Reform Commission Gene Patenting Advisory Committee.

Professor Sara is a Fellow of the Australian Academy of Science, and the Australian Academy of Technological Sciences and Engineering. She was appointed Vice-Chair of the OECD's Global Science Forum in 1999, and member of the Advisory Board of the APEC R&D Leaders' Forum in 2002.

Professor Sara will replace Professor Alan Robson, who announced on January 5th 2004 that he would be unable to continue his role with the ACPFG board due to commitments as Vice Chancellor of the University of Western Australia. We thank Professor Robson for his valuable contribution and wish him well for his new position.

SA — the nations hub of plant biotechnology research

South Australia is on track to becoming an international hub for plant biotechnology research with the relocation of the International Triticeae Mapping Initiative (ITMI) headquarters to Adelaide.

The relocation of ITMI was recently confirmed at a gathering of wheat and barley researchers in Minneapolis, USA and their management office will relocate in January 2005.

ITMI is the key international forum for the discussion and coordination of public sector activities in the genetics and genomics of wheat, barley, rye and their wild relatives.

"ITMI has been crucial in bringing together public sector researchers from around the world. The collaborative spirit fostered by ITMI has been key in keeping cereal research at the forefront of scientific advances," he said.

Professor Langridge said ITMI's decision to relocate reflects the high regard for South Australian biotechnology research. "With the head office in Adelaide, it will add further strength to the city's already thriving biotechnology sector. We will be able to focus attention on the activities being undertaken in Australia and this new role will provide a crucial mechanism for ACPFG to provide input into international wheat and barley improvement programs.

"It will contribute to technology development and growth in agricultural research in Australia," Professor Langridge said.



Genomics in the Barossa

From the 5th to the 8th of October 2004, the ACPFG will be holding the first of a new symposium series, 'Genomics in the Barossa', at the Novotel Resort, Rowland Flat in South Australia. The Symposium will generate open discussion and vigorous debate on the general topic of the biology of abiotic stress, one of the key areas underpinning the research at the ACPFG.

Before moving to the Barossa the conference will open at the University of Adelaide's Waite Campus, when a series of speakers will look at the issue 'What role for crop biotechnology'. Speakers including Robin Williams (Australian Broadcasting Corporation), Hon. Rory McEwen (SA Minister for Agriculture), Dr Jim Peacock, President of the Australian Academy of Science and John Lush President of the South Australian Farmers Federation.

International speakers at the Barossa meeting will include Professor David Galbraith (University of Arizona), Dr Zhi-Kang Li (International Rice Research Institute) and Professor Steve McGrath (Rothamsted Research Institute). It will also feature presentations by acclaimed national and ACPFG research scientists.

For further information please visit:
www.acpfg.com.au



ACPFG Research Excellence:

World leading scientists are heading to Adelaide following the development of the ACPFG.

Federation Fellow, Professor Mark Tester decided to return to his home town of Adelaide after 11 years at the University of Cambridge (UK) to take advantage of the research opportunities. He has now joined the ACPFG as part of the Faculty of Sciences at the University of Adelaide.



“With continued growth, we have the chance to develop the world-leading centre for crop improvement, for the benefit of Australia, as well as many other countries” stated Professor Tester.

Professor Tester’s initial grant is worth \$3 million over five years, and this may increase with further external grants. Over the past two years in the UK, he has raised almost \$5 million in research grants, many benefits of which will be coming to the ACPFG.

Professor Tester’s research at the ACPFG will use a “combination of cellular and genetic technologies to work on increasing the tolerance of cereals to poor soil conditions (such as high salinity or low water)”.

This research is identifying mechanisms for increasing stress tolerance well beyond that found in existing varieties. This will lead to the development of cereal crops that are suited to the Australian environment.

The Executive Dean, Faculty of Sciences, University of Adelaide, Professor Peter Rathjen says “Professor Tester’s appointment will augment our strong activities in plant research and shows the advantages to be gained by the involvement of the University with research centres such as ACPFG”. The arrival of Professor Tester will further ensure that the ACPFG and Australia play a prominent role in national and international plant genomics research.



Research Excellence

Some exciting results are already emerging from ACPFG research. For example, candidate genes responsible for boron tolerance in wheat and barley have already been identified and new approaches to identifying drought and salinity tolerance have been developed. We also have some exciting developments in the study of salt tolerance in wheat and barley, and novel genetic tools have now been established in rice that will provide insights into mechanisms of salinity tolerance, knowledge that will be directly transferable to wheat and barley.

