

Summary of Discovery Projects Proposals for Funding to Commence in 2010

Queensland

The University of Queensland

DP1094765 A/Prof J Adams; Dr AF Broom; Prof C Gallois; A/Prof D Sibbritt

Approved Project Title **Therapeutic pluralism in pregnancy, labour and birthing: Decision-making, communication and inter-professional dynamics**

2010 : \$ 90,000

2011 : \$ 90,000

2012 : \$ 80,000

Primary RFCD 3701 SOCIOLOGY

Administering Organisation The University of Queensland

Project Summary

Women are frequent users of practices outside 'mainstream' medicine. Pregnancy, labour and birthing (PLB) is a key area of integration, but no research has examined how women perceive obstetrics, midwifery and complementary medicine, or the impact on their health and wellbeing. This study systematically document Australian women's experiences of PLB with a nationally-representative sample of women of child-bearing age to document decision making, lay-professional communication, and inter-professional dynamics.

DP1096866 Prof PF Alewood

Approved Project Title **Design and discovery of novel conotoxins that target ion channels and receptors**

2010 : \$ 200,000

2011 : \$ 195,000

2012 : \$ 205,000

Primary RFCD 2503 ORGANIC CHEMISTRY

Administering Organisation The University of Queensland

Project Summary

The national benefits that may arise include (i) new knowledge of biologically active peptides and their mode of action that will be protected through patent applications and provide a competitive edge for Australian biotechnology (ii) the training of a new generation of skilled researchers in chemical and structural biology that will sustain the biotechnology industry (iii) economic benefits from licensing and royalty returns on drug leads that may arise from this program (iv) environmental benefits from the development of more sensitive analytical methods that obviate over collection of endangered species and (v) social benefits from a reduction in suffering from diseases for which drugs are developed as a result of this program.

DP1094080 Prof K Alexandrov; Prof H Waldmann; Dr DK Abankwa

Approved Project Title **Understanding mechanistic and systemic regulation of protein prenyltransferases**

2010 : \$ 320,000

2011 : \$ 290,000

2012 : \$ 320,000

2013 : \$ 285,000

2014 : \$ 285,000

Primary RFCD 2701 BIOCHEMISTRY AND CELL BIOLOGY

APF Prof K Alexandrov

Administering Organisation The University of Queensland

Project Summary

The proposed research will expand our understanding of lipid-conjugating enzymes that are critical for a multitude of normal cellular functions. We seek to reveal the basic workings of cells and help to explain the development and complexity of signalling networks in eukaryotic evolution. The findings will enable us to explore and exploit the catalytic properties of these lipid-related enzymes for applications in biotechnology. The ultimate aim is to create novel technologies for protein production, modification and analysis that will accelerate the pace of discovery in protein research, basic cell and organism biology, diagnostics, biotechnology and drug discovery.

Summary of Discovery Projects Proposals for Funding to Commence in 2010

DP1092606 Dr MB Andrejevic

Approved Project Title **The Monitored Audience: Control of Personal Information in the Digital Era**

2010 : \$ 95,000
2011 : \$ 85,000
2012 : \$ 75,000
2013 : \$ 75,000
2014 : \$ 60,000

Primary RFCD 4001 JOURNALISM, COMMUNICATION AND MEDIA

QEII Dr MB Andrejevic

Administering Organisation The University of Queensland

Project Summary

In an era when the internet can gather detailed information about citizens and mobile phones can target ads to them based on their location, consumers need a say in the policies and practices governing the use of their personal information. Research indicates Australians are concerned about the collection and use of their information. This project would explore what they are doing about it and what information handling policies and practices they support. The findings will provide a citizen perspective on deliberations over information and data handling policy as well as on ethical and legal debates about commercial monitoring at a time when the technology for capturing personal information continues to develop at a rapid pace.

DP1094069 Dr SM Babidge

Approved Project Title **The Atacama and Australian mining companies: identity, intercultural communication and negotiation in northern Chile**

2010 : \$ 35,000
2011 : \$ 43,000
2012 : \$ 30,000

Primary RFCD 3703 ANTHROPOLOGY

Administering Organisation The University of Queensland

Project Summary

The involvement by state administrations and global corporations in planning for social responsibility in mining and the resulting negotiations with citizens - especially groups identified as indigenous - brings a range of people into dialogue. However, these contexts are under-researched. The proposed project will contribute an independent study of relationships between Chilean citizens, Australian mining companies and the state in northern Chile. It seeks to provide theoretical insights and offer practical information in academic and plain language for local negotiators, global business and state administration: a timely analysis given recently (2008) signed Free Trade Agreement with Chile.

DP1095325 Dr S Balasubramanian; Dr C SPILLANE

Approved Project Title **Molecular genetic analyses of trinucleotide repeat expansions**

2010 : \$ 120,000
2011 : \$ 120,000
2012 : \$ 120,000

Primary RFCD 2702 GENETICS

Administering Organisation The University of Queensland

Project Summary

Several neuronal diseases like Huntington's disease, Frederick's ataxia and fragile X syndrome are caused by expansion of trinucleotide repeat sequences in the deoxyribonucleic acid (DNA). These diseases show progressive severity in subsequent generations. Here we use a simple plant model with a very similar DNA mutation to study the genetic basis of repeat expansions over several generations across populations. This proposal will improve our mechanistic understanding of genetic diseases in populations. In addition, this proposal is expected to lead to identification of potential targets and technologies that would be of interest to Australian industry.

Summary of Discovery Projects Proposals for Funding to Commence in 2010

DP1095631 Dr MJ Bellanta

Approved Project Title **Sentimental blokes: a cultural history of working-class masculinities in Australia, 1850-1929**

2010 : \$ 90,000

2011 : \$ 85,000

2012 : \$ 83,000

Primary RFCD 4301 HISTORICAL STUDIES

APD Dr MJ Bellanta

Administering Organisation The University of Queensland

Project Summary

For decades now, therapists, academics and activists have called for Australian men to be more emotionally articulate. This is necessary in part because stereotypes of Australian masculinity emphasise hostility towards emotion, especially sentimental emotion. By demonstrating the significance of masculine sentimentality in Australia's past, this project will help to change this. Drawing on the insights of theatre and cultural studies and publishing in diverse forums, it will also bring a more interdisciplinary dimension to the history of Australian masculinities. Further, it will make Australian material relevant to international scholarship on emotional history, the relationship between class and gender, and gendered subjectivities.

DP1096029 Prof PV Bernhardt; A/Prof MJ Riley

Approved Project Title **Spotlighting biologically active Iron (Fe) chelators within cells**

2010 : \$ 110,000

2011 : \$ 110,000

2012 : \$ 110,000

Primary RFCD 2502 INORGANIC CHEMISTRY

Administering Organisation The University of Queensland

Project Summary

Anti-cancer drugs that act in ways different from traditional chemotherapeutics offer hope in evading acquired drug resistance. Previously we have studied compounds that can enter cancer cells, bind iron and halt cellular proliferation. However, there are many sources of iron in cells and we do not know from where these iron chelators acquire their iron or how these iron complexes kill cancer cells. We will tackle this problem by attaching light emitting probes to known iron chelators and mapping their location within cells with high resolution fluorescence microscopy. These experiments will spotlight the cellular location of these potential drugs bound to iron for the first time, providing crucial information on their mode of action.

DP1092437 Prof SK Bhatia; Prof D Nicholson; Prof Dr J Kaerger

Approved Project Title **Friction-based modelling of the dynamics of nanoconfined fluid mixtures**

2010 : \$ 235,000

2011 : \$ 205,000

2012 : \$ 200,000

2013 : \$ 260,000

2014 : \$ 100,000

Primary RFCD 2906 CHEMICAL ENGINEERING

APF Prof SK Bhatia

Administering Organisation The University of Queensland

Project Summary

This project will transform the molecular science of fluid transport in nanoconfined spaces by delivering a tool that will be critical to the development of emerging nanotechnologies. The tool will embed a novel theory in a framework for modelling transport over all scales from nano- to macroscopic. The project will have strong benefits for the advancement of leading-edge fundamental research and in its relevance to a number of novel nanotechnologies. It will be particularly relevant to scientific and industrial developments exploiting new nanomaterials such as AlPO₄-25, carbon molecular sieves and carbon nanotubes, as well as in nanofluidics.

Summary of Discovery Projects Proposals for Funding to Commence in 2010

DP1095746 Prof ME Bialkowski; Dr AM Abbosh

Approved Project Title **Microwave System for Early Breast Cancer Detection Employing Ultra Wideband Conformal Array Antenna**

2010 : \$ 90,000

2011 : \$ 90,000

2012 : \$ 80,000

Primary RFCD 2917 COMMUNICATIONS TECHNOLOGIES

Administering Organisation The University of Queensland

Project Summary

Breast cancer is the most common cancer diagnosed in women in various parts of the world. Currently the primary method for breast screening is X-ray mammography and in rare cases Magnetic Resonance Imaging. X-ray mammography has saved many lives, but the technology still produces a relatively high number of false negative and false positive diagnoses. In the last decade, active microwave techniques have attracted considerable interest as viable alternatives to X-ray mammography. This project aims at the design and development of a low-cost microwave system, which will complement all the currently available breast cancer diagnosis tools.

DP1094205 Dr I Blakey; Dr KJ Thurecht; A/Prof PM Fredericks; Prof C Alexander

Approved Project Title **Multimodal biomedical imaging probes: development of advanced polymer nanocomposite devices for oncology**

2010 : \$ 90,000

2011 : \$ 90,000

2012 : \$ 85,000

Primary RFCD 2918 INTERDISCIPLINARY ENGINEERING

Administering Organisation The University of Queensland

Project Summary

Despite significant research being directed toward cancer treatment, 7.6 million people died world wide in 2007. Early detection and treatment is widely recognised as being effective in significantly reducing mortality rates. Biomedical imaging techniques are routinely used for detection and staging of many cancers. However, greater sensitivity is required so that these techniques can be applied to very early detection of tumours. To overcome this short-coming the next generation of imaging probes will be developed, which will require fundamental investigations in polymer and nanomaterials science to maximise imaging sensitivity and extend probe functionality. Successful outcomes will lead to significant benefits to healthcare in Australia.

