Australian Biochemist

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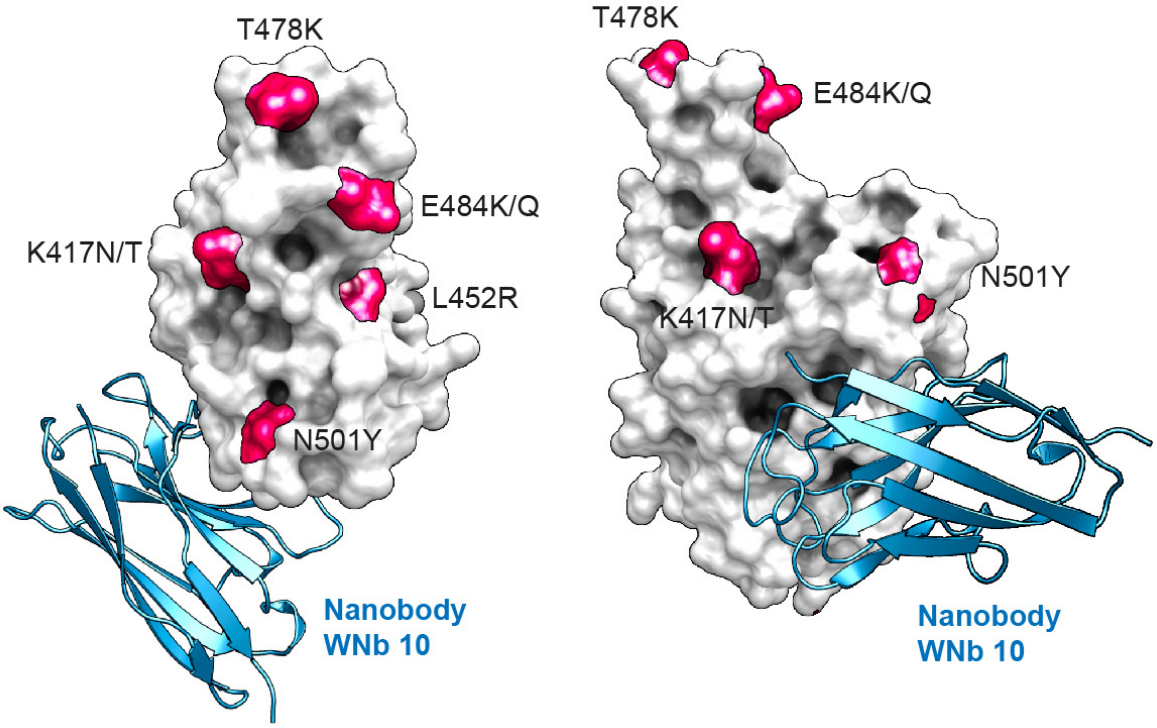

ISSN 1443-0193

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The Australian Biochemist
Editor Tatiana Soares da Costa
Editorial Officer Liana Friedman

Front Cover

SARS-CoV-2 RBD with neutralising WNb 10 nanobody. The pink residues highlight the receptor-binding domain variants that are present in the global variants of concern. Image credit: Phillip Pymm, Amy Adair and Wai-Hong Tham.

Australian Biochemist Editorial Committee

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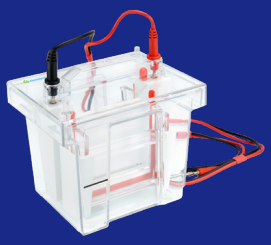

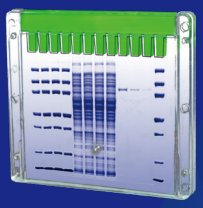

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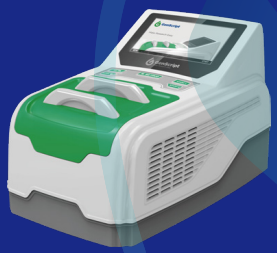

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Publications with Impact profiles recent, high impact publications by ASBMB members. These short summaries showcase some of the latest research by presenting the work in a brief but accessible manner. If your work has recently been published in a high profile journal, please email editor@asbmb.org.au.

The Jewel is in the Lotus: Evolutionary Seed of a Novel Photosynthetic Antenna Discovered Among the Petals of the Red Algal Phycobilisome

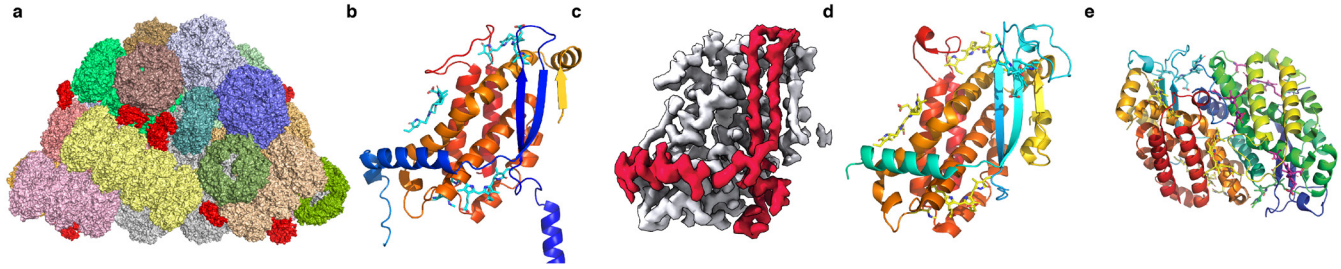
Rathbone HW, Michie KA, Landsberg MJ, Green BR, Curmi PMG*. Scaffolding proteins guide the evolution of algal light harvesting antennas. *Nat Commun* 2021;12:1890.
***Corresponding author: p.curmi@unsw.edu.au**

In our paper, we uncover a new family of scaffolding proteins present in previously deposited cryo-EM maps of red algal phycobilisomes. These scaffolding proteins represent a crucial missing link between the photosynthetic antennas of cryptophyte algae and their secondary endosymbionts (red algae).

Untangling the evolutionary history of eukaryotic algae and their photosynthetic systems presents a challenge. This is largely due to the genetic complexity introduced by a string of serial endosymbioses among these organisms. The photosynthetic apparatus can be broken down into two parts: a pigment-protein antenna complex responsible for capturing and relocating solar energy and a transducer capable of converting the excitation into a proton gradient. The transducer element (the reaction centre) has remained largely unchanged since it evolved in cyanobacteria and was transferred to photosynthetic algae via primary endosymbiosis. In contrast, the light harvesting antenna complexes have taken on many forms, where some are evolutionarily related and others are unique.

In our study, we focus on the antennas of two groups of photosynthetic algae: the cryptophytes and the red algae, where the former evolved via secondary endosymbiosis of the latter. Like cyanobacteria, red algae have an elaborate light harvesting antenna called the phycobilisome (PBS), which consists of stacked hexamer rings of an αβ protomer along with a slew of linker proteins. The αβ protomer consists of α and β chromophore-containing globin-fold proteins stabilised by αβ protomer formation. The PBS rings form rods extending from the integral membrane photosystem in such a manner as to produce an energy funnel, channelling all captured photon energy to the photosystem. Following endosymbiosis, the cryptophytes took the energetically elegant red algal phycobilisome and drastically remodelled it. Cryptophytes stripped the PBS down to a remnant PBS phycoerythrin β (PE β), complexed this with a novel peptide (the cryptophyte α subunit, which is unrelated to the PBS α subunit) and shuttled it into an internal compartment within the chloroplast. Since the discovery of the cryptophyte antenna, the cause of the phycobilisome collapse and the origin of the cryptophyte α subunit has remained a mystery.

Two recently published high resolution cryo-EM



a. *Model for the 15 MDa phycobilisome with rods given separate colours and lone PE β dotted around the structure in bright red; many lone PE β are occluded.*

b. *An example CaRSP in blue (the first CALM domain of CaRSP1 in this case) bound to a PE β in orange with the C- and N- terminal tails stretching off to scaffold other PE β subunits.*

c. *Example cryo-EM map density extracted from maps deposited by Ma* et al. *(2020) with the CALM domain density in red against the grey PE β density.*

d. *The cryptophyte αβ protomer with the alpha subunit shown in blue along the hydrophobic face of PE β (orange).*

e. *The mature cryptophyte light harvesting antenna protein made from two cryptophyte αβ protomers. Chromophores are shown in stick representation.*

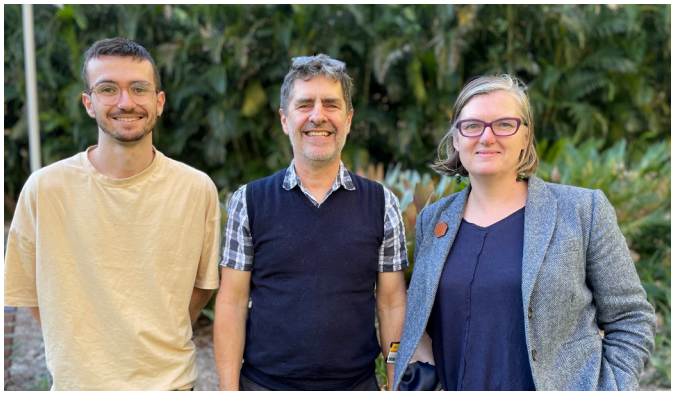
structures of red algal phycobilisomes (17MDa – Ma *et al.* 2020 and 15MDa – Zhang *et al.* 2017), coupled with time at home from COVID-19 lockdown, provided the catalyst for our work. In the each of the published cryo-EM models, we noticed about 20 unpaired (and thus unstable) PBS β subunits, one of which had a partially modelled C-terminal extension from PBS linker protein that structurally resembled the evolutionarily elusive cryptophyte α subunit. Detailed inspection of the cryo-EM maps showed that nearly all unpaired β subunits had an unmodelled cryptophyte-α like peptide bound.

The difficulty was that we had several unmodelled regions of cryo-EM map density and no sequence data. BLAST searches with cryptophyte α subunit sequences yielded only cryptophyte sequences, as they are short (approximately 70 residues) with low sequence identity. Using the cryptophyte-like segment of the single red algal linker peptide that was partially modelled, we were able to refine our BLAST search and eventually find 13 candidate red algal sequences. Our search was narrowed using motif analysis, as the sequence identity was very poor. We discovered a motif (CALM – cryptophyte alpha-like motif), which also fit the cryptophyte α subunit structural motif comprising a β ribbon usually followed by an α helix. In the new red algal sequences, these CALM domains are usually in tandem arrays (CaRSPs – CALM repeat scaffolding proteins). This led us to conclude that these proteins are scaffolding proteins that stabilise and position lone PBS β subunits within the red algal PBS.

Armed with these new sequences, we were able to build atomic models for the CaRSPs attached to several lone PE β subunits within the red algal PBS cryo-EM maps. The CaRSP:PE β complexes 'snake' between the PBS rod structures increasing their photon capture cross-section by scaffolding extra, stabilised PE β subunits. By comparing cryo-EM maps of the two red algal species, we observe that the structure and location of the CaRSP:PE β complexes are tightly conserved.

These CaRSP scaffolding proteins bind to the same unstable hydrophobic surface on the PBS PE β as the PBS PE α, which would have created competition between protein binding partners. We propose that this may have signalled the collapse of the PBS in early cryptophytes as the CaRSPs that evolved to attach more PBS β subunits to the PBS (and thus more light harvesting capacity) were in fact trojan horses that lead to the collapse of the greater PBS system. We believe that a CaRSP stripped down to a single CALM domain was the progenitor of the cryptophyte α subunit, leading to the modern cryptophyte light harvesting antenna.

Harry Rathbone and Paul Curmi
UNSW



From left: Harry Rathbone, Paul Curmi and Kate Michie.

Nanobodies Against SARS-CoV-2

Pymm P, Adair A, Chan LJ, Cooney JP, Mordant FL, Allison CC, Lopez E, Haycroft ER, O'Neill MT, Tan LL, Dietrich MH, Drew D, Doerflinger M, Dengler MA, Scott NE, Wheatley AK, Gherardin NA, Venugopal H, Cromer D, Davenport MP, Pickering R, Godfrey DI, Purcell DFJ, Kent SJ, Chung AW, Subbarao K, Pellegrini M, Glukhova A, Tham WH. Nanobody cocktails potently neutralize SARS-CoV-2 D614G N501Y variant and protect mice. *Proc Natl Acad Sci USA* 2021;118(19):e2101918118.
***Corresponding author: tham@wehi.edu.au.**

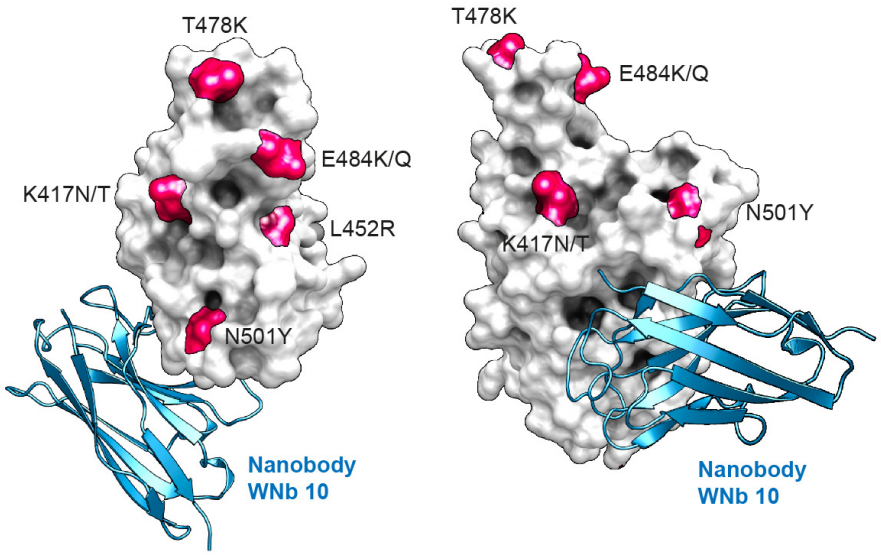
Coronaviruses are enveloped RNA viruses that infect many mammalian and avian species. The current COVID-19 pandemic is caused by the newly discovered coronavirus SARS-CoV-2, which has resulted in over 140 million infections and over 3 million deaths. The severe acute respiratory syndrome coronavirus SARS-CoV resulted in the SARS epidemic in 2002 with over 8,000 infections and a 10% fatality rate. Therapeutic monoclonal antibodies against COVID-19 will be critical for preventing or treating infection in vulnerable groups that respond poorly to vaccination such as the immunosuppressed and the elderly, and to provide immediate protection which are important for limiting outbreaks in hotel quarantine and aged care.

