Australian Biochemist

The Magazine of the Australian Society for Biochemistry and Molecular Biology Inc.

December 2024, Volume 55, Number 3

ISSN 1443-0193

Table of Contents

Front Cover

Grimwade Award Lecturer Professor Brian Kobilka (Stanford University, USA), joint winner of the Nobel Prize in Chemistry 2012 for research on the structure and function of G protein-coupled receptors, presents at Biomolecular Horizons 2024.

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

Australian Biochemist Editorial Committee

Note from the Editorial Officer

It is my great pleasure to present this issue of the *Australian Biochemist* to you. I hope that you take some time over the holiday season to enjoy browsing the amazing breadth of articles featured in this issue! We can be proud of the many innovations forged by our contributors, ranging from world-class scientific research, effective education at universities around Australia, collaboration with First Nations People, to drug discovery and development at a local immuno-oncology biotech.

Congratulations to Leann Tilley and her dedicated team for coordinating the Biomolecular Horizons 2024 international conference that incorporated ComBio2024. Reports about this vibrant multifaceted conference start on page 30 of this issue.

We farewell two members of the Editorial Committee who are retiring after many years of valued service – Joe Kaczmarski, who created clever puzzles for our competitions, and Gabby Watson, who coordinated both the SDS Page students' feature and the travel reports. Thank you, Joe and Gabby, for your excellent contributions to this magazine!

I would like to thank our Acting Editor, Doug Fairlie, who has captained the *Australian Biochemist* for the past four issues. Doug is the Editorial Committee member who coordinates the inspiring Publications with Impact feature of the *Australian Biochemist*, and I am extremely grateful that he volunteered to act as Guest Editor while our Editor, Tatiana Soares da Costa, was on parental leave. Doug's editorial judgement, enthusiasm and reliability enabled our magazine to flourish. I look forward to welcoming Tatiana back to the helm in 2025.

Wishing all our members a happy and safe holiday season, and a successful and fulfilling 2025.

Liana Friedman
Editorial Officer, *Australian Biochemist*
ASBMB

Publications with Impact

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 doug.fairlie@onjcri.org.au.

WNT Pathway Under Siege: the Role of NDRG1 and PKCα in Tumor Suppression

Gholam Azad M, Hussaini M, Russell TM, Richardson V, Kaya B, Dharmasivam M, Richardson DR*. Multi-modal mechanisms of the metastasis suppressor, NDRG1: inhibition of WNT/β-catenin signaling by stabilization of protein kinase Cα. *J Biol Chem* 2024;300:107417.
***Corresponding author: d.richardson@griffith.edu.au**

Pancreatic cancer is one of the deadliest types of tumours, with an estimated five-year survival rate of less than 10%. Its high mortality is attributable to its aggressive nature and late detection. This challenge has driven research to delve deeper, to increase understanding of the molecular mechanisms involved in the pathogenesis of the disease, to find new targets, and to develop innovative pharmacological strategies.

One such promising strategy involves therapeutic targeting of the potent metastasis suppressor, N-myc downstream-regulated gene 1 (NDRG1). Recent findings by our Centre have demonstrated that NDRG1 could play a crucial role in inhibiting one of the critical pathways that drive pancreatic cancer growth and metastasis, namely the WNT/β-catenin pathway.

Moreover, we have taken advantage of this mechanism with patented new anti-cancer drugs that pharmacologically upregulate NDRG1 to inhibit the WNT/β-catenin pathway. This therapeutic strategy offers a potential breakthrough in cancer treatment.

The WNT/β-catenin pathway: a double-edged sword

The WNT/β-catenin pathway signalling pathway is essential for critical cell functions like growth and differentiation. However, it is often dysregulated in several cancers, such as pancreatic, colorectal, melanoma and hepatocellular carcinoma, leading to uncontrolled tumour growth and metastasis. When the WNT pathway is active, β-catenin, the key player, is stabilised and accumulates in the cell. This leads to its translocation to the nucleus, activating genes that promote cancer growth and survival (e.g. *cyclin D1*).

Given its critical role in cancer development and metastasis, targeting the oncogenic WNT/β-catenin pathway as a potential therapeutic approach has proven challenging due to the complexity of its regulation. This is where NDRG1 comes into the picture.

NDRG1: The Potent Metastasis Suppressor

The anti-oncogenic and anti-metastatic activities of NDRG1 are mediated via its ability to inhibit a broad range of pathways responsible for angiogenesis, tumour growth and metastasis such as WNT/β-catenin, transforming growth factor-β (TGF-β), phosphatidylinositol-3-kinase (PI3K)/protein kinase B (AKT) and pathways involving the receptor tyrosine kinases, etc. The molecular mechanism of action of NDRG1 is mediated via its association with other proteins, such as the tumour suppressor, mitogen-inducible gene-6 (MIG6), leading to MIG6 stabilisation, which results in downregulation of EGFR via lysosomal degradation.

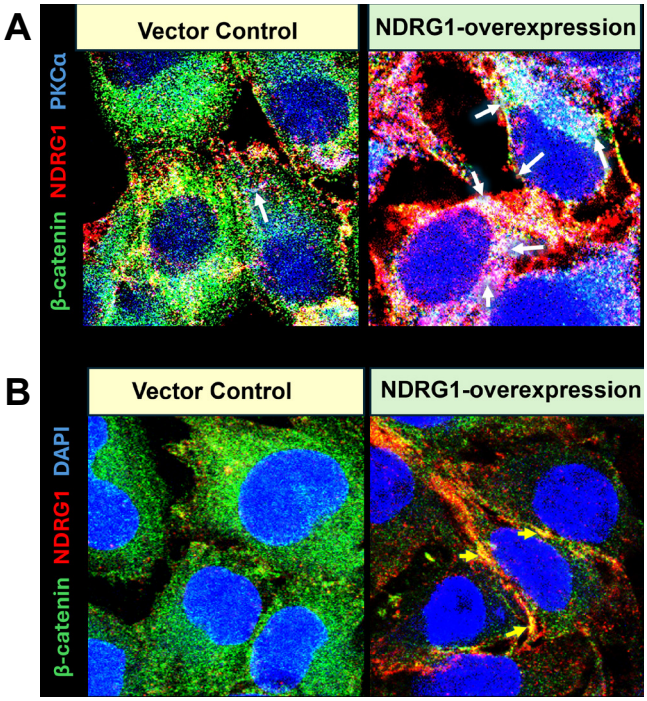
NDRG1 and PKCα: the power partnership targeting the WNT pathway

In our recent paper published in the *Journal of Biological Chemistry*, we demonstrated that NDRG1 overexpression in PANC-1 pancreatic cancer cells (N1) leads to a significant decrease in β-catenin levels, the key player in the WNT pathway, compared to vector control (VC) cells. Subsequently, the downstream target protein of the WNT pathway and the driver of cancer progression, cyclin D1, was also significantly downregulated.

The study uncovered for the first time that NDRG1 mediated the inhibition of oncogenic β-catenin activity via partnering with the serine/threonine kinase, protein kinase C alpha (PKCα). NDRG1 overexpression in PANC-1 cells resulted in a significant increase in PKCα compared to VC cells. Similar effects were observed in multiple other tumour cell types. Through a series of techniques such as co-immunoprecipitation and confocal microscopy, it was demonstrated the increase in PKCα levels with NDRG1 overexpression could be due to the association between these proteins, which results in PKCα stabilisation and an increase in its half-life.

This new partnership between NDRG1 and PKCα results in the inhibition of the WNT/β-catenin pathway, as both NDRG1 and PKCα associate with β-catenin to generate a potential metabolon. Metabolons are protein complexes that facilitate efficient substrate processing,

Publications with Impact



Confocal microscopy of PANC-1 pancreatic cancer cells transfected with Vector Control (VC; low NDRG1) and NDRG1 plasmid (N1; high NDRG1), probed for β-catenin (green), NDRG1 (red) and PKCα (blue).

*(**A**) Possible metabolon formation indicated by the triple colocalisation (white; arrows) between β-catenin (green), NDRG1 (red), and PKCα (blue) in NDRG1-overexpressing cells. This results in reduced β-catenin levels and nuclear localisation in N1 cells compared to VC cells.*

*(**B**) Colocalisation (yellow; arrows) of NDRG1 and β-catenin near the plasma membrane of N1 cells relative to VC cells.*

Figure panel from J Biol Chem *2024;300:107417 (CC-BY 4.0 licence).*

and are crucial to identify to elucidate the biochemical pathways within cells.

Formation of this potential metabolon was evident via co-immunoprecipitation studies and by confocal microscopy using triple colocalisation of NDRG1, PKCα and β-catenin that results in white pixels (indicated by white arrows; **Fig. A**) in N1 cells compared to VC cells. This potential metabolon would result in the phosphorylation of β-catenin at Ser33, 37 and Thr41 mediated by PKCα, leading to the subsequent degradation of total β-catenin levels. This effect suppresses cyclin D1 levels, a key driver of cancer cell proliferation.

Furthermore, colocalisation studies examining NDRG1 and β-catenin revealed that in N1 cells compared to VC cells, β-catenin remains localised near the cell membrane (**Fig. B**). This localisation may be crucial in the formation of the adherens complex that inhibits cell migration and prevents metastasis.

The door to future therapeutics: thiosemicarbazone drugs to block the WNT pathway in cancer

This study also explored the potential therapeutic implications of the novel NDRG1-mediated regulatory mechanism on the oncogenic WNT/β-catenin pathway through NDRG1-inducing thiosemicarbazones. These drugs are tailor-designed and characterised by our laboratory and include Dp44mT, DpC and the new generation agent, PPP44mT, which are patented and undergoing extensive development.

The unique mechanism of action of thiosemicarbazones includes their ability to upregulate NDRG1 via hypoxia-inducible factor-1α. PANC-1 pancreatic cancer cells treated with the thiosemicarbazones, Dp44mT, DpC and PPP44mT for 24 hours demonstrated a significant increase in PKCα levels following NDRG1 induction. Subsequently, the decrease in β-catenin levels and its downstream target, cyclin D1, highlights a promising therapeutic approach to inhibit the oncogenic WNT/β-catenin pathway. These results through pharmacological induction of NDRG1 nicely mirrored our studies after genetic manipulation of this molecule.

While this study focuses only on pancreatic cancer, the findings may extend to other cancers. We observed the same NDRG1-PKCα relationship in melanoma, neuroblastoma and breast cancer cells. Given the WNT/β-catenin pathway's role in tumours like colorectal, liver and breast, our thiosemicarbazone therapies could have broader oncological applications, with anticipated commercialisation and clinical trials.

Mahan Gholam Azad and Des Richardson
Centre for Cancer Cell Biology and Drug Discovery
Griffith University

From left: Mahan Gholam Azad, Mohammed Hussaini, Tiffany Russell, Vera Richardson, Busra Kaya, Mahendiran Dharmasivam and Des Richardson.

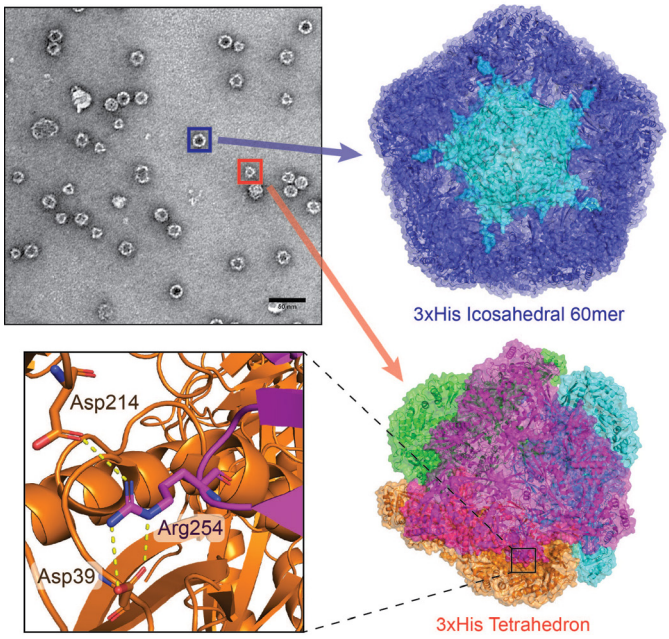
Publications with Impact

Small Changes Lead to Drastic Rearrangements in Protein Cages

Szyszka TN*, Andreas MP, Lie F, Miller LM, Adamson LSR, Fatehi F, Twarock R, Draper BE, Jarrold MF, Giessen TW, Lau YH*. Point mutation in a virus-like capsid drives symmetry reduction to form tetrahedral cages. *Proc Natl Acad Sci USA* 2024;121(20):e2321260121. *Corresponding authors: taylor.szyszka@sydney.edu.au, yuheng.lau@sydney.edu.au

Protein-bound compartments are ubiquitous throughout nature, from microcompartments such as the cyanobacterial carboxysome through to viral capsids and protein cages. Encapsulins are a family of prokaryotic protein cages which self-assemble from many copies of a single protein monomer to form icosahedral cages that structurally resemble simple viral capsids. Their native prokaryotic functions are diverse, but they are most commonly thought to store important resources such as iron, or house enzymatic reactions that benefit from sequestration.

Encapsulins possess many features which make them attractive to biotechnology, such as robust self-assembly, high thermal stability and the ability to encapsulate non-native protein cargo. Most encapsulins are accompanied by a targeting peptide, which can form a specific non-covalent interaction with the interior surface of each cage monomer. By appending this targeting peptide to the C-terminus of a desired protein cargo, packaging will occur during self-assembly.



Transmission electron microscopy image of the 3xHis mutant shows the spherical and triangular particles corresponding to the icosahedral 60mer (blue box) and the tetrahedron (orange box) respectively, with arrows pointing to the corresponding Cryo-EM structures. Cut-out box shows the new salt bridge interactions stabilising the tetrahedron.

One biotechnology application of encapsulins is the construction of nanoreactors. Different properties of the encapsulin cage can be tuned to optimise the diffusion of substrates and products for a packaged enzyme. This diffusion is mediated through the encapsulin pores which are found at the vertices of the cages. In 2022, our lab published a study (1) where we mutated the pores of our smallest encapsulin, a 60mer cage from *Thermotoga maritima*. We found that we could create pores of different sizes and charges using mutagenesis. To build upon these results in a larger encapsulin cage, we turned our attention to the encapsulin from *Myxococcus xanthus*. This cage is dimorphic, forming a majority of 180mer assemblies with a 60mer minority population.

We began by mutating 3 pore-lining residues to histidine. Immediately, we noticed the purification of this mutant cage was not proceeding as expected. We noticed the absence of 180mer assemblies and a complete shift to smaller cages reminiscent of the 60mer. Upon analysis using mass photometry, charge detection mass spectrometry and transmission electron microscopy, we also discovered the emergence of an even smaller species with 30–40 monomers. With collaborators at the University of Michigan, we elucidated the structure of this cage using cryo-electron microscopy, revealing the first known tetrahedral encapsulin cage with a striking pyramid-like morphology, in stark contrast to the more spherical icosahedral 60mer.

Interrogating this further, we performed a mutagenesis study, making 3xAla, 3xLys, and 3xAsp mutants at the same position, as well as single histidine mutants at each of the three positions. We found evidence of the tetrahedron in every sample, with a specific pattern emerging in the single mutants. We noticed that each single mutant had a different proportion of tetrahedron, with K199H more closely resembling the wildtype and T200H and G201H having higher proportions of the tetrahedron.

The results of the mutagenesis make sense when looking at the tetrahedral structure. While one would intuitively anticipate new specific interactions forming at the pore and locking the tetrahedron into place, this is not the case. The new protein–protein interaction responsible for stabilising the tetrahedron is not at the pore, but rather in the targeting peptide binding site, where an arginine is now positioned between two aspartic acid residues. To verify this, we co-expressed the 3xHis mutant with a

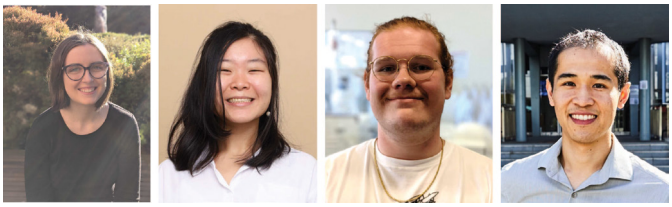
cargo protein and found the tetrahedron was completely abolished in the presence of protein cargo.

Taken together, these results have suggested that encapsulins may have greater structural plasticity than previously anticipated. This also has implications for protein cage engineering and de novo design, where small changes to a monomer sequence can propagate through a multimeric structure to create architecturally distinct cages for applications such as vaccines or nanocarriers. Most of all, this work has added another dimension to our encapsulin engineering efforts and deepened our appreciation for the complex butterfly effects that are propagated by the process of self-assembly.

Taylor Szyszka and Yu Heng Lau
School of Chemistry, University of Sydney

Reference

1. Adamson LSR, Tasneem N, Andreas MP, Close W, Jenner EN, Szyszka TN, Young R, Cheah LC, Norman A, MacDermott-Opeskin HI, O'Mara ML, Sainsbury F, Giessen TW, Lau YH. *Sci Adv* 2022 4;8(5):eabl7346.



University of Sydney team members, from left: Taylor Szyszka, Felicia Lie, Lachlan Adamson and Yu Heng Lau.

Discovery of Key Cancer Gene Opens Unexplored Therapeutic Avenues

Murray JE, Valli E, Milazzo G, Mayoh C, Gifford AJ, Fletcher JI, Xue C, Jayatilleke N, Salehzadeh F, Gamble LD, Rouaen JRC, Carter DR, Forgham H, Sekyere EO, Keating J, Eden G, Allan S, Alfred S, Kusuma FK, Clark A, Webber H, Russell AJ, de Weck A, Kile BT, Santulli M, De Rosa P, Fleuren EDG, Gao W, Wilkinson-White L, Low JKK, Mackay JP, Marshall GM, Hilton DJ, Giorgi FM, Koster J, Perini G, Haber M, Norris MD*. The transcriptional co-repressor Runx1t1 is essential for MYCN-driven neuroblastoma tumorigenesis. *Nat Commun* 2024;15(1):5585.
***Corresponding author: mnorris@ccia.unsw.edu.au**

In children under five, neuroblastoma is the most common solid tumour. Neuroblastoma is often advanced by the time it is diagnosed and grows particularly aggressively in children whose tumors contain multiple copies of the MYCN oncogene, with high MYCN levels serving as a powerful independent marker of poor prognosis. In these high-risk cases, the survival rate is barely 50%, making the need for more treatment options urgent.

Much of the research into high-risk neuroblastoma has been aimed at targeting the MYCN oncogene to negate its effects. However, so far this gene has proven 'undruggable'. In this study we took a fresh approach, using transgenic mice genetically engineered to express the human MYCN gene in neural crest cells (neuroblastoma cell-of-origin) and then performing an unbiased large-scale mutagenesis screen in these neuroblastoma-prone mice to look for genes associated with MYCN that are critical to the development of neuroblastoma.

The results of our mutagenesis screen revealed that a gene known as *Runx1t1* is involved in neuroblastoma tumourigenesis. In fact, it is so critical that mice having only one mutant copy of this gene completely failed to develop tumours. Furthermore, when we used an independent *Runx1t1* knockout mouse model, we confirmed that the mutation had caused a loss-of-function effect, since knockout of one allele also prevented tumourigenesis in our neuroblastoma-prone mice.

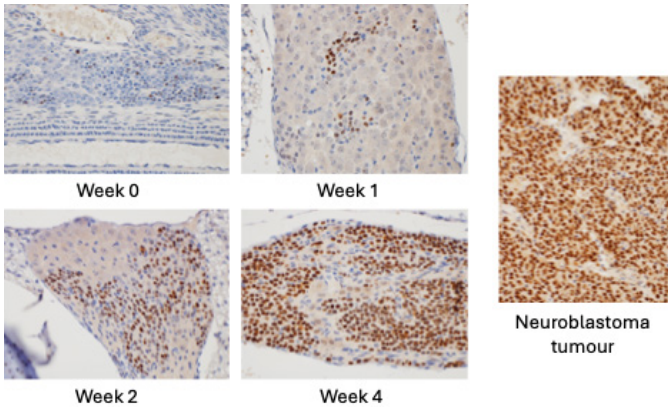
This loss-of-function effect was also observed in human cells where silencing *Runx1t1* strongly inhibited the growth of human neuroblastoma cells in culture as well as in xenografted animals. In addition to inhibiting cell growth, we found that *Runx1t1* silencing also appears to make tumour cells more visible to the body's immune system. This could have important implications for immunotherapy, because in children with solid tumours such as neuroblastoma, cancer cells are able to evade the immune system by effectively making themselves undetectable.

We then ran experiments looking at two other cancers shown to have high levels of Runx1t1: adult small cell lung cancer and rhabdomyosarcoma. Our results suggested that Runx1t1 could play an important role in the development of these tumours as well, warranting further investigation.

Having shown that Runx1t1 is critical to the initiation and progression of neuroblastoma, we are now working on developing a drug treatment strategy that specifically targets this gene. If successful, this could not only help treat the disease, but also potentially lead to prevention strategies.

Our results suggest that, using current gene technology, potentially critical disease-driving genes are going undetected. In the case of neuroblastoma,

Publications with Impact



Runx1t1 immunohistochemistry in neuroblastoma-prone mice.
Immunohistochemistry of sympathetic ganglia in neuroblastoma-prone mice from birth to 4 weeks of age and a neuroblastoma tumour. While there are few Runx1t1 positive cells at birth (Week 0), there is a steady increase in Runx1t1 expressing cells through to 4 weeks of age. In a fully-formed neuroblastoma tumour all of the tumour cells express Runx1t1.

MYCN is well known as a master gene regulator, whose action involves binding to specific DNA regions to control the transcription or RNA expression of a large number of genes. One of the reasons that *Runx1t1* has not been previously identified from gene sequencing studies is that MYCN does not transcriptionally regulate its expression, and vice versa. Rather, high levels of MYCN drive the machinery that causes high levels of Runx1t1 protein to be produced. It is highly likely that there are many other genes regulated in a similar fashion.

Murray Norris
Children's Cancer Institute and
UNSW Centre for Childhood Cancer Research

Jayne Murray and Murray Norris.

Intracellular pH Transforms Protein Kinase Signalling

Didan Y, Ghomlaghi M, Nguyen LK, Ng DCH*. Stress pathway outputs are encoded by pH-dependent clustering of kinase components. *Nat Commun* **2024;15(1):6614**
***Corresponding author: d.ng1@uq.edu.au**

Intracellular protein kinases, assembled into phosphorylation relays, transmit and process biochemical information in order for cells to respond appropriately to their environment. It remains a mystery how complex and diverse responses are encoded within a limited number of protein kinase pathways involved in signal transduction. Our recent study sheds light on a novel mechanism by which intracellular pH (pH_i) influences the activity of c-Jun N-terminal kinases (JNK), highly conserved members of the mitogen-activated protein kinase (MAPK) family that are integral to cell responses to stress stimuli.

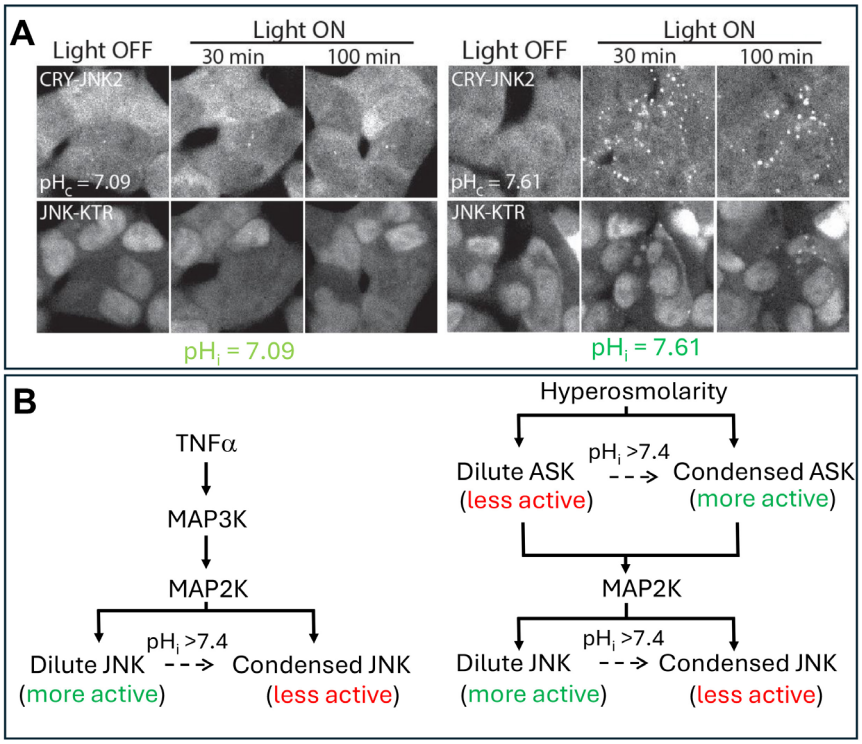
Through the co-expression of protein biosensors and quantitative imaging of pH_i and JNK activity in live cells, we revealed that pH_i was a significant regulator of JNK signal activity, which determines specific cell fate under stress conditions. Specific manipulation of pH_i within a narrow physiological range was sufficient to modify JNK activation in response to diverse stress stimuli. Surprisingly, the specific relationship between pH_i and JNK activity was dependent on the type of stimulus tested. For instance, an increase in pH_i diminished JNK activity in response to the pro-inflammatory cytokine TNFα. However, the opposite was true with hyperosmolarity where increased pH_i was positively associated with JNK activation.

To determine how JNK signals 'sense' subtle variations in pH_i we utilised optogenetic tools to show that pH_i influenced the light-induced clustering of tiered kinases with the JNK pathway. Specifically, we found that ASK1 and JNK2 underwent phase transition to form biomolecular condensates, and this was enhanced at more alkaline pH_i (**Fig. A**). Interestingly, ASK1 and JNK2 condensate formation had opposing effects on their activities. ASK1 condensates were enhanced in signalling to JNK activation, whereas JNK2 condensates attenuated kinase activity.

We next performed mathematical modelling to show that the differential effect of pH_i-regulated condensate formation on ASK1 and JNK2 activity was sufficient to predict the signal output from the JNK pathway in response to different stimuli. In the case of TNFα stimulation, JNK activation did not involve ASK1, so an increase in pH_i led to attenuated signal output. In contrast, the significant contribution of ASK1 in signalling to JNK in response to hyperosmolarity accounted for increased signal output under otherwise similar pH_i contexts (**Fig. B**). Thus, our study underscores the role

of pH_i as an active component of signalling networks capable of influencing kinase interactions and their signal outcomes.

