

Queensland Brain Institute Annual Report 2020



THE UNIVERSITY
OF QUEENSLAND
AUSTRALIA

CREATE CHANGE



Our vision

To improve lives through a deeper understanding of the brain in health and disease.

Our mission

To unlock the mysteries of the brain to generate new knowledge, understand learning and memory, and develop new technologies to improve lives, and diagnose and treat brain disease and mental health.

2020 Year in Review video

To watch a video summarising our 2020 achievements, please scan the QR code below.





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Vice-Chancellor's message

In 2020, the Queensland Brain Institute (QBI) continued to pursue its mission of unlocking fundamental knowledge about how our brains function, so that we can contribute to new methods of treating and preventing brain disease and disorders.

The important work of QBI advanced throughout 2020, despite the considerable obstacles created by the COVID-19 pandemic. I'd like to acknowledge my predecessor, Professor Peter Høj AC, and The University of Queensland's (UQ) senior leadership team for their swift response to the crisis in the first half of the year. While the landscape was still evolving when I became UQ's Vice-Chancellor in August 2020, the decisive response of the leadership team earlier in the year provided a foundation from which to chart our recovery.

Upon my return to UQ, I was delighted to tour QBI and become reacquainted with its mission and its role in advancing the University's research agenda. I was particularly impressed by the broad range of impactful basic research emerging from QBI – from research into mental health, to neurodevelopmental and neurodegenerative disorders, and even the impact of COVID-19 on brain function.

Despite the many disruptions that we faced in 2020, UQ emerged from this very challenging year in a relatively healthy position. We were ranked among the top 50 universities globally in most of the major surveys of university performance, and consistently among the top handful of Australian universities.

More specifically, UQ ranked in the top 40 universities for Life Sciences and Medicine in the QS World University Rankings by Subject; and in the top 60 worldwide in the US News Best Universities for Neuroscience and Behaviour.

There is no doubt that QBI – with its concentration of leading neuroscientists and facilities – makes a significant contribution to propelling UQ up the rankings and maintaining our position among the world's leading research universities.

QBI was also involved this year in the development of a new international centre that focuses on our understanding of the brain and brain disorders: the SUSTech-UQ Centre for Neuroscience and Neural Engineering, established in conjunction with the Southern University of Science and Technology (SUSTech) in Shenzhen. The centre is developing new technologies and methodologies to treat brain diseases, such as stroke and movement disorders. International collaborations such as this are important in allowing us to harness the talents and expertise of researchers beyond our own university, with the aim of ultimately helping people around the world.

QBI continues to develop alternative streams of funding to support its work,

including the Discovery Research Endowment Fund. It was pleasing to see that our donors continued to support us throughout the year and I thank them for their generosity.

At a broader university-wide level, we saw the successful fulfilment of our *Not If, When* philanthropic campaign in 2020, with more than half of the funds raised being dedicated to driving research discovery and impact. QBI research into dementia and motor neurone disease featured heavily in the campaign and inspired donors to join our mission to create change.

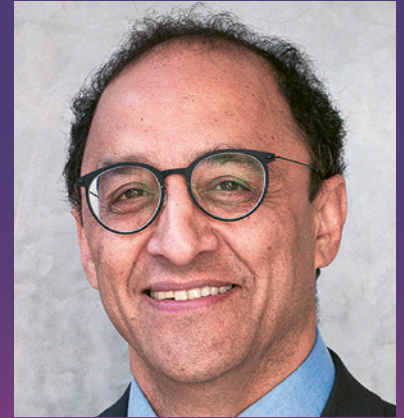
Finally, I'd like to congratulate and thank QBI's Director Professor Pankaj Sah, the QBI Advisory Board, as well as QBI's researchers, staff and students for your hard work, commitment, energy and perseverance throughout this extraordinary year.

I look forward to seeing how QBI continues to build on its many successes in 2021.

Professor Deborah Terry AO

Vice-Chancellor and President
The University of Queensland

Director's Message



2020 was a year in which the importance of science was truly brought home to the world. As many facets of how we live changed, the efforts of scientists around the world to develop vaccines, diagnostics and treatments for COVID-19 brought hope to the global populace.

At QBI we continued our work, advancing understanding of the brain and developing new treatments for neurological disorders. We endured a relatively short lockdown in Brisbane compared to many of our peers, both nationally and internationally, and our researchers and operations staff worked together to continue vital neuroscience efforts during this time.

The challenge of SARS-CoV-2 is a potent illustration of the importance of supporting discovery research. The efforts to develop treatments and vaccines did not occur overnight – they are based on years of fundamental research that cannot occur without ongoing funding. The success rates in several national competitive grant schemes, an important source of funding for research, is less than 10 per cent. This challenging situation, which shows no sign of improving in the near future, is particularly hard on our up-and-coming scientists.

Into this environment, we launched our Discovery Research Endowment Fund, aimed at supporting fundamental research that seeks to understand the impact of neural function on cognition and behaviour in both diseased and healthy brains – in other words, understanding the very essence of who we are as humans. This fund will enable researchers to pursue questions

that may not have an immediate benefit, but will generate knowledge that underpins discovery and translation in the future.

Congratulations go to QBI's Founding Director, Professor Perry Bartlett, on being named an Officer in the Order of Australia. Perry's work is a clear example of how investing in discovery research can eventually lead to clinical translation, and highlights the length of this journey, and the importance of sustained funding.

In January, we welcomed Associate Professor Ethan Scott to QBI, moving across from UQ's School of Biomedical Sciences. Ethan investigates sensory networks using a range of experimental and computational approaches in the zebrafish model, an ideal alignment for our research interests. We were also delighted to have Dr Matilde Balbi join our Faculty in September, relocating from the University of British Columbia. Matilde has a research program that focuses on understanding the pathological mechanisms that mediate ischaemic brain injury. This work will have a clinical application helping to advance the diagnosis and treatment of stroke.

I am pleased that our international connections remained strong this year, despite the absence of travel. We organised a major event in January, before travel was no longer possible, that of the launch of the SUSTech-UQ Joint Centre in Neuroscience and Neural Engineering (CNNE), with our colleagues at the Southern University of Science and Technology (SUSTech) in Shenzhen. A number of joint projects are underway, working towards developing new

treatments for brain disease, and these will be built on once we are again able to travel. We also maintained and even strengthened our local connections, due to the willingness of our researchers, our donors and the community to engage digitally and virtually rather than in-person, enabling outreach to a broader community.

Indeed, our donors and other stakeholders remained a source of outstanding support, continuing to invest in our research; a source of inspiration for our scientists to keep pursuing their work in the face of adversity.

I would like to thank all of QBI's researchers and operations staff for their continued passion and dedication, and for adapting to the year's changing conditions. Thank you to the QBI Executive, for their support and advice towards the management of the Institute; this includes my Deputy Directors: Professors Linda Richards and Helen Cooper (Research – Linda to July, and Helen taking over as the new DDR from August) and Helen Hume who commenced as our new Deputy Director (Operations) in June.

I would also like to thank the wider UQ community, including outgoing Vice-Chancellor Professor Peter Høj and our new Vice-Chancellor Professor Deborah Terry, for their leadership and advice as we navigated a challenging year. I would particularly like to thank our Advisory Board, chaired by Jeff Maclean, for their sage counsel.

I am looking forward to a promising 2021.

Professor Pankaj Sah
Director



Chairman's Message

2020 provided an unexpected and somewhat challenging landscape for not only the scientific community, but society globally. I was delighted to see QBI researchers, management and staff step up to the challenge of Covid-19 and pursue innovative ways to remain connected.

The funding environment for QBI remains uncertain, despite science taking centre stage throughout the year. Covid-19 highlighted the critical role science plays in creating certainty in times of crisis.

Sustainable, long-term financial support is the only means of ensuring critical discovery research continues into the future, and highly skilled research staff are retained. QBI's Discovery Research Endowment Fund is crucial to ensuring that QBI scientists can continue to focus on fundamental discovery science. QBI was built on the foundation of intellectual freedom to develop ideas or concepts that capture their curiosity but may not have an immediate or obvious outcome.

Despite limited opportunities to meet face-to-face during the year, the QBI Advisory Board continued to provide support to the Institute. Thank you to my fellow Board members for raising awareness of QBI and its ground-breaking research within the corporate and donor community. The Board very much appreciated Professor Deborah Terry AO, UQ's new Vice-Chancellor, for taking time out of her busy schedule, to share her vision at a Board meeting during the year. The VC's commitment to, and ongoing support of QBI, is highly valued and we look forward to a mutually beneficial partnership.

Welcome to new Board members, Lady Jane Edwards and Simon Rogers, who have kindly agreed to lend their experience and expertise to the current Board.

Although no fundraising activities occurred this year, our loyal donor base remained true to the cause and continued to support QBI. This support was even more critical during this difficult year. Thank you to all those who donated in 2020 – our gratitude to our long-term, and new donors, is immense. We look forward to reconnecting with you, in person, in 2021, through renewed support of QBI's events which help to raise important research funds.