DP1093474 Prof MW Blows; Miss EJ Hine

Approved Project Title **The Geometry of Genetic Limits to Evolutionary Change**

2010 : \$ 210,000

2011 : \$ 210,000

2012 : \$ 210,000

Primary RFCD 2702 GENETICS

APD Miss EJ Hine

Administering Organisation The University of Queensland

Project Summary

Genetic limits to evolutionary change are a fundamental issue for plant and animal improvement, as well as understanding how natural populations may respond to human-induced changes such as habitat degradation and climate change. Because we still know very little about how genetic variation is distributed among the multiple traits that are likely to respond to selection in such circumstances, we have no way of directly measuring the evolutionary potential of any natural population. In this proposal, we develop the theory, statistical tools, and experimental designs to investigate the nature and prevalence of these multivariate genetic constraints.

Summary of Discovery Projects Proposals for Funding to Commence in 2010

DP1094152 Prof JR Botella; Prof S Assmann

Approved Project Title **Plant heterotrimeric G proteins: new roles in defence, stomatal control and ABA perception**

2010 : \$ 110,000

2011 : \$ 110,000

2012 : \$ 110,000

Primary RFCD 3002 CROP AND PASTURE PRODUCTION

Administering Organisation The University of Queensland

Project Summary

Agriculture is an important economic activity in Australia that results in considerable export revenues. Two of the major problems facing agriculture around the globe are the incidence of diseases and the scarcity of water. Agricultural losses caused by plant pathogens and low water availability account for billions of dollars every year and have profound economic and social implications. Water is an extremely scarce resource in Australia and periodic droughts inflict immense losses to the Australian agricultural sector. Our research will explore new and cleaner strategies to provide crop protection as well as to increase water use efficiency.

DP1096148 Dr TW Bredy

Approved Project Title **Epigenetic mechanisms regulating sex differences in fear-related learning and memory**

2010 : \$ 160,566

2011 : \$ 160,566

2012 : \$ 160,566

2013 : \$ 160,566

2014 : \$ 160,566

Primary RFCD 3207 NEUROSCIENCES

ARF Dr TW Bredy

Administering Organisation The University of Queensland

Project Summary

Anxiety disorders represent an enormous burden on society and are associated with premature aging and infertility in men and women. Evidence also indicates that parental anxiety affects child development. Given that fear-related learning has an important influence on emotional health which, in turn, affects lifestyle and the aging process, an understanding of the neural mechanisms mediating sex differences in fear learning will enhance our ability to develop better therapeutic approaches for treating anxiety and preventing relapse, potentially through a gender-specific approach. The studies outlined in this proposal will have implications for promoting and maintaining good health.

DP1093193 Dr TJ Carroll; A/Prof SP Riek

Approved Project Title **Neural mechanisms underlying interlateral transfer of ballistic motor skill**

2010 : \$ 107,000

2011 : \$ 101,000

2012 : \$ 120,000

Primary RFCD 3801 PSYCHOLOGY

Administering Organisation The University of Queensland

Project Summary

This project seeks to discover why practicing a task with one limb can improve performance with the corresponding limb (which does no physical work) on the opposite side of the body. Identifying the changes in the brain that cause acquisition of skill without direct training is crucial to determine whether the effect might be exploited to improve rehabilitation outcomes for movement disorders that chiefly affect one side of the body (e.g. after a stroke). The research will provide basic information that might lead to new treatment approaches that help to minimize the social cost of the persistent and severe movement difficulties experienced by many patients after neurological injury.

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DP1093960 Dr A Cherney; A/Prof KL Murphy

Approved Project Title **Understanding police and ethnic group interactions: Testing an integrated theoretical model**

2010 : \$ 130,000
2011 : \$ 150,000
2012 : \$ 50,000

Primary RFCD 3701 SOCIOLOGY

Administering Organisation The University of Queensland

Project Summary

This project uses social science research methods to examine perceptions of the roles and authority of the police among ethnic groups in Australia. Outcomes will have implications for police community cooperation and cooperation with social institutions more generally (e.g. government authorities). The research addresses issues that impact on the provision of information to the police and the willingness of groups in Australia to participate in collaborative crime control. National and community benefits include ascertaining how greater levels of cooperation with the police can be promoted among ethnic groups who feel ill-served and marginalised by the criminal justice system.

DP1093177 Dr RJ Clark; Prof DJ Adams; Dr J Pin

Approved Project Title **A new G-protein coupled receptor target for conotoxins**

2010 : \$ 120,000
2011 : \$ 120,000
2012 : \$ 120,000

Primary RFCD 2701 BIOCHEMISTRY AND CELL BIOLOGY

Administering Organisation The University of Queensland

Project Summary

We aim to understand the interaction between venom components from the marine cone snail, a major source of potential drug leads, and a key receptor in nerve cell signalling. This receptor plays a role in many nervous system functions and has been proposed as a target for treating a range of diseases including pain, depression and drug addiction. It is critical that we understand this interaction so we can fully exploit the potential of these molecules as drug leads. The potential exists for multibillion dollar markets for these new drugs that could provide significant economic benefits to Australia.

DP1093164 Dr N Cloonan

Approved Project Title **Functionally characterizing mammalian microRNAs and mRNA interactions controlling cell division.**

2010 : \$ 140,000
2011 : \$ 140,000
2012 : \$ 140,000

Primary RFCD 2702 GENETICS

APD Dr N Cloonan

Administering Organisation The University of Queensland

Project Summary

This project addresses some of the most burning issues in molecular biology and genetic research, and the results will be widely applicable to a broad range of fields, including biotechnology, animal breeding, agricultural production, genetic engineering, medical science, and computational biology. By understanding the regulatory potential of microRNA molecules, we will understand more about species diversity, regulatory networks, and plant and animal development. The early adoption of multi-gigabase next-generation sequencing technology in Australia provides rare and exciting opportunity to lead the world in genome-scale research, and to ensure that Australia has the necessary skill base to remain internationally competitive in this field.

Summary of Discovery Projects Proposals for Funding to Commence in 2010

DP1095429 Prof JJ Cooper-White; Prof NM Fisk; Dr L Grondahl; A/Prof EJ Wolvetang
Approved Project Title **Scalable, high throughput microfluidic platforms for tissue specific biomaterials development and tissue genesis**
2010 : \$ 130,000
2011 : \$ 130,000
2012 : \$ 140,000
Primary RFCD 2906 CHEMICAL ENGINEERING
Administering Organisation The University of Queensland

Project Summary

The co-development of novel biomaterial platforms and new generation production methods for tissue analogues will provide the necessary stimulus for improved and more relevant methods of enhanced repair or regeneration of diseased or damaged tissues. These outcomes will result in faster time-to-market new generation therapeutic products for Australia and the world. These advances will have a significant impact on our healthcare costs and the quality of life for all Australians.

DP1095976 Dr DA Copland; Dr KL McMahon; Prof PA Silburn; A/Prof PJ Nathan
Approved Project Title **How does dopamine modulate adult new word learning?**
2010 : \$ 70,000
2011 : \$ 50,000
2012 : \$ 90,000
Primary RFCD 3801 PSYCHOLOGY
Administering Organisation The University of Queensland

Project Summary

Stroke is a chronic disease of increasing prevalence with increasing age. There is a critical need to develop more effective treatments of communication disorders in this population. One way of achieving this is to combine certain drugs with language therapy. Through studying how these drugs influence language, this research will provide vital knowledge for developing effective forms of pharmacotherapy for adults with language disorders after brain injury. More effective language rehabilitation can have direct positive consequences on the ability to regain and maintain employment and social relationships after stroke or brain injury and will address the large and growing social and economic cost to the nation.

DP1093542 Prof PM Cryle; Dr EA Stephens
Approved Project Title **A Critical Genealogy of Normality**
2010 : \$ 71,000
2011 : \$ 71,000
2012 : \$ 71,000
2013 : \$ 71,000
2014 : \$ 71,000
Primary RFCD 4203 CULTURAL STUDIES
ARF Dr EA Stephens
Administering Organisation The University of Queensland

Project Summary

The rather divergent ideas about normality that emerged in nineteenth-century medical thought continue to have a widespread cultural influence today. Cultural assumptions about what constitutes a normal body inform a wide range of medical practices and underpin the use of standardised testing to determine health or disability. They are also in play when doctors decide when to undertake preventative health measures and when to intervene surgically. A detailed understanding of how bodily norms come to be established has an important role to play in both shaping medical ethics and in helping people make more informed choices about elective surgical procedures.

Summary of Discovery Projects Proposals for Funding to Commence in 2010

DP1094025 A/Prof MJ Davis; Dr PB Blakie; A/Prof BP Anderson

Approved Project Title **Ebb and flow of superfluids: Bose-Einstein condensates far from equilibrium**

2010 : \$ 130,000
2011 : \$ 130,000
2012 : \$ 120,000
2013 : \$ 80,000
2014 : \$ 80,000

Primary RFCD 2402 THEORETICAL AND CONDENSED MATTER PHYSICS

QEII A/Prof MJ Davis

Administering Organisation The University of Queensland

Project Summary

We will develop and test a new theory to describe the dynamics of Bose-Einstein condensates (BECs), and gain insight into the physics of coherence, turbulence, and phase transitions. This proposal will strengthen Australia's reputation for excellence in the field of ultra-cold gases, and develop significant international linkages in this important area of physics. We will train a number of students in high-level problem solving and computing, transferrable skills ever more important in Australia's growing knowledge-based economy. Improved understanding of how BECs behave will assist in their development as sensitive measurement devices, with possible intellectual property benefits in the future as we learn to tame these unique systems.

DP1092619 Dr GI de Zubicaray

Approved Project Title **How the brain produces speech**

2010 : \$ 150,000
2011 : \$ 150,000
2012 : \$ 160,000
2013 : \$ 160,000
2014 : \$ 145,000

Primary RFCD 3801 PSYCHOLOGY

QEII Dr GI de Zubicaray

Administering Organisation The University of Queensland

Project Summary

Speech production is a fundamental ability that enables human interaction through language. Brain injuries impair this ability, with profound negative consequences for the individual and their immediate family and friends. This project will increase our understanding of the brain mechanisms involved in producing speech by using state-of-the-art brain imaging techniques. The findings will inform future clinical research and improve the advice given to clinicians, patients and the broader community about the nature of language production and its impairments and ultimately the treatment of speech disorders.