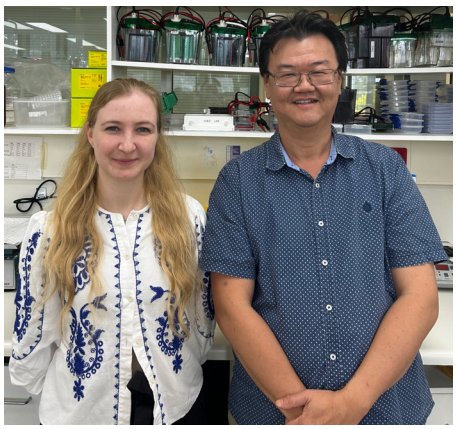
The implication of our findings is significant as it helps unravel the complex feedback dynamics of intracellular kinases and provides understanding of how cellular context, such as pH_i, may delineate the output and function of stress signalling pathways. For example, in cancer, the JNK pathway has capacity to promote cell survival and apoptosis. Indeed, we found that an evaluation of ASK1 and JNK2 levels, with pH_i, could help predict tumour cell responses to chemotherapeutic compounds such as cisplatin. Beyond cancer, the insights gained from this study have broader implications in neurodegenerative disorders and inflammatory diseases where complex and highly contextual functions for JNK signalling have been described but are poorly understood.



*(**A**) Light-induced formation of JNK2 condensates at increased pH_i. Figure panel adapted from* Nat Commun *2024;15(1):6614 (CC BY-NC-ND 4.0 license).*

*(**B**) Differential effects of phase separation on activity of tiered kinases delineates stress specific response and relationship with pH_i.*

Yuliia Didan and Dominic Ng
School of Biomedical Sciences
University of Queensland



Yuliia Didan (left) and Dominic Ng.

Outsmarting Cancer: How Maths Models Crack the Drug Resistance Code

Shin SY#, Chew NJ#, Ghomlaghi M, Chüeh AC, Jeong Y, Nguyen LK*, Daly RJ*. Integrative modeling of signaling network dynamics identifies cell type-selective therapeutic strategies for FGFR4-driven cancers. *Cancer Res* 2024;84(19):3296–3309.
#Co-first authors
***Corresponding authors: lan.k.nguyen@monash.edu, roger.daly@monash.edu**

The battle against cancer is often likened to a complex game of chess, where each move by clinicians is met with an unexpected countermove by the disease. This analogy is particularly apt when considering the challenge of drug resistance to targeted cancer therapies. As researchers and clinicians develop increasingly precise treatments targeting specific molecular drivers of cancer, the disease frequently responds by rewiring its internal signalling networks in complex and often unintuitive ways. This adaptive response can render once-effective treatments obsolete, leaving patients and doctors scrambling for new options.

At the heart of this challenge lies the intricate web of cellular signalling pathways that control cell growth, survival and differentiation. These pathways do not operate in isolation, but form complex, interconnected networks with multiple feedback loops and points of crosstalk. When a targeted therapy disrupts one part of this network, the entire system can reconfigure itself in ways that are difficult to predict using traditional experimental approaches alone.

Publications with Impact

One signalling system that exemplifies this complexity is the fibroblast growth factor receptor (FGFR) family, comprising FGFR1–4. While initial research focused on FGFR1–3, recent studies have unveiled critical oncogenic roles for FGFR4 in various cancers, including triple-negative breast cancer (TNBC) and hepatocellular carcinoma (HCC). The development of selective FGFR4 inhibitors, such as BLU9931 and H3B-6527, has shown promise in preclinical studies. However, as with many targeted therapies, resistance to these inhibitors often emerges, highlighting the need for more effective treatment strategies.

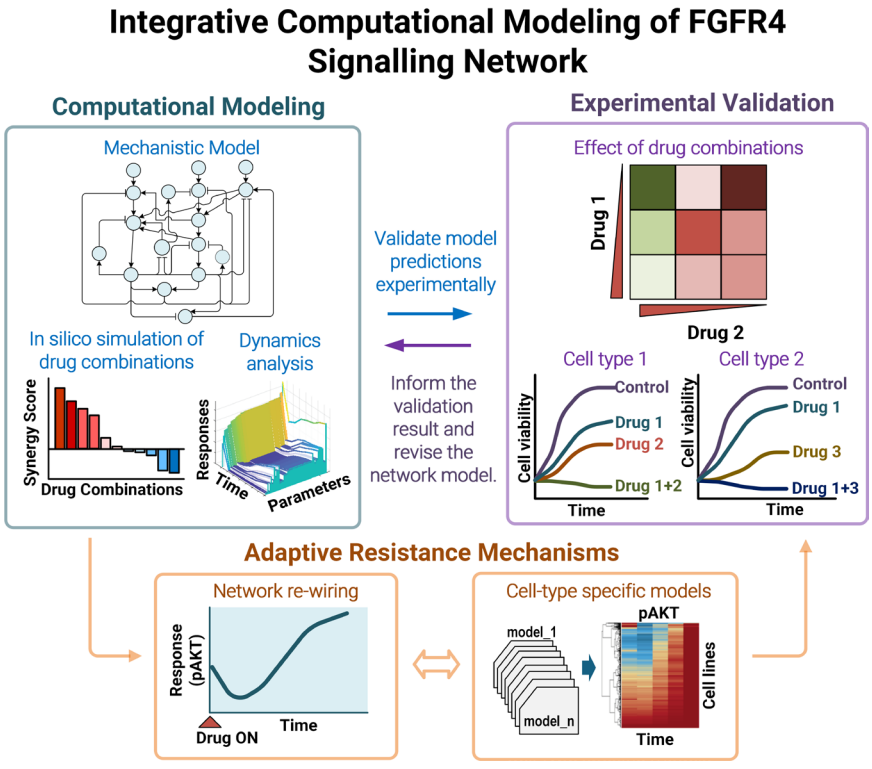
To address this challenge, our team set out to develop a comprehensive computational model of the FGFR4 signalling network. Our goal was twofold: to explain counterintuitive experimental data and to make new, testable predictions that could guide the development of more effective combination therapies. This required a multidisciplinary approach, bringing together experts in computational systems biology, cancer signalling and experimental oncology.

The core of our study is a novel mechanistic mathematical model of the integrated FGFR4 signalling network. This model incorporates not only the core FGFR4 pathway but also key downstream signalling cascades and critical feedback mechanisms. To ensure its accuracy and predictive power, we subjected the model to rigorous calibration using experimental data from TNBC and HCC cell lines treated with selective FGFR4 inhibitors.

One of the key strengths of our approach is its ability to capture the dynamic nature of signalling responses. For instance, our model recapitulated initial experimental timecourse data showing that FGFR4 inhibition in TNBC cells would lead to a potent reactivation of AKT, a critical pro-survival signalling node. Building on this insight, our model made the surprising prediction that co-targeting FGFR4 and AKT would be more effective than combining FGFR4 and PI3K inhibition, despite PI3K being upstream of AKT in the signalling cascade. This counterintuitive prediction was borne out in experimental studies, highlighting the power of our modelling approach to reveal non-obvious therapeutic strategies.

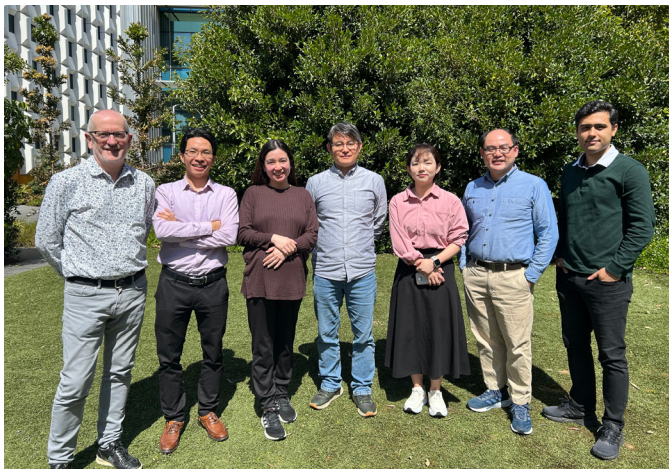
A powerful application of our model was its ability to make unbiased predictions about synergistic drug combinations targeting FGFR4. We conducted *in silico* simulations to evaluate the efficacy of tens of possible pair-wise drug combinations co-targeting FGFR4 and other network nodes. This systematic approach allowed us to prioritise potential combinations based on their predicted synergistic effects. Strikingly, the top candidates emerging from this computational screen were validated experimentally. For instance, the model predicted strong synergy between FGFR4 and AKT or ErbB inhibition in TNBC cells, which we confirmed in cell viability assays.

Perhaps one of the most exciting aspects of our work was the development of cell type-specific models. By incorporating protein expression data from 350 different cancer cell lines, we were able to generate a suite of models that capture the signalling diversity across different cancer types. This approach revealed that while AKT reactivation following FGFR4 inhibition is common, it is not universal. For example, in a FGFR4-driven HCC cell line, we observed ERK reactivation instead.



Integrative modelling of the FGFR4 signalling network reveals cell type-specific rewiring and predicts synergistic drug combinations. Our approach combines mechanistic network modelling and simulation, protein expression data from multiple cancer cell lines, and experimental validation to identify effective combination therapies tailored to specific cancer types.

This led to the prediction and subsequent experimental validation that co-targeting FGFR4 and MEK would be particularly effective in this context.



From left: Roger Daly, Lan Nguyen, Nicole Chew, Sung-Young Shin, Yunhui Jeong, Anderly Chüeh and Milad Ghomlaghi.

The success of our study hinged on the close collaboration between computational modellers and experimental biologists. Throughout the project we engaged in rigorous and iterative cycles of prediction, experimental validation and model refinement. This back-and-forth process allowed us to continually improve the accuracy and predictive power of our model while also generating new biological insights.

Our work has important implications for the development of targeted cancer therapies. By providing a framework for predicting cell type-selective combination therapies, we open the door to more personalised and effective treatment strategies. Moreover, the approach we developed is not limited to FGFR4-driven cancers but could be applied to other kinase-targeted therapies, potentially revolutionising how we approach drug resistance in cancer.

Sung-Young Shin and Lan Nguyen
Monash Biomedicine Discovery Institute
Department of Biochemistry and Molecular Biology, Monash University

Precise and Minimal Modification of Proteins with Structural Spies

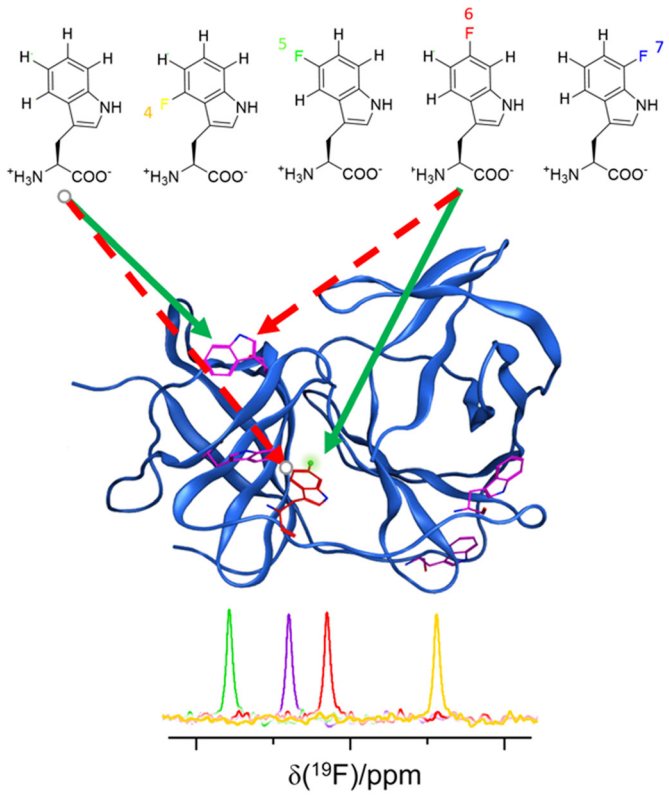
Qianzhu H#, Abdelkader EH#, Otting G*, Huber T*. Genetic encoding of fluoro-l-tryptophans for site-specific detection of conformational heterogeneity in proteins by NMR spectroscopy.
***J Am Chem Soc* 2024;146(19):13641–13650.**
#Contributed equally to this work
***Corresponding authors: gottfried.otting@anu.edu.au, t.huber@anu.edu.au**

NMR spectroscopy is currently the only method to determine biomolecular structure and dynamics in their native solvent environment and under physiological conditions. ^{19}F NMR spectroscopy of proteins labelled with fluorine has attracted significant attention because ^{19}F is the only stable isotope of fluorine and possesses spin ½ with a large gyromagnetic ratio which gives rise to intense NMR signals. Additionally, fluorine is xenobiotic and absent from biological macromolecules, resulting in background-free signals. Furthermore, ^{19}F chemical shifts are highly sensitive to changes in the chemical environment, and therefore are excellent spectroscopic probes to monitor conformational changes and ligand–protein interactions.

Previously, fluorine probes were introduced by either reacting a protein with a chemical tag, replacing all instances of one canonical amino acid with a closely related fluorinated analogue, or by using genetic code expansion to site-specifically install a relative bulky fluorinated non-canonical amino acid in a protein. However, these approaches are less than ideal because they involve major changes to the protein structure and sometimes compromise function. It would be more desirable to replace a single hydrogen atom with fluorine.

In our recent work, we developed genetic encoding systems for the site-selective incorporation of the unnatural amino acids 4-fluorotryptophan (4F-Trp), 5-fluorotryptophan (5F-Trp), 6-fluorotryptophan (6F-Trp) and 7-fluorotryptophan (7F-Trp) in response to an amber stop codon. The approach relies on specially engineered tRNA synthetases which display exquisite specificity and selectivity for the unnatural amino acids. The high selectivity of the enzymes is astonishing, as the structural difference between fluoro-tryptophan and tryptophan is small. The van der Waals radius of the fluorine atom replacing a hydrogen is increased by only 0.15 Å and the C-F bond is only about 0.3 Å longer than the C-H bond. Having engineered highly active and selective tRNA synthetase enzymes for genetic code expansion allows us to replace a single tryptophan residue by fluoro-tryptophan in high yield and purity in the presence of multiple tryptophan residues at other sites in the protein, thus producing the desired outcome of a protein where a single hydrogen atom is replaced by a fluorine atom.

Publications with Impact

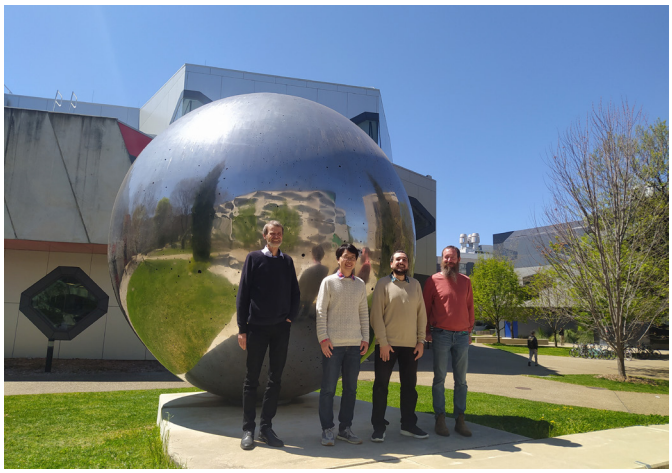


Top panel: *Chemical structures of tryptophan, 4-fluorotryptophan, 5-fluorotryptophan, 6-fluorotryptophan, 7-fluorotryptophan.*
Middle panel: *Illustration of selective incorporation of 6-fluorotryptophan into Zika virus protease. Arrows indicate where a residue is (green) or is not (red dashed) incorporated, providing selectivity.*
Bottom panel: *NMR spectra showing the large chemical shift dispersion of different fluoro-tryptophans.*

To demonstrate our approach, we used 1D ^{19}F NMR spectroscopy to investigate both ligand binding in a designed amino acid binding protein and conformational heterogeneity in flaviviral NS2B-NS3 proteases. In both cases, we replaced a single tryptophan residue (out of many) with fluoro-tryptophans, requiring only modest amounts of protein sample. For the amino acid binding protein, the NMR spectra uncovered distinct fingerprints for different amino acid ligands, enabling their identification. In the case of the flaviviral NS2B-NS3 proteases, the spectra revealed conformational heterogeneity in the apo form, which could be significant for rational inhibitor design in antiviral drug development.

We believe that the genetic encoding of different fluoro-tryptophan isomers will enhance ^{19}F NMR in a multitude of applications where sensitive and simple of experiments are essential. Specifically, it has strong potential to drive new developments on the frontiers of in-cell NMR and EPR spectroscopy where ^{19}F is a privileged spin to analyse due to its clean background. To encourage the uptake of this technology, the requisite plasmids to genetically encode fluoro-tryptophans have been deposited at Addgene (#207620, #207621).

Haocheng Qianzhu, Elwy Abdelkader, Gottfried Otting and Thomas Huber
Research School of Chemistry
Australian National University



From left: Gottfried Otting, Haocheng Qianzhu, Elwy Abdelkader and Thomas Huber.

Australian Society for Biochemistry and Molecular Biology Inc
PUBLICATION SCHEDULE FOR *AUSTRALIAN BIOCHEMIST*, volume 56, 2025

Issue	ASBMB Content	Copy Deadline	Issue Date
April 2025 56(1)	Profiles of medal, award and fellowship winners Nominations for Executive/Council	Monday 3 February	Monday 31 March
August 2025 56(2)	Nominations for medals, awards and fellowships Notice of AGM/proposed constitutional changes	Monday 2 June	Monday 4 August
December 2025 56(3)	Annual reports ASBMB meeting report	Monday 6 October	Monday 1 December

eppendorf

2nd Generation Feedstock – 1st Class Consumables

Meet your sustainability targets with bio-based pipette tips in sterile reloads

The new epT.I.P.S.® BioBased pipette tips and ep Dualfilter T.I.P.S.® BioBased filter pipette tips are made from "bio-circular" renewable-based feedstock, recycled e.g. from food oil wastes and residues. By choosing these tips, customers help to significantly reduce the number of fossil resources required for their production. The bio-based tips are only available in the new Eppendorf Sterile Reloads to be used with epT.I.P.S. Box 2.0.

> New Sterile Reloads produced from up to 54 % less polypropylene compared to disposable racks
> epT.I.P.S.® BioBased and ep Dualfilter T.I.P.S.® BioBased incl. SealMax® BioBased versions are ACT®* labeled – Environmental Impact Factor Certification by My Green Lab

www.eppendorf.com/BioBased

Bacteriophages That Kill Antimicrobial-resistant Bacteria

Professor Trevor Lithgow and his team, in partnership with First Nations People, have looked to nature to fight to a modern superbug.

In hospital settings, the bacteria *Klebsiella pneumoniae* is a common opportunistic pathogen that can cause pneumonia, wound infections and meningitis. There has recently been a significant increase in the number of cases of antimicrobial-resistant hypervirulent *K. pneumoniae* that are even resistant to the last-resort class of antibiotics, carbapenems (1). In response to the global problem of antimicrobial resistance (AMR), there is renewed interest in bacteriophages (phages) as a new line of therapy.

ASBMB member, Trevor Lithgow, from the Monash Biomedicine Discovery Institute, leads a research program into phages sourced from waterways in Melbourne. Working in partnership with the Wurundjeri Woi wurrung Cultural Heritage Aboriginal Corporation, his team found a phage that kills *K. pneumoniae* in water from Merri Creek (2). The phages were found in a small area of Merri Creek, according to Lithgow, "suggesting to us that there may be even more that we can find in that creek alone."

Monash Biomedicine Discovery Institute PhD student, Alex Hall, collects water samples for phage purification.

Working with Wurundjeri Elders, the phage was named Merri-meeri-uth nyilam marra-natj (MMNM) in Woi wurrung language (in English, 'dangerous Merri lurker'), based upon its structure and mode of attack. This bioprospecting project was governed by the principles of the Nagoya Protocol (3) to facilitate the fair and equitable sharing of benefits arising from the research, for conservation and sustainable use of biodiversity.

To characterise novel phages such as MMNM, Lithgow's team developed the computational tool, STEP^3 (4), which has had broad uptake by the research community. In their latest paper (2), the team found that a single genetic difference between two forms of MMNM changed how well the phages killed bacteria, including those from patients at The Alfred hospital. Using experimental evolution, multiple mutations were selected to make the phage even more efficient at killing *K. pneumoniae*.

Trevor Lithgow by Merri Creek.

Lithgow says, "The finding suggests we can use natural selection in the lab to tease out from the untapped genetic variation in natural populations, phages with properties delivering new ways to kill antimicrobial resistant bacteria." Students from the Lithgow lab are now working with partners from the Wurundjeri Woi wurrung Cultural Heritage Aboriginal Corporation and Bunurong Land Council to seek out undiscovered potent phages.

References

1. European Centre for Disease Prevention and Control. 14 February 2024. Increase of hypervirulent carbapenem-resistant *Klebsiella pneumoniae* in the EU/EEA. https://www.ecdc.europa.eu/en/news-events/increase-hypervirulent-carbapenem-resistant-klebsiella-pneumoniae-eueea
2. Thung TY, Hall A, Jati AP, White ME, Bamert RS, Tan KS, Press C, Taiaroa G, Short FL, Dunstan RA, Lithgow T. *mBio* 2024;e0256424 in press.
3. United Nations Environmental Programme. 29 October 2010. Nagoya Protocol on Access to Genetic Resources and the Fair and Equitable Sharing of Benefits Arising from their Utilization to the Convention on Biological Diversity. https://www.cbd.int/abs/doc/protocol/nagoya-protocol-en.pdf
4. Thung TY, White ME, Dai W, Wilksch JJ, Bamert RS, Rocker A, Stubenrauch CJ, Williams D, Huang C, Schittelhelm R, Barr JJ, Jameson E, McGowan S, Zhang Y, Wang J, Dunstan RA, Lithgow T. *mSystems* 2021;6(3):e0024221.

SHIMADZU
Excellence in Science

Higher Peaks – Clearly

Experience newfound clarity with the Nexera XS inert UHPLC. Offering reliable, robust performance, the Nexera XS inert represents a new peak in the analysis of biopolymers. It features a metal-free sample flow path prepared from corrosion-resistant materials, so that results will be clear and unaffected by sample adsorption or surface corrosion. Together with a new range of consumables, Shimadzu now offers the complete solution for bioanalysis.

Unconstrained recovery and sensitivity
Bioinert flow path prevents sample loss due to adsorption.

Clear resolution without restrictions
UHPLC performance for high efficiency bioanalysis.

Assured reliability and reproducibility
Corrosion-resistant material ensures long-term stability and reliable data acquisition.

Ultra High Performance
Liquid Chromatograph
Nexera XS inert

www.shimadzu.eu/higher-peaks

Learn more about
Nexera XS inert!

The ASBMB Education Feature is coordinated by Tracey Kuit (tracey_kuit@uow.edu.au) and Amber Willems-Jones (amber.willems@unimelb.edu.au).

Building Career-ready Scientists: Developing Transferable Skills in Science Education

Jane AL Kouba and Tracey Kuit

School of Chemistry and Molecular Bioscience, University of Wollongong

The transition from education to full-time employment is increasingly difficult, with many graduates struggling to secure jobs despite their qualifications (1). This issue is particularly pertinent in Australia, where the job market is influenced by global trends such as automation and flexible work arrangements (2,3). Further, embedding authentic research and collaboration with industry partners in university subjects serves as a powerful method of developing real-world research skills and core capabilities sought after by employers (4). As such, the importance of developing essential research and employability skills in undergraduate education cannot be overstated. By focusing on the development of these skills, BIOL342 addresses these challenges head-on, providing a model that could be replicated in other institutions.

BIOL342 is a 300-level subject at the University of Wollongong (UOW) designed for biomedical science students. The course, which has been running since 2019, involves approximately 30 students per year. It emphasises the development of research skills and core capabilities aligned with future employment. The curriculum is delivered through a collaboration between educators, career specialists, researchers and industry partners.

Within this subject, students complete individual research projects focused on core research skills, data integrity, electronic notebook record keeping, critical thinking, etc, followed by group projects on authentic industry problems with group presentations and reports back to industry. In addition to research, the students focus on a career development action plan throughout the semester. Students prioritise areas such as development of a career network, professional profile, job applications, informational interviewing, etc. At the end of the semester, students articulate and demonstrate learning gains through a peer-reviewed reflective ePortfolio, which serves as an exemplary model for presenting and effectively communicating research and employability skills to future employers.

Through a Qualtrics survey, we examined the impact of BIOL342 on students' self-declared research (5) and employability skills (6,7), before and after completing the subject. We compared pre-subject survey responses (week 1) to post-subject survey responses (week 13) from 2019, 2021 and 2022. Statistical analysis using the Non-Parametric Mann-Whitney U-Test compared pre- and post-subject survey results from the combined data. Reliability analysis across all skill categories was checked, and analysis was conducted using jamovi.

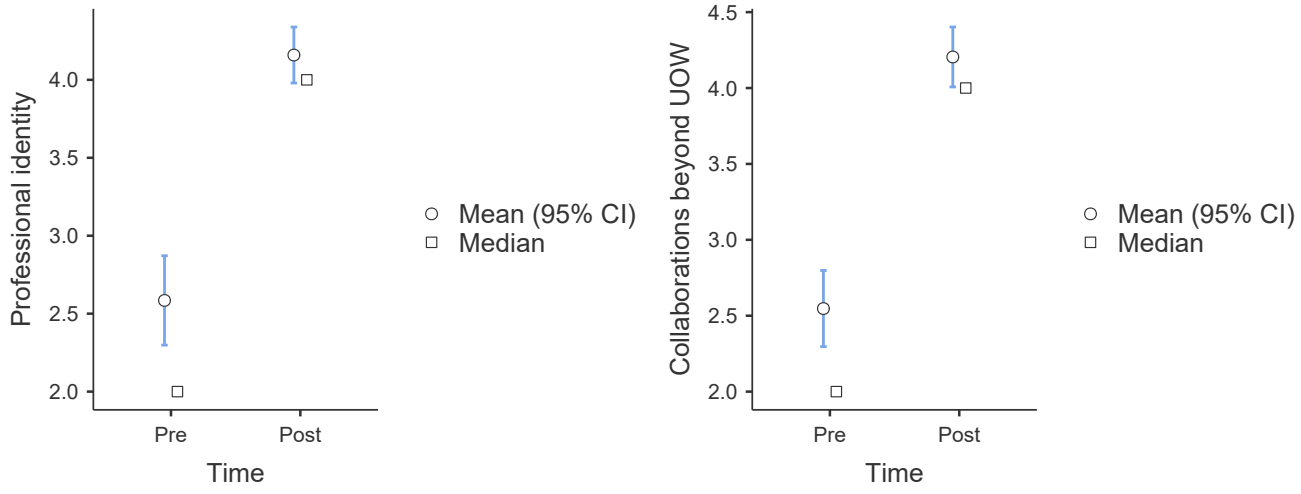


Fig. 1. Boosting professional identity and collaboration: a pre–post journey.
Scores of two key career skills comprared before and after taking the BIOL342 subject on a scale from 0 to 5. The error bars indicate 95% confidence intervals (CIs) of the mean.

Results – Employability Skills

A comparison of the student survey results across 14 employability-related questions before undertaking the subject and upon the completion of the subject showed that students' self-declared skills were improved across all areas of the employability skills analysed with statistically significant differences ($p < 0.001$). Students' responses revealed increased development and awareness of their professional identity and the importance of networking and linkages and collaborations beyond UOW (**Fig. 1**). Importantly, the students developed confidence in their job search strategies and ability to integrate into the workforce after graduation. Students also showed an increased awareness of the development of generic non-discipline-specific skills that they were developing in their degree such as communication and teamwork. Furthermore, students' indicated that after completing BIOL342 they were more aware of postgraduate research opportunities and had greater confidence in their career future.

