

**South Australia**

**The University of Adelaide**

**DP0880565** Prof K Anderson

**Approved Project Title** **Political economy of distortions to global agricultural markets**

**2008 :** \$ 98,095

**2009 :** \$ 95,195

**2010 :** \$ 95,195

**Primary RFCD** 3402 APPLIED ECONOMICS

**Administering Organisation** The University of Adelaide

**Project Summary**

Farmers, agribusiness and governments in Australia and other food-exporting nations have put enormous efforts into seeking reductions in agricultural protectionism, particularly in the past two decades via the Cairns Group in GATT/WTO negotiations but also in bilateral and regional integration initiatives. Yet levels of protection have fallen little for agriculture relative to manufacturing in high-income countries, and in some newly industrializing countries that indicator has been rising. Improving our understanding as to why that is the case will ensure Australia gets a better return from its investment in that area of commercial diplomacy.

**DP0877707** Prof NG Bean; Prof PG Howlett; Prof CE Pearce; Prof SC Beecham; Dr AV Metcalfe; Dr JW Boland

**Approved Project Title** **WaterLog - A mathematical model to implement recommendations of The Wentworth Group**

**2008 :** \$ 235,000

**2009 :** \$ 215,000

**2010 :** \$ 195,000

**Primary RFCD** 2302 STATISTICS

**Administering Organisation** The University of Adelaide

**Project Summary**

In 2003, The Wentworth Group of Concerned Scientists released their 'Blueprint for a national water plan' with the primary objective to 'protect river health and the rights of all Australians to clean usable water'. Currently, there are significant water restrictions in all the Australian mainland capital cities. In January 2007, the Prime Minister of Australia, announced a bold plan to rescue the Murray-Darling Basin. The plan incorporates political management changes, and an investment of \$10Bn. Now is the time to develop improved techniques for management of water storage systems. This project will develop the fundamental mathematical principles required for this improved management.

**DP0880933** Dr P Bi; A/Prof P Ryan; Prof P Weinstein; A/Prof DL Pisaniello; Prof KA Parton; Mr JR Moss; A/Prof AJ Braunack-Mayer

**Approved Project Title** **Extreme weather and population health in Australia: risk assessment, prediction of health impacts and disease burden, and adaptive strategy exploration**

**2008 :** \$ 70,000

**2009 :** \$ 56,899

**2010 :** \$ 62,586

**Primary RFCD** 3212 PUBLIC HEALTH AND HEALTH SERVICES

**Administering Organisation** The University of Adelaide

**Project Summary**

This is the first systematic assessment of the effect of heatwaves on daily mortality/hospitalisations/emergency department visits/ambulance callouts, and the burden of disease due to climate change in major Australian cities. It will explore relevant health specific adaptation strategies. The results will help relevant government agencies with policy-making, such as public service and resource allocation, infrastructure establishment, disaster prevention and response, including establishing the national heatwaves response system. They will help relevant industry for their adaptation to climate change, i.e. aged care industries. The results will also benefit local communities with their attention and behaviour changes for climate change.

## Summary of Discovery Projects Proposals for Funding to Commence in 2008

**DP0877356** Prof JH Bowie

**Approved Project Title** **Negative ion mass spectrometry: fundamental studies and applied applications.**

**2008 :** \$ 116,000

**2009 :** \$ 118,000

**2010 :** \$ 115,000

**Primary RFCD** 2501 PHYSICAL CHEMISTRY (INCL. STRUCTURAL)

**Administering Organisation** The University of Adelaide

### Project Summary

We seek to:

(i) establish negative ion mass spectrometry as an analytical tool for the sequencing of proteins and to probe the structures of active peptide Ca<sup>2+</sup> calmodulin complexes which, for example, inhibit the formation of NO from nitric oxide synthases. Controlling the concentration of nitric oxide may assist with the treatment of inflammatory and cardiac diseases, stroke and diseases of the central nervous system.

(ii) to study the possibility of the formation of biological molecules of life in interstellar regions

(iii) to train graduate students to international standards in the chemistry of proteomics.

**DP0877728** Prof AJ Bradbrook; Prof JG Gardam

**Approved Project Title** **Creating a Comprehensive International Law of Sustainable Energy: The Contribution of Law to Sustainable Development and Climate Change**

**2008 :** \$ 130,000

**2009 :** \$ 120,000

**2010 :** \$ 90,000

**2011 :** \$ 21,000

**Primary RFCD** 3901 LAW

**Administering Organisation** The University of Adelaide

### Project Summary

This project provides a legal initiative that will contribute to the achievement of a sustainable energy future. Australia is already experiencing the impact of the failure to achieve this goal through climate change, threats to energy security and increased destabilisation of international peace and security. All sections of the community must respond to these challenges and the project provides a contribution from the law. The realisation of the project may also lead to increased demand for energy efficiency and sustainable energy technologies and infrastructure that could result in the development of commercial opportunities for Australian companies.

