# EMBL Australia Partner Laboratory Network

2021 Highlights



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# Foreword by EMBL Director General

In the face of the difficulties brought on by the ongoing pandemic, 2021 demonstrated, perhaps more than ever before, the need for strong research networks and access to advanced services. training and tools in the life sciences in order to rise up to the challenges that this pandemic created.



Professor Edith Heard FRS EMBL Director General

#### Ties that bind: 2021 demonstrates how world-class research requires a worldwide network

EMBL was able to forge ahead with its actions to enable global, cuttingedge molecular biology research and services and reach several important milestones in 2021, including:

- Completing construction on our state-of-the-art Imaging Centre at EMBL Heidelberg, and welcoming the first users of this new service for our member states. This achievement builds upon a longstanding reputation for microscopy expertise, which extends to new methods development, advanced microscopy training, and services that are of great interest to Australian users and available to them remotely.
- Two independent reports were produced that validated the immense economic value and impact that EMBL's experimental services and data resources provide to the scientific community in EMBL member states and beyond. In one of these reports, the Technopolis Group found

that 70 per cent of academic users indicated that using EMBL experimental services helped them deliver wider societal impacts in health, biotechnology, climate change, and food security. The <u>EMBL-EBI Impact report</u> found that the 40+ open data resources maintained by EMBL-EBI are essential for the global life science community, and offer exceptional value for money.

- EMBL-EBI's new collaboration with DeepMind made AIpowered predictions of the threedimensional structures of nearly all catalogued proteins known to science freely and openly available to the scientific community via the AlphaFold Protein Structure Database. This new resource is a true game-changer for structural biology and is already having a huge impact in many sectors, including human health and drug development.
- In preparing for EMBL's new Programme to study life 'in context', EMBL teamed up with several experts from different sectors to lead and publish a white paper titled 'Harnessing molecular biology to accelerate the Green Recovery', which was equally helpful and informative to Australian researchers and decision-makers.

# Foreword by EMBL Director General (cont.)

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### The benefits of Australia's Associate Membership

Most notably, I would like to express our immense gratitude to all EMBL member states who, through the EMBL Council, supported us in a historic endorsement and approval of EMBL's new Programme 'Molecules to Ecosystems' 2022-2026 and its associated financial plan. This approval was given in November 2021 and the new Programme, which seeks to understand life in the context of changing environments, will launch EMBL into a new era. It will set the stage for molecular biology to reach new heights in a broader context than ever before and should provide a great impact in the next five years.

The new Programme will offer further opportunities for the EMBL Australia Partner Laboratory Network, and the Australian life science research community as a whole, to rethink how we address environmental and human health challenges. Overall, the new Programme provides significant new opportunities for Australia in a number of areas, including collaborative research, new training programs for Australia at EMBL, remote access to EMBL services and facilities, recruitment of international talent, and access to large international networks. Additionally, we will harness the impact of managing high volumes of data, which aligns well with Australia's national priorities.

I look back on 2021 as a year where COVID kept us physically apart while simultaneously showing how critical it is to work together, sharing resources and knowledge.

EMBL Grenoble Group Leader Eva Kowalinski and EMBL Deputy Director General Ewan Birney attended the Lorne Protein Conference in February 2021, discussing with Australian experts EMBL's structural biology research and COVID data analysis from a 'life in context' perspective.

The pandemic also didn't stop us from collaborating scientifically, with over 60 papers co-authored by EMBL and Australian researchers on cancer genomics, infectious diseases and proteomics, just to name a few examples. Australian researchers continued to be heavy users of EMBL's data services, with over 230 million requests to EMBL-EBI websites made in 2021 alone. Further, Australian scientists took advantage of EMBL's facilities remotely. In fact, a Monash University researcher was one of the first users of EMBL Hamburg's Sample Preparation and Characterisation Facility's <u>online</u> <u>platform for analysing data from</u> <u>biophysical experiments</u>.

In the context of the 2022-2026 EMBL Programme and across all EMBL missions, EMBL's relationship with the Australian science community through the Associate Membership scheme remains critical for increasing the quality and impact of international collaborative research.

I look forward to the numerous ways we will collectively advance science to address the many human health issues that we face today, as well as the challenges facing the planet, for the benefit of our societies.

## Report of EMBL Australia Scientific Head

It was another year of extreme challenge for scientists across Australia and the world, but as the remarkable mRNAbased vaccines were rolled out across the global community, we all started to emerge, somewhat dazed, into the "new normal".



Professor James Whisstock EMBL Australia Scientific Head Our Partner Laboratory Network (PLN) group leaders and their teams of scientists continued their efforts to understand SARS-CoV-2 infection and COVID-19, particularly in the context of vaccine development (see page 14).

The continued lockdowns and travel restrictions meant we had to redouble our efforts to stay connected with the international scientific community. While some of our student programs could not proceed, others were adapted to be widely accessible. For the first time, our Postgraduate Symposium was held as a hybrid event that allowed both virtual and in-person participation, which happily resulted in a record number of attendees (see page 28).

EMBL Australia group leaders continued to share their science far and wide by presenting virtually in 25 cities spanning five continents, including giving keynote addresses at conferences hosted in China, Kenya, Germany and the United Kingdom.

I am pleased that in 2022 our inperson international programs will recommence. Our travel program will once again permit Australia's best and brightest young scientists to visit EMBL sites and conferences, and we will enjoy scientific exchanges with EMBL, working with the leadership team on implementing the new scientific program and accessing remarkable new facilities, such as the EMBL Imaging Centre and the X-ray imaging synchrotron beamline at the Hamburg Outstatio

Tragically, in early 2021 a founding member of EMBL Australia, Scientia Professor Katherina Gaus, died. Kat was the genius behind the EMBL node in Single Molecule Science at the University of New South Wales. She was a great friend and colleague, and we all miss her greatly. (See our tribute on page 16.) I would also like to pay testament to the strength and support of the PLN group leaders, and the leadership of A/Prof Till Böcking, who has helped the UNSW node flourish.

Pleasingly, recruitment activities continued in 2021. We commenced recruiting a new PLN group leader (see page 27) and universities and institutes around the nation expressed interest in using our Associate Membership in 2022 to recruit top international scientists.

We are emerging from the pandemic as a result of the strength and cohesion of the international scientific community, as well as decades of basic "blue-sky" research. In just over a year, the threads of over 50 years of basic discovery research in many fields of science were drawn together in a massive effort that resulted in several classes of effective COVID vaccines rolled out into the community. Even more remarkably, production of two novel oral antivirals were approved for clinical use in 2021 – and reached the shelves of chemists in 2022.

