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Plenary Lecturer Professor Jodi Nunnari (University of California, Davis, USA), pioneer in the field of mitochondrial biology, presents at ComBio2022.

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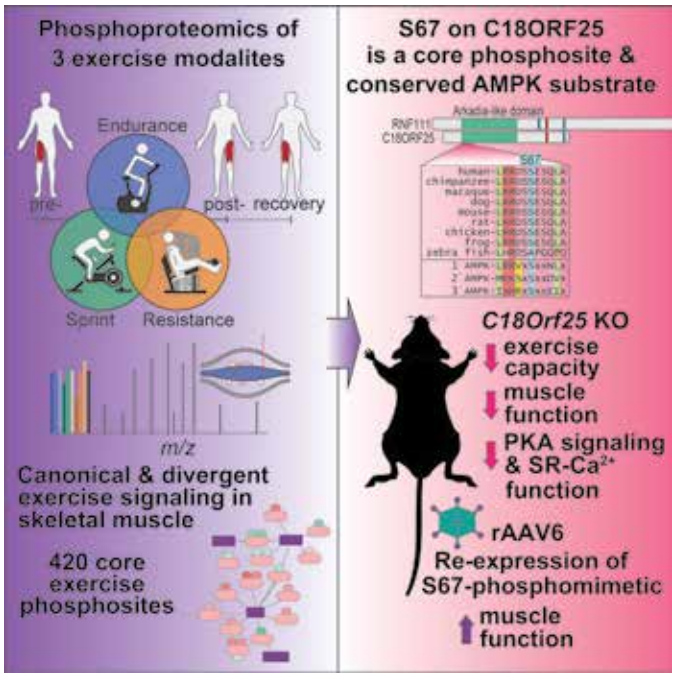
C18ORF25: a Novel Regulator of Exercise Signalling and Skeletal Muscle Function

Blazev R, Carl CS, Ng Y, Molendijk J, Voldstedlund CT, Zhao Y, Xiao D, Kueh AJ, Miotto PM, Haynes VR, Hardee JP, Chung JD, McNamara JW, Qian H, Gregorevic P, Oakhill JS, Herold MJ, Jensen TE, Lisowski L, Lynch GS, Dodd GT, Watt MJ, Yang P, Kiens B*, Richter EA*, Parker BL*.
Phosphoproteomics of three exercise modalities identifies canonical signaling and C18ORF25 as an AMPK substrate regulating skeletal muscle function. *Cell Metab* 2022;34(10):1561-1577.e9.
***Corresponding authors: bkiens@nexs.ku.dk, erichter@nexs.ku.dk, ben.parker@unimelb.edu.au**

Our lab has a keen interest in identifying novel regulators of skeletal muscle function. This is because promoting optimal muscle function through interventions such as exercise is key to reducing risk factors associated with disease and conferring positive health benefits. In this context, understanding how exercise-regulated signalling mediates the beneficial effects of exercise at a molecular level may lead to novel and/or improved therapeutic strategies. To this end, we collaborated with our colleagues from the University of Copenhagen, Denmark (Professor Erik Richter and Professor Bente Kiens) and performed a phosphoproteomic analysis of human skeletal muscle from a cross-over intervention of endurance, sprint and resistance exercise. This experimental design allowed us to compare signalling responses between different exercise modalities in the same individual, relative to their pre-exercise level, meaning we could directly monitor how an individual responded to different exercises.

Using mass spectrometry-based phosphoproteomics, we identified 5,486 phosphosites that were regulated during or after at least one type of exercise modality, and 420 core phosphosites common to all exercises. One of these core phosphosites was S67 on the uncharacterised protein C18ORF25, which we subsequently validated as a novel bona fide AMP-activated protein kinase (AMPK) substrate. The robust activation of AMPK in all exercise modalities is significant because AMPK is a 'master' regulator of exercise response and mice lacking AMPK are known to have major defects in exercise capacity.

Given we conduct research in a Physiology department, we thought it would be cool to probe the *in vivo* functions of C18ORF25 in skeletal muscle by generating a C18ORF25 whole-body mouse knockout (KO) model. When subjected to treadmill exercise to exhaustion, KO mice fatigued earlier and ran 20% less distance as compared to their wildtype (WT) littermates. We next performed *ex vivo* assessments of muscle function using electrically induced contractions and observed that isolated soleus muscles from KO mice generated significantly reduced force per cross-sectional area, with no differences in fatigue resistance or recovery. This finding prompted us to then investigate, at a single muscle cell level, the ability of the sarcoplasmic reticulum (SR, the major calcium store in skeletal muscle) to release and sequester calcium. SR Ca^{2+} loading capacity was significantly decreased in fast-, but not slow-, twitch fibres of KO mice as compared to WT. Furthermore, passive SR Ca^{2+} leak was significantly increased in fast-, but not slow-, twitch fibres of KO mice. The reduced muscle function of KO mice was not due to differences in the Ca^{2+}-sensitivity of the contractile apparatus, but likely the result of impaired SR Ca^{2+} pump function.



Graphical abstract.

We then investigated whether phosphorylation of S67 on C18ORF25 could regulate skeletal muscle function by re-expressing C18ORF25 in KO mice. Here, S67 on C18ORF25 was mutated to either an alanine (A, phospho-dead) or aspartic acid (D, phospho-mimetic) and then re-expressed into left or right extensor digitorum longus muscle, respectively, using adeno-associated viruses in a paired design. Muscles expressing the S67D mutant generated significantly greater force per cross-sectional area and showed improvements in tetanic contractile kinetics, including the rate of force development and relaxation as compared to S67A mutant. Thus, the reduced muscle function of KO mice could be reversed following re-expression of a C18ORF25 S67 phospho-mimetic mutant.

Taken together, our work has defined the canonical exercise phosphoproteome across different exercise modalities and identified C18ORF25 as a novel regulator of exercise signalling and skeletal muscle function.

Parker laboratory members.

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How Phase Separation of Unfolded States of an Intrinsically Foldable Protein Arises and Interacts with the Surrounding Proteome Milieu of a Mammalian Cell

Ruff KM, Choi YH, Cox D, Ormsby AR, Myung Y, Ascher DB, Radford SE, Pappu RV*, Hatters DM*.
Sequence grammar underlying the unfolding and phase separation of globular proteins.
***Mol Cell* 2022;82(17):3193-3208.e8.**
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Protein aggregation is a form of phase separation, which describes the separation of a homogenous solution into two co-existing phases: a dilute phase and dense phase. In recent years, it has become evident that phase separation can explain the organisational behaviour of intracellular proteins into 'membraneless organelles'. In addition, the aberrant phase separation of intrinsically disordered proteins (IDPs) such as FUS and TDP-43 has been linked to disease pathology. In this study, we aimed to decipher the principles that drive the phase separation of unfolded states of intrinsically foldable proteins (IFPs), which includes, potentially, at least 32 globular proteins in a range of diseases. We sought to decipher how phase separation links to the sequence features of the unfolded state and the interaction with endogenous proteins in the cell including chaperones and other co-aggregating proteins.

We used the small bacterial ribonuclease, barnase, as a model to address these questions. Barnase was chosen because it has properties well-suited to assessing the question without confounding effects of native activity. When expressed in mammalian cells, the catalytically inactive H102A mutant of barnase is benign, soluble and diffusely distributed. When mutated to decrease the conformational stability, visible aggregates occurred. We called these unfolded protein deposits (UPODs). Barnase was combined with an optogenetic tool called optoDroplets, which enabled us to precisely determine the threshold concentration for unfolded proteins to phase separate.

We showed that phase separation of barnase was dependent on not only the concentration of the unfolded state, but on the physicochemical properties of the unfolded state. Using a 'stickers and spacers' framework, we were able to measure which amino acids were important drivers of aggregation. In this framework, stickers describe amino acids that drive phase separation, whereas spacers are more inert or repulsive. Atomistic simulations, followed by the experimental testing of mutants, highlighted aromatic residues tyrosine and phenylalanine as predicted key stickers. We concluded that phase separation of IFPs was dependent on both the concentration of unfolded protein and the presence of hydrophobic residues in the unfolded sequence.

Publications with Impact

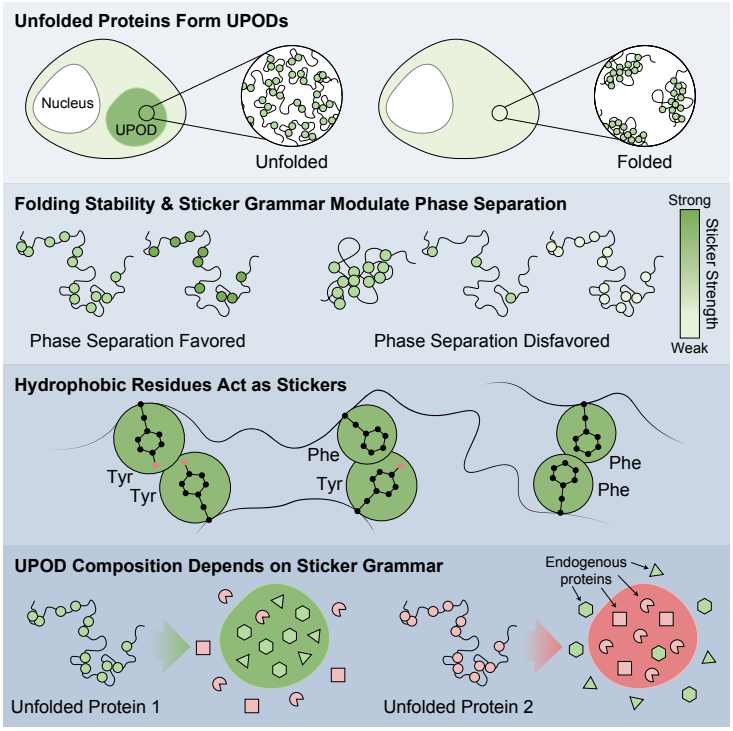
We hypothesised that when UPODs form in cells, they influence two cellular processes. One is that UPODs recruited quality control machinery such as chaperones that recognise sticker patterns mediating phase separation and play a functional role to prevent or remove inappropriate aggregates. The other is that the sticker patterns cause other endogenous unfolded proteins with compatible sticker patterns to coalesce into the UPOD phase. Indeed, we found that Hsp70 and Hsp40 chaperones inhibited barnase optoDroplet phase separation by preferential binding to unfolded states in the dilute phase.

We also found, via proteomics, which endogenous proteins partitioned with the barnase UPODs formed by different sticker patterns and abilities to fold. We found about one third of the top 100 proteins that enriched with the UPODs did so in a manner non-selective to sticker grammar or foldedness. However, the remainder of proteins partitioned in a selective manner to barnase variants and in a manner uncorrelated to the amount of barnase UPOD present. Some proteins, including chaperones HSPA1A/B and HSPB1, were non-selectively recruited to barnase UPODs. However, other chaperones, notably TRiC subunit CCT7, was selectively enriched with barnase variants that were unable to fold. Collectively, the data sheds light on a high level of specificity in what endogenous proteins interact with UPODs.

Sequence analysis of endogenous proteins enriched in barnase UPODs revealed compositional biases to different barnase variants that provide clues to a sequence grammar compatibility in the co-aggregation into the UPOD phases. Of note was a barnase mutant containing more tyrosine stickers leading to a bias of proteins of higher arginine content. This finding is reminiscent of known sticker combinations seen in IDPs involving arginine–tyrosine cation–pi interactions. There were other biases present too; the mechanisms of action remain to be understood.

The study has been a vibrant collaboration between the Hatters lab and the Pappu lab at Washington University that bridges expertise in protein aggregation cell biology and proteomics (Hatters lab) with polymer physics of phase separation (Pappu lab).

Yoon Hee Choi and Danny Hatters
Department of Biochemistry and Pharmacology and Bio21 Molecular Science and Biotechnology Institute, University of Melbourne



Left: How unfolded states of intrinsically foldable proteins can phase separate into aggregates (UPODs). We showed that globular protein barnase needed to be unfolded to form UPODs and that the sequence properties of the unfolded state (i.e. a sticker and spacer 'grammar') dictates both the efficiency of UPOD formation as well as how those UPODs co-mix with endogenous proteins. Figure adapted from Ruff et al. Mol Cell *2022 with permission.*

Right: Hatters lab on 'Go Blue on May 22' in 2021 for Huntington's disease awareness. Clockwise from left: Chloe Gerak, Helen Lyu, Christian Makhoul, Yoon Hee Choi, Angelique Ormsby, Viacheslav Kriachkov and Danny Hatters. Key personnel to this study not in the photo are Dezerae Cox (formerly from the Hatters lab), and Kiersten Ruff and Rohit Pappu from Washington University.

Publications with Impact

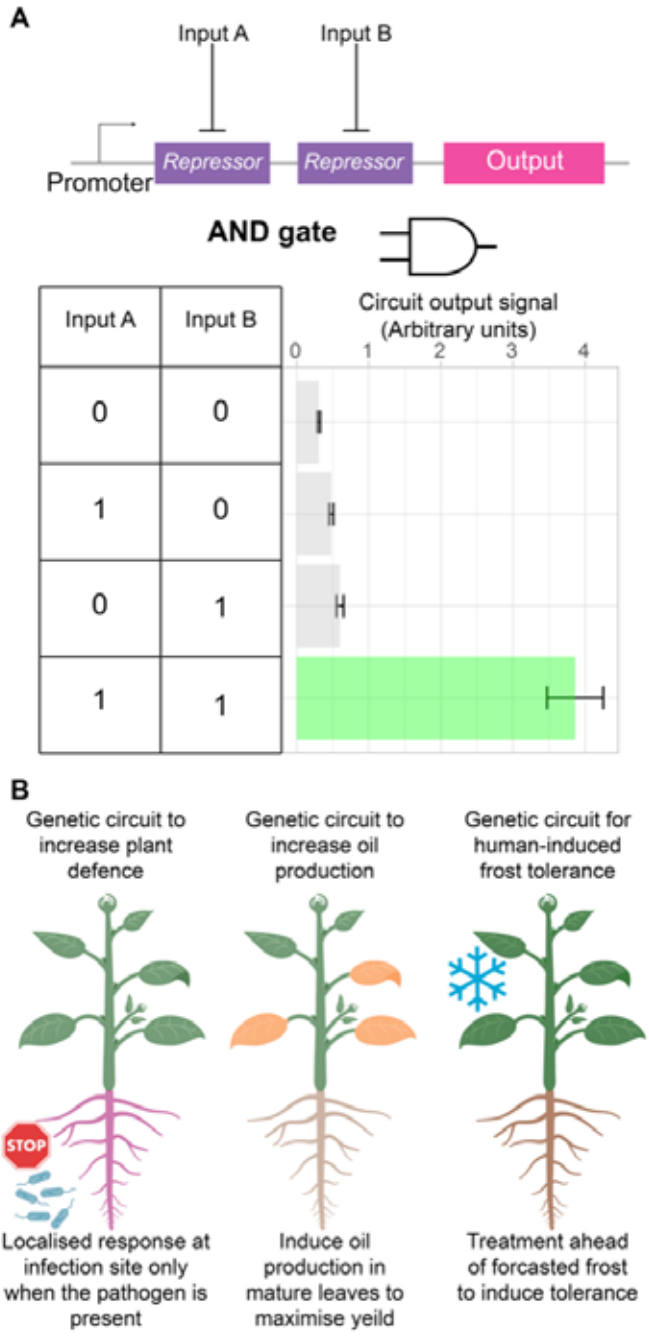
Reprogramming Plants with Genetic Circuits

Lloyd JPB, Ly F, Gong P, Pflueger J, Swain T, Pflueger C, Fourie E, Khan MA, Kidd BN, Lister R*.
Synthetic memory circuits for stable cell reprogramming in plants. *Nat Biotechnol* 2022;in press.
***Corresponding author: ryan.lister@uwa.edu.au**

Nature has evolved many wonderful and sophisticated ways of controlling where and when to turn a gene on, which is fundamental to organism complexity. Genetic engineers and synthetic biologists are striving to alter plant form and function for increased productivity and robustness in an increasingly challenging environment. However, we do not have the luxury of time needed for interesting new crop traits to evolve. Ideally, we would be able to predictably and reliably engineer any new and desired spatiotemporal gene expression patterns into plants to confer useful new traits and functions, but we need new tools to achieve this.

In many cases, researchers have identified various naturally existing plant promoters that are useful for driving gene expression in a particular condition. Some promoters might be activated by drought or by a pathogen. Others might be developmentally controlled by the plant and will only be turned on within a specific tissue or cell type. But what if we wanted to activate a particular gene only in a specific type of cell, and only when a certain selected stress condition is perceived? Discovery of a natural promoter that achieves this could be very time consuming, or one simply may not exist. When we consider the wide range of species and traits that plant biotechnologists aim to manipulate and improve, this lack of appropriately customised promoters for achieving precise gene expression control poses a major problem.

Enter genetic circuits. Synthetic genetic circuits allow for us to use two (or more) different condition specific promoters as inputs into a genetic computation machine. In our new study, published in *Nature Biotechnology*, we have developed a set of DNA-based logic gates that can process incoming signals to the plant and respond with a specific output pattern of gene expression. These patterns are determined by the specific circuit that we design and that is deployed within the plant. For example, an 'AND gate' circuit can be used to program a plant so that it turns on a desired gene only when two chosen incoming signals/conditions are present. As a proof-of-principle, we programmed a functioning AND gate in plants so that they produce a fluorescent signal only in one very specific type of cell in the root, and only after we feed them a specific chemical signal. We have also demonstrated that many other logical operations can be achieved with this system in plant cells to switch on and off genes on-demand in a predictable and customisable manner. This is similar to how a computer processes user inputs to control output, but acting with biological inputs and the processes happening at the DNA level rather than electrical.



Genetic circuits in plants.
***A.** Removal of two separate repressor sequences can activate the output and create AND gate logic.*
***B.** Possible applications of gene circuits in crops.*
Figure created with Biorender.

Many genes have been discovered that could enhance plant resilience against stresses, but many of these have deleterious side effects whereby, unless their expression

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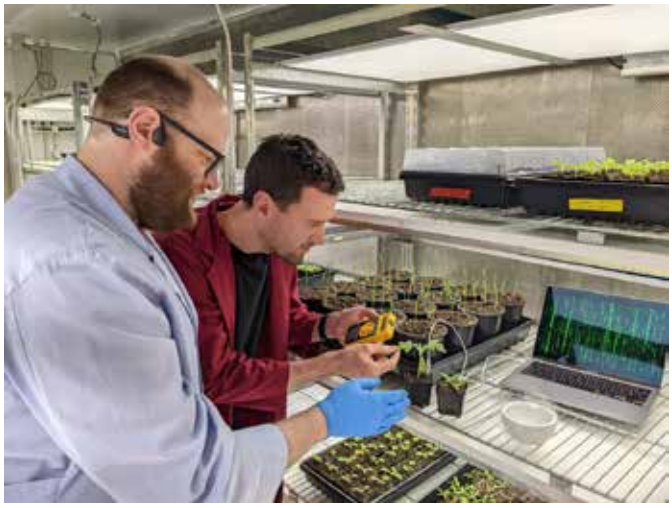

James Lloyd (left) and Ryan Lister inspect plants being tested with synthetic genetic circuit technologies.

patterns are precisely manipulated in time and space, plant health and productivity is actually reduced. With genetic circuits, the expression of such potent potential plant defender genes could be controlled specifically only when and where they are needed in the plant to confer enhanced resilience. Therefore, we could have the best of both worlds: enhanced stress resilient plants but without the growth tradeoffs.

Ultimately, gene circuit technologies will provide new abilities to program in the language of the cell, enabling development of novel plant capabilities that simply aren't possible by conventional breeding or genetic engineering approaches. Synthetic genetic circuits will allow us to program entirely new capabilities and functions into plants, including the ability to produce new useful and valuable biomolecules, switch plant function and productivity on demand, enhance nutritional and flavour characteristics, act as sentinels to detect and report disease and stress states, or grow in completely new environments in which plants have not evolved. Such customisability will enable development of improved crops, and tailoring of plants to new environments, such as the burgeoning indoor vertical farming industry, or further away as we venture beyond Earth.

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A Phosphoinositide Conversion Pathway That Controls Lysosome Repopulation to Sustain Autophagy Function

Rodgers SJ, Jones EI, Arumugam S, Hamila SA, Danne J, Gurung R, Nanayakkara R, Ramm G, McGrath MJ[#], Mitchell CA[#*]. Endosome maturation links PI3Kα signaling to lysosome repopulation during basal autophagy. *EMBO J* 2022; 41(19):e110398.
[#]These authors contributed equally to this work
***Corresponding author: christina.mitchell@monash.edu**

Autophagy is an evolutionarily conserved catabolic pathway responsible for degrading intracellular components into macromolecules that are reutilised by the cell. Dysregulation of the autophagy pathway contributes to ageing and several diseases including cancer and neurological disorders. Most mammalian cells undergo a basal level of autophagy under nutrient-rich conditions to remove damaged organelles and protein aggregates, and in addition, upregulation of autophagy occurs during starvation or stress to mobilise nutrients and promote cell survival. During autophagy, autophagic cargo is sequestered within specialised membranous organelles called autophagosomes, which then fuse with lysosomes to form autolysosomes where cargo is degraded by lysosomal hydrolases. Lysosomes are heavily utilised during this process, and continued autophagy function requires the repopulation of lysosomes. During starvation-induced autophagy, *de novo* lysosome biogenesis occurs through the activation of a lysosomal gene transcription program. Lysosomes can also be generated by the recycling of autolysosome membranes formed during autophagy via a process called autophagic lysosome reformation. In a new advance, we have identified a separate pathway that facilitates lysosome repopulation during basal autophagy, which is controlled by the sequential conversion of phosphoinositides.