The spike protein of coronaviruses facilitates viral entry into target cells. In addition to mediating viral entry, spike proteins are critical determinants of viral host range and tissue tropism and key targets of the human immune responses. Coronavirus spike protein is composed of a large ectodomain, a transmembrane anchor followed by a short cytoplasmic tail. The ectodomain is further separated into the receptor-binding subunit S1 and the membrane-fusion subunit S2. Within S1, the receptor-binding domain (RBD) is responsible for binding human

receptors. Antiviral therapies that block attachment and the ability to undergo membrane fusion will effectively inhibit the process of viral entry and stop infection.

Alpacas, llamas and their camel cousins have evolved one of the smallest naturally occurring antigen recognition domains called nanobodies. Nanobodies are highly suited for development as potential inhaled therapies against coronaviruses due to their unique properties. They are approximately 15 kDa in size, highly stable across a wide range of pH and temperature, display strong binding affinities to target proteins and can be expressed at high yields. To identify nanobodies that would be effective at blocking SARS-CoV-2 entry, we immunised alpacas with both the RBD of SARS-CoV-2 and SARS-CoV. Using phage display, we identified high affinity nanobodies which disrupted SARS-CoV-2 RBD engagement with the human ACE2 and potently neutralised SARS-CoV-2. Epitope mapping, X-ray crystallography and cryo-electron microscopy revealed that two of our leading neutralising nanobodies bound to distinct antigenic sites on the spike trimer. Delivering this nanobody cocktail as a prophylatic, we were able to reduce viral loads in a mouse model of infection.

Of particular interest is that one of our leading neutralising nanobodies, WNb 10, recognises both SARS-CoV-2 and SARS-CoV RBDs. Structural analyses and a multiplex RBD variant array show that WNb 10 does not contact RBD residues 417, 452, 478, 484 and 501, therefore still effective against global variants of concern which carry mutations at these residues (see figure). This leads to a potential pathway for the development of nanobody therapeutics that would be effective against both SARS-CoV-2 and SARS-CoV and the emerging variants of concern.



SARS-CoV-2 RBD with neutralising WNb 10 nanobody. The pink residues highlight the RBD variants that are present in the global variants of concern.

Phillip Pymm, Amy Adair and Wai-Hong Tham
Walter and Eliza Hall Institute of Medical Research

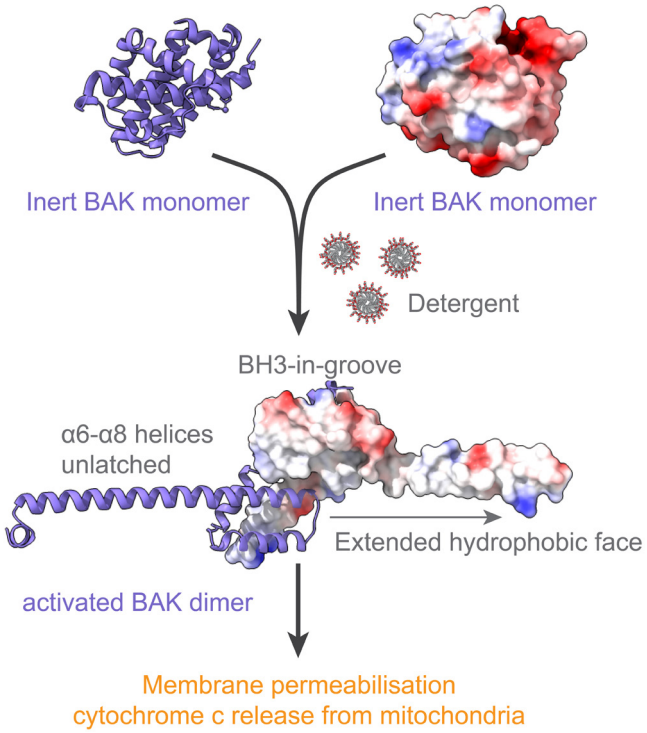
From left: Amy Adair, Matthew O'Neill, Li-Jin Chan, Phillip Pymm, Wai-Hong Tham, Damien Drew, Jing Deng, Gabby Watson, Lynn Tan and Melanie Dietrich.

How BAK Converts From an Inert Monomer into a Membrane Killer

Birkinshaw RW*, Iyer S, Lio D, Luo C, Brouwer JM, Miller MS, Robin AY, Uren RT, Dewson G, Kluck RM, Colman PM, Czabotar PE*. Structure of detergent-activated BAK dimers derived from the inert monomer. *Mol Cell* 2021;81(10):2123–2134.e5.
***Corresponding authors: birkinshaw.r@wehi.edu.au, czabotar@wehi.edu.au**

Programmed cell death is an important defence mechanism against pathogens and the development of abnormal cells, for example as occurs in cancer. Apoptosis is one of the major programmed cell death pathways, with mitochondrial apoptosis principally regulated by the BCL-2 family of proteins. The BCL-2 antagonist/killer (BAK) protein performs a key role in apoptosis. BAK resides on the mitochondrial outer

Publications with Impact



Detergents induce BAK monomers to dimerise and form active BAK dimers. Structures of these BAK dimers revealed a BH3-in-groove dimer with unlatched α6-8 helices that extend the hydrophobic underbelly of the dimer.

membrane (MOM) and, upon suitable apoptotic cues, converts from an inactive monomer into a dimer. The dimers then oligomerise and disrupt the MOM, forming pores that release cytochrome *c* into the cytosol, widely seen as the point of no return for apoptosis. In this work, we have shown that BAK monomers can be converted into membrane rupturing dimers *in vitro* using appropriate detergents to mimic a membrane-like environment.

Our team used the detergent $C_{12}E_8$ to turn BAK monomers into dimers. The dimers were separated from excess detergent and residual monomers by size exclusion chromatography coupled with multi-angle light scattering (SEC-MALS). The SEC-MALS confirmed that BAK formed dimers that were associated with residual $C_{12}E_8$ molecules to stabilise the complex. Through a combination of liposome based *in vitro* assays and *ex vivo* mouse liver mitochondrial assays, we showed that the BAK dimers rupture membranes, both liposomes and the MOM, in the absence of a standard apoptotic stimulus. Notably, these dimers lacked a membrane targeting anchor (their α9 transmembrane helix). The capacity to target to biological lipid membranes and form pores demonstrated that these dimers represent an activated state of BAK.

We were able to grow crystals of our BAK dimers that diffracted X-rays to sufficient resolution to solve their structure by X-ray crystallography. The resulting structure showed a braid of three BAK dimers that wrapped their way through the crystal. This was the first time anyone had described a structure of active BAK dimers. The dimers themselves showed two key features: a BH3-in-groove dimer – where the BH3 domain from one monomer binds in the BH3-binding groove from their partner – and unlatching of the α6-8 helices from the BH3-in-groove dimer core. Our earlier studies had provided accumulating evidence for these conformational changes, but we had never observed both in a single structure. A consequence of the unlatching of the BAK α6-8 helices was the formation of an extended hydrophobic underbelly of the BH3-in-groove dimer that might drive them to embed into lipid bilayers, disrupting the bilayer in the regions around the newly embedded BAK dimers. We propose that this BAK dimer represents a transient state of BAK prior to oligomerisation, which produces tension on the membrane, and not that upon further oligomerisation, disrupts the bilayer sufficiently to stabilise the formation of toroidal membrane pores.

Our work provides new insights into how BAK and other membrane rupturing BCL-2 family proteins destabilise membranes to form pores. This is key for addressing how cytochrome *c* is released from mitochondria to initiate apoptosis. However, important questions remain on how BAK dimer oligomerisation transitions from the initial destabilised membrane described here into a stabilised toroidal pore. Understanding this process is crucial for developing strategies to control BAK and will allow its exploitation for therapy.

Richard Birkinshaw and Peter Czabotar
Walter and Eliza Hall Institute of Medical Research

Clockwise from top left: Sweta Iyer, Peter Czabotar, Ruth Kluck and Richard Birkinshaw.

Publications with Impact

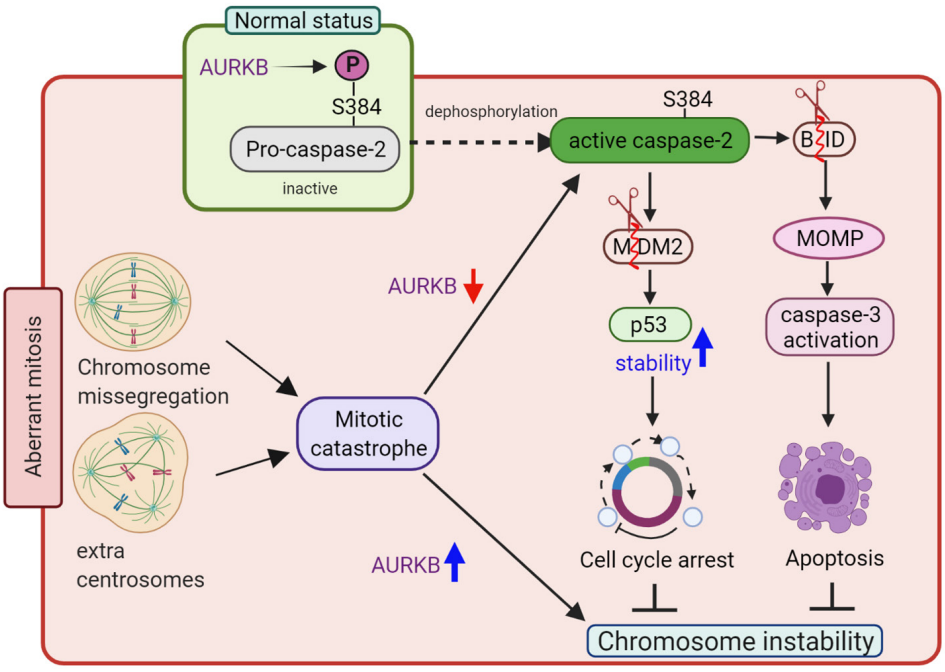
Cellular Signalling Underpinning Caspase2-dependent Mitotic Catastrophe and How NEDD4-2 Prevents Kidney Damage

The Molecular Regulation Laboratory at the Centre for Cancer Biology, University of South Australia, studies the processes of cell death and ubiquitination in cell signalling and disease. Advances in these fields are highlighted by two recent articles in *Cell Death & Differentiation* and *Cell Death & Disease*.

A Novel Mechanism Regulating Caspase-2 Activity and Function

Lim Y*, De Bellis D, Sandow JJ, Capalbo L, D'Avino PP, Murphy JM, Webb AI, Dorstyn L, Kumar S*. Phosphorylation by Aurora B kinase regulates caspase-2 activity and function. *Cell Death Diff* 2021;28:349–366.
***Corresponding authors: yoon.lim@unisa.edu.au, sharad.kumar@unisa.edu.au**

Mitotic catastrophe (MC) is a key oncosuppressive mechanism that prevents mitotically aberrant cells from proliferating and surviving. Caspase-2 has been shown to play a critical role in MC by eliminating polyploid or aneuploid cells through apoptosis or cell cycle arrest, therefore preventing chromosome instability. However, the molecular mechanisms that regulate the activation and activity of caspase-2 are poorly understood. In this study, we identified six potential phosphorylation sites in caspase-2. By examining these phosphorylation sites, we found that phosphorylation at S384 of caspase-2 prevents the activation and catalytic activity of caspase-2 following aberrant mitosis. We discovered that Aurora kinase B (AURKB), a key mitotic kinase, phosphorylates S384 of caspase-2. Further functional characterisation using cells stably expressing caspase-2-S384E, a phosphomimetic mutant, confirmed that phosphorylation at S384 inhibits caspase-2 activity without affecting the dimerisaiton of procaspase-2, and this leads to increased polyploidy and/or cell survival following aberrant mitosis. Structural modelling suggested that phosphorylation at S384 of caspase-2 most likely impacts substrate binding. Together, the results suggest that AURKB-mediated phosphorylation of caspase-2 is a critical mechanism that regulates caspase-2 function during mitosis and in MC.



In normal mitosis, S384 of caspase-2 is phosphorylated by AURKB, keeping caspase-2 inactive and preventing inappropriate cell cycle arrest and/or apoptosis. In response to aberrant mitosis, reduced AURKB activity allows S384 dephosphorylation, which leads to caspase-2 activation. Activated caspase-2 then cleaves:
***1.** MDM2, which leads to p53 stabilisation and cell cycle arrest, or*
***2.** BID, which leads to MOMP, caspase-3 activation and apoptosis. Thus caspase-2 activation prevents chromosome instability. Dashed lines, unknown mechanism. MOMP, mitochondrial outer membrane permeabilisation.*

Publications with Impact

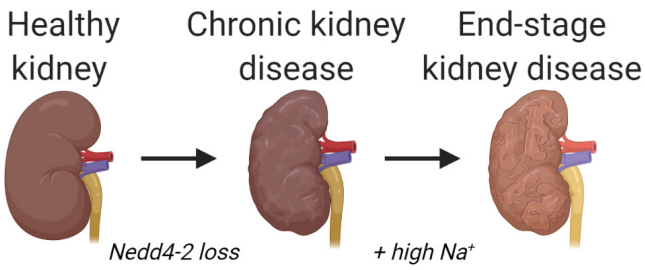
Regulation of Sodium Homeostasis and Fibrotic Signalling by NEDD4-2 in Kidney Health and Disease

Manning JA*[#], Shah SS[#], Nikolic A, Henshall T, Khew-Goodall Y, Kumar S*.
The ubiquitin ligase NEDD4-2/NEDD4L regulates both sodium homeostasis and fibrotic signaling to prevent end-stage renal disease. *Cell Death Dis* 2021;12:398
[#]Contributed equally
***Corresponding authors: jantina.manning@unisa.edu.au, sharad.kumar@unisa.edu.au**

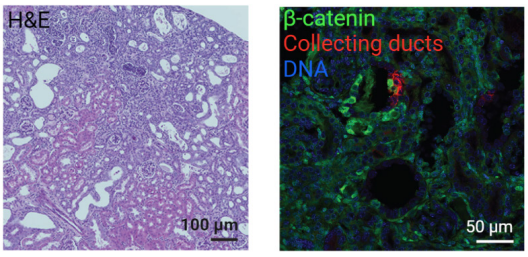
NEDD4-2 is a key member of the NEDD4 family of HECT-type of ubiquitin protein ligases. It plays a critical role in the regulation of membrane proteins, including several ion channels and transporters. As such, it has been the topic of much interest in cell biology, membrane physiology and pathology. In previous work, we reported that *NEDD4-2* deficiency results in progressive kidney disease similar to human chronic kidney disease (CKD), a nephropathy that afflicts around 10% of the global population.

