

**Australian Capital Territory**

**The Australian National University**

**DP0770659** Dr PM Allison

**Approved Project Title** **Food, drink and sociality in the early Roman Empire and their significance for understanding ancient family and community life**

**2007 :** \$121,342  
**2008 :** \$145,287  
**2009 :** \$120,969  
**2010 :** \$60,300  
**2011 :** \$97,446

**Primary RFCD** 4302 ARCHAEOLOGY AND PREHISTORY

QEII Dr PM Allison

**Administering Organisation** The Australian National University

**Project Summary**

To understand and be secure in the present we must understand the past. The Roman world was multi-cultural and multi-ethnic - a foundation for modern European and Mediterranean cultures. It, therefore, has deep significance for contemporary Australia and its migrant populations. Knowledge of Roman social practices can provide unique insights into issues and dilemmas facing Australian society. Eating behaviours and food practices are of great public interest and understanding the foodways of people in the past is vital to these debates. This project also places Australia at the forefront of archaeological research and guarantees its international prominence in Roman social history.

**DP0773860** Dr AA Ashrafi

**Approved Project Title** **Pulsed Laser Deposition of Zinc Oxide-based Materials for Optoelectronic Device Applications**

**2007 :** \$120,000  
**2008 :** \$90,000  
**2009 :** \$90,000

**Primary RFCD** 2914 MATERIALS ENGINEERING

APD Dr AA Ashrafi

**Administering Organisation** The Australian National University

**Project Summary**

Zinc oxide (ZnO) is expected to play an important role in new optoelectronic components and systems such as visible and ultraviolet light sources, high temperature electronics and window materials for solar cells. This project will not only investigate the fundamental issues related to the growth of ZnO but also develop some solutions to realise the true potentials of ZnO-based materials. This project is at the forefront of a number of important fields, and therefore the outcomes are expected to appeal to a large community of academics, national security and the high technology industries. It will position the Australian researchers among the pioneering groups in this area.

**DP0771018** Dr PR Backwell; Dr MD Jennions

**Approved Project Title** **The intensity of sexual selection with density and age and its importance in the evolution of animal populations**

**2007 :** \$90,000  
**2008 :** \$88,000  
**2009 :** \$85,000

**Primary RFCD** 2707 ECOLOGY AND EVOLUTION

**Administering Organisation** The Australian National University

**Project Summary**

Australia is internationally highly regarded for the quality of its research into the basic biology of its fauna. This study will provide information on the breeding biology of an endemic marine species distributed across the Northern tropics of Australia. It addresses a pure research question of great theoretical interest. However, it also provides valuable training opportunities for postgraduate students in the practicalities of conducting tropical field biology and the execution of field experiments. These are essential skills that can readily be transferred to applied biological problems. Maintaining a pool of skilled field biologists is essential for the on-going success of programmes in conservation and ecosystem management.

## Summary of Discovery Projects Proposals for Funding to Commence in 2007

**DP0774491** Prof MC Ball; Dr CE Lovelock; Prof NM Holbrook

**Approved Project Title** **Interactive effects of salinity and nutrients: linking physiological processes with patterns in mangrove forest productivity**

**2007 :** \$90,000

**2008 :** \$88,000

**2009 :** \$85,000

**Primary RFCD** 2704 BOTANY

**Administering Organisation** The Australian National University

### Project Summary

The proposed research will provide insight into physiological mechanisms that underpin mangrove productivity along salinity and aridity gradients, and determine how these factors affect plant responses to nutrient enrichment. Plant traits that increase salt and drought tolerance will be identified, thereby assisting development of plant varieties suited to Australian conditions. The results will also contribute to development of process-based models to better manage mangrove resources with climate change and increasing nutrient influx from urban or agricultural activities. Such models are essential for managing mangrove productivity for sustainable fisheries, and protecting the ecological well being of the coastal zone.

**DP0771749** Prof MG Banwell; Prof MJ Garson

**Approved Project Title** **Total Synthesis and Biological Evaluation of Australian Sponge Metabolites**

**2007 :** \$181,151

**2008 :** \$168,509

**2009 :** \$185,086

**Primary RFCD** 2503 ORGANIC CHEMISTRY

**Administering Organisation** The Australian National University

### Project Summary

The development of functional syntheses of Australian natural products and certain analogues of ecological and therapeutic significance will emerge. Such activities will lead to the identification and evaluation of molecular entities of value in managing marine environments, reduce the need for removal of organisms from marine environments both within and outside of Australia as well as helping maintain and enhance chemical synthesis capacity within the country. The proposed studies could lead to the identification of related natural products produced by organisms on the Great Barrier Reef and that may display even more potent activities and/or complementary ecological roles.

**DP0774597** Dr GR Barker; Prof L Waverman

**Approved Project Title** **The impact of Information and Communications Technology (ICT) on economic growth and productivity, and the role of Government Policy**

**2007 :** \$55,000

**2008 :** \$58,000

**Primary RFCD** 3402 APPLIED ECONOMICS

**Administering Organisation** The Australian National University

### Project Summary

While it is widely agreed that the use of Information and Communications Technology (ICT) has many national benefits, the role of law and policy on the extent of ICT uptake and related productivity effects have not been directly researched. A stronger research base on the role of law and policy on the use and economic effects of ICT can potentially create a number of national and community benefits. It can assist Governments and firms to isolate the drivers of the information economy and economic growth; it can facilitate the development of appropriate policy and legislation, and inform better administration of existing policies.

## Summary of Discovery Projects Proposals for Funding to Commence in 2007

**DP0774079** Prof PS Bellwood; Dr MF Oxenham; Dr JG Stevenson

**Approved Project Title** **The Creation of Southeast Asian Peoples and Cultures, 3500 BC to AD 500**

**2007 :** \$91,500  
**2008 :** \$130,000  
**2009 :** \$100,000  
**2010 :** \$30,118

**Primary RFCD** 4302 ARCHAEOLOGY AND PREHISTORY

**Administering Organisation** The Australian National University

### Project Summary

This project will make a significant intellectual contribution to enhancing Australia's awareness of the histories of neighbouring populations in Southeast Asia that in total exceed 350 million people. It will thus contribute to a better understanding of our region and the world. The project will also benefit the indigenous populations and future researchers of neighbouring Southeast Asian countries, through training, research collaboration and the dissemination of original research results, enhancing Australia's status as a supportive neighbour in the region.

**DP0774193** Prof PG Bouwknegt

**Approved Project Title** **Generalized Geometries and their Applications**

**2007 :** \$95,000  
**2008 :** \$90,000  
**2009 :** \$85,000

**Primary RFCD** 2301 MATHEMATICS

**Administering Organisation** The Australian National University

### Project Summary

Geometry is one of the pillars of both ancient and modern mathematics. It also plays a vital role in many scientific applications, in particular in physics. Progress on the mathematical aspects and the applications have often gone hand in hand, as for example with differential geometry and general relativity. Geometry is a very fruitful area for interdisciplinary research.

Australia has a long tradition and a recognized research strength in Mathematical Physics, and this project will contribute to maintaining that status. An integral part of this proposal is student involvement and postgraduate research training, for which the topic lends itself particularly well.

**DP0772382** Dr MA Brady; Dr BH Hunter

**Approved Project Title** **Indigenous Australians and alcohol control: The impact of hotel ownership on harm reduction and social and economic development**

**2007 :** \$125,000  
**2008 :** \$129,000  
**2009 :** \$124,000  
**2010 :** \$115,000  
**2011 :** \$115,000

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

QEII Dr MA Brady

**Administering Organisation** The Australian National University

### Project Summary

This project investigates Indigenous social enterprise that intersects with the alcohol industry. Findings will benefit the Indigenous governing bodies of licensed premises and their communities, health and liquor regulation authorities and the country as a whole. The research addresses policy uncertainty surrounding Indigenous ownership of licensed premises and whether this achieves anticipated economic and social goals and reduces alcohol-related problems. Harm minimisation is an object of liquor licensing acts in most jurisdictions in Australia. Indigenous-owned licensed premises are well-placed to implement responsible alcohol service and promote harm minimisation in keeping with Australian best practice.

## Summary of Discovery Projects Proposals for Funding to Commence in 2007

**DP0771043** Dr JJ Brocks; Dr SC George; Prof JF Banfield

**Approved Project Title** **Molecular fossils, environmental genomics and the natural history of an Australian salt lake**

**2007 :** \$90,000

**2008 :** \$88,000

**2009 :** \$85,000

**Primary RFCD** 2603 GEOCHEMISTRY

**Administering Organisation** The Australian National University

### Project Summary

Increasing salinity of lakes is a critical problem for sustainable water supply in Australia. To comprehend the consequences of human-induced salinization, it is crucial to understand salt lakes at their most fundamental level. This project develops pioneering technologies to elucidate the microbial ecology and geochemistry of salt lakes in unprecedented detail. It will open new pathways to unravel how microbial ecosystems adapt to increasing salinization, and how they reacted to climate fluctuations in the past. Students will gain multidisciplinary skills in environmental genomics, proteomics and geochemistry, a unique combination that will become decisive for understanding and preserving ecosystems on our continent.

**DP0774147** Prof DJ Chalmers; Prof N Block; Prof S Siegel

**Approved Project Title** **The High-Level Structure of Consciousness**

**2007 :** \$70,000

**2008 :** \$60,000

**2009 :** \$70,000

**Primary RFCD** 3803 COGNITIVE SCIENCE

**Administering Organisation** The Australian National University

### Project Summary

The study of consciousness is often regarded as the last great frontier for science. Work in this area has flowered recently, but it has focused on low-level aspects of consciousness, such as visual perception of color and shape. We aim to discover the high-level structure of consciousness, which involves attention, self-consciousness, and the unity of consciousness, among other things. The project involves international collaboration in a three-way interaction between philosophy, cognitive science, and phenomenology. This work has potential social benefits, for example in understanding attention in distracted drivers, and potential medical benefits, in understanding breakdowns of the unity of consciousness in patients with mental illness

**DP0771841** Dr GR Clark

**Approved Project Title** **Colonization of the Mariana Islands and its implications for Indo-Pacific prehistory**

**2007 :** \$79,000

**2008 :** \$68,000

**2009 :** \$72,000

**Primary RFCD** 4302 ARCHAEOLOGY AND PREHISTORY

**Administering Organisation** The Australian National University

### Project Summary

The Asia-Pacific region, including Australia, is linked by seas and oceans that have been crossed by colonists in ancient as well as recent times. The most significant prehistoric migration was the movement of people out of southern China, into Taiwan, Island Asia and from there into Micronesia and across the Pacific. New investigations of the oldest sites in the Marianas will provide better understanding of early prehistoric maritime capacity, the connections between migrant groups who settled the islands of Asia and Oceania, and the processes of Indo-Pacific colonization. Improved knowledge of our neighbours capabilities and history is of clear national benefit to Australia.