On a positive note, the year of COVID provided researchers with an opportunity to focus on publishing papers highlighting their remarkable research discoveries. A small selection include:

- research solving two major puzzles – how to repair nerve cells following an injury and how neural circuits develop – knowledge that will deliver huge insights into how the brain works
- an extraordinary international collaboration, including researchers at QBI, which discovered a short sequence in the genome of SARS-CoV-2 (the virus that causes COVID-19), which plays an important role in its transmissibility and infectiousness.
- A deficiency in vitamin D on the mother's side could explain why autism spectrum disorder is three times more common in boys

Congratulations to Emeritus Professor Perry Bartlett, QBI Founding Director on his Order of Australia for his discoveries in neuroscience and his scientific leadership. Professor Bartlett's tireless work over 27 years has also led to his upcoming ephA4 MND drug trial which will commence in early 2021. A magnificent achievement for QBI, and also in the fight against MND.

Despite the uncertain funding environment, QBI continues to achieve an above average level of grant success. The passion and commitment to science that QBI researchers, support and technical staff exhibit daily is the driving motivation behind QBI's accomplishments. Thank you to them for all for their dedication, especially in a year that called for much agility and innovative thinking, to create new ways to engage externally.

On behalf of the Board, I would like to express our deep appreciation to UQ, Government, Foundations, corporates, industry partners and the many individuals for their continued generosity in supporting QBI's work over the past year. Special mention goes to the Clem Jones Foundation, Brazil Family Foundation and the Stafford Fox Medical Research Foundation, in enabling QBI to continue its critical research.

Thank you also to Professor Sah, his Management and Advancement team for their hard work and commitment throughout 2020.

A pressing priority remains to understand more about the brain, improve treatments and, importantly, develop preventative tools as well as long-term treatments for brain conditions. QBI continues to be a leader in the field of neuroscience research and is well-positioned to capitalise on the work of the last 17 years, which will see the progression of both discovery and translational research pathways.

In the year ahead, the Board will concentrate on developing some innovative ways to spread the word of the amazing research work at QBI with the goal of helping QBI to become more financially independent, ensuring future sustainability.

Jeff Maclean
Chairman QBI Advisory Board

QBI Board members



**Mr Jeff Maclean
(Chair)**

CEO-Director,
The Index Group of
Companies



**Professor Alastair
McEwan**

Dean, UQ Graduate
School
Pro-Vice Chancellor
(Research Training), The
University of Queensland.



**Dr Sallyanne
Atkinson AO**

Chair, Museum of
Brisbane
Chair, Fidelis
Investment Group



Dr Eamonn Eeles

Consultant Physician
and Geriatrician, Metro
North Hospital and
Health Service
Steering Committee
Member, Statewide
Dementia Clinical
Network and
Australasian Delirium
Association



Dr David Merson

Founder,
Mincom Limited
Chairman, Board of
Euclidean Unlimited



**Professor Aidan
Byrne**

Provost and Senior
Vice-President,
The University of
Queensland



Mr Médy Hassan

Founder and Managing
Director, Haus Holdings
Co-founder and
Director, Vitae Capital



Mr Simon Rogers

Investment Adviser,
Crestone Wealth



Mr Tim Crommelin

Chair, Morgans
Holdings (Australia)
Limited
Member of Senate,
The University of
Queensland



**Mr Bruce
Humphrys**

Managing Partner,
HopgoodGanim
Lawyers



**Professor
Pankaj Sah**

Director, Queensland
Brain Institute (QBI)
Editor-in-Chief, Nature
Partner Journal *npj*
Science of Learning



Lady Jane Edwards AM

Chair and Chief Executive, BBS
Communications Group
Honorary Consul for France
(Queensland), French Embassy



Mrs Beverley Trivett

Director, Cure Brain
Cancer Foundation
Director,
Trivett Ventures

Research themes

Our research is divided into four themes that collectively encompass neuroscience discovery from the level of individual cells to entire organisms to the clinic.



Professor Fred Meunier

Synaptic, Cellular and Molecular Neuroscience

Our researchers investigate how our brain operates at the level of individual cells, encompassing both the inner workings of cells and their interactions with one another. The brain is unique because its cells communicate with each other, a process that can adapt and change depending on an individual's experience – the source of the brain's amazing plasticity. Drug therapies also operate at this scale, so by understanding the workings of the brain at the cellular and molecular level, we are much more likely to find targets for conditions such as Alzheimer's disease, schizophrenia, motor neurone disease and more.

Faculty:

Professor Fred Meunier (Theme Co-ordinator)

Professor Helen Cooper

Professor Elizabeth Coulson

Professor Geoffrey Faulkner

Professor Jürgen Götz

Professor Massimo Hilliard

Dr Zhitao Hu

Dr Jana Vukovic

Dr Adam Walker

Dr Steven Zuryn



Professor Stephen Williams

Circuits, Systems and Computational Neuroscience

Our researchers explore how groups of cells, often in different parts of the brain, interact with each other. This includes studying which way the information travels and how groups of cells control the flow of information. Our computational neuroscience researchers take the complexities of the brain and simplify them into mathematical models, based on available experimental data, that give us hypotheses about how the brain might function. These hypotheses can then be tested by experimental neuroscientists, whose findings further inform the computational models in a cycle that delivers us ever-more detailed information and predictions about brain function. This level of neuroscience is the most likely to provide us with knowledge about how the brain actually works: how information is transferred to ensure the right parts of the brain are active to achieve tasks, and other parts of the brain do not interfere. It is also the level about which we know the least, making our efforts in this area key to understanding the brain.

Faculty:

Professor Stephen Williams
(Theme Co-ordinator)

Dr Victor Anggono

Dr Matilde Balbi

Associate Professor
Kai-Hsiang Chuang

Professor Geoff Goodhill

Dr Dhanisha Jhaveri

Dr Zhaoyu Li

Dr Fatima Nasrallah

Dr Patricio Opazo

Professor Linda Richards

Professor Pankaj Sah

Associate Professor
Ethan Scott



Professor Jason Mattingley

Cognitive, Behavioural and Sensory Neuroscience

Research in our theme focuses on sensory processing, brain functions and resulting behaviours that affect the whole of an individual. This includes tracking inputs to the brain through multiple sensory systems and brain outputs in the form of cognition and behaviour. If we want to understand the brain and ourselves, we need to understand how sensory inputs shape the responses of humans, and a variety of model animal systems, to the environment and to the specific needs of each species. In the case of humans, we may think of this how brain activity drives cognition and behaviour, including capacities such as attention, learning, memory and decision making.

Faculty:

Professor Jason Mattingley (Theme Co-ordinator)

Associate Professor Timothy Bredy

Associate Professor Thomas Burne

Professor Barry Dickson

Professor Darryl Eyles

Professor Justin Marshall

Associate Professor Gail Robinson

Emeritus Professor Mandyam Srinivasan

Dr Susannah Tye

Associate Professor Bruno van Swinderen



Professor Peter Nestor

Genomics and Clinical Neuroscience

Our genomics researchers explore brain function by investigating the genome and how our DNA influences our behaviour, brain structure and function and our predisposition to neurological and mental health disorders such as schizophrenia and motor neurone disease. Our clinical researchers work directly with patients to improve prevention strategies, diagnoses and treatments. They are on the front line of developing new treatments and diagnostics to improve quality of life for affected people and their families.

Faculty:

Professor Peter Nestor (Theme Co-ordinator)

Emeritus Professor Perry Bartlett

Associate Professor Terry Coyne

Professor John McGrath

Professor Bryan Mowry

Professor Peter Silburn

Professor Naomi Wray

Associate Professor Margie Wright

Research highlights

Genome sequence provides infectious pathway for COVID-19

A short sequence in the genome of SARS-CoV-2 – the virus that causes COVID-19 – provides the virus with an additional way to enter cells, and plays an important role in its transmissibility and infectiousness, a team of international collaborators discovered in a paper published in *Science*.

Professor Fred Meunier and Dr Merja Joensuu were part of the team, which found that a short sequence of amino acids known as the 'furin cleavage site' on the spike protein of the virus enables it to enter cells via an additional cellular receptor called neuropilin-1 (NRP1). (Publication 36, page 25).