Recent work published by our team provides new data towards understanding the mechanisms responsible for high Na^+-induced kidney damage and how this influences kidney function. In this study, we show that a high Na^+ diet compromises kidney function in *Nedd4-2*-deficient mice, indicative of progression towards end-stage kidney disease (ESKD). Kidney injury is characterised by enhanced tubule dilation and extracellular matrix accumulation, together with sustained activation of both Wnt/β-catenin and TGF-β signalling. *Nedd4-2* knockout in cortical collecting duct cells also activated these pathways and led to epithelial–mesenchymal transition. Furthermore, low dietary Na^+ rescued kidney disease in *Nedd4-2*-deficient mice and silenced Wnt/β-catenin and TGF-β signalling. This study reveals the central function of NEDD4-2 in Na^+ homeostasis and in protecting against aberrant Wnt/β-catenin and TGF-β signalling. Given that reduced expression of NEDD4-2 (NEDD4L) in patients with kidney disease has been reported in several recent studies, this work has significant implications for understanding and potentially managing CKD in patients.

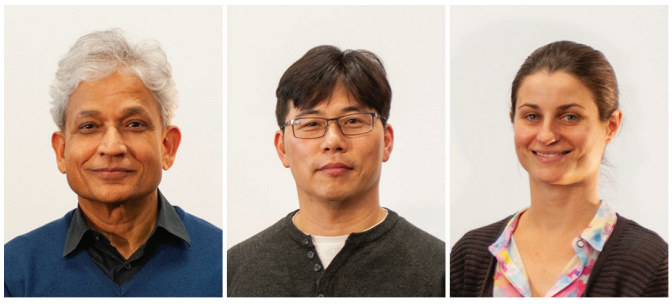
Sharad Kumar, Yoon Lim and Jantina Manning
Centre for Cancer Biology
SA Pathology and University of South Australia



High Na^+ induced kidney damage in *Nedd4-2*-deficient mice



Nedd4-2 loss leads to the development of chronic kidney disease and progression to end-stage kidney disease after high dietary Na^+ via dysregulation of several pathways, including β-catenin dependent fibrotic signalling.



From left: Sharad Kumar, Yoon Lim and Jantina Manning.

FAOBMB 2021

16th FAOBMB Congress
CHRISTCHURCH, NEW ZEALAND

We invite Australian Society for Biochemistry and Molecular Biology members to the 16th Congress of the Federation of Asian and Oceanian Biochemists and Molecular Biologists (FAOBMB), being hosted in:

Christchurch, New Zealand
22 – 25 NOVEMBER 2021

Under the umbrella of FAOBMB, five life science Societies from New Zealand and Australia are partnering to deliver a diverse programme that covers topics in biochemistry, molecular biology, microbiology and plant biology.

The Congress will also be one of the first international meetings to take place after all of the postponements and cancellations associated with COVID-19. Excitement is mounting to reconnect with old friends and make new ones!

Our primary focus is a Congress of the highest quality for delegates who can attend in person. We are also promoting engagement via a hybrid model of Congressing, for those who are unable to travel to New Zealand and wish to still be a part of this Congress.

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CONFIRMED SPEAKERS

KEY DATES

Close of call for abstracts:

13 August 2021

Close of early bird registration:

24 September 2021

THE CONGRESS WILL INCLUDE ASBMB MEDAL AND AWARD WINNERS:

Merlin Crossley
THE LEMBERG MEDAL

Erinna Lee
THE SHIMADZU RESEARCH MEDAL

Lahiru Gangoda
THE EPPENDORF EDMAN ECR AWARD

Lois Balmer
THE SDR SCIENTIFIC EDUCATION AWARD

Anton Calabrese
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Molecular dynamics

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USA
Transcription & epigenetics

Dr Emily Leproust

USA
Synthetic biology

Prof Ron Milo

ISRAEL
Systems biology & sustainability

Prof Paul Young

AUSTRALIA
Virology & vaccines

Dame Anne Salmond

NEW ZEALAND
Mātauranga & molecular science

Prof Victoria Korolik

AUSTRALIA
Host-pathogen interactions

Dr Adrian Davin

AUSTRALIA
Microbial evolution & phylogenetics

Prof Steven Lindow

USA
Plant-microbe interactions

Dr Jemma Geoghegan

NEW ZEALAND
Ecology & evolution of COVID-19

DRAFT CONGRESS PROGRAMME DAY 1 & 2

MONDAY 22 NOVEMBER DAY 1

CHECK BACK

Speakers and programme continues to be updated

EARLY BIRD REGISTRATION CLOSES 24 SEPT 2021

Opening Ceremony
Commences at 12.30pm

Mātauranga & molecular science
Dame Anne Salmond
Jisnuson Svasti Lecture

A RANGE OF PARALLEL SESSIONS:

Biochemistry & Molecular Biology
–
Microbiology
–
Plant Biology & Environmental Sciences

AFTERNOON TEA *amongst the exhibition and the posters*

A RANGE OF PARALLEL SESSIONS:

Biochemistry & Molecular Biology
–
Microbiology
–
Plant Biology & Environmental Sciences

Prof Masayuki Yamamoto
2020 FAOBMB Award for Research Excellence

Microbial evolution & phylogenetics
Dr Adrian Davin

WELCOME RECEPTION
Kindly sponsored by Lab Supply

TUESDAY 23 NOVEMBER DAY 2

Molecular dynamics
Prof Rommie Amaro
Kunio Yagi Lecture

Dr Donna Cormack and Hana Burgess

Host-pathogen interactions
Prof Victoria Korolik

MORNING TEA *amongst the exhibition and the posters*

A RANGE OF PARALLEL SESSIONS:

Biochemistry & Molecular Biology
–
Microbiology
–
Plant Biology & Environmental Sciences

LUNCH *amongst the exhibition and the posters*

A RANGE OF PARALLEL SESSIONS:

Microbiology
–
Plant Biology & Environmental Sciences

FAOBMB-IUBMB EDUCATION SYMPOSIUM

AFTERNOON TEA *amongst the exhibition and the posters*

A RANGE OF PARALLEL SESSIONS:

FAOBMB Awards Session
Young Scientist Awards, *Names to be confirmed (male and female)*
Ramachandran Lecture, Name to be confirmed

Biochemistry & Molecular Biology
–
Microbiology

Virology & vaccines
Prof Paul Young
Takashi Murachi Memorial Lecture

POSTER SESSION

CONGRESS PROGRAMME DAY 3 & 4

WEDNESDAY 24 NOVEMBER DAY 3

Understanding microbial life on leaves
Prof Steven Lindow
FAOBMB Lecture

Ecology & evolution of COVID-19
Dr Jemma Geoghegan

Transcription & epigenetics
Prof Gerd Blobel

MORNING TEA *amongst the exhibition and the posters*

A RANGE OF PARALLEL SESSIONS:

Biochemistry & Molecular Biology
–
Microbiology
–
Plant Biology & Environmental Sciences

LUNCH *amongst the exhibition and the posters*

A RANGE OF PARALLEL SESSIONS:

ASBMB Awards Session

DON'T MISS THIS!

Microbiology
–
Plant Biology & Environmental Sciences

AFTERNOON TEA *amongst the exhibition and the posters*

A RANGE OF PARALLEL SESSIONS:

Biochemistry & Molecular Biology
–
Microbiology
–
Plant Biology & Environmental Sciences

Synthetic biology
Dr Emily Leproust
Kindly sponsored by Twist Bioscience

POSTER SESSION

CONGRESS DINNER IN THE EVENING
Kindly sponsored by Twist Bioscience

THURSDAY 25 NOVEMBER DAY 4

Systems biology & sustainability
Prof Ron Milo
Osamu Hayashi Lecture

NZSBMB AWARD FOR RESEARCH EXCELLENCE

NZMS Student Speaker Competition

MORNING TEA *amongst the exhibition and the posters*

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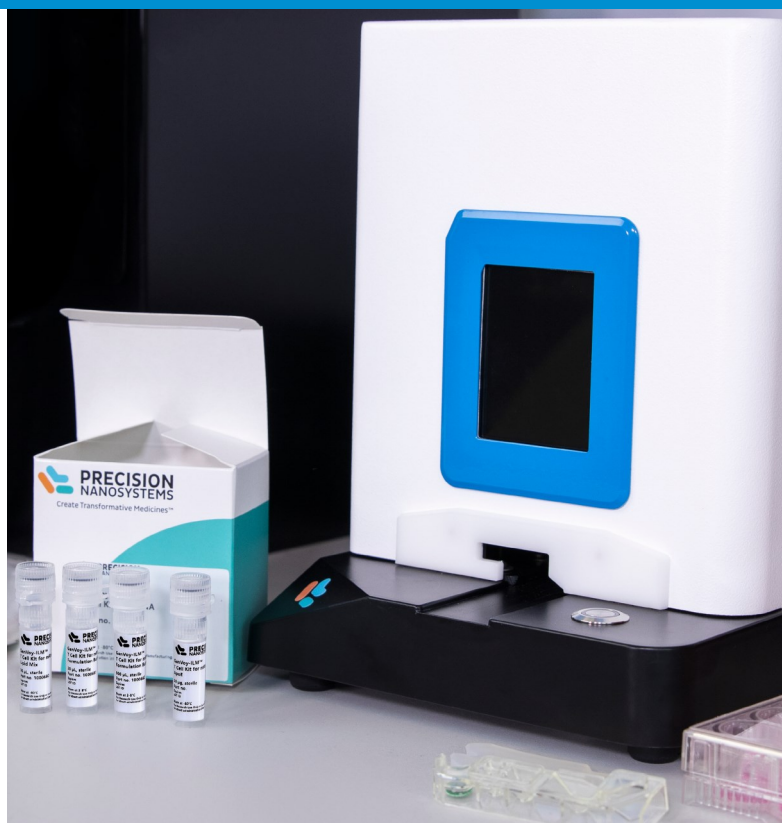

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ASBMB EDUCATION SYMPOSIUM

Sharing Practice: A Focus on Assessment and Academic Integrity

12:00–16:30 AEST, Tuesday 28 September 2021, Online

Photo: Andrew Neel on Unsplash.

Assessment should motivate and engage students while providing valuable information about student learning. The COVID-19 pandemic has challenged educators to redesign assessment whilst preserving academic integrity. It has been a time of significant learning and innovation.

Sharing Practice: A Focus on Assessment and Academic Integrity provides a platform for biochemistry and molecular biology educators and students to share their insights and experiences to recognise good practice and to transform the student learning experience as we move forward.

Participants will hear from students and educators through expert presentations and panel discussions designed to allow educators to reflect on their teaching and learning practice.

The themes of the symposium include online examinations, student partnerships in assessment design, innovative assessments for practical skills, assessing work-integrated learning, use of learning analytics, student views on academic integrity and addressing student diversity in assessment design.

KEYNOTE SPEAKER

The Keynote Address, **Cheating and online learning**, will be given by **Professor Phillip Dawson**, Associate Director, Centre for Research in Assessment and Digital Learning (CRADLE) at Deakin University. He leads CRADLE's research into academic integrity and the security of online assessments. His most recent books are *Defending Assessment Security in a Digital World* (Routledge, 2021) and *Re-Imagining University Assessment in a Digital World* (Springer, 2020).

https://philldawson.com

ASBMB EDUCATION SYMPOSIUM

Sharing Practice: A Focus on Assessment and Academic Integrity

12:00 – 16:30 AEST, Tuesday 28 September 2021, Online

CALL FOR SUBMISSIONS

The Organising Committee invites members of the ASBMB community, along with partners from associated organisations across the globe, to submit an abstract to present their practices online via Zoom. We invite submissions for short-form presentations (8 min) and Q&A (5 min). Submissions should address the following points:

- Assessment and/or academic integrity challenge(s) addressed
- Actions taken to address the challenge(s)
- Evidence of what you learnt
- Next steps and future actions

KEY DATES

Extended Abstract Submission Deadline	13 August 2021
Notice of Acceptance	27 August 2021
Registration Deadline	24 September 2021

MORE INFORMATION

Education Symposium Webpage www.asbmb.org.au/education/education-symposium

CONTACTS

Chair

Nirma Samarawickrema, Monash University

nirma.samarawickrema@monash.edu

Organising Committee

Tracey Kuit, University of Wollongong

Matthew Clemson, University of Sydney

Maurizio Costabile, University of South Australia

Amber Willems-Jones, University of Melbourne

The ASBMB Education Feature is coordinated by Nirma Samarawickrema (nirma.samarawickrema@monash.edu) and Tracey Kuit (tracey_kuit@uow.edu.au).

Designing Learning Opportunities to Enrich Student Understanding Through Community and Professional Engagement

Lois Balmer, School of Medical and Health Science, Edith Cowan University, Western Australia

Background

The Medical Science undergraduate degree at Edith Cowan University (ECU) has a diverse student cohort. As a result, their experience at university requires a carefully designed and engaging curriculum. These students often find it difficult to make connections between theoretical concepts in textbooks and the real world, the human face of medical genetics, raising several ethical considerations (1). As an active researcher in the field of medical genetics as well as an educator of undergraduate students at ECU, I am all too aware of this disconnect.

