The University Of Queensland
AUSTRALIA

CREATE CHANGE

2000
21

CELEBRATING

21 years

INSTITUTE FOR
MOLECULAR BIOSCIENCE

Timeline

1998

$50 million project receives government and philanthropic backing

IMB is officially given the green light following funding commitments from the State and Federal Governments, UQ and a transformational gift from the Atlantic Philanthropies.

2000

The birth of an institute

Two previous centres – the Centre for Molecular and Cellular Biology and the Drug Design and Development Centre are officially merged to become the Institute for Molecular Bioscience.

2001

IMB's first spin-out company launches

Protagonist Therapeutics is launched as a spin-out company to develop peptide-based drugs.

2003

Queensland research powerhouse unveiled

IMB's new home, the Queensland Bioscience Precinct, is officially launched as the largest research facility in Australia, bringing together 700 scientists from IMB and CSIRO.

2005

IMB breaks new ground in fight against infection and chronic disease

IMB researchers make a vital discovery about how immune cells orchestrate their response to disease-causing microbes.

2009

International team cracks mammalian gene control code

IMB researchers are part of a major worldwide effort understanding how genes are controlled and discovering the tiniest genetic element yet known.

2013

Researchers grow kidney from stem cells

IMB researchers announce they have grown a mini-kidney using stem cells, a breakthrough that paves the way for improved treatments for patients with kidney disease.

Algae to fuel a renewable future

IMB opens a solar biofuels pilot plant to develop microalgae as a source of clean energy.

2014

Genetic test unlocks cause of Brisbane boy's rare disease

Queensland researchers lead an international effort to uncover the gene behind a young Brisbane boy's rare developmental condition, which only seven people in the world have been diagnosed with.

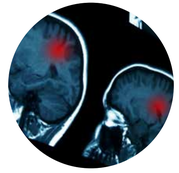
2015

Spider venom may have legs as future painkiller

Seven molecules in spider venom are found that block the pathway that sends pain signals from nerves to the brain, a discovery that could inspire new painkillers.

IMB spin-out raises $40 million to advance drug to clinical trial

Protagonist Therapeutics raises $40 million to begin clinical trials of an oral drug for Inflammatory Bowel Disease.



2016

IMB spin-out company Inflazome launches

IMB's biotech spin-out company Inflazome launches, with a focus on developing drugs to block harmful inflammation. The company was based on a research partnership between The University of Queensland and Trinity College Dublin (TCD) and targets inflammasomes, which are understood to drive many chronic inflammatory conditions, such as Alzheimer's and Parkinson's.

The Cane Toad Challenge launches

The Cane Toad Challenge empowers the public to help in the fight to eradicate the billions of cane toads wreaking havoc on our environment.

2017

New company Sero-X launches

IMB partners with Australian family-owned company Innovate Ag to create Sero-X, the world's first mass producible organic insecticide.

Potential treatment for brain cancer as drug shrinks tumours

A drug previously approved to treat breast cancer could also shrink a common form of childhood brain tumour, IMB and international researchers discover.

2018

Scientists discover off-switch for 'molecular machine' active in many diseases

Researchers discover how an inflammation process automatically switches off in healthy cells; a discovery that could be the key to stopping damage caused by uncontrolled inflammation in a range of diseases.

Unlocking the genetic combinations that control complex diseases

Researchers develop a method to pinpoint genes linked to 12 complex diseases, including Crohn's disease, rheumatoid arthritis, and coronary heart disease.

Turning plants into medicine factories

Australian researchers take a step closer to turning plants into medicine factories through producing key molecules in a range of plants that do not naturally produce them, but are suitable for large-scale production of pharmaceuticals.

2020

$600M deal for inflammation startup

The startup company Inflazome, which develops treatments for inflammatory diseases, was acquired in a landmark deal by the Swiss multinational pharmaceutical company Roche.

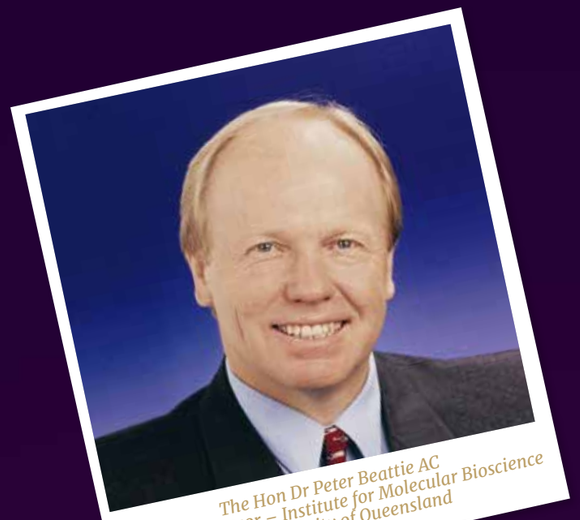
2021

Backyard scientists key to new antibiotics

IMB launches 'Soils for Science' – a citizen science project aiming to unearth new antibiotics in backyards, gardens and farms across Australia.

Repairing hearts with deadly spider venom

A peptide found by IMB researchers in the venom of funnel-web spiders, was found to prevent damage caused by a heart attack and extend the life of donor hearts used for organ transplants.



The Hon Dr Peter Beattie AC
Adjunct Professor – Institute for Molecular Bioscience
The University of Queensland

Foreword

In 2021 UQ's Institute for Molecular Bioscience (IMB) celebrated a significant milestone: 21 years of ground-breaking science.

IMB officially opened its doors in January 2000, following $500 million in funding commitments from the State and Federal Governments, UQ and a transformational gift from the Atlantic Philanthropies. Its mission was clear: to create a better future by making breakthrough discoveries to improve health and wellbeing.

IMB was the first institute that my government supported through the Smart State strategy. It was a recognition of not just the great science that we have in Queensland, but the need for the translational process – to take the research and translate it into practice. For too long Queensland missed this key ingredient and we tried through Smart State strategy to solve this problem.

It fills me with pride to see IMB accept this challenge and become one of the world's most influential and innovative research institutes in just two short decades.

In Australia, IMB is not only the nation's number one research institute on the Nature Index, but also the top research institute for commercialisation activity. Its research has led to 13 spin-out companies, including Mimetica, Xenome, Protagonist (listed on the NASDQ value of over $2Billion), Inflazome (sold to Roche for $600m in 2020) and Infensa.

In my current tenure as Director of the Medical Research Commercialisation Fund, which is the biggest investor in medical science in Australia, I see the brilliance that is coming out of Queensland. IMB is no exception. To see some of Queensland's greatest scientific minds breaking through barriers of the unknown at IMB is truly outstanding.

Congratulations, IMB, on the brilliance you have demonstrated over the past 21 years. I have unwavering confidence that it will continue long into the future.

The Hon Dr Peter Beattie AC

Adjunct Professor
Institute for Molecular Bioscience
The University of Queensland

Professor Ian Henderson
Director – Institute for Molecular Bioscience
The University of Queensland

Welcome

I warmly welcome you to join us in celebrating the Institute for Molecular Bioscience's 21st anniversary.

When I accepted a research leadership role with the IMB as Deputy Director, Research in 2018 and as Director in 2020, it was because I was attracted to its collegial culture, a collective brains trust, where achieving your research aspirations is limited only by self-imagination.

Now as the current director, I am proud to lead this place of people who seek each other's complementary expertise to achieve their purpose, for we are more than a locale of high-tech laboratories.

Building on the legacies of previous IMB leaders, the IMB continues to provide an intellectual home for scientists, where they learn how to be world class researchers and science communicators, and where they make discoveries that transform society.

We are also future-focused. We are embedding emerging technologies like artificial intelligence to analyse and translate the increasing data that our research generates.

We embrace true diversity – beyond gender, age, cultural backgrounds and physical abilities. We encourage interdisciplinary collaboration for solving complex problems.

Under one roof we harness nature. We look at the biodiversity of plants and animals to find connections, cures and control measures in one realm for the other. Few research institutes can claim such cross-fertilisation for revealing how the health of people, animals and the environment are interconnected.

The stories you'll read here describe how we facilitate the journey from an idea to a societal benefit, how we create and translate value-rich knowledge into technologies that become tools for practical impact, and how we support the people who make that happen.

The proof is also in the spin-out companies (equivalent to one every 18 months over the past two decades) that take IMB discoveries through the commercialisation process and help to diversify the Queensland economy.

Last year's purchase of Inflazome by Swiss multinational pharmaceutical company Roche was one of the largest in Australian biotech history. The landmark acquisition is but one example of the IMB's fundamental research value to commercial drug development.

In life sciences research globally, our Institute is well-known and highly regarded. However, in the public, political and industry spheres, there is more we need to do to be recognised for our inspiring work and our capacity to serve partnerships worldwide.

We must help them get to know us and understand us. This compilation of just a few of our stories from the past 21 years is an important step towards that goal.

Professor Ian Henderson

Director
Institute for Molecular Bioscience
The University of Queensland

Reflections from our Directors

Emeritus Professor Peter Andrews AO FTSE
Founding Co-Director, 1999-2003

'From bricks to brains to business' sums up the vision.

It would be a powerhouse unlike any other research centre in Queensland, one that would bring the brightest minds together and transform discoveries into commercial enterprises that boosted the state economy with global biotech investment and positioned Brisbane as the southern hemisphere's hub for exciting life sciences activity.

This concept, conjured between two colleagues on a retreat in 1995, developed into a compelling business case for combining the complementary disciplines of chemistry and biology under one roof, with a focus on graduate development, science communication and entrepreneurship.

"To realise our vision and create knowledge-intensive businesses, John and I knew it was critical to attract and retain top research talent," said Professor Andrews.

"Within ten years the IMB had contributed significantly to Queensland's moving from the lowest number of scientists per capita in the country to the state with the highest."

As the inaugural CEO of IMBCom, the Institute's embedded commercialisation company, Professor Andrews created opportunities for researchers to forge relationships with industry and investors.

"It's important for many researchers to go beyond the discovery phase and personally generate economic and societal value from their science.

"Involving them in the process of translating their ideas into products and techniques that actually diagnose and treat diseases helps them to design and attract substantial funding for future research projects.

"To hear and see their passion is a lso very appealing to investors and philanthropists," Professor Andrews said.

With an impressive portfolio of globally connected spin-out companies and its current researchers continuing to generate outstanding economic, societal and environmental benefits, the original concept of the IMB is being proven successful many times over.

Professor John Mattick AO, FAA, FTSE
Founding Co-Director, 1999-2005

It was an aspirational time: the turn of a new century, an ambitious political landscape, and a state primed to do things differently.

