

Summary of Discovery Projects Applications for Funding to Commence in 2006

South Australia

The University of Adelaide

DP0662822 Dr S Akkach

Approved Project Title **Islam, Modernity and the Enlightenment: A New Perspective**

2006 : \$70,000

2007 : \$30,000

2008 : \$46,000

Primary RFCD 4301 HISTORICAL STUDIES

Administering Institution The University of Adelaide

Project Summary

Australia's encounters with Islam have never been as politically, militarily and emotionally demanding as the events of the last few years have revealed. In the current climate of tension and conflict a deeper understanding of Islam - its socio-religious and intellectual history, its systems of thought, and its attitude towards modernity and the modern world - is vital to enhance Australia's capacity to interpret and engage with its regional and global environment. This project contributes to enhancing Australia's ability to engage and interact in constructive and enabling ways with the Muslim communities locally, regionally and internationally.

DP0666189 Prof M Augoustinos; Dr PH Delfabbro; Mr D Riggs

Approved Project Title **Understanding Foster Carers' Motivations: Personal, Political & Historical Perspectives on Care Provision in Australia**

2006 : \$79,895

2007 : \$79,690

2008 : \$74,940

Primary RFCD 3212 PUBLIC HEALTH AND HEALTH SERVICES

APD Mr D Riggs

Administering Institution The University of Adelaide

Project Summary

Due to the increasing number of children in care nationally, and the declining number of available foster care placements, there is current considerable interest in understanding the most appropriate means to recruit and retain foster carers. This project involves a national interview study of carers from several Australian States to understand the factors that most strongly motivate people to become carers. Based on interviews with carers and other important stakeholders, the results will help us to understand the nature of the foster-carer role within the current political and social climate and help inform future national recruitment strategies.

DP0663345 Mr M Baumert

Approved Project Title **Towards early detection of upper airway obstruction in children: investigation of autonomic control**

2006 : \$78,340

2007 : \$78,340

2008 : \$78,340

Primary RFCD 2915 BIOMEDICAL ENGINEERING

APD Mr M Baumert

Administering Institution The University of Adelaide

Project Summary

This project focuses on the investigation of new indicators for early detection of upper airway obstruction (UAO)-which is a common sleep disorder in children. Failure to treat UAO can result in serious adverse outcomes including failure to thrive, neurocognitive deficits, developmental delay, behavioural disorders and cardiovascular disease. Thus, early treatment of UAO will significantly improve quality of life for the child. Direct benefits to community health via reduced costs for medical treatment will also be a key outcome. The establishment of new diagnostic indicators will form the basis of new tools for identifying child sleep disorders and contribute to advancing Australia's international leading position in health technology.

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DP0662900 Prof JH Bowie; A/Prof F Separovic

Approved Project Title **Structure and activity of host-defence peptides from Australian anurans: anticancer agents, neuropeptides and nNOS inhibitors.**

2006 : \$122,000

2007 : \$120,000

2008 : \$120,000

Primary RFCD 2503 ORGANIC CHEMISTRY

Administering Institution The University of Adelaide

Project Summary

We have discovered peptides that may have clinical applications. This is significant as these molecules may have one or more of the following properties. They may have anti-cancer effects; they may increase the effectiveness of the immune system by enhancing lymphocyte formation; and, they may act to reduce inflammation, stroke or cardiac conditions by controlling nitric oxide formation. Another national benefit is that personnel involved in this project are trained to the highest international standards in peptide chemistry/mass spectrometry/nuclear magnetic resonance: currently, there are not enough trained scientists in this area to meet demand.

DP0663579 Prof MC Bulbeck

Approved Project Title **The limited promise of 'equality biographies': Young Australians negotiate modern gendered identities, family and citizenship engagements in a divided society.**

2006 : \$30,000

2007 : \$34,000

2008 : \$35,000

Primary RFCD 3799 OTHER STUDIES IN HUMAN SOCIETY

Administering Institution The University of Adelaide

Project Summary

Apart from its contribution to the international sociological debate concerning the individualization thesis, the project will contribute to pressing policy issues, ie. declining fertility, accessibility of abortion, appropriate childcare, humane immigration policies in a world with millions of refugees and reconciliation. Based on an empirically grounded analysis in a rich qualitative data set revealing how young Australians see themselves negotiating family, work and citizenship, the project will construct the vocabularies by which young people locate themselves in the community. The results will make contributions to policy debates by suggesting changes that are responsive to the needs and aspirations of the citizens of the future.