Tragically to date, more than half a billion cases of COVID-19 have been recorded, along with the deaths of well over 6 million people. A comparison with the 1918 influenza pandemic where no vaccine or orally available treatment was available and over 50 million died – reveals the power of our global medical and research response. It is through continuing to nurture and support the young in the pursuit of science that we continue to build resilience to combat the health and environmental challenges that are upon us as a consequence of the changing climate.

I wish you all a happy, healthy and productive 2022.

# Welcome from the Council Chair

The research and innovation communities around the world. including Australia, have wrestled with the impact of COVID-19. As communities and economies move forward to recover. the task will be not only to make up lost ground, but to venture into and investigate new areas of discoverv and innovation.



Emeritus Professor Ian Smith Chair of the EMBL Australia Council

EMBL Australia has risen to this challenge in 2021, for example, by producing close to 100 high-impact research publications, many in the very best international scientific journals.

I am continually impressed by the passion and progress being made by our researchers to deliver translational and, thus, impactful outcomes from their research (see page 17 of this report).

Some examples include: describing ways to make current antibiotics work better against antimicrobial-resistant bacteria; discovering mechanisms which may lead to faster recovery from muscle injury and wasting diseases; refining peptide design to advance the fight against superbugs; finding that signalling drives intestinal regeneration after tissue damage, which may have implications for intestinal conditions. such as Crohn's disease and colorectal cancer: revealing the potential for optogenetics – a relatively new and rapidly evolving technology – to treat Parkinson's disease; and showing that building on an aspect of the gene repression process may bring us one step closer to the development of new cancer drugs.

A truly remarkable array of scientific discoveries.

In addition. Professor Eduardo Evras launched the new Centre for Computational Biomedical Sciences at the John Curtin School of Medical Research to drive collaborative and multidisciplinary projects that support discovery and interpretation in biomedical research, and Dr Vaishnavi Ananthanaravanan was awarded the 2021 Women in Cell Biology Junior Award for Excellence in Research by the American Society for Cell Biology. We congratulate her on her ongoing work advocating for women's equity and representation in science (see page 24).

As well as the publications and securing more than \$8 million in competitive grants in 2021, the EMBL Australia network of researchers also continued to give back to the scientific community. Our group leaders shared their research at more than 30 conferences and symposia and were involved in organising many similar scientific events. An ABC News story also highlighted a pen pal program initiated by Dr Jennifer Payne, a researcher in the Cryle Group, which now sees more than 90 Australian scientists corresponding with primary school children to inspire their interest in STEM research (see page 21).

Finally, I would like to take this opportunity to thank our Scientific Head, Professor James Whisstock, and the EMBL Australia team for their dedication, perseverance and professionalism throughout this challenging year. Given the climate, their important work to facilitate and foster community connections and support research excellence across the EMBL Australia network of researchers has been invaluable.

## About EMBL Australia

EMBL Australia is a life science network that supports ambitious research projects and provides access to infrastructure and training to early-career Australian scientists.

Australia is an associate member of the <u>European Molecular Biology</u> <u>Laboratory (EMBL)</u> – Europe's flagship life sciences institution.

The associate membership gives Australia the opportunity to internationalise our life sciences research, introduce the world's best young researchers to new networks and tools here in Australia, and develop highly competitive research teams networked across the nation, with Europe and Asia.

Supported by the <u>National</u> <u>Collaborative Research</u> <u>Infrastructure Strategy (NCRIS)</u>

program, an Australian Government initiative, EMBL Australia is at the cutting edge of life sciences research in Australia. EMBL Australia has:

- a <u>Partner Laboratory Network</u> (PLN) consisting of 14 research groups led by outstanding earlycareer researchers at nodes in Victoria, South Australia, New South Wales, Queensland and the ACT
- a nationwide reach through student training programs, including a PhD course, postgraduate symposium, travel grants and PhD program
- access to international linkages through EMBL and the European Bioinformatics Institute (EMBL-EBI).

Australia became the first associate member of the EMBL in early 2008. Launched in 2010, the EMBL Australia <u>Partner Laboratory</u> <u>Network</u> set out to take full advantage of this unique affiliation, with the goal of strengthening the nation's global position in life sciences research. The EMBL Australia PLN is hosted at the South Australian Health and Medical Research Institute (SAHMRI), University of New South Wales (UNSW), Australian National University (ANU), the Garvan Institute of Medical Research, QIMR Berghofer Medical Research Institute (QIMR Berghofer) and Monash University.

The EMBL Australia Secretariat is hosted by the <u>Monash Biomedicine</u> <u>Discovery Institute</u>.

The <u>EMBL Australia Council</u> oversees and guides the activities of EMBL Australia.\*

The Partner Laboratory Network also has a Steering Committee, which is composed of senior representatives of each institution that form part of the network and is chaired by EMBL Australia's Scientific Head, <u>Professor James</u> Whisstock.

### \*

#### Members of the EMBL Australia Council

- Emeritus Professor Ian Smith (Chair)
- Professor Edith Heard (EMBL)
- Professor Ewan Birney (EMBL)
- Ms Plamena Markova-Anderson (EMBL)
- Professor John Carroll (Universities Australia)
- Professor Sarah Russell (Universities Australia)
- Professor Andrew Sinclair (Association of Australian Medical Research Institutes)
- Professor Elizabeth Hartland (Association of Australian Medical Research Institutes)
- Dr David Hansen (CSIRO)
- Professor Susie Nilsson (CSIRO)
- Mr Andrew Gilbert (Bioplatforms Australia)
- Representative from the Australian Government's Department of Education, Skills & Employment

# Research Groups

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### In 2021, EMBL Australia consisted of 16 research groups at six institutes across Australia.

With the freedom to drive their own ambitious research projects, EMBL Australia group leaders are exceptional and innovative researchers who apply novel approaches and techniques to complex scientific problems.

They ask challenging research questions and publish in high-impact journals.



External funding grants\* as well as \$5.47M in internal grants 2018 · 25 2019 · 49 2020 · 71 2020 · 72

Students (PhD, Master & Hons)

Image: Second second

\* Includes the entire amount of individual and collaborating grants for projects active in 2021



\*Became EMBL Australia alumni during 2021.

EMBL Australia 2021 Highlights

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EMBL Australia 2021 Highlights

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# Partner Laboratory Network (cont.)

### EMBL Australia's flagship program is its network of research groups embedded in existing research institutes and universities across the country – the EMBL Australia Partner Laboratory Network (PLN).

Following the EMBL model in providing talented young scientists with solid funding and the freedom to drive the development of ambitious new research, the PLN mentors and nurtures outstanding young scientists selected from an international pool by offering up to nine years of secure funding.

