





**bio21**  
institute



# Annual Report 2017



The Bio21 Molecular Science and  
Biotechnology Institute  
University of Melbourne  
30 Flemington Road  
Parkville Victoria 3010  
Telephone: (03) 8344 2220  
[www.bio21.unimelb.edu.au](http://www.bio21.unimelb.edu.au)

 @Bio21Institute  
 @Bio21Institute

**Director**

Professor Michael W. Parker  
DPhil (Oxon) FAA FAHMS

**Deputy Director**

Professor Frances Separovic  
PhD FAA

**Scientific Research Manager**

Dr David Keizer

**Associate Director – Platform  
Infrastructure**

Professor Malcolm McConville

**Associate Director – Commercialisation**

Professor Spencer Williams

**Associate Director – Engagement**

Associate Professor Sally Gras

Produced by the Bio21 Molecular Science  
and Biotechnology Communications  
and Engagement team

# Contents

Our Mission	02
Our Vision	02
About the Institute	03
Director's Message	04
Bio21 Leadership	06
Deputy Director Frances Separovic	06
Associate Directors Appointed	08
Associate Director Engagement – Associate Professor Sally Gras	08
Associate Director Commercialisation – Professor Spencer Williams	09
Associate Director Platform Infrastructure – Professor Malcolm McConville	09
New Group Leaders Welcomed	10
Impacts of Research	12
Enabling Platform Technologies	16
Scientific Research Manager's Message	16
Industry Engagement and Commercialisation	18
External Relations, Communications and Engagement	20
Bio21 Visiting Delegations	20
Public and School Engagement	22
Bio21 Institute Internal Community Events and Engagement	26
Bio21 Hosted Events	27
Bio21 Graduate Researchers and Postdocs	29
Bio21 Institute Members Honoured	31
Grant Successes	34
Governance	38
Occupational Health and Safety Statement	39
Bio21 People	40
Institute in Numbers	42
Steering Committee	43
Papers Published	48

## Our Mission

The Bio21 Institute seeks to improve human health and the environment through innovation in molecular life sciences and biotechnology, driven by collaborative research and dynamic interactions with industry.

## Our Vision

### Research Excellence:

To be leaders in world-class multidisciplinary molecular science research and research training

### Shared resources:

To provide Core Platform Technology Facilities to industry and academic researchers

### Industry engagement and Innovation:

To nurture Australia's biotechnology sector

### Science Education

for secondary schools through the partnership with the Elizabeth Blackburn Science School



## About the Institute

The University of Melbourne's \$140 million core research and development facility, Bio21 Molecular Science and Biotechnology Institute (Bio21 Institute), is a multidisciplinary molecular science research centre specialising in medical, agricultural and environmental biotechnology. Accommodating up to 600 academic and industry research scientists, the Bio21 Institute is one of the largest biotechnology research centres in Australia.



The Bio21 Institute seeks to improve human health and the environment through innovation in molecular science biotechnology and related areas, driven by collaborative research and dynamic interactions with industry.

The commitment to establish the Bio21 Institute was the University of Melbourne's original contribution to the Bio21 Cluster project, now known as Biomedical Research Victoria.

Established in 2002, the Bio21 Institute was officially launched on 8 June 2005 by Victorian Premier Mr Steve Bracks, joined by University of Melbourne Vice-Chancellor Professor Glyn Davis, Innovation Minister Mr John Brumby and Health Minister Ms Bronwyn Pike.

### A home of research and discovery

The Bio21 Institute was built on the premise that multidisciplinary ventures between life sciences, physical sciences and engineering disciplines, including harnessing genomics knowledge in

medical and other biomedical areas of biotechnology, are fundamental to translating biological discoveries into biotechnology outcomes. The Institute also embraces commercialisation as a facilitator for scientific advancement, skills development and economic outcomes. The Institute's commitment to intellectual property protection, technology transfer and business incubation are key drivers of this innovation.

The Bio21 Institute now attracts outstanding scientists and technicians looking to use the purpose-built laboratories and state-of-the-art core platform technology facilities which are accessible to these diverse scientific and industry communities investigating various research themes. Included in this community are the start-up companies supported through business incubation and entrepreneurship skills development, as well as students and early-career researchers.





## Bio21 Welcomes Michael Parker as new director

Professor Michael Parker formally took over from Professor Malcolm McConville as Director of Bio21 Molecular Science and Biotechnology Institute on 6 March 2017. As one of Australia's leading protein structural biologists, Michael is exceptionally well placed to develop the strategic directions of the Institute and further promote the vibrant, multidisciplinary culture that has been established here. Michael's research group moved into Bio21 Institute from the St Vincent's Institute for Medical Research in a staged process during 2017.

## Director's Message

In March 2017 I took up my post as Director of the Bio21 Molecular Science and Biotechnology Institute. It is a great honour to lead the Institute into an exciting future, located in one of the great bioscience precincts in the world.

As I step into this role, it is an opportunity to think about what kind of institute we are, what we do and where we're going. Bio21 is not the 'cancer' centre, the 'brain', 'infectious diseases' or 'sustainability' institute; yet individual groups do conduct research in all these fields. From understanding how malaria invades the body, to what makes mozzarella cheese stretchy, or how organisms can adapt to climate change – the common denominator is the molecular science approach we all use to seek knowledge and solutions to problems in health and disease, environment and agriculture and more generally the biological sciences. We are the 'molecular sciences' institute!

With 9 nuclear magnetic resonance spectrometers; 22 mass spectrometers and a high-end Advanced Microscopy facility that is home to two new Cryo-electron microscopes, Bio21 is uniquely positioned with large, state-of-the-art technology to delve deeply into the structure and nature of molecules, from small molecules, to peptides, proteins, nucleic acids and viruses.

In the labs of the Bio21 Institute, true innovation occurs. Bio21 is a scientific success story and this was reflected in a Nature survey of leading research institutions in Australia, where the Bio21 Institute figured prominently.

One strategy that has served many of us well is to truly seek to work collaboratively with our colleagues within and across disciplines, in academia and industry. Recent successes that illustrate this are the ARC Linkage grants awarded to the Gleeson/Mintern labs with CSL; Wille lab with Incitec Pivot Ltd, and the successful grant for the ARC Centre of Excellence in Excitation Science (under the ARC Linkage scheme) led by Professor Paul Mulvaney.

Also, there are numerous examples within the Institute of collaboration that has led to truly innovative commercialisation successes, such as: Spencer William's success with Fibrotech and Paul Donnelly's commercialisation of radiopharmaceuticals through Clarity Pharmaceuticals; Barnham and Donnelly labs commercialisation and licencing of a motor neurone disease drug with Collaborative Medicinal Development Pty Ltd (CMD); and collaborative work between Takeda Pharmaceuticals and the Tilley lab to show that proteasome-inhibiting cancer drugs can be repurposed to be effective against malaria. These great stories highlight the biotechnology aspirations of Bio21.

The Bio21 Institute was built with collaboration in mind. The architects built bridges across the atrium with break-out spaces to meet and chat. The Institute is home to groups across the three faculties (Science, Medicine Dentistry and Health Sciences and the Melbourne School of Engineering).



Our community also includes industry tenants CSL Ltd, Prana Biotech Ltd, Circa Group and research groups from The Women's Hospital and the Murdoch Children's Research Institute.

In the course of 2017, we saw the Stage 2B building arise from its foundations. It is founded on collaboration between CSL and the University of Melbourne and will house CSL research groups as well as groups from the University of Melbourne. We particularly thank Malcolm McConville, previous Director and currently Associate Director for Platform Infrastructure and his team for their leadership in converting the vision into reality.

So, as Director of the Bio21 Molecular Science and Biotechnology Institute, I endeavour to carry on the powerful founding vision of the Institute which is inherent in its name: a molecular science and biotechnology institute. A community of brilliant scientists, equipped with the most cutting-edge instrumentation, working together to improve human health and the environment through innovation in biotechnology and molecular sciences, driven by multidisciplinary research and dynamic interactions with industry.

**Michael W. Parker**

DPhil (Oxon) FAA FAHMS  
Director, Bio21 Molecular Science and Biotechnology Institute (Bio21 Institute)  
Professor, Department of Biochemistry and Molecular Biology I University of Melbourne  
NHMRC Senior Principal Research Fellow  
Head of Structural Biology  
ACRF Rational Drug Discovery Centre  
St. Vincent's Institute of Medical Research







# Bio21 Leadership

## Deputy Director – Professor Frances Separovic

Professor Frances Separovic was appointed to the role of Deputy Director of the Bio21 Institute in 2017.

In accepting this role, Frances became a key member of the Institute's executive team, working closely with the Institute Director, Scientific Research Manager and members of the Institute's Management team to help deliver on strategic and operational plans. She provides leadership and fosters excellence in research, teaching and policy development in the Institute, the University and also within the community, professional, commercial and industrial sectors.

In line with this, Frances contributes to the development of a gender policy for the Institute, guided, among other things, by the principles of the Athena SWAN Charter.

Frances is a researcher of international renown, and a long-standing valued member of the Institute, who has demonstrated high level leadership and management skills in previous roles, most recently as the Head of the School of Chemistry. In this capacity, she has fostered and developed relationships with external stakeholders at an executive level.

Frances Separovic has received many honours in the course of her career, being the first female Professor of Chemistry in Victoria and only the third in Australia in 2005.

In 2017 on International Women's Day she was one of 12 awardees worldwide of the International Union of Pure and Applied Chemistry (IUPAC) 2017 Distinguished Women in Chemistry or Chemical Engineering. She was also honoured at the 2017 UNSW Alumni Awards.

"The most significant event that occurred at Bio21 for me personally, was the visit of the President of Croatia, Ms Kolinda Grabar-Kitarovic.

Being of Croatian heritage, the visit of the President to Bio21 was quite an emotional experience for me, something that I would not have dreamed.

The fact that the president is a woman: the first female president of Croatia and the highest ranking female official to have served within NATO's administrative structure, makes it an even greater cause for celebration.

With a few notable exceptions – Angela Merkel, Theresa May and our own former Prime Minister, Julia Gillard – women in powerful positions are still a rarity in politics and in science.

Meeting the president on the day were, amongst others, our Provost, Margaret Sheil, the first female chemistry professor in Australia, and our Dean of Science, Karen Day.



Our own Leann Tilley, ARC Georgina Sweet Laureate Fellow, has established the 'Georgina Sweet Awards' to promote and support female scientists who demonstrate excellence in quantitative biomedical science. This is one way to encourage women to enter non-traditional fields of scientific enquiry, as is the 'Margaret Sheil Leadership Award' recently established by the RACI for female chemists.

Mentoring is important at all career stages and I am especially grateful for the support that I have received throughout my career from men and women.

As Acting and Deputy Director, I've set myself the challenge to improve the opportunities for women in the Institute to rise to leadership positions. A 'Women in Bio21' committee has been formed to advise us on how best to achieve this."

## Bio21 Associate Directors Appointed

Three Associate Directors were appointed at the Bio21 Institute in 2017:

- **Engagement** – Associate Professor Sally Gras
- **Commercialisation** – Professor Spencer Williams
- **Platform Infrastructure** – Professor Malcolm McConville

Rather than research themes, these appointments have been made to align with operational needs and strategic directions of the Institute. The Associate Directors are highly-respected researchers with international reputations, and leaders and long-standing members of the Bio21 Institute and work with the Director to advance the goals of the Institute in improving health and the environment through innovation in molecular science and biotechnology, driven by multi-disciplinary research and dynamic interactions with industry.



### Associate Director Engagement – Associate Professor Sally Gras

Professor Sally Gras is Director of the ARC Dairy Innovation Hub which brings together three of Australia's leading dairy research groups – the University of Melbourne, the University of Queensland and Dairy Innovation Australia Ltd (DIAL) – in a five year research program co-funded by the Australian Research Council. The research program engages more than 40 researchers to address some of the major challenges identified as constraints to business growth and productivity in the dairy manufacturing sector.

Professor Sally Gras is a Member of The Department of Chemical Engineering, within the Melbourne School of Engineering, where she leads Food and Agribusiness research and development and teaches Biochemical and Pharmaceutical Engineering. She also leads a research group at Bio21.

Professor Gras was a Gates Scholar and received her PhD in protein mis-folding from Cambridge University in the UK (supervised by Prof Cait Macphee and Prof Chris Dobson) and her BSc (Biochemistry and Molecular Biology) and BEng (Chemical) degrees from the University of Melbourne.

Her research focusses on applying bioengineering and biotechnology to solve problems relating to: food and dairy products, pharmaceuticals and the environment. She has authored over 100 journal articles, collaborated widely with industry through research projects and direct contracts and contributed to policy development.

***Sally brings key experience engaging with diverse stakeholders through the Dairy Innovation Hub to this role.***



### Associate Director Commercialisation – Professor Spencer Williams

Professor Spencer Williams obtained his BSc and PhD (under the supervision of Professor Bob Stick) at the University of Western Australia. Following receipt of his PhD in 1998, he was an Izaak Walton Killam Postdoctoral Fellow in the laboratory of Professor Stephen G Withers at the University of British Columbia, Canada, where he worked on glycosidase inhibitors. In 2000 he moved to the USA where he was a Howard Hughes Medical Institute Fellow of the Life Sciences Research Foundation in the laboratory of Professor Carolyn Bertozzi. Spencer moved to Melbourne as a member of the Faculty in the School of Chemistry beginning July 2002. His current interests include the application of chemical synthesis, and in particular carbohydrate chemistry, to biological problems of relevance to human health and disease.

Spencer is the recipient of the Grimwade Prize for Industrial Chemistry; the Rennie Memorial Medal; and the David Syme Prize.