DP0665037 Prof JA Carver

Approved Project Title **Small heat-shock molecular chaperone proteins and amyloid fibrils**

2006 : \$97,000

2007 : \$90,000

2008 : \$90,000

Primary RFCD 2701 BIOCHEMISTRY AND CELL BIOLOGY

Administering Institution The University of Adelaide

Project Summary

This proposal addresses the fundamental mechanisms of protein aggregation associated with debilitating age-related diseases, e.g. Alzheimer's, Parkinson's and cataract, and the prevention of aggregation via the action of a group of molecular chaperone proteins known as small heat-shock proteins. With the ageing population, the prevalence of these diseases will increase significantly over the next 20 years. Understanding and treating these diseases will therefore have significant long-term health benefits. Furthermore, the highly structured protein aggregates that form as hallmarks of many of these diseases have potential wide ranging applications in the emerging field of bionanotechnology, e.g. as nanowires and biofilms.

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DP0663550 Dr MA Coleman

Approved Project Title **Dispersal and gene flow in habitat-forming algae**

2006 : \$110,000

2007 : \$95,000

2008 : \$65,000

2009 : \$65,000

Primary RFCD 2707 ECOLOGY AND EVOLUTION

APD Dr MA Coleman

Administering Institution The University of Adelaide

Project Summary

The temperate coast of Australia has a unique and diverse algal flora. Many of these algae play a central role in subtidal ecology by providing habitat to an astonishing diversity of taxa. Despite this, we have no understanding of levels of gene flow within and among populations of habitat forming algae or how such populations persist in nature. By addressing this lack of knowledge, my research will contribute information that is critical for the conservation and management of algal habitats. This is particularly pertinent because anthropogenic stressors are beginning to precipitate significant changes in algal forests along Australia's coastline.

DP0664562 Prof A Cooper; Prof TF Flannery

Approved Project Title **Using ancient DNA to investigate the environmental impacts of climate change and humans through time**

2006 : \$160,000

2007 : \$155,000

2008 : \$155,000

Primary RFCD 2707 ECOLOGY AND EVOLUTION

Administering Institution The University of Adelaide

Project Summary

This project will provide important information about how climate change and human impact have effected our environment over the past 50,000 years, removing many of the large mammals and altering the landscape. It is critical that the background to our current environment is properly understood if we are to predict the effects of on-going changes such as global warming. The research will concentrate on the effects of climate change on large mammals in North and South America, New Zealand, Australia and Africa over this time period, and will examine the additional impact of humans in each location.

DP0663675 Dr SJ Cooper; Dr WF Humphreys

Approved Project Title **Modes of speciation in subterranean diving beetles from calcrete aquifers of central Western Australia**

2006 : \$95,000

2007 : \$50,000

2008 : \$50,000

Primary RFCD 2707 ECOLOGY AND EVOLUTION

Administering Institution The University of Adelaide

Project Summary

Understanding speciation is a fundamental biological problem and our analyses of the diving beetles will broaden our understanding of modes of speciation and how an extraordinary biodiversity of subterranean animals (stygo fauna) evolved in the limestone aquifers of central WA. The aquifers are an important source of water for pastoralists and mining companies and the limestone is also a valuable resource, so there is a need for further research on the impacts of these uses. We will generate further knowledge of the diversity and biological significance of the stygo fauna, information that is critical for the environmentally sustainable management of the aquifers and their ecosystems.