And the IMB, recalled Professor John Mattick, was emblematic of what a medium-sized city could achieve with strategically leveraged funding from state and federal governments and philanthropic partnerships.

"We started with excellence and we nurtured that culture," said Professor Mattick.

"We recruited emerging superstars in science and promoted graduate research. We gave them their own laboratories and the freedom to pursue research that connected basic and applied science, chemistry and biology and, importantly, people with common interests and complementary expertise."

"As co-directors, Peter and I were keen to foster this youthful dynamic, to lead and support, not control," Professor Mattick said.

The Institute was developed and run like a business. A phased approach secured funding first for the building then for operations, negotiating a financial runway with a ten-year plan for incremental funding increases and reviews every five years.

It was an ethos that permeated the Institute.

"It's a privilege to be funded to follow your passion and dedicate your academic career to research, so you have to be the best.

"We encouraged and supported IMB researchers to seek out and apply for opportunities that would extend their discovery and collaboration experiences beyond the University.

"It was a loyalty-performance trade off that generated layers of value for the Institute and the careers of its staff and students," Professor Mattick said.

From its very beginnings, the IMB disrupted conventional thinking about research innovation and outcomes. It was the model that set the standard for establishing other institutes, at UQ and elsewhere; a flagship not just for the University but for Brisbane's burgeoning biotech industry.

Professor Brandon Wainwright AM
Director, 2006-2019

With a mandate to extend the momentum and mature the Institute, investing in people and partnerships was Professor Wainwright's strategy as the IMB's director from 2006 to 2019.

Risk, discovery and communication featured strongly throughout the tenure of this director who saw his role as knowing what every researcher was working on, to optimise the interdisciplinary collaborations that were now functioning fruitfully under one roof.

"We nurtured a culture that celebrated risk, one that supported standing on the dark edge of the unknown and stepping into where others were not game to go," said Professor Wainwright.

"The IMB itself began as an untested concept, but soon we were attracting three times the national average in grants.

"Our point of difference was that we were not just another medical research centre.

"We were people who spoke diverse life science languages yet learned to understand each other's drivers for solving problems differently."

IMB people were chosen because they asked interesting questions. They had plans and were open to mentorship. They recognised discovery as the first stage of translational research. They sought knowledge that had not yet been imagined.

Professor Wainwright encouraged IMB researchers to develop multiple skillsets for communicating with the people in government, industry and community organisations who could take their discoveries further.

"I imparted something I had learned early in my career and that was to help stakeholders understand what you're doing so they can help others understand why you need the support to achieve it," Professor Wainwright explained.

Discerning what people wanted from each partnership meant the IMB could attract the resources to pursue signature projects.

"It was never about the pixels, it was always about the big picture.

"To see what's beyond the next horizon, you have to stand tall and stand at the edge."

The lifetime gift that created a life sciences legacy

For a long time, the source of the $10 million transformative investment in 1998 that would kickstart Queensland's biotech industry remained anonymous.

But eventually the world found out that it was Chuck Feeney, an Irish-American entrepreneur and his foundation, The Atlantic Philanthropies, who provided the foundation for the Queensland and Australian governments to create the IMB: the nation's first multidisciplinary life sciences research centre.

This visionary support ignited an enduring partnership with UQ and influenced the success of the Beattie government's 'Smart State' strategy.

The decision to help establish Queensland's first institute for translating research from the state's unique biodiversity into new drug and health discoveries was also a strategic one for Atlantic.

Mr Feeney had no family connection to Australia, nor did our country contribute much to his Duty Free Shoppers empire. But he admired our down-to-earth, no-frills culture and saw unfulfilled potential.

The plans for the IMB also accorded with the features deemed right for an Atlantic investment: bright students and faculty, ambitious ideas, and savvy leaders.

Mr Feeney believed in supporting projects that would make a lasting difference within his lifetime. He valued building relationships with project visionaries and was known for visiting university campuses to observe interactions between staff and students.

He was drawn to opportunities where collaboration played a central part, which was at the very core of the IMB concept.

Mr Feeney recognised the determination of local stakeholders to reposition Queensland, both socially and economically, which also aligned with his preference for how Atlantic-funded projects should be realised: 'local players working together' to build their communities.

His early vision and belief in UQ's research capabilities inspired confidence from the university, all levels of government and other philanthropists to partner in building what soon became a place of discovery for global impact.

Mr Feeney has been one of the most generous supporters of innovation and advancement in our country's history.

Seeking no recognition for his philanthropy in donor lists or building signage, and indeed preferring his gifts to be anonymous until more recent years, Mr Feeney remains a deeply private man who subscribed to the philosophy of 'Giving While Living'. In 2020, he achieved his goal of giving away his $8 billion fortune while still being around to witness the difference it has made.

The IMB remains grateful for his first gift to UQ and its powerful legacy that continues to create change.

ALUMNI PROFILE

NAME:

Dr Judy Halliday

IMB:

2000 Biological Chemistry Group Leader (Glycobiology)

NOW:

Chief Operating Officer, Office of the South Australian Chief Entrepreneur

A journey lit by a passion for impact

Scientist, research leader, manager, executive, director, inventor, investor, advisor.

In these roles Dr Judy Halliday has contributed significantly across the breadth of research translation since graduating with a PhD from UQ three decades ago and becoming one of the IMB's founding group leaders.

Just prior to joining the IMB, Judy was a director with the Australian Society for Medical Research. For her contribution to this national peak body, in particular her dedication to promoting the AMP-QLD Biomedical Research Awards, Judy was nominated successfully to be a torch bearer for the 2000 Sydney Olympics.

Throughout her career, Judy has continued to keep the flame alight for science with impact.

At the IMB, Judy's glycobiology research involved a collaboration with Alchemia Pty Ltd. Alchemia was spun out of UQ in 1995 to commercialise an enabling technology that allows complex carbohydrate synthesis to fight infections and disease efficiently.

In 2001 Judy accepted a full-time clinical development position with Alchemia. Over the next six years with the ASX-listed company she added commercialisation to her research repertoire, and played a role in Alchemia becoming the first Australian biotech company to take over a listed company following its merger with Meditech Research.

Commercialisation led Judy to carry her scientific expertise from the bench to the boardroom.

Judy joined UniQuest (UQ's main commercialisation company) in 2007, initially as a Commercialisation Manager. Nearly a decade later she had risen to Senior Director, Commercial Engagement – Science before leaving to take on the role of Director of Industry Development for TechInSA, the South Australian Government's startup support agency.

Judy has since been appointed to other executive positions with the South Australian Department for Innovation and Skills, including Director of Industry Development and Director of Science, Technology and Commercialisation.

Judy's technology commercialisation career has included being named as a co-inventor on granted patents, raising millions of dollars for startup companies, and negotiating multi-million-dollar licensing and collaboration agreements to develop early-stage concepts.

Along the way, opportunities arose to accept advisory as well as action roles.

Her understanding of scientific methods and research environments, combined with her biotech business smarts and strategic insight, have afforded Judy unique perspectives and opportunities to add value to the governance and advisory boards of several startup companies, including UQ spin-outs Aussie Colours, Nexgen Plants, Q-Sera, QUE Oncology Inc, GRW and Dendrimed.

Judy carried her scientific expertise from the bench to the boardroom in pursuit of impact from ideas.

Judy has also lent her expertise to investment committees for the Medical Research Commercialisation Fund and venture fund Uniseed, the Finders University Medical Device Partnering Program, the University of Adelaide's Institute for Photonics and Advanced Sensing, and the Australian Research Centre for Interactive and Virtual Environments.

Judy's pursuit of impact from ideas is ongoing.

In her current role as Chief Operating Officer with the Office of the South Australian Chief Entrepreneur, Judy continues to help innovators in research and business take their discoveries to market, build global enterprises, and create positive change.

Judy is also a SheEO Activator, participating in a global initiative to radically transform how women-led, innovation-driven ventures are funded, supported and celebrated.

ALUMNI PROFILE

NAME:

Dr Goslik Schepers

IMB:

2000-2003 PhD;
2004-2004 IMBCom Biotechnology Analyst

NOW:

Senior Investment Manager – Queensland, Brandon Capital Partners

A rewarding career in translational research

From molecular development biology student to multimillion dollar medtech investment manager, two themes have been constant in Goslik Schepers' career: collaboration and commercialisation.

What drew Goslik to the IMB in 2000 was the appeal of a new, multi-disciplinary approach to scientific discovery with a specific focus on health outcomes.

He joined Professor Peter Koopman's group, studying the molecular genetics of organ development mapping, the human SOX8 gene.

At the end of his PhD, an industry fellowship enabled Goslik to work with IMBCom as a biotechnology analyst.

"I don't think I would have had the opportunity anywhere else at that time to gain not just a PhD but also incredible exposure to a variety of alternative views on how research discoveries might change the way disease could be treated, and how they could get from bench to bedside," said Goslik, when asked to reflect on his choice for postgrad study.

"The IMB model allowed us to focus on our research interests but always with exposure to translational concepts.

"To get there we needed to converse with other disciplines, which meant learning other vocabularies to understand what they were doing.

"We went on retreats and commercialisation bootcamps with other research groups and it was a very nurturing environment for scientists who didn't fit the mould for a classical research career.

"That immersive experience set me up for the roles I've taken on since – it broadened my scientific knowledge, built up a strong network, and helped me realise I enjoyed the commercialisation side more than the lab life," he said.

Those roles include project management with Oxford University Innovation, founder of online startup enterprise Technology Partnering, and business development for Summit Therapeutics (UK), Alchemia and QIMR Berghofer Medical Research Institute.

Goslik attributes his interdisciplinary training as a key factor in achieving an early career highlight from his time with Oxford University Innovation, which was commercialising an artificial bone technology that combined materials science and stem cell biology.

As the Business Development Manager for Summit Therapeutics (then VASTox PLC), Goslik was involved with commercialising a chemical genomics platform. He established several collaborations with pharma in toxicology screening, as well as VASTox's first drug discovery collaboration based on the zebrafish model platform.

Shortly after returning to Australia, Goslik joined Alchemia Limited as VP of Business Development. Alchemia was spun out of The University of Queensland in 1995 to commercialise an enabling technology, based on the research from scientists in the Centre for Drug Design and Development (which later formed the basis of the IMB). The technology allowed complex carbohydrate synthesis to fight infections and disease efficiently. His portfolio included new oncology assets and the VAST drug discovery platform.

Goslik has drawn on his experience at iMB, including a PhD in molecular genetics, to create value in early-stage biomedical ventures.