Results – Research Skills

A comparison of the student survey results across 19 research-related questions before undertaking the subject and upon the completion of the subject showed that students' self-declared skills were improved across most areas of the employability skills analysed with statistically significant differences ($p < 0.05$) for 15 of the 19 questions. Students' responses revealed an improvement in their research skills and increased confidence in undertaking independent research (**Fig. 2**). They also showed an increased ability to frame research questions and increased confidence in their ability to think critically to solve complex problems. Students also indicated increased confidence in managing themselves, whilst managing the needs of others. They also showed they could more effectively evaluate the credibility of their sources of information in research, were more aware of the importance of the rigorous experimental design within research, could better devise procedures in research to locate information relevant to their inquiry and were more confident in their ability to identify resources, technology and skills to generate information, data and ideas. Their responses also declared an increased ability to clearly communicate in writing their understanding of research, increased confidence to collaborate with others to solve complex problems, and an increased belief that research was important to their career. The areas that did not show a statistically significant difference were areas where the students had a strong response upfront including a desire for research and an understanding of the importance of ethics in research.

Students often state this subject as a highlight of their course, as shown in the student quotes from the class survey (2019–2022):

"Glad that I was able to develop my independent research skills – as this will be important for Honours."
"I have applied for jobs, developed my interview skills and utilised these skills for medical interviews."
"I improved my CV which scored me an international job offer and a full-time job."

The survey results show that students declared learning gains in career skills, most notably in areas related to awareness of professional identity and collaborations beyond UOW. Students also declared learning gains in their research skill development, most notably their general research skills and capabilities in independent research. The data also shows that students asserted development of key transferrable skills in communication, teamwork, critical thinking and problem-solving.

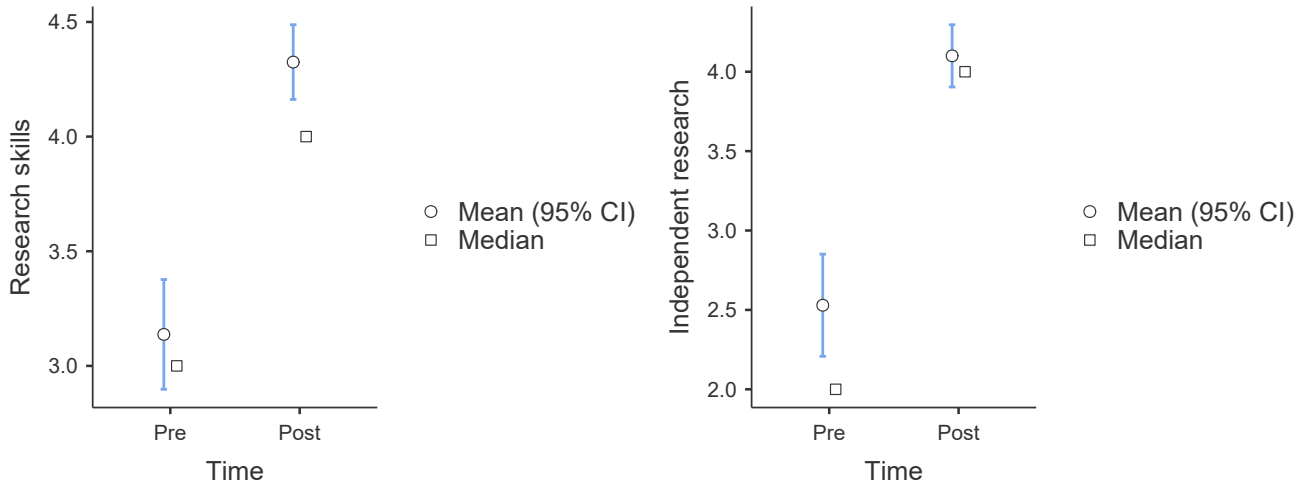


Fig. 2. Transformative gains in research proficiency: a pre–post journey.
Scores of two key research skills compared before and after undertaking the BIOL342 subject on a scale from 0 to 5. The error bars indicate 95% confidence intervals (CIs) of the mean.

Conclusions

Collectively, the results show that embedding authentic research and collaboration with industry partners in university subjects assists students to develop core capabilities sought after by employers.

The changing nature of work and perceived fluidity of careers requires university students to be able to reflect on their capabilities with confidence and a strong evidence base. A purposeful focus on career development learning assists students in developing their professional identity and confidence in their career futures. Through our subject design, we show that our biomedical science students can develop greater career confidence through a course focusing on research and career development learning.

Acknowledgements

We acknowledge and thank all BIOL342 students, our student partners in the co-design, the entire teaching team, the UOW Careers Unit and our industry partners. We also thank Brad Wakefield (UOW) for assistance with the statistical analysis. This work was supported in part by a UOW Educational Strategies Development Fund Grant.

References

1. Foundation for Young Australians. *The New Work Smarts: Thriving in the New Work Order.* 2017. https://www.fya.org.au/app/uploads/2021/09/FYA_TheNewWorkSmarts_July2017.pdf
2. Foundation for Young Australians. *The New Work Reality.* 2018. https://www.fya.org.au/app/uploads/2021/09/TheNewWorkReality_2018.pdf
3. Foundation for Young Australians. The New Work Standard: How Young People are Engaging with Flexible Work. 2020. https://www.fya.org.au/app/uploads/2021/09/FYA-New-Work-Standard-2020.pdf
4. Bandaranaike S. *J Univ Teach Learn Pract* 2018;15(4).
5. Bennett D. *Embedding employABILITY Thinking Across Higher Education.* 2020. Australian Government Department of Education, Skills and Employment. https://ltr.edu.au/resources/FS16-0274_Bennett_Report_2020.pdf
6. Bennett D, Richardson S, MacKinnon, P. *Enacting Strategies for Graduate Employability: How Universities Can Best Support Students to Develop Generic Skills.* 2015. Australian Government Office for Learning and Teaching.
7. Willison J, O'Regan K. *High Educ Res Dev* 2007;26(4):393–409.

Dr Jane AL Kouba is an Education-focused Lecturer in the School of Chemistry and Molecular Bioscience, University of Wollongong.
jalkouba@uow.edu.au

Professor Tracey Kuit is an Education-focused Professor in the School of Chemistry and Molecular Bioscience, University of Wollongong.
tracey_kuit@uow.edu.au

Key Considerations for Effectively Engaging Students With Hands-on Learning Activities

Christian Moro and Charlotte Phelps

Faculty of Health Sciences and Medicine, Bond University, Gold Coast

In biochemistry teaching, while laboratories and practical workshops are hands-on focused, across many institutions, there is an increasing demand to provide active-learning opportunities for students across all sessions where on-campus delivery is an option. This presents some challenges. Very few current academics undertook courses that offered hands-on activities during lectures. This makes it easy to find oneself quite out of depth with the need to start from scratch. Often it can be difficult to know what to change and how to change it in a way that facilitates engaging and effective hands-on student activities. To address this, our team examined the literature to identify evidence-based best practices in active learning for undergraduate science students, resulting in the development, validation and evaluation of the CRAFTS Framework (**Fig. 1**). Information and strategies were drawn from a variety of literature, research methods and other pursuits to arrive at the initial framework, which has been evaluated in an undergraduate science classroom. Following the CRAFTS Framework enables academics to embed hands-on activities that encourage students to engage in relevant, accessible, fun and tailored learning that is both scholarly and effective (1).

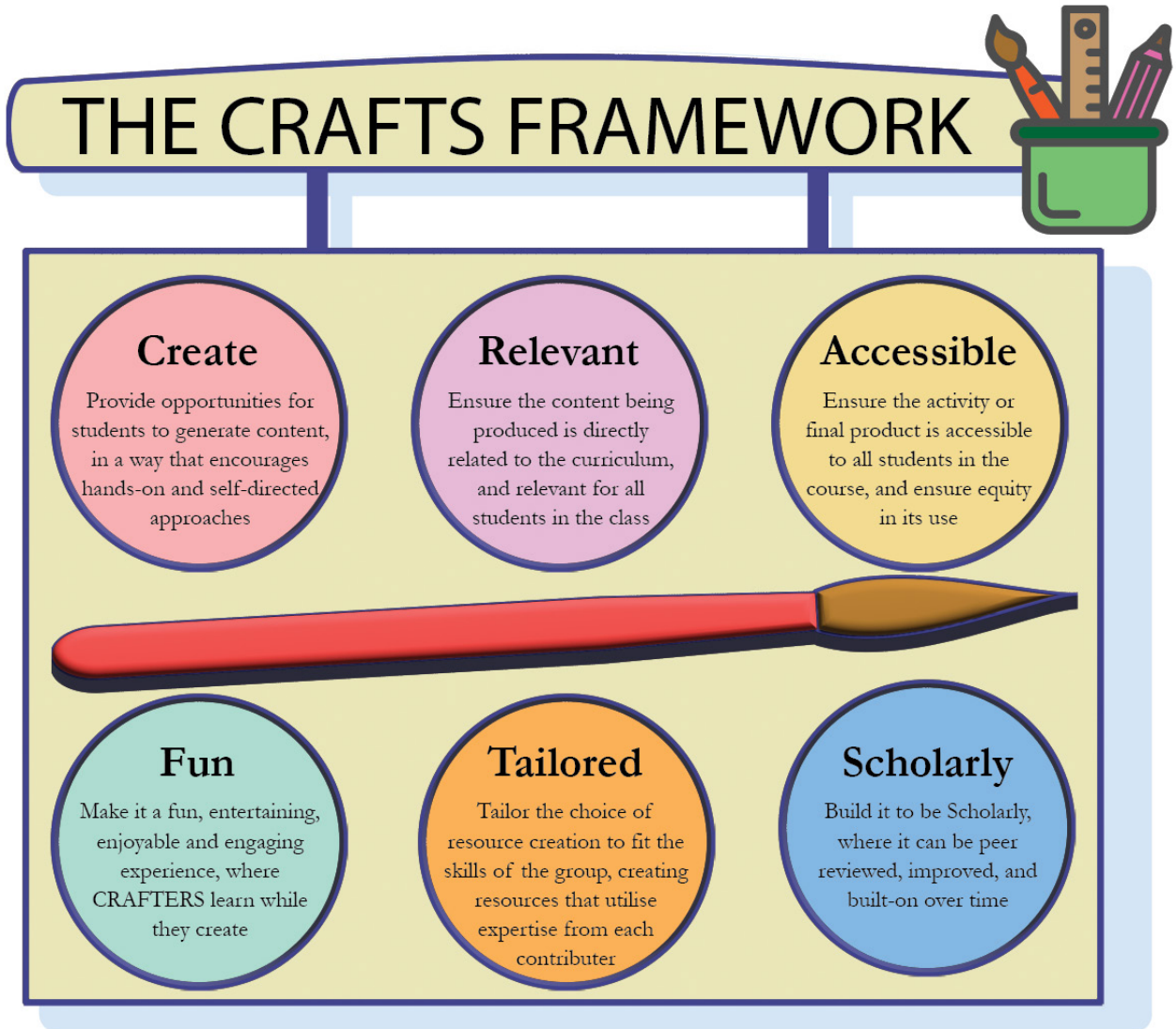


Fig. 1. *CRAFTS Framework for engaging students in hands-on learning (1).*

It is anticipated that this framework will serve as a helpful foundation for academics as they implement more hands-on and presence-teaching approaches into their classes, where they encourage 'doing' and facilitate learning through student engagement (1).

Tips for making CRAFTS activities for student-active learning

Create: **Create** and produce content through various interconnected multimodal platforms for collaborative online learning and other new socio-material networks (2).
Relevant: Ensure the content created is **relevant** to all students in the class and directly aligned with the curriculum (3).
Accessible: Learning materials should be **accessible** to all students in the course and ensure equitable use (4). This includes considering the sustainability, serviceability and scalability of the resource (5).
Fun: Create a **fun**, entertaining, enjoyable, and engaging experience where CRAFTers learn as they create (6,7).
Tailored: **Tailor** the resource creation to match the skills of the group, utilising the expertise of each contributing member (artistic abilities, computer skills, web development, content knowledge, etc.) (8).
Scholarly: Design it to be **scholarly**, allowing for peer review, improvement and ongoing development. Ensure that every aspect of the content is accurate and proofread by an academic or expert (9).

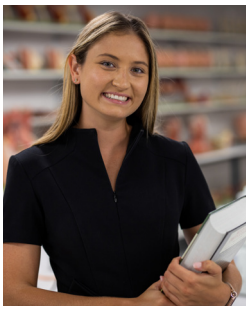
A package of resources and example activities can be downloaded from www.tandfonline.com/action/downloadSupplement?doi=10.1080%2F10494820.2024.2308100&file=nile_a_2308100_sm2313.pdf

References

1. Moro C, Mills KA, Phelps C. *Inter Learn Environ* 2024;1–12.
2. Saykılı A. *J Educ Technol Online Learn* 2019:2(1);1–15.
3. Barr RB, Tagg J. *Change: The Magazine of Higher Learning* 1995;27(6):12–26.
4. Owens B. *The Evolving Digital Divide Within Higher Education Institutions: a Quantitative Study.* 2019. University of Memphis.
5. Moro C, Mills KA, Phelps C, Birt J. *Int J Educ Technol High Educ* 2023;20(1):7.
6. Moro C, Phelps C, Stromberga Z. *Adv Physiol Educ* 2020;44(3):505–507.
7. Phelps C, Moro C. *J Univ Teach Learn Pract* 2022; 19(3):8.
8. Taddeo G, Tirocchi S. *Inf Commun Soc* 2021; 24(2):241–257.
9. Chen L, Howitt S, Higgins D, Murray S. *Assess Eval High Educ* 2022;7(4):493–506.

Dr Christian Moro is the Associate Dean of External Engagement and Associate Professor of Science and Medicine in the Faculty of Health Sciences and Medicine, Bond University.
cmoro@bond.edu.au

Dr Charlotte Phelps is a Senior Teaching Fellow in the Medical Program, Faculty of Health Sciences and Medicine, Bond University.
cphelps@bond.edu.au



Designing Open Education Resources: the Importance of the Third Space

Julian Pakay[1] and Steven Chang[2]

[1]Department of Biochemistry and Chemistry, La Trobe University

[2]La Trobe Library, La Trobe University

Traditional STEM textbooks often overwhelm students, who can feel intimidated by the content-heavy nature of their size, depth, level of detail, and the financial cost of purchasing them (1). There is a dearth of quality resources designed to tackle this and similar STEM education barriers, though one solution for educators is using open educational resource (OER). OERs are teaching and learning materials that are free and adaptable for local courses or teaching due to the benefits of open licensing. There has been rapid growth in OER development in Australian universities since 2022, exemplified by a national grant program that has funded 33 projects, generating a catalogue of 45 OERs.

The development of OERs for STEM education relies heavily on technical images and visual data, and furthermore, very little of this media is openly licensed and development *de novo* is costly (2). In addition, the current role of the classroom textbook is an open question given that basic information is more freely accessible online than ever before. Therefore, to get

the most value out of new open textbooks generated by OER projects, educators must go beyond simply restating basic information in a new medium. Instead, educators need to ensure that open technologies fundamentally reshape and improve pedagogy for online environments.

Following and iterative development process (**Fig. 1**), we recently published two OERs:

- *Foundations of Biomedical Science* – designed to improve mathematics skills in incoming biomedical/ biology students.
- *Threshold Concepts in Biochemistry* – based on addressing the key concepts identified in studies (3,4) resulting from the AAAS Vision and Change in Undergraduate Biology Education Initiative.

Benefits of Third Space collaboration

The two above OER projects have generated unexpected benefits beyond the usual gains associated with OER projects, such as access and equity. Benefits included embedded asynchronous teacher presence, interactive content, local and vocational context, as well as the potential for incorporating student-generated content. These resulted from our Third Space collaboration, a term which refers to mutually collaborative academic-professional partnerships that go beyond traditional university department boundaries (5). In our case, the collaboration is a cross-disciplinary one between a teaching-focused biochemist and a professional OER specialist librarian – acting as a 'critical friend' from outside the discipline to mediate reflective practice.

Our collaboration was powered by the La Trobe eBureau open education program. The program's guidelines focus on designing the OER to address the limitations of existing learning resources and to solve classroom teaching problems. The Third Space partnership provided the opportunity for mutual knowledge and capability exchange across university departments that are typically siloed. The academic gained capabilities in OER publishing and open technologies, while the librarian became familiar with STEM classroom barriers to learning. This fusion of expertise enabled us to link organic classroom teaching reflections to OER ideation, which generated provocative questions like, "What can our OERs do that traditional textbooks and AI can't?" This provided answers and impetus for adding creative enhancements to our OERs.

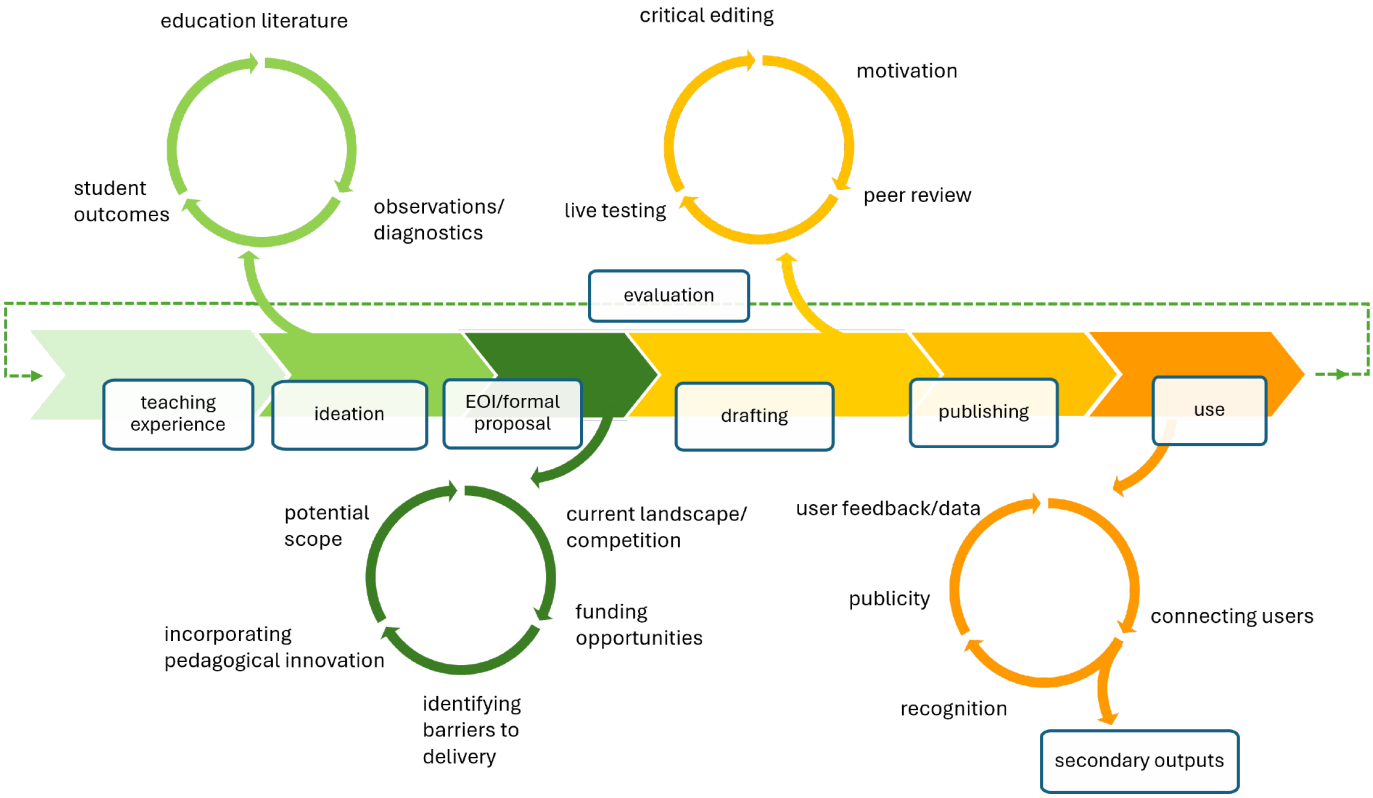


Fig. 1. The iterative process of developing an OER.
Publishing an OER as an educational intervention is initially informed by and eventually evaluated by teaching experience. However, all stages of OER development benefit greatly from collaboration between academics and librarians/learning designers to create a third space perspective. Ideas initiated from teaching experience can be refined in terms of scope and pedagogical innovation. The draft OER can be improved through critical editing, and peer review. Finally, collaboration can connect end users to the OER as well as facilitating the gathering of evaluative data to feedback to the teaching experience, improving student outcomes to create a virtuous loop.

How OERs enable student engagement

Engagement in the learning experience requires more than just knowledge acquisition – it is fundamentally facilitated by teacher presence. Students engage much better with content developed by their own locally present instructors. We introduced this element through the 'living textbook' medium by embedding the instructor's presence into the text via video content and screen capture of problem-solving processes.

Students also require context, motivation and personal relevance to engage with material. For example, students often struggle to see the relevance of maths to their careers – *Foundations of Biomedical Science* was created to tackle this. We leveraged the modular nature of OERs to incorporate support for students' emerging professional identities so they could see their future selves represented in the text. For example, we embedded video interviews with diverse professionals representing students' future careers via authentic practitioner voices. This demonstrates recommendations by open practitioners to ensure students see themselves reflected in open textbooks (6,7).

OERs also create possibilities for students to become open textbook co-creators. We used *Threshold Concepts in Biochemistry* as a basis for developing a lecture course and oral presentation assessment in a large cohort, 1st year biology subject. Our OER Collective grant enabled us to film a curated selection of these student presentations we plan to embed as OER content for the next iteration of the text. This will showcase student work, create peer-to-peer asynchronous engagement, and will hopefully improve the standard of oral presentations – creating a virtuous loop.

Our project demonstrates how Third Space partnerships can generate the time, space, and collaboration to reflect on practice and organically connect teaching practices with 'living textbook' OERs. Our next steps are to formally evaluate our OERs as interventions and present our methods as case studies to support the growth of Australasian open educational practices.

Resources

- OER Collective guide on getting started with creating OER
- Contact someone for OER expertise: Australasian institutional contacts
- La Trobe University Library Open Educational Resources
- Julian Pakay's presentation to BioMolecular Horizons 2024/ComBio2024: Developing open educational resources as educational interventions

References

1. White HB. *Biochem Educ* 1996;24:41–45.
2. Griffiths R, Mislevy J, Wang S, Ball A, Shear L, Desrochers D. *OER at Scale: The Academic and Economic Outcomes of Achieving the Dream's OER Degree Initiative.* 2020. SRI International.
3. Loertscher J, Green D, Lewis JE, Lin S, Minderhout V. *CBE Life Sci Educ* 2014;13(3):516–528.
4. Tansey JT, Baird T Jr, Cox MM, Fox KM, Knight J, Sears D, Bell E. *Biochem Mol Biol Educ* 2013;41(5):289–296.
5. Whitchurch C. *Reconstructing Identities in Higher Education: the Rise of 'Third Space' Professionals.* 2012. Routledge.
6. Lambert SR, Fadel H. *Open Textbooks and Social Justice: a National Scoping Study.* 2022. Australian Centre for Student Equity and Success.
7. Andersen N. *Enhancing Inclusion, Diversity, Equity and Accessibility (IDEA) in Open Educational Resources (OER).* 2022. University of Southern Queensland.

Dr Julian Pakay is a Senior Lecturer in the Department of Biochemistry and Chemistry, La Trobe University.
j.pakay@latrobe.edu.au

Steven Chang is the Coordinator of Open Education & Scholarship, La Trobe University Library.
s.chang@latrobe.edu.au

ADVANCED CHARACTERISATION TECHNOLOGIES UNRAVELLING THE MYSTERIES OF PROTEINS

BOOK A DEMO OR HIRE IT TODAY!

SCAN ME

RedShiftBio AuroraTx

Secondary Structure of Proteins & RNA Across a Wide Concentration Range , Plus Thermal Ramping

Microfluidic Modulation Spectroscopy (MMS) technology provides label-free measurement of protein structure, stability, aggregation, concentration and protein structural similarity. Study vaccines, enzymes/ligand binding, Aggregate Quantitation, AAVs / DNA / mRNA gene therapies and more.

Malvern Zetasizer Ultra

Particle and Molecular size using Multi-Angle Dynamic Light Scattering

The most advanced light scattering system, delivers enhanced resolution, speed and ease-of-use for the measurement of particle and molecular size, particle charge and calibration-free particle concentration.

Malvern NanoSight Pro

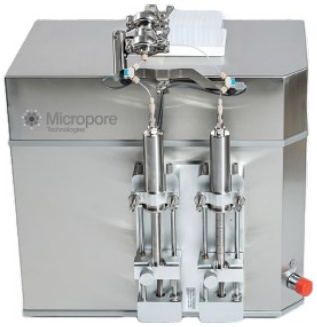
High Resolution Nano Particle Size Distribution and Concentration

Detect and visualise individual nanoparticles moving under Brownian motion in solution. Particle size, concentration and viscosity and be quickly analysed while a fluorescence mode provides detection of labelled particles.

Malvern MicroCal PEAQ ITC

Label-free in Solution Measurement of Binding Affinity and Thermodynamics

Accurate determination of binding constants (KD), reaction stoichiometry (n), enthalpy (ΔH) and entropy (ΔS) in a single experiment using Isothermal titration calorimetry.



Micropore AXF Pathfinder

One mixer from Lab to Clinic to GMP manufacture

Rapid, reproducible and scalable manufacture of lipid, polymer or hybrid nanoparticles carrying small molecules, peptides or nucleic acids for non-viral based vaccines, cell therapies and gene therapies - No consumables - GMP ready.

SDS Page: Short Discussions for Students Page

Balancing a Career in Science with Raising a Family

Laura Osellame and Catherine Palmer

Balancing a career and a family in science is not easy, no one pretends otherwise. There is no right or wrong time to start a family, and there are several things everyone considers, such as financial stability and the impact of career interruption. However, one of the most beneficial aspects to starting a family is the flexibility that a career in science affords you. Career breaks are taken into consideration when applying for grants and fellowships, in addition to grants available to support career continuity upon return to work from parental leave, and grants to cover childcare assistance at conferences. The most important thing to remember is to not feel pressured to return to work and to take the time you need.

Catherine (left) and Laura in Rome, Italy, on the way to Sardinia for the Mitochondrial Dynamics conference in 2011.

Expectation versus reality

Laura – Your new reality will be difficult to come to terms with if you expect that you or your lab work will be the same as before kids. At any moment, you can get a call from childcare or school saying your child is sick and that you must collect them. This is not always compatible with productive lab work! These situations are completely out of your control and are a part of having a young family, but can still be frustrating in your work context. I am very open and communicative with my manager and other people if I am working whilst my kids are sick. Everyone has been understanding.

Catherine – Before having a child, I was convinced that I would want to return to work immediately after maternity leave. This is certainly the case for some people. However, I absolutely needed to take the time with my daughter and adjust to being a parent. When I felt ready to return, I elected to work part-time. This involved a significant adjustment to my presence in the lab and how I utilised my time at work, which took time to adapt to. The most important thing is to discuss with your manager realistic expectations for productivity and output.