Summary of Discovery Projects Applications for Funding to Commence in 2006

DP0666086 A/Prof CB Daniels; Prof JS Torday; Dr WW Burggren; Prof JA Whitsett

Approved Project Title Environmental Control of Developmental Plasticity of Vertebrate Cardio-Pulmonary Systems

2006 : \$105,000

2007 : \$95,000

2008 : \$95,000

Primary RFCD 2706 PHYSIOLOGY

Administering Institution The University of Adelaide

Project Summary

Our research will generate the first comprehensive picture of how environmental conditions are transduced to control the development of the vertebrate respiratory and cardiovascular systems over the perinatal period. The research will demonstrate how physiological systems are modified and hence evolve. Moreover, understanding the developmental pathology in embryos induced by changing environmental conditions (especially exposure to steroid-like pollutants) is crucial to support breeding programs of endangered species and may improve veterinary and medicinal treatment of premature animals and humans. This multi-disciplinary, international collaboration provides an international training ground and two-way exchange of students and postdocs.

DP0664339 Prof MG Eastwood

Approved Project Title Symmetry in Differential Geometry

2006 : \$168,000

2007 : \$156,000

2008 : \$156,000

2009 : \$160,000

2010 : \$160,000

Primary RFCD 2301 MATHEMATICS

APF Prof MG Eastwood

Administering Institution The University of Adelaide

Project Summary

Differential geometry is a major branch of mathematics studying shape by using calculus and differential equations. This is a fundamental research project in this area, especially concerned with the interaction between geometry, differential equations, and symmetry. The mathematical notion of symmetry was already formalised early last century and nowadays lies at the very heart of mathematics and physics. Advances in this area provide essential tools in basic science and unexpected technological benefits can easily arise (for example, in medical imaging). Fundamental mathematical research is absolutely necessary if Australia is to maintain a presence on the international scientific stage.

DP0665185 Adj/Prof JB Egan

Approved Project Title Defining New Building Blocks for the Construction of Artificial Genetic Circuits

2006 : \$134,000

2007 : \$121,000

2008 : \$121,000

Primary RFCD 2702 GENETICS

Administering Institution The University of Adelaide

Project Summary

By characterising the components of a natural genetic switch, we will make available a set of well defined genetic building blocks for construction of rationally designed biological circuits. The ability to build such circuits would have significant economic benefit in areas such as metabolic engineering, to improve the efficiency of production of natural compounds from micro-organisms, and in biomedicine, for the controlled release of therapeutic compounds. The involvement of Honours and Ph.D students in this project will expose the next generation of Australian scientists to this emerging discipline. International collaboration leading to publications in high impact scientific journals will enhance Australia's scientific reputation.

Summary of Discovery Projects Applications for Funding to Commence in 2006

DP0665303 Mr TS Elsdon

Approved Project Title **Bottom-up effects of nutrients on estuarine fish related ecosystems**

2006 : \$115,000

2007 : \$100,000

2008 : \$100,000

Primary RFCD 2707 ECOLOGY AND EVOLUTION

APD Mr TS Elsdon

Administering Institution The University of Adelaide

Project Summary

Over 84% of Australians live within 50 km of the coast, and have large impacts on coastal ecosystems, such as increasing nutrients in estuaries. Nutrients have strong bottom-up effects on fish ecosystems, especially during critical juvenile life history stages. Elevated nutrients can alter fish productivity and sustainability, having ecosystem and social implications. This project will combine experimental evidence with novel approaches of fatty acid tracers in food-webs and fish otolith (earbone) chemistry, to determine how nutrients affect fish ecosystems, recruitment, and survivorship. This project will provide information needed to create sustainable fisheries, to safeguard Australia's fisheries resources for future generations.

DP0664479 Dr DG Hemer

Approved Project Title **Early detection of component incompatibility in time-dependent computer architectures**

2006 : \$107,029

2007 : \$25,000

2008 : \$25,000

Primary RFCD 2804 COMPUTATION THEORY AND MATHEMATICS

Administering Institution The University of Adelaide

Project Summary

Complex real-time systems are increasingly being built by integrating off-the-shelf components. There are obvious benefits to this approach, but the hidden costs associated with integration are still a major problem. Our proposed approach will enable early detection of integration problems, and thus provide potential for large cost savings. This brings with it clear benefits to industry. One industry that would benefit by such technology is the Australian Navy, which is increasingly being confronted with the challenge of integrating off-the-shelf components in large Naval Combat Systems.