DP1095154 Prof BM Degnan; Dr D Arendt; Dr N King; Prof KS Kosik; Prof MQ Martindale; Dr T Oakley; Prof M Vervoort

Approved Project Title **Origin of animal sensory and nervous systems: a case study in cell type evolution**

2010 : \$ 195,000
2011 : \$ 195,000
2012 : \$ 190,000

Primary RFCD 2705 ZOOLOGY

Administering Organisation The University of Queensland

Project Summary

The origin of the nerve cell and the nervous system allowed the first animals to interact with their biotic and abiotic environment in rapid and complex ways. These capabilities are the primary agents for success in the animal kingdom, underpinning the ability to capture food, avoid predation, and find a mate. These same nerve cells have bestowed on the human brain cognitive abilities that have driven our biological and cultural evolution. Despite the phenomenal importance of the nerve cell, we know almost nothing about its origin and early evolution. This basic research project seeks to make a major contribution towards addressing this gap in knowledge.

Summary of Discovery Projects Proposals for Funding to Commence in 2010

DP1096826 Dr K Deng
Approved Project Title **Context Exploration: An Effective Way to Enhance Duplication Detection**
2010 : \$ 85,000
2011 : \$ 85,000
2012 : \$ 85,000
Primary RFCD 2801 INFORMATION SYSTEMS
APD Dr K Deng
Administering Organisation The University of Queensland

Project Summary

As a vital data quality problem, effective duplication detection has practical significance in data management, in particular in large scale information systems such as in business, health and national security. This project aims to be a unique value to virtually every information systems by providing a general, domain-independent framework which is comprehensive to significantly improve the duplication detection. The developed cutting-edge technologies are potential to be a new direction of data duplication detection study. This project will allow us to avail an opportunity to promote Australia's capability in developing sophisticated technologies and are potential to add to Australia's profile in this area.

DP1096157 Dr WH Dressler; A/Prof R Cramb; Dr S Singh
Approved Project Title **Swidden Cultivation and the Agrarian Transition on the Forest Frontiers of Southeast Asia**
2010 : \$ 173,000
2011 : \$ 90,000
2012 : \$ 159,000
Primary RFCD 3703 ANTHROPOLOGY
APD Dr S Singh
Administering Organisation The University of Queensland

Project Summary

Challenges to rural sustainability increase as swidden farmers adjust to the uneven impacts of agrarian change such as social conflict, material poverty and environmental decline. However, little is known about how swidden farmers engage with the causes and consequences of agrarian change in different political economic contexts. This research will generate a multi-scale comparative assessment (local-regional) of how swidden farmers adjust livelihoods and social relations in response to agrarian change in Laos, Philippine and Malaysian frontiers. It will offer new insights to Australian donors, international academic networks and resource practitioners on how agrarian change affects swidden farmers and local landscapes.

DP1093840 A/Prof PE Earl; Dr LM Friesen
Approved Project Title **A study of consumers' competence when choosing between complex mobile phone contracts and the regulatory implications of their coping strategies**
2010 : \$ 93,000
2011 : \$ 96,000
2012 : \$ 100,000
2013 : \$ 60,000
Primary RFCD 3402 APPLIED ECONOMICS
Administering Organisation The University of Queensland

Project Summary

The main outcome of this project will be a better understanding of which kinds of mobile phone contracts and methods of displaying them to potential users are the biggest sources of decision making errors, and which techniques for coping with a plethora of such contracts are the most reliable ones. This knowledge will be used to derive recommendations for consumer policy agencies and advice for consumers that will increase financial welfare and reduce mental stress for consumers. Some of the findings may have implications for regulators seeking to design consumer protection policies in other area where firms deliberately offer customers opaque contracts.

Summary of Discovery Projects Proposals for Funding to Commence in 2010

DP1093245 Prof DP Fairlie; Prof MA Cooper

Approved Project Title **Common hot spots in protein-activated GPCRs enable discovery of new ligands for mapping of G-protein signalling pathways**

2010 : \$ 300,000

2011 : \$ 300,000

2012 : \$ 300,000

Primary RFCD 2503 ORGANIC CHEMISTRY

Administering Organisation The University of Queensland

Project Summary

This project will teach researchers and industry how to more rapidly discover new compounds for development into medicines, and how to design them with reduced side effects. This interdisciplinary research will provide excellent training for scientists in chemistry, pharmacology, biochemistry and biotechnology. It will advance fundamental science at the chemistry-biology interface, attract international interest from researchers, students, and companies, with potential for translational and commercial outcomes. New drug leads and information on how important drug targets communicate with different intracellular signalling pathways has potential to impact on National Research Priorities of good health and building Australian industry.

DP1096290 Prof DP Fairlie

Approved Project Title **Protein And Peptide Alpha Turns**

2010 : \$ 120,000

2011 : \$ 120,000

2012 : \$ 120,000

Primary RFCD 2503 ORGANIC CHEMISTRY

Administering Organisation The University of Queensland

Project Summary

All life is controlled by the structures and functions of proteins. Major components of proteins are alpha helices that are combinations of alpha turns. Different types of alpha turns exist in proteins but have not been well studied. This project will discover and classify alpha turns in proteins, create the first small molecules that contain alpha turns outside of complex protein environments, and provide a better understanding of their chemical, structural and biological properties. Results will teach scientists important details about protein structure and function, train scientists at a frontier of chemistry-biology research, and may contribute to national priorities by triggering new approaches to medicines and novel materials.

DP1093035 Dr H Feng; Prof SR Bell

Approved Project Title **Healing the Achilles Heel: the Politics of China's Banking Reform since 1997**

2010 : \$ 120,000

2011 : \$ 120,000

2012 : \$ 110,000

2013 : \$ 20,000

Primary RFCD 3499 OTHER ECONOMICS

Administering Organisation The University of Queensland

Project Summary

China's rapid economic growth and gradual integration with the international system, in particular the increasingly strong economic links between Australia and China, means Australia now has a big stake in China's financial and economic stability, especially under the current global financial crisis. By examining the path and process of China's banking and regulatory reform, this project will significantly enhance our capacity to interpret macroeconomic and financial development in China, to support our commitment to states in the Asia Pacific region that are dealing with economic reforms and transition, and more importantly, to exert influence on the desired direction of change in China through engagement with the Chinese polity.

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DP1095875 Dr JA Fraser

Approved Project Title **Understanding an exotic disease: Initiation of sex and infection by the sugarcane smut Ustilago scitaminea**

2010 : \$ 160,000
2011 : \$ 140,000
2012 : \$ 140,000

Primary RFCD 2703 MICROBIOLOGY

Administering Organisation The University of Queensland

Project Summary

Australian sugar exports generate almost \$2 billion in annual sales, making the sugar industry a critical facet of the Australian economy. In 2006, Australia's primary sugar producing region came under threat when an outbreak of sugarcane smut caused by the fungus *Ustilago scitaminea* first appeared in Queensland. Management of this potentially devastating disease has focused on breeding programmes aimed at developing resistant sugarcane cultivars, a complex process hampered by a lack of information about the mechanisms of smut resistance. Our research will provide key insight into the mechanisms by which *U. scitaminea* infects sugarcane, directing future breeding efforts and protecting this valuable industry against further outbreaks.

DP1095507 Prof WK Halford; Prof KL Wilson; Dr D Busby; Dr J Larson; Dr TB Holman

Approved Project Title **The effects of home-based couple relationship education on couple relationships, mental health and work performance**

2010 : \$ 100,000
2011 : \$ 100,000
2012 : \$ 80,000

Primary RFCD 3801 PSYCHOLOGY

Administering Organisation The University of Queensland

Project Summary

Marital distress and separations cause great suffering and cost the Australian community at least \$5 billion annually. This research evaluates an innovative relationship education program that couples can complete at home. The research tests whether the education enhances couples' relationship satisfaction, which couples benefit, how the program achieves its effects, and whether improved couple relationships enhances partners' mental health and work performance. The program might provide national benefit in reducing the enormous personal and social costs of marital problems, as well as providing a potentially important new product with significant export potential.

DP1093287 A/Prof BD Hankamer; Dr BJ Marsh; Dr O Kruse; Prof Dr CH Posten

Approved Project Title **The structural biology of light capture: A molecular resolution 3D atlas of the photosynthetic machinery**

2010 : \$ 103,000
2011 : \$ 103,000
2012 : \$ 103,000

Primary RFCD 2701 BIOCHEMISTRY AND CELL BIOLOGY

Administering Organisation The University of Queensland

Project Summary

This project underpins the development of carbon dioxide (CO₂)-neutral fuels for the future. Fuels account for around sixty seven percent of the global energy market. The Solar-Biofuels Consortium (www.solarbiofuels.org) is targeting this market by developing high efficiency second generation microalgal biofuel systems for the production of bio-diesel, bio-methane and bio-hydrogen (shown on Catalyst 2007). The solar-powered microalgal bioreactors can be located on non-arable land (eliminating competition with food production) and be coupled to carbon sequestration. Closed systems also minimize water use. This technology differs from most others (that is, clean-coal, nuclear, solar, wind, geothermal) as these target the electricity market.

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DP1093159 Dr AM Hindmoor; Prof A McConnell

Approved Project Title **Governing vs. opposition parties and the global financial crisis: Comparing the United Kingdom and Australia**

2010 : \$ 40,000

2011 : \$ 40,000

Primary RFCD 3601 POLITICAL SCIENCE

Administering Organisation The University of Queensland

Project Summary

The Australian Prime Minister has described the global financial crisis as the 'equivalent of a rolling national security crisis'. Our project, which examines the pressures upon political parties to adopt an adversarial approach to crises as an election approaches, benefits the nation by enhancing our understanding of how political systems cope with crisis. Should governing and opposition parties unite in order to tackle the national crisis and portray consensus to the outside world? Or should they continue to engage in routine adversary criticism, facilitating dialogue and providing a 'check' on a centralised response? Our research will help develop an understanding of Australia's capacity to respond to major economic threats.