He has authored over 100 journal articles, 10 patents, 6 book chapters, and a co-authored textbook, *Carbohydrates: The essential molecules of life* (by RV Stick and SJ Williams, 2009, Elsevier). He is a co-founder of Fibrotech Therapeutics (purchased by Shire in 2014) and OccuRx, and has worked closely with NeuProtect Pty Ltd, a Melbourne-based biotechnology company in the development of their lead compound NP202.

***Spencer brings his experience commercialising his own research to this role.***



### Associate Director Platform Infrastructure – Professor Malcolm McConville

Professor Malcolm McConville has had a long-standing interest in the metabolism of microbial pathogens with the view of identifying new drug targets. He received his PhD from the University of Melbourne and held post-doctoral fellowships at the Walter and Eliza Hall Institute of Medical Research and the University of Dundee, Scotland.

He moved his research group to the Department of Biochemistry in 1994 and since then has received substantial funding from the NHMRC, the Wellcome Trust, and the Howard Hughes Medical Institute. He is currently a Principal Research Fellow with the NHMRC and is involved in the establishment of the Metabolomics Australia hub in the Bio21 Institute.

***Malcolm brings experience in establishing the Metabolomics Australia platform facility at the Bio21 Institute and as former Director of the Institute, planning the Stage 2B project of the Bio21 Institute.***



## New Group Leaders Welcomed

It is important to renew our platform technology facilities at Bio21, but also to invest in and to recruit highly skilled people with expertise in applying these technologies to their research.

In 2017 we were very fortunate to have a number of new group leaders and their teams join Bio21: David Stroud, Isabelle Rouiller, Laura Edgington-Mitchell, in the Department of Biochemistry and Molecular Biology, MDHS, and Guy Jameson, in the School of Chemistry, who moved from University of Otago, New Zealand, as well as the new Head of Biosciences, Herbert Kronzucker, who moved from the University of Toronto.

It is great to see researchers attracted to the Institute because they recognise the value of the platform facilities we house; the multidisciplinary collaborative environment and our strategically beneficial location in the Parkville biomedical precinct.

A common theme that arises from each of these researcher's motivation for moving to Bio21 is the 'collaborative environment'. Genuine collaboration cannot be forced; often arises out of serendipity; relies on mutual trust and respect and a generous attitude towards our colleagues and peers, but it can be fostered and the desirable

conditions created that encourage these encounters that lead to beneficial research collaborations.

Collaboration is a worthwhile research strategy, as people working together, bringing different disciplinary strengths knowledge and skillsets, can achieve new insights. Also, in the tight funding conditions, working and publishing in teams, can help scientists survive and thrive in a very competitive system.

Collaboration has been a key consideration in the design of the Bio21 building, with the inclusion of break-out balconies – offering people the opportunity to meet and interact over lunch and coffee – as well as the café area on ground and level 1, the atrium as a large event space and the auditorium.

Also, the Institute has brought together academic and industry research groups and platform technology facilities into the same building. Encounters between groups and individuals are supported by Bio21 social events, such as the regular morning teas and Bio21 'Big Picture' Seminars.



### **Laura Edgington-Mitchell:**

"I was initially drawn to Bio21 by the truly multidisciplinary nature of the Institute, its attractive location in the Parkville biomedical precinct, and the state-of-the-art technology platforms that it offers. Since arriving, I have been impressed by the collegial environment, strong support for early career researchers and clear commitment to promoting women in science."

***Laura combines chemistry and biology to study the role of proteases in diseases and disease conditions, such as inflammation and cancer.***



### **David Stroud:**

"I came to Bio21 because of the world-class platforms, and strong connections to both industry partners and clinicians in the institute and Parkville precinct."

***David seeks to apply proteomics tools to the study of mitochondria.***



**Isabelle Rouiller:**

“I chose to move my research lab to Bio21 because Bio21 is an outstanding research environment that encourages collaborations and promotes multidisciplinary approaches. This environment promotes novel research opportunities for me and for my trainees. The equipment and support is world class. Plans for further expansion are very exciting.”

*Isabelle brings expertise in CryoEM which she uses to study how membrane traffic is regulated.*



**Guy Jameson:**

“Bio21 is a hub for biological research. It provides me the opportunity to work in an exciting environment and interact with people across a wide range of disciplines and research areas opening new projects and collaborations. However, it is not an island. The wider research community (the WEHI, Peter MacCallum, The Florey Institute and University of Melbourne) is just a few minutes’ walk away.”

*Guy brings expertise in Mössbauer, EPR and NMR techniques.*





## Impacts of Research

It is the goal of the Bio21 Institute to improve health and the environment through innovation in molecular science and biotechnology, driven by multi-disciplinary research and dynamic interactions with industry.

From improving the resilience of plants and animals, to the effects of global climate change and controlling mosquito populations that transmit dengue in Australia and abroad, to gaining an understanding of the impact of severe viral infection on our immune systems, developing a vaccine against periodontitis and compounds against Motor Neurone Disease – the impact of the research conducted at the Institute in the Schools of Biosciences, Chemistry and the Department of Biochemistry, Melbourne Dental School, Faculty Medicine Dentistry and Health Sciences in improving health and the environment is far-reaching.

### Human Health

Alzheimer's Disease  
Antimicrobial therapies  
Cancer Therapies  
(Radiopharmaceuticals)  
Dengue  
Dental Health (Periodontitis)  
Huntington's Disease  
Inflammation  
Leishmaniasis  
Legionella  
Malaria  
Mitochondrial Disease  
Motor Neurone Disease  
Parkinson's Disease  
Sepsis  
Toxoplasmosis

### The Environment

Water pollution monitoring  
Waste Water Treatment  
Species rescue (Eastern Barred  
Bandicoot; Mountain Pygmy  
Possum)  
Sustainable pesticides (sheep  
blow fly; cotton bollworm)  
Sustainable energy (organic  
solar cells)



## Impacts of Research: Environment

### Coming to the genetic rescue of our endangered marsupials

In terms of our environment, climate change is one of the greatest threats facing Australia's wildlife, plants and ecosystems, a point driven home by two consecutive years of mass coral bleaching on the Great Barrier Reef. Yet among this growing destruction there is a degree of resilience to climate change, as Australian animals and plants evolve and adapt.

The Hoffmann group, in collaboration with Dr Andrew Weeks from the School of Biosciences, are coming to the rescue of threatened marsupial species by helping them improve their resilience through increasing the genetic variation within the marsupial gene pool.

As populations of threatened Australian marsupials continue to shrink, inbreeding makes extinction a very real threat. But genetic rescue is helping in populations of pygmy possums and bandicoots.

Genetic variation is essential for survival; it allows species to adapt and evolve so they can overcome disease and other environmental threats, and avoid the negative consequences of inbreeding.

But in small, heavily fragmented populations, like many of Australia's threatened marsupials, inbreeding becomes inevitable, leading to a decrease in their ability to fight these threats - otherwise known as a loss of 'population fitness'. Genetic rescue provides a way for small inbred populations to recover fitness and restore lost genetic variation. In an ideal genetic rescue, individuals from a healthy large population are introduced into a small recipient population. The deleterious alleles that decrease fitness in the small population are then masked, and this hybrid hardiness leads to an immediate increase in population size.

*(This is an excerpt from an article written by Dr Andrew Weeks and Professor Ary Hoffmann, first published on the University of Melbourne's Pursuit platform.)*





## Impacts of Research: Human Health

### First releases of Wolbachia-carrying Aedes mosquitoes in Malaysia

The Bio21 Institute's Hoffmann group from the School of Biosciences is also collaborating with the Institute of Medical Research in Kuala Lumpur, Malaysia and Glasgow University in research funded by the Wellcome Trust to develop and release Aedes mosquitoes (*Ae. albopictus*, *Ae. aegypti*) which carry a strain of Wolbachia bacteria isolated from a different mosquito species that blocks dengue transmission. The first releases took place in 2017 following a strong program of community engagement – as evident by this poster from Kuala Lumpur.



### Discovering the Deadly Diversity of Malaria

Another mosquito-borne disease – Malaria – is the focus of Bio21's Day group, one of four groups at the Institute conducting malaria research. Malaria kills the world's most vulnerable; of the nearly half a million deaths from malaria annually, the vast majority are children under the age of five living in Sub-Saharan Africa. There are around two hundred million cases worldwide every year.

A new genetic fingerprinting technique has for the first time shown the huge genetic diversity of the malaria parasite, one of nature's most persistent and successful human pathogens. The technique proves a previously untestable hypothesis proposed more than 20 years ago and opens up new ways of thinking about how to tackle this cunning killer.

Professor Karen Day is the lead researcher on the paper published in PNAS: 'Evidence of Strain Structure in Plasmodium

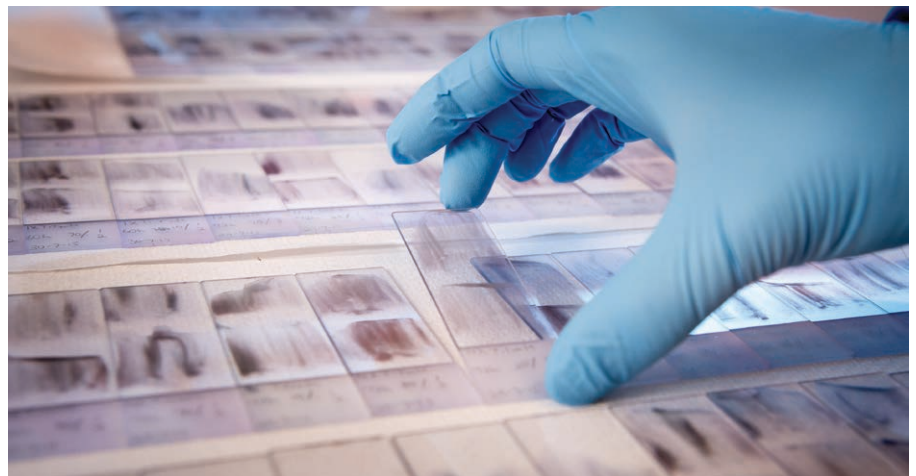
falciparum Var Gene Repertoires in Children from Gabon, West Africa'.

The University of Melbourne and the University of Chicago have led an international research collaboration to collect blood samples from 641 children, aged 1 to 12 years from Bakoumba, a village in Gabon, West Africa, and the genetic fingerprints of parasites from 200 infected children. Remarkably, every child was infected with malaria parasites that had a different fingerprint from the parasites in every other child.

These results validate the 'strain hypothesis' first proposed by Professor Sunetra Gupta and Professor Karen Day.

And key to that understanding is changing the way we think about malaria – that it is not like measles and more like the flu.

*(This is an excerpt from an article written by Daryl Holland and was first published on the University of Melbourne's Pursuit platform.)*





## Impacts of Research – Biochemistry

### Why flu can be fatal

The 2017 influenza season was Australia's most severe since 2009. And while many consider flu an annoying but relatively minor illness, it can kill. At least 121 related deaths were reported this year, and there were many more hospital admissions. Research from Professor Jose Villadangos from the Bio21 Institute at the University of Melbourne published in *Immunity*, sheds light on why patients who survive a severe infection or physical inflammation, such as pneumonia caused by flu, may have compromised immune systems.

"Flu deaths are commonly caused by lower respiratory tract infections and pneumonia – a leading cause of death

*"Flu deaths are commonly caused by lower respiratory tract infections and pneumonia – a leading cause of death from infectious disease," explains Professor Jose Villadangos from the Bio21 Institute at the University of Melbourne.*

from infectious disease," explains Professor Jose Villadangos from the Bio21 Institute at the University of Melbourne.

"The risk of pneumonia is particularly high for critically ill patients recovering from their first flu infection episode."

"We have discovered that recovery from the viral infection leaves an 'immunological scar' that reduces the immune system's capacity to launch protective responses against subsequent infections," says Professor Villadangos.

*(This is an excerpt from an article written by Florienne Loder and was first published on Pursuit.)*

## Impacts of Research – Chemistry

### Teaming up to fight Motor Neurone Disease

When a person is diagnosed with Motor Neurone Disease (MND), it's a race against time.

Symptoms are severe: muscle weakness, cramps, slurred speech, weak grip, fatigue, pain, insomnia, behaviour changes and a constant dry mouth. Many sufferers do not survive past the first five years because the progressive destruction of their brain's neurons that control muscles means lung failure is inevitable. There is no cure.

The lack of an effective treatment haunts sufferers, but now, following ten years of work by researchers from the University of Melbourne, Bio21 Molecular Science and Biotechnology Institute, Associate Professors Kevin Barnham and Paul Donnelly and the Florey Institute of Neuroscience and Mental Health, Associate Professor Tony White, a human trial for a drug that could fight this devastating disease has begun. Cu(-ATSM), the drug to treat MND, entered phase I clinical trials at Macquarie University in November. But before it could reach human trials, there was years of hard work, Associate Professor Barnham says.

*(This is an excerpt from an article written by Florienne Loder and was first published on Pursuit.)*



## Enabling Platform Technologies

### Message from the Scientific Research Manager – David Keizer

2017 saw some exciting new acquisitions in the Bio21's Platform Technology Facilities, as well as the continued works for the overall expansion of the Institute through the 'Stage2B' project, jointly funded through CSL Ltd, that will provide space for the platform facilities to grow.

It has been exciting to see how much progress has been made in the construction of the Stage2B expansion of Bio21. It will be a fantastic new (and much needed) space and architecturally very striking.

From the beginning, the David Penington building that houses the Bio21 Institute was purpose-built with space for Platform Technology Facilities that house very large, powerful and expensive research instruments, such as nuclear magnetic resonance spectrometers, electron microscopes and mass spectrometers.