The PLN model, together with the prestigious brand and reputation of EMBL, enables host institutions to attract the best early-career researchers – researchers who may not otherwise consider establishing their laboratory in Australia – and develop the next generation of scientific leaders by providing group leaders:

- The freedom to drive their own ambitious research projects in a multi-disciplinary manner
- Strong international links for collaborations
- Access to infrastructure and expertise to maximise technology investment
- A community of like-minded leading scientists to tackle the new challenges in science together
- Use of the EMBL brand to attract high-calibre staff and students to their group and
- Access to exceptional scientific mentorship and leadership.

### Accessing cutting-edge European facilities from the lab in Australia

Australia's associate membership to EMBL provides Australian researchers with access to EMBL's world-leading facilities and the ability to directly contribute to Australia's own research capabilities.

In 2021, Monash University researcher Dr Francesca Short was one of the first users to test an online platform developed by EMBL for analysing data from biophysical experiments.

Inspired by COVID lockdowns, EMBL Hamburg's Sample Preparation and Characterisation Facility created eSPC, a freely available tool that enables scientists around the world to easily analyse their data without the need to travel to the laboratory where the data was generated.

Dr Short used one of the three modules available, FoldAffinity, which quantifies how an interaction between two molecules can further stabilise them.

"We used FoldAffinity to study how various molecules bind and influence bacterial proteins that contribute to antimicrobial resistance, a critical public health challenge of this century," said Dr Short.

"We could only do measurements using methods suitable for small amounts of protein, so it was great for us that FoldAffinity allows us to analyse data generated with these methods."

Dr Short said the output from eSPC was also very comprehensive and easy to understand.

A valuable tool to many fields of research (including structural biology, biomedicine, and biotechnology), the sSPC platform enables users to upload and analyse raw data from several experimental techniques: steadystate fluorescence spectroscopy, microscale thermophoresis, and differential scanning fluorimetry experiments.

It consists of FoldAffinity and two other modules: MoltenProt, which helps to estimate how durable a protein is in different conditions, and ThermoAffinity, which identifies how strongly two molecules, e.g. a protein and a drug, bind to each other.

# Partner Laboratory Network (cont.)

#### Victorian node

The Victorian node of the PLN is hosted at Monash University and, in 2021, consisted of six research groups:

- The <u>Davidovich Group</u>, based at the Monash Biomedicine Discovery Institute (Monash BDI), studies the key proteins involved in the maintenance of stem cell fate, which play an important role in multiple cancers.
- The <u>Cryle Group</u> (also based at Monash BDI) uses a combination of techniques to understand and harness the major protein machines that catalyse the production of some of the most important antibiotics in clinical use, as well as developing novel approaches to treat bacterial infections.
- The Martino Group, based at the Australian Regenerative Medicine Institute (ARMI), focuses on the immune regulation of stem cells and regeneration, seeking to design regenerative medicine strategies integrating a control of the immune system.

- The Janovjak Group was based at ARMI and aimed to develop synthetic biology strategies to maintain cell survival and initiate cell proliferation in degenerative disorders. (Note that Dr Harold Janovjak departed from ARMI and EMBL Australia in December 2021, relocating to Flinders University as a Professor.)
- The <u>Arumugam Group</u>, based at Monash BDI, researches how complex properties arise out of molecules and their interactions, with a primary focus on endosomal trafficking.

The Australian EMBL Partnership Laboratory Head for Monash BDI is <u>Professor John Carroll</u> and for ARMI is <u>Professor Peter Currie</u>.

#### South Australian node

The South Australian node of the PLN is hosted at SAHMRI and comprises three groups, supported by the University of Adelaide, the University of South Australia and Flinders University.

- The Lynn Group is based at SAHMRI and Flinders University and investigates how pathogenic and commensal microbes regulate the immune system in different contexts from infection, vaccination and cancer immunotherapy.
- The <u>Mäkinen Group</u> is based at the Heart Health research theme at SAHMRI, where members use big data to better understand pathologic phenomena at the intersection of ageing, obesity, diabetes and cardiovascular disease.

 The <u>Apaja Group</u> investigated protein networks and mechanisms that regulate protein trafficking, signalling and organelle function. (Note that Dr Pirjo Apaja's term as an EMBL Australia group leader ended in April 2021.)

The Australian EMBL Partnership Laboratory Head for SAHMRI is <u>Professor Chris Proud</u>.



# Partner Laboratory Network (cont.)

#### New South Wales node

The New South Wales node of the PLN is hosted at the UNSW Centre in Single Molecule Science and the Garvan Institute of Medical Research (Garvan Institute), Sydney..

The <u>Gambin Group</u>, based at UNSW, combines single-molecule detection and microfluidics to develop a microscopy-based pipeline to readily study protein-protein interactions at high resolution.

- The <u>Biro Group</u>, also based at UNSW, investigates the cell biology and mechanics of the actin cytoskeleton and how immune cells locate and kill cancer cells.
- The <u>Weatheritt Group</u> is based at the Garvan Institute and aims to understand how posttranscriptional regulation contributes to proteomic diversity and cell signalling.
- The Morris Group, based at UNSW, applies and develops concepts from statistical and theoretical softcondensed matter physics, as well as applied mathematics, in order to describe biological systems.

- The <u>Ananthanarayanan Group</u> is also based at UNSW and investigates how stochastic and rare events, such as motor protein binding to cytoskeletal tracks or cargo, give rise to complex cellular organisation across scales.
- In 2021, <u>Associate Professor Till</u> <u>Böcking</u> took on the role of Australian EMBL Partnership Laboratory Head for UNSW, which was previously held by the late Scientia Professor Katharina Gaus (see page 16).

Professor <u>Chris Goodnow</u> represents the Garvan Institute.

#### Australian Capital Territory node

The ACT node of the PLN is hosted at the ANU, Canberra. The Australian EMBL Partnership Laboratory Head for ANU is <u>Professor Ross Hannan</u>.

- The <u>Thompson Group</u> is based at the John Curtin School of Medical Research (JCSMR) at ANU and aims to understand the control of tissue growth and form using Drosophila and mice as models.
- The Eyras Group, also based at JCSMR, is working on understanding the biology of RNA and cancer using computational methods.



The Queensland node of the PLN is hosted at QIMR Berghofer. The Australian EMBL Partnership Laboratory Head for QIMR Berghofer is Professor Fabienne Mackay.

 <u>The Boyle Group</u> is based at QIMR Berghofer and aims to inform the development of effective malaria vaccines by defining functional mechanisms of antibodies that target the parasite, and the development of protective antibodies in humans.







### Recruiting the best and brightest from around the world

Our generous and unique funding model, combined with the internationally renowned EMBL brand, enables our group leaders to attract the best and brightest students and postdoctoral fellows from around the world, ensuring our Partner Laboratory Network is bursting with high-calibre staff with diverse talents. Data collected from more than 130 PLN members shows that our people come from 34 countries, spanning six continents (with the majority of members originating from Australia, Asia and Europe).