Phosphoinositides are membrane-bound signalling lipids generated on intracellular membranes by a dedicated family of kinases and phosphatases, which add or remove phosphate groups respectively on the inositol ring to generate distinct phosphoinositide species. In the canonical autophagy pathway, the phosphoinositide, PI(3)P, is generated by Vps34 during starvation-induced autophagy to promote autophagosome formation. However, PI(3)P can also be generated via a sequential phosphoinositide conversion pathway in response to growth factor stimulation

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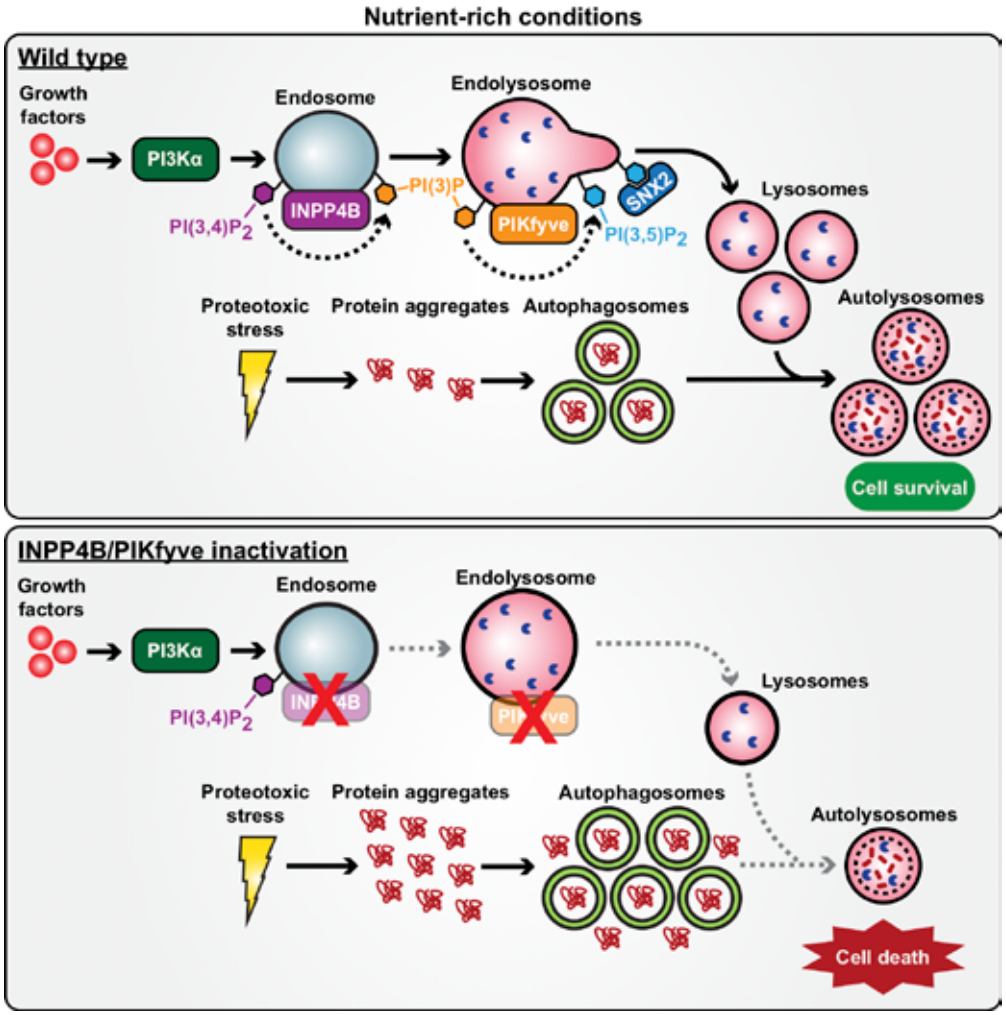

Sequential phosphoinositide conversion via endosomes promotes lysosome reformation, basal autophagic degradation and protein aggregate clearance under nutrient-rich conditions. INPP4B or PIKfyve inactivation reduces lysosome reformation and basal autophagic flux leading to protein aggregate accumulation and cell death. Reproduced from Rodgers et al. EMBO J *2022; e110398, with permission from Wiley.*

and PI3Kα activation. PI3Kα generates $PI(3,4,5)P_3$ on the inner leaflet of the plasma membrane that is hydrolysed by inositol polyphosphate-5-phosphatases to form $PtdIns(3,4)P_2$, which is subsequently internalised via endocytosis and hydrolysed to PI(3)P by INPP4B on endosomes. In our recent study, we undertook a systematic evaluation of the autophagy pathway in mammalian cells with INPP4B depletion or overexpression in order to determine whether this alternate PI(3)P synthesis pathway also plays a role during autophagy. This analysis revealed that INPP4B increased lysosome numbers and enhanced basal autophagic degradation under nutrient-rich conditions, but had no effect on starvation-induced autophagy and functioned independently from the canonical Vps34-dependent PI(3)P pathway.

To uncover the molecular mechanisms by which INPP4B regulates lysosome homeostasis and basal autophagy, we first determined the intracellular site of PI(3)P generation. Our previous study showed that INPP4B generates PI(3)P on endosomes, organelles that can also fuse with lysosomes to form endolysosomes in which endocytic cargo is degraded. In the current study, we showed that PI(3)P signals generated by INPP4B were retained as endosomes matured into endolysosomes, where they served as the substrate for the PI(3)P 5-kinase, PIKfyve, to generate $PI(3,5)P_2$. PIKfyve has been previously reported to promote lysosome reformation from endolysosomes, a process whereby endolysosome membranes protrude and undergo scission in order to generate new lysosomes, but with no defined role in autophagy. Using spinning disk microscopy, we showed that INPP4B promoted PIKfyve-dependent lysosome reformation from endolysosomes by recruiting the $PI(3,5)P_2$-binding protein, SNX2, which facilitated membrane curvature and formation of endolysosome tubules. Collectively, our analysis has identified a phosphoinositide conversion pathway that facilitates lysosome reformation during basal autophagy, which is dependent on the sequential generation of PI(3)P on endosomes followed by $PI(3,5)P_2$ on endolysosomes, to promote SNX2-dependent lysosome reformation. Inhibition of endosome maturation to endolysosomes suppressed lysosome reformation and basal autophagy by preventing the delivery of PI(3)P to endolysosomes to generate $PI(3,5)P_2$, demonstrating a new level of interplay between the endosomal and autophagy pathways.

Finally, basal autophagy is essential for protein quality control and protection against neurodegeneration, and defective basal autophagy in mice results in the accumulation of cytotoxic protein aggregates leading

to neurodegenerative disease. Interestingly, PIKfyve complex loss of function also results in neurological disorders in humans and mice, which is associated with lysosomal dysfunction by unknown mechanisms. Our study revealed that inactivation of INPP4B/PIKfyve-dependent lysosome reformation reduced the autophagic clearance of protein aggregates during proteotoxic stress, leading to protein aggregate accumulation and cytotoxicity (see figure). These findings raise the intriguing possibility that impaired lysosome reformation and protein aggregate clearance may contribute to the pathogenesis of PIKfyve complex neurological disorders.

Samuel Rodgers, Meagan McGrath and Christina Mitchell
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From left: Samuel Rodgers, Jill Danne, Georg Ramm, Randini Nanayakkara, Christina Mitchell, Emily Jones and Meagan McGrath.

New Signalling Nucleotides Produced by TIR Domains and How They Are Made

Manik MK[#], Shi Y[#], Li S[#], Zaydman MA, Damaraju N, Eastman S, Smith TG, Gu W, Masic V, Mosaiab T, Weagley JS, Hancock SJ, Vasquez E, Hartley-Tassell L, Kargios N, Maruta N, Lim BYJ, Burdett H, Landsberg MJ, Schembri MA, Prokes I, Song L, Grant M, DiAntonio A, Nanson JD, Guo M, Milbrandt J, Ve T*, Kobe B*. Cyclic ADP ribose isomers: production, chemical structures, and immune signaling. *Science* 2022;eadc8969.
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Organisms from bacteria to animals and plants must protect themselves against pathogens. Homologous protein motifs are present in the immune pathways of all these organisms. One of these motifs is the TIR (Toll/interleukin-1 receptor/resistance protein) domain, which is named after the mammalian and plant immune receptors.

Although TIR domains have long been thought to function only as protein interaction modules that form signalosome complexes, recent work revealed that many have enzymatic functions, most commonly cleaving NAD^+ (the oxidised form of nicotinamide adenine dinucleotide). Both signalosome assembly and enzyme functions depend on self-association into filamentous, open-ended complexes. NAD^+ is a metabolite with redox properties that has a role in many cellular processes. TIR domains cleave NAD^+ into nicotinamide and ADPR (adenosine diphosphate-ribose), but often also convert ADPR into its cyclic form (cADPR). The animal protein SARM1 (sterile alpha and Toll/interleukin-1 receptor motif-containing 1), for example, executes programmed axon death and produces the 'classical' cADPR with an N-glycosidic cyclic linkage.

In bacteria, TIR domains feature in several recently discovered bacteriophage defence pathways. One such system, called the Thoeris defense system, involves the thsA and thsB genes. Upon phage infection, the TIR domain-containing protein ThsB cleaves NAD^+, which activates ThsA, in turn killing the infected bacterial cell and protecting the bacterial population. Another bacterial TIR-domain protein is HopAM1, an 'effector' protein delivered by the phytopathogen *Pseudomonas syringae* DC3000 into the host plant cell, which suppresses plant immunity and facilitates bacterial infection. These bacterial proteins produce cADPRs that differ from classical cADPR, but their chemical structures were unknown. Our aims were therefore to determine the chemical structures of these new cADPR isomers, the molecular basis of their production by bacterial TIR domains, and their mechanisms of action.

Using NMR and crystallography, we found that bacterial TIR proteins can produce at least two new cADPR isomers. These are cyclised though an O-glycosidic bond; based on the location of the bond between the ribose moieties in ADPR, we named them 2′cADPR and 3′cADPR.

Publications with Impact

We used a stable NAD⁺ mimic to capture the active form of the assembly of TIR domains from a protein from *Acinetobacter baumannii* that produces 2′cADPR, and determined the structure using cryoEM. Incredibly, the assembly is a filament structurally analogous to those formed by animal TIR domains involved in Toll-like receptor signalling. A tryptophan residue in the binding pocket appears to position NAD⁺ and critical for production of cyclic ADPR products.

So how do these new cADPRs work? We found that 3′cADPR activates ThsA by allosterically modulating its oligomeric structure. In the case of HopAM1, it instead acts as an inhibitor of the plant immune system. While functions of 2′cADPR in bacteria are currently unknown, the same molecule is produced by plant immune receptors and may be an intermediate in the production of related nucleotides that activate the plant immune system.

In conclusion, our study reveals the chemical structures of new cADPR isoforms with signalling functions and provides information on how they are produced by TIR domains and how they signal in the immune pathways of bacteria and plants.

Sulin Li[1], Mohammad Manik[1], Yun Shi[2], Weixi Gu[1], Veronika Masic2, Tamim Mosaiab[2], Eduardo Vasquez[2], Michael Landsberg[1], Jeffrey Nanson[1], Thomas Ve[2] and Bostjan Kobe[1]
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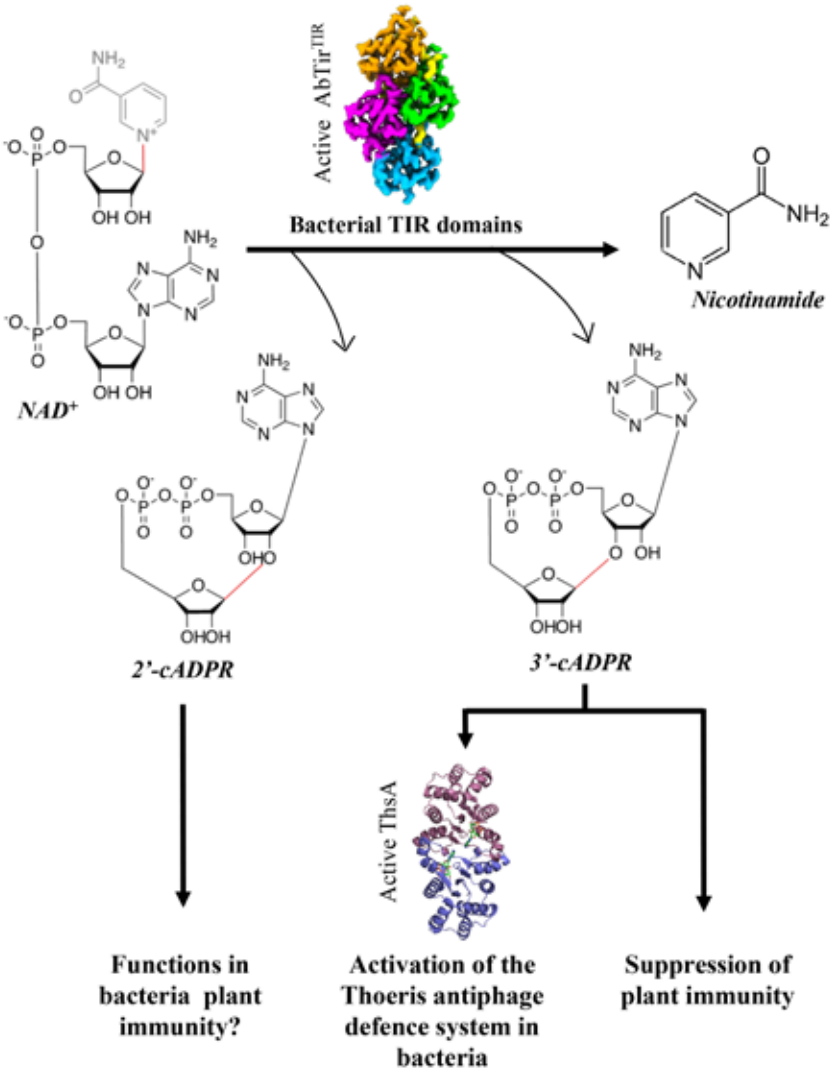


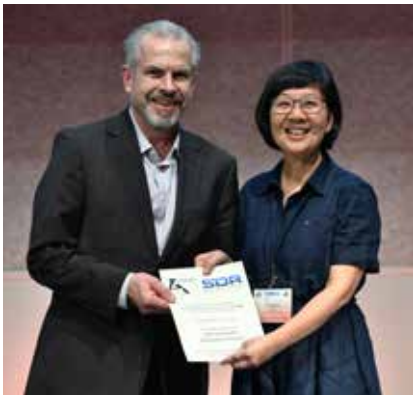
Overview of the study characterising diverse immune roles of bacterial cADPR isomers. Bacteria have TIR domain-containing proteins that cleave NAD⁺ to produce cyclic ADPR isomers with different cyclic linkages. One of these molecules, 3'cADPR, has different roles in immunity pathways – it acts as an activator of the Thoeris anti-phage defence systems, by binding to the protein called ThsA. When produced by the effector HopAM1 from the plant pathogen Pseudomonas syringae*, it suppresses plant immunity.*

Key Australian members of the cADPR team: Sulin Li, Mohammad Manik, Yun Shi, Weixi Gu, Veronika Masic, Tamim Mosaiab, Eduardo Vasquez, Michael Landsberg, Jeffrey Nanson, Thomas Ve and Bostjan Kobe.

ASBMB Medallists and Awardees at ComBio2022

ASBMB President Jacqui Matthews with Lemberg medallist, Leann Tilley (right).

Mark Szewczyk of Shimadzu with Shimadzu Research medallist, Michael Lazarou (right).



Simon Rushworth of SDR Scientific with SDR Scientific Education awardee, Saw Hoon Lim.

Monica Santese of Eppendorf South Pacific with Eppendorf Edman ECR awardee, Wael Awad.

From left: ASBMB Secretary Dominic Ng, ASBMB Fellowships awardees Tess Malcolm, Chris Horne, Jacinta Conroy and Yanxiang Meng, with ASBMB President Jacqui Matthews.

Yanxiang Meng receives the Fred Collins Award from Joan Collins (centre) and Cathie Jilovsky, Fred Collins' daughters.

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ComBio2022 Meeting Report

Jackie Wilce, Chair of ComBio2022

ComBio2022 was a meeting to remember! After a two-year interruption from the originally planned ComBio2020 due to COVID-19, we were truly ready to get back together – at last! The atmosphere was electric – with researchers, delighted to be able to share their findings in-person again and Trade keen to re-engage and promote their latest products. For some students, it was their first opportunity to attend a large in-person conference at all – and they could be seen wide-eyed looking for the correct place to set up their poster in the enormous Exhibition Hall. In total, 1,115 registrants came together, from five scientific societies, to the magnificent new wing of the Melbourne Convention and Exhibition Centre for the extravaganza that is ComBio!

The meeting kicked off with Professor Jennifer Doudna Zooming in live from the University of California, Berkley. Having received the Nobel Prize in Chemistry in 2020 for the development of CRISPR (along with Professor Emmanuelle Charpentier), she was busier than ever and could not participate in person. Her presentation was still a highlight of the meeting. We were treated to her captivating style that shares her sense of curiosity, discovery and innovation in science so well. She explained the raw data that were the first to show the powerful gene cutting tool her lab had invented, and described how we might use it in the future to potentially impact the gut microbiome.

Conference Chair, Jackie Wilce, opens ComBio2022.

Opening Keynote Plenary Lecturer Jennifer Doudna.

From that point – as is the tradition of ComBio – delegates then sprinted off in all directions depending on their symposia stream of interest. From Proteins, Peptides and Structural Biology, Plant Biology, Development, Stem Cell and Regenerative Medicine, Evolutionary and Ecological Genetics, Mechanisms of Disease, Genomics, Genome Editing and Systems Biology, Biochemistry and Metabolism, Cell Biology and Signalling to Education – there was something for everyone. Within our program, we had 72 concurrent sessions being included in three sets of symposium sessions for each of the three days (nine separate sessions) with eight concurrent symposia happening in each session. Overall, there were 717 abstracts with 22 plenary presentations, 389 symposium presentations (including 36 lightening talks) and 306 poster presentations! I would like to thank the marvellous Mark Hulett, our Program Chair, for his superb and insightful management of the program. Thanks also goes to all the speakers and poster presenters for attending and sharing their excellent work with such enthusiasm and brilliance.

Program Chair, Mark Hulett.

A spectacular feature of the ComBio2022 meeting was the magnificent Trade exhibition, where we congregated between sessions to enjoy our breaks (with delicious snacks and real espresso coffee!). With 53 Booths and six Tables, we were amongst all our Trade partners who were also exuding pure joy at this return to in-person interactions. The poster sessions were lively with great engagement between the older generations of scientists and our young up and coming cohort!

Our International Plenary talks were delivered by outstanding scientists – some virtual and some in-person. International Plenary speaker Professor Jamie Cate, from the University of California, Berkley, explained the extraordinary role of the eiF3 multi-subunit protein auxiliary to the ribosome in contributing to translation initiation. Professor Roy Parker, Zooming in from the University of Colorado, Boulder, described the way in which phase separated subcellular organelles are able to promote tau fibre propagation that underlies neurodegenerative disease. Professor Jodi Nunnari, from University of California, Davis, treated us to a tour through cells to explain how mitochondrial behaviour, metabolism and cell behaviour are intertwined. Jodi is a pioneer of

ComBio2022 Meeting Report

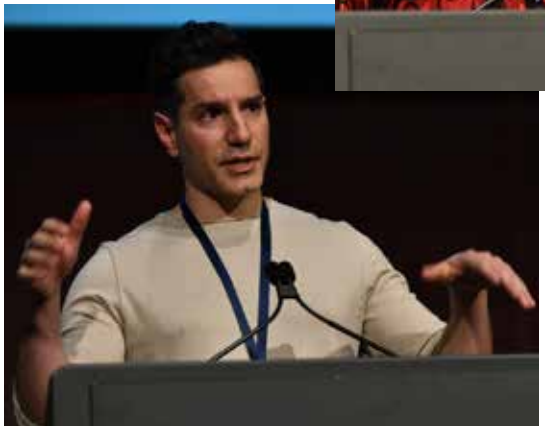
International Plenary Speakers, Jodi Nunnari (left) and Tony Hunter.

mitochondrial biology, the Editor-in-Chief of the *Journal of Cell Biology* and elected as a member of the National Academy of Sciences. We were also treated to a very special in-person presentation by Professor Tony Hunter. As the discoverer of tyrosine protein kinases, he has been part of the signalling field from the start, and continues to make important discoveries leading to cancer treatments used in the clinic today. He spoke about his investigation of histidine phosphorylation and told us that 50 years into his scientific career – he is still having fun!

Within the ASBMB stream, we treated to outstanding Plenary Lectures from our local excellent scientists and leaders. Professor Merlin Crossley, Deputy Vice-Chancellor (Academic and Student Life) UNSW, Sydney, presented a special Education Lecture – discussing the pressures and opportunities we are facing in universities. The ComBio2022 Education Day is featured on page 22 of this issue of the *Australian Biochemist*.

Left: 2022 Lemberg Medallist, Leann Tilley.

Below: 2022 Shimadzu Medallist, Michael Lazarou.