The Director, Michael Parker headed a successful collaborative ARC LIEF grant in 2016 for the acquisition of Cryo Electron Microscopes for the Advanced Microscopy facility.

2017 saw the (logistically challenging) installation of two new cryo electron microscopes into the Advanced Microscopy facility: The Talos Arctica is a 200kV cryoTEM with automated sample loading and the latest detection hardware with the Gatan K2 summit camera located behind an energy filter.

Its 'little sister' the Talos L120C is a 120kV microscope of the latest generation that will be used for sample screening, negative staining and standard biological TEM.



*Professor Malcolm McConville, Associate Director Platform Infrastructure, inspecting the Bio21 Stage2B construction site*

The Arctica is the second of its kind in Australia (the first one was installed in Wollongong) while the L120C is the first of its kind and one of the first worldwide. They were both acquired as part of a collaborative ARC LIEF grant led by Michael Parker last year together with very strong support by the University. The academic partners of the grant are University of Melbourne, Monash University,

RMIT University, Walter and Eliza Hall Institute of Medical Research, Murdoch Children's Research Institute, the Peter MacCallum Cancer Centre, the St Vincent's Institute of Medical Research, University of New South Wales, Latrobe University, Auckland University, the Victor Chang Institute in collaboration with our major industry partner CSL who was a major contributor to the purchase.

The Bio21 instruments are complemented by a third EM (another Talos) installed at Monash University in September, which collectively will create world leading capacity in cryo-Electron Microscopy protein structural biology.

Also, in terms of our Metabolomics Facility, the Federal Government National Collaborative Research Infrastructure (NCRIS) funding was secured for another year through Bioplatforms Australia, a project that provides services and scientific infrastructure in the specialist fields of genomics, proteomics, metabolomics and bioinformatics. Malcolm McConville has also been appointed the new convenor for Metabolomics Australia, which will involve overseeing not only the Bio21 'node' of Metabolomics Australia, but all the nodes across the nation. We are in a wonderful position to house a node here at Bio21. This will be consolidated into one facility with MS and Proteomics in the new Stage2B building.

I look forward to the challenges and opportunities this will bring to Bio21 and in advancing biosciences and biomedical research in the precinct.

Bio21 will continue to build research capacity in the area of the Platform Technology Facilities, attracting researchers to the University of Melbourne, and allowing our researchers to pursue cutting-edge research in the field of molecular science.



## Industry Engagement and Commercialisation

For biomedical scientists interested in research commercialisation, these are heady times in which we live.

The Innovation and Science Australia (ISA) Review found that production of research is a strength of the Australian system. But according to the OECD, Main Science and Technology Indicators database, there is room to improve relative to other OECD countries in the translation of publicly funded research into commercial outcomes (2017 National Science Statement).

In the past couple of years, there have been some very significant investments being made by universities, government and industry in addressing this short-coming by providing support to researchers to commercialise research.

Also in May 2017, IP Group, a listed UK company, established signed commercialisation agreements with nine Australasian universities, including the University of Melbourne.

IP Group have committed to invest \$200M over the next 10 years (\$20M pa) into commercialisation of work out of these universities; this is not limited to biomedical commercialisation so any ideas with commercial potential can be considered.

Many researchers probably ask whether research commercialisation is a pathway they want to tread.

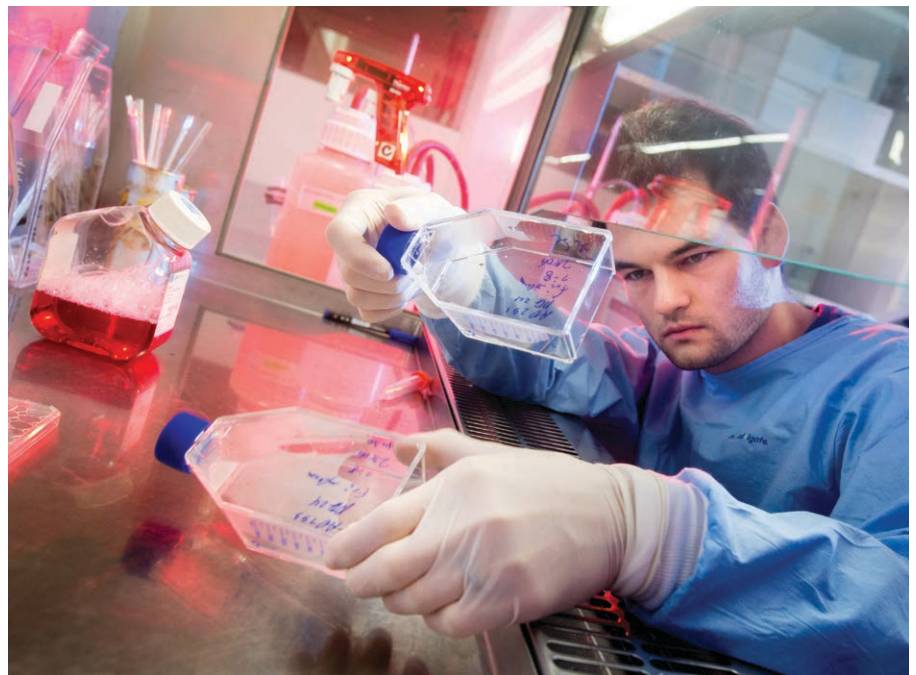
At the start of this year, the Institute Director, Michael Parker, asked that I take over in the new role of Associate Director Commercialisation. In this role one of my goals is to provide support anyone who may wonder how to take the first steps on this pathway:

As I highlighted above, there is a lot of funding available that could support our ability to prosecute our research. But more

importantly, research commercialisation provides the potential for your ideas to make the leap from the lab into society.

I think that all scientists would genuinely derive great personal satisfaction if some of their ideas could contribute to the betterment of society, the economy and the human condition.

**By Professor Spencer Williams,  
Associate Director (Commercialisation)**





## Bio21 researchers team up with industry for ARC Linkage grant success



**Paul Gleeson** and Justine Mintern (Dep Biochemistry and Molecular Biology) and Anne Verhagen and Steve Dower (CSL) were successful with their ARC Linkage grant application titled: “The cell biology of the albumin-FcRn receptor recycling system”. The grant will be funded for 3 years for a total of \$470,000.

Professor Paul Gleeson and colleagues have joined forces with CSL Ltd to investigate ways to rescue protein molecules which have been internalised into cells from the circulation with the aim of designing new protein therapeutics with extended half-lives.



Bio21’s **Associate Professor Uta Wille**, School of Chemistry is part of a team partnering with INCITEC PIVOT LIMITED that has received funding for \$420,000 to create new fertiliser technologies for sustained food security. This project aims to provide fundamental research to develop next-generation fertiliser products that will improve nitrogen use efficiency, and reduce nitrogen losses in food production systems.



**Paul Donnelly** (pictured above) and **Brendan Abrahams** received the TechConnect Innovation Award for their work on synthetic polymers capable of capturing, storing and releasing volatile anaesthetics, such as desflurane and sevoflurane.



**Professor Paul Mulvaney** successfully led a grant for the ARC Centre of Excellence in Exciton Science, receiving \$31.85 million from the ARC over 7 years. The centre was officially launched in 2017.

He is also part of a team that has partnered with the Reserve Bank of Australia. They have received \$501,989 to develop nanostructured films for optical document security. This project aims to develop a new class of synthetic thin films, with unique optical signatures as strong anti-counterfeiting features for future generations of Australian banknotes.



# External Relations, Communications and Engagement

## Bio21 Visiting Delegations

Every now and again, Bio21 receives visits from high level international delegations of this nature. We are a popular destination to showcase the research taking place at the University of Melbourne, but also because the Institute brings together state-of-the-art platform technology facilities, and university and industry research groups. Many are impressed by this and wish to learn from our experiences of creating an institute that fosters collaboration and the sharing of resources, but also to connect with research groups in the institute.

In May 2017 in the matter of a few days of each other, Bio21 was honoured with the visit of two different ambassadorial delegations: The Australian Ambassador to Mexico and Cuba, and the Croatian Ambassador and Croatian Consul for Victoria.

Reflecting the global nature of the scientific endeavour, the Bio21 Institute community includes researchers and students from many countries; from those who grew up in Australia, and have a migrant background, to those who are visiting on sabbatical, or completing a research project for a time in one of our research groups. These international connections create opportunities to collaborate and support our peers in different countries, and to learn from each other.

For instance, the Australian Ambassador to Mexico and Cuba, Dr David Engel, who visited on the 24 May, was very keen to learn about the opportunities for students and researchers to spend time at the Institute, to train in particular techniques, such as HPLC, so that they may bring that knowledge back to their country. He was also very interested in the opportunities to send samples to the institute to be analysed at our platform facilities. Also, some of our groups are conducting research into infectious diseases and sustainable pesticides that may be of relevance to countries such as Mexico, or Cuba.

## The Croatian Ambassador visits Bio21

The Croatian Ambassador, His Excellency Dr Damir Kusen and the Croatian Consul of Croatia for Victoria, Mr Dubravko Belavic visited the Bio21 Institute 26 May 2017. They met with Bio21 Director, Prof Michael Parker and Deputy Director Prof Frances Separovic to explore potential research connections and build bridges between Bio21 and centres of research excellence in Croatia. This visit paved the way for the visit of the President of Croatia to visit Bio21 on her visit to Australia 17 August 2017.



The Australian Ambassador to Mexico, Dr David Engel visited the Bio21 Institute, and toured our facilities. He met with Bio21 director, Prof Michael Parker and Prof Phil Batterham to explore potential research connections between Bio21 and centres of research excellence in Mexico and Cuba.

### The President of Croatia, Her Excellency Ms Kolinda Grabar-Kitarovic visits Bio21

Bio21 hosted the visit of the President of Croatia, Her Excellency Ms Kolinda Grabar-Kitarovic and her entourage, 17 August 2017. The President was accompanied among others by His Excellency Mr Damir Kusen Ambassador, Ms Anamarija Kirinić Chief of Staff, Office of the President, Ms Natalija Hmelina Chief of Cabinet of the President, Office of the President and Ms Zdravka Bušić State Secretary, Ministry of Foreign and European Affairs.

During the President's visit a Memorandum of Understanding was signed between the University of Melbourne and the University of Zagreb to facilitate research collaboration and PhD pathways. As one example, the MOU will aim to increase student recruitment between both institutions with a focus on engineering and science doctoral students.



### President of Rice University visits Bio21

Professor David Leebron, President of Rice University, Houston, Texas and Chair of the Association of American Universities and Ms Ping Sun, also representing Rice University, visited Bio21 as part of their University of Melbourne visit, 23 August. They were particularly interested in learning about the University's strengths in biosciences, engineering, nanotechnology and materials engineering. They also used their visit to discuss entrepreneurship, innovation, models and structures for Asia Pacific partnerships. Frances Separovic, Herbert Kronzucker, Phil Batterham and Ary Hoffmann hosted the Bio21 visit.

## Public and Schools Engagement

As scientists we do not exist in 'silos'. The days of the 'ivory tower' science are over and as scientists we are called upon to engage with the public, with government and with industry.

This 'March for Science' in April 2017 was particularly heartening, not only for its participation of scientists across the country, but also for the large numbers of members of general public who turned up to support science.

Signs read: "What do we want? Science-based policy. When do we want it? After peer review!"; "Girls just wanna have fun(ding for their research)" and "At the start of every disaster movie, there's a scientist being ignored."

Despite the jumble of agendas and messages at such rallies, it certainly demonstrated the support and respect that science enjoys from the public, despite, or maybe because of the current phenomenon of 'fake news' and 'alternative facts'.

The public purse funds science and the public has a right to know what we do. The public can hope to be beneficiaries of the outcomes of research, such as better treatments for diseases, but also through the development of sound evidence-based

policies that benefit society. For this to occur, science needs to engage with the public and with government.

Through the advent of social media, it has never been easier to engage with the public about research: Twitter is King!

Bio21 hosts a number of engagement activities and events throughout the year.



## Bio21 'Big Picture' Seminars 2017

The 'Big Picture' seminar series that is open to the scientific community, but also to the general public, is an opportunity to hear a 'Big Picture' view from leaders in their fields of discipline. In 2017, we were honoured to hear from the following speakers:

### **Professor Michael Parker, Director, Bio21 Institute 'Journeys in Molecular Science'**

29 March 2017

We heard Professor Michael Parker speak about his journey from an undergraduate chemistry student to a researcher realising the power of visualising the structures of molecules using X-ray crystallography, to an institute director, forging a path for molecular science into the future.

### **Professor Ian Gilbert, University of Dundee – 'Drug Discovery for Neglected Diseases'**

7 April 2017

Professor Ian Gilbert, University of Dundee spoke on how The Drug Discovery Unit (DDU) was set up at the University of Dundee in 2006. It is a fully integrated drug discovery unit, combining hit discovery, medicinal and computational chemistry, drug metabolism and pharmacokinetics. The key aims of the unit are to tackle unmet medical need. The DDU has two main therapeutic focuses: neglected tropical diseases such as malaria, tuberculosis and kinetoplastid infections; and novel drug targets emerging from the academic sector. Professor Gilbert summarised the capabilities of the DDU and outlined some of the work that he has carried out on drug discovery for neglected diseases.

### **Prof Carol Sibley, Professor of Genome Sciences at the University of Washington in Seattle, Washington – 'Steps towards the elimination of malaria: What can basic scientists contribute?'**

20 June 2017

Prof Carol Sibley's lecture briefly outlined the trajectory of efforts to eliminate the mosquito-borne Plasmodium parasites that for millennia have been responsible yearly for millions of human deaths. Basic science – studies focused on understanding the biology, genetics and interactions of these adaptable, single-celled organisms – has played a crucial role in the progressive successes in controlling both deaths and disease from malaria. But the story is not yet over.... and the need to deepen our basic understanding of the parasites remains a key component if roadblocks to elimination are to be overcome and malaria finally eradicated.

