

# CONNECTIONS

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## PARTNERSHIP TO TACKLE MELANOMA

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### NEW BPA DATASET TACKLES MELANOMA CANCER

Bioplatforms Australia is partnering with the Melanoma Institute Australia to identify the genetic mutations that cause deadly melanoma cancer.

Bioplatforms Australia nodes will generate new genomic datasets of approximately 500 melanoma tumors so that researchers can identify the common gene mutations that lead to melanoma. The Melanoma Initiative will ultimately lead to new ways to diagnose and treat melanoma that better target the genetic basis of the disease.

Melanoma is often considered Australia's "national cancer" as more than 10,000 Australians are diagnosed and 1,200 die from the disease each year. While treatment advances have cut mortality rates for other cancers, melanoma remains resistant to drug therapy.

The Melanoma Initiative aims to identify all the gene mutations present in 500 melanoma samples collected by the Melanoma Institute over the last 20 years. Researchers will then seek to determine how common each of the identified mutations are and the part they play in the growth and spread of melanomas.

The project is broadly collaboratively as Bioplatforms Australia will be working with a national team of researchers from the Melanoma Institute Australia, The University of Sydney, Westmead Millennium Institute, Royal Prince Alfred Hospital, the Queensland Institute of Medical Research and others to deliver the DNA sequence data for all 500 samples. Three Bioplatforms Australia's nodes will undertake the sequencing work - the Australian Genome Research Facility, the Ramaciotti Centre and the John Curtin School of Medical Research which all offer next-generation sequencing technology and the expert capabilities needed for large scale projects that require detailed genetic-based investigations.

Bioplatforms Australia will also support proteomic and metabolomic analyses to profile the proteins and other small molecules expressed by pinpointed genes. As mutated genes can create abnormal proteins compared to 'healthy' ones, such analyses will give further clues on the impact of melanoma gene mutations and new drug targets.

The two year project will commence with a pilot study to establish research protocols and determine the extent of DNA sequencing required to produce an adequate 'map' of tumor samples and healthy cells.



### KANGAROO GENOME SEQUENCED

The Australian tammar wallaby is the first member of the kangaroo family to have its genetic makeup sequenced.

The international research collaboration, led by Australian scientists, has provided many insights into the genetic makeup of the iconic Australian kangaroo, including the genes behind its unusual reproductive system and how some genes control the development of the kangaroo's specialised toes that allow them to hop.

Australian researchers worked closely with Bioplatforms Australia node, the Australian Genome Research Facility and others to sequence the tammar genome. The research has uncovered surprising similarities and differences in the genomic profile of tamaras compared to humans and other mammals providing new insights into marsupial early development, lactation and the immune system.

For example, marsupials give birth to tiny under-developed young after a very short pregnancy, which is then followed by a long and sophisticated lactation period while in the mother's pouch. This includes the simultaneous



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TAMMAR WALLABY



## AUSTRALIA'S FIRST STRUCTURAL CRYO-EM RESEARCH CENTRE TO BE ESTABLISHED AT MONASH UNIVERSITY

The first state-of-the-art structural Cryo-Electron Microscopy (Cryo-EM) research centre will be established at Monash University with the help a \$1 million research award from the Ramaciotti Foundation.

Cryo-EM is a technology that can be used to reveal the shape of large, complex, biological macromolecules. The Clive and Vera Ramaciotti Centre for Structural Cryo-Electron Microscopy will allow scientists to address structural biology questions that are traditionally difficult to solve using conventional approaches such as protein crystallography and nuclear magnetic resonance. Such data offer significant benefit for medical research and will lead to new therapeutic approaches and drug development programs.

The new Cryo-EM centre will be established at Monash University and fills a significant technological gap for structural biologists in Australia as there has been no widely accessible,

provision of two types of milk from adjacent mammary glands to offspring of different ages. This is like the left breast and right breast making milk of two completely different compositions.