DP1093654 A/Prof MJ Hornsey; Dr MJ Wohl

Approved Project Title **Promoting intergroup forgiveness: The benefits and pitfalls of apologies and invocations of shared humanity**

2010 : \$ 57,000

2011 : \$ 61,000

2012 : \$ 56,000

Primary RFCD 3801 PSYCHOLOGY

Administering Organisation The University of Queensland

Project Summary

In the last 200 years Australians have found themselves as both perpetrators and victims of historical transgressions. This history of transgression has ongoing implications for how Australians deal with the present. It has implications for how Australians relate to Japan, for example, and has implications for relations between Indigenous and non-Indigenous Australians. The proposed research offers fresh ideas for understanding and promoting intergroup reconciliation and forgiveness. This information will contribute to the development of effective strategies for reconciling with the past, which will enhance our ability to anticipate and tackle critical threats to the cohesiveness of Australian society.

DP1093421 Dr MT Hsu; Dr MJ Mandella; Prof GS Kino

Approved Project Title **Intravital super-resolution imaging via Stimulated Emission Depletion microscopy (STED)-microendoscopy**

2010 : \$ 280,000

2011 : \$ 165,000

2012 : \$ 135,000

Primary RFCD 2404 OPTICAL PHYSICS

APD Dr MT Hsu

Administering Organisation The University of Queensland

Project Summary

We will develop a new technology to enable the imaging of sub-cellular structures within a biological specimen, with super-resolution. This intravital super-resolution imaging technology will build off world leading techniques to image objects with super-resolution and to perform this within a specimen, with minimal invasion. The broad ramifications of this technology apply to biology, medical science, imaging and sensing. Important applications include the early detection of debilitating diseases and the advancement of understanding of cellular biology. This research will raise Australia's profile as a world leader in science and technology, building on our emerging presence in the biophysical sciences.

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DP1095328 A/Prof JJ Jacobs

Approved Project Title **Worldwide: the history of the commercial arm of the British Broadcasting Corporation (BBC)**

2010 : \$ 60,000

2011 : \$ 65,000

2012 : \$ 93,000

Primary RFCD 4203 CULTURAL STUDIES

Administering Organisation The University of Queensland

Project Summary

This project will result in a greater historical understanding of how state funded public service broadcasters develop and manage their commercial operations. The BBC's commercial arm was emulated by public service broadcasters across the world, not least by the Australian Broadcasting Corporation which was also a key client and partner. This history will enhance our understanding of public service broadcasting by examining the industrial and cultural innovations that are needed if the delivery of public content in Australia is to survive in a highly privatised digital environment.

DP1094034 Prof J Jetten; Prof N Ellemers

Approved Project Title **Minority hostility and resistance: The interplay between majority rejection and minority goals**

2010 : \$ 50,000

2011 : \$ 56,000

2012 : \$ 50,000

Primary RFCD 3801 PSYCHOLOGY

Administering Organisation The University of Queensland

Project Summary

Our current theorizing cannot inform us about the antecedents of minority hostility towards majorities, the causes of minority radicalisation, and defiance of majority norms. There is an urgent need to examine these issues because fears of minority hostility (whether real or imagined) may lead to civil unrest and the breakdown of relationships between minorities and majorities. The unique value of the research lies in addressing an important social issue and concern in everyday society and its outcomes will inform policy development. In addition, the research helps to advance Australia's intellectual leadership position in this area, provides research training, and strengthens existing collaborative networks.

DP1092492 Dr KN Johnson; Prof SL O'Neill; Dr JC Brownlie

Approved Project Title **Understanding the mechanism of Wolbachia-mediated antiviral protection**

2010 : \$ 140,000

2011 : \$ 140,000

2012 : \$ 140,000

Primary RFCD 2703 MICROBIOLOGY

Administering Organisation The University of Queensland

Project Summary

Insects are involved in the transmission of many viral diseases of both plants and animals. A considerable number of these diseases have adverse effects for public health or cause large economic losses in agriculture. We were the first to discover that a common bacteria protects insects from virus infection. Knowledge of the mechanisms used by the bacteria to interfere with virus accumulation will facilitate novel strategies for control of virus disease. The findings of this project will enable Australian researchers and industry to design innovative approaches to control diseases that are transmitted by insects.

Summary of Discovery Projects Proposals for Funding to Commence in 2010

DP1093471 A/Prof MK Jones; Dr GN Gobert

Approved Project Title **Discovery of pathways to embryogenesis in pathogenic flatworm parasites using microdissection and transcriptomic technologies**

2010 : \$ 75,000

2011 : \$ 75,000

2012 : \$ 75,000

Primary RFCD 3005 VETERINARY SCIENCES

Administering Organisation The University of Queensland

Project Summary

The cost to Australia of flatworm parasites to animal production and human health is substantial (hundreds of millions of dollars per year). This research will give new insights into how flatworms reproduce and equip their progeny for survival, providing impetus for new vaccine or drug therapies to be developed. As these pathogens are more significant in Australia's near neighbours, this project will strengthen Australia's international leadership in this field. Our study will provide, for the first time for any helminth parasite, a freely available genetic database that profiles the gene expression repertoire of individual parasite tissues, a development likely to enhance the international effort in controlling these harmful diseases.

DP1095883 A/Prof AB Kelly; Dr MA Haynes; Prof R Young

Approved Project Title **Dynamic social systems and adolescent alcohol/tobacco use: A new cusp catastrophe model**

2010 : \$ 50,000

2011 : \$ 50,000

2012 : \$ 50,000

Primary RFCD 3801 PSYCHOLOGY

Administering Organisation The University of Queensland

Project Summary

This research will substantially improve our understanding of the development of adolescent high-risk behaviours. It will directly inform multimodal prevention strategies by demonstrating how substance use, peer factors, and parent relationships unfold over time. This is much needed because most prevention strategies are too simplistic to address complex precursors to alcohol/tobacco use. The research will benefit health researchers in and beyond Australia who seek to understand behaviours that do not adhere to conventional assumptions. Collaboration with researchers from leading national and international centres will enhance Australia's research reputation and will attract postgraduates and researchers to Australia.

DP1093281 Prof MA Kendall; Prof IH Frazer; Prof MS Roberts; Prof DC Ambrosi

Approved Project Title **Improving immune response to vaccines by selective targeting of epithelial regions with the Nanopatch.**

2010 : \$ 270,000

2011 : \$ 280,000

2012 : \$ 275,000

Primary RFCD 2915 BIOMEDICAL ENGINEERING

Administering Organisation The University of Queensland

Project Summary

Vaccination protects us from infections like measles and flu. In principle, it could protect us from all diseases, even from skin cancer and arthritis. In practice, however, vaccines to diseases like cancer have largely proved ineffective. One problem is that we don't really understand how the body's immune system responds to vaccination. Our aim, therefore, is to investigate changes in the immune system when a vaccine enters the skin, as might happen by injection. Experimenting with laboratory mice and a special vaccine-injecting Nanopatch that is attached to each mouse's ear, we are starting to understand how a vaccine affects the immune cells in the skin. In the future we plan to apply this knowledge to improve vaccination in people.

Summary of Discovery Projects Proposals for Funding to Commence in 2010

DP1095728 Prof GF King
Approved Project Title **Peptidic spider toxins: a novel paradigm for control of insect pests**
2010 : \$ 190,000
2011 : \$ 185,000
2012 : \$ 185,000
Primary RFCD 3002 CROP AND PASTURE PRODUCTION
Administering Organisation The University of Queensland

Project Summary

Many insects are serious pests of Australian crops, livestock, and pets. Australian farmers spend about \$300 million per annum on insecticides and acaricides, while Australian consumers spend more than \$100 million annually on insecticides for use around the home and garden, and on pets. Viruses disseminated by insects are also responsible for diseases such as dengue, Japanese encephalitis, and Ross River fever. Unfortunately, many of these insect pests have developed resistance to chemical insecticides. The aim of this research program is to develop a new generation of environmentally-friendly natural products and insect-resistant crops that can be used to control insect pests on farms and around the home and garden.

DP1092466 Prof MF Lavin
Approved Project Title **Characterisation of the novel mitochondrial protein (CABC1/ADCK3) and its role in protecting against oxidative stress**
2010 : \$ 120,000
2011 : \$ 90,000
2012 : \$ 90,000
Primary RFCD 2701 BIOCHEMISTRY AND CELL BIOLOGY
Administering Organisation The University of Queensland

Project Summary

This is the first detailed characterisation and mechanistic study on a protein that protects against oxidative stress and neurodegeneration. Demonstrating the basis for this oxidative stress and its possible contribution to the cellular phenotype will be of benefit in understanding the disease process and ultimately designing approaches to minimise oxidative stress. An investigation of this protein presents an opportunity for the investigator to work at the forefront in this field adding to Australia's scientific leadership in the area. It also represents an ideal project for post-graduate training and is a collaboration between groups in Brisbane and Melbourne.

DP1092489 Prof MF Lavin; Dr TL Roberts
Approved Project Title **To investigate the role of the protein kinase SMG-1 in the stress response**
2010 : \$ 105,000
2011 : \$ 85,000
2012 : \$ 95,000
Primary RFCD 2702 GENETICS
Administering Organisation The University of Queensland

Project Summary

This project is included in the designated priority area of research Promoting and Maintaining Good Health and Ageing Well. It represents a mouse model to assist in the study of human disease. It is the first mouse model for SMG-1, a protein kinase that protects against a variety of different forms of stress. The strength of the model is that it can be combined with other mouse models to interrogate and elucidate the events occurring in different pathways for stress. The expectation is that ground-breaking data will be generated with this model providing scientific leadership on the role of this protein. It will also assist in establishing new collaborations.

Summary of Discovery Projects Proposals for Funding to Commence in 2010

DP1094850 Prof RL Lingard

Approved Project Title **Schooling the nation in an age of globalization: National curriculum, accountabilities and their effects**

2010 : \$ 166,000
2011 : \$ 166,000
2012 : \$ 166,000

Primary RFCD 3301 EDUCATION STUDIES

Administering Organisation The University of Queensland

Project Summary

The research will contribute to the development of Australia's human capital through the enhancement of knowledge concerning the policy settings necessary at national and state systemic levels for achieving higher quality and more equitable student outcomes. The research will advance understandings of how education federalism can best be utilized to achieve such outcomes. Analyses of NAPLAN and PISA data will also provide policy and practice relevant knowledge for systems and for schools. The project will strengthen Australia's research capacity in education policy studies and its reputation in the academic field, and contribute to improved research-based policy making in education.