Stopping fearful memories relies on DNA flexibility

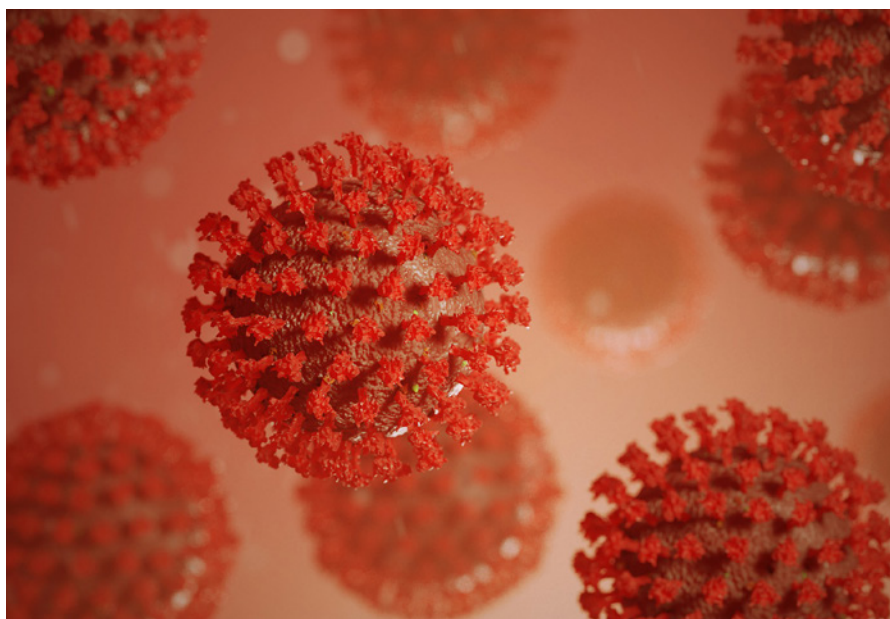
Associate Professor Tim Bredy and Dr Paul Marshall showed that fear extinction, the ability to extinguish fearful memories when no longer needed, relies on the flexibility of your DNA. The findings suggest that a type of DNA called Z-DNA – a counter-clockwise twisted version of B-DNA, the most common type – forms during fear, then, during fear extinction, a gene called ADAR1 binds to the Z-DNA and flips it back to B-DNA, allowing non-fearful memories to be formed.

Understanding how fear extinction works gives researchers a better chance of finding better treatments for conditions where it is impaired, including PTSD and phobias. The study was published in *Nature Neuroscience*. (Publication 197, page 29).

Mapping health risks for people with mental disorders

A study revealed that people with mental disorders are many times more likely to develop other health conditions, highlighting the need to provide them with better medical care. A study led by Professor John McGrath and published in the *New England Journal of Medicine* studied 10 broad types of mental disorder and nine broad categories of mental conditions in 5.9 million people.

Their findings included that women with anxiety disorders have a 50 per cent increased risk of developing a heart condition or stroke, and that men with substance abuse disorders have a 400 per cent increased risk of gut or liver disorders. Professor McGrath said the best way to reduce mortality is for GPs, mental health clinicians and people with mental disorders to work more closely together to monitor the general health of people with mental disorders. (Publication 215, page 30).



A short sequence in the SARS-CoV-2 genome provides the virus with an additional way to enter cells.

Immune cells help shift thinking on brain injury

Researchers have identified a major shift in how to treat brain injuries, after rejuvenating immune cells to support the repair process. Dr Jana Vukovic said up until now, the brain's immune cells, known as microglia, were considered to drive inflammation, resulting in cognitive deficits after injury.

Dr Vukovic and her team were surprised to find that removing microglia from mice resulted in no change in their behaviour or ability to repair brain tissue. However, depleting microglia and allowing them to repopulate the brain, profoundly increased brain repair. The study, published in *Cell*, shows that we need to learn more about how microglia support and stimulate pathways to repair as a treatment for brain injuries. (Publication 350, page 33).

Timing of gene activity crucial in evolution of human brain

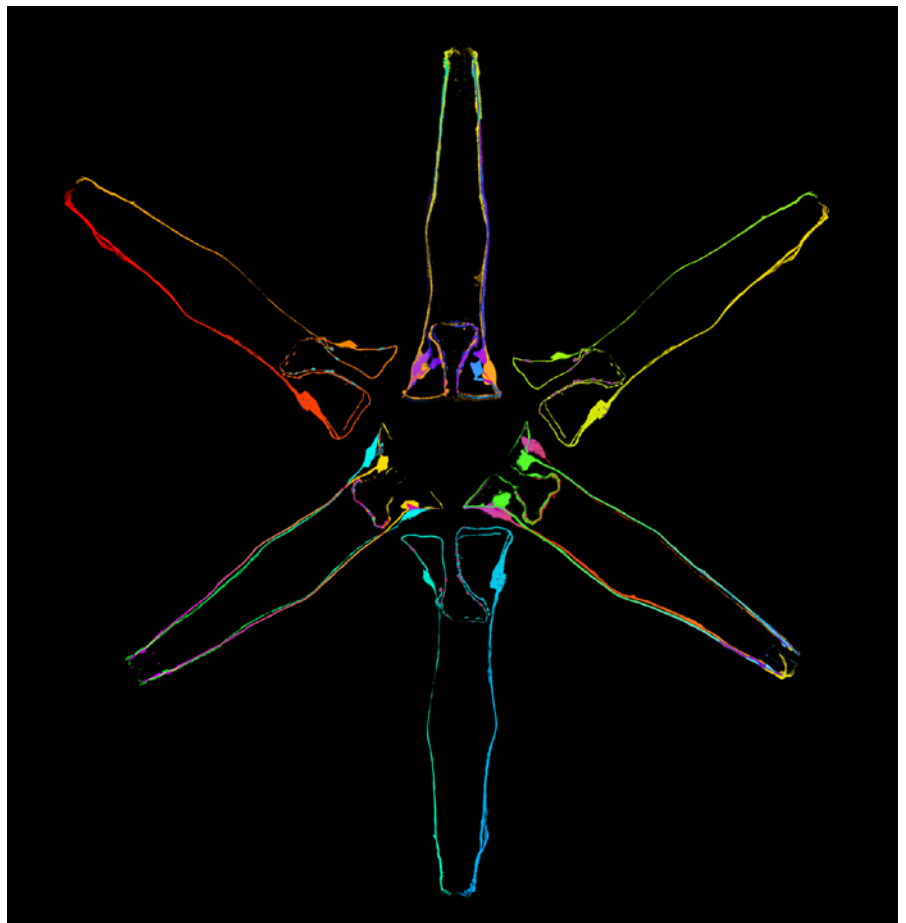
Researchers have discovered that a small change in the timing of gene activity may have triggered the evolution of our brain's corpus callosum, one of the most remarkable events in the evolution of mammalian brains.

The corpus callosum is a bundle of nerve fibres that enables both sides of the brain to communicate with each other. In research published in *Proceedings of the National Academy of Sciences USA*, Professor Linda Richards, Dr Rodrigo Suárez and their colleagues showed that the timing of gene activity plays an important role in the development and evolution of brain connections in animals, and provides new insight into how these connections can change in some neurological diseases. (Publication 240, page 30).

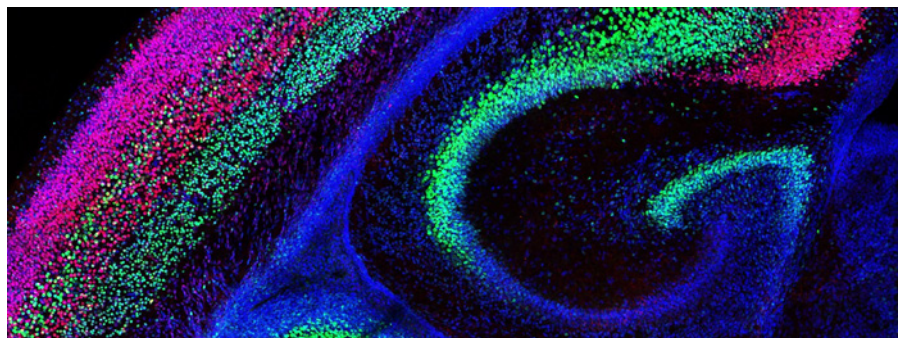
Faulty brain circuits arise from abnormal fusion

It has been discovered that, contrary to 100 years of belief, nerve cells can fuse with each other under some conditions. Professor Massimo Hilliard, Dr Rosina Giordano-Santini and Dr Zhaoyu Li found that nerve cells in nematode worms would fuse together when engineered to express molecules called fusogens, which are essential for the fusion of cells in tissue development, but generally not found in the nervous system.

When the nerve cells were fused, their electrical circuits coupled together, causing behavioural impairments such as the ability to be attracted to food or repelled by danger. The study, published in *Proceedings of the National Academy of Sciences USA* shows a new cause of malfunction of the brain's electrical circuits and a possible underlying cause of neurological diseases. (Publication 110, page 27).



Nematode worms were engineered to express fusogens in their neurons.

