

Summary of Discovery Projects Applications for Funding to Commence in 2006

Victoria

The University of Melbourne

DP0663938 Dr KA Adelaar; Dr MC Ewing

Approved Project Title **Dialect variation in Javanese: an integrated historical-linguistic and typological analysis**

2006 : \$100,000

2007 : \$80,000

2008 : \$60,000

Primary RFCD 3802 LINGUISTICS

Administering Institution The University of Melbourne

Project Summary

Australia has the highest concentration outside Indonesia of researchers engaged in the study of Java and this project will strengthen Australia's position as the premier Anglophone centre of Javanese Studies world wide. This project will also enhance Australia's position as a leader of academic research in Australasia by highlighting Australia's positive contribution to the study of Indonesia's cultural history. International links will be strengthened through cooperation between scholars in Australia and Indonesia. Research results will feed into the teaching programs in Indonesian Studies at the University of Melbourne and will strengthen Indonesian Studies across Australia.

DP0663915 Dr AJ Anderson; Dr RH Carpenter

Approved Project Title **Using eye movements to study how past experiences shape expectations**

2006 : \$45,000

2007 : \$25,000

2008 : \$30,000

Primary RFCD 3803 COGNITIVE SCIENCE

Administering Institution The University of Melbourne

Project Summary

We intend to examine how the brain decides where to look next with our eyes, a decision made approximately three times every second. Understanding how the normal brain makes decisions will in turn help us to understand what happens when things go wrong in diseases like dementia and Parkinson's disease, with the hope of better - and earlier - diagnosis, and improved monitoring of treatment. In addition, our research will establish an important research link with The University of Cambridge, and allow Australia to be competitive with laboratories in North America and Europe that are currently studying how the brain makes decisions about where to look.

DP0663374 Prof A Bacic; Dr CJ Schultz

Approved Project Title **Assembly and function of arabinogalactan-proteins: a class of proteoglycans involved in plant growth and development**

2006 : \$140,000

2007 : \$95,000

2008 : \$95,000

Primary RFCD 3002 CROP AND PASTURE PRODUCTION

Administering Institution The University of Melbourne

Project Summary

Achievements of the Objectives will specifically address National Research Priority 3 by developing breakthrough science and utilising frontier technologies with application to Australia's agri-biotechnology industries. In addition to contributing to world class research outcomes, we will train highly skilled graduates and postdoctoral fellows in functional genomics technologies, thereby contributing to the "knowledge nation".

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DP0663879 Dr T J Baldwin

Approved Project Title Information Delivery from Segmented Textual Data Streams

2006 : \$62,744
2007 : \$48,000
2008 : \$50,000

Primary RFCD 2802 ARTIFICIAL INTELLIGENCE AND SIGNAL AND IMAGE PROCESSING

Administering Institution The University of Melbourne

Project Summary

This project will contribute to the advancement of ICT innovation in Australia by developing a robust, reusable language understanding engine. The technology will be tailored to web applications, in the form of a conceptually-aware web search engine capable of tracking cross-document dialogues and identifying the core semantic thread of the dialogue. It will place Australia at the forefront of next-generation language technology development, with applications in areas including concept-based multi-document summarisation and email surveillance.

DP0663299 Dr E Barberio

Approved Project Title Origin of the Mass

2006 : \$105,000
2007 : \$90,000
2008 : \$90,000

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

Administering Institution The University of Melbourne

Project Summary

A hundred metres below ground, under the French-Swiss border, scientists are preparing to travel back in time to study matter as it was in the first fractions of a second after the beginning of the Universe. They are building the world's largest scientific instrument to help reveal how this primordial matter developed into the building blocks that form the great diversity of today. Australian physicists are preparing to extract the few fundamental particles that will explain the origin of the mass from the debris of billions of proton collisions. While solving the major issue confronting particle physics today, we will train students who will subsequently apply their skills in fields as diverse as science, medicine, industry and finance.

DP0664976 A/Prof JM Boldero; A/Prof RC Bell; Dr E Rafaeli; A/Prof JY Shah

Approved Project Title The structure and content of self-knowledge: When and how are implicit and explicit measures related and what do they tell us?

2006 : \$90,000
2007 : \$80,000
2008 : \$80,000

Primary RFCD 3801 PSYCHOLOGY

Administering Institution The University of Melbourne

Project Summary

Research has found clear links between individuals' beliefs about themselves and emotion, motivation, and behaviour. These beliefs also play a role in the development of and recovery from psychological illness. However, understanding has been limited by the use of explicit measures, which rely on our ability to 'know' everything about ourselves, and our willingness to disclose. We investigate how explicitly and implicitly measured self-knowledge affect emotion, motivation, and behaviour. As a result, we redress a major criticism of this research, and facilitate a greater understanding of the role of self-knowledge, including aspects that we are not able to articulate, in psychological well-being.

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DP0664271 Dr AN Burkitt

Approved Project Title **Gain modulation and stability in biological neural systems**

2006 : \$68,000

2007 : \$70,000

2008 : \$72,000

Primary RFCD 2802 ARTIFICIAL INTELLIGENCE AND SIGNAL AND IMAGE PROCESSING

Administering Institution The University of Melbourne

Project Summary

This project is relevant to the National Research Priority area of Frontier Technologies and addresses fundamental cross-disciplinary issues of control and information processing in large, distributed neural systems that are at the cutting edge of intelligent processing systems. Applications are in rapidly growing fields of robotics, machine learning, adaptive control and intelligent systems, all with applications in diverse areas of economic importance. Applications to cochlear implant speech processing will provide benefit for the hearing impaired. The project will provide students with training at an international level within Australia, thus helping ensure Australia maintains and extends its science and technology base into the future

DP0664068 Prof AI Bush; Dr R Cherny; Prof JF Mercer

Approved Project Title **The Role of Amyloid Protein Precursor in Mammalian Copper Transport**

2006 : \$185,000

2007 : \$140,000

2008 : \$140,000

Primary RFCD 3207 NEUROSCIENCES

Administering Institution The University of Melbourne

Project Summary

The knowledge gained from this investigation will help us to develop new medicines for the treatment of debilitating and ever more prevalent age-related neurodegenerative diseases and will help us to illuminate the role of metals in the ageing process itself. Apart from the obvious economic and social benefits in extending the productive lifetime of its citizens, the outcomes of this project have clear commercial applications. We anticipate that there will be patents that will ensue from the programme, which will be licensed to Australian interests, and contribute to the national revenue in the biotechnology and pharmaceutical sector.

DP0664789 Dr MW Cantoni

Approved Project Title **Modelling, Analysis and Synthesis Tools for Multi-Dimensional Signal Processing Systems**

2006 : \$93,000

2007 : \$83,000

2008 : \$85,000

Primary RFCD 2802 ARTIFICIAL INTELLIGENCE AND SIGNAL AND IMAGE PROCESSING

Administering Institution The University of Melbourne

Project Summary

Multi-dimensional signal processing plays a role in a variety of application areas, ranging from remote sensing for environmental monitoring and geological mapping, to medical imaging and the automatic control of industrial processes. The success of this project will provide mathematical tools for the advancement of the state-of-the-art in these broad areas.

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DP0666305 Dr R Cappai

Approved Project Title **Delineating the role of the GxxxG motif in transmembrane protein metabolism**

2006 : \$100,000

2007 : \$70,000

2008 : \$70,000

Primary RFCD 2701 BIOCHEMISTRY AND CELL BIOLOGY

Administering Institution The University of Melbourne

Project Summary

This study will define how a well defined motif involved in transmembrane interactions affects the metabolism of proteins. Since this motif is present in proteins involved in Alzheimer's disease it has potential benefits for community health and combating ageing.

DP0665518 Prof PH Carter; Dr EC Potter

Approved Project Title **Recreating Public Space: Poetics in the Production of Public Space**

2006 : \$108,000

2007 : \$103,230

2008 : \$104,500

Primary RFCD 4203 CULTURAL STUDIES

APD Dr EC Potter

Administering Institution The University of Melbourne

Project Summary

Community health and environmental sustainability are two national goals. 'Recreating Place' proposes that they are interlinked. First, it focuses on the neglected cultural heritage of local communities. Second, it investigates a graphic technique for translating these collective traces and associations into the design of the place. Developing a creative research model, 'Recreating Place' acts locally but thinks globally. Showing that the well-being that springs from poetic repossession of the place through its stories provides the collective motivation to ensure that place's environmental sustainability, it demonstrates how national goals can be met through the poetic re-enchantment of particular locales.

DP0664112 Dr RA Caruso; Dr Y Cheng

Approved Project Title **Chemical and morphological engineering of semiconductor electrodes for high efficiency solar cells**

2006 : \$200,000

2007 : \$130,000

2008 : \$120,000

Primary RFCD 2502 INORGANIC CHEMISTRY

Administering Institution The University of Melbourne

Project Summary

The expected outcomes of the project are the preparation and development of sophisticated electrodes for solar cells, the main advantage of which resides in their designed chemical and morphological properties. The resulting electrodes have the potential to improve the efficiency of the solar cells over current industrially used materials. The products and mechanisms developed are envisaged to be amenable to large scale-up in industry. Hence, at a future date, there is the potential to fabricate the electrodes in Australia and then export the materials or technology internationally. This will benefit the Australian economy through employment of Australians and income generated through exports.