The ASBMB Lemberg Medallist was Emeritus Professor Leann Tilley of the University of Melbourne, who provided a wonderful overview of her career in malaria research. She told the story of how a mutation underlying artemisinin resistance in the malaria parasite led to the discovery of ML901 that targets the plasmodium tRNA synthetase. Her detailed investigative work led to an understanding of a reaction hijacking mechanism, ultimately leading to new class of drugs that may be applicable in a broad range of infections, metabolic and neurodegenerative diseases.

The Shimadzu Research Medallist was Associate Professor Michael Lazarou, who heads a lab focussed on autophagy and mitochondrial quality control at the Walter and Eliza Hall Institute of Medical Research. He treated us to a captivating story of investigating PINK1/Parkin mechanisms of signalling mitochondrial damage.

Congratulations to our medallists and thank you for your excellent science and inspiring presentations!

ComBio2022 evoked equal enthusiasm from our affiliated societies. The following are highlights from ASPS and ANZSCDB Stream Leaders reports:

About ComBio

ComBio is the combined biological societies meeting that was first held in 1999. Societies brought their annual meetings together so that members could interact with each other and with Trade partners in one place. Sally Jay has helped organise the meeting from the start until this year, with her extraordinary flair and passion for organising the exhibitors and researchers alike. She recruited graphic designer, Elena Rebuli, to come up with the ComBio99 logo. Elena has graphically designed the logos and materials for all ComBios held in Australia.

ComBio2022 Meeting Report

From the Australian Society of Plant Scientists – Professor Ros Gleadow and Dr John Golz

ComBio2022 was a great success for the ASPS. It was the best attended ComBio for at least a decade and the plant symposia had over 100 people, even on the last day. The talks were of a very high standard, revealing an incredible depth to plant science in Australia and New Zealand. Our invited international plenaries given by Professor Siobhan Brady (UC Davis) and Professor Niko Gelder (University of Lausanne; supported by the *Annals of Botany*) were fantastic, as were our local plenaries species speakers. For a lot of people, the standout were the two plant plenaries (festival of roots) and Jennifer Doudna's talk. Science at its most beautiful and elegant.

We had an excellent and well-balanced program, thanks to the selection of really good chairs and the oversight of President Professor Peter Ryan. All branches of plant science were well represented as were the various Centres of Excellence. There was good representation by females, ECRs, PhD students including international students, and other underrepresented groups. It was an excellent experience for students and ECRs. The excitement from the students who have not had the chance to experience an in-person conference before, let alone present something, was palpable. Although the showcase could have gone on for another couple of days, most people were exhausted. The Trade fair was good, there was a great vibe in the Exhibition Hall. Wonderful support from MCEC staff and of course Sally Jay (and Chris). We wish them all the best in their retirement.

From the Australia and New Zealand Society for Cell and Developmental Biology – Associate Professor Louise Cheng and Dr Seb Dworkin

What an exciting few days of incredible science, particularly in the Development, Stem Cells and Regenerative Medicine Stream. We were treated to cutting edge scientific talks from both established Australian and international leaders in our fields, as well as by the emerging next wave of exceptional students, postdocs and junior group leaders. The meteoric advances in *ex vivo*/organoid culture, microscopy, imaging, new application of animal models and particularly transcriptomics and bioinformatics analysis has advanced profoundly since our last face-to-face ComBio meeting in 2018, and has undoubtedly positioned Australian scientists at the forefront of international discoveries.

Our international plenary speakers, Professor Cristina Lo Celso and Professor Daniel St Johnston, both presented exceptional talks, highlighting their incredible mastery and advances in live-organism imaging. Professor Lo Celso brought to the fore her expertise in intravital imaging of the hematopoietic stem cell niche, highlighting new roles for non-hemopoietic cells, particularly osteoblasts, in the context of infection and leukemogenesis. Professor St Johnson showcased his groups' recent advances in understanding apical-basal polarity, using *Drosophila* epithelia as a model. The clarity of both these talks, particularly to non-experts, was exceptional.

Attendees were treated to outstanding presentations from the ANZSCDB Emerging Leader Awardee, Associate Professor Kelly Smith, on her work uncovering novel genetic mechanisms regulating cardiac rhythm, and the President's Medal awardee, Professor Jose Polo, who presented a truly outstanding session on his work in understanding the fundamental events in the very earliest stages of human embryogenesis – groundbreaking research that would definitively captivate audiences in any international scientific forum. We would like to thank the many wonderful symposia chairs who outdid themselves in assembling such an incredible array of engaging scientific leaders to showcase their research throughout the meeting.

Meeting conclusion

The meeting concluded with the Grimwade Keynote Lecture presented by Professor Cynthia Kenyon, Vice President of Aging Research and expert on the genetics of aging at Calico. Her infectious enthusiasm for science captivated us all as she related her discovery of mutations in *Caenorhabditis elegans* that could double its

Passport Prize Competition

A fabulous feature of the ComBio Trade exhibition is the Passport Prize competition. Delegates visit 40 Trade exhibits or more and collect their stamp to enter the lucky draw from the large silver bowl. There were great prizes, ranging from bottles of wine to iPhones! Chris Jay has always been fond of this event, which is lots of fun and helps to stimulate the researcher–Trade interactions!

ComBio2022 Meeting Report

lifespan. She explained that aging is, in fact, subject to transcriptional regulation in all forms of life, rather being a haphazard event. Research continues that may lead to healthy lengthening of human lives! With such a topic – that is so directly intriguing to us all – it was an excellent note to finish on.

And so ended the meeting – that was nothing short of a festival of great science and wonderful renewal of friendships with our colleagues, students and Trade partners! As many tweets and emails relayed during and after the meeting – it was a marvellous and exciting meeting and it was my absolute pride and privilege to be part of the great team that made this happen!

The ASBMB Grimwade Keynote Plenary Lecturer, Cynthia Kenyon.

Thank you again!

On behalf of Mark Hulett and myself, I would like to again thank all of the Local Organising Committee members and Stream Leaders – both those who helped initiate plans and those that stepped in to fill the gaps, for their great contributions to ComBio2022. I'd also like to thank all of the Symposia Chairs – for their work selecting and inviting speakers as well as filling out the sessions with fantastic choices from abstracts! They kept the sessions to time and promoted lively discussion with the speakers at question time. Thank you to the poster judges and poster judge organisers, who enhanced the critical connections with our young scientists to help their development and to honour their great achievements.

Thanks goes to our Trade partners for supporting our meeting and attending with such great interactions in the magnificent Exhibition Hall!

And thank you to Sally and Chris Jay and team for providing your outstanding style and quality of professional conference organisation. Sally Jay brought ComBio meetings to life in 1999, and has been her personal passion and contribution to the biological sciences for over 20 years. Sally and Chris Jay have provided the care and attention to detail that underlies this meeting that is so special to us all. We wish them all the best in their well-earned retirement and just hope that future meetings can retain their legacy!

And lastly – to all the presenters of talks and posters – it is really you that made the meeting so scientifically excellent. Thank you for your enthusiasm and for working through hard times (during COVID-19) to still be producing excellent work that you could share with us all.

Jackie Wilce
Monash Biomedicine Discovery Institute and Department of Biochemistry and Molecular Biology
Monash Univeristy

Some ASBMB members who had reached 50 years of membership to the Society attended ComBio2022 and received a certificate in recognition of their outstanding loyalty. From left: Anthony Ashton, Christopher Driver, TJ Higgins, Bruce Kemp, Nicos Nicola, Raymond Norton and ASBMB President, Jacqui Matthews.

ComBio2022 ASBMB Poster Prize Winners

Nadia Aleksandrova (University of Queensland)
The molecular mechanisms of cellular recognition by ABC toxins

Jordan Crameri (University of Melbourne)
Unique oxphos deficiency indicates novel functions for mitochondrial protein import subunit TiMM50

Anna Faber (University of Western Australia)
Teaching bacteria how to eat plastic in marine conditions

Kapil Mcinerney (Monash University)
Towards a better understanding of the role of annexin A2-S100A10 tetramer in diseases

Fabian Munder (Monash University)
Investigating the Mycobacterium tuberculosis *outer envelope and mycomembrane-associated nutrient transporters*

Daniela-Lee Smith (UNSW Sydney)
Comprehensive identification of crosslinked peptides using a multi-crosslinker, fragmentation and data analysis approach

ComBio2022 Meeting Report

ComBio2022 Meeting Report

Behind the Scenes of ComBio2022

How does a meeting like this come together? Sally and Chris Jay and their team drive ComBio like a well oiled-machine. Negotiations with the venue, relationships with Trade partners, communications with the societies, management of the website and other publicity are all dealt with! As Chair of this meeting, I could fully focus on assembling a great Local Organising Committee to build an exciting scientific program. I hit the jackpot with the stellar Mark Hulett as Program Chair – and plans for ComBio began in mid-2018. In consultation with society presidents, we assembled a team that would represent each of the participating societies. At first, it was the ASBMB, ASPS and ANZSCDB that were involved, but the NZSBMB and GSA joined us soon after to make an even better, well-rounded and exciting meeting. In August 2018, we came up with suggestions for International Plenary speakers, Symposia Stream themes and a schedule, and made the decision to run a Career Development Forum on the preceding Tuesday. A logo was designed (the fairy penguin mascot overtowering the iconic Melbourne Flinders Street Station) and the meeting was announced at ComBio2018, held in Sydney. By early 2019, we had already secured ten exciting International Plenary speakers including Jennifer Doudna of CRISPR fame (not yet a Nobel Laurate but anticipated to be so) and Cynthia Kenyon, world expert on the science of aging. We finalised our selection of Stream Leaders who, in turn, identified Symposia themes and Symposia Chairs and the process of developing the program began! By the beginning of 2020, we had a fully fleshed out program with invited speakers in each symposium and gaps for award winners and selections from abstracts... then COVID-19 struck!

Starting with an email in March of 2020 from the then President of ASBMB, Joel Mackay (with subject 'Eek'), we swiftly made the decision to postpone ComBio for two years! All plans were put on hold – with the hope that we had made the right choice and all could come together again for a successful meeting in 2022. The change of logo was easy enough, but after two years there were some gaps in the committee and scientific program to fill, new society presidents involved, and there was always the question on our minds of whether ComBio2022 would be able to go ahead as an in-person meeting, or whether we should be organising a hybrid meeting or have a backup plan of a fully virtual meeting. Happily, all international Plenary speakers were still enthusiastic to be involved – albeit some only as virtual speakers – and we were able to fill the gaps in the program with some wonderful contributors. And we pressed on towards the new date, watching the waves of COVID strains rise and fall, and seeing the way in which other meetings reverted to virtual or were in-person but proved to be super-spreader events. So you can imagine our relief as we headed into September 2022, COVID-19 numbers were falling. With the fantastic accomplishments of the biological sciences to understand and tackle COVID-19 – we could come together again in-person in 2022 – to celebrate science with a greater appreciation and exuberance than ever!

ComBio2022 Career Development Forum

For over 160 years, the iconic Victorian State Museum has been a place where visitors can connect with both our past and present, and to imagine the future. As such, the Museum Theatre was a fitting (and beautiful) location for the ComBio2022 Early Career Researcher (ECR) Career Development Forum. This was a dedicated event for ECRs to hear from experienced scientists about topics that could help shape the future stages of their career.

The opening session, chaired by Dr Amy Baxter (LTU) and Dr Luke Formosa (Monash University), was conducted as a vibrant interview of a panel of speakers representing the diverse stages along a traditional academic ladder. The panel included Professor Jodi Nunnari (Altos Labs, UC Davis), Professor Cynthia Kenyon (Calico Labs), Dr Gavin Knott (Monash University), Associate Professor Michael Lazarou (WEHI) and Dr Anukriti Mathur (ANU).

A fantastic turnout to the Career Development Forum.

ComBio2022 Career Development Forum

Session on tips and insights into progressing along the academic ladder.

Networking at the Career Development Forum.

Collectively, we heard their thoughts on the chances they took during their postdoctoral years (both good and bad), their transitions into independent lab heads and the challenges faced, the mentors that influenced their career and how they ensure a work–life balance. As it turns out, horse riding seems to be a popular way for our North American academic panellists to de-stress!

Following a delicious morning tea break, we delved into the often-discussed F word – **funding**. The session, chaired by Dr Kha Phan (LTU), included guest speakers Dr Sejal Kendal (WEHI), Professor Alpha Yap (University of Queensland) and Dougal Edwards (Bright Arena). We were taken through traditional funding routes and what the future could look like for seeking alternate funding sources. We were also treated to useful tips from the perspective of an expert grant reviewer on how to make your application stand out from the hundreds of other applications in the pile. There was something everyone could take away and apply no matter the career stage!

After lunch, Dr Laura Osellame (ONJCRI) guided us through a diverse session exploring career options beyond traditional academia. This highly entertaining and informative session opened with Dr Drew Berry (WEHI), who took us through his award-winning world of biomedical animations. One couldn't help but be reminded of the 80s science-fiction movie, *Innerspace*. The next speaker was Dr Lorien Parker, who is making science accessible for all types of learners through her company, SciencePlay Kids. Her quest to ensure our next generation of STEM researchers stays engaged reassures us that the continuity of science in this country is in good hands. Following on was Dr Tom Murray-Rust (CSL), who shared his insights into working at one of Australia's leading biotechnology companies. The session concluded with one of the most entertaining presentations of the day from Dr Kaye Ballantyne (Victoria Police Forensic Services). It was made clear from the outset that whilst her intention was to enter a career in environmental conservation, this was not to be. Instead, we were introduced into a world where molecular biology can make a significant and positive impact to victims of crime and their families (and where high heels perhaps did not have a place at the worksite!). The popularity of this session was evident by the long lines of ECRs waiting to consult with each of the speakers following their presentations.

The day concluded with a session showcasing the importance of outreach and science communication through easily accessible channels such as social media. This was chaired by Dr Georgia Atkin-Smith (WEHI and LTU) who, as a successful ECR, shared her experiences utilising Twitter (@someblondescientist) to complement her research. Other speakers on the panel included Superstar of STEM, Associate Professor Hannah Power (University of Newcastle), and previous host *Ask the Doctor* on ABC, Associate Professor Shalin Naik (WEHI). It is safe to say that the take-home message from our guest speakers was just how powerful communicating science in general (beyond our traditional publication routes) is, not just for the general public, but also for one's own career by enhancing visibility and impact.

Judging by the post-event survey feedback, it is clear to see that the ComBio2022 Career Development Forum was a wonderful success. We would like to thank the Melbourne Museum staff (venue logistics), The Catering People (catering), Associate Professor Doug Fairlie (photography and venue logistics), and especially Professor Jackie Wilce (Chair), Professor Mark Hulett (Program Chair), Professor Mark Kvansakul (Treasurer), and Sally and Chris Jay (Sally Jay Conferences) for enabling this event to take place. Finally, to all our ECRs in attendance, thank you for the stimulating discussion and enthusiastic support of the forum.

Erinna Lee, La Trobe Institute for Molecular Science and Olivia Newton-John Cancer Research Institute on behalf of the Organising Committee

Career Development Forum Organising Committee, from left: Luke Formosa, Kha Phan, Amy Baxter, Erinna Lee, Georgia Atkin-Smith and Laura Osellame.

ComBio2022 Education Day

Education Day at ComBio2022 was a resounding success! Following a COVID-induced pause of four years, educators joined ComBio2022 in person with great enthusiasm to showcase the lessons they learned from the pandemic and how to advance their practice post-pandemic. Held on Wednesday 28 September, the Education Day was studded with highlights demonstrating star educators' teaching excellence, innovation, talent and creativity.

Education Day Organising Committee, from left: Matthew Clemson, Amber Willem-Jones, Nirma Samarawickrema, Tracey Kuit and Maurizio Costabile.

We commenced the sessions with presentations from award winners from three different societies: the Australian Society for Biochemistry and Molecular Biology (ASBMB), the Australian Society of Plant Scientists (ASPS) and the Genetics Society of AustralAsia (GSA). Their presentations were inspirational in different ways. The ASBMB SDR Education Award winner, Saw Hoon Lim (University of Melbourne), set the tone by demonstrating her innovation and creativity in education by partnering with students to organise a conference to launch an interdisciplinary journal to publish research works, reflective or opinion pieces, and artworks that relate to biomedical technologies. The project is featured on page 25 of this issue of the *Australian Biochemist*. Saw Hoon was followed by a team presentation on creating awareness of safeguarding our future food security by the ASPS Education and Outreach winners. Megan Shelden, Georgia Koerber and Beth Loveys (University of Adelaide) demonstrated their innovation in creating awareness by connecting scientists with the community through National Science Week. Finally, the GSA Excellence in Education Award winner, Miloš Tanurdžić (University of Queensland), demonstrated his outstanding contributions to genetics education through innovative curriculum changes that provided students with a scaffolded pathway to mastering genetics.

The students' voice was a dominant theme of the day. Invited speaker, Susan Rowland (University of Queensland), shared student insights and perspectives on their employability gains as a result of online learning and experience of isolation. Presentations on student partnerships during the pandemic and beyond and how student feedback can be skillfully used to drive curriculum changes added value to this session. As always, our student panel discussion invoked much thought and deep reflection. We had a panel of undergraduate students from the University of New South Wales, University of Melbourne, Monash University and Deakin University. By sharing their experiences of how they learned during the pandemic, they challenged us all to learn from their experiences to advance our practice and thereby further student learning. A summary is featured on page 23 of this issue of the *Australian Biochemist*.

The final education session focussed on what educators learned from remote teaching. Invited speaker, Robyn Yucel (Deakin University), shared expertise on the integration of learning environments that redefined the way students learn through exploiting digital technologies, resulting in new pedagogical approaches and enhanced learning. Presentations on reimagined laboratory practicals, biochemistry curricula and assessments from submitted abstracts complemented this session.

The final highlight of the day was the first ever Education Plenary at a ComBio conference, given by Professor Merlin Crossley (Deputy Vice-Chancellor (Academic and Student Life), UNSW Sydney). His recognition of the constraints with which educators are operating post-COVID highlighted the need not only for increased public funding but also for academic specialisation. This model recognises the benefits of supporting the varied strengths of academics to fulfil their career aspirations.

The inaugural ComBio Education Plenary lecture, presented by Merlin Crossley.

We thank the ASBMB for its support and encouragement. In particular, thank you to both the ASBMB and UNSW Sydney for supporting our student panel discussion. We very gratefully thank our Session Chairs and Education Working Group, Maurizio Costabile (University of South Australia), Amber Willem-Jones (University of Melbourne) and Matthew Clemson (University of Sydney), for their tireless commitment, both on the day and behind the scenes. A special thank you to Amber Willem-Jones for photographing special moments of the day for our records. Our sincere thanks to our student participants, presenters and the attendees of the education sessions.

Nirma Samarawickrema, Monash University
Tracey Kuit, University of Wollongong
Chair and Deputy Chair,
ASBMB Education Special Interest Group

ASBMB Education Feature

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

The Student Perspective: Advice from Students on What Teaching Academics Should Take With Them From the Pandemic

Amber Willems-Jones (University of Melbourne) and Tracey Kuit (University of Wollongong) talk to undergraduate Biochemistry students Ishika Jaitly, Marcus Go, Darlene Sentosa and Janelle Accheni.

At the ComBio22 Education Symposium, a student panel discussion was held with undergraduate students from three universities, including: Marcus Go, a third year Bachelor of Science (BSc) student from Monash University, Ishika Jaitly a final year Bachelor of Medicinal Chemistry student from UNSW and Darlene Sentosa, a third year BSc student from the University of Melbourne. Along with Janelle Accheni, a second year BSc student from Deakin University, our amazing student panellists shared their perspectives on what has been learned during the pandemic and how teaching academics can take these learnings into the future to further advance teaching in conjunction with a positive student experience.

What positive or negative learning experiences stand out in your time as an on-line learner during the pandemic?

Ishika – A distinct positive was the interactive engagement between teachers and students through live polling and quiz platforms (e.g., Slido or Kahoot). This strategy was mutually beneficial, allowing teachers to assess student understanding in real-time, while holding students' attention to facilitate improved retention of the concepts being taught. As Benjamin Franklin said, "Tell me and I forget, teach me and I may remember, involve me and I learn."

Janelle – As a mature-age student, a positive aspect of online learning was the opportunity to make social connections through study groups and discussion forums. Being able to go back over recorded content was also beneficial to cement understanding. However, a downside was the lack of physical practicals. Most of my cohort had very little or no hands-on experience during the pandemic, so by the time we returned on-campus, much of our practical class time was spent learning how to use equipment, rather than exploring content. This was frustrating not only to us, but also our demonstrators. Even now, I still feel very behind in my practical skills.

Darlene – One of the downsides I found was the lack of interaction between academics and students, and more importantly between students in the online space (i.e., in breakout groups). I found this hindered effective learning, such that it had the potential to negatively impact mental health and academic performance. In support of Janelle's comments, I also found lack of hands-on experience in practical classes to be a negative experience, because it was difficult to picture the experiments without directly seeing or being involved in them.

Marcus – One of the negatives from my perspective was not being able to bond with my peers in physical lectures, as online learning placed a digital wall between us. Losing the opportunity to build face-to-face support groups, both for study and mental wellbeing, was a significant disadvantage during my time online.

Student panel discussion at ComBio2022.

Can you describe what you learned about yourself through the online learning experience during the pandemic?