Going on to lead the business development team at QIMR Berghofer for three years, Goslik continued to work on bringing cancer therapies closer to market. This included taking on the CEO role for spin-out genomiQa for a short time, which used precision medicine to tailor whole genome cancer analysis.
It was the first service of its kind in Australia to be offered to hospitals, doctors, pathology services and global sequencing companies.

Now as a Senior Investment Manager with Brandon Capital Partners, Goslik continues to draw on his experience at IMB to create value from a diverse portfolio of early stage biomedical ventures.

"I gain a lot of satisfaction from working with startups that emerge from collaborations between university researchers and hospital clinicians, and maybe that enjoyment of being part of something seminal also relates back to my IMB roots," said Goslik.

"I was one of the first PhD students to graduate, was a member of SIMBA (student association) and the AusBiotech committee. I also established an captained the first, and only, IMB volleyball team.

"More impressive, though, was that IMB was one of the first research institutes to have an artist-in-residence and hold an art competition. My prize-winning image of a digitalised embryo gave me a great cover for my thesis."

It's been nearly two decades since that project was published and in that time Goslik has helped hundreds of other scientists give visibility and commercial validation to their 'big picture' ideas.

He looks forward to supporting more research-based spinouts and nurturing the next generation of biotech CEOs, then seeing the flow-on effects benefit universities, hospitals and ultimately patients.

ALUMNI PROFILE

NAME:

Professor Melissa Little

IMB:

2000-2014 Senior Principal Research Fellow and Group Leader

NOW:

Chief Scientist, Cell Biology Theme Director, Murdoch Children's Research Institute

UQ Vice-Chancellor's Alumni Excellence Award, 2017

Rebuilding a kidney in a dish

Based on understanding normal organ formation, Professor Melissa Little and her team at IMB first described the ability to recreate a model of the human kidney in a dish using human stem cells.

A year later, her research collaborations produced an organoid that could feature up to 12 types of cells normally found in the human body, making it equivalent to a foetal kidney. Critically, the new method meant researchers could create a miniature model kidney from any person, starting with skin or blood cells.

A world first, this method is now allowing her and other researchers to better study the human kidney outside of a human body.

An alumnus of The University of Queensland (1984), Professor Little established her research laboratory within the Center for Molecular and Cellular Biology prior to the formation of the IMB. A Royal Society Fellow at the MRC Human Genetics Unit, Edinburgh, she returned to UQ in 1992 and was awarded an R.D Wright Fellowship to commence her group. Hence, Professor Little has now spent more than 30 years studying the molecular and cellular basis of kidney development, disease and repair.

Melissa is a global leader in developmental and stem cell biology research and a pioneer in the field of kidney organoids. It was while at IMB that she began to ask the question of where her basic science could make a difference to patients.

She envisioned a future for patients with renal failure whereby replacement organs could be bioengineered from their own cells to reduce the risk of organ rejection.

In 2014, Melissa's research attracted a ground-breaking deal with bio-printing company Organovo in the United States to create artificial mini kidneys using 3D printing technology. Using robotic platforms to generate many mini kidney models simultaneously, Melissa hopes to identify drugs that could develop into new treatments for the inherited forms of kidney disease.

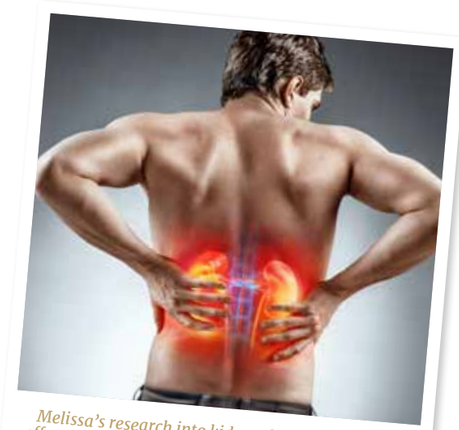
She is also developing engineering approaches to scale up and scale out kidney tissue manufacture with the hope that one day such tissue can be transplanted into patients.

Professor Little now leads the stem cell initiative within the Murdoch Childrens Research Institute (Melbourne) where, together with other stem cell biologists and the virologists at the Doherty Institute, they are investigating the effects of COVID-19 on the heart, lungs, brain, kidneys, immune system and blood vessels, and even placenta.

Melissa's academic contribution to knowledge about kidney development and efforts to revolutionise the management of chronic renal disease is impressive. She has published prolifically in highly ranked journals, with her work featured on many front covers, including *Nature* and *Nature Cell Biology*.

She has been an invited, keynote and plenary speaker at more than 50 international events, an editor for five international journals, and she has sat on many peer review panels, interview and strategic review committees.

Her research has been supported by national and international Government and philanthropic funding, including highly competitive grants from the US National Institutes of Health, Human Frontiers Science Program, European Union and the Dutch Kidney Foundation. Having patented her research outcomes, she has partnered with a number of companies, including Organovo and Novo Nordisk.



Melissa's research into kidney development and efforts to revolutionise the management of chronic renal disease is impressive.

Melissa has also contributed significantly to research policy development in Australia and is considered by her peers to be one of the most influential scientists to advise different governments. She was invited to participate in both major reviews of health and medical research in Australia – the Wills Review and the McKeon Review. She also served on the NHMRC's Research Committee for six years.

Melissa was Chief Scientific Officer of the Australian Stem Cell Centre (2007-2008), Director of Stem Cells Australia (2017-2020), President of the Australasian Society for Stem Cell Research and is currently President of the International Society for Stem Cell Research.

In her role as teacher, Melissa has supervised more than 30 PhD and honours students and examined numerous theses for students at leading research-intensive universities across the globe. The postdoctoral scientists who have received advanced training working alongside her have gone on to secure positions at some of the world's most prestigious health and medical research institutions.

A Fellow of both the Australian Academy of Science and the Australian Academy of Health and Medical Science, Professor Little has been recognised by numerous national and international awards, including UQ Alumnus of the Year, Eureka Prize for Scientific Research, NHMRC Outstanding Researcher Award, Smart Women – Smart State Award, GlaxoSmithKline Award for Research Excellence, Australian Academy of Sciences Gottschalk Medal in Medical Sciences, ANZSCDB Presidents Medal, World Congress of Nephrology Alfred Newton Richards Award, and the Julian Wells Medal. An Eisenhower Fellow, she was recently the Boerhaave Professorship and was awarded an Honorary Degree from Leiden University. In 2017, she was awarded the Elizabeth Blackburn Fellowship (Biomedical) and was also the Top Ranked Research Fellow that year. In 2021, she was awarded the Homer Smith Award by the American Society for Nephrology, the first Australian and only the fifth woman (this award commenced in 1964) to ever receive this accolade.

As a mother of two children, Professor Little has played a key role in mentorship of women in science.

ALUMNI PROFILE

NAME:

Professor Kate Schroder

IMB:

2001-2005 PhD

NOW:

Principal Investigator, Inflammasome Lab

Director, IMB Centre for Inflammation Research

NHMRC RD Wright Fellow

An agent for local and global change

Professor Kate Schroder's research has been translated into one of the largest deals in Australian biotech history.

In 2020, Swiss multinational pharmaceutical company Roche paid $600 million to acquire Inflazome Ltd, the UQ spinout established to commercialise small molecule inflammasome inhibitors discovered and developed in collaborative research from IMB's Inflammasome Laboratory.

Kate heads this group, which she set up in 2013. However, her connection to the IMB stretches back more than 20 years. It's where Kate completed her PhD in Immunology in 2005 and continued with postdoctoral work until 2008.

In January 2009, Kate travelled to Switzerland where she trained as an NHMRC CJ Martin Fellow at the University of Lausanne, working with the famous Swiss immunologist Professor Jürg Tschopp. Kate returned to Australia as an NHMRC and IMB Fellow in 2011.

By then she was hooked on the biology of inflammasomes: inflammation-generating molecular machines that trigger immune cells to respond to an infection or injury.

Inflammation protects us against infection, but it also drives several human diseases such as gout, chronic liver disease, and neurodegenerative diseases. The anti-inflammatory medications currently available, such as aspirin, ibuprofen or steroids, do not target inflammasome pathways.

The Inflammasome Laboratory, however, researches fundamental cellular processes to develop new therapeutics for a wide range of inflammatory diseases.

Kate and her group are investigating the role of inflammation in injury and chronic disease and have helped create more precise anti-inflammatories to shut down the disease-causing pathways.

These new drugs leave the other pathways that help people fight infection intact. It's an extraordinary new approach that will benefit patients with many different diseases.

Inflazome Ltd conducted clinical trials of the inhibitors in 2019, attracting the interest of Roche, one of the largest pharmaceutical companies in the world.

Roche now has full rights to Inflazome Ltd's portfolio of inflammasome inhibitors. Two of the drug candidates are in clinical trials to treat debilitating conditions such as cardiovascular disease, arthritis, and neurodegenerative diseases such as Parkinson's, Alzheimer's and Motor Neurone Disease.

Kate's contributions to science are not limited to the research that deepens our understanding of inflammation and challenges how we treat inflammatory diseases. She is an agent for change at UQ, her sphere of influence.

Prof Kate Schroder and Dr Rebecca Coll working in the lab at IMB.

Kate served as the chair of the IMB Diversity and Inclusion Committee between 2018 and 2020. As a member of the UQ Ally Network, Kate actively creates an inclusive environment on campus for gender, sex, and sexuality diverse staff and students.

While attitudes towards women in science have shifted over time, it concerns Kate that the retention rate for women working in STEM is low, with talented women dropping out of academia and leaving a predominantly male workforce at the senior levels.

Kate knows that science is better when teams with diverse perspectives and experiences conduct research. She believes that we need to do more to keep women in STEM, not just get them interested in the disciplines as young people. Female scientists seek her mentorship, and women make up 10 out of 14 team members in the Inflammasome Laboratory.

Kate has earned a swag of awards and accolades, has authored more than 100 publications, and is an editorial board member for international journals such as *Science Signaling, Clinical and Translational Immunology* and *Cell Death & Disease.*

Kate's research has established that inflammasome signalling is crucial in antimicrobial defence and she has confirmed that they drive pathological inflammation in diseases.

She recently applied successfully to the NHMRC for Synergy and Investigator Grants. With this $7,900,000 funding and in the role of Chief Investigator, Kate aims to create new drugs that will halt unhealthy inflammation, and avert the global health disaster posed by emerging viruses and superbugs.