DP1095902 Dr F Liu; Mr E Weber; Dr A Trakic

Approved Project Title **Solutions for reducing magnetic resonance image degradations and tissue heating at high frequencies**

2010 : \$ 150,000
2011 : \$ 150,000
2012 : \$ 150,000

Primary RFCD 2915 BIOMEDICAL ENGINEERING

APD Dr A Trakic

Administering Organisation The University of Queensland

Project Summary

This project will contribute to the development of the high-end Magnetic Resonance Imaging (MRI) systems that can substantially improve the image quality, speed of imaging and patient safety in MRI. The project will develop innovative high radio frequency hardware and control methods for imaging. Successful outcomes of this project will, facilitate higher patient throughput in hospitals, provision of more powerful clinical imaging tools to aid early diagnosis and various research modalities ranging from molecular to real-time imaging during interventional procedures.

DP1094070 Mr J Liu

Approved Project Title **Nanostructured Degradable Polymer for Drug Delivery**

2010 : \$ 80,182
2011 : \$ 80,182
2012 : \$ 80,182

Primary RFCD 2918 INTERDISCIPLINARY ENGINEERING

Administering Organisation The University of Queensland

Project Summary

The success of synthesising nanostructured degradable polymers will position Australia at the world forefront in the field of nanotechnology, bioengineering and healthcare sectors in both fundamental and applied research. This multi-disciplinary research has the potential to generate patentable technologies with economic benefits to Australia. The project also involves fundamental research into surface chemistry, nanostructure, polymer sciences and will be a meaningful contribution to the advancement of scientific knowledge in Australia. All these will enhance the international competitive profile of Australia in the field of nanotechnology for drug delivery.

Summary of Discovery Projects Proposals for Funding to Commence in 2010

DP1092490 Dr WR Louis; Dr JR Smith; Dr KD Vohs

Approved Project Title **Draining the will for peace or war: Understanding how social influence and self-regulation processes interact in conflict**

2010 : \$ 40,000

2011 : \$ 20,000

2012 : \$ 30,000

Primary RFCD 3801 PSYCHOLOGY

Administering Organisation The University of Queensland

Project Summary

Conflict is common, whether between racial, religious, and political groups, or between businesses and firms. Yet conflict frays tempers, wastes time, costs money, and hurts people. Destructive conflict escalation often occurs despite rational plans and good intentions. This process is poorly understood. The present research applies new psychological research on understanding motivation to improve our understanding of how good intentions fail and conflict escalates. By studying how conflict drains our ability to exercise willpower and increases our vulnerability to situational cues that promote confrontation, we will be able to develop interventions to reduce unwanted conflict escalation.

DP1092582 Prof JW Lynch

Approved Project Title **Activation mechanisms of Cys-loop ion channel receptors**

2010 : \$ 116,000

2011 : \$ 116,000

2012 : \$ 116,000

Primary RFCD 3205 PHARMACOLOGY AND PHARMACEUTICAL SCIENCES

Administering Organisation The University of Queensland

Project Summary

This proposal will employ a cutting edge approach to reveal fundamental new insights into the ways that proteins work. The information and technology developed here will broaden and strengthen Australia's research expertise across a number of basic scientific disciplines. The results will also have relevance to human health. Cys-loop ligand-gated receptors have an essential role in brain function and are targets for many therapies and drugs of abuse. New insights into how biological ligands and drugs affect ion channel structure and function may lead to novel therapeutic opportunities and improved drug structure predictions.

DP1093900 Prof NG Martin; Dr MJ Wright; Prof GS Halford; Prof DH Shum; Dr G Andrews; Dr NR Wray

Approved Project Title **Identifying genes for cognition**

2010 : \$ 116,000

2011 : \$ 117,000

2012 : \$ 119,000

Primary RFCD 3801 PSYCHOLOGY

Administering Organisation The University of Queensland

Project Summary

We have established a large twin sample and are the Australian arm of an international consortium to identify genes for cognition. This work will transform our understanding of brain functions that affect normal cognitive functioning. It has potentially enormous public health significance by providing clues into the underlying mechanisms of impaired cognitive ability. Many different conditions affect people's ability to think and remember (e.g. schizophrenia, dementia). By understanding how cognitive processes work in healthy individuals, we can better identify the fundamental mechanisms of impaired cognitive ability. This may have future applications for treating brain dysfunction, and managing memory of intellectual disabilities.

Summary of Discovery Projects Proposals for Funding to Commence in 2010

DP1094395 Prof RH McKenzie; Dr NE Hussey

Approved Project Title **Interlayer magnetoresistance of strongly correlated electron materials**

2010 : \$ 120,000

2011 : \$ 120,000

2012 : \$ 120,000

Primary RFCD 2402 THEORETICAL AND CONDENSED MATTER PHYSICS

Administering Organisation The University of Queensland

Project Summary

The continued rapid expansion of information and entertainment technology requires new materials and devices for information storage. State of the art computer and iPod memories utilise advanced materials composed of layers of atoms, recognised by the 2007 Nobel Prize in Physics. These materials have metallic properties quite unlike those of simple metals such as copper and brass. This research will lead to a greater understanding of and ability to design the next generation of materials. Australia's capacity for research and development in this scientifically challenging and technologically important field will be enhanced by this project.

DP1094498 Dr M Mesbah; Prof PB Colditz; Dr C East; Dr JE Smeathers; Prof B Boashash

Approved Project Title **Detection and Quantification of General Fetal Movements from Accelerometer Measurements using Nonstationary Signal Processing Techniques**

2010 : \$ 50,000

2011 : \$ 50,000

2012 : \$ 50,000

Primary RFCD 2802 ARTIFICIAL INTELLIGENCE AND SIGNAL AND IMAGE PROCESSING

Administering Organisation The University of Queensland

Project Summary

There are approximately 1,750 fetal deaths per year in Australian with about one-third occurring late in gestation and without an apparent cause. The development of an automated system capable of long-term monitoring of fetal health will result in accurate diagnoses and prediction of future outcome. This will, in turn, allow early intervention by the clinician to reduce fetal deaths and enhance the chances of good outcomes with resultant savings in social and financial costs to the community. The development of such equipment would spawn future research into intervention treatments and contribute to Australia's position as a world leader in computerised health monitoring systems.

DP1093056 Prof AP Middelberg

Approved Project Title **Sustainable processes for next-generation surface coatings and core-shell nanoparticles based on biomolecular templating**

2010 : \$ 160,000

2011 : \$ 150,000

2012 : \$ 160,000

Primary RFCD 2906 CHEMICAL ENGINEERING

Administering Organisation The University of Queensland

Project Summary

Nanotechnology promises new materials with broad impact, yet our ability to manufacture complex nanomaterials using sustainable processes is very limited. This project will advance our knowledge of nanomaterial manufacture using inspiration from how complex materials are made in nature. This project will deliver next-generation surface coatings that are incredibly thin but strong, and specialised nanoparticles made using biocompatible processes. The knowledge and methods developed will benefit the biotechnology and nanotechnology sectors, as well as research in soft-matter science, quantum computing, photonics and healthcare. The value proposition for innovation in these fields will increasingly rely on new nanomanufacturing approaches.

Summary of Discovery Projects Proposals for Funding to Commence in 2010

DP1093082 Prof MD Mills; Dr DR Geelan; Prof PD Renshaw; Dr AM Keddie; A/Prof PH Christie

Approved Project Title **Engaging students: Issues of difference, distribution and recognition in schools**

2010 : \$ 146,495

2011 : \$ 145,809

2012 : \$ 151,837

Primary RFCD 3301 EDUCATION STUDIES

Administering Organisation The University of Queensland

Project Summary

The project will help to improve the quality of schooling provided to students currently marginalised within the education sector. It focuses on the achievement of diverse groups of students and on how schools and classrooms value and educationally 'work with' their differences. The engagement of marginalised students in the schooling process has been identified as a national priority by Federal and State Ministers of Education in the 2008 Melbourne Declaration on Educational Goals for Young Australians. By addressing the engagement of students marginalised from mainstream schooling, the project will also address the promoting and maintaining good health.

DP1093784 Dr K Monro

Approved Project Title **How does allocation to each sex evolve in hermaphrodites? New insight from the sea**

2010 : \$ 120,000

2011 : \$ 120,000

2012 : \$ 98,000

Primary RFCD 2707 ECOLOGY AND EVOLUTION

APD Dr K Monro

Administering Organisation The University of Queensland

Project Summary

Understanding the ability of hermaphroditic animals to adapt their sex allocation to suit environmental conditions will pave the way for integration between pure and applied research. Such understanding can provide stakeholders across a range of disciplines (natural resource management, aquaculture, conservation) with key information about genetic and environmental influences on the reproduction of many species of significant ecological, economic and social value with this mating system. This research will yield knowledge at the very forefront of evolutionary ecology, enhancing Australia's reputation for research excellence in this field, and further benefit Australian science through the training of young scientists.

DP1094560 Prof RG Morgan; Dr TJ McIntyre; A/Prof DR Buttsworth; Prof RR Boyce; Dr PA Gnoffo; Dr M McGilvray; Dr PA Jacobs

Approved Project Title **Hypervelocity re-entry**

2010 : \$ 170,000

2011 : \$ 160,000

2012 : \$ 160,000

Primary RFCD 2902 AEROSPACE ENGINEERING

APD Dr M McGilvray

Administering Organisation The University of Queensland

Project Summary

Addressing a critical area of space travel and its practical utilisation it will help expand a key technology niche which will facilitate our involvement in major programs of the future. In international space programs each participant provides a unique technical contribution and shares in the intellectual and economic returns. Educational benefits arise due to the challenging nature of the work, contact with overseas researchers, and through the marketing and development of flight vehicles and associated technology. There will be opportunity for our graduates to be employed in senior positions overseas, and to subsequently return to Australia with advanced skills and facilitate Australian collaboration from positions of influence.

Summary of Discovery Projects Proposals for Funding to Commence in 2010

DP1095880 Dr TA Nieminen; Prof NR Heckenberg

Approved Project Title **Advanced optical tweezers technologies for biophysical measurements**

2010 : \$ 140,000
2011 : \$ 130,000
2012 : \$ 120,000
2013 : \$ 60,000
2014 : \$ 60,000

Primary RFCD 2404 OPTICAL PHYSICS

ARF Dr TA Nieminen

Administering Organisation The University of Queensland

Project Summary

While much is understood about the fundamental unit of life, the living cell, such as their behaviour and their biochemistry and genetics, the interface between these two is only poorly known. We will use optical tweezers, which can trap and move microscopic objects without physical contact, to measure forces on the molecular and cellular scale to study the mechanical properties of cells and biomolecules, including molecular motors, which are Nature's own nanomachines, advanced our knowledge of the fundamental machinery of life.