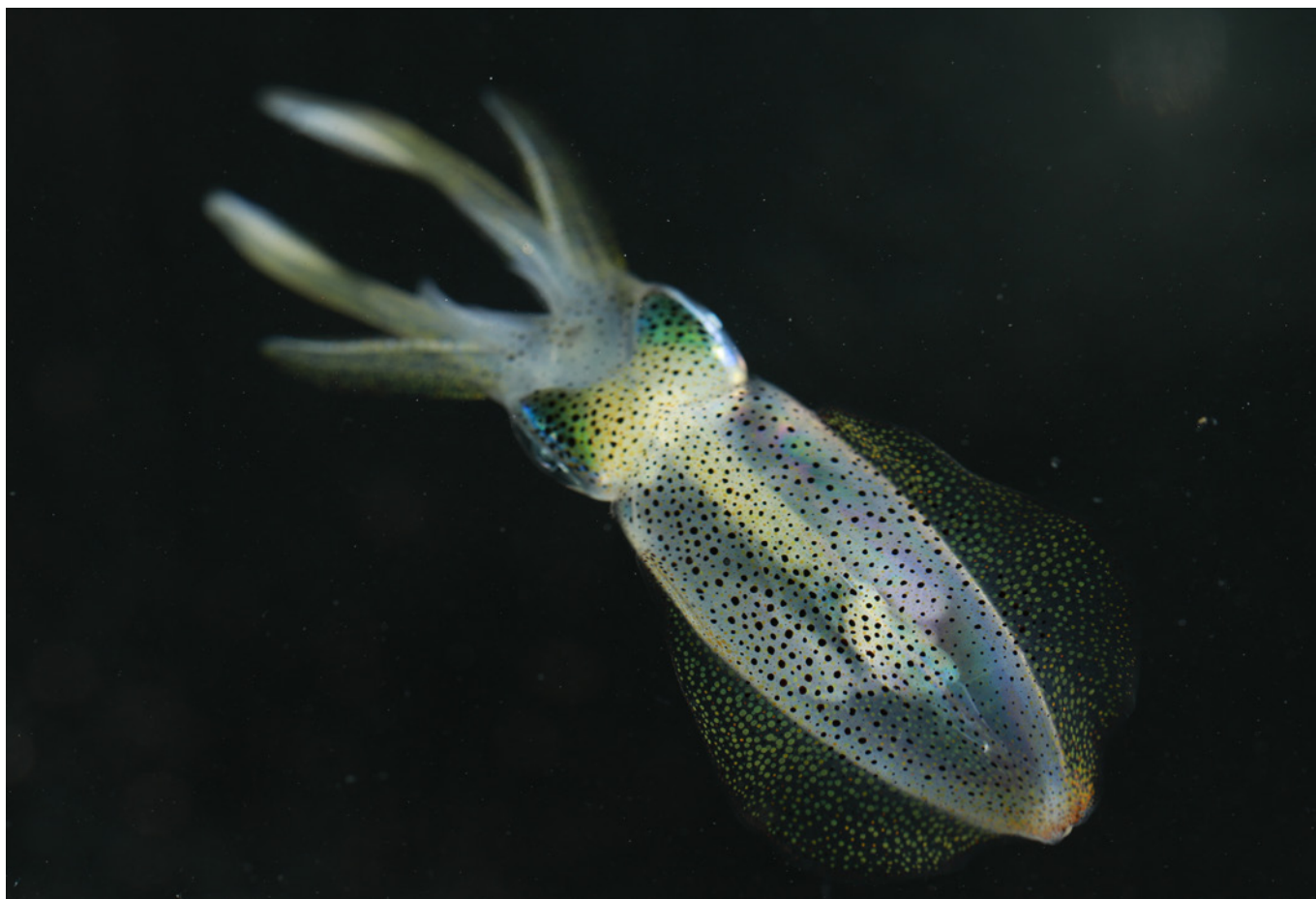


A small change in the timing of gene activity may have triggered the evolution of our brain's corpus callosum.

Fruit fly offers new insights into attention and sleep

Associate Professor Bruno van Swinderen and Dr Lucy Tainton-Heap revealed that a fly's brain activity during a specific sleep stage influences its ability to pay attention when awake. Dr Tainton-Heap developed a method to track thousands of neurons simultaneously while flies fell asleep. They discovered that sleep in the fly brain comprises distinct stages, including a more active 'wake-like' stage followed by a deep sleep stage.

When they artificially increased the amount of wake-like sleep, the flies were less distractible and better at paying attention to attractive objects. In particular, prolonged wake-like sleep corrected attention defects associated with sleep deprivation. The findings, published in *Current Biology*, shed new light on the links between certain sleep stages and the ability to pay attention. (Publication 307, page 32).



Some cephalopods - which include squids - have more than 500 million neurons, compared to 200 million for a rat.
Immune cells help shift thinking on brain injury – Publication 350, page 33.

Developing neural circuits linked to hunting behaviour

Researchers have made an important step forward in linking changes in behaviour to the underlying development of brain circuitry. Professor Geoffrey Goodhill and Dr Lilach Avitan demonstrated the relationship between improvements in zebrafish hunting skills and the development of sensory coding in a part of the brain that reacts to visual stimuli.

Using a combination of lab-based experiments and mathematical techniques, the researchers could even predict the hunting success of individual fish from the quality of neural coding. The study, published in *Current Biology*, is important for understanding both neural coding during normal development and also for understanding how neural circuit changes in neurodevelopmental disorders cause changes in behaviour. (Publication 14, page 25).

Brain map reveals camouflage tactic of squid

The first MRI-based mapping of the squid brain in 50 years was completed by Professor Justin Marshall and Dr Wen-Sung Chung to develop an atlas of neural connections. They found 145 new connections and pathways, more than 60 per cent of which are linked to the vision and motor systems.

It was the first time modern technology has been used to explore the brain of squid, which have famously complex brains with more neurons than rats and mice, and nearly as many as dogs. The study, published in *iScience*, takes us closer to understanding the incredible ability of squid to instantly camouflage themselves. (Publication 51, page 26).

Sex differences found in memory region of the brain

A study revealed region-specific sex differences in the hippocampus – an area of the brain important for memory, learning and emotions. The hippocampus is impacted by neuropsychiatric disorders and several, such as eating or mood disorders, show that one sex is more susceptible than the other.

Associate Professor Margie Wright's team showed that males and females with the same size hippocampus had sex-based differences in its subregions, though none were detected for its core regions. The findings, published in *NeuroImage*, show that adjusting for overall hippocampal volume in future research may lead to a greater understanding of the implications of sex difference for behaviour and neuropsychiatric disorders. (Publication 324, page 32).

Grants and Fellowships

New competitive research funding awarded in 2020 excluding GST and annual indexation

Australian Research Council (ARC)

ARC Discovery Early Career Researcher Award

Fabio Cortesi: Phenotypic plasticity of reef fish vision in a changing world, 2020-2022, \$424,856

Roger Marek: Mapping the neural circuits that underlie emotional learning, 2020-2022, \$390,000

ARC Discovery Project Grants

Geoff Faulkner & Sandra Richardson: Visualising genetic mosaicism during development, 2020-2023, \$546,992

Geoffrey Goodhill: How do patterns of brain activity emerge during early life? 2020-2022, \$610,000

Justin Marshall: Stomatopods v Cephalopods: discovery from an information coding arms-race, 2020-2022, \$710,048

Linda Richards: Control of cellular differentiation in the developing brain, 2020-2022, \$615,000

Ethan Scott: Mapping a complete visual circuit in zebrafish, 2020-2022, \$465,000

Rodrigo Suárez & Laura Fenlon: How does timing affect mammalian brain development and evolution? 2020-2022, \$449,250

Steven Zuryn: Mechanisms that control the inheritance of mitochondrial DNA mutations, 2020-2023, \$450,000

Brain Foundation Major Research Gift Initiative

Jana Vukovic, Kelli MacDonald & Marc Ruitenber: Blocking ROCK2 to improve recovery from brain injury, 2019-2020, \$33,000 [awarded to and administered by UQ Faculty of Medicine]

Commonwealth Defence Science and Technology Group

Paul Dux, Hannah Filmer & **Jason Mattingley:** Cognitive augmentation via training and brain stimulation: Predicting and optimising outcomes, 2019-2023, \$499,975 [awarded to and administered by UQ Health and Behavioural Sciences Faculty]

Dragan Rangelov & Jason Mattingley:

Research Network for Undersea Decision Superiority (RN-UDS) Reducing uncertainty in perceptual decision making by training awareness of neurocognitive states, 2020-2023, \$248,846

Dementia Australia Research Foundation 2020 Project Grants

Patrico Opazo: *In vivo* synaptic correlates of cognitive reserve, 2020-2022, \$75,000

German Research Foundation

Odette Leiter: Deutsche Forschungsgemeinschaft (DFG) Fellowship – Lenken Thrombozyten die adulte hippocampale Neurogenese und beeinflussen diese die kognitiven Fähigkeiten im alternden Gehirn? 2020-2022, [administered by European host; hosted in Tara Walker lab, QBI]

FightMND Grant

Drug Development Grants

Robert Chuang, Leszek Lisowski, **Adam Walker**, Mary-Louise Rogers, Albert Lee, Marco Morsch, Stephanie Rayner, 2020-2023, \$336,134. Development of a TDP43-targeting gene therapy for ALS (administered by Macquarie University)