Setting boundaries

Laura – I am terrible at this. I know some people with children set their out-of-office replies and do not respond outside of their rostered hours. I tend to triage emails out of hours and on my days off so that I can maximise my time in the office. This ensures that I don't spend the first few hours of my time in the lab answering emails. When I have my day off, we always try to do something fun (although a bit tricky at the moment with a 7-month-old!). Whether it be going to the zoo or the museum, I make the most of the time I have with them. My oldest is now old enough to start doing 'experiments' at home, and it is such a joy to watch him playing around with things like food dye and oil and prisms.

Catherine – As my daughter has grown and entered school, there are certainly aspects that get easier and harder in regard to balancing work and home. I definitely get more sleep these days and can be present more at work, however there are the new commitments of her extracurricular activities and social engagements. I also spend time out of hours attending to emails or computer-based work such as report writing. The boundary that I have set is to ensure that while I may do extra work at night during the week when my daughter has gone to bed, I keep the weekends free to devote to family time, with only the occasional exception. This works for us!

Organisation

Laura – I look back at my time as a PhD student and early postdoc and think how much more time efficient I could have been, but that really would have taken a lot of the fun out of what was a really positive PhD experience. Nowadays, I start early, take minimal breaks and am extremely efficient with my time. Only working four days means that everything is planned, reagents and SOPs ready the day before to make sure I maximise the time I am in the lab before childcare pickup. I can safely say I am more organised now than earlier in my career.

Catherine – The greatest tool I have learnt since returning to work part-time is to not put things off. The way I cope with the pressures of home and work is to act on things immediately. Don't put off sending that email or writing that abstract. This was the best way I found in the early days of returning to work to mitigate forgetting to do things, and it is something I have continued. I also rediscovered the benefit of talking to people face-to-face. This may sound obvious, but I find it much easier to have a short face-to-face meeting (in person or via Zoom) than to send multiple emails back and forth.

SDS Page: Short Discussions for Students Page

Good support networks

Laura – My husband also works in science, though in a 'stable' job at CSL. With our first child, we had additional help from my parents with childcare, however circumstances have changed, and this is no longer possible. My in-laws live overseas, so we don't really have any alternative to childcare. This is not be an unusual scenario for anyone with children, but it adds an extra layer of pressure in terms of work productivity. If possible, we arrange and organise to split the caring responsibility into blocks (AM and PM) so both can get some work done each day. Quite often this means early mornings or late nights, but this works for us. We all have different support networks. I'm so grateful for my children's childcare educators. The kids love it and are always learning new things and making friends. I love hearing what adventures my son got up to during his extremely busy day!

Catherine – Finding your support network is very important and this is different for everyone. My partner and I do not have family to help, so we utilised childcare when our daughter was young as our main support while working, but the value of friends as emotional support cannot be understated. We have made a number of close friends with children the same age as ours; we assist each other with babysitting, which is really wonderful. The greatest change in the last few years has been increased flexibility in my partner's job and the ability to work from home. While we share drop-off and pick-up duties, it has had a really significant impact on our ability to care for our daughter on curriculum days or sick days (or for when you need time to do that last minute experiment). My co-workers and manager are the greatest sources of support at work and are very encouraging and understanding of my commitment to being the best parent I can be.

Be kind and make time for yourself

Laura – Life with children and a demanding job can be exhausting, so do try and make time for yourself. I try to get to yoga and Pilates at least once a week. This is either before work or later at night, but I always feel better after. Taking time for yourself is so important, even if it's only an hour per week.

Catherine – This is probably the area I find most challenging, and I think many people feel too tired or too busy at the end of the day to spend time on themselves. However, neglecting self-care can be counterproductive, and should absolutely be a priority. You may have a period of time when you are too busy at work to do any extra activities, but try to take advantage when you are less busy. Find something that recharges you emotionally and/or physically, whether it is exercising, cooking, crafting or going out with friends. My preference is to go out for dinner with a friend and debrief our lives.

What would you do differently?

Laura – Learning to say 'no' earlier in my career. In the past, I've not been realistic with what I can achieve in the lab and all the extracurricular activities that come with this job. This has taken me a long time to come to grips with the fact I can't do everything or say 'yes' to every opportunity and acknowledge that that is OK. This is especially true after returning from maternity leave, and having just come back from my having my second child, this is something I am prioritising for the future.

Catherine – Understanding that everyone has their own struggles is something I wish I had acknowledged earlier, along with the realisation that perfection is neither necessary nor achievable. It's the classic mistake of comparing your situation and success to others at work or within your social circle. Everyone is different, but we are all trying to achieve our best within our means. Comparing ourselves to others is not helpful. You may not get that next grant or that next talk, but treat yourself with kindness and seek out the support of a mentor who can help you navigate those transition periods.

Laura (left) and Catherine in 2024.

Dr Laura Osellame is a postdoc in the Tumour Targeting Laboratory of Professor Andrew Scott at the Olivia Newton-John Cancer Research Institute. Her work involves characterising novel antibody binding to unique tumour membrane proteins and investigating mechanisms of antibody–radionucleotide conjugates in tumour killing.
laura.osellame@onjcri.org.au
@lauraosellame1

Dr Catherine Palmer is a postdoc in A/Prof Diana Stojanovski's group at the Bio21 Institute of Molecular Science and Biotechnology. Her work involves interrogating the biogenesis of the mitochondrial solute carrier protein citrin, and the consequences of pathogenic mutations on citrin import and localisation within the cell.
catherine.palmer@unimelb.edu.au
@DrCathPalmer

SDR SCIENTIFIC
EQUIPMENT · SUPPORT · RESULTS

Proud to be

appointed ANZ Authorised Distributor for Hoefer, Inc.

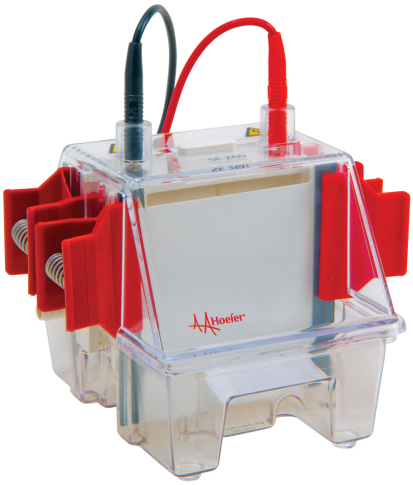
&

Sponsor of the ASBMB Education Award

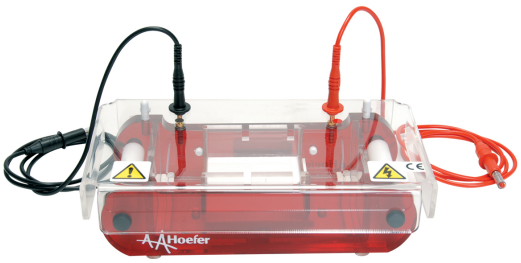
Hoefer specialises in developing and manufacturing tools and complementary accessories for gel electrophoresis and blotting applications.

Hoefer products can be found in laboratories around the world and are proven to deliver consistent and reproducible protein and nucleic acid electrophoretic separations.

You can be assured that Hoefer instruments, accessories and consumables will meet the highest standards of excellence, enabling you to achieve success in your work.



Hoefer



Need More Information? Contact your friendly SDR Scientific Technical Sales and Support Specialist on

t: 02 9882 2882/+61 2 9882 2882 e: info@sdr.com.au w: www.sdr.com.au

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.

Spreading Wings in Science: a Journey in Cancer Immunotherapy

Nicholas Huntington, Chief Scientific Officer, oNKo-Innate and Head, Cancer Immunotherapy Laboratory, Biomedicine Discovery Institute, Monash University

I started researching at a young age. I was passionate about ornithology, keeping around 100 different birds in flight aviaries as a kid and was lucky enough to do work experience at the Royal Melbourne Zoo in the Ornithology Department. This passion led me to a BSc and a successful PhD from the University of Melbourne, a postdoc at Pasteur Institute, Paris, and a career in academia at WEHI (2012–2018) then Monash University (2019–present). My research is focused on immune cell development, homeostasis and anti-tumour biology. I have been fortunate to be awarded enough competitive funding over the past 15 years to run a lab of eight to ten staff which has contributed 140 publications and patents. Throughout my early academic career, the publish or perish aphorism was a real factor behind this productivity, as I loved doing research and could not imagine an alternative career.

Around ten years ago, our lab published the discovery of a major regulator of Natural Killer (NK) cell anti-tumour immunity which changed my mindset somewhat and my career goals. At the time, immunotherapy drug discovery and development had hit fever pitch off the back of the remarkable responses rates seen with anti-CTLA-4 and anti-PD1 in advanced melanoma patients. As a consequence, we were inundated with requests for licencing and industry collaboration opportunities from venture capital, biotech and big pharma to therapeutically target this pathway in cancer immunology. We were awarded two patents covering the drug target and gene edited NK cells and entered into a collaborative research agreement with an international pharmaceutical company. I really enjoyed the business development activities required in establishing subsequent industry deals, and the more applied research questions we pursued were exciting and refreshing. Previously, I had not thought too much about what the ideal drug should look like. At this time, I gained valuable exposure to clinical development challenges, such as how biomarkers might serve to stratify which patient population could benefit most from this approach. Flying around the world and pitching this opportunity to like-minded professionals was a real rush, as was the potential implications of successfully delivering on these collaborations, getting a drug into first-in-human trials where it could benefit cancer patients who'd exhausted all other treatment options.

Nicholas Huntington.

The thrill of potentially expediting our discoveries into cancer therapies was what drove the next step in my career. This shift was made possible thanks to a brilliant and entrepreneurial postdoc in the lab, Dr Jai Rautela, who shared this enthusiasm and envisioned that we could achieve this even more efficiently by starting our own biotech company. Jai went and did an MBA part time while he was still actively researching in the lab and oNKo-Innate was registered in 2018. Being a small private company meant we were nimble, adapting quickly to industry needs and in 2020, oNKo-Innate made headlines locally by inking a large multi-year R&D partnership with Gilead Sciences and Kite Pharma and hasn't looked back.

Off the Beaten Track

oNKo-Innate R&D headquarters is based in Melbourne with 40 research and executive staff in the offices and labs each day while several others are based in the US and Europe. This sets us apart from most local biotech which tend to be more virtual, not having their own labs but using international contract research organisation or academic labs for drug development. At oNKo-Innate, we perform collaborative drug discovery and development projects with strategic partners as well as our internal development pipeline aimed at overcoming major hurdles in effective immune responses to tumours (for details of our pipeline, see https://www.onko-innate.com/pipeline). In my role as founder and Chief Scientific Officer, my activities are diverse and include business development, public relations, research and corporate strategy but also several academia-like tasks including training and mentoring, writing scientific papers, and getting amongst the weeds of the latest data coming out of the lab.

My academic leadership in NK cells and cytokine biology has transferred perfectly to this CSO role in an immunology discovery biotech. I love working side-by-side with some of Australia's best and brightest in designing research projects, and interpreting and debating our findings. So while we are highly focussed on developing specific assets, there is still a huge amount of exciting discovery activities going on in the background to seed future pipeline assets and collaborations.

What I enjoy about biotech is the flexibility in how we operate, the ability to grow the team rapidly and the freedom in what therapeutic goals we set ourselves. I've loved being involved in creating a new research culture where a large group of highly talented, diverse scientists and executives all working with passion and dedication as a team towards the common goal of improving patient outcomes through the development of innovative medicines. I do not dislike anything about my job in biotech. Our physical isolation from biopharma industry colleagues is a real challenge for Australian biotech companies, thus frequent international travel for the team is essential. My publish-or-perish upbringing forced me to become a workaholic, which serves me now in balancing both very demanding roles as an academic professor and a biotech CSO. My advice to others considering biotech as a career is that it is an exciting, fast paced environment where you get to exploit your science training and get exposed to new skills and perspective that you would rarely get exposed to in academia. I love to challenge myself and keep learning and evolving, so biotech life really satisfies these needs.

nicholas.huntington@monash.edu

ASBMB Medallists and Awardees at BMH2024

ASBMB President Ross Hannan with Lemberg medallist, Anthony Weiss (right).

From left: ASBMB Secretary Dominic Ng, Monica Santese of Eppendorf South Pacific, Eppendorf Edman ECR awardee, Praveena Thirunavukkarasu, and ASBMB President Ross Hannan.

From left: Shimadzu Research medallist, Thomas Ve, Mahnaz Modarresi of Shimadzu and ASBMB President Ross Hannan.

From left: Simon Rushworth of SDR Scientific, SDR Scientific Education awardee, Julian Pakay, and ASBMB President Ross Hannan.

ASBMB Secretary Dominic Ng (left), ASBMB Fellowship awardees holding certificates – Abhimanu Pandey, Sai Chitti (recipient of the Fred Collins Award), Jascinta Santavanond and Yuliia Didan, with Fred Collins' daughter, Cathie Jilovsky (third from right).

BIOMOLECULAR HORIZONS2024: DISCOVER CREATE INNOVATE / ComBio 2024 MELBOURNE 22nd COMBIO CONFERENCE

Leann Tilley, Convenor of Biomolecular Horizons 2024/ComBio2024

The Hon Ben Carroll MP, Deputy Premier and Minister for Education and Medical Research, formally opened the Biomolecular Horizons Congress. From left: Joon Kim (FAOBMB President), Erinna Lee, Alexandra Newton (IUBMB President), Ben Carroll, Leann Tilley, Ross Hannan (ASBMB President) and Frances Separovic.

The Biomolecular Horizons 2024 (BMH2024) Congress, hosted by the ASBMB, brought together three prestigious conferences – the 26th Congress of the International Union of Biochemistry and Molecular Biology (IUBMB), the 17th Congress of the Federation of Asian and Oceanian Biochemists and Molecular Biologists (FAOBMB), and the 22nd ComBio Conference.

From 22–26 September, BMH2024 welcomed 1,875 registrants from 44 countries to share new developments in biomolecular research, innovation and education. The largest international delegations were from South Korea, New Zealand, India, Japan and the USA.

The Program Committee, co-led by Stephanie Gras, Andy Hill and Wai-Hong Tham, and their team of more than 40 Stream Leads undertook the herculean effort of assembling the scientific program. They programmed over 500 talks, comprising seven Plenary sessions, including two presented by Nobel laureates, 34 Keynote Sessions, 77 Symposium Sessions, six Award Sessions, four Hot Topics Sessions and seven Technical Workshops. These were topped with four pre-Congress Satellite events, a Young Scientist Program, 60 Lightning Talks and over 600 posters. The BMH2024 program was diverse, equitable and scientifically excellent.

Satellites

The Program commenced ahead of the main Congress with a series of Satellite events. Gabby Watson and her team organised a Young Scientist Program (YSP) in Macedon with 36 attendees, selected through a highly competitive process (see page 38 of this issue of the *Australian Biochemist*). The Korean Society for Biochemistry and Molecular Biology joined forces with ASBMB colleagues, led by Victor Anggono, to organise a Molecular Neuroscience Satellite at the Bio21 Institute. A follow-up meeting will be held in Korea in 2025 – an important legacy event. Donna Whelan put together a Biophysics Workshop. An Education Workshop was organised by Nirma Samarawickrema (see page 39 of this issue of the *Australian Biochemist*). Sarah Garnish and Tatiana Soares da Costa and their team organised a Career Development Forum (see page 42 of this issue of the *Australian Biochemist*).

Public Lecture

An exciting prelude to the main Congress was a Public Lecture held on 22 September, with 240 members of the public joining with the delegates for this exciting Grimwade Award Lecture. Uncle Ian Hunter welcomed attendees to Country and played the didgeridoo,with its evocative tones reverberating around the Plenary Hall. The Lecture featured Brian Kobilka, who was awarded the Nobel Prize in Chemistry 2012 for revealing the workings of G protein-coupled receptors (GPCRs). We learned that, amongst mammals, elephants have the most GPCRs and dolphins the fewest! Brian explored how GPCR signalling works and the difficulties in discovering drugs for these important receptors, using the μ-opioid receptor as an example. He explained how molecular studies of GPCRs underpin the development of new drugs that provide pain relief without causing addiction and other negative effects.

Grimwade Award Lecturer, Brian Kobilka, Nobel Laureate in Chemistry 2012. From left: Leann Tilley, Laura Edgington-Mitchell, Brian Kobilka, Angus Grimwade, Ian van Driel, Stephanie Gras, Waihong Tham and Andy Hill.

BMH2024 Meeting Report

Congress Opening

Monday morning saw the Presidents of the IUBMB (Alexandra Newton), the FAOBMB (Joon Kim) and the six ComBio partner Societies including the ASBMB on the stage for a spectacular Congress Opening. Djirri Djirri, a Wurundjeri women's dance group, provided cultural context and made an Acknowledgement of Country. The Hon Ben Carroll MP, Deputy Premier of the State of Victoria and Minister for Education and Medical Research, formally opened the Congress. He explained the importance of technology and innovation to Victoria and highlighted the value of meetings such as BMH2024 for fostering global relationships.

Breadth and depth

Several themes of interest to biochemists and molecular biologists ran across the program. These included Biotechnology and Synthetic Biology, Cell Signalling and Metabolism, Genomics, Gene Regulation and Epigenetics, Bioinformatics, Computational Biology and 'Omics, Structural Biology and Biophysics, Microbial World, Molecular Basis of Disease, Molecular Physiology and Cell, Developmental and Stem Cell Biology, and Education. An exciting aspect of the Congress were focused theme days that permitted deep dives into particular specialities.

Misty Jenkins AO giving her Plenary talk on CAR T-cell therapies for treating brain cancer.

Indigenous Perspectives in Biomolecular Science

A focus theme that proved both popular and exciting was Indigenous Perspectives in Biomolecular Science, organised by and featuring Indigenous scientists. The Congress Opening Plenary Lecture was delivered by Misty Jenkins AO (WEHI), a Gunditjmara woman and an influential contributor to First Nations affairs. Misty energised the audience with her work on the development of CAR T-cell therapies to treat brain cancer. The day featured Keynote presentations from Phillip Wilcox (University of Otago, New Zealand) on Indigenous communities and gene technologies, Kimiora Henare (University of Auckland, New Zealand) on tumour microenvironment and tumour immunology, and Michael-Shawn Fletcher, a Wiradjuri man and biogeographer (Indigenous Knowledge Institute, University of Melbourne) on climate change and One Health.

Djirri Djirri, a Wurundjeri women's dance group.

The future of RNA technology

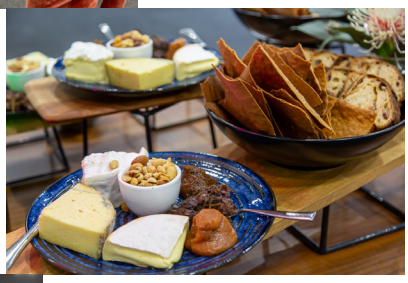
RNA Technology Day showcased the best of national and international scientific developments in the field. BioNTech Australia organised an Industry Breakfast with a panel discussion on 'Accelerating the clinical translation of local mRNA breakthroughs'. Norbert Pardi (University of Pennsylvania, USA) delivered a Plenary Talk on the design of precise optimised mRNAs for therapeutic applications, including protecting against multiple coronaviruses. Petro Terblanche (CEO, Afrigen Biologics, Cape Town, South Africa) is a global advocate for the production of medicines in Africa. She explained that Africa consumes 25% of all vaccines produced globally, but only produces 1% of its needs. Terblanche outlined a strategy to increase manufacturing capacity to 60% by 2040. Yue Wan (Genome Institute of Singapore) described new technologies to study RNA structures, whilst Ling-Ling Chen (Chinese Academy of Sciences) described circular RNA-based aptamers that can effectively suppress excessive gene activation. Traude Beilharz (Monash University) and Andrew Boslem (New England Biolabs) chaired a panel on the Future of RNA Technology with Amanda Caples (Victoria's Lead Scientist), Claire Borg (Associate Director, R&D Partnerships, Moderna Australia), Catherine Mills (Monash Bioethics Institute) and Steven Rockman (CSL Seqirus). The panel discussed new horizons in RNA technologies, the regulatory and societal constraints to progress, and how industry, government and academia can work together to realise the potential of mRNA vaccines.

Poster display in Exhibition Hall.

BMH2024 Meeting Report

Above: Grimwade Medal Reception.

A trio of musicians plays Aussie bush classics at the Welcome Mixer.



'Mad scientist' stilt walkers the Welcome Mixer.

The koala is the centre of attention at the Welcome Mixer.

Precision genome editing

Caixia Gao (Chinese Academy of Sciences) gave an astounding Plenary talk describing the development of precise and specific genome editing technologies to engineer new traits into crops. One of *Nature's* 'Ten Science Stars of China', she amazed the audience with her descriptions of 'scarless' and base-editing strategies. Her team's wheat strain that resists powdery mildew, with no loss of crop yield, has achieved registration. Alexis Komor (UC San Diego, USA), who developed the first cytosine base editor, described her multiplexed orthogonal base editors that can install multiple point mutations in target genes. Peter Fineran (Otago University, New Zealand) talked about new CRISPR-Cas-like systems that bacteria use to resist bacteriophages.

Designing biology for a healthy planet

With the world's population edging towards 9 billion people, there are major challenges around sustaining food and energy resources, and keeping people healthy, without destroying the planet. Pam Silver (Harvard University, USA) gave a Plenary talk remotely, explaining how synthetic biology can be used to design and engineer cells, tissues and organisms with enhanced function. She described her bionic leaf project to turn sunlight into liquid fuel and outlined recent projects that enabled bacteria to capture greenhouse gases and make chocolate. Seigo Shima (Marburg University, Germany) shared his findings on the enzymes involved in methane production, with a view to finding biotechnology solutions to climate change. Greg Cook (University of Otago, New Zealand) has identified microbes responsible for methane production in sheep, a discovery which could help reduce emissions from livestock. Cook described the development of small molecule inhibitors and vaccines to specifically target the production of methane by methanogens.

AI for protein design

Sergey Ovchinnikov (Massachusetts Institute of Technology, USA) gave a Plenary talk remotely that explained how artificial intelligence (AI) has been used to solve a grand challenge in biology, namely, the accurate prediction of the three dimensional structure of proteins. His group is using AI to drive new bio designs. Jennifer Listgarten (UC Berkeley, USA) reported on machine learning for protein engineering and Jane Allison (University of Auckland, New Zealand) described her work on molecular dynamics simulations to provide atomic level information about signalling processes.

Microbial world and new therapeutics

Leo Eberl (Zürich University, Switzerland) gave a Plenary talk on the use of genome-wide profiling to understand quorum sensing and bacterial pathogenicity. Kei Sato (Tokyo University, Japan) reviewed lessons learned about SARS-CoV-2 variants from the COVID-19 pandemic and how to prepare for future pandemics.

BMH2024 Meeting Report

Raghavan Varadarajan (Indian Institute of Science) described thermostable vaccine designs, including for the SARS-CoV-2 spike protein, that obviate the need for cold chain vaccine storage. Victor Nizet (UC San Diego, USA) described the production of biodegradable, biomimetic cellular nanoparticles that can be used to combat invasive bacterial infections such as those causing pneumonia and sepsis. Mike Barrett (University of Glasgow, UK) described the characterisation of *Leishmania* immunometabolites that are produced to alter macrophage function, thereby avoiding immune destruction by host cells.

Metabolic mayhem

Shobhna Kapoor (Indian Institute of Technology Bombay) described the effects of *M. tuberculosis* lipids on host macrophage membranes. Heather Christofk (UC Los Angeles, USA) explained how cancer metabolism affects tumour growth. John Chambers (NTU, Singapore) described studies of the genetic makeup of thousands of patients, and their use to identify new genetic and epigenetic pathways associated with coronary heart and metabolic diseases. Brian Glancy (NIH, USA) reported his work on muscle energetics and mitochondrial energy metabolism. Marian Walhout (University of Massachusetts, USA) described a 'worm Perturb-seq' method that combines RNAi knockdown with RNA sequencing, which she has applied to apporximately 1,000 metabolic genes, to understand how metabolism is wired in *C. elegans*. You-Me Kim (KAIST, Korea) explained that short chain fatty acids are major microbial metabolites that can reduce airway inflammation and improve lung function.

Genomics and epigenetics

Richard Roberts (New England Biolabs, USA) delivered his Path to a Nobel Prize session, chaired by Erinna Lee and Marilyn Anderson. Roberts discovered split genes and mRNA splicing, for which he received the Nobel Prize in Medicine or Physiology in 1993. He also founded New England Biolabs, one of the first commercial suppliers of restriction enzymes in the late-1970s. He explained that restriction enzymes were the key to unlocking the doors of modern genomics and molecular biology. He exhorted early career colleagues to embrace 'failed' experiments. If someone repeatedly gets an unexpected result, Roberts' observation is that "nature is trying to tell you something". His Keynote talk described new insights into DNA methylation in bacteria. Job Dekker (University of Massachusetts, USA) used 3D interaction studies to understand how cells compact their chromosomes, as they enter mitosis. Wei Xie, (Tsinghua University, China) described the epigenomic reprogramming that accompanies early embryogenesis and cell fate determination in mammalian embryogenesis. Marnie Blewitt (WEHI) described new epigenetic regulators, and explained how epigenetic silencing can be manipulated to treat disease.

Signalling, communication and cellular control

Nick Barker (A*STAR IMCB, Singapore) described the use of organoids to identify cancer stem cells that represent potential therapeutic targets. Hozumi Motohashi (Tokyo University, Japan) described supersulfides as universal bioactive metabolites that play roles in regulation of inflammation. She described a novel oxygen-sensing system that regulates lysosomal activity. Nieng Yan, (Shenzhen Medical Academy, China) used cryo-EM to study membrane transport proteins, revealing the different mechanisms that cells use to exchange material with their environment. Alexandra Newton (UC San Diego, USA) talked about protein kinase C as a signalling nexus, illuminating its role in Alzheimer's disease and as a tumour suppressor in human cancer cells.

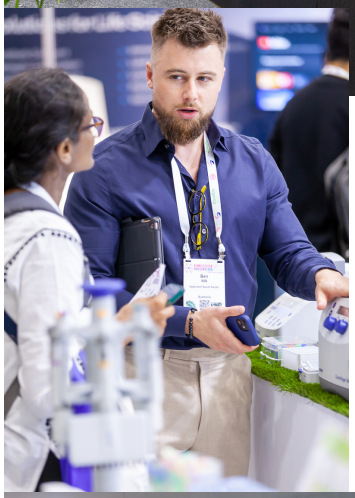
Education

Two Education sessions featured Keynote talks from Elizabeth McKinley (University of Melbourne) and Drew Berry (WEHI). A full report on Education at BMH2024 is on page 39 of this issue of the *Australian Biochemist*.

Abrove (from left): Ivanhoe Leung, Zahra Islam and Leann Tilley.

Networking Event at the SEA LIFE Melbourne Aquarium.

BMH2024 Meeting Report



Above: Stories & Structures: New Connections exhibition.

Left and below: Trade Exhibition.

Technical Workshops

The Congress also provided the opportunity to share technical insights through workshops on Protein Structure Prediction and Application, ANSTO Australian Synchrotron, Protein Cryo-electron Microscopy, Digital Spatial Profiling, Protein Nomenclature, the Future of Publishing, and Editor Insights.

