Number of Successful Discovery Early Career Researcher Award Proposals for Funding Commencing in 2015 by State and Organisation

New South Wales

Australian Catholic University	1
Macquarie University	5
Southern Cross University	2
The University of New South Wales	23
The University of Newcastle	2
The University of Sydney	14
University of Technology, Sydney	4
University of Western Sydney	4
University of Wollongong	5
Total for New South Wales	**60**

Victoria

Deakin University	4
La Trobe University	5
Monash University	13
RMIT University	4
Swinburne University of Technology	4
The University of Melbourne	20
Total for Victoria	**50**

Queensland

Griffith University	1
James Cook University	1
Queensland University of Technology	5
The University of Queensland	23
Total for Queensland	**30**

South Australia

The Flinders University of South Australia	3
The University of Adelaide	10
University of South Australia	3
Total for South Australia	**16**

Western Australia

Curtin University of Technology	2
Murdoch University	2
The University of Western Australia	10
Total for Western Australia	**14**

Tasmania

University of Tasmania	5

Number of Successful Discovery Early Career Researcher Award Proposals for Funding Commencing in 2015 by State and Organisation

Total for Tasmania **5**

Australian Capital Territory

Commonwealth Scientific and Industrial Research Organisation	1
The Australian National University	23
University of Canberra	1
Total for Australian Capital Territory	**25**

Total Number of Grants **200**

Summary of Successful Discovery Early Career Researcher Award Proposals for Funding Commencing in 2015 by State and Organisation

New South Wales

Australian Catholic University

DE150100269   Geiger, A/Prof Vince S

2015	$118,942.00
2016	$121,467.00
2017	$121,467.00
Total	**$361,876.00**

Primary FoR   1302   CURRICULUM AND PEDAGOGY

Funded Participants:

DECRA   A/Prof Vince S Geiger

Administering Organisation   Australian Catholic University

Project Summary

Numeracy has been a national education priority for more than a decade, yet there appears to be little progress in students' numeracy performance. A lack of numeracy skills leads to devastating social and economic outcomes for individuals. This project aims to improve students' numeracy capabilities through: attention to the design of tasks intended to enhance numeracy learning across the curriculum; and the refinement of teaching practices with a view to improving student performance on both standardised numeracy tests and more realistic, contextualised tasks. The project aims to generate new theoretical and practical insights into effective numeracy education across the school curriculum.

Summary of Successful Discovery Early Career Researcher Award Proposals for Funding Commencing in 2015 by State and Organisation

Macquarie University

DE150100510   Giuliani, Dr Andrea

2015	$124,000.00
2016	$124,000.00
2017	$124,000.00
Total	**$372,000.00**

Primary FoR   0403   GEOLOGY

Funded Participants:

DECRA   Dr Andrea Giuliani

Administering Organisation   Macquarie University

Project Summary

Kimberlite magmas are very rich in volatiles (for example carbon dioxide and water); they are the major host of diamonds and provide the deepest samples from Earth's mantle. The primary compositions of these melts can provide unique information on the nature of the deep mantle. However, kimberlite melts mix and react with wall rocks on the way up, obscuring their primary composition. To see through these secondary processes, the project aims to use a novel approach integrating the study of melt inclusions in magmatic minerals with analysis of radiogenic and stable isotopes, and investigating reactions between kimberlite magmas and wall-rock fragments. The project aims to provide new understanding of the constraints on melting processes and recycling of crustal material in the deep mantle.

DE150100396   Harris, Dr Celia B

2015	$114,000.00
2016	$114,000.00
2017	$114,000.00
Total	**$342,000.00**

Primary FoR   1701   PSYCHOLOGY

Funded Participants:

DECRA   Dr Celia B Harris

Administering Organisation   Macquarie University

Project Summary

Older couples remember more together than apart, but little is known about mechanisms underlying such collaborative benefits. Collaborative remembering may have therapeutic value in age-related cognitive decline and dementia, providing cost-effective, readily-available memory support. However there are several 'active ingredients' that may underlie collaborative benefits and not all of these will be equally effective or translatable into therapy. This project aims to identify and evaluate these active ingredients, teasing apart 'what', 'who' and 'how'. Testing younger and older couples, healthy and in early stages of decline, this project aims to generate new knowledge and provide a basis for future therapies utilising collaborative remembering.

Summary of Successful Discovery Early Career Researcher Award Proposals
for Funding Commencing in 2015 by State and Organisation

DE150101092   Nguyen, Dr Diep

2015	$107,000.00
2016	$107,000.00
2017	$107,000.00
Total	**$321,000.00**

Primary FoR   0805   DISTRIBUTED COMPUTING

Funded Participants:

DECRA   Dr Diep Nguyen

Administering Organisation   Macquarie University

Project Summary

Demand on wireless traffic is estimated to increase more than one thousand-fold in the next 10 years. As existing networks are quickly becoming overloaded, this project aims to improve radio spectrum utilisation by harvesting temporarily unused spectrum holes to accommodate future traffic. The proposed spectrum harvesting system is cost-effective as it will rely on a software that runs on users' devices to sense and report spectrum holes to mobile service providers. An unprecedented communications framework that incentivises both users and service providers to harvest and trade/share radio spectrum holes will be developed. It will reduce the costs of the radio spectrum, allowing cheaper and better mobile data services for the Australian public.

DE150100318   Proctor, Dr Michael I

2015	$120,000.00
2016	$120,000.00
2017	$120,000.00
Total	**$360,000.00**

Primary FoR   1702   COGNITIVE SCIENCES

Funded Participants:

DECRA   Dr Michael I Proctor

Administering Organisation   Macquarie University

Project Summary

Speech sounds that fall into the 'l' and 'r' family of consonants ('liquids') are amongst the most difficult to master, both for children learning their first language and for learners of a second. This is because liquids are highly complex and require finely tuned, and language specific, coordination of articulatory gestures. The details of this complexity remain poorly understood, posing significant challenges for remediation of speech errors and for effective pedagogy in language learning. This project aims to use state-of-the-art articulatory methods to examine liquids in four typologically distinct languages of increasing importance in modern Australian society to lay essential foundations for future work on remediation and instruction.

DE150100009   Tetu, Dr Sasha G

2015	$124,512.00
2016	$132,512.00
2017	$132,452.00
Total	**$389,476.00**

Primary FoR   0605   MICROBIOLOGY

Funded Participants:

DECRA   Dr Sasha G Tetu

Administering Organisation   Macquarie University

Project Summary

Environmental pollution threatens the sustainability of the world's oceans. However, we still do not understand how pollution affects primary producers at the base of oceanic food chains. This project aims to provide the first account of how common chemical pollutants (herbicides, plastic leachates and crude oil) affect key groups of marine photosynthetic bacteria. As these microbes underpin entire marine food webs, understanding their responses is crucial to monitoring and mitigating the impact of pollutants on ocean ecosystems. The aim is to design and validate novel, rapid environmental stress assays, based on gene expression profiling. This represents a pioneering new application of gene monitoring techniques to ocean conservation.

Southern Cross University

DE150100581   Maher, Dr Damien T

2015	$130,000.00
2016	$120,000.00
2017	$110,000.00
Total	**$360,000.00**

Primary FoR   0402   GEOCHEMISTRY

Funded Participants:

DECRA   Dr Damien T Maher

Administering Organisation   Southern Cross University

Project Summary

The aquatic and terrestrial carbon cycles are intrinsically linked with changes in terrestrial carbon dynamics altering the aquatic carbon cycle. However, the main methodology employed to assess land-atmosphere carbon dioxide fluxes fails to account for carbon losses through subsurface lateral exports of carbon via groundwater. This project aims to resolve the importance and drivers of this pathway, along with the ultimate fate of the carbon once it reaches the aquatic environment. This project aims to contribute to closing a significant gap in our understanding of terrestrial-aquatic carbon cycling and will quantify a potentially important yet poorly understood component of regional and global carbon budgets.

DE150101477   Wang, Dr Zhaohui

2015	$124,000.00
2016	$118,000.00
2017	$118,000.00
Total	**$360,000.00**

Primary FoR   0402   GEOCHEMISTRY

Funded Participants:

DECRA   Dr Zhaohui Wang

Administering Organisation   Southern Cross University

Project Summary

Natural volatile organohalogens have recently been linked to significant atmospheric ozone depletion. The fundamental reactions controlling their emission and fate are unresolved within the international scientific literature. This project aims to use novel geochemical techniques to determine the role of ultraviolet radiation in organohalogen emissions from degraded saline and acidic landscapes. The expected outcome will shift our understanding of natural volatile organohalogens and predictions of stratospheric ozone recovery. The project also aims to systematically resolve the feedback between elevated ultraviolet radiation and ozone layer depletion, and is therefore highly innovative.

Summary of Successful Discovery Early Career Researcher Award Proposals for Funding Commencing in 2015 by State and Organisation

The University of New South Wales

DE150100563   Chang, Dr Lijun

2015	$124,000.00
2016	$124,000.00
2017	$124,000.00
Total	**$372,000.00**

Primary FoR   0806   INFORMATION SYSTEMS

Funded Participants:

DECRA   Dr Lijun Chang

Administering Organisation   The University of New South Wales

Project Summary

Cohesive-subgraph searching is highly demanded by many applications that deal with large graphs, such as community searching, social marketing, crime detection, and collaborative tagging systems. This project aims to develop effective and efficient techniques to search cohesive subgraphs of particular interest to end-users that are defined by a set of query vertices or a set of query labels (keywords). This project aims to develop, analyse, implement, and evaluate novel indexing and query processing techniques to effectively and efficiently support a set of primitive cohesive-subgraph search queries. The project aims to provide technological breakthroughs and be beneficial for both science and society in Australia.

DE150100456   Donat, Dr Markus G

2015	$121,512.00
2016	$121,512.00
2017	$124,512.00
Total	**$367,536.00**

Primary FoR   0401   ATMOSPHERIC SCIENCES

Funded Participants:

DECRA   Dr Markus G Donat

Administering Organisation   The University of New South Wales

Project Summary

The occurrence of extreme temperature and precipitation events undergoes substantial seasonal to decadal variability, but little is known about their predictability. This project aims to examine variability and predictability of these climatic extremes and associated mechanisms. It will be the first to systematically investigate sources of predictability by incorporating the most comprehensive novel databases of both multi-model decadal climate simulations and observed climate extremes. This study is significant as it will lead to a vastly improved understanding of variability and predictability of climate extremes. This will enable improved climate predictions on seasonal to decadal timescales and ultimately improve longer-term projections.

DE150100667   Griffiths, Dr Oren

2015	$111,000.00
2016	$104,000.00
2017	$113,000.00
Total	**$328,000.00**

Primary FoR	1701	PSYCHOLOGY

Funded Participants:

DECRA	Dr Oren Griffiths

Administering Organisation   The University of New South Wales

Project Summary

As Donald Rumsfeld noted, there are 'known unknowns¶. That is to say, people are seemingly capable of learning that some things cannot be reliably predicted. This learning underpins decisions from the trivial (whether to pack a jacket) to the life-defining (whom to marry). An aberrant form of this learning may also underlie mental health disorders. Yet the mechanisms of such learning have been largely overlooked by cognitive scientists and thus are poorly understood. The project, which is based on significant pilot data, aims to examine when and how people learn about unpredictability, and what the cognitive, memorial, neural and affective consequences of this learning are.

DE150100268   Hameiri, Dr Ziv

2015	$115,000.00
2016	$115,000.00
2017	$110,000.00
Total	**$340,000.00**

Primary FoR	0906	ELECTRICAL AND ELECTRONIC ENGINEERING

Funded Participants:

DECRA	Dr Ziv Hameiri

Administering Organisation   The University of New South Wales

Project Summary

Photovoltaic (PV) solar cells are too expensive to become a viable solution for the challenges facing humanity. Increasing solar cell efficiency can reduce the cost of PV-generated power. Improved efficiency requires the ability to identify and quantify loss mechanisms, many of which are recombination related. Thus, innovative analysis methods need to be developed to facilitate improved understanding and identification of various loss mechanisms. The project aims to investigate recombination processes that deteriorate solar cells performance, using a novel measurement system in combination with advanced simulation tools. The project aims to assist with development of advanced processes to improve device performance.

DE150100019   Hart-Smith, Dr Gene O

2015	$124,000.00
2016	$124,000.00
2017	$104,000.00
Total	**$352,000.00**

Primary FoR   0601   BIOCHEMISTRY AND CELL BIOLOGY

Funded Participants:

DECRA   Dr Gene O Hart-Smith

Administering Organisation   The University of New South Wales

Project Summary

The systems-level analysis of protein-protein interaction networks is a vital new framework for exploring protein complex formation. However key studies into the dynamics of these networks are being precluded by a lack of broad-scale data on interactions mediated by post-translational modifications, which are known regulators of protein-protein interactions. To solve this problem, this project aims to conduct an organism-wide survey of interactions mediated by an important class of post-translational modification, methylation, using an innovative mass spectrometry-based workflow. This project aims to produce fundamental new insights into the mechanisms underlying protein-protein interaction network dynamics, and into how protein complexes are formed.

DE150100750   Hinterstein, Dr Jan M

2015	$105,000.00
2016	$105,000.00
2017	$105,000.00
Total	**$315,000.00**

Primary FoR   0912   MATERIALS ENGINEERING

Funded Participants:

DECRA   Dr Jan M Hinterstein

Administering Organisation   The University of New South Wales

Project Summary

Legislation against the use of lead initiated a search for lead-free piezoelectric ceramics. This project aims to derive guidelines for the development and implementation of this new class of materials. This project will utilise an analysis technique that allows elucidation of the origin of the high strain in piezoelectric materials. A separate analysis of the three known strain mechanisms in materials with coexisting phases will innovatively correlate theory and macroscopic observation with processes on the atomic scale. The quantification of the contribution of each mechanism will lead to new insights into the enhancement of sustainable functional materials.

DE150101478   Holmes, Dr Nathan M

2015	$119,000.00
2016	$124,000.00
2017	$123,000.00
Total	**$366,000.00**

Primary FoR   1701   PSYCHOLOGY

Funded Participants:

DECRA   Dr Nathan M Holmes

Administering Organisation   The University of New South Wales

Project Summary

People who suffer from anxiety disorders essentially treat the world as a dangerous place. They exhibit exaggerated fear responses to trauma or phobia-related cues. Little is known, however, about how they process innocuous cues or information encountered in the course of everyday experience. Recent evidence shows that a state of fear shifts the processing of innocuous information from cortical to subcortical brain regions in the rat. This project originates in these novel findings and aims to identify what this cortical-to-subcortical shift means for processing of innocuous information and whether it can be reversed by treatments that eliminate fear. The project aims to shed light on how fear regulates information processing in anxiety disorders.

DE150100895   Humphery-Jenner, Dr Mark

2015	$122,000.00
2016	$123,000.00
2017	$124,000.00
Total	**$369,000.00**

Primary FoR   1502   BANKING, FINANCE AND INVESTMENT

Funded Participants:

DECRA   Dr Mark Humphery-Jenner

Administering Organisation   The University of New South Wales

Project Summary

This project aims to analyse the benefits and costs of appointing overconfident individuals as Chief Executive Officers (CEOs), their subsequent impact on corporate performance and litigation-risk, and how this CEO overconfidence may be harnessed through appropriate regulation and incentive-based contracts. The project will examine the circumstances in which firms appoint overconfident individuals as CEOs and how such individuals may affect firm performance, including takeover performance and litigation risk. The project aims to analyse whether regulations, such as the Sarbanes-Oxley Act, can help to harness CEO overconfidence. Additionally, it will assess the optimal way to compensate overconfident CEOs to maximise firm value.

DE150100670   Jane, Dr Emma A

2015	$123,971.00
2016	$124,041.00
2017	$124,083.00
Total	**$372,095.00**

Primary FoR   2001   COMMUNICATION AND MEDIA STUDIES

Funded Participants:

DECRA   Dr Emma A Jane

Administering Organisation   The University of New South Wales

Project Summary

This project aims to investigate the threat posed to online participation and digital citizenship by the recent, marked increase in rape threats and sexualised vitriol directed at women online. While hostile discourse on social media platforms and the internet has been studied by cyberbullying researchers to determine its impact on youth, there is little scholarship on its effect on women and on adult targets. This project will map the emergent phenomenon of gendered cyberhate using approaches from the new field of internet historiography. It will make a major contribution to the study of digital citizenship and fill a significant research gap in understanding the nature and impact of hate speech online.

DE150100752   Karuturi, Dr Siva Krishna

2015	$120,000.00
2016	$120,000.00
2017	$120,000.00
Total	**$360,000.00**

Primary FoR   1007   NANOTECHNOLOGY

Funded Participants:

DECRA   Dr Siva Krishna Karuturi

Administering Organisation   The University of New South Wales

Project Summary

Hematite (iron oxide) is a promising electrode material for photoelectrochemical hydrogen generation from water. It has low cost, good long-term stability and absorbs light efficiently. However, its use is limited by its poor electrical conductivity. This project aims to develop a novel host-guest nanostructure that exploits the beneficial light-absorption properties of hematite (the guest) but shifts the charge transport function to a nanostructured transparent conductive oxide host. The project aims to produce nanostructured hematite electrodes for efficient hydrogen production from water and sunlight, thus making a significant contribution to the goal of commercially-viable storage of solar energy in the form of hydrogen.

Summary of Successful Discovery Early Career Researcher Award Proposals
for Funding Commencing in 2015 by State and Organisation

DE150100500   Li, Dr Xiaomin

2015	$108,000.00
2016	$107,000.00
2017	$106,000.00
Total	**$321,000.00**

Primary FoR   0402   GEOCHEMISTRY

Funded Participants:

DECRA   Dr Xiaomin Li

Administering Organisation   The University of New South Wales

Project Summary

This project aims to develop the kinetic (both in vivo and in vitro) and thermodynamic models of the extracellular electron transfer processes at the microbe-mineral interface via outer membrane cytochromes and exudates of dissimilatory iron-reducing bacteria, and elucidating the potential electron transfer process from iron-reducing bacteria to semiconducting iron minerals. The observed models will provide a more comprehensive understanding of electron transfer reactions at the microbe-mineral interface, which will be helpful in the prediction of natural redox processes of iron transformation and in the development of bioremediation strategies for contaminated sites.

DE150101518   Lu, Dr Hongxu

2015	$115,000.00
2016	$115,000.00
2017	$115,000.00
Total	**$345,000.00**

Primary FoR   1007   NANOTECHNOLOGY

Funded Participants:

DECRA   Dr Hongxu Lu

Administering Organisation   The University of New South Wales

Project Summary

The mechanisms underlying cell-nanoparticle interactions remain largely unknown. It has hampered the design and development of innovative nano devices to be used for drug delivery, biomarkers and diagnostics. This project aims to explore the influences of cell size, density, geometry, intercellular communication and substrate properties on cell-nanoparticle interactions. A micropatterning technology is applied to precisely control cell behaviour and provide a novel in vitro cellular model for nanoparticle studies. This project aims to significantly improve the understanding of cell-nanoparticle interactions to provide new insight into nanoparticle design and improve the efficacy of nano devices.

DE150100107   Menviel, Dr Laurie

2015	$124,512.00
2016	$122,512.00
2017	$122,512.00
Total	**$369,536.00**

Primary FoR   0406   PHYSICAL GEOGRAPHY AND ENVIRONMENTAL GEOSCIENCE

Funded Participants:

DECRA   Dr Laurie Menviel

Administering Organisation   The University of New South Wales

Project Summary

In the past 50 000 years there were several episodes of abrupt climate change during which atmospheric carbon dioxide rose significantly. This project aims to determine the causes of past abrupt changes in atmospheric carbon dioxide. The project is significant because understanding changes in the global carbon cycle is essential to estimate future climate trajectories. Innovatively, it will highlight the relationship between Southern Hemisphere water masses and the marine carbon cycle during abrupt climate change. The expected outcomes include a better understanding of the interplay between Southern Ocean processes and the carbon cycle.

DE150100329   Nanquette, Dr Laetitia

2015	$112,604.00
2016	$108,397.00
2017	$110,719.00
Total	**$331,720.00**

Primary FoR   2005   LITERARY STUDIES

Funded Participants:

DECRA   Dr Laetitia Nanquette

Administering Organisation   The University of New South Wales

Project Summary

This project will be the first comparative study examining Iranian literatures and their circulation on a global scale, in Iran and in the Iranian diaspora in Australia, the United States of America and Western Europe. It aims to explore how literature circulates in a globalised world and how national and global literary practices are connected. The Iranian example is significant as a case study of a rich culture affected by political change, decentralisation and diasporic spread.

DE150101351   Saffidine, Dr Abdallah

2015	$105,000.00
2016	$105,000.00
2017	$105,000.00
Total	**$315,000.00**

Primary FoR   0801   ARTIFICIAL INTELLIGENCE AND IMAGE PROCESSING

Funded Participants:

DECRA   Dr Abdallah Saffidine

Administering Organisation   The University of New South Wales

Project Summary

Constructing rational agents for general dynamic decision problems is a long-standing open Artificial Intelligence challenge. An important milestone is to construct artificial agents that can learn and play new games well (universal playing agents). Specialised artificial intelligence systems are increasingly successful in domains such as Chess, Go, and Poker. The project aims to develop the theoretical and practical foundations of universal playing agents through a mathematical study of algorithms and heuristics for specific games. This project aims to significantly bridge the gap from efficient specialised players to high performance rational agents.