Almost half of our network identifies as female.



# COVID-19 Research

When the COVID-19 pandemic hit, many EMBL Australia group leaders joined the international scientific community in a global effort to research, understand and conquer the virus - an effort that is still ongoing.

In particular, immunologist and Flinders University Professor David Lynn, an EMBL Australia Group Leader in the Infection and Immunity Theme at SAHMRI, has dedicated a large portion of his time to researching vaccines and the immune response to the virus at a cellular level.

In 2021, Prof Lynn was involved in three studies investigating various aspects of COVID-19 and its impact on the immune system.

### Tuberculosis vaccine tested to reduce impact of COVID-19

An Australian-led trial has been testing whether the readily available, safe and low-cost tuberculosis vaccine the Bacillus Calmette-Guérin (BCG) vaccine - can reduce the severity of COVID-19 in high-risk groups, such as healthcare workers.



Although typically used against the tuberculosis pathogen, the BCG vaccine also modulates the response of the immune system to protect against other unrelated pathogens.

Immune protection from the BCG vaccine is seen within days of vaccination and has been reported to decrease hospitalisations from conditions unrelated to tuberculosis, especially respiratory tract infections and sepsis, making it a good candidate to study for use against COVID-19.

The protocol for the BRACE trial was published in <u>BMJ Open</u> in early 2021.

Trial co-investigator Professor David Lynn said more than 6800 participants have been recruited worldwide so far, with the 12-month follow-up completed in South Australia in 2021.

"The study includes healthcare workers in five countries across three continents, making this randomised, controlled trial large enough to assess the effect of BCG vaccination on the incidence of severe COVID-19, as well as symptomatic COVID-19 and other infections," Prof Lynn said.



#### Immune system affected for at least six months in people with 'long COVID'

An Australian study has analysed the human immune system for longer and in more detail than others to shed light on 'long COVID'.

Professor David Lynn and colleagues followed people with COVID-19 for up to 24 weeks after infection, while most other studies have only assessed people from two to 12 weeks.

The research showed that people taking longer to recover from COVID-19 can have dysregulation of their immune systems for up to 24 weeks.

While persistent symptoms such as fatigue, shortness of breath, chest pain and brain fog are now known as long COVID, more information is needed about what causes these symptoms at the detailed molecular level.

Professor Lynn said their study published in <u>BMC Medicine</u> - was a deep integrated investigation and analysed blood, cells and gene regulation involved in the immune system.

# COVID-19 Research (cont.)

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"Our study followed people recovering from mild–moderate or severe–critical COVID-19 at 12, 16, and 24 weeks after infection with the COVID-19 virus and compared the results with healthy age-matched individuals," he said.

"We found that immune changes down to the level of the cell and gene regulation may explain persistent symptoms from COVID-19 experienced by some people."

Prof Lynn said people referred to a long COVID clinic had persistent immune dysregulation six months after infection.

"The data suggest persistent mild thrombocytopenia – low levels of platelets in the blood, which often has fatigue as a symptom. If this result is confirmed, it could suggest new treatment strategies for long COVID," Prof Lynn said.

#### Study launches to investigate immune responses after AstraZeneca and Pfizer vaccinations

The COVID-19 Vaccine Immune Responses Study (COVIRS) - one of the few studies in the world to look at the immune system's first lines of defence - launched in 2021 and began recruiting participants.

Professor David Lynn said the earliest defence against pathogens entering the body is known as the innate immune system.

"The study will focus on investigating the early innate immune response induced by COVID-19 vaccinations and its relationship to immunogenicity and reactogenicity after each vaccine dose," he said. In this study, blood is collected before an AstraZeneca or Pfizer vaccine dose at baseline, and then after the first dose, and twice after each of the second and third doses.

The large-scale approach using many branches of life sciences is known as systems immunology and will include study of proteins, lipids, cells, blood and genetic material.

With more than 100 participants, the study is a collaboration with the groups of Professors Nigel Curtis and Paul Monagle at Murdoch Children's Research Institute and Professor Huyen Tran from Monash University, as well as many others.

#### In the Media

In May 2021, Professor David Lynn spoke about the COVID-19 pandemic, vaccinations and complacency - and answered questions from the public - on Adelaide commercial talkback radio station FIVEaa's 'Health Talk' segment.

Listen here



## Katharina Gaus 1972 - 2021

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Scientia Professor Katharina Gaus died on 3 March 2021 after battling complications of cancer. Kat was an inspirational scientist and a much-loved friend, colleague and collaborator.



An inspirational scientist and mentor, Kat was greatly admired by those in the scientific community for her kindness, intellect and generosity. She attracted exceptional scientists to her Centre and developed a wonderful culture and community that has enabled her recruits to flourish and that will empower her vision to continue to grow into the future.

"Kat was an incredible, visionary scientist and a key person behind the development and expansion of the EMBL Australia initiative," EMBL Australia Scientific Head Professor James Whisstock said. "She was a huge support for me personally, for her scientific team and for the EMBL Australia leadership team as a whole.

"Over the years we had so many great conversations about science and life in general - I miss her enormously."

Professor Gaus was an NHMRC Senior Research Fellow and also the Deputy Director of the ARC Centre of Excellence in Advanced Molecular Imaging.

Professor Gaus recruited many talented EMBL Australia group leaders, including those in her Single Molecule Science Node – Dr Maté Biro, Dr Yann Gambin, Dr Richard Morris and Dr Vaishnavi Ananthanarayanan. She also recruited and mentored Dr Senthil Arumugam, who is now an EMBL Australia Group Leader at Monash University.



### Some of Prof Kat Gaus' most important work

Her recent advances in single-molecule localisation microscopy, enabling direct distance measurements between molecules in intact cells on the scale between 1 and 20nm (featured in <u>Laser Focus World's</u> 'Top 20 inventions in 2020'):

Coelho S, Baek J, Graus MS, Halstead JM, Nicovich PR, Feher K, Gandhi H, Gooding JJ & Gaus K. (2020) '<u>Ultraprecise single-molecule</u> <u>localization microscopy enables</u> <u>in situ distance measurements</u> <u>in intact cells</u>', *Science Advances*, 6(16):eaay8271.

Coelho S, Baek J, Walsh J, Gooding JJ & Gaus K. (2021) '<u>3D active</u> stabilization for single-molecule imaging', *Nature Protocols*, 16:497-515. Advancing knowledge of T cell biology, a discovery enabled by Kat's deep understanding of both biophysics and microscopy:

Williamson DJ, Owen DM, Rossy J, Magenau A, Wehrmann M, Gooding JJ & Gaus K. (2011) '<u>Pre-existing</u> clusters of the adaptor Lat do not participate in early T cell signaling events', Nature Immunology, 12:655-662.