Trent Woodruff, Richard Clark, Marcela Pekna, John Lee, **Adam Walker** & Vinod Kumar: Preclinical development of centrally active complement C3a receptor modulators as disease-modifying drugs for Motor Neuron Disease, 2020-2023, \$1,099,468 [awarded to and administered by UQ Faculty of Medicine]

Early-Career Fellowship

Rebecca San Gil: Genome-wide CRISPR screen to reveal regulators of TDP-43 aggregation and toxicity in MND, 2020-2022, \$300,000

Fulbright Future Scholarship, Kinghorn Foundation

Adam Briner: Studying the role of tau protein in neurodegenerative disease in Professor Aaron Gitler's lab at Stanford University, 2020-2022, [award provided travel funds and allowances to undertake study abroad]

Lewis and Clark Fund for Exploration and Field Research

Gabriella Scata: Octopus says it with the skin: status signaling and individual recognition in the reef octopus, *Abdopus* 2020-2021, \$5,000

MND Research Australia

Betty Laidlaw MND RIA Research Prize

Shyuan Ngo, X Wang, Frederik Steyn, **Adam Walker** & Fleur Garton: From the nucleus to the powerhouse: investigating how TDP-43-mitochondrial interactions wreak havoc in MND, 2020-2022, \$274,692 [awarded to and administered by UQ Australian Institute for Bioengineering and Nanotechnology]

MNDRA Innovator Grant

Adam Walker, M Morsh, Sian H Brown-Wright & A Lee: New mouse models of TDP-43 pathology, 2020-2020, \$100,000

Medical Research Future Fund (MRFF) Traumatic Brain Injury Mission

Fatima Nasrallah, David Reutens, *et al.* : PREDICT-TBI - PREdiction and Diagnosis using Imaging and Clinical biomarkers Trial in Traumatic Brain Injury: the value of Magnetic Resonance Imaging, 2020-2023, \$1,765,000

National Health and Medical Research Council (NHMRC)

NHMRC Ideas Grant for funding in 2020

Timothy W Bredy: RNA modifications in space and time: How do they govern fear extinction? 2020-2023, \$808,880

Helen Cooper & Cecilia Flores: Identifying a molecular signalling network governing spine morphogenesis, 2020-2024, \$1,635,663

Kelli MacDonald & **Jana Vukovic:**

Preclinical modelling of brain chronic GVHD to instruct novel approaches for limiting the neurological complications of SCT, 2020-2023, \$1,061,778 [awarded and administered by QIMR Berghofer Medical Research Institute]

Jason Mattingley, Dragan Rangelov, Nele Demeyere & Mark Stokes: Computational and neural investigations of integrated perceptual decision making in health and disease, 2021-2023, (delayed start) \$736,414

NHMRC Investigator Grant Emerging Leadership 1 for funding in 2020

Laura Fenlon: The anatomy, development, mechanisms and function of long-range axonal plasticity, 2020-2024, \$552,830

Jean Giacomotto: ZebraClinics. From the identification of drugs against neurodegeneration to a better understanding of synaptic development and function, 2020-2024, \$614,750

NHMRC Investigator Grant Leadership Levels 1-3

Geoff Faulkner: NHMRC Investigator Grant Leadership 1: Somatic genome mosaicism in human brain function and neurodegeneration, 2020-2024, \$2,811,818 [awarded to and administered by UQ Faculty of Medicine]

Stephen Williams: NHMRC Investigator Grant Leadership 1 – Fundamental Computations Underlying Brain Function, 2020-2024, \$2,078,030

Jürgen Götz: NHMRC Investigator Grant Leadership 2 – Understanding signalling in the brain in neurons and at the blood-brain barrier in the context of Alzheimer's disease pathology and its treatment, 2020-2024, \$2,448,640

Naomi Wray: NHMRC Investigator Grant Leadership 3 – Quantitative genomics of common disease, 2020-2024, \$2,401,595 [awarded to and administered by UQ Institute for Molecular Bioscience]

Plexxikon grant

Jana Vukovic: PLX in GBHD models, 2020-2022, \$214,830 [awarded to and administered by UQ Faculty of Medicine]

Port of Brisbane – Community Grant Program

Justin Marshall, Monique Grol & Diana Kleine: CoralWatch Ambassadors promoting beautiful Moreton Bay marine environment, 2020-2021, \$5,000

Rebecca L. Cooper Medical Research Foundation Project Grant

Merja Joensuu: Dendritic spine actin cytoskeleton in Autism Spectrum Disorder, 2020-2022, \$100,000

Sea World Research and Rescue Foundation Inc

Marine Vertebrate Grant

Heather Middleton, Justin Marshall, & Robert Capon: Behavioural evidence of pheromone use by an elasmobranch, 2020, \$9,980

US DoD CDMRP FY20 Breast Cancer Research Program

Gregory Monteith, Sarah Roberts-Thomson, Felicity Davis & **Geoffrey Goodhill:** Deciphering and intercepting messages between cancer cells and cells in the breast cancer microenvironment: Roles for intracellular calcium signaling, 2020-2023, \$959,397 [awarded to and administered by UQ Faculty of Health and Behavioural Sciences]

US National Institutes of Health (NIH) Research Project Grant Program (R01)

Ethan Scott, Danielle Bassett & Halina Rubinsztein-Dunlop: An integrated platform for studying sensory networks in the vertebrate brain, 2020-2023, \$1,669,075 [awarded to UQ Faculty of Medicine and transferred to QBI]

Waterloo Foundation - Child Development Grant

Darryl W Eyles & Jake Gratten: Vitamin D in autism; preventative mechanisms, 2020-2021, \$114,558

Our 2020:

5

Fellows of the
Australian Academy
of Science



\$41.4M
Income

66 2 99

Highly Cited
Researchers

Awards

Australasian Cognitive Neuroscience Society

Jason Mattingley – Lifetime Contribution Award

Australasian Neuroscience Society

Paxinos-Watson Award for the most significant neuroscience paper published by a member of the society

Jess McFadyen, Jason Mattingley and Marta Garrido. An afferent white matter pathway from the pulvinar to the amygdala facilitates fear recognition. *Elife*. 2019 Jan 16;8:e40766. doi: 10.7554/eLife.40766

Australian Academy of Health and Medical Sciences

2020 Australian Academy of Health and Medical Sciences Fellow

Naomi Wray – Fellow of the Australian Academy of Health and Medical Sciences

Australian Academy of Science

2020 Australian Academy of Science Fellow

Justin Marshall – Fellow of the Australian Academy of Science

Commonwealth of Australia

Order of Australia

Perry Bartlett – Officer in the Order of Australia recipient

Rank Prize

Justin Marshall – Rank Prize for Optoelectronics (shared with T Cronin) - £100,000

RNA Society

Paul Marshall – Travel Fellowship

Royal Australian and New Zealand College of Psychiatrists

Dr Philip Mosley – Early Career Psychiatrist Award

Society for Molecular Biology and Evolution

Young Investigator Travel Award

Fabio Cortesi - \$2000

The Cajal Club

Krieg Cortical Kudos Discoverer Award

Linda Richards - \$5000

The University of Queensland

Itia Favre-Bulle – Above and Beyond in 2020 Honour Roll

US Institute of Electrical and Electronics Engineers

2020 US Institute of Electrical and Electronics Engineers Fellow

Tianzi Jiang – Fellow of the US Institute of Electrical and Electronics Engineers

40
Faculty




\$1.85M
Philanthropic support



378
Publications



135
HDR students

Early and Mid-Career Researchers

Our 219 early and mid-career researchers are an energetic and enthusiastic community who greatly contribute to our scientific efforts. Despite the challenges of 2020 on this cohort, they continued to achieve, receiving awards, grants and publishing high-impact papers.



Clockwise from left: Dr Paul Marshall, Dr Odette Leiter, Dr Laura Fenlon and Dr Rodrigo Suárez.

Some of our EMCR highlights include:

Drs Paul Marshall and Fabio Cortesi won travel awards from the RNA Society and Society for Molecular Biology and Evolution, respectively.

Dr Merja Joensuu was a key collaborator on the neuroscience and microscopy elements of a paper published in *Science* outlining that a short sequence on the genome of SARS-CoV-2 provides the virus with an additional way to enter cells and plays an important role in its transmissibility and infectiousness. **Dr Joensuu** was also awarded \$100,000 from the Rebecca L. Cooper Medical Research Foundation to investigate the dendritic spine actin cytoskeleton in autism spectrum disorder.

Dr Fabio Cortesi received a \$424,856 Discovery Early Career Researcher Award from the Australian Research Council (ARC) to study the phenotypic plasticity of reef fish vision in a changing world. **Dr Roger Marek** was awarded \$390,000 from the same scheme to map the neural circuits that underlie emotional learning.

Dr Rodrigo Suárez and **Dr Laura Fenlon** won an ARC Discovery project grant worth \$449,250 to investigate how timing affects mammalian brain development and evolution. **Dr Fenlon** was also awarded a National Health and Medical Research Council (NHMRC) Emerging Leadership Investigator Grant of \$552,830 to study the anatomy, development, mechanisms and function of long-range axonal plasticity.