ALUMNI PROFILE

NAME:

Dr Madhavi Maddugoda

IMB:

2004-2007 PhD; 2007-2008 Post-Doctoral Fellow

NOW:

Strategic Advisor – Research Training, IMB

Curiosity, culture and communication

Madi Maddugoda wants to cultivate curiosity and purpose in the next generation of IMB postgrads.

She's keen to help them pursue their passion for science with meaningful, memorable learning experiences – because that's how her research training began.

Recalling her early days as a PhD student, entering the new and very modern IMB building in 2004 and feeling so hopeful and inspired by the possibilities ahead, is what sparks Madi's excitement about her current role at IMB: Strategic Advisor – Research Training.

"For me, it was a golden time. It wasn't just the shiny new facilities but also the culture which was supportive and the friendships that were fostered," says Madi.

"While we were training in research, we also learned what it meant to be part of a project team, how to solve problems, and how to explain our solutions so they could have impact beyond our own labs.

"For example, my supervisor, Professor Alpha Yap, and a young scientist travel award from the America Society for Cell Biology (ASCB), made it possible for me to attend the ASCB Annual Meeting in San Diego with other students in the lab. It was an incredible investment in us.

"That stimulation to be thinking about what we could do with our research training, to build valuable networks, and preparing us for multiple career options – that's what I want future students choosing IMB to experience too."

Madi believes that such opportunities to explore diverse capabilities set her up for the next phases of her career.

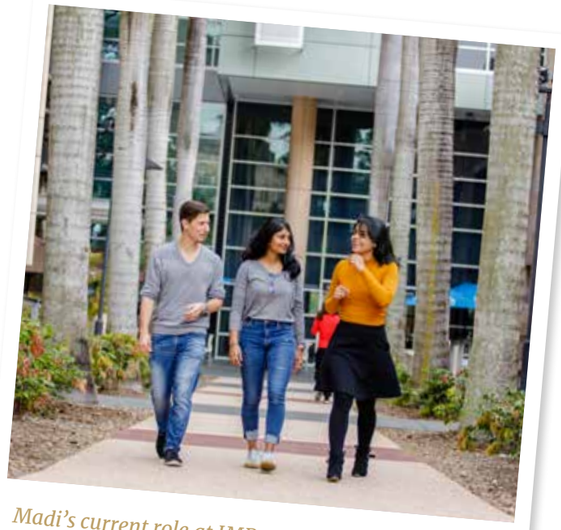
As a postdoctoral fellow Madi spent three and a half years in Nice, France, working for INSERM – the National Institute of Health and Medical Research. Her project involved exploring a newly discovered method that the notoriously infectious golden staph uses to tunnel through blood vessels.

With full reign to create and spearhead this multinational, collaborative project that included physicists and clinicians among other specialists, Madi's penchant for science communication proved particularly valuable.

"Telling this story, with its sci–fi microscopy videos and complex physics theories was a real highlight", Madi says.

Madi credits her in-demand problem-solving abilities in part to the research and communication proficiency she honed at IMB.

"I'm a big picture thinker who learned how to pay attention to detail, to become more considerate of different audiences when explaining concepts, and that focus on clarity and precision gives me confidence in my work," says Madi.



Madi's current role at IMB supports career pathways for the next generation of students.

"And it's why I can present with certainty when sharing the stage with highly acclaimed scientists from all over the world."

Coming back to Australia in 2012, Madi worked at the Garvan Institute of Medical Research as a scientist and then a scientific writer and illustrator. She was thrilled when *Genome Research* chose her graphic – genomic data panels represented as a combined Sydney-Melbourne cityscape – as the cover of the May 2018 issue.

In parallel, Madi's role as committee secretary for the Australian Epigenetics Alliance saw her skills applied to solving engagement problems: disseminating epigenetic research through seminar series and conferences as well as social media.

Three years ago, Madi returned to UQ as a science writer, illustrator and researcher. In 2021 she accepted on a very different position at IMB – the student has become the strategist.

"In the end, all my roles have leaned heavily on strategic thinking, from establishing international collaborations to solve research problems, to consulting to labs on how to best communicate to publish papers or win grants, as well as the role I play as a director on the board of an independent school," she says.

"These roles gave me formal and informal training in strategy, and set me up for the next stage of my career.

"Now, I'm formulating and implementing a strategy that responds to what the research community needs and what curious young minds expect and aspire to.

"For example, there are still many invisible barriers for women in science, like proving to themselves as well as others that they are ready to step up as leaders.

"In this role, I can bring both my personal and professional experience to the challenge of creating career paths for others to step out with confidence."

Fighting the conditions that cultivate disease and poverty

Generous financial support from the Bill & Melinda Gates Foundation has expanded the global reach and impact of IMB research.

The Foundation, launched in 2000 as a partnership program initiated by Microsoft founder Bill Gates and Melinda French Gates, funds innovative projects that fight poverty, disease, and inequity around the world. It has released more than US$60.1 billion in grants in 134 countries over the past two decades.

Mathematician and genomics researcher Associate Professor Lachlan Coin (IMB 2012-2021) contributed to a collaboration that drew on a US$12.4 million allocation from the Foundation to tackle hunger and poverty in sub-Saharan Africa.

His team developed genomic tools for breeding new varieties of sweet potato crop with higher yields, improved nutritional characteristics, higher levels of drought tolerance and improved disease and pest resistance.

In sub-Saharan Africa, sweet potato is an important cash crop grown predominantly by female small-holder farmers.

Assembling the complex sweet potato genome was a world-first breakthrough and created a significant global resource for building cultivation capacity and sustainability in one of the world's poorest regions.

A $US100,000 Grand Challenges Exploration grant from the Foundation enabled biologist Professor Kirill Alexandrov (IMB 2008–2018) to develop an affordable, portable biosensor to detect viral and bacterial DNA in real-time.

Grand Challenges Exploration grants fund the development of ideas that challenge and change how persistent global health and development problems could be solved. Infectious diseases, for example, cause 16 percent of deaths every year around the world, mostly in developing countries.

Professor Alexandrov's team re-engineered technology from blood glucose monitors, enabling disease biomarkers to be detected in a sample of human blood or saliva and the results to be viewed on a mobile phone.

This innovation meant that infectious diseases like tuberculosis, HIV, influenza, Dengue fever and Zika virus could be diagnosed immediately and cheaply in rural and remote communities, preventing outbreaks and epidemics.

These are just two examples of innovative research projects advanced with Bill & Melinda Gates Foundation funding.

IMB research has also received financial benefits from the Foundation through collaborations such as the recent agreement between the Centre for Superbug Solutions and CARB-X (Combating Antibiotic-Resistant Bacteria Biopharmaceutical Accelerator). This global non-profit partnership receives support from the Foundation to fund the world's largest antibacterial development pipeline, including US$21 million for the IMB Centre for Superbug Solutions team to develop a new antibiotic.

Breeding new and improved sweet potato crops to tackle hunger and poverty, using genomic tools.

ALUMNI PROFILE

NAME:

Dr Ryan Taft

IMB:

2005-2009 PhD;
2009-2017 Research Fellow and Group Leader

NOW:

Vice President, Scientific Research, Illumina

UQ International Alumnus of the Year, 2021

Solving rare medical mysteries with genomic research

Dr Ryan Taft came to Australia to complete a PhD in genomics and computational biology, focusing on non-coding ('junk') DNA.

He returned to the United States as a world leading expert in diagnosing rare genetic diseases.

It began as a research career with IMB founding director Professor John Mattick to advance the idea that non-coding regions of the genome (existing outside of genes) had an important function in human biology.

It turned into a quest to help parents of children with rare diseases find answers in their genes.

Ryan stayed with the Mattick group as a postdoctoral fellow, then began leading his own laboratory. From his research Ryan was the first to document the link between non-coding RNAs and developmental complexity. He discovered new classes of small regulatory RNAs, and produced major reviews on non-coding RNAs and disease. He revealed how previously considered junk genetic material actually comprised the major output of the human genome.

Ryan's work was published in such prestigious journals as Nature Genetics, Nature Structural and Molecular Biology, the American Journal of Human Genetics, RNA. It was recognised by the Australia Museum Eureka Prizes and the UQ Foundation Research Excellence Awards.

Significantly, the knowledge generated led to a greater understanding of how precisely a single cell can develop into a human capable of complex physical and intellectual feats.

Then a chance conversation between a family doctor and Ryan's wife, magazine editor Erica Sontheimer, changed his research focus, his career trajectory, and the impact of his scientific endeavour.

That conversation in 2012 put Ryan into contact with the Damiani family, whose son, Massimo, had a mysterious and debilitating disease of unknown cause. The closest they had come to understanding their son's diminishing development was that it related to leukodystrophy, a group of genetic conditions affecting the white matter of the brain and causing loss of normal brain functions.

When their options for finding a diagnosis or cure had dried up, Ryan agreed to sift through the mass of the genomic sequencing data the family had commissioned, working on it in his spare time.

It was an incredibly onerous mission a decade ago when sequencing technology was far less advanced. However, Ryan did identify the damaged gene and linked it to similar international cases. He led a global team that discovered a new disease: HBSL (Hypomyelination in the Brain stem and Spinal cord leading to Leg Spasticity).

The diagnosis was the first step towards treatments that vastly improved Massimo's quality of life. This work provided answers and hope not just for the Damiani family, but for others around the world whose children were also suffering from mysterious conditions. Ryan has since identified numerous other novel disease genes, including seven across the leukodystrophy spectrum.

A passion project undertaken to help a family in need became a turning point in Ryan's career. The challenge of helping the Damianis gave him a new purpose. It became his mission to make an impact by getting whole-genome sequencing to be an evidence-based, front-line diagnostic for mystery illnesses, not a last resort.

Ryan realised that his mission would need a strong network to effect change in clinical practice. He wanted to build expertise into the analysis and diagnosis process so that doctors could translate the data into meaningful information for patients. He believed he could achieve this faster outside of academia.

Heading back to San Diego, Ryan joined Illumina, a biotechnology company that develops next-generation sequencing for genetic analysis, and set in motion his plans to make genome sequencing available in all major centres around the world.

In the commercial sphere Ryan now supports technology development and advocates with government, hospitals, insurers and patient groups so that families with children suffering from rare and unknown diseases can seek answers in genetics.

He has initiated projects that demonstrate how paediatric patients with unresolved disorders can avoid painful invasive tests with clinical whole genome sequencing, empowering their parents with information to improve the quality of life of their children.

Ryan has translated the skills, experiences and connections he made at the IMB into a rewarding career and enduring legacy, while helping to position Australia as a leader in genomics.