Over the past five years, it has been my constant aim to expose students to more than just a repeating cycle of lectures, laboratories and tutorials. While these are essential components of university education, we should not lose sight of the fact that the ultimate motivation for, and benefit of, medical genetics knowledge is to improve the lives of patients in the community (2). Drawing on my extensive research, and industry- and community-based professional connections, I have refined the curriculum to engender a deeper, more relevant understanding of medical genetics. Students actively engage with support organisations, patients and their families to develop a truly holistic and empathic understanding of the concepts underpinning the reality of living with a genetic disease. The evidence below demonstrates how my work has led to vastly improved student satisfaction and outcomes, and a truly transformative learning experience.

Developing curriculum: connecting with community-led approaches to learning and teaching

My development of curricula and resources is guided by my connections with community, and a focus on student learning through engagement. Prior to taking over the Medical Genetics (third year) unit in 2014, student satisfaction by institutional student evaluation was approximately 50%. The unit content was delivered through a traditional approach of weekly lectures while the assessment consisted of an essay on a genetic disease, mid-semester test and final exam. In 2015, I started using a human-centred, authentic learning approach (3) to transform the unit into one that was engaging and reflective.

I utilised my professional connections and industry relationships to enhance the weekly lectures to include guest speakers, as well as staging a Genetics Forum where students engaged with people with a lived experience of genetic disease: patients, families and care workers. Involving the community members and provision of a 'real human focus' developed the students' empathy, and they began to think about ways to facilitate patient goals with real action, rather than remaining passively sympathetic.

The essay was replaced by a research and reflection cycle built around the forum experience (4). Following a period of research into genetic diseases, students were required to formulate questions that are ethically appropriate and culturally sensitive. After the forum, students submitted a reflection for the assessment alongside the forum participants' responses to their questions.

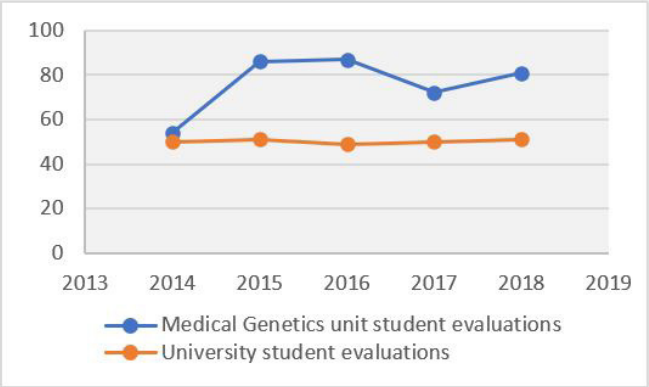

Fig. 1. *Unit satisfaction, 2014–2019.*

The improvements in overall student satisfaction that have occurred since implementation of the changes to curriculum in 2014 are clear (**Fig. 1**). Overall, student satisfaction for the unit has been 22 to 38 points higher than the ECU average; this is in the context of ECU being the highest rated public university for overall student satisfaction in Australia (5). Student reflections demonstrate a highly transformative learning experience (6) that fosters the connection of theory to practice, while students envision their future employment and develop empathy and respect, particularly for people

Table 1. *Evidence of transformative learning experienced by students.*

Theme	Students' Perspectives
Connecting theory to practice	*"The guest speakers really helped me piece together textbook learning to actually reality."* Student evaluations 2016 *"I feel it has given me a greater understanding that real people with challenges do exist outside textbook readings."* Student evaluations 2018
Envisaging future work in the health sector	*"This unit has shown me that this is the area that I want to pursue for my life, I don't know yet exactly what but I am so excited about looking into a career in MG."* Student reflection 2019 *"I am considering going into the health sector so I need to keep this in mind when dealing with patients and not just see the science but understand that forming a rapport encourages good health outcomes."* Student reflection 2019 *"The perspectives the carers, parents and the three young people was very moving for me and listening to them helped me see the people not just the condition."* Student reflection 2017
Developing empathy and challenging perspectives of disability	*"Meeting the Directions clients reinforced how these individuals should be treated respectfully and that they are just another person within the grand spectrum of humanity."* Student communication 2019 *"The most rewarding experience for me came from listening to and writing about the experience of the careers, I didn't know such people existed."* Student reflection 2017
Inspiring and transforming mindsets	*"What an inspirational forum, thank you so much, Dr Lois Balmer, for putting it all together. The best that I had for my study life at ECU. I know that their fighting spirit will be with me throughout my life's journey."* Student correspondence 2018 *"Initially I thought they would present as depressed people, forget about them I felt depressed even by the thought of people living with chronic diseases. However, my thoughts are totally changed by the fact that all of the guest speakers lived/live a better and fuller life then majority of normal people would even think of living."* Student reflection 2019

with disabilities, leading to an inspired and transformed mindset (**Table 1**).

Conclusion

I feel privileged to be able to bring to students community-based initiatives that provide an authentic human-centred focus. I believe that the ripple effects of these experiences will reach into the community in positive and meaningful ways. The enhanced quality of student learning is evident in the improved grades since the curriculum transformation. Already for some, the passion for their future career and commitment to ongoing learning is developing.

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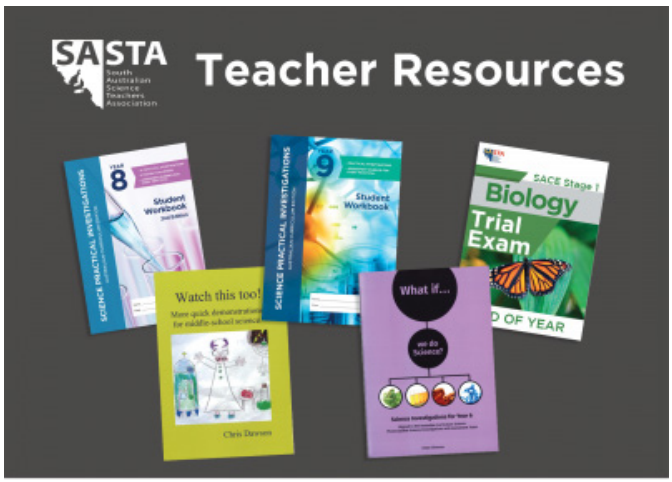
ASBMB Education Feature

Planting the Seeds of Learning in the Future Biochemist

Melissa Pitman, School of Biological Sciences, University of Adelaide

One of the aims of the ASBMB is to facilitate training and education in biochemistry and molecular biology. Engaging and inspiring students at high school level could play a major role in boosting the uptake of biosciences at university. Identifying the best way to do this is the first step in the process. I reached out to the South Australian Science Teachers Association (SASTA), Biology Teachers of South Australia (BTSA) group and bioscience educators at the three universities (University of Adelaide, Flinders University and University of South Australia) to seek their insights on how to encourage student engagement at a high school level.



SASTA supports science teachers in South Australia through conferences, scholarships and awards and teaching resources. SASTA also runs the annual Oliphant Science Awards. SASTA is celebrating an incredible milestone of 70 years in 2021 and currently has over 500 members.

From a high school educator perspective, it was suggested that students would benefit from experiences in professional laboratories and access to 'real world' science and scientists to help with some assessment tasks. One possible way to address this is to tap into the network of ASBMB members to find volunteers for give talks at schools or for students to interview. However, providing students access to a laboratory to gain experience remains a challenge when the number of students is likely to far outweigh the capacity of regular research laboratories. While it may be possible for some labs to take on a small number of students for internships or work experience, an alternative avenue for larger cohorts of students may be facilitated through universities to run practical classes in their purpose-built undergraduate teaching laboratories. Some universities already run STEM programs for high school students

Undergraduate students learning molecular biology techniques. Image: adelaide.edu.au

that do encompass some bioscience aspects but would benefit from more hands-on time at the bench.

Professional development for high school teachers to boost their laboratory experience may be another way to improve student experiences. Some universities run a personal development training workshop, co-developed by high school and university educators, for high school teachers to help them gain experience in running molecular biology experiments. This program may prove to be an excellent model to replicate in other universities. One assumption with this model is that teachers have adequate equipment in their school laboratories to run these more advanced experiments and so it's likely that a combination of approaches may be required.

Keeping up to date with content and methods requires training and support and most importantly, time. Initiatives that empower high school teachers and build their confidence will ultimately flow onto students. In addition, universities and scientists could build stronger networks with high schools to inspire budding scientists into a career in biosciences. With the links that I have made, I am keen to advocate for the teachers and students here in SA and find new ways to encourage and support their bioscience journey.

Dr Melissa Pitman is a Senior Lecturer and researcher in the School of Biological Sciences at the University of Adelaide. Melissa's research spans drug discovery and cancer biology. melissa.pitman@adelaide.edu.au

Zooming in on Seven Recommendations for Online Teaching

Emma Gamble, Jessica Gibbons and Nirma Samarawickrema,
Monash University

Online active learning in biochemistry education is a contemporary pedagogy which has been fast-tracked by the COVID-19 pandemic and the associated era of online learning. Active learning in biochemistry is well-researched, but teaching online offers the opportunity for an exploration of alternative techniques.

In 2018, the biochemistry unit 'Metabolic Basis of Disease' undertaken by 216 second year science undergraduate students transitioned to a flipped learning format with students required to review material before attending an active learning workshop component. In 2020, this classroom workflow was converted into an online learning format (**Fig. 1**). The active learning workshops were run over Zoom and involved the use of breakout rooms, where students were required to work collaboratively to analyse case studies, problem solve and analyse data. We studied students' perceived learning gains in online active learning workshops over one semester in 2020 using a mixed methods approach.

Our study drew on a survey based on the Student Assessment of their Learning Gains (SALG) survey used in a flipped biochemistry classroom (1) to evaluate students on their perceived learning gains from the online active learning workshops. Interviews involving two students were also conducted to gain a greater depth of understanding of the survey results.

Fig. 1. *The workflow of the flipped learning format with an online active learning workshop component.*

Several findings were identified from this data and in response, a series of recommendations have been devised for educators when conducting online active learning workshops. These findings are juxtaposed with the recommendations in **Table 1**.

Table 1. *Findings from online active learning workshops and proposed recommendations.*

Finding	Recommendation
Educators were very welcoming and approachable and contributed to a positive learning environment.	Continue to create a safe and positive environment for students.
Students felt the worksheets and questions were useful.	Provide students with digital worksheets to work on during the workshops, which can be used as a study resource.
Participation in the Zoom breakout rooms was low due to intimidation by the online platform and inconsistent breakout rooms.	Group students in the same breakout rooms throughout the semester to promote engagement and relationship development.
Students felt there was a lack of engagement with their peers, which made it difficult to interact during the breakout room activities.	Start each class with an icebreaker in the main discussion room and have teachers actively monitor breakout room activity.
Students felt the questions to check understanding of content delivered during the pre-workshop online module considerably helped their learning compared to other resources.	Incorporate opportunities to track learning by using in-class quizzes (e.g. Kahoot) at the start of the workshops.
Students' perceived that they couldn't always apply what they had learnt in the workshops to their daily life.	Make explicit links to the students' lives (e.g. nutrition, exercise) when designing the pre-class activity, which is then linked to the in-class activity.
When students had their cameras on, the online environment was positive and collaborative, as opposed to when students had their cameras off and the participation was low.	Encourage students to turn their cameras on wherever possible.

ASBMB Education Feature

These recommendations will be implemented during the Semester 1 online active learning workshops in 2021 and students' perceived learning gains will be surveyed in order to gather more data. In the future, we hope to continue testing our recommendations through this iterative process to ultimately improve the learning outcomes in biochemistry online active learning workshops.

Reference

1. Ojennus DD (2016). *Biochem Mol Biol Educ* 44(1):20–27.

From left: Jessica Gibbons, Emma Gamble and Nirma Samarawickrema.

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nirma.samarawickrema@monash.edu

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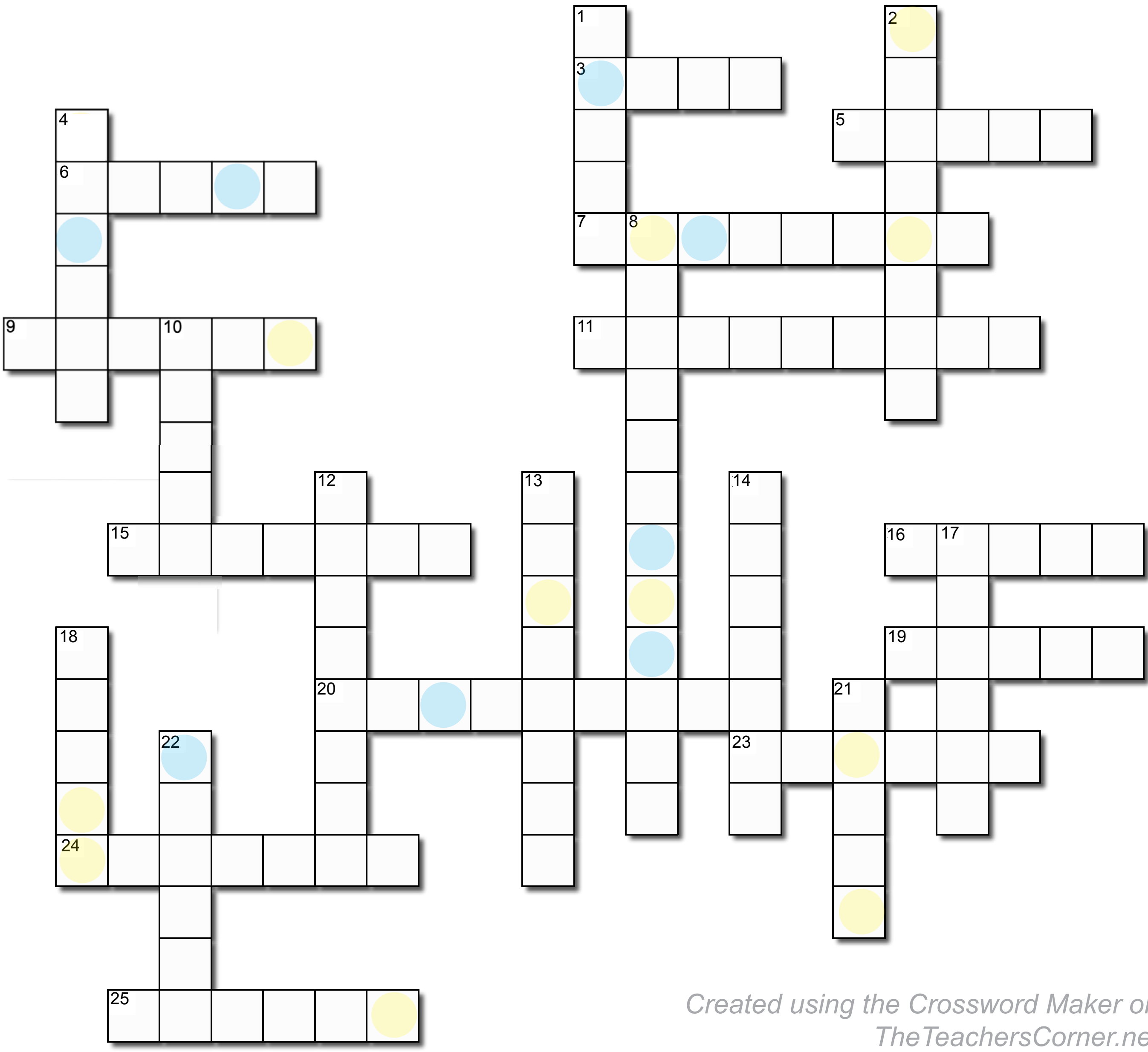
Competition: Crossword

Presenting the latest competition for the members of ASBMB. All correct entries received by the Editor (editor@asbmb.org.au) by 10 September 2021 will enter the draw to receive a voucher. With thanks to Joe Kaczmarski.