Australian researchers involved in the project, Professor Marilyn Renfree from the University of Melbourne and Dr Tony Papanfuss from Melbourne's Walter and Eliza Hall Institute Melbourne said the discovery of new genes involved in immunity, development and reproduction highlights the valuable insights that sequencing the genetic material of our native fauna and flora can deliver. The new information generated by the genome sequence will make a vital contribution to the understanding of Australian wildlife health and conservation, particularly the survival of the young.

While many of the genes in the tammar sequence are shared with humans, the study actually revealed a new human gene and is the sort of exciting discovery that researchers hoped to uncover.

Dr Sue Forrest from the Australian Genome Research Facility whose team led the Australian sequencing component said this exciting project shows how Australian facilities are able to unlock the valuable genetic information contained within our own unique Australian species. "Importantly,

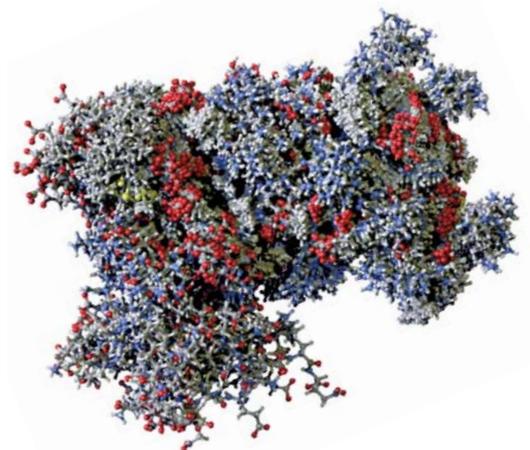
dramatic technology advances now mean we can sequence Australian species faster and more cost effectively than ever before," she said.

Dr Kim Worley from the Human Genome Sequencing Centre at the Baylor College of Medicine, USA who led the US sequencing component, said that the tammar wallaby joins the other sequenced mammalian genomes that are wonderful resources for understanding mammalian biology.

The international collaboration of researchers and other supporters included the State Government of Victoria; the National Institute of Health, USA; Applied Biosystems (Life Technologies); the Jack Brockhoff Foundation; and the Australian Research Council's Centre of Excellence in Kangaroo Genomics, with partners at the University of Melbourne, ANU, University of New South Wales, The Walter and Eliza Hall Institute of Medical Research and the Australian Genome Research Facility.

The project results have been published in the international journal *Genome Biology*.

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dedicated centre for Structural Cryo-EM. Australian researchers will now be able gain detailed insight into how large dynamic proteins and their complexes assemble and function which is particularly relevant to research on how the human immune system recognises and eliminates foreign molecules, how large multi-protein complexes assemble in cancer, how cell surface receptors interact with their protein ligands and how monoclonal antibodies interact and interfere with protein cell-surface function.

The centre will be directed by Monash School of Biomedical Sciences researchers, Professors James Whisstock and Ian Smith and Associate Professor, Mike Lawrence from the Walter and Eliza Hall Institute of Medical Research. Professor Whisstock said the Centre will place Australia in a leading position on the international medical research stage while attracting and building a community of local and international researchers. The Ramaciotti Biomedical Award makes it possible to provide state-of-the-art technology that Australia desperately needs to take its research to the next level.

The Centre is scheduled for completion in 2012. Further enquiries can be directed to Professor Whisstock, Department of Biochemistry and Molecular Biology, Monash University, email: james.whisstock@monash.edu.



Professors Whisstock and Smith will lead the new Cryo-EM Centre with other leading scientists.



PRATO, ITALY

## BPA'S FRAMEWORK DATASETS RECOGNISED AS A POSITIVE MODEL OF RESEARCH COLLABORATION

BPA was invited to attend the Australian International Collaborative Research Workshop held in Italy last November to present its Framework Dataset initiative as an example of research collaboration.