As Illumina's Vice President of Scientific Research, he maintains a unified focus on the goal of achieving a rapid diagnosis for a rare disease through genomic technologies.

He is also the chair of iHope – the Illumina-founded philanthropic consortium committed to providing whole-genome sequencing to under-served families.

Since 2014 he has chaired the Mission Massimo Foundation Scientific Advisory Board and the Medical and Scientific Advisory Board of Global Genes, a leading rare disease advocacy organisation.

At George Washington University Ryan is an Adjunct Assistant Professor of Integrated and Systems Biology and of Paediatrics.

In these roles Ryan remains committed to finding faster diagnoses through genomic testing, knowing improved patient outcomes can be achieved from accurate genetic counselling, tailored intervention, and supportive care.

And from these esteemed positions he has the potential to change the policy and healthcare landscape worldwide.

ALUMNI PROFILE

NAME:

Dr Mark Howes

IMB:

2006-2010 PhD

NOW:

Co-Founder, CEO, and Fermentologist of Newstead Brewing Co.

Co-Founder, Working Title Brew Co.

Beers, brains, and giving back

Dr Mark Howes is a modern Renaissance Man. He has skills and interests in multiple disciplines, including business and science. His Honours year sparked creative thinking and nurtured curiosity, inspiring Mark to undertake his PhD at the IMB, graduating in 2010.

The environment of enthusiastic scientists with the drive and desire to find answers to new questions pushed Mark to test the boundaries of his thinking and research. Inspired to be the best version of himself, he was compelled to go further, think deeper, and be keener than he ever thought possible.

Mark's experiences at IMB fuelled his passion for research and innovation. Inherent to experimentation is the fusion of art and science, and Mark took this learning and applied it to creating and refining craft beer.

The joy of discovery in science motivates Mark, who integrates the elements of discovery and innovation into his beer brewing. Adding purpose to his passion for beer is the belief that discovery and research are the best way to grow our economy.

Mark is the co-founder of Newstead Brewing Co., one of Brisbane's first boutique breweries. Founded in December 2013, Newstead Brewing Co. is committed to sustainability, corporate responsibility, and community engagement.

Community involvement has taken several forms, including fundraising for charity and partnerships with Queensland Rugby, QAGOMA, and Alliance Airlines. Who can forget 2018's 'Smithy's FGB' (Fokkin' Good Beer), created to commemorate the 90th anniversary of Sir Charles Kingsford Smith making the first trans-pacific crossing from the US to Australia?

Newstead Brewing Co. has always focused on using local suppliers, an important practice reinforced by the COVID-19 pandemic and the associated economic turndown. While the company experienced extreme financial losses and had to let go more than three-quarters of its workforce overnight, Mark and his team doubled down and found ways to keep their dream alive.

The pandemic inspired Mark to strengthen the company's commitment to local partnerships. Buying from local and independent suppliers was the tangible way Newstead Brewing Co. could have an immediate positive effect on their colleagues, friends, and neighbours.

Other Brisbane brewers also benefited from this approach, with Newstead Brewing Co. sharing its retail outlets as a mechanism for brewing colleagues to get their beers into the public's hands.

Mark has continued to contribute to scientific research. Newstead Brewing Co. collaborated with UQ, and with support from Advance Queensland, PhD student Edward Kerr researched how wild yeast could help diversify beer production and quality.

The result was a beer brewed using fermented yeast, hand-picked from a jacaranda tree at UQ. There are more economic opportunities to be realised from this collaboration, with the wild yeast variety licenced for Newstead Brewing Co.'s use. There is potential for more cooperation between the parties to create more beers in the "Wild Yeasts and Where to Find Them" line.

More recently, Newstead Brewing Co. formed a corporate partnership with the IMB. The team created 'Molecular Magic Hazy Pale Ale' to celebrate the IMB's 21st anniversary and help support the IMB with the profits. The beer was named by Dr Jeffrey Mak following an internal naming competition.

According to Mark, yeast is the real hero of beer and the brewers selected a strain of ale yeast that produces peach-like stone fruit esters to compliment the hop profile. The result is a soft and approachable modern pale ale that remains vibrant and refreshing.

Molecular Magic is raising funds and awareness for IMB.

Molecular Magic brew day. L–R Mark Howes, Jeffrey Mak, Ian Henderson

Always keen to continue his voyage of discovery, Mark opened Working Title Brew Co. in 2021. It is the passion project of two mates who have been working in, around, and over a beer for the last decade.

Their ethos is "No rhyme, no reason. Just good beer" – an apt summary of the fusion of art and science that is characteristic of experimentation.

ALUMNI PROFILE

NAME:

Dr Melanie Shakespear

IMB:

2007-2012 PhD; 2012-2014 Research Officer; 2015-2018 Postdoctoral Research Fellow

NOW:

Director, COVID-19 Vaccine Strategy Taskforce, Australian Department of Health

The PhD candidate who became a policy practitioner and COVID advisor

Dr Melanie Shakespear might dream of being in Copenhagen instead of Canberra, but she's actually where her science training is most needed right now.

A decade ago, Melanie was completing her PhD in immunology at the IMB and now she leads a science team in the national taskforce addressing Australia's response to the COVID-19 pandemic.

Between the two roles she did go to Denmark as a postdoc, where she sought support from research colleagues for a Marie Curie Fellowship, one of Europe's most competitive and prestigious scholarship grants.

Although narrowly missing out on the Fellowship, initiating the meeting with like minds in Copenhagen yielded other rewards, including an ongoing collaboration for the IMB's Innate Immunity, Infection and Inflammation group led by Professor Matt Sweet (Melanie's PhD supervisor).

"Opportunities and support to travel overseas, to connect in person with other researchers solving the same problems – that's partly what made my time at the IMB so memorable," said Melanie.

"We learned how to attract independent funding to attend conferences and present our research at them, how to leverage the IMB's support so we could go and meet the authors of the papers that informed and expanded our own research."

Melanie's PhD project looked at the behaviour of cells in our immune system called macrophages and whether certain molecules could be used to inhibit inflammatory pathways, possibly leading to a treatment for diseases such as arthritis.

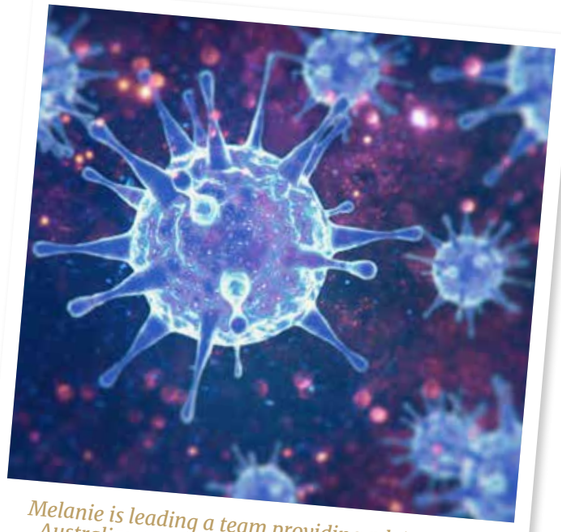
A chance meeting with Professor Sweet at a social event in 2006 piqued her interest in pursuing the project at the IMB. At the time, Melanie was a research assistant at the Kennedy Institute of Rheumatology in London.

However, the opportunity to work with the highly esteemed Professor David Hume, who was establishing an arthritis animal model at the IMB, drew her back to UQ, where she had completed her undergraduate honours degree in biotechnology.

"I was also attracted by the IMB's reputation for supporting students and early career researchers who didn't want to follow a straight academic career path", explained Melanie.

"We were motivated to explore how we might use our scientific knowledge and research skills to make an impact beyond the Institute.

"We had access to people and resources in other research groups and such exposure helped us discover potential career paths beyond academia", Melanie said.



Melanie is leading a team providing advice to the Australian Government on COVID-19 vaccines.

That included opportunities for Melanie to engage in extracurricular activities like volunteering for the Science Ambassadors program and coordinating the IMB's bubble soccer games.

"The culture, the camaraderie – we learned that it's important to live for more than just the science!" Melanie said.

Melanie also took part in a structured mentoring program run by the IMB which paired her with Natalie Fitzpatrick, a double degree UQ alumna and specialist in public policy. Although Natalie had studied Economics and IT, her policy portfolio included the common ground of health and pharmaceuticals.

That experience helped Melanie to be selected as one of seven in the first intake of Australian Science Policy Fellows, an initiative of the Office of the Chief Scientist that enables early- to mid-career scientists to become skilled policy practitioners and bring scientific expertise to policy development in Commonwealth departments.

During her first six months in this embedded role, Melanie worked in the Department of Health with the team responsible for the Medical Research Future Fund on grant design, development and administration.

"It was fascinating to be on the other side of the application process and I learned a lot about stakeholder management and relations too," said Melanie.

"I believe the collaborative culture at IMB prepared me for seeking and valuing input from others, which is an important part of policy development."

Other elements of her research training that Melanie believes equipped her for her current leadership role were the opportunities to supervise students and manage group dynamics in the lab, the facilitation of network building, and IMB's focus on science communication skills to make complex, technical information meaningful for different audiences.

Leading a team of scientists providing advice to the Australian Government on COVID-19 vaccines and treatments is Melanie's focus for now, but she looks forward to contributing her scientific knowledge and policy expertise to future advisory roles... perhaps one day in Copenhagen!

ALUMNI PROFILE

NAME:

Dr Maggie Hardy

IMB:

2007-2011 PhD; 2012-2014 Post-Doctoral Fellow; 2014-2017 Research Fellow

NOW:

Senior Executive Service, Australian Public Service

One scientist on a 'One Health' mission with more than one story to tell

For most people, Queensland's major attractions are the sun and the surf. For Maggie Hardy, it was the K'gari (Fraser Island) funnel web spider.

The Boston-born and Hawaii-educated entomologist chose the IMB for her postgraduate studies so she could work with Professor Glenn King's group researching how venomous invertebrates could play a role in developing new drug therapies.

"Only in Australia could I get close to funnel web spiders in their natural habitat, and I wanted to find out if their venom could unlock some answers for environmentally-friendly insecticides," explained Maggie.

"Even from that early contact with IMB's Higher Degree by Research Liaison Officer, Dr Amanda Carozzi, I felt supported and encouraged to believe that what I wanted to achieve was certainly possible," Maggie said.

For a decade Maggie worked on various interdisciplinary projects within the IMB and across UQ. She co-authored many papers and was credited as a co-inventor on a patent for pest-controlling agents isolated from spider venom.

"It was excellent science with excellent people – that's what my experience at IMB was all about," said Maggie.