In anticipation of the upcoming 16th FAOBMB Congress, this crossword highlights invited speakers and ASBMB award recipients. Letters in the coloured circles (read from top to bottom, left to right) spell out the answer to this puzzle.



Created using the Crossword Maker on TheTeachersCorner.net

ANSWER: ________________ __ _____ __________ __!

Competition: Crossword

ACROSS

3. Osamu Hayashi Lecturer at the 2021 FAOBMB Congress, Professor _____

5. Takashi Murachi Memorial Lecturer at the 2021 FAOBMB Congress, Professor _____

6. The Boomerang Awardee, _____ Calabrese

7. What the 'O' in FAOBMB stands for

9. The Lemberg Medallist, _____ Crossley

11. Jacqui Matthews is the _____ of the ASBMB

15. Dame Anne _____, Distinguished Professor of Māori Studies and Anthropology, University of Auckland

16. Name of the convention centre where the 16th FAOBMB Congress will be held (2,3)

19. Dr Emily Leproust, CEO, Co-founder and Director of _____ Bioscience

20. City where the 26th Congress of the International Union for Biochemistry and Molecular Biology will be held in 2024

23. New Zealand greeting wishing good health (3,3)

24. ASBMB Fellowship Recipient, Abi _____ (University of Western Australia)

25. The Eppendorf Edman ECR Awardee, _____ Gangoda

DOWN

1. Kunio Yagi Lecturer at the 2021 FAOBMB Congress, Professor _____

2. ASBMB Fellowship Recipient, Belal _____ (Queensland Brain Institute)

4. The SDR Scientific Education Awardee, Lois _____

8. City where the 16th FAOBMB Congress will be held

10. *Australian Biochemist* Editorial Officer, _____ Friedman

12. Month in which FAOBMB 2021 will be held

13. Australian state in which ComBio2022 will be held

14. Recipient of the Fred Collins Award, Pamali _____

17. ASBMB Fellowship Recipient, _____ Kerr (University of Queensland)

18. Event preceding 16th FAOBMB Congress, the _____ Scientist Programme

21. FAOBMB 2021 Congress Chair, Associate Professor _____ Patrick

22. The Shimadzu Research Medallist, _____ Lee

SDS Page: Short Discussions for Students Page

Comparing Yourself to Others

Alyce Mayfosh, La Trobe Institute for Molecular Science and Wintermute Biomedical

Do you compare yourself to others? Think that you haven't accomplished enough? Feel like you're behind? Wonder if there is something you're doing wrong? I felt like this a lot during my PhD.

During my Honours, PhD and now postdoc, I have worked in the same lab alongside a successful peer. With dozens of papers, talks and awards, news and media stories, they have already had huge success in their career. During my Honours and PhD, I found myself comparing our journeys. I could not understand why, despite my hard work, I wasn't getting where I wanted. I wondered what I was doing wrong.

The advice I usually received is that you can't compare yourself to others. And I would think, I don't *want* to compare myself to others. I just don't know *how* to stop comparing myself.

It wasn't until the second year of my PhD that I figured out what to do. I needed to stop feeling sorry for myself. I had to feel that I was enough. Here is what I did:

1. I talked about it

I shared how I was feeling with my partner. Then, a few close friends at uni. I spoke to a counsellor about it. I told my supervisor I was concerned that I wasn't making the progress I should have been. He assured me that I was doing well. He said that I can't compare myself to colleagues working on other projects with different experimental techniques. It helped to hear him say that.

The more I spoke about it, the more I realised that I wasn't the only one feeling this way. Other people also have these feelings.

My advice is to speak to someone you feel comfortable with. Who can you talk to about what you're going through?

2. I acknowledged everything I had done, and congratulated myself for everything I had accomplished

I looked at what I had accomplished during my PhD, and I had to admit that I have had some wins. During my PhD, I published a first-author review and a second-author paper, and I'm very close to publishing two more on my PhD work. I gave talks at conferences and won a few prizes and awards. I was involved in several outreach and student society events. Thinking about everything I accomplished made me feel really proud of myself.

Where could you give yourself credit where it's due?

3. I got a friend to give me the reality check I needed

My partner listened with empathy and compassion when I was stressed. Importantly, he did not accept the invitation to my pity party. He would ask me questions to put things in perspective. These included questions such as 'What are you proud of?', 'What do you really want?', 'Could you be doing more?' or 'Does it really matter that someone is ahead of you?'. It helped to snap me out of it.

Think of someone who can give you a reality check. Not someone who will be mean about it. And not someone who will encourage it – it might feel nice, but it won't help in the long run. Who do you know that could do this?

4. I started celebrating other people's wins

I started acknowledging the successes that my colleagues were having. I was happy for them! It shifted me from feeling sorry for myself to feeling good. In doing this, I realised that their successes didn't at all diminish mine! It didn't mean there was less for me. My wins were coming.

This can be hard, but it makes a big difference. Who around you has accomplished something you can celebrate?

5. I acknowledged the good that came from my circumstances

First, I had a lot of trouble getting assays to work. That led to me becoming more independent and learning to troubleshoot, both of which are good skills as a scientist. Second, I learnt a lot from being in the same lab as my accomplished colleague. They showed me that when things go wrong, I don't need to get upset about it. Being around great scientists has made me a better scientist.

What have you learnt from difficult circumstances?

6. I thought about where I wanted to go

I thought about where I was going and where my peer was going. I realised that we are on different paths. I am interested in biotech, PhD training and academic funding. They are interested in research, academia and science communications. They are great at what they do. I am great at what I do. We are not competing!

How are you different from the people you are comparing yourself with? What sets you apart? What do you have that they don't have?

SDS Page: Short Discussions for Students Page

Comparing yourself to others is more common than you think. Start by speaking to someone. If you aren't sure who to talk to, feel free to reach out to me at a.mayfosh@latrobe.edu.au. I'm not a mental health professional, so I also recommend speaking to a counsellor. Most universities offer these services to students for free.

Remember that a PhD it not a competition. There is no first place. Seeing how far you have come since you started is a success in itself.

Dr Alyce Mayfosh is a postdoctoral researcher at the La Trobe Institute for Molecular Science and Wintermute Biomedical. a.mayfosh@latrobe.edu.au

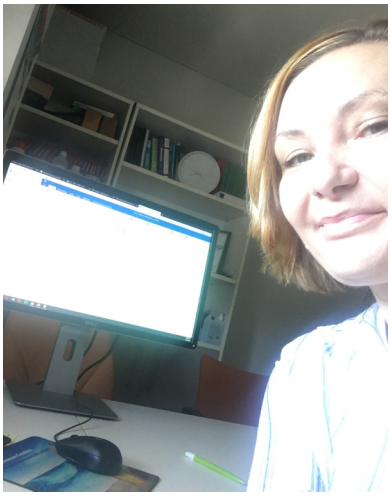
Science meets Parliament 2021

Science & Technology AUSTRALIA

Monika Murcha and Alastair Stewart report on SmP2021

Science meets Parliament (SmP) is an annual event organised by Science & Technology Australia (STA) that was created to connect those working in STEM sector with our country's decision makers. Due to COVID restrictions, the 21st SmP was held virtually over the month of March 2021, with some small in person activities spread across the country as well. Dr Monika Murcha, University of Western Australia, and Dr Alastair Stewart, Victor Chang Cardiac Research Institute, attended SmP2021 on behalf of the ASBMB.

As with all virtual meetings, there were pros and cons. Spreading the meeting over a few weeks, rather than a couple of days, and the lack of travel required made the meeting more attractive to those with teaching and caring responsibilities. But, as with most virtual meetings, the event started with a few small technical glitches that were speedily resolved. The added bonus of a virtual meeting meant that all sessions were recorded and could be viewed at a later date, allowing SmP to be fitted into most busy schedules. The flexibility and the smooth coordination overall made the inaugural online format a great experience.



Monika Murcha attends SmP2021 from the comfort of her office at the University of Western Australia.

The main focus of SmP is to develop relationships between politicians and scientists, with the highlight event being a meeting with a federal parliamentarian. Hence, there were many sessions and workshops aimed at upskilling the attendees on how policy decisions are made and how researchers can effectively communicate their views on policy and research to those outside of the STEM sector. SmP began with a great workshop describing the machinery of government, essential for those who never paid much attention to the inner workings of Canberra, before moving onto some master classes on how to prepare for meetings with parliamentarians and how to 'Marie Kondo' your writing. The main event was held over two days, with STA CEO Misha Schubert bringing together a great program across industry and academia to showcase how policy decisions are made as well as some recent success stories. One highlight was hearing from Professor Brian Schmidt, Vice-Chancellor and President of ANU, who gave a wonderful example of how to tell a quick and engaging story that can catch the imagination of those without a STEM background. Describing how the technology that was developed to understand astrophysics has been transferred to make many components of the smart phones we often take for granted. It was also great to hear from Dr Cathy Foley, Australia's Chief Scientist, who gave an inspiring National Press Club address, describing her passion for STEM and vision for the future of research in Australia.

Science meets Parliament 2021

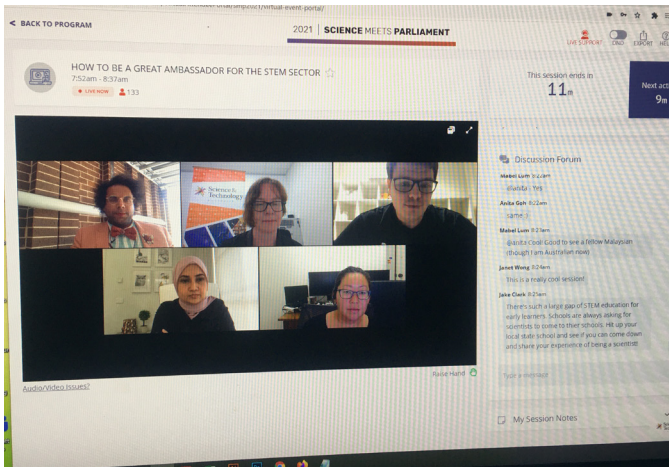
Science & Technology AUSTRALIA

Corey Tutt, founder of DeadlyScience (an initiative that provides science books and early reading material to remote schools in Australia), was an inspirational panellist at the 'How to be a great ambassador for the STEM sector' session. It was a wonderfully engaging session that highlighted the important role we all can play to ensure inclusivity in science.

A real highlight of SmP was the regular 'Zoom bars' that ran throughout the month, which facilitated discussions between the attendees. This was a fabulous place to network and hear about the wonderful diversity of research being performed across the country; from wrist bands that warn you on sun exposure, to faecal transplantation or the geology of distant planets.

Near the end of March, Alastair had a meeting with Mr Jason Falinski MP, Member for Mackellar, NSW. It was great to hear his enthusiasm for science, his thoughts on scientific research and some difficulties STEM sector researchers have experienced. Monika spoke to the Hon Luke Howarth MP, Member for Petrie, QLD, and, despite a delay, Luke ensured the meeting proceeded well beyond the allocated time. His enthusiasm and genuine interest was encouraging, being keen to listen to our research and surprisingly aware of the many challenges faced by academics, particularly women in science.

Alastair was fortunate to attend a Gala Dinner held in the Great Hall of the University of Sydney, held concurrently with dinners in Canberra, Melbourne and Adelaide. Here, the attendees were treated to a wonderful meal and speeches from the Hon Karen Andrews MP, on her last day as the Minister for Industry, Science and Technology, and the Hon Richard Marles MP, Deputy Leader of the Opposition and Shadow Minister for Science. Although from the two sides of politics, both showed great bipartisanship on the role science plays in our society and its ever-growing importance in society, highlighted by the recent pandemic. Pamela Naidoo-Ameglio, Group Executive, Nuclear Operations, ANSTO, also gave an inspiring talk on her personal journey through STEM.



Left: 'How to be a great ambassador to the STEM sector'.

STA CEO Misha Schubert speaks at the SmP Gala Dinner held at the Great Hall, University of Sydney.