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DP0664372 A/Prof AE Castles; A/Prof GW Stuart

Approved Project Title **Reconciling perceptual and cognitive accounts of dyslexia: The neural rate deficit hypothesis**

2006 : \$55,000

2007 : \$45,000

2008 : \$55,000

Primary RFCD 3801 PSYCHOLOGY

Administering Institution The University of Melbourne

Project Summary

The proposed research will form part of a co-ordinated program to understand the causes of dyslexia, a disorder that affects a large number of children and often persists into adulthood. It complements parallel efforts to elucidate the genetic basis of dyslexia, the heterogeneity and subtypes of dyslexia, and the developmental precursors to the disorder. This research will inform early intervention and remediation efforts and will also assist in the understanding of the normal process of reading acquisition in children.

DP0663499 Prof MS Chong; Prof J Soria; Prof I Marusic; Dr TB Nickels

Approved Project Title **The structure of turbulent boundary layers**

2006 : \$180,000

2007 : \$160,000

2008 : \$180,000

Primary RFCD 2918 INTERDISCIPLINARY ENGINEERING

Administering Institution The University of Melbourne

Project Summary

This research has an enormous impact in many fields of engineering - for example, in aeronautical, mechanical, chemical, meteorological and biomedical engineering. The resulting energy and economic savings and the reduction in atmospheric pollution and greenhouse gasses will ultimately impact on areas such as global climatic change and the energy sustainability of our urban environment, thus influencing the well-being of all people living on this planet. This research project will result in technological advancement and provide important training for future generations of researchers. This will entrench the Australian engineering and scientific community as world leaders in this area of scientific research.

DP0666803 Prof AF Christie; Ms KG Weatherall

Approved Project Title **...and by opposing, end them: A Comparative Examination of Opposition Processes in Patent Law**

2006 : \$100,000

2007 : \$130,000

2008 : \$59,967

Primary RFCD 3901 LAW

Administering Institution The University of Melbourne

Project Summary

Patent law is central to the key Australian economic aim of encouraging an innovative culture. One aspect of patent law, the opposition process, is directly linked to two important issues currently facing our patent system: improving patent quality, and minimising predatory behaviour by powerful firms. This project will assess the operation of the opposition process here, and the practice of equivalent international procedures in other jurisdictions, in order to inform Australian policy in current and ongoing negotiations towards global harmonisation. Material from this project will lead directly to proposals for improving the Australian patent system, and ensuring that it promotes, and does not retard, innovation.

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DP0663939 Prof J Damousi

Approved Project Title **Elocution Lessons: A History of Elocution, Speech and the Auditory Self in Australian Cultural Life.**

2006 : \$45,000

2007 : \$40,000

2008 : \$60,000

Primary RFCD 4301 HISTORICAL STUDIES

Administering Institution The University of Melbourne

Project Summary

This project makes a contribution to the national and community benefit by showing that speech and voice has played a central role in how Australians have come to define and understand their national identity.

A study of the aural dimension of Australian culture will also shed light on how Australians have heard themselves as well. By understanding the influence of sound and listening, this project will open up a new understanding of cultural life. Finally, an analysis of the shifting sonic environment through technological discoveries will highlight the ways in which the experience of listening has changed over time.

DP0665898 A/Prof MR Davidson; Dr DJ Harvie

Approved Project Title **Electro-viscous effects on pressure-driven liquid flow in microchannels**

2006 : \$70,000

2007 : \$70,000

2008 : \$70,000

Primary RFCD 2918 INTERDISCIPLINARY ENGINEERING

Administering Institution The University of Melbourne

Project Summary

Australian biotechnology, information technology and food technology industries will benefit from the development of new tailored micro- and nano-fluidic devices for processing of non-Newtonian fluids. The efficiency of functional elements such as valves, pumps, mixers, reactors, heat exchangers can be optimised for specific fluids by understanding the coupling between the fluid properties, the device geometry, surface charge, and the numerical predictions. This understanding will complement development in related projects on non-Newtonian drop and particle formation in microfluidic flows which envisage continuous particle manufacture for novel materials possessing programmable, enhanced functional properties.

DP0666857 Dr CW Davis; Dr J Kim; Prof ME Sams

Approved Project Title **Establishing how head and face movement properties contribute to the perception of speech and identity**

2006 : \$120,000

2007 : \$132,000

2008 : \$130,000

2009 : \$132,000

2010 : \$125,000

Primary RFCD 3801 PSYCHOLOGY

QEII Dr J Kim

Administering Institution The University of Melbourne

Project Summary

The proposed studies provide an extensive research program into audio-visual speech processing and person identification: key components of face-to-face communication. The likely impact and benefits of the project concern its contribution to perceptual theory (linking signal, brain and behaviour) and its practical implications: For determining the viability of multimodal biometric identification procedures by assessing the distinctiveness and permanence of AV speech characteristics. In the development of a visual dubbing technique that has potential for communication in noisy environments (and for the deaf) and for the development of a morphable model for AV presentation that has application for both first and second language learning.

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DP0663500 A/Prof LM Delbridge; A/Prof RE Widdop

Approved Project Title **Shaping the heart in early development - new insights into cellular modelling processes**

2006 : \$85,000

2007 : \$65,000

2008 : \$65,000

Primary RFCD 3210 CLINICAL SCIENCES

Administering Institution The University of Melbourne

Project Summary

Heart health is an important contributor to quality of life and longevity. This research will provide new insights into the way hormonal influences early in development shape a healthy heart. The project builds on the application of recently patented, sophisticated cell imaging techniques. Research students and trainees recruited to this project will benefit from their involvement with this leading edge technology. These studies are important in providing a basis for developing optimal management strategies for congenital heart conditions and preterm infants. Improved knowledge of the cardiac effects of fetal and neonatal exposure to steroids (to assist with lung maturation in prematurity or to control maternal asthma) will be gained.

DP0664317 A/Prof S Dey; A/Prof JS Evans; Dr GN Nair

Approved Project Title **Distributed Estimation and Control under Communication Constraints**

2006 : \$118,000

2007 : \$108,000

2008 : \$110,000

Primary RFCD 2801 INFORMATION SYSTEMS

Administering Institution The University of Melbourne

Project Summary

Sensor networks will be an important technology for Australia's future. Applications range from monitoring water quality to controlling complex defence systems. This project will lead to a better understanding of the fundamental limits of wireless sensor networks. Above and beyond the creation of new theory and algorithms, the national and community benefits will include: (i) enhancement of Australia's reputation for innovative Engineering research through quality publications and international collaborations; and (ii) improvement of the research and development capability in the information and communications technology sector through high level training of postgraduate students and postdoctoral fellows in this important technology.

DP0663365 Dr NM Dragomir

Approved Project Title **Quantitative polarisation phase microscopy: A new tool for advances in structural analysis and biophotonics**

2006 : \$130,000

2007 : \$85,000

2008 : \$85,000

Primary RFCD 2404 OPTICAL PHYSICS

APD Dr NM Dragomir

Administering Institution The University of Melbourne

Project Summary

Innovation in biomedical research is driven by technology in optical imaging. Optical imaging methods including polarisation microscopy are widely accepted and are at the forefront of biomedical scientific discoveries. This project undertakes fundamental and applied research innovatively combining polarisation imaging and quantitative phase imaging microscopy to uniquely quantify the physical thickness and morphology of birefringent specimens such as the cardiac muscle cell. This project, while of substantial intellectual merit in its own right, could also have the potential to lead to the detection of the mechanisms related to heart failure.

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DP0664051 Prof WA Ducker; A/Prof KE Van Cott; A/Prof RM Davis

Approved Project Title **Artificial Proteins for the Control of Colloid and Surface Properties**

2006 : \$250,000

2007 : \$220,000

2008 : \$220,000

Primary RFCD 2501 PHYSICAL CHEMISTRY (INCL. STRUCTURAL)

Administering Institution The University of Melbourne

Project Summary

A large amount of Australia's wealth arises from mining and the processing of small (colloidal) particles. This project will develop new coatings for particles, which will allow better control of the properties of particle suspensions. Control of surface properties is also important in the preparation of ceramics and in the preparation of implants and biosensors. The development of new coatings will also offer opportunities for improved performance in these areas.

Many existing coating technologies rely on procedures using organic solvents, which are hazardous to human health and the environment. The proposed research will develop coatings that are made and used in solutions of water only, thereby minimizing pollution production.

DP0662906 Dr MR Duckham

Approved Project Title **Automatic fusion of geoinformation: The intelligent geo-mediator architecture (iGMA)**

2006 : \$60,000

2007 : \$50,000

2008 : \$50,000

Primary RFCD 2910 GEOMATIC ENGINEERING

Administering Institution The University of Melbourne

Project Summary

The efficient integration of geographic information from different sources (termed geoinformation fusion) is recognized internationally as a major problem for projects that rely on geographic information. Conventional geoinformation fusion procedures require manual assistance from human experts. This project will lead to increased speed, reliability, and economy for this task, by automating the process of geoinformation fusion. Many different application domains will benefit from these improvements to geoinformation fusion procedures, including emergency response systems (for example, helping to combine different data about the structural characteristics of buildings as part of a housing damage assessment following an earthquake).

DP0664037 Dr AM Finnane

Approved Project Title **Consumption in Late Imperial China: an Early Modern Phenomenon?**

2006 : \$21,939

2007 : \$60,000

2008 : \$40,000

Primary RFCD 4301 HISTORICAL STUDIES

Administering Institution The University of Melbourne

Project Summary

China's present economic growth and consumer activity are of immediate interest to Australia. This study of consumer activities in earlier centuries will shed light on changes as well as continuities in Chinese consumption in a long era of globalization. The project will contribute to the corpus of Australian scholarship on Chinese and world history, enhancing local and global understandings of China's past, and enriching ways in which it is imagined.