While refining her research skills, Maggie also pursued her interests in the business and training aspects of knowledge translation, including commercialisation, laboratory management and completing a Graduate Certificate in Higher Education.

Meanwhile, her contributions to The Conversation caught the attention of so many readers that in 2017 she was ranked as its number one most-read woman author at UQ and the eighth UQ author overall. More than 575,000 readers have viewed her articles to date.

In 2016 Maggie was featured as an Advance Queensland 'Community Digital Champion'.

"One of the most valuable skills I learned at the IMB was how to turn research and science into relatable stories," said Maggie.

"This capability has helped me connect meaningfully not just with members of the public, but also with other researchers and practitioners.

"For example, when I worked as a public health scientist for the Centers for Disease Control and Prevention in Atlanta, Georgia, my colleagues were specialists in vector-borne, food-borne, water-borne and environmental diseases, which intersected with my own background in biochemistry," Maggie said.

A common theme throughout Maggie's scientific endeavours has been the relationship of insects to the environmental damage and diseases that impact human and animal health.

She supports the One Health approach, which recognises that the health of people, animals and the environment are interconnected, and that multidisciplinary collaborations at local, national, and global levels are needed to achieve optimal outcomes.

Her current regulatory role in the Australian Public Service continues to involve her in helping manage pests safely and effectively while protecting human, animal, and environmental health, and Australia's trade.

A career highlight that helped to build Maggie's strengths in strategy and policy development was being part of a multi-agency emergency response to the impact of Hurricane Maria in 2017.

Maggie's research into the funnel web spider could unlock some answers for environmentally friendly insecticides.

"In Puerto Rico, the catastrophic damage from successive natural disasters that year devastated its public health laboratories," explained Maggie.

"Our job was to systematically re-establish testing capacity for identifying disease outbreaks and monitoring the safety of food, water, and conducting surveillance for infectious diseases.

"The lessons learnt and the tool we used in our quality management approach were published in the 20 June 2019 edition of *Nature Communications*.

"And in the support of open science, we then made the tools and resources available under a Creative Commons licence for similar response and recovery operations in the future.

"It was a privilege to serve with my colleagues on such an incredibly important project and to use my expertise in a very practical way," Maggie said.

Another theme that has characterised Maggie's career is her commitment to making STEM more inclusive. Along with the Institute's Dr Amanda Carozzi and Bronwyn Adams, she helped to establish the IMB Science Ambassadors program in 2008 and was involved with the 'Flying Scientists', an initiative of the Office of the Chief Scientist that engages rural Queenslanders in science.

In 2016 and 2017, Maggie and another IMB colleague, Mathilde Desselle, secured a National Science Week grant to initiate the 'Catch a Rising Star' program. Over two years, more than 80 women researchers attended a two-day training workshop in Brisbane then visited regional and remote Queensland communities to share their passion for science.

Maggie also served on the Board of the Tech Girls Movement Foundation from 2015 to 2017.

"I am a strong advocate for equity and diversity, and my consistent aim is to increase access to higher education and careers in research for people from historically excluded groups," Maggie said.

"I enjoy working in public health because of the importance in taking folks on the journey with the science, no matter where they're from or their background.

"I believe in talking about science whenever the opportunity is presented, because you never know who might be listening, who you might inspire to join the next generation of public health advocates."

ALUMNI PROFILE

NAME:

Dr Robert McLeay

IMB:

2008-2011 PhD

NOW:

MD student, UQ
(expected graduation 2021)

When pharmacology met coding, precision-dosing made better patient care possible

Dr Robert McLeay led software development teams that were delivering complex projects for hundreds of thousands of users before completing a PhD in Bioinformatics, using computational techniques to model and understand genetic and biological data.

Like many breakthrough inventions, serendipity played a role in the creation of Robert's DoseMeRx software and startup company a few years later.

An acquaintance at a barbecue made a passing remark about the effort pharmaceutical companies spend in optimising dosing across a large group of patients in clinical trial cohorts, ensuring that the hundreds of millions of dollars spent on these trials is not wasted. He asked, "why don't we apply these techniques to predict optimal medication dosages for individual patients in normal clinical practice?"

Robert was inspired to create a tool that helped doctors and pharmacists calculate the correct amount of medication for each patient. He founded DoseMe in April 2014 after two years of prototype development. His interest in combining modelling biological data with his background in IT led to safer and more effective precision-dosing of patient medications.

Precision-dosing has been independently proven to improve patient outcomes (even halving mortality in some groups) and lower healthcare costs. Through deploying DoseMeRx, hospitals have been able to demonstrate reducing the incidence of antibiotic-associated acute kidney injury by 83 per cent.

DoseMe's easy-to-use software, DoseMeRx was designed from the beginning for clinicians rather than researchers. Making these complex algorithms available within a simple, app-based user interface now allows clinicians access to the DoseMe platform anytime, anywhere. DoseMeRx became first application integrated and available within the most commonly-used electronic healthcare record systems globally, Cerner and Epic – making the benefits of machine learning available within normal clinical workflow.

Robert focused on ensuring that the software had a rigorous scientific basis assuming scientific leadership within the company. He assumed responsibility for DoseMeRx's validation and regulatory clearance in Australia, Europe, and the USA.

The software platform was built on the principles of Bayesian dose forecasting. This method uses thousands of data points from published population models and uses a complex mathematical algorithm to integrate individual patient data and laboratory results – modelling their individual ability to absorb, process and clear a drug from their system.

Once this virtual model of each individual is built – in less than a second – DoseMe helps clinicians dose more accurately and precisely, calculating the most effective dose to reach the desired outcome. DoseMe can also simulate the potential outcome of different dosing regimens to support clinicians in making the best decision for challenging cases.

Today, DoseMeRx enables individualised dosing in hundreds of hospitals across 10 countries. DoseMe currently supports over 7,000 clinician users, supports 42 drug models ranging from antibiotics to transplant medicines to chemotherapy, and to date has calculated over 1.4 million medication doses.

As a scientist, Robert applied modelling and bioinformatics to a range of fields and published 13 peer-reviewed articles in genomic data analysis, developmental biology, glioblastoma, and schizophrenia research.

As an entrepreneur and innovator, he attracted $500,000 seed funding from high profile investor tech Steve Baxter in 2014, followed by $2.6 million to underpin DoseMe's continued growth in a Series A round that valued the company at $20 million.

Fewer than five years after its launch, US-based Tabula Rasa HealthCare acquired DoseMe for US$30 million. Robert moved on to the next stage of his career – completing his qualification as a Doctor of Medicine at UQ.

Robert's deep background in medical research and experience with MedTech startups benefits his contribution to the advisory of board at Atidia, a company commercialising clinical decision support software that uses machine learning to improve peri-operative and surgical care. He continues to support other early-stage startups around Australia.

Strokes, spiders, and a passion to pay it forward

Pauline North is a thought leader and trailblazer. As one of the first women in Australia with a career in computer science and co-author of the book Women in Computing, she has an insatiable curiosity and ongoing passion for learning.

Pauline is highly invested in outcomes for stroke patients, and so when a 2020 article about the use of spider venom to stop brain death in stroke patients caught her eye, she had to know more.

Brain death in stroke patients and the associated protracted and complex recovery incur a massive social and emotional toll.

Years ago, Pauline was a helpless observer when her mother had a stroke.

"The doctors needed time to assess what sort of stroke had occurred, as the wrong treatment would have killed Mum," explains Pauline.

"The delay in treatment meant the stroke caused more brain death than if the medication was administered immediately."

Pauline had long desired to support research and had now found a project that excited her.

She believes it's difficult for donors to be motivated to contribute without understanding the nitty-gritty of the discipline or project. After attending an evening hosted by the IMB where the Head of Research spoke about IMB's projects and potential health outcomes, she wanted to get involved.

"IMB makes it easy for prospective and current donors to connect with its cutting-edge research.

"The scientists skilfully communicate high-level concepts shaped to describe the value of what they do and their goals.

"The public is welcome to tour the physical space and ask questions but never pressured to donate money," says Pauline.

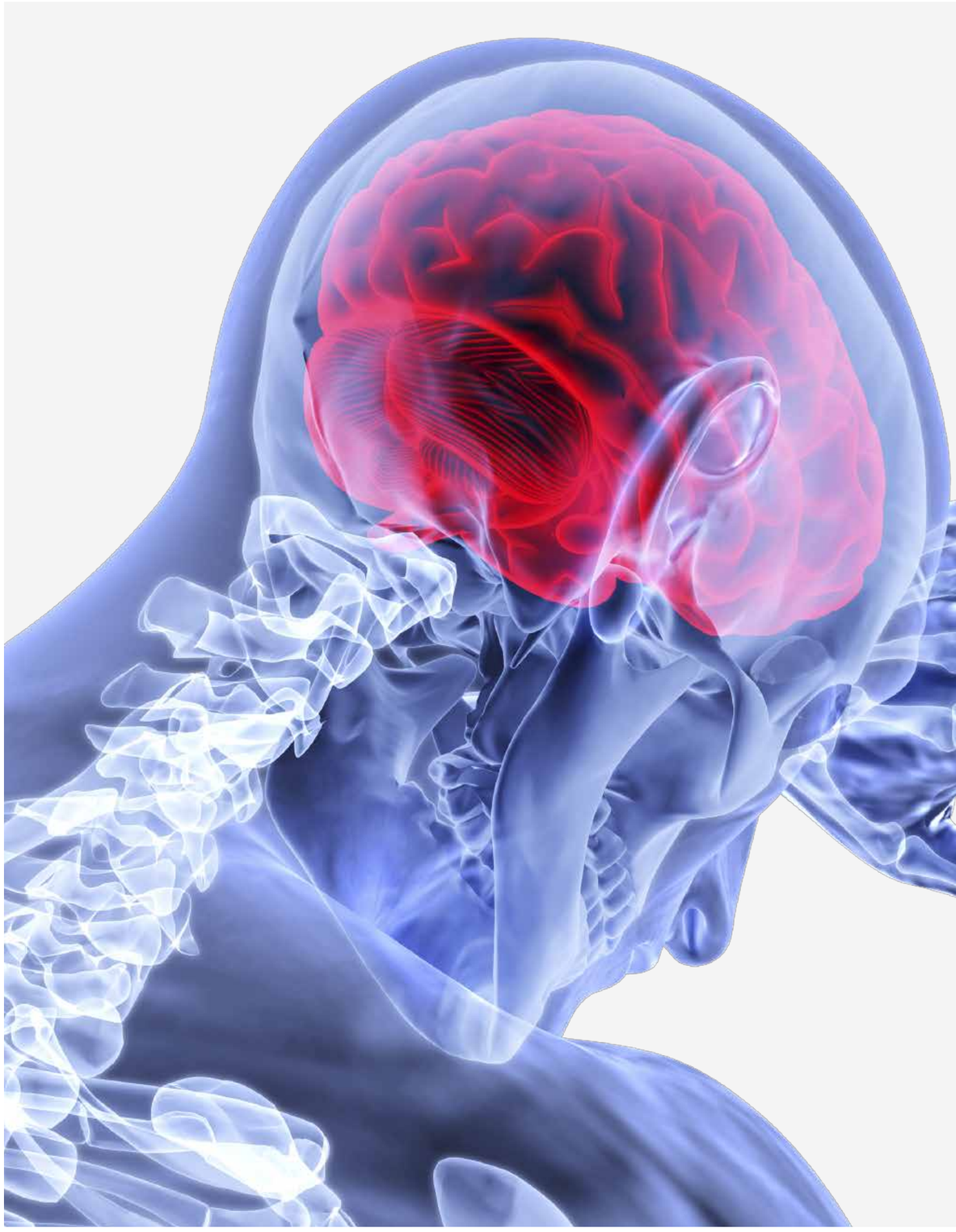
Getting close to a project, visiting the laboratories, and accessible communication with researchers inspires Pauline to continue to donate to IMB research.