SmP was a great experience that neither of us will forget and it has given us some added optimism about the future of research in Australia. Most importantly, it has provided us with tools and networking opportunities beyond our fields. It has also allowed us to hear how engaged politicians are on science and reflect on our role as scientists within the wider community and within politics. We would like to thank the ASBMB for the fabulous opportunity to attend SmP.

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Right: Tea sent to SmP attendees from the Department of Defence.

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Off the Beaten Track

Written by former researchers who have now established careers outside of research, Off the Beaten Track is intended to give the readers insights into the range of alternative careers available to them. Authors describe the paths they have taken to arrive at their present career and provide a detailed description of exactly what the job entails on a day-to-day basis.

Walking the Line Between Science and Business

Robert Ninnis, Business Manager, Automation ANZ, Trajan Scientific and Medical

A PhD, a business card and a robot. It may be hard to draw a line of connection between these three items however, this is my path, and I would not change a step in my journey.

My current role is with Trajan Scientific and Medical, an Australia-based analytical science company, which focuses on developing and manufacturing innovative products for the scientific and healthcare industries. Now instead of performing analytical experiments, I am discussing and developing Trajan's cutting-edge technology with the scientific community.

So that explains the PhD, but where do the business card and robot fit in? Well, I'm the Automation business development manager at Trajan, responsible for supporting Trajan's growth by expanding its globally recognised automation business into the Australian, New Zealand and Asian territories. How did I get into this role? It's an interesting story that focuses around networks created by keeping business cards, and now I have my own!

Truth be told, my career journey was never one of clear intentions however my compass has always been set to follow my passion. This mindset has rewarded me with many exciting opportunities and a network of great people. My scientific journey began at La Trobe University where I completed my PhD researching bacterial chaperones. Like many of those reading, my PhD studies was a real eye-opening experience stepping into the academic world. To any PhD candidates reading this now, I would advise you to interact with as many research groups as you can, learning from new researchers is one of the fastest ways to develop new skills, even non-academic ones.

As I was preparing to see the light at the end of the tunnel that is PhD graduation, I realised it was important for me to further extend my network beyond La Trobe University. This led me to have a catch up with Dr Grant Dewson, a lab head at Walter and Eliza Hall Institute (WEHI), who was doing some incredibly exciting work in elucidating the mitochondria cell death pathway. Fortunately, I made a good impression as he offered me a position in his lab, confirming to me that with the right mindset you can translate your current skillset to excel in a new path. This was the official start of my scientific career.

Robert Ninnis.

I will always look back fondly at my years at WEHI, enjoying life as a postdoctoral researcher and being involved in some fantastic group achievements. Many lab heads at WEHI were friends and mentors and although their position brought many rewards, I also saw firsthand the stresses of the role. It was clear that to be a great lab head, a lot of passion was required, and my passion did not pull me in this direction. Fortunately, WEHI is an institute involved in scientific communication and commercialisation, a key example being the co-development of venetoclax, a successful anti-cancer drug. I was lucky enough to be involved in some of the basic research to understand this drug, prompting me to develop an interest in the pharmaceutical industry and its ability to make a positive impact to society.

This passion led me to my next role at CSL, Australia's largest pharmaceutical company and a very logical transition step for a scientist looking to leave academia and make an impact in the pharma industry. As a research scientist in a pharma company, your work often directly impacts the direction and outcomes of new product development. This was a rewarding position that taught me to handle the pressure that comes with the stricter deadlines of being part of a pipeline, rather than an independent research island. My contributions came by being part of the team that established CSL's hydrogen–deuterium exchange capabilities through Trajan's robotics platforms. This was an exciting time for CSL as this advanced technology enabled the acquisition of essential structural data critical to guiding drug and

vaccine development.

Despite a rewarding experience as a researcher at CSL, I still could not shake the feeling I was not yet in the right place. This led to considering a move to the USA to join the big pharma world to make my mark. Reaching out to my network, I caught up with a connection who worked at Trajan for some advice. Their insights would be valuable to succeed at this transition as they had previously moved from England to the USA to further a scientific career. After a lengthy discussion about visas and logistics, I was given a counter suggestion: a job proposal for a role in Australia and before I knew it, I had a brand-new position in a totally new industry. Theirs was one business card I was glad I kept in my network.

Now as a business manager at Trajan, my primary focus is to deliver workflow automation solutions to our scientific community, often requiring an innovative approach and intimate knowledge of scientific methodologies. Here, communication skills such as explaining complex ideas simply to new audiences is crucial to helping customers understand the value that automation can offer them. Playing a key role in new product development where my aptitude to ask the right questions and manage projects, developed through my years as a researcher, has enabled me to make a positive impact in the new products to market.

Taking on a commercial role as a scientist has been challenging and although many of my previous skills are transferrable, it was important to realise that every new role requires professional development. Being responsible for the Trajan Automation brand in the ANZ markets requires knowledge of our customers bases, the sales process and market development. Despite having hung up my lab coat a few years ago, my analytical thinking has allowed me to quickly adapt to tackling these challenges and I am thoroughly enjoying the diversification of my abilities and loving my career at Trajan.

Scientific thinking has always appealed to my logical and inquisitive nature. I quickly discovered that it was this skill that would help me excel in my new role. I often remember a quote from Dr Michael Baker, a former colleague, “The mind of a PhD graduate is already geared to analytical problem solving, which is incredibly useful in the business world.” Scientific skills translate exceptionally into the business sphere where the inquisitive nature of a scientist deployed with a commercial objective is a powerful thing.

My academic journey in science built the foundations that are enabling my success at Trajan. The road to Trajan was certainly unexpected but the journey has taught me many valuable lessons and equipped me with many transferrable skills. So, for anyone looking to step outside of the ‘traditional science career, I would say do not undersell the impact your scientific skills can have in alternative industries. Not to yourself and not to anyone else.

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Other People's IP: When Do I Have Freedom to Operate?

In this issue, Sarah Hennebry, Patent Attorney at FPA Patent Attorneys, takes a look at when and how to consider other people's IP, providing a brief insight to considerations for freedom to operate.

Frequently, considerations of IP strategy are focused on obtaining patent protection. However, questions of freedom to operate (FTO) often come later and by the time people start thinking about FTO, the whole concept of FTO, and often the lack of certainty around FTO, can come as a bit of a shock.

This article seeks to clarify some of the key issues surrounding FTO and to provide some reassurance that not all questions relating to FTO need to be answered during the early stages of technology transfer and establishment of a new spin-out.

You may recall from some of my earlier articles that obtaining patent protection for your invention does not necessarily give you the right to use your invention. This is because any exploitation of your invention could be an infringement of another party's patent.

FTO refers to your ability to develop, make and market a product without infringing the existing IP rights of a third party.

But how do you know whether you have FTO and when should you try to find out?

FTO searches

Determining whether you have FTO involves conducting a search of various patent databases, and considering whether your activities infringe the claims of those patents.

There is no one-size fits all FTO search; ultimately, the type of search you conduct will depend on where you are in the development pipeline for your product(s).

Typically, FTO searches are outsourced to an IP professional, such as a patent attorney, who will be well placed to advise you on the scope of FTO searching required.

When is important

FTO searching can and should be conducted on an ongoing basis during the course of development of your commercial product.

Typically, 'high level', broader FTO searches are conducted early during product development. Although certain FTO issues may be identified as a result of those searches, for the reasons explained below, the identification of these issues may not necessarily mean that product development is stopped. Rather, searching at this stage may be more about identifying potential FTO issues, and making sure these are taken into consideration as product development continues and manufacturing processes are further refined.

For example, during the early stages of commercialisation, the ultimate product you are working towards may be a little unclear and there may be a few options on the table with respect to manufacturing. It can be quite difficult at this stage to structure a comprehensive search that will identify all relevant patents and which is not cost prohibitive! However, a high level search at this stage may assist in identifying key issues, and provide you with an opportunity to consider alternative manufacturing processes to avoid infringement.

In the first instance, you may decide to limit your FTO searching to identification of patents owned by key competitors in the field. This can assist in setting some boundaries around the search and keeping costs manageable.

Later, as the nature of your product and manufacturing process is further defined (and you have a sense of what is critical and what can be modified in your manufacturing process), more comprehensive FTO searching can be undertaken. The breadth of searching conducted at this stage will necessarily be broader than at the early stages: not only will you need to consider patents which potentially cover your product, but you may also need to consider patents which cover aspects of your manufacturing process, formulation and packaging.

In some instances, a potential investor or a party planning to acquire your company may require FTO searching to be done prior to finalising any commercial agreement.

The extent of FTO searching undertaken will also depend on the amount of risk you are willing to undertake. It can be a little unsettling, but it is virtually impossible, particularly during early stage product development, to have 100% certainty that you have FTO. FTO searching at any stage is about knowing and balancing risks.

Where is important too

Patents are granted on a jurisdictional basis, and therefore FTO also differs from country to country. For example, you may be aware of a potentially blocking patent in Australia. However, if that patent is not granted in the US, the FTO issues for you to conduct your business are likely to be different in the US as compared to Australia.

Other People's IP: When Do I Have Freedom to Operate?

This is another reason why it is important to think about the timing and scope of your FTO searches: if you don't yet know *where* manufacturing and key markets are going to be, then you can't determine which countries to limit your FTO search to. Having said this, many companies begin with considering FTO in the major jurisdictions, such as US and Europe (as well as their 'home' territory) – as any major FTO issues will likely be identified through conducting searches for US and European patents.

FTO can and does change

Just as the nature of your commercial product may change during the course of development, so too can the FTO field. This is why it is often recommended that initial FTO searches be kept to a manageable cost and scope, and why regular FTO searching be conducted.

FTO can change because third party patent rights can expire or cease. Cessation of patent rights can occur if a patentee does not pay 'maintenance' fees (also called 'renewal' or 'annuity' fees) to individual patent offices. Thus, an FTO issue you identify in year one, may not be an issue by the time you are ready for product launch, at year ten.

Another reason FTO changes is third parties are regularly filing patent applications. This means that in five years, there could be new patents to consider, resulting from more recent filings. Moreover, there is an 18-month gap between application filing and publication, which means that even if you conduct a comprehensive search today, you won't necessarily identify a patent application filed last year.

Finally, FTO searching will identify a combination of 'pending' patent applications (i.e., those still undergoing examination) and 'granted' patents. For the pending applications, you can't have certainty around the FTO until examination has concluded and the final claim scope determined. You may choose to monitor the progress of examination of any potentially relevant patent applications identified in initial FTO searches, until such time as the FTO position becomes clearer.

What if I identify a potential FTO issue?

Identifying an FTO issue does not mean you have to pack up your bags and go home.

Some FTO issues can easily be resolved through obtaining a license from the party who owns the relevant patent. Depending on the nature of the party or patent right, the license may be obtained at minimimal to no cost.

Further, an FTO issue that is identified could potentially be avoided by making minor modifications to your product or manufacturing process so as to avoid infringement.

It may also be that the nature of the FTO issue is not necessarily relevant to your final product, but rather to the steps you took to develop your product or to obtain regulatory approval. Some FTO issues may be mitigated by certain infringement exemptions (such as the exemptions for seeking regulatory approval or for experimental use) that exist in various jurisdictions.

If you do identify a potential FTO issue, you should seek the advice of your patent attorney who can properly advise you on next steps, and the extent of the risks involved.

Take home messages

- Think about FTO early and frequently
- Consider the level of certainty of FTO you require given where you are in product development and commercialisation
- Think about *where* FTO is required
- Given the changing FTO landscape, it is important to achieve balance in relation to the costs you outlay for FTO searching, particularly in the very early stages of product development
- Think about who to engage to conduct your FTO searches and to provide you with advice: this should be an IP professional such as a patent attorney

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'Codon Wheel' Result

The winner of the April competition is Derrick Lau from Single Molecule Science, UNSW. Congratulations to Derrick, who will receive a gift voucher.

Solution: I AM A MASTER DECIPHERER

ASBMB Awards 2022

SOCIETY MEDALS, AWARDS AND FELLOWSHIPS NOW OPEN

Nomination or application forms for all 2022 Medals, Awards and Fellowships can be obtained from the ASBMB website: https://www.asbmb.org.au/awards/nominations/

Nominations or applications must be submitted no later than **1 November 2021**. Nominations or applications must be emailed to the Secretary of the Society: secretary@asbmb.org.au Please note that hard copies are not required.

There are membership requirements for all nominations/applications. These are outlined on the nomination forms available from the ASBMB website.

NOMINATIONS FOR MEDALS AND AWARDS

*The **Lemberg Medal** is awarded to a distinguished ASBMB member who will present the Lemberg Lecture at the ASBMB annual scientific meeting. The Medal is presented in memory of Emeritus Professor M.R. Lemberg who was the Society's first President and Honorary Member. The award will be made to an individual who has demonstrated excellence in biochemistry and molecular biology and who has made significant contributions to the scientific community. An honorarium is provided by ASBMB.*

*The **Shimadzu Research Medal** is awarded to an outstanding ASBMB member with no more than 15 years since the award of the PhD degree (or equivalent taking any career disruption into account) at the nominated deadline. The successful candidate will present the Shimadzu Medal Lecture at the ASBMB annual scientific meeting. An honorarium is provided through the courtesy of Shimadzu.*

ASBMB Awards 2022

APPLICATIONS FOR TRAVEL AWARDS AND FELLOWSHIPS

*The **Eppendorf Edman ECR Award** is awarded to an ASBMB member with no more than 7 years postdoctoral experience (or equivalent taking any career disruption into account), in recognition of their outstanding research work. The Award provides funds to assist the recipient to attend an overseas conference in a field associated with biochemistry or molecular biology or to visit briefly a research laboratory in Australia or elsewhere to access specialised equipment or to learn new research techniques. The recipient will give a talk at the ASBMB annual scientific meeting. The contribution to travel expenses is provided through the courtesy of Eppendorf South Pacific.*

*The **SDR Scientific Education Award** rewards outstanding achievement in education in biochemistry or molecular biology, especially innovation and creativity in education, with a view to fostering leadership in this important area of the Society's objectives. The Award will enable the recipient to participate in an international conference with a significant focus on education, or to spend a period of time at another institution for the purposes of undertaking developments in education in biochemistry and molecular biology. The recipient will present a lecture within the Education Symposium at the ASBMB annual scientific meeting. The contribution to travel expenses is provided through the courtesy of SDR Scientific.*

*The Awards Committee will also award several **ASBMB Fellowships** to postgraduate students who are no more than 2 years prior to the completion of their PhD degree or recently graduated postdoctoral researchers no more than 2 years subsequent to the award of their PhD degree. The contribution to travel expenses is provided by ASBMB. The most outstanding ASBMB Fellowship applicant may receive the **Fred Collins Award**. These travel grants are awarded to early career researchers, normally resident in Australia, in recognition of their outstanding work in an area of biochemistry and molecular biology. The Fellowships provide funds to assist the recipient to attend an overseas conference in a field associated with biochemistry or molecular biology, or to visit briefly a research laboratory in Australia or elsewhere to access specialised equipment or to learn new research techniques.*

Election of Council 2022

Nominations are called for the following positions on the Council of the Australian Society for Biochemistry and Molecular Biology Inc for 2022: Secretary, Treasurer, Editor, Education Representative, Secretary for Sustaining Members and State Representatives.