DP0665560 Dr MA Keller; Prof O Schmidt

Approved Project Title **Nutritional ecology of predatory arthropods: molecular analysis of gut contents to elucidate prey choice and diet breadth**

2006 : \$80,000

2007 : \$75,000

2008 : \$75,000

Primary RFCD 3002 CROP AND PASTURE PRODUCTION

Administering Institution The University of Adelaide

Project Summary

The evolution of genetic resistance in insect pest populations against synthetic and biological pesticides requires new integrated pest management strategies with increasingly large biological control components. This is the only sustainable approach to pest management in agricultural production and natural ecosystems. Biological control of insect pests can potentially be achieved with indigenous generalist predators, thereby reducing the risks associated with importing exotic natural enemies. This project provides new opportunities for enhancing biological control by examining the diets of generalist predators using new diagnostic technologies. This is crucial for the effective and reliable use of predators in biological control.

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DP0665094 Dr DE Kelsey

Approved Project Title **Tectonic links between the Musgrave Province and the North Australian Craton: correlations, event chronology, and tectonothermal regimes.**

2006 : \$90,000

2007 : \$65,000

2008 : \$70,000

2009 : \$70,000

Primary RFCD 2601 GEOLOGY

APD Dr DE Kelsey

Administering Institution The University of Adelaide

Project Summary

Developing effective mineral exploration strategies relies on data-rich tectonic models that seek to explain the full history of a terrain. In the Australian context the tectonic evolution of the Musgrave Province is a key focus of the minerals industry due to its widely recognised potential for base-metal mineralisation. This project will develop tectonic models that encompass the evolution of the Musgrave Province and the adjacent North Australia Craton. The outcomes of the project will reduce risk to mineral explorers and make an important contribution to the broader question Australia's Proterozoic evolution.

DP0666129 A/Prof DB Leinweber

Approved Project Title **The Essence of QCD Vacuum Structure**

2006 : \$82,000

2007 : \$78,000

2008 : \$72,000

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

Administering Institution The University of Adelaide

Project Summary

This first-principles study of quantum field theory will elucidate an outstanding mystery of modern particle physics. Understanding confinement is recognized as one of the top 10 Physics Questions to Ponder for a Millennium or Two. In support of the National Research Priorities, new scientific data visualization techniques will be transferred to industry, facilitating smart information use. Further economic benefits are realized through the training and development of expertise in high-performance parallel computing, promoting an innovation culture and economy. The opportunity for young Australian Honours and Postgraduate students to work at the forefront of nuclear and particle theory is an obvious social benefit.

DP0662824 Dr JT Makeham

Approved Project Title **The Formation and Development of Chinese Philosophy as an Academic Discipline in Twentieth Century China**

2006 : \$40,000

2007 : \$60,000

2008 : \$30,000

Primary RFCD 4401 PHILOSOPHY

Administering Institution The University of Adelaide

Project Summary

It is in Australia's national interest to pay close attention to the orientation of intellectual and political currents in China and to how these currents are increasingly merging and interacting. This project will enhance our capacity to interpret and engage with our regional environment by contributing to a clearer understanding of the changing relationship between Chinese intellectual traditions and cultural identity. A commitment to understanding what Chinese philosophy means to China's educated elite also demonstrates a willingness to foster dialogue and communication that is sensitive to the intellectual and cultural traditions which are a source of pride and identity for several of our major regional partners.

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DP0662978 Dr P Marschner; Dr RJ Smernik; Dr JA Baldock

Approved Project Title **Understanding plant residue decomposition by linking organic matter chemistry and soil microbiology**

2006 : \$100,000

2007 : \$80,000

2008 : \$80,000

Primary RFCD 3001 SOIL AND WATER SCIENCES

Administering Institution The University of Adelaide

Project Summary

Soils are an important source or sink for CO₂. Currently we lack a fundamental understanding of plant residue decomposition and their transformation into various soil organic carbon (SOC) pools. Since these different pools of soil C are recycled back to atmosphere at different rates, a better understanding of the process is crucial for our ability to manage soil C and to predict the impact of management on SOC. For the first time we will combine detailed chemical analyses of soil organic matter fractions with determination of decomposition rates and microbial community structure; thereby also increasing the knowledge of how Australia's biodiversity is modulated.