Outreach

We welcomed high school students to our Outreach Program organised by Laura Edgington-Mitchell (University of Melbourne) and her team, working with Tony Chiovitti (Gene Technology Access Centre). Two hundred and seventy students attended a Public Lecture, with talks from Melinda Jingqi Wang (University of Melbourne) on life in science, Alexis Komor on precision genome editing and Rhys Grinter (University of Melbourne) on microbial machines. One hundred and fifty students enjoyed a guided tour of the Exhibition Hall.

Trade Exhibition and Congress catering

The extensive and vibrant exhibition Trade Exhibition was integral to the Congress, showcasing the latest innovations, products and services in the biomolecular research market. The Exhibition Hall was buzzing during the breaks between the sessions. With 69 exhibition booths, it was a valuable opportunity to connect companies with customers from across Australia and the world. The passport competition proved very popular, as were the BMH Quiz and the Factor X competitions. The MCEC Catering was superb, with thoughtful culinary options that were delicious, healthy and environmentally friendly.

Innovations

We were very pleased to incorporate an ‘art meets science’ exhibition entitled Stories & Structures: New Connections. Curated by Jenny Whiting (Microscopy Australia), the exhibition explored the rich visual parallels between Indigenous artworks and the microscopic world of nature. Another innovation was a Family Room, as well as childcare subsidies to assist delegates with carer responsibilities.

Social events

A face-to-face event is an opportunity to catch up with old friends and to make new and enduring collaborations and friendships. There was a general buzz of friendliness as colleagues practised tuakana–teina, a Maori term that refers to a teacher–student relationship based on shared mutual respect. The Monday evening Weclome Mixer was a night to remember. A koala munched on gum leaves as delegates made friends with a 2-metre python and a very tame dingo. A trio of musicians dressed as an emu, a kangaroo and a ranger roamed the room, playing Aussie bush classics. ‘Mad scientist’ stilt walkers greeted delegates as they entered the Exhibition Hall, whilst an oyster shucker added fresh molluscs to the array of excellent food.

The Wednesday evening Networking Event at the SEA LIFE Melbourne Aquarium started with a quick glimpse of Pesto the big baby penguin, before moving on to see the jellyfish, the seahorses and the 65-year-old, 6-metre long, 750 kg, male saltwater crocodile, Pinjarra. Roving canapes, food and drink stations, and lots of bubbly scientists made it a very special event.

Thank you

The Local Organising Committee worked tirelessly for six years, ever since our successful bid in Seoul in 2018, to bring the Congress together – driven by a shared passion to celebrate all things biomolecular. I would like to thank all the Presidents of the Societies and Society groupings for agreeing to come together to make this amazing meeting. There are so many things that can go wrong during the organisation of a large Congress: major bushfires, COVID, world conflicts, to name a few. We learned much more about liability insurance and

BMH2024 Meeting Report

Right: Panel on the Future of RNA, from left: Andrew Boslem (New England Biolabs), Claire Borg (Moderna) and Amanda Caples (Victoria's Lead Scientist).

Poster Prize Winners

SPONSORED BY THE ASBMB

Ashleigh Geiger (University of Adelaide)
CRISPR/Cas9 allele-specific targeting of autosomal dominant retinitis pigmentosa disease variants

Alix Harlington (University of Adelaide)
The S-lignin O-demethylase SyoA: structural insights into a new class of heme peroxygenase enzymes

Anastasiya Potapenko (Macquarie University)
Ataxin-3 as a deubiquitinating enzyme and its involvement in the molecular basis of Machado-Joseph disease

Muhammad Zahir Siddiqui (University of Wollongong)
Structural characterization of the Escherichia coli *primosome*

Lachlan Staker (University of Adelaide)
Novel prime editing approach for therapeutic targeting of autosomal dominant retinitis pigmentosa

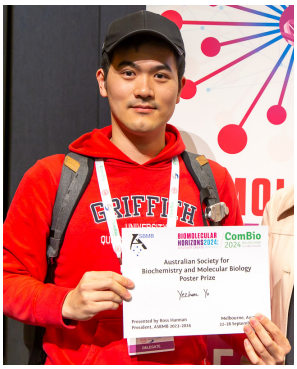
Yezhou Yu (Griffith University)
Exploring the cellular roles of carbonic anhydrase III and finding new binding partners

SPONSORED BY *FEBS Open Bio*

Vishnu Sunil Jaikumar (University of South Australia)
Understanding chemoresistance mechanism in triple negative breast cancer – a novel cell signalling axis

SPONSORED BY *Trends in Biochemical Science*

Solace Roche (University of Queensland)
The elusive pore-forming mechanism of the Yersinia entomophaga *toxin complex*



ASBMB poster prize winners. Above, from left: Alix Harlington, Ashleigh Geiger and Lachlan Staker. Below, from left: Muhammad Zahir Siddiqui and Yezhou Yu.

ASBMB poster prize winner, Anastasiya Potapenko (left) with ASBMB President Elect, Megan Maher.

FEBS Open Bio *poster prize winner, Vishnu Sunil Jaikumar.*

Trends in Biochemical Sciences *poster prize winner, Solace Roche (left) with ASBMB President Elect, Megan Maher.*

insolvent trading laws that we really wanted. But we made it. As the inspirational Indigenous Elder, Pat O'Shane, says, "Obstacles are there to get around, climb over or scramble through." I want to thank everyone for coming together to create a smoothly run and exciting meeting.

In particular, I would like to thank Executive Secretary, Erinna Lee. Her organisational skills are unparalleled. She was quite literally indispensable to the organisation process – so many letters sent, so many queries fielded, such commitment. She is amazing! I want to thank Deputy Convenors, Frances Separovic, who was always there with advice and support, and Christina Mitchell, who provided sage advice and brought so many people from Monash. I want to thank the wonderful Terry Piva who kept a firm hand at the helm of the finances and steered us to a good outcome. And Fiona Whelan and her team, for the amazing communications portfolio. I would also like to thank Paul Gleeson (FAOBMB Liaison), Debnath Ghosal (YSP), James Murphy (Fellowships and IUBMB Liaison), Nirma Samarawickrema (Education), Laura Edgington-Mitchell (Outreach), David Greening, Colby Zaph, Michelle Dunstone and Dominic Ng (Sponsorship and External Relations) and Ricky Johnstone (Research Institution Liaison). The success of the meeting was due to their amazing work. What a team!

I would like to thank all of the Program Committee members for their enormous contributions to BMH2024. Stephanie Gras, Andy Hill and Wai-Hong Tham were inspirational leaders. So many 8am meetings. So much poring over Abstracts and the dreaded Program grid! They assembled a team of more than 40 Program Committee members who put together the Streams, and then found Chairs, who found the speakers, who made it such an amazing Program. I want to thank the organisers of the Career Development Forum, Sarah Garnish, Tatiana Soares da Costa and their team, as well as Sarah Stewart, Emma Grant and their teams, for organising the posters and lightning talks.

The Victorian State Government was a very strong financial supporter of the Congress, enabling us to put together this impressive event. I would like to thank the State Government, the City of Melbourne and the Melbourne Convention Bureau. We are very grateful for financial support from the IUBMB and the FAOBMB. I would like to thank major sponsors, CSL Pty Ltd, the University of Melbourne, and the sponsors of individual sessions and events, including Moderna Australia Pty Ltd, BioPlatforms Australia, mRNA Victoria, NEB Pty Ltd, Thermofisher Pty Ltd, University of Queensland, Monash University, La Trobe Institute for Molecular Science, Olivia Newton-John Cancer Research Institute, Victorian mRNA Innovation Lab, Metabolomics Australia, BioNTech Pty Ltd, Portland Press Pty Ltd, CoE SynBio, Australia–Korea Foundation and ANSTO.

Many thanks are due to our Professional Conference Organisers, Waldron Smith Management, led by Kate Smith and her incredible team, particularly Annabel, Hannah, Charlene, Helen and Sarah. Their input went so much further than the logistical; we could not have done it without them. Kate was there with us every step of the way, holding our hands, sharing our pain and our joys, and pointing us in the right direction.

One of our early career delegates described BMH2024 as the "best conference I have ever attended". Who am I to disagree? As Evonne Goolagong Cawley said, "When you have a dream you have to work hard to achieve that dream. Your dreams can be the force that keeps you going." The BioMolecular Horizons Congress was our collective dream, and we hope it inspired delegates to continue to follow their dreams in biomolecular science.

Leann Tilley
(Bio21 Molecular Science and Biotechnology Institute, University of Melbourne)
BMH2024 Congress Convenor

Local Organising Committee: Back, from left: Fiona Whelan, Stephanie Gras, Colby Zaph, Dominic Ng, Gabby Watson, James Murphy, Tatiana Soares da Costa, Laura Edgington-Mitchell, Paul Gleeson and Nirma Samarawickrema. Front, from left: Wai-Hong Tham, Frances Separovic, Erinna Lee, Leann Tilley, Terry Piva and Andy Hill.

A Memorable Young Scientist Program in Melbourne

Welcome event at Naughtons Hotel Parkville.

We are extremely grateful to have participated in the 2024 Young Scientist Program (YSP). The event, held from 19–22 September 2024, was a remarkable opportunity for early-career researchers to exchange ideas and form lasting networks. After a very warm welcome at Naughtons Hotel in Parkville, we headed to the picturesque Cammeray Waters in the Macedon Ranges for two excellent days filled with scientific camaraderie, knowledge exchange and networking.

The 2024 YSP awardees included PhD students, postdocs and faculty members from Bangladesh, Canada, Chile, China, Germany, India, Indonesia, South Korea, Malaysia, New Zealand, the Philippines, South Africa, Switzerland, Thailand, the United Kingdom, the United States and Australia. Australia was well represented in this diverse group of 36 YSP participants, with ten fellows – Allegra Angeloni, Osvaldo Contreras, Jennilee Davidson, Katherine Davies, Alexis Diaz-Vegas, Rebecca San Gil, Yun Shi, Tao Tan, Xuan Ling Hilary Yong, Zijing Zhou.

The program featured two days of scientific sessions, during which YSP fellows gave six-minute presentations of their exciting research in a range of topics from structural biology, proteomics, molecular biology, to cancer biology, clinical genomics and more. These short presentations were divided into five sessions over two days, with tea and lunch breaks in between, providing excellent opportunities for stimulating discussions that fostered vibrant exchanges of ideas. We also had inspiring guest lectures from Professor Joon Kim (Korea University, FAOBMB President) and Distinguished Professor Alexandra Newton (UC San Diego, IUBMB President), respectively, about not only scientific research but also commercialisation efforts and career paths filled with passion. Additionally, we had the pleasure of hearing from Dr Michael Healy (University of Queensland), winner of the IUBMB Whelan Young Investigator Award, who presented his work on the Commander macromolecular complex.

Outside of the scientific sessions, participants had ample time to network in a more informal setting, including free time between 5pm and 7pm, a bushwalk, a lively trivia quiz, challenging board games, table tennis and eight-ball on a billiard table. We also had the privilege of attending a masterclass on science communication by Dr Shane Huntington, who emphasised the importance of crafting effective presentations with clear purpose and audience engagement.

Bushwalk in the Macedon Ranges.

The YSP was an inspiring and enriching event, and we are deeply thankful to the IUBMB, the FAOBMB and other societies of biochemistry and molecular biology, as well as the outstanding organising committee, Gabby Watson, Debnath Ghosal, David Teran, Rhys Grinter and Alisa Glukhova, for making it such a success.

Osvaldo Contreras (Victor Chang Cardiac Research Institute and UNSW Sydney) and Yun Shi (Griffith University)

YSP awardees and organising committee members.

Education at BMH2024

The Pre-Congress Education Workshop

Hosted by Monash University's Biomedicine Discovery Institute (Education), the Education Workshop, *Publishing high-quality higher education pedagogical research to enhance your professional visibility – tips and advice to authors,* was held the day before the Biomolecular Horizons Congress. This interactive 2-hour workshop was co-facilitated by Professor Marilee Benore (University of Michigan–Dearborn and the Editor-in-Chief of *Biochemistry and Molecular Biology Education [BAMBEd]*), Associate Professor Nirma Samarawickrema (Monash University, Education Chair of the FAOBMB) and Professor Tracey Kuit (University of Wollongong, Chair of the ASBMB Education SIG). The workshop was attended by 44 keen educators interested in publishing their pedagogical research. It focused on how to formulate a pedagogical research project; use evidence-based scholarly strategies; and develop ethically appropriate data collection instruments and analysis processes. The collaborative workshop space was buzzing with enthusiastic discussions, sharing of information and plans for future collaboration.

The workshop participants conveyed their enthusiasm via the survey:

> *"It was a great initiative to have the workshop but it felt really short and quick, more please in the future!"*
>
> *"Thanks for putting together the workshop activities and for inviting Marilee."*

In the survey, 65% of participants indicated that they were keen on becoming an author, reviewer or guest editor of the journal, while 94% planned or considered submitting manuscripts to the journal.

We thank the FAOBMB, the ASBMB Education SIG, Monash University and Wiley Publishers for generously supporting this workshop.

Education Workshop facilitators, from left: Marilee Benore, Nirma Samarawickrema and Tracey Kuit.

Education Workshop attendees.

Education Workshop in progress.

ASBMB Education SIG Committee. From left: Tracey Kuit, Matthew Clemson, Amber Willems-Jones, James Tsatsaronis, Nirma Samarawickrema, Maurizio Costabile, Alyssa Van Dreumel and Jessica Gibbons.

Education Day

The theme, *Bioscience for a sustainable future,* encompassed several sub-themes including reimaging bioscience learning, teaching and assessment; preparing graduates of the future for social licence; student voice; and bioscience jobs for the sustainable future. The Education Day brought together educators and researchers who shared innovative ways of teaching, current practices and stimulating ideas. The presentations on widely varying aspects of teaching and learning were delivered through a mix of keynotes, invited speakers, selected talks from submitted abstracts, lightning talks and posters.

Commencing the session with a Keynote talk, Dr Drew Berry (WEHI) enthralled the audience with a captivating display of magnificent animations of tissues, cells, organelles and molecules. Drew very adeptly combined cinema, science and his skills as a biomedical animator to reveal the dramatic intricacies of the electron transport chain, making this complicated process come alive. From the molecular world of biomedical animations, the second Keynote talk moved our attention to social equity issues that surround the nexus of Indigenous knowledge and STEM education. In her presentation, Professor Elizabeth McKinley (University of Melbourne) questioned what counts as knowledge, and how it can be

Education at BMH2024

known, transmitted, learned, distributed and modified in a culturally sensitive way.

Following each keynote talk was an invited presentation. The first was by Professor Marilee Benore who, as Editor-in-Chief of the IUBMB journal *BAMBEd*, emphasised the need to showcase and share best practices, innovative pedagogies, laboratory activities, our student-centred learning/teaching approaches and the pivotal role played by the journal to connect the global community of biochemistry and molecular biology educators. Her message was both powerful and encouraging! Equally encouraging for education-focused academics was Professor Merlin Crossley's (UNSW) perspective on the merits of developing a recognition scheme for education-focused academics that correlated directly to ensure career progression, recognition and respect as an educator.

> *"Teaching is a core purpose of universities. It is easier than ever to share learnings about teaching, and, with technology advancing, I find I need more help than ever to keep up. It was wonderful to get together with like-minded colleagues at the BHM2024 Education Day, to talk and hear about developments, and to share, make visible and celebrate successes."*
>
> Professor Merlin Crossley (UNSW)

Professor Crossley's attitude likely resonated with everyone. In addition, the Education Day included seven presentations from selected abstracts ranging from the use of generative AI, relationships for student success, measuring learning gains, case study teaching and building biochemical literacy, amongst others. A rich display of 24 Education posters provided further opportunities for educators to exchange ideas and network.

Education awards

An Education Award talks symposium showcased four educators that are creating innovations in biochemistry and molecular biology.

Dr Julian Pakay (La Trobe University) won this year's ASBMB SDR Scientific Education Award. He presented his work on error analysis of assessment tasks to categorise the main sources of student conceptual misunderstanding. Julian used his findings to inform curriculum development and the open educational eBook, *Foundations of Biomedical Science*.

The 2024 Michael Roberts Excellence in Teaching Award (Australian Physiological Society) was awarded to Associate Professor Puspha Sinnayah (Victoria University). Puspha demonstrated her multifaceted approach and commitment to teaching and learning, whilst embracing the challenges imposed by COVID, the rise of artificial intelligence against the ever-changing backdrop of policy frameworks.

The FAOBMB Education Special Travel Fellowship was awarded to Dr Nuruliza Roslan (Universiti Sains Islam Malaysia). Nuruliza illustrated how she integrated

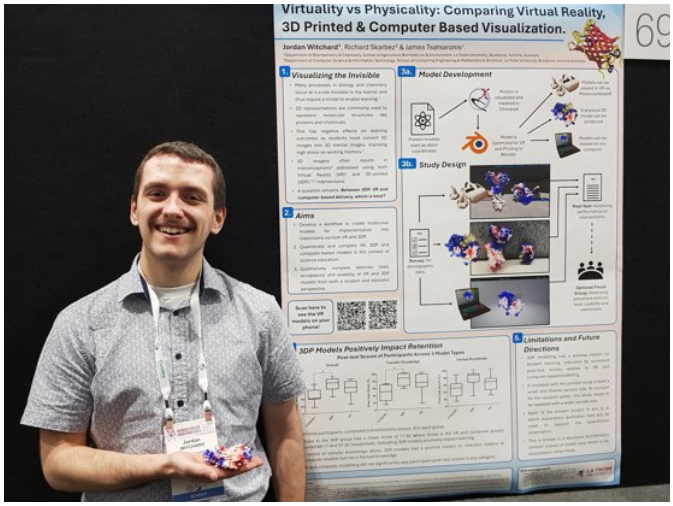
Education Keynote Session 1. From left: session co-chair, Yang Mooi Lim (Chair Education and Training Committee, Universiti Tunku Abdul Rahman, Malaysia), Drew Berry (Keynote speaker), Marilee Benore (Invited speaker) and session co-chair, Joon Kim (President FAOBMB, Korea University).

Left: Education Keynote Session 2. Keynote speaker, Elizabeth McKinley (University of Melbourne).

Education Keynote Session 2. From left: Kathryn Jones (University of Aukland), Sonja McKeown (Monash University), Reece Sophocleous (University of Wollongong), Matt Clemson (University of Sydney), Kay Colthorpe (University of Queensland), Kathy Tangilakis (Victoria University), Christian Moro (Bond University) and Tracey Kuit (University of Wollongong).

Education at BMH2024

Education Award Talks Symposium. From left: Kay Colthorpe (session co-chair), Nuruliza Roslan, Puspha Sinnayah, Tracey Kuit, Julian Pakay and Andrew Moorhouse (session co-chair).



Winner of the Education Poster, Jordan Witchard.

Educators networking beside their posters at the Welcome Mixer.

augmented reality with a mobile application platform to create interactive and visually stimulating educational tools that promote deep learning of difficult concepts.

Through a focus on student and staff relationships and sense of belonging, Tracey Kuit shared the success of her projects centred on interdisciplinarity and wicked problems using the UN Sustainable Development Goals Framework.

Jordan Witchard (La Trobe University) won the Education Poster Prize, awarded by *BAMBEd,* for his poster titled *The educational impacts of using 3D printed, virtual reality and computer-based instruction in biochemistry education*.

We thank all the participants, presenters, sponsors, supporters and the ASBMB Education SIG Committee for their contributions in making the Workshop and BMH2024 Education Day a success.

"BMB education symposia are the best forums for educationists to gather to share and learn the problems and solutions, skills and knowledge, techniques and strategies, platforms and other innovative ways of teaching BMB in different countries. The BMH2024 Education Workshop, attended by participants from the IUBMB and FAOBMB, successfully elicited different issues and concerns in BMB education. Thank you for such a stimulating day."

Professor Gracia Fe Yu
(University of the Philippines)

"The community of biochemistry educators that I met were delightful, supportive of each other, actively engaged in best practices and building a community of research and practice."

Professor Marilee Benore
(University of Michigan–Dearborn, USA)

Nirma Samarawickrema
(Monash University)
BMH2024 Education Representative
and Chair of Education, FAOBMB

BMH2024 Career Development Forum

On Sunday 22 September, we welcomed over 300 early career researchers (ECRs) from 25 countries for the BMH2024 Career Development Forum. This was a dedicated one-day workshop for ECRs to help shape the planning and development of their careers. We were joined by 15 excellent invited speakers from various countries, professions and career stages who engaged our ECRs and imparted their wisdom.

The opening session focused on the hot topic of research commercialisation. Three Australian research group heads Associate Professor Ashley Mansell (La Trobe University), Professor Stephanie Gras (La Trobe University), and Associate Professor James Vince (WEHI) each shared their experiences in commercialising their research through spin-outs/start-up companies. Collectively, we heard about how to identify and protect IP, translating fundamental research, and differences between academic and industry research.

Following a morning tea break, where attendees were encouraged to network with their fellow ECRs through a Networking Bingo game, we got into the discussion of how ECRs can strengthen their CV. In this session we were joined by Professor Dan Dries (Chapman University; Chair, IUBMB Fellowship Committee) and Professor Dario Alessi (University of Dundee; President-Elect, IUBMB), and NHMRC Early Career Fellow, Dr Georgia Atkin-Smith (WEHI). Professor Dries shared with us how to approach Fellowship applications, providing suggestions on how to assemble a reasonable budget and experimental plan. Dr Atkin-Smith provided useful tips on the types of leadership opportunities available to ECRs and how to showcase our leadership activities on our CV. To close out the session, Professor Alessi discussed the daunting task of finding the right postdoctoral position, giving our ECRs an insight to what group heads are looking for in applications, cover letters and interviews.

The final session before lunch, Strategic Publishing, was part of a workshop series running during the BMH2024 congress discussing the evolving landscape of scientific publishing. Editor-in-Chief of *Biochemical Society Transactions*, Professor James Murphy (WEHI), discussed the process of preparing rebuttals and reformatting your manuscript in accordance with revisions. In addition to providing ECRs with helpful tips on the revision process, James also shared the ways they can get involved in reviewing manuscripts, giving us insights into how to make ourselves accessible to editors. We were also privileged to have Dr Michael Funk, a Senior Editor of *Science*, join us for our strategic publishing session. With his professional insights, Michael spoke about the role of cover letters and how to identify the right journal for your manuscript. This was a fantastic session to include in the Career Development Forum, highlighting how involving ECRs in the publishing pipeline is not only beneficial for them, but for the system itself.

After lunch, we delved into the world outside academia and showcased the various career paths available to our ECRs. Dr Drew Berry (WEHI) opened this informative session with his award-winning animations and gave us insight into being a biomedical animator. The next speaker Dr Jasmine Li (FB Rice) shared her career path from a postdoctoral researcher to a trainee patent attorney. Dr Li gave our ECRs an understanding of the day-to-day responsibilities of the role and how she navigated the career change. We were rejoined by Dr Michael Funk *(Science)*, who shared his experiences as a professional editor. Michael's presentation provided insights into how being a professional editor differs from a scientific editor. He also highlighted the unfortunate lack of professional editorial roles available in Australia. The session concluded with an engaging presentation from Dr Matthias Pelzing, reflecting on his 30-year career in industry, starting as an application scientist in Germany to his current role with CSL as Senior Director of Analytical Biochemistry. It was clear from the outset that Dr Pelzing has pursued his passion for mass spectrometry throughout his career, conveying to our ECRs the value of following one's passion in their work.

From left: Ebony Monson, James Vince, Ashley Mansell, Stephanie Gras and Tatiana Soares da Costa.

Following a quick afternoon tea break, the day concluded with an academic panel session, providing ECRs the opportunity to ask group heads all their burning questions about the academic career. We were joined by Dr Alisa Glukhova (WEHI), Associate Professor Shobhna Kapoor (Indian Institute of Technology), Dr Scott Berry (University of NSW) and Associate Professor Alexis Komor (University of California San Diego). This session had superb engagement from our audience, with the panellists answering questions on topics such as work–life balance, finding your scientific niche and establishing your own group. Overall, this session highlighted that all academic

BMH2024 Career Development Forum

Career Development Forum committee, from left: Stanley Xie, Sarah Garnish, Chris Horne, Ella Johnston, Ebony Monson, Tatiana Soares da Costa, Emily Mackie, Noni Frankenberg and Pirooz Zareie.

journeys are different, and taking scientific leaps in your career, whilst scary, can be incredibly rewarding.

Overall, we had incredible engagement from the ECRs throughout the forum and wonderfully positive feedback from attendees. Judging by the number of entries we got for our Networking Bingo game, the Career Development Forum gave our BMH2024 ECRs a perfect opportunity to get to know each other prior to the beginning of the congress. We would like to thank our dedicated Career Development Forum committee, the Melbourne Convention Centre staff, catering staff, all our invited speakers, and the BMH2024 Local Organising Committee, especially Professor Leann Tilley (Convenor), for helping bring this event to life. Thank you to all our ECRs in attendance, for driving thoughtful, provoking and exciting discussion.

Tatiana Soares da Costa (University of Adelaide) and Sarah Garnish (Monash University), Chairs of the Career Development Forum

50 Years of Membership

Three ASBMB members reached 50 years of membership of the Society. Les Copeland attended BMH2024 and received his certificate from ASBMB President, Ross Hannan. Other members to reach this milestone and receive a certificate in recognition of their outstanding loyalty were Philip Kuchel and Ray Rose.

Les Copeland (left) receives a certificate of appreciation from ASBMB President, Ross Hannan.

26th Ordinary General Assembly of the IUBMB

Terry Piva reports on the International Union of Biochemistry and Molecular Biology (IUBMB) aspects of BMH2024.

The International Union of Biochemistry and Molecular Biology (IUBMB) General Assembly was held on Tuesday 24 September 2024. Representatives from 33 countries attended in person along with other representatives who were online. Professor Marc Kvansakul and Associate Professor Terry Piva represented the ASBMB.

The IUBMB is the roof body for 77 National Societies of Biochemistry and Molecular Biology around the world. There are four Associated Regional Organisations through which IUBMB activities are coordinated on a more or less continental basis:

- FEBS – Federation of European Biochemical Societies
- PABMB – Pan-American Association for Biochemistry and Molecular Biology
- FASBMB – Federation of African Societies of Biochemistry and Molecular Biology
- FAOBMB – Federation of Asian and Oceanian Biochemists and Molecular Biologists

These regional organisations help the coordination of proposals for Congress and Conferences to IUBMB as well as being integrating bodies for National Societies in the various areas of the world.

IUBMB President, Alexandra Newton, addresses the BMH2024 Welcome and Opening.

The meeting was chaired by Professor Alexandra Newton (USA). At the start of the meeting, she gave her President's report, which was followed by the Treasurer's report delivered online by Professor Loredano Pollegioni (Italy). Following this, elections were held for positions on the Executive Committee (EC). Professor Sandhya Visweswariah (India) was elected President-Elect, Emeritus Professor Ilona Concha Grabinger (Chile) was elected unopposed for the position of EC Member for Congresses and Focused Meetings, and Professor James Murphy (Australia) was elected unopposed for the position of EC Member for Publications.

IUBMB General Assembly delegates.