Dr Volker Herzig and Dr Sandy Pineda Gonzalez study funnel web spider venom as a possible treatment for stroke.

"I appreciate being able to ask any question I want. If nobody has the answer, someone from the IMB team will reach out later with the information I've requested."

Pauline is impressed by the research quality and the calibre and dedication of the researchers. She has observed how their commitment to research drives IMB scientists to go the extra mile to generate data. The combination of pure and applied research means there's a roadmap for long- and short-term results.

Contributing to the IMB is how Pauline shows her appreciation for the hard work of scientists and how she is helping to shape positive health outcomes for the future.



ALUMNI PROFILE

NAME:

Dr Marga Gual Soler

IMB:

2009-2013 PhD; 2010-2012 Science Ambassador

NOW:

Science Diplomacy Expert, Advisor and Educator

Making a difference through science diplomacy

Born on a Mediterranean island and speaking four languages, Dr. Marga Gual Soler was already a world traveller when she arrived in Brisbane to begin her PhD, adding another continent to her research training resume.

She grew up believing that science was the best tool for improving the world. Opportunities taken up throughout her scholarship at the IMB helped Marga realise how she could use the tool to create impact.

While completing her doctorate in molecular cell biology with Professor Jennifer Stow's group, Marga sought out every opportunity to engage in science communication, interactions with the public and policymakers, and further training in science policy and strategy. She earned a reputation for focusing on service towards others and drawing people together.

As well as being an active IMB Science Ambassador, Marga became the Global Community Coordinator for the Science House Foundation, a virtual role engaging students, teachers, scientists and non-profit organisations to build a worldwide network of people inspired by science as a catalyst for literacy and cross-cultural collaboration.

In her final year at the IMB, Marga was selected from more than 10,000 applicants to undertake a traineeship with the United Nations in New York. Marga's career in global advocacy and policy making for science was launched.

In her first role at the UN, Marga helped to elevate the voices of the scientific community in the lead-up to the negotiations for the 2030 Sustainable Development Agenda. Her research training, cross-cultural awareness and multilingual proficiency proved to be the right combination for addressing global problems through scientific collaboration. The experience confirmed that science diplomacy could be the practical expression of her views on how science could bring nations together.

Moving to the UN office in Geneva, Marga supported the 2013 ECOSOC High Level Segment focused on science, technology and innovation for sustainable development and achieving the Millennium Development Goals. A highlight was participating in the UNESCO For Women in Science panel with senior executives from UNESCO, International Telecommunication Union and CERN (European Organisation for Nuclear Research).

In 2014 Marga joined the AAAS Center for Science Diplomacy in Washington DC, where she helped build the intellectual, practical and educational foundations of science diplomacy, so it could be researched, taught, and operationalized as a new discipline at the intersection of science and international affairs. In that role, she led a program to help rebuild scientific collaborations between the United States and Cuba after decades of diplomatic strain. Her PhD training at the IMB served her particularly well, as the cooperation agenda between the two countries focused on biomedical topics such as infectious diseases, cancer, neuroscience and vaccines.

In 2016 Marga became the youngest member appointed to serve on the high-level Research, Innovation, and Science Experts Group (RISE) advising to European Commissioner Carlos Moedas on the design of a science diplomacy strategy for the European Union.

She has since become well-known as an international expert, advisor and educator in science diplomacy. Working in more than 50 countries, Marga has helped governments, universities, NGOs and international organisations understand and promote the role of science in foreign policy and to strengthen their science-policy interfaces.

Marga has been recognised with many honours and awards, including as one of "100 Spanish experts in innovation" by Fundación Cotec and "40 Under 40 Latinos in Foreign Policy" by The Huffington Post. She has been an Aspen Ideas Festival Scholar and Georgetown University Global Competitiveness Leadership Fellow. In 2020 she was named as a World Economic Forum Young Global Leader.

In 2019, Marga participated in the fourth cohort of Homeward Bound, the largest-ever all-women expedition to Antarctica. This global leadership initiative, based in Australia, connects, trains and inspires women scientists from around the world to influence the policies and decisions that will shape the future of the planet.

She was also part of the EU-funded initiative "Using Science for/in Diplomacy for Addressing Global Challenges" (S4D4C). This recently concluded project involving interdisciplinary and social sciences research explored the needs and experiences of science diplomacy stakeholders, and led to the creation of the EU Science Diplomacy Alliance, of which Marga is a founding member.

Marga's firsthand experience early in her career of how science adds value to diplomatic processes inspired her to develop innovative training programs for scientists who, like herself, sought roles not just beyond the lab but also at the boundaries of science, policy and global change.

In 2015 she founded an immersive science diplomacy and leadership program at Arizona State University, later transferred to the AAAS Center for Science Diplomacy, and has led training programs for thousands of people all over the world ever since (many leading today's science diplomacy efforts in their own countries and organisations).

Crossing the borders of countries and research disciplines to connect people with science is the common thread woven throughout Marga's career. In partnership with UNESCO she co-founded the Science Slam Festival, an event which combines science and performing arts in Latin America, and Ellas Lideran, a new women's leadership initiative in Spain.

The nature of Marga's current work as the founder and CEO of SciDipGLOBAL also bears testament to how she expresses her passion for science: interdisciplinary and intercontinental. She manages multiple advisory and academic roles simultaneously for organisations in Europe, Latin America, the US, Canada and more.

Even in a COVID-constrained world, Marga can still use science to cross borders and break down barriers between peoples and nations.

ALUMNI PROFILE

NAME:

Dr Kaiwen Chen

IMB:

2011-2015 PhD; 2016-2017 Postdoctoral Researcher, Inflammasome Lab

NOW:

Team Leader and Assistant Professor, Life Sciences Institute at the National University of Singapore

Rewiring what we know about inflammation biology

Dr Kaiwen Chen has made an impressive impact on his research field in just a few years since completing his PhD at the IMB. His discoveries are changing what we know about cell death and inflammation and he now leads his own team in the Life Sciences Institute at the National University of Singapore, investigating the mechanisms of cell death and innate immune signalling.

He is also a newly elected Editorial Board member for *Communications Biology*.

Kaiwen's group is interested in understanding the complex crosstalk between innate immune signalling and cell death, aiming to rewire cell signalling pathways and develop new therapies for patients with infectious diseases and inflammatory disorders.

It's an ambitious goal, but Kaiwen has always been a high achiever and team player who pushes his own boundaries.

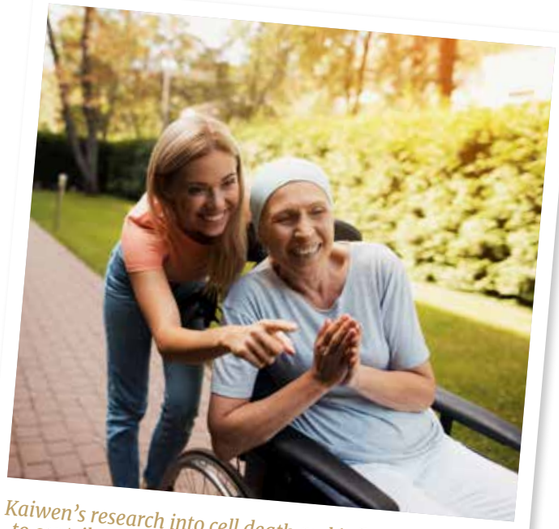
Moving from Singapore to Brisbane as an International student, Kaiwen graduated with a Bachelor of Science with First Class Honours in 2010, receiving several commendations from the UQ Dean of Science. With a long-term interest in the host side of infection and immunity, he completed his PhD under the supervision of Professor Kate Schroder.

Kaiwen won competitive scholarships from the IMB and the ANZ Bank Trustee to support his seminal research. During his doctorate studies, Kaiwen achieved four first-author publications, including two original research articles, a review, and a book chapter. He was involved in a further two original research articles and an additional review.

While at the IMB, Kaiwen wrote the "Chemical, Biological, and Clinical Aspects" chapter for the textbook *Cancer and Inflammation Mechanisms*. This new perspective on the link between inflammation and cancer inflammation was paradigm-changing and directly impacted inflammation research and the associated clinical outcomes.

Kaiwen remained in Professor Schroder's laboratory as a postdoctoral researcher for two years before securing a position in Professor Petr Broz's laboratory at the University of Lausanne, supported by two prestigious fellowships.

While there, Kaiwen made a breakthrough discovery that proved a molecule called Gasdermin-D (GSDMD) was the key driver of inflammation associated with the pharmacological activation of cell death, such as during chemotherapy.



Kaiwen's research into cell death and inflammation aims to contribute to increasing positive outcomes for cancer patients and other sufferers from inflammatory disorders.

Discovering the role of GSDMD has led to further research and an attempt to block the GSDMD protein with oral inhibitors to treat inflammatory diseases. While success is elusive so far, the knowledge gained will progress the push towards positive patient outcomes.

At the University of Lausanne, Kaiwen's leadership capabilities came to the fore, both as a team captain and as a role model for emerging career scientists.

His desire to achieve the best outcomes for his team was evident soon after starting work in Switzerland. The laboratory had recently relocated and was without appropriate resources. Kaiwen stepped in and created protocols to support diverse laboratory functions and trained his colleagues in best practices for optimising laboratory infrastructure.