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DP0665098 Mr AG Fowler

Approved Project Title **Implementing large-scale solid-state quantum computation**

2006 : \$65,000

2007 : \$57,000

2008 : \$60,000

2009 : \$57,000

Primary RFCD 2402 THEORETICAL AND CONDENSED MATTER PHYSICS

APD Mr AG Fowler

Administering Institution The University of Melbourne

Project Summary

The goal of quantum computing research is to harness the properties of quantum mechanics to build computers that are exponentially more powerful than the computers of today. Along the way, many spin-off technologies for conventional computing and nanotechnology are expected. Realising the quantum computing dream is a daunting experimental challenge requiring both theoretical assurance that it is possible in principle, and theoretical guidance as to the best method. We seek to provide this theoretical support for solid-state systems, and broaden the range of problems that such systems are demonstrably suited to tackle.

DP0665971 Dr BG Fry

Approved Project Title **Modern reptiles with ancient toxins: the molecular origin and evolution of novel bioactive proteins from squamate dental glands.**

2006 : \$85,000

2007 : \$30,000

2008 : \$30,000

Primary RFCD 2702 GENETICS

Administering Institution The University of Melbourne

Project Summary

Animal venoms provide a rich source of novel bioactive proteins, some of which have demonstrated therapeutically useful activities. Through this researcher's unique approach of investigating previously unmapped squamate venom systems, there is potential for the identification of divergent, bioactive proteins. Those already identified by the applicant in the dental glands of Australian monitor lizard species represent a tremendous opportunity for biodiscovery. Further knowledge in this area will increase medical understandings of bites and aid conservation measures informed by the natural history of these animals.

DP0664951 Dr L Gangadharan; Dr N Erkal; A/Prof LA Cameron; Dr A Chaudhuri

Approved Project Title **The Economics of Corruption and Institutional Change: Theory and Experiments**

2006 : \$70,000

2007 : \$120,000

2008 : \$65,000

Primary RFCD 3499 OTHER ECONOMICS

Administering Institution The University of Melbourne

Project Summary

The economic and social wellbeing of its neighbours is important for Australia. It results in a more prosperous and safe region. Australia's interest in the wellbeing of its neighbours is often expressed through financial aid and the sharing of expertise. This research will contribute to this expertise by investigating the ways in which changes in political and legal institutions can help reduce corruption and result in economic development. Moreover, the cross-country nature of this research project will help increase the level of academic interactions between Australian and foreign universities.

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DP0665230 A/Prof RB Gasser; Dr AC Loukas

Approved Project Title **Discovery of early developmental events in the transition to parasitism in the hookworm *Ancylostoma caninum* using genomic technologies**

2006 : \$97,000

2007 : \$80,000

2008 : \$75,000

Primary RFCD 3005 VETERINARY SCIENCES

Administering Institution The University of Melbourne

Project Summary

The national/community benefits are: (1) to develop a long-term, high quality scientific and technological program contributing to national objectives, including the maintenance of a strong capability in basic research, the development of new scientific concepts and the enhancement of international collaborative links; (2) to strengthen the links between basic and applied research; (3) to develop excellence in research by promoting collaborative research, resulting in a more efficient use of resources in a national and international context; (4) to enhance the skills-base in biology and biotechnology; (5) to substantially increase global visibility through quality research, leading to an increased investment in Australian science.

DP0665082 Dr AL Genovese

Approved Project Title **Has Feminism Failed the Family? A History of Equality, Law and Reform**

2006 : \$90,000

2007 : \$74,340

2008 : \$74,340

Primary RFCD 3999 OTHER LAW, JUSTICE AND LAW ENFORCEMENT

APD Dr AL Genovese

Administering Institution The University of Melbourne

Project Summary

The research will examine the history of legal reform since the introduction of the Family Law Act. As such, it will provide a broader perspective to feminist and conservative criticisms of gender bias and legal unfairness in the operation of a family law system understood to be based on equality principles. The project's outcomes will be of immediate significance therefore to policy makers, as well as to the divergent groups who currently research legal and government regulation of families and family breakdown. Further, the project will enhance national knowledge by contributing to the historical understanding of Australia's immediate past.

DP0664163 Prof KP Ghiggino; Dr TD Bell; Prof FC De Schryver

Approved Project Title **Single molecule spectroscopy of functional luminescent materials.**

2006 : \$170,000

2007 : \$100,000

2008 : \$100,000

Primary RFCD 2501 PHYSICAL CHEMISTRY (INCL. STRUCTURAL)

Administering Institution The University of Melbourne

Project Summary

This project will provide new insights into the light induced processes occurring in individual molecules of potentially useful luminescent materials. The molecules to be studied include new fluorescent probes of biological and polymer systems and single light harvesting nanoparticles with applications in solar energy collection and conversion. The program of work proposed will increase our understanding of light induced chemical processes and assist the design of advanced materials for photomolecular devices.

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DP0665127 Prof AJ Gleadow; A/Prof BP Kohn; Prof RW Brown; Dr JM Fletcher; Prof F Chemale Jr.

Approved Project Title **Reconstructing the morphotectonic evolution of rifted continental margins from low-temperature thermochronology**

2006 : \$110,000

2007 : \$103,000

2008 : \$90,000

Primary RFCD 2601 GEOLOGY

Administering Institution The University of Melbourne

Project Summary

Knowledge of how continental rifting occurs will improve our ability to predict the locations of important oil and gas resources on the margins of Australia and elsewhere, which is directly relevant to the National Research Priority goal of 'Developing Deep Earth Resources'. The project will enhance our national scientific standing by developing and maintaining key expertise and facilities that can sustain a world-leading research capability in Australia. The project will also forge strong international links with researchers outside Australia, build our research profile in an area of significant worldwide scientific interest at the present time, and provide a training ground for a new generation of younger scientists in Australia.

DP0663972 Dr DC Goodman

Approved Project Title **A History of Public Conversation in the USA**

2006 : \$37,000

2007 : \$40,000

2008 : \$70,000

Primary RFCD 4301 HISTORICAL STUDIES

Administering Institution The University of Melbourne

Project Summary

The quality of public conversation is a subject of continuing concern in Australia as in the US. This study of the history of public conversation in the US will offer a longer historical perspective on current political and social concerns about declining social capital and civility in public discourse. Americans have always sought more and better public discussion, but for quite different reasons at different times. The research will illuminate the very rich history of public conversation in the US and shed some comparative light on Australian conditions.

DP0663494 Dr MN Guillemin; Dr LH Gillam; Prof DA Rosenthal

Approved Project Title **Hamstrung by ethics creep? Investigating human research ethics in practice**

2006 : \$60,000

2007 : \$30,000

2008 : \$55,000

Primary RFCD 3799 OTHER STUDIES IN HUMAN SOCIETY

Administering Institution The University of Melbourne

Project Summary

This project will benefit national ethics review processes and ethical research practice. It will provide the community, funding bodies, researchers, participants and ethics committee members with confidence in both the ethics review process and day-to-day practice of health research. As health research becomes increasingly complex, it is vital that the conceptual bases used in ethical deliberations and their relationship to research practice are made explicit. By making known the ways that ethics committee members and health researchers make decisions about research ethics and how this influences the conduct of their practice, we can be assured that health research in the future is being conducted in the most effective and ethical way.

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DP0665701 Dr CA Hartley; Dr JR Gilkerson; Prof GF Browning; Dr F Li

Approved Project Title **Blocking immune responses: a critical factor in herpesvirus virulence?**

2006 : \$98,000

2007 : \$88,000

2008 : \$88,000

Primary RFCD 3005 VETERINARY SCIENCES

Administering Institution The University of Melbourne

Project Summary

The horse and poultry industries are two large, primarily rural based livestock production industries that are major contributors to the national economy. The research proposed in this project will improve our understanding of the pathogenesis of two important viral pathogens that are each a significant cost to their respective industry, and thus will ultimately reduce the cost of these two viruses to industry. In addition, the technology developed during this project would have a global market and may be transferable to other viral pathogens of other domestic species.

DP0664286 A/Prof OT Henry; A/Prof MD McKenzie; A/Prof N Olekalns; Dr K Shields; Dr S Suardi

Approved Project Title **Measuring the Effects of Interest Rate Volatility**

2006 : \$90,000

2007 : \$50,000

2008 : \$60,000

Primary RFCD 3503 BANKING, FINANCE AND INVESTMENT

Administering Institution The University of Melbourne

Project Summary

Interest rate changes have important implications for highly influential macroeconomic variables and, for the investor, have direct implications for asset prices, net worth and future wealth. By considering unresearched areas concerning the behaviour and influence of interest rates our research will be of interest to an academic audience, government, regulators and market practitioners. Attention to Australia, the US and Asia means that the research will be directly relevant to Australian decision-makers. Further, the project will yield papers for publication in top international journals, reinforcing Australia's reputation as a leading centre for financial research and enhance it's reputation for cutting-edge work.