### **Cynthia Whitchurch receives the David Syme Prize at Bio21**

3 August 2017

DNA slime, exploding bacteria and biofilms were the topic of Associate Professor Cynthia Whitchurch's 'Big Picture' presentation at the Bio21 Institute.

Her research on *Pseudomonas aeruginosa*, has used super-resolution (OMX blaze) microscopy to yield insights into bacterial colony behaviour that has implications for how we design medical devices such as Foley catheters and implants to reduce our dependence on antibiotics.

For her significant contribution to the field, Cynthia Whitchurch was awarded the David Syme Prize by Professor Frances Separovic, Deputy Director of the Bio21 Institute.

Cynthia is only one of very few women to receive the prestigious prize since it was first awarded in 1906, following in the footsteps of Georgina Sweet and Suzanne Cory.



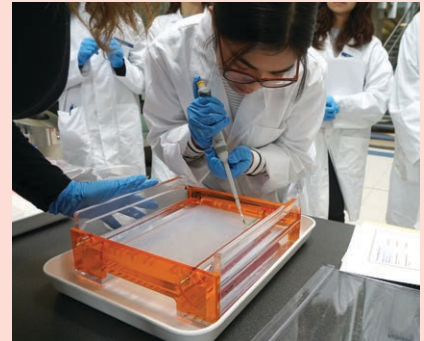
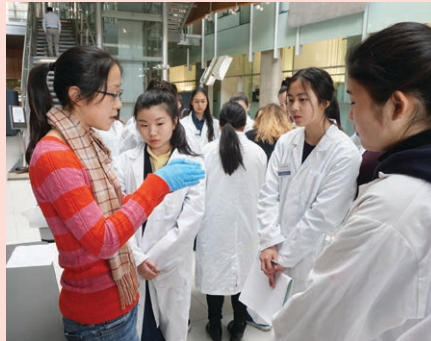


## Public and School Engagement Activities 2017

Bio21 has for the past two years opened our doors over a weekend to the general public in the City of Melbourne's Open House. We engage with school children through the work experience program, the CSIRO's Scientists in Schools program; school tours and through the 'Life Magnified' event as part of National Science Week, just to name a few.

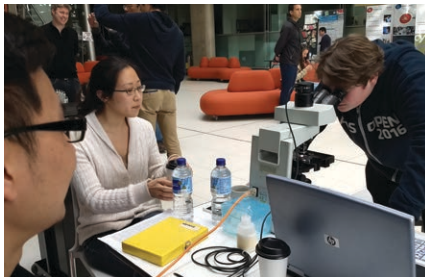
### Bio21 Engagement – Work Experience Week

In the last week of June, Bio21 hosted 22 Year 10 work experience students from across Melbourne and some rural and regional areas. The program included tours through the building; Platform Technology Facilities; Mosquito, Malaria and Proteomics pracs, shadowing in the lab and project time, where students interviewed researchers about their research and created posters



### Open House Weekend– 29 & 30 July

On the weekend of the 29 and 30 July, Bio21 hosted over 350 members of the public during the City of Melbourne's Open House weekend. Bio21 members hosted tours through the building and Magnetic Resonance Facility and many displays



within the atrium. Many groups gave up some of the weekend to host displays and to engage with the public: Malaria Display; Circa Group, Exciton Science; Rare Animals, Insects and Dengue; Dental Science and Drug Discovery.

### Masters of Biotechnology Student Forum

Friday 4 August, Masters of Biotechnology students visited the Bio21 Institute. Bio21 Industry group members Andrew Nash, CSL Ltd, Jack Parsons, Prana Biotech, Tony Duncan and Mei Ng, Circa Group, Laila Huq, Dental Science research group, Ruth Park-Jones and Jens Sommer-Knudsen RIC shared their insights peaking as part of the Masters of Biotechnology Student Forum.

### National Science Week – 'Life Magnified' @ Bio21

"10/10 best day ever"; "Gave a great insight into a career in science"; "Better than school"; "It was both fun and informative" and "I want not to get cancer" – were just some of the overwhelmingly positive comments Paul McMillan, Manager of Biological Optical Microscopy Platform (BOMP) at Bio21, received from the sixty year 9 and 10 students that participated in the "Life Magnified" program during National Science Week, 17 and 18 August, this year. Students from schools across Victoria, including The Geelong College, Mac Robertson Girl's High School, Mount Alexander College and Copperfield College (and a home-schooled student) participated in the program this year.

## Scientist for a Week @ Bio21 – Report by Elvis Tran

Elvis Tran was one of the 22 students who participated in the Bio21, Faculty of Science’s Work Experience program this year. Read about his experience of the week here:



*Elvis Tran – front row, far right in red*

For a week in June, I was no longer a student bound by books and constantly in a classroom setting. Instead, I had become a research scientist at Bio21, surrounded by million-dollar cutting-edge biotechnology. Wearing a white lab coat and safety goggles everywhere I went, I really did feel like a scientist. But it was not just what I wore: the incredible workshops I took part in, the vibrant scientific atmosphere, being able to talk to and learn from scientists who make real-life contributions to what we know about science today, and a multitude of other factors had allowed me to thoroughly explore what a career pathway in science would be like.

The sensational week at Bio21 provided a myriad of opportunities for me to engage in the work undertaken by scientists. It consisted of touring laboratories, looking at the works of various Bio21 research groups, conducting experiments on a molecular scale and attending seminars and talks of new work by scientists. Although it was not a part of the program, I was also very fortunate to have been able to listen to PhD and Masters students present their thesis.

The week culminated with a poster presentation in which all students in the Melbourne University Work Experience Program were able to present their findings on a topic related to what they had been studying throughout the week. Since I was a part of the Bio21 group, I did not partake

in the programs for the other branches of science offered and hence, found it tremendous when I was able to converse with and find out what other students had been endeavouring in as a part of Astrophysics, Particle Physics, Chemistry, and Geology, to list a few.

Finally, the program ended in the best way possible, in my opinion, with a visit to Scienceworks. While we did not have much time to spend at the museum, we did take part in the planetarium experience which I found to be simply unforgettable. In fact, the whole week was invaluable and being able to have met like-minded new friends and get a taste of university life was a most welcoming bonus. Considering all the incredible things I had done and learnt, it really was a phenomenal week.

My work experience placements at Bio21 was an astounding experience. I learnt not only what a career in science would look like but also essential skills and qualities a person needs to be familiar with when looking to be employed - an utmost necessity being punctuality. As such, I highly encourage future Year 10 students to apply to be a part of the Melbourne University Work Experience Program as I am sure they will, like I was, be provided with nothing short of a worthwhile experience.

**Elvis Tran**, Mazenod College

## Bio21 Institute Community Internal Events and Engagement

For a culture such as ours to flourish, it needs to be inclusive, equitable, fair and underpinned by a strong sense of respect for each other.

The Bio21 Institute, reflecting the international nature of science, is a diverse community of academic and industry researchers and professional staff members at various stages of their careers, from diverse cultural, ethnic backgrounds and genders. It is one of the reasons that science institutions are such enriching places to work in.

Bio21's science community brings forth new discoveries each day and supports its members to develop solutions to problems of human and environmental health. For a scientific culture such as ours to flourish, it needs to be inclusive, equitable, fair and underpinned by a strong sense of respect for each other.

One of the ways in which Bio21 nurtures its culture is through regular internal morning teas throughout the year often linked with fundraising for various causes, where Bio21 members come together over a cup of Avist café barista-made coffee and some sweet treats to hear from the Director about goings-on, to welcome new members into our community, recognise the achievements

of our members and to enjoy a chat with colleagues and peers. The Bio21-BAMBII 'Biggest-Morning Tea' is co-sponsored by our largest tenant CSL and is one of the highlights each year, where all manner of science-themed cakes and biscuits are produced to raise money for the Cancer Council.

The Biochemistry and Molecular Biology Department hosts a seminar series every Wednesday 12-1pm in the Bio21 auditorium and the School of Chemistry also host regular seminars on Fridays, 12-1pm.

For the first time, Bio21 also formed a team to participate in the Royal Children's Hospital's 'Run for the Kids' fun run event, 9 April 2017.

Bio21's Green Impact team, headed by Christine Baggs and including Courtney Zlatic, Yan Hong Tan, Peter Coles, Johanna Gunn, Florienne Loder and two student assistants, Auriel Yeap and Lu Zhang worked hard to improve sustainable practices and well-being within the Bio21 Institute.

Green Impact is a change and engagement program, developed in the UK by the National Union of Students (NUS). Piloted for the first time in Australia at the University of Melbourne, it has been implemented by over 400 organisations worldwide. It aims to raise awareness of sustainability, university wide, by giving people a focused approach to tackling sustainability issues and supporting them in achieving these actions.

Bio21's Green Impact team was recognised with an 'Engagement and Innovation' award during the 'Green Impact' Sustainability Awards Ceremony. The team achieved 40 actions as part of the sustainability initiative attaining a 'Silver' ranking in introducing more sustainable practises to the Bio21 Community, such as using the recycling options, buying office plants and using sustainable coffee cups.



## Bio21 Hosted Events

Apart from internal events, Bio21 is a popular venue for conferences, symposia and other scientific events.

### Georgina Sweet Awards

Monday, 23 October

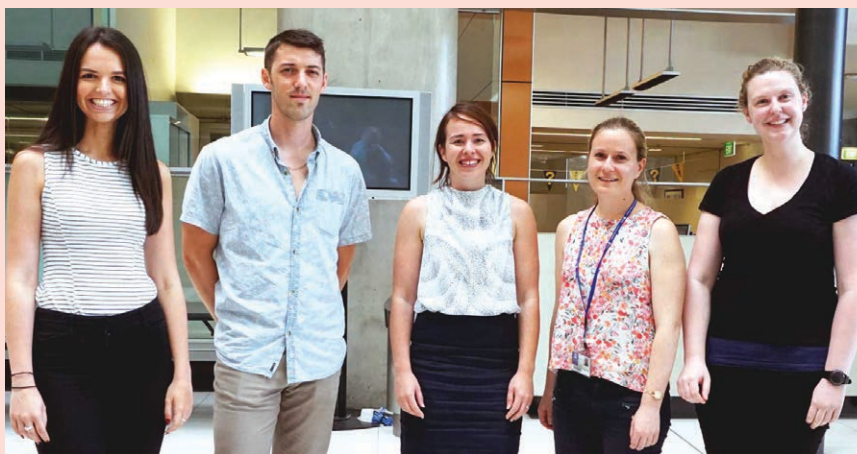
For the second consecutive year, Bio21's Professor Leann Tilley has hosted The Georgina Sweet Awards ceremony at the Bio21 Institute, which celebrates the winners of the Georgina Sweet Awards for Women in Quantitative Biomedical Science. Speakers included the three award winners Alyssa Barry, Stephanie Gras and Megan Maher and guest speaker Professor Anne Kelso AO, Chief Executive Officer of NHRMC.

The guests at the event heard from each of the prize recipients, as well as receiving personal accounts of their leadership journey from Anne Kelso, CEO NHRMC and Edwina Cornish, former Deputy Vice Chancellor Research Monash University. Alyssa Barry and Alicia Oschlack also took the opportunity to engage with visiting year 9 and 10 students from Westbourne Grammar School.

*"It was an extraordinary event and I know that from listening to their conversations on the way back that there are now nine, incredibly inspired young women. The awards themselves are an extraordinary initiative by Leann Tilley and I certainly hope we can attend in following years and establish an ongoing relationship with Bio21 to continue to foster an awareness of the opportunities that exist for young women in the sciences," wrote Brett Fitzsimmons, the Learning Leader, Westbourne Grammar.*

### Biophysics Week at Bio21

Biophysics Week was celebrated on 7 March 2017 at Bio21 with a half-day symposium in the auditorium organised by Dr Marc-Antoine Sani, Victorian representative of the Australian Society for Biophysics.