DP0665486 Prof TM Monro; Dr H Ebendorff-Heidepriem

Approved Project Title **New materials and structures for next generation optical fibres**

2006 : \$150,000

2007 : \$80,000

2008 : \$80,000

Primary RFCD 2404 OPTICAL PHYSICS

Administering Institution The University of Adelaide

Project Summary

A soft glass optical fibre capability of critical importance to Australia's industrial and scientific capability will be established. This facility addresses a range of the National Research Priorities, most notably Defence, and brings fundamentally important technology to Australia. The proposed research capability strategically complements existing Australian silica-based fibre expertise and infrastructure. The aim is to develop soft glass fibres for defence applications, and to develop fibre-based solutions for emerging applications in bionanophotonics. A key attraction of the platform technology proposed is its adaptability for testing concepts without requiring the support of large-scale fabrication and production industries.

DP0664943 Prof PG Quester; Dr FJ Farrelly; Dr MB Beverland; Prof SM Kates

Approved Project Title **Sharing values and the co-creation of brands: Towards a new consumer driven branding paradigm.**

2006 : \$48,500

2007 : \$20,000

2008 : \$32,000

Primary RFCD 3502 BUSINESS AND MANAGEMENT

Administering Institution The University of Adelaide

Project Summary

The project proposes a paradigm shift from traditional image building towards a full understanding and integration of consumer values into a deliberate process of co-created brand meanings. Brands thus managed can become iconic and symbolic of consumers' existing subcultures or may even define micro-cultures of consumption of their own (as in the case of Harley Davidson).

Should managers understand the process by which such co-created brands develop, more Australian brand success stories (eg. Rip Curl, Penfold's Grange) would evolve and be better placed to tap the increasingly diversified sub-cultural landscape that characterises the Australian marketplace and many of our major trading partners.

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DP0665427 Dr M Roughan

Approved Project Title **Characterisation of Internet Traffic Matrices**

2006 : \$88,000
2007 : \$75,000
2008 : \$77,000

Primary RFCD 2917 COMMUNICATIONS TECHNOLOGIES

Administering Institution The University of Adelaide

Project Summary

The benefits to the community of characterisation of Internet traffic matrices arise because this information is used in the design of efficient and reliable networks. This is a genuine example of using the data we have more cleverly, rather than throwing money at a problem. Better information will result in the Internet becoming more efficient, and therefore cheaper, and at the same time more reliable.

DP0662810 Dr GP Rowell

Approved Project Title **Very high energy gamma-ray astronomy in Australia and the development of future gamma-ray detectors**

2006 : \$120,000
2007 : \$140,000
2008 : \$140,000
2009 : \$140,000
2010 : \$117,000

Primary RFCD 2401 ASTRONOMICAL SCIENCES

QEII Dr GP Rowell

Administering Institution The University of Adelaide

Project Summary

Australia contributes to the burgeoning field of ground-based gamma-ray astronomy via its involvement in the CANGAROO-III project.

I will continue the development of CANGAROO-III and establish links with the other collaborations in this field, in particular H.E.S.S., also in the southern hemisphere. Studies with CANGAROO-III of high energy gamma-ray sources such as supernova remnants and active galaxies will finally reveal the type of particles that are accelerated in such violent regions of our universe. The development of future ground-based gamma-ray detectors beyond CANGAROO-III is also a project aim, and will expand the energy coverage of gamma-ray detectors into uncharted territory.

DP0663740 Dr R Seracino; A/Prof DJ Oehlers

Approved Project Title **Development of innovative fibre reinforced polymer plating techniques to retrofit existing reinforced concrete structures**

2006 : \$130,000
2007 : \$90,000
2008 : \$90,000

Primary RFCD 2908 CIVIL ENGINEERING

Administering Institution The University of Adelaide

Project Summary

The demand for retrofitting reinforced concrete structures in Australia is estimated at \$500 million per annum. However, with improved understanding of emerging retrofitting techniques the cost of retrofitting may be reduced. The innovative retrofitting techniques investigated in this project will address the shortcomings of existing techniques with particular emphasis on the ductility of the system which is a particularly important characteristic when retrofitting for earthquake or explosive loads. It also reinforces Australia's high international standing in developing innovative retrofitting alternatives using advanced materials in this rapidly developing area.