DP0666120 Prof G Hjorth

Approved Project Title **Equivalence Relations, Group Actions, and Descriptive Set Theory**

2006 : \$151,060

2007 : \$151,060

2008 : \$151,060

2009 : \$151,060

2010 : \$151,060

Primary RFCD 2301 MATHEMATICS

APF Prof G Hjorth

Administering Institution The University of Melbourne

Project Summary

This project is a contribution to basic and foundational research in the area of Pure Mathematics generally and Mathematical Logic specifically. Logic in particular appears in disciplines as diverse as Computer Science, Linguistics, and Philosophy, and the development of logic in these fields has been profoundly influenced by the foundational work of mathematical logicians. The innovative techniques introduced in this proposal will enable Australia to maintain a position at the forefront of Pure Mathematics, and by recruiting a recent winner of the highly prestigious Karp prize the country will be instantly established as one of the leading centers of Mathematical Logic.

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DP0663399 A/Prof CD Hodgson

Approved Project Title **Three-dimensional geometry and topology**

2006 : \$82,000

2007 : \$72,000

2008 : \$74,000

Primary RFCD 2301 MATHEMATICS

Administering Institution The University of Melbourne

Project Summary

This project will carry out important fundamental research into the geometry and topology of 3-dimensional manifolds, an area of intense activity over the last 30 years.

The work has direct applications to physics, for example recent work in cosmology aimed at determining the global structure of our universe. Our work on knotting and symmetries of molecular graphs will also be of considerable interest in chemistry and biology.

The project will also provide high quality training of undergraduate and graduate students in geometry and topology, and will increase international cooperation by developing closer links with colleagues and institutions overseas.

DP0663108 Dr OD Jones; Dr DN Veitch

Approved Project Title **Multifractal models in finance via the crossing tree**

2006 : \$86,000

2007 : \$76,000

2008 : \$78,000

Primary RFCD 2302 STATISTICS

Administering Institution The University of Melbourne

Project Summary

High level mathematical modelling is an established part of the modern finance industry, in particular the Black-Scholes option pricing formula is now an indispensable financial tool.

To remain competitive the Australian financial sector needs to keep up with developments in mathematical finance, which is only possible if the Australian academic community remains active in the field.

The work on multifractal modelling proposed here is innovative both in its theoretical aspects and its applied methodology, and will ensure that Australian research remains at the cutting edge of this highly competitive and fast moving field.

DP0664225 Dr C Kao; Dr MW Cantoni; A/Prof U Jonsson

Approved Project Title **Robustness Analysis and Control Design of Distributed and Networked Systems**

2006 : \$90,000

2007 : \$80,000

2008 : \$82,000

Primary RFCD 2301 MATHEMATICS

Administering Institution The University of Melbourne

Project Summary

The theory and computational tools to be developed in this project have impact on a broad range of areas, including various engineering disciplines, biology, and medical and environmental sciences. In terms of practical interests, this project will create cutting edge technologies which are applicable to important infrastructures of the modern society such as communication networks, transportation systems, electrical power grids, collaborative intelligent machines, and water distribution networks.

Summary of Discovery Projects Applications for Funding to Commence in 2006

DP0662844 Dr AT Kenyon; A/Prof TC Lindsey; Dr T Marjoribanks; Ms AJ Whiting

Approved Project Title **The Media and ASEAN Transitions: Defamation Law, Journalism and Public Debate in Indonesia, Malaysia and Singapore**

2006 : \$80,000

2007 : \$90,000

2008 : \$90,000

2009 : \$75,000

Primary RFCD 3901 LAW

Administering Institution The University of Melbourne

Project Summary

This project will examine defamation law, journalism and public debate in three core members of the Association of Southeast Asian Nations: Indonesia, Malaysia and Singapore. It will focus on a legal issue, defamation, which is central to the Australian and regional media's potential for improving public and private sector governance, and promoting domestic and regional understanding, at a time when independent media speech has great value in relation to trade, security and development. When risks of transnational defamation liability are increasing, it will assist the Australian media's coverage of three pivotal countries in the region and substantially develop the academic understanding of defamation law's effects on media content.

DP0664674 Dr MG Kirley

Approved Project Title **Evolutionary multi-objective algorithms for Global Grids**

2006 : \$75,027

2007 : \$25,000

2008 : \$25,000

Primary RFCD 2803 COMPUTER SOFTWARE

Administering Institution The University of Melbourne

Project Summary

This research investigates alternative software technologies for Grid-based evolutionary multi-objective decision algorithms. By employing the latest adaptive techniques and taking advantage of the low cost Grid infrastructure, new parallel evolutionary systems will be developed that can rapidly supply robust solutions to complex problems. This project will further develop an understanding of scaling issues in parallel evolutionary systems and pave the way for even more widespread application of evolutionary techniques for large scale, data-intensive applications in science and industry.

DP0664752 Prof C Kulik; Dr C Cregan; Dr M Brown; Dr MI Metz

Approved Project Title **The psychological contract: Bridging human resource management practices and organisational effectiveness**

2006 : \$30,000

2007 : \$30,000

2008 : \$30,000

Primary RFCD 3502 BUSINESS AND MANAGEMENT

Administering Institution The University of Melbourne

Project Summary

Many managers believe that recent changes in management practice are responsible for Australia's high labour productivity but very little is known about the mechanisms through which such effects are transmitted. Will HRM enable Australian organisations to generate and maintain a competitive advantage in the global context? In this project we draw on theoretical frameworks established in the behavioural sciences to understand how HRM practices influence employee reactions and impact organisational effectiveness, such as labour productivity. The results will be of direct benefit to Australian organisations designing, evaluating, or reconfiguring their HRM practices in line with their competitive strategy.

Summary of Discovery Projects Applications for Funding to Commence in 2006

DP0664342 Dr S Kurnia

Approved Project Title **Adoption of electronic commerce-enabled supply chain management: a trans-national comparison study**

2006 : \$75,440

2007 : \$25,000

2008 : \$25,000

Primary RFCD 2801 INFORMATION SYSTEMS

Administering Institution The University of Melbourne

Project Summary

The framework developed will allow practitioners to identify an appropriate strategy to promote the adoption of EC-enabled SCM in developing countries. By including Indonesia and China as two of Australia's large trading partners in this study, the relationships can be further enhanced, leading to an increase in Australia's export market and improvement in national productivity and growth. Through wider adoption of EC-enabled SCM by Australia's trading partners, Australia can trade with them more efficiently. The empirical data and the research instruments developed will also enhance Australia's research standing and contribute to university teaching and research training.

DP0662804 A/Prof KA Landman; A/Prof BD Hughes; Dr MJ Simpson

Approved Project Title **Multi-scale modelling of cell migration in developmental biology**

2006 : \$94,000

2007 : \$82,000

2008 : \$82,000

2009 : \$60,000

Primary RFCD 2399 OTHER MATHEMATICAL SCIENCES

APD Dr MJ Simpson

Administering Institution The University of Melbourne

Project Summary

Interpretative and predictive tools are needed for the comprehensive understanding of directed cell migration in the medical sciences. Mathematical models and modelling methodologies developed in this project will make a significant contribution to the investigation of cell migration and the testing and generation of hypotheses. Such models are needed to understand observed cellular patterns. This project will contribute to knowledge of normal and abnormal developmental processes, especially in embryonic growth. Understanding these processes should lead to prediction and treatment of congenital disorders and contribute to a healthy start to life.

DP0663196 Dr C Leckie; Prof J Bezdek

Approved Project Title **Data Mining by Clustering in Very Large Relational Databases**

2006 : \$65,000

2007 : \$67,000

2008 : \$69,000

Primary RFCD 2801 INFORMATION SYSTEMS

Administering Institution The University of Melbourne

Project Summary

Many commercial and governmental entities possess very large relational data that cannot be feasibly analyzed by today's computers, e.g., gene expression data, product usage databases and telecommunication call records. The clustering tools developed in this project will have a significant benefit on many business processes that involve clustering this type of data, such as fraud detection and market segmentation.

Summary of Discovery Projects Applications for Funding to Commence in 2006

DP0663788 Dr H Lewi; Prof K Darian-Smith; Prof PJ Goad; Dr JL Willis; A/Prof JF Murphy

Approved Project Title **Healthy Bodies, Healthy Minds: Designing Everyday Modernism for Australian Communities**

1920-1970

2006 : \$68,000

2007 : \$100,000

2008 : \$100,000

Primary RFCD 4301 HISTORICAL STUDIES

Administering Institution The University of Melbourne

Project Summary

This cross-disciplinary project will construct an historical account of the interconnections between the network of governmental policies and initiatives promoting a healthy and educated citizenry, and the design and use of modern, municipal architecture in mid-century Australia. Detailed analysis of modern building types, from around the nation, including kindergartens, sporting facilities, swimming pools, child health clinics, libraries and community centres will constitute an original and important resource for historians, conservationists and architects. Historical findings will inform directions and lessons for future practice in the design, planning and conservation of community infrastructure.

DP0665417 Dr SA Lovegrove; A/Prof JA Lawrence; Dr AC Sutton; Dr CS Ross; Ms R Holder

Approved Project Title **Fairness and equity for victims of crime: what do victims want, and why don't they get it?**

1920-1970

2006 : \$60,000

2007 : \$25,000

2008 : \$55,000

Primary RFCD 3903 JUSTICE AND LEGAL STUDIES

Administering Institution The University of Melbourne

Project Summary

The goal of the research is to assist justice and crime victims services agencies to understand their role in relation to crime victims and to develop more effective and responsive ways to meet this important social and justice challenge. The research will contribute to a better understanding how traditional legal and justice processes can be made consistent with victims' needs for procedural fairness and equity of outcomes. The project will establish a strong theoretical and policy framework for a principled, fair and responsive justice system that is informed by the diverse interests of its constituents and consumers. This research has the support of Victims Support Australasia and in-principle agreement from four member services.