## Summary of Discovery Projects Proposals for Funding to Commence in 2007

**DP0771133** Dr JD Close; Dr SM Scott; Dr CM Savage; Prof M Visser

**Approved Project Title** **Quantum Simulations with Dilute Gas Bose Einstein Condensates**

**2007 :** \$110,000

**2008 :** \$110,000

**Primary RFCD** 2402 THEORETICAL AND CONDENSED MATTER PHYSICS

**Administering Organisation** The Australian National University

### Project Summary

Fundamental scientific research, such as we propose, is an important contributor to the long term wealth and well being of the Nation. It shapes our culture, our ways of thinking, and our beliefs. It also contributes directly, and in the shorter term, through the technology development that accompanies scientific research at the frontiers of knowledge. The students participating in this research will develop skills in innovation, intellectual property management, and commercialisation - all of which are critical to the Nation's future.

**DP0774260** A/Prof VS Craig

**Approved Project Title** **Salt, Bubbles and Life; A study of ion specificity in colloid science**

**2007 :** \$105,000

**2008 :** \$80,000

**2009 :** \$60,000

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

**Administering Organisation** The Australian National University

### Project Summary

A colloidal solution is a liquid that contains a finely dispersed material. The properties of these solutions are critical in many industrially important practices and in the everyday processes of life. Though not understood, it is observed that the type of salt in solution controls how the colloid behaves. Through a series of very careful experiments we seek to learn precisely how different salts influence the properties of a colloidal solution. This world-leading research will enable us to improve our fundamental understanding of colloids and thereby facilitate advances in topics as diverse as enzymatic action and minerals purification, ensuring Australia remains at the forefront of science in this field.

**DP0770332** Prof A Curthoys

**Approved Project Title** **Indigenous peoples, the British Empire, and self-government for the Australian colonies.**

**2007 :** \$171,209

**2008 :** \$171,812

**2009 :** \$195,230

**2010 :** \$155,129

**2011 :** \$95,340

**Primary RFCD** 4301 HISTORICAL STUDIES

APF Prof A Curthoys

**Administering Organisation** The Australian National University

### Project Summary

This study enhances our understanding of the foundations and representative functions of Australian democratic institutions, especially as they concern Indigenous-settler-missionary-imperial relationships. In drawing out the connections between two major questions for Australian history and modern society - democracy and Indigenous dispossession - the project will contribute deeper historical knowledge to current public debate about Indigenous policy past and present. It will also illuminate the importance of understanding Australian history in broad transcolonial and transnational contexts and enhance the contribution of Australian historians to imperial, missionary, and comparative settler-society histories.

## Summary of Discovery Projects Proposals for Funding to Commence in 2007

**DP0772180** Prof P De Deckker; Prof NJ Tapper; Dr GE Allison; Dr D De Beer; Prof K Hinrichs; Dr E Schefuss; Dr JW Stuu

**Approved Project Title** **The composition and transport of Australian air-borne dust: critical to continental and marine environments**

**2007 :** \$255,000  
**2008 :** \$250,000  
**2009 :** \$240,000

**Primary RFCD** 2603 GEOCHEMISTRY

**Administering Organisation** The Australian National University

### Project Summary

This project will determine the composition of Australian airborne dust and effects on the environment and in particular soils, rainforests and the marine realm, including reefs. 'Fingerprinting' the chemical and microbiological content of aeolian dust is of particular relevance to determining its impact on the health of the Australian people and environment. Atmospheric conditions propitious for dust entrainment and transport will be determined, and in particular atmospheric exchanges between Indonesia, southern Africa and Australia will be established. The relevance of aeolian dust to climate, ecosystems and biosecurity in our region will be established through the study of marine and lacustrine cores.

**DP0771188** Dr AS Desyatnikov; Prof YS Kivshar; Prof WZ Krolikowski

**Approved Project Title** **Singular photonics: twisted light and optical vortices**

**2007 :** \$190,000  
**2008 :** \$180,000  
**2009 :** \$180,000

**Primary RFCD** 2404 OPTICAL PHYSICS

**Administering Organisation** The Australian National University

### Project Summary

This project will help to establish and support a world-leading research team in Australia in the field of singular photonics and the physics of twisted light; it will help to return the leading positions of the Australian physics in the field of singular optics, and it will initiate a design of a novel generation of photonic devices operating with vortex beams. The project will promote this field in order to enhance its rapid development and facilitate the emergence of novel technologies in Australia; it will be combined with an extensive collaboration with top overseas groups attracting strong interest from industry.

**DP0773626** Prof JS Dryzek; Dr B Kanra

**Approved Project Title** **Communication Across Difference in a Democracy: Australian Muslims and the Mainstream**

**2007 :** \$87,000  
**2008 :** \$105,000  
**2009 :** \$77,030

**Primary RFCD** 3601 POLITICAL SCIENCE

APD Dr B Kanra

**Administering Organisation** The Australian National University

### Project Summary

The relationship between Islam and democracy is of central importance to Australia. In light of the possibility of radical Islamist recruitment within such communities, it is vital to establish the place of these communities in relation to other groups in the context of a liberal democratic society. The debate on the compatibility of Islamic and western values has been very prominent. Our focus on the attitudes of Australian Muslims and how they perceive themselves in relation to western values (and how the mainstream perceives Muslims) has implications for policy and social learning across Islamic and non-Islamic communities, and so more productive social and political relationships.

## Summary of Discovery Projects Proposals for Funding to Commence in 2007

**DP0773683** Prof AF Dulhunty; Dr R Dirksen  
**Approved Project Title** **Structural Determinants of an Intracellular Calcium Store.**  
**2007 :** \$90,000  
**2008 :** \$88,000  
**2009 :** \$85,000  
**Primary RFCD** 2706 PHYSIOLOGY  
**Administering Organisation** The Australian National University

### Project Summary

Understanding the molecular interactions between key proteins in calcium signalling in muscle and the heart will allow calcium signalling to be used as a platform for a variety of purposes. These include reducing the debilitating effects of changes in calcium signalling and muscle performance in aging and in genetically- or drug-induced disorders. The project will have benefits for Australian biotechnology since it will facilitate the design of novel compounds for treating muscle disorders in animals and humans, for improving meat quality and for use as insecticides. The project will facilitate graduate and undergraduate training in basic science with exposure to biotechnology, through our commercial partner Biotron.

**DP0772325** Dr ME Eagle  
**Approved Project Title** **Augustus Earle (1793-1838) and the roles of humanism and science in interpreting the world and its peoples.**  
**2007 :** \$110,000  
**2008 :** \$120,000  
**2009 :** \$80,000  
**Primary RFCD** 4199 OTHER ARTS  
APD Dr ME Eagle  
**Administering Organisation** The Australian National University

### Project Summary

The study relates to two national concerns. The first is Australia's capacity to understand and engage with its global environment. A closer understanding of Earle's and other artists' engagement with peoples around the world will feed the interest in past appraisals that already exists in global tourism. Secondly, a study of a past, influential form of collaboration between science and art will shed light on the issues in cross-disciplinary and cross-sectoral research collaborations between the arts and sciences in our own day. The study addresses an issue currently being considered by governments around the world, and in Australia by the Prime Minister's Science, Engineering and Innovation Council.

**DP0771519** Dr SM Eggins; Dr MJ Ellwood; Dr M Kelly  
**Approved Project Title** **The Southern Ocean's role in determining atmospheric CO2 levels: new insights from novel biogenic silica records of seawater pH**  
**2007 :** \$112,000  
**2008 :** \$78,000  
**2009 :** \$72,000  
**Primary RFCD** 2603 GEOCHEMISTRY  
**Administering Organisation** The Australian National University

### Project Summary

About half the emissions from the burning of fossil fuel since the Industrial Revolution have been absorbed by the oceans. However, considerable uncertainty surrounds the consequences of and the extent to which the oceans will continue to sequester CO2 into the future. This research will improve existing limited knowledge of the key biological and related ocean processes that transfer CO2 between the surface and depth, and the poorly understood effects on marine ecosystems of increasing ocean acidity due to CO2 absorption. This knowledge will contribute to predicting the course of future climate change and gauging the impacts on marine life and production systems.

## Summary of Discovery Projects Proposals for Funding to Commence in 2007

**DP0771158** Prof RG Elliman; Prof SH Choi; Dr J Valenta

**Approved Project Title** **Self-assembled semiconductor nanocrystals as functional materials for microelectronics, optoelectronics and photonics**

**2007 :** \$110,000  
**2008 :** \$105,000  
**2009 :** \$100,000

**Primary RFCD** 2402 THEORETICAL AND CONDENSED MATTER PHYSICS

**Administering Organisation** The Australian National University

### Project Summary

This project will study an important new class of nanoscale materials (semiconductor nanocrystals) with the aim of understanding the processes and mechanisms responsible for their structure and properties. It will have direct application to microelectronics, optoelectronics and photonics; will provide world-class training for Australia's future scientists and engineers in materials science and nanotechnology; and will further strengthen international scientific collaboration in these field.

**DP0772544** Dr HA Evans; Dr EE Gray

**Approved Project Title** **Understanding an important aspect of current-day family dynamics: the institution of repartnering in Australia**

**2007 :** \$71,000  
**2008 :** \$78,000  
**2009 :** \$82,000

**Primary RFCD** 3705 DEMOGRAPHY

**Administering Organisation** The Australian National University

### Project Summary

Families are at the core of Australia's social fabric. Understanding their dynamics assists in developing good policies and mechanisms to support them. Repartnering is an important aspect of current-day family dynamics. Yet we know relatively little about how these partnerships operate. This project will illuminate the patterns and issues central to repartnering and provide a significant contribution to social research. Results from this study will equip policy makers with appropriate knowledge to develop policies aimed at assisting families. The findings will contribute to growing international knowledge on family dynamics in repartnered relationships, as well as strengthen Australia's social and economic fabric through stronger families.

**DP0771413** Dr JR Evans; Prof S Von Caemmerer

**Approved Project Title** **What limits CO<sub>2</sub> diffusion inside leaves? Dissecting the diffusion path with Arabidopsis mutants.**

**2007 :** \$90,000  
**2008 :** \$88,000  
**2009 :** \$85,000

**Primary RFCD** 2704 BOTANY

**Administering Organisation** The Australian National University

### Project Summary

Human induced increase in atmospheric carbon dioxide is now generally accepted as contributing to global warming. Forecasting our future impact relies on models of terrestrial photosynthesis which use a signature in the atmosphere created by plants when they discriminate against the heavy stable isotope of carbon during photosynthesis. Discrimination between isotopes is affected by carbon dioxide diffusion within leaves and key steps in this process will be identified through the use of Arabidopsis mutants. Better representation of this process in models will improve estimates of terrestrial photosynthesis and climate change forecasts

## Summary of Discovery Projects Proposals for Funding to Commence in 2007

**DP0772231** Dr TA Faunce

**Approved Project Title** **Regulating Medical Nanotechnology in Australia: Developing Practical Improvements in Safety and Cost-Effectiveness Analysis**

**2007 :** \$62,294  
**2008 :** \$62,294  
**2009 :** \$30,000

**Primary RFCD** 3901 LAW

**Administering Organisation** The Australian National University

### Project Summary

This Project will provide policy makers with previously unavailable detailed information and well developed, innovative regulatory options, on how best to ensure safe and cost-effective use of one of the fastest growing areas of Australian research and development: medical nanotechnology. The Project will benefit Australian healthcare workers and patients who will increasingly be exposed to, and concerned about, the risks of medical nanotechnology. It will help to facilitate export and institutional uptake of Australian medical nanotechnology products, by ensuring they comply with world's best practise safety standards and offer value for public expenditure.