Dr Jean Giacomotto was also successful in this scheme, being awarded a \$614,750 grant titled: ZebraClinics. From the identification of drugs against neurodegeneration to a better understanding of synaptic development and function.

Dr Rebecca San Gil was awarded \$300,000 from Cure for MND Foundation to conduct a genome-wide CRISPR screen to reveal regulators of TDP-43 aggregation and toxicity in MND.

Dr Odette Leiter was awarded a fellowship from the German Research Foundation

QBI Students

21 students were conferred with a Doctor of Philosophy and one student awarded a Master of Philosophy:

Tobias Bluett MPhil

Principal advisor: Professor Linda Richards
The onset, early dynamics, and cortical-area specificity of neural activity in the developing neocortex of the fat-tailed dunnart

Joseph Benetatos PhD

Principal advisor: Professor Jürgen Götz
Synaptic Apoptosis in Alzheimer's Disease: The Role of PTEN in Neurodegeneration

Deniz Ertekin PhD

Principal advisor: Professor Bruno van Swinderen
The effects of diet on sleep and visual selective attention in *Drosophila melanogaster*

Harrison Evans PhD

Principal advisor: Professor Jürgen Götz
Investigating the *de novo* proteome in neurodegenerative disease- a click chemistry approach

Alejandra Lopez Galan PhD

Principal advisor: Professor Justin Marshall
Neuroethology of the visual communication in the mourning cuttlefish *Sepia plangon*

Dasun Gunasinghe PhD

Principal Advisor: Professor Mandyam Srinivasan
Conflict Warning and Avoidance in Dual Aircraft Scenarios

Sumasri Guntupalli PhD

Principal Advisor: Dr Victor Anggono
The regulation of AMPA receptor trafficking by protein ubiquitination and its role in the pathogenesis of Alzheimer's disease

Xue Yan Ho PhD

Principal advisor: Professor Massimo Hilliard
Understanding the molecular and cellular mechanisms of axonal repair using *C. elegans* as a model system

Kiaran Lawson PhD

Principal Advisor: Professor Mandyam Srinivasan
Experimental analysis of complex insect flight behaviours inside virtual reality for potential applications in robotics

Jonathan Wei Chuen Lim PhD

Principal Advisor: Professor Linda Richards
Nuclear factor one transcription factors in cortical development: deciphering function through the identification of downstream effectors

Paul Marshall PhD

Principal advisor: Dr Timothy Bredy
Dynamic DNA structure states and memory

Sonja Meier PhD

Principal advisor: Professor Elizabeth Coulson
p75 neurotrophin receptor function in brain development

Jan Mölter PhD

Principal advisor: Professor Geoffrey Goodhill
Information processing in the developing zebrafish brain

Laura Morcom PhD

Principal Advisor: Professor Linda Richards
Cellular and genetic regulation of interhemispheric fissure remodelling and corpus callosum formation

Rucha Pandit PhD

Principal advisor: Professor Jürgen Götz
Understanding ultrasound-mediated blood-brain barrier opening as a potential non-invasive therapeutic approach for Alzheimer's disease

Kai Sempert PhD

Principal advisor: Professor Helen Cooper
The Role of Neogenin and RGMa in Dendritic Spine Morphogenesis

Cooper Alan Smout PhD

Principal Advisor: Professor Jason Mattingley
Great Expectations: The Neural Mechanisms of Prediction and Attention in Visual Awareness

135 Research by Higher Degree students

127 PhD students

8 MPhil students

64 domestic students

71 international students

18 new students in 2020

Neha Soni PhD

Principal Advisor: Dr Fatima Nasrallah
Magnetic Resonance Imaging reveals underlying pathology associated with traumatic brain injury in a tau transgenic mouse model

Susan Travis PhD

Principal Advisor: Professor Jason Mattingley
On the Relationship between Visual Attention and Perceptual Awareness

Marcus Triplett PhD

Principal advisor: Professor Geoffrey Goodhill
Neural encoding models for multivariate optical imaging data

Cong Wang PhD

Principal Advisor: Professor Pankaj Sah
Role of the medial prefrontal cortex and hippocampus in memory and learning

Mei Zhou PhD

Principal Advisor: Dr Dhanisha Jhaveri
Role of Adult Neurogenesis in Depression



QBI student on a Fulbright mission to US

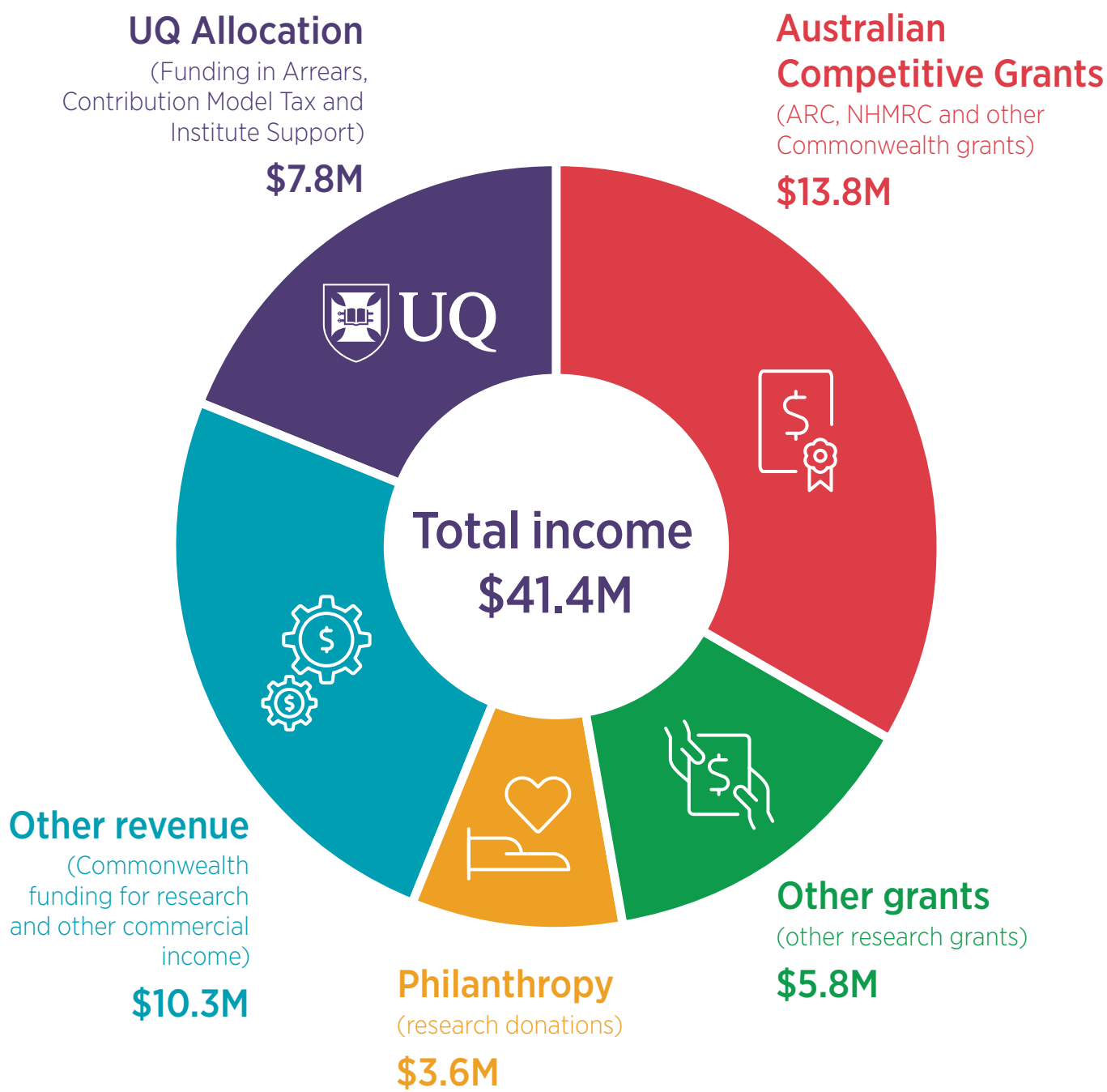
Adam Briner is heading 'stateside' in 2021 after successfully applying for a 2020 Fulbright scholarship. Mr Briner, who works in the laboratory of Professor Jürgen Götz, will use the scholarship to study the role of tau protein in neurodegenerative diseases like Alzheimer's under the guidance of Professor Aaron Gitler at Stanford University.

"I hope to identify new mechanisms through which tau mediates, and ultimately dysregulates, fundamental pathways in neuronal physiology to identify novel therapeutic targets," Mr Briner said.

"I'm excited by a future where I'm among the first generation of clinician-scientists able to understand, prescribe and deliver this type of targeted therapy."

The Fulbright Program in Australia provides funding each year for the nation's best and brightest to study at world-leading research institutes and universities in the United States.