ACPFG linkages

ACPFG has recently completed a collaboration agreement with Genome Prairie in Canada, a program funded by the Canadian government, to use genomics technologies to investigate disease and stress tolerance in wheat and canola. ACPFG also has collaboration agreements in place with Molecular Plant Breeding (MPB CRC) and Australian Grain Technologies (AGT)

Research and Facilities

The ACPFG has established a series of new facilities for plant growth and analysis. In the Melbourne nodes, substantial funding has been provided by the Victoria Government to establish high throughput genomics capability and equipment for proteomics and metabolomics analysis. Extensive new capabilities have also been setup in Adelaide attracting many new opportunities for research collaboration.

Education and Community Involvement

The ACPFG with the Molecular Plant Breeding CRC (MPB CRC) have developed, and are now hosting, a secondary level plant biotechnology workshop - 'Get into Genes'. The FREE workshops (with curriculum links) are available to secondary schools throughout South Australia. 'Get into Genes' sessions are predominantly held at the Plant Genomics Centre. However, it is also being taken to schools throughout rural Australia. Get into Genes has students conducting a range of plant biotechnology experiments set out in stations. These include: Conventional Plant Breeding (crossing and traits), DNA extraction from wheat germ, the use of restriction enzymes and gel electrophoresis. Located at each station is a guide indicating the procedure for each experiment, together with a question sheet and a general information handout explaining the science. To book into 'Get into Genes', students or community groups simply need to contact Belinda Barr (ACPFG) or Heather Bray from the MPB CRC.



'Get into Genes'
Lucindale School students loading gels and getting a helping hand from Dr Heather Bray (MPB CRC)



The ACPFG and MPB CRC have been hosting professional development workshops for secondary teachers throughout SA. Each workshop has been developed to either suit the requirements of the teachers or to act as a tool to inform teachers of the latest plant biotechnology research.

To increase the community's awareness of plant biotechnology the MPBCRC and the ACPFG arranged displays at numerous careers fairs and field days including The Lucindale Field Days, AGFEST (Tasmania), Tocal Field Days (NSW), Cleve Field Days (SA), the University of Adelaide's Careers Fair (Bonython Hall, North Terrace), Sienna College Careers Fair, Careers One Expo at Wayville and the BioInnovation Careers Spectacular.

At each of these events visitors have the opportunity to extract DNA from wheat germ – this has been a great tool for increasing interest in cereal cropping research.

Another exciting communication development has been the featuring of ACPFG on Nexus – an ABC TV program, screened in the Asia Pacific region. The five minute segment, which aired on the 9th September 2004, features Rob Morrison interviewing Professor Mark Tester about research at the ACPFG. This segment gave us a chance to show case some of the exciting equipment and technologies we have at the ACPFG.

A summary of the segment can be reviewed at:

<http://abcasiapacific.com/nexus/planetearth/s1189058.htm>

National Science Week Events



The ACPFG and MPB CRC have been actively involved in National Science Week Events.

The major event held was 'Beer – Barley to the Bottle'; this was an interactive quiz night that featured talks about barley

breeding (Dr Jason Eglinton), malting (Belinda Barr), brewing (Nick Sterenberg, Coopers) and beer flavours and tastings (Chris Ford, The University of Adelaide).

The event highlighted the importance of quality barley for brewing and the need for breeding excellence. The event, sponsored by Coopers Brewery, attracted 85 people and was successful in generating interest in plant science and linking the importance of science to the food chain.

Beer...
Barley to the bottle
Fun, games and great prizes for all!



Belinda Barr at the Cleve Field Days and doing DNA extraction pracs while at the Lucindale Field Days

ACPFG Education Initiative

The ACPFG has participated in the first phase of placements for the 'Premier's Industry Awards for Teachers of Science and Mathematics' in South Australia. The ACPFG hosted Lyn Jefferies, an Oakbank Area School Teacher. This placement has provided mutually beneficial outcomes – for Lyn, the placement provided an insight into the careers available at the ACPFG through studying science and biology, the processes involved in gene identification and provided an insight into how a research centre is run.

"The Premier's Industry Awards give teachers the stimulating opportunity to update their knowledge and skills in current technologies. This will pay off for students back in the classroom" said Lyn.

The ACPFG will benefit from this placement by way of an assignment completed by Lyn – this involved developing careers fact sheets to help inspire students to pursue careers in plant biotechnology and through promoting plant biotech as an exciting career option.

The ACPFG have been so impressed with the program, the contribution from Lyn and the potential benefits, that we have decided to sponsor its awards dinner in December 2004.