**DP0773815** Prof LK Fifield; Prof JM Chappell; Dr M Honda

**Approved Project Title** **Exposure dating with manganese-53, neon-21 and beryllium-10: a new toolkit for studying long-term landscape evolution**

**2007 :** \$130,000  
**2008 :** \$125,000  
**2009 :** \$123,000

**Primary RFCD** 2601 GEOLOGY

**Administering Organisation** The Australian National University

### Project Summary

Australia today is the driest inhabited continent but this was not always the case. Tens of millions of years ago the climate of Australia was considerably wetter. Then, several million years ago, aridity in Australia developed producing most of the desert features of the red Centre that we see today. The age of our deserts and other arid features are not, however, well known. This project will determine the age of desertification in Australia, thereby enhancing our understanding of such processes and the response of our landscape to changing climate.

**DP0771378** Dr J Fischer

**Approved Project Title** **Sustainable Farms: Tree Regeneration and the Future of Farmland Biodiversity**

**2007 :** \$181,000  
**2008 :** \$165,000  
**2009 :** \$162,000

**Primary RFCD** 2707 ECOLOGY AND EVOLUTION

APD Dr J Fischer

**Administering Organisation** The Australian National University

### Project Summary

While many government and community initiatives aim to enhance the sustainability of Australian farming systems, none specifically target the important regional-scale threatening process of tree recruitment failure. Unless this problem is addressed urgently, many farming landscapes may be virtually treeless in the future, with severe negative ramifications for both biodiversity and agricultural productivity. 'Sustainable Farms' will have major national and community benefits because it will: (1) identify more sustainable farming practices that are conducive to successful tree recruitment in the future, and (2) raise awareness about a much neglected threat to the sustainability of Australian farming landscapes.

## Summary of Discovery Projects Proposals for Funding to Commence in 2007

**DP0773920** Dr DO Fisher  
**Approved Project Title** **Extrinsic threats and biological predisposition in animal extinction and rediscovery**

**2007 :** \$105,000  
**2008 :** \$105,000  
**2009 :** \$98,287  
**2010 :** \$100,000  
**2011 :** \$96,950

**Primary RFCD** 2707 ECOLOGY AND EVOLUTION

ARF Dr DO Fisher

**Administering Organisation** The Australian National University

### Project Summary

A global extinction crisis looms, and Australia has a shocking record, especially of mammal extinctions. The results of this project to find how different threats affect each species will lead to management that focusses on species- and region-specific causes. This will help to prevent further extinctions of Australian mammals and other fauna. Many people hope that species of particular importance to us such as the thylacine have defied extinction, and will be rediscovered. This project will test which predictive factors can increase the chance of species rediscovery, and help management agencies plan for the expected number of future rediscoveries.

**DP0772283** Prof KC Freeman; Dr QA Parker; Dr GF Lewis; Dr TR Bedding; Dr J Bland-Hawthorn; Prof BK Gibson

**Approved Project Title** **Galactic Archaeology: A Radial Velocity Experiment to Unveil the History of the Milky Way**

**2007 :** \$340,000  
**2008 :** \$340,000  
**2009 :** \$300,000  
**2010 :** \$150,000  
**2011 :** \$150,000

**Primary RFCD** 2401 ASTRONOMICAL SCIENCES

**Administering Organisation** The Australian National University

### Project Summary

The RAVE survey is a large international project, conceived by Australians and involving astronomers from 10 countries. The survey is well-known internationally - it enhances Australia's scientific visibility and contributes very significantly to Australia's international collaborations in science. RAVE will be an outstanding resource for Australia's distinguished community of stellar and galactic astronomers, as well as for the international community. A large astronomical survey of this kind provides excellent opportunities for public outreach and stimulation of young Australian prospective scientists.

**DP0771978** Prof PM Gill; Prof MA Collins

**Approved Project Title** **Molecular Energies and Non-Bonded Interactions**

**2007 :** \$170,000  
**2008 :** \$163,000  
**2009 :** \$170,000

**Primary RFCD** 2403 ATOMIC AND MOLECULAR PHYSICS; NUCLEAR AND PARTICLE PHYSICS; PLASMA PH

**Administering Organisation** The Australian National University

### Project Summary

The development of new techniques that allow non-bonded chemical interactions to be modelled and predicted reliably and accurately will allow researchers in the chemical, and pharmaceutical sciences to predict the physical and chemical behaviour of moderately large molecular systems with an accuracy and efficiency that has not previously been possible. The software that will result will enable cost and time savings in molecular design within the medical and agricultural contexts.

## Summary of Discovery Projects Proposals for Funding to Commence in 2007

**DP0770874** Prof RQ Grafton; Dr T Kompas; Dr AD Smith

**Approved Project Title** **Bioeconomic Modelling of Marine Reserves**

**2007 :** \$85,000  
**2008 :** \$85,000  
**2009 :** \$100,000

**Primary RFCD** 3402 APPLIED ECONOMICS

**Administering Organisation** The Australian National University

### Project Summary

Australian waters contain a huge range of biodiversity, but are under threat from human activities. To face this challenge and resolve the problems of depleted fisheries and habitat destruction, innovative approaches are required to integrate marine biology with fisheries economics. The research meets this immediate need by developing bioeconomic models of marine reserves to determine reserve location and size, and analyse interactions between reserves and harvested areas under environmental uncertainty. The models will be developed using the latest developments in economics, biology and numerical methods and will be used to conserve Australia's marine biodiversity and improve fisheries management.

**DP0772030** Prof JA Graves

**Approved Project Title** **Organization, function and evolution of marsupial Y chromosomes**

**2007 :** \$220,000  
**2008 :** \$205,000  
**2009 :** \$190,000

**Primary RFCD** 2702 GENETICS

**Administering Organisation** The Australian National University

### Project Summary

The Y chromosome of humans and other mammals contains only a few genes, most specialized for male sex and reproduction. How the Y chromosome evolved to be so peculiar has been debated for 90 years. It began as an ordinary chromosome, but has degraded until there is almost nothing left, and it is likely to disappear in about 13 million years. Molecular characterization of the Y chromosomes of distantly related mammals could serve to 're-run the evolutionary tape', but the Y chromosome has been left out of whole genome sequencing because it is hard to do efficiently. We developed a novel technique to isolate DNA sequences and genes on the Y chromosome in three species of marsupials, which are especially valuable because they are so different from human and mouse.

**DP0770950** Prof NA Gunningham; Prof CD Shearing; Prof BC Karkkainen; Dr BR Jenkins; Prof JI Glazewski

**Approved Project Title** **The New Collaborative Environmental Governance: Natural Resource Management in Australia**

**2007 :** \$60,000  
**2008 :** \$165,000  
**2009 :** \$170,000  
**2010 :** \$80,000  
**2011 :** \$57,000

**Primary RFCD** 3901 LAW

**Administering Organisation** The Australian National University

### Project Summary

This project will evaluate the new regional natural resource management arrangements that have been established across Australia. The project outcomes will enable policy-makers nationally to identify opportunities for innovative policies and programs which can achieve better results for the environment (reducing environmental degradation), and for the economy (reducing costs to rural industries and to regulators) while substantially increasing effective community participation. The project will also provide principles with the potential to reshape environmental strategy and establish Australia as a leader in collaborative environmental governance internationally.

## Summary of Discovery Projects Proposals for Funding to Commence in 2007

**DP0774343** Prof AR Hajek  
**Approved Project Title** **The Mathematical and Philosophical Foundations of Probability**  
**2007 :** \$60,000  
**2008 :** \$50,000  
**2009 :** \$50,000  
**Primary RFCD** 4401 PHILOSOPHY  
**Administering Organisation** The Australian National University

### Project Summary

We find probability wherever we find uncertainty: virtually everywhere in our lives. Probability is essential to almost every technology. High-stakes decisions are routinely made on the basis of probability judgments and risk assessment-for example, in engineering, medicine, agriculture, environmental management, urban planning, public policy, public health, the law, and in our national defence. And some of those decisions have been made badly because of poor probability estimates-witness the 1986 space shuttle disaster. Our current methodologies for using probability are inadequate. This project will make an important contribution to the collective enterprise of enhancing our understanding of probability and its myriad applications.

**DP0771374** Prof AR Hardham; Dr DA Jones; Dr PN Dodds; Dr JG Ellis  
**Approved Project Title** **Translocation of secreted effector proteins from fungal pathogens into host plant cells**  
**2007 :** \$127,000  
**2008 :** \$119,000  
**2009 :** \$110,000  
**Primary RFCD** 2704 BOTANY  
**Administering Organisation** The Australian National University

### Project Summary

Every year, fungal diseases of plants cause huge losses in agricultural productivity and extensive environmental damage in Australia. Disease control in major crops, like wheat, currently relies heavily on breeding for disease resistance. However, fungal pathogens continually adapt to overcome plant defences, necessitating identification of new sources of resistance. The research in this project will elucidate the molecular basis of a new aspect of the establishment of plant infection by fungi, and in so doing will provide new avenues for the development of novel disease resistance strategies, with relevance in particular to devastating cereal diseases like wheat rust.

**DP0773697** Dr RQ Harrison  
**Approved Project Title** **The colonial souvenir market and Indigenous agency in Oceania**  
**2007 :** \$108,000  
**2008 :** \$92,000  
**2009 :** \$78,480  
**Primary RFCD** 4302 ARCHAEOLOGY AND PREHISTORY  
APD Dr RQ Harrison  
**Administering Organisation** The Australian National University

### Project Summary

This project focuses on the objects from the late nineteenth and early twentieth century which were sold as Indigenous 'curios' to the general public through a Sydney museum. While much of the literature on collecting has focused on the role of institutional collecting the project examines popular objects which the general public purchased. This project will contribute to the growing importance of research into colonialism in the region, drawing together the results of research from the fields of archaeology, anthropology and material culture studies.

## Summary of Discovery Projects Proposals for Funding to Commence in 2007

**DP0773761** Prof RI Hartley; Dr L Wang

**Approved Project Title** **Computer Vision Optimization Problems Using Machine Learning**

**2007 :** \$85,000

**2008 :** \$85,000

**2009 :** \$85,000

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

**APD** Dr L Wang

**Administering Organisation** The Australian National University

### Project Summary

Computer Vision concerns itself with understanding the world through the analysis of images obtained by a video or still camera. An important application is tracking of people in video and modelling their movements. This has evident applications in security, sport and entertainment. By enabling the computer to capture the motion of a subject in a video, we may detect suspicious activity in security, analyze the motion (golf-swing, diving style) of a sports-person, or capture the motion of an actor for animation or game applications. Development of a reliable technology requires new optimization techniques, which will place Australia at the forefront of the application of such research, commercially and for the public benefit.

