



CONNECTIONS

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BIOPLATFORMS AUSTRALIA LEADS A NATIONAL WHEAT GENOMICS INITIATIVE

Bioplatforms Australia will invest in the creation of a wheat-based genomics data resource on behalf of the Australian and international wheat research community.

Wheat is Australia's most important grain crop valued at over \$5 billion annually. It is a staple food crop for the world's population and Australia is one of the world's largest exporters. The national wheat dataset will combine existing data with new genomic, proteomic and metabolomic analyses and form a vital resource for the entire wheat community from laboratory researchers to crop breeders.

The initiative will be supported by investment from the Super Science Education Investment Fund and builds on successful research programs heavily supported by the Grains Research Development Corporation (GRDC) involving several Australian Universities, the CSIRO, the Australian Centre for Plant Functional Genomics and respective Departments of Primary Industry from around the nation.

Improving future wheat varieties for greater crop yields, defence against pathogens and improved grain quality is critically driven by advanced breeding technologies. There are 21 chromosomes in wheat and investments from GRDC and Bioplatforms Australia will define the structure of one chromosome in detail. Chromosome 7A has important genetic implications for Australian conditions and the genomic data generated will form part of Australia's contribution to the International Wheat Genome Sequencing Consortium (IWGSC). This international collaboration aims to sequence the entire wheat genome in order to understand agronomically important traits and accelerate wheat improvements.

Professor Rudi Appels from Murdoch University, Western Australia is a co-chair of the IWGSC and believes the



investment in sequencing Chromosome 7A will fortify Australia's leadership in wheat research and help Australian scientists gain early access to equivalent information on the other 20 chromosomes.

The Bioplatforms Australia's investment will also support sequence information for 16 wheat varieties of importance to Australia. When combined with the reference genome, additional genomic information on peak breeding lines will accelerate the identification and isolation of new traits for the development of new varieties.

When asked about the value of the wheat genomics initiative, Professor Peter Langridge, CEO of the Australian Centre for Plant Functional Genomics, said *"Breeding has underpinned productivity gains in Australian agriculture and our breeders have been leaders in the application of new technologies. The new sequencing data will give a detailed view of variation present in Australian germplasm and raise breeding to a new level of sophistication."*

Australia's hostile environment with scarce water supply and poor soil quality is compounded by the impact of pathogens such as stripe and stem rust, tan spot, glume blotch, septoria leaf blotch, Rhizoctonia bare patch and crown rot. The Bioplatforms Australia investment will fund biomolecular datasets from a diverse range of wheat pathogens allowing new insights into their interaction with wheat and a framework for intervention.

This component of the dataset will require a highly integrated approach which will in turn enhance and

demonstrate Australian systems biology capability. John Manners, Deputy Chief of CSIRO Plant Industry, is a principle co-ordinator of the Bioplatforms Australia Wheat Pathogenomics initiative. Dr Manners said *"This initiative will, for the first time, allow us to compare the molecular armoury employed by a diverse range of pathogen types on a single host, in this case wheat. These pathogens are highly adaptable and this knowledge will enable us to develop durable molecular resistance strategies for wheat into the future."*

Support and collaboration by key wheat researchers will be critical to the success of the wheat genome data resource and participation is keenly invited. To obtain further information, please contact Dr Anna Fitzgerald at Bioplatforms Australia afitzgerald@bioplatforms.com.

BPA WELCOMES THE ENVIRONMENT INSTITUTE

The Environment Institute at the University of Adelaide is the latest member of the Bioplatforms Australia family.



The Institute brings together leading researchers in the fields of science, engineering, economics and social



The Australian Proteome Analysis Facility (APAF) will use Super Science funding to acquire the AB SCIEX TripleTOF™ 5600 System

science to tackle some of the most serious environmental challenges facing Australia and the world.

A focus of the new Institute is the creation of a research hub for excellence in landscape scale biodiversity characterisation and monitoring using DNA based approaches. It aims to provide the National Resource Management sector with comprehensible information for evidence based decision making.