# Research Excellence Snapshot

# 97

Publications by group leaders in 2021, including journal articles, pre-prints, reports, reviews, letters and book chapters.

#### View all 2021 publications



### Reversing severe muscle wasting in disease, ageing and trauma

An exciting discovery by Monash University scientists – including EMBL Australia group leader Associate Professor Mikaël Martino and led by Australian EMBL Partnership Laboratory Head Professor Peter Currie – may lead to faster recovery from muscle injury and wasting diseases.

Researchers at the Australian Regenerative Medicine Institute (ARMI) at Monash University have discovered a factor that triggers muscle stem cells, which drive the tissue's growth and repair after injury, to proliferate and heal.

In a mouse model of severe muscle damage, injections of this naturally occurring protein led to the complete regeneration of muscle and the return of normal movement after severe muscle trauma.

The research, published in esteemed journal <u>Nature</u>, involved the scientists studying the regeneration of skeletal muscle in zebrafish. By studying the cells that migrated to a muscle injury in these fish, the scientists identified a group of immune cells, called macrophages, which appeared to have a role in triggering the muscle stem cells to regenerate.

It has long been thought that two types of macrophages exist in the body, however the research team found that there were in fact eight genetically different types of macrophages in the injury site and that one particular type of macrophage released a substance called NAMPT.

By removing these macrophages from the zebrafish and adding the NAMPT to the aquarium water, the scientists found they could stimulate the muscle stem cells to grow and heal – effectively replacing the need for the macrophages.

Researchers are hopeful the compound will be used in the treatment of human muscle disease and injury.

### Signalling drives intestinal regeneration after tissue damage

Researchers have found that cellsignalling pathways can cause a generegulating protein to relocate to the nucleus and drive tissue regeneration.

The protein, called YAP-TEAD, is a transcription factor that regulates genes when present in the nucleus of stem cells in the intestine.

Professor Barry Thompson, an EMBL Australia group leader based at the John Curtin School of Medical Research at ANU, said while YAP-TEAD normally localises to the nucleus in intestinal stem cells, it also moves to the nucleus in most intestinal epithelial cells after tissue damage.

"These findings provide a new understanding of how intestinal epithelium regenerates after tissue damage, with implications for intestinal conditions such as Crohn's disease and colorectal cancer," Prof Thompson said.

The research was published in the highly respected *EMBO Journal*.

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# Research Excellence Snapshot (cont.)

#### Making current antibiotics work harder against superbugs

Researchers have found a way to make current antibiotics work better against antimicrobial-resistant bacteria, also known as 'superbugs'.

When superbugs infect an individual, doctors are forced to try giving patients higher doses or rely on the discovery of new types of antibiotics, but making current antibiotics work better would give doctors more options.

This research, published in the prestigious journal <u>Nature</u> <u>Communications</u>, tried using an immunotherapeutic approach - a strategy used to fight cancer - to make current antibiotics more effective.

Dr Jennifer Payne, the lead researcher from EMBL Australia and Monash BDI, said there are two factors leading to the immune system's ability to fight bacteria.

"The first is our ability to entrap bacterial cells and kill them," Dr Payne said. "The second is the signals – the chemoattractants – calling for more neutrophils, white blood cells, which lead the immune system's response to resolve infection.

"We've been working on using dualfunction antibiotic-chemoattractant 'hybrids', which improve the recruitment of neutrophils and increase the engulfing and killing of the bacteria."

Dr Payne said critical to achieving their results was travelling to Harvard University to learn and perform microfluidic research with collaborators Associate Professor Daniel Irimia and Dr Felix Ellett.

She said microfluidics allowed them to try imitating in the laboratory what would happen in the human body.

"Microfluidics was ground-breaking for this research, as it allowed us to generate an infection-on-a-chip to monitor the recruitment of human immune cells and observe in realtime how our immunotherapeutic enhances their ability to kill MRSA [methicillin-resistant Staphylococcus aureus, a superbug]." Associate Professor Max Cryle, EMBL Australia Group Leader at Monash BDI, said this new avenue of research is very promising and has a lot of potential against the threat of drug-resistant superbugs.

"By stimulating our powerful immune system in this way with the immunotherapeutic antibiotic, we've shown in mouse models that the treatment is two-fold more effective than just using the antibiotic alone at one-fifth lower dose," A/Prof Cryle said.

#### Watch the animated video

produced to further explain how immunotherapeutics – a strategy previously used to fight cancer – is now being used to fight superbugs.



#### In the Media

The research from the Cryle Group was picked up by several media outlets, both locally and internationally, including <u>The</u> <u>Guardian Australia</u> ('Australian discovery brings hope in fight against superbugs', 26 October 2021) and <u>Cosmos</u> ('New technique gives new weapon to antibiotics in the fight against superbugs', 25 October 2021). Dr Jennifer Payne was also interviewed on UK science podcast <u>The Naked Scientists</u>.



# Research Excellence Snapshot (cont.)

### Discovery may help boost peptide design

Research led by EMBL Australia group leader Associate Professor Max Cryle revealed a key aspect of peptide machineries, advancing his work in countering the pressing global threat of antimicrobial resistance and having broad implications for health and industry.

The findings, published in <u>Nature</u> <u>Communications</u>, allow A/Prof Cryle to advance his lab's work into re-engineering frequently used glycopeptide antibiotics to counter antimicrobial resistance and, more broadly, to improving the properties of peptides generally.

A/Prof Cryle led a multidisciplinary team of scientists who enlisted a variety of techniques to model the peptide structures, including using the Australian Synchrotron for X-ray crystallography, along with chemical and biochemical techniques. He collaborated with groups in Canberra, Brisbane and Germany, who helped with computational modelling and bioinformatics. "Our ability to understand the enzymes that make natural peptides is key to our ability to produce improved ones to target issues like antimicrobial resistance," A/Prof Cryle said.

The Cryle Group is now working on translating the findings from a theoretical lab solution to eventually developing a commercial-scale production of new and improved antibiotics.



Max Cryle's research group aims to understand antibiotics to better treat bacterial infection.

#### Lights out for Parkinson's disease

Research led by EMBL Australia group leader Dr Harald Janovjak has revealed the potential of optogenetics – a relatively new and rapidly evolving technology – to treat Parkinson's disease.

Dr Janovjak, based at ARMI at Monash University, said that current strategies to counter the brain cell death involved in Parkinson's and other neurodegenerative diseases can lead to the undesired activation of other cells, causing permanent side effects.