DE150100223   Spence, Dr J. Paul P

2015	$118,858.00
2016	$119,308.00
2017	$118,858.00
Total	**$357,024.00**

Primary FoR   0405   OCEANOGRAPHY

Funded Participants:

DECRA   Dr J. Paul P Spence

Administering Organisation   The University of New South Wales

Project Summary

Changes in the Southern Ocean abyssal circulation are linked with dramatic climate events, yet the associated dynamics are poorly understood. This project aims to determine the fundamental dynamic processes driving abyssal flows, and diagnose impacts of recent and projected climate change. The project also aims to bridge the large gap between conceptual and observational understanding of this vital limb of the ocean's overturning circulation. A significant innovation is that it will be the first study of the Southern Ocean abyss using realistic global-scale models capable of simulating all the key dynamic processes. Results will guide Southern Ocean observation programs, explain observed changes, and reduce uncertainties in climate projections.

DE150100738   Tang, Dr Chunguang

2015	$120,000.00
2016	$124,000.00
2017	$124,000.00
Total	**$368,000.00**

Primary FoR	0912	MATERIALS ENGINEERING

Funded Participants:

DECRA   Dr Chunguang Tang

Administering Organisation   The University of New South Wales

Project Summary

Bulk metallic glasses are a new class of superior, high-performance structural material exhibiting ultra-high strength and high corrosion and wear resistance. However, they suffer from poor ductility and the inability to strain harden, which restricts their range of applications. A recent novel approach of embedding ductile shape-memory-alloy particles into the glassy matrix is a promising way to improve ductility. The project aims to identify the optimal structures of these particles and the corresponding process for improving the properties of copper-zirconium based metallic glasses. This project is expected to create ductile metallic glass composites attractive for engineering, medical, sporting, and military applications.

DE150100553   Wake, Dr Caroline

2015	$121,405.00
2016	$106,837.00
2017	$99,607.00
Total	**$327,849.00**

Primary FoR	1904	PERFORMING ARTS AND CREATIVE WRITING

Funded Participants:

DECRA   Dr Caroline Wake

Administering Organisation   The University of New South Wales

Project Summary

This project aims to analyse the Performance Space archive as a microcosm of how contemporary performance practices have evolved over the past thirty years. In doing so, it will argue that this rare national resource can contribute to wider global debates about the changing relationship between theatre, performance and live art. The project aims to produce data for existing infrastructures such as AusStage as well as a public symposium, an edited book addressed to a wide audience, and a series of journal articles and monographs for the scholarly community.

DE150100576   Whalan, Dr Jeni

2015	$121,000.00
2016	$115,000.00
2017	$110,000.00
Total	**$346,000.00**

Primary FoR	1606	POLITICAL SCIENCE

Funded Participants:

DECRA   Dr Jeni Whalan

Administering Organisation   The University of New South Wales

Project Summary

This project aims to examine an enduring question for peacekeeping: should United Nations peacekeepers take sides between conflict parties, or should they remain impartial brokers that assist combatants to find their own peace settlement? Detailed comparison of six decades of peacekeeping will advance both the theory and practice of peacekeeping by understanding and explaining a striking gap between the long-standing principle of impartiality and the frequent, controversial practice of taking sides. By conducting the first systematic study of partiality in peacekeeping and evaluating the effectiveness of this practice, the project aims to contribute new data, theoretical tools and policy proposals for building international peace and stability.

DE150100862   Wilson, Dr Laura A

2015	$122,665.00
2016	$115,000.00
2017	$100,445.00
Total	**$338,110.00**

Primary FoR	0403	GEOLOGY

Funded Participants:

DECRA   Dr Laura A Wilson

Administering Organisation   The University of New South Wales

Project Summary

Why are some groups of marsupials more morphologically diverse than others? The patterns and processes occurring over development shape adult variability, and yet these remain poorly understood and unknown across marsupials. This significantly limits understanding of how marsupial diversity has evolved. This project aims to use novel analytical methods to provide the first empirical data on how marsupials grow, and how those patterns have evolved over time. In doing so it will yield fundamental insight into why Australia's marsupials are so diverse, and how morphological traits interact over development to shape this diversity; this knowledge is key to understanding how morphological diversity is generated and what determines how species evolve.

DE150100636   Yang, Dr Tao

2015	$125,000.00
2016	$125,000.00
2017	$125,000.00
Total	**$375,000.00**

Primary FoR   0804   DATA FORMAT

Funded Participants:

DECRA   Dr Tao Yang

Administering Organisation   The University of New South Wales

Project Summary

Inter-user interference is becoming the dominant bottleneck in state-of-the-art wireless networks. This project aims to address this bottleneck problem by studying a new paradigm, referred to as a Distributed-Input Distributed-Output (DIDO) wireless system, which makes the best use of interference. Results from information theory and modern coding techniques will be advanced to develop new design principles and novel physical-layer coding techniques of DIDO systems, leading to substantially improved throughput, reliability, energy efficiency and robustness. This project aims to develop fundamentally enhanced wireless infrastructure with targeted applications in cellular and wireless networks, satellite communications and wireless sensor networks.

DE150100791   Yin, Dr Chunming

2015	$124,512.00
2016	$124,512.00
2017	$124,512.00
Total	**$373,536.00**

Primary FoR   0205   OPTICAL PHYSICS

Funded Participants:

DECRA   Dr Chunming Yin

Administering Organisation   The University of New South Wales

Project Summary

An efficient and economical light source, an essential component for silicon integrated photonics, is still missing. This project aims to identify optically efficient erbium centres in silicon materials that are compatible with the cost-effective silicon integration technology. This project also aims to advance the microscopic study of erbium in silicon to a single-atom level and establish the essential link for optimising light emission between the microscopic structure and the optical transition. The expected outcomes are optically efficient erbium centres in silicon, which will speed up the material optimisation process and advance the development of silicon integrated photonics in Australia.

DE150100030   Zanin, Dr Dmitriy

2015	$100,000.00
2016	$100,000.00
2017	$100,000.00
Total	**$300,000.00**

Primary FoR   0101   PURE MATHEMATICS

Funded Participants:

DECRA   Dr Dmitriy Zanin

Administering Organisation   The University of New South Wales

Project Summary

The concept of independence lies at the very core of the probability theory. Many attempts to establish the general notion of independence in noncommutative probability theory have led to only two examples so far: the classical (commutative) independence and the free one introduced by Voiculescu. Every other approach has failed to demonstrate the analogues of the key probabilistic results, such as the Law of Large Numbers and the Central Limit Theorem. There is an urgent need for new efficient methodology. This project aims to develop an approach to the independence in terms of mixed momenta and to find new examples of independence besides the ones mentioned above.

Summary of Successful Discovery Early Career Researcher Award Proposals for Funding Commencing in 2015 by State and Organisation

The University of Newcastle

DE150100308   Reid, Dr Colin D

2015	$94,512.00
2016	$94,512.00
2017	$94,512.00
Total	**$283,536.00**

Primary FoR   0101   PURE MATHEMATICS

Funded Participants:

DECRA   Dr Colin D Reid

Administering Organisation   The University of Newcastle

Project Summary

This project aims to develop the theory of groups of symmetries that have self-similarity (part of the object has the same structure as the whole) and branching (transformations may be performed on parts of the object independently of one another while preserving the overall structure). The focus will be on a class of topological groups in which these properties frequently occur, building on methods recently developed and their actions on trees and on the Cantor set. The project aims to significantly advance the theory of locally compact groups, as well as giving insights into the phenomena of self-similarity and branching as they occur in group theory and dynamical systems.

DE150101262   Waller, Dr Amy E

2015	$119,146.00
2016	$123,764.00
2017	$116,843.00
Total	**$359,753.00**

Primary FoR   1117   PUBLIC HEALTH AND HEALTH SERVICES

Funded Participants:

DECRA   Dr Amy E Waller

Administering Organisation   The University of Newcastle

Project Summary

End of life care provides an ideal framework in which to explore the principle of individual autonomy and consumer decision making. Older people at a high risk of dying in 6 months will be recruited from acute care wards, and asked about preferences for involvement in end of life decision making in a standardised interview survey. Surrogate decision makers and physicians will be asked to answer the same questions from the patient's perspective (namely what they think the patient wants). Findings will suggest ways end of life care can be better tailored so that patients can participate in decisions and receive care that is consistent with their wishes.

Summary of Successful Discovery Early Career Researcher Award Proposals for Funding Commencing in 2015 by State and Organisation

The University of Sydney

DE150100676   Acri, Dr Andrea

2015	$121,897.00
2016	$117,744.00
2017	$112,709.00
Total	**$352,350.00**

Primary FoR   2204   RELIGION AND RELIGIOUS STUDIES

Funded Participants:

DECRA   Dr Andrea Acri

Administering Organisation   The University of Sydney

Project Summary

This project is an interdisciplinary study of the foundational textual canon underpinning the reformed version of Hinduism that developed on Bali from the early 20th century. It aims to provide a new perspective on modern and contemporary Balinese Hinduism in the light of the premodern Hindu religious discourse, analysing neglected sources of textual and historical data. The approach is designed to do justice to the sophisticated and centuries-old Balinese tradition of translation and exegesis of Sanskrit sources from the Indian Subcontinent, which still plays an important role in contemporary Bali.

DE150101863   Chalker, Dr Justin M

2015	$124,000.00
2016	$124,000.00
2017	$124,000.00
Total	**$372,000.00**

Primary FoR   0305   ORGANIC CHEMISTRY

Funded Participants:

DECRA   Dr Justin M Chalker

Administering Organisation   The University of Sydney

Project Summary

This project aims to introduce strained alkenes as probes for cysteine sulfenic acid, a poorly understood biomarker for oxidative stress. This probe will enable rapid detection of cysteine sulfenic acid and meet an urgent need for tools to map cysteine redox signalling. Moreover, since many enzymes feature a cysteine sulfenic acid at their active site, the strained alkene probes will also serve as useful inhibitor probes of these enzymes. Such inhibitor probes will provide critical information for potential therapeutic applications in human conditions associated with oxidative stress such as ageing, cancer, and heart disease.

DE150101275   Cordingley, Dr Anthony

2015	$111,000.00
2016	$110,500.00
2017	$99,880.00
Total	**$321,380.00**

Primary FoR	2005	LITERARY STUDIES

Funded Participants:

DECRA	Dr Anthony Cordingley

Administering Organisation   The University of Sydney

Project Summary

Moving between French and English, Samuel Beckett's bilingual writing practice offers a unique record of how the artistic imagination engages with the experience of migration. To date, studies of Beckett concentrate on his involvement with the Anglophone expatriate communities and the French literary coteries of post-war Paris. They neglect, however, the impact of Beckett's grounding in the French literary tradition from the sixteenth century onwards. By filling this gap, this project aims to quantify how French and English cultural heritages are processed differently in the French and English versions of his works. The project will illuminate how national literatures are reshaped through cultural translation.

DE150101703   Dias-da-Costa, Dr Daniel

2015	$120,000.00
2016	$120,000.00
2017	$120,000.00
Total	**$360,000.00**

Primary FoR	0905	CIVIL ENGINEERING

Funded Participants:

DECRA	Dr Daniel Dias-da-Costa

Administering Organisation   The University of Sydney

Project Summary

Fracture in concrete is a critical issue for serviceability and minimising the risk of structural collapse. The project aims to develop a technology for the robust and detailed prediction of how concrete structures behave during fracture. The scientific framework will build on a novel theory for 3D fracture and a new computational approach for tackling the highly non-linear behaviour of damage propagation. These advances aim to produce a platform for designers to create and test new designs and technologies for current and new materials. The project aims to produce outcomes that will advantage Australian companies in the international market for large construction projects, where competition is intense and innovation is an important part of increasing market share.

DE150101540   Griffiths, Dr Ryan

2015	$111,000.00
2016	$113,000.00
2017	$107,000.00
Total	**$331,000.00**

Primary FoR   1606   POLITICAL SCIENCE

Funded Participants:

DECRA   Dr Ryan Griffiths

Administering Organisation   The University of Sydney

Project Summary

What is the relationship between democracy and secessionism? This project aims to investigate the theory that democratisation unleashes secessionist forces that are likely to turn violent in the absence of mature democratic institutions. Thus, waves of democracy yield waves of secessionist conflict. Through a statistical analysis of secessionism combined with case studies in three countries with dissimilar regime types - Myanmar, Papua New Guinea, and Spain - the project aims to study the relationship between democratic institutions and secessionist outcomes. The project aims to contribute to our understanding of the unintended consequences of democratisation and inform policy choices regarding the introduction and sequencing of democratic institutions.

DE150101704   Hardjawana, Dr Wibowo

2015	$120,000.00
2016	$110,000.00
2017	$110,000.00
Total	**$340,000.00**

Primary FoR   1005   COMMUNICATIONS TECHNOLOGIES

Funded Participants:

DECRA   Dr Wibowo Hardjawana

Administering Organisation   The University of Sydney

Project Summary

As the radio spectrum for cellular services is quickly running out, the next generation cellular networks require some fundamental technology advances to meet the exponentially growing traffic demand. This project aims to produce a cloud-based massive multiple-input-multiple-output cellular system to achieve a substantially higher system capacity without additional spectrum. Key research issues will be addressed by developing novel interference suppression techniques based on joint signal processing and cloud-based resource allocations. The project aims to leverage recent advances in cloud-based optimisation and utilise interference cancellation to provide fundamentally new approaches in increasing the capacity of cellular systems.

Summary of Successful Discovery Early Career Researcher Award Proposals
for Funding Commencing in 2015 by State and Organisation

DE150101510   Lara-Lopez, Dr Maritza A

2015	$112,714.00
2016	$108,564.00
2017	$108,014.00
Total	**$329,292.00**

Primary FoR   0201   ASTRONOMICAL AND SPACE SCIENCES

Funded Participants:

DECRA   Dr Maritza A Lara-Lopez

Administering Organisation   The University of Sydney

Project Summary

Some of the biggest questions in astronomy are intimately related to the star formation process in galaxies. To truly understand how galaxies evolve, it is first essential to determine the dominant process controlling the rate at which gas in a galaxy converts to stars, the mass distribution of the resulting stars, and how galactic winds or accretion of gas into the galaxy affect the star formation. With the advent of large surveys at different wavelengths, this is the first time in history that we have all the information necessary to understand star formation. This project intends to use the multiwavelength power of the Galaxy and Mass Assembly (GAMA) survey, and the detailed information of the Sydney-AAO Multi-object Integral-field spectrograph (SAMI) survey to understand star formation in galaxies throughout cosmic time.

DE150101535   Marpaung, Dr David

2015	$120,000.00
2016	$120,000.00
2017	$117,000.00
Total	**$357,000.00**

Primary FoR   0906   ELECTRICAL AND ELECTRONIC ENGINEERING

Funded Participants:

DECRA   Dr David Marpaung

Administering Organisation   The University of Sydney

Project Summary

A massive technology gap of high quality tuneable filters in the microwave (1-100 GHz) frequency range is impeding advances towards fully-reconfigurable wireless systems. This project aims to address this limitation and to deliver the world's first reconfigurable microwave filter with unprecedented tuning range, resolution, and selectivity using integrated microwave photonics technology. The project aims to produce the critical filter technology for advanced radio spectrum management and efficient bandwidth utilisation. The project will endeavour to have a profound impact on virtually all high bandwidth microwave systems in key sectors such as wireless communications, defence, and radio astronomy.

DE150101415   McNamara, Dr Peter

2015	$120,000.00
2016	$120,000.00
2017	$120,000.00
Total	**$360,000.00**

Primary FoR	0101	PURE MATHEMATICS

Funded Participants:

DECRA   Dr Peter McNamara

Administering Organisation   The University of Sydney

Project Summary

Representation theory is a field of mathematics with applications across the breadth of mathematical study in fields as diverse as number theory and physics. The study of higher (or categorical) representation theory is a modern set of tools that provides new insights into representation theoretic phenomena. This project aims to study categorified quantum groups and, in particular, the categorifications provided by diagrammatic algebras. The project aims to further develop the theory of Khovanov-Lauda-Rouquier (KLR) algebras, providing important foundational results for future research to build upon.

DE150100756   Polkinghorne, Dr Martin

2015	$124,031.00
2016	$123,446.00
2017	$123,557.00
Total	**$371,034.00**

Primary FoR	2101	ARCHAEOLOGY

Funded Participants:

DECRA   Dr Martin Polkinghorne

Administering Organisation   The University of Sydney

Project Summary

This project aims to conduct the first systematic archaeological investigations of Cambodian Middle Period capitals on the banks of the Mekong and Tonle Sap arterial rivers between 1350 and 1750. Whilst the decline of Angkor is one of the most significant events in the history of Southeast Asia, we do not have a precise date for the event that involved the relocation of many hundreds of thousands of people. By determining when the Kings of Angkor moved to the southern capitals we will clarify the end of Angkor, retrieve Cambodian history from a perceived Dark Age, and reveal critical linkages between the celebrated Angkorian past and modern and contemporary Cambodia.

DE150101655   Song, Dr Yang

2015	$99,012.00
2016	$99,012.00
2017	$99,012.00
Total	**$297,036.00**

Primary FoR   0801   ARTIFICIAL INTELLIGENCE AND IMAGE PROCESSING

Funded Participants:

DECRA   Dr Yang Song

Administering Organisation   The University of Sydney

Project Summary

This project aims to develop a new framework for the detection and quantification of cancer biomarkers in diagnostic and histopathology images with discriminative modelling of intrinsic structures. The framework will be the first computerised solution to provide automated, quantitative annotations of cancer imaging biomarkers at the macroscopic and microscopic levels to support standardised reporting of image interpretation. It will help to alleviate the inter-observer variability and time-consuming process of manual analysis. The project aims to advance fundamental biomedical imaging research in generalised visual structure extraction and classification, and enable large-scale translational research in systems pathology for personalised cancer care.

DE150101032   Tymula, Asst Prof Agnieszka A

2015	$125,000.00
2016	$123,000.00
2017	$130,000.00
Total	**$378,000.00**

Primary FoR   1402   APPLIED ECONOMICS

Funded Participants:

DECRA   Asst Prof Agnieszka A Tymula

Administering Organisation   The University of Sydney

Project Summary

Although healthier, stronger and better at reasoning than young children, adolescents' morbidity and mortality rates are double those of young children. Unintentional injury, mostly avoidable and attributed to wrong decisions, is the biggest cause of death and hospitalisation among adolescents in Australia. Peer presence is likely to be a major cause of adolescents' inferior decision-making. This project aims to use experimental economics methods to study how peer presence affects the parameters of the economic decision model, specifically risk tolerance, discounting, and propensity to make errors. The project aims to advance the understanding of decision-making across the lifespan, inform theoretical modelling and advise policy-makers how to reduce the risks to adolescents.

Summary of Successful Discovery Early Career Researcher Award Proposals for Funding Commencing in 2015 by State and Organisation

DE150101692   Van Ham, Dr Carolien

2015	$95,000.00
2016	$128,000.00
2017	$102,000.00
Total	**$325,000.00**

Primary FoR   1606   POLITICAL SCIENCE

Funded Participants:

DECRA   Dr Carolien Van Ham

Administering Organisation   The University of Sydney

Project Summary

Why do some countries manage to 'get their elections right' while others fail? What explains changes in election integrity over time? And does election integrity matter for democracy? This project aims to address these questions by developing an original theoretical framework explaining changes in election integrity over time and the consequences for democratisation. The project will empirically test the theoretical framework with a mixed-method approach that combines quantitative statistical analysis and in-depth country case studies using data on election integrity in over 900 elections from over 100 electoral democracies and autocracies around the world between 1974 and 2012.

DE150101161   Yacobi, Dr Oded

2015	$110,000.00
2016	$110,000.00
2017	$110,000.00
Total	**$330,000.00**

Primary FoR   0101   PURE MATHEMATICS

Funded Participants:

DECRA   Dr Oded Yacobi

Administering Organisation   The University of Sydney

Project Summary

Representation theory, the mathematical study of symmetry, has applications in diverse areas such as particle physics, computer science, and molecular biology. This project aims to use a new family of quantum groups to prove a network of conjectures about categorical and geometric representation theory. The project aims to answer a long-standing open question in geometric representation theory concerning two families of geometric spaces underlying the theory of Lie groups. Representation theory is a strength of Australian mathematics, and this project aims to undertake pressing research at the forefront of this dynamic field.

University of Technology, Sydney

DE150100365 Hopwood, Dr Nicholas A

2015	$123,000.00
2016	$124,000.00
2017	$124,000.00
Total	**$371,000.00**

Primary FoR	1301	EDUCATION SYSTEMS

Funded Participants:

DECRA   Dr Nicholas A Hopwood

Administering Organisation   University of Technology, Sydney

Project Summary

Children born into circumstances of socio-economic disadvantage are at risk of missing out on the developmental, educational and social opportunities that give them the best possible start in life. By helping parents in disadvantaged families to cope with adversity, parent education services can mitigate these risks, build resilience in families, and change children's prospects for the future. This project aims to identify the most effective ways that parent educators can create lasting positive impacts for families. This project also aims to find out what needs to change to make these best practices more widespread and cost effective, including learning from study of low-cost community-based services.