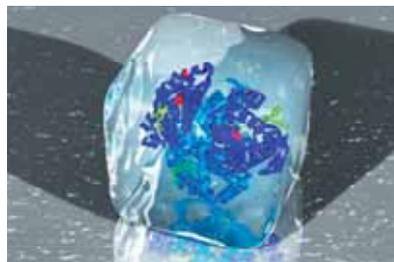
The new institute combines the established research strengths of over 100 members from the Australian Centre for Ancient DNA (ACAD, Directed by Prof. Alan Cooper) and the Australian Centre for Evolutionary Biology and Biodiversity (ACEBB, Directed by Prof. Andy Lowe). These two centres are taking leading roles in some of the most exciting national and international programs for environmental genomics and both make critical contributions to the discovery and conservation of the world's evolution and biodiversity. Their inter-disciplinary approach is fundamental to determining how we can better manage our water and landscapes for the greatest well being of our society.

To find out more about the Environment Institute visit <http://www.adelaide.edu.au/environment>.

RESURRECTED MAMMOTH BLOOD VERY COOL

ACAD (Australian Centre for Ancient DNA) in collaboration with a team of international researchers have brought the primary component of mammoth blood back to life using ancient DNA preserved in the bones of Siberian specimens between 25,000 to 43,000 years old.

Professor Alan Cooper's team was able to extract mammoth haemoglobin from the extinct species in Australia's only purpose built Ancient DNA labs. The results, published earlier this year in Nature Genetics, revealed special evolutionary adaptations that allowed the mammoth to cool its extremities down in harsh Arctic conditions in order to minimise heat loss.



The structural model of the mammoth haemoglobin. Illustration by Ansgar Philippesen.

The Australian Centre for Ancient DNA is a world leader in the study of evolution and environmental change across time through the use of preserved genetic records from human, animal, plant and sedimentary remains. The techniques developed in this project are providing researchers with new tools to study the biomolecular and physiological characteristics of extinct species.

To find out more about this research view the manuscript on the Nature Genetics website at: <http://tinyurl.com/mammoth-blood>.

EDUCATION INVESTMENT FUND

Bioplatforms Australia received \$50 million through the Education Investment Fund Super Science initiative to further expand its 'omics network and services.

Following broad consultation, contracts for new research infrastructure

purchases have been instigated together with plans to create a new bioinformatics analysis environment. Investments will also be made in 'soft infrastructure' to be delivered in the form of reference datasets - large scale datasets that can be accessed by all researchers for systems biology and other research projects.

Bioinformatics Analytical Environment

A bioinformatics analytical environment will allow biologists to directly manipulate and employ bioinformatics and information technology through a new user interface. While many bioinformatics tools are available for systems biology, it remains confusing and challenging for many biologists to integrate diverse data forms and apply the most appropriate tools for analysis

This project will deliver a new work environment by creating an interface to the software tools previously the exclusive domain of bioinformaticians. This new environment will facilitate data management, annotation, analysis and visualisation. It will directly benefit the research services provided to Australian scientists and will also advance the field of systems biology by providing new methods of data integration and analysis.

Reference Datasets

Bioplatforms Australia is establishing framework datasets of strategic organisms and samples of national significance to form a new national resource.

Existing data will be combined with new genomic, proteomic and metabolomics analyses to promote systems wide analysis. The datasets will be coupled with a data management system to enhance accessibility and generated in partnership with aligned research organisations to ensure relevance. As reported, wheat has been chosen as the subject of the first national dataset and others will be nominated following industry consultation. The datasets project is expected to continue beyond the Super Science initiative.

ADVANCING THE CAPABILITIES OF PROTEOMICS AUSTRALIA

The Australian Proteome Analysis Facility (APAF) is supported by Bioplatforms Australia through both the NCRIS program and the newly established Education Investment Fund Super Science project.

APAF is the largest proteomics service provider within the Proteomics Australia consortium. It is primarily focused on differential protein expression analysis which drives the search for biomarkers for improved human health, agriculture and food research.

APAF will use Super Science funding to acquire the AB SCIEX TripleTOF™ 5600 System. The TripleTOF™ 5600 System is the life science industry's fastest and most sensitive high-resolution mass spectrometer for high-performance qualitative and quantitative analysis.