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DP0663757 Dr PF Slade

Approved Project Title **Saddlepoint approximation, likelihood analysis and ancestral graphs for strong and weak natural selection, genetic drift and population subdivision.**

2006 : \$22,728

2007 : \$20,000

Primary RFCD 2302 STATISTICS

Administering Institution The University of Adelaide

Project Summary

Building new research strength in theoretical population genetics and related statistical techniques will enhance Australia's capability in harnessing the power of post-genomic information. Sophisticated statistical techniques that make smart use of genetic data are being developed in this project. The extent to which natural selection and migration affect current genetic polymorphism on a population level can be quantified using these new methods. New modeling provides a rigorous foundation with which to construct inference techniques currently beyond computational approaches to the data. Assessing selective effects on genetic mutations associated with human disease will be a consequence of this new statistical methodology.

DP0663239 Prof FA Smith; Prof SE Smith

Approved Project Title **Roles of arbuscular mycorrhizal fungi (AMF) in plant competition: revealing underlying physiological and molecular mechanisms**

2006 : \$155,000

2007 : \$129,000

2008 : \$129,000

Primary RFCD 2707 ECOLOGY AND EVOLUTION

Administering Institution The University of Adelaide

Project Summary

This project will increase understanding of physiological and molecular mechanisms that enable widespread beneficial symbiotic soil fungi to influence plant productivity and biodiversity of natural and managed plant ecosystems. It will also aid biotechnological and agronomic goals of maximizing use of scarce soil nutrients, especially phosphate. Results will be important for agro-industry and Government groups focusing on 'healthy soil'. The project adds considerably to investment in research, infrastructure and international collaboration in this priority area. It will enhance Australia's reputation for research in soil biology and provide high standards in research education and training in an internationally recognised environment.

DP0662916 Prof SE Smith; Prof FA Smith

Approved Project Title **Mechanisms of arsenic tolerance in plants: how do symbiotic arbuscular mycorrhizal (AM) fungi reduce uptake?**

2006 : \$160,000

2007 : \$130,000

2008 : \$140,000

Primary RFCD 2704 BOTANY

Administering Institution The University of Adelaide

Project Summary

Arsenic contamination of soil is a major problem caused by irrigation with contaminated ground-water, mining and application of pesticides. Plant uptake leads to entry into food chains, with severe consequences for crop growth and human health. This project will aid the search for mechanisms to reduce plant arsenic accumulation by exploring roles of beneficial plant-fungus symbioses in reducing uptake. Results will be relevant to most crop plants, because of the widespread occurrence of the symbioses. The project will enhance collaboration with China where arsenic toxicity is prevalent, provide education and training in an internationally recognised laboratory and enhance Australia's reputation for tackling soil contamination.

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DP0667006 A/Prof JN Timmis; Dr J da Silva; Dr MA Ayliffe

Approved Project Title **Analysis of interorganellar transposition of DNA**

2006 : \$93,000

2007 : \$83,000

2008 : \$83,000

Primary RFCD 2702 GENETICS

Administering Institution The University of Adelaide

Project Summary

The movement of DNA between organelles is a major driving force in the eukaryotic evolution. In yeast about 75% of all nuclear genes may derive from protomitochondria. Though DNA transfer per se continues in all higher cells, including mammals, in most species the functional transfer of genes has stopped. It continues at a high rate in plants, giving them unique potential in evolutionary studies of the genome. We established experimentally that DNA moves frequently from the plastid (chloroplast) to the nucleus. We now aim to measure the frequency of DNA transposition from the plastid to the mitochondrion. If transposition is sufficiently frequent, the approach can be used to transformation the mitochondrial genome.