DP1092442 Dr AC Paulk

Approved Project Title **Neural mechanisms of attention in the honeybee and *Drosophila melanogaster***

2010 : \$ 105,000
2011 : \$ 85,000
2012 : \$ 85,000

Primary RFCD 3207 NEUROSCIENCES

APD Dr AC Paulk

Administering Organisation The University of Queensland

Project Summary

By examining convergent neural mechanisms of attention in insects and comparing these mechanisms to those found in vertebrates, we may uncover basic principles of how attention operates in widely divergent systems. This type of basic scientific research could be used to provide a framework to develop better approaches for treatment for individuals with defects in attention. Such defects are symptoms of several psychological conditions, including attention deficit disorder, autism, and schizophrenia, which have major social and economic costs in Australia. Therefore, by expanding our understanding of how attention operates at the level of neurons, we can begin to develop targeted treatments for addressing these conditions.

DP1094285 Prof CC Peterson; A/Prof VP Slaughter; Prof HM Wellman; Prof C Moore

Approved Project Title **Theory of mind and everyday social behaviour in children with autism, deafness and typical development**

2010 : \$ 70,000
2011 : \$ 70,000
2012 : \$ 160,000

Primary RFCD 3801 PSYCHOLOGY

Administering Organisation The University of Queensland

Project Summary

Via new insight into the social-cognitive underpinnings of children's peer relationships, we will assist national research priorities to promote child health and limit adverse costs of disability. Our findings will also advance Australia's world leadership in the science of developmental psychology: Building both on our international team's novel social cognition discoveries and proven successes researching and publishing together, we are ideally poised for scientific discovery, world-class research leadership/ research training, and for fostering a collaborative research network of key international significance, while guiding policies and intervention to help Australia's typically-developing and disabled children.

Summary of Discovery Projects Proposals for Funding to Commence in 2010

DP1092732 Prof HP Possingham; Dr E McDonald-Madden

Approved Project Title **The role of learning in conservation management: developing adaptive approaches for the conservation of biodiversity in a changing climate.**

2010 : \$ 120,000

2011 : \$ 110,000

2012 : \$ 110,000

Primary RFCD 3008 ENVIRONMENTAL SCIENCES

APD Dr E McDonald-Madden

Administering Organisation The University of Queensland

Project Summary

Biodiversity underpins several major industries: agriculture, tourism, forestry and fisheries. To mitigate the loss of biodiversity, there have been significant investments from all levels of government, including 2.2 billion dollars to manage biodiversity and 138 million dollars simply to gather data on the impact of climatic changes. Despite this well intended funding, the key questions of how to best allocate this money between the many threatened species and regions of Australia, and how to adapt this allocation in light of climatic changes, remain unanswered. Our research will develop explicit and practical frameworks by which we can cost efficiently learn and act simultaneously.

DP1093224 Dr BJ Powell; Dr S Lo; Dr R Coldea; Prof W David; Dr J Merino

Approved Project Title **Spin-liquids, antiferromagnetism, and superconductivity in organic charge transfer salts: synthesis, neutron scattering and theory**

2010 : \$ 120,000

2011 : \$ 133,500

2012 : \$ 110,000

Primary RFCD 2402 THEORETICAL AND CONDENSED MATTER PHYSICS

Administering Organisation The University of Queensland

Project Summary

Materials have driven the digital revolution. Understanding and controlling silicon has allowed us to make smaller devices that perform better; an iPhone has more computing power than a PC had ten years ago. For this remarkable trend to continue future devices will need to utilise novel physics and be made from new materials. We will grow crystals of organic molecules, whose properties derive from the correlated motion of the electrons in these materials. State-of-the-art 'neutron scattering' experiments will test theories of the way the electrons behave in these materials. We will answer fundamental questions, which is an important first step towards harnessing such effects for future technology.

DP1095861 Dr S Qiao; Dr Y Jin; Prof M Jaroniec

Approved Project Title **Multifunctional Porous Nanospheres Engineered Composite Membranes for Hydrogen and Methanol Fuel Cells**

2010 : \$ 85,000

2011 : \$ 85,000

2012 : \$ 80,000

Primary RFCD 2918 INTERDISCIPLINARY ENGINEERING

Administering Organisation The University of Queensland

Project Summary

Increasing concerns about greenhouse gas emissions and dwindling petroleum supplies have driven the development and commercialisation of fuel cells. The development of novel nanocomposite membranes will possibly lead to the materials breakthrough necessary for advancing both hydrogen and methanol fuel cell technologies, significantly benefiting Australian clean energy supplies and in particular transport vehicles and portable devices. The synthesis strategies generated will be applicable to creating other functional nanoporous or nanocomposite materials for wider application. This project will also enhance the international reputation and impact of Australian research in the internationally focused fields of nanomaterials and fuel cell technology.

Summary of Discovery Projects Proposals for Funding to Commence in 2010

DP1095196 Prof MR Sanders
Approved Project Title **Controlled trial of a family intervention for children bullied by peers**
2010 : \$ 100,000
2011 : \$ 30,000
Primary RFCD 3801 PSYCHOLOGY
Administering Organisation The University of Queensland

Project Summary

Bullying by peers begins as early as pre-school and affects a tenth of Australian children almost every day. This has serious ongoing consequences including increased risk of mental health problems, onset of health problems, development of negative school attitudes and behaviour problems and loss of friendships. This study is a controlled trial of a family program to assist children and parents to reduce the incidence and impact of bullying. If successful, such a program could provide relief to many children and families struggling with bullying and save untold millions of dollars lost to future mental health demands.

DP1096395 A/Prof MA Schembri; Prof AG McEwan; Dr B Heras
Approved Project Title **Disulfide catalysis and protein folding in bacterial virulence**
2010 : \$ 100,000
2011 : \$ 100,000
2012 : \$ 100,000
Primary RFCD 2703 MICROBIOLOGY
Administering Organisation The University of Queensland

Project Summary

The molecular mechanisms that underpin disulfide bond formation have had a major impact on our understanding of protein folding and function. This project will make a major contribution to fundamental areas of disulfide catalysis pathways in bacterial pathogens and thus help maintain a strong international profile for Australian research in this field. The work will lead to training of research scientists and students in techniques that include molecular genetics, protein biochemistry and structural biology. Our findings may impact future directions for vaccine research on pathogens that cause life threatening infections in humans and therefore lead to improved health and reduced health care expenditure.

DP1097032 A/Prof MA Schembri
Approved Project Title **Autotransporter proteins of enterohemorrhagic Escherichia coli O157:H7**
2010 : \$ 100,000
2011 : \$ 100,000
2012 : \$ 100,000
Primary RFCD 2703 MICROBIOLOGY
Administering Organisation The University of Queensland

Project Summary

Escherichia (E.) coli O157:H7 has caused hundreds of outbreaks in the United States and United Kingdom. Although not currently a major problem in Australia, the emergence of E. coli O157:H7 here would have serious implications for our meat and livestock industry. This study will provide important information for the selection of vaccine antigens used to prevent the colonisation of cattle with E. coli O157:H7 and other diarrhoeagenic E. coli serotypes. A direct outcome of this will be improved human health, as E. coli O157:H7 can cause life threatening infections in humans. The study will also examine the contribution of specific adhesins to biofilm formation; measures to prevent biofilm formation may reduce the persistence and spread of E. coli O157:H7 in the environment.

Summary of Discovery Projects Proposals for Funding to Commence in 2010

DP1094749 Dr PM Schenk; A/Prof JM Vivanco; Dr CD Town; Prof KH Nealson

Approved Project Title **Simultaneous analysis of root-derived plant defences and the associated microbiome**

2010 : \$ 165,000

2011 : \$ 165,000

2012 : \$ 165,000

Primary RFCD 2702 GENETICS

Administering Organisation The University of Queensland

Project Summary

Australia is dependent on sustainable agricultural yields, which need to be maintained or improved. This production capacity is currently under threat by new and existing diseases which are predicted to worsen with climate change. This project will provide a global picture of how disease resistance and soil microbial communities are causally linked, and provide new strategies for disease control. In doing so, it will develop intellectual property (IP) and infrastructure that can be used in soil health management. This will provide many benefits to Australia, including sustainable agriculture in the context of climate variability and an increased demand for food, biomaterials and biofuels.

DP1094678 Dr HT Shen

Approved Project Title **Spotting Near-duplicate Sequences from Online Databases, Streams and Communities**

2010 : \$ 100,000

2011 : \$ 100,000

2012 : \$ 100,000

Primary RFCD 2801 INFORMATION SYSTEMS

Administering Organisation The University of Queensland

Project Summary

This project studies a very important problem which has significant research and economy value. Advances in this project will reshape the landscape of media, commercial and legal service industries. Success of this project will not only establish us as an internationally leading research group but also bring significant economic and social benefits. Australia organizations with media assets will be benefited by saving enormous cost, improving service quality, protecting their intelligence properties, etc. It will also advance Australia's intellectual leadership in copyright compliance and benefit commercialization of research results.

DP1093592 Dr SR Shouldice; Prof JL Martin; Dr A Chacinska

Approved Project Title **The MIA mitochondrial import pathway: structure and function**

2010 : \$ 95,000

2011 : \$ 95,000

2012 : \$ 95,000

Primary RFCD 2701 BIOCHEMISTRY AND CELL BIOLOGY

APD Dr SR Shouldice

Administering Organisation The University of Queensland

Project Summary

Our aging population is increasingly susceptible to mitochondrial disease and Australia is vulnerable to the associated economic and social burden. This research will benefit Australia by contributing to a knowledge-based economy; identifying new pathways that can be targeted for therapeutic intervention; developing smarter and faster hybrid approaches that strengthen Australia's basic and strategic research capability; and forging new international links. In the future, this research will lead to new collaborations between academia and industry and the discovery of potential new drugs that would benefit the health of Australians, benefit the economy of our healthcare system and provide potential economic benefits through royalty streams.