APAF is among the first laboratories in the world to adopt this groundbreaking

scientific technology which will greatly enhance their capability to characterise proteins to a much greater depth and accuracy than currently possible. The TripleTOF™ 5600 System was on display at the HUPO conference recently held in Sydney. It represents a new generation in mass spectrometry instrumentation given it is the only system that combines the highest available sensitivity and speed with high resolution.

The TripleTOF™ 5600 System also provides life scientists with access to powerful new workflows for comprehensive exploration, rapid profiling and high-resolution quantitation of complex samples not possible with any other mass spectrometer. These workflows give scientists greater flexibility to do multiple types of experiments on one instrument.

APAF's acquisition of the TripleTOF™ 5600 System will enable a significant increase in proteome coverage that will really improve the ability to map differentially expressed proteins in comparative analyses. For the first time, they will have the capability to combine qualitative identification with quantitation in the same instrument, and this means higher quality outcomes can be provided to academic and commercial customers.



TRIPLE TOF 5600

Associate Professor Mark Molloy, APAF's Director, with the new Triple TOF 5600.

AUSTRALIAN PHENOMICS NETWORK LAUNCHES A NEW microRNA PLATFORM

The Australian Phenomics Network (APN) will shortly launch a microRNA screening platform that encompasses all the known microRNAs currently identified in the human genome.



MICROASSAY PLATES

MicroRNA is an exciting scientific development. It consists of small pieces of RNA that bind to messenger RNA and reduce gene expression. This mechanism of gene regulation is getting increasing attention because many diseases, such as breast cancer, can be regulated by microRNA.

The new microRNA service will be offered in conjunction with the Victorian Centre for Functional Genomics (VCFG) situated at the Peter MacCallum Cancer Centre. The VCFG is one of APN's newest nodes and provides genome-wide discovery technology and infrastructure to mouse researchers. It is recognised as the premier facility for RNA interference in Australia and provides researchers with the opportunity to identify novel genes which, after characterisation, can ultimately provide new mouse models. This fits well with APN's goal to produce new mouse models for the study of gene function and human disease.

Contact Dr Kaylene Simpson, Facility Manager, Victorian Centre for Functional Genomics on (03) 9656 1790 or by email at kaylene.simpson@petermac.org



The 4th International Barcode of Life Conference is the flagship event of the Consortium for the Barcode of Life.

4TH INTERNATIONAL BARCODE OF LIFE CONFERENCE

The University of Adelaide's Centre for Evolutionary Biology and Biodiversity (ACEBB) will host the 4th International Conference for the Barcode of Life in November 2011.

A unique strength of ACEBB is its relationship between the SA Museum, State Herbarium and South Australian Department of Environment and Natural Resources, a close collaboration that is seen as the best practice model in Australia. The Centre is recognised for its expertise in systematics, evolutionary biology and biodiversity science and will do much to showcase Australia's research strengths in barcoding, systematics, biogeography, gene flow, conservation science and wildlife molecular forensics.

The conference is the flagship event of the Consortium for the Barcode of Life (CBOL) which is based at the Smithsonian Institution's National Museum of Natural History (Washington, DC). CBOL operates as the working group for outreach and collaboration to the International Barcode of Life Project (iBOL). The conference is set to draw over 300 iBOL members to Australian shores including leading biodiversity scientists, genomics specialists and



technologists from 25 nations. Together these researchers are working toward the construction of a DNA-based identification system for all multi-cellular life.

The goal of this consortium is to create 5 million barcode records from 500,000 species in five years. Members of iBOL are building the infrastructure required to use barcode reference libraries in real-world situations such as conservation, ecosystem monitoring, forensics and control of agricultural pests and invasive species.

Situated at the heart of a world class biodiversity precinct, the Adelaide venue brings together elements of research and public outreach in

collaboration with the Adelaide Zoo, Botanic Gardens and State Museums to provide an excellent context to the 2011 BOL conference.

Contact Scott Mills, Operations Manager of The Environment Institute at scott.mills@adelaide.edu.au for further information.

2010 ANNUAL REPORT

Bioplatforms Australia's 2010 Annual Report is now available.

Download it at www.bioplatforms.com or request a copy from Anita Tymkiw atymkiw@bioplatforms.com.



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