## Launch of the ARC Centre of Excellence in Exciton Science

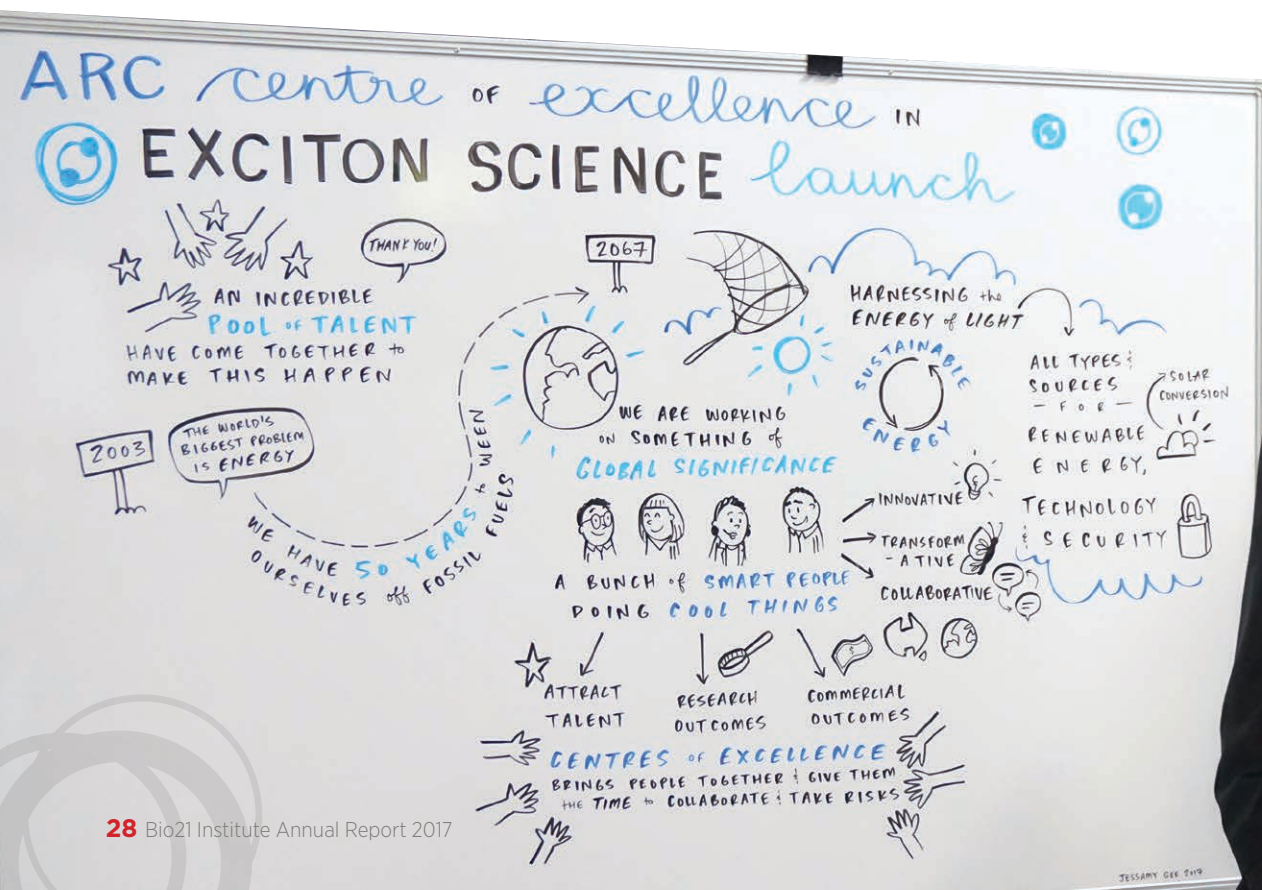
The ARC Centre of Excellence in Exciton Science was officially launched at Bio21 at 2pm, Wednesday, 13 December 2017.

The event celebrated the official opening of the Centre, which was awarded \$31.8M over 7 years by the Australian Research Council to lead world-class research in the science of excitons, address the challenges of sustainable energy through photovoltaic and solar fuels and capitalise on commercial applications.



The Centre's vision is to pursue exceptional research, develop our researchers' capacity and establish them as leaders in the field, inspire Australian students to take

up careers in science, engineering and technology and strive for commercial and industrial outcomes.



## Graduate Researchers and Postdocs at Bio21

One of the questions that many PhD graduate researchers have is what happens after their PhD. In the course of a PhD, graduate researchers become experts on their topic and can come to know more than anyone else about their chosen protein, molecule or other object of study. But many fear that this may not prepare them for a research career, or for any other career path.

The competitive nature of the science endeavour can leave many graduate researchers feeling that if they cannot, or do not wish to pursue the academic research path, that they have failed in some way.

Furthermore, some people would argue that it is a waste of our society's resources to invest in training such specialists, who then may not pursue a research path after completion.

Nothing could be further from the truth.

PhD graduate researchers have gone on to pursue very disparate and fulfilling career paths, some in academia, but many in other professions.

A PhD is a challenging endeavour, where a student takes responsibility for their own project. They need to work independently and in teams to solve problems that no one else has ever encountered. To do this they need endurance, perseverance and grit. Problem-solving becomes a way of approaching the world.

A PhD trains your critical thinking skills like no other work. Graduate researchers are constantly asked to question what they see, what they read and to be critical of their own work and that of their peers. The ability to think critically and clearly is highly sought after in many high level professions.

PhD graduate researchers are constantly challenged to communicate their work to the outside world – from small groups of colleagues to an auditorium of international peers; from school children to journalists – honing their public speaking, oral and written communication skills.

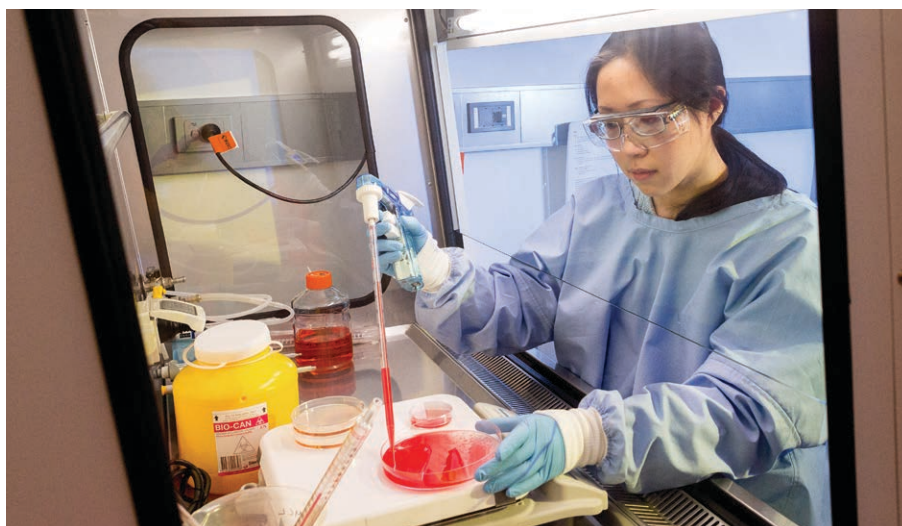
From patent law, journalism, entrepreneurship, politics, education or even as a committee member at your local school, these skills are required in all walks of life.

Most importantly, there is an urgent need for scientists to take up careers in science

journalism, politics and school teaching, in particular, if we are serious about Australia being a “clever” country.

By delving into the depths of problems in the course of a PhD, a world of opportunity opens up to graduate researchers.

Bio21 is host to over 200 Honours, Masters and PhD graduate researchers and we are very supportive of the postgraduate student societies BAMBII (Biochemistry and Molecular Biology) and CPS (Chemistry Postgraduate Society), who often host social events at the Bio21 Institute.





### **BAMBII & Biochemistry Department Three Minute Thesis Comp**

Haiyin Liu, Riley Metcalfe and Autumn Bricker were the top three winners of the 2017 BAMBII & Biochemistry and Molecular Biology Department Three Minute Thesis Competition that took place at Bio21 on Tuesday, 28 March judged by Shane Huntington and organised by Justine Mintern.

### **Shazia Ruybal awarded Dame Margaret Blackwood Soroptimist Scholarship**

Shazia Ruybal (PhD Candidate in the Day lab) was awarded a Dame Margaret Blackwood Soroptimist Scholarship. This is a great accomplishment for one of our promising young female scientists.

### **Best Thesis Award for Wenyi Li**

Dr Wenyi Li has been awarded the Graham Johnston Best Thesis Award from RACI Division of Medicinal Chemistry/Chemical Biology. As part of the award, he was invited to present a lecture on his research at the RACI Centenary Congress (23-28 July 2017).

Dr Li found that the antibacterial activity of a proline-rich antimicrobial peptide against Gram-negative bacteria was extended by C-terminal functionalization and multimerization using different linker groups. The mechanism of action was investigated in *E. coli* and model membranes. The C-modified peptides had a broader spectrum and increased potency as potential antibiotics.

The Graham Johnston Best Thesis Award is an award for the best PhD thesis submitted in the previous two years in Medicinal Chemistry/Chemical Biology. This award, formerly known as the Bionomics Best Thesis Award, has been renamed in recognition of Professor Graham Johnston's seminal contribution to the Division as well as pharmacology and medicinal chemistry in Australia. The award is designed to give recognition of outstanding achievement in research and to promote chemical communication.

The award is open to anyone working broadly in the design, synthesis, and development of bioactive agents.

Dr Li was supervised by Professor Frances Separovic and Professor John Wade.

### **RACI Victorian Inorganic Chemistry Symposium Prize Winners**

The annual RACI Victorian Inorganic Chemistry Symposium was held Friday, 24 November 2017 at the Bio21 Institute. The PhD-student focused symposium involved scientists from all over Victoria with over 100 delegates. The symposium featured 10 talks given by current research students and all the sessions were chaired by students. The plenary lecture was delivered by Associate Professor Deanna D'Alessandro.

Congratulations to Stacey Rudd (Donnelly Group) who won the 'Bruce West Prize' for the best oral presentation. Congratulations to Ben Spyrou (Donnelly Group) who won a prize for 'best poster' and HuiJing Koay (Donnelly Group) winner of the prize for 'best question'.

## Institute Members Honoured

Despite the fierce competition for grants, Bio21 remains a success story. Situated in the Parkville Precinct, the Bio21 Institute is located amongst a unique concentration of hospitals and medical research institutes within walking distance of one another. It is a powerhouse of scientific research. This provides researchers at Bio21 with fabulous opportunities to collaborate with researchers in neighbouring institutes. It is the mentors and supervisors; our team members; our colleagues and collaborators, that contribute to our success through their support, advice and sharing of ideas.

For Bio21 Institute members it has been an exciting year for awards and prizes; our members being honoured with the Prime Minister's Prizes for Science, NHMRC Development grants and Early Career Fellowships, NHMRC \$2.5 million Centre for Research Excellence (CRE) in Malaria Elimination and commercialisation agreements.

Laureate Professor Eric Reynolds AO, was awarded the Prime Minister's Prize for Innovation in recognition of his lifetime's work to improve dental health in the community, through innovative approaches to combat oral diseases.

Kat Holt received an NHRMC Career Development Fellowship to pursue her work into antimicrobial resistance. Spencer Williams (CIB) and Eric Reynolds and Stuart Dashper for a NHMRC Development grants for asthma drug development and in dental science, respectively.

Paul Donnelly's radiopharmaceutical research, to diagnose and treat certain cancers using Zirconium, progressed on the path towards translation and commercialisation with the signing of a technology licencing agreement and research collaboration agreement between the University of Melbourne and Telix Pharmaceuticals.

Leann Tilley is one of the Associate Investigators for the CRE in Malaria Elimination located at the Peter Doherty Institute.

Three members of the Bio21 community, Dr Natalie Spillman (Eppendorf Edman Award), Dr Heather Verkade (Shimadzu Education Award) and Yi Lin Kang (ASBMB Fellowship) have received prestigious Australian Society for Biochemistry and Molecular Biology (ASBMB) awards. It is great to see our early and mid-career researchers and teaching staff being recognised for their achievements, and at Bio21 we encourage research leaders to support their younger group members to apply for these opportunities, as success often begets success.

Danny Hatters received incredible news that he had been awarded the prestigious Human Frontiers Program Grant to pursue fundamental research into how cells clear faulty proteins with their Protein Quality Control Network. Danny formed a team with researchers Simon Ebbinghaus, Germany, Alex Dickson, Canada and Nicholas Hannah, Sydney and attributes the success of his application to a well thought-out idea and a truly international collaboration across disciplines.

On International Women's Day, 8 March, Professor Frances Separovic was recognised as an IUPAC Distinguished Woman in Chemistry and Chemical Engineering. Frances Separovic has been a pioneer for women in biophysics and chemistry, being one of the first five women - who include the University of Melbourne's Provost, Professor Margaret Sheil - to be appointed a professor of chemistry in Australia. We can be very proud to have her in our midst.

One of Bio21's founding group leaders, seasoned collaborator and president of the Australian Academy of Sciences, Professor Andrew Holmes has been awarded Australia's highest honour as a Companion to the Order of Australia. In his interview with the Guardian Australia, Andrew humbly says: "It's a tremendous honour. I feel it's wonderful to have the science community recognised, even if it's through just one person. I take it as a recognition of science in Australia."