The Assembly voted on admitting the United Arab Emirates Genetic Disease Association (UAEGDA) and the Biochemistry and Molecular Biology Section of the Science Society of Thailand (BMB Thailand) as Adhering bodies. The Assembly also approved the reinstatement of the Netherlands Society for Biochemistry and Molecular Biology (NVBMB) and the Nigerian Society of Biochemistry and Molecular Biology (NSBMB) as Adhering bodies.

I delivered a report on the 26th IUBMB Congress and Young Scientist Program (YSP) to the Assembly, which was followed by reports on forthcoming IUBMB-sponsored meetings, including a report on the 27th IUBMB Congress and YSP that will be held in 2027.

In her last duty as President, Professor Newton handed over the chair of the meeting to Professor Dario Alessi (United Kingdom) who gave his vision for the IUBMB, before closing the meeting. The next IUBMB Congress will be held in Cape Town, South Africa, from 19–23 September 2027.

Terry Piva (RMIT University)

Future, present and past IUBMB Presidents. From left: Sandhya Visweswariah, Dario Alessi and Alexandra Newton.

17th FAOBMB Congress

Phillip Nagley reports on the Federation of National Societies of Biochemistry and Molecular Biology (FAOBMB) aspects of BMH2024.

The 26th IUBMB–17th FAOBMB Congress held in Melbourne, from 22–26 September 2024 was dubbed BMH2024 for very good reason. The range of topics presented at the Congress under the broad Biomolecular Horizons umbrella is outlined by Leann Tilley (see page 31 of this issue of the *Australian Biochemist*). This report focuses on aspects relating to the FAOBMB.

Lectures Sponsored by FAOBMB

The Plenary talks were mainly sponsored by IUBMB and included the FEBS Worldwide Lecture. The named lectures sponsored by FAOBMB were Keynote Symposia, in which each lecture listed below was delivered as the first Keynote Talk in the session:

Osamu Hayaishi Lecture
Hozumi Motohashi (Tohoku University, Japan)
Supersulfides as an emerging biomolecule for stress response

Takashi Murachi Memorial Lecture
Yue Wan (Genome Institute of Singapore, Singapore)
Studying RNA structures to understand RNA function

Kunio Yagi Lecture
You-Me Kim (Korea Advanced Institute of Science and Technology, Korea)
Gpr43-mediated regulation of eosinophils in asthma

Jisnuson Svasti Lecture
Shobhna Kapoor (Indian Institute of Technology Bombay, India)
Chasing the functions of Mycobacterium tuberculosis *glycolipids during infection using membrane biophysics and chemical proteomics*

FAOBMB Lecture
Peter Fineran (University of Otago, New Zealand)
Defence and counter-defence strategies in the phage–bacterium arms race

FAOBMB Lecturer Peter Fineran.

These top-quality international speakers came from countries across the FAOBMB region and collectively covered many topics in biochemistry and molecular biology, with applications to biotechnology and medicine.

Ramachandran Lecture

On 24 September, a special session was held that included the GN Ramachandran Lecture supported by the Society of Biological Chemists, India. The Lecture was delivered by Raghavan Varadarajan (Indian Institute of Science, Bangaluru, India), who described his research into the development of efficacious, thermotolerant, viral vaccines. Such formulations have application for vaccines that can be distributed from a central depot with refrigeration facilities to areas where such cold storage facilities are unavailable. Dr Varadarajan has focussed on protein engineering to provide components of SARS-CoV-2 with enhanced immune-protective activity and, at the same time, to minimise supply chain requirements for refrigeration, especially towards the end point for delivery to resource-limited settings in developing regions.

Ramachandran Lecturer, Raghavan Varadarajan (centre), with Terry Piva, incoming FAOBMB Secretary General (left), and Sheila Nathan, outgoing FAOBMB Secretary General (right).

FAOBMB Awards

On the last day of the Congress, a special Keynote Symposium was held, which included lectures by the recipients of the FAOBMB Award for Research Excellence and the male and female recipients of the FAOBMB Young Scientist Awards (as stipulated by the benefactor, Yasuhiro Anraku, when the awards were inaugurated in 2006).

The recipient of the 2024 Award for Research Excellence was Ling-Ling Chen (Shanghai Institute of Biochemistry and Cell Biology, China), who spoke on 'Biogenesis, function and potential application of circular RNAs'. These interesting RNA species are covalently closed single-stranded transcripts with unique biogenesis, stability and conformation. Dr Chen showed how these molecules have great potential for controlling the expression of genes involved in human disease, such as the excessive activation of protein kinase R as occurs in Alzheimer's disease.

17th FAOBMB Congress

Right: Ling-Ling Chen receives the FAOBMB Award for Research Excellence from FAOBMB President Joon Kim.

Left: Carolina Gubert receives the FAOBMB Young Scientist Award from FAOBMB President Joon Kim.

Right: Shuofeng Yuan receives the FAOBMB Young Scientist Award from FAOBMB President Joon Kim.

The female FAOBMB Young Scientist Awardee for 2024 was Carolina de Moura Gubert (Florey Institute of Neuroscience and Mental Health, Melbourne), whose talk was entitled 'Depletion of the paternal gut microbiome alters sperm small RNAs and impacts offspring physiology and behaviour'. Her research explored the interesting aspects of how the gut microbiome of male mice affects the genetic inheritance of certain traits through the differential expression of small non-coding RNAs in sperm, which influences epigenetic inheritance and offspring development.

The male FAOBMB Young Scientist Awardee for 2024 was Shuofeng Yuan (University of Hong Kong, Hong Kong, China) whose talk was entitled 'Reprogramming host metabolism for broad-spectrum antiviral therapy'. His research aims at developing broad spectrum anti-viral therapies based on the metabolic changes in host cells after viral infection, particularly related to lipid biosynthetic pathways and glycolytic aspects. Examples of his approaches are the use of the lead compound AM580 that blocks lipid synthesis needed for viral replication, and treatment with D-mannose in order to disrupt glucose metabolism and, thereby, interfere with virus entry via modulation of cellular protein glycosylation.

FAOBMB COUNCIL MEETING

An FAOBMB Council meeting took place on 21 September, prior to the Congress. This annual business meeting of the Federation was well attended, with 14 delegates (or their alternates) of the 20 Constituent Members (National Societies or Groups of Biochemists and Molecular Biologists in the Asia-Oceania region) present in person, and a further two joined the meeting via Zoom. In his opening remarks, President Joon Kim briefed Council that normal activities of FAOBMB reconvened in 2023 and continued in 2024 with an in-person Executive Committee (EC) meeting from 9–11 May 2024 in Yogyakarta, Indonesia, as well as the FAOBMB Congress (BMH2024) in Melbourne. He also appreciated the support and understanding of all 20 societies of FAOBMB to achieve the Federation's aims to improve the quality of scientific education and research in the Asian and Oceanian countries. Professor Kim reiterated the importance of the relationship with other regional Federations and IUBMB for the future development of FAOBMB. To promote such interactions among FAOBMB and IUBMB, FEBS had invited him to the FEBS/IUBMB Congress which was held from 29 June–3 July 2024, in Milan, Italy.

Secretary General Sheila Nathan confirmed the results of the elections held during this year for two positions on the EC. The position of President-Elect will be taken up by Hans Hung-Lin Chung (Taipei, China) and that of Secretary General by Terrence Piva (Australia). These new EC members take up their positions on 1 January 2025. A meeting of the new Executive Committee will be held in Colombo, Sri Lanka, in January 2025 to facilitate a smooth transition of the leadership of FAOBMB.

17th FAOBMB Congress

Council noted its thanks to Akira Kikuchi for his dedicated contribution to FAOBMB as President-Elect (2019), President (2020–2022) and Past-President (2023–2024). Council also appreciated the great contribution of Sheila Nathan for six years of service as Secretary General since 2018 plus an additional year as Acting Secretary General during 2024. In addition, Sheila was Fellowships Chair (2014–2017), making a total of 11 years' service on EC.

The next annual scientific meeting will be the 31st FAOBMB Conference, to be held in Busan, Korea, from 20–23 May 2025 at BEXCO (Busan Exhibition and Convention Center). The meeting of FAOBMB Council will be held there on 19 May 2025.

Phillip Nagley (Monash University)

Incoming FAOBMB President-Elect Hans Hung-Lin Chung.

Joon Kim promotes the 2025 FAOBMB Conference that will be held in Korea.

Members of the FAOBMB Executive Committee, Delegates and Observers at the FAOBMB Council meeting.

A Patent Attorney's Guide to Conference Attendance

Dr Harriet Keenan (Associate) and Dr Sarah Hennebry (Associate Principal) from FPA Patent Attorneys describe how to avoid disclosure of inventions at conferences prior to filing a patent application.

Harriet Keenan (top) and Sarah Hennebry.

Patenting and conference attendance do not need to be mutually exclusive. Seeking exclusive patent rights does not in and of itself prevent participating in and sharing knowledge at academic conferences. This article aims to outline potential disclosures associated with conference attendance that can affect the patentability of an invention, and patent-friendly strategies for attending conferences without putting your patent prospects at risk.

Disclosures and conferences

In the broadest sense, a public disclosure is any information that is made publicly available and conveys information regarding the invention. A disclosure can destroy the novelty or 'newness' of an invention if the disclosure describes the essential features of the invention. A disclosure may also jeopardise the inventiveness of an invention, if it makes suggestions or teachings that would make the invention 'obvious' to someone familiar with the technology area.

Disclosing key aspects of an invention could include revealing specific details about:

- Molecular features of a new small molecule, protein, drug candidate or drug target
- Biomarkers for diagnosis, prognosis or other patient stratification
- Treatment steps for a clinical trial regimen
- Hypotheses and expected treatment outcomes for a clinical trial
- Predicted medical indications to be treated using a specific drug, particularly if the invention hinges upon re-purposing a drug for a new disease

Written abstracts are often cited by patent examiners during examination of patent applications, because they are readily available online. However, other disclosures relating to conference attendance include:

- Video abstracts
- Posters (including digital/virtual posters)
- Oral presentations
- Displays of the invention (e.g. prototypes)

Researchers may believe that because they have not published their poster and oral presentations online, disclosure is not an issue. However, a disclosure does not have to be online to represent a legal disclosure, and failing to acknowledge the disclosure can have legal ramifications for patent validity, especially in the US. In addition, the prevalence of social media means there's no guarantee that the presentation does not exist online. For example, should a third party take a photo or a video of your talk and post it to social media, that would represent a public disclosure.

Strategies for avoiding potentially damaging disclosures when attending conferences

1. ***Consult with your commercialisation/technology transfer office before submitting a conference abstract.***

Often in collaboration with patent attorneys, your commercialisation/technology transfer office can determine if your proposed abstract and presentation should be edited or postponed to avoid a potentially harmful disclosure.

The strategy may be to ensure that a patent application is filed first. As discussed in our previous articles, filing a patent application establishes a priority date. The novelty and inventiveness of your patent application is assessed against prior art published before the priority date.

Provided you make a disclosure at a conference after the priority date, and the priority date is upheld, your disclosure will not be considered prior art against the invention described in your patent application. In other words, there is less risk to the patentability of the invention described in the patent application if you wait until after the priority date.

However, your abstract and presentation could still be relevant prior art if there is another patent filing in the future. When there is a chance that more that one patent application is needed to protect your invention/s, it is necessary to strategically consider the timing of the patent filings alongside the timing and content of your conference disclosures.

Ideally, all patent applications relevant to your invention/s would be filed before you submit any conference abstracts or give any conference presentations. This is the lowest risk scenario (see **Fig. 1**). Practically, this may not be possible due to competing pressures and interests – particularly if the conference is being used to engage with collaborators that will help drive research towards the patenting stage.

A Patent Attorney's Guide to Conference Attendance

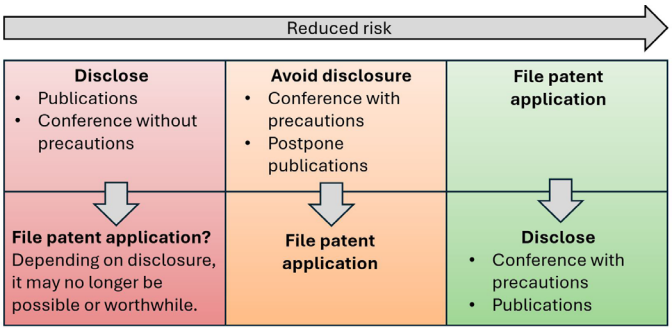


Fig. 1. Risk and disclosures.
The risk of impairing patentability – destroying the novelty and/or inventiveness of the invention – is most reduced by filing a patent application before making any disclosures. Applying precautions to avoid disclosures when attending conferences can also reduce the risk.

2. ***Kept the abstract and presentation high-level to avoid disclosing key features of the invention.***

It may be possible to communicate the important research finding without describing the details and giving away the 'secret sauce' of the invention (see **Fig. 1**). Withholding key features, for example, describing a method of treatment but omitting a key step, or describing that biomarkers can be used to diagnose a challenging disease but not stating the specific biomarkers identified, can prevent the abstract/presentation from being an enabling disclosure that impacts upon the novelty and/or inventiveness of your invention.

3. ***De-identify key features of the invention in the abstract and presentation.***

If it's not possible to keep certain aspects of the technology out of the abstract/presentation, you may choose to anonymise features (see **Fig. 1**). For example, instead of disclosing the molecular structure of a new drug candidate, you may refer to the candidate as drug X. Another example would be describing the outcomes of a new medical treatment method, without disclosing the dosages and/or administration schedule used in the treatment protocol to achieve the advantageous treatment outcomes.

For strategies 2 and 3, if you are unsure whether you are disclosing any key features of your invention, again, consulting with your commercialisation/technology transfer office can reduce risk. The office, or a patent attorney, can review abstracts and presentations beforehand to advise if revising or postponing is needed.

What options are available when there is an inadvertent disclosure at a conference?

If a self-disclosure of an invention has been made in an abstract or at a conference, options to obtain patent protection are restricted. Certain jurisdictions have grace period provisions within which the patent application can be filed (usually six to twelve months from the disclosure) and the self-disclosure is excluded from consideration as prior art. Grace period provisions exist in the US, Australia and Japan (and some others). However, some jurisdictions, including Europe, do not currently provide a grace period for self-disclosures which could hence fatally jeopardise your patent. Therefore, to retain the opportunity to seek patent protection in different countries, inventors and applicants should not aim to rely on grace period provisions to correct loss of novelty. It is always preferable to instead avoid premature disclosure of the invention!

Take-home messages

- The patenting process does not in and of itself prevent the valuable academic discourse and collaborations that can arise by attending conferences and presenting research progress.
- It is important to consider potential disclosures carefully and employ appropriate precautions and strategies to protect valuable IP.
- The lowest risk strategy is ensuring a patent application is filed beforehand. If this is not possible, abstracts and presentations can be adjusted to omit or de-identify key invention features, reducing the risk of a self-disclosure that could damage patenting prospects.

harriet.keenan@fpapatents.com
sarah.hennebry@fpapatents.com

News from the States

Australian Capital Territory

Contributed by Chathura Suraweera

Canberra Protein Group

This year, the Canberra Protein Group (CPG), organised a number of diverse and highly engaging events, providing a platform for knowledge sharing and professional development within the biomolecular sciences community.

The Annual General Meeting on 15 March featured talks by new members of the CPG. Wai-Hong Tham gave a fascinating presentation on antibody engineering and the fight against the chytrid fungus, a major threat to native frog populations. Joanna Melonek followed with insights into her latest research.

The CPG Annual Early and Mid-career Researcher (EMCR) Symposium was held on 24 May. Five speakers were selected from abstracts to present a 10-minute talk for the opportunity to be selected to represent the CPG at Biomolecular Horizons (BMH2024). Competition for the coveted speaking slot was fierce, with exceptional talks covering a range of biomolecular topics from Alice Shin, Chathura Suraweera, Ciara Wallis Rosemary Georgelin and Sasanan Trakansuebkul. Rosemary was awarded the BMH2024 speaking slot for her talk on ligand specificity evolution, and Chathura took away the runner-up prize for his talk on histone variant H2A.B. Following these informative talks, attendees enjoyed a one-hour poster session, which featured work from various ANU labs on subjects such as silk proteins, cyanobacteria and peptide engineering, complemented by great food and networking opportunities.

The CPG also hosted a Molecular Nodes workshop led by Brady Johnson, in collaboration with the ARC Centre of Excellence for Innovations in Peptide and Protein Science. The session was incredibly well-received, with participants learning to generate stunning visualisations of their favourite proteins. Brady's teaching style, which catered to both beginners and experts, ensured everyone walked away with new skills.

The final major event of the year was an informative and practical Cytiva information session held in conjunction with Cytiva representatives Karen Croft and Jane Ng. The week-long event covered basic and advanced FPLC/AKTA techniques, as well as the care and maintenance of the machines. The event culminated in an engaging networking session over pizza and snacks, where attendees delved into intricate details of protein preparations.

ANU ASBMB Awardees

The 2023 ANU ASBMB Prizes for the two ANU undergraduate students who achieved the highest average marks in three of four courses with a biochemistry and/or molecular biology focus, were awarded to Innocentia Carissa and Sara Alzaanin.

New South Wales

Contributed by Tara Christie

I am pleased to report on the activities and awards that were sponsored by ASBMB NSW this year. We continued to reward our excellent undergraduate and high school students across NSW, and provided travel support to PhD students attending the East Coast Protein Meeting.

Charles Sturt University – ASBMB Biochemistry Prize

The ASBMB Biochemistry Prize was awarded to Andrea Filigoi for outstanding results in Biochemistry subjects at Charles Sturt University.

University of Newcastle – ASBMB Prize for Biomedical Science

Farin Siddique received the ASBMB Prize for Biomedical Science as the student with the best overall performance in the Bachelor of Biomedical Science at the University of Newcastle. Farin was a very deserving awardee with the best overall performance in every year of her degree!

Lisa Wood, Head of School, Biomedical Sciences and Pharmacy, University of Newcastle (left), presents Farin Siddique with the 2023 ASBMB Prize for Biomedical Science.

NSW Science Teachers Association Young Scientist Awards

The ASBMB Award is given for the best high school student project with a biochemistry or molecular biology theme. ASBMB NSW's involvement in this scheme helps encourage our future scientific stars and ignite their passion for research.

East Coast Protein Meeting

This year's East Coast Protein Meeting was organised by the Queensland Protein Group. This meeting provides a forum for ECRs and students to present their research. ASBMB NSW and QLD awarded travel support to four students, Felicia Lie (University of Sydney), Junyu Liu (UQ), Bryan Lim (UQ) and Yan Zhou (UQ) to attend the East Coast Protein Meeting held in July 2024.

QPG President, Thomas Ve, presents Felicia Lie a travel award at ECPM.

News from the States

Queensland

Contributed by Conan Wang

Abdulla Al-Ghabban, recipient of the Griffith University ASBMB Prize.

Delegates of the East Coast Protein Meeting at Coffs Harbour, an event of the Sydney and Queensland Protein Groups.

The ASBMB Queensland branch has had an exciting year promoting and supporting biochemistry and molecular biology across Queensland! We've been thrilled to support the Queensland Science Contest, organised by the Science Teachers Association of Queensland, giving school students a chance to shine with their scientific projects. Angeline Chan and Conan Wang were the judges representing ASBMB. On 16 November 2024, the award ceremony took place with seven awards sponsored by the ASBMB. Congratulations to all the winners!

At the undergraduate level, we proudly supported the James Cook University ASBMB Prize for Academic Excellence in Third-year Biochemistry, awarded to Victoria Wood. The Griffith University ASBMB Prize went to Abdulla Al-Ghabban, who achieved an impressive GPA of 7 for the 2023 academic year.

Continuing our tradition, we supported the University of Queensland's School of Chemistry and Molecular Biology Research Students Symposium on 20 November 2024 at the St Lucia campus. This flagship event in the postgraduate student calendar attracted over 140 registrants and 30 volunteers, celebrating exceptional research in biotechnology, chemistry, biochemistry, molecular biology, microbiology and parasitology.

We were also delighted to support the East Coast Protein Meeting, a collaborative effort by the Sydney and Queensland Protein Groups of ASBMB held from 17–19 July 2024. This event showcased the work of Australia's emerging protein scientists. We supported the BMH Award, presented to Taylor Szyszka (University of Sydney) for her talk on 'Single point mutation in protein capsid leads to remarkable rearrangement and symmetry reduction.' This award included a speaking slot and registration for Biomolecular Horizons 2024.

South Australia

Contributed by Michael Roach

The SA branch of the ASBMB sponsored several events throughout 2024 to support our amazing community of undergraduate and HDR students, and our ECR researchers.

University of Adelaide Biological Sciences Student Awards

The ASBMB SA branch supported the University of Adelaide School of Biological Sciences student awards. We congratulate the 2023 recipient of the ASBMB-sponsored Biochemistry prize, Zita Ziukelis.

Centre for Cancer Biology Achievement Awards

Each year, the Centre for Cancer Biology hosts the Achievement Awards. The event recognises the excellent research that its postgraduate and EMCR researchers had achieved in the year prior, including best publication, best publication by a student, ECR award, commended PhD theses and best scientific image. The ASBMB congratulates all CCB awards winners for 2023, including the winner of the ASBMB ECR Award, Thuong Ha.

Natasha Harvey (left) and Jim Deed (right) present the CCB 2023 ASBMB ECR Award to Thuong Ha.

News from the States

Zita Ziukelis (left) receives the University of Adelaide School of Biological Sciences Biochemistry prize from ASBMB member, Daniel McDougal.

Adelaide Protein Group: AwardsFest

AwardsFest is the Adelaide Protein Group's (APG) premier annual event, including student and ECR talks and posters in a full-day symposium. AwardsFest 2024 was held on 10 July and featured guest talks by Luke Isbel (ACE and SAiGENCI) and Brett Collins (University of Queensland). The SA branch continued its support for the ECR Award winner to presents their work at the ASBMB conference. We congratulate all the APG winners for 2024: Sonja Frölich (ECR Award), Daniel McDougal (student talk), Alana White (people's choice), Dayna Holroyd (poster prize), Jesse Kennedy (poster prize) and Kate Whyte (poster prize).

Victoria

Contributed by Sarah Stewart

The ASBMB Victoria branch has continued to support a range of scientific events in Victoria, particularly events that engage the next generations of scientists, from primary school up to postgraduate studies. ASBMB Victoria sponsored the following events for 2024.

Monash University BDI Student Symposium

ASBMB was a Silver Sponsor of the Biennial 2024 Monash Biomedicine Discovery Institute Graduate Student Symposium held on 22 November at the Clayton campus. This symposium brought together a diverse range of research disciplines within Monash University with the Graduate Student Committee representing around 330 PhD students.

Melbourne Protein Group Student Symposium

The 22nd MPG Student Symposium was held on 11 July at the Walter and Eliza Hall Institute. This event provides a supportive environment for the enthusiastic protein students of Melbourne to present their research and network with peers. The keynote speakers were Louise Purton (St Vincent's Institute), Bernhard Lechtenberg (WEHI) and Katherine Jackman (Brandon Capital), who shared their scientific journey and participated in the careers Q&A session. There were six student oral presentations and 54 student poster presentations. This event is a highlight in the calendar, with 86 participants contributing to a vibrant student symposium.

Science Talent Search

ASBMB Victoria was once again a gold sponsor of the Science Talent Search (STS) organised by the Science Teachers' Association of Victoria. The STS is open to primary and secondary school students throughout Victoria. The program aims to stimulate ongoing interest in the study of science. Prize presentations took place in November 2024. One of ASBMB Victoria 2023 bursary winners, Katie, reported on her project that investigated the efficiency of different products (soap versus sanitiser) in hand cleaning. She found that hand sanitiser was the best, as she predicted, but surprisingly showed that the other products were not that much better than washing with water alone. Katie did an amazing job of designing an experimental protocol to test her hypothesis.

Primary school student, Katie, with her STS Award.

Leann Tilley (right) presents the Tilley Award for best oral presentation to Alayna Caruso at the MPG Student Symposium.

Western Australia

Contributed by Alyssa Van Dreumel

The fifth Perth Protein Group (PPG) Annual General Meeting (AGM) took place on 1 November 2024 at Edith Cowan University, Joondalup. The meeting received

News from the States

PPG AGM Flash Talk Prize winner, Emma Knowling (left), with ASBMB WA Representative, Alyssa Van Druemel.

strong sponsorship support and the keynote speakers were Mihwa Lee and Danny Hatters, both from the University of Melbourne. The ASBMB WA branch sponsored three prizes – two EMCR Talk Prizes were awarded to Jaco Zandberg and Anuradha Pullakhandam and a Flash Talk Prize awarded to Emma Knowling.

The WA branch established awards to recognise and reward outstanding academic achievement of undergraduate students at both UWA and Murdoch University in biochemistry and molecular biology focused areas of study, commencing in 2024.

Involvement in the National Biochemistry and Molecular Biology Core Concept project working group, led by Dr Amber Willems-Jones, progressed this year to achieve national agreement on Core Concepts for the Discipline of Biochemistry and Molecular Biology undergraduate learning outcomes. A survey was deployed, the first task force recruitment is underway and more participants are needed!

Yeast SIG: an ASBMB Special Interest Group

The Yeast Special Interest Group (SIG) was established in 2006. It aims to bring together ASBMB members with an interest in yeast. The major impetus was that the International Conference on Yeast Genetics and Molecular Biology (ICYGMB) (a major international yeast conference) was to be held in Australia in 2008. The Yeast SIG draws its members from all over Australia. Yeast is a versatile organism. It was developed as an experimental model eukaryotic organism and has been used to make discoveries relevant to human health recognised with several Nobel Prizes for Medicine or Physiology. Yeast is also used for the brewing of beer, fermenting of wine, baking of bread and biotechnology, so some Yeast SIG members work in industry. The Yeast SIG now also has members who work on non-yeast fungi.

The Yeast SIG officer-bearers are Alan Munn (President), Birgita Ebert (Treasurer) and Ben Schulz (Secretary). Yeast SIG members organise conferences, most recently the 37th International Specialised Symposium on Yeast (ISSY37) was held from 27 November to 1 December 2023 at the National Wine Centre, Adelaide. This event was co-chaired by Yeast SIG member Vladimir Jiranek (University of Adelaide and University of Southampton, United Kingdom) and Sakkie Pretorius (Macquarie University). The Local Organising and Session Planning committees also included Jennie Gardner, Jin Zhang, Krista Sumby and Jacqui McRae (University of Adelaide), and Jenny Bellon and Cristian Varela (Australian Wine Research Institute). The professional conference organiser was All Occasions Group (Adelaide).

ISSY37 began with an evening welcome reception, featuring a Welcome to Country from Cliffy 'Tangku Munaitya' Wilson, a Kaurna, Narungga, Ngarrindjeri, Ngadjuri and Arrente Man. Canapes and beverages from local producers were enjoyed by all, whilst the overseas visitors were particularly pleased to have the opportunity to see several native animals up close.

Welcome to Country: Cliffy 'Tangku Munaitya' Wilson (left) and ISSY37 Co-Chair, Vladimir Jiranek.