Darlene – As an international student, far from home, I found the rapid move to online learning challenging and it affected my physical and mental health. But after returning home to Indonesia to study online for a semester, I found online learning changed for me and it forced me to be more independent. I also learned to be more prepared and to understand topics in more detail rather than plainly regurgitating material. I think that was very valuable. Online learning gave me the opportunity

Biochemistry students, from left: Janelle Accheni, Marcus Go, Ishika Jaitly and Darlene Sentosa.

of self-exploration to find out how to study efficiently, and to identify what I want to pursue in my career. Ultimately, the experiences during the pandemic shaped me to be the person I am now.

Marcus – In my first year of university, my approach to learning was memorisation: if the topic stuck in my brain for the exams, that was all I needed. But during the pandemic though, I found it more difficult; I managed to shift from rote memorisation to comprehension of the underlying concepts to achieve a deeper understanding. Once I adapted my approach, I understood, I listened and I questioned. Ultimately, when the exams came around, I thrived.

Ishika – Looking back now, my online learning experience through the pandemic really was a series of opportunities for me to prove to myself that I had what it took to not just survive at university but to thrive in the face of adversity. Having juggled acclimatising to independent learning, adjusting to online exams, managing home-sickness and social isolation, I now feel more resilient because I know that no matter what curveballs life throws at me, I can handle it.

Janelle – During the pandemic, I learned the critical importance of taking care of my mental health and of being adaptable. While I initially thought I was managing, as time progressed, it became increasingly difficult to balance everything (studying online, working remotely, caring responsibilities and staying sane). Acknowledging these challenges and taking time out from university through a leave of absence meant I was able to mentally refresh and to reevaluate my approach to study; and return as a more confident, focussed and balanced student.

Is there a piece of advice you would like to give your teaching academics as they move into the 'post-pandemic' future?

Ishika – It's important to establish a sense of community amongst students who are studying online to support the more social aspects of learning, and therefore, match the effectiveness of traditional in-person learning. A sense of community can be achieved through group projects or weekly tutorial breakout room discussions.

Another important consideration is to ensure there are clear lines of communication between academics and the student cohort. This could be using virtual office hours to replace in-person drop-in sessions, posting weekly to-do lists of lectures/assignments to watch/complete and periodic check-in surveys to see how students are progressing. These small initiatives can in turn help to create a sense of student accountability and effective time management, and to facilitate insight in how students allocate their time towards various tasks.

Darlene – Embrace that aspects of online learning are here to stay, but caution must be exercised when augmenting in-person activities with online activities. It's important not to simply replace teaching the content and engaging students with online self-learning activities and assignments. Online activities should not be the centrepiece, but rather, they should be used to complement and scaffold the main teaching material.

Marcus – Establishing a community within the student cohort is very important. Where possible, facilitating weekly tutorial sessions with peer interactions will enhance the learning experience, serving to help not only student learning but to also help foster networking between students.

Janelle – My advice: university is not a one-size-fits-all experience. Online learning offers many benefits including flexibility. However, it is important that online learning quality is retained, and that there is a balance (and equity) between online and on-campus work. Online classes should not simply rely on self-directed online learning modules and worksheets. Some students will need scaffolding and direction. Continue to be flexible and don't dismiss students' requests/needs because the pandemic is 'over' – many students are still struggling mentally, and some have no experience outside of online learning. The return to campus requires a considered transition because an abrupt move back could have just as negative an effect as the rapid transition online did for some.

Is there a piece of advice you would like to give a fellow student as they transition into a 'post-pandemic' future?

Marcus – Be aware of the kinds of subjects/units you can take across your degree. Subjects like research projects or internships will help you understand and develop transferrable skills, whilst ensuring that you can apply

theory within the discipline to real life situations. They say, 'variety is the spice of life', so it's also important to consider taking electives from different subjects outside your major. Not only will you come to understand what you enjoy and what you don't, but you may also establish new approaches to tackle life's challenges. The pandemic took a significant portion of the learning process and the transition from university to employment has only become more complicated with the changing world and the shifting paradigm. Practical skills and a broad understanding can be very beneficial in these changing times.

Darlene – While it can be scary and daunting to ask questions, be sure to engage with your tutors and lecturers, even if your questions aren't related to the material for that week. Build your timetable to maximise in-person learning where possible because it is a completely different experience to online learning. However, remain flexible and remember that some online classes are great if you can't make it on campus, particularly if the subject isn't a practical or a hands-on subject.

Ishika – Be adaptable! If there's anything the sudden transition to online learning because of the pandemic has taught me, it is that the world is capricious, and circumstances can change on a dime. So, aim to be the Play-Doh that never hardens – mould yourself through hard work, dedication and passion into a student who accepts the exciting challenges university has to offer.

Janelle – Always put yourself and your mental health first. If you are struggling, utilise the services offered by your university and ensure you have a strong external support network. Find what works best for you – in terms of studying – then structure your degree around that. Choose classes that suit your study methods but still meet the criteria needed for your degree. Don't be scared to reach out to lecturers for support, they're not gods. Try to incorporate practical classes, they really do provide fundamental transferrable skills. But above all, do your best and enjoy your university experience.

Responses to questions have been paraphrased and condensed with permission.

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Trafficking the Interdisciplinary Mindset Beyond the Intracurricular Space

Saw Hoon Lim, Jiangli Tan and Ger Post, University of Melbourne

'Designer Humans: Prospects and Perils' was launched as a University Breadth subject at the University of Melbourne in 2021. A central question in this 'Unibreadth', as they are affectionately known, is: How should biomedical innovations be critically evaluated for their impact on human life, culture and society? Such a question would be best interrogated through interdisciplinary lenses, with perspectives derived from the sciences, social sciences and humanities.

In this subject, students must engage with concepts and peers from other disciplinary backgrounds. Initially, it was daunting for some to be exposed to wide-ranging concepts and viewpoints. However, as the subject unfolded, students learnt to integrate disparate concepts to form interdisciplinary perspectives on technologies they were passionate about. This was seen from the lively discussions during tutorials and critical evaluations in assessments. The staff, who themselves come from diverse disciplines, found excitement in learning new concepts from each other and from the students! Evidenced by student feedback last year, "Love the subject but can the lecturers stop asking each other questions and give us a chance?"

Anything this good should be shared widely. With the help of a University of Melbourne Learning and Teaching Initiatives grant, we established a student-led interdisciplinary journal for students to publish interdisciplinary essays, reflections and artworks focusing on our future. This journal, called Humans 2.0, was also the launchpad for its namesake conference.

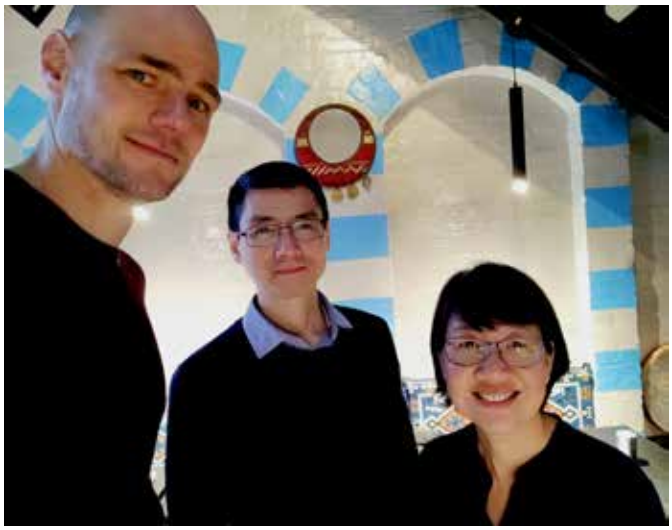
The Humans 2.0 conference was organised by students and staff to engage the university community and the wider public on the importance of tackling complex issues through an interdisciplinary mindset.

ASBMB Education Feature

The Humans 2.0 conference was held on 1 July 2022 to promote the interdisciplinary student-led journal. Pictured are the Humans 2.0 designed souvenirs for speakers (mugs) and attendees (badges).

The conference program featured fantastic speakers who connect disparate fields in their work and students who brilliantly shared their thoughts and hopes for biomedical technologies. The conference also featured a captivating storyline that complemented the talks – a family's plight, when their young child is found to carry the gene for early onset Huntington's disease, a rare autosomal dominant inherited disorder. Issues arise when the family makes decisions that question the ethics of advancing technologies and what it means to be human. The narrative was strategically punctuated by speaker presentations and panel discussions in the areas of art, science and ethics so that the audience was further prompted to think deeper on emerging issues as they interacted with speakers and voted on decisions as if they were family members in the scenario. In a way, the audience drove the conference as much as the speakers and panellists. An audience member remarked, "The combination of art and science was fabulous. The provocations through the case study which was woven through the conference enabled the audience to reflect and interact with the information."

This was a conference where the audience did not need to be ushered back to the lecture theatre after lunch – as much as they were eager to cast their interdisciplinary lenses on the issues, they were keen to find out the ending of the story. No spoilers allowed!



From left: Ger Post, Jiangli Tan and Saw Hoon Lim.

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SAVE THE DATE FOR ASBMB 2023

20–23 November 2023

Australian National University, Canberra

Contact: Professor Colin Jackson (Chair)
Dr Christina Spry (Secretary)

Farewell Sally and Chris Jay

After thirty years of dedicated service to the ASBMB, Sally and Chris Jay say farewell.

Here we are on the cusp of retirement from administering the ASBMB National Office since 1991 and organising three ASBMB and 19 ComBio conferences. In 1998, Sally took on the ASBMB Council role as the Secretary for Sustaining Members. In 2001, Chris joined in the administration of the Society and the organisation of ComBio.

It seems hard to believe that the time has gone so quickly! What a fabulous time we have had, and what a pleasure and privilege it has been.

Chris and Sally Jay at OzBio2010.

There are so many people we wish to thank:

- **Past and present ASBMB Council members.**
- **Past and present ASBMB members.**
- **Past and present ASBMB Sustaining Members.**
- **The Chairs, Program Chairs and Local Organising Committees** of the ASBMB conferences (held in 1993, 1996 and 1998) and, from 1999, the 19 ComBio conferences held in Australia.
  Special mention must be made of the ComBio2022 Chairs, Jackie Wilce and Mark Hulett. We booked the Melbourne Convention Centre for ComBio2020 in mid-2016. In 2018, Jackie and Mark confirmed that they were on board to Chair and Program Chair the conference; thank you to Joel Mackay, the then ASBMB President, for inviting Jackie to take on this role. In April 2020, ComBio2020 was postponed for two years when COVID-19 hit to become ComBio2022. Jackie and Mark did a superb job that ensured our last conference was our best. We are very grateful!
- **Tristan Wallis** – the ASBMB webmaster from 1998 until 2016. Tristan was also the ComBio webmaster for all ComBios held in Australia.
- **Neville Manning** – the printer since 1991 of all the ASBMB stationery and the ASBMB/ComBio conference registration brochures, programs, abstract books, mini programs, etc.
- **Elena Rebuli** – the graphic designer who created the ASBMB logo in 1991 when the Australian Biochemical Society (ABS) became the ASBMB. Elena designed the original concept for ComBio and the logos – and also graphically designed the materials for all ComBios held in Australia, including the fabulous mini program.
- **Mark Stevens** – the Audio Visual Manager for all ComBio conferences.
- **Cameron Evans** – the conference app developer since 2013 when the first ComBio conference app was produced.
- **Chrissy Gulin** – Chrissy who has helped us with ComBio since 2006.
- **Liana Friedman** – the ASBMB Editorial Officer, ASBMB webmaster since January 2018 and ASBMB email liaison since July 2000. We have so enjoyed working with Liana for the past 22 years.
- **Jenny Blanchard** – Jenny who introduced Sally to the ASBMB in 1991. Jenny organised the first ASBMB conference held at a dedicated convention centre in 1988 in Adelaide. Without Jenny, we would have never had the involvement with the ASBMB and the conferences, so we are extremely grateful.

Thank you to the ASBMB family for giving us a fabulous career. We have made so many friends over the years.

Sally and Chris Jay


From left: Mark Hulett, Sally Jay, Jackie Wilce and Chris Jay at ComBio2022.


From left: Jacqui Matthews, Sally Jay, Liana Friedman and Tatiana Soares da Costa at ComBio2022.

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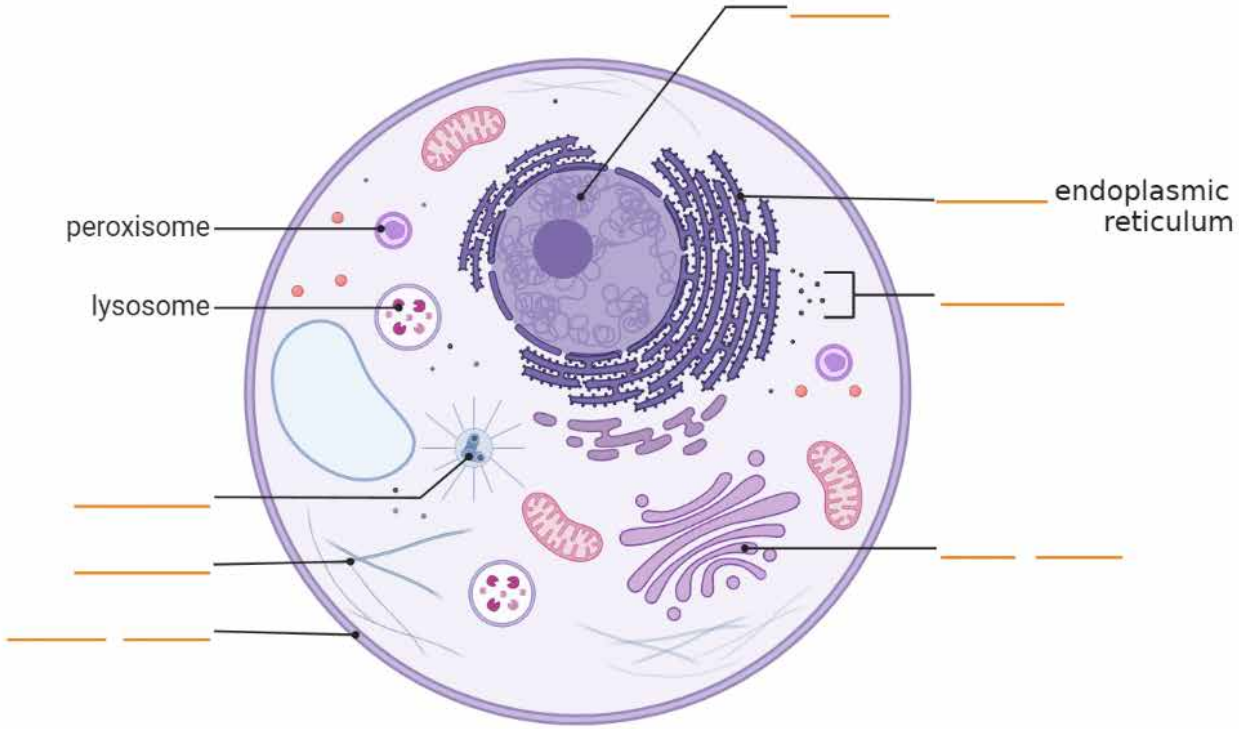
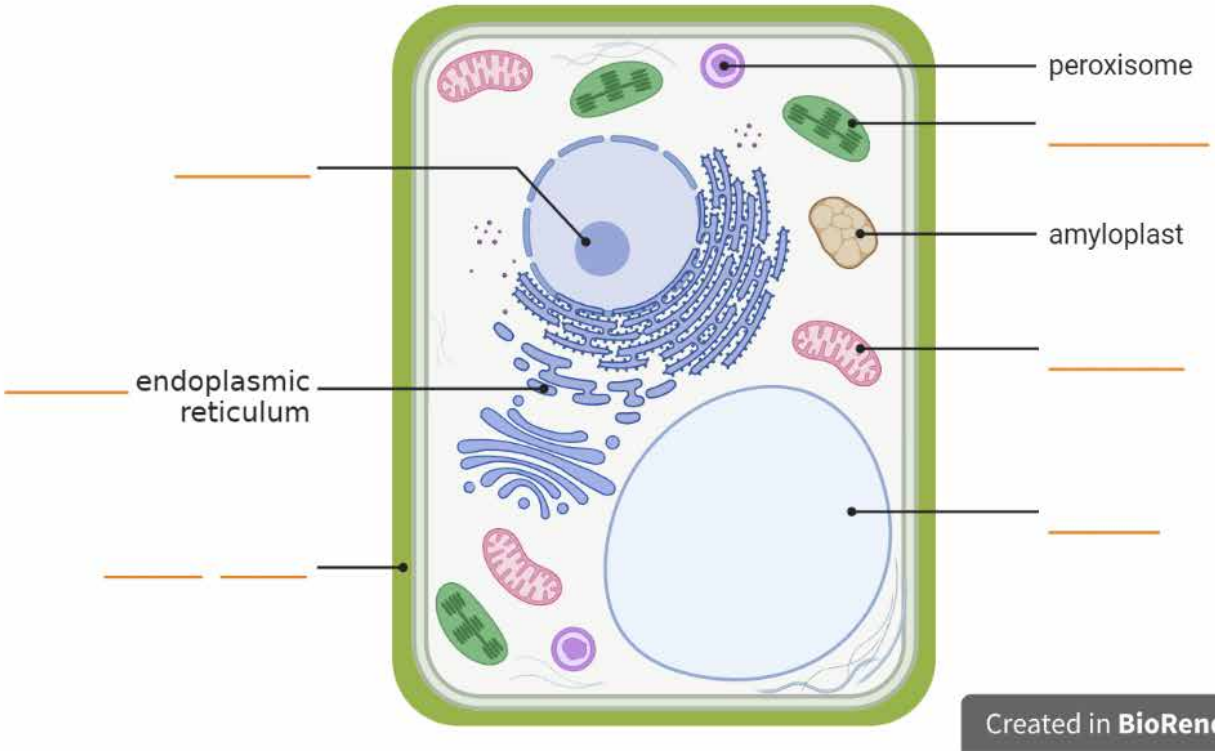
Competition: Label the Cell

Presenting the latest competition for members of the ASBMB. All correct entries received by the Editor (tatiana.soaresdacosta@adelaide.edu.au) by 30 January 2023 will enter the draw to receive a voucher. With thanks to Joe Kaczmarski.

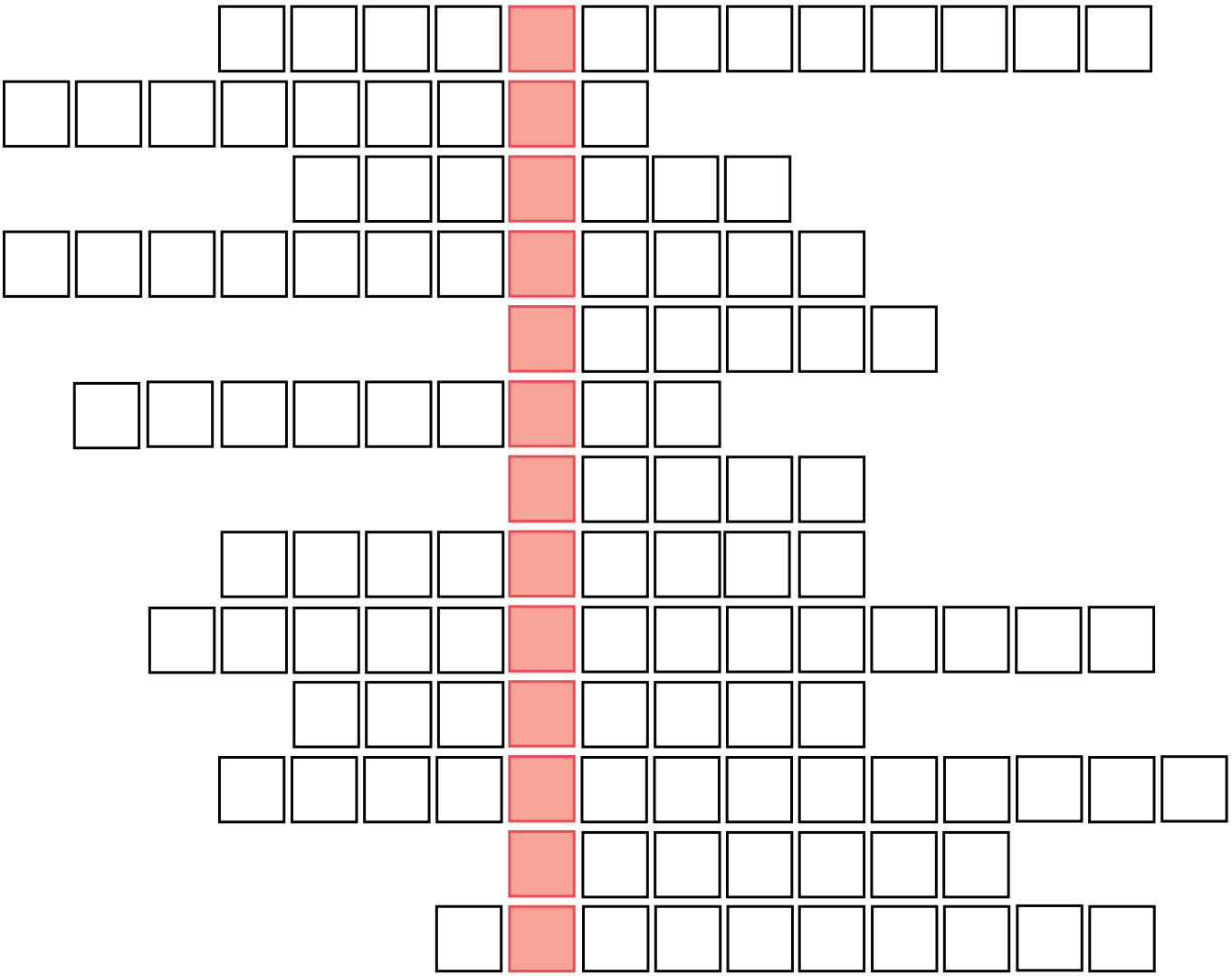
The following cell diagrams are missing some of the labels.
Solve the missing labels and find where they belong in the answer key.
The highlighted letters in the completed answer key will spell out a phrase.