Kaiwen also supervised and mentored many postgraduate students during his time in Professor Broz's laboratory. His commitment to collaborative work and paying it forward means he is in demand as a PhD supervisor. He is known for going beyond just bench skills and also teaching his students how to analyse and evaluate their data ready for publication.

This nurturing of critical and independent thinking means Kaiwen's students finish their PhDs with the capability to bring a project from preliminary data to a finished manuscript for submission.

Kaiwen himself has authored 31 highly cited publications and is invited to peer review papers for prestigious journals, including *Molecular Cell, PNAS USA, Cell Reports, PLOS Pathogens,* and *EMBO Reports*.

Following this outstanding work during his PhD and his equally impressive postdoctoral work in Switzerland, Kaiwen has returned to the National University of Singapore as an Assistant Professor.

ALUMNI PROFILE

NAME:

Professor Andrew Mallett

IMB:

2013-2016 PhD; 2018-present Clinical Fellow

NOW:

Director of Clinical Research & Nephrologist, Townsville Hospital and Health Service

UQ Distinguished Young Alumni Award, 2019

Setting the standards for kidney disease care

Prof Andrew Mallett is on a mission to change the way Australian families affected by inherited kidney disease receive treatment, care and support.

The milestones he's reached in the five years since completing a PhD in nephrogenetics at the IMB have been ground-breaking 'firsts' and exemplars for how health systems around the world can transform clinical care models.

Andrew's determination to improve diagnoses and treatments for kidney disease patients stems from the frustration he experienced when trying to help families as a medical doctor. He realised that access to diagnostic genomics services would deliver quicker, more accurate assessments of their type of kidney disease, which in turn would better inform their treatment regime and improve outcomes.

Before commencing his PhD at the IMB, Andrew helped to establish Australia's first renal genetics clinic at the Royal Brisbane and Women's Hospital (RBWH). It was the forerunner to KidGen, for which he became the founding national director in 2016, the same year he completed his PhD.

KidGen is one of a group of national collaborations that has led the way for integrating genomics into clinical practice. As well as providing vital evidence-based resources for families via its website, KidGen brings together paediatric and adult nephrologists, clinical geneticists, genetic counsellors, diagnostic and research genomics teams and disease modelling research groups to understand the causes and consequences of inherited kidney disease.

The KidGen network enables these specialist practitioners to engage directly with patients, provide targeted and individualised education, and improve knowledge about living with inherited kidney disease. More than 1400 families have been helped with access to diagnostic genomic sequencing at 18 clinics around Australia. Producing diagnoses at a lower rate of cost than previously has also generated economic benefits for the national healthcare system.

Andrew remains connected to the KidGen conversations by holding several positions simultaneously across the network. These include academic positions in the Faculties of Medicine at UQ and James Cook University; inaugural Clinical Fellow at the IMB; Clinical Fellow at MNHHS Genomics Institute; Co-lead of the Queensland Renal Genetics Program; and his current roles as Director of Clinical Research and Nephrologist for the Townsville Hospital and Health Service.

He has also been a Visiting Fellow at international research centres, including the Mayo Clinic Rochester, Toronto General Hospital, Cambridge University Hospitals and Institute for Medical Research, and the Hôpital Necker-Enfants Malades in Paris.

Andrew is passionate about improving understanding of, and diagnostics and treatments for kidney disease.

As a highly respected scientist, Andrew is Genetics Subject Editor for the journal Nephrology and a reviewer for leading scientific journals such as Kidney International, Nature Communications, Clinical Journal of the American Society of Nephrology, PLoS ONE and American Journal of Kidney Disease. He has also presented by invitation at international scientific conferences, including the World Congress of Nephrology.

With the Australian Genomics Health Alliance Andrew set up the HIDDEN (wHole genome Investigation to iDentify unDEtected Nephropathies) project as another innovative approach to researching inherited kidney disorders. It is one of four rare disease flagship projects announced by Australian Genomics in 2018.

HIDDEN applies disruptive technologies such as genomics to facilitate clinical service redesign, epidemiology studies and outcome evaluation. The aim of embedding genomics within kidney healthcare is to enable clinical trials to close the gap between bench and bedside, delivering new therapies sooner.

Andrew remains committed to the coalface of kidney care. He engages with patient support organisations and presents to the general public to further their understanding of genetic research and advances in kidney medicine.

Andrew's mission continues through mentorship programs for medical students, junior doctors, kidney medicine trainees and research higher degree students. He has spearheaded work to incorporate genomic education in Australian medical schools so the next generation of clinicians and medical scientists can keep pace with the rapid and continual advances in kidney research.

Supporting research to create lasting change

The Rotary Club of Salisbury encourages its members to learn about community issues and exchange ideas for potential solutions. When the Club learned about the IMB and its research and development activities, they were interested to know more.

Supporting the IMB appealed to Salisbury Rotary Club for a few reasons. They appreciated the high quality of the research undertaken and could see the benefits as an IMB sponsor of gaining insight into ground-breaking discoveries.

The Club continues to value how the IMB reaches out to sponsors and makes just as much effort to nurture these relationships as to build them. Supporting the IMB has been a natural extension of Rotary's work to improve health outcomes for everyone.

Dr Colin Rendell is a retired dentist, UQ alumnus, and member of the Rotary Club of Salisbury. Diagnosed with Parkinson's Disease in 2011, Colin has a personal interest in the IMB's research.

Parkinson's disease is a progressive neurological condition that affects a person's ability to control their movement and coordination.

"You don't know where the Parkinson's is going and how fast," Colin explains.

"Parkinson's Disease has changed my life, but not killed me. I can still do lots of things and have a full life.

"I walk 4-6 kilometres every morning and keep busy playing with my four grandchildren, who live around the corner.

"The drugs available are not a cure, but they do help with the symptoms."

This cheerful and optimistic outlook doesn't prevent the difficulties Colin experiences because of his Parkinson's Disease.

"My quality of life has deteriorated since my diagnosis," Colin says.

"The disease affects all aspects of daily living, including walking, talking, swallowing, and speaking. Activities that were spontaneous or automatic can be a chore.

"I am motivated by knowing the IMB researchers might find, or contribute to, a breakthrough or treatment that helps me manage my Parkinson's Disease."

IMB's research into neurodegenerative disease aims to improve outcomes for sufferers.

Salisbury Rotary Club has an ongoing commitment to service. Whether it's all hands on deck for a fund-raising sausage sizzle or an onsite tour at the IMB, they are dedicated to being part of the research that drives better health outcomes in the community.

Find out more

Stay up to date with the latest news and events from IMB with our podcasts, videos and magazine.

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imb.uq.edu.au/our-stories/podcasts

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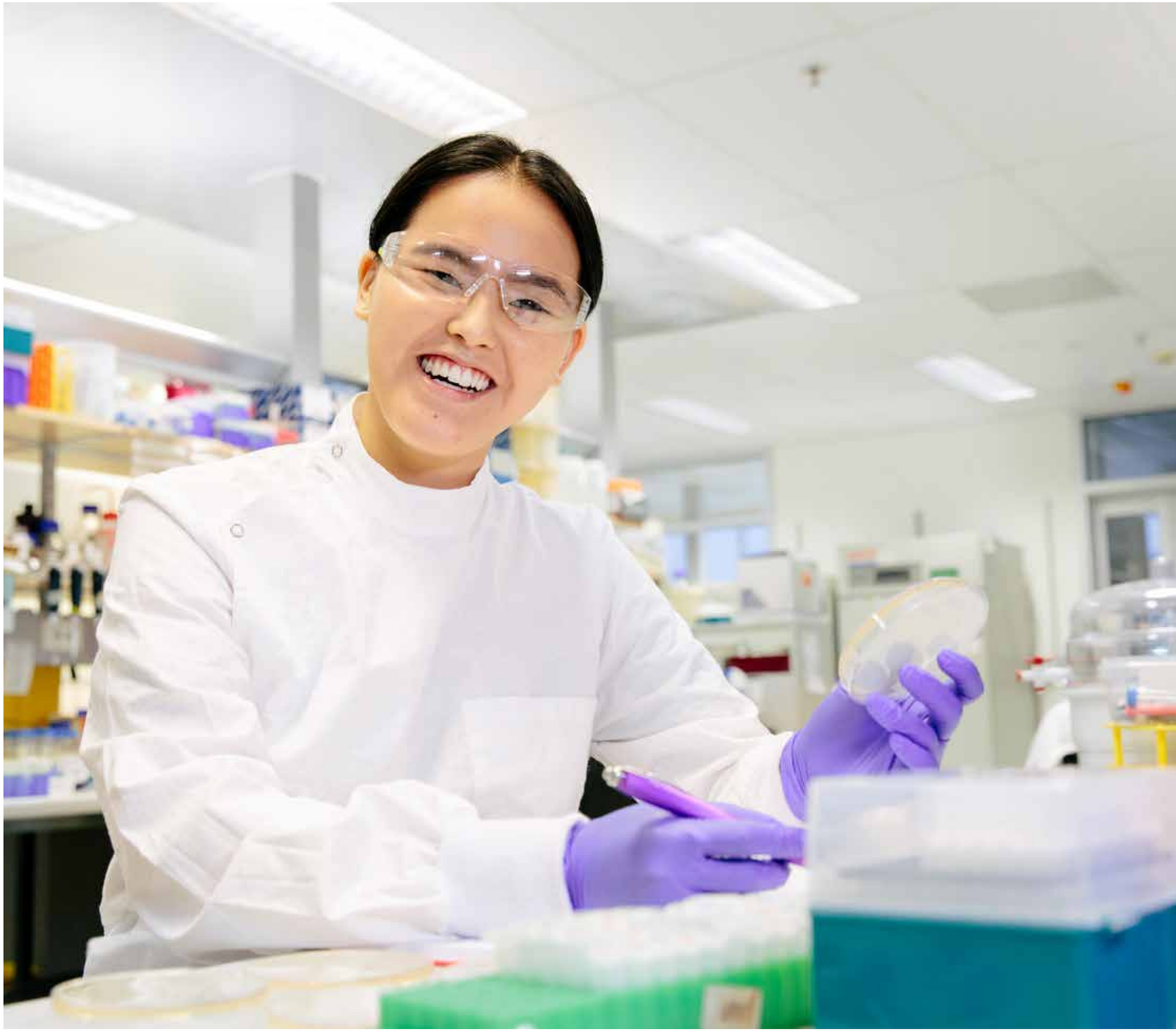

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