**DP0881764** Prof BW Brook; Prof CN Johnson

**Approved Project Title** **Reconstructing past population dynamics to understand human and climatic impacts in prehistory**

**2008 :** \$ 213,000

**2009 :** \$ 213,000

**2010 :** \$ 198,000

**Primary RFCD** 2707 ECOLOGY AND EVOLUTION

**Administering Organisation** The University of Adelaide

### Project Summary

More than 100 species have become extinct since humans first colonised Australia, and over 1000 are considered threatened. This research will determine the factors most strongly governing the interaction between humans and native fauna in Australia over the last 46 millennia. Our approach is powerful and novel because it will effectively draw together multidisciplinary evidence on natural resource exploitation and habitat alteration by ancient people, and the influence of dramatic climatic shifts on the Australian biota. Information on past biological responses to environmental change is critical to properly contextualising the current impact, and long-term consequences of, threats such as global warming, habitat loss and invasive species.

## Summary of Discovery Projects Proposals for Funding to Commence in 2008

**DP0878472** Prof MJ Brooks

**Approved Project Title** **Enhanced parameter estimation for multi-component fitting in computer vision**

**2008 :** \$ 85,000

**2009 :** \$ 85,000

**2010 :** \$ 80,000

**Primary RFCD** 2802 ARTIFICIAL INTELLIGENCE AND SIGNAL AND IMAGE PROCESSING

**Administering Organisation** The University of Adelaide

### Project Summary

This project will benefit Australia's scientific knowledge and technology base in the area of computer vision. By contributing improved methods for parameter estimation applicable to a wide variety of technical problems, the project will aid the generation of improved software products in a wide variety of domains. Examples include: augmented reality systems, with which virtual reality artifacts may be immersed within real video; behaviour analysis in surveillance, in which complex, articulated 3D object motions may be characterised.

**DP0878903** Dr J Brugger; Dr D Testemale; Dr CG Ryan

**Approved Project Title** **Molecular Structure and Transport Properties of Hydrothermal Fluids under Extreme Conditions: Near-Critical, High Salinity, High Pressure and High Volatile Contents**

**2008 :** \$ 250,000

**2009 :** \$ 190,000

**2010 :** \$ 180,000

**2011 :** \$ 210,000

**2012 :** \$ 110,000

**Primary RFCD** 2603 GEOCHEMISTRY

APF Dr J Brugger

**Administering Organisation** The University of Adelaide

### Project Summary

The experimental capabilities, theoretical understanding, and numerical modeling methods developed in this project have broad implication for supporting both well-established (mineral exploration and ore processing) and emerging (geothermal energy; geosequestration) industries of core significance for the future of Australia's economy. This project also provides access to unique technology developed overseas; this technology will be adapted for the unique challenges faced by Australia, and made available to the broader scientific community via the Australian Synchrotron.

**DP0880386** Prof GM Cullity

**Approved Project Title** **Structured Moral Pluralism**

**2008 :** \$ 42,583

**2009 :** \$ 20,000

**2010 :** \$ 31,897

**Primary RFCD** 4401 PHILOSOPHY

**Administering Organisation** The University of Adelaide

### Project Summary

The Australian intellectual scene is characterized by intensely lively ethical debate, and a very high international reputation for the quality of its moral philosophy. This project will add significantly to the breadth of theoretical ethics in this country, by developing in detail an approach that has not previously been strongly represented. It offers a new approach to thinking about the foundations of ethics and reasoning from those foundations. Its practical applications are of pressing importance to policy and public debate. It also offers guidance to the many Australians whose work involves applying ethical principles, such as ethics committee members.

## Summary of Discovery Projects Proposals for Funding to Commence in 2008

**DP0879075** A/Prof BR Dawson; Prof RW Clay  
**Approved Project Title** **Particle astrophysics with the Pierre Auger observatory**  
**2008 :** \$ 180,000  
**2009 :** \$ 170,000  
**2010 :** \$ 170,000  
**Primary RFCD** 2401 ASTRONOMICAL SCIENCES  
**Administering Organisation** The University of Adelaide

### Project Summary

Australia's scientific reputation is enhanced through participation in international collaborations that aim to solve long-standing mysteries in science. The Pierre Auger Observatory covers a huge 3000 square km in western Argentina, where we are attempting to solve one of the biggest puzzles in modern astrophysics - the origin of the highest energy cosmic rays, particles 100 million times more energetic than we can produce on Earth. Adelaide scientists were founding members of the Auger project, and now have leading roles within the experiment. This is providing our students with access to world-class facilities and researchers in a field which has moved to the mainstream of astrophysics research.