Competition: Label the Cell

For labels that are more than one word, remove any spaces before finding their location in the answer key.



Answer phrase: _____

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MAKING FUTURES

Starting an academic career is difficult at the best of times. The barrier pointed out to us most frequently by young biochemists is opportunities to present their research to a nationwide audience.

The Canberra Protein Group is proud to host Making Futures, which features outstanding young biochemists in a community-supported national seminar series. This is the second of two Making Futures series.

Please join the community Monday at 12:00pm AEDT.

Zoom link: Making Futures
Meeting ID: 814 4907 8807
Password: 797403

2023 PROGRAM

16 January **Sofiya Tsimbalyuk (Charles Sturt University)**
The Bermuda triangle of nuclear import pathway

23 January **Jessica Kretzmann (University of Western Australia)**
DNA origami for biotechnological applications

30 January **Blagojce Jovcevski (University of Adelaide)**
Implementing ion-mobility MS to understand the aggregation dynamics of amyloid fibril-forming proteins in proteostasis

6 February **Emma Watson (University of Adelaide)**
Post-translationally sulfated proteins from the saliva of blood feeding organisms as novel anticoagulants

13 February **Stephanie Portelli (University of Queensland)**
Harnessing protein structure to understand and predict disease

20 February **Jason KK Low (University of Sydney)**
Cross-linking mass spectrometry can discover, evaluate and validate the structural proteome

27 February **Andrew Marshall (University of Western Australia)**
Disordered regions of DBHS proteins have distinct roles in protein condensation behaviour

6 March **Stephen Fairweather (Australian National University)**
Membrane mechanisms of amino acid homeostasis and drug resistance in apicomplexan parasites

20 March **Rhys Grinter (Monash University)**
Living on thin air: the structural basis of atmospheric hydrogen oxidation

27 March **Beatrice Chiew (University of Newcastle)**
Design in the dark – illuminating the druggability of 53BP1 for BRCA-1 breast cancer

3 April **Shabih Shakeel (Walter and Eliza Hall Institute of Medical Research)**
Structures of protein complexes involved in Fanconi anemia DNA repair

SDS Page: Short Discussions for Students Page

Digital Tools: Apps, Websites and Programs That are PhD Lifesavers

Katrina Black

Walter and Eliza Hall Institute of Medical Research

Completing your thesis isn't just an exercise in writing – it's a marathon comprised of a myriad of other cumulative and complementary tasks. Reading the literature, generating new ideas, attending meetings, carrying out experiments and recording the results, and presenting your work in manuscripts and seminars are just some of the tasks expected of you during your graduate work. Keeping abreast of these competing demands is one of the challenges of completing a PhD, and this requires focus, organisation and good record keeping. Fortunately, we live in an age wherein numerous digital tools are available to lighten this load – if you know where to find them. Below is a brief overview of some of tools that might be a lifesaver during your PhD.

Dr Katrina Black is a postdoctoral researcher at the Walter and Eliza Hall Institute of Medical Research.

1. Literature tools

Keeping abreast of the literature, organising a library of publications, and managing references

Reading papers, both historical and newly published, is a fundamental part of PhD-level research. The pace of scientific publication can be swift, so establishing a strategy for keeping up with the literature is crucial. Email alerts are useful for this, as literary databases such as **PubMed** can be automated to email updates of new papers containing key words. An RSS-feed app such as **Feedly** can neatly act as a repository for such automated literature search updates and journal subscriptions. More recently, I have relied on advanced academic search engines such as **scinapse.io** and **connectedpapers.com**. These tools allow more nuanced literature searching and visual representations of related papers. A **reference manager** is essential for efficient management of your literature. Your reference manager will ideally allow literature searching, storage and organisation of papers, annotations, and referencing whilst you write. You may be aware of **EndNote**, but many researchers prefer alternatives such as **ReadCube Papers**, **Bookends**, **Paperpile**, **Mendeley** or **Zotero**. I used Papers throughout my PhD – as this is what my supervisor used and recommended. However, more recently I've migrated to Zotero as I've found it to have a better user interface, fewer bugs, and a library of plugins to enhance its features.

2. Keeping organised

Managing notes, ideas, time and focus throughout your project

Digital tools are great companions for keeping organised and managing time. Scraps of paper won't cut it for notetaking over the long haul. To keep my project organised, I use **Notion** as a one-stop-shop for my notes, tasks, and to-do lists. There are many alternatives – **OneNote**, **ObsidianMD** or **Evernote** – to name a few. These tools will encourage you to make a digital record of your plans, ideas and notes, and provides a way for these notes to be mapped, linked and tagged. Apps such as **Omnifocus** or **Todoist** can help to convert your thoughts into practical to-do lists and link them to specific part of your project. If you find yourself hoarding tabs in your web browser, consider the extension **OneTab**. This tool converts your tabs into a list and enables you to restore the URLs when you need them. There are regular meetings and deadlines throughout a PhD, and so a simple **digital calendar** is a frequently used digital tool to enhance time management. There are many calendars available, so I recommend choosing one that integrates easily with your wider digital life, such as your email and operating system. I use the **Microsoft Teams** calendar, as this is the system preferred by my institution and this makes organising and tracking my meetings seamless. Maintaining focus and productivity can be challenging due to constant task-switching and frequent distractions. Apps such as **Focus Keeper** or **Forest** make use of the Pomodoro method to reduce distraction and help you focus. These apps encourage deep work and limit interruptions for a set period, before allowing a short break. I am also someone who likes to listen to music during deep work, so I can consider a **Spotify** subscription an absolute lifesaver for productivity.

SDS Page: Short Discussions for Students Page

3. Getting your PhD done

Writing, presenting, figure making and data wrangling

Writing, making slides for presentations, and analysing data are unavoidable elements of doing a PhD. The classic – the **Microsoft Office** suite – is the standard for a reason and I have always relied on these programs for my academic work. If you do rely on this suite, explore some of the advanced features as this will save you time and frustration in the long run. Google also provides free alternatives – **Sheets**, **Slides** and **Docs** – that are based in the cloud, enhancing collaboration. Other word processing tools such as **Scrivener** or **LaTeX** are designed for handling larger documents, simplifying referencing or dealing with mathematical notation. Generating coherent figures facilitates presenting your data and summarising your project background. **Biorender** offers a large library of biologically relevant icons and simple graphical tools to easily create and share scientific illustrations. I completed my PhD before Biorender was available, meaning that I made most of my figures in the **Adobe Suite**. The Adobe Suite, alongside free alternatives such as **Inkscape**, provide a powerful toolset for generating figures and posters, although the learning curve can be steep. Whilst some data analysis tools are uniquely applicable to specific fields, others are broadly germane and so are frequently used across a range of projects. Some programs in this latter category include **GraphPad Prism**, a robust analytical, statistical modelling, and graphing program, and **Fiji** (**ImageJ**), an image processing and analysis program that can be extended with numerous plugins and add-ons. More complex datasets may require more advanced statistical packages such as **Mathematica**, **MATLAB** or programming in **RStudio**. However, you choose to analyse and present your data and writing – don't forget to regularly back it up! A stolen or bricked computer can be disastrous if that device represents the only copy of your data or dissertation. Many cloud-based services (**OneDrive**, **Dropbox**, **Google Drive** or **iCloud**) are available to back up your work. Your lab or IT department may have specific policies around this – so check with your supervisor for guidance here.

4. Some final tips

- The tools and programs mentioned in this article are just a sample of the many options that you may find helpful during your PhD. In choosing which digital tools to integrate into your workflow, don't be afraid to explore alternatives and discard those that do not suit you.
- Consider how your chosen tools will work together to form a cohesive workflow throughout your project. For example, you may like a project management program like Evernote, but if it doesn't integrate well with your chosen reference manager, you will find your system frustrating rather than pleasing.
- Many of these programs are free – but not all are, and the cost of digital tools can be a barrier to accessing them. However, most institutions and universities will have dedicated IT services and subscriptions to software for students, so it is worth checking if the program you are interested in is available through your institution.
- Finally, remember that digital tools are not the only tools at your disposal. Sometimes, good old pen and paper is king.

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2022 Frank Fenner Prize for Life Scientist of the Year

The ASBMB congratulates Professor Si Ming Man on being awarded the Frank Fenner Prize for Life Scientist of the Year. On 21 November 2022, nine 2022 Prime Minister's Prizes for Science recipients were recognised by the Prime Minister, the Hon Anthony Albanese MP, and Minister for Industry and Science, the Hon Ed Husic MP, at an event at Parliament House in Canberra.

Professor Man received the 2022 Frank Fenner Prize for Life Scientist of the Year in recognition of his extensive research into immunology and infectious diseases, advancing our understanding of the role inflammation plays in health and disease. His research could shape the way we treat inflammatory diseases and cancers into the future, improving health outcomes for patients in Australia and abroad.

Si Ming received his PhD from the University of Cambridge, UK, in 2013 for his work on inflammasomes in the host defence against *Salmonella* infection. He did his postdoctoral training at St. Jude Children's Research Hospital, USA, where he studied immune signalling pathways in the host response to infection and cancer. Currently, he is Professor and CSL Centenary Fellow at the Australian National University, where his laboratory focuses on the molecular mechanisms of innate immune activation and pattern-recognition receptor signalling in the host defence against infectious diseases. His laboratory also studies how uncontrolled inflammation can lead to the development of cancer. His research has been recognised by the Commonwealth Health Minister's Medal for Excellence in Health and Medical Research (2019), the American Association of Immunologists Pfizer-Showell Award (2019), the ASBMB Eppendorf Edman ECR Award (2020), a CSL Centenary Fellowship (2021) and his inclusion in the Clarivate Highly Cited Researcher List (2020 and 2022).

Si Ming Man at the 2022 Prime Minister's Prizes for Science presentation dinner.

Si Ming Man.

Professor Man has partnered with industry leaders and fellow scientists to give his discoveries a practical application. He is currently involved in clinical testing for a new class of antimicrobial drugs that could improve the global issue of antibiotic resistant bacteria. This led him to partner with CSL and CSIRO to test the proteins in our immune system and develop a new class of antimicrobial drugs that would reduce our reliance on antibiotics and harness our natural immune defences.

He is recognised for discovering that the same immune receptors that recognise pathogens also have anti-inflammatory and anti-cancer capabilities. He has also partnered with gastroenterologists at the Canberra Hospital in two clinical studies to determine whether these immune receptors can be used as biomarkers in the early diagnosis and personalised therapy for bowel cancer patients.

Professor Man is a mentor of new researchers and is committed to training the next generation of scientists.

Professor Man says, "It is an incredible honour to be a recipient of the Frank Fenner Prize for Life Scientist of the Year. It will continue to inspire me and other young scientists to dream big and to take risks with our research to solve big problems. Our research makes a significant impact in improving the quality of our lives, especially for people in our community who are at the greatest risk of catching an infection, like children. I'm really excited that our work extends beyond medical research to help find solutions to combat diseases affecting our agricultural and food industries."

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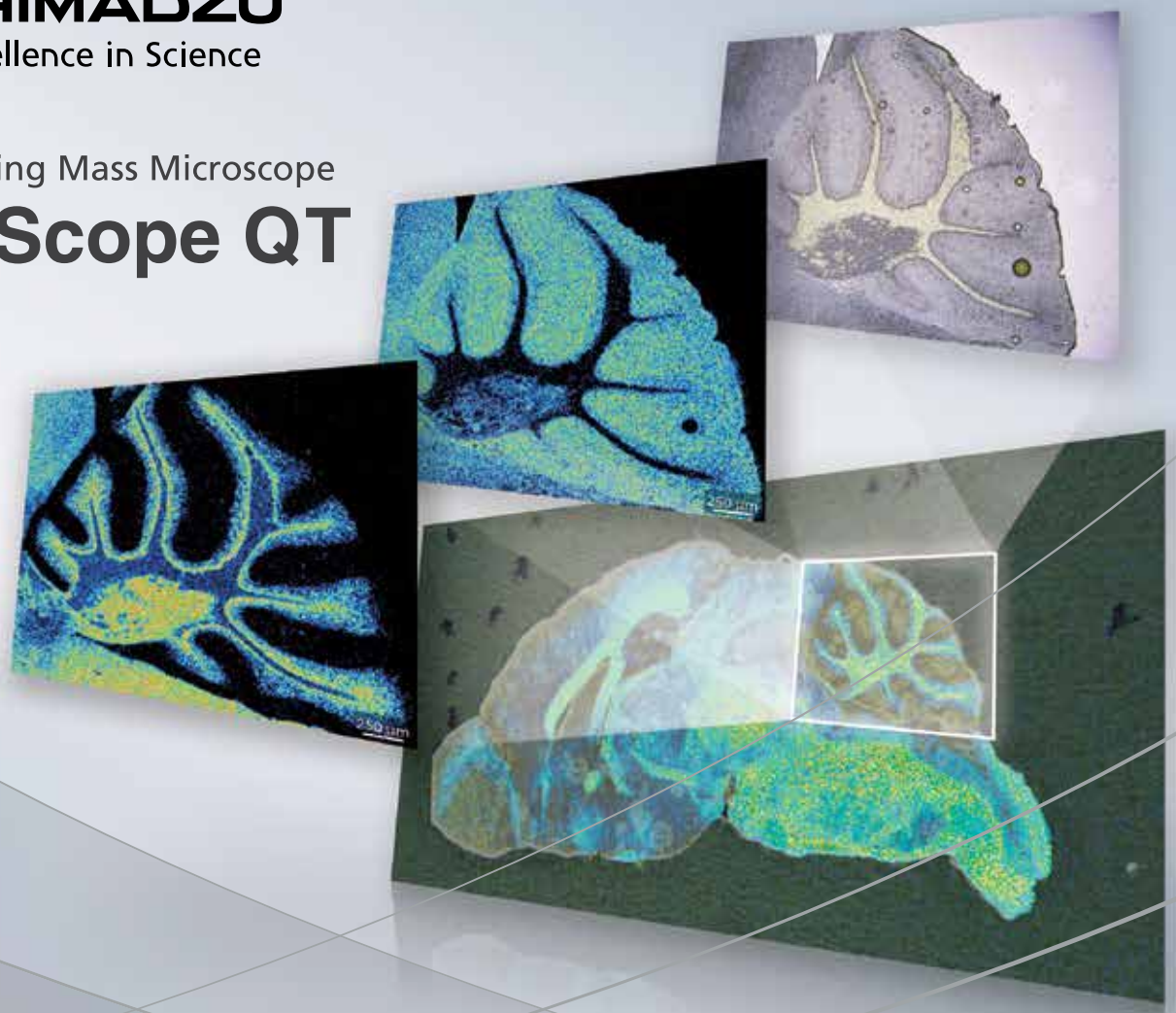

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Off the Beaten Track

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

Grant Seeker to Grant Advisor

Lahiru Gangoda, Research Development Advisor, Centre for Eye Research Australia

I was a biomedical researcher for the last 15 years and earlier this year, I made the move away from academia. In 2006, I arrived in Australia as an international student to pursue a Masters degree at La Trobe University under the supervision of Professor Leanne Tilley, who is well known for her research in malaria. Following my Masters degree, I worked in the lab of Professor Nicholas Hoogenraad on several projects which were funded by Cooperative Research Centre (CRC) for Biomarker Translation and CRC for Diagnostics. During this time, I developed critical skills in monoclonal antibody production. In 2011, I commenced my PhD with Associate Professor Hamsa Puthalakath and gained expertise in various preclinical animal models of cancer. Following my PhD, I commenced my first postdoctoral position with Professor Suresh Mathivanan in 2014. In Suresh's lab, I learnt to work with extracellular vesicles. I was fortunate to get a two-year Victorian Cancer Agency seed grant during my first postdoc to support my research in chemoresistance in colorectal cancer. As you can see, my research areas have constantly changed and each time I joined new research groups, I was able to gain a new set of skills and expertise. I started as a senior postdoctoral researcher at the Walter and Eliza Hall Institute (WEHI) in 2018 with Professor Marco Herold. I got a one-year CASS Foundation Science and Medicine Grant during my time at WEHI. I was President of the WEHI Postdoctoral Association in 2021 and through this role, I got many opportunities to be on various committees at WEHI and to be more involved in professional development activities. These experiences from working at WEHI broadened my view and understanding of many different career pathways available for someone like me with a biomedical science background. During the pandemic, I increasingly started working from home and enjoyed the flexibility that comes with it. This also gave me time to evaluate where I was heading with my career and make plans. I was at a career stage (seven years post-PhD) where obtaining funding to establish myself as an independent researcher was getting increasingly difficult. Therefore, mid-last year, I started looking for other career opportunities. The two pathways I was mostly interested in was project management and grant administration. I was successful in getting a grant administrator role at Centre for Eye Research Australia (CERA). So, at the beginning of this year, I hung up my lab coat and moved to CERA for a research support role. It was the transferable skills I learned during my time as a wet lab researcher such as problem-solving, teamwork and project management that employers were most interested in. The experience I have gained through writing funding applications, manuscript preparation, student supervision, conference presentation and other activities in academia has given me many soft skills that I could leverage for this role.

Lahiru Gangoda

CERA is an independent medical research institute affiliated with the University of Melbourne and it is based at the Royal Victorian Eye and Ear Hospital, Melbourne. It is ranked fourth in World University Rankings for research output in the field of ophthalmology. CERA's world-leading basic science researchers work closely with clinician–scientists to understand the causes of eye disease, inform disease prevention, improve diagnosis and treatment of eye disease, and ensure our breakthroughs reach patients as quickly as possible. CERA has achieved incredible advances in research into a new bionic eye prototype, which has given some patients a 'sense of vision'. Ophthalmology is a whole new field that I knew very little about until joining CERA. Each day in my new role I learn more about this field of research by attending seminars and assisting CERA's researchers in formulating funding applications.

Off the Beaten Track

My role involves strategic planning to increase and diversify the institute's research income from external sources. I provide senior management with specific updates and presentations to track and report progress of annual research funding performance targets. I work closely with researchers to provide accurate and timely advice and assistance with grant writing. I am also involved in giving support for post-award requirements, including maintaining records, grant management databases, filing systems and reporting. I work closely with the executive, project officers, legal team, business development team, communications team and philanthropic fundraising team of CERA. I liaise with government officials and funding bodies such as the NHMRC. Managing the full grant life cycle also involves tasks such as reviewing proposed budgets to ensure they align with policies and procedures of the organisation, providing technical assistance to grantees with online applications, circulating bulletins to promote grant opportunities, facilitating workshops to build grant writing capabilities and reporting, and ensuring that all of the submitted documents meet the requirements of the organisation.

My role requires strong communication, analytical and organisational skills as my day-to-day work involves liasing with people from diverse backgrounds, preparing proposals and documents, and ensuring deadlines are met. Given my previous wet lab experience, I also assist in developing knowledge and capabilities in animal ethics.

I quite enjoy the flexible hours/hybrid work arrangements with this role. I can do the majority of the work from home as all I need is my laptop and phone. There are very busy periods when all the major grants get submitted and then there are off-peak times. This is very different to when I was working in the lab when there was never a slow day. I also enjoy the fact that I get to interact with many people outside science such as HR and finance managers, lawyers and journalists. I think it has broadened my view of how people with different skill sets come together for a common goal in achieving organisational success. I think taking this new step in my career has helped me to upskill myself and has put me in a better position to pursue various employment opportunities outside academia.

lgangoda@cera.org.au

Adelaide Protein Group: an ASBMB Special Interest Group

The Adelaide Protein Group (APG) was founded in 2008 to unite South Australian researchers with similar interests in protein science. Our aim is to foster new relationships, engage in academic collaboration, share research among peers and promote emerging and esteemed Adelaide researchers. The APG committee and members are broadly represented, comprised of individuals from the University of Adelaide (UoA), University of South Australia (UniSA), Flinders University, South Australian Medical Research Institute (SAHMRI) and the Centre for Cancer Biology (CCB).

The APG continues to find new ways to bring together Adelaide's brightest minds in protein science and showcase the excellent work being performed by students and early–mid career researchers (EMCRs).

On 29 July 2022, we held our inaugural Big Protein Quiz Night – and judging on feedback, it was a standout success! The event was attended by over 50 undergraduate students, postgraduate students, EMCRs and faculty members from different institutions.

In addition to being an entertaining, trivia-focussed event, it was great to see attendees (especially undergraduate students) networking with their peers and getting to know faculty members in a social environment.

Big Protein Quiz Night 2022. Committee member, Kimberley McLean, was quizmaster and resident GFP.

Adelaide Protein Group: an ASBMB Special Interest Group

South Australia is a blooming hub for biomedical research, with researchers from the three major universities and research-only institutions producing primary research that regularly pushes respective fields further. To celebrate this work, the APG holds an annual Awards Fest where students and EMCRs can present their work and are eligible for numerous prizes. In 2021, we were honoured to have Professor Trevor Lithgow (Monash University) as our keynote speaker. Dr Nan (Andrew) Hao won the 2021 EMCR award and presented ground-breaking synthetic biology research at ComBio2022 with support from the ASBMB.