The ASBMB Council for the period 1 January 2021 to 31 December 2021 is composed of the following members:	President	J Matthews
	Past President	J Mackay
	Secretary	D Ng #
	Treasurer	M Kvansakul #
	Editor	T Soares da Costa #
	Education Representative	N Samarawickrema §
	Secretary for Sustaining Members	S Jay #
Representatives for:	ACT	C Spry #
	NSW	L Sharpe #
	Vic	L Osellame #
	Qld	M Landsberg #
	SA	M Pitman §
	Tas	I Azimi #
	WA	M Murcha §

Eligible for re-election
§ Position open

Nomination forms are available on the ASBMB website. Nominations for all vacant positions must be signed and seconded by members of the Society. The nominations must be signed by the nominee to indicate his/her willingness to stand. If more than one nomination is received for any position, a ballot will be held at the Annual General Meeting. All members will be notified of any elections and members not attending the Annual General Meeting may submit a proxy form available from the Secretary.

NOMINATIONS MUST REACH THE SECRETARY BY 5PM 16 SEPTEMBER 2021
(14 DAYS BEFORE THE ANNUAL GENERAL MEETING TO BE HELD ON 30 SEPTEMBER 2021)

Annual General Meeting of the Australian Society for Biochemistry and Molecular Biology Inc.

The 65th Annual General Meeting of the Australian Society for Biochemistry and Molecular Biology Inc. will be held will be held on Thursday 30 September 2021 at 1100 hours Australian Eastern Standard Time. The meeting will be conducted online via Zoom: https://uqz.zoom.us/j/86876358976

AGENDA

1. Apologies
2. Confirmation of the Minutes of Annual General Meeting No. 64
3. President's Report
4. Treasurer's Report
5. Fees for 2022
6. Elections to Council
7. ASBMB Awards 2022
8. Amendments to Constitution and By-laws
9. Any Other Business

Dominic Ng
Secretary, ASBMB

New Fellow of the Australian Academy of Science

On 25 May 2021, the Australian Academy of Science announced the election of 22 new Fellows for their outstanding contributions to science, including ASBMB member, Brendan Crabb.

Professor Brendan Crabb AC is Director and CEO of the Macfarlane Burnet Institute for Medical Research and Public Health (Burnet Institute) and was the former President of the Association of Australian Medical Research Institutes (AAMRI), the peak body for 41 independent medical research institutes in Australia. He is internationally recognised for his contribution to the health of poor and vulnerable communities throughout Australia and the world through scholarly research, leadership and advocacy, and through education on a number of fronts.

Brendan's expertise is in the study of infectious diseases, particularly malaria. The long-term aim of his research is the development of a malaria vaccine and the identification of new drugs to treat malaria, goals that fit well with the Burnet Institute's mission to improve the health of disadvantaged communities throughout the world.

Malaria remains one of the world's most important global problems and is a key driver of poverty in much of the developing world. A malaria vaccine has proven elusive and the parasite has evolved resistance to all antimalarial drugs. Brendan is best known for pioneering the development of crucial genetic technologies to study the parasite that causes malaria. He has made several discoveries of significance about human malaria. His team discovered the malaria translocon, a protein machine that allows the translocation of malaria proteins into its host cell, a highly vulnerable point in the parasite's life cycle. He was the first to provide an order for the myriad of receptor–ligand interactions that mediate red blood cell invasion by malaria parasites. He is also a pioneer of genetic technologies in human malaria, describing the first gene knockout in this organism, and has made fundamental discoveries in malaria pathogenesis using these and other approaches.

Brendan Crabb with Burnet Institute staff members in Papua New Guinea. Photo credit: Martin Maden.

His original pioneering work was published in *Cell* and since then, his work has been cited more than 17,468 times in peer-reviewed scientific publications. These genetic technologies led to a paradigm shift in malaria research worldwide, allowing an understanding of the malaria parasite at a molecular detail not previously possible. For example, prior to the availability of these technologies, it was not possible to be certain at a molecular level why malaria parasites become resistant to antimalarial drugs. The technologies Professor Crabb pioneered, working together with his long-time colleague Professor Alan Cowman, played a key role in generating such an understanding for all the mainstay drugs, and as a result of this knowledge public policy relating to the use of antimalarial drugs is greatly assisted.

Also as a result of these technologies, a similar level of understanding is now reached in many other aspects of malaria biology, such as understanding why the parasite causes severe disease and how the parasite invades red blood cells. The latter understanding has led to the identification of new vaccine targets and drug therapy approaches.

Queen's Birthday Honours for ASBMB Members

Professor Susan Fletcher was awarded an Officer of the Order of Australia (AO) for distinguished service to medical research, to neurological science, and to the treatment and support of those with muscular dystrophy.

Professor Fletcher is an internationally renowned RNA therapeutics scientist, molecular biologist, Chief Scientific Officer for PYC Therapeutics and Senior Principal Research Fellow at Murdoch University. Professor Fletcher has been an integral member of the group that pioneered therapeutic antisense oligomer development, with a focus on treating Duchenne muscular dystrophy (DMD), building a 25-year partnership with Professor Steve Wilton.

The Wilton–Fletcher group demonstrated specific 'exon skipping' in a mouse dystrophinopathy model, was the first to recognise the clinical potential of morpholino oligomers and describe a complete panel of oligomers to target every dystrophin exon. The novel compound eteplirsen (ExonDys51®), licensed by Sarepta Therapeutics, was the first drug and only drug to have altered the natural history of DMD and received accelerated approval in 2016. Additional compounds developed by the research team, golodirsen (VyonDys53®) and casimersen (Amondys45), which were designed to address other subsets of DMD mutations, also received accelerated approval, in 2019 and 2021, respectively.

Professor Fletcher more recently collaborated with renowned ophthalmologist Dr Fred Chen to undertake mechanistic studies on inherited retinal disease and develop novel genetic drugs to treat blinding diseases. ASX-listed drug development company PYC Therapeutics and Lions Eye Institute formed Vision Pharma to undertake translation of novel drug candidates. As Chief Scientific Officer of PYC Therapeutics, Professor Fletcher now directs additional projects to develop antisense therapies for undisclosed central nervous system diseases.

Professor Steve Wilton was awarded an Officer of the Order of Australia (AO) for distinguished service to medical research, to neurological science, and to the treatment of muscular dystrophy.

Steve Wilton completed his PhD in Biochemistry, Adelaide University in 1984 and worked for two biotechnology companies before joining the Australian Neuromuscular Research Institute in 1991. He is one of the pioneers of splice switching antisense oligomers to treat Duchenne muscular dystrophy (DMD). Targetting an exon flanking frame-shifting genomic deletions can restore the reading frame and allow functional dystrophin expression. His laboratory demonstrated proof-of-concept in animal models, designed oligos to excise every dystrophin exon during mRNA maturation and identified the morpholino oligomers as being most clinically relevant. The US Food and Drug Administration granted accelerated approval for the first dystrophin exon-skipping drug, eteplirsen, in September 2016, a second drug, golodirsen, in 2019, and casimersen in February 2021, as treatments for DMD (licensed to Sarepta Therapeutics, Cambridge, Massachusetts, USA).

He is now the Director of the Centre for Molecular Medicine and Therapeutics at Murdoch University, and the Perron Institute for Neurological and Translational Science (previously known as ANRI) in Perth. His Molecular Therapy laboratory is developing oligo-based treatments for many inherited and acquired diseases, several with national and international collaborators.

Together with Professor Susan Fletcher, Professor Wilton was named the 2012 Western Australian Innovator of the Year Award and received the 2013 Australian Museum Eureka Award for Translational Medicine. Professor Wilton won the 2014 LabGear Australia Discovery Science Award by ASBMB, was a finalist in the 2016 Western Australian of the Year (Professions Category) and a finalist for the 2019 Prime Minister's Award for Science.

Queensland Protein Group: an ASBMB Special Interest Group

The Queensland Protein Group (QPG) was established in 1987 and operates under a constitution accepted in 2004. The QPG committee comprises members from a range of institutions including the University of Queensland (UQ), Queensland University of Technology (QUT), Griffith University (Nathan and Gold Coast campuses) and the Queensland Institute of Medical Research. The current QPG Office Bearers are Brett Collins (President), Mehdi Mobli (Secretary), Thomas Ve (Treasurer) and Michael Landsberg (IT Officer). General committee members include Bostjan Kobe, Yanni Chin, and Glenn King.

The primary activities of the QPG are in coordinating the biannual East Coast Protein Meeting (ECPM) together with our sister group the Sydney Protein Group, and to organise annual symposia for early career researchers and students in Queensland protein science. Sadly, in 2021 the mutual decision was made that ECPM will be postponed until next year due to COVID-19 and scheduling conflicts. However, we are very excited at the idea that we might be able to all get together face-to-face again next year at the usual Coffs Harbour venue to see all of the great protein science research being done by our early career protein scientists!

The goal of the ECPM is to provide a forum for postdocs and students to present their work in any protein-related field; with a high ratio of oral presentations by graduate students and postdocs to traditional presentations by senior scientists. At the 2019 meeting, Associate Professor Denise Wootten (Monash University) and Professor Colin Jackson (ANU) gave plenary lectures. The meeting included an ECR Career advice session with plenary speakers such as Sylvia Johnson from BMG Labtech, and various student and postdoc talk and poster prizes.

ASBMB QPG Travel Award – Lin Luo, IMB, UQ
ASBMB SPG Travel Award – James Walshe, Victor Chang Cardiac Research Institute
Student Travel Award – Michael Healy, IMB, UQ
Student Travel Award – Megan Cherry, University of Wollongong
John Morris Student Travel Award – Khushboo Patel, UQ
Formulatrix Student Travel Award – KM Rifat Faysal, UNSW
Best Student Poster – Ryan Hall, IMB, UQ
Best Student Poster – Olivia Tan, Griffith University
Best Postdoc Poster – Adam Damry, ANU
Best Student Talk – Gurleen Kaur, University of Wollongong
Best Student Talk – Shelley Barfoot, UQ
Best Postdoc Talk – Andrew Walker, IMB, UQ

2019 East Coast Protein Meeting attendees.

2019 East Coast Protein Meeting student and postdoctoral prizewinners.

In November 2021, the QPG will be hosting a local student and postdoctoral awards symposium (details to be announced). Most importantly, QPG is keen to bring new young scientists to the Executive and Organising Committee of our Special Interest Group. The symposium will be an opportunity to elect new office bearers, and to bring more people into the regular committee so we will be very keen to hear from people interested in taking on these roles to continue the QPG traditions and activities into the future.

Brett Collins, QPG President
b.collins@imb.uq.edu.au
Website https://www.asbmb.org.au/special-interest-groups/queensland-protein-group/
Twitter @QueenslandProt1

ASBMB Welcomes New Members

A warm welcome is extended to the following new members who joined ASBMB from 1 July 2020 to 30 June 2021

OVERSEAS
MR LUKMAN AFOLABI, NIGERIA
DR ANTONIO CALABRESE, UNITED KINGDOM
A/PROF DAMIEN HALL, JAPAN
DR NICHOLAS LIAU, USA

ACT
MR JAMES ANTONEY
DR WEIDONG JING
MR CARL McCOMBE
MR MATTHEW MORTIMER
MS MISBAH NAZ
MISS RAQUEL ROCHA
MR MATTHEW SPENCE
MR DANIEL YU

NSW
MS FAKHRI ATHARI
MR MAX BAKER
MISS TARA BARTOLEC
MS SARAH BELL
DR JODI BREWSTER
MISS SAYANTANI CHATTERJEE
MR ZHENG CHEN
MISS ICHIA CHEN
MRS ANASTASIA CHERNYKH
DR BRET CHURCH
MR DONOVIN COLES
DR LUKE DOWMAN
DR JOSEP FONT SADURNI
MISS CHARLOTTE FRANCK
DR SANDY GONZALES
DR SOPHIE HERTEL
MR KYLE HOEHN
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DR MIYA JOHN
DR DERRICK LAU
DR YU HENG LAU
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MISS IRENE MORONI
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DR TAYLOR SZYSZKA
DR GOKHAN TOLUN
MR JULIAN UGONOTTI
MS NATASCHA WEINBERGER
DR MARK WHITE
DR NIRMANI WIJENAYAKE
MISS CECY XI
MS YICHEN (JESSICA) ZHONG

QLD
MISS ZAINAB AL-HAMEEDAWI
MISS REEM ALHULAIS
MISS LUCY BADMAN
MR CHRISTOPHER BATHO
MR BEN CHESTERMAN
DR YI (ANDREA) CUI
MS KAREN EAGER
DR BIRGITTA EBERT
MS SHERIDAN HELMAN
MS KULWINDER KACHURA
MR EDWARD KERR
A/PROF DANIEL KOLARICH
MISS SELINA McLEOD
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MS TIAN XIE
MISS YINGDIE YANG
DR PAULINE ZAENKER

Australian Society for Biochemistry and Molecular Biology Inc
PUBLICATION SCHEDULE FOR *AUSTRALIAN BIOCHEMIST*, volume 52, 2021

Issue	ASBMB Content	Copy Deadline	Issue Date
April 2021 52(1)	Profiles of medal, award and fellowship winners Nominations for Executive/Council	Monday 8 February	Monday 5 April
August 2021 52(2)	Nominations for medals, awards and fellowships Notice of AGM/proposed constitutional changes	Monday 7 June	Monday 2 August
December 2021 52(3)	Annual reports FAOBMB/ASBMB conference report	Monday 4 October	Monday 6 December

In Memoriam

Paul Whitfeld 1927–2021

Plant scientist, Paul Whitfeld, who had a distinguished career with CSIRO, passed away on 16 March 2021.