**DP0771826** Dr A Hassell

**Approved Project Title** **Quantum chaos and scattering theory**

**2007 :** \$90,000

**2008 :** \$85,000

**2009 :** \$80,000

**Primary RFCD** 2301 MATHEMATICS

**Administering Organisation** The Australian National University

### Project Summary

The project will involve mathematical research of the highest international standard, as well as research training of postgraduate students and postdoctoral researchers, in a very active and far-reaching field. Progress in this field will have implications in areas ranging from engineering (e.g. nanotechnology, quantum computing) and mathematical analysis (e.g. theory of partial differential equations) through to number theory.

**DP0772775** Dr J Hermann

**Approved Project Title** **Experimental and natural constraints on trace element and volatile recycling in subduction zones**

**2007 :** \$100,000

**2008 :** \$100,000

**2009 :** \$100,000

**Primary RFCD** 2601 GEOLOGY

**Administering Organisation** The Australian National University

### Project Summary

The results of this project will provide important constraints on the differentiation of Earth, which ultimately leads to the concentration of elements suitable for mining. Trace element and volatile recycling in subduction zones is an integral part of the research theme 'Journey to the centre of the Earth' which has been identified as a key project (4.4) in the national strategic plan for geosciences. CO<sub>2</sub> recycling in subduction zones is crucial for our understanding of the long-term greenhouse gas variations on Earth. The ANU is one of the world-leading research institutions in experimental petrology and geochemistry, and the outcomes of this project will ensure that Australia remains at the forefront in these disciplines.

## Summary of Discovery Projects Proposals for Funding to Commence in 2007

**DP0771497** Prof AF Hill

**Approved Project Title** **Understanding and Harnessing the Unique and Curious Metal Boron Bond: Unlocking the Metallaboratrane Cage**

**2007 :** \$105,000

**2008 :** \$98,000

**2009 :** \$101,000

**Primary RFCD** 2502 INORGANIC CHEMISTRY

**Administering Organisation** The Australian National University

### Project Summary

Metal-boron bonding holds enormous technological importance due to the emergence of boron-based metal-mediated synthetic transformations that access a diversity of high value-added fine chemicals. Whilst Australia boasts an emergent boron-based fine chemicals industry, no research program into the nature of metal boron bonding exists to provide either fundamental science or advanced training in organometallic boron chemistry. The proposed work offers two distinct national benefits: The maintenance of a discipline in which Australia leads the world (metallaboratranes) and the genesis of one, which whilst intensely studied elsewhere, is notably absent from the Australian science base (low coordinate, unsaturated boron chemistry).

**DP0774156** Prof DJ Hill

**Approved Project Title** **Dynamics and Security Control of Complex Networks**

**2007 :** \$165,000

**2008 :** \$130,000

**2009 :** \$115,000

**Primary RFCD** 2301 MATHEMATICS

**Administering Organisation** The Australian National University

### Project Summary

The research will yield basic techniques to analyse, design and operate complex networks so that security, as well as performance, is achieved. These techniques will be further developed towards particular applications including power grids and telecommunication networks. However, the emphasis is on providing basic ideas and techniques.

**DP0770149** Dr W Hillier; Prof ER Krausz; Dr TJ Wydrzynski; Dr RJ Debus; Dr A Boussac; Dr M Sugiura

**Approved Project Title** **The mechanism of water splitting in photosynthesis**

**2007 :** \$92,000

**2008 :** \$106,000

**2009 :** \$92,000

**Primary RFCD** 2499 OTHER PHYSICAL SCIENCES

**Administering Organisation** The Australian National University

### Project Summary

Sunlight reaching the earth is used by the vast body of plants and algae living in surface waters and on the land to drive photosynthesis. One of the most fundamental contributions that photosynthesis provides to the Biosphere is the gaseous oxygen produced by its water-splitting chemistry - ~300 gigatons of O<sub>2</sub> are released into the atmosphere per year. However, the mechanism behind water-splitting is not precisely known. We will use a range of unique experimental approaches to determine the molecular mechanism of the photosynthetic water-splitting chemistry. The understanding of this reaction will provide the molecular blueprint for the development of efficient biocatalysts to generate H<sub>2</sub> and O<sub>2</sub> from water.

## Summary of Discovery Projects Proposals for Funding to Commence in 2007

**DP0770259** Dr P Hiscock; Dr VJ Attenbrow

**Approved Project Title** **Evolution of technology and tool use in 10,000 years of Aboriginal History**

**2007 :** \$52,000

**2008 :** \$39,000

**2009 :** \$43,000

**Primary RFCD** 4302 ARCHAEOLOGY AND PREHISTORY

**Administering Organisation** The Australian National University

### Project Summary

Results will substantially enhance the power of explanations for the Australian backed artefact proliferation, a key archaeological signature of cultural change in ancient Aboriginal society. A solution to the puzzle of why those artefacts were frequently made during one period in the past will be of interest to all researchers concerned with the historical development of Aboriginal societies, and to Aboriginal people. Furthermore, a detailed study of the evolution of a technology and its use over a period of 10,000 years, defining the entanglement of production and use systems, is rare in archaeology and the project will enable development of new insights into theories concerning the reasons technologies are adopted and changed.

**DP0773537** Mr CJ Hoskin

**Approved Project Title** **Understanding "reinforcement", an evolutionary process that can lead to the origin of new species and generate species diversity**

**2007 :** \$90,000

**2008 :** \$90,000

**2009 :** \$85,000

**Primary RFCD** 2707 ECOLOGY AND EVOLUTION

APD Mr CJ Hoskin

**Administering Organisation** The Australian National University

### Project Summary

Understanding how species are formed is of broad significance. National benefit will come from internationally competitive research and collaborations with leading international researchers. Benefits will also come under the ARC Priority Goals of 'An Environmentally Sustainable Australia' as I will (i) provide genetic data that will be invaluable for the conservation of a highly threatened species, (ii) determine the importance of contact zones for generating new species and maintaining the evolutionary potential of regions, and (iii) address the role of climate change in shaping diversity over recent evolutionary time, an understanding of which is essential for predicting the impact of future change.

**DP0772122** Prof MG Humphrey; Dr MJ Samoc; Dr MP Cifuentes

**Approved Project Title** **Metal Alkynyl Materials for Photonics**

**2007 :** \$149,000

**2008 :** \$123,000

**2009 :** \$113,000

**Primary RFCD** 2599 OTHER CHEMICAL SCIENCES

**Administering Organisation** The Australian National University

### Project Summary

Investment in this project (i) will gain Australia entry into an international network of researchers investigating materials (particularly NLO) properties of organometallic and other compounds, (ii) will involve training four PhD students, who will graduate with highly developed interdisciplinary skills, (iii) may identify new materials with sufficient performance for commercial development, and (iv) will build bridges between traditional research in organometallic chemistry and that in nanophotonics and biophotonics, and position Australia as a major player in these nascent fields.

## Summary of Discovery Projects Proposals for Funding to Commence in 2007

**DP0773094** A/Prof PA Jackson

**Approved Project Title** **The sexual cultures of Thai men; implications for Australia's international HIV/AIDS strategy**

**2007 :** \$40,410

**2008 :** \$26,000

**2009 :** \$39,000

**Primary RFCD** 4203 CULTURAL STUDIES

**Administering Organisation** The Australian National University

### Project Summary

This project contributes to safeguarding Australia's national interests by supporting the implementation of AusAID's international HIV/AIDS strategy laid out in the policy document 'Meeting the Challenge: Australia's International HIV/AIDS Strategy' (2004). This project directly addresses research priorities identified in the analytical report for the White Paper on Australia's AID program, 'HIV/AIDS in the Asia Pacific Region' (AusAID 2005): (1) the cultural, economic, and political dynamics driving the HIV epidemic in Asia; (2) the nexus between HIV/AIDS, economic activity, and development; and (3) the Asian experience of feminisation and gender impacts as factors in the epidemic HIV in the region.

**DP0770083** Prof C Jagadish

**Approved Project Title** **Epitaxial Nanowires for Optoelectronic Device Applications**

**2007 :** \$230,000

**2008 :** \$235,000

**2009 :** \$210,000

**2010 :** \$175,000

**2011 :** \$150,000

**Primary RFCD** 2914 MATERIALS ENGINEERING

**Administering Organisation** The Australian National University

### Project Summary

Nanotechnology is expected to make a major impact in all industrial sectors and multi-trillion dollar economic activity is expected by 2020. Nanowires are considered to be new building blocks for future electronics and photonics technologies and our aim is to develop nanowire based technologies which are of benefit to Australian industry. This project will develop patentable technologies as well as enhance international links with UK, China, Sweden and Norway. Training of postgraduate students and post-doctoral fellows in the field of nanotechnology will be of immense benefit to Australian industries, research and academic institutions.

**DP0772298** Prof C Jagadish; Dr HT Hattori; Prof RM De La Rue

**Approved Project Title** **Photonic Crystal Quantum Dot Lasers**

**2007 :** \$213,000

**2008 :** \$213,000

**2009 :** \$213,000

**Primary RFCD** 2404 OPTICAL PHYSICS

**Administering Organisation** The Australian National University

### Project Summary

Nanotechnology is expected to make a major impact in all industry sectors. This research has the potential to develop patentable technologies of interest to Australian industries in the fields of computers, communications, defence, environmental and medical sensing. This project will enhance Australia's international links with UK, France, Canada, Korea and USA and allow us to train skilled personnel essential for the development of high tech industries in Australia.

## Summary of Discovery Projects Proposals for Funding to Commence in 2007

**DP0773925** Prof P Jalland

**Approved Project Title** **Understanding old age in Australian history as a foundation for improved social and economic policy**

**2007 :** \$53,977

**2008 :** \$49,725

**2009 :** \$46,362

**Primary RFCD** 4301 HISTORICAL STUDIES

**Administering Organisation** The Australian National University

### Project Summary

My history of old age in Australia since 1860 will provide the first book which maps our experiences of growing old in the past, as a foundation for improved social and economic policy. The national government's 'Inter-generational report' has started a process of review and planning at a time of dramatic demographic change. However, developing strategies for 'ageing well, ageing productively' depends on an informed understanding of previous and current expectations about and attitudes to ageing in Australia. The history of old age is a complex rather than simple story, and successful policy development will require a solid historical foundation.