After several months of unforeseen delays, the 2022 Awards Fest and annual general meeting took place on 3 November at the South Australian Health and Medical Research Institute. We were delighted to host Professor Leann Tilley (University of Melbourne) as a keynote speaker, who gave an excellent talk 'Hijacking proteostasis for the development of anti-infectives'. Leann shared her career journey, beginning as a young postdoc in Europe to where she is today, and the hurdles that had to be overcome as a woman in science.

Leann Tilley, keynote speaker at the 2022 APG Awards Fest. Photos: Erin Brazel.

We had an excellent lineup of presentations from our students and ECRs covering herbicidal development, gene editing technology and novel peptide synthesis approaches. Congratulations to the presentation awardees, Dr Emma Watson (ECR), Ashleigh Geiger (Student) and Alice Ascari (People's Choice Award), and poster awardees, Alison Roennfeldt and Jill Chmielewski. Thank you to the presentation judges, Leann Tilley, Fiona Whelan, Nan Hao and Bart Eijkelkamp.

At the annual general meeting, outgoing APG Chairperson, Dr Blagojce (BJ) Jovcevski, thanked the ASBMB and sponsors for generous financial support and the committee for their hard work. Bethiney Vandborg was nominated as the new APG Chairperson. We also welcomed new Executive Committee members, Alix Harlington, Josh Chey, Emma Mao and Tace Conlin. Thank you to our outgoing Committee Members, Dr Lauren Thurgood and Dr Felise Adams. We look forward to another year of great events and excellent protein science in 2023!

APG Awards Fest awardees, from left: Alison Roennfeldt, Emma Watson, Ashleigh Geiger, Leann Tilley (keynote speaker), Alice Ascari, Jill Chmielewski and John Abbenante (BMG Labtech, gold sponsor).

APG Executive Committee
Chair: *Bethiney Vandborg*
Treasurer/Sponsorship: Officer *Kimberley McLean*
Secretary: *Alix Harlington*
ASBMB Liaison Officer: *Daniel McDougal*
Webmaster: *Michael Roach*
Events Coordinator: *Josh Chey*
Promotions and Social Media Officers: *Tace Conlin and Emma Mao*
General Committee Member: *Erin Brazel*

Daniel McDougal, ASBMB Liaison Officer, APG
Web www.apg.asn.au
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APG Executive Committee members in attendance at the 2022 APG Awards Fest, from left: Daniel McDougal, Emma Mao, Erin Brazel, Leann Tilley (keynote speaker), Bethiney Vandborg, Tace Conlin, Blagojce Jovcevski, Joshua Chey and Kimberley McLean.

Food for Thought – Patent Protection in Cellular Agriculture

Dr Harriet Manley, Patent Scientist, and Dr Sarah Hennebry, Associate Principal, from FPA Patent Attorneys describe the rapidly expanding field of celluar agriculture.

Harriet Manley (top) and Sarah Hennebry.

Introduction

Meat 'grown' in the lab – would you try it? You might see it on the shelf earlier than you think. Lab-grown meat could represent as much as 0.5% of the world's meat supply by 2030 – millions of tonnes of food (1).

Cellular agriculture for food production is a rapidly growing field aimed at targeting vegetarian and vegan audiences, but also combating global food security and climate change challenges. Creating non-traditional food products by using biotechnology will be particularly important for generating diversified protein sources to meet global demand.

Significant advances in stem cell and recombinant technologies in recent years set the foundation for further innovation to create the food of the not-so-distant future. As such, cellular agriculture food products are predicted to have an Australian commercial market of AUD$105–210 million by 2035, and multiple companies and university research groups across Australia focus upon lab-grown food (2).

Australia is in the top ten jurisdictions for national patent filings in the field of cellular agriculture technology. However, Australia appears to be underperforming compared to other major jurisdictions, particularly China – currently leading the way by a significant margin (**Fig. 1**). And in South East Asia, Singapore is rapidly establishing itself as a world leader in non-traditional protein industries (3) (although this is not yet reflected in national Singaporean filings, **Fig. 1**). But there is great potential for Australia to compete with other jurisdictions. With Australia's close proximity to Asia and ripe ground for scientific innovation, Australia's commercial and intellectual property footprint in the cellular agriculture space can only be expected to grow going forward.

With these scientific and commercial developments in mind, this article discusses considerations for patent protection around cellular agriculture technology.

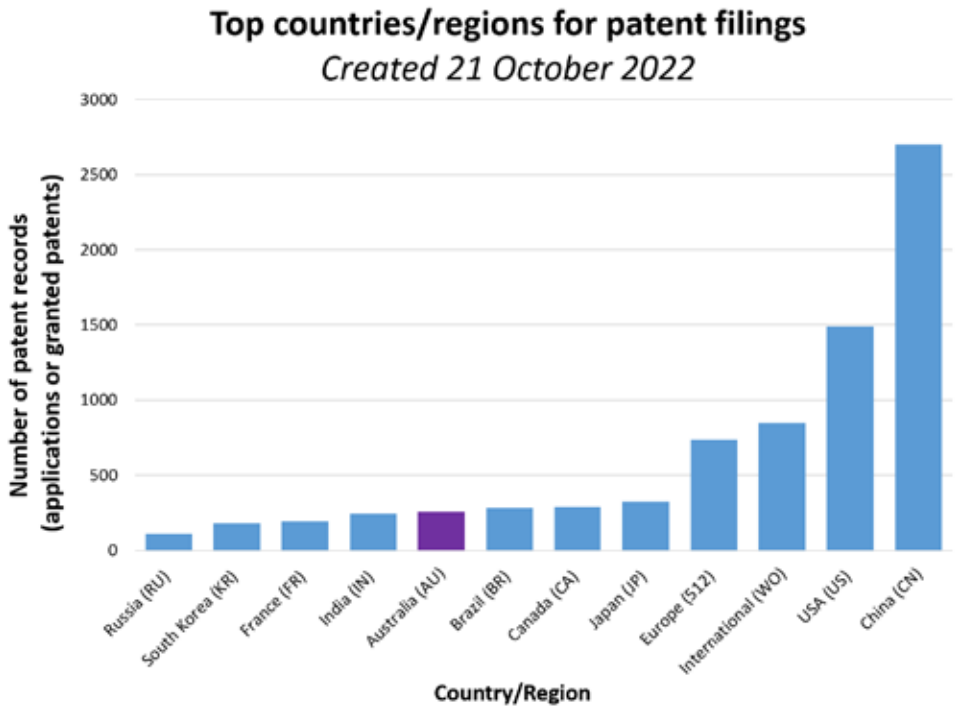

Fig. 1. *A graphical comparison of patent records in the cellular agriculture space (including cultivated meat, precision and biomass fermentation).*

Food for Thought – Patent Protection in Cellular Agriculture

What is cellular agriculture in terms of food?

Cellular agriculture for food production encompasses many biotechnology and synthetic biology processes for 'growing' animal-derived food products (e.g. meat, dairy) or components (e.g. proteins, fats, sugars, flavours) in the lab.

The CSIRO identified in their future 'protein' roadmap two prominent areas for the development of novel food production systems (3):

1. **Cell cultivation** (also known as cultivated meat), where stem cells are cultured into a meat product. The stem cells can be fat or muscle stem cells, or induced-pluripotent stem cells differentiated towards fat and muscle cells and proliferated, as required. The key difference between cultivated meats over existing alternative meats that are exclusively plant-based is that cultivated meats have the potential to directly 'replicate' animal meat, because they are based on grown animal cells. Cultivating meat in the lab also gives the opportunity to add flavour enhancers and/or nutrients to improve the end meat product. Examples of cultivated meats currently being explored include the usual suspects chicken, beef, pork, lamb and seafood but also kangaroo, crocodile and alpaca.

2. **Precision fermentation**, which is designed to generate a specific food component that is then extracted from the microorganism used to 'brew' the component. Precision fermentation can utilise recombinant fungi, algae or even bacteria to produce required plant or animal molecules, the caveat being that the molecules must be safely extracted and purified for human consumption. Examples of precision fermentation include lactoferrin breast milk protein for baby formula produced by yeast.

A third aspect of cellular agriculture is **biomass fermentation**. Unlike precision fermentation, the microorganisms undergoing biomass fermentation become the food product themselves, rather than having the food product extracted from them. An example is Quorn meat substitute, which is based on filamentous mycelium harvested for their high mycoprotein content.

Hybrid technologies combining multiple aspects (e.g. precision fermentation + cell cultivation) are also emerging. Further, cell-based products can complement existing plant-based or fermentation derived products.

Whilst these technology areas herald exciting changes to the food landscape, challenges in this sector include:

- identifying suitable cellular sources for fermentation and/or culturing
- synthesising difficult ingredients
- maintaining taste and texture to appeal to consumers
- cost-effectiveness
- quality control
- safety
- scalability

But with each challenge comes opportunity – opportunities for further innovation, and subsequently patent protection.

What aspects of cellular agriculture may be eligible for patent protection?

Numerous aspects of cellular agriculture may be susceptible to patent protection. For example:

- recombinant or isolated peptides, polypeptides, nucleic acids, cells
- novel microbial strains
- food composition, components, and mixtures such as:
  - nutrients
  - flavours, additives and preservatives
  - precursor molecules
  - biomaterials
  - engineered haeme-containing proteins
  - engineered plant proteins
- cell-based food products such as:
  - meat replicas or substitutes
  - seafood replicas or substitutes
  - dairy replacements – milk, cheese, yoghurt
  - artificial breast milk
- bioreactor design and devices
- growth factors and culture media and uses thereof
- methods of:
  - culturing cells
  - modifying cells
  - fermentation
  - purification and extraction
  - generating cell scaffolds or supports
  - producing proteins or compounds
  - producing/formulating food products

General requirements for patenting in this space

In order to obtain a patent to an invention, the invention must be:

Novel – The invention must be new. Any non-confidential disclosure can form part of the 'prior art' against which novelty is assessed, including third party disclosures and even disclosures by the inventor/s (self-disclosures). As such, it is essential to be aware of and manage self-disclosures, e.g. inventors' publications, presentations, public or online announcements, etc.

Ideally, a patent application should be filed before the invention is publicly disclosed. If a disclosure of the invention has been made, it may be possible to navigate the disclosure by filing a patent application within the 'grace period' (usually six to twelve months) from the disclosure in certain jurisdictions. However, it should be kept in mind that some important jurisdictions, notably

Food for Thought – Patent Protection in Cellular Agriculture

Europe, do not currently provide a grace period and therefore inventors and applicants should not aim to rely on the grace period to correct loss of novelty through premature disclosure of the invention.

Inventive – The invention must be non-obvious. Patent examiners assess if the invention would be obvious to a hypothetical person of ordinary skill in the field of the invention (the skilled person). The assessment of inventiveness differs across jurisdictions, including major jurisdictions like Europe and the US. Typically, the differences in approach between jurisdictions amount to the number of documents that can be combined by an examiner to demonstrate non-obviousness, and the 'starting point' for determining whether something is non-obvious. For example, in Europe, an examiner will consider whether the claimed invention provides a non-obvious solution to a particular problem, starting from the item of prior art that is deemed the closest to the invention. In the US, the examiner may not necessarily adopt a 'problem/solution' approach, but will ask the question, 'given the disclosures of one or more documents, would someone in the field take this combination of information and be motivated to arrive at the claimed invention?'

Prospects of successfully demonstrating non-obviousness can be increased by pointing to advantages of the invention over the prior art. For example, if the invention is a method, does the method provide increased efficiency and/or better yield? Are aspects of the method not routine or straightforward? For products, does the food composition or component have improved features, e.g. better taste, nutritional value, texture; or any other surprising or unexpected benefits? It can also be very useful to include data within the patent application directly contrasting advantages of your invention against existing methods/products.

Supported and enabled – There must be sufficient evidence to demonstrate that the invention works, and the invention must be described with enough information that a person in the field would be able to perform the invention. Importantly, the information included within the patent specification directly influences how narrow or broad the claims can be, impacting the scope of the monopoly that a granted patent would provide.

Patentable subject matter – The subject matter of the claimed invention must not be legally excluded from patentability. Patentable subject matter requirements vary in different countries, including across major jurisdictions.

Challenges can arise if aiming to patent cells, nucleic acid sequences, protein sequences or other naturally occurring substances, particularly if the cell, sequence or substance has not been modified compared to its naturally occurring form. Patentable subject matter is an important consideration, particularly in the US where patenting of inventions directed to naturally occurring substances can be challenging. Your patent attorney will be able to appropriately advise you as to the options and strategies for obtaining patent protection if your invention relates to a naturally occurring substance.

A further important consideration for patenting food innovations is the patent eligibility of mixtures. If the composition is a mere mixture of known ingredients where the ingredients are each behaving as per their inherent properties, or the method is a process producing such a composition by mere admixture, then it may not constitute patentable subject matter (depending on the jurisdiction). This can sometimes be overcome by demonstrating an *interrelationship* between the elements in a mixture – for example, one ingredient reduces the acidity of another.

Conclusion

- Cellular agriculture is an exciting field ready to diversify food production worldwide
- Key biotechnology areas in this space include cultivated meat, precision fermentation and biomass fermentation
- New and inventive cellular agriculture methods and/or food compositions, components and products may be susceptible to patent protection
- Key considerations for patenting cellular agriculture inventions are: novelty, inventiveness, ensuring sufficient information within the application to support and enable the invention, and the eligibility of cells and biologicals for patent protection in different countries

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In Memoriam

Ross Smith 1946–2022

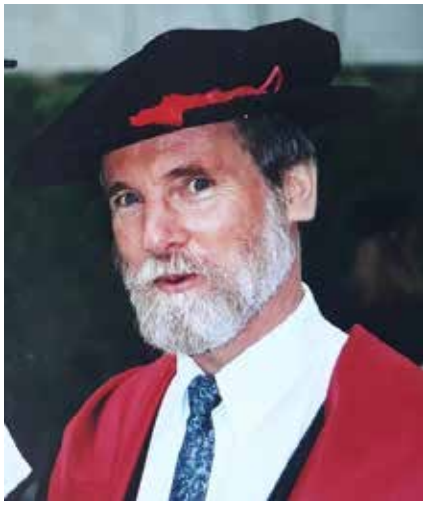
Ross Smith was born on 4 July 1946 in Christchurch, New Zealand. He grew up in humble beginnings in council housing. His father was a boilermaker on the New Zealand railways, while his mother was the homemaker. Ross' parents were very keen for him and his older brother to have a good education; they were fortunate that school and university had fewer financial barriers back then.

Ross Smith in the mid-1970s. Photo supplied by Sali Smith.

Ross enrolled in a BSc in Chemistry at the University of Canterbury with a scholarship that allowed him to skip the first year. He graduated with Honours in 1967 and continued on to a PhD at the same university, which he completed in 1970. He then undertook postdoctoral research at Duke University in North Carolina with Professor Charles Tanford (1970–1972), followed by a second postdoc at the Institute Jozef Stefan in Ljubljana, Slovenia, with Professor Vito Turk (1972–1974; at the time, part of Yugoslavia). He arrived in Australia in 1974, having secured a position as a Lecturer at the University of Sydney, where he spent five years before moving to La Trobe University as Senior Lecturer in 1980. He then moved to the University of Queensland (UQ) in 1983, joining the Department of Biochemistry as a Reader, and then acting as Deputy Head of the Department from 1997–2000. In 1999, he was promoted to Professor and appointed Head of the Department of Biochemistry from 2001 until 2005 (when Departments were disbanded at UQ and merged into Schools). He was appointed Emeritus Professor of UQ upon his retirement.

Throughout his career, Ross was held in high regard for his wide-ranging contributions to research, teaching and postgraduate training. Recognised as a pioneer of structural biology and protein chemistry research in Queensland, Ross helped to establish the Queensland Centre for Protein and Nucleic Acid Research in 1986, serving as its inaugural Director. This Centre, which brought together researchers from UQ, the Queensland Institute of Medical Research and Griffith University, would serve as a nucleation point for like-minded researchers that led to many subsequent joint research efforts and meetings, including the establishment of the Queensland Protein Group (QPG) as a Special Interest Group of the ASBMB. Many of his peers at this time recall that Ross was enthusiastic about introducing new techniques for characterising proteins and nucleic acids through these and other meetings, and he led several successful ARC LIEF grants for new protein characterisation equipment. A landmark paper from his lab published in *Proceedings of the National Academy of Sciences USA* in 1995 described the structure of a cysteine-rich repeat from the low density lipoprotein receptor; this is believed to have been the first three-dimensional protein structure solved in Queensland using NMR spectroscopy. The paper was communicated by the Nobel Laureate, Michael Brown.

Ross was also enthusiastic about incorporating new technologies into university teaching. In 2000, he helped develop the curriculum for a third level course in Genomes and Bioinformatics, believed to be the very first course offered in this subject area by an Australian university. He also served as inaugural Chair of the Board of Studies for UQ's Biotechnology program, which has since grown to be recognised as one of the top ten programs in this discipline worldwide. His colleagues remember Ross as an outstanding mentor of postgraduate students, postdocs and junior staff members. He supervised over 20 PhD students and 30 Honours students, mentored many more, and in 2001, he received UQ's highest award for excellence in postgraduate supervision.



In 2001, Ross received a UQ award for outstanding research higher degree supervision. Photo supplied by Sali Smith.

Ross took many sabbaticals during his time at UQ, visiting McGill University, Montreal (1986), the University of Oxford (1986), the Scripps Research Institute, San Diego (1994) and the University of Connecticut Health Centre (1990 and 1998–1999). While on sabbatical in San Diego, he worked with Professor Stephen Kent to

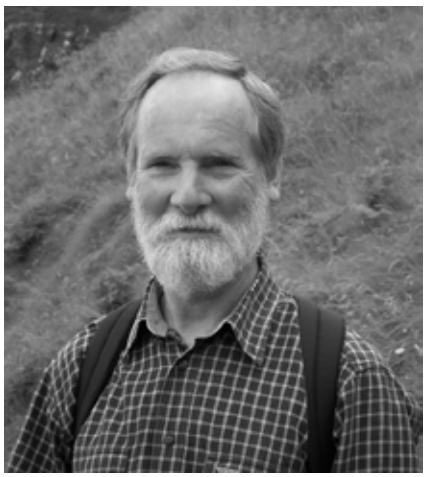
solve the structure of the HIV-1 protease, a finding that revealed catalytic residues important for the function of the enzyme and led to the development of improved HIV-1 protease inhibitors. In Connecticut, he struck up a collaboration with the groups of Professor John Carson and Professor Elisa Barbarese, and completed experiments crucial to what became arguably his group's most important research discovery – that hnRNP proteins bind to specific mRNA sequences within transcripts coding for myelin basic protein (and others), trafficking them to the periphery of myelinating nerve cells where their expression is localised.

Caricature of Ross drawn by his colleague at La Trobe University, Gideon Polya.

As a keen sportsperson (Ross played hockey and volleyball at school and university, respectively) with a great sense of humour, the vibrant social atmosphere within the UQ Biochemistry Department throughout the 1990s and 2000s provided an ideal environment for Ross and his lab to thrive, both academically and socially. Ross was an enthusiastic participant in the departmental bush walks that were held regularly in the regions surrounding Brisbane. Members of the Smith and neighbouring Rothnagel groups would also gather annually on 26 September to celebrate Lumberjack Day. Scones with jam and cream, along with a heart-warming rendition of Monty Python's Lumberjack Song were the order of the day. Ross could sometimes be found on the UQ squash courts having a hit with members of his lab, while the inter-lab volleyball competition of the early 2000s was keenly contested by 'Ross' Renegades'.

Ross was a member and strong contributor to the activities of many professional societies throughout his career, including the ASBMB, the Australia and New Zealand Society for Cell and Developmental Biology, the Society for Neuroscience (USA) and the Protein Society (USA). For the ASBMB, he served as the Chair of the QPG from its establishment in 1987 until 1994. Around 1990, he established the East Coast Protein Conference (now the East Coast Protein Meeting) with support from the ASBMB. He served on the Organising Committee of the 1998 ASBMB conference, was Chair of the ComBio2006 Organising Committee, was Queensland Representative from 2011–2014 and sat on the ASBMB Research Awards Committee 2010–2011.

The important role Ross played in shaping future protein and nucleic acid research in Queensland is highlighted in the ASBMB web archives: 'In the early years, QPG would regularly host two to three meetings a year featuring keynote speakers which highlighted new and state of the art techniques in protein science, and afforded opportunities for students to give oral presentations, opportunities that were hard to come by in those days at larger national and international meetings. The mid-year meeting evolved into what is now the East Coast Protein Meeting, initially held at Byron Bay before moving to its current location at Coffs Harbour and which continues to be held jointly with the Sydney Protein Group every two years. The annual Christmas meeting of the QPG became synonymous with student-led presentations, featuring prizes sponsored by Sustaining Members of the ASBMB.' Recognising the significance of these efforts, it was decided in 2021 that the annual QPG meeting would be renamed the Ross Smith Symposium, with the Ross Smith Medal to be awarded annually at this event to a high achieving early career researcher.



Ross on a walk in 2005. Photo supplied by Lisa Smith.

Ross passed away peacefully and surrounded by family on 16 July 2022. He is survived by his wife Sali and his daughters, Lisa and Kirsten. Ross will be greatly missed, but his legacy lives on through the many staff, students and friends he taught, mentored and interacted with, and the institutions, conferences and society groups he founded that continue to make such important contributions to Australian protein science.