DE150100461 Kumar, Dr Manoj

2015	$120,000.00
2016	$120,000.00
2017	$120,000.00
Total	**$360,000.00**

Primary FoR	0602	ECOLOGY

Funded Participants:

DECRA   Dr Manoj Kumar

Administering Organisation   University of Technology, Sydney

Project Summary

Eutrophication (nutrient over-enrichment) caused by a host of anthropogenic activities is recognised as the most widespread cause of seagrass loss. In order to effectively control seagrass loss, there is an urgent need to determine the link between eutrophication and seagrass loss. This project aims to undertake an innovative 'omics approach (transcriptomics and metabolomics) to develop an early-warning system for seagrass loss. The acclimation and plasticity of seagrass to sub-lethal stress induced by eutrophication will be investigated at the molecular and biochemical levels. This will allow mitigation responses such as altered catchment management processes to prevent damage before meadows are lost.

DE150101889   Putnins, Dr Talis J

2015	$120,000.00
2016	$118,000.00
2017	$112,000.00
Total	**$350,000.00**

Primary FoR	1502	BANKING, FINANCE AND INVESTMENT

Funded Participants:

DECRA   Dr Talis J Putnins

Administering Organisation   University of Technology, Sydney

Project Summary

Insider trading destroys confidence in financial markets and undermines their fairness and efficiency. Substantial amounts of taxpayer money are spent each year in combatting insider trading, and yet cases of insider trading remain abundant. This project aims to advance our understanding of insider trading, its prevalence, social costs, characteristics and determinants, and how it responds to different penalties. This project aims to allow for more efficient use of regulatory resources through better rules, more accurate detection methods, and increased deterrence. It aims to benefit society through fairer and more efficient markets.

DE150100720   Qiao, Dr Youming

2015	$125,000.00
2016	$125,000.00
2017	$125,000.00
Total	**$375,000.00**

Primary FoR	0802	COMPUTATION THEORY AND MATHEMATICS

Funded Participants:

DECRA   Dr Youming Qiao

Administering Organisation   University of Technology, Sydney

Project Summary

The algorithmic problem of isomorphism testing seeks to decide whether two objects from a mathematical category are essentially the same. This project focuses on the setting when the categories are from algebra, including but not limited to, groups and polynomials. It is a family of fundamental problems in complexity theory, with important applications in cryptography. The project aims to develop efficient algorithms with provable guarantee, or formal hardness proofs, for these problems. Algorithms will be implemented to examine the impacts on certain cryptography schemes. The successful completion of this project will enhance the understanding of computational complexities of these problems, and identify the security of certain cryptography schemes.

Summary of Successful Discovery Early Career Researcher Award Proposals for Funding Commencing in 2015 by State and Organisation

University of Western Sydney

DE150101053   Antoniou, Dr Mark

2015	$122,512.00
2016	$122,512.00
2017	$119,512.00
Total	**$364,536.00**

Primary FoR   1702   COGNITIVE SCIENCES

Funded Participants:

DECRA   Dr Mark Antoniou

Administering Organisation   University of Western Sydney

Project Summary

Mastery of a second language generates economic advantages, especially in English-speaking nations with large immigrant populations, such as Australia. It is not clear why some second-language learners flourish while others struggle in the same educational setting. Successful learners must possess attributes that when combined with the features of the learning situation result in positive learning outcomes, whereas unsuccessful learners are likely mismatched to their training method. In a series of artificial language learning experiments, this project aims to identify the combination of factors that matter most in successful language learning. Ultimately it may be possible to tailor training proactively to maximise learning outcomes.

DE150100408   Plett, Dr Jonathan M

2015	$129,387.00
2016	$130,377.00
2017	$133,652.00
Total	**$393,416.00**

Primary FoR   0605   MICROBIOLOGY

Funded Participants:

DECRA   Dr Jonathan M Plett

Administering Organisation   University of Western Sydney

Project Summary

Relationships between mutualistic fungi and plants are exploited as they foster plant productivity and vigour. One significant problem facing the agro-forestry and agricultural industries is that the ability of beneficial fungi to colonise plant hosts is highly dependent on the genetic background of the host. Ultimately, this means that if fungal inoculants are not matched with the appropriate plant host, maximal benefits from these relationships are not achieved. This project aims to identify the first genetic markers to be used for matching plants with appropriate fungal isolates, thereby guaranteeing optimal plant performance. This will add a critical component to the global effort of increasing the productivity of our natural resources.

DE150100861   Power, Dr Emma R

2015	$117,136.00
2016	$109,615.00
2017	$121,959.00
Total	**$348,710.00**

Primary FoR   1604   HUMAN GEOGRAPHY

Funded Participants:

DECRA   Dr Emma R Power

Administering Organisation   University of Western Sydney

Project Summary

This project aims to investigate the stability of single older women's senses of home, security and belonging as they negotiate asset and income insecurity. It examines: how national and housing-provider scale housing policy and governance frameworks shape the ways that older women experience and make decisions about the home; and how the home is affected by housing mobility. Using a housing pathways approach, the project aims to develop knowledge of how housing markets and supply affect, and are shaped by, homemaking cultures and practices. The project aims to address a research gap about the ways in which asset-poor older Australians maintain stable housing pathways and senses of home, security and belonging as they age.

DE150100748   Robertson, Dr Shanthi K

2015	$118,320.00
2016	$112,005.00
2017	$105,684.00
Total	**$336,009.00**

Primary FoR   2002   CULTURAL STUDIES

Funded Participants:

DECRA   Dr Shanthi K Robertson

Administering Organisation   University of Western Sydney

Project Summary

Migration and mobility between Australia and Asia is becoming more temporary and more fluid. This project aims to investigate the lived experience and the governance of migration flows from Asia to Australia, at local, national and transnational scales. It seeks to analyse and visualise complex migrant journeys across borders and regions, across time and across visa statuses and labour markets. Key research questions include how migration policy and migrant's decisions and experiences influence each other, and the effects of new types of mobility in the Asia-Pacific region on both transnationalism and migrant's sense of belonging over time.

University of Wollongong

DE150100242   Eriksen, Dr Christine

2015	$120,473.00
2016	$122,927.00
2017	$110,373.00
Total	**$353,773.00**

Primary FoR   1604   HUMAN GEOGRAPHY

Funded Participants:

DECRA   Dr Christine Eriksen

Administering Organisation   University of Wollongong

Project Summary

Bushfire emergencies in Australia have social, ethical and political, as well as biophysical causes. Hidden in embedded vulnerability, social norms and institutional structures, these causes are often critical obstacles to building resilient communities. This project aims to identify key ways to heighten resilience by examining how sacred and secular faith affects the ability of individuals and communities to prepare for, respond to and recover from bushfires. Using ethnographic methods, this project will critically examine evidence of bushfire vulnerability, resilience and adaptation strategies driven by, retained in, or promoted through faith and ethics.

DE150101499   Liu, Dr Zheng

2015	$117,407.00
2016	$119,147.00
2017	$119,247.00
Total	**$355,801.00**

Primary FoR   0204   CONDENSED MATTER PHYSICS

Funded Participants:

DECRA   Dr Zheng Liu

Administering Organisation   University of Wollongong

Project Summary

It has long been predicted that materials may contain special topological order. The recent discovery of topological insulators reveals the tip of the iceberg, but many theoretical hypotheses, such as the existence of the fractional Chern insulator and quantum spin liquid, remain elusive. This project aims to bridge the gap between conceptual models and real materials by using first-principles calculations. The plan is to identify and engineer topological electronic bands in experimentally feasible materials, characterise existing quantum frustrated materials and connect these materials with minimal theoretical models. This project also aims to reveal further families of topological materials and clarify their physical properties.

DE150101921   Santos, Dr Rute M

2015	$129,000.00
2016	$129,000.00
2017	$99,000.00
Total	**$357,000.00**

Primary FoR   1117   PUBLIC HEALTH AND HEALTH SERVICES

Funded Participants:

DECRA   Dr Rute M Santos

Administering Organisation   University of Wollongong

Project Summary

The levels of sedentary behaviour are now alarmingly high in toddlers, yet little is known about the effect of this behaviour on cognitive development and executive functions during early childhood. This 15 month cluster randomised controlled trial will examine the effects of reduced sitting time on cognitive development and executive functions in Australian toddlers from low socio-economic families. This project aims to develop and implement evidence-based strategies and policies designed to optimise developmental and health outcomes in young children, specifically in those from a low socio-economic status, thus giving young children the best start in life.

DE150100280   Sun, Dr Ziqi

2015	$124,512.00
2016	$124,512.00
2017	$124,512.00
Total	**$373,536.00**

Primary FoR   0303   MACROMOLECULAR AND MATERIALS CHEMISTRY

Funded Participants:

DECRA   Dr Ziqi Sun

Administering Organisation   University of Wollongong

Project Summary

Learning from nature involves taking ideas from nature and developing novel functional materials. This project aims to design novel bio-inspired multifunctional interfaces to prevent the adherence of crystals and solid particles to surfaces, achieve excellent mechanical resilience, and provide multiple photoresponses, based on a deep understanding of the fundamental physiochemical, mechanical, structural, and optical characteristics of natural multifunctional surfaces/interfaces in the target natural species. This project aims to aid in the design of new bio-inspired smart materials and deliver novel technologies for materials synthesis for potential uses in the chemical industry, sustainable energy applications, and agriculture.

DE150101116   Yang, Dr Guomin

2015	$105,000.00
2016	$105,000.00
2017	$105,000.00
Total	**$315,000.00**

Primary FoR   0803   COMPUTER SOFTWARE

Funded Participants:

DECRA   Dr Guomin Yang

Administering Organisation   University of Wollongong

Project Summary

Authenticated key exchange protocols allow multiple parties to establish a common secret key over a public network, and are a central component of network security. Key-leakage and quantum attacks are two primary threats against the existing protocols. This project aims to fill the gap by developing new authenticated key exchange protocols which are secure against both attacks. The new models, theories, and techniques developed in this project will produce technologies essential for securing data communications in current and future computer networks, and hence directly contribute to improving cybersecurity for all Australians.

Summary of Successful Discovery Early Career Researcher Award Proposals
for Funding Commencing in 2015 by State and Organisation

Victoria

Deakin University

DE150100538   Lamon, Dr Severine

2015	$116,000.00
2016	$112,000.00
2017	$114,000.00
Total	**$342,000.00**

Primary FoR   0606   PHYSIOLOGY

Funded Participants:

DECRA   Dr Severine Lamon

Administering Organisation   Deakin University

Project Summary

Skeletal muscle is the largest organ in the body and plays a vital role in maintaining independent living and social interaction. As it ages, skeletal muscle loses its ability to build up new muscle proteins. However, the principles underlying the biology of skeletal muscle ageing are not well understood. MicroRNAs (MiRNAs) are essential regulators of skeletal muscle biology. Whether they play a role in the ageing process and how they regulate muscle protein synthesis as we age has not been investigated. This project aims to identify the MiRNA species involved in muscle protein synthesis and will provide a better understanding of the biology of ageing skeletal muscle.

DE150101617   Liu, Dr Dan

2015	$110,000.00
2016	$110,000.00
2017	$110,000.00
Total	**$330,000.00**

Primary FoR   1007   NANOTECHNOLOGY

Funded Participants:

DECRA   Dr Dan Liu

Administering Organisation   Deakin University

Project Summary

This project aims to develop new three-dimensional (3D) porous nanomaterials of boron nitride (BN) foam with excellent sorption properties for water purification. New chemical synthesis approaches will be used to produce 3D porous BN foams with high porosity, large surface area and high mechanical stability leading to a high adsorption capacity, easy regeneration and excellent recycle ability for water purification. The expected outcomes include a new class of light absorbent materials, new production techniques and a high efficiency water cleaning technique.

Summary of Successful Discovery Early Career Researcher Award Proposals
for Funding Commencing in 2015 by State and Organisation

DE150101393   Rollins, Dr Lee A

2015	$120,000.00
2016	$120,000.00
2017	$120,000.00
Total	**$360,000.00**

Primary FoR   0604   GENETICS

Funded Participants:

DECRA   Dr Lee A Rollins

Administering Organisation   Deakin University

Project Summary

Although invasive species are a massive threat to biodiversity, and costly to society, we still do not understand the evolutionary processes that shape invasions. Invasive populations often show rapid evolutionary change in novel environments but attempts to identify the underlying genetic mechanisms have been largely unsuccessful. This project aims to explore an innovative and untested alternative possibility: that invader evolution is primarily driven by epigenetic change. Using an iconic Australian invasive species, the cane toad, the project aims to quantify genetic and epigenetic change across the invasion and use manipulative experiments to determine the influence of epigenetic change on the evolution of phenotypic traits important to invasion.

DE150100969   Slaveski, Dr Filip

2015	$123,930.00
2016	$120,227.00
2017	$96,512.00
Total	**$340,669.00**

Primary FoR   2103   HISTORICAL STUDIES

Funded Participants:

DECRA   Dr Filip Slaveski

Administering Organisation   Deakin University

Project Summary

Historians are struggling to understand the complexities of the chaotic and violent transition from war to peace in Soviet-occupied Europe after the second World War. This project seeks to apply an innovative methodology to newly declassified archival data so as to compare the experiences of social collapse, famine and reconstruction across this region. This broad comparative approach aims to address the unresolved question of why violence against the Soviet state, culminating in insurgency, emerged in some areas and not others. The resulting publications have the potential to change the way we think about the effects of insurgency and counter-insurgency on post-war Soviet development. They will inform and reshape international debates on historical memory and state-building.

Summary of Successful Discovery Early Career Researcher Award Proposals
for Funding Commencing in 2015 by State and Organisation

La Trobe University

DE150100825   Carrie, Dr Christopher J

2015	$120,000.00
2016	$120,000.00
2017	$120,000.00
Total	**$360,000.00**

Primary FoR   0607   PLANT BIOLOGY

Funded Participants:

DECRA   Dr Christopher J Carrie

Administering Organisation   La Trobe University

Project Summary

In addition to their central role in metabolism, plant mitochondria have emerged as important hubs for both sensing and responding to a variety of stimuli. However, as yet there are still many unanswered basic questions about how mitochondria are built in plant cells. This project aims to characterise two novel protein import/assembly pathways, specifically, the newly identified twin-arginine translocation (Tat) protein assembly pathway, and the disulphide relay system of the mitochondrial intermembrane space which displays unique characteristics compared to other systems. A mechanistic understanding of these pathways can be used to design novel strategies to alter plant growth and performance.

DE150100301   Ennis, Dr Courtney

2015	$125,000.00
2016	$110,000.00
2017	$100,000.00
Total	**$335,000.00**

Primary FoR   0306   PHYSICAL CHEMISTRY (INCL. STRUCTURAL)

Funded Participants:

DECRA   Dr Courtney Ennis

Administering Organisation   La Trobe University

Project Summary

Observed in planetary atmospheres such as Saturn's moon Titan, cyanide-based aerosols undergo photolytic processing to generate complex organic material of prebiotic interest. However, dedicated spectroscopic experiments directed at nitrile aerosol analogues have not been performed to date. To bridge this gap, a custom cooling cell at the Australian Synchrotron will be used to investigate condensed-phase nitriles at Titan conditions. Laser irradiation of nitrile ice particles will then follow; designed to simulate photochemical processes in the Titan atmosphere. The project aims to use data compiled for nitrile aerosols and their photolytic products to assist in assigning these species to unconfirmed bands within infrared surveys of planetary environments.

DE150101203   Hayes, Dr Sarah C

2015	$105,142.00
2016	$117,613.00
2017	$100,434.00
Total	**$323,189.00**

Primary FoR   2101   ARCHAEOLOGY

Funded Participants:

DECRA   Dr Sarah C Hayes

Administering Organisation   La Trobe University

Project Summary

Victoria's 19th century gold rush triggered a major social and economic transformation with far ranging consequences. This project aims to investigate how individuals responded and contributed to this transformation over their life course, and how this moulded current values around quality of life in Australia. The project also aims to develop a pioneering approach that will integrate historical and archaeological evidence on individual, site, neighbourhood, city and global levels in new ways. Fresh social histories of Melbourne and Bendigo will be generated, which reinforce national identity and have implications for understanding the impact of the current mining boom on individuals.

DE150101243   Lee, Dr Mihwa

2015	$127,000.00
2016	$123,000.00
2017	$121,000.00
Total	**$371,000.00**

Primary FoR   0601   BIOCHEMISTRY AND CELL BIOLOGY

Funded Participants:

DECRA   Dr Mihwa Lee

Administering Organisation   La Trobe University

Project Summary

Dynamic interactions between proteins and nucleic acids are a fundamental process in gene regulation, where aberrant regulation leads to lethality or various diseases. This project aims to elucidate the underlying mechanisms of DNA-RNA interplay with a multifunctional nuclear protein, splicing factor proline/glutamine-rich (SFPQ) in gene regulation at the molecular level by characterising the interactions between SFPQ and nucleic acids. The results will provide a fundamental understanding of the molecular mechanisms of dual nucleic acid specificities of nuclear proteins in gene regulation, for which no structural information is currently available.

Summary of Successful Discovery Early Career Researcher Award Proposals for Funding Commencing in 2015 by State and Organisation

DE150101777   Mathivanan, Dr Suresh

2015	$125,000.00
2016	$125,000.00
2017	$125,000.00
Total	**$375,000.00**

Primary FoR   0601   BIOCHEMISTRY AND CELL BIOLOGY

Funded Participants:

DECRA   Dr Suresh Mathivanan

Administering Organisation   La Trobe University

Project Summary

Exosomes, small packages released by cells, are powerful signalling organelles that can activate neighbouring cells by transferring proteins and RNA. Currently, it is unknown whether exosomes have similar membrane protein/lipid composition to that of the host cell. This project aims to explore the similarities and differences between the exosomal and host cell membranes in terms of the protein/lipid composition. In addition, the project aims to study how the proteins and RNA are packaged into exosomes. Membrane molecules that are detected only in the exosomes may have important signalling implications and may aid in the uptake/fusion of exosomes by/with target cells. The project aims to improve our understanding on signalling mediated by exosomes.

Summary of Successful Discovery Early Career Researcher Award Proposals for Funding Commencing in 2015 by State and Organisation

Monash University

DE150101853   Dean, Dr Rebecca F

2015	$116,000.00
2016	$120,000.00
2017	$120,000.00
Total	**$356,000.00**

Primary FoR   0602   ECOLOGY

Funded Participants:

DECRA   Dr Rebecca F Dean

Administering Organisation   Monash University

Project Summary

How can males and females display striking sex differences, when they primarily share the same set of genes? By experimentally evolving the degree of sexual dimorphism in Drosophila melanogaster, this project endeavours to address key issues at the heart of evolutionary biology. This project aims to deliver a novel, data-rich resource with which to explore the mechanisms and consequences of sexual dimorphism evolution, to expand current understanding of this fundamental evolutionary paradox.

DE150101323   D'Orazi, Dr Valentina

2015	$115,000.00
2016	$106,500.00
2017	$106,500.00
Total	**$328,000.00**

Primary FoR   0201   ASTRONOMICAL AND SPACE SCIENCES

Funded Participants:

DECRA   Dr Valentina D'Orazi

Administering Organisation   Monash University

Project Summary

Galaxy formation is an outstanding problem in modern astronomy. Star clusters are the basic building blocks in the Universe. The oldest stellar aggregates are the globular clusters whose stars show patterns in composition that are not found elsewhere. This project aims to bring new understanding to globular clusters by studying the composition of their constituent stars in many different environments. Patterns in this composition reveal the history of star formation and the formation of the globular clusters themselves. These are in turn involved in the formation of galaxies. The project aims to use these stars to probe the formation of globular clusters and the stellar components of the Galaxy, and hence link these old stars to larger cosmological questions.

Summary of Successful Discovery Early Career Researcher Award Proposals
for Funding Commencing in 2015 by State and Organisation

DE150100326   Duarte, Dr Joao C

2015	$121,022.00
2016	$108,622.00
2017	$108,622.00
Total	**$338,266.00**

Primary FoR   0404   GEOPHYSICS

Funded Participants:

DECRA   Dr Joao C Duarte

Administering Organisation   Monash University

Project Summary

An outstanding question in plate tectonics is how do oceans start to close? The Wilson Cycle describes the life of an ocean in three phases: opening and spreading, foundering of its passive margins and development of new subduction zones, and consumption and closure. It has been suggested that new subduction zones are difficult to form and thereby they are more likely to spread from ocean to ocean like a sort of invasive mechanism. This project aims to make use of laboratory models and plate kinematic modelling to understand how subduction zones are initiating and propagating in the Atlantic. The project aims to provide clues on how ancient oceans may have closed and whether the Atlantic is already in its turning point.

DE150101297   Gallant, Dr Ailie

2015	$104,121.00
2016	$106,744.00
2017	$109,229.00
Total	**$320,094.00**

Primary FoR   0401   ATMOSPHERIC SCIENCES

Funded Participants:

DECRA   Dr Ailie Gallant

Administering Organisation   Monash University

Project Summary

Drought risk describes the likelihood that damage will result from exposure to drought. This project aims to fundamentally reshape how we define, characterise and understand drought risk in Australia. A framework for drought risk will be applied that includes the complete range of characteristics that modulate the impacts of drought, which are the frequency of recurrence, duration, severity, seasonality and spatial extent. Long-term changes in drought risk will be examined and the process-based climatic risk factors will be identified. Advancing knowledge on the nature and causes of the long-term changes in drought risk is crucial to improving risk management of drought in the agricultural and water resource sectors.