But this research, conducted in collaboration with colleagues in Germany and Austria and published in <u>PLOS Genetics</u>, reveals that optogenetics - a promising technique that uses light to control cells in tissues - may hold the key as the method is precise, being cell-type specific and reversible.

The research team demonstrated that the optogenetic-mediated activation of a key signalling pathway, the PI3K proliferative signalling pathway, was viable and effective in a genetic model of Parkinson's disease. They were able to induce a growth response in isolated cells, which led to the suppression of mitochondrial defects, tissue degeneration and behavioural deficits, all hallmarks of juvenile Parkinson's disease in the experimental model.



The first application of optogenetics to repair defects in a model of Parkinson's disease with repair of mitochondrial cellular energy factories impacted by degeneration.

# Research Excellence Snapshot (cont.)

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#### New centre launches to develop advanced computational and medical technologies

The new <u>Centre for Computational</u> <u>Biomedical Sciences</u> (CCBS) was launched in 2021 to drive collaborative and multidisciplinary projects that support discovery and interpretation in biomedical research.

EMBL Australia group leader Professor Eduardo Eyras launched the CCBS at the John Curtin School of Medical Research at ANU.

The CCBS will coordinate the development of innovative computational biology tools and boost the research support to high-throughput experimental technologies.

The research and activities at CCBS are organised according to the following research and technology themes:

- biosensors and nucleotide editing characterising the next generation of gene editing and sensing tools for precision medicine
- single cell and spatial biology developing novel computational informatics and imaging tools to

study and correlate behaviour of molecules in cells

 genome data, health and highthroughput phenotyping – analysing massive datasets and developing new machine learning and deep learning tools to predict patient outcomes.

#### Talent accelerator backs early career researchers in cutting-edge computational biology

The <u>Talo Computational Biology Talent</u> <u>Accelerator</u> was launched in 2021 at the John Curtin School of Medical Research at ANU.

EMBL Australia group leader Professor Eduardo Eyras generated \$2.5 million in funds to launch the initiative at the Centre for Computational Biomedical Sciences.

"This program, of which I am the main academic coordinator, aims to support PhD students and early career researchers from computer science and engineering to work on biology research at JCSMR," Prof Eyras said.

The talent accelerator was funded by the founders of Talo Labs, Mr Loong Wang and Mr Taiyang Zhang.

# Understanding how putting the hand brake on genes could halt cancer

EMBL Australia group leader Associate Professor Chen Davidovich and his team at Monash BDI have shed light on an aspect of the gene repression process, bringing us one step closer to the development of new cancer drugs.

Cancer cells use the polycomb machinery to shut down genes that would, under normal conditions, prevent the growth of these cancer cells, thereby allowing it to spread.

The research, published in <u>Nature</u> <u>Communications</u>, determines how one of the components of this polycomb system — a protein called PALII — carries out its task.

The scientists discovered that PALII is crucial in shepherding other parts of the polycomb machinery to wherever the gene is that needs switching off and, importantly, the mechanism PALII uses to trigger the cascade of events required for gene repression.

The researchers say current anticancer drugs target many components of the polycomb machinery, carrying risks of toxicity and serious side effects, including the development of secondary cancer.

The Davidovich Group aims to identify more specific aspects of the polycomb machinery that could serve as targets for next-generation drugs that would be both effective and safe.

"Based on our results, we believe that the PALI and similar proteins could be good targets for drugs that will weaken the polycomb machinery in cancer cells but without preventing them from doing most of their tasks in healthy cells," A/Prof Davidovich said.



## EMBL Australia Outreach

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Despite the continued and challenging COVID-related restrictions in Australia in 2021 resulting in cancelled in-person events, more time spent working from home and increased isolation, EMBL Australia researchers focused on reconnecting with, and giving back to, the local and international scientific community.

Connectivity was encouraged with initiatives that included starting a pen pal program (which featured on the <u>ABC News</u> website and Radio National and now sees more than 90 Australian scientists corresponding with primary school children to inspire their interest in STEM research) and bringing global leaders in cutting-edge life science research methods directly to a local audience via a unique webinar series.

As well as being involved in various committees and leadership roles within their host institutions, EMBL Australia group leaders shared their own research and expertise at more than 30 conferences and symposia hosted across five continents.

They were also involved in organising similar scientific events, including the annual meeting of the Australian Society of Biophysics and the Lorne Infection and Immunity Conference, and reviewing grant applications.

### Travel bans are no hurdle to sharing science internationally

The international scientific community has rallied over the past few years to remain connected and find new ways to communicate and collaborate, reflected in the number of international events our group leaders participated in despite international travel bans.

In 2021, EMBL Australia group leaders presented virtually in 25 cities spanning five continents, including giving keynote addresses at conferences hosted in China, Kenya, Germany and the United Kingdom, as well as in Australia.

#### Inspiring the next generation of scientists with primary school PenPal Program

The plan to start the <u>PenPal Program</u> to link students with scientists was conceived during Victorian COVID-19 lockdowns.

Dr Jennifer Payne is an EMBL Australia and Monash University researcher and founded the program with teacher Chris Kaliviotis from Jells Park Primary School in Melbourne's southeast.

In 2021, the program grew to have approximately 90 scientists and Grade 5 and 6 students writing to each other.

The program was started, and is run by, volunteers at the Monash BDI, but it has now attracted scientists from across Australia to exchange snail mail with students.

The PenPal Program has also grown to include nodes – groups of scientists at a single workplace – with coordinators, who make sure scientists receive their letters and the letters they write in response are sent back to students on time. The program was even featured on the <u>ABC News</u> website ('Pen pal project inspired the next generation of scientists' on 12 September 2021) and on ABC's *Radio National* program, '<u>The Science Show</u>'.



# EMBL Australia Outreach

### Webinar series connects local audiences with international experts

A unique webinar series co-organised by an EMBL Australia group leader enabled 17 leading international researchers to share their cuttingedge approaches to the study of living systems with a local audience in 2021.

Co-organiser Dr Richard Morris of EMBL Australia and UNSW said the <u>Theory of Living Systems</u> webinars are hosted online to lower the barriers for researchers around the world to share their work with the Australian community.

Past webinars can be viewed on a dedicated <u>YouTube channel</u>.

"The presentations in 2021 were nothing short of stunning for those interested in this approach to life sciences," Dr Morris said. The presentations, attended largely by an Australian and New Zealand audience, but also by researchers from Japan and Singapore, focus on theory and computation at the interface with life sciences.

Other organisers of the webinar series are Dr Emanuele Crosato and Dr Sami Al-Izzi (both of EMBL Australia and UNSW), as well as Professor Michael Stumpf (University of Melbourne).

EMBL Australia, UNSW, University of Melbourne and the ARC Centre for Advanced Molecular Engineering are supporters of the Theory of Living Systems webinars.