Michael Landsberg and Bostjan Kobe
School of Chemistry and Molecular Biosciences, UQ
Lisa Smith
School of Biosciences, University of Sheffield, UK
Glenn King
Institute for Molecular Bioscience, UQ
Trent Munro
Microba Life Sciences

ASBMB Fellowship Report

Molecular Neuronal Connectivity and the Lobster

Belal Shohayeb with protein folding sculpture on Cold Spring Harbor Laboratory Campus.

I had the pleasure of visiting Cold Spring Harbor Laboratory (CSHL) in Long Island, New York, with the support of an ASBMB Fellowship. Founded in 1890, CSHL has shaped contemporary biomedical research, with several Nobel prize laureates stemming from there. I am so grateful to receive the ASBMB Fellowship, which allowed me to attend the Molecular Mechanisms of Neuronal Connectivity, organised at CSHL every two years since the late seventies. The ASBMB Fellowship gave me the opportunity to attend a prestigious international meeting for the first time in two years following the COVID-19 pandemic. It was great to meet researchers and peers in person who I have met either virtually or connected with on Twitter during the pandemic. I had the opportunity to network with experts in the field of neuronal connectivity and actin cytoskeleton dynamics from different institutes around the globe. I also presented a poster about my postdoctoral research work at the Queensland Brain Institute, where I have identified autism gene networks using super-resolution microscopy. I received fantastic feedback and was thrilled to walk away with the postdoctoral poster award from among 130 other presenters.

In addition to engaging with the science at the meeting, I enjoyed the early morning runs along the Cold Spring Harbor beach. I also visited important landmarks in New York such as the Statue of Liberty, Times Square, New York Central Park, the United Nations building and the financial district. One of the interesting experiences during the meeting was trying the lobster at the last dinner of the meeting, which has been a tradition of this meeting for many years.

Once again, I would like to express my gratitude to the ASBMB for the fellowship support, which has allowed me to learn new things, build a bigger network and make new collaborations.

Belal Shohayeb is a postdoctoral research fellow in the Queensland Brain Institute at the University of Queensland.

Presenting his poster to Associate Professor Stephanie Gupton from North Carolina State University.

Receiving the postdoctoral poster award from Professor Kang Shen from Stanford University.

Cold Spring Harbor Inner Lake.

ASBMB Fellowship Report

A Barley Holiday: Beers, Beach and Barley

I had originally planned to use my ASBMB Fellowship to go to Stockholm in 2021 but due to COVID, I had to settle for the Stockholm of Australia, the Gold Coast! Stockholm has the Drottningholm Palace, but the Gold Coast has Surfers Paradise.

I attended the 20th Australian Barley Technical Symposium (ABTS) with my ASBMB Fellowship. ABTS is one of the most significant technical symposiums on barley and rivals any other held anywhere in the world. The conference was held at the fantastic QT hotel and had a barista handing out free coffees all day. This was my third ABTS and it is one of my favourite conferences to attend; it is a fantastic mix of science and industry. The conference started with a Student and Newcomers Forum with Industry Leaders, where I was lucky enough to present a talk about my career and past experiences at ABTS, which was then followed by welcome drinks and dinner, a foolproof way to start any conference.

The three-day conference covered all aspects of barley and the barley industry. Talks ranged from genetics and proteomics to sustainability, agronomy and brewing. I presented my research work on understanding germination in barley seeds using proteomics. On the second night of the conference, we went to Burleigh Brewing Company and had a fantastic evening learning about beer, hops and barley. This fun evening at a brewery also included drinks and dinner, a foolproof way to continue any conference.

The conference continued and there were many great talks and discussions. I met many new and familiar faces and with many opportunities to network and talk science. Excitingly, one of my students presented her work on understanding heat stress in barley using proteomics. It was fantastic to see her present this work at such an important conference. Finally, the conference ended with a formal dinner, which surprisingly included drinks and dinner; a foolproof way to end any conference.

While not the trip I intended, I was fortunate to be across the road from the beach, within walking distance of pubs and cafes, and attend one of my favourite conferences after all the uncertainty of the past few years. What more could I want?

I am very appreciative to have attended ABTS and also present my work. I am grateful to the ASBMB for giving me this opportunity. I had a wonderful time and loved sharing my work with peers.

Edward Kerr is a postdoctoral research fellow in the School of Chemistry and Molecular Biosciences at the University of Queensland.

Photo booth fun at ABTS! Edward Kerr (left) with Catherine Lawn and Joel Boettcher.

Australian Society for Biochemistry and Molecular Biology Inc
PUBLICATION SCHEDULE FOR *AUSTRALIAN BIOCHEMIST*, volume 54, 2023

Issue	ASBMB Content	Copy Deadline	Issue Date
April 2023 54(1)	Profiles of medal, award and fellowship winners Nominations for Executive/Council	Monday 6 February	Monday 3 April
August 2023 54(2)	Nominations for medals, awards and fellowships Notice of AGM/proposed constitutional changes	Monday 5 June	Monday 31 July
December 2023 54(3)	Annual reports ASBMB meeting report	Monday 2 October	Monday 4 December

ASBMB Fellowship Report

Aloha – Immunity Booster

I'm so grateful to be awarded an ASBMB Fellowship during the third year of my PhD. With the support of this fellowship, I was able to attend the International Cytokine & Interferon Society (ICIS) 10th Annual Meeting: Cytokines 2022 on the Big Island, Hawaii, USA. Upon landing at the Daniel K. Inouye International Airport in Honolulu, I was greeted by Aloha! I arrived a few days before the conference started to explore the area. The city is a fusion of Polynesian and Western culture. It is surrounded by beautiful beaches and lush green mountains. I went sightseeing and did some snorkelling; I even spotted a wild turtle swimming next to me, I was awestruck!

The conference was held on the Big Island of Hawaii, which is the largest and the youngest island in the Hawaiian chain of islands. The welcome event of the conference commenced with Hawaiian chants, followed by the opening addresses from the ICIS President Professor Christopher Hunter and Program Chair Professor James Turkson. The conference garnered over 300 abstracts from all around the world. It was a joint meeting with Innate Lymphoid Cells 4th Annual Conference (ILC4). I was selected to give an oral presentation in Symposium 1: Cytokines Induction, where I discussed my latest findings about the innate immune recognition of a bacterial lecithinase. I received great feedback and suggestions from experts in the field.

Anukriti Mathur presenting at the ICIS 2022 meeting.

The meeting was well curated with high-quality scientific presentations covering topics spanning tissue immunity, cytokine induction, signalling and regulation (with IL17 being the most discussed cytokine in the meeting), host–microbe interaction, to immune regulation in host physiology and diseases. The conference also provided career development opportunities, including an interactive panel discussion on careers in academia and industry. There was an excellent young investigator networking session with publishing groups comprising of editors from *Cell Press, Journal of Experimental Medicine, Nature Immunology, The Journal of Immunology, Cytokine* and *ImmunoHorizons*.

Green paradise, Makapu'u lookout, Honolulu.

Overall, it was a fantastic conference to share my research findings and enhance my professional network with global experts in the field. I am thankful to the ASBMB for their generous support in promoting early career researchers like myself.

Anukriti Mathur is a postdoctoral researcher at the John Curtin School of Medical Research, Australian National University, Canberra.

Hawaiian lū'au, Big Island, Hawaii.

News from the States

Compiled by Melissa Pitman

Australian Capital Territory

Contributed by Christina Spry

Canberra Protein Group

March 2022 saw Megan Outram (formerly ANU, now CSIRO) take over from Simon Williams (Research School of Biology, ANU) as the chair of the Canberra Protein Group (CPG). We say a big thank you to Simon, who co-founded the group with Matt Johnson (formerly ANU, now University of Melbourne), for all his contributions to establishing and running the CPG. Sacha Pulsford and Stephen Fairweather (both from the Research School of Biology, ANU) also joined the committee, otherwise composed of Rebecca Frkic, Xiaoxiao Zhang, Matt Mortimer and Christina Spry (all from the Research School of Biology/Chemistry, ANU).

CPG meetings were held monthly throughout the year, bringing together researchers from across the ANU campus and CSIRO. Meetings were run in a hybrid format, and included presentations from students and group leaders, as well as staff from ANU research facilities.

The first CPG symposium was held in June 2022, for which three early career researchers (ECRs), Carl McCombe, Sacha Pulsford and Cassidy Whitefield, from the Research School of Biology and Research School of Chemistry, ANU, were selected from abstracts to present a 15-minute seminar for the opportunity to be selected to represent the CPG at ComBio2022. All ECRs gave excellent talks, but ultimately Carl McCombe (PhD candidate in the group of Simon Williams) was awarded the ComBio2022 speaking spot by a panel of six judges. Carl also took away the People's Choice Prize. Congratulations Carl!

The Australian Biochemistry Lunch Seminar Series

The Australian Biochemistry Lunch Seminar Series initiated by Thomas Huber (Research School of Chemistry, ANU) continued in 2022, now coordinated by the CPG and chaired by Christina Spry, Megan Outram and Thomas Huber. The seminar series, which is held weekly at 12pm AEDT on Mondays, sees leading biochemists from across the country share their work on Zoom with an audience of researchers also spanning Australia. A list of past speakers, recordings of past presentations and the upcoming schedule can be accessed here. To join upcoming meetings, simply follow this Zoom link.

After the Winter/Spring season concludes, the Biochemistry Lunch will shift to showcasing early- and mid-career researchers (EMCRs) in a new series entitled Making Futures, again spearheaded by Thomas Huber. This series gives outstanding EMCRs planning to submit a Fellowship application in the field of biochemistry a platform to share their work. See page 32 of this issue of the *Australian Biochemist* for more information.

ANU ASBMB Awardees

The 2021 ANU ASBMB Prize, a prize awarded to the ANU undergraduate student who achieves the two highest average marks in three of four courses with a biochemistry and/or molecular biology focus, was dually awarded to Gemma Hart and Siena Scott-Hickie. Congratulations Gemma and Siena!

New South Wales

Contributed by Laura Sharpe

2022 saw the return of many in-person events, including ComBio! I am pleased to report on the activities and awards that were sponsored by ASBMB NSW this year. We continue to reward our excellent undergraduate and high school students across NSW and supported the (in-person!) East Coast Protein Meeting.

Charles Sturt University – ASBMB Biochemistry Prize

This was awarded to Damien Chan for outstanding results in Biochemistry subjects. Congratulations to Damien and best wishes for your future!

University of Newcastle – ASBMB Prize for Biomedical Science

This award is presented to the student with the best overall performance in the Bachelor of Biomedical Science program.

NSW Science Teachers Association Young Scientist Awards

ASBMB NSW has sponsored this award for several years. The ASBMB Award is given for the best high school student project with a biochemistry or molecular biology theme. Our involvement in schemes like this helps encourage our future scientific stars and ignite their passion for research.

East Coast Protein Meeting

To help facilitate the return to face-to-face conferences, additional support was provided to the Sydney Protein Group for the East Coast Protein Meeting, held in Coffs Harbour in July 2022.

Queensland

Contributed by Michael Landsberg

ASBMB Queensland has continued to support biochemistry and molecular biology outreach and activities over the past 12 months. The ASBMB supports the annual Queensland Science Contest, organised by the Science Teachers Association of Queensland (STAQ). This year, we funded six bursaries for students whose entries were in the broad field of biochemistry and molecular biology. The winners, announced at a ceremony in November 2022 were, Connor Baker

News from the States

(Emmanuel College), Laicey McAleer (Albany Hills State School), Zali Miler (Elanora State School), James Cousins (Brisbane Boys College), Raelynn Liang and Yuri Song (Citipointe Christian College) and Richard Nguyen (Queensland Academy of Science, Maths and Technology). Congratulations to the winners and a big thank you to the ASBMB judges, Adam Walker, Rebecca San Gil and Conan Wang.

The 2022 Ross Smith ECR Award Symposium and Queensland Protein Group (QPG) Student Prize was held at the Griffith University Institute for Glycomics on 15 November, sponsored by ATA Scientific, the ASBMB and the QPG. The symposium was attended by approximately 50 protein scientists and biochemists. Professor Mark von Itzstein and Professor Megan O'Mara gave plenary talks. A judging panel selected four ECRs and four students to present their work. The Ross Smith ECR Medal was awarded to Larissa Dirr (Griffith University), while the best student presentation was awarded to Kuok Yap (University of Queensland). All finalists gave excellent presentations and the event was enjoyed by all.

2022 Ross Smith ECR Award Symposium and QPG Student Prize finalists.

We were saddened to hear that Ross Smith passed away in July 2022. We pass on our sincere sympathies to Ross' family, and look forward to remembering his contributions to protein and nucleic acid research and to activities of the ASBMB in Queensland for many years to come. A tribute is published on page 42 of this issue of the *Australian Biochemist*.

ASBMB continues to support prizes for high achieving undergraduate and postgraduate students at universities across Queensland. This year, Holly Radford was recognised with a prize sponsored by the ASBMB for the highest achievement in third year biochemistry at James Cook University. The Griffith University ASBMB prize was awarded to James Davidson. We extend our congratulations to both receipients.

The East Coast Protein Meeting was held in July in Coffs Harbour after a three-year hiatus, with many ASBMB Queensland members attending. Congratulations to the award winners, and to the Sydney Protein Group for hosting what was once again a fantastic meeting.

South Australia

Contributed by Melissa Pitman

The SA branch of the ASBMB has sponsored a number of local events in 2022 that have supported primary school, undergraduate and post-graduate students and recognised excellence for early- and mid-career molecular biologists and biochemists.

Oliphant Science Awards

In order to support and inspire budding scientists, the SA ASBMB branch sponsors the Oliphant Science awards each year. This year the scientific writing prize was awarded to Isaiah Ajaero (Year 11–12, Concordia College) for his essay on 'Chimeric antigen receptor T-lymphocytes (CAR T-lymphocytes): the application of immuno-engineering in the treatment of haematological malignancies'. In the multimedia category, the winner Saheli Dissanayake (Year 7–8, Seymour College) presented an engaging animated YouTube video describing the biochemical factors to explain 'What makes food spicy'.

Undergraduate Student Prizes (University of Adelaide)

To recognise the efforts and excellence in undergraduate university students, the SA state branch sponsored two prizes at the School of Biological Sciences Academic Event at the University of Adelaide. This year, the prizes were awarded Julia Leeflang and Emma Mao for their outstanding scores in biochemistry and molecular biology courses in the second year of their studies in 2021.

Mid-career/early-career/PhD Publication Prizes (University of South Australia)

In support of early- and mid-career researchers in the biochemistry and molecular biology fields, the ASBMB SA branch also sponsored a number of researcher prizes for best publications at UniSA (Centre for Cancer Biology). The winners were Zadeh Shirazi, Saumya Samaraweera and Paul Wang and Naranie Shanmuganathan.

RNA Special Interest Group

This year, the ASBMB will be sponsoring the Adelaide Epigenetics and RNA club networking event in December 2022. This session will be focused on non-coding RNA research and will be co-organised by the RNA Special Interest Group and the Epigenetics Consortium of South Australia (EpicSA). The goal of this event is to facilitate discussions with people from South Australia that are working on RNA- and/or epigenetics-related research.

Adelaide Protein Group (APG)

The APG ran its inaugural quiz night in July 2022. This event was a resounding success. The APG held its second Student and Early Career Research Awards Fest and annual general meeting on 3 November. A report on the 2022 Awards Fest can be found in the APG profile

News from the States

Adelaide Protein Group inaugural quiz night flyer.

on page 37 of this issue of the *Australian Biochemist.* The SA branch of the ASBMB sponsored a one-off small travel grant to contribute to the travel costs for Andrew Hao (2021 APG Awards Fest ECR awardee) to attend ComBio2022 in Melbourne.

We look forward to another year of inspiring and stimulating events. In September 2022, I handed over my role as the SA State Representative to Dr Michael Roach (Flinders University). I have had a fantastic time in the role and have enjoyed the chance to support and promote science within South Australia.

Tasmania

Contributed by Iman Azimi

College of Health and Medicine (CoHM)–College of Science and Engineering (CoSE) Biochemistry, Molecular Biology and Advanced Analytics Seminar

ASBMB Tasmania organised the first joint seminar between two colleges of the University of Tasmania, College of Health and Medicine (CoHM) and College of Science and Engineering (CoSE). This event that was highly supported by the Head of both Colleges, was proposed by ASBMB Tasmania given the similarities in the molecular, biochemical and analytical methodologies used by many of the CoHM and CoSE researchers, to showcase research employing these techniques across the two Colleges. In this seminar that was chaired by Dr Iman Azimi, two speakers attended, Associate Professor Eloise Foo presenting on understanding dynamic signalling molecules in plant roots, and Dr David Nichols presenting on a mass spectrometry coupled with high resolution imaging platform for assessment of intact tissues and its applications across biological sciences. This event was a success, with 50 attendees and a high level of engagement from the audience.

Victoria

Contributed by Laura Osellame

The ASBMB Victoria Branch has continued its commitment to a wide range of scientific events for all researchers at all stages of their career in Victoria. As Victoria slowly emerges from COVID-19 lockdowns, face-to-face meetings became a possibility again. ASBMB Victoria has continued to sponsor biochemistry and molecular biology events, both hybrid and online. Below are the events we have sponsored and organised in 2022.

Melbourne Immunotherapy Network

In 2022, the Melbourne Immunotherapy Network (MIN) held two events, of which both were sponsored by ASBMB Victoria. The Reconnect Symposium 2022 was hosted by WEHI on 19 July with around 150 delegates. The MIN Spring Symposium was held in Marysville on 4–5 November. There were 60 delegates in attendance with Isabel Everard winning the poster prize for her work entitled 'Targeted radiotherapy induces changes to the immunological tumour microenvironment in advanced prostate cancer.'

Melbourne Protein Group Student Symposium 2022

The MPG Student symposium was held at Monash Institute for Pharmaceutical Sciences (MIPS) on 21 July. Keynote speakers included Professor Denise Wootten (MIPS), Associate Professor Andrew Ellisdon (Monash) and Associate Professor Ashleigh Buckle (Replay). Poster prizes were awarded to Hayley Turnham (Bio21)

Poster prizewinners at the MPG Student Symposium.

Matha Monsouri (MIPS), Jaison D Sa (WEHI), Ayeshah Rosdah (SVI), Kaitlin Clarke (La Trobe), Scott Williams (La Trobe), Shi Xuam Sum (La Trobe) and Petar Calic (Monash). The Tilley Prize for the best oral presentation was awarded to Ashleigh Kropp from Monash University. This in-person meeting was a great success and it was wonderful to see the students interacting after the last few years of online events.

Science Talent Search Victoria

After the last few years of the Science Talent Search (STS) being an online event, this year's STS took place in the classroom, with the children able to undertake their experiments together. Judging Day was hosted at Parade College and Methodist Ladies' College on 6 August, with the Online Presentation Day taking place on 16 November via Zoom for each school. ASBMB Victoria was once again a gold sponsor of this program and supported 13 awards.

Western Australia

Contributed by Alyssa Van Dreumel

Following on from Dr Monika Murcha, I commenced the role as ASBMB WA State Representative at the end of 2021. Western Australia was extremely fortunate over the previous two years with respect to COVID-19, with very few cases and little restrictions. However, at the beginning of 2022 with high case numbers in the state many events and gatherings were not organised, or delayed and so it has been a slow start to the year with regard to scientific meetings and events. Annually the ASBMB WA branch sponsors a number of research prizes for best talks or poster presentations with a focus on students, and early and mid-career researchers.

The Perth Protein Group (PPG) Special Interest Group led by Dr Josh Mylne held its third AGM on 26–27 October at the Curtin Graduate School of Business Function Room. The meeting received strong sponsorship support. Twenty talks were scheduled, focussing on providing opportunities for early career researchers, including several Honours and Masters students. The plenary talks were given by Dr John Bruning (University of Adelaide) and Professor Alice Vrielink (University of Western Australia). The ASBMB was delighted to sponsor the prize for the best student presentation, which was awarded to Bence Olasz (University of Western Australia).

Bence Olasz receives the ASBMB Presentation Prize from Western Australian State Representative, Alyssa Van Dreumel, at the Perth Protein Group AGM.

The School of Molecular Sciences, University of Western Australia, held its annual PhD student symposium in October. The symposium is organised by PhD students and includes research project proposal presentations given by commencing students and a poster session for second- and third-year students. The ASBMB sponsored the best biochemistry seminar award, which was presented to Rana Alqusumi.

As WA State Representative I have an interest in education and outreach and am exploring a diverse range of initiatives that ASBMB can support in WA to promote interest in science in high school and undergraduate students. We are in the early stages of investigating outreach opportunities for high school students to establish a skills-based laboratory competition similar to the RACI titration competition, or a science communication competition, or project with a biochemistry or molecular biology theme; ideally involving interactions between all universities in Perth and local school students and their teachers. The WA branch will also aim to establish an award for undergraduate students who demonstrate outstanding effort in their biochemistry and molecular biology studies. We are looking forward to an active year.

29th FAOBMB Conference

Terrence Piva reports on the fully online FAOBMB Conference hosted in Shenzhen, China, and the virtual FAOBMB Council meeting.

The 29th FAOBMB Conference incorporating the annual 2022 meeting of the Chinese Society for Biochemistry and Molecular Biology (CSBMB) as well as sessions sponsored by the International Union of Biochemistry and Biology (IUBMB) was held from 20–22 October 2022. This meeting was intially scheduled to be a hybrid meeting, but due to an outbreak of COVID-19 in Shenzhen, this conference was run online, attracting over 1,000 participants.