Funding and income



Impact of Philanthropy

2020 was a year of unexpected surprises in regard to philanthropy at QBI. Like the rest of the world, our well-laid plans shifted to a new world of Zoom meetings, webinars and inventing new ways to stay connected to our incredible community of donors.

Despite the adversity that many people were facing in their own lives, nearly 300 donors helped raise \$1.85M for QBI in 2020. In uncertain times, this extraordinary support reflects the generosity of our loyal supporters from philanthropic foundations, corporates and our highly regarded community of givers.

All gifts to QBI, whether large or small, are meaningful and help crucial brain research progress with the hope of delivering impact that will improve health outcomes for society.

Our researchers devote their time to solving problems and discovering innovative solutions to complex brain disorders, whilst also exploring the unknown frontiers of what makes us who we are.

QBI's Discovery Research Endowment Fund continues to grow through donations from generous benefactors who believe in the value of fundamental science. This year has shown globally that without scientists working diligently behind the scenes, discoveries which are critical in times of crisis would not be made. Without a thriving scientific ecosystem, which pushes the boundaries deeper into the unknown, new possibilities are not uncovered. Science does not always proceed in a straight line toward progress and is more often than not time-consuming, complicated and unpredictable. The recognition that our donors are supportive of this pursuit is to be commended.

Donors are at the heart of what QBI is. The value that our army of donors and community advocates bring in raising awareness of QBI is immeasurable. Your interest in the Institute allows us to look to the future and imagine what our researchers can achieve.

Thank you again to all our supporters for your loyalty in 2020. A special thanks, as always, goes to our long-term donors, including The Clem Jones Foundation, The Brazil Family Foundation and The Stafford Fox Medical Research Foundation.



Dr Philip Mosley, Dr Susannah Tye, Dr Dhanisha Jhaveri and Dr James Kesby recording the live 'Understanding the brain to treat depression' webinar.

How your donations have helped

Parkinson's partnership leads to a positive future

A chance meeting at a Rotary Conference has led to a 12-year partnership establishing the Rotary Human Brain Global Grant PhD Scholarship in Parkinson's Disease.

The journey began when QBI's Professor Peter Silburn presented at the 2008 District Conference at Yamba, providing an insight into deep brain stimulation (DBS) as an increasingly viable treatment for Parkinson's disease.

This inspiring speech motivated Rotarian Allan Weston from the Rotary Club of Maclean to seize the moment and discuss with Professor Silburn the need for specialist researchers at QBI to enhance DBS research. Gaining support from the Rotary clubs of Maclean, Yamba and Iluka-Woombah, in 2010, Allan established a Board of Trustees to raise funds for PhD students and specialist investigators to advance DBS research at QBI.

Three sponsoring Rotary clubs raised more than \$60,000 over the next four years

and this money plus additional backing, including Past District Governor Sandra Doumany's organisation of three black tie dinners, raised greatly appreciated funds.

This incredible effort generated the first Human Brain PhD Scholarship granted to Italian researcher Andrea Giorni. Andrea, a biotechnical engineer, completed his PhD in 2019 and developed fundamental imaging processes that enabled surgeons to better locate the DBS electrodes.

From 2016, District 9640 played a stronger role in the providing funding of the Human Brain PhD Scholarships, generating welcome new funds to support the Scholarship.

2017 saw a second Global Grant awarded when the Scholarship was given to Samra Naz, a biomedical engineer from Pakistan. Through matching and wonderful support from Rotary clubs in Hong Kong, Macau, and Mongolia, a scholarship of \$89,000 was available over three years. Samra is in

the final stage of her scholarship, which funded her to study the effects of DBS on the motor actions and non-motor effects in Parkinson's Disease.

Chiemeka Chinaka, a researcher from Nigeria, is the third fortunate recipient of Rotary's generosity, and will commence his research in the Health Economics as it relates to Parkinson's disease in 2021.

In Australia there are almost 80,000 people living with Parkinson's disease, and the figure worldwide is almost 10 million. QBI is privileged to have had the support of Rotary since 2012, which has enabled the development of exceptional talent in Parkinson's disease research. The findings generated through the Rotary partnership has helped many people living with Parkinson's to enjoy a better quality of life, and is leading to state-of-the-art research that is providing treatment solutions for this debilitating and life-changing disease.



Professor Peter Silburn's work on deep brain stimulation to treat Parkinson's disease inspired the Rotary Clubs of Maclean, Yamba and Iluka-Woombah, with later support from clubs in Hong Kong, Macau and Mongolia.



From left: Dr Steven Zuryn, Mr Ross Pollock (Ailsa's nephew), Professor Pankaj Sah (QBI Director), Mr James Pollock (Ailsa's brother-in-law), Mrs Heather Pollock (Ailsa's sister), Ms Ann Forbes (Ailsa's niece), Dr Merja Joensuu and Professor Fred Meunier.

A lasting gift to support discovery science

Ailsa Gillies' passion for science will live on thanks to a generous gift left in her will to support fundamental brain research at the Queensland Brain Institute.

Ailsa's family had a long association with UQ. Her father, Dr CD Gillies, studied science soon after UQ was first established. Dr Gillies then lectured in biology at UQ and then moved to study medicine at Melbourne University, before the program was established locally. Ailsa's mother was one of the first women dentists to graduate from Sydney University, a notable achievement in 1914.

In 1949, Ailsa followed in her parent's footsteps and studied Medical Science at UQ, with an interest in bacteriology, and later obtained her master's degree. Her keen interest in research and using her science to solve practical problems in the dairy industry led to a successful 37-year career culminating in her being appointed as the first woman Director in Primary Industries with the Queensland Government.

In her private life, Miss Gillies' generosity extended to helping the community, with her dedicating considerable time as a community volunteer especially, in the area of epilepsy. She spent many years on Epilepsy Queensland's Managerial Board, with her nephew Fergus Pollock, working to raise money to support those living with epilepsy.

Ailsa's lifetime of studying and working in fundamental research led to her generous bequest to QBI. This support of fundamental research, to help solve the question of why underlying causes in the brain lead to epilepsy and other disorders, provides the opportunity to progress possible medical treatments. It also reflects Ailsa's important medical training and her understanding of the vital importance of moving treatments forward and fulfilling her wish to help people in the future.

QBI researchers were fortunate to meet Ailsa's family and discover more about her passion for "hard science" and the legacy that Ailsa wished to leave after her passing.

The Queensland Brain Institute is extremely grateful to the late Ailsa Gillies for the wonderful impact her gift will have in progressing our understanding of the brain to treat brain diseases and disorders. Her generosity and enduring gift will help support researchers to continue important work that can often take years to come to fruition.



2020 Donors

Bequests

QBI expresses its sincere appreciation for the charitable bequests received from estates in 2020.

Estate of Ailsa Gillies
Estate of Ruth Anne Young.

Principal Gift – Organisations

The Stafford Fox Medical Research Foundation

Major Gifts – Organisations

Josef Reisinger Foundation
Medtronic Australasia Pty Ltd
Motor Neurone Disease Research Institute of Australia Inc
Rebecca L Cooper Medical Research Foundation Limited
The Donald and Joan Wilson Foundation
The Rotary International District 9640 Ltd

Major Gifts

The Late Geoffrey Ilett and Kay Ilett
Rae Peacock

Organisations

Ashintosh Foundation
Australia Post
Brain and Behavior Research Foundation
Brain Foundation
Culleton Partnership
Equity Trustees Limited
Eumundi Branch of the Queensland Country Women's Association
Felicity's Wish Foundation
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Metro North Hospital and Health Service
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Motor Neurone Disease

Research Institute of Australia Inc
New Hope Corporation Limited
Notlob Mechanical Services Pty Ltd
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Story Bridge Hotel
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The Flight Centre Foundation Trust
The John and Barbara Hay Philanthropic Foundation
The MND and Me Foundation Limited
The Nicol Foundation
The Terry and Maureen Hopkins Foundation
The Wilgarning Trust
U3A Canberra French Group

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Pablo Pardoen
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Hilary Pearl
Erin Pearl
Shannon Pearson
John Pell

Leah Perry
Louise Pertnikovs
Simon Ponder
Glenda Powell AM
William Quarterman
Suzanne Reid
Steven Rigley
Katherine Robbins
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Patricia Ryan
Steven Ryan
Peter and Lesley Sampson
Leonard Scanlan
Alice Schwarz Brunold
The Late John and Beryl Seymour
Peter Sharry
Alan Shaw
Lesley Silvester
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Roger Simons
Russell Skinner
Anne-Maree Smith
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Ella Spence
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Darryl White
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Vicki Willmot
Jane Wilson
David Wilson
Roger Woodgate
Irene Yii
Frank and Patsy Youngleson
Margredel Zaccari

Anonymous donors

A sincere thank you to our donors who prefer to remain anonymous.