### "What every biologist needs to know about physics"

A 2021 lecture series aimed to cross the divide between physics and biology for full-time researchers, postdoctoral fellows and PhD students in biology at UNSW.

EMBL Australia group leader and organiser Dr Richard Morris said that the series was designed to address a clear gap in traditional scientific training.

"There is a growing interdisciplinarity between physics and biology at the research level," he said.

"However, traditional career paths often mean that biologists have little chance to explore important concepts from physics before they meet them in their research." The lectures, delivered in "chalk-ntalk" style, aimed to present physical concepts from the point-of-view of biology - "something that is rarely done", according to Dr Morris.

The series included 12 lectures in total, with subjects ranging from 'What do physicists think they are doing in my subject?' to 'Why to polymers crumple?' and 'How to walk like a drunkard'.

Whilst COVID-19 interrupted the series, four lectures were delivered in 2021, and discussions have begun to re-launch the series, with the potential for recordings to be published online.

"Each lecture was accompanied by in-depth typeset notes," Dr Morris said.

"Even with COVID, we had a good turnout, with each lecture drawing approximately 40 participants across all career stages.

"One member of faculty has even begun a working group for those interested to perform a deep dive into the material that we presented."

## EMBL Australia Outreach

### Bringing together the optogenetics community

Dr Harald Janovjak, an EMBLAustralia group leader based at ARMI, co-organised and chaired Optogenetics Australia's 2021 Workshop.

The virtual event was held between 16 - 19 February 2021 and brought together a community of experts and early-career researchers with a keen interest in the emerging field of optogenetics - a rapidly-growing research technology that has been applied to answer fundamental and previously unresolvable questions in bacteria, animals and plants.

The workshop included keynote lectures from prominent researchers in the field, including Associate Professor Jared Toettcher from Princeton University, Assistant Professor Lukasz Bugaj from the University of Pennsylvania and UNSW Professor Gavan McNally.

### Open Science preprint and publication series

EMBL Australia and Monash BDI group leader Dr Senthil Arumugam organised and hosted an Open Science webinar series focused on the rising use of preprints across multiple research disciplines.

The webinars - titled 'Preprints in Life Sciences' and 'eLife and the Future of Preprints' (still available to <u>watch</u> <u>online</u>) - featured experts in the field, including the co-founder of *bioRxiv* and *medRxiv*, John Inglis, *eLife* deputy editor Anna Akhmanova and *PreReview* co-founder and director Daniela Saderi.

The events focused on the benefits and concerns around the accelerating use of preprints, current trends in journal and institutional policies and new innovations in preprint review and curation.

#### In the Media:

A/Prof Chen Davidovich was featured in an article by <u>The Sydney Morning Herald</u> ('RNA is the future. So... what can you do with it?' on 22 August 2021) about the current fierce competition for talent and investment in RNA research.



# Awards and Achievements





#### Dr Vaishnavi Ananthanarayanan

Dr Vaishnavi Ananthanarayanan was awarded the 2021 Women in Cell Biology Junior Award for Excellence in Research by the American Society for Cell Biology.

This award is given to an early-career woman or non-binary researcher who is making exceptional scientific contributions to cell biology, is developing a strong independent research program, and who exhibits the potential for continuing at a high level of scientific endeavor and leadership.

More about Dr Ananthanarayanan's work

#### Breaking biases and fighting for equity for women in science

Attracted by the advanced microscopy facilities and interdisciplinary program that combines biology, physics and engineering at UNSW, Dr Vaishnavi Ananthanarayanan relocated to Sydney as an EMBL Australia group leader in November 2020.

Based at the Single Molecule Science Node at UNSW, her group aims to understand how stochastic and rare events, such as motor protein binding to cytoskeletal tracks or cargo, give rise to complex cellular organisation across scales.

Away from the microscope, Dr Ananthanarayanan is also an advocate for women's equity and representation in science. In 2020, she co-founded BiasWatchIndia, an initiative that documents women's representation and combats gender-biased panels in Indian science conferences, meetings and talks. With her co-founder Dr Shruti Muralidhar, Dr Ananthanarayanan publishes the number of women speakers compared to the percentage of women in the specific area of science - an often difficult process, with these numbers not being publicly available. However, the initiative is producing results and has led to some conference organisers changing their speaker ratios and being more aware of the gender bias that exists in science in India.

### In an essay published in *Molecular Biology of the Cell,*

Dr Ananthanarayanan said she realised how hard it was to be a woman in Indian academia when she started her own lab at the Indian Institute of Science in Bangalore, India. "As a woman principal investigator, one's authority, expertise, and ability are constantly called into question," she said. "Justifying your presence in academia on a daily basis is an exhausting task"

Dr Ananthanarayanan went on to become an Assistant Professor at the same institute, but said the implicit and explicit gender biases she experienced as a young woman in Indian science continued. She said she was "embarrassingly ignorant of the rampant misogyny in academia" until she had to contend with it herself.

Dr Ananthanarayanan said the fact that women are awarded approximately 40 percent of the science PhDs in India but make up only 13 percent of Indian academia highlights the stark gender biases at play in creating the leaky pipeline something she hopes initiatives such as BiasWatchIndia will help redress.

#### She told the <u>Journal of</u>

<u>Cell Biology</u> that while BiasWatchIndia had sparked some backlash and trolling for simply pointing out the obvious, it has also sparked positive changes in speaker lineups and she remains optimistic that real changes will result in equity for women and other minorities in academia in her lifetime.

# Grant Success for Group Leaders

As well as continuing work on innovative research projects enabled by more than \$27.29 million in external funding, EMBL Australia group leaders won more than \$8.1 million in competitive grants in 2021.

### Dr Michelle Boyle

QIMR Berghofer Medical Research Institute

Awarded a Ramaciotti Health Investment Grant of \$100,000 to improve malaria vaccines to save the lives of high-risk children.

#### A/Prof Chen Davidovich Monash University (Monash BDI)

Awarded a National Health and Medical Research Council (NHMRC) Ideas Grant, with postdoctoral research fellow Dr Michael Uckelmann, of close to \$850,000 to investigate chromatin compaction and a new pathway for polycomb-mediated gene repression in development and disease.

### Prof Eduardo Eyras Australian National University

Awarded an Australian Research Council (ARC) Discovery Project Grant, leading a team that includes Australian EMBL Partnership Laboratory Head Professor Ross Hannan, of approximately \$638,000 to investigate how novel ribosomal RNA gene repeat variants drive cellular function, including protein synthesis and genome structure, enabling the development of novel genomics applications for human health, biotechnology and agriculture.