DP0665071 A/Prof GS Lynch; Dr DR Plant

Approved Project Title **Modulating the molecular and cellular physiology of ageing skeletal muscle**

1920-1970

2006 : \$93,000

2007 : \$83,000

2008 : \$83,000

Primary RFCD 3206 MEDICAL PHYSIOLOGY

Administering Institution The University of Melbourne

Project Summary

Understanding the underlying mechanisms of how ageing affects muscle is of increasing importance to the community as the number of older persons in the population continues to escalate and the age of retirement increases. Old muscles are slower and weaker than young muscles, and are more easily injured. This proposal is focussed on developing safe therapies to prevent or reverse these age-related effects. Making old muscles young again, is a research strategy that will promote healthy ageing and enable older Australians to enjoy a better quality of life.

Summary of Discovery Projects Applications for Funding to Commence in 2006

DP0663857 A/Prof GM MacNaughton; Dr P Hughes

Approved Project Title **Negotiating Staff-Parent Relations in Culturally Diverse Early Education Settings**

2006 : \$39,000

2007 : \$35,000

2008 : \$23,000

Primary RFCD 3399 OTHER EDUCATION

Administering Institution The University of Melbourne

Project Summary

The Australian federal government invests nearly \$A1.25 billion annually in childcare and more than 1.6 million children attend some form of childcare. There is an international consensus that parental involvement in early childhood programs enhances their economic and social benefits, including improved educational outcomes, enhanced employment opportunities and increased social participation. This project increases the likelihood that an increasingly culturally diverse Australia will attain those benefits by offering a radical approach to improving staff-parent relations in culturally diverse settings and helping to reduce the occupational stress often linked with those relations

DP0664097 Prof GI McFadden; Dr RF Waller

Approved Project Title **Infrakingdom Alveolata: searching for a defining structural feature**

2006 : \$99,000

2007 : \$90,000

2008 : \$90,000

Primary RFCD 2799 OTHER BIOLOGICAL SCIENCES

Administering Institution The University of Melbourne

Project Summary

This project will establish the first molecular nexus between a cellular structure currently used to define an Infrakingdom of life. It will aid in the higher order systematics of our microscopic diversity and allow us to interpret how important parasites learned to penetrate host cells to establish infection. We will train excellent graduate and Honours students in cellular and molecular biology.

DP0666735 Dr KL McFerran

Approved Project Title **Tipping the Scales: Fostering a healthy adolescence through musical participation**

2006 : \$33,000

2007 : \$20,000

2008 : \$20,000

Primary RFCD 4101 PERFORMING ARTS

Administering Institution The University of Melbourne

Project Summary

The prevention of mental illness is a priority for the Australian community. The death of a parent or sibling during childhood or adolescence is a significant risk factor for mental illness because of the multiple losses that stem from the original bereavement. Early intervention programs with a focus on enhancing resilience have been identified as the most appropriate strategy for promoting mental health. This project investigates and evaluates the potential of creative expression to function as a protective factor in fostering resilience and effective coping with bereavement during adolescence. Innovative models of analysis will provide multiple perspectives on this benefit.

Summary of Discovery Projects Applications for Funding to Commence in 2006

DP0664589 Prof W Moran; Dr SD Howard; Prof AR Calderbank

Approved Project Title **Towards an Information Theory of Radar**

2006 : \$83,000

2007 : \$73,000

2008 : \$75,000

Primary RFCD 2802 ARTIFICIAL INTELLIGENCE AND SIGNAL AND IMAGE PROCESSING

Administering Institution The University of Melbourne

Project Summary

Radar is a key sensing technology for the defence of Australia. It is also used in several civilian applications. Recent advances in engineering and science have led to significantly increased inherent capabilities for radar hardware. Nonetheless, radars in service and planned are unable to counter many current threats. To a large extent these new capabilities have yet to be fully exploited, and in large part this is because of the lack of an information theory for radar that corresponds to the highly successful theory of this kind for telecommunications. Our work, though pitched at fundamental ideas in the theory of radar, will lead to the production of improved radar capability that will permit improved threat detection and tracking.

DP0663055 Dr M Murphy; Dr EL Fletcher

Approved Project Title **Histamine and non-visual regulation of retinal signalling**

2006 : \$105,000

2007 : \$83,000

2008 : \$83,000

Primary RFCD 3207 NEUROSCIENCES

Administering Institution The University of Melbourne

Project Summary

This project is internationally competitive, asking basic biological questions about the brain and vision. Of direct national benefit, the new knowledge generated may alter the way we understand how vision works. Ultimately this knowledge may give insight into particular health issues, such as the persistence of visual memory in Post Traumatic Stress Disorder, and age related diseases such as Alzheimer's disease. Further this new knowledge will flow directly into the reputation of our major institutes of higher education and strengthen their place on the world stage. Through both CIs, this research will contribute to the education of both undergraduate and postgraduate science students at The University of Melbourne.

DP0664501 A/Prof D Netic; Dr Y Tan

Approved Project Title **Finite-dimensional Sampled-data Control of Nonlinear Spatially Distributed Parameter Systems**

2006 : \$113,000

2007 : \$101,000

2008 : \$101,000

Primary RFCD 2301 MATHEMATICS

APD Dr Y Tan

Administering Institution The University of Melbourne

Project Summary

Optical communication networks, smart materials and fluid flows, are all examples of systems whose behaviour can be significantly improved by automatic control. These are identified as some of the key technologies that will shape our future. This project will contribute to the fundamental science and engineering design of such diverse systems. Two postdoctoral fellows and one graduate student will be trained in this important emerging field.

Summary of Discovery Projects Applications for Funding to Commence in 2006

DP0664723 Prof RS Norton

Approved Project Title **Malarial parasite surface proteins: structure and interactions of key merozoite antigens**

2006 : \$110,000

2007 : \$94,000

2008 : \$94,000

Primary RFCD 2701 BIOCHEMISTRY AND CELL BIOLOGY

Administering Institution The University of Melbourne

Project Summary

Malaria remains one of the most lethal infectious diseases in the world today, being directly responsible for around 2 million deaths annually, many in children under 5 years of age. Related parasitic diseases affect livestock in malaria-endemic regions and more broadly. There is an urgent need for an improved understanding of how these parasites invade target red blood cells. Knowing the structures of key proteins on the parasite cell surface will provide a deeper understanding of host-parasite interactions, as well as a basis for the design of vaccines or drugs that interfere with parasite invasion of host red blood cells.

DP0663264 Dr CE Parker; Dr VL Nielsen

Approved Project Title **The Impact of ACCC Enforcement Action: Evaluating the explanatory and normative power of responsive regulation and responsive law**

2006 : \$70,000

2007 : \$70,000

2008 : \$70,000

2009 : \$70,000

2010 : \$70,000

Primary RFCD 3903 JUSTICE AND LEGAL STUDIES

ARF Dr CE Parker

Administering Institution The University of Melbourne

Project Summary

The project will enhance the capacity of the ACCC and other business regulators to ethically and effectively regulate to achieve the goals of regulatory policy such as a fair, competitive economy, occupational health and safety, and environmental integrity. Australia is already well recognised as a leader in ambitious empirical and policy-oriented social science research on regulatory compliance (through the ARC funded Governance Network including RegNet at ANU). This project will enhance that reputation with the most comprehensive data set on the corporate compliance impact of enforcement action and fundamental re-thinking of foundational theoretical questions about the nature and capacities of regulation.

DP0665261 Prof PE Pattison; Dr GL Robins; Prof TA Snijders

Approved Project Title **Statistical models for social networks, network-based social processes and complex social systems**

2006 : \$140,000

2007 : \$150,000

2008 : \$150,000

2009 : \$140,000

2010 : \$130,000

Primary RFCD 3801 PSYCHOLOGY

Administering Institution The University of Melbourne

Project Summary

Our methodological advances (flexible, theoretically defensible and empirically testable quantitative models for a wide range of interactive social processes) will add significantly to national capacity in modelling complex social systems. Existing collaborations will result in practical scientific outcomes relating to: the impact of social contact and needle-sharing networks on HIV transmission; the social epidemiology of mental health; health policy and local government networks; governance arrangements in environmental management; intra-organizational networks; labour market dynamics; and acculturation processes for international students. A major emphasis will be the training of a new group of quantitative social science graduates.

Summary of Discovery Projects Applications for Funding to Commence in 2006

DP0663005 A/Prof PA Pearce; Prof MD Gould

Approved Project Title **Quantum Spectra**

2006 : \$88,000

2007 : \$78,000

2008 : \$80,000

Primary RFCD 2301 MATHEMATICS

Administering Institution The University of Melbourne

Project Summary

Fundamental quantum processes will play a key role in emerging technologies in the twenty-first century across diverse industries including quantum information technology, quantum computers and electronics, quantum optics, nanoscale quantum microscopes and superconductor technology. Australia has a strong base of expertise in the underpinning quantum disciplines. This project in strategic basic research within mathematical physics will develop a comprehensive and consistent mathematical description of quantum processes. This research will lead to a deeper understanding of quantum processes, keep Australia at the leading edge of international developments and increase Australia's capacity to develop and implement these new technologies.