DE150100327   Hall, Dr Matthew D

2015	$126,000.00
2016	$126,000.00
2017	$126,000.00
Total	**$378,000.00**

Primary FoR   0603   EVOLUTIONARY BIOLOGY

Funded Participants:

DECRA   Dr Matthew D Hall

Administering Organisation   Monash University

Project Summary

Males and females experience the burden of infection differently. Males are typically thought of as the 'sicker sex', favouring investment in costly sexual displays, at the expense of immune function. But what does this mean for the pathogen? Each sex presents a unique set of challenges that an invading organism must overcome; yet the impact of these differences on pathogen evolution has been surprisingly overlooked. This project aims to unravel how sex-specific challenges influence the outcome of pathogen evolution. This work will show how infection in males or females can alter the evolutionary potential of disease, and will ask whether same-sex populations could ever lead to the evolution of new pathogen strains and virulence genes.

DE150100406   Jamadar, Dr Sharna D

2015	$134,112.00
2016	$134,112.00
2017	$107,712.00
Total	**$375,936.00**

Primary FoR   1701   PSYCHOLOGY

Funded Participants:

DECRA   Dr Sharna D Jamadar

Administering Organisation   Monash University

Project Summary

Decline in cognitive control can have a devastating effect on an individual's capacity to live a high quality and safe independent life. It is an untested assumption that older adults can compensate for age-related changes in cognitive control function to perform at the same level as younger adults. This project aims to be the first to test this widely-held assumption and will examine changes in cognitive control and the emergence of compensation over the adult lifespan (20 to 90 years). The project aims to establish whether cognitive compensation is an effective mechanism to maintain cognitive control function into old age and will inform future strategies to help older individuals live more successful and productive independent lives for longer.

DE150101648   Johnson, Dr Travis K

2015	$120,000.00
2016	$125,000.00
2017	$118,000.00
Total	**$363,000.00**

Primary FoR   0604   GENETICS

Funded Participants:

DECRA   Dr Travis K Johnson

Administering Organisation   Monash University

Project Summary

Growth factors are secreted signalling molecules that govern fundamental biological processes such as cell growth, proliferation and death. The mechanism for growth factor control by a Membrane Attack Complex/Perforin-like (MACPF) protein is highly novel as MACPF proteins typically function to kill pathogens during the vertebrate immune response. This project aims to reveal how the MACPF protein Torso-like controls highly localised growth factor signalling, using the sophisticated genetic and advanced imaging methods possible in the fruit fly Drosophila. This project aims to understand growth factor control as its deregulation leads to serious developmental disorders and diseases.

DE150100035   Leibbrandt, Dr Andreas

2015	$120,000.00
2016	$130,000.00
2017	$126,000.00
Total	**$376,000.00**

Primary FoR   1402   APPLIED ECONOMICS

Funded Participants:

DECRA   Dr Andreas Leibbrandt

Administering Organisation   Monash University

Project Summary

Affirmative action policies traditionally favour members of disadvantaged groups in labour markets such as women, elderly, and non-white. They are widely implemented internationally in employment, contracting, and education often despite a lack of knowledge about societal impacts. This project aims to use both field and laboratory experiments to study how individuals react to affirmative action and investigate sabotage, cooperation, and competition between disadvantaged and advantaged groups. The main hypothesis is that affirmative action can increase sabotage, harm cooperation and push competition in ways that endanger the well functioning of labour markets. This project aims to provide new insights for policy makers and managers on the relevance of unintended effects of affirmative action.

DE150101751 Li, Asst Prof Wengui

2015	$117,000.00
2016	$117,000.00
2017	$117,000.00
Total	**$351,000.00**

Primary FoR 0905 CIVIL ENGINEERING

Funded Participants:

DECRA Asst Prof Wengui Li

Administering Organisation Monash University

Project Summary

Harnessing the abundance of solar energy has been one of the most attractive energy alternatives. This project aims to investigate the mechanical properties, thermal energy storage capacity, thermal conductivity, long-term durability and nano/microstructural changes in nanofiller reinforced concrete composites using modern characterisation and modelling techniques. The newly developed concrete will be accessed as a thermal energy storage medium for concentrated solar energy plants. The project aims to create the next generation of construction materials to reduce the cost of the storage medium for solar energy harvesting.

DE150101145 Mueller, Dr Bernhard J

2015	$114,905.00
2016	$110,361.00
2017	$113,629.00
Total	**$338,895.00**

Primary FoR 0201 ASTRONOMICAL AND SPACE SCIENCES

Funded Participants:

DECRA Dr Bernhard J Mueller

Administering Organisation Monash University

Project Summary

This project aims to understand the full three-dimensional structure of massive stars when they explode. In particular, the project will model the late evolution and burning stages of massive stars before they explode as core collapse supernovae. The violent nature of the thermonuclear burning during the star's last few minutes and seconds may cause significant deviations from spherical symmetry, in particular when considering rotating stars. Such realistic models are an essential ingredient for any realistic supernova model, and for understanding how these supernovae synthesise the entire range of elements (from lightest to the heaviest) in the universe.

Summary of Successful Discovery Early Career Researcher Award Proposals for Funding Commencing in 2015 by State and Organisation

DE150100427   van Embden, Dr Joel L

2015	$110,000.00
2016	$110,000.00
2017	$110,000.00
Total	**$330,000.00**

Primary FoR   0306   PHYSICAL CHEMISTRY (INCL. STRUCTURAL)

Funded Participants:

DECRA   Dr Joel L van Embden

Administering Organisation   Monash University

Project Summary

At present, manufacturing solar panels involves expensive high temperature and high vacuum processes. The bottleneck to cheaper solar power is the ability to design new methods of manufacturing. The ability to print the active components of a solar cell is an excellent way to mitigate these costs. This project aims to focus on developing the knowledge to print the most crucial component of a solar cell - the light absorbing layer. Innovative nanoscience will be used to develop novel solar inks composed of tiny semiconductor crystals. The formulation and transformation of these inks into efficient semiconductor light absorbing layers, with a clear view to cheaper printed solar cells, will be the key objective of this project.

DE150100507   van Heerwaarden, Dr Belinda

2015	$122,208.00
2016	$115,158.00
2017	$115,088.00
Total	**$352,454.00**

Primary FoR   0603   EVOLUTIONARY BIOLOGY

Funded Participants:

DECRA   Dr Belinda van Heerwaarden

Administering Organisation   Monash University

Project Summary

Accurately predicting the vulnerability of species to climate change is of paramount importance for managing biodiversity for conservation, agricultural and human health-related purposes. Mounting evidence indicates that adaptive responses to climate changes may be highly constrained, particularly in the biodiverse tropics. However, this is based on studies that do not reflect projected climatic variations. This project aims to provide the first assessment of the capacity to adapt to climate change in widespread and tropical species using ecologically realistic conditions that reflect projected changes. The data will be used to develop accurate models predicting species vulnerability and serve to better guide conservation strategies.

DE150100770   Wilson, Dr Siobhan A

2015	$119,512.00
2016	$119,512.00
2017	$119,512.00
Total	**$358,536.00**

Primary FoR   0402   GEOCHEMISTRY

Funded Participants:

DECRA   Dr Siobhan A Wilson

Administering Organisation   Monash University

Project Summary

Some lakes, such as the Coorong lakes in South Australia, naturally sequester carbon dioxide in magnesium carbonate minerals. These minerals, which form in association with microorganisms in lake water, represent the safest possible long-term traps for carbon dioxide pollution. This project aims to determine the essential geochemical constraints on formation of magnesium carbonate minerals in the Coorong lakes, which are unique natural laboratories for studying carbon dioxide sequestration. By delivering fundamental understanding of how microbial populations alter water chemistry for carbonate production, this project aims to inform the design of efficient and sustainable technologies for carbon dioxide sequestration that emulate natural processes in lakes.

Summary of Successful Discovery Early Career Researcher Award Proposals
for Funding Commencing in 2015 by State and Organisation

RMIT University

DE150100909   Balendhran, Dr Sivacarendran

2015	$120,000.00
2016	$120,000.00
2017	$120,000.00
Total	**$360,000.00**

Primary FoR   0906   ELECTRICAL AND ELECTRONIC ENGINEERING

Funded Participants:

DECRA   Dr Sivacarendran Balendhran

Administering Organisation   RMIT University

Project Summary

This project aims to integrate two recently researched phenomena: memristors (resistive memory) and planar materials. It aims to adopt atomically thin, planar materials for memristors enabling the realisation of high performance resistive memory devices. The physical and environmental effects that govern the memristive properties, which are of utmost importance in understanding resistive memory nature, will be investigated. While generating breakthrough knowledge, the key outcomes of this project will lay the foundation for a novel class of memory devices based on planar van der Waals nanostructures. Such a breakthrough will contribute to the realisation of sustainable memristor technology.

DE150100118   Morfa, Dr Anthony J

2015	$107,132.00
2016	$97,057.00
2017	$97,562.00
Total	**$301,751.00**

Primary FoR   1007   NANOTECHNOLOGY

Funded Participants:

DECRA   Dr Anthony J Morfa

Administering Organisation   RMIT University

Project Summary

Control over defect densities in 2D transition metal chalcogenide films permit controlled fabrication of van der Waals heterostructures and other ultra-thin electronic devices. This is crucial for controlling the optoelectronic properties of devices, yet, unlike bulk semiconductors, defect and dopant control in 2D transition metal chalcogenides is not presently possible. This project aims to investigate the optical properties of single-defects, and how to control them using sensitive microscopy and controlled ligand deposition. Simultaneous electronic characterisation and single-defect microscopy in fabricated thin-film transistors will be investigated to correlate optical and electronic properties of thin-film devices.

DE150100240   Roshchina, Dr Vera

2015	$105,000.00
2016	$105,000.00
2017	$105,000.00
Total	**$315,000.00**

Primary FoR	0102	APPLIED MATHEMATICS

Funded Participants:

DECRA   Dr Vera Roshchina

Administering Organisation   RMIT University

Project Summary

Conic programming allows one to model and solve large industrial problems via modern optimisation methods, such as interior-point algorithms. These methods are efficient and reliable in solving a vast number of problems, however, they fail on a relatively small but significant set of ill-posed instances, thus affecting the overall reliability of the technique. The reason for such behaviour is profound and constitutes one of the major unsolved problems in real complexity: there is no known algorithm that solves conic problems with real data in polynomial time. The project aims to develop a deep understanding of the geometry of conic problems, aiming for the resolution of this fundamental problem in computational theory.

DE150100278   Strengers, Dr Yolande A

2015	$124,000.00
2016	$123,000.00
2017	$123,000.00
Total	**$370,000.00**

Primary FoR	1608	SOCIOLOGY

Funded Participants:

DECRA   Dr Yolande A Strengers

Administering Organisation   RMIT University

Project Summary

Home automation technologies are expected to achieve reductions in household energy costs and consumption. However, there has been no systematic investigation of the ways in which they are being incorporated into everyday life. The project aims to address this critical gap in relation to home cooling. It will investigate how automated cooling technologies are being incorporated into household practices in Australia, and the expectations they promote, sustain and transform. The project also aims to produce important new knowledge about how to study and understand the effects of ambient and automated technologies in everyday life and their potential impact on energy consumption.

Swinburne University of Technology

DE150101665   Li, Dr Xiangping

2015	$115,000.00
2016	$115,000.00
2017	$115,000.00
Total	**$345,000.00**

Primary FoR   1007   NANOTECHNOLOGY

Funded Participants:

DECRA   Dr Xiangping Li

Administering Organisation   Swinburne University of Technology

Project Summary

To tackle the capacity bottleneck of current big data centres enabled by hard disk drives, this project aims to investigate an entirely new concept of petabyte 3D opto-magnetic data storage by nanophotonic engineering of the Inverse Faraday Effect (IFE) based on breakthrough achievements in 3D orientation-unlimited polarisation control and the innovative discovery of the polarisation dependent IFE. This project aims to produce cutting-edge opto-magnetic information technologies to revolutionise magnetic storage industries and provide a new paradigm of exabyte data centres for a sustainable future, thereby maximising Australia's competitive advantage in the emerging big data sector.

DE150101636   Li, Dr Yun

2015	$105,000.00
2016	$105,000.00
2017	$105,000.00
Total	**$315,000.00**

Primary FoR   0206   QUANTUM PHYSICS

Funded Participants:

DECRA   Dr Yun Li

Administering Organisation   Swinburne University of Technology

Project Summary

Gauge fields are central in our modern understanding of physics. They are at the origin of many sophisticated states of matter including quantum Hall materials, topological insulators and supersolids that have potential applications in future technologies. This project aims to explore these exotic quantum states emerging in ultracold atomic gases with artificially engineered gauge fields. Unlike the solid-state systems, in which all details of the material structure are not controlled or even not known with certainty, the unprecedented controllability of the ultracold system provides a unique opportunity to gain key insights on the physics related to the gauge fields, and to advance the studies in both fundamental physics and applications.

DE150100288   Lobato, Dr Ramon A

2015	$113,000.00
2016	$120,000.00
2017	$115,000.00
Total	**$348,000.00**

Primary FoR   2001   COMMUNICATION AND MEDIA STUDIES

Funded Participants:

DECRA   Dr Ramon A Lobato

Administering Organisation   Swinburne University of Technology

Project Summary

Digital content portals including iTunes, Hulu, Netflix and BBC iPlayer use geoblocking to restrict access in certain markets. Australian consumers are increasingly finding ways to circumvent such restrictions. This project aims to investigate how geoblocking and geoblocking circumvention are shaping digital media consumption in Australia. It will offer rigorous analysis of an emerging transnational media practice, and what it means for audiences, producers and regulators. This project endeavours to advance the understanding of digital content flows and inform media policy in a volatile regulatory environment.

DE150101755   Wang, Dr Peng-Yuan

2015	$120,000.00
2016	$120,000.00
2017	$120,000.00
Total	**$360,000.00**

Primary FoR   0915   INTERDISCIPLINARY ENGINEERING

Funded Participants:

DECRA   Dr Peng-Yuan Wang

Administering Organisation   Swinburne University of Technology

Project Summary

This project aims to use nanotopography approaches to improve the efficiency of generating induced Pluripotent Stem Cells (iPSCs) by changing cell behaviour at biomaterial surfaces. The significance is that iPSCs have enormous potential in stem cell therapy, regenerative medicine, and disease-specific treatment, with the potential to replace other stem cell types. The expected outcomes are that cellular reprogramming process for iPSCs generation will be improved and the canonical reprogramming factors might be reduced using surface nanotopographies of self-assembled colloidal crystals. The benefits are the promotion of productivity, the reduction of costs, and the application of iPSC derivatives, aimed at future clinical applications.

The University of Melbourne

DE150101230   Bumpus, Dr Adam G

2015	$116,803.00
2016	$122,822.00
2017	$117,343.00
Total	**$356,968.00**

Primary FoR   1604   HUMAN GEOGRAPHY

Funded Participants:

DECRA   Dr Adam G Bumpus

Administering Organisation   The University of Melbourne

Project Summary

Australia seeks to reduce its greenhouse gas emissions while also creating a strong innovation and knowledge economy. As yet, it is not known how to move low emissions innovations into the mainstream to assist in this transition. At the same time, our economy is connected to leaders in innovation, such as the United States of America (especially California) and to rising powers, such as China, who are scaling up low emissions technologies extremely quickly. This project aims to develop and test explanatory theories to explain how and why low emissions innovation can be scaled up to provide environmental, economic and social benefits. It uses innovative online and in-person methods, and compares the policy-industry-innovation nexus, from local to global, in Australia, the USA and China.

DE150100373   Chen, Dr Xi

2015	$125,000.00
2016	$125,000.00
2017	$125,000.00
Total	**$375,000.00**

Primary FoR   1005   COMMUNICATIONS TECHNOLOGIES

Funded Participants:

DECRA   Dr Xi Chen

Administering Organisation   The University of Melbourne

Project Summary

The exponential growth of internet traffic poses great challenges in the physical layer. This project aims to explore the fibre nonlinearity impact on few-mode fibre transmission through a mixture of theoretical analysis, computer simulation, and experimental demonstration. The scope of the research encompasses study of few-mode fibre nonlinear propagation in dispersive fibre optic channels, and advanced digital signal processing for fibre nonlinearity characterisation. Successful execution of the project will provide valuable understanding of nonlinearity of few-mode fibre transmission.

DE150101904   Edwards, Dr Danielle L

2015	$127,507.00
2016	$129,492.00
2017	$128,482.00
Total	**$385,481.00**

Primary FoR   0603   EVOLUTIONARY BIOLOGY

Funded Participants:

DECRA   Dr Danielle L Edwards

Administering Organisation   The University of Melbourne

Project Summary

Understanding the processes driving speciation is fundamental to understanding how biodiversity is generated. The two main forces underlying speciation, ecological divergence and sexual selection, are well characterised, yet how they interact during the speciation process is remarkably poorly understood. This project aims to test hypotheses regarding how ecological divergence and sexual selection interact during speciation, from its inception to its completion. In doing so, this research aims to identify genomic regions underlying divergence in colour patterns, which are important for ecological and sexual interactions. Consequently, this project will significantly enhance our understanding of ecological and genetic mechanisms underlying speciation.

DE150100838   Fedor, Dr Julie C

2015	$107,954.00
2016	$106,468.00
2017	$106,468.00
Total	**$320,890.00**

Primary FoR   2103   HISTORICAL STUDIES

Funded Participants:

DECRA   Dr Julie C Fedor

Administering Organisation   The University of Melbourne

Project Summary

Over the past decade, the Russian state has reasserted a role in shaping how the past is narrated and represented, both within Russia and beyond. This project critically examines this phenomenon, drawing on close readings of sources including history textbooks, monuments and mass media. The project aims to enhance understanding of how narratives about the past are being mobilised in contemporary dynamics between the Russian state and Russian civil society.

DE150100443   Fernandez, Dr Bina

2015	$122,000.00
2016	$127,000.00
2017	$129,000.00
Total	**$378,000.00**

Primary FoR   1605   POLICY AND ADMINISTRATION

Funded Participants:

DECRA   Dr Bina Fernandez

Administering Organisation   The University of Melbourne

Project Summary

Migration produces re-configurations of care arrangements within households and communities that are often invisible to social policy yet crucial to the welfare of society. This project aims to make the care needs of migrants visible to social policy by analysing the care practices of Ethiopian migrants in Lebanon and in Australia. The project also aims to produce an innovative re-conceptualisation of how migrants' care practices are shaped by households, communities, the state and the market within three diverse social policy regimes. This project aims to provide an evidence-base for the culturally specific dimensions of care and propose policy related outcomes to enhance the well-being and productivity of migrant communities and enrich social cohesion.

DE150100708   Greenwood-Nimmo, Dr Matthew J

2015	$128,000.00
2016	$112,000.00
2017	$112,000.00
Total	**$352,000.00**

Primary FoR   1403   ECONOMETRICS

Funded Participants:

DECRA   Dr Matthew J Greenwood-Nimmo

Administering Organisation   The University of Melbourne

Project Summary

This project aims to develop a richly detailed model of the global financial system including both public and private institutions. By treating the system as a network of interconnected entities, this project aims to introduce new techniques to map and to trace the evolution of risk in the financial system, to forecast the spillover of risk between entities in the system, and to conduct counterfactual analysis of potential policy measures. This project will investigate the link between spillover intensity and the existing research on extreme events in financial data. By studying how the recent crisis spread through the global financial system, this project aims to enhance our ability to foresee future crises and to mitigate their impact and costs.

DE150101044   Hautphenne, Dr Sophie M

2015	$105,000.00
2016	$105,000.00
2017	$105,000.00
Total	**$315,000.00**

Primary FoR   0104   STATISTICS

Funded Participants:

DECRA   Dr Sophie M Hautphenne

Administering Organisation   The University of Melbourne

Project Summary

Branching processes are powerful modelling tools in population biology. They describe how individuals live and reproduce according to specific probability laws, and can be used to answer a wide range of population-related questions. This project aims to develop new algorithmic methods for a tractable class of branching processes called Markovian binary trees. Following a matrix analytic approach, it will deliver new results on the efficient estimation of model parameters, and on the effects of random environments on population dynamics. These results will be used to study significant problems in evolutionary and conservation biology, thereby establishing the relevance of the developed techniques.

DE150100870   Hu, Dr Hangwei

2015	$115,000.00
2016	$115,000.00
2017	$112,000.00
Total	**$342,000.00**

Primary FoR   0503   SOIL SCIENCES

Funded Participants:

DECRA   Dr Hangwei Hu

Administering Organisation   The University of Melbourne

Project Summary

Soil ecosystems are believed to be the most dominant sources of global nitrous oxide emissions. However, mitigations of nitrous oxide are strongly hindered by lack of knowledge on microbial mechanisms underpinning its production. This project aims to integrate a range of advanced approaches to identify the key nitrogen cycling genes as best predictors of nitrous oxide in field studies, to disentangle relative contribution of microbial pathways to nitrous oxide in glasshouse and microcosm studies, and to validate these findings across various land-use types in Australia and China. This will provide a critical framework incorporating microbial data into the nitrous oxide prediction models for better mitigation of greenhouse gas emissions.

DE150100161   Illingworth, Dr Simon

2015	$125,000.00
2016	$125,000.00
2017	$125,000.00
Total	**$375,000.00**

Primary FoR   0915   INTERDISCIPLINARY ENGINEERING

Funded Participants:

DECRA   Dr Simon Illingworth

Administering Organisation   The University of Melbourne

Project Summary

Wall turbulence is a critically important phenomenon for any system where fluid flows past an object. Wall turbulence is responsible for 90 per cent of the drag experienced by a large crude tanker, to give just one example. This project aims to investigate novel ways to control wall turbulence by exploiting the presence of recently-discovered large-scale structures. This will lead to significant reductions in the drag and fuel burnt by transport vehicles.