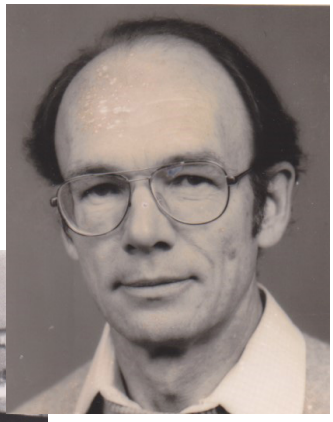
Paul was born on 6 December 1927 in Gordon, Sydney. Paul was an outstanding plant biochemist and molecular biologist. After graduating from the University of Sydney in 1949 with a BSc (Hons), he joined CSIRO Animal Health in Glebe as an Ian McMaster Scholar working with Dr WP Rogers on the molecular biology of mouse malaria. He published his first paper in *Nature* in 1952 as a single author. He was encouraged to do a PhD and obtained a CSIRO Student Fellowship to study at the Molteno Institute of the University of Cambridge in 1952. There he worked with Roy Markham, FRS on plant viruses, developing the first method for sequencing nucleic acids (in this case RNA), which was later improved and extended to DNA by Walter Gilbert, Allan Maxam and Frederick Sanger.

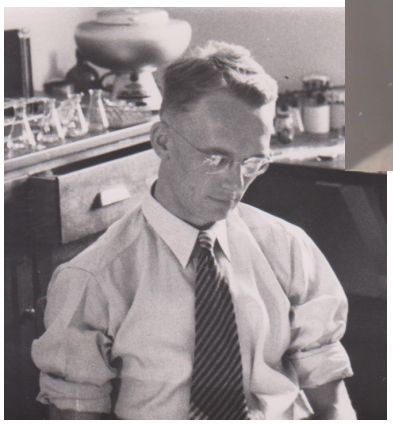
Paul was associated with CSIRO for 53 years and spent most of his career (46 years) at Plant Industry. He took study leave as a Gosney Research Fellow to work at Caltech in 1954 and in 1960 as a Senior Fulbright Fellow at the University of California, Berkeley. In 1968, he was a Visiting Professor at the University of Arizona with Milton Zaitlin and in 1969, he was back in Cambridge at the MRC Laboratory of Molecular Biology.

Paul's early research was on the serious plant pathogen, tobacco mosaic virus, which he regarded as a source of a very high molecular weight nucleic acid that was homogeneous and therefore an ideal substrate for his meticulous approach to biochemistry. He even determined part of the RNA sequence, albeit a short sequence, which was a major achievement at the time.

Paul went on to show that pancreatic ribonuclease and spleen phosphodiesterase were not just hydrolytic enzymes but could also catalyse the synthesis of oligonucleotides.

The majority of Paul's career was devoted to understanding the molecular biology of chloroplasts. The CSIRO team at Plant Industry that worked on chloroplasts was of a critical mass and became very well-known. It included Paul's close colleagues, Don Spencer and Rick Bottomley, as well as John Kirk, Hal Hatch, Jan Anderson and Keith Boardman. The team grew further as younger scientists were appointed and high-profile visitors were attracted to spend their sabbaticals in Canberra. Paul was a central member of this world leading group that was instrumental in defining the chloroplast genome, showing that it was prokaryotic in nature and that it replicated its own DNA. Among many discoveries, Paul provided great insights into the complicated processing of multicistronic transcripts in chloroplasts and found introns in genes where none were expected.





Paul was a model 'scientific citizen' and was on the Editorial Board of *Plant Molecular Biology* for nearly two decades. He was a foundation member of the Board of the International Society for Plant Molecular Biology. He was also a member of the Recombinant DNA Monitoring Committee, an important precursor of the OGTR which regulates genetically modified organisms in Australia. He also served for five years on the Australian Research Grants Committee, the forerunner of the current ARC. He served as Treasurer of the Australian Biochemical Society (now the ASBMB) from 1973 to 1977.

Paul built a wide international network and was a much sought after invited speaker at conferences, especially in Europe and the USA.

Paul Whitfeld epitomises the quiet achiever and is one of CSIRO's unsung heroes. He was a familiar figure on his daily bike ride: rain, hail or shine. He was a mentor to many, long before this term became widely used and would go to great lengths to demonstrate techniques if required, generously giving his time. Although Paul was very shy, he was interested in people both at a personal and professional level and was a fixture at the Friday afternoon Happy Hour interacting with staff at all levels. He could always be counted on to lend a sympathetic ear to your concerns. We will miss his friendly critiques of our work and his gentle dissection of our ideas that were half baked until he had a good go at them.

He is survived by his son, Peter, and his daughter, Janet.

A great loss of a friend and colleague.

TJ Higgins

ComBio 2022 MELBOURNE

Melbourne Convention and Exhibition Centre

South Wharf, MELBOURNE 27 - 30 September 2022

We extend a warm invitation to you to be part of ComBio2022 to be held at the Melbourne Convention and Exhibition Centre (MCEC). After a long pause in our plans, we anticipate that this will be a vibrant return to face-to-face scientific exchange with our colleagues.* ComBio2022 will be held in a spectacular arm of MCEC that is adjacent to the Yarra River and walking distance from numerous restaurants and cafes serving the widest imaginable variety of food. Melbourne is home to many sporting and cultural events and world class museums and galleries plus an aquarium are in the immediate vicinity. There is also an abundance of budget priced accommodation within walking distance of MCEC. ComBio in Melbourne in the Spring of 2022 should be a 'must' for all. (*Covid-safe protocols will be in place as advised closer to the date)

We are pleased to announce that the Opening Keynote Plenary Lecturer is Nobel Laureate Jennifer Doudna and the ASBMB Grimwade Keynote Plenary Lecturer is Cynthia Kenyon.

Jennifer Doudna is an internationally renowned Professor of Chemistry and Molecular and Cell Biology at U.C. Berkeley. She and her colleagues rocked the research world in 2012 by describing a simple way of editing the DNA of any organism using an RNA-guided protein found in bacteria. This technology, called CRISPR-Cas9, has opened the floodgates of possibility for human and non-human applications of gene editing and was the basis for her co-award of the Nobel Prize in 2020. Jennifer is a Howard Hughes Medical Investigator, a member of the National Academy of Sciences, the National Academy of Medicine, the National Academy of Inventors and the American Academy of Arts and Sciences.

Cynthia Kenyon is Vice President, Aging Research, at Calico and world expert on the genetics of aging. In 1993, Cynthia's discovery that a single-gene mutation could double the lifespan of the roundworm *C. elegans* has led to a new understanding of the genetics of aging. She has received many honors and awards for her findings. Cynthia is a member of the US National Academy of Sciences, the American Academy of Arts and Sciences, and the Institute of Medicine and she is a past president of the Genetics Society of America.

Plenary Speakers:

- **Siobhan Brady,** *University of California, Davis, CA, USA*
- **Jamie Cate,** *University of California, Berkeley, CA, USA*
- **Jennifer Doudna,** *University of California, Berkeley, CA, USA*
- **Niko Geldner,** *Université de Lausanne, Switzerland*
- **Wolfgang Haak,** *Max Planck Institute, Germany*
- **Tony Hunter,** *Salk Institute, CA, USA*
- **Cynthia Kenyon,** *Calico LLC, South San Francisco, CA, USA*
- **Cristina Lo Celso,** *Imperial College London, London, UK*
- **Jodi Nunnari,** *University of California, Davis, USA*
- **Roy Parker,** *University of Colorado, Boulder, USA*
- **Daniel St Johnston,** *Gurdon Institute, Cambridge, UK*
- **Emma Teeling,** *University College, Dublin, Ireland*
- **Lisette Waits,** *University of Idaho, USA*

ASBMB Education Plenary

- **Martin Westwell, Chief Executive** *SACE Board of South Australia*

Conference Streams:

- Proteins, Peptides and Structural Biology
- Plant Biology
- Development, Stem Cell and Regenerative Medicine
- Evolutionary and Ecological Genetics
- Mechanisms of Disease
- Genomics, Genome Editing and Systems Biology
- Biochemistry and Metabolism
- Cell Biology and Signalling
- Education

Photos courtesy of MCVB

Siglo Bar on Spring Street by Ben King

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Registration/Exhibition
Sally Jay
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KEY DATES:

Earlybird Registration Deadline:
Friday, 24 June 2022

Abstract Submission Deadline:
Friday, 24 June 2022

Guaranteed Hotel Reservation Deadline:
Friday, 5 August 2022

ComBio2022 incorporates the annual meetings of:

- Australian Society for Biochemistry and Molecular Biology
- Australian Society of Plant Scientists
- Australia and New Zealand Society for Cell and Developmental Biology
- Genetics Society of AustralAsia
- New Zealand Society for Biochemistry and Molecular Biology

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New T Cell Kit for LNP-based mRNA Delivery to T Cells

The rapid development of COVID-19 vaccines using lipid nanoparticles (LNP) to encapsulate mRNA have demonstrated the power of LNP technology. This novel approach has opened up new opportunities for the manufacture of gene-edited cell therapies and *in vivo* gene targeting.

The GenVoy-ILM T Cell Kit for mRNA, is a new cell therapy reagent optimised for the delivery of mRNA into activated primary human T cells. Using LNPs designed to exploit endogenous uptake pathways, this method efficiently delivers mRNA into activated human primary T cells to mediate titratable, uniform protein expression levels with high cell viability. The GenVoy-ILM T Cell Kit for mRNA enables a higher proportion of T cells to be engineered, making it a more potent gene delivery method than electroporation.

Preparing mRNA-LNPs from the GenVoy-ILM T Cell Kit for mRNA is quick and simple. Formulated on the NanoAssemblr® Spark™ instrument and cartridges, one preparation **takes under 5 minutes to prepare.** The resulting mRNA-LNPs are also compatible with established T cell culture media allowing rapid integration into existing workflows.

The combination of non-disruptive mRNA delivery technology and seamless integration with cell culture protocols eliminates cell recovery times post-treatment to accelerate the production of T cell therapies.

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Tecan has launched the Frida Reader™ for the Fluent® Automation Workstation, offering researchers the ability to quantify nucleic acids without sample loss. This unique solution performs UV absorbance-based quantification and purity assessment in a hanging drop, avoiding the consumption of rare and precious samples following nucleic acid purification (NAP). This latest offering further expands Tecan's portfolio of workflow automation solutions and reagents to cover all your genomics needs.

Efficient NAP is crucial prior to applications such as NGS or PCR/qPCR, but laboratories working with low volume, high value samples cannot always afford to lose a portion of their samples for quantification and purity assessment. This can lead to downstream failures if insufficient genetic material is available for processing, or if samples are contaminated with excess protein or salts, wasting time and causing unnecessary consumption of expensive reagents. The Frida Reader eliminates this issue by allowing assessment of sample quality and quantity without any sample loss, aspirating the sample back into the pipette tip after performing hanging drop absorbance measurements. It uses four separate wavelengths – 230, 260, 280 and 320 nm – to allow real-time nucleic acid quantification in the 5 to 1,000 ng/µL range, as well as QC measurements to identify protein contamination. Designed to work in combination with the Fluent platform's Air Flexible Channel Arm™, this system only occupies a single SLAS-format position on the Dynamic Deck™, and is compatible with both benchtop and cabinet-based instrument configurations, offering flexible integration for labs looking to eliminate sample loss for quantification and QC from their workflow.

To learn more about Tecan's Frida Reader, go to www.tecan.com/fridareader

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An essential part of the early phase of drug discovery is screening libraries of compounds to detect potential 'hits' of a therapeutic target. Screens conducted in 1536 well plates require speed and sensitivity, measured in seconds, and in less than 10 µl / well. The reader also needs to be reliable, as errors occurring during a screen result in repetitions, loss of time, reagents and consequently money.

BMG LABTECH's PHERAstar *FSX* masters all these requirements in all detection modes, making it popular in screening facilities. For screening assay development and testing, the CLARIOstar *Plus* is the perfect addition to develop and characterise an assay before transitioning to high throughput. www.bmglabtech.com/screening/

BMG LABTECH are proud to support the WEHI National Drug Discovery Centre, as a core supplier for a drug discovery and high throughput screening (HTS) resource for Australian Science, with both the PHERAstar *FSX* and CLARIOstar *Plus* supporting this research. www.wehi.edu.au/research/research-technologies/drug-discovery

As a company, BMG LABTECH's focus is always on supporting our customers to achieve their research outcomes. If we can help your laboratory's assay development, or simply loan an instrument to ensure assay compatibility for HTS, please contact our team on +61 3 5973 4744 or email australia@bmglabtech.com.au.

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Eppendorf has always worked closely with researchers to understand their precise needs and develop the right pipette or solution for every application. Over the years, Eppendorf has continued to evolve the pipette through the advent of electronic pipetting and automated liquid handling systems to maximise reproducibility when working with micro- and nanoliter volumes. Today, Eppendorf's customers can choose from a broad range of instruments, consumables, and services to suit their liquid handling needs and further accelerate their research.

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By monitoring function, cell morphology can be observed in real time for more than 14 days. Multi-position capture provides more meaningful and reliable results for a target location than single point imaging.

The Celloger Mini fits easily into a standard CO_2 incubator and uses bright-field technology to provide high quality images and time-lapse videos needed for cell-based research workflows and applications such as **wound healing assay, cell proliferation,** cytotoxicity assay, **confluency,** and growth curve data.

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