DP0663724 Prof S Praver; Prof DN Jamieson; Dr P Olivero; Dr P Reichart; Dr J Wrachtrup; Dr F Jelezko; Dr DF Moore; Prof A Briggs; Prof IA Walmsley; Prof J Salzman

Approved Project Title **Diamond Based Quantum Information Processing**

2006 : \$148,680

2007 : \$148,680

2008 : \$148,680

Primary RFCD 2917 COMMUNICATIONS TECHNOLOGIES

APD Dr P Olivero

APD Dr P Reichart

Administering Institution The University of Melbourne

Project Summary

The explosive growth in ideas for applications of quantum mechanics to practical devices for information processing has been a worldwide phenomenon of the past 4 years. A leading material which promises many of the desirable quantum properties is diamond. We aim to build on our extensive expertise in fundamental diamond research to design, fabricate and analyse novel quantum devices made from diamond. We will seek to attain the glittering prize of constructing diamond devices that will absorb, store and re-emit single light-photons with revolutionary applications to information storage and processing.

DP0665027 Prof IM Ramsay; Prof C Rider; A/Prof AM O'Connell; Prof RJ Mitchell

Approved Project Title **Employee Share Ownership Plans: Current Practice and Regulatory Reform**

2006 : \$147,000

2007 : \$86,000

2008 : \$90,000

Primary RFCD 3901 LAW

Administering Institution The University of Melbourne

Project Summary

National Priority Research Goal: Fostering and Innovative Culture and Economy.

Employee Share Ownership Plans (ESOPs) are important to the development of an economic culture of enterprise and innovation and the building of national wealth and savings in response to long-term demands of intergenerational equity. ESOPs require development through appropriate regulatory frameworks. This project will subject the existing regime of tax, corporate and labour law to technical and empirical scrutiny. This will enhance the capacity of policy makers to evaluate and identify appropriate regulatory techniques to ensure the growth of efficiency of ESOPs at the national and enterprise level.

Summary of Discovery Projects Applications for Funding to Commence in 2006

DP0665513 Dr R Reed

Approved Project Title **Housing affordability: the use and misuse of reverse mortgages by older households**

2006 : \$27,000

2007 : \$28,000

2008 : \$27,000

Primary RFCD 3705 DEMOGRAPHY

Administering Institution The University of Melbourne

Project Summary

Many retirees are without compulsory superannuation although daily living costs have risen substantially. As additional workers in the 'baby boom' generation retire and less tax will be paid to the government, it appears there will be increasing pressure placed on the pension system. A large proportion of the population may struggle to enjoy a fulfilling retirement and be drawn towards a reverse mortgage, which in turn may be misunderstood. With an increasing proportion of older residents leaving the workforce, the community would be adversely affected if this cohort required government financial assistance due to the misuse of home equity loans.

DP0663872 Prof R Robson; Dr BF Abrahams

Approved Project Title **Coordination Polymers and Oligomers and Labyrinthine Molecular Solids as Materials for the Sorption of Gases/Vapours, with Emphasis on Hydrogen**

2006 : \$143,000

2007 : \$83,000

2008 : \$83,000

Primary RFCD 2599 OTHER CHEMICAL SCIENCES

Administering Institution The University of Melbourne

Project Summary

The work will afford new types of gas sorbing solids, which may find practical uses in the separation and storage of gases and in catalysis. Hydrogen is almost the perfect, pollution-free fuel; Australia's abundant sunlight potentially makes it cheap and readily available here. The lack of a safe and economic means of storing hydrogen at easily achieved and maintained pressures remains the chief obstacle to the viability of numerous hydrogen-powered devices of the future such as cell phones, laptop computers, cordless tools and vehicles. The work proposed will contribute to the development of safe, efficient, and portable hydrogen storage systems.

DP0664832 Dr G Rosenbaum

Approved Project Title **Geodynamic evolution of the Banda Arc**

2006 : \$75,000

2007 : \$75,000

2008 : \$75,000

Primary RFCD 2601 GEOLOGY

APD Dr G Rosenbaum

Administering Institution The University of Melbourne

Project Summary

The project will contribute to a better understanding of plate tectonic processes and will provide insights into the dynamics of the Indo-Australian plate. This information is fundamentally important for estimating seismic hazards and the potential for generating large magnitude earthquakes in Australia. Outcomes of this project will facilitate to unravel analogue tectonic systems that were active during the geological evolution of Australia (e.g. the Lachlan fold belt in eastern Australia), thus providing a new insight into the Australian environment. The project will also elucidate the nature of tectonic processes that are known to generate major ore deposits and is therefore likely to have important economic implications.

Summary of Discovery Projects Applications for Funding to Commence in 2006

DP0664276 Prof JH Rubinstein; Dr PT Norbury

Approved Project Title **Minimal surfaces**

2006 : \$88,000

2007 : \$78,000

2008 : \$80,000

Primary RFCD 2301 MATHEMATICS

Administering Institution The University of Melbourne

Project Summary

Recent stunning progress in topology, in particular a possible solution to one of the Clay Institute million dollar problems, using techniques from partial differential equations and minimal surfaces has made this area a hot topic. To attract researchers in this field to visit Australia and to train students in this area is a major part of this project.

DP0663084 Dr JY Scheerlinck

Approved Project Title **Regulation of local lymphocyte trafficking and its role during infection**

2006 : \$88,000

2007 : \$83,000

2008 : \$83,000

Primary RFCD 2706 PHYSIOLOGY

Administering Institution The University of Melbourne

Project Summary

The study of early immune responses will contribute to the development of better vaccination strategies. In particular it will contribute by helping to understand the essential differences between reactogenicity and immunogenicity and how this relates to adjuvants. Using this understanding it will be possible to develop novel adjuvants that induce appropriate immunity with minimal side effects.

DP0665409 Prof FB Sear; Mr AE Hutson; Dr HM Goldsworthy

Approved Project Title **Technological Advances in Large-scale Roman Concrete Buildings during the 2nd and 1st centuries BC**

2006 : \$70,000

2007 : \$30,000

2008 : \$40,000

Primary RFCD 4302 ARCHAEOLOGY AND PREHISTORY

Administering Institution The University of Melbourne

Project Summary

How were the Romans able to build monuments which are still standing after 2,000 years? Skills to achieve this were clearly not developed overnight. A multidisciplinary team from the University of Melbourne has identified the 1st century BC as a time of tremendous technological change in Roman architecture. Was it that the Romans used a technologically advanced type of concrete? Was it that they had perfected the structural design of vaults and domes? Was it simply their organisational ability or the enormous wealth which flowed from their vast Empire? A team of experienced archaeologists, architects and engineers seeks to answer these questions by survey and material analysis of a number of key Roman monuments.

Summary of Discovery Projects Applications for Funding to Commence in 2006

DP0664601 A/Prof F Separovic; Dr GD Ciccotosto; A/Prof JD Wade

Approved Project Title **Membrane interactions and neurotoxicity of Amyloid Abeta peptides from Alzheimer's disease.**

2006 : \$120,000

2007 : \$105,000

2008 : \$105,000

Primary RFCD 2499 OTHER PHYSICAL SCIENCES

Administering Institution The University of Melbourne

Project Summary

A consequence of the increase in human life span is that age-related neurodegenerative diseases such as Alzheimer's disease (AD) are more prevalent. Currently there are limited therapeutic treatments and no cure for AD. The key protein causing AD is Abeta and characterization of the toxic species of this peptide is critical towards identifying potential therapeutic targets. This proposal aims to study mutant peptides made synthetically and to identify a membrane-binding site. By establishing which lipid is critically involved in membrane binding of Abeta and mediating subsequent cell death, drugs may be developed to prevent the binding of Abeta to membranes resulting in neuronal survival and prevention of memory loss in AD patients.

DP0666313 Dr JA Siapno

Approved Project Title **Dance, Movements and Visual Symbolism in East Timor**

2006 : \$25,900

2007 : \$25,000

2008 : \$30,975

Primary RFCD 4101 PERFORMING ARTS

Administering Institution The University of Melbourne

Project Summary

By understanding traditional dance and indigenous belief systems which are often marginalized in the modern hierarchical ordering that privileges western-style "capacity building" based on modern scientific and managerial values, we will have a nuanced understanding of East Timorese cosmologies and practices on care of the self, resilience, power and agency. Development aid which is often defined exclusively in terms of infrastructure and economic growth, may pay attention to culture and creating space for emotional, social and spiritual creativity. Dance practices may provide alternative models of generative processes and therapy that actively produce feelings of joy and peace in the bodies, hearts, minds and souls of East Timorese.

DP0663886 Prof IH Simmonds; Dr JA Bye; Prof Dr K Fraedrich; Dr JC Fyfe

Approved Project Title **Global objective identification and tracking of atmospheric fronts and the role of fronts in climate change**

2006 : \$60,000

2007 : \$60,000

2008 : \$60,000

Primary RFCD 2606 ATMOSPHERIC SCIENCES

Administering Institution The University of Melbourne

Project Summary

Fronts, particularly those in the Indian and Southern Oceans, have a very strong impact on day-to-day weather over a vast proportion of Australia. Frontal systems are associated with a broad range of weather and climate parameters which affect people directly. These include precipitation, temperature, wind and a variety of extremes. The quality global climatology of fronts to be compiled in this project will allow reliable assessments of how frontal systems have changed, and may be expected to change in the next century. Great community benefit will derive from understanding how these are linked with changes in Australian weather and climate extremes, and to decreases in rainfall over southern Australia in recent decades.