**DP0878630** A/Prof JC Dunn; Dr SJ Dennis; Dr GI de Zubicaray  
**Approved Project Title** **Single and dual process models of recognition memory: Reconciliation of behavioural, electrophysiological, and neuroimaging data**  
**2008 :** \$ 65,000  
**2009 :** \$ 65,000  
**2010 :** \$ 75,000  
**Primary RFCD** 3801 PSYCHOLOGY  
**Administering Organisation** The University of Adelaide

### Project Summary

Advanced brain scanning technologies are increasingly used to study human memory. As well as being important for our basic understanding of memory, they also tell us how memory is affected by normal development, ageing, disease, and injury. Unfortunately, because these technologies are so new, a gap has opened up between our psychological understanding of memory and the physiological events measured by the scanning technologies. This has created a problem for how we should interpret the results that are found. The present project aims to close this gap by applying new research methodologies and theoretical insights based on our previous research.

**DP0877639** Prof RJ Elliott  
**Approved Project Title** **Dynamic risk measures**  
**2008 :** \$ 191,000  
**2009 :** \$ 191,000  
**2010 :** \$ 191,000  
**2011 :** \$ 167,000  
**2012 :** \$ 157,296  
**Primary RFCD** 2301 MATHEMATICS  
APF Prof RJ Elliott  
**Administering Organisation** The University of Adelaide

### Project Summary

Exposure to risk is a pervasive problem. The results will be of importance for financial institutions when they estimate their exposure to risk. Other applications will be to determine the level of risk from a terrorist attack or regional instability. Companies wish to allocate resources to minimize their exposure to adverse events.

## Summary of Discovery Projects Proposals for Funding to Commence in 2008

**DP0878419** Prof NL Fazzalari; A/Prof NH Voelcker; Prof R Lal

**Approved Project Title** **Material structure and properties of mineralised tissue: An integrated micro and nano level investigation**

**2008 :** \$ 123,000

**2009 :** \$ 122,000

**2010 :** \$ 117,000

**Primary RFCD** 2501 PHYSICAL CHEMISTRY (INCL. STRUCTURAL)

**Administering Organisation** The University of Adelaide

### Project Summary

Bone material properties have a direct influence on disorders of the skeleton, such as osteoporotic bone fragility fractures and osteoarthritis. It has been estimated that the direct and indirect cost of all fragility fractures and arthritis is over \$20 billion per annum. The impact of this will be far-reaching with the social benefits ranging from earlier and more accurate diagnoses, to the development of preventative strategies to delay the onset of musculoskeletal disorders. These developments will translate into exciting commercial opportunities and overall economic growth and sustainability.

**DP0881054** Dr MD Finn

**Approved Project Title** **Topological Optimisation of Fluid Mixing**

**2008 :** \$ 83,377

**2009 :** \$ 83,377

**2010 :** \$ 82,295

**Primary RFCD** 2301 MATHEMATICS

**Administering Organisation** The University of Adelaide

### Project Summary

The proposed research is aimed at improving the efficiency of fluid mixers, which in the long term has potential to reduce vastly the economic and environmental costs associated with large-scale mixing processes in Australian chemical industries. The research will not only impact on practical mixer design, but will also develop important results in the application of topology to the the field of chaotic dynamical systems. This project will also provide a graduate student and post-doctoral researcher with training to pursue a career in fluid dynamics or general applied mathematics research.

**DP0879592** A/Prof MC Griffith; Dr MJ Masia; Em/Prof AW Page; Dr JM Ingham

**Approved Project Title** **Earthquake protection of masonry buildings using fibre reinforced polymer strengthening**

**2008 :** \$ 150,000

**2009 :** \$ 150,000

**2010 :** \$ 135,000

**Primary RFCD** 2908 CIVIL ENGINEERING

**Administering Organisation** The University of Adelaide

### Project Summary

The importance of this research is highlighted, both nationally and internationally, by the work of the insurance industry which reported that the economic risk posed by a moderate earthquake in any of the capital cities in Australia is of the order of billions of dollars (Blong, 1993). For example, a 'design magnitude' earthquake in Sydney is predicted to cause, just in domestic construction, over \$10 billion damage and more than 5000 deaths. Most of this damage would be associated with unreinforced masonry construction such as low-rise apartment buildings. The damage bill for the entire built environment (with business interruption costs) could easily be an order of magnitude greater.