Peter Høj (Vice Chancellor, University of Adelaide) opened the meeting. This was followed by a keynote address from Brenda Andrews (University of Toronto, Canada) entitled 'Using budding yeast to map the spectrum of possible morphological phenotypes in a model eukaryotic cell'. Keynote addresses opened each

Yeast SIG: an ASBMB Special Interest Group

subsequent day and included: 'Next generation strains, vectors and methods for gene expression employing *Komagataella phaffii (Pichia pastoris)'* (Anton Glieder, Graz University of Technology), 'Competing with complexity: unlocking nature's potential using synthetic biology' (Tom Williams, Macquarie University), and '*In vivo* directed evolution for metabolic engineering' (Verena Siewers, Chalmers University of Technology).

From the 113 poster abstracts submitted, some were given the opportunity to also present their work as a talk. Session themes included 'Yeast in Medicine', 'Bioprospecting & Collections', 'New Knowledge via Yeast', 'Yeast Interactions & Microbiomes', 'The Yeast Bioeconomy', 'Yeast Cell Factories', 'Yeast in Food & Beverages', 'Yeast as a Source of Ingredients in Plant-based Foods', 'Genomics & Evolution', 'Systems/ Synthetic Biology', and 'Yeast in Space & Extreme Environments'. Ten abstracts were selected for five-minute presentations in the Posters Alive! session. Delegates viewed posters in two evening sessions, the second of which included a Celebration of Yeast featuring yeast foods and beverages.

The symposium dinner was held on the last evening at the Playford Hotel. As well as excellent food and beverages, the attendees had the opportunity to dance the night away to the sounds of the Baker Boys Band.

A €250 prize (donated by *FEMS Yeast Research*) went to Christiane Glitz (Technical University of Denmark) for the poster 'Fifty shades of red – production of natural food dyes with yeast cell factories'.

Sponsors included Lallemand, Coopers, Lesaffre, the University of Adelaide, Microbiogen, Eden Brew, Main Sequence, Nourish Ingredients, Fermentis, ASBMB, Yabby Lake Vineyard, Greenhill Wines, Yalumba, Jacob's Creek, Treasury Wine Estates, Fermentation, and Metabolomics Australia.

The Yeast SIG offers awards to early career researchers (ECRs). The ECR Award winner receives financial support to present at the ASBMB conference. The 2023 and 2024 winners were Paige Erpf and Ed Kerr, respectively.

Paige Erpf had an early interest in science and was the first in her family to attend university. Paige completed her PhD at the University of Queensland (UQ) under the supervision of James Fraser on the pathogenic yeast *Cryptococcus* and looking at infectivity using a mouse model. One of her career challenges was continuing the animal work during the COVID-19 lockdowns – Paige once worked in the lab for 83 days straight, including weekends! Her greatest discovery is a fungal protein with homology to proteins that function in a pathway known to exist only in bacteria. After her PhD, Paige moved to Sydney to work on the Yeast 2.0 project to build a yeast artificial chromosome at Macquarie University with Ian Paulsen and Sakkie Pretorius. Paige has a forthcoming publication in *Nature Communications* based on this

Yeast SIG ECR Awardees, Paige Erpf (left) and Edward Kerr.

work. Paige also works on a synthetic biology project engineering synthetic microbial communities to help tackle problems arising from climate change. She also works on the upcoming industrially relevant yeast *Yarrowia lipolytica.* Paige is involved in science outreach and performs science comedy gigs. Her advice to people interested in a research career is to be open minded about research topic, to develop transferrable skills and to take any opportunities.

Edward Kerr was unsure of where his interest lay, but his hobby of home brewing beer led him to take an undergraduate course in fermentation science at UQ. This fermentation science course stimulated Edward's interest in microbiology and all things yeast. Edward then went on to complete a PhD with Ben Schulz at UQ partnering with Newstead Brewing Co focussed on isolating and characterising wild yeast for beer brewing. As part of this project, Edward successfully characterised and commercialised novel yeast strains that have subsequently been used by Newstead Brewing Co in Brisbane. After his PhD, Edward continued at UQ as a postdoc with Ben Schulz continuing work on wild yeast and utilising omic technologies to better understand their molecular diversity. In 2023, Edward joined the CSIRO and is developing novel vaccines against fly strike (blowfly) and other parasites for the livestock industry. Although he has changed fields, Edward still uses yeast, but now to produce key antigens for ecto and endoparasite vaccines. Edward sees networking, presenting his work, and collaboration as keys to success. His advice to those pursuing a career in science is to do what interests you most and never say no to an opportunity. Getting outside your comfort zone is key to growing as a scientist.

Alan L Munn (Griffith University, Gold Coast) and Vladimir Jiranek (University of Adelaide and University of Southampton, United Kingdom)
Yeast SIG President Email a.munn@griffith.edu.au
Yeast SIG Website www.ayeastgroup.org

ASBMB Fellowship Report

Blood Vessels in the Heart of Amsterdam

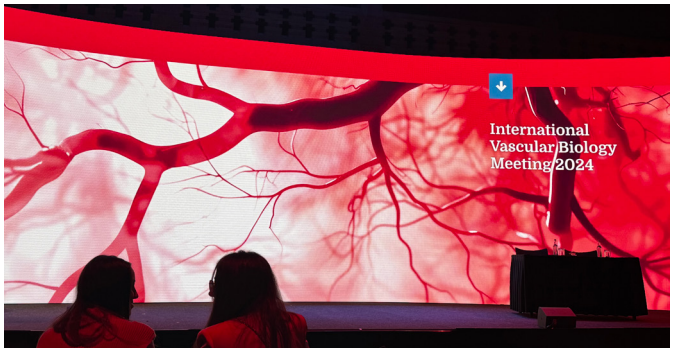
In July this year, I had the pleasure of attending the International Vascular Biology Meeting (IVBM2024) in Amsterdam, Netherlands, supported by the ASBMB Fred Collins Award. Although I received the award in 2020, the COVID pandemic disrupted my travel plans that year. Thankfully, I was able to use the award for this more recent trip.

Having recently established the Vascular Cell Death, Clearance and Inflammation laboratory as a new lab head at La Trobe Institute for Molecular Science at La Trobe University, I am now focused on expanding my profile in the international cardiovascular space, forming new collaborations and being up to date with the latest in vascular research. IVBM2024 was the first international vascular biology meeting I had attended, and I was both excited and nervous to present my research to the international leaders in the field. I was very pleased that my talk received a lot of interest, and I made many new connections at the meeting and associated networking events during my stay in Amsterdam.

The beautiful canals that weave through the city.

Above: A very loud welcoming ceremony!

Left: Amy presents her research in the Beurs van Berlage.



IVBM2024 was held in Amsterdam, Netherlands.

The meeting included nine key-note lectures, over 80 main talks and more than 100 short talks for junior researchers. It was held in the beautiful Beurs van Berlage building in the historic centre of Amsterdam and I very much enjoyed giving my presentation in a lecture room with such a stunning stained-glass backdrop.

It must also be mentioned that IVBM2024 did not hold back on entertainment. The meeting was opened by an incredible drumming performance and the conference social night included a nightclub-quality live DJ, vocalists and saxophonist, and consequentially an absolutely pumping dancefloor – you know how wild scientists get when they get the chance to let loose!

In addition to presenting at IVBM2024, I was also fortunate to give a seminar talk at the Amsterdam University Medical Centre, where I presented my research to an audience of both vascular biologists and clinicians. This was another very rewarding experience that has resulted in ongoing connections and potential collaboration opportunities.

Overall this was an amazing trip. I am extremely grateful to the ASBMB, firstly for the recognition in receiving the Fred Collins Award and also for the opportunity to take this very productive and enjoyable trip.

Dr Amy Baxter is head of the Vascular Cell Death, Clearance and Inflammation laboratory at La Trobe Institute for Molecular Science, La Trobe University, and leads the Dying Cell Communication and Clearance division in the Centre for Cardiovascular Biology and Disease Research.

ASBMB Annual Reports

President's Report

ASBMB President Ross Hannan.

Dear ASBMB members,

I write to you from the traditional lands of the Ngunnawal and Ngambi People in the Canberra region. I pay respect to their Elders past, present and emerging.

As we reflect on the past year, I remain ever amazed by the outstanding research training and education conducted by our biochemistry and molecular biology community. It is my honour to present this report, highlighting our achievements, challenges, and future directions.

First, I would like to extend my heartfelt thanks to our outgoing Treasurer, Kate Quinlan. Kate has been instrumental in guiding us through numerous transitions, advocating for affordable membership rates, especially for students, and in particular facilitating our successful partnership with Waldron Smith for conference management. We welcome our new Treasurer, Adrian Achuthan, and look forward to his contributions.

I also want to thank all ASBMB Executive, State and other representatives for their contributions and in particular Dominic Ng, our indefatigable Secretary who continues to safely guide our Society and has proved seamless transition between multiple ASBMB Presidents.

I am pleased to report that our membership remains strong, with over 1,000 members just two months into the new subscription year. In 2023, we experienced a remarkable 20% increase in membership. The Society's transition to biannual ComBio meetings has not negatively impacted membership numbers.

However, we recognise that smaller states, particularly those far from the main city centres on the east coast, continue to face challenges in membership and conference attendance. Our travel bursaries and scholarships will remain vital in supporting students and ensuring their participation in our events.

Biomolecular Horizons 2024 was a resounding success, bringing together over 1,850 registrants from 44 countries. I extend my sincere thanks to the organising team, led by Leann Tilley, and Deputy Convenors, Frances Separovic and Christina Mitchell, for their tremendous effort. The program, curated by Andy Hill, Wai-Hong Tham and Stephanie Gras, featured approximately 500 talks and 600 posters, showcasing the exceptional quality of research in biochemistry and molecular biology from Australians and our international neighbours.

Looking ahead, our next ASBMB standalone meeting will take place in Brisbane in 2025, led by Michael Landsberg. We anticipate another successful gathering, building on the outstanding achievements of the 2023 Canberra meeting organised by Colin Jackson and and Christina Spry. ComBio2026 will return to Sydney, co-chaired by Tracey Bryan and Mark Larance, with preparations already well under way.

We are excited about our growing collaborations in the Asia–Pacific which I think are essential to grow our community at the international level and to provide our EMCRs with new opportunities. The inaugural ASBMB–KSBMB (Korean Society for Biochemistry and Molecular Biology) joint symposium on Molecular Neuroscience, held on 21 September 2024 at the Bio21 Institute, attracted 185 registrants and featured 12 speakers from Australia and Korea. Special thanks to Victor Anggono and his co-organisers for driving this initiative. We have expressed our strong support for a second joint symposium with KSBMB, scheduled for May 2025 in Busan, Korea, as part of the FAOBMB conference. In addition, we participated in a joint ASBMB–MBSJ (Molecular Biology Society of Japan) symposium on RNA in Japan in November 2024, further strengthening our ties in the Asia–Pacific region.

As we navigate the current landscape, we must acknowledge the financial pressures facing the university research sector, including the likely effects of reduced international student caps. This will significantly decrease revenue from student fees that have increasingly been used to prop up indirect cost Australian research not covered by research block grants. These funds are also essential to cover the ever increasing gaps between university and institute salaries and those provided in government grants. Some estimates are that Australian STEM research may contract as much as 20–30% over the next three years if there is no intervention. This is concerning to say the least.

In addition to these financial pressures obviously limiting career prospects, particularly of early- and mid-career researchers (EMCRs), they are likely to impact the ASBMB through reduced ability of our members to attend conferences and reduced industry sponsorship for our conferences. For this reason, it is critical that the ASBMB remains relevant and cost-effective to support our members during these challenging times. In particular, I believe the success of our smaller ASBMB meetings is vital for engaging EMCRs, providing them with affordable opportunities for presentations and networking in a more intimate setting.

In closing and as I conclude my term, I want to express how privileged I have been to lead such an esteemed society as the ASBMB and I thank each of you for your continued support and engagement. I am confident that

by handing over the reins to Megan Maher for 2025, our Society is in capable hands. Together, we can navigate the challenges ahead and seize the opportunities that lie before us. Let us continue to foster a vibrant diverse and inclusive community dedicated to advancing biochemistry and molecular biology in Australia and beyond.

Professor Ross Hannan, President
ross.hannan@anu.edu.au

Treasurer's Report

ASBMB Treasurer Kate Quinlan.

Relevant summaries of the filed annual return (1 July 2023 to 30 June 2024) should be read in conjunction with this statement. The final audit has been submitted and the summary statements on which the report is based were provided by our auditors. The overall position of the Society has stabilised compared to the 2021–2022 financial year. We recorded an operating profit of $21,603 in 2023–2024 and $34,984 in 2022–2023 compared to a profit of $7,540 in 2021–2022. While ComBio2022 profits were the main driver of the surplus in 2022–2023, the surplus in the current year was driven by interest income, resulting from higher interest rates, with $27,028 of interest earned in 2023–2024 compared to $2,538 in 2022–2023.

The ASBMB2023 meeting was held at the Australian National University in November 2023. It was a highly successful meeting, breaking even with an overall operating loss of $272. I would like to congratulate Co-Chairs, Colin Jackson and Christina Spry, and the Organising Committee for holding this great meeting for our members. With ComBio meetings every two years returning substantial profits for the ASBMB, aiming to break even for these ASBMB meetings in the intervening years is fiscally responsible and ensures that registration rates can be kept as low as possible for our members.

The major sources of income for the ASBMB were membership revenue and bank interest. Corporate support for our named awards remains strong and on behalf of the Society, I thank the sponsors of these awards. Further increases in interest income are expected in the next financial year, driven by the higher interest rate secured for the ASBMB term deposit which will mature in April 2025. We also anticipate significant income from the ASBMB share of profits from the BMH2024 meeting. I therefore anticipate a further strengthening of the financial position of ASBMB over the next year.

Net expenditure in 2022–2023 financial year was up $94,282 compared to the previous period, but this resulted from ASBMB2023 expenses and was offset by the income from this meeting. The distribution of funds to the state branches and Special Interest Groups in 2023–2024 was higher than in 2022–2023, likely reflecting increased activities being offered for our members.

We are fortunate that WALDRONSMITH Management administered the ASBMB National Office with a high degree of effectiveness. Following the transition to WALDRONSMITH Management at the start of 2023, National Office costs have dropped, with $26,432 expenditure in 2023–2024 compared to $47,026 in 2022–2023 (the transition year) and $44,621 in 2021–2022. We thank WALDRONSMITH Management for its efficient administration of the Society throughout 2023 and 2024.

Our flagship publication is the *Australian Biochemist* and it is available to members as a PDF. Doug Fairlie as Acting Editor of the *Australian Biochemist*, along with Editorial Officer, Liana Friedman, are to be commended for their work in putting the magazine together.

The overall financial position of ASBMB has improved in 2023–2024. After accessing cash reserves in 2019 ($100,000 was used), we have been able to return a significant amount of this to our reserves for investment in the subsequent years. Our cash reserves are $544,994 at the end of the 2023–2024 financial year, up from $510,216 at the end of the 2022–2023 financial year.

As I step down from my role as ASBMB Treasurer at the end of 2024, I have many people to thank. I would like to thank the members of the ASBMB Executive, WALDRONSMITH Management, Ian Price (ASBMB bookkeeper), Priestleys (ASBMB accountants) and Mark Andreassen (ASBMB auditor) for their support of the ASBMB and me as Treasurer. I look forward to handing over the Treasurer reins to Adrian Achuthan in 2025 and to helping Adrian as he transitions into this role.

Associate Professor Kate Quinlan, Treasurer
kate.quinlan@unsw.edu.au

ASBMB Annual Reports

Executive Officers' Report

Your Executive Officers submit herewith the financial statements of the Association for the year ended 30 June 2024, together with the Auditors' Report thereon and in accordance with Section 73 of the Associations Incorporation Act 1991 report as follows.

PRINCIPAL ACTIVITIES

The principal activity of the Association in the course of the financial year was the advancement of the science and profession of both biochemistry and molecular biology.

EXECUTIVE OFFICERS

The Executive Officers throughout the year were: Professor Ross Hannan (President); Professor Dominic Ng (Secretary); Professor Kate Quinlan (Treasurer); Dr Tatiana Soares da Costa (Editor and Chair of Communications); Associate Professor Tracey Kuit (Education Representative); Associate Professor Terrence Piva (FAOBMB Representative to 31/12/22); Associate Professor Nirma Samarawickrema (FAOBMB Representative to 31/12/23); Professor Marc Kvansakul (FAOBMB Representative from 1/1/24).

OPERATING RESULTS

During the year, the Association produced an operating profit of $21,603 (2023: operating profit $34,984).

STATEMENT BY EXECUTIVE OFFICERS

In the opinion of the Executive Officers the financial statements, consisting of the Statement of Profit and Loss and other Comprehensive Income, Statement of Financial Position, Statement of Changes in Equity, Statement of Cash Flows and Notes to and forming part of the Financial Statements:

(a) Presents a true and fair view of the financial position of the Association as at 30 June 2023 and its performance for the year ended on that date in accordance with Australian Accounting Standards – Simplified Disclosure Requirements.

(b) At the date of this statement, there are reasonable grounds to believe that the Association will be able to pay its debts as and when they fall due.

Signed in accordance with a Resolution of the Executive Officers.

Professor Ross Hannan, President
Associate Professor Kate Quinlan, Treasurer

Independent Auditor's Report

REPORT ON THE FINANCIAL STATEMENTS

We have audited the financial report of the Australian Society for Biochemistry and Molecular Biology Incorporated (the association) which comprises the statement of financial position as at 30 June 2024, the statement of profit or loss, statement of comprehensive income, statement of changes in equity and statement of cash flows for the year then ended, notes comprising a summary of significant accounting policies and other explanatory information, and the certification by members of the committee on the annual statements giving a true and fair view of the financial position and performance of the association.

AUDIT OPINION

In our opinion, the accompanying financial report of the Australian Society for Biochemistry and Molecular Biology Incorporated is in accordance with the Associations Incorporation Act 1991 including:

(i) giving a true and fair view of the association's financial position as at 30 June 2024 and of its performance for the year then ended; and

(ii) that the financial records kept by the association are such as to enable financial statements to be prepared in accordance with Australian Accounting Standards – Simplified Disclosure Requirements.

BASIS FOR OPINION

We conducted our audit in accordance with Australian Auditing Standards. Our responsibilities under those standards are further described in the Auditor's Responsibilities for the Audit of the Financial Report section of our report. We are independent of the association in accordance with the ethical requirements of the Accounting Professional and Ethical Standards Board's APES 110: Code of Ethics for Professional Accountants (the Code) that are relevant to our audit of the financial report in Australia. We have also fulfilled our other ethical responsibilities in accordance with the Code.

We believe that the audit evidence we have obtained is sufficient and appropriate to provide a basis for our opinion.

EXECUTIVE OFFICERS' RESPONSIBILITIES

The committee of the association are responsible for the preparation and fair presentation of the financial statements in accordance with Australian Accounting Standards – Simplified Disclosure Requirements, the Associations Incorporations Act 1991 (ACT) and for such internal control as the committee determine is necessary to enable the preparation of the financial report that gives a true and fair view and is free from material misstatement, whether due to fraud or error.

MC Andreassen (Partner)
Priestleys Chartered Accountants

ASBMB Annual Reports

AUSTRALIAN SOCIETY FOR BIOCHEMISTRY AND MOLECULAR BIOLOGY INCORPORATED

STATEMENT OF FINANCIAL POSITION AT 30 JUNE 2024

	2024 $	2023 $
CURRENT ASSETS		
Cash and cash equivalents	544,994	510,216
Trade and other receivables	57,162	58,383
Other current assets	2,500	2,500
TOTAL CURRENT ASSETS	**604,656**	**571,099**
TOTAL ASSETS	**604,656**	**571,099**
CURRENT LIABILITIES		
Trade and other payables	134,839	122,885
TOTAL CURRENT LIABILITIES	**134,839**	**122,885**
TOTAL LIABILITIES	**134,839**	**122,885**
NET ASSETS	**469,817**	**448,214**
EQUITY		
Retained surplus	469,817	448,214
TOTAL EQUITY	**469,817**	**448,214**

STATEMENT OF CASH FLOWS FOR THE YEAR ENDED 30 JUNE 2024

	2024 $	2023 $
CASH FLOWS FROM OPERATING ACTIVITIES		
Receipts from members	97,491	71,084
Conference revenue	110,566	77,778
Other income	26,373	5,586
Payments to suppliers and employees	(226,680)	(151,251)
Interest received	27,028	2,538
Net cash provided by/(used in) operating activities	**34,778**	**5,735**
CASH FLOWS FROM INVESTING ACTIVITIES		
Net increase/(decrease) in cash held	5,735	5,735
Cash at the beginning of the financial year	510,216	504,481
Cash at the end of the financial year	**544,994**	**510,216**

REVENUE

	2024 $	2023 $
Operating activities		
Administration Fund		
Subscriptions – ordinary, student, retired and Sustaining Members	88,401	87,168
Conference revenue - ComBio (Note a)	-	48,554
Conference - Registration Fees (Note b)	68,518	-
Conference – Sponsorships (Note b)	9,435	-
Conference - Sale of Booths (Note b)	38,618	-
Advertising in proceedings and magazines	1,995	5,055
Other Income	7,500	7,500
	148,277	**148,277**
Non-operating activities		
Interest received – Administration Fund	20,002	5,266
Donations	-	25
	20,002	**5,291**
Total Revenue	**234,469**	**153,568**

EXPENSES

	2024 $	2023 $
Other expenses from ordinary activities		
Affiliate memberships	7,304	5,774
Awards and medals	10,000	11,800
Conference expenses – food and beverages	55,805	-
Conference expenses – other expenses	3,580	-
Conference expenses – support services	15,474	-
Conference expenses – travel and accommodation	23,688	-
Conference expenses – venue hire	18,296	-
Conference support – other conferences	1,652	9,159
Council expenses	5,265	7,260
Insurance	2,265	713
National Office costs	26,432	47,026
Magazine costs	7,701	8,458
Other costs	2,793	5,236
State allocations	16,863	8,482
Remuneration of auditor		
- audit or review services	3,425	3,334
- other services	2,323	1,985
ASBMB Fellowship – Research Fund	10,000	9,357
	212,866	**118,584**

CASH AND CASH EQUIVALENTS

	2024 $	2023 $
Cash at bank – Administration Fund	544,994	510,216
	544,994	**510,216**

TRADE AND OTHER PAYABLES

	2024 $	2023 $
Current		
Accrued expenses – Administration Fund	3,374	10,400
Conference receivables	21,288	15,283
Advances to state committees	32,500	32,700
	57,162	**58,383**

RETAINED SURPLUS

	2024 $	2023 $
Administration Fund		
Balance at 1 July	448,214	413,230
Surplus (deficit) for the financial year	21,603	34,984
Balance at 30 June	**469,817**	**448,214**

All sums given in Australian Dollars.

Notes

a. *Conference revenue represents the Association's share of the net profits generated by ComBio2022. This conference is held in partnership with other assoications.*

b. *The Conference revenue and expense represents the revenue received and the expenses incurred in holding the ASBMB2023 conference held at the Australian National University. This conference is held solely by the association making the association entitled to all of the revenue generated and is liable for all of the expenses from this conference.*

Our Sustaining Members

Disclaimer

The *Australian Biochemist* is published by the Australian Society for Biochemistry and Molecular Biology Inc. The opinions expressed in this magazine do not necessarily represent the views of the Australian Society for Biochemistry and Molecular Biology Inc.

bio-strategy
delivering technology

NEW – Future-proof Your Digital PCR

Stilla's new Nio™ is the most versatile, all-in-one, fit-for-throughput, digital PCR instrument with unparalleled user-friendliness.

Nio™ is the next-generation in digital PCR system, from the giant touchscreen interface to its unique Crystal Digital PCR® technology, which provides the highest partition density available and allows persistent access, to every individual PCR micropartition for full documentation, advanced assay QC and assay rescanning capabilities.

Multiplexing is the next frontier for digital PCR and with 7 channels, Nio™ has you covered! Besides full TaqMan® support, a unique new low-cost 7-color probe chemistry from Stilla called Flex Probe™ supports record-breaking 21-plex assays.

A busy lab with many users will love the Nio™ as its continuous loading capability means you can add a new assay plate into the instrument at any time and process up to 768 samples in an 8-hour workday. Even though the Nio™ is fully automated once a plate is loaded, automating upstream PCR plate setup can be done with a variety of robotic liquid handling workstation options.

For more information, please contact
Bio-Strategy
T: 1800 00 84 53
E: sales.au@bio-strategy.com
W: www.bio-strategy.com

GenScript
Make Research Easy

FLASH Gene

Accelerate your research with GenScript's FLASH Gene service – the fastest and most affordable gene-to-plasmid service in the industry. We guarantee plasmid yields and 100% sequence accuracy, with delivery in just 4 business days. Starting at only US$89 per construct, this flat-rate service is designed for efficiency and reliability.

Upgraded Gene Synthesis Services

Our enhanced gene synthesis services cater to a wide range of applications with exceptional quality and industry-leading turnaround times. With over 20 years of experience, GenScript offers:

- Gene synthesis up to 200K bp
- Production capacity of 200M bp daily
- 100% sequence accuracy guaranteed
- Quality control via Sanger sequencing
- Turnaround times as fast as 72 hours
- Global manufacturing network (US, China, Singapore)

At GenScript, we ensure the delivery of high-quality, complex genes that meet your specific requirements – on time and within budget. Don't waste your budget and time if others can't deliver – because we can.

Order Effortlessly With GenSmart 2.0

- Optimise your sequence with our advanced codon optimisation algorithm
- Choose the ideal synthesis, cloning and plasmid DNA preparation options
- Get instant quotes with estimated pricing and turnaround times

Contact: sales.ap@genscript.com or visit https://www.genscript.com for more details.

New customer promotion available!

CapellaScience

Statebourne Cryogenics Biosystem Archive Series

Statebourne Cryogenics Biosystem Archive 21, 40, 80 and 100 models optimise storage while conserving LN2. A rotating liquid-proof internal container maintains secure liquid levels between the drum and container wall space, achieving near isothermal storage mapping. The container rotates for full access through the neck opening. Class leading microprocessor provides full control, security backup and sensor accuracy with <10°C temperature variation in vapour phase storage. Vapour Guard incorporated in each ARCHIVE refrigerator ensures zero liquid-sample contact.

Enhanced Standard Features
Vapour guard, hot gas by-pass, de-fog and quick chill functions

Optimised Performance
Configurable accelerated re-cooling, handles LN2 pressures 20-40 psi

Security
Dual solenoid valves, platinum resistance temperature sensing, key operated secure lockable lid

Added Benefits
Optional coloured anodised storage racks and foldaway non-slip step

Five-year Vacuum Warranty

Microprocessor Controller Features
Effortless Operation
Automated LN2 top-up with self-diagnostic electronics and time/temperature event data logging

Robust Security
Connection port for remote alarm and autodialler with user configurable alarm time/temperature limits

Smart Control
PC connection port backed by data retention through an automatic backup battery

For more information, contact **Capella Science** on 02 9575 7512 or enquiries@capellascience.com.au

Our Sustaining Members

MCE®
MedChemExpress

Master of Bioactive Molecules

MedChemExpress (MCE) is the world's leading life science brand. Our products cover high-purity small molecules, high-activity macromolecules and a variety of commonly used biological reagents and kits. We have experienced and friendly staff to professionally meet your needs. We are a competent and trustworthy partner for your research and scientific projects

MCE offers 11,000+ recombinant proteins including cytokines and growth factors, immune checkpoint proteins, CAR-T related proteins, CD antigens, Fc receptor proteins, receptor proteins, enzymes and regulators. MCE recombinant proteins encompass a variety of applications, such as regulation of cell growth and differentiation, stimulation of cell signaling, biopharmaceutical target discovery, protein structure and function analysis.