Summary of Discovery Projects Applications for Funding to Commence in 2006

DP0663981 Dr CA Smith; A/Prof AH Sinclair

Approved Project Title **A bird's eye view of sex: the chicken embryo as a model for gonadal development**

2006 : \$87,000

2007 : \$85,000

2008 : \$85,000

Primary RFCD 2702 GENETICS

Administering Institution The University of Melbourne

Project Summary

The development of an embryo as either male or female (sex determination) is a fundamental biological process that fascinates both scientific and lay communities alike. This project will use the chicken embryo as a unique model organism to study how genes control sex determination. We will bring a novel method to our field of study; the use of avian viruses to deliver genes into embryos. This project will enhance our understanding of a basic biological process. It will have application to the poultry industry, in terms of sex ratio manipulation. It will also aid in the diagnosis of humans born with sexual abnormalities. The project will consolidate Australia's standing as a world leader in the area of reproduction and development.

DP0663889 Dr TA Smith; A/Prof DE Dunstan; A/Prof JE Sader; Dr EK Hill; Prof DJ Birch; Dr P Burn

Approved Project Title **Towards Nano-Assembled Light Emitting Polymer Films**

2006 : \$165,000

2007 : \$110,000

2008 : \$110,000

Primary RFCD 2505 MACROMOLECULAR CHEMISTRY

Administering Institution The University of Melbourne

Project Summary

Advanced materials constructed with molecular level architecture through controlled nano-assembly will benefit medical science, biotechnology and nanotechnology, communications and the electronics fields. The national research priorities of nanotechnology and advanced materials through nano-assembly will be promoted by this work. This research will assist Australian industries to further advance these processes and devices leading to better quality, cheaper, more efficient products. The Australian community will benefit through economic and technological advances. These advanced materials will promote health and environmental wellbeing.

DP0662936 A/Prof LF Stirling

Approved Project Title **Autism and written narrative: discourse analysis and the characterisation of higher level language disorder phenotypes**

2006 : \$60,000

2007 : \$55,000

2008 : \$55,000

Primary RFCD 3802 LINGUISTICS

Administering Institution The University of Melbourne

Project Summary

This work contributes to the national research priority goal 'A healthy start to life', in advancing our understanding of the language disorder of autism. It is expected to benefit the children, their families and the community in furthering the basic research necessary for the development of new measures of performance, of use in the better assessment of children with language disorders and in the design and targeting of intervention programs. This work is cutting edge internationally in the approach it takes to the naturalistic language of children with autism. Hence it will raise the profile of Australia in this research domain.

Summary of Discovery Projects Applications for Funding to Commence in 2006

DP0664883 A/Prof MK Stivens

Approved Project Title **Imagining the Asian Child: Towards an Anthropology of New Asian Childhoods**

2006 : \$46,000

2007 : \$22,000

Primary RFCD 3703 ANTHROPOLOGY

Administering Institution The University of Melbourne

Project Summary

This innovative study will be of both popular and scholarly interest. The future of childhoods is a key concern in Australia and globally, with growing anxieties about a number of related issues: declining birthrates, ageing populations and allegedly rising welfare burdens, youth crime, and children's experiences in families. Asian and family studies are both acknowledged scholarly strengths in Australia: the project, drawing on the principal investigator's expertise in both fields, will place regional developments in a global context, and will appeal to a range of social scientists and cultural theorists interested in comparative studies of family and childhoods.

DP0664448 Dr RT Taylor

Approved Project Title **From Race to the Genome: the Tasmanian Aboriginal People in the Scientific Imagination**

2006 : \$130,000

2007 : \$85,000

2008 : \$75,000

Primary RFCD 4301 HISTORICAL STUDIES

APD Dr RT Taylor

Administering Institution The University of Melbourne

Project Summary

This project addresses the nationally significant issue of contested Aboriginality in Tasmania. It offers a broader understanding of complex scientific ideas and deeper insights into the 'History Wars' debate that goes to the heart of shaping Australian national identity. It provides a comprehensive historical and legal context to the current national definition of an Aboriginal, of direct relevance to the collection of national census data, the allocation of welfare funding and the Government's current restructuring of ATSIC. It will place Tasmania and Australia within an international context and make accessible new sources of Tasmanian culture and history to scholarly, indigenous and regional communities.

DP0663371 A/Prof JW Toumbourou; Prof RF Catalano

Approved Project Title **What factors influence the development of antisocial behaviour in Australian adolescents?**

2006 : \$150,000

2007 : \$90,000

2008 : \$150,000

Primary RFCD 3801 PSYCHOLOGY

Administering Institution The University of Melbourne

Project Summary

Antisocial behaviour is prevalent in Australia and imposes large social and economic costs on our communities. Once entrenched, antisocial behaviour and related problems often continue throughout life. Currently, much of the research in this area has been conducted overseas. The findings of this study will provide important insights into the development of antisocial behaviour from childhood to adolescence in the Australian context. By better understanding how antisocial behaviour develops, prevention and early intervention programs can be developed to target specific subgroups. In this way spending on juvenile and adult criminal justice systems can be reduced and a safer, more harmonious community can be fostered.

Summary of Discovery Projects Applications for Funding to Commence in 2006

DP0663726 A/Prof JW Toumbourou; A/Prof AV Sanson

Approved Project Title Pathways to positive personal and social adjustment in early adulthood: a follow-up of the Australian Temperament Project longitudinal cohort

2006 : \$120,000

2007 : \$60,000

Primary RFCD 3801 PSYCHOLOGY

Administering Institution The University of Melbourne

Project Summary

Young adulthood today is characterised by delayed independence and family formation, extended attachment to peer culture, and relatively high levels of alcohol and drug use and mental health problems. Concerns are voiced about the capacity of this generation to become healthy and productive members of society. Examining the development of healthy young adulthood within this large longitudinal cohort will enable pathways and predictors of positive development from infancy through adolescence to be identified. It will hence allow identification of potential targets for policies and interventions to enhance the development of productive personal capacity, responsible social participation, compassion and trust.

DP0663444 Dr CQ Tran

Approved Project Title Advancing x-ray imaging into new dimensions using interferometry and phase-space tomography

2006 : \$130,000

2007 : \$130,000

2008 : \$170,000

2009 : \$100,000

2010 : \$100,000

Primary RFCD 2404 OPTICAL PHYSICS

ARF Dr CQ Tran

Administering Institution The University of Melbourne

Project Summary

Synchrotron science and nanofabrication technologies are priority investment areas for most industrial countries including Australia. This research program takes advantages of recent progress in these fields and aims to advance x-ray imaging techniques of high sensitivity and low radiation dose and retrieve all extractable information of an object encoded in a wavefield. The development of these techniques is critical to future opportunities of frontier discoveries of the biological, nano and atomic world. Its application includes structural biology, medical diagnosis, biomedicine, material sciences and many other fields.

DP0664120 Dr J Van Buskirk

Approved Project Title Population genetic structure and habitat specialisation in amphibians

2006 : \$80,000

2007 : \$75,000

2008 : \$75,000

Primary RFCD 2707 ECOLOGY AND EVOLUTION

Administering Institution The University of Melbourne

Project Summary

This will be the first study to uncover the initial stages of ecological speciation in a fully natural setting, which will solidify Australia's leading position in evolutionary biology. The project promotes active international collaboration and bolsters the vibrant intellectual community here at home. Many Australian undergraduate and PhD students will participate in cutting-edge science and develop connections with overseas colleagues, helping Australia maintain its prominent international reputation in the future. The work also advances knowledge and appreciation of the natural world - a more urgent objective now than ever before. Ecological information is especially critical for amphibians, many of which are declining in Australia.

Summary of Discovery Projects Applications for Funding to Commence in 2006

DP0662959 A/Prof IR van Driel; A/Prof A Giraud; Dr LM Judd

Approved Project Title **Reg growth factors in gastric regeneration and disease**

2006 : \$98,000

2007 : \$88,000

2008 : \$88,000

Primary RFCD 3210 CLINICAL SCIENCES

Administering Institution The University of Melbourne

Project Summary

This project will obtain a more detailed knowledge of the role that growth factors play in helping the lining of the stomach repair itself after damage caused by disease. Growth factors may also play a role in causing stomach cancer. To do this we will examine the expression of growth factors in number of stomach diseases and cancer and assay the ability of growth factors to promote the growth of stomach cells.

This work is that it will contribute to our knowledge of how cell growth in the stomach is controlled under normal circumstances and in the very common pathological conditions of tissue damage, inflammation and cancer. It may also help us understand how inflammation can in some circumstances lead to cancer.

DP0664130 Prof RR Volkas

Approved Project Title **Cosmology and astrophysics with neutrinos and other elementary particles**

2006 : \$74,000

2007 : \$77,000

2008 : \$79,000

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

Administering Institution The University of Melbourne

Project Summary

Particle physics, cosmology and astrophysics provide a major contribution to the scientific and intellectual culture of the nation, as they address some of the most important questions in physical science. The nation's international standing will benefit greatly from participation in these quintessentially Big Science activities. High achieving students are very excited by the research questions addressed in this proposal, so it will add significantly to the pool of highly-trained young Australians. They emerge as general problem solvers and flexible thinkers of high calibre in addition to becoming experts in particular areas. The big fundamental questions to be considered are also of great fascination to the general public.