## Summary of Discovery Projects Proposals for Funding to Commence in 2008

**DP0880884** Dr PV Grundler; Prof A Pring; Prof P Spry; Prof B Casey; Prof L Helm

**Approved Project Title** **The Geochemistry of Tellurium in Hydrothermal Environments and the Gold-Tellurium Association**

**2008 :** \$ 145,000  
**2009 :** \$ 129,000  
**2010 :** \$ 114,000

**Primary RFCD** 2603 GEOCHEMISTRY

**Administering Organisation** The University of Adelaide

### Project Summary

Gold and base metal mining are some of Australia's principal export earners. Thus, improving the country's mining and geological exploration capabilities will be a considerable economic benefit to the whole community. The results of the project will yield information concerning how gold deposits form, improved techniques for gold exploration, and more environmentally friendly techniques for the processing of gold-telluride ores.

**DP0878342** Prof RS Hill; Dr TJ Brodribb; Dr GJ Jordan

**Approved Project Title** **The role of atmospheric carbon dioxide in fostering hyperdiversity in Australian conifer palaeofloras**

**2008 :** \$ 80,352  
**2009 :** \$ 79,286  
**2010 :** \$ 74,244

**Primary RFCD** 2707 ECOLOGY AND EVOLUTION

**Administering Organisation** The University of Adelaide

### Project Summary

Human intervention into atmospheric processes appears to have triggered an excursion in atmospheric CO<sub>2</sub> to levels unknown for millennia. Our ability to predict the environmental implications of such a change will play a major role in ameliorating the social and financial impact upon Australia. This project examines the ecology and function of forests that grew under CO<sub>2</sub> levels considerably higher than present, and will provide an invaluable insight into how future biological systems will function. The evidence produced by this project has potential economic flow-ons, particularly for long-term planning of softwood versus hardwood plantation forestry.

**DP0878258** Prof RR Hillis; Dr MR Tingay; Dr CK Morley; Prof KR McClay; Dr B Müller

**Approved Project Title** **Present-Day Stress and Tectonics of Deltas and Deepwater Fold-Thrust Belts**

**2008 :** \$ 129,297  
**2009 :** \$ 149,000  
**2010 :** \$ 144,000

**Primary RFCD** 2601 GEOLOGY

**Administering Organisation** The University of Adelaide

### Project Summary

The key benefit of the project will be to advance our understanding of the geological processes that control the development of deltas, and of the fold-thrust belts located in deepwater adjacent to deltas, by analysis of five examples worldwide. Global hydrocarbon exploration is successfully moving to deepwater fold-thrust belts. One of Australia's key under-explored frontier petroleum provinces is the Australian Bight Basin. The prospective parts of this basin comprise delta/deepwater fold-thrust belt systems and analysis of more data-rich systems worldwide will help provide the geological knowledge required to help re-invigorate exploration in the Bight Basin.

## Summary of Discovery Projects Proposals for Funding to Commence in 2008

**DP0879612** Prof RR Hillis; Dr SP Holford; Dr P Green; Dr MS Stoker

**Approved Project Title** **Compressional Deformation and Uplift of Australia's Passive Southern Margin**

**2008 :** \$ 130,000

**2009 :** \$ 104,000

**2010 :** \$ 99,000

**2011 :** \$ 80,000

**Primary RFCD** 2601 GEOLOGY

APD Dr SP Holford

**Administering Organisation** The University of Adelaide

### Project Summary

The key project benefit will be to advance our understanding of the processes which cause active deformation of continental margins that are predicted by plate tectonic theory to be passive. We will analyse Australia's 'passive' southern margin because it is an ideal natural laboratory in which to investigate the causes of the deformation of 'passive' continental margins. Hydrocarbon exploration interest and investment has waned along much of Australia's southern margin because of lack of understanding of the relative age of the formation of potentially hydrocarbon-bearing structures and the timing of hydrocarbon charge. This project will clarify their relative ages.

**DP0878499** A/Prof MJ James; Prof RA Gibson

**Approved Project Title** **Omega-3 fats in vegetable oils: Improving their benefits**

**2008 :** \$ 85,000

**2009 :** \$ 87,500

**2010 :** \$ 85,000

**Primary RFCD** 3212 PUBLIC HEALTH AND HEALTH SERVICES

**Administering Organisation** The University of Adelaide

### Project Summary

While authoritative health agencies in Western countries recommend increased intake of omega-3 fats, fish stocks world-wide are already under stress and could not sustain the general uptake of this advice. Nor could aquaculture expansion meet the demand for omega-3 fats with current practices of using wild fish or fish meal or fish oil for feed. This project will address the knowledge gap in how fish handle the omega-3 fatty acids from vegetable oils such as canola, flaxseed and echium. Australia is well placed in agriculture and aquaculture to capture the value of this research.