DE150100104   Moshtaghi, Dr Masud

2015	$110,000.00
2016	$110,000.00
2017	$110,000.00
Total	**$330,000.00**

Primary FoR   0801   ARTIFICIAL INTELLIGENCE AND IMAGE PROCESSING

Funded Participants:

DECRA   Dr Masud Moshtaghi

Administering Organisation   The University of Melbourne

Project Summary

This project aims to address a key problem of interpreting and providing meaningful information in real-time from large volumes of multivariate, noisy and incomplete data in fine-scale monitoring applications. Specifically, it targets air quality monitoring within a workplace. The project aims to significantly advance the current models for online data clustering and real-time anomaly detection in streaming data. The project aims to produce computational models for the two aforementioned tasks and a complete system prototype for indoor air quality monitoring. This system has major health benefits for workers and the showcased computational models have various industrial potentials with significant socio-economic benefits to Australia.

DE150100809   Panza, Dr Laura

2015	$117,000.00
2016	$108,000.00
2017	$101,000.00
Total	**$326,000.00**

Primary FoR   1402   APPLIED ECONOMICS

Funded Participants:

DECRA   Dr Laura Panza

Administering Organisation   The University of Melbourne

Project Summary

This project aims to contribute to a deeper understanding of the long-run economic impact of the Arab-Israeli conflict. Combining the tools of historical research and empirical economic analysis, it aims to investigate four specific economic aspects of the conflict: the origin and implications of the economic separation between Arabs and Jews; the conflict's costs and the related spillover effects to the Middle East; the evolution of the Israeli-Palestinian labour market; and, the study of trade relations between Israel, Palestine and the Middle East. The analysis will provide new insights to improve the prospects for viable economic growth and development in the region through trade policy and increased labour market integration.

DE150100309   Petrie, Dr Dennis

2015	$129,000.00
2016	$104,102.00
2017	$95,512.00
Total	**$328,614.00**

Primary FoR   1402   APPLIED ECONOMICS

Funded Participants:

DECRA   Dr Dennis Petrie

Administering Organisation   The University of Melbourne

Project Summary

Health differences across socio-economic groups have persisted in many countries, including Australia, despite decades of considerable improvements in life expectancy and average health status. Little is known of how policies may influence socio-economic health inequalities as the mechanisms underlying them are complex and the causes differ across population groups and over the lifecycle. This project aims to develop methods to quantify the major mechanisms that give rise to changes in socio-economic health inequalities in Australia. This project aims to improve our understanding of the dynamic factors that drive changes in health inequalities, thus providing useful information for decision makers about which policies will be cost effective at reducing them.

DE150100985   Philip, Dr Jimmy

2015	$130,000.00
2016	$130,000.00
2017	$130,000.00
Total	**$390,000.00**

Primary FoR   0915   INTERDISCIPLINARY ENGINEERING

Funded Participants:

DECRA   Dr Jimmy Philip

Administering Organisation   The University of Melbourne

Project Summary

Patches of turbulent flow such as in clouds, volcanic or bushfire plumes grow with time because they draw or entrain non-turbulent fluid through their boundaries. The quantity of fluid entrained, and why it entrains this amount, is poorly understood. This is a major bottleneck in our ability to predict how these natural phenomena evolve in time. This project aims to employ idealised laboratory models of these natural phenomena, and utilise high quality measurement techniques and theoretical tools to quantify and understand the physical basis of the entrainment mechanism. The project aims to create better climate models and more accurate predictions of natural disasters associated with bushfires and volcanos.

DE150100388   Roche, Dr Gerald J

2015	$117,002.00
2016	$124,019.00
2017	$124,019.00
Total	**$365,040.00**

Primary FoR   1601   ANTHROPOLOGY

Funded Participants:

DECRA   Dr Gerald J Roche

Administering Organisation   The University of Melbourne

Project Summary

China is currently addressing many issues associated with issues of minority cultural autonomy and ethnic differences. This project will explore the ongoing assimilation of the Monguor, an ethnic minority group in Tibet. It seeks to fill an important gap in our knowledge of ethnic tensions, autonomy and assimilation in contemporary China. Ethnographic fieldwork and discourse analysis of texts in Tibetan will be used to investigate the impact of state and ethno-national assimilationist projects on ethnic minorities in China. This new analysis of China's ethnic dynamics and their geopolitical consequences is designed to strengthen our understanding of the region.

DE150100228   Ruppanner, Dr Leah E

2015	$124,000.00
2016	$124,000.00
2017	$124,000.00
Total	**$372,000.00**

Primary FoR   1608   SOCIOLOGY

Funded Participants:

DECRA   Dr Leah E Ruppanner

Administering Organisation   The University of Melbourne

Project Summary

For many parents, balancing work and family demands is extremely stressful, affecting work, relationships and parent and infant health. In response, governments around the world have instituted family policies, which have not yet been systematically evaluated for their effectiveness This project aims to address this limitation by systematically evaluating family policies to maximise the health and well-being of Australian families. Applying cutting-edge methods and recently released data, this project also aims to provide specific policy suggestions to guide Australian family policy and to improve the future well-being of Australian families.

DE150100666   Sewell, Dr Robert J

2015	$124,512.00
2016	$124,512.00
2017	$124,512.00
Total	**$373,536.00**

Primary FoR   0202   ATOMIC, MOLECULAR, NUCLEAR, PARTICLE AND PLASMA PHYSICS

Funded Participants:

DECRA   Dr Robert J Sewell

Administering Organisation   The University of Melbourne

Project Summary

The project aims to make the world's most sensitive measurement of high-frequency electric fields, and demonstrate the first quantum-enhanced electric field measurement. It will use quantum entanglement and Rydberg atoms, excited to the very edge of the classical/quantum divide, to reach record sensitivities for fields associated with next generation ultrafast electronic, communication and radar devices. The project aims to build on the existing Australian research strengths in photonics, atomic physics and quantum sensing, with the potential to provide a disruptive technological breakthrough in the measurement of ultra-high-frequency electric fields, and establish a high profile research effort in the field of strongly correlated quantum gases.

DE150100169   Sun, Dr Qiang

2015	$113,000.00
2016	$103,000.00
2017	$103,000.00
Total	**$319,000.00**

Primary FoR   0103   NUMERICAL AND COMPUTATIONAL MATHEMATICS

Funded Participants:

DECRA   Dr Qiang Sun

Administering Organisation   The University of Melbourne

Project Summary

Robust, efficient numerical algorithms will be developed to solve a fundamental class of equations common in engineering, chemistry and biology. Equations describing wave phenomena in acoustics, ultrasonics and antenna design and equations describing electrostatic interactions between charge moieties in proteins and DNA as well as drug-substrate interactions are formulated as boundary integral equations. This is an efficient reduction of 3D problems to 2D but at the expense of having to deal with numerical singularities. This project aims to remove such long existing theoretical difficulties and the outcome will be general and flexible open source software solutions that will be freely available to handle such fundamental problems.

DE150101301   Trueblood, Dr Jennifer

2015	$120,000.00
2016	$120,000.00
2017	$120,000.00
Total	**$360,000.00**

Primary FoR   1702   COGNITIVE SCIENCES

Funded Participants:

DECRA   Dr Jennifer Trueblood

Administering Organisation   The University of Melbourne

Project Summary

This project aims to study human decision-making by attackers, defenders and users, in a cyber-security setting. Cognitive modelling of these decisions will play a central role in understanding and optimising the safety of cyberspace. This project will involve three components: new behavioural experiments focusing on cybersecurity situations of prevention and detection; cognitive models to understand and predict how people make decisions in such settings; and the evaluation of these models against behavioural data using Bayesian statistical methods. This will then be applied to operational problems that will involve, determining optimal security policies, automated behaviour in adversarial situations, and individualised training.

DE150100924   Wang, Dr Ke

2015	$125,000.00
2016	$125,000.00
2017	$125,000.00
Total	**$375,000.00**

Primary FoR	1005	COMMUNICATIONS TECHNOLOGIES

Funded Participants:

DECRA   Dr Ke Wang

Administering Organisation   The University of Melbourne

Project Summary

High-speed interconnects are needed to link, transmit, retrieve, and process intensive data in a time- and energy-efficient and cost-effective manner in data centres and high-performance computing. This project aims to investigate high-speed, integrated interconnects, including novel integrated devices and transceivers on silicon platforms, flexible subsystems and overall system architecture. The research outcomes will be beneficial to a number of industries including integrated chip and circuit design and fabrication, integrated systems, and network infrastructures, and will enable faster platforms for cloud computing, sensing, signal processing, and computational health.

DE150100901   Zhang, Dr Lei

2015	$121,000.00
2016	$126,000.00
2017	$119,000.00
Total	**$366,000.00**

Primary FoR	0302	INORGANIC CHEMISTRY

Funded Participants:

DECRA   Dr Lei Zhang

Administering Organisation   The University of Melbourne

Project Summary

The global energy crisis requires practical solutions regarding the development of clean and renewable alternatives to fossil fuels. This project aims to focus on the development of molecular water oxidation catalysts which is the crucial step in the utilisation of solar energy. The proposed polynuclear molecular materials will be based on earth-abundant elements and are expected to present enhanced catalytic activities for light-driven oxidation of water into oxygen. Development of these compounds will advance knowledge and breakthroughs in the area of artificial photosynthesis and generate numerous economic and environmental benefits.

Summary of Successful Discovery Early Career Researcher Award Proposals for Funding Commencing in 2015 by State and Organisation

Queensland

Griffith University

DE150100820   Huo, Dr Ziyang

2015	$130,000.00
2016	$130,000.00
2017	$130,000.00
Total	**$390,000.00**

Primary FoR   0904   CHEMICAL ENGINEERING

Funded Participants:

DECRA   Dr Ziyang Huo

Administering Organisation   Griffith University

Project Summary

Returning carbon dioxide (CO2) to a useful state is a significant and challenging problem which requires appropriate devices and energy input. By utilising sunlight as a promising and green energy input, the conversion of CO2 into liquid fuel would positively impact the global carbon balance. This project aims to prepare abundant, non-toxic and sufficiently active photoelectrodes with one dimensional nanostructure, then develop appropriate and robust photoelectrochemical devices to convert CO2 into liquid fuels. This project aims to help reduce the atmospheric CO2 concentrations and explore a new energy source.

James Cook University

DE150101266   Rummer, Dr Jodie L

2015	$119,512.00
2016	$119,512.00
2017	$119,512.00
Total	**$358,536.00**

Primary FoR   0603   EVOLUTIONARY BIOLOGY

Funded Participants:

DECRA   Dr Jodie L Rummer

Administering Organisation   James Cook University

Project Summary

This project aims to examine the effects of ocean acidification on coral reef fishes due to increasing atmospheric carbon dioxide (CO_2). Physiological performance of fish vary under elevated CO_2, but behaviour is consistently, negatively impacted. This project aims to investigate evolutionary trade-offs between behaviour and performance, physiological mechanisms key to compromising, maintaining, or enhancing metabolic performance under elevated CO_2, and the importance of habitat in how fish respond to elevated CO_2. As fish play critical roles in marine ecosystems by structuring food webs and driving ecological processes, this information will be critical for predicting the effects of ocean acidification on marine ecosystems and biodiversity.

Queensland University of Technology

DE150101137   Carr, Dr Elliot J

2015	$104,000.00
2016	$104,000.00
2017	$104,000.00
Total	**$312,000.00**

Primary FoR   0103   NUMERICAL AND COMPUTATIONAL MATHEMATICS

Funded Participants:

DECRA   Dr Elliot J Carr

Administering Organisation   Queensland University of Technology

Project Summary

Groundwater constitutes a vital part of water resources in Australia, however, the quality of this water is susceptible to contamination. This project aims to develop an innovative two-scale mathematical model for contaminant transport that accounts for small-scale heterogeneities found in the unsaturated zone of an aquifer located between the ground surface and the underlying groundwater. The project aims to develop valuable environmental insights, a simulation tool that will help in making decisions regarding the future management of Australian groundwater resources, and a general two-scale modelling and simulation framework for other important environmental and industrial problems involving coupled transport in heterogeneous media.

DE150101854   Kou, Dr Liangzhi

2015	$110,000.00
2016	$110,000.00
2017	$110,000.00
Total	**$330,000.00**

Primary FoR   0307   THEORETICAL AND COMPUTATIONAL CHEMISTRY

Funded Participants:

DECRA   Dr Liangzhi Kou

Administering Organisation   Queensland University of Technology

Project Summary

The project aims to reveal a new family of two-dimensional heterostructure topological insulators by extensive theoretical simulations, and develop feasible approaches to control the topological phase, thus enabling their use in practical nanodevice applications. The project aims not only to advance knowledge in material chemistry and condensed matter physics, but also to lead to technology revolutions in information technology, clean energy generation and cooling devices based on topological insulators. The outcomes are expected to produce new technology applications in electronics, communications, information technology, data storage and transportation.

DE150101347   Mason, Dr Matthew S

2015	$125,000.00
2016	$125,000.00
2017	$125,000.00
Total	**$375,000.00**

Primary FoR	0915	INTERDISCIPLINARY ENGINEERING

Funded Participants:

DECRA   Dr Matthew S Mason

Administering Organisation   Queensland University of Technology

Project Summary

This project aims to characterise probabilistically the severe convective wind storm risk (thunderstorm and tornado) to Australia under current and future climates. This will be achieved using a new coupled analysis-simulation based approach to wind hazard analysis. It will also characterise the complex wind structure within these wind storms by integrating three-dimensional data from novel high-resolution observation networks into a unifying wind field model. The project aims to generate the requisite information that allows convective wind storms to be explicitly accounted for in national and international wind-resistant design standards, thus acting to mitigate the devastating impacts of future events.

DE150101104   Poologanathan, Dr Keerthan

2015	$110,000.00
2016	$110,000.00
2017	$110,000.00
Total	**$330,000.00**

Primary FoR	0905	CIVIL ENGINEERING

Funded Participants:

DECRA   Dr Keerthan Poologanathan

Administering Organisation   Queensland University of Technology

Project Summary

Safe shelters are needed within residential, school and commercial building systems to prevent the loss of lives during natural disasters. This project aims to understand how the fire, cyclone and earthquake resistance of shelters can be increased by using a new cold-formed and rivet fastened hollow flange section as studs and joists within the lightweight steel frame wall, and floor systems with superior configurations that are lined with thin steel sheet and thermally superior boards. Experimental and numerical studies will be used to enhance our understanding of these novel and more complex systems and develop safer shelter systems at low cost. They can also be used in many other applications based on the emerging modular building concept.

DE150101842   Yang, Dr Qianqian

2015	$115,000.00
2016	$115,000.00
2017	$115,000.00
Total	**$345,000.00**

Primary FoR   0103   NUMERICAL AND COMPUTATIONAL MATHEMATICS

Funded Participants:

DECRA   Dr Qianqian Yang

Administering Organisation   Queensland University of Technology

Project Summary

This project aims to understand the impact of the heterogeneity of brain tissue on Magnetic Resonance Imaging (MRI) data in both healthy and diseased human brains, and to extract and quantify information on heterogeneity from the data. The project aims to develop novel mathematical and computational approaches to model the heterogeneity of the human brain. The project aims to identify new biomarkers for classifying different brain diseases, based on the extent of heterogeneity across different brain tissue. Results will be validated against extensive MRI scanning data of patients. This project aims to advance state-of-the-art techniques in human brain MRI data analysis.

Summary of Successful Discovery Early Career Researcher Award Proposals
for Funding Commencing in 2015 by State and Organisation

The University of Queensland

DE150101552   Butt, Dr Nathalie

2015	$112,500.00
2016	$113,100.00
2017	$99,512.00
Total	**$325,112.00**

Primary FoR   0502   ENVIRONMENTAL SCIENCE AND MANAGEMENT

Funded Participants:

DECRA   Dr Nathalie Butt

Administering Organisation   The University of Queensland

Project Summary

Biodiversity faces multiple threats, including global change. A significant problem is the gap between the science underpinning species' vulnerability assessments and the development of effective conservation management solutions, reducing the probability of successful conservation. Given insufficient resources exist to conserve all species, the development of a future-smart framework for prioritising resource allocation at global, national and regional scales is essential. This project aims to do that by classifying the risks to species using a predictive framework, and construct a widely applicable management scheme to maximise species' future persistence.

DE150100652   Combes, Dr Alexander N

2015	$115,000.00
2016	$115,000.00
2017	$115,000.00
Total	**$345,000.00**

Primary FoR   0604   GENETICS

Funded Participants:

DECRA   Dr Alexander N Combes

Administering Organisation   The University of Queensland

Project Summary

Transient stem/progenitor cell populations play essential roles in establishing organ systems. The balance between self-renewal and differentiation in the nephron progenitor population plays a major, but poorly understood, role in regulating kidney development. Factors produced by undifferentiated progenitors promote organ expansion, whereas differentiation of these cells builds functional capacity. What is not clear is how the balance between self-renewal and differentiation is regulated in these cells, nor how the control of this fate decision impacts on optimal organ development. This project aims to dissect the molecular identity, regulation, and influence of this stem cell population on kidney development.

DE150101110   Davenport, Dr Caillan

2015	$119,669.00
2016	$120,170.00
2017	$106,089.00
Total	**$345,928.00**

Primary FoR   2103   HISTORICAL STUDIES

Funded Participants:

DECRA   Dr Caillan Davenport

Administering Organisation   The University of Queensland

Project Summary

This project aims to examine how Roman emperors were perceived by the inhabitants of their empire, from soldiers, slaves and freedmen to senatorial aristocrats. It has two main aims: to explain the different ways in which the emperors' military, judicial, religious and moral authority was conceived, interpreted and transmitted in the Roman world; and to analyse the continuities and changes in these aspects between the first and fourth centuries A.D. The significance of this study lies in its demonstration that the popular reception of imperial rule is crucial to understanding how and why the institution of emperorship endured in the Roman world. This outcome will enhance scholarly and public understanding of the Roman empire.

DE150101117   Ewing, Dr Adam D

2015	$109,000.00
2016	$109,000.00
2017	$109,000.00
Total	**$327,000.00**

Primary FoR   0604   GENETICS

Funded Participants:

DECRA   Dr Adam D Ewing

Administering Organisation   The University of Queensland

Project Summary

Novel copies of genes often arise through retrotransposition of processed messenger RNAs. Many thousands of gene copies have arisen over evolutionary time and some of these have retained functionality while diverging from the parental gene leading to new paralogs under different regulatory regimes. Through analysis of whole-genome sequence data, we are now able to identify very recent gene copies that are not present in the reference genomes for various species, giving us the opportunity to explore the effects of new copies on the regulation of the original gene and the surrounding genomic environment into which the new copy is inserted. This project aims to address these important open questions through computational and biochemical approaches.

DE150101512   Fernando, Dr Nangallage D

2015	$120,000.00
2016	$120,000.00
2017	$120,000.00
Total	**$360,000.00**

Primary FoR   0905   CIVIL ENGINEERING

Funded Participants:

DECRA   Dr Nangallage D Fernando

Administering Organisation   The University of Queensland

Project Summary

This project aims to investigate the structural behaviour of innovative hybrid Fibre Reinforced Polymer - Timber Composite (FRPTC) sections manufactured from small 'sawlog' timber. These FRPTC sections are made by taking advantage of the orthotropic material properties and, unlike sawn timber, these structures have efficient cross sectional shapes and can be made easily in different sizes to match the requirements. Even though preliminary studies have shown promising results, behaviour of these FRPTC sections are not yet fully understood. This project aims to investigate the behaviour of these novel FRPTC sections and to develop numerical models to allow wide usage of these sections.

DE150101180   Forlini, Dr Cynthia E

2015	$116,000.00
2016	$122,000.00
2017	$124,000.00
Total	**$362,000.00**

Primary FoR   2201   APPLIED ETHICS

Funded Participants:

DECRA   Dr Cynthia E Forlini

Administering Organisation   The University of Queensland

Project Summary

As the workforce ages, Australian and international governments are prioritising brain health, seeking to increase economic productivity and reduce the costs of age-related cognitive decline. In addition to healthy lifestyle habits, certain neurotechnologies are being promoted as the means to protect cognitive performance. This project aims to explore the ethical issues and social pressures that ageing individuals experience as a result of cognitive ageing. Understanding later life from the perspective of ageing individuals may enable society to meet the ethical and policy challenges raised by emphasising cognitive wellbeing above other aspects in the ageing process.

Summary of Successful Discovery Early Career Researcher Award Proposals for Funding Commencing in 2015 by State and Organisation

DE150100397   Hooman, Dr Kamel

2015	$110,000.00
2016	$115,000.00
2017	$115,000.00
Total	**$340,000.00**

Primary FoR   0913   MECHANICAL ENGINEERING

Funded Participants:

DECRA   Dr Kamel Hooman

Administering Organisation   The University of Queensland

Project Summary

Vehicle emissions have recently driven the research, development, and commercialisation of Exhaust Gas Recirculation (EGR) systems. The development of novel EGR gas coolers for such systems will probably lead to the breakthrough necessary for advancing EGR technologies, benefiting Australian clean energy supplies in general and transport vehicles in particular. The project aims to produce lighter and cleaner EGR systems at lower costs. This project also aims to enhance the international reputation and impact of Australian research in the internationally focused fields of microporous materials and clean transport technology.