The Australian International Collaborative Research Workshop held in November 2011 hosted by Monash University at its Prato Centre in Italy, brought together key research stakeholders and innovation contributors from Australia as well as international research partners such as the European Organisation for Nuclear Research, European Molecular Biology Laboratory (EMBL), of which Monash is host to the Australian affiliate – EMBL Australia, and the leading technology company, Siemens International.

The aim of the workshop was to develop best practice models for establishing

research collaborations that can both drive innovation and position Australia as a leader in international collaboration for the future. The workshop focused on various aspects of collaboration including moves toward 'open innovation' driven by globalisation, opportunities to use the Internet and other technologies for increased cooperation, and models of interaction between public and private research institutions and industry. The workshop employed various case studies of successful partnerships in areas of national research priorities and strength, to provide insight and increased awareness of proven models.

Bioplatforms Australia presented details of its Framework Data Initiative which has been a successful catalyst for national strategic collaborations in biomedicine, environmental science and agricultural biotechnology.

The workshop identified a number of elements that promote success in research collaborations including:

- a national collaborative research culture;
- 'think global' - the need to be globally connected and partnered within key networks;
- the need to establish and build long term relationships;
- encourage excellence in collaboration;



## Understanding how different plant functional groups respond to change is critical to biodiversity conservation

- ensure defined leadership, with strong and effective management and governance;
- acknowledge and address stakeholder value propositions and drivers.

Bioplatforms Australia will use workshop insights to inform its own strategic planning and continuing efforts to both promote and participate in research collaborations.

### METAGENOMICS PROJECT EXPANDS KNOWLEDGE OF RAINFOREST BIODIVERSITY

Understanding why species are distributed and assembled differently across environmental gradients is a major objective of evolutionary research.

Understanding how different plant functional groups respond to change is critical to biodiversity conservation. DNA-based evidence can help achieve these goals by revealing how past environmental fluctuation shaped current distributions. However, until recently the amount and quality of data obtained through standard molecular techniques has been a limiting factor. The latest advances in Next Generation sequencing has now made it possible



RAINFOREST BIODIVERSITY RESEARCH

to apply the power of genomic analysis to whole microbial communities and their function. With the development of large-scale metagenomics approaches, scientists are gaining a deeper understanding of biodiversity and drawing new insights for environmental protection, remediation and land management.

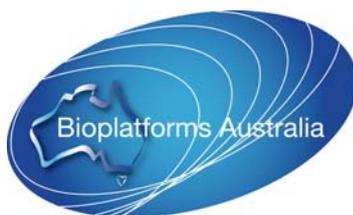
Previous research by the Evolutionary Ecology team led by Dr Maurizio Rossetto at the NSW Herbarium at the Royal Botanic Gardens in Sydney has shown that current environmental gradients affect biodiversity in Australian rainforest, and that past climatic changes have impacted differently among different species.

With support from Bioplatforms Australia, Rossetto's team is currently developing metagenomic approaches to deepen their investigations of genetic

diversity within Australian subtropical rainforests. The research team aims to empirically quantify and qualify how different plant functional groups respond to environmental disturbance. The first step will see the development of a genomic database for over 50 rainforest tree species which will be followed by metagenomic analysis of representative rainforest sites.

This project will take advantage of the skills and expertise of The Ramaciotti Centre, University of NSW and make an important contribution to our knowledge of biodiversity patterns in Australia. It will expand current understanding on why biodiversity is distributed the way it is, as well as facilitate the assessment of relative vulnerability to climate change.

Contact: Dr Maurizio Rossetto, National Herbarium of NSW, Tel 02 9231 8337.



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#### PROJECT SPOTLIGHT

BPA is keen to showcase exciting 'omics related projects in Connections, particularly ones that demonstrate cutting edge technology. If you would like to share your research with our readers, please contact Andrew Gilbert at [agilbert@bioplatforms.com](mailto:agilbert@bioplatforms.com).