**DP0878741** Dr MS Lee; Dr MN Hutchinson

**Approved Project Title** **Insights into macroevolution using a model adaptive radiation of lizards (Lerista)**

**2008 :** \$ 88,000

**2009 :** \$ 88,000

**2010 :** \$ 88,000

**Primary RFCD** 2705 ZOOLOGY

**Administering Organisation** The University of Adelaide

### Project Summary

Australia has arguably the greatest diversity of lizards in the world. This research will investigate how this diversity arose, using *Lerista*, a radiation of skinks with over 80 species spanning fully limbed to totally legless forms. We will investigate how development, geographic distribution and morphological features have influenced the evolutionary diversification of *Lerista*. We will also map the biodiversity of *Lerista* across Australia using (and thus testing) several alternative methods of quantifying biodiversity. Such knowledge is important as many hotspots of *Lerista* diversity are coming under increasing human pressure (e.g. mid-coast of WA), and many species have very localised ranges.

## Summary of Discovery Projects Proposals for Funding to Commence in 2008

**DP0878100** Prof SF Lincoln; Prof R Prud'homme  
**Approved Project Title** **Controlled Supramolecular Assembly in Aqueous Molecular and Macroscopic Systems**  
**2008 :** \$ 115,000  
**2009 :** \$ 114,000  
**2010 :** \$ 109,000  
**Primary RFCD** 2599 OTHER CHEMICAL SCIENCES  
**Administering Organisation** The University of Adelaide

### Project Summary

This project uses benign and mainly bio-degradable materials to produce hydrogels which are remarkable new materials containing at least ninety-eight percent water which may be made into films. Similar films are proving to be valuable in covering wounds, particularly serious burns, and in greatly improving wound healing and tissue growth. They may also be useful in new coating and aircraft de-icing technologies. These environmentally friendly materials are likely to find a multitude of uses as their development progresses. Young Australians involved in the project will gain experience in cutting edge science, its practical applications, and in international collaboration - a training essential to Australia's future prosperity.

**DP0881057** Dr L Mackenzie; Prof P Sanders  
**Approved Project Title** **Electrophysiological and Anatomical Characterization of the Coronary Sinus Musculature and its Relationship to the Atria**  
**2008 :** \$ 147,000  
**2009 :** \$ 145,000  
**2010 :** \$ 142,500  
**Primary RFCD** 3206 MEDICAL PHYSIOLOGY  
**Administering Organisation** The University of Adelaide

### Project Summary

This series of experiments will characterise the normal coronary sinus musculature and its connectivity to the atria of the heart and establish their electrical relationships. The underlying characteristics of the muscular connections will also be evaluated with a view to possible future manipulations of the system. Understanding normal heart impulse propagation is paramount before we can understand and develop treatments for dealing with heart problems. This information will facilitate the development of techniques to treat and prevent heart rhythm disorders that are a common cause of morbidity in the community.

**DP0879165** Prof MJ McLaughlin; Dr DJ Chittleborough; Dr JK Kirby; Dr GM Hettiarachchi  
**Approved Project Title** **The fate and toxicity of nanoparticles in the terrestrial environment**  
**2008 :** \$ 110,000  
**2009 :** \$ 110,000  
**2010 :** \$ 90,000  
**Primary RFCD** 3001 SOIL AND WATER SCIENCES  
**Administering Organisation** The University of Adelaide

### Project Summary

This research aims to provide the knowledge needed to understand the fate and effects of new nanoparticulate metal products in Australian landscapes. The movement and environmental effects of manufactured nanoparticulates are unknown, partly because of the difficulty of measuring and detecting these nano-products in the environment. This project will develop techniques to identify manufactured nanoparticulate metals in soils, and to determine the potential adverse effects of these products on plants and soil organisms. This will indicate the need, if any, for controls on the disposal or dispersal of nano-sized metal products in the terrestrial environment.

## Summary of Discovery Projects Proposals for Funding to Commence in 2008

**DP0880436** Prof TM Monro; Dr Y Ruan  
**Approved Project Title** **Sub-wavelength light confinement**  
**2008 :** \$ 165,000  
**2009 :** \$ 164,000  
**2010 :** \$ 159,000  
**Primary RFCD** 2404 OPTICAL PHYSICS  
APD Dr Y Ruan  
**Administering Organisation** The University of Adelaide

### Project Summary

This project will introduce and demonstrate new concepts for confining and patterning light on sub-wavelength scales. Building on Australian expertise in optical fibre technologies, this fundamental research will enhance Australia's position at the forefront of international research in the nanoscale control of light. These concepts also promise to lead to patentable new tools for ultra high-resolution imaging and for manipulating materials. This project will enhance Australia's international links, build on a range of national research programs, and provide training of researchers in photonics, which will be of benefit to Australian industry and research.