DE150100285   Kirby, Dr Emma

2015	$124,000.00
2016	$124,000.00
2017	$124,000.00
Total	**$372,000.00**

Primary FoR   1608   SOCIOLOGY

Funded Participants:

DECRA   Dr Emma Kirby

Administering Organisation   The University of Queensland

Project Summary

It is often said that a society can be measured by how it cares for its most vulnerable people. Informal care for people nearing the end of life, often provided by family and friends, is a vital area of care for the vulnerable, and is coming under significant pressure in Australia. Our capacity to care is being challenged by economic, social and cultural shifts. This project aims to examine systematically the character of informal care from multi-stakeholder perspectives, providing policy and practice-relevant evidence for better support and understanding of the role and significance of informal care for people approaching the end of life in Australian society.

DE150101523   Kuo, Dr Mei-fen

2015	$104,851.00
2016	$107,680.00
2017	$96,216.00
Total	**$308,747.00**

Primary FoR   2103   HISTORICAL STUDIES

Funded Participants:

DECRA   Dr Mei-fen Kuo

Administering Organisation   The University of Queensland

Project Summary

From the late 19th century to the present, Chinese Australian businesses and merchants have played an important but under-acknowledged role in bilateral trade and investment. This project aims to provide the first systematic study of how Chinese Australian enterprises and diasporic networks were developed from the late 19th to the early 20th century. Historical insights will be enhanced through extensive use of bilingual archival sources. The proposition to be explored is that Chinese business culture in diaspora was not simply oriented to economic survival and money-making, it was also an important element of building a trans-local community with diasporic aspects in everyday life.

DE150101150   Larroux, Dr Claire

2015	$129,000.00
2016	$129,000.00
2017	$104,000.00
Total	**$362,000.00**

Primary FoR   0603   EVOLUTIONARY BIOLOGY

Funded Participants:

DECRA   Dr Claire Larroux

Administering Organisation   The University of Queensland

Project Summary

The invention of a basic developmental program was likely a key step in the transition to multicellularity in animals, one of the major transitions in the tree of life. By combining next-generation sequencing of a representative panel of sponges and functional studies on an oviparous sponge, this project aims to identify gene interactions and networks that built the first animal embryos over 680 million years ago. Furthermore, the role of Wingless (Wnt) signalling in patterning these ancestral embryos along a primordial anterior-posterior axis will be investigated. Piecing together the fundamental molecular machinery shared by all animal embryos will shed light on the molecular basis for the complex development of most animals on Earth.

Summary of Successful Discovery Early Career Researcher Award Proposals
for Funding Commencing in 2015 by State and Organisation

DE150100425   **Liu, Dr Qiao**

2015	$124,079.00
2016	$124,079.00
2017	$124,102.00
Total	**$372,260.00**

Primary FoR   1801   LAW

Funded Participants:

DECRA   Dr Qiao Liu

Administering Organisation   The University of Queensland

Project Summary

Contract law provides an essential legal framework for every business transaction. However there are fundamental differences between the contract law of Australia and that of its biggest trade partner, China. This project aims to compare Australia and China's different judicial solutions to shared real-life contract problems. The findings, it is hoped, will facilitate mutual understanding and economic competitiveness, produce reflections and advice on the reform of Australian contract law, assist in businesses' contract drafting, and provide Australian courts and government agencies with information critical to decision-making in the context of trade relations with China.

DE150101597   **Manne, Dr Tiina**

2015	$123,869.00
2016	$123,869.00
2017	$123,869.00
Total	**$371,607.00**

Primary FoR   2101   ARCHAEOLOGY

Funded Participants:

DECRA   Dr Tiina Manne

Administering Organisation   The University of Queensland

Project Summary

For over 40 years, archaeologists have debated the nature of the initial colonisation of Australia and how people subsequently coped with large-scale climate change. This is the first study to examine systematically variation in human subsistence behaviour and animal community structure across northern Australia. Through analyses of archaeofaunas from key archaeological sites, this project aims to test assumptions about why and how northern Australia was first occupied and the manner in which people responded to dramatic environmental shifts. An additional outcome of this project, it is hoped, will be insight into the causes of fragmentation in Australian fauna assemblages and in particular, the recognition of carnivore damage.

DE150100784   **Muttenthaler, Dr Markus**

2015	$124,418.00
2016	$124,418.00
2017	$124,418.00
Total	**$373,254.00**

Primary FoR   0601   BIOCHEMISTRY AND CELL BIOLOGY

Funded Participants:

DECRA   Dr Markus Muttenthaler

Administering Organisation   The University of Queensland

Project Summary

The oxytocin and vasopressin receptors are part of a 600 million year old signalling system that is widely distributed in the kingdom of life. It is involved in many fundamental physiological functions, however we still lack a complete toolbox of selective probes to delineate the individual receptor subtypes. This project aims to introduce a novel and innovative strategy that uses state-of-the art discovery techniques to identify selective ligands in nature. Leads will be developed into molecular probes to facilitate in-depth studies of this system. This strategy is applicable to other systems and the outcomes will contribute to a significant advancement of knowledge in chemical biology.

DE150100382   **Parsell, Dr Cameron S**

2015	$129,502.00
2016	$129,366.00
2017	$129,508.00
Total	**$388,376.00**

Primary FoR   1608   SOCIOLOGY

Funded Participants:

DECRA   Dr Cameron S Parsell

Administering Organisation   The University of Queensland

Project Summary

The project aims to produce evidence and to provide theoretical and policy relevant knowledge about how people are able to exit chronic homelessness and attain housing. Generating knowledge and developing strategies to end homelessness and to realise positive life outcomes for highly marginalised people is an enduring theoretical, policy and substantive question. By closely engaging with people with experiences of homelessness, and the people that provide them with services and housing, the research will gather first-person accounts of people's actions and motivations to generate practice and policy relevant knowledge to help reduce homelessness and improve wellbeing, social and economic participation for excluded individuals.

DE150101548   Pulemotov, Dr Artem

2015	$115,000.00
2016	$115,000.00
2017	$115,000.00
Total	**$345,000.00**

Primary FoR   0101   PURE MATHEMATICS

Funded Participants:

DECRA   Dr Artem Pulemotov

Administering Organisation   The University of Queensland

Project Summary

The Ricci flow is a geometric differential equation which recently made headlines for its key role in the proof of the Poincaré Conjecture (a century-old mathematical conjecture whose resolution carried a $1,000,000 prize). Developing the theory of boundary-value problems for the Ricci flow is a fundamental question which has remained open for over two decades. This project aims to answer this question on a wide class of spaces, along with the closely related question of solvability of boundary-value problems for the prescribed Ricci curvature equation. The results will have ramifications in a variety of fields, from pure mathematics to quantum field theory, relativity and modelling of biological systems.

DE150101024   Round, Dr Erich R

2015	$126,000.00
2016	$124,000.00
2017	$123,000.00
Total	**$373,000.00**

Primary FoR   2004   LINGUISTICS

Funded Participants:

DECRA   Dr Erich R Round

Administering Organisation   The University of Queensland

Project Summary

This project aims to harness the insights of dissipating information, to discover language histories by bringing together two high-definition technologies: powerful, computational statistical engines pioneered in genetics; and fine-grained, statistically optimised observations of language structure. It seeks new insight into how languages reveal history, and how cultural groups speaking the Uralic languages of Eurasia and Australian Aboriginal languages diverged, spread and interacted, from a distant past to the recent present.

DE150101637   **Smith, Dr Cameron L**

2015	$115,000.00
2016	$115,000.00
2017	$115,000.00
Total	**$345,000.00**

Primary FoR   1007   NANOTECHNOLOGY

Funded Participants:

DECRA   Dr Cameron L Smith

Administering Organisation   The University of Queensland

Project Summary

Plasmonics (waves in a metal's electrons) can focus light to extreme concentrations that enable imaging techniques to resolve features well beyond the optical barrier known as the diffraction limit. This project aims to develop a routine methodology capable of extracting precise information from single DNA molecules by incorporating plasmonic components into a lab-on-a-chip device for use under conventional optical microscopes. The configuration would have the convenience and technological maturity associated with microscopes whilst being able to capture details of biomolecules with unprecedented detail. New DNA analyses will be made possible by the platform, such as studying the genomic diversity within a population of tumour cells.

DE150101481   **Sunagar, Dr Kartik**

2015	$123,000.00
2016	$123,000.00
2017	$127,000.00
Total	**$373,000.00**

Primary FoR   0304   MEDICINAL AND BIOMOLECULAR CHEMISTRY

Funded Participants:

DECRA   Dr Kartik Sunagar

Administering Organisation   The University of Queensland

Project Summary

Animal venoms target multiple physiological pathways to rapidly disrupt homeostasis and cause paralysis and death of prey animals. Physiological protein-encoding genes are recruited into the envenoming function, which then evolve to be highly effective on their molecular targets. The expansion of venom complexity due to the predator-prey chemical 'arms race' has given rise to a plethora of toxin types. While examples of venoms that have become subsequently streamlined and/or simplified in response to a change in environment and/or specialisation of diet are plenty, the underlying mechanisms remain elusive. This project aims to unravel how animal venoms become streamlined and uncover the underexplored vast pharmacopeia of aquatic venoms.

DE150100492   Thompson, Dr Jessica C

2015	$124,112.00
2016	$124,112.00
2017	$124,112.00
Total	**$372,336.00**

Primary FoR	2101	ARCHAEOLOGY

Funded Participants:

DECRA   Dr Jessica C Thompson

Administering Organisation   The University of Queensland

Project Summary

This project will test novel hypotheses about human behavioural strategies and responses to resource stress in central Africa at the time of early human dispersals out of Africa. It aims to examine how behavioural complexity observed in the stone artefact records of southern and eastern Africa relate to those in northern Malawi, which lies at a key crossroads for these dispersals. The study area contains rare archaeological deposits that offer a unique opportunity to address problems of early human resource use at all scales: site, landscape, and region. This project aims to contribute to human origins research through investigation of why and how local geophysical and climatic constraints shaped past human behaviour relative to other regions.

DE150101578   Vukovic, Dr Jana

2015	$124,000.00
2016	$124,000.00
2017	$124,000.00
Total	**$372,000.00**

Primary FoR	1109	NEUROSCIENCES

Funded Participants:

DECRA   Dr Jana Vukovic

Administering Organisation   The University of Queensland

Project Summary

One of the primary brain structures critical for learning and memory in animals and humans is the hippocampus, where regulated production of new neurons throughout life (i.e. adult neurogenesis) underpins these cognitive functions. The project aims to unravel how adult-born neurons exert their influence over behaviour by determining when newly born neurons become critical for behaviour and the connections made by these cells within the hippocampal network. It aims to provide fundamental new insight into the stages at which these neurons are important for the acquisition of spatial task versus the recall of spatial tasks.

DE150101687   Wang, Dr David K

2015	$115,000.00
2016	$115,000.00
2017	$110,000.00
Total	**$340,000.00**

Primary FoR	0904	CHEMICAL ENGINEERING

Funded Participants:

DECRA   Dr David K Wang

Administering Organisation   The University of Queensland

Project Summary

This project aims to produce inorganic membranes with desired nanostructures using a Rapid Thermal Processing (RTP) technique for gas separation applications. The key concept of the research is that the RTP will be able to achieve thin-film membrane layer with a finer microstructure and pore size control without heat stress-induced cracking. RTP aims to deliver superior membrane performance with less than 10 per cent of the fabrication time compared to normal slow calcination. The outcomes of this new technology aims to make inorganic membranes a commercial reality and maximize the membrane manufacturing capability and productivity of petrochemcial, chemical and clean coal/energy industries.

DE150101212   Wang, Dr Li H

2015	$120,000.00
2016	$120,000.00
2017	$120,000.00
Total	**$360,000.00**

Primary FoR	1007	NANOTECHNOLOGY

Funded Participants:

DECRA   Dr Li H Wang

Administering Organisation   The University of Queensland

Project Summary

Understanding the deformation of nanocrystalline (NC) metals is crucial for their practical application. So far, the deformation mechanism of ultrafine NC metals with grain size below 15 nanometre has been predicted by simulations which need to be verified experimentally. Using different in situ transmission electron microscopy deformation approaches, this project aims to determine deformation mechanisms of ultrafine NC platinum (Pt) at atomic-scale and to clarify how the deformation behaviour affects mechanical properties. The expected outcomes will advance the knowledge base in ultrafine NC metals and will provide guidance for developing advanced metallic materials with high strength/ductility that are the backbone for developing flexible and bendable devices.

DE150100393   Ye, Dr Liu

2015	$115,000.00
2016	$110,000.00
2017	$110,000.00
Total	**$335,000.00**

Primary FoR   0907   ENVIRONMENTAL ENGINEERING

Funded Participants:

DECRA   Dr Liu Ye

Administering Organisation   The University of Queensland

Project Summary

Nitrous oxide (N2O) is a potent greenhouse gas that can be produced during biological nitrogen removal in wastewater treatment systems. N2O emissions primarily occur in aerated zones due to active striping, and ammonia-oxidizing bacteria (AOB) are the major contributors to N2O production under such conditions. The project aims to carry out a systematic study on N2O production by AOB in mixed culture wastewater treatment systems. The project aims to advance the fundamental knowledge on N2O production pathways by AOB under different operational conditions, and deliver a modelling tool for reliably estimating N2O emission from wastewater treatment systems as well as strategies to reduce the emissions.

South Australia

The Flinders University of South Australia

DE150101981   Gutierrez-Jurado, Dr Hugo A

2015	$120,402.00
2016	$124,902.00
2017	$108,402.00
Total	**$353,706.00**

Primary FoR   0406   PHYSICAL GEOGRAPHY AND ENVIRONMENTAL GEOSCIENCE

Funded Participants:

DECRA   Dr Hugo A Gutierrez-Jurado

Administering Organisation   The Flinders University of South Australia

Project Summary

This project aims to develop, implement and evaluate a field monitoring technique building upon new theoretical developments to quantify evaporation and transpiration from soil and vegetation using a limited number of measurements of temperature, humidity and net radiation above soil and canopies. This new technique aims to characterise in situ the effect of vegetation cover on the partitioning of energy and water fluxes in areas with complex terrain and patchy vegetation. The project aims to produce new field experiment designs for optimal use of available technology and without restrictive limitations of fetch size required by traditional approaches (for example, eddy-covariance, Bowen ratio method).

DE150100302   Shanafield, Dr Margaret A

2015	$126,546.00
2016	$121,612.00
2017	$109,012.00
Total	**$357,170.00**

Primary FoR   0406   PHYSICAL GEOGRAPHY AND ENVIRONMENTAL GEOSCIENCE

Funded Participants:

DECRA   Dr Margaret A Shanafield

Administering Organisation   The Flinders University of South Australia

Project Summary

Australia is the world's driest continent, and reliant on groundwater for survival and livelihood. A clear understanding of how our groundwater is replenished is therefore imperative. Groundwater recharge is difficult to quantify because it occurs as infiltration beneath streambeds in response to rain events. This project aims to combine field data from fibre optic temperature sensing, radio-isotopes, and remote sensing into streamflow and catchment scale models to characterise connections between infiltration and recharge in an Australian catchment. The project aims to produce easily applicable tools to predict aquifer replenishment after storm events and predictions of groundwater availability under future climate conditions.

DE150101108   Thomas, Dr Nicole A

2015	$119,000.00
2016	$119,000.00
2017	$114,000.00
Total	**$352,000.00**

Primary FoR   1701   PSYCHOLOGY

Funded Participants:

DECRA   Dr Nicole A Thomas

Administering Organisation   The Flinders University of South Australia

Project Summary

The brain has a remarkable capacity to provide a coherent experience of the world by seamlessly integrating sights and sounds from different locations. It is only after brain damage, or when faced with a high attentional load, that our limitations become apparent. The project aims to investigate these limitations by determining how spatial location influences attention in relation to distractibility, cross-modal input and emotionality. Eye tracking and physiological measures of arousal will be combined with traditional cognitive measures to provide a deeper understanding of spatial attention. This project aims to improve attentional models and develop innovative strategies to increase safety by decreasing inattention and distraction.

Summary of Successful Discovery Early Career Researcher Award Proposals for Funding Commencing in 2015 by State and Organisation

The University of Adelaide

DE150100542   Breed, Dr Martin F

2015	$120,000.00
2016	$120,000.00
2017	$115,000.00
Total	**$355,000.00**

Primary FoR   0604   GENETICS

Funded Participants:

DECRA   Dr Martin F Breed

Administering Organisation   The University of Adelaide

Project Summary

This project aims to address a key debate on the relative roles of dispersal and selection on adaptation, testing how life history traits determine the magnitude of adaptation. Since dispersal should override selection, this project endeavours to show that plants that strongly disperse will display weaker signals of adaptation but a higher capacity to adapt. The project aims to test these predictions with ecological genomics and functional genetics at a multi-species scale across climate gradients in South Australia, using a novel design that separates dispersal (isolation-by-distance) from selection (isolation-by-ecology). This understanding will provide improved conservation planning that seeks to restore resilience to biological communities that are under increasing environmental pressures.

DE150100837   Byrt, Dr Caitlin S

2015	$118,000.00
2016	$118,000.00
2017	$118,000.00
Total	**$354,000.00**

Primary FoR   0607   PLANT BIOLOGY

Funded Participants:

DECRA   Dr Caitlin S Byrt

Administering Organisation   The University of Adelaide

Project Summary

This project will aim to use data to define how the synthesis and interconversion of nucleotide sugars is regulated and how this controls the properties of arabinoxylan in economically important plants. Dietary consumption of arabinoxylan reduces chronic diseases. Additionally, the attributes of arabinoxylan influence the cost of processing plant biomass. However, genetic control of the properties of the plant polysaccharide arabinoxylan is unresolved. A major control point in the partitioning of carbon from photosynthesis into arabinoxylan is the activity of sugar nucleotide interconverting enzymes. To characterise these enzymes, genomic, glycomic and enzyme kinetic data will be combined and the target enzymes will be modified in transgenic plants.

DE150101647   Globke, Dr Wolfgang

2015	$110,000.00
2016	$110,000.00
2017	$110,000.00
Total	**$330,000.00**

Primary FoR	0101	PURE MATHEMATICS

Funded Participants:

DECRA   Dr Wolfgang Globke

Administering Organisation   The University of Adelaide

Project Summary

Symplectic geometry is the mathematical foundation of classical mechanics and quantum theory. The symmetry group of a physical system determines the conservation laws governing its behaviour. This project aims to advance the understanding of a large class of these symmetry groups and their associated symplectic geometries, which are called symplectic solvmanifolds. The project aims to: determine the topological properties of symplectic solvmanifolds as encoded in their fundamental groups; their geometric properties in the form of holonomy groups; and the algebraic properties of their symplectic algebras. The project endeavours to classify the building blocks of symplectic geometry.

DE150100091   Hao, Dr Nan

2015	$111,000.00
2016	$115,000.00
2017	$115,000.00
Total	**$341,000.00**

Primary FoR	0604	GENETICS

Funded Participants:

DECRA   Dr Nan Hao

Administering Organisation   The University of Adelaide

Project Summary

The DNA inside the cell is not just a repository of information, but is an active player in how that information is used. Proteins bind to defined locations on the DNA to control which genes are active, and genes are expressed by RNA polymerases that track along the DNA. Collisions between RNA polymerases and DNA-bound proteins can remove the proteins or block the polymerase. How can these essential processes safely coexist on the DNA? The project aims to integrate systematic experiments using well-defined genetic components and mathematical modelling to understand the 'design' features of DNA and proteins that minimise these traffic problems. A better understanding could inform new strategies for manipulation of gene expression.

Summary of Successful Discovery Early Career Researcher Award Proposals
for Funding Commencing in 2015 by State and Organisation

DE150101306   Ma, Dr Tianyi

2015	$125,000.00
2016	$120,000.00
2017	$120,000.00
Total	**$365,000.00**

Primary FoR   0306   PHYSICAL CHEMISTRY (INCL. STRUCTURAL)

Funded Participants:

DECRA   Dr Tianyi Ma

Administering Organisation   The University of Adelaide

Project Summary

The high-performance storage and utilisation of renewable energy, such as solar and wind energy, will provide a direct response to Australia's energy and climate issues. This project aims to develop porous metal phosphonate ion exchange membranes, which can be used in the redox flow battery, one of the most powerful, large-scale energy storage devices, with large capacity, high efficiency, long life and low cost. The project aims to improve the overall performance and fabrication of redox flow batteries, promote capacity and efficiency, and reduce the cost of renewable energy storage thereby benefiting the Australian economy and environment.

DE150101528   Moreau, Dr Danielle J

2015	$115,000.00
2016	$115,000.00
2017	$115,000.00
Total	**$345,000.00**

Primary FoR   0913   MECHANICAL ENGINEERING

Funded Participants:

DECRA   Dr Danielle J Moreau

Administering Organisation   The University of Adelaide

Project Summary

Noise from air transportation and wind turbines is a rapidly growing component of environmental noise pollution that must be reduced to improve public health and well-being. A submarine must also have a low acoustic signature to ensure its stealthiness. The common source of noise generation among these technologies is the airfoil, yet we do not understand how they create noise in real, complex environments. This project aims to understand how fluid flow interacts with a wall-mounted finite airfoil to produce sound. The project aims to identify the noise producing physics via a novel wind tunnel experiment and numerical study. This enhanced understanding will create better airfoil noise prediction and control strategies in the future.