DP0665775 Prof RR Volkas; Prof BH McKellar; Dr GC Joshi

Approved Project Title **Frontiers of Theoretical Particle Physics**

2006 : \$100,000

2007 : \$85,000

2008 : \$85,000

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

Administering Institution The University of Melbourne

Project Summary

This project will involve PhD and other students, who will work at the frontiers of theoretical particle physics, which provides excellent training in model building and problem solving. They will serve the nation as physicists, but also as teachers, in the finance industry, in the public service and in think tanks, as our former students have done. The quest to understand the ultimate structure of matter has been a part of western culture for the last 2000 years or more. Media stories on this subject are popular, and our work will enable authoritative public outreach as the subject develops, and we find that our present understanding is not the complete story.

Summary of Discovery Projects Applications for Funding to Commence in 2006

DP0663590 Dr RF Waller

Approved Project Title **Molecular-genetic organization and evolution of dinoflagellate mitochondria**

2006 : \$110,000

2007 : \$77,000

2008 : \$77,000

Primary RFCD 2701 BIOCHEMISTRY AND CELL BIOLOGY

Administering Institution The University of Melbourne

Project Summary

Dinoflagellates are unicellular organisms that are important parts of the biota as significant primary producers of the oceans. Certain dinoflagellates form essential symbionts of reef-forming corals and loss of the symbiont causes coral bleaching and death, a phenomenon linked to global warming. Dinoflagellate blooms are also notorious for causing fish kills and human illnesses such as paralytic shellfish poisoning. My studies of the mitochondrion will address a major aspect of the biology of this poorly understood group. Mitochondrial function is often a target for drugs and other controlling agents, and therefore these studies could offer scope to better interpret and manage dinoflagellates in our environment.

DP0663525 Dr SO Warnaar; Prof PJ Forrester; Prof AJ Guttman

Approved Project Title **Theory and Applications of Hypergeometric Series**

2006 : \$88,000

2007 : \$78,000

2008 : \$80,000

Primary RFCD 2399 OTHER MATHEMATICAL SCIENCES

Administering Institution The University of Melbourne

Project Summary

Techniques based on hypergeometric series lie at the heart of an exciting and rapidly developing class of mathematical methods, with applications to many areas of science and engineering, such as computer science, statistics, physics, chemistry and biology.

In the past decades Australia has been at the forefront of important developments in the field, and this proposal serves to further strengthen the country's leading reputation.

Many of the modern methods in the theory require expertise in mathematics as well as a high level of programming skills. This combination provides a unique training ground for higher degree students aiming at careers in financial mathematics, weather/climate forecasting and internet security.

DP0662752 Dr CR Warren

Approved Project Title **How do plants cope with temporal variability in water and nutrients?**

2006 : \$200,000

2007 : \$155,000

2008 : \$155,000

2009 : \$155,000

2010 : \$155,000

Primary RFCD 2704 BOTANY

QEII Dr CR Warren

Administering Institution The University of Melbourne

Project Summary

Australia's climate and weather are temporally variable, yet we know little of how Australia's flora is affected by temporally variable vs constant supplies of water and nutrients. In addition, climate change will affect our flora by, among other things, increasing temporal variability in water and nutrient availability. This program of research will provide basic data on growth responses to variable vs. constant water and nutrient availability. Hence, results will be directly applicable to predicting the effects of climate change on growth, species' distribution and community composition. This research will also improve our basic understanding of limitations to photosynthesis, transpiration and nutrient uptake/assimilation.

Summary of Discovery Projects Applications for Funding to Commence in 2006

DP0663287 Dr SJ Wills

Approved Project Title **Hostels, Hosts and Hospitality: A Social and Cultural History of Migrant Temporary Accommodation in Australia Since the Second World War**

2006 : \$36,200

2007 : \$63,000

2008 : \$55,775

Primary RFCD 4301 HISTORICAL STUDIES

Administering Institution The University of Melbourne

Project Summary

Because it promotes a deeper understanding of migrant experience, the social relations and outcomes that derive from that experience, on-arrival settlement services, the role of the nation as 'host', and the complexity of national and immigrant identities, this project strengthens Australia's social fabric and capacity to interpret and engage with its regional and global environment. The experience of regional and global migration, often entailing processes of acute disjuncture, enjoins both an urgent need for, and specific difficulties in, the creation of a coherent identity. This study contributes to an understanding of anxieties about place and belonging and how we might interpret and engage such challenges today.

DP0665494 Dr SJ Wilson; Dr NM McLachlan; Dr CA Falk

Approved Project Title **A Study of Acoustical, Psycho-acoustical and Musicological Factors in Tuned Percussion Ensemble Design**

2006 : \$148,000

2007 : \$100,000

2008 : \$100,000

2009 : \$100,000

2010 : \$100,000

Primary RFCD 4101 PERFORMING ARTS

Administering Institution The University of Melbourne

Project Summary

This research will generate the following nationally benefits: 1) The World's first new, widely available, acoustical musical instruments in almost a Century, and the creation of a uniquely Australian musical form, 2) The creation of a major new teaching resource for classroom music and a new export industry for Australia, 3) New knowledge and techniques for the application of psycho-acoustic theory to industrial design processes, and their evaluation with respect to musical instrument acoustics and performance practices, and 4) New knowledge of the human auditory system; thereby contributing to Australia's international standing as a leader in auditory research and promoting Australia's cultural and scientific capabilities.

DP0663979 Dr AI Wirth

Approved Project Title **Fast, practical and effective algorithms for clustering with advice**

2006 : \$60,857

2007 : \$45,000

2008 : \$47,000

Primary RFCD 2804 COMPUTATION THEORY AND MATHEMATICS

Administering Institution The University of Melbourne

Project Summary

To maintain a safe and healthy society, government and industry need high quality immunization and national security databases. Since we cannot afford to have duplicate, incomplete and conflicting records that refer to the same person, we unify them by identifying clusters of related records.

In the emerging field of functional genomics, diagnosis of certain diseases is enhanced by determining which genes act together. Different experimental runs might result in different clusterings of genes: we need one consensus clustering that summarizes the experimental outcomes.

Cleaning databases and combining clusterings by hand would require vast amounts of time. This project will result in faster and more accurate computational procedures.

Summary of Discovery Projects Applications for Funding to Commence in 2006

DP0663362 Prof MP Wooden; Prof JI Borland; Dr K Mavromaras

Approved Project Title **Labour market transitions and dynamics in Australia: An analysis of the Household, Income and Labour Dynamics in Australia Survey**

2006 : \$250,000

2007 : \$100,000

2008 : \$100,000

Primary RFCD 3402 APPLIED ECONOMICS

Administering Institution The University of Melbourne

Project Summary

As stated in the National Research Priorities, 'in the decade ahead, it will be vital to understand and support the drivers for workforce participation and the broader social and economic trends influencing Australian families and communities'. Improving our understanding of these drivers is the main objective of this project. Specifically, the outcomes from this project will result in a richer comprehension of the interaction between the social safety net and economic participation, and especially labour force participation. This research will thus directly support the Government's welfare reform and participation agendas, and thus should feed into improved policy decision-making, especially in the areas of employment and income support.

DP0664621 Dr JD Woodhead; Prof PW Williams; Dr F McDermott

Approved Project Title **Of caves, bones, and climate change: new insights from old speleothems**

2006 : \$80,000

2007 : \$80,000

2008 : \$80,000

Primary RFCD 2601 GEOLOGY

Administering Institution The University of Melbourne

Project Summary

Australia has an enviable reputation as a leading innovator in geochronological studies and this research will reinforce that standing. The outcomes will have an immediate and significant impact on studies of global climate change, and provide new insights into the evolution of Australia's unique fossil mammal fauna. In these ways, and as described in more detail elsewhere in the application, this project addresses directly our current national research priorities 'responding to climate change and variability' and 'the sustainable use of Australia's biodiversity'.

DP0663208 Dr S Young

Approved Project Title **Political reporting of Australian election campaigns**

2006 : \$134,000

2007 : \$80,000

2008 : \$75,000

Primary RFCD 3601 POLITICAL SCIENCE

Administering Institution The University of Melbourne

Project Summary

Up to 40% of Australian voters decide their vote during an election campaign but most never have any direct contact with candidates and rely instead on information from newspapers, radio, television and the Internet. According to democratic theory, these media should act as a site for political information and debate to enable voters to make an informed choice. If they are not performing this role well, then as a community, Australians are missing out. This project assesses the quality of election reporting to find out how well or badly we are served by those who report and comment on politics.

Summary of Discovery Projects Applications for Funding to Commence in 2006

DP0663812 Prof CF Zika

Approved Project Title **The Living Dead: witchcraft and apparition in European culture (3rd to 18th century)**

2006 : \$100,000

2007 : \$25,000

2008 : \$80,000

2009 : \$27,000

Primary RFCD 4301 HISTORICAL STUDIES

Administering Institution The University of Melbourne

Project Summary

By providing a major monograph, an edited collection of papers by national and international scholars, and an electronic pictorial catalogue, the project will be of immense benefit to this rich new field of international research, and also help maintain the high reputation Australian scholarship enjoys in the field of medieval and early modern studies. But the relationship of societies to their dead continues to evoke keen interest in contemporary Australia outside the bounds of the academy. A fully researched history of Europe's changing views towards the dead will contribute to this topical discussion, made more urgent by our aging population and changes to traditional religious and cultural responses to death.