**DP0877924** Prof GC Nerlich  
**Approved Project Title** **Spacetime: its metaphysical type, its reality, its methodological role in philosophy**  
**2008 :** \$ 25,200  
**2009 :** \$ 22,000  
**2010 :** \$ 20,000  
**Primary RFCD** 4401 PHILOSOPHY  
**Administering Organisation** The University of Adelaide

### Project Summary

Australian philosophy has a high standing both among academic disciplines in this country and internationally. Studies in metaphysics are at its core. The tradition of excellent Australian work in the area of space and time, beginning with Samuel Alexanders's *Space Time and Deity*, 1920, has lapsed somewhat and needs to be revitalised and extended in this century. This project builds on that tradition and extends it both in the direction of the philosophy of science of space and time, of pure metaphysics and its methodology.

**DP0880983** A/Prof DC O'Carroll; Dr K Nordstrom  
**Approved Project Title** **Target detection in visual clutter**  
**2008 :** \$ 80,000  
**2009 :** \$ 80,000  
**2010 :** \$ 78,648  
**Primary RFCD** 3207 NEUROSCIENCES  
APD Dr K Nordstrom  
**Administering Organisation** The University of Adelaide

### Project Summary

The interdisciplinary nature of the project will offer a stimulating environment for training a postdoctoral worker in the hot topic of computational neuroscience. While computationally expensive solutions to moving target detection in clutter have been implemented using conventional engineering, this project will offer insight into the efficiency of the biological brain (with benefit of millions of years of evolution towards compact, economical and optimal solutions). The results will assist development of efficient artificial intelligence. It will also assist our ongoing collaborations with defence partners to develop and apply algorithms in artificial vision systems.

## Summary of Discovery Projects Proposals for Funding to Commence in 2008

**DP0880559** Dr JP Opie; Dr PC Lyon; Prof R Adolphs; Dr F Keijzer; Dr C Craver

**Approved Project Title** Foundations for a Cognitive Biology

**2008 :** \$ 78,648

**2009 :** \$ 81,000

**2010 :** \$ 95,134

**Primary RFCD** 4401 PHILOSOPHY

**APD** Dr PC Lyon

**Administering Organisation** The University of Adelaide

### Project Summary

Understanding cognition has important implications for individual and social wellbeing and thus for the nation's economic health. Until the many disciplines concerned with cognition can effectively integrate their disparate findings, public investment in cognitive research will not yield benefits to its potential. The project aims to produce a coherent model of cognition that will facilitate new cross-disciplinary approaches to research, thereby improving Australia's means of promoting and maintaining healthy cognitive function and treating cognitive dysfunction.

**DP0880087** Dr X Peng

**Approved Project Title** Population ageing, labour mobility and sustainability of China's economic growth - a dynamic general equilibrium analysis

**2008 :** \$ 95,000

**2009 :** \$ 80,000

**2010 :** \$ 80,000

**Primary RFCD** 3705 DEMOGRAPHY

**APD** Dr X Peng

**Administering Organisation** The University of Adelaide

### Project Summary

China is Australia's second largest trading partner. This project will enable Australian policymakers and business partners to gain better understanding of China's macroeconomic performance between 2008 and 2030. Secondly, China is the second largest source of immigrants to Australia. Given that Australia's population is ageing and labour shortages are expected, Australia may benefit increasingly from the flow of Chinese immigrants. The project will provide Australian policymakers with detailed labour supply forecasts in China disaggregated by age, sex, sector and region that will enable them to develop targeted immigration policies and effectively harness the flow of Chinese emigrants to Australia.

**DP0881006** A/Prof RJ Protheroe; Prof RD Ekers; Prof T Stanev; Dr J Alvarez-Muniz

**Approved Project Title** Ultra High Energy Cosmic Ray and Neutrino Astronomy using Radio Telescopes

**2008 :** \$ 115,000

**2009 :** \$ 114,000

**2010 :** \$ 109,000

**Primary RFCD** 2401 ASTRONOMICAL SCIENCES

**Administering Organisation** The University of Adelaide

### Project Summary

There will be an increase in Australian visibility in the high energy astrophysics community and stronger links between and within the fields of radio astronomy and high energy astrophysics in Australia, and internationally. This project will enhance Australian participation in the international Square Kilometre Array. By making observations using the Australia Telescope we may discover the first UHE neutrino - this would have huge impact and prestige for Australia. The technology developed resulting from this project will contribute to Australia's IT base.