DE150101574   Weyrich, Dr Laura S

2015	$128,431.00
2016	$120,151.00
2017	$120,001.00
Total	**$368,583.00**

Primary FoR   0603   EVOLUTIONARY BIOLOGY

Funded Participants:

DECRA   Dr Laura S Weyrich

Administering Organisation   The University of Adelaide

Project Summary

The bacteria within the human body (microbiome) are vital to human health, and alterations to these intricate microbial communities are now associated with disease. Using ancient DNA, this project aims to examine the evolutionary history of the human microbiome by exploring ancient bacterial communities preserved in calcified dental plaque (calculus) over the past 10 000 years. This will provide valuable information that reveals how these bacterial communities respond to alterations in human diet, environment, culture, and location. By monitoring changes in a natural modern system, this project aims to determine how these microbial communities established themselves within the human body, elucidating how the microbiome may respond in the future.

DE150100548   Wiederman, Dr Steven

2015	$117,000.00
2016	$121,000.00
2017	$121,000.00
Total	**$359,000.00**

Primary FoR   1109   NEUROSCIENCES

Funded Participants:

DECRA   Dr Steven Wiederman

Administering Organisation   The University of Adelaide

Project Summary

Whether a human catching a ball, a dog leaping at a frisbee or a dragonfly hunting prey amidst a swarm, brains both large and small have evolved the ability to focus attention on one moving target, even in the presence of distracters. This project aims to investigate how brains solve this challenging problem by recording the activity of dragonfly neurons that selectively attend to one target whilst ignoring others. The project aims to examine how expectation and attention are encoded in the brain and will build an autonomous robot using computational models bio-inspired from this neuronal processing. Robots capable of visually perceiving and interacting with targets in natural environments have applications in health, surveillance and defence.

DE150101234   Zhang, Dr Lei

2015	$120,000.00
2016	$120,000.00
2017	$120,000.00
Total	**$360,000.00**

Primary FoR   0912   MATERIALS ENGINEERING

Funded Participants:

DECRA   Dr Lei Zhang

Administering Organisation   The University of Adelaide

Project Summary

Aqueous sodium ion batteries are promising to meet demands for large-scale energy storage applications in the deployment of solar, wind and other volatile renewable energy sources. This project aims to design and synthesise a series of nanostructured metal organic frameworks, especially Prussian blue analogues, with controllable mesoporosity and hollow architectures as electrode materials for aqueous sodium ion batteries. Unique nanostructure design can endow the battery systems with advanced features of long cycle life, high rate capacity retention and very low hysteresis. The project is vitally important to the long-term viability of Australia's resources and supports Australia's access to new markets and supply chains.

DE150101506   Zivkovic, Dr Tanya M

2015	$110,000.00
2016	$110,000.00
2017	$107,612.00
Total	**$327,612.00**

Primary FoR   1601   ANTHROPOLOGY

Funded Participants:

DECRA   Dr Tanya M Zivkovic

Administering Organisation   The University of Adelaide

Project Summary

Given Australia's diverse ageing population, there is increasingly urgent need for culturally sensitive end-of-life care. Currently, end-of-life planning is promoted and standardised in the form of advance care directives, which have a lower uptake in culturally and linguistically diverse groups. The project aims to identify and theorise points of uptake and resistance to advance care planning in Australia's largest Asian populations. This new knowledge will be used to develop strategies for cross-cultural understanding in relation to end-of-life care preferences. The outcomes will have a strong bearing on how community attitudes, the experience of individuals, professional protocols, and ultimately, legislation evolve in Australia.

University of South Australia

DE150100564   Chien, Dr Chia-Chi

2015	$120,000.00
2016	$130,000.00
2017	$125,000.00
Total	**$375,000.00**

Primary FoR   1007   NANOTECHNOLOGY

Funded Participants:

DECRA   Dr Chia-Chi Chien

Administering Organisation   University of South Australia

Project Summary

This inter-disciplinary project aims to develop advances in in vitro models aimed at elucidating the delivery and transport of diagnostic and therapeutic nanomedicine agents in tumour tissues. The project aims to build on advanced tissue engineering principles and state-of-the-art micro-fabrication technologies to remove the limitation associated with animal studies and provide unprecedented mechanistic insights into the delivery, transport and binding of nanomedicines into tumour tissues.

DE150100328   Loch, Dr Adam J

2015	$131,000.00
2016	$127,000.00
2017	$116,000.00
Total	**$374,000.00**

Primary FoR   1402   APPLIED ECONOMICS

Funded Participants:

DECRA   Dr Adam J Loch

Administering Organisation   University of South Australia

Project Summary

Transaction costs provide social, economic, environmental and political barriers to the effectiveness of water reallocation policy in Australia. These costs are often difficult to quantify, but potentially are subject to measurement. This project aims to develop a comprehensive transaction cost framework for the Murray-Darling Basin that can be used to capture and measure transaction costs related to water policy. Further, the scope of the cost measurement will involve a variety of data collection approaches. Outcomes include better water policy and management from arrangements that will span the divide between the Basin Plan and its implementation.

DE150100926   Peterson, Dr Andrew D

2015	$110,269.00
2016	$114,497.00
2017	$111,261.00
Total	**$336,027.00**

Primary FoR   1302   CURRICULUM AND PEDAGOGY

Funded Participants:

DECRA   Dr Andrew D Peterson

Administering Organisation   University of South Australia

Project Summary

The increasingly globalised world requires education and schooling in Australia to provide young people with the knowledge, skills and attributes needed to participate fully as global citizens. While the goals of Australian schooling and the national Australian Curriculum highlight the importance of preparing students for global citizenship, little is known about how schools and teachers interpret and apply this Curriculum. This project aims to use qualitative research methods to determine teachers' work and students' experiences, providing the first detailed account of educating students for global citizenship in Australian schools. The project aims to contribute to improved educational policy and practice, both in Australia and internationally.

Western Australia

Curtin University of Technology

DE150100195   Bi, Dr Kaiming

2015	$120,000.00
2016	$120,000.00
2017	$120,000.00
Total	**$360,000.00**

Primary FoR   0905   CIVIL ENGINEERING

Funded Participants:

DECRA   Dr Kaiming Bi

Administering Organisation   Curtin University of Technology

Project Summary

Pipelines are important structures but are vulnerable to different types of damage. This damage is often associated with pipeline vibration. It is important to control adverse vibrations to reduce the risk of catastrophic damage. This project proposes using sandwich pipe to suppress different sources of vibrations that may be experienced during the lifetime of the pipeline. Analytical, numerical and experimental investigations will be carried out to demonstrate the feasibility of the proposed method. The project aims to develop direct applications for designing pipelines to suppress different sources of vibration and to guarantee the safety of pipelines.

DE150100517   Nguyen, Dr Thanh Vinh

2015	$120,000.00
2016	$120,000.00
2017	$120,000.00
Total	**$360,000.00**

Primary FoR   0305   ORGANIC CHEMISTRY

Funded Participants:

DECRA   Dr Thanh Vinh Nguyen

Administering Organisation   Curtin University of Technology

Project Summary

The current technologies to synthesise organic substances, an important part of human life, often involve the use of excess amounts of reagents or precious and toxic metal catalysts, which incur high production costs and severe environmental impact. This project aims to use organocatalysis, chemical processes catalysed by stable, small, easily accessible, non-metallic organic compounds, to find a solution for these issues. Novel organocatalytic methods will be designed and developed in order to promote environmentally friendly, highly efficient and selective chemical procedures for low cost production of laboratory organic substances and application in the industrial synthesis of potential agrochemicals and medicinal agents.

Murdoch University

DE150100321   Gleiss, Dr Adrian C

2015	$115,000.00
2016	$105,000.00
2017	$115,000.00
Total	**$335,000.00**

Primary FoR   0602   ECOLOGY

Funded Participants:

DECRA   Dr Adrian C Gleiss

Administering Organisation   Murdoch University

Project Summary

Climate variation will continue to impact biodiversity on our globe. Exciting new evidence has suggested that terrestrial ectotherms can minimise their vulnerability to changing temperatures by altering their thermoregulatory behaviour. Fish, unlike terrestrial ectotherms do not possess the same ability to thermoregulate and it is unclear how behavioural changes may reduce a population's vulnerability to climate change. This project aims to combine bio-logging technology, energy budget theory and climate models to predict the potential role that changing behaviours may have in reducing the vulnerability of fish populations to climate change.

DE150100731   Pino-Pasternak, Dr Deborah S

2015	$120,308.00
2016	$122,016.00
2017	$119,420.00
Total	**$361,744.00**

Primary FoR   1301   EDUCATION SYSTEMS

Funded Participants:

DECRA   Dr Deborah S Pino-Pasternak

Administering Organisation   Murdoch University

Project Summary

How do young children develop critical learning behaviours that are the key for their future academic success? What kinds of environments support this development? This project aims to answer these questions by investigating the development of regulatory behaviours (with a specific focus on self-regulated learning) during the first two years of schooling, and identifying critical contextual variables at home and at school impacting on this development. Findings from this research will provide crucial information for the design of family and practitioner-based interventions helping to improve the educational outcomes of young Australians.

The University of Western Australia

DE150100428   An, Dr Hongwei

2015	$120,000.00
2016	$120,000.00
2017	$120,000.00
Total	**$360,000.00**
Primary FoR	0905	CIVIL ENGINEERING

Funded Participants:

DECRA   Dr Hongwei An

Administering Organisation   The University of Western Australia

Project Summary

This project aims to investigate the flow around a circular cylinder, placed near a plane boundary, as a fundamental fluid phenomenon and for applications of designing subsea pipelines. The proposed work will be carried out using a combined approach of physical model testing and numerical study. The effect of the plane boundary on flow transition from 2D to 3D, from sub-critical to critical turbulence regime will be examined. The project aims to derive a comprehensive set of force coefficients to predict hydrodynamic forces on pipelines that will improve the design of subsea pipelines. This project could provide significant benefits for the Australian subsea oil and gas industry.

DE150101521   Buzatto, Dr Bruno A

2015	$117,667.00
2016	$116,065.00
2017	$115,967.00
Total	**$349,699.00**
Primary FoR	0602	ECOLOGY

Funded Participants:

DECRA   Dr Bruno A Buzatto

Administering Organisation   The University of Western Australia

Project Summary

Diseases, crops, livestock, and even some natural resources evolve, therefore comprehending evolutionary processes and their implications for humans is paramount. A paradigm shift in evolutionary theory was the realisation that genes are not the whole story, and that plasticity to the environment is vital for evolution. This highlights the importance of environmentally sensitive traits, such as conditional alternative phenotypes, where a genome can produce completely different morphologies in different environments. This project aims to investigate the development, evolutionary potential, and ecology of alternative phenotypes, contributing to our ability to understand and manage the most important of biological processes, evolution.

DE150101625   Gasparini, Dr Clelia

2015	$128,512.00
2016	$128,512.00
2017	$128,512.00
Total	**$385,536.00**

Primary FoR	0603	EVOLUTIONARY BIOLOGY

Funded Participants:

DECRA   Dr Clelia Gasparini

Administering Organisation   The University of Western Australia

Project Summary

The way that ejaculates interact with the female reproductive tract is thought to have profound evolutionary implications in internal fertilizers. Yet we currently lack clear insights into these processes in most taxa, precisely because such ejaculate-female interactions are hidden from view inside the female's reproductive tract. In this project an integrated series of experiments on a model vertebrate (the guppy) will overcome the inherent challenges in studying ejaculate-female interactions. The project aims to shed new light on the role that ejaculate-female interactions play in sperm competition, and will explore the consequences of these interactions at different evolutionary levels and across varying social environments.

DE150101484   Gutmann, Dr Bernard

2015	$122,000.00
2016	$121,000.00
2017	$122,000.00
Total	**$365,000.00**

Primary FoR	0607	PLANT BIOLOGY

Funded Participants:

DECRA   Dr Bernard Gutmann

Administering Organisation   The University of Western Australia

Project Summary

The pentatricopeptide repeat (PPR) code has been described as an RNA code that connects specific residues in PPR motifs with the precise recognition of individual nucleotides. It will enable the design of custom RNA-binding proteins with tremendous potential in research and biotechnology. RNA-processing technologies aim to be developed that consist of PPR domains fused with an additional endonuclease domain for cleaving chosen target RNAs. In the longer term, successful technologies will be tested in living organisms for biotechnology applications or in new therapeutic strategies.

DE150100618   Lagos, Dr Claudia D

2015	$118,000.00
2016	$118,000.00
2017	$118,000.00
Total	**$354,000.00**

Primary FoR   0201   ASTRONOMICAL AND SPACE SCIENCES

Funded Participants:

DECRA   Dr Claudia D Lagos

Administering Organisation   The University of Western Australia

Project Summary

This project aims to understand the complete cycle of gas in galaxies: from the process of feeding galaxies, going through star formation, to the process of outflowing gas from galaxies. This requires a full physical description of the inflow of gas from filaments going through the halo until reaching galaxies, the process of star formation in a multi-phase gas medium, and the effect energetic events have on the gas content of galaxies. This project in the field of extragalactic astrophysics is designed to complement major observational efforts in Australia, such as the Square Kilometre Array and its Pathfinder, as it will provide simulations with full physical descriptions of the neutral gas in the Universe.

DE150101005   Lorenser, Asst Prof Dirk

2015	$127,412.00
2016	$130,429.00
2017	$120,447.00
Total	**$378,288.00**

Primary FoR   0205   OPTICAL PHYSICS

Funded Participants:

DECRA   Asst Prof Dirk Lorenser

Administering Organisation   The University of Western Australia

Project Summary

The project aims to develop new types of tiny biomedical imaging devices based on optical fibres that can be inserted into the body via hypodermic needles or catheters. These devices will have the ability to generate a three-dimensional image of the tissue region. As the devices will also be able to sense biochemical or mechanical properties of the tissue, they can be used to differentiate healthy from diseased tissue. These minimally invasive devices will produce information-rich multidimensional fused image and sensor data, opening up new possibilities for biologists and medical researchers to study disease progression and treatment in living animals and humans, with great potential for scientific discovery.

DE150100130   O'Leary, Dr Brendan M

2015	$122,000.00
2016	$120,000.00
2017	$120,000.00
Total	**$362,000.00**

Primary FoR   0607   PLANT BIOLOGY

Funded Participants:

DECRA   Dr Brendan M O'Leary

Administering Organisation   The University of Western Australia

Project Summary

Plant metabolism is more complex and less well understood than metabolism in other groups such as animals or bacteria. Our lack of understanding of how plants control their metabolism is currently a major roadblock in the development and use of plants to produce increased quantities of nutritional, medicinal and chemical compounds. It was recently discovered that animal and bacterial cells coordinate the activity of central metabolic pathways via a specific chemical modification (acetylation) of key enzymes. As enzyme acetylation may function in plant cells as well, this project aims to perform a fundamental yet practical assessment of how this mechanism works in plants and how it can be exploited to accurately manipulate plant metabolism.

DE150101612   O'Loughlin, Dr Katrina L

2015	$118,319.00
2016	$114,848.00
2017	$101,579.00
Total	**$334,746.00**

Primary FoR   2005   LITERARY STUDIES

Funded Participants:

DECRA   Dr Katrina L O'Loughlin

Administering Organisation   The University of Western Australia

Project Summary

This project will investigate a rare archive of letters and manuscript materials to examine forms of literary friendship between women in the eighteenth century. This was a period of unprecedented globalisation: letter-based networks stretched across continents. Such connections were conceived in terms of a modern Republic of Letters, an idealised fraternity of scholars and writers who set aside differences in order to foster the exchange of information and ideas. This study of fresh manuscript materials will assist in exploring the history of English-speaking intellectual networks and international exchange in early modernity and the place of women within them. The project is located within the long history of global, material and intellectual exchanges in which European Australia was settled. Looking to the past, the project simultaneously contributes to contemporary debates over the possibilities and pitfalls of cultural ⸢cosmopolitanism⸣ as a mode of transnational exchange.

DE150101795   Samsam Shariat, Dr Bashir

2015	$124,000.00
2016	$124,000.00
2017	$124,000.00
Total	**$372,000.00**

Primary FoR   0912   MATERIALS ENGINEERING

Funded Participants:

DECRA   Dr Bashir Samsam Shariat

Administering Organisation   The University of Western Australia

Project Summary

The fundamental leaps in new technologies occur with improvements in the materials with which they are made. Until recently high performance metallic composite design had hit a 20 year blockage in nanocomposite design. The solution, a Nickel, Titanium and Niobium (NiTi-Nb) nanowire composite has been heralded as an era of new possibilities in materials design. This project aims to advance high performance metallic composite design by investigating the mechanisms of exceptionally large elastic strains achieved in nanowires embedded in a phase-transforming metallic matrix (i.e. NiTi). An understanding of this high performance nanocomposite design has broad application in medicine and engineering.

DE150100460   Secco, Dr David

2015	$129,000.00
2016	$129,000.00
2017	$122,000.00
Total	**$380,000.00**

Primary FoR   0604   GENETICS

Funded Participants:

DECRA   Dr David Secco

Administering Organisation   The University of Western Australia

Project Summary

DNA methylation (mC) is a covalent modification of DNA essential for the establishment and maintenance of correct gene expression patterns and recently suggested to be responsive to some environmental cues in plants. Using cutting edge technologies, this project aims to identify nutrient stress-induced mC changes and investigate the role that these changes may play in transcriptional regulation, as well as assessing whether these changes can be transmitted to the next generation to confer intergenerational stress responsiveness. Altogether this project aims to provide fundamental knowledge of the role of mC in plant gene regulation and stress response as well as paving the way for the next generation of novel crop-improvement strategies.

Summary of Successful Discovery Early Career Researcher Award Proposals
for Funding Commencing in 2015 by State and Organisation

Tasmania

University of Tasmania

DE150101190   Carey, Dr Rebecca J

2015	$120,023.00
2016	$115,708.00
2017	$114,528.00
Total	**$350,259.00**

Primary FoR   0403   GEOLOGY

Funded Participants:

DECRA   Dr Rebecca J Carey

Administering Organisation   University of Tasmania

Project Summary

Exploration on the modern seafloor reveals the deposits of deep (greater than 1 000 metres) silicic explosive eruptions, yet theory predicts that explosivity at these depths is largely suppressed. In 2012 the largest and deepest silicic submarine explosive eruption ever recorded took place at depths up to 1 600 metres, also challenging this theory. This project leverages a United States of America research expedition to the eruption site. This project aims to constrain the physical and chemical factors that control explosivity using cutting-edge technologies. Australia's ancient submarine volcanoes host highly economic ore deposits. This project aims to enhance the ability to interpret ancient volcanic settings, thereby improving the potential for new ore deposit discoveries.

DE150101390   Gilbert, Dr Frederic

2015	$120,512.00
2016	$121,512.00
2017	$121,512.00
Total	**$363,536.00**

Primary FoR   2201   APPLIED ETHICS

Funded Participants:

DECRA   Dr Frederic Gilbert

Administering Organisation   University of Tasmania

Project Summary

The use of novel, invasive, synthetic, biomedical brain technologies such as predictable brain devices, 3D printed biomaterials, additive-bio-fabricated materials, and drug delivery systems have raised unprecedented ethical issues for research. Given the therapeutic potential and high risk of harm associated with synthetic biomedical applications, it is critical to identify the ethical issues before these novel applications are widely used in human clinical trials. This project aims to explore how research trial guidelines can address the ethical issues raised by these new brain applications.

Summary of Successful Discovery Early Career Researcher Award Proposals
for Funding Commencing in 2015 by State and Organisation

DE150100263   Kilah, Dr Nathan L

2015	$124,512.00
2016	$124,512.00
2017	$124,512.00
Total	**$373,536.00**

Primary FoR   0302   INORGANIC CHEMISTRY

Funded Participants:

DECRA   Dr Nathan L Kilah

Administering Organisation   University of Tasmania

Project Summary

The properties of substances we experience in our daily lives owe much to very weak interactions taking place between molecules. Consider a cup of coffee: very weak interactions hold the water together as a liquid, and result in the biological action of caffeine within the body. The project aims to develop new materials based on an underexplored class of weak interactions known as halogen bonds. These interactions will be used to assemble large molecules in solution, probe the presence of pollutants in water, and to separate active and inactive forms of pharmaceuticals. The development of health and environmental applications in the course of this project aim to significantly enhance our fundamental understanding of these weak interactions.

DE150100937   Nikurashin, Dr Maxim

2015	$124,508.00
2016	$124,468.00
2017	$124,508.00
Total	**$373,484.00**

Primary FoR   0404   GEOPHYSICS

Funded Participants:

DECRA   Dr Maxim Nikurashin

Administering Organisation   University of Tasmania

Project Summary

Mixing in the Southern Ocean strongly affects the transport and storage of heat, carbon, and nutrients in the global ocean and hence climate itself. Yet processes generating mixing in the Southern Ocean remain poorly understood and inadequately represented in present ocean and climate models. This project aims to: understand mixing processes based on an innovative approach combining sparse observations and computer simulations; and to implement this understanding into a state-of-the-art climate model to study mixing impacts on the ocean circulation and climate. This project aims to produce substantial improvements in climate models and allow Australia to predict and respond more effectively to climate change.

DE150100336   While, Dr Geoffrey M

2015	$127,591.00
2016	$123,862.00
2017	$118,000.00
Total	**$369,453.00**

Primary FoR   0602   ECOLOGY

Funded Participants:

DECRA   Dr Geoffrey M While

Administering Organisation   University of Tasmania

Project Summary

The project aims to connect processes occurring across levels of biological organisation to provide a unified understanding of why animals live together. Evolutionary transitions to and from complex social behaviour appear linked to female multiple mating (polyandry). However, the causal pathway by which variation in polyandry results in the emergence and diversification of sociality is yet to be established. This project aims to combine empirical, theoretical and comparative approaches to address this. It will test: the environmental causes of individual variation in polyandry; its effect on social behaviours that promote social complexity at the population level; and how this corresponds to divergence in social complexity across species.