Prof Eyras also generated \$2.5 million in philanthropic funding to launch the Talo Computational Biology Talent Accelerator, a program designed to support PhD students and early career researchers to further biology research at the newly established Centre for Computational Biomedical Sciences at ANU.

### Prof David Lynn

South Australian Health and Medical Research Institute & Flinders University

Awarded an \$883,000 NHMRC Ideas Grant with postdoc research fellow Dr Natalie Stevens to study the mechanisms and potential consequences of vaccine nonspecific effects of live and non-live vaccines.

Professor Lynn was one of the chief investigators for a project awarded \$1.29 through the Federal Government's Medical Research Future Fund to study the role of gut microbiota in the therapeutic response for adolescents with Acute Lymphoblastic Leukaemia.

He was also awarded a grant from the Hospital Research Foundation Group to investigate whether COVID-19 infection leads to long-lasting perturbations of the immune system, as well as a Flinders Foundation Health Seed Research Grant to study whether vaccination with the Pfizer-BioNTech mRNA-based SARS-CoV-2 vaccine (Comirnaty) induces innate immune reprogramming in humans.

# Grant Success for Group Leaders (cont.)

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### A/Prof Mikaël Martino

#### Monash University (ARMI)

Awarded a prestigious Viertel Senior Medical Research Fellowship of \$1.25 million to develop the next generation of regenerative strategies, focusing on growth factor/cytokine technologies and the critical role of the immune system during tissue regeneration and repair.

#### Dr Robert Weatheritt

Garvan Institute of Medical Research

Awarded an ARC Future Fellowship of more than \$925,000 to dissect cell cycle regulation using programmable gene-editing technology, improving our understanding of controlled and uncontrolled cell division (that leads to cancer). This research will benefit many disciplines, including health and biotechnology, and will boost Australia's capability in the rapidly expanding field of gene engineering.

Dr Robert Weatheritt was also awarded a \$450,000 Cancer Council (NSW) Grant to help switch off the spread of triplenegative breast cancer. Dr Weatheritt discovered a molecular switch in triple-negative breast cancer cells that, when activated, promotes the spread of cancer to other parts of the body. Using gene-editing, he will test ways of turning this switch off, with the aim of developing targeted treatments for this aggressive type of breast cancer.

In addition, he was awarded a \$500,000 Cancer Institute NSW Career Development Fellowship to investigate P-bodies as a novel mechanism driving triple-negative breast cancer.

# People Highlights



### A/Prof Harald Janovjak New Alumnus

Associate Professor Harald Janovjak was an EMBL Australia group leader at ARMI, Monash University, between 2018 and 2021. In January 2022, Harald relocated as a Professor to Flinders University, where his group will continue to manipulate mammalian physiology through synthetic biology.



A/Prof Pirjo Apaja New Alumna

Associate Professor Prijo Apaja was an EMBL Australia group leader at SAHMRI and the University of Adelaide between 2016 and 2021. During that time, the Apaja Group investigated protein networks and mechanisms that regulate protein trafficking, signalling and organelle function.



New Group Leader Australian Regenerative Medicine Institute

In August 2021, EMBL Australia offered a talented researcher the opportunity to become a new group leader at ARMI at Monash University within one of two existing research themes (neural regeneration or organ engineering and synthetic biology).

Following a competitive process, we received a total of 33 applications from national and international candidates, eight of which were shortlisted and then four selected for full interview (two male and two female). Interviews were conducted virtually over a week with the EMBL Australia recruitment panel, and applicants gave an hour-long research presentation to the Monash University research community.

Two candidates were invited to visit ARMI in early 2022.

# Student Programs

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To identify and develop future scientific leaders, EMBL Australia attracts Australia's best students by offering a number of highly sought-after programs.

In 2021, many of our student programs continued to be disrupted by the global pandemic and associated restrictions on travel and gathering.

However, where possible, our agile program organisers found alternative options to allow events to continue – for example, by transforming our traditional in-person student symposium into a hybrid event or both virtual and in-person attendance.

### 2021 EMBL Australia Postgraduate Symposium: 'On Giant's Shoulders'

An annual student-developed symposium for honours, masters and PhD students provides an opportunity for students to learn from world-leading researchers, network and present their work.

A record number of students attended the eighth annual EMBL Australia Postgraduate Symposium (EAPS), held from 10-12 November 2021 as a hybrid virtual and in-person event due to ongoing COVID-19 restrictions on travel and gathering. This flexible format enabled students to access the event virtually and, for those willing and able, to meet in-person to experience the networking and engagement benefits of a traditional conference.

Around 170 research graduate students from across Australia and New Zealand attended the event - our highest number of participants to date. More than half of the participants elected to attend the in-person events held in Adelaide, Melbourne and Brisbane (to circumvent interstate travel restrictions) on the final day of the symposium. The meeting's theme was 'On Giant's Shoulders: Adapting to an everchanging world' and the program covered a variety of topics, including molecular and computational biology, cancer, ecology and biodiversity, infection and immunity and regenerative biology.

Many leading researchers presented their work - including a keynote presentation from renowned geneticist Professor Peter Dearden from the University of Otago - over the course of the three-day symposium and delegates enthusiastically shared their own work via 'lightning talks', longer presentations and poster sessions.

EAPS 2021 was organised by a diverse committee of dedicated postgraduate students, led by co-convenors Françios Olivier and Shanice Mah, and we thank them for the significant time and energy they committed to the symposium's success.



Yunan Rainie Ye and fellow in-person attendees at the University of Queensland. Image via Twitter / @Yunan Ye.

# Student Programs (cont.)

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### **Travel grants**

Supporting PhD students to take a short course, attend a conference or work collaboratively alongside some of the world's best researchers at EMBL's facilities in Germany, Italy, France, Spain or the UK.

In a normal year, EMBL Australia travel grants afford 20 Australian PhD students the opportunity to train at one of EMBL's six European facilities, go to a conference or take a short course.

The \$2000 grants assist students in attending the annual EMBL PhD Symposium in Heidelberg, Germany, a course or conference run by EMBL, or the opportunity to work with EMBL researchers at one of their European facilities.

Unfortunately, ongoing international travel restrictions meant the program was suspended in 2021.

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#### The EMBL Australia PhD Course

Modelled on EMBL's predoc course, the two-week annual program offers sixty first or second-year PhD students symposium-style presentations and workshops from Australian and international speakers. Unfortunately, the 2021 course was again cancelled due to travel restrictions associated with the coronavirus pandemic.

We look forward to bringing the hugely popular in-person event back in 2022.

### Partnership PhD Program

EMBL Australia group leaders offer scholarships to outstanding students, who receive additional career, research and monetary support during their doctoral studies. The program was suspended in 2021 due to ongoing travel restrictions associated with the coronavirus pandemic.







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#### EMBL Australia is supported by:



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