How you can support the Queensland Brain Institute

100% of donations go to research

Donations

There are many ways in which you can help support QBI's research effort, including:

- Donate to the QBI Discovery Research Endowment Fund
- Donate to a specific area of research
- Make a donation to purchase scientific equipment
- Fund scholarships for talented students
- Provide fellowships for early and midcareer scientists
- Support Professorial Chairs
- Undertake laboratory dedications
- Attend a QBI fundraising event including the Lexus Alzheimer's Gala, the Ross Maclean Race Day, Alastair Rushworth Fundraising Trek
- Organise a Gift in Memory by making a donation in memory of a loved one which is a meaningful way to celebrate their life, while supporting brain research. Gifts in memory can be made on an anniversary or birthday to make a lasting gift in honour of your family member, friend or colleague.
- Fundraise for us – get involved, have a great time and support QBI. There are many ways to get involved and include your network of family and friends using the Just Giving platform.

Bequests

Leaving a gift in your will signifies a timeless legacy through support of valuable brain research which accelerates current research and preserves future endeavours.

Bequests can include:

- A percentage of an estate
- The residuary of an estate (what remains after all other gifts and costs have been deducted)
- A gift of a specific sum of money
- A particular asset, such as property, works of art, shares, or an insurance policy.

Under current legislation, gifts to the Queensland Brain Institute are tax deductible.

To discuss how you can support the Institute, please contact Andrea Markey, Deputy Director, Advancement at:

Queensland Brain Institute

Building #79

**The University of Queensland
St Lucia QLD 4072**

Telephone: +61 7 3346 6413

Facsimile: +61 7 3346 6301

Email: advancement@qbi.uq.edu.au

Website: qbi.uq.edu.au

Public and scientific engagement

Engaging and sharing the findings of research is a key component of our scientific endeavours. Whether we are welcoming the public or sharing knowledge with our scientific peers, our researchers value the opportunity to connect with others for our mutual benefit.

In January, we welcomed local, interstate and international speakers to the Systems

and Computational Neuroscience Down Under Conference, a leading forum for neuroscientists to interact and share their insights into the function of neural circuits and systems. As the year progressed, our engagement took on a different format as we adjusted to, and embraced, new forms of connecting, holding a mixture of in-person and online events as appropriate.

Our neuroscience seminar series paused in mid-March, but resumed as an online offering in April. This allowed us to schedule several international speakers without the need for them to travel to Australia.



Speakers at the Systems and Computational Neuroscience Down Under Conference (SCiNDU).

Community events and conferences

EVENT	DATE	ONLINE OR IN-PERSON
Systems and Computational Neuroscience Down Under Conference (SCiNDU)	29 – 31 January	In person at QBI
International Women's Day	6 March	In person at QBI
MND Breakfast	7 May	Online - pre recorded
Parkinson's Breakfast	26 May	Online - pre recorded
CJCADR Public Dementia Forum	22 September	Online - pre recorded
Understanding the Brain to treat Depression Webinar	14 October	Online - live webinar
Discovery Research Breakfast	21 October	In-person
Director's Boardroom Lunch	30 November	In-person



Discovery Research Endowment Fund breakfast.

Neuroscience seminars

20 February

Professor Denise Manahan-Vaughan

Ruhr University,
Bochum, Germany

*“Functional correlates of
hippocampal synaptic plasticity”*

4 March

**Associate Professor Peter van
Wijnngaarden**

Deputy Director and Principal
Investigator

Centre for Eye Research Australia
and University of Melbourne

*“The eyes as a window to the brain:
retinal imaging biomarkers of
Alzheimer’s disease”*

8 April

Professor Matteo Carandini

University College London, UK

*“Organization of neural activity
across the brain”*

15 April

A/Professor Tim Bredy

Queensland Brain Institute,
The University of Queensland

*“Long noncoding RNAs and
memory”*

22 April

Professor Claudia Clopath

Computational Neuroscience Laboratory
Bioengineering Department,
Imperial College London, UK

*“Temporal backbone for rapid
compressible learning in
hippocampus”*

30 April

Professor Larry Abbott

Dept of Neuroscience,
Columbia University Medical Center,
Columbia University, New York

*“Multi-layer network learning in
an electric fish”*

13 May

Professor David Hume

Mater Research Institute and
The University of Queensland

“Life without microglia?”

20 May

Professor William Bialek

Princeton University and
The CUNY Graduate Center, USA

*“Statistical mechanics for networks
of real neurons”*

27 May

A/Professor Sonja Hofer

Group Leader

Sainsbury Wellcome Centre for Neural
Circuits and Behaviour, London, UK

*“Making sense of what you see:
cortical and thalamic circuits
for vision”*

17 June

A/Professor Paul Dawson

Mater Research Institute and
The University of Queensland

*“Sulfate deficiency and adverse
neurodevelopment”*

24 June

Professor Ashley Bush

Director of the Melbourne Dementia
Research Centre

The Florey Institute, Parkville VIC

*“Ferroptosis, iron and
neurodegenerative disease”*

1 July

A/Professor Lea K Davis

Dept of Medicine,
Vanderbilt University,
Nashville, Tennessee, USA

*“Beyond biomarkers: Mining
clinical data from the Electronic
Health Record to advance
psychiatric genomics”*

8 July

Professor Gwyneth Card

Janelia Research Campus
Howard Hughes Medical Institute,
Virginia, USA

*“Small brains, big decisions:
uncovering neural mechanisms
for real-world choices”*

5 August

Dr Jess Taubert

Laboratory of Brain & Cognition
National Institute of Mental Health,
Bethesda, USA

*“The neural basis of social
intelligence in primates”*

2 September

Professor Jozef Gecz

Chair for the Prevention of Childhood
Disability

NHMRC SPRF,
The University of Adelaide

*“Movement in the genetics of
neurodevelopmental disabilities”*

16 September

Professor Jason Mattingley

Queensland Brain Institute and
School of Psychology
The University of Queensland

*“Understanding the role of
prediction in sensory coding”*

7 October

Dr Steven Zuryn

Queensland Brain Institute
The University of Queensland

*“Mitochondrial genome mosaicism
and resistance to damage”*

28 October

Professor Peter Nestor

Queensland Brain Institute
The University of Queensland

*“How degenerative dementias
affect the cortex in humans”*

4 November

Dr Zhitao Hu

Queensland Brain Institute
The University of Queensland

*“Functional study of
synaptotagmins in synaptic
transmission”*

16 December

Professor David Bredt

Site Head for Johnson and Johnson
R&D campus, La Jolla

Site Leader Global Head,
Neuroscience Discovery, Clinical
Biomarkers and External Innovation
San Diego, California, United States

*“Getting a handle on
neuropharmacology by targeting
receptor-associated proteins”*

Publication List

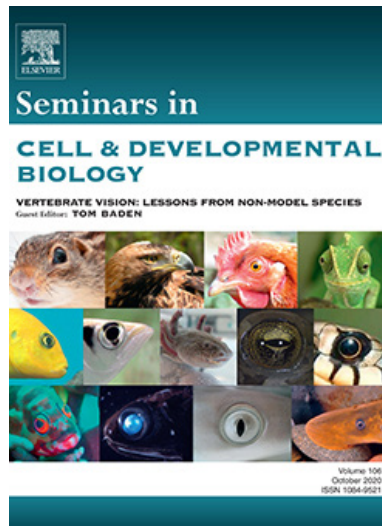
QBI publications (journal articles, books, book chapters, peer-reviewed conference papers) appearing in 2020 either as epubs or in print. Some 2020 epubs are now in print in 2021 and have been updated to reflect this. Superscript ^[STUDENT] next to an author indicates the author is/was a QBI Higher Degree Research student at the time the publication was submitted.

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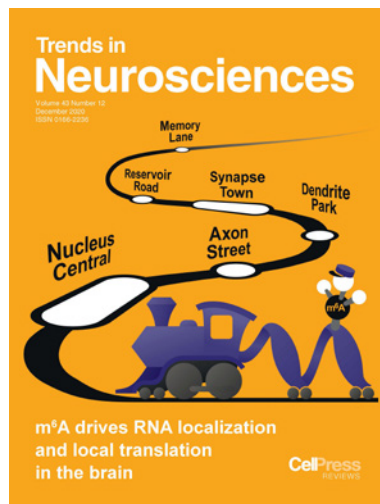
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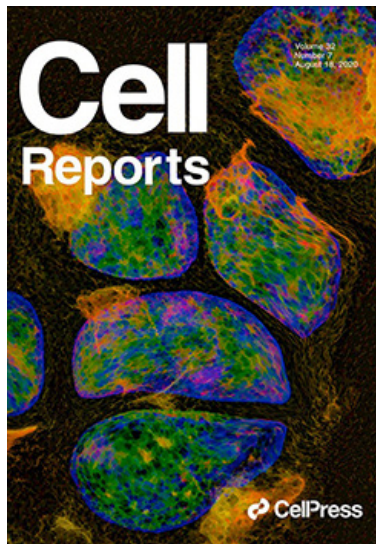
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