Summary of Discovery Projects Proposals for Funding to Commence in 2010

DP1095906 Prof SC Smith; Dr H Zhang; Prof W Thiel

Approved Project Title **Function, Mechanism and Dynamics in Fluorescent Proteins: a Computational Investigation**

2010 : \$ 120,000

2011 : \$ 120,000

2012 : \$ 125,000

Primary RFCD 2506 THEORETICAL AND COMPUTATIONAL CHEMISTRY

Administering Organisation The University of Queensland

Project Summary

The rich reservoir of chromoproteins and fluorescent proteins in the ecosystem of the Great Barrier Reef offers Australia a unique natural advantage for the development of a niche biotechnology industry based on fluorescent markers for cellular biology and biomedical imaging. This project provides a crucial component of the science that is necessary for developing such an industry: a molecular-level knowledge of how these proteins function and how we can manipulate and enhance their properties as imaging agents. It will achieve fundamental advances in biomolecular modelling techniques, train graduates with exceedingly valuable skill sets as well as deriving knowledge that aids the development of Australia's biotech industries.

DP1094964 A/Prof RA Sturm; Prof JL Stow

Approved Project Title **Molecular, genetic and cellular analysis of melanisation in human pigmentation**

2010 : \$ 143,000

2011 : \$ 143,000

2012 : \$ 143,000

Primary RFCD 2701 BIOCHEMISTRY AND CELL BIOLOGY

Administering Organisation The University of Queensland

Project Summary

This investigation examines variations in the genes that determine human skin pigmentation and are likely to be associated with skin cancer risk. Our research program will form the basis of future diagnostics based on major genes that determine a person's skin type. Current skin cancer prevention strategies rely predominantly on broad spectrum campaigns that are aimed at increasing the general community awareness of the damaging effects of ultraviolet (UV) radiation. A better understanding of the genetic basis of UV-sensitive skin types will greatly enhance the targeting of such skin cancer-prevention campaigns, provide an understanding of changes that occur in skin pathology, and the mechanisms of sun induced tanning.

DP1093105 Dr S Takayama; Prof R Tourky

Approved Project Title **Information and market price manipulation in trade**

2010 : \$ 90,000

2011 : \$ 90,000

2012 : \$ 90,000

Primary RFCD 3401 ECONOMIC THEORY

APD Dr S Takayama

Administering Organisation The University of Queensland

Project Summary

As we can see from the financial crisis, speculative trading in financial markets can have real world effects. Inside traders can exploit their information for more profits. At this stage, we do not fully understand the role of diverse information in the financial system and we need better ways to model price manipulation and information in a dynamic setting. This proposal seeks to supply a reference framework for analyzing price manipulation. Recently, there has been an increasing interest in the informed trader's dynamic strategy. By strengthening this research area, this project will give new momentum to Australian economic theory.

Summary of Discovery Projects Proposals for Funding to Commence in 2010

DP1092829 Prof I Toth; Dr CR Engwerda; Dr P Simerska

Approved Project Title **Lipid and Carbohydrate Based Systems to Target and Deliver Peptide Drug Candidates to Specific Cells**

2010 : \$ 250,000

2011 : \$ 245,000

2012 : \$ 255,000

Primary RFCD 2503 ORGANIC CHEMISTRY

APD Dr P Simerska

Administering Organisation The University of Queensland

Project Summary

The demand for novel effective, orally available medicines to treat a wide range of diseases (cancer, pain - ageing Australian population) is increasing exponentially. Conjugation of peptide drug or vaccine candidates with lipids and/or sugars represents an important, novel strategy in the drug delivery and targeting field. Increasing the lipophilicity improves absorption through intestinal mucosal membranes. The carbohydrates increase the compound's aqueous solubility and can utilize active transport systems and can target the site required for its biological function. There is no limit to the areas of medicine and public health that would benefit from this revolutionary new technology.

DP1092887 Dr MM Turpin

Approved Project Title **Singing the Dreaming: exploring the relationship between language and music in Arandic song-poetry.**

2010 : \$ 100,200

2011 : \$ 102,000

2012 : \$ 109,000

Primary RFCD 3802 LINGUISTICS

APD Dr MM Turpin

Administering Organisation The University of Queensland

Project Summary

Positive interactions between non-Indigenous and Indigenous Australians are essential for our nation to grow. By assisting Arandic people maintain and promote their song-poetry, this project is a practical step towards reconciliation between Indigenous and non-Indigenous Australians. Furthermore, performances of Arandic song-poetry play a major role in Promoting and Maintaining Good Health. These health-giving practices not only benefit Indigenous people, but may also reduce national health expenditure. Wider appreciation of Arandic song-poetry may lead to more performance opportunities, resulting in increased economic independence for Indigenous people, and assist in forging a national musical culture of international significance.

DP1093175 Dr GW Tyson; Dr P Hugenholtz; Asst Prof MB Sullivan

Approved Project Title **The only constant is change: ecology and evolution of phage-host interactions in a model ecosystem**

2010 : \$ 160,000

2011 : \$ 140,000

2012 : \$ 150,000

2013 : \$ 150,000

2014 : \$ 150,000

Primary RFCD 2703 MICROBIOLOGY

QEII Dr GW Tyson

Administering Organisation The University of Queensland

Project Summary

Microorganisms underpin life on Earth, but our understanding of their diversity and activity is limited by our inability to grow most of them in the laboratory. Recently, new techniques have emerged that allow access to the genetic information of all microorganisms by directly sequencing DNA and RNA from the environment. In this research we will further develop these frontier technologies, promoting this new area of science in Australia. We will apply these techniques to microbial communities involved in wastewater treatment in order to understand the interactions between microorganisms and the viruses that infect them. Understanding this interaction will have important implications for optimising these treatment processes.

Summary of Discovery Projects Proposals for Funding to Commence in 2010

DP1095404 Dr G Vamvounis
Approved Project Title **Solution Processable, High Dimensional Dendrimers for Plastic Electronics**
2010 : \$ 140,000
2011 : \$ 120,000
2012 : \$ 120,000
2013 : \$ 110,000
2014 : \$ 110,000
Primary RFCD 2505 MACROMOLECULAR CHEMISTRY
ARF Dr G Vamvounis
Administering Organisation The University of Queensland

Project Summary

Microelectronics are present in our everyday life, from numerous chips in our vehicles to our mobile telephones; and the list is almost infinite. The electronics used today are limited to rigid surfaces, and are incompatible for the next generation of technology such as rollable displays and radio frequency identification cards. This proposal describes the development of a new class of high performance flexible electronic inks that could be used in the next generation of microelectronics. There is a huge commercial interest in these electronic ink materials and this market is projected to be \$7.7 billion by 2012. The proposed electronic inks address issues with current materials such as processability, performance and reproducibility.

DP1093968 Dr B van Swinderen
Approved Project Title **Presynaptic mechanisms of general anaesthesia in the fly brain**
2010 : \$ 145,000
2011 : \$ 135,000
2012 : \$ 135,000
Primary RFCD 3210 CLINICAL SCIENCES
Administering Organisation The University of Queensland

Project Summary

General anaesthesia is a routine procedure for both human and veterinary surgery and for any experimental paradigms requiring immobilization of animals. By abolishing consciousness, these drugs provide practitioners with an ideal way of manipulating subjects under conditions when responsiveness might be undesirable. Understanding how manipulating synaptic release mechanisms might modulate anaesthetic potency will be valuable for eventually being able to better control the anaesthetized state in human and animal subjects. By understanding general anaesthesia across multiple levels of brain function, we will at the same time be answering fundamental questions pertaining to mechanisms of perception and awareness.

DP1092513 Prof G Vidal; Dr IP McCulloch; Dr PR Corboz
Approved Project Title **Entanglement renormalization: a new route to strongly correlated fermions and novel states of matter in two dimensions**
2010 : \$ 130,000
2011 : \$ 130,000
2012 : \$ 130,000
Primary RFCD 2402 THEORETICAL AND CONDENSED MATTER PHYSICS
Administering Organisation The University of Queensland

Project Summary

The expected outcome of the research program is a significant boost in our understanding of strongly correlated fermion systems, which will reinforce Australia's competitiveness and international profile in aspects of breakthrough science and frontier technologies. By strengthening both the underpinning theory and innovative computational tools to study fermion systems, and by applying them to specific problems of recognized importance, this program will have direct implications in condensed matter physics and will exert significant influence in areas such as quantum chemistry, particle, nuclear and atomic physics, quantum computing, quantum atom optics and nanotechnology.

Summary of Discovery Projects Proposals for Funding to Commence in 2010

DP1095482 A/Prof GH Walter; Dr DT Booth; Dr LI Terry; Dr RB Roemer; Dr CJ Moore

Approved Project Title **Understanding responses of tightly coupled ecological interactions of biota vulnerable to climate change: endangered Australian cycads and their pollinators**

2010 : \$ 40,000
2011 : \$ 40,000
2012 : \$ 40,000

Primary RFCD 2707 ECOLOGY AND EVOLUTION

Administering Organisation The University of Queensland

Project Summary

Australian cycads are iconic plants. Most of the forty Macrozamia species have small, fragmented distributions and fifteen are endangered or vulnerable. They are at risk from harvesting by collectors and pollination failure, because a highly specialised relationship with insect pollinators is crucial to their persistence in nature. Cycads release chemo-attractants by increasing cone temperatures when ambient temperature reaches a threshold, so climate change will affect these systems. An understanding of this temperature-dependent relationship will help predict future fates of cycads and other tightly coupled ecological interactions. Our integrated approach will generate knowledge to help manage vulnerable Australian biodiversity.

DP1092846 Dr L Wang; Prof R Yoon

Approved Project Title **Control of Hydrophobic Interactions between Gas Bubbles in Water and Their Role in Gas Hydrate Formation and Dissociation**

2010 : \$ 44,000
2011 : \$ 89,000
2012 : \$ 51,000

Primary RFCD 2912 MARITIME ENGINEERING

Administering Organisation The University of Queensland

Project Summary

Methane is a powerful greenhouse gas, and its release in deep oceans and permafrost regions due to decomposition of methane hydrate, an ice-like crystalline, could potentially pose devastating threat to mankind. On the other hand, methane hydrate represents a vast energy potential to Australia and the remainder of the world. Understanding the mechanism of gas hydrate formation and dissociation is of fundamental importance to methane extraction and capture. This project employs state-of-the-art surface analytical tools to explore the mechanism of gas hydrate formation. The outcomes will strengthen Australia's leading role in scientific and technological development in this field.