**DP0770057** Dr MD Jennions

**Approved Project Title** **Does size really matter? Selection, constraints and allometry**

**2007 :** \$150,000

**2008 :** \$140,000

**2009 :** \$130,000

**2010 :** \$130,000

**2011 :** \$130,000

**Primary RFCD** 2707 ECOLOGY AND EVOLUTION

QEII Dr MD Jennions

**Administering Organisation** The Australian National University

### Project Summary

Australia is internationally recognized for its strong performance in evolutionary biology and quantitative genetics. This study contributes to the advancement of these fields. It is explicitly designed to create selection lines that can be used by developmental biologists, physiologists, geneticists and endocrinologists. This will strengthen links between institutes within Australia and internationally and later allow more applied questions to be asked. Although this study addresses a basic research question, it uses techniques and statistics that are integral to work selecting for improvement of commercial crops and animals. It therefore provides valuable training opportunities for an essential part of Australia's agricultural sector.

**DP0771459** Dr RJ Joyce; Prof K Sterelny; Prof F Cowie

**Approved Project Title** **The Evolution of the Social Brain: How Emotions and Moral Judgement Interact in the Generation of Cooperative Behaviour**

**2007 :** \$65,118

**2008 :** \$60,118

**2009 :** \$60,118

**Primary RFCD** 4401 PHILOSOPHY

**Administering Organisation** The Australian National University

### Project Summary

Understanding the psychological forces that underpin human interactions is a necessary step to knowing how to improve those interactions. Comprehending the complex interplay of emotions and moral judgements lying behind decision-making in the social sphere will help explain such things as corruption, risk-taking, domestic violence, and political affiliation. Such knowledge can guide the design of effective social policy, and is vital for a realistic educational strategy. This project will strengthen Australia's excellent reputation in philosophy, bring here leading scholars from diverse fields, build international research networks, and in particular forge an ongoing partnership between the ANU and the California Institute of Technology.

## Summary of Discovery Projects Proposals for Funding to Commence in 2007

**DP0773898** Prof RA Kennedy; Mrs P Sadeghi; Prof Dr P Rapajic

**Approved Project Title** **Model-Based Approach to Adaptive Channel Coding and Estimation for Future Wireless Communication Systems**

**2007 :** \$110,000

**2008 :** \$105,000

**2009 :** \$100,000

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

**Administering Organisation** The Australian National University

### Project Summary

The project aims to maximise capacity, data rate and user mobility in wireless communication systems and will advance Australia's fundamental knowledge base in this field so that it stays at the forefront of international research in mobile communications. The application of research outcomes by the Australian telecommunications industry will improve the extent and quality of mobile networks, increasing network capacity and the number of mobile phone subscribers in Australia. This project will also optimise the use of mobile network resources (such as bandwidth and power) in next generation mobile networks, which in turn will result in faster and more reliable services such as wireless Internet access for business and private use.

**DP0770131** Prof BL Kennett; Dr N Rawlinson

**Approved Project Title** **From crust to core: probing the heterogeneity of the Earth with seismic arrays**

**2007 :** \$80,000

**2008 :** \$91,000

**2009 :** \$80,000

**Primary RFCD** 2602 GEOPHYSICS

**Administering Organisation** The Australian National University

### Project Summary

Seismic array deployments will be used for a variety of studies including tomographic mapping of upper mantle structure, coda analysis for crustal properties and delineation of deeper Earth structure. The high resolution information on crustal and upper mantle structure will provide important detail on the building blocks of the Australian plate at depth. This class of information helps to refine our understanding of the way that the Australian continent has been assembled with regard to the interaction of the crust and mantle and the emplacement of mineral resources.

**DP0771420** Prof B Kerkvliet

**Approved Project Title** **Public Political Criticism in Contemporary Vietnam**

**2007 :** \$50,000

**2008 :** \$58,000

**2009 :** \$40,000

**Primary RFCD** 3601 POLITICAL SCIENCE

**Administering Organisation** The Australian National University

### Project Summary

This study will enhance Australia's capacity to interpret and engage with its regional and global environment by expanding its comprehension of the political system in Vietnam, a prominent Asian neighbor. The outcomes will benefit Australian diplomats, investors, business people, journalists, aid donors, and universities with interests and programs in the region. As a major work on Vietnam that is also comparative and engages political science literature on authoritarian regimes and political movements, this project also augments Australia's reputation as a source of high quality research on Asian countries.

## Summary of Discovery Projects Proposals for Funding to Commence in 2007

**DP0772770** Dr RC Kerr; Prof KV Cashman

**Approved Project Title** **Solidification, Channel Formation and Thermal Erosion In Lava Flows**

**2007 :** \$56,000

**2008 :** \$56,000

**2009 :** \$45,000

**Primary RFCD** 2601 GEOLOGY

**Administering Organisation** The Australian National University

### Project Summary

This project will elucidate the complex dynamics that control the cooling rates and advance rates of lava flows. It will result in improved hazard assessments for volcanic areas around the world affected by the advance of lava flows, including many Pacific islands and most countries around the Pacific Rim. The project will also provide a quantitative understanding of thermal erosion in lava channels, which will help explain the formation and location of major ore deposits of nickel, copper and platinum in Western Australia and elsewhere around the world.

**DP0771312** Prof AS Kheifets; Prof Dr JH Ullrich; Prof NA Cherepkov

**Approved Project Title** **Multiple ionization of atoms and molecules in strong laser fields**

**2007 :** \$86,000

**2008 :** \$83,000

**2009 :** \$86,000

**Primary RFCD** 2402 THEORETICAL AND CONDENSED MATTER PHYSICS

**Administering Organisation** The Australian National University

### Project Summary

Our research contributes to multidisciplinary efforts to unravel the fundamental mechanisms that govern interaction of intense laser radiation with matter. Understanding and accurate numerical modelling of such precesses have far-reaching implications for astrophysics, plasma physics and controlled fusion, life and materials sciences. The research project will further enhance our reputation in an area where Australian theorists are preeminent, and the research training will produce PhD graduates with a high-level ability in numerical modelling using supercomputers. Such skills are essential in many defense, information and nano-technology applications of national priority.

**DP0771754** Prof K Kirk; Dr KJ Saliba

**Approved Project Title** **Ion transport in the malaria parasite and parasitised erythrocyte**

**2007 :** \$100,000

**2008 :** \$95,000

**2009 :** \$90,000

**Primary RFCD** 2701 BIOCHEMISTRY AND CELL BIOLOGY

**Administering Organisation** The Australian National University

### Project Summary

This work will contribute to the national research effort in parasitology (an area in which the ARC has established a Research Network), as well as laying the groundwork for subsequent efforts (not part of this grant) to develop new antimalarial strategies. Although not yet endemic in Australia, malaria is a serious problem in the local region and, as the major developed nation in the region Australia has an obligation to make a significant contribution to research in this area. The work proposed here will contribute to Australia's meeting this obligation.

## Summary of Discovery Projects Proposals for Funding to Commence in 2007

**DP0773019** Prof K Lambeck; Prof CD Woodroffe; Dr J Zhao; Dr SG Smithers; Dr D Fabel; Dr J Stone  
**Approved Project Title** **Sea-level change in the Australasian region during the past 6000 years: Understanding the past to predict the future.**  
**2007 :** \$128,000  
**2008 :** \$137,000  
**2009 :** \$96,000  
**Primary RFCD** 2606 ATMOSPHERIC SCIENCES  
**Administering Organisation** The Australian National University

### Project Summary

Interactions of climate, ice, oceans, and solid earth result in complex variations sea level in time and space. This proposal develops a predictive understanding of this change through an interdisciplinary integration of geophysical theory and geologic observations. Focus is on the Australian area and on the present interglacial but the outcomes will be placed in a global frame. Outcomes will include estimates of rates and amplitudes of sea-level change, of changes in ice volume, of land movements from isostatic and tectonic causes. It also provides the framework necessary for separating natural change from anthropogenic change during the recent past and for predicting future regional and global sea-level change on a century time scale.

**DP0770023** Dr C Lee  
**Approved Project Title** **Many-body quantum effects in the physics of ultracold atoms**  
**2007 :** \$77,030  
**2008 :** \$77,030  
**2009 :** \$77,030  
**Primary RFCD** 2403 ATOMIC AND MOLECULAR PHYSICS; NUCLEAR AND PARTICLE PHYSICS; PLASMA PH  
APD Dr C Lee  
**Administering Organisation** The Australian National University

### Project Summary

The project will advance the fundamental research in quantum atom optics by exploring the mysterious many-body quantum phenomena in the systems of ultracold atoms. It will therefore contribute into the fundamental knowledge base that underpins future quantum technologies based on manipulating and utilizing the systems of ultracold atoms. The project will also further Australia's international competitive ability in fundamental research and strengthen its reputation in the field of quantum atom optics.

**DP0774366** Dr W Lei  
**Approved Project Title** **Indium arsenic antimony (InAsSb) Quantum Dots for Mid-Infrared Lasers**  
**2007 :** \$125,000  
**2008 :** \$110,000  
**2009 :** \$100,000  
**Primary RFCD** 2918 INTERDISCIPLINARY ENGINEERING  
APD Dr W Lei  
**Administering Organisation** The Australian National University

### Project Summary

This proposal will open a new area of research for mid-infrared laser devices. Any achievement from this project will benefit various academic and industrial communities, such as national security, environmental monitoring and spectroscopy. The outcomes of this research could create a new generation of high-performance mid-infrared lasers and put Australian researchers in the forefront of the development in this field.

## Summary of Discovery Projects Proposals for Funding to Commence in 2007

**DP0773408** Dr JJ Longdell

**Approved Project Title** **Quantum technologies based on crystalline rare-earth ion doped optical waveguides and resonators**

**2007 :** \$137,030  
**2008 :** \$132,030  
**2009 :** \$105,030

**Primary RFCD** 2404 OPTICAL PHYSICS

APD Dr JJ Longdell

**Administering Organisation** The Australian National University

### Project Summary

Quantum information processing is a powerful emerging technology that aims to fully exploit the properties of quantum mechanics to perform computations and securely transmit information. This project will develop an essential component for this technology that will enable for the first time the direct and reversible transfer of quantum information between solid-state quantum systems and light. Successful completion of this project will provide a route to fully scalable quantum computing and long range quantum networks. This project will help secure Australia's leading role in this strategically important new generation technology.

**DP0773380** Prof B Luther-Davies; Prof R Haglund

**Approved Project Title** **A Novel Optical Source for the Vaporization and Deposition of Polymers**

**2007 :** \$150,000  
**2008 :** \$150,000  
**2009 :** \$100,000

**Primary RFCD** 2918 INTERDISCIPLINARY ENGINEERING

**Administering Organisation** The Australian National University

### Project Summary

Thin polymer films are used widely in industrial processes and, hence, new techniques for producing such films are increasingly important. This project develops new optical technology required before a novel process for depositing polymers from the vapour phase can be widely explored for industrial applications. This project will enhance the capacity of Australian science in this important area of technology and could benefit the Australian economy by developing a novel commercial technology based on cutting-edge Australian research.