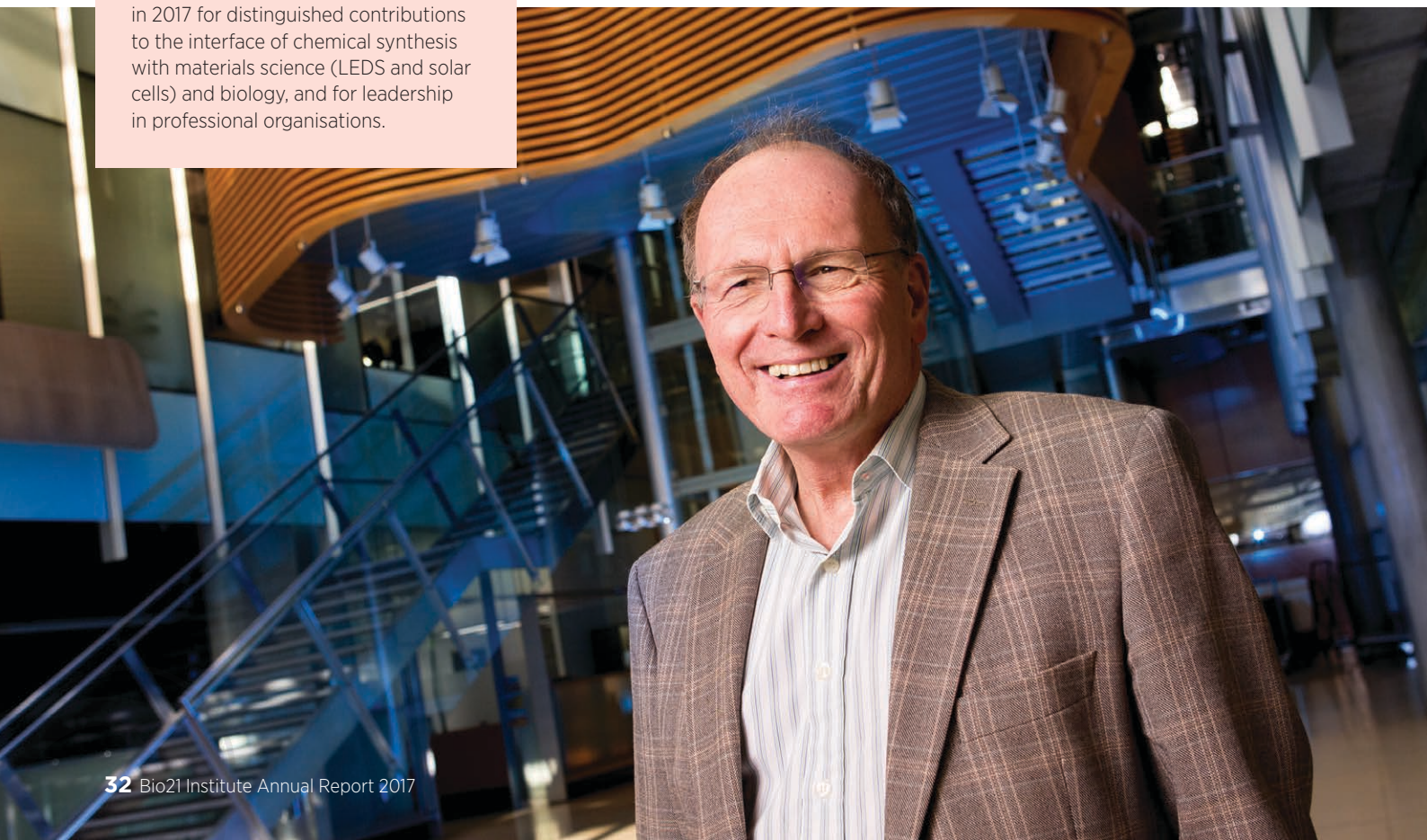
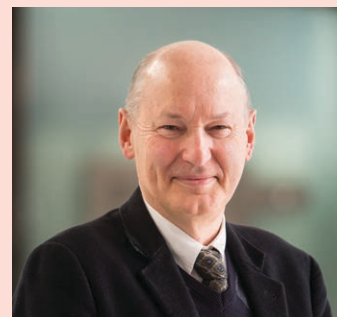
In these difficult times for science, let us support each other and be inspired and celebrate our successes at the Bio21 Institute.

### **Andrew Holmes honoured as Companion of the Order of Australia**

Congratulations to Professor Andrew Holmes, who works in the School of Chemistry and Bio21 Institute, and is President of the Australian Academy of Science, who has been recognised with Australia's highest honour, Companion in the General Division of the Order of Australia in the 2017 Australia Day Honours list.

Andrew Holmes was named as an American Association for the Advancement of Science (AAAS) Fellow in 2017 for distinguished contributions to the interface of chemical synthesis with materials science (LEDS and solar cells) and biology, and for leadership in professional organisations.

**Laureate Professor Eric Reynolds AO**, who was awarded the Prime Minister's Prize for Innovation in recognition of his lifetime's work to improve dental health in the community, through innovative approaches to combat oral diseases.







**ASBMB recognises Bio21's Dr Natalie Spillman, Dr Heather Verkade and Yi Lin Kang**

From recognising innovation in teaching initiatives to supporting mid-career researchers to attend international conferences, three members of the Bio21 community and the University of Melbourne's Department of Biochemistry and Molecular Biology, Dr Natalie Spillman (Eppendorf Edman Award), Dr Heather Verkade (Shimadzu Education Award) and Yi Lin Kang (ASBMB Fellowship) have been awarded ASBMB awards.



**Associate Professor Danny Hatters on successful Human Frontiers Program Grant**

Bio21's Danny Hatters on receiving a most prestigious Human Frontiers Program Grant for his application titled: "Defining the capacity of cells to keep the proteome folded over space and time". Teaming up with researchers, Alex Dickson, Canada, Simon Ebbinghaus, Germany and Hannah Nicholas, Sydney, this international team will collaborate on a program that aims to understand how cells' Protein Quality Control Network – that comprises over 800 proteins – functions to clear away defective proteins.



**Bio21's Associate Professor Kat Holt 1 of 41 International HHMI Research Scholars**

The Howard Hughes Medical Institute (HHMI) has teamed up with the Bill & Melinda Gates Foundation, the Wellcome Trust, and the Calouste Gulbenkian Foundation to develop scientific talent around the world, and will award a total of nearly \$26.7 million to this group of scholars.

Associate Professor Kathryn Holt, Department of Biochemistry and Molecular Biology, University of Melbourne is one of the 41 early career researchers chosen by the philanthropies as an International Research Scholar.



**Professor Frances Separovic honoured at UNSW Alumni Awards, IUPAC Distinguished Woman in Chemistry or Chemical Engineering and elected as an Ordinary Member (Physical Sciences) of Council of the Australian Academy of Science**

Professor Frances Separovic has been honoured at the UNSW Alumni Awards in the Science and Technology category, for her contribution to chemistry and the promotion of women in science. Having earned her PhD from UNSW as a single mother, Frances became the first female Professor of Chemistry at the University of Melbourne in 2005, and in 2010 became the first woman to head our School of Chemistry.

International Women's Day this March 8th, IUPAC announced the awardees of the IUPAC 2017 Distinguished Women in Chemistry or Chemical Engineering.

The Bio21 Institute's Professor Frances Separovic was one of 12 women to be honoured.

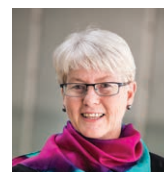
"It's a very special Women's Day for me," says Professor Separovic. "I feel honoured."

Frances Separovic was elected as an Ordinary Member (Physical Sciences) of Council of the Australian Academy of Science (one of two).



**Associate Professor Uta Wille secured a Learning and Teaching Initiatives grant**

Bio21's Uta Wille (Chemistry), has successfully secured a Learning and Teaching Initiatives grant. The grant will be used to redesign the 1st year chemistry laboratory classes to include work-integrated learning experiences – all aimed to improve the learning experience of undergraduate students.



**Professor Leann Tilley receives the 2017 ASB Bob Robertson award**

Leann Tilley received the 2017 ASB Bob Robertson award, which recognises outstanding contributions to biophysics, including the quality of published work; the service to the biophysics community and teaching in biophysics.

## Grant Successes

### ARC Grants: Bio21 Teams Funded for Discovery

On 10 November 2017 Senator the Hon Simon Birmingham, Minister for Education and Training announced \$333.5 million of funding as part of the Australian Research Council's (ARC) National Competitive Grants Programme.

#### LIEF infrastructure and equipment grants:

Members of the Bio21 community who received funding for their research and who have been part of LIEF infrastructure and equipment grants that have received funding include: Elizabeth Hinde, Craig Hutton, Uta Wille, Malcolm McConville, Stuart Ralph, Diana Stojanovski, Richard O'Hair, Paul Donnelly, Justine Mintern, Spencer Williams and Kat Holt.

Also Lloyd Hollenberg, Paul Donnelly, Leann Tilley and Paul McMillan are cooperating on a successful ARC LIEF grant that will go towards establishing a cryogenic, quantum microscope facility and an adaptive optics, super-resolution optical microscopy facility, respectively:

#### Discovery Projects 2018:

##### University of Melbourne:

##### Dr Elizabeth Hinde; Professor Enrico Gratton

This project aims to investigate the role of nuclear architecture in regulating genome function by development of a new microscopy method to quantify the diffusive route of fluorescent proteins in live cells. The anticipated outcomes of this project include an insight into how chromatin dynamics facilitate DNA target search and an analytical tool for cell biologists to probe how genomes work in



their natural environment (the cell nucleus). This project received \$412,608 over 3 years.

##### Associate Professor Craig Hutton; Associate Professor Uta Wille

This project aims to invent new synthetic strategies that enable chemical manipulation of small cyclic peptides, a promising class of biologically active molecules with high metabolic stability. Combining theory and practice, this project will develop novel acyl transfer reactions that will allow traceless, site-selective, ring expansion and contraction of small cyclic peptides. This project will result in new synthetic methodology that will simplify the synthesis of an important class of small drug-like molecules. This will provide significant benefits, such as a breakthrough

in the synthetic approach to small cyclic peptides, which will strengthen Australia's international standing in peptide research and provide new strategies for translation to the growing biotechnology industry. This project received \$396,610 over three years.

##### Professor Malcolm McConville; Dr Stuart Ralph; Dr Zoran Nikoloski; Dr Audrey John

This project aims to investigate the origin and function of the large number of chemically undefined metabolites that occur in all cells. The project will utilise advanced analytical techniques, as well as computational and genetic approaches, to characterise the chemical structures of these metabolites and identify the enzymes involved in their synthesis and degradation.

It will provide new information on the metabolic capacity of eukaryotic cells and allow the generation of more accurate models of metabolism. These outcomes have important biotechnology applications and will identify metabolic processes that underpin normal and disease states in animals and human cells. This project received \$530,496 over 3 years.

**Dr Hayley Newton; Dr Diana Stojanovski; Dr Nichollas Scott**

This project aims to understand how intracellular bacterial pathogens target mitochondria. *Coxiella burnetii* is a unique and significant pathogen of humans and commercially important animals that uses effector proteins to control host cell functions. A cohort of these effectors target mitochondria. Since mitochondria are key players in cell health, the intended outcome of this research is to understand the role of the mitochondrially-targeted effector proteins. The project will determine the importance of mitochondrial protein trafficking for *Coxiella* pathogenesis and how mitochondrial function is altered during infection. This will provide understanding of how bacterial pathogens manipulate organelles like mitochondria for their survival. This project received \$269,734 over 3 years.

**Professor Richard O’Hair; Associate Professor Paul Donnelly; Professor Allan Canty**

This project aims to discover new metal-promoted methods to synthesise amides and thioamides, important structural motifs in chemistry and biology. The project will use a mechanism-based approach that integrates theory with gas- and solution-phase experiments to discover new chemical reactions. A benefit of this research will be new eco-friendly alternatives to existing processes, thereby reducing waste and eliminating toxic and expensive reagents. This project received \$401,706 over 3 years.

**Dr Georgina Such; Dr Angus Johnston; Dr Justine Mintern; Professor Elizabeth Gillies**

This project aims to engineer responsive nanoparticles capable of trafficking efficiently within cells. The site of release of therapeutic cargo has importance for improving the efficacy of many treatments, for example vaccine delivery. Therefore fundamental understanding of how nanoparticle structure can be engineered to control cellular behaviour is necessary. The project will engineer new polymeric nanomaterials and investigate the impact of their structure on biological properties. The benefits of this project will include new fundamental insights into improving nanoparticle design for vaccine delivery, as well as the expansion of Australia’s knowledge base in the area of biodegradable polymers. This project received \$438,161 over 3 years.

**Professor Spencer Williams; Professor Gideon Davies**

This project aims to develop a detailed molecular description of the sulfoglycolysis pathway, a major pathway involved in cycling an abundant sulfolipid. The project will use an integrated chemical, biochemical and structural approach to illuminate how sulfoglycolysis degrades sulfolipid to access its elemental and energy constituents. Expected outcomes include an advanced understanding of the biosulfur cycle, the development of new chemical approaches to manipulate sulfur cycling for agricultural and biotechnology applications, and deepened ties to leading international researchers. Potential benefits include new strategies to reduce dependence on agricultural fertilisers, promote gut wellbeing, and control insect pests. This project received \$496,925 over 3 years.



**Monash University:****Professor Ross Coppel; Professor Malcolm McConville; Dr Isabelle Lucet**

This project aims to investigate how the complex cell walls of Mycobacteria and Corynebacteria are assembled. The project will utilise a combination of genetic, biochemical and advanced analytical approaches to investigate individual steps in the synthesis of key cell wall components and understand how the assembly of these components is coordinated with bacterial growth. Important outcomes of this research will be detailed information on processes that regulate the growth of bacteria with important biotechnology, veterinary and medical significance, as well as information on mechanisms of cell wall synthesis that may be conserved in all bacteria. This project received \$707,328 over 3 years.

**Dr Michael McDonald; Associate Professor Kathryn Holt**

This project aims to measure the rates and genetic mechanisms of adaptation for individual species within a microbial community. Expected outcomes of this interdisciplinary project include the first genomic and phenotypic dataset of a model microbial community, and novel tools for the analysis of meta-genomic datasets. This project has the potential to transform understanding of microbial adaptation. This project received \$398,794 over 3 years.

**ARC LIEF – University of Melbourne****Professor Lloyd Hollenberg; Professor Efstratios Skafidas; Professor Alastair Stewart; Associate Professor Paul Donnelly; Dr Jean-Philippe Tetienne; Professor Sven Rogge; Professor Michelle Simmons; Associate Professor Jared Cole; Dr Marcus Doherty**

This project aims to establish a cryogenic, quantum microscope facility in Australia. Quantum sensing is a new field that harnesses the properties of individual quantum systems to realise new types of detection and imaging with unprecedented combination of sensitivity and spatial resolution. The potential innovations, applications and benefits to society are far reaching across the full spectrum of scientific and engineering activity, from the development of atomic-scale imaging of protein structures for drug discovery, to the study of chemical, physical, and biological processes and materials for advanced technology and manufacturing. This application received \$223,039.