DP1095889 Dr L Wang; Prof Dr J Ye

Approved Project Title **Designing New Visible-light Active Photocatalysts for Efficient CO2 Reduction**

2010 : \$ 165,000
2011 : \$ 145,000
2012 : \$ 140,000

Primary RFCD 2918 INTERDISCIPLINARY ENGINEERING

Administering Organisation The University of Queensland

Project Summary

The increasing concern over Climate Change has triggered great efforts in developing new CO2 capture technologies. The outcomes of this program will lead to a new class of photocatalysts that underpin the development of economical CO2 reduction for clean fuel production using sunlight. Such technologies will speed up the transition of Australian environmental and energy industries from fossil fuel economy to renewable energy economy. The research program will contribute significantly to knowledge advancement in nanomaterials, surface chemistry, and photochemistry, and falls in the National Research Priority Area of 'Environmentally Sustainable Australia' addressing the key goals of Climate Change and low emission energy supply.

Summary of Discovery Projects Proposals for Funding to Commence in 2010

DP1096950 Prof Dr MJ Waters; Dr HJ Schirra; Prof LK Nielsen

Approved Project Title **From genotype to phenotype - systems biology bridging the gap**

2010 : \$ 120,000
2011 : \$ 100,000
2012 : \$ 110,000

Primary RFCD 2701 BIOCHEMISTRY AND CELL BIOLOGY

Administering Organisation The University of Queensland

Project Summary

This project is basic research at the forefront of international science and deals with a fundamental question of modern biology: 'How do genes determine the makeup of an organism?' The main outcome will be a deeper understanding of the internal working mechanisms of a higher organism. The project combines some of the most advanced systems technologies - genomics, proteomics, metabonomics, fluxomics and computational biology in a novel and unique way. This combination is in itself a major advancement of scientific methods that will accelerate discovery in the field of systems biology. In this respect, the project is a premier example of the priority goal Breakthrough Science and of the national research priority Frontier Technologies.

DP1092569 Prof GL Whitlock

Approved Project Title **Inhumanities: Asylum seeker letters and the precarious 'human' rights of contemporary life narrative**

2010 : \$ 103,000
2011 : \$ 103,000
2012 : \$ 108,000
2013 : \$ 102,000
2014 : \$ 102,000

Primary RFCD 4203 CULTURAL STUDIES

APF Prof GL Whitlock

Administering Organisation The University of Queensland

Project Summary

Letters exchanged between asylum seekers and activists between 2001-05 are a powerful repository of cross cultural exchange and political activism in Australia this century, and they offer unique insights into debates about citizenship and national identity in the very recent past. When read as a distinctive genre of life narrative, these letters and the epistolary communities which they engender are important new resources in current scholarship on human rights and testimony. This project will make a vital and distinctive Australian contribution to debates about representations of the human and the inhuman in contemporary literature.

DP1094589 Dr RL Wickes; Dr RP McCrea

Approved Project Title **Examining the impact of employment on social relationships in urban communities**

2010 : \$ 165,000
2011 : \$ 165,000
2012 : \$ 89,000

Primary RFCD 3701 SOCIOLOGY

APD Dr RP McCrea

Administering Organisation The University of Queensland

Project Summary

Intra-community relationships are associated with positive health outcomes for communities and residents by increasing social support, promoting engagement and encouraging community belonging. Community health outcomes are also linked to community socio-economic disadvantage suggesting that strengthened community relationships can potentially reduce socio-economic disparities in health. However, first an understanding of the complex effects of employment on forming and sustaining community relationships is needed. This research will provide policy makers with evidence to better balance and address objectives of increasing employment, strengthening community and improving health by taking into account their interdependencies.

Summary of Discovery Projects Proposals for Funding to Commence in 2010

DP1094464 Dr MR Woolfit; Dr EA McGraw; Prof SL O'Neill; Dr I Iturbe-Ormaetxe; Prof M Turelli

Approved Project Title **The genomics of adaptation in Wolbachia pipientis, an emerging biocontrol agent**

2010 : \$ 160,000
2011 : \$ 140,000
2012 : \$ 140,000

Primary RFCD 2702 GENETICS

Administering Organisation The University of Queensland

Project Summary

Australians are increasingly exposed to insect-transmitted diseases such as dengue fever. Novel biocontrol methods using the bacterium Wolbachia aim to control insect populations to reduce disease transmission. Our research will be the first to investigate genomic variation and the process of adaptation to new insect hosts in Wolbachia. The novel data and understanding of evolutionary processes we generate will be critical for screening bacterial biocontrol candidates and designing biocontrol release strategies. It will also strengthen the position of Australian research as a world-leader in the fusion of post-genomics and applied microbiology.

DP1096121 Dr X Yao; Dr C Yu

Approved Project Title **Practical Hydrogen Storage for Fuel Cells Electrical Vehicles by Confined Ammonia Borane System**

2010 : \$ 125,000
2011 : \$ 120,000
2012 : \$ 115,000

Primary RFCD 2918 INTERDISCIPLINARY ENGINEERING

Administering Organisation The University of Queensland

Project Summary

Practical hydrogen storage is critical to make the hydrogen economy a reality, in particular for fuel cells electrical vehicles (FCVE). However, currently there is no approach to satisfy the requirements of hydrogen storage for FCVE, e.g. fulfill the US Department of Energy target for practical hydrogen storage. This project is proposed to develop a new strategy to achieve the goal of practical hydrogen storage which, if successful, will make FCVE possible in Australia in the near future. It will also be beneficial for reducing the dependence on exported oil and possibly solving critical environmental issues, and thus benefits the Australian economy.

DP1095433 Prof MP Zalucki; Dr BW Cribb; Dr JS Hanan; Dr PB Brewer

Approved Project Title **To move or not to move: are insect movement strategies driven by plant-induced defences?**

2010 : \$ 242,000
2011 : \$ 238,000
2012 : \$ 240,000

Primary RFCD 2705 ZOOLOGY

Administering Organisation The University of Queensland

Project Summary

Plants change chemically when damaged by insects. By showing how movement and feeding is related to these induced defences we can manipulate plant defences to resist insect attack in a more focused way. Our target insects are major pests against which we use large amounts of insecticide. Our research will decrease insect damage to crops using existing genetic machinery of plants as opposed to inserting 'novel' toxin-expressing genes. This project builds on Australia's strong record of achievement in agricultural and natural resource research by increasing understanding of the interplay between plant traits and insects. We will build cross-disciplinary research capacity training a new generation of biologists in an exciting area of science.

Summary of Discovery Projects Proposals for Funding to Commence in 2010

DP1095545 A/Prof M Zhang; Hon Prof PM Kelly; Dr D Qiu; Dr MP Moody; Prof T Furuwara

Approved Project Title **A Unified Crystallographic Theory of Phase Transformations in Solids**

2010 : \$ 155,000
2011 : \$ 165,000
2012 : \$ 160,000
2013 : \$ 160,000
2014 : \$ 120,000

Primary RFCD 2913 METALLURGY

ARF Dr D Qiu

Administering Organisation The University of Queensland

Project Summary

Phase transformations control the microstructures that govern the properties of metallic materials. The unified crystallographic theory to be developed will improve the understanding of phase transformation and then enhance the ability to produce high performance metals and alloys. This is particularly important in the automotive and aeronautical industries, as these sectors seek increasing fuel efficiency through weight reduction. The new scientific knowledge generated will significantly impact and contribute to the fields of physical metallurgy and materials science. Furthermore, the research will also strengthen Australia's international leading position in the fields because it is based on the theories developed in Australia.

DP1095737 A/Prof M Zhang; Dr MA Easton; Dr D Qiu; A/Prof JA Taylor; Dr X Xiong

Approved Project Title **A Novel Approach to Grain Refinement of Cast Metals**

2010 : \$ 95,000
2011 : \$ 100,000
2012 : \$ 95,000

Primary RFCD 2914 MATERIALS ENGINEERING

Administering Organisation The University of Queensland

Project Summary

This proposal combines fundamental scientific studies with applied engineering research. The outcomes will offer materials scientists and engineers with a totally new way to understand the grain refinement of cast metals. The new scientific knowledge generated will put Australia at the absolute forefront of the field and maintain our internationally leading position. The new grain refiners and the relevant master alloys to be developed will have strong potential to be commercialized to produce cast metals with much improved properties and performance. This will not only increase Australian competitive ability in the international market, but will also make considerable economic benefits.

DP1095089 Mr W Zhou

Approved Project Title **Novel cathode materials for low-temperature solid-oxide fuel cells**

2010 : \$ 90,000
2011 : \$ 90,000
2012 : \$ 95,000

Primary RFCD 2918 INTERDISCIPLINARY ENGINEERING

APD Mr W Zhou

Administering Organisation The University of Queensland

Project Summary

This project will produce novel mixed ionic and electronic conducting cathodes to reduce the operating temperature of solid-oxide fuel cells (SOFC). The technology developed is of ultimate benefit to the Australian electricity consumer. It can accelerate the development of low-cost SOFCs that can serve in distributed power generation. The benefits include increased reliability of the power supply and substantive cost savings through increased efficiency of the conversion of gas to electricity. Depending on the level of market penetration, the broad deployment of SOFCs can save well over \$100 million/year for the Australian consumer. The environmentally friendly technologies will also be beneficial for reducing pollution and greenhouse gases in Australia.

Summary of Discovery Projects Proposals for Funding to Commence in 2010

DP1096948 Prof J Zhu; Prof Y Wang; Prof Y Bin

Approved Project Title **Transport Processes in Flexible Porous Materials for Gas Separation and Storage**

2010 : \$ 145,000

2011 : \$ 145,000

2012 : \$ 130,000

Primary RFCD 2906 CHEMICAL ENGINEERING

Administering Organisation The University of Queensland

Project Summary

This project seeks to understand the mechanisms of transport processes in flexible porous materials, which have great potential in gas separation and storage. Coal and natural gas are important to the Australian economy, and the potential applications of flexible porous materials, such as air separation and hydrogen storage, are crucial for Australia to use coal and natural gas cleanly. The analysis method to be developed is useful not only to gas separation and storage, but also to hydrogeology and soil science in Australia.