Summary of Successful Discovery Early Career Researcher Award Proposals for Funding Commencing in 2015 by State and Organisation

Australian Capital Territory

Commonwealth Scientific and Industrial Research Organisation

DE150101259   Firth, Dr Cadhla

2015	$124,000.00
2016	$124,000.00
2017	$123,000.00
Total	**$371,000.00**

Primary FoR   0604   GENETICS

Funded Participants:

DECRA   Dr Cadhla Firth

Administering Organisation   Commonwealth Scientific and Industrial Research Organisation

Project Summary

Urbanisation increases the risk of infectious disease emergence by rapidly altering contact rates between humans and other species. Fortunately, many consequences of urbanisation appear to be universal, suggesting that it is possible to identify factors likely to increase the risk of viral disease emergence and predict their impacts. This project aims to examine the viral response to changes in host and vector population structure and dynamics that occur as a result of urbanisation, and identify viral characteristics that are associated with survival in an urban environment. This novel fusion of urban and viral ecology will have unprecedented impact on the development of predictive models of viral emergence for risk assessment and management.

The Australian National University

DE150100637   Banfield, Dr Michelle A

2015	$108,630.00
2016	$107,072.00
2017	$106,832.00
Total	**$322,534.00**

Primary FoR   1117   PUBLIC HEALTH AND HEALTH SERVICES

Funded Participants:

DECRA   Dr Michelle A Banfield

Administering Organisation   The Australian National University

Project Summary

This project aims to inform health system change to ensure people with serious mental illness can access quality services. While improved access to quality mental health services has been a key target in Australian health policy for over 20 years, people with mental illness continue to report problems accessing and navigating the complex service system. The project aims to study consumers' mental health service experiences using policy, qualitative, quantitative and geographic analysis to identify systemic problems. Mental health consumers and service providers will be actively involved in developing final policy recommendations to ensure system change reflects their knowledge.

DE150100026   Barton, Dr Philip S

2015	$127,512.00
2016	$124,512.00
2017	$127,512.00
Total	**$379,536.00**

Primary FoR   0501   ECOLOGICAL APPLICATIONS

Funded Participants:

DECRA   Dr Philip S Barton

Administering Organisation   The Australian National University

Project Summary

Decomposition is fundamental to the recycling of nutrients in ecosystems, yet it is not known how different combinations of decomposer insects contribute to this important ecosystem service. This project includes a series of experiments to examine how insects affect carrion decomposition rates, and how this depends on environmental context. The project aims to show how decomposition is maintained in variable and changing landscapes by revealing when the loss or gain of species will alter this critical ecological process. This will have implications for biodiversity-ecosystem function theory, and applications to biodiversity management and ecosystem restoration.

Summary of Successful Discovery Early Career Researcher Award Proposals for Funding Commencing in 2015 by State and Organisation

DE150100083   Beanland, Dr Vanessa

2015	$120,000.00
2016	$120,000.00
2017	$120,000.00
Total	**$360,000.00**

Primary FoR   1701   PSYCHOLOGY

Funded Participants:

DECRA   Dr Vanessa Beanland

Administering Organisation   The Australian National University

Project Summary

Visual search is a fundamental skill that is required in several aspects of everyday life. Driving represents an example of high-stakes search: we must constantly scan the environment in order to identify both potential hazards and informational cues, such as traffic lights and signs. While most drivers are experienced (they have been driving for years) they are not experts (they have no special training or skills); this lack of expertise potentially affects search accuracy and, in turn, road safety. This project aims to use and extend existing models of visual search performance in order to explore factors that influence drivers' visual search abilities, and to identify strategies for reducing these perceptual failures and, in turn, road crashes.

DE150100795   Chan, Dr Joshua C

2015	$120,000.00
2016	$130,000.00
2017	$115,000.00
Total	**$365,000.00**

Primary FoR   1403   ECONOMETRICS

Funded Participants:

DECRA   Dr Joshua C Chan

Administering Organisation   The Australian National University

Project Summary

Quantitative models are essential for formulating good policies. In a changing world, the analysis should be based on models that allow the behaviour of the economy to change over time. Due to computational limitations, however, one is often restricted to linear models, even when nonlinear ones are more appropriate. This project aims to develop new methods for estimating time-varying nonlinear models. Two important applications are also considered: one investigates how the zero lower bound on interest rates affects the monetary policy transmission mechanism; and, the other examines how uncertainties about monetary and fiscal policy affect economic growth and inflation. This project will have strong practical significance for conducting macroeconomic policy.

DE150100884   Decker, Dr Manuel

2015	$122,000.00
2016	$122,000.00
2017	$122,000.00
Total	**$366,000.00**

Primary FoR   1007   NANOTECHNOLOGY

Funded Participants:

DECRA   Dr Manuel Decker

Administering Organisation   The Australian National University

Project Summary

Metal nanoparticles are ideal candidates to enhance and modify the radiation of nanoscale light sources. However, research in nano light sources is only just beginning, thus their full potential has not yet been unlocked. This project aims to develop novel nano light sources to control the polarisation-state of emission and to enhance their efficiency and brightness. The project aims to deliver a new technology platform for on-chip integration of these light sources which is needed to demonstrate real-world applications. This platform will also be used to develop a new class of compact waveguide sensors that are highly sensitive and flexible with a broad range of applications.

DE150101206   Eichten, Dr Steven

2015	$122,512.00
2016	$124,512.00
2017	$125,512.00
Total	**$372,536.00**

Primary FoR   0604   GENETICS

Funded Participants:

DECRA   Dr Steven Eichten

Administering Organisation   The Australian National University

Project Summary

Adaptation to environmental change is required for species to persist, however rapid environmental change may exceed the limits of traditional genetic adaptation leading to widespread decline. Recent work has highlighted the 'extended genotype' as an additional factor influencing adaptive phenotypes. This project aims to examine DNA methylation and polyploidisation as both a cause and consequence of the adaptation process using natural populations of the model cereal Brachypodium distachyon. The project aims to determine the architecture of these features and how their variability impacts adaptive traits such as flowering time. From the functional role of the extended genotype the project endeavours to predict and select genetic responses to the environment.

DE150101799   Hall, Dr Jack

2015	$105,000.00
2016	$105,000.00
2017	$105,000.00
Total	**$315,000.00**

Primary FoR   0101   PURE MATHEMATICS

Funded Participants:

DECRA   Dr Jack Hall

Administering Organisation   The Australian National University

Project Summary

Algebraic stacks are natural types of spaces to consider when parameterising geometric objects in mathematics and physics. The Tannakian formalism allows one to view algebraic stacks through the way it acts on other geometric objects. This project aims to employ the perspective provided by the Tannakian formalism to prove innovative and foundational results in order to elucidate the geometry of algebraic stacks.

DE150100315   Hodgman, Dr Sean S

2015	$124,000.00
2016	$124,000.00
2017	$124,000.00
Total	**$372,000.00**

Primary FoR   0206   QUANTUM PHYSICS

Funded Participants:

DECRA   Dr Sean S Hodgman

Administering Organisation   The Australian National University

Project Summary

Understanding the behaviour of electrons in a lattice has led to the development of numerous devices now taken for granted in everyday life. But there are still many open questions concerning strongly interacting electrons in a lattice, for example, an explanation of high temperature superconductivity. This is because modelling these systems is hard, due to the quantum correlations between particles, while impurities in solid state materials hinder experimental studies. This project aims to develop a quantum simulator using ultracold helium atoms in an optical lattice to model such systems. Correlation functions will be measured by detecting individual atoms, providing a new observable to characterise many-body lattice states.

DE150101196   Hudson, Dr Sean A

2015	$134,512.00
2016	$134,512.00
2017	$134,512.00
Total	**$403,536.00**

Primary FoR   0304   MEDICINAL AND BIOMOLECULAR CHEMISTRY

Funded Participants:

DECRA   Dr Sean A Hudson

Administering Organisation   The Australian National University

Project Summary

Correct expression, folding, and clearance of proteins are critical for all cell functions. However, cell stresses and aging can cause protein balance mechanisms to become overloaded, resulting in the misfolding and aggregation of proteins. Understanding the mechanisms by which protein aggregation occurs and how to prevent the process have become major scientific challenges. This project aims to gain unprecedented insights into the interactors, effectors and fate of misfolded protein aggregates within cells, using new, cutting-edge, catalytic-tagging biochemical tools. Critical interactions will be investigated for their roles in protein aggregation cell death, and in whether modulation of the interaction can also mitigate or reverse the process.

DE150100857   Kent, Dr Lia M

2015	$123,786.00
2016	$122,027.00
2017	$123,541.00
Total	**$369,354.00**

Primary FoR   1699   OTHER STUDIES IN HUMAN SOCIETY

Funded Participants:

DECRA   Dr Lia M Kent

Administering Organisation   The Australian National University

Project Summary

It is well known that, in post-conflict societies, political elites portray and memorialise the past in the service of nation-building. Far less attention has been paid to the relationship between local memory practices and nation-building. By examining how community members in Timor-Leste and Bougainville commemorate the past, construct monuments, undertake reconciliation practices and ritually rebury the dead, this project aims to reveal how citizens' collective memories are shaping nations. This research aims to contribute new theoretical understandings of the relationship between memory and nation-building, while also influencing policy debates on peace-building and transitional justice after conflict.

DE150101365   Kneip, Dr Laurent

2015	$120,000.00
2016	$120,000.00
2017	$120,000.00
Total	**$360,000.00**

Primary FoR	0801	ARTIFICIAL INTELLIGENCE AND IMAGE PROCESSING

Funded Participants:

DECRA   Dr Laurent Kneip

Administering Organisation   The Australian National University

Project Summary

This project aims to develop novel theories and algorithms for live capturing of accurate dense 3D models of moving subjects based on hybrid camera networks. The latter consist of a mix of static external red, green, blue plus depth (RGB-D) cameras and a dynamic head-mounted regular camera. The scientific novelties will be dense, non-rigid, and collaborative structure-from-motion theories that maximise the exploitation of such hybrid information, for instance by utilising exact head-pose information. The outcome is a working prototype producing live full-body animations, thus leveraging new applications in the Information Technology industry. Highly strategically relevant examples are given by 3D tele-presence, enhanced tele-operation, robotics, and intelligent transportation systems.

DE150100494   Kubiszewski, Dr Ida K

2015	$110,000.00
2016	$115,000.00
2017	$113,000.00
Total	**$338,000.00**

Primary FoR	0502	ENVIRONMENTAL SCIENCE AND MANAGEMENT

Funded Participants:

DECRA   Dr Ida K Kubiszewski

Administering Organisation   The Australian National University

Project Summary

The project aims to be a first attempt at a comprehensive, integrative, assessment of which factors contribute most significantly to the sustainable wellbeing of the Australian population. It will employ regression analyses to explore the relationship between social, economic, and environmental indicators and subjective wellbeing. The project aims to allow estimates of the relative value and trade-offs of the factors in creating wellbeing. Geographic Information System (GIS) maps will show the special patterns and distribution of the contributing factors at local and regional scales, providing detailed information about the assets and policy recommendations for improving sustainable wellbeing.

DE150101836   Li, Dr King-Fai

2015	$108,033.00
2016	$109,045.00
2017	$108,033.00
Total	**$325,111.00**

Primary FoR   0401   ATMOSPHERIC SCIENCES

Funded Participants:

DECRA   Dr King-Fai Li

Administering Organisation   The Australian National University

Project Summary

This proposal aims to better understand how tropical intraseasonal variability (periods of 40 to 60 days) influences the chemical components of the global atmosphere. The results of the research aim to improve regional air-quality forecasts on weekly and monthly timescales. The highly vertically resolved ozone concentrations from the surface up to 20 kilometres, measured by balloon-borne instruments called ozonesondes, will be used as a dynamical tracer. The knowledge gained from the ozonesonde data will be used to elucidate the chemical origins of the tropical variability related to biomass burning activities and convective lightning, as well as the subtropical variability related to the polar vortex dynamics.

DE150101773   Matzke, Dr Nicholas J

2015	$134,512.00
2016	$134,512.00
2017	$100,512.00
Total	**$369,536.00**

Primary FoR   0603   EVOLUTIONARY BIOLOGY

Funded Participants:

DECRA   Dr Nicholas J Matzke

Administering Organisation   The Australian National University

Project Summary

Species Distribution Models (SDMs) are crucial tools for conservation and planning, but they assume that environmental variables (e.g. temperature) are the only controls on distributions, when historical factors, like dispersal limitation and phylogenetic niche conservatism, are also important. A Bayesian Hierarchical Model (BHM) will be constructed to jointly estimate dispersal history, niche evolution, and present-day SDMs for each species in a clade. BHMs will be tested against traditional SDMs using Australian clades (e.g. frogs) and simulations. BHMs will advance scientific understanding of how species and biogeography coevolve and provide practical improvements in predictions for species that are rare, data-poor, or in changed climates.

DE150101816   Milone, Dr Antonino P

2015	$111,000.00
2016	$111,000.00
2017	$111,000.00
Total	**$333,000.00**

Primary FoR	0201	ASTRONOMICAL AND SPACE SCIENCES

Funded Participants:

DECRA   Dr Antonino P Milone

Administering Organisation   The Australian National University

Project Summary

Recent studies have resulted in one of the most exciting and unexpected developments in stellar-population studies: the discovery of multiple stellar generations in globular clusters. These findings have dramatically changed the traditional picture of these seemingly simple stellar systems and provided evidence that the globulars are building blocks of the Galactic halo. The Hubble Space Telescope is in the process of collecting a large amount of data as part of the first survey of multiple generations in globular clusters. The project is based on this unique dataset and aims to provide a major advance to understand the origin and the evolution of globular clusters, as well as the formation mechanisms that build the Milky Way.

DE150101187   Nesossi, Dr Elisa

2015	$113,000.00
2016	$120,000.00
2017	$120,000.00
Total	**$353,000.00**

Primary FoR	1699	OTHER STUDIES IN HUMAN SOCIETY

Funded Participants:

DECRA   Dr Elisa Nesossi

Administering Organisation   The Australian National University

Project Summary

This project aims to explore the relationship between justice and injustice in the People's Republic of China (PRC), and the impact of changing conceptions of justice over the last thirty years. Research will focus on key legal cases in the PRC since the 1980s. Examination of official documents, unexplored court material and other fresh evidence will explore new perspectives on Chinese law and comparative criminal justice. Comprehending how Chinese decision-makers understand the concept of justice has wider implications for the international and regional legal order and for Australia's legal cooperation with China.

DE150101774   Noble, Dr Daniel W

2015	$124,000.00
2016	$124,000.00
2017	$124,000.00
Total	**$372,000.00**

Primary FoR   0602   ECOLOGY

Funded Participants:

DECRA   Dr Daniel W Noble

Administering Organisation   The Australian National University

Project Summary

Early developmental environments can profoundly influence the survival and reproductive success of organisms, including humans. The project aims to use an exceptional model lizard system to test a new theory about how personality and learning are influenced through the manipulation of offspring environment and how this affects lifetime fitness. Understanding these effects is important for predicting the responses to selection imposed by changing environments, the success of re-introduction programs for threatened species, and for understanding the long-term viability of populations. This project aims to merge theoretical developments in life history theory and evolutionary biology and contribute important empirical advances to a new research field.

DE150101720   Phillips, Dr Ryan D

2015	$129,000.00
2016	$129,000.00
2017	$128,923.00
Total	**$386,923.00**

Primary FoR   0603   EVOLUTIONARY BIOLOGY

Funded Participants:

DECRA   Dr Ryan D Phillips

Administering Organisation   The Australian National University

Project Summary

Specialised pollination systems are of global scientific importance because they offer unique insights into speciation and are exceptionally vulnerable to anthropogenic change. Fundamental gaps remain in our knowledge of the adaptations required for specialisation, the ecological processes favouring its evolution, and whether specialisation facilitates or constrains floral evolution. This project aims to address these questions in a unique and diverse group of Australian orchids that are pollinated by sexual mimicry. This work will apply experimental, ecological and phylogenetic approaches to understand the visual and chemical adaptations to sexual mimicry and their consequences for species diversification, floral evolution and conservation.

DE150101897   Schwessinger, Dr Benjamin

2015	$114,000.00
2016	$113,000.00
2017	$114,000.00
Total	**$341,000.00**

Primary FoR   0603   EVOLUTIONARY BIOLOGY

Funded Participants:

DECRA   Dr Benjamin Schwessinger

Administering Organisation   The Australian National University

Project Summary

Fungal crop pathogen epidemics lead to severe yield losses worldwide, impact national economies and individual human lives. Wheat stripe rust fungal epidemics caused by new virulent races can lead to 80 per cent reduction in yield. This project aims to investigate the molecular mechanisms leading to newly virulent races by whole genome, epigenome and transcriptome comparison of several wheat stripe rust races. This project aims to fundamentally advance our understanding of evolutionary forces driving virulence and specification at the whole (epi-)genome level in important fungal crop pathogens. This will promote new crop protection strategies important for local and global food security in an ever-changing environment.

DE150100511   vanderHeijden, Dr Jeroen

2015	$123,720.00
2016	$118,800.00
2017	$111,670.00
Total	**$354,190.00**

Primary FoR   1605   POLICY AND ADMINISTRATION

Funded Participants:

DECRA   Dr Jeroen vanderHeijden

Administering Organisation   The Australian National University

Project Summary

There is a pressing need to improve the resource sustainability of cities and their resilience to hazards. Increasingly, governments seek to achieve such improvement by engaging directly with businesses and citizens. Whilst this collaborative city governance holds promise for transforming resource use and the resilience of cities, little is known about its performance benefits and effectiveness. The project aims to address this knowledge gap through a systematic empirical analysis of a series of collaborations in four global cities. The project aims to help refine theories of collaborative governance, and provide policymakers and practitioners with lessons on how to improve sustainability and resilience of cities in Australia and elsewhere.

DE150100070   Wood, Dr Rachel E

2015	$123,650.00
2016	$123,307.00
2017	$123,850.00
Total	**$370,807.00**

Primary FoR   2101   ARCHAEOLOGY

Funded Participants:

DECRA   Dr Rachel E Wood

Administering Organisation   The Australian National University

Project Summary

This project aims to develop techniques to radiocarbon date archaeological tooth enamel. In warm environments, it is rarely possible to date bone, as the protein targeted degrades rapidly. Without direct dates on skeletal material, chronologies underpinning archaeological studies across much of Australia and South East Asia (SEA) are insecure, hindering the study of numerous archaeological questions. Enamel is relatively stable, but it does degrade during burial. The effect of degradation on the radiocarbon age of archaeological teeth will be studied to identify the least altered areas for dating. Using these outcomes, a chronology for the spread of pigs through SEA will then be developed, testing models that explain how early farming practices developed.

DE150101870   Youngentob, Dr Kara N

2015	$116,915.00
2016	$113,915.00
2017	$111,270.00
Total	**$342,100.00**

Primary FoR   0501   ECOLOGICAL APPLICATIONS

Funded Participants:

DECRA   Dr Kara N Youngentob

Administering Organisation   The Australian National University

Project Summary

Recent advances in remote sensing are allowing us to measure the biochemical and structural properties of ecosystems with increasing accuracy. This type of information is essential for sustainable natural resource management. However, we still lack a clear understanding of this technology's capabilities and limitations for environmental decision making. This project aims to investigate key gaps in our knowledge about the extent to which modern remote sensing tools are capable of measuring landscape change and habitat quality. This collaborative research project aims to provide an unparalleled opportunity to examine these issues by combining state-of-the-art remote sensing with data from two intensively studied landscape-scale experiments.

DE150100363   **Zhang, Dr Wen**

2015	$110,000.00
2016	$110,000.00
2017	$110,000.00
Total	**$330,000.00**

Primary FoR   0906   ELECTRICAL AND ELECTRONIC ENGINEERING

Funded Participants:

DECRA   Dr Wen Zhang

Administering Organisation   The Australian National University

Project Summary

This project aims to advance fundamental research in source localisation by using a binaural system with two sensors to mimic human listening capabilities. It will provide new theory of source localisation features, novel signal processing techniques and design of binaural devices for localising sound sources in a cluttered acoustic environment. New technologies developed from this project will endeavour to lead to further development of binaural audio research and will have a broad range of applications, such as hearing aids, personal sound amplification products and humanoid robots. The project aims to enable people wearing binaural devices or robots having two artificial ears to localise sounds and to follow a conversation in realistic situations.

University of Canberra

DE150101866   Curato, Dr Nicole P

2015	$101,897.00
2016	$120,584.00
2017	$102,076.00
Total	**$324,557.00**

Primary FoR   1606   POLITICAL SCIENCE

Funded Participants:

DECRA   Dr Nicole P Curato

Administering Organisation   University of Canberra

Project Summary

'Building back better' has become a global mantra for countries recovering from disasters. This project aims to examine how this principle can be extended from rebuilding disaster-resilient physical infrastructure to rehabilitating institutions of participatory governance to ensure the inclusive and empowering character of recovery efforts. Through a multi-sited ethnography in cities worst hit by the 2013 Typhoon Haiyan in the Philippines, a theoretically-informed and empirically-grounded analytical toolkit that gauges the democratic quality of post-disaster reconstruction will be developed. The project aims to generate insights into the precise ways in which participatory governance can also be 'built better' in a post-Haiyan world.