**DP0770380** Dr DH Macdonald; Dr LJ GEERLIGS; Dr J Schmidt

**Approved Project Title** **Unlocking the potential of n-type silicon for solar cells**

**2007 :** \$140,000  
**2008 :** \$150,000  
**2009 :** \$175,000  
**2010 :** \$135,000  
**2011 :** \$135,000

**Primary RFCD** 2402 THEORETICAL AND CONDENSED MATTER PHYSICS

QEII Dr DH Macdonald

**Administering Organisation** The Australian National University

### Project Summary

This project will lead to an improved understanding of impurities in silicon, especially several emerging low-cost n-type silicon materials made especially for solar cells. This knowledge will enable the negative effects of these impurities to be eliminated or reduced, thus yielding higher efficiency modules that produce solar electricity at a lower cost. The potential benefits to Australia, which already has an established silicon solar cell industry, are large. They include increased employment in well-paid high-technology jobs, increased export earnings, and reduced carbon dioxide emissions. These benefits could grow rapidly, in line with the global photovoltaic industry growth rate of more than 30% per year.

## Summary of Discovery Projects Proposals for Funding to Commence in 2007

**DP0773333** Dr S Madden  
**Approved Project Title** **Next Generation Planar Tellurite Waveguides**  
**2007 :** \$110,000  
**2008 :** \$95,000  
**2009 :** \$95,000  
**Primary RFCD** 2917 COMMUNICATIONS TECHNOLOGIES  
**Administering Organisation** The Australian National University

### Project Summary

The project provides the basis for the production of new high technology photonic products in Australia, the availability of at least one new unique facility for future scientific endeavour, and the generation of skillsets new to Australia. New IP will also be developed during the project. A successful outcome could also ultimately result in new products offering, for example, enhanced National Security through the Defence applications, better measurements of atmospheric contaminants through the sensing route, and more advanced telecommunications services at lower cost for citizens and businesses, and for lower operating costs for service providers.

**DP0770821** Dr R Maleszka  
**Approved Project Title** **Epigenesis and sociality: Unraveling the link between nutrition and the genome - how do genes and environment interact to produce phenotypes?**  
**2007 :** \$82,000  
**2008 :** \$82,000  
**2009 :** \$82,000  
**Primary RFCD** 2702 GENETICS  
**Administering Organisation** The Australian National University

### Project Summary

This project has the capacity to transform our understanding of how genes and environment interact to produce whole-organism phenotypes. It will provide novel data on how an entire genome responds to nutrition and how external factors can enforce a differential expression of a common heritable genetic program. The national and community benefits of the project will be to maintain Australian leadership in epigenetics and advanced genetics of complex self-organizing systems. The findings of this project have the potential to be applicable to explaining regulatory networks underlying diet induced changes in human gene expression.

**DP0772931** Prof NB Manson  
**Approved Project Title** **Optical-spin coupling in the nitrogen-vacancy centre in diamond**  
**2007 :** \$100,000  
**2008 :** \$80,000  
**2009 :** \$60,000  
**Primary RFCD** 2402 THEORETICAL AND CONDENSED MATTER PHYSICS  
**Administering Organisation** The Australian National University

### Project Summary

Australia has made investment in the developing area of quantum information processing where information is stored and processed by manipulating the spin states in solids. One of the most promising materials for this purpose is diamond incorporating nitrogen-vacancy colour centres. The appeal with this material is that the processing can be faster and components smaller as the spins can be controlled by laser beams. This project investigates the control of spin with light to obtain optimum performance.

## Summary of Discovery Projects Proposals for Funding to Commence in 2007

**DP0773924** Prof JH Manton

**Approved Project Title** **Nonlinear Signal Processing: Optimisation and Tracking on Manifolds**

**2007 :** \$160,000

**2008 :** \$135,000

**2009 :** \$120,000

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

**Administering Organisation** The Australian National University

### Project Summary

Most hi-tech electronic devices must process signals. A mobile phone, for example, must encode, transmit, decode and receive voice signals. This project will use specialised mathematical theories applied in novel ways to advance the theoretical foundations of signal processing and develop better signal processing algorithms for practical applications. Companies with access to better signal processing algorithms have an edge over their competitors, and consumers benefit too from better and more advanced products.

**DP0771262** Dr J Masle; Prof GD Farquhar

**Approved Project Title** **Physiological and molecular controls of plant transpiration efficiency: investigating the role of the ERECTA gene**

**2007 :** \$90,000

**2008 :** \$88,000

**2009 :** \$85,000

**Primary RFCD** 2704 BOTANY

**Administering Organisation** The Australian National University

### Project Summary

Water is the single most limiting factor in agriculture and the world's supply of fresh water is diminishing, the greatest fraction of total water use being by agriculture. Progress in water-use efficiency will have social value, and this program should help us to achieve it. Our progress in this area is already one of the most successful of 'bottom-up' approaches - in the sense of transferring knowledge from biochemistry and biophysics to breeding and agronomy, as CSIRO now has a successful wheat breeding program based on this earlier work of ours. Now that we have discovered a gene that controls water-use efficiency at the leaf level, we wish to see how the gene works, and how it affects mineral nutrition of leaves.

**DP0773236** Dr J Mavrogenes; Prof RJ Arculus; Dr JE Mungall

**Approved Project Title** **Magmatic processes, volatiles and ore formation**

**2007 :** \$50,000

**2008 :** \$50,000

**2009 :** \$40,000

**Primary RFCD** 2601 GEOLOGY

**Administering Organisation** The Australian National University

### Project Summary

A major current source of Australia's export wealth derives from mining of gold and copper ores. Many of our largest ore deposits, such as those at Mt Isa and Broken Hill, formed in paleo- environments equivalent to the active submarine volcanic arcs which we are proposing to study. Modern systems yield the vital clues to explore intelligently for fossil equivalents. We propose a two-pronged approach in world-renowned analytical and experimental laboratories to understand active processes that will guide experimental simulations under controlled conditions. Results are critical for national economic advantage and the maintenance of Australian Earth science in the forefront of global research effort.

## Summary of Discovery Projects Proposals for Funding to Commence in 2007

**DP0772331** Prof I McAllister; Prof RK Gibson

**Approved Project Title** **Australian public opinion towards foreign and defence policy since 1960: patterns, explanations, policies**

**2007 :** \$83,000

**2008 :** \$85,000

**Primary RFCD** 3602 POLICY AND ADMINISTRATION

**Administering Organisation** The Australian National University

### Project Summary

The issues of foreign affairs and national security have become increasingly important to Australians in the wake of the Bali bombing, the invasion of Iraq, and the 'War on Terror.' However there are a number of unknowns in research of this kind. What are the public's key concerns? How have our current attitudes been shaped and how much have our opinions changed in recent years? This project would provide crucial insights into the topic, identifying those countries seen as the principal threats to Australia, examining how and why people feel that way, and most importantly, indicating what governments can do to better inform and shape public opinion in foreign affairs and defence-related matters.

**DP0774299** Prof ID McCalman

**Approved Project Title** **Scientific voyages in the Antipodes. Thomas Huxley, John McGillivray and the Darwinian Revolution**

**2007 :** \$149,097

**2008 :** \$188,600

**2009 :** \$123,107

**Primary RFCD** 4301 HISTORICAL STUDIES

**Administering Organisation** The Australian National University

### Project Summary

This project examines the scientific British survey expeditions to Australasia during the nineteenth century. The research focuses on the importance of Australasia in the formation of Darwinism, one of the key scientific and social theories of modern western culture. Environmental change and scientific and cultural heritage in our region will be traced back to these early scientific voyagers.

**DP0771475** Dr JF McCarthy; A/Prof R Cramb

**Approved Project Title** **Oil Palm and Agrarian Transition on the Indonesian and Malaysian Frontiers**

**2007 :** \$100,024

**2008 :** \$53,346

**2009 :** \$93,410

**Primary RFCD** 3703 ANTHROPOLOGY

**Administering Organisation** The Australian National University

### Project Summary

Challenges to peace and security in Southeast Asia emerge from uneven economic development and agricultural and environmental changes that marginalize vulnerable communities, exacerbate tensions and lead to endemic local level conflicts. This project will explore the linkages between agrarian and environmental change, governance systems and conflict by studying how policy and economic developments are affecting rural communities. It will produce a comparative study that will be relevant to policy discussions and scholarship and of interest to donor agencies and practitioners as well as educational institutions and the wider international research community.

## Summary of Discovery Projects Proposals for Funding to Commence in 2007

**DP0770426** Prof DE McClelland; Dr SM Scott; Dr BJ Slagmolen; Dr SE Whitcomb; Prof B Owen

**Approved Project Title** **Pushing the frontiers of gravitational wave science: from technology to astrophysics**

**2007 :** \$270,030

**2008 :** \$270,030

**2009 :** \$270,030

**Primary RFCD** 2499 OTHER PHYSICAL SCIENCES

APD Dr BJ Slagmolen

**Administering Organisation** The Australian National University

### Project Summary

The direct detection of Einstein's elusive gravitational waves will not only confirm one of the most important theories in physics, it will unleash a new form of radiation (in addition to electromagnetic) with which to study the Universe. Our participation in this quest continues Australia's role in the vanguard of new astronomy and its exploitation. This proposal will produce scientists highly trained in areas of national priority, including frontier technologies such as photonics and smart information use through GRID computing. Developing ways to build instruments of almost unimaginable sensitivity fosters innovation leading to spin-offs into other areas of optical sensing - fundamental research resulting in economic benefit.

**DP0771923** Prof G McCormack

**Approved Project Title** **The Japanese State and Civil Society in Transformation, 1970-2006**

**2007 :** \$55,250

**2008 :** \$58,350

**2009 :** \$53,275

**Primary RFCD** 4301 HISTORICAL STUDIES

**Administering Organisation** The Australian National University

### Project Summary

Since Japan is the world's second and the region's first economic power the importance of understanding major transformations in its political, social, and economic structure is plain. This project is therefore highly relevant to academia, policy and intelligence analysts, the media and citizenry in general. The last time the cry of 'reform' and fundamental restructuring of institutions was heard on anything like the present level was in the 1930s. Then, 'renovation' (kakushin) - offered as a path through multiple national and international crises - actually paved the way to militarism and war. Koizumi's reform (kaikaku) program, which is no less than a program for recasting the state, therefore deserves to be studied very seriously.

**DP0770731** Dr CA McGarty

**Approved Project Title** **Bolstering commitment to positive social change through group-based interaction.**

**2007 :** \$77,000

**2008 :** \$75,000

**2009 :** \$77,000

**Primary RFCD** 3801 PSYCHOLOGY

**Administering Organisation** The Australian National University

### Project Summary

Building on an impressive series of preliminary results, this research uses small group interaction to bolster commitment to work towards long-term goals. The methods explored in the proposal have the potential to boost commitment in the public, private, and community sectors by identifying the key factors responsible for sustaining long-term change. The research is relevant for efforts to combat racism, and to increase community support for international development and environmental sustainability. Benefits are expected both in terms of the promotion of positive attitudes in society and in overcoming apathy within organisations.