## Summary of Discovery Projects Proposals for Funding to Commence in 2008

**DP0881545** Prof JW Randles; Prof A Rezaian

**Approved Project Title** **Enhancement of monopartite geminivirus pathogenicity by satellite DNA beta encoded betaC1 protein: the role of host factors**

**2008 :** \$ 85,000

**2009 :** \$ 85,000

**Primary RFCD** 2703 MICROBIOLOGY

**Administering Organisation** The University of Adelaide

### **Project Summary**

Australian incursions of geminiviruses are uncontrollable due to their unique mode of spread by whiteflies. The first incursion in Darwin in 1970 has spread to Far Northern Queensland. The second in SE Queensland in 2006 is estimated to cause \$500 million loss to horticulture. Our \$2 billion cotton industry is threatened by cotton leaf curl diseases from South Asia, where DNA beta enhances virus replication and disease severity. DNA beta has the potential to enter Australia with several different geminiviruses and to spread into others by co-infection, which requires research on detection and pathogenesis of DNA beta.

**DP0878144** Prof IM Reid; Prof RA Vincent; Mr J Hecht

**Approved Project Title** **The aeronomy of the atmosphere between 50 and 110 km**

**2008 :** \$ 190,000

**2009 :** \$ 200,000

**2010 :** \$ 125,000

**Primary RFCD** 2499 OTHER PHYSICAL SCIENCES

**Administering Organisation** The University of Adelaide

### **Project Summary**

Signals of climate change in the 50 to 110 km height region of the atmosphere are becoming more evident. This region shields the surface from extreme UV radiation and so understanding any changes in the region is important for life. We will improve our understanding of the region and look for additional evidence of changes. We will also contribute to improvements in numerical weather prediction models.

**DP0881071** Prof O Schmidt

**Approved Project Title** **Functional analysis of Bacillus thuringiensis crystal toxins**

**2008 :** \$ 85,000

**2009 :** \$ 85,000

**2010 :** \$ 85,000

**Primary RFCD** 3002 CROP AND PASTURE PRODUCTION

**Administering Organisation** The University of Adelaide

### **Project Summary**

Pore-forming toxins, such as anthrax, hemolysin, cholera and diphtheria toxins, are among the most virulent microbial toxins, posing a threat to humans and livestock. We are using a novel functional approach to test possible lectin and antimicrobial peptide functions of a typical and economically important pore-forming toxin, the crystal endotoxin from *Bacillus thuringiensis*, to examine why toxicity of the lectin-containing toxin is restricted to invertebrates only, while the amphipathic peptide alone is also toxic to many vertebrate cells. The outcome of these experiments has important implications for the sustainable use of biopesticides and for the prevention and containment of infectious diseases.

## Summary of Discovery Projects Proposals for Funding to Commence in 2008

**DP0878367** Dr M Sheng

**Approved Project Title** **A Platform for Rapid and Flexible Development of Context-Aware Web Services**

**2008 :** \$ 75,118

**2009 :** \$ 72,118

**2010 :** \$ 69,118

**Primary RFCD** 2801 INFORMATION SYSTEMS

**Administering Organisation** The University of Adelaide

### Project Summary

Context awareness is one of the most exciting trends in computing today, and it holds the potential to make our daily life more productive, convenient and enjoyable. The proposed project will produce a comprehensive platform for developing context-aware Web services, which will facilitate ready implementation of many innovative applications and make important contributions to Australian society and the national economy. One such application is an intelligent seniors assistance service that will improve quality of life for senior citizens while helping them maintain an independent lifestyle. This project will also place Australia at the forefront of Web service development.

**DP0878917** Dr M Sheng; Prof PH Cole

**Approved Project Title** **Towards Scalable, Internet-Based RFID Traceability Networks**

**2008 :** \$ 80,000

**2009 :** \$ 80,000

**2010 :** \$ 75,000

**Primary RFCD** 2801 INFORMATION SYSTEMS

**Administering Organisation** The University of Adelaide

### Project Summary

Food and drug safety is a major public health issue in Australia. Recent events involving poisoning of chocolate bars and paracetamol tablets in Australia have demonstrated the urgent need for improved ways of locating and recalling commercial products that have been released into the community. This project will develop novel techniques for locating items in large-scale distribution networks driven by RFID (Radio Frequency Identification) technology. The outcomes of the project will make it easier to rapidly and accurately pinpoint product locations in the event of problems such as an illness outbreak due to contaminated food or counterfeited drugs.

**DP0878530** Dr WL Soong; Prof CV Nayar; Dr N Ertugrul

**Approved Project Title** **Innovative Grid-Connected, Small-Scale Wind Turbine Generators Offering Low Cost and Wide Operating Speed Range**

**2008 :** \$ 95,000

**2009 :** \$ 95,000

**2010 :** \$ 75,000

**Primary RFCD** 2909 ELECTRICAL AND ELECTRONIC ENGINEERING

**Administering Organisation** The University of Adelaide

### Project Summary

Growing concerns about sustainability issues with fossil fuels have resulted in strong interest in wind power worldwide. Grid-connected inverters are an efficient way of utilising small wind turbines on domestic, farming or small commercial properties which have access to the power grid. Existing small-scale, grid-connected wind turbines are expensive and have a limited operating wind speed range. We are investigating new designs for low-cost wind turbine generators which can produce power over a wide range of wind speeds. The project should result in a greater application of small-scale wind generators in Australia and will lead to reductions in fossil fuel usage and greenhouse gas emissions.