**Professor Leann Tilley; Professor Staffan Persson; Professor Melissa Little; Dr Paul McMillan; Dr Alexander Combes; Professor Trevor Lithgow; Dr Thomas Naderer; Professor Michael Ryan; Associate Professor Helena Richardson; Dr Peter Lock; Professor Antoine van Oijen; Professor Sarah Russell; Associate Professor Marcus Heisler; Associate Professor Till Boecking; Dr Kirstin Elgass**

This project aims to establish an adaptive optics, super-resolution optical microscopy facility to image cellular events with the highest possible spatial resolution, in a whole cell or tissue context. Sophisticated computer-controlled deformable mirrors will be used to correct the way light is distorted as it passes through specimens, thereby overcoming aberrations found in thick and complex samples. This adaptive optics system will enable researchers to study complex behaviour of biological specimens, at the optical resolution limit in plant and animal tissues, leading to basic biology and biotechnology outcomes in biofuels, biomaterials and biomedicines. This application received \$345,475.

## Bio21 projects funded by NHMRC

Bio21 researchers who have received NHMRC funding for their project grants were announced 6 December. Researchers whose projects have received funding include: Mike Griffin, Leann Tilley & Stuart Ralph, Malcolm McConville, Paul Gooley, Neil O'Brien-Simpson & Eric Reynolds, Ian van Driel, Paul Donnelly, Gavin Reid, Frances Separovic and Spencer Williams. Also, Suzanne Garland's Royal Women's Hospital research group received funding for a Centre of Research Excellence.

NHMRC funding for their project grants was announced 6 December.

### Dr Mike Griffin

Development of an Interleukin-11 Signalling Antagonist

### Professor Leann Tilley, Dr Stuart Ralph

Molecular basis of artemisinin action and resistance in *Plasmodium falciparum*

### Professor Malcolm McConville

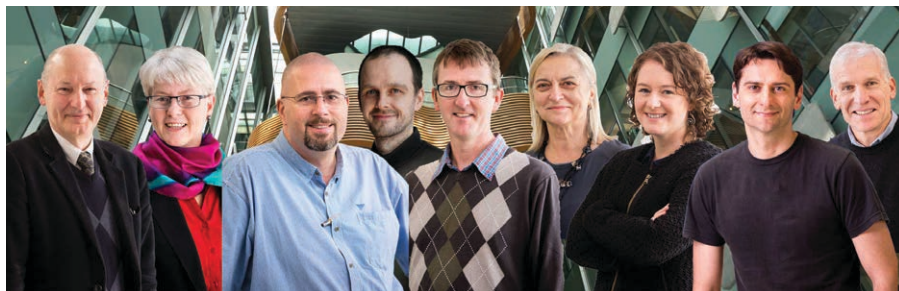
Targeting phosphoinositide metabolism in *Leishmania*

### Dr Paul Gooley, Dr Mike Griffin

Resolving and targeting the complex molecular mechanisms underlying GPCR signalling

### Dr Paul Gooley

Molecular determinants of drug binding and selectivity at muscarinic acetylcholine receptors



### Dr Neil O'Brien-Simpson and Prof Eric Reynolds

Star polymers as novel antimicrobial and immunomodulatory agents

### Professor Ian van Driel

Interferon mediated control of *Legionella* infection

### Prof Paul Donnelly with researchers from Monash and La Trobe Universities and Austin Health

Alpha Particle Therapy of Solid Tumours

### Profs Gavin Reid and Frances Separovic with researchers from Monash University

Mechanism of Bacterial Resistance to Antimicrobial Peptides

### Prof Spencer Williams with researchers from Immunology (University of Melbourne) and Monash University

Characterisation and Development of Type-2 NKT cells

### Kat Holt received a Career Development Fellowship for \$476,728.00.

Project Title: "Applied bacterial genomics to tackle antimicrobial resistance."

"The focus of my research program for the next 5 years will be antimicrobial resistance (AMR), which is recognized by the WHO as one of the most pressing health issues globally and a threat to the very core of modern medicine. AMR is a consequence of adaptive evolution of microbial genomes in response to antimicrobial drugs; as such, genomics has a crucial role to play in understanding, monitoring and managing this most challenging of global health problems."

### Spencer Williams received a NHMRC Development Grant with Professor Alastair Stewart and Dr Paul Barrett, of \$538,064.00.

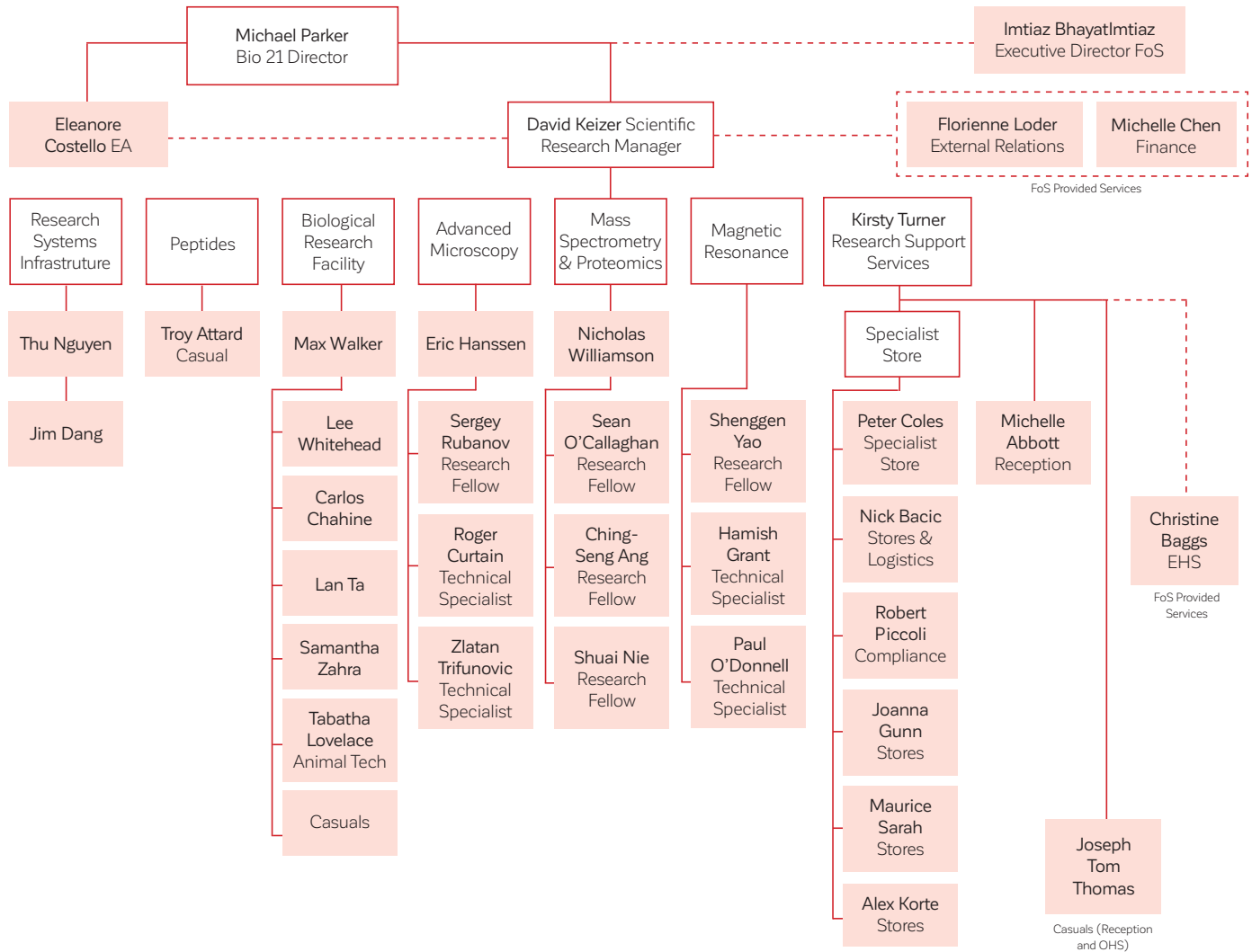
Project Title: "Steroid-enhancing selective casein kinase inhibitors: first in class novel inhaled anti-asthma agents."

### Eric Reynolds and Stuart Dashper received a NHMRC Development Grant of \$800,585.00.

Project Title: "Enamel remineralisation and prebiosis by a novel biomimetic system."

# Governance

## Bio21 Institute - Scientific Research Team





## Occupational Health and Safety Statement

The Bio21 Institute is committed to the health, safety and wellbeing of its members and visitors and has the support of senior management to achieve safety targets. Objectives and targets for 2017 were predominantly focused on training and internal audits to ensure compliance was met when conducting high risk activities.

It is pleasing to see high levels of occupational health and safety (OHS) related training across all Institute members.

Despite the complex and challenging environment in 2017, which included a major construction project, incidents were lower than in previous years and with no severe consequences.

Thank you to all Institute members for cooperating in providing a safe work place for all.

**Christine Baggs**

OHS Coordinator  
Bio21 Institute



# Bio21 People

## Bio21 Institute Leadership

Michael Parker  
Director

Frances Separovic  
Deputy Director

David Keizer  
Scientific Research Manager

Malcolm McConville  
Associate Director – Platform Infrastructure

Spencer Williams  
Associate Director – Commercialisation

Sally Gras  
Associate Director – Engagement

## Administration & Operations Team

Michelle Abbott  
Reception

Eleonore Costello  
EA to the Director and Scientific Research  
Manager

Kirsty Turner  
Research Support Services Manager

Jessie Chan  
Senior Management Accountant

Tony Whyte  
Building Maintenance

Christine Baggs  
EHS Coordinator

Florence Loder  
Communications and Engagement Advisor

Peter Coles  
Specialist Stores Manager

## Platform Technology Managers

Eric Hanssen  
Advanced Microscopy Facility

Nick Williamson  
Mass Spectrometry and Proteomics

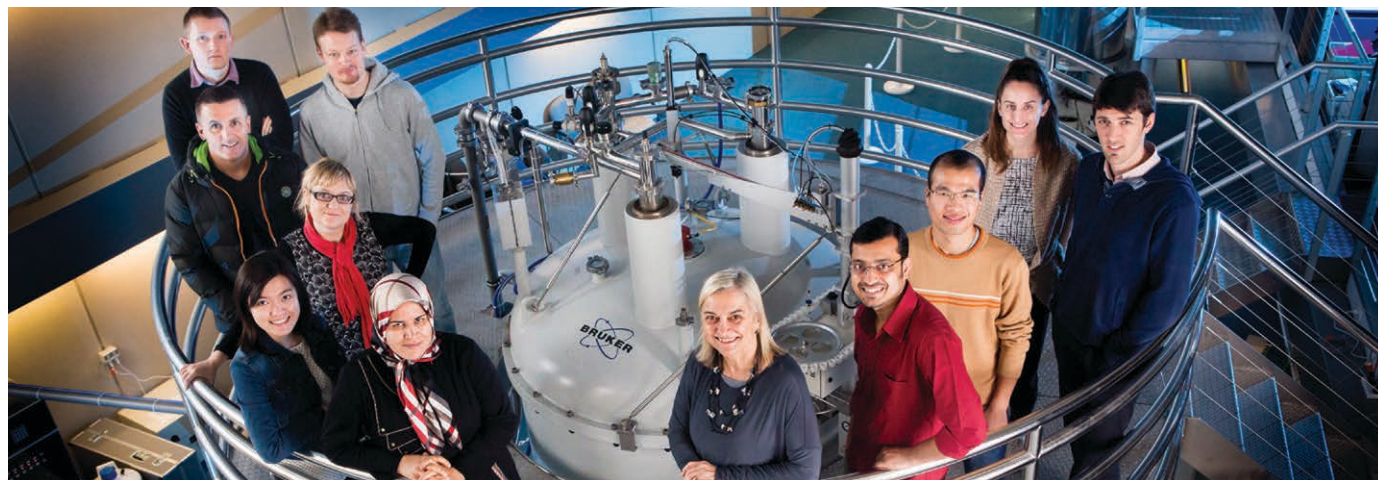
David Keizer  
Magnetic Resonance

Dedreia Tull  
Metabolomics Australia

Gavin Reid  
Peptides

Peter Coles  
University of Melbourne Specialist Store

Thu Nguyen  
Research Systems Infrastructure



## **Institute Departments and Laboratory Group Leaders**

### **Faculty of Science**

#### **School of BioSciences**

Professor Philip Batterham  
Professor Karen Day  
Professor Ary Hoffmann  
Professor Herbert Kronzucker

#### **School of Chemistry**

Professor Paul Donnelly  
Associate Professor Craig Hutton  
Associate Professor Guy Jameson  
Dr David Jones  
Professor Paul Mulvaney  
Professor Richard O'Hair  
Professor Gavin Reid  
Professor Mark Rizzacasa  
Professor Frances Separovic  
Professor Tony Wedd  
Professor Jonathan White  
Associate Professor Uta Wille  
Professor Spencer Williams  
Dr Wallace Wong

#### **School of Physics**

Professor Lloyd Hollenberg

### **Faculty of Medicine Dentistry and Health Sciences**

#### **Department of Biochemistry and Molecular Biology**

Dr David Ascher  
Professor Kevin Barnham  
Dr Laura Edgington-Mitchell  
Professor Paul Gleeson  
Associate Professor Paul Gooley  
Dr Michael Griffin  
Associate Professor Danny Hatters  
Dr Elizabeth Hinde  
Dr Kathryn Holt  
Professor Malcolm McConville  
Dr Justine Minter  
Professor Michael Parker  
Dr Stuart Ralph  
Professor Gavin Reid  
Professor Eric Reynolds  
Associate Professor Isabelle Rouiller

Dr Diana Stojanovski  
Dr David Stroud  
Professor Leann Tilley  
Professor Ian van Driel  
Professor Jose Villadangos  
Melbourne School of Engineering  
Associate Professor Sally Gras