DP0665194 Dr MR Tingay; Prof R Hall; Dr CK Morley; Dr D Coblenz

Approved Project Title **Crustal Stress Field of SE Asia**

2006 : \$65,000

2007 : \$65,000

2008 : \$65,000

2009 : \$55,755

Primary RFCD 2601 GEOLOGY

APD Dr MR Tingay

Administering Institution The University of Adelaide

Project Summary

The key project benefit is to advance our fundamental understanding of tectonic processes such as sedimentary basin development and continental collision. It has major implications for natural hazard assessment and resources exploration in SE Asia, consistent with Australia's participation in the APEC Energy Working Group. The project has major ancillary benefits. It will strengthen international links between Australia, SE Asia, the UK, USA and Germany. It will provide high-quality research and training experience for the APD and PhD student involved, whom will spend time with research groups and oil companies in Australia, UK, USA and SE Asia. Finally, the project will increase the institutional capacity for contract research in SE Asia.

DP0666108 Prof SD Tyerman; Dr WH Zhang

Approved Project Title **Root aquaporins as sensors and regulators of plant water transport.**

2006 : \$110,000

2007 : \$95,000

2008 : \$95,000

Primary RFCD 2704 BOTANY

Administering Institution The University of Adelaide

Project Summary

The knowledge we will gain will benefit Australia by allowing better management of plant water use. Because such large quantities of water move through aquaporins in membranes, our understanding of the pores could enable us to manipulate plants to conserve or use water depending on predicted climatic conditions. Molecular aspects of the project will reveal potential novel ways of controlling root water uptake by shoot and root manipulation. High calibre PhD and Honours students will also be educated to maintain the momentum of international excellence within Australia in the field of plant water relations.

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DP0662770 A/Prof M Varghese

Approved Project Title Fractional analytic index theory

2006 : \$94,000

2007 : \$84,000

2008 : \$86,000

Primary RFCD 2301 MATHEMATICS

Administering Institution The University of Adelaide

Project Summary

Atiyah-Singer index theory, for which M.F. Atiyah and I.M. Singer received the 2004 Abel Prize, has stimulated considerable interaction between mathematicians and mathematical physicists. An extension of this theory is Fractional Index Theory, co-invented by R.B. Melrose, I.M. Singer and myself, which has received international attention, having solved a fundamental open problem. A central aim in my research project is to extend our theory to elliptic boundary value problems. I will assist beginners to navigate to the cutting edge of research through workshops, spring-schools and supervision. Benefits include the enhancement of Australia's position in the forefront of international research.

DP0664311 Prof JC Wallace; Dr GW Booker

Approved Project Title Innovative Approaches for Defining the Interaction of Insulin like Growth Factor I (IGF I) with the Type 1 IGF Receptor

2006 : \$93,000

2007 : \$83,000

2008 : \$83,000

Primary RFCD 2701 BIOCHEMISTRY AND CELL BIOLOGY

Administering Institution The University of Adelaide

Project Summary

This study will improve our understanding of the interactions of Insulin-like Growth Factors (IGFs) with their principal receptor, the IGF-1R. A sound understanding of these interactions is essential for the development of non-peptide IGF antagonists designed for therapeutic applications. Such molecules could lead to new therapeutic approaches for diseases in which dysregulation of the IGF system has been implicated including cancer, diabetes and atherosclerosis.

Since IGFs are major determinants of growth, the outcomes of this project could also lead to improvements in animal production with major benefit to primary industry. New IGF analogues developed could assist biotechnology exports.

DP0666383 Prof AG Williams; A/Prof DB Leinweber; Dr LJ von Smekal

Approved Project Title Advanced studies of QCD and the strong interaction

2006 : \$210,000

2007 : \$150,000

2008 : \$150,000

Primary RFCD 2402 THEORETICAL AND CONDENSED MATTER PHYSICS

Administering Institution The University of Adelaide

Project Summary

This project will significantly advance our knowledge of the subatomic structure of the universe. It will maintain excellence and strength in an area where Australia has built an outstanding international reputation over the past decade. It will place Australia at the cutting edge of fundamental and computational science research and it will maintain and grow strong international links. It will produce Australian graduates and research associates of high quality, who will benefit from participating in these state-of-the-art studies and from the advanced training in modelling, high-performance computer simulation and visualisation. This training will have major economic benefits for and provide strong links to Australian industry.