## Summary of Discovery Projects Proposals for Funding to Commence in 2008

**DP0877945** Dr P Strelan

**Approved Project Title** **A new conceptualization of forgiveness: Altruistic and self-interested foci as predictors of psychological costs and benefits of forgiveness**

**2008 :** \$ 110,000  
**2009 :** \$ 49,000  
**2010 :** \$ 65,000

**Primary RFCID** 3801 PSYCHOLOGY

**Administering Organisation** The University of Adelaide

### Project Summary

The project makes a pioneering theoretical contribution by recognising that forgiveness possesses both altruistic and self-interested dimensions. This reconceptualisation will result in three main community benefits: [1] researchers and practitioners will be better able to predict when forgiveness is most beneficial and when it is psychologically costly; [2] forgiveness strategies and principles will be more appropriately and strategically applied across different social contexts; and [3] public understanding of what it really means to forgive will be enhanced, thereby increasing the extent to which forgiveness may be embraced in the population.

**DP0881509** Dr P Thomas; Dr RH Lovell-Badge

**Approved Project Title** **Function and redundancy of SOX genes in the mammalian sex determination pathway**

**2008 :** \$ 115,000  
**2009 :** \$ 115,000  
**2010 :** \$ 115,000

**Primary RFCID** 2702 GENETICS

**Administering Organisation** The University of Adelaide

### Project Summary

We are studying a mouse model of abnormal sex organ development in which genetically female mice develop as males. Our basic research program will lead to greater understanding of the genetic switch controlling the formation of male and female characteristics. This research should in turn provide insight into the causes of defects in patients with disorders of sex development, helping to inform the difficult clinical decisions that need to be made for their treatment, and ultimately leading to better management and therapeutic strategies. Our studies may also provide unique methods to control the exotic mouse population, using the daughterless strategy.

**DP0878802** Dr AJ van den Hengel; Dr P Torr

**Approved Project Title** **Interactive 3D modelling from video**

**2008 :** \$ 80,000  
**2009 :** \$ 75,000  
**2010 :** \$ 70,000

**Primary RFCID** 2802 ARTIFICIAL INTELLIGENCE AND SIGNAL AND IMAGE PROCESSING

**Administering Organisation** The University of Adelaide

### Project Summary

Many industry sectors are becoming increasingly reliant on the production of 3D models from imagery. These models are used for purposes such as video post-production, virtual reality, reverse engineering, 3D medical imaging, planning and simulation. By developing technologies and expertise in these areas, and particularly in model generation, within Australia, the research team aim to provide a capacity of significant value to Australian industry and a valuable export opportunity.

## Summary of Discovery Projects Proposals for Funding to Commence in 2008

**DP0881850** A/Prof ML Whitelaw  
**Approved Project Title** **Single Minded 2: Cross coupling or specificity within the bHLH/PAS transcription factor family?**  
**2008 :** \$ 107,852  
**2009 :** \$ 116,352  
**2010 :** \$ 106,352  
**Primary RFCD** 2702 GENETICS  
**Administering Organisation** The University of Adelaide

### Project Summary

Understanding the mechanisms of action of SIM2 may lead to novel ideas towards drug development for diseases such as Down syndrome and cancer. The SIM2 protein can interfere with activity of the related Hypoxia Inducible Factor (HIF), a protein important in stress response and recovery from stroke. Understanding the molecular basis of this interference could aid current strategies being used to manipulate HIF for pharmaceutical benefit.

**DP0878058** Prof MA Williams; Dr MR Talbot; Dr JC Woodward; Prof GA Duller; Prof MG Macklin  
**Approved Project Title** **Environmental impacts of climate change in the Nile basin over the past 30,000 years**  
**2008 :** \$ 90,000  
**2009 :** \$ 80,000  
**2010 :** \$ 80,000  
**Primary RFCD** 2601 GEOLOGY  
**Administering Organisation** The University of Adelaide

### Project Summary

There is growing international and national concern over the possible environmental, economic and social impacts of global and regional climate change. This project brings together a multi-disciplinary team of internationally recognised research leaders and the resources they command to investigate the environmental impacts of climatic changes in the Nile basin over geologically recent times. The outcome will be a more comprehensive understanding of how a major river system responds to global and regional climate change, and will provide an enhanced conceptual basis for anticipating how drainage systems such as the Murray-Darling could respond to future change.