### **Bio21 Industry Tenants**

CSL Ltd  
Circa Group  
Prana Biotech  
The Women's Hospital research group

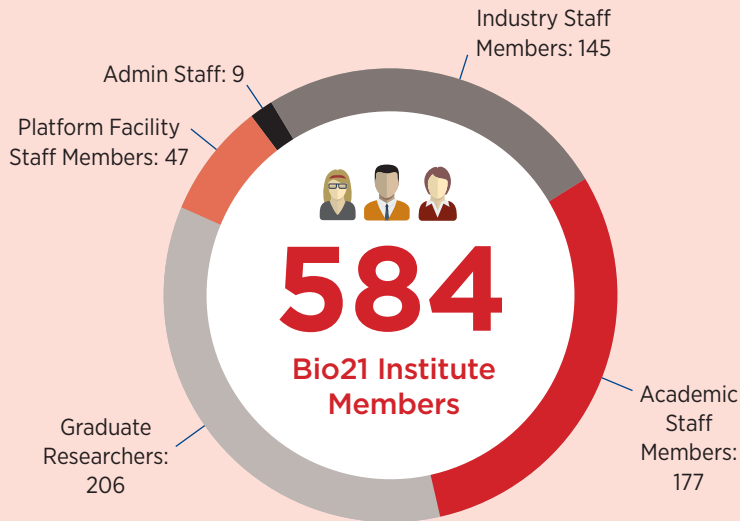
### **Fellows and Affiliates**

Professor Andrew Holmes  
Melbourne Laureate Professor Emeritus/  
President of the Australian Academy of  
Science



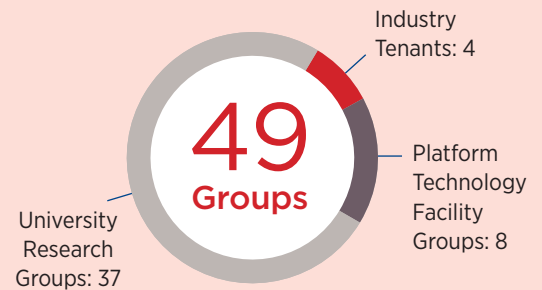


# Institute in Numbers



## External Funding Received:

Total ARC Funding:	\$3 274 478
Total NHMRC Funding:	\$5 256 303
Other Industry Funding:	\$2 100 000
Other CRC funding:	\$3 360 000



## Total Events: 200

Internal Events: 157  
External Events: 43



## Total Engagement Tours: 18

Visiting international government or academic delegations: 10  
Visiting high school or undergraduate student groups: 8



## 313 Publications



## Facebook:

New likes in 2017:  
rose from 131 to 338 = 207

## 2017 Bio21 Steering Committee

Bio21 is overseen by a steering committee that includes the Director of the Institute, the Deans of the Faculty of Science, the Faculty of Medicine, Dentistry and Health Sciences, the Melbourne School of Engineering and the Deputy Vice Chancellor Research of the University of Melbourne.



### Director Bio21 Institute of Molecular Science and Biotechnology

#### Professor Michael Parker

Professor Michael Parker is Director of the Bio21 Institute, University of Melbourne and Head of Structural Biology, St. Vincent's Institute of Medical Research in Melbourne. He is also an NHMRC Senior Principal Research Fellow in the Department of Biochemistry and Molecular Biology at Bio21. After obtaining his D. Phil. in protein crystallography from Oxford University, Michael returned to Australia to re-establish a protein crystallography laboratory at St. Vincent's in 1991. The work of the laboratory is internationally recognised with the determination of more than 140 crystal structures of proteins involved in cancer, Alzheimer's disease and infection. He has published over 300 papers and his work has been recognised with numerous awards including the 1999 Gottschalk Medal of the Australian Academy of Science,

a 2006 Federation Fellowship from the Australian Research Council, the 2011 Lemberg Medal of the Australian Society for Biochemistry and Molecular Biology, the 2011 Ramaciotti Medal for Excellence in Biomedical Research, the 2012 Federation of Asian and Oceanian Biochemists and Molecular Biologists Award for Research Excellence and the 2016 Bob Robertson Award of the Australian Society for Biophysics for outstanding contributions to biophysics in Australia and New Zealand. He was elected a Fellow of the Australian Academy of Science in 2010 and a Fellow of the Australian Academy of Health and Medical Sciences in 2015. He is currently Chair of the National Committee of Crystallography under the auspices of the Australian Academy of Science.



## Provost

### Professor Margaret Sheil

Professor Margaret Sheil has been appointed Vice-Chancellor, QUT, effective February 2018. She is Provost, deputy to the Vice-Chancellor and the Chief Academic Officer, at the University of Melbourne where she has led the implementation of the online strategy and other curriculum reform, business transformation and the recruitment and development of academic leaders.

In 2016, Margaret joined the boards of the Australian Academy of Technological Sciences and Engineering (ATSE) and the Australian Nuclear Science and Technology Organisation.

From 2007 to 2012, Margaret was the Chief Executive Officer of the Australian Research Council where she led the development of the Excellence in Research for Australia evaluation of Australian university research and the implementation of a range of initiatives to support women,

early career and Indigenous researchers. Her previous roles were Deputy Vice Chancellor (Research), Dean of Science and Professor of Chemistry at the University of Wollongong.

Margaret holds a Bachelor of Science (Hons) in Pure and Applied Chemistry and a PhD in Physical Chemistry from the University of New South Wales. She was presented with the Science and Technology Alumni Award from UNSW in 2016.

Margaret is a Fellow of the Australian and New Zealand Society for Mass Spectrometry (ANZMS); ATSE; and the Royal Australian Chemical Institute (RACI) which established the Margaret Sheil Leadership Award in recognition of her work. Margaret has been a member of the Prime Minister's Science, Engineering and Innovation Council and the Cooperative Research Centres Committee and in 2017 was awarded an Order of Australia, for her services to science and education.





## Deputy Vice Chancellor

### Professor Jim McCluskey

BMedSc MB BS MD UWA FRACP FRCPA  
FAA FAHMS

Professor James McCluskey has been Deputy Vice-Chancellor (Research) at The University of Melbourne, since 2011. Prior to this he was the Pro Vice-Chancellor (Research Partnerships), Associate Dean (Research), Faculty of Medicine Dentistry and Health Sciences and Chair of Microbiology and Immunology at The University of Melbourne. Professor McCluskey trained in Perth as a physician and pathologist before spending four years at the National Institutes of Health in the USA. On returning to Australia in 1987 he worked at Monash University until 1991 before joining Flinders University and the Australian Red Cross Blood Service. Professor McCluskey joined the University of Melbourne in 1997 as Chair in Microbiology and Immunology.

He has published extensively on how genes control immunity, mechanisms of autoimmune disease, immune recognition and the basis of transplantation matching. His work has been recognised by the Rose Payne Award from the American Society for Histocompatibility and Immunogenetics (ASHI), the Ceppellini award from the European Federation for Immunogenetics, the International Roche Organ Transplantation Fund Recognition Prize in 2011, the Australian Museum Eureka Prize in 2013, the GSK Award for Research Excellence in 2015 and the Victoria Prize for Life Sciences in 2016. He was elected a Fellow of the Australian Academy of Science in 2012 and Australian Academy of Health and Medical Sciences in 2015. He has been a consultant to the Australian Red Cross for more than 25 years leading transplant services and advising on organ transplantation matching. He implemented molecular techniques for genetic matching of patients and donors

and established the South Australian node of the Australian Bone Marrow Donor Registry in 1992. He served as Editor-in-Chief of the international immunogenetics journal *Tissue Antigens* from 2001-2015. He is a Director of the Walter and Eliza Hall Institute, Victorian Comprehensive Cancer Centre, Bionics Institute, University of Melbourne Commercial, Friends of ASHA for Indian Slums and is Chair of the Board of Nossal Institute Limited. He has previously been a director of the Burnet Institute, the Florey Institute of Neuroscience and Mental Health and two national Cooperative Research Centres. He led the conception, construction and development of the Peter Doherty Institute for Infection and Immunity, a AUD\$210M joint venture between the University of Melbourne and Melbourne Health.



## Dean of Science

### Professor Karen Day

Professor Karen Day is a distinguished malaria researcher dedicated to the improvement of global health. Born in Melbourne, she was educated at University of Melbourne where she obtained her BSc (Hons) with a double major in microbiology/biochemistry and a PhD in Molecular Parasitology from the Walter and Eliza Hall Institute of Medical Research (WEHI). As a young postdoctoral researcher she had the “life changing” opportunity to study the public health problems of Papua New Guineans working at the Papua New Guinea Institute of Medical Research.

Following her postdoctoral research, Prof. Day held positions in molecular epidemiology at Imperial College, London and in the Department of Zoology at the University of Oxford. She was appointed a Fellow of Hertford College in 2003, becoming one of the few women “dons”

in science at Oxford. She was a Founding Partner of both the Wellcome Trust Centre for the Epidemiology of Infectious Disease (WTCEID) and the interdisciplinary Peter Medawar Pathogen Evolution Research Centre at Oxford, during which time she was appointed a Visiting Professor at the Harvard School of Public Health.

In 2004 she moved to New York University School of Medicine where she held several senior academic administrative roles at NYU including Chair of the Department of Medical Parasitology; Director of the Institute of Urban and Global Health; and led the development of a Masters Program in Global Public Health.

In 2014 Prof. Day was appointed the Dean of Science at The University of Melbourne where she also continues to be actively involved in running a multidisciplinary malaria research group whose aim is to understand the transmission of malaria to better define control strategies.



## Dean of Medicine, Dentistry and Health Sciences

### Professor Shitij Kapur

MBBS AIIMS PhD Toronto FRCPC FMedSci

Professor Shitij Kapur, FRCPC, PhD, FMedSci is the Dean, Faculty of Medicine, Dentistry and Health Sciences and Assistant Vice-Chancellor (Health), University of Melbourne. Shitij is a clinician-scientist with expertise in psychiatry, neuroscience and brain imaging. He trained as a Psychiatrist at the University of Pittsburgh, and undertook a PhD and Fellowship at the University of Toronto. He is a Diplomate of the American Board of Psychiatry and Neurology, similarly Board Certified in Canada and has a specialist medical license in the United Kingdom.

Professor Kapur’s main research interest is in understanding Schizophrenia and its treatment. He has used brain imaging, animals models and clinical studies which have led to a better understanding of antipsychotic action, its relationship to



brain dopamine receptor blockade, the role of appropriate dosing of these drugs and has led to the development of the 'salience' framework of psychosis and the 'early onset' hypothesis of antipsychotic action. He is now working on how 'biomarkers' might be best incorporated into psychiatric care and drug development. Shitij has published 300 peer-reviewed papers, his work has received over 25,000 citations as he has made numerous presentations worldwide. He serves in advisory capacity to public charities and pharmaceutical companies and has received national and international awards including the AE Bennett Award of the Society for Biological Psychiatry, Paul Janssen Award of the CINP. He is a Distinguished Fellow of the American Psychiatric Association and the Fellow of the Academy of Medical Sciences, UK, and Fellow of King's College London, UK. He led NEWMEDS, an EU-wide Innovative Medicines Initiative and currently leads STRATA, a UK-wide program to enhance stratified medicine strategies in psychiatry.

## Dean of Melbourne School of Engineering

### Iven Mareels

Redmond Barry Distinguished Professor Iven Mareels obtained the (ir) Masters of Electromechanical Engineering from Gent University Belgium in 1982 and a PhD in Systems Engineering from the Australian National University, Canberra, Australia in 1987. Since 1996, he is a Professor in the Department of Electrical and Electronic Engineering, The University of Melbourne. In June 2007, he became Dean of the Melbourne School of Engineering. Previously he was a Reader at the Australian National University (1990-1996), a lecturer at the University of Newcastle (1988-1990) and the University of Gent (1986-1988). Prof Mareels received the 2017 Harold Chestnut Control Engineering Textbook Prize, for Feedback and Control for Everyone; the W.H. Kwon Award for Engineering Education (2013); the inaugural Grand Challenges Award from Taylor's University, Malaysia (2013); a Clunies Ross Medal, Academy of Technological Sciences and Engineering (2008) for his work on Smart Irrigation Systems; the inaugural Vice-Chancellor's Knowledge Transfer Excellence award from the University of Melbourne (2007),

for his work in large scale irrigation systems with Rubicon Systems Australia. He was named twice IEEE CSS Distinguished Lecturer (2005-2006) and (2016-2017). In 1994 he received the Vice-Chancellor's Award for Excellence in Teaching from the Australian National University. He is a Fellow of the International Federation of Automatic Control, of the Academy of Technological Sciences and Engineering, of the Institute of Electrical and Electronics Engineers (USA), and of the Institute of Engineers Australia. He is a Foreign Fellow of the Royal Flemish Academy of Belgium for Science and the Arts. In 2013 Professor Mareels, was named a Commander in the Order of the Crown of Belgium for meritorious services in engineering and science. In 2003 he received the Centenary Medal, for services to engineering education. At present his research is focused the modelling and control of water distribution systems, the electrical grid and the brain (in particular the epileptic brain). Iven Mareels has published widely, one general book about systems engineering, four research monographs, in excess of 130 journal publications and 250 conference publications. He is also co-inventor of a family of 23 international patents related to autonomous water distribution systems.



## Papers Published

See: [www.bio21.unimelb.edu.au/annual-reports](http://www.bio21.unimelb.edu.au/annual-reports)







**bio21**  
institute


**The Bio21 Molecular Science and Biotechnology Institute**


University of Melbourne

30 Flemington Road, Parkville Victoria 3010

Telephone: (03) 8344 2220

[www.bio21.unimelb.edu.au](http://www.bio21.unimelb.edu.au)

 @Bio21Institute

 @Bio21Institute