## Summary of Discovery Projects Proposals for Funding to Commence in 2007

**DP0773270** Dr AA Millar; Dr PM Waterhouse; Dr F Gubler

**Approved Project Title** **MicroRNA control of gene expression and development in plants.**

**2007 :** \$112,000

**2008 :** \$104,000

**2009 :** \$96,000

**Primary RFCD** 2702 GENETICS

**Administering Organisation** The Australian National University

### Project Summary

Controlling a gene's activity is fundamental in biotechnology, from dissecting a gene's function to introducing desired traits in crop plants. Recently a new class of genes have been identified that are 'master-regulators' able to control the activity of many genes, and through this, they can ultimately control how an organism develops and functions. By understanding how these genes operate and the extent of their influence, not only will we gain greater insights into the gene regulatory networks required for multicellular life, but how we may develop methods of controlling gene activity that will have tremendous biotechnological applications.

**DP0773050** Dr FP Mills; Prof BR Lewis; Prof YL Yung; Dr GR Gladstone

**Approved Project Title** **Isotopic fractionation in planetary atmospheres**

**2007 :** \$200,000

**2008 :** \$150,000

**2009 :** \$100,000

**Primary RFCD** 2606 ATMOSPHERIC SCIENCES

**Administering Organisation** The Australian National University

### Project Summary

Ongoing changes in the Earth's atmosphere, such as ozone depletion, demonstrate the need to understand atmospheric photochemical processes. Isotopic fractionation is one vehicle for obtaining detailed insight into these processes. The proposed research will increase our understanding of fundamental molecular processes and use these new results to improve our knowledge of isotopic fractionation in planetary atmospheres. The resulting models will lead to new insight into the Earth's ozone chemistry and the recent evolution of Titan's and Venus' atmospheres, including how much water may have been present on Venus in the recent past. The research program also enables Australian participation in three international spacecraft missions.

**DP0771218** Dr AE Miroshnichenko

**Approved Project Title** **Tunable nonlinear photonic devices with liquid crystals**

**2007 :** \$77,030

**2008 :** \$77,030

**2009 :** \$77,030

**Primary RFCD** 2404 OPTICAL PHYSICS

APD Dr AE Miroshnichenko

**Administering Organisation** The Australian National University

### Project Summary

This project will help to initiate in Australia a systematic study of nonlinear properties of liquid crystals for applications in optical components. Taking the advantage of strong and tunable nonlinear response of liquid crystals and low threshold powers, it will analyse new opportunities for controllable light manipulation in nanoscale photonic devices, suggesting realistic designs for tunable photonic circuits. The project will promote this attractive field and will facilitate the emergence of novel technologies. It will also lead to important international collaborations and bring important new expertise to Australia, complementing the core research program of the ARC Centre of Excellence CUDOS.

## Summary of Discovery Projects Proposals for Funding to Commence in 2007

**DP0770873** Prof TI Morris-Suzuki

**Approved Project Title** **Rethinking Impartial Humanitarianism: Lessons from the Recent History of the Asia-Pacific Region**

**2007 :** \$51,468

**2008 :** \$82,035

**2009 :** \$72,035

**Primary RFCD** 4301 HISTORICAL STUDIES

**Administering Organisation** The Australian National University

### Project Summary

Australia today is increasingly involved in complex international humanitarian missions, involving cooperation with other nations and with international non-government organizations. These actions have profound implications for relationships between Australia and other countries. Through an investigation of key case studies from the Asia-Pacific region, this project will create a deeper understanding of the long-term experiences, possibilities and limitations of impartial humanitarian action. It will thus contribute to global debates about humanitarianism, and to better-informed Australian engagement in responding to humanitarian crises in our region and the wider world.

**DP0771480** Prof TI Morris-Suzuki; Dr J Yonetani; Dr TY Tsu

**Approved Project Title** **Historical Conflict and Reconciliation in East Asia: Media, History Wars and the Search for Regional Understanding**

**2007 :** \$30,000

**2008 :** \$100,000

**2009 :** \$32,294

**Primary RFCD** 4301 HISTORICAL STUDIES

**Administering Organisation** The Australian National University

### Project Summary

The relationship between Japan, China and Korea is of central importance to the future stability of our region, and of particular political and economic importance to Australia. This project will promote a deeper understanding of current tensions in the relationship between these countries, and will contribute to the practical search for resolutions to cultural and ideological dimensions of this conflict. By addressing the relationship between changing methods of communication and contrasting images of history, the project will also contribute to the development of new theoretical approaches to the communication of historical knowledge in the twenty-first century.

**DP0773301** Prof A Neeman; Dr JM Borger

**Approved Project Title** **Topological Lambda-Algebras**

**2007 :** \$50,000

**2008 :** \$130,000

**2009 :** \$123,000

**2010 :** \$115,000

**2011 :** \$34,244

**Primary RFCD** 2301 MATHEMATICS

**Administering Organisation** The Australian National University

### Project Summary

This project will explore a mathematical puzzle that has defied twenty years of attempts to solve it. This puzzle is in an area which has been at the centre of worldwide mathematics research for more than a decade. The idea of the project is to use new techniques, developed in the last couple of years by Borger and Wieland, and bring them to bear on the old questions.

## Summary of Discovery Projects Proposals for Funding to Commence in 2007

**DP0771640** Prof HS O'Neill  
**Approved Project Title** **An experimental exploration of silicate melt thermodynamics**  
**2007 :** \$43,000  
**2008 :** \$43,000  
**2009 :** \$36,000  
**Primary RfCD** 2601 GEOLOGY  
**Administering Organisation** The Australian National University

### Project Summary

The chemical properties of magmas are the key to understanding igneous activity in the Earth, and hence the tectonic significance of magmatism, and the mineral resources resulting from past magmatism. The chemistry of magmas is also a determining factor in assessing the hazards associated with volcanic eruptions, including natural inputs into the atmosphere against which anthropogenic inputs causing climate change must be assessed. This research program will measure experimentally the way different magma compositions affect the solubilities of important volatile and trace-element components in magmas, providing the much-needed fundamental data to model magmatic activity.

**DP0773069** Dr EA Ostrovskaya  
**Approved Project Title** **Controlled manipulation of matter-waves in atomic waveguiding structures**  
**2007 :** \$96,614  
**2008 :** \$96,614  
**2009 :** \$96,614  
**2010 :** \$96,614  
**2011 :** \$96,614  
**Primary RfCD** 2402 THEORETICAL AND CONDENSED MATTER PHYSICS  
ARF Dr EA Ostrovskaya  
**Administering Organisation** The Australian National University

### Project Summary

This project will enable Australian researchers to actively participate in the cutting edge, internationally competitive research that investigates ways to manipulate and guide large ensembles of ultra-cold atoms and underpins future technological applications in ultra-high-precision metrology and sensors. Australia is currently moving into a prominent position amongst world leaders in this fast-paced research field. The outcomes of this proposal will further raise the prestige of Australian research overseas, and lead to greater acceptance of Australia as a major player in fundamental research. It will also provide outstanding training opportunities for young researchers.

**DP0774015** Dr MJ Phillips  
**Approved Project Title** **Uncovering the evolutionary history of Australasian marsupials: combining molecular phylogenetics and ecological inference**  
**2007 :** \$120,000  
**2008 :** \$100,000  
**2009 :** \$100,000  
**Primary RfCD** 2707 ECOLOGY AND EVOLUTION  
APD Dr MJ Phillips  
**Administering Organisation** The Australian National University

### Project Summary

Marsupials are symbolic of the uniqueness of Australia's biological systems and there is widespread public interest in their natural history. Yet we know little of the evolutionary mechanisms that have shaped their biodiversity. This is a critical problem when considered in the context of Australian marsupials having suffered the highest extinction rate of any continental mammal fauna over the past 200 years. This project will make a major contribution to understanding the origins, timescale and ecological nature of Australasian marsupial evolution. In doing so, it will inform conservation strategy, promote Australasian marsupials as a model system for studying faunal coevolution and develop widely applicable bioinformatic tools.

## Summary of Discovery Projects Proposals for Funding to Commence in 2007

**DP0772673** Dr J Powers  
**Approved Project Title** **On Whose Authority? The Contest to Define Tibetan Buddhism**  
**2007 :** \$95,482  
**2008 :** \$75,000  
**2009 :** \$85,000  
**Primary RFCD** 4402 RELIGION AND RELIGIOUS TRADITIONS  
**Administering Organisation** The Australian National University

### Project Summary

As our third largest trading partner, China is of immense importance to Australia, and the problem of Tibet is a contentious aspect of Australia-China relations. The presentation of a comprehensive and nuanced perspective on the subtleties of Sino-Tibetan tensions relating to the core issue of religious belief and practice will provide Australian policy-makers with key tools and insights for more effectively managing this important foreign policy matter, which can aid in preventing military instability in the region. The Tibet problem has ramifications for both China and India, and it is vital for Australian leaders to be equipped with the best information about it.

**DP0769999** Dr GD Price; Prof MR Badger  
**Approved Project Title** **Nano-molecular structure and function of protein mini-compartments known as carboxysomes**  
**2007 :** \$90,000  
**2008 :** \$88,000  
**2009 :** \$85,000  
**Primary RFCD** 2701 BIOCHEMISTRY AND CELL BIOLOGY  
**Administering Organisation** The Australian National University

### Project Summary

Intriguing protein nano-structures, present in blue-green algae and known as carboxysomes, act as tiny compartments where CO<sub>2</sub> can be fixed into simple sugars at high efficiency. This important photosynthetic process forms the basis of global primary productivity on this planet, but most land-based CO<sub>2</sub> fixation lacks the efficiency seen in blue-greens. This research aims to determine how the several proteins that make up carboxysomes come together to make up carboxysome nano-structures and how these function to enhance rates of CO<sub>2</sub> fixation. A more thorough understanding of the carboxysome is likely to have potential applications in industrial nano-technology and improvements in crop productivity.

**DP0774115** Dr PJ Rose  
**Approved Project Title** **Catching criminals by their voice - combining automatic and traditional forensic speaker identification methods for optimum performance**  
**2007 :** \$100,000  
**2008 :** \$123,000  
**2009 :** \$80,000  
**Primary RFCD** 3802 LINGUISTICS  
**Administering Organisation** The Australian National University

### Project Summary

Key benefits of the project will be improvement in national security; substantial savings in Court time and expenditure, and Legal Aid funding; and, most importantly, improvement in the equity and efficiency of Australia's Criminal Justice System.