- ✓ Low Endotoxin Levels
- ✓ High Purity
- ✓ Superior Biological Activity
- ✓ Excellent Lot-to-Lot Consistency
- ✓ Full Range Sizes
- ✓ Competitive Price

MCE offers 7,100+ high quality peptides including tag peptides, therapeutics peptides, cell-penetrating peptides and amino acid derivatives to clients in pharmaceutical and academic institutions all over the world. MCE peptides are widely used in functional analysis, antibody research, vaccine research, and especially the field of drug research and development.

- ✓ Diverse Functions
- ✓ Strict Quality Assurance
- ✓ Custom Peptide Synthesis

MedChemExpress
au.sales@MedChemExpress.com

eppendorf

Meet Your Own Sustainability Targets with Eppendorf Tubes® and Tips BioBased

Most of the plastic we use in our daily life – and in the lab – is made of fossil sources. Its production and disposal lead to high CO2e (CO_2 equivalents) emissions and further environmental impacts. One of the key approaches to improve sustainability of lab plastics is to use recycled and renewable feedstocks in their production.

For Eppendorf bio-based polymer production, fossil raw material is replaced with sustainable raw material produced from bio-based waste and residues (2nd generation renewable feedstock). The renewable feedstocks are tracked so the origin of the renewable raw materials from carefully selected suppliers committed to sustainability is assured. The final polymers are then sustainability certified by ISCC PLUS – the leading global certification scheme for manufacturers of biobased polymers and downstream converters.

The new Eppendorf BioBased pipette tips are available as epT.I.P.S.® BioBased Biopur, ep Dualfilter T.I.P.S.® BioBased and ep Dualfilter T.I.P.S.® SealMax® BioBased. Eppendorf Tubes® BioBased, Sterile, with screw caps^ are available in volumes of 5 mL, 15 mL, 25 mL and 50 mL.

More information about the BioBased range: www.eppendorf.group/2vwtim
Phone: 02 9889 5000
Email: info@eppendorf.com.au

^These tubes are made with at least 90% BioBased polypropylene. The screw caps are currently fossil-based material but will soon switch to BioBased.

ASBMB welcomes the following new Sustaining Member:
Sartorius

PLP PACIFIC LABORATORY PRODUCTS

At **Pacific Laboratory Products** we have all your general laboratory needs on our website www.pacificlab.com.au

PLP can supply you with lab pipettors, filter tips, PCR tubes, centrifuges, incubators, shakers, mixers, tube rollers, beakers, serological pipettes, cell strainers, water baths, balances, autoclaves, cryotubes, cryoboxes, freezers, freezer boxes, timers, tongs, tubing, crucibles, stirrers, hotplates, detergents, disinfectants, buffers, test strips, cell density meters, spectrophotometers, electrophoresis systems, plasticware, glassware, centrifuges, incubators and lab instruments and equipment and chemicals and reagents. Basically, all this and more for your general laboratory needs can be found at PLP.

PLP brands include Axygen, Labnet, Radiometer Analytical, Biochrom, Hach, Labwit, Daihan Scientific and Ohaus and a complete range of our own brand PLP Biosciences plasticware and glassware. Contact us for dedicated chemical reagents from BallyBio, ChemSupply and Hach test kits. We also provide a range of safety products to ensure the end user is protected in their daily work.

Pacific Laboratory Products is a wholly Australian owned company that distributes a great range of quality suppliers to provide our customers with an extensive range of specialist laboratory products for your research and testing needs.

Don't forget to visit us at www.pacificlab.com.au or contact us at sales@pacificlab.com.au

Our Sustaining Members

Micropore Technologies Pathfinder Series Creates Nanoparticles in a Better Way

The Micropore Technologies Pathfinder series using Advanced Cross Flow (AXF) mixing technology has been proven to effectively create nanoparticles. Whilst many turn to readily available lipids to assess size, PDI and encapsulation efficiency (EE), they are often finding Micropore encapsulates RNA beyond 99%.

The development of treatments is changing, research institutes and smaller biotech organisations are demanding scale much like CMOs, CDMOs, lipid manufacturers and pharmaceutical companies across the globe. The Micropore Pathfinder and Horizon series encompasses both research and production requirements accommodating this emerging requisite.

The capacity to be customisable to a given formulation means the system can pivot to the formulation rather than changing the formulation to fit a technology. Additionally, the formulation conditions can scale on the same mixer from microlitres to litres of production – even thousands of litres.

The Micropore Technologies Pathfinder PRO 125 suits the formulation discovery path while Pathfinder PRO 250 enables the transition to clinical trials. Furthermore, a small Horizon system is ideal for your GMP environment. The flexibility of this technology is so vast, there is sure to be a fit for your paradigm.

Consider a demonstration in your facility to experience the scope of this technology with your formulation.

ATA Scientific Pty Ltd
(02) 9541 3500
enquiries@atascientific.com.au
https://www.atascientific.com.au/products/axf-pathfinder/

GeneTex HistoMAX™ IHC-Optimized Antibodies

Immunohistochemistry (IHC) is an indispensable application routinely employed in academic and clinical research as well as in patient care. In addition to the quality of tissue section preparation, the pivotal component determining the reliability of IHC data is the suitability of the antibody used. This can only be assessed through strict and focused reagent validation for this assay.

GeneTex is proud to introduce its **HistoMAX™ IHC-Optimized Antibodies** product line that consists of antibodies specifically vetted for IHC. These antibodies were extensively evaluated for IHC utilising formalin-fixed normal and cancer tissue microarrays to guarantee specificity and best-in-class performance. Only antibodies that have passed these stringent performance criteria for IHC will be added to the HistoMAX™ portfolio.

GeneTex's HistoMAX™ IHC-Optimized Antibodies are distributed in Australia and New Zealand by Sapphire Bioscience.

For more information, please contact:
Sapphire Bioscience Pty Ltd
1800 062 088
(02) 9698 2022
sales@sapphirebioscience.com
www.sapphirebioscience.com

www.genetex.com/research/overview/histomax

www.sapphirebioscience.com/genetex-histomax

Flyer: www.sapphirebioscience.com/genetex-histomax-flyer

Glucose Stabilisation Right from the Beginning With VACUETTE® FC Mix Tube

VACUETTE® FC Mix tubes provide effective glycolysis inhibition for precise determination of the *in vivo* blood sugar content.

Accurate plasma glucose levels are essential for the evaluation and correct diagnosis of diabetes mellitus and gestational diabetes.

VACUETTE® FC Mix blood collection tubes contain a special additive mix of Na_2 EDTA, sodium fluoride, citric acid and sodium fluoride. The mixture inhibits glycolysis and prevents coagulation.

Clear Advantages of VACUETTE® FC Mix Tubes

- FC Mix preserves *in vivo* concentration of glucose at almost 100% for up to 48 hours
- Stabilisation allows for longer storage and transport times
- Avoids false negative diagnosis of diabetes patients
- After suitable inversion FC Mix tubes can be stored for up to 24 hours at room temperature without centrifugation

In comparison with standard fluoride tubes, variable loss within the first 2 hours of collection can be avoided with VACUETTE® FC Mix tubes. The blood glucose value is stabilised at time of collection.

Interpath Services
Tel: 03 9056 5300
Freecall: 1800 626 369
Email: sales@interpath.com.au
Web: www.interpath.com.au

Our Sustaining Members

Uni-rAb™ Recombinant Monoclonal Antibodies

Uni-rAb™ antibodies are the latest generation of recombinant monoclonal antibodies developed using Proteintech's Antigen-Specific B-Cell Cloning & Engineering (ABCE™) platform. The ABCE™ platform achieves stable and high expression of recombinant monoclonal antibodies by cloning antibody heavy and light chain sequences derived from antigen-specific B cells into high-yield expression vectors followed by their introduction into suitable mammalian expression systems.

Antigen-specific single B cell sorting allows the isolation of functional monoclonal antibodies reactive against antigens in their native conformation that predominantly occur *in vivo* and are difficult to reproduce *in vitro*. This ultimately leads to the generation of Uni-rAb™ recombinant antibodies that have native V_H-V_L pairings which is critical for maintaining antibody specificity and functionality but is often lost in other antibody development approaches such as phage display. The ABCE™ platform utilises antigen dual-labelling and multiparametric FACS to exclude low-affinity and non-specific B cells, thereby facilitating the isolation of antigen-specific B cells with high efficiency.

Since the development of Uni-rAb™ recombinant monoclonal antibodies relies on the *in vitro* cloning and expression of defined heavy and light chain sequences derived from antigen-specific B cells, the entire production process can be standardised and replicated whenever needed once the antibody sequences are known. Being biologically defined eliminates the risks of genetic drift and instability as seen in traditional hybridoma-derived monoclonal antibodies, thereby ensuring unparalleled lot-to-lot consistency and reproducibility of experimental data.

For further information, please contact United Bioresearch Products who distribute the Proteintech range in Australia.

United Bioresearch Products
Kirrily Smith
Phone (02) 4575 0309
info@unitedbioresearch.com.au

SDR Scientific: Newly Appointed as ANZ Distributor for Hoefer Inc.

Hoefer Inc. offers a range of innovative products designed to enhance the efficiency and precision of laboratory researchers. Specialising in electrophoresis, gel documentation and blots, Hoefer's equipment is tailored to meet the diverse needs of modern laboratories.

One of the standout features of Hoefer products is their user-friendly design, which streamlines complex procedures. For example, their gel electrophoresis systems provide consistent results, ensuring reproducibility in experiments. This reliability is crucial for researchers working in fields such as molecular biology, biochemistry, and genetics where precise measurements are essential.

Additionally, Hoefer's advanced imaging systems facilitate the rapid analysis of gels and blots, saving valuable time in data interpretation. The integration of software solutions enhances data management, allowing researchers to focus on their scientific inquiries rather than manual data handling.

Hoefer's commitment to quality means that their products are built to last, minimising downtime and maintenance costs. This durability, combined with excellence in customer support, makes Hoefer Inc. ideal for laboratories aiming to advance their research.

Hoefer Inc. provides reliable, efficient and user-friendly solutions that empower laboratory researchers to achieve their goals with confidence and accuracy. To learn more about Hoefer, please contact your friendly SDR Scientific Technical Sales and Support Specialist.

SDR Scientific
t: 02 9882 2882
e: info@sdr.com.au
w: www.sdr.com.au

Sartobind® Membrane Adsorbers – Membrane Chromatography Solutions for Rapid Protein and Virus Purification

Displaying a macroporous structure with pores that are orders of magnitude larger than conventional resin matrices, molecules are transported rapidly to the functionalised surface of Sartobind® membrane adsorbers, by convective flow.

These membranes are supplied in ready-to-use Sartobind® Lab and Vivapure® units for fast and easy macromolecule purification.

- Purification as simple as filtration
- Rapid separations
- No bed cracking or channeling
- Single use or reusable
- Process-ready platform

For laboratory-scale purification, Sartobind® membrane adsorbers are available with a comprehensive range of anion exchange (Q and D), cation exchange (S), and affinity (IDA and Protein A) ligands.

Typical Applications
Capture | Purification:
Proteins, Antibodies, Nucleic Acids, Viruses and VLPs

Flowthrough | Polishing:
DNA, Host Cell Proteins, Viruses and Endotoxins

Phone 1800 645 076
Email Info.Australia@Sartorius.com
Web www.sartorius.com

Our Sustaining Members

End of Year Special: Get 20% Off mexec jobstrategy™ Program in 2024 with Code '2024jobstrategy'

mexec is an Executive Search Recruitment firm that also supports individuals seeking to transition to a new role.

We specialise in the science, health and innovation sectors.

mexec is experienced in resourcing staff for companies, including executive search and selection services to build your leadership team.

We offer comprehensive services for individuals, including our mexec jobstrategy™ program, résumé writing, LinkedIn profile updates and interview coaching.

mexec works at all levels from graduate to CEO and board.

Contact us today on 1300 0 MEXEC or www.mexec.com or careers@mexec.com

Save Time and Money and Reduce Waste With Autosampler Filter Vials

Does your research rely on autosamplers? Would you like to reduce the tedium and expense of traditional vial preparation?

Thomson Filter Vials are a single system which replaces HPLC Vials, HPLC Caps, Syringes and Syringe Filters for the filtration of samples directly in an autosampler-ready vial. The same size as standard HPLC vials, Filter Vials help reduce time and costs by eliminating transfer steps and minimising waste. Just add your sample, insert the filter and squeeze – for a ready-to-sample vial! Available with pre-slit or non-slit septum.

You can choose the membrane material (PTFE, PVDF, PES or nylon) and porosity (0.2 µm or 0.45 µm) right for your samples. When you add the versatility of Filter Vials that can process as little as 10 µL of sample or as much as 650 µL, plus eXtreme vials for viscous or high-particulate samples or Low Evap vials for high volatility organic solvents, you will find something right for you whatever your research needs.

Spend less time preparing experiments and get more time for getting your results. For more information visit https://htslabs.com/fv and to apply for your free samples just email us at info@genesearch.com.au

MP Biomedicals

High-throughput automation technologies have transformed life science research, particularly in DNA extraction and molecular biology. Traditionally time-consuming, DNA extraction is now faster and more efficient with robotic liquid handlers, magnetic bead-based purification, and total laboratory automation (TLA). These systems enhance precision, reduce human error and increase reproducibility. In molecular biology, automation enables the simultaneous processing of thousands of DNA samples, which benefit fields like genome sequencing, forensic analysis and DNA barcoding.

By streamlining workflows – such as DNA isolation, sample preparation and quality control – automation boosts scalability, allowing for large-scale genomic studies. This rapid processing accelerates discoveries in personalised medicine, biotechnology and environmental monitoring. Additionally, automated nucleic acid extraction is essential in microbiome research, where isolating DNA and RNA from microbial communities is critical for analysis. Overall, high-throughput automation is revolutionising research by increasing accuracy, speed, and data-handling capacity, driving innovation in the life sciences.

At MP Biomedicals, we have developed a unique automated system tailor-made for microbiome research.

The MPure™ aNAP System combined with MP Biomedicals Magbeads for Feces and Magbeads for Soil kits delivers optimised sample preparation followed by walkaway extraction processing with minimum hands-on time – all you have to pipette is the prepared sample.

Top-notch performance

- Designed for but not limited to MagBeads Kits for sequential sample processing and purification of nucleic acids

Time saving

- The average processing time is between 30–60 minutes.
- High throughput of up to 32 or 96 samples

Safe and user-friendly

- Intuitive design and UI for faster navigation and experiment setups
- UV and temperature control allow trustworthy results
- Effective cross-contamination control from aerosols

The performance of the MPure™ aNAP System instruments have been extensively evaluated with MagBeads Purification Kits. Users have the flexibility to self-assemble the reagents with the relevant consumables for maximum cost-effectiveness or purchase the pre-assembled reagent kits for greater convenience. Contact us at www.mpbio.com/au/contact_us to discuss your research requirements and learn more about our newest products at www.mpbio.com/au.

Our Sustaining Members

TECAN

Spark® Cyto Plate Reader for 2D and 3D Cell Experiments With Live Cell Imaging and Real-time Cytometry

Spark Cyto uniquely brings together top-of-the-range camera components with proprietary patent-pending technology to ensure that you can truly investigate your entire cell population. It gives you the ability to record the whole well area of a 96- or 384-well microplate with just one image, without tiling or distortion. This means that you never miss a cell when investigating the total cell population in a microplate well. Included are three magnification levels combined with four channels for fluorescence and bright field imaging, enabling high quality cell analysis for a wide variety of applications.

Spark Cyto takes a user-friendly approach to the most common cytometry applications:

- 3D^{ai} spheroid and organoid analysis
- Label-free cell counting
- Confluence
- Nuclei counting
- Transfection efficiency
- Cell viability
- Cell death

Imaging of 3D cell culture objects is supported by AI-based segmentation of 3D structures, e.g. spheroids or organoids. Object-based data like area, eccentricity, diameter and fluorescence intensity are derived from the segmentation mask and can be used to gate and analyse 3D objects. The Z-stacking function allows the acquisition of multiple layers in the Z-dimension and the automated creation of a projected image of these Z-layers serves as the basis for the AI-based segmentation.

For all other applications simply select the 'user-defined' option to easily set up your own method in the SparkControl™ software or use the 'image-only' feature to export your files to a third-party image analysis software. This gives you complete flexibility in meeting your respective assay requirements.

Interested in learning more or want to arrange a demonstration? Visit www.tecan.com, call us on 1300 808 403 or email info-aus@tecan.com

SciTech
Imaging & Optical Solutions

Sapphire FL Biomolecular Imager – Resolution Now Down to 5 µm

The latest Sapphire FL Biomolecular Imager from Azure Biosystems is a multi-modal scanner with image resolution now down to just 5 microns. With customisable and user-changeable laser and filter modules, it easily supports a broad range of wavelengths from 375 nm through to 900 nm allowing UV, phosphor, visible and NIR imaging and offers an optional chemiluminescent imaging module.

A wide depth of field (25 x 25 cm) allows you to image Western blots, six 96-well plates, 2D gels, protein and tissue arrays, tissue slides, living small animals, plants, phosphor screens, organ and tumour imaging and much more.

High sensitivity allows femtogram detection of proteins labelled with common fluorescent dyes. Extended dynamic range EDR, when selected, allows imaging of both bright and weak bands without experiencing saturation. It extends to 24 bits of data which is ideal for samples that feature strong and weak expressing proteins.

The Sapphire FL imager makes imaging of live animals possible. When combined with appropriate tubing and nose cones, living mice can be fluorescently imaged under anaesthesia using one of five built-in anaesthesia ports. The wide imaging platform can accommodate specimens with depth (up to 4 cm) allowing mice, plants, multi-well plates, petri dishes, microscope slides and other large biological samples to be imaged.

The imager offers a 7 mm software-controlled adjustable focal plane, so you can scan your sample at multiple depths to ensure you see all your data has to offer. It scans between 5–1000 µm resolution to ensure clear visualisation of detailed samples.

The Chemiluminescence Module adds high-resolution, quantitative chemiluminescence and visible imaging.

Scitech Pty Ltd
(03) 9480 4999
sales@scitech.com.au
www.scitech.com.au

FB
fisherbiotec
AUSTRALIA

Fisher Biotec stands out as a premier supplier of high-quality laboratory equipment in Australia. With decades of experience backed by JAS-ANZ ISO 9001:2015 certification for the sale and supply of laboratory equipment, you can depend on us to provide the scientific community with reliable, cost-effective, and timely solutions for your laboratory operations.

Whether you need laboratory essentials such as plastic consumables, pipette tips and PCR equipment, or more specialised equipment such as imagers, centrifuges, or biosafety cabinets, our extensive product range has you covered. We understand that everyone's research work is unique, and therefore, we offer a diverse selection of products from the world's biggest names in scientific research to meet your specific requirements.

Additionally, we provide custom solutions and buffers tailored to your particular research needs, ensuring optimal performance and results. For all your laboratory needs, you can trust Fisher Biotec to deliver the right products with exceptional quality and service.

For all enquiries, please don't hesitate to contact our friendly team by calling 1800 066 077, emailing info@fisherbiotec.com or visiting our website at www.fisherbiotec.com. We look forward to working with you!

ASBMB Council 2025

PRESIDENT
Professor Megan Maher
School of Chemistry and
Bio21 Molecular Science and
Biotechnology Institute
University of Melbourne
PARKVILLE VIC 3052
Phone: (03) 9035 7451
Email: megan.maher@unimelb.edu.au

PAST PRESIDENT ELECT
Professor Ross Hannan
John Curtin School of Medical Research
Australian National University
ACTON ACT 2601
Phone: (02) 6125 6312
Email: ross.hannan@anu.edu.au

TREASURER
Associate Professor Adrian Achuthan
Department of Medicine
Royal Melbourne Hospital
University of Melbourne
PARKVILLE VIC 3010
Phone: (03) 8344 3298
Email: aaa@unimelb.edu.au

SECRETARY
Associate Professor Dominic Ng
School of Biomedical Sciences
University of Queensland
ST LUCIA QLD 4072
Phone: (07) 3365 3077
Email: d.ng1@uq.edu.au

EDITOR and
CHAIR OF COMMUNICATIONS
Dr Tatiana Soares da Costa
Waite Research Institute
University of Adelaide
GLEN OSMOND SA 5064
Phone: (08) 8313 0258
Email: tatiana.soaresdacosta@adelaide.edu.au

EDUCATION REPRESENTATIVE
Professor Tracey Kuit
School of Chemistry and Molecular Bioscience
University of Wollongong
WOLLONGONG NSW 2522
Phone: (02) 4221 4916
Email: tracey_kuit@uow.edu.au

FAOBMB REPRESENTATIVE
Professor Marc Kvansakul
Department of Biochemistry and Chemistry
La Trobe Institute for Molecular Science
La Trobe University
BUNDOORA VIC 3086
Phone: (03) 9479 2263
Email: m.kvansakul@latrobe.edu.au

SECRETARY FOR SUSTAINING MEMBERS
Sarah Parsons
WALDRONSMITH Management
119 Buckhurst Street
SOUTH MELBOURNE VIC 3205
Email: asbmb@wsm.com.au

www.asbmb.org.au **@ITSASBMB** **ComBio**

Directory

COUNCIL FOR 2025

PRESIDENT
Professor Megan Maher
School of Chemistry and Bio21 Molecular Science and Biotechnology Institute
University of Melbourne
PARKVILLE VIC 3052
Phone: (03) 9035 7451
Email: megan.maher@unimelb.edu.au

PAST PRESIDENT
Professor Ross Hannan
John Curtin School of Medical Research
Australian National University
ACTON ACT 2601
Phone: (02) 6125 6312
Email: ross.hannan@anu.edu.au

TREASURER
Associate Professor Adrian Achuthan
Department of Medicine
Royal Melbourne Hospital
University of Melbourne
PARKVILLE VIC 3010
Phone: (03) 8344 3298
Email: aaa@unimelb.edu.au

SECRETARY
Associate Professor Dominic Ng
School of Biomedical Sciences
University of Queensland
ST LUCIA QLD 4072
Phone: (07) 3365 3077
Email: secretary@asbmb.org.au

EDITOR and CHAIR OF COMMUNICATIONS
Dr Tatiana Soares da Costa
Waite Research Institute
University of Adelaide
GLEN OSMOND SA 5064
Phone: (08) 8313 0258
Email:
tatiana.soaresdacosta@adelaide.edu.au

EDUCATION REPRESENTATIVE
Professor Tracey Kuit
School of Chemistry and Molecular Bioscience
University of Wollongong
WOLLONGONG NSW 2522
Phone: (02) 4221 4916
Email: tracey_kuit@uow.edu.au

FAOBMB REPRESENTATIVE
Professor Marc Kvansakul
Department of Biochemistry and Chemistry
La Trobe Institute for Molecular Science
La Trobe University
BUNDOORA VIC 3086
Phone: (03) 9479 2263
Email: m.kvansakul@latrobe.edu.au

SECRETARY FOR SUSTAINING MEMBERS
Sarah Parsons
WALDRONSMITH Management
119 Buckhurst Street
SOUTH MELBOURNE VIC 3205
Email: asbmb@wsm.com.au

STATE REPRESENTATIVES

AUSTRALIAN CAPITAL TERRITORY
Dr Chathura Suraweera
John Curtin School of Medical Research
Australian National University
ACTON ACT 2601
Email: chathura.suraweera@anu.edu.au

NEW SOUTH WALES
Dr Tara Christie
School of Medical Sciences
University of Sydney
SYDNEY 2006 NSW
Phone: (02) 9351 2001
Email: tara.christie@sydney.edu.au

QUEENSLAND
Dr Conan Wang
Institute for Molecular Bioscience
University of Queensland
ST LUCIA QLD 4072
Phone: (07) 3346 2014
Email: c.wang@imb.uq.edu.au

SOUTH AUSTRALIA
Dr Michael Roach
College of Science and Engineering
Flinders University
ADELAIDE SA 5001
Email: michael.roach@flinders.edu.au

TASMANIA
Professor Adele Holloway
Tasmanian School of Medicine
University of Tasmania
HOBART TAS 7001
Email: a.f.holloway@utas.edu.au

VICTORIA
Dr Sarah Stewart
Department of Biochemistry and Chemistry
La Trobe Institute for Molecular Science
La Trobe University
BUNDOORA VIC 3086
Phone: (03) 9479 4785
Email: s.stewart@latrobe.edu.au

WESTERN AUSTRALIA
Dr Alyssa Van Druemel
School of Molecular Science
University of Western Australia
CRAWLEY WA 6009
Phone: (08) 6488 4779
Email: alyssa.vandreumel@uwa.edu.au

ASBMB NATIONAL OFFICE

WALDRONSMITH Management
119 Buckhurst Street
SOUTH MELBOURNE VIC 3205
Email: asbmb@wsm.com.au

COPY DEADLINE FOR NEXT ISSUE:
Monday 3 February 25

SPECIAL INTEREST GROUPS

ADELAIDE PROTEIN GROUP
Chair: Alison Roennfeldt
University of Adelaide
ADELAIDE SA 5005
Email: alison.roennfeldt@adelaide.edu.au

AUSTRALIAN YEAST GROUP
Chair: Dr Alan Munn
Griffith University Gold Coast
SOUTHPORT QLD 4222
Phone: (07) 5552 9307
Email: a.munn@griffith.edu.au

CANBERRA PROTEIN GROUP
Chair: Sacha Pulsford
Research School of Chemistry
Australian National University
CANBERRA ACT 2601
Email: sacha.pulsford@anu.edu.au

CELL ARCHITECTURE
Chair: Professor Thomas Fath
Dementia Research Centre
Macquarie University
NORTH RYDE NSW 2109
Email: thomas.fath@mq.edu.au

EDUCATION
Chair: Associate Professor Tracey Kuit
School of Chemistry and Molecular Bioscience
University of Wollongong
WOLLONGONG NSW 2522
Phone: (02) 4221 4916
Email: tracey_kuit@uow.edu.au

MELBOURNE PROTEIN GROUP
President: Dr Chris Langendorf
St Vincent's Institute of Medical Research
FITZROY VIC 3065
Phone: 0410 475 978
Email: clangendorf@svi.edu.au

METABOLISM AND MOLECULAR MEDICINE GROUP
President: Dr Adam Rose
Monash Biomedicine Discovery Institute
Monash University
CLAYTON VIC 3800
Phone: (03) 9902 9340
Email: adam.rose@monash.edu

PERTH PROTEIN GROUP
Chair: Dr Joel Haywood
Curtin University
PERTH WA 6102
Phone: 0477 788 895
Email: joel.haywood@curtin.edu.au

QUEENSLAND PROTEIN GROUP
Chair: Dr Thomas Ve
Griffith University Gold Coast
SOUTHPORT QLD 4222
Phone: (07) 5552 7023
Email: t.ve@griffith.edu.au

SYDNEY PROTEIN GROUP
President: Dr Kate Michie
Structural Biology Facility, UNSW Sydney
RANDWICK NSW 2052
Phone: (02) 9348 0441
Email: k.michie@unsw.edu.au