## Summary of Discovery Projects Proposals for Funding to Commence in 2007

**DP0771823** Dr WP Schellart

**Approved Project Title** **Relationship between subduction zone geometry, trench kinematics and great subduction earthquakes**

**2007 :** \$179,893  
**2008 :** \$139,893  
**2009 :** \$124,893  
**2010 :** \$114,893  
**2011 :** \$114,893

**Primary RFCD** 2601 GEOLOGY  
 QEII Dr WP Schellart

**Administering Organisation** The Australian National University

### Project Summary

The devastating Boxing Day 2004 earthquake near Sumatra and the four other largest earthquakes in recorded history all occurred along subduction zones. This research will compare the geodynamic setting of these subduction zones with those surrounding the Australian continent and assess whether the Australian subduction zones are capable of producing great earthquakes and tsunamis that might pose a risk for the east and northwest coast of Australia. Also, Eastern Australia is a composite of fossil arcs rich in ore deposits and the Tasman Sea region is composed of basins that host hydrocarbons, all of which formed by subduction processes. The proposed research will thus improve the basis for mineral and hydrocarbon exploration.

**DP0772300** Dr I Shadrivov

**Approved Project Title** **Engineering and control of metamaterials with negative refraction**

**2007 :** \$87,030  
**2008 :** \$82,030  
**2009 :** \$82,030

**Primary RFCD** 2402 THEORETICAL AND CONDENSED MATTER PHYSICS  
 APD Dr I Shadrivov

**Administering Organisation** The Australian National University

### Project Summary

This project will extend significantly the research activity on metamaterials in Australia, promoting this new field and aiming to solve high priority problems and paving the way to creation of practical sub-wavelength devices. This project is therefore of national benefit for its advances in critical fundamental research and for potential applications in a large number of engineering tasks in microwave and optical devices. The project will initialize collaboration with world leading experts in the area, bringing important expertise to Australia. It will provide a greater acceptance of Australia as a major world player in fundamental research.

**DP0773307** Dr CJ Shepherd

**Approved Project Title** **Sustainable Development, Cultural Diversity, and Global Transformations: An Ethnography of Agricultural and Environmental Practices in East Timor**

**2007 :** \$95,030  
**2008 :** \$83,030  
**2009 :** \$77,030

**Primary RFCD** 3706 HISTORY AND PHILOSOPHY OF SCIENCE AND MEDICINE  
 APD Dr CJ Shepherd

**Administering Organisation** The Australian National University

### Project Summary

Civil unrest, low productivity, and environmental degradation in East Timor, the Solomon Islands, PNG, Nauru, and Indonesia, highlight the new challenges for international development policy. By providing culturally specific analyses of development processes and by advancing new policy directions, the study will enhance the capacities of Australian NGOs, as well as international NGOs with Australian offices, government agencies and Indigenous communities, effectively to tackle acute poverty and environmental degradation in our region. These issues are increasingly pertinent to Australia.

## Summary of Discovery Projects Proposals for Funding to Commence in 2007

**DP0773740** Prof Dr L Sitsky; Dr GR Lancaster

**Approved Project Title** **The role of piano music, and the piano manufacturing industry in Australia's cultural history**

**2007 :** \$113,266  
**2008 :** \$122,108  
**2009 :** \$105,174

**Primary RFCD** 4101 PERFORMING ARTS

**Administering Organisation** The Australian National University

### Project Summary

This project aims to re-examine Australia's cultural heritage through a study of the history of the piano. The study will research the Australian piano manufacturing industry; the piano roll recording industry and a significant group of pianist composers.

**DP0769987** Dr MM Skidmore; Dr HJ Lang; Dr S Turnell

**Approved Project Title** **Understanding Burma's Health Crisis and its Challenge to Regional Security: New Pathways to Peacebuilding**

**2007 :** \$123,685  
**2008 :** \$105,617  
**2009 :** \$105,620

**Primary RFCD** 3703 ANTHROPOLOGY

**Administering Organisation** The Australian National University

### Project Summary

Researching ways in which war-torn societies can build the human capital necessary for long-term implementation of peacebuilding initiatives will contribute to making peace interventions more successful. The unique focus upon the right to health and its linkages with human rights within conflict economies will provide significant information and new policy directions for improving human security and stability among Australia's neighbours in the Asian region.

**DP0774439** Dr L Strazdins; Dr B Rodgers; Dr S Charlesworth; Prof MP Bittman; A/Prof JM Nicholson; Dr R D'Souza; Dr DH Broom; Dr M Clements

**Approved Project Title** **Job quality and the mental health and well-being of working parents and their children**

**2007 :** \$70,000  
**2008 :** \$115,000  
**2009 :** \$40,000

**Primary RFCD** 3701 SOCIOLOGY

**Administering Organisation** The Australian National University

### Project Summary

Maximizing workforce participation is a national priority, essential to support an ageing population. Also critical is the full development of children's capabilities; part of a healthy start to life. Jobs, parents, children and family life lie at the centre of these priorities. Although employment supports families financially, this may come at a cost if aspects of the job affect parent well-being, or strains family relationships, which are critical to children's development and well-being. As well as informing industrial relations changes, this project will benefit the twin economic and social policy goals of workforce participation while at the same time supporting the health and well-being of parents and their children.

## Summary of Discovery Projects Proposals for Funding to Commence in 2007

**DP0773273** Dr AE Stuchbery; Prof PF Mantica; Prof N Koller

**Approved Project Title** **Magnetic moments of radioactive beams - an incisive probe of novel structures in neutron-rich nuclei**

**2007 :** \$200,000  
**2008 :** \$200,000  
**2009 :** \$160,000

**Primary RFCD** 2403 ATOMIC AND MOLECULAR PHYSICS; NUCLEAR AND PARTICLE PHYSICS; PLASMA PH

**Administering Organisation** The Australian National University

### Project Summary

This project gives Australian scientists, whose expertise underpins recent ground-breaking success, the opportunity for continued leadership in research with international large-scale radioactive beam facilities - a scientific frontier of high technical and intellectual standing. In the process of studying the fundamental goal of nuclear physics, to reach a unified understanding of all nuclei, it will develop the basic science needed for future applications of exotic isotopes, e.g. in materials science and medicine. Including experiments in Australia and abroad, it offers an exceptional breadth of training to address the shortage of nuclear expertise needed by the health sector, industry, government, and for national security.

**DP0770279** Dr AA Sukhorukov

**Approved Project Title** **Slow light in nanostructured materials**

**2007 :** \$114,893  
**2008 :** \$114,893  
**2009 :** \$114,893  
**2010 :** \$114,893  
**2011 :** \$114,893

**Primary RFCD** 2404 OPTICAL PHYSICS

QEII Dr AA Sukhorukov

**Administering Organisation** The Australian National University

### Project Summary

This project will introduce and demonstrate novel concepts for dynamically controlling the speed of light and manipulating optical pulses in specially designed nanoscale structures, making an essential step towards the creation of all-optical devices performing fast switching and processing of optical signals. These developments underpin the next generation of high-performance networks, promising to revolutionize global communications. This project will keep Australia at the forefront of international research and provide training of students on breakthrough applications of photonics and nanotechnology, contributing to the uptake of frontier technologies by Australian industries for successful operation in a competitive global environment.

**DP0774014** Dr DJ Tremethick

**Approved Project Title** **The Dynamic Control of Chromatin Structure**

**2007 :** \$90,000  
**2008 :** \$88,000  
**2009 :** \$85,000

**Primary RFCD** 2701 BIOCHEMISTRY AND CELL BIOLOGY

**Administering Organisation** The Australian National University

### Project Summary

A human chromosome is a highly heterogeneous global structure because along its axis, it folds to different extents to form either highly compacted domains that repress the expression of genes or less condensed regions that enable genes to be turned on. Changes to the structure or stability of chromosomes, and the corresponding alterations to gene expression, have been linked to many diseases states like defects in human development and cancer. This study will uncover the underpinning mechanism of how our chromosomes are organised into distinct functional domains, which may offer the potential to develop new strategies to correct chromosomal abnormalities.

## Summary of Discovery Projects Proposals for Funding to Commence in 2007

**DP0772480** Prof J Unger  
**Approved Project Title** **Land, Community and Governance in Rural China**  
**2007 :** \$75,000  
**2008 :** \$71,000  
**2009 :** \$45,000  
**Primary RFCD** 3701 SOCIOLOGY  
**Administering Organisation** The Australian National University

### Project Summary

Although China is becoming Australia's largest trading partner, we know too little about the control of land in rural China and the implications for the agricultural economy. Geo-politically, the stability of China is crucial to the region, and many commentators see rural unrest as the greatest threat to the regime. Since disputes over the use and ownership of land are the main source of this instability, providing much-needed information about China's agricultural economy and the potential for political unrest in rural China is directly in Australia's interest.

**DP0770665** Prof TR Welberry  
**Approved Project Title** **Understanding, prediction and control of polymorphism in pharmaceuticals.**  
**2007 :** \$110,000  
**2008 :** \$85,000  
**2009 :** \$60,000  
**Primary RFCD** 2501 PHYSICAL CHEMISTRY (INCL. STRUCTURAL)  
**Administering Organisation** The Australian National University

### Project Summary

The proposed research will lead, through a better understanding of polymorphism, to more efficient production of pharmaceuticals and will enhance the establishment and protection of patents. The work will have flow-on in other areas such as the manufacture of pigments, dyes and explosives. The project uses methodology for the elucidation of local structure and function at the atomic to nanoscale level in which Australia is a world leader. The project will further enhance our standing in this field and will provide excellent research training opportunities in areas particularly pertinent to future exploitation of the Australian Synchrotron and the new Research Reactor OPAL, which open in 2007.

**DP0774054** Prof RC Williamson; Dr AJ Smola; Prof Dr B Schoelkopf  
**Approved Project Title** **Unifying Modern Approaches in Machine Learning**  
**2007 :** \$81,993  
**2008 :** \$91,000  
**2009 :** \$91,000  
**Primary RFCD** 2802 ARTIFICIAL INTELLIGENCE AND SIGNAL AND IMAGE PROCESSING  
**Administering Organisation** The Australian National University

### Project Summary

The proposed research will lead to better algorithms for some important machine learning problems that could lead to better tools for extracting useful knowledge from data such as in bioinformatics and sensor networks; it will strengthen an international collaboration with one of the world's top centres of machine learning research; it will contribute to an open source toolkit of machine learning algorithms which will put Australia on the map as a provider of sophisticated machine learning software; it will provide training opportunities for several PhD students and a postdoc to work with some of the best machine learning researchers in the world.

## Summary of Discovery Projects Proposals for Funding to Commence in 2007

**DP0772138** Dr GC Young; Prof JA Long; Prof Dr M Zhu  
**Approved Project Title** **Old brains, new data - early evolution of structural complexity in the vertebrate head**  
**2007 :** \$175,000  
**2008 :** \$180,000  
**2009 :** \$173,000  
**Primary RFCD** 2601 GEOLOGY  
**Administering Organisation** The Australian National University

### **Project Summary**

Of the all the complex structures biology has provided, the evolution of the vertebrate brain and its sensory organs is perhaps the most enigmatic. The fossil record occasionally provides a chance to trace this evolution, but only with the use of novel X-ray scanning techniques can these secrets be detailed in three dimensions. Exploiting the exceptional fossil record from Australia and China, this team will for the first time collect a vast comparative data base which will yield clues on the early evolution of the ear, eye and brain.