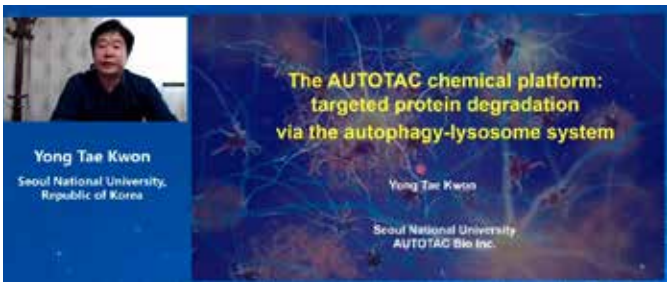
The theme was Biochemistry and Molecular Biology for Human Health. The conference web portal allowed registrants to view as well as move easily between the online presentations, which were delivered in real time. Registrants were also able to view posters and listen to short recordings about the posters. Apart from one or two minor glitches that were quickly rectified, the conference ran extremely well in the online format.

The conference contained nine Plenary lectures and and 17 parallel sessions. The sessions covered broad aspects of molecular sciences, including genomics and proteomics, virology, lipidomics, immunology, cell biology, plant biology, metabolism and enzymes. These sessions were populated by 90 invited speakers, mostly from FAOBMB countries. There were 65 posters hosted online during the conference. There were two Australian plenary speakers, Nirma Samarawickrema (Monash University) and Archa Fox (University of Western Australia).

Akira Kikuchi at the Welcome Ceremony.

The Welcome Ceremony was chaired by Paul Gleeson (FAOBMB Fellowship Chair) and featured Lin Li (CSBMB President) and Akira Kikuchi (FAOBMB President). Baoliang Song (China) delivered the first Plenary lecture on the role the deubiquitylase USP20 plays in cholesterol metabolism and how inhibitors of this enzyme may be used to treat diseases associated with hypercholesterolaemia. The second Plenary lecture was delivered by Rui-Ping Xiao (China), who discussed the role played by the myokine MG53, in particular its E3 ligase activity, in cardiometabolic function, and how it can be used to devise strategies to treat ischaemic heart disease.

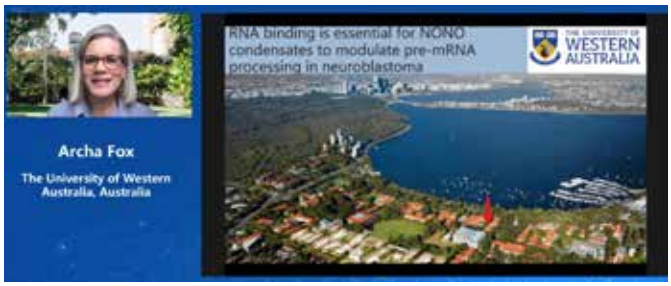
Rui-Ping Xiao's Plenary lecture.



2022 FAOBMB Award for Research Excellence winner, Yong Tae Kwon, delivers a Plenary lecture.

The recipient of the 2022 FAOBMB Award for Research Excellence, Yong Tae Kwon (Republic of Korea), delivered the third Plenary lecture. This award is given annually to a distinguished biochemist or molecular biologist from the FAOBMB region. Yong Tae's presentation focussed on the AUTOTAC technology, which can selectively target proteins to autophagosomes for degradation in the autophagosome/lysosome system. This talk was highly informative and initial studies on the use of AUTOTAC in the degradation of tau neurofibrils in Alzheimer's disease mouse models were impressive and highlights the potential use of this technology in research, drug development and clinical applications in being able to degrade specific cellular proteins. Recipient of the 2022 FAOBMB Education Award, Nirma Samarawickrema, gave the fourth Plenary lecture. Nirma spoke of the challenges faced by all academics who had to switch from classical face-to-face teaching to online as a result of COVID-19 restrictions. The use of digital technology was employed to instruct students in online lectures, workshops, practicals and lectorials as the new medium of information transfer. Given these changes in teaching, new authentic assessments had to be devised. This was a very informative presentation and highlighted the challenges all academics faced since the onset of COVID-19. The last Plenary talk on Day 1 was delivered by Hidenori Ichijo (Japan), who spoke of the role played by ASK family members in cellular stress responses.

2022 FAOBMB Education Award winner, Nirma Samarawickrema, delivers a Plenary lecture.



Archa Fox's Plenary lecture.

The afternoon sessions of Day 1 and sessions on Day 2 were devoted to presentations arranged in 17 different sessions, and a workshop on scientific writing and publishing. On the afternoon of Day 2, the Education in Biochemistry and Molecular Biology session was co-chaired by Grace Yu (Philippines) and Cong-Zhao Zhou (China), and included presentations on the future of biochemical teaching followed by a roundtable discussion. It was easy to move online from one session to another. In between the sessions and Plenary talks, there were advertisements of new research products and future conferences, such as the FEBS Congress in Tours, France (2023) and BioMolecular Horizons 2024, the IUBMB Congress which will be held in Melbourne. I enjoyed the musical videoclips of cell metabolism.

Metabolism videoclip shown during session breaks.

The first Plenary talk on Day 3 featured Archa Fox, who spoke of the role played by the DNA and RNA binding protein, NONO, in neuroblastoma. This was a very interesting and highly informative presentation of this unusual nucleic acid binding protein. Incoming FAOBMB President, Joon Kim (Republic of Korea), delivered the second Plenary lecture on the development of anti-fungal drugs to treat candida infections as a result of changes to *C. albicans* exposed to stress. The last two Plenary lectures were delivered by Shengcai Lin (China) and George Fu Gao (China). Xiaolong Liu (CSBMB Vice President and Secretary General) chaired the conference Closing Ceremony and handed the baton to Tuangporn Suthiphongchai (Thailand) to host the next FAOBMB Conference in Bangkok in November 2023.

FAOBMB Council meeting

The FAOBMB Council meeting was held via Zoom on 5 October 2022, with Australian participants Terry Piva as the ASBMB delegate and Paul Gleeson as Chair of Fellowships Committee. The meeting was attended by delegates from 18 of the 21 constituent member societies/countries, along with the six members of the Executive Committee. The Council meeting was chaired by the FAOBMB President, Akira Kikuchi (Japan), and the Secretary-General, Sheila Nathan (Malaysia). Akira discussed the impact that COVID-19 had on the FAOBMB's activities, especially in regard to hosting a face-to-face meeting. He looked forward to seeing everyone attend the FAOBMB Conference in Bangkok in 2023 in person. Akira discussed the role of the FAOBMB's interactions with the IUBMB and highlighted the role that biochemistry and molecular biology will play in overcoming issues that currently affect the region. He also discussed the key role that FAOBMB plays in bringing scientists together. In 2023, Joon Kim (Republic of Korea), will assume the role as President and will serve in this role until the end of 2024. Shannon Au (Hong Kong) was re-elected as FAOBMB Treasurer for another three-year term.

Reports on the previous FAOBMB Council Meeting (November 2021) and the FAOBMB Executive Committee Meeting (April 2022) were tabled. There were discussions on the Council's finances, as well as reports from the Education Committee, Fellowships Committee, IUBMB, as well as discussions on the FAOBMB Awards. Reports from the 16th FAOBMB Congress in Christchurch (2021), 29th FAOBMB Conference in Shenzhen (2022), 30th FAOBMB Conference in Bangkok (2023) and 17th FAOBMB–26th IUBMB Congress in Melbourne (2024) were tabled. The Committee approved changes to the FAOBMB Awards and Fellowship Schemes, as well as appointing an Auditor and Archivist (Phillip Nagley). Zengyi Chang (China) was made an Honorary Member of the FAOBMB.

The next FAOBMB Conference will be held in Bangkok, Thailand, from 22–25 November 2023.

As this is my last report as the FAOBMB Representative for ASBMB, I would like to thank all who have assisted me in this role over the past five years. I wish Nirma Samarawickrema all the best as the incoming FAOBMB Representative for ASBMB.

ASBMB Annual Reports

President's Report

ASBMB President Jacqui Matthews.

After the restrictions of the last few years, it's been lovely to see our worlds open up again, with more and more in-person events, teaching students IRL and getting opportunities to travel. Hopefully, the worst of the COVID pandemic is behind us. My commiserations to anybody who has suffered through serious illness, the loss of loved ones, the deprivations of lockdowns and the increased workloads of online and hybrid teaching.

Meetings

Our biggest event in the past 12 months was the long-awaited ComBio2022 meeting. Held at the Melbourne Convention and Exhibition Centre in late September with our partners (Australian Society of Plant Scientists, Australia and New Zealand Society for Cell and Developmental Biology, Genetics Society of AustralAsia and New Zealand Society for Biochemistry and Molecular Biology), this meeting can only be described as a resounding success. With well over 1,000 delegates, it was the biggest ComBio for more than a decade. It was great to see a few international speakers attending the conference in person. For those who missed the talks by our opening and closing speakers, Nobel Laureate Jennifer Doudna and the Russell Grimwade Lecturer Cynthia Kenyon, they are available on the ASBMB website until the end of this year. A huge thanks to Jackie Wilce and Mark Hulett for making this conference happen, hanging in there as Conference and Program Chair, respectively. Erinna Lee hosted the Career Development Forum associated with the meeting, where students and ECRs who were registered for ComBio2022 received some excellent advice on research career progression, funding opportunities, alternate careers and outreach.

The East Coast Protein Meeting, co-hosted by the Sydney and Queensland Protein Groups, and held at the Opal Cove Resort in Coffs Harbour in July 2022, was a sold out event. This relaxed and informal meeting was, as usual, an excellent opportunity for junior protein scientists to present their work.

2023: An ASBMB-only meeting led by Colin Jackson will be held on 20–23 November 2023 in Canberra. This will be a fairly broad meeting with lots of opportunities for abstract talks.

2024: Planning for ComBio2024, the 26th IUBMB Congress and the 17th FAOBMB Congress in Melbourne, led by Leann Tilley, is well underway. With the theme 'Biomolecular Horizons 2024: Discover, Create, Innovate', the Congress will offer a series of plenary sessions, semi-plenaries, symposia, workshops, technical talks and poster presentations. There will be a dedicated Young Scientists Program preceding the Congress. There are opportunities to run satellite meetings in association with the meeting so please get in touch with Leann and her team if you have a proposal for such a meeting.

Special Interest Groups

Our Special Interest Groups (SIGs) play a very valuable role in supporting subdisciplinary interactions within our broader community and provide a mechanism for local or distributed groups to network on a regular basis, create opportunities to present and share research and/or teaching practices, and to award prizes or awards to our emerging society members. During the last few years of COVID restrictions, they have been the lifeblood of the Society, running local and online meetings. We encourage members to join appropriate SIGs and to put your hand up to help running these focussed groups, or running events when the opportunities arise – it's a great opportunity to gain experience with Society and symposium organisation etc, especially for ECRs. We encourage the SIGs to turn over leadership roles regularly to both encourage activity and to provide opportunities to other members.

ASBMB Award Recipients

I would like to take the opportunity to congratulate our 2022 award recipients:

The Lemberg Medal
Leann Tilley (Bio21 Institute, University of Melbourne)
The Shimadzu Research Medal
Michael Lazarou (Walter and Eliza Hall Institute of Medical Research and Monash Biomedicine Discovery Institute, Monash University)
The SDR Scientific Education Award
Saw Hoon Lim (University of Melbourne)
The Eppendorf Edman ECR Award
Wael Awad (Monash University)
ASBMB Fellowships
Yanxiang Meng (Walter and Eliza Hall Institute of Medical Research) – Fred Collins Award
Jacinta Conroy (University of Queensland)
Chris Horne (Walter and Eliza Hall Institute of Medical Research)
Tess Malcolm (University of Melbourne)

ASBMB Annual Reports

Running the Society

A big thank you to everybody who has put significant amounts of time and effort into the Society. This is my last year in the role of ASBMB President, although I'll remain part of the Executive as Past President during 2023 as Ross Hannan takes over the reins. We are saying a huge thank you and farewell to Marc Kvansakul as Treasurer, and welcome Kate Quinlan as our incoming Treasurer. Nirma Samarawickrema is stepping down as our Education Representative, but is taking on a new role as the FAOBMB Representative, taking over from Terry Piva, who has been our longest standing current member of Council, having previously been Treasurer. Tracey Kuit is our incoming Education Representative.

Dominic Ng continues to be an outstanding Secretary, and Tatiana Soares da Costa is our fantastic and energetic Editor and Chair of Communications, as well as the Biological Sciences representative for the STA. Liana Friedman plays a key role in putting the *Australian Biochemist* together and keeping us all informed of what is going on in and around the ASBMB.

The State Representative for South Australia, Melissa Pittman, is stepping down with Michael Roach coming into the position. Remember that our State Representatives can help you with local initiatives or be a conduit to the Council. Our other State Representatives are Christina Spry (ACT), Michael Landsberg (QLD), Alyssa Van Dreumel (WA), Laura Osellame (VIC), Iman Azimi (TAS) and Laura Sharpe (NSW).

It's with a lot of sadness and a huge amount of gratitude that we say farewell to Sally and Chris Jay. Sally Jay has been running our National Office and supporting the Executive since 1991, has held office as the Secretary for Sustaining Members since 1998, and has run 22 meetings for ASBMB including 19 ComBio meetings. Chris has been part of the team since 2001 running our membership subscriptions and conferences, amongst other tasks. They have always done so much more than providing a service – we are really going to miss them and wish them well in retirement.

Please be patient as we transition to our new National Office managers, Waldron Smith.

Final words

It's a privilege to have been President of this Society for the last two years. My focus has been more about keeping things going rather than developing new initiatives, but the future looks promising, and the Society is in good hands so I'm looking forward to a new phase for the ASBMB. Remember, the Society belongs to all of us, so if you have any ideas about how to make it better and do more for members, bring them to the Council.

Professor Jacqui Matthews, President
jacqui.matthews@sydney.edu.au

ASBMB Annual Reports

Treasurer's Report

ASBMB Treasurer Marc Kvansakul.

Relevant summaries of the filed annual return (1 July 2021 to 30 June 2022) should be read in conjunction with this statement. The final audit has been completed and will be submitted shortly, and the summary statements on which the report is based were provided by our auditors.

The overall position of the Society has substantially improved compared to the 2021. We recorded an operating profit of $7,540 compared to the loss of $5,013 in 2020–2021. Furthermore, we anticipate a substantial profit moving forward, driven by an estimated $110,000 profit from ComBio2022 (see indicated budget estimate for the conference).

The major sources of income for ASBMB are membership revenue, ComBio profits and bank interests. There was $4,990 of advertising income to report, down from $7,655 in the previous year. Corporate support for our named awards remains strong and on behalf of the Society, I thank their support of these awards. I would also like to thank Sally Jay for her tireless efforts in securing continuing sponsorship of our awards. Interest on our accounts dropped in 2021–2022 due to the flow-on effect of very low deposit rates based on the official interest rate. However, we should be able to generate a better return for our reserves in April next year when we are able to reinvest higher bank interest rates.

Net expenditure in the 2021–2022 financial year was down $2,740 compared to the previous period (2020–2021), despite the resumption of 'business as normal' and ComBio2022. This was largely due to further cost cutting in the area of affiliate memberships. The distribution of funds to the state branches and Special Interest Groups was $4,018 higher that in 2020–2021. We are fortunate that Sally and Chris Jay manage the National Office with a high degree of effectiveness while keeping their costs relatively stable. However, with the transition of our National Offfice to Waldron Smith, we are entering unchartered territory. Our flagship publication is the *Australian Biochemist* and it is available to members as a PDF. Tatiana Soares da Costa as the Editor of the *Australian Biochemist,* along with Editorial Officer, Liana Friedman, are to be commended for their work in putting the magazine together. Reduced meeting costs were achieved by the Executive and Council holding teleconferences.

The overall financial position of ASBMB has improved in 2020–2021. After accessing cash reserves in 2019 ($100,000 was used), we are likely to be able to return a significant amount of this to our reserves for investment. The amount to be returned will need to be determined early next year, once the final financial outcome of ComBio2022 has been determined, and will need to take into account the projected expenditure and seed funding requirements for ASBMB 2023.

For 2021–2022, ASBMB supported the NZSBMB-led FAOBMB Congress, which took place online in November 2021. As part of the support, we provided $10,000 in seed funds, and engaged in a profit/loss share. This proved to be an excellent decision, and ASBMB received $8,944 as its share of the profits from FAOBMB 2021. I would like to extend my congratulations to the NZSBMB team who led the conference for a job superbly done under exceptionally challenging circumstances.

In my role as the ASBMB Treasurer, I have many people to thank. Members of the ASBMB Executive who are always constructive and supportive, Sally and Chris Jay (ASBMB National Office), Ian Price (ASBMB bookkeeper), Priestleys (ASBMB accountants) and Brian Hiley (ASBMB auditor).

This is my final report as Treasurer, and I am handing over the financial reins to Kate Quinlan, who undoubtedly will be a most excellent custodian of the ASBMB finances. I would like to thank ASBMB Executive members past and present for their support whilst being Treasurer, it was quite an adventure!

Professor Marc Kvansakul, Treasurer
m.kvansakul@latrobe.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 2022, together with the Auditors' Report thereon and in accordance with Section 73 of the Associations Incorporation Act 1991 report as follows.

EXECUTIVE OFFICERS

The Executive Officers throughout the year were: Professor Jacqui Matthews (President); Professor Joel Mackay (Past President); Professor Ross Hannan (President Elect from 1/1/22); Professor Leann Tilley (Past President to 30/9/20); Professor Dominic Ng (Secretary from 30/9/20); Professor Marc Kvansakul (Treasurer); Dr Tatiana Soares da Costa (Editor and Chair of Communications); Associate Professor Nirma Samarawickrema (Education Representative); Associate Professor Terrence Piva (FAOBMB Representative).

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.

OPERATING RESULTS

During the year, the Association produced an operating profit of $7,540 (2021: operating loss $5,013).

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 2022 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 Jacqui Matthews, President
Professor Marc Kvansakul, 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 2022, 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 2022 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 2022

	2022 $	2021 $
CURRENT ASSETS		
Cash and cash equivalents	504,481	456,848
Trade and other receivables	80,379	89,296
Other current assets	286	-
TOTAL CURRENT ASSETS	**585,146**	**546,144**
NON-CURRENT ASSETS		
Property, plant and equipment	-	-
TOTAL NON-CURRENT ASSETS	**-**	**-**
TOTAL ASSETS	**585,146**	**546,144**
CURRENT LIABILITIES		
Trade and other payables	171,916	140,454
TOTAL CURRENT LIABILITIES	**171,916**	**140,454**
TOTAL LIABILITIES	**171,916**	**140,454**
NET ASSETS	**413,230**	**405,690**
EQUITY		
Retained surplus	413,230	405,690
TOTAL EQUITY	**413,230**	**405,690**

STATEMENT OF CASH FLOWS FOR THE YEAR ENDED 30 JUNE 2022

	2022 $	2021 $
CASH FLOWS FROM OPERATING ACTIVITIES		
Receipts from members	109,868	95,189
Conference income	19,267	-
Other income	12,750	25,091
Payments to suppliers and employees	(95,032)	(103,693)
Interest received	780	3,646
Net cash provided by/(used in) operating activities	**20,233**	**20,233**
CASH FLOWS FROM INVESTING ACTIVITIES		
Net increase/(decrease) in cash held	47,633	20,233
Cash at the beginning of the financial year	456,848	436,615
Cash at the end of the financial year	**404,481**	**456,848**

REVENUE

	2022 $	2021 $
Operating activities		
Administration Fund		
Subscriptions – ordinary, student, retired and Sustaining Members	78,571	75,736
Conference income *(see note)*	19,267	-
Advertising and insert in proceedings and magazines	4,990	7,655
Other Income	7,500	15,000
	110,328	**98,391**
Non-operating activities		
Interest received – Administration Fund	780	3,009
Donations	260	155
	1,040	**3,164**
Total Revenue	**111,368**	**101,555**

EXPENSES

	2022 $	2021 $
Other expenses from ordinary activities		
Affiliate memberships	2,488	8,583
Awards and medals	13,305	12,147
Conference support – other conferences	145	-
Council expenses	3,512	3,812
National Office costs	44,621	44,572
Magazine costs	11,168	10,983
Other costs	5,296	4,389
State allocations	8,000	3,982
Remuneration of auditor		
- audit or review services	2,950	2,900
- other services	2,200	2,700
ASBMB Fellowship – Research Fund	10,143	12,500
	103,828	**106,568**

CASH AND CASH EQUIVALENTS

	2022 $	2021 $
Cash at bank – Administration Fund	504,481	456,848
	504,481	**456,848**

TRADE AND OTHER PAYABLES

	2022 $	2021 $
Current		
Accrued expenses – Administration Fund	172	172
Conference receivables	44,507	53,424
Advances to state committees	35,700	35,700
	80,379	**89,296**

RETAINED SURPLUS

	2022 $	2021 $
Administration Fund		
Retained surplus at beginning of the year	405,690	410,703
Net surplus (deficit) attributable to the Fund	7,540	(5,013)
Retained surplus at the end of the year	**413,230**	**405,690**

All sums given in Australian Dollars.

Note
Conference Revenue represents the association's share of the net profits generated by the FAOBMB Conference held in Christchurch, New Zealand.

ComBio2020 was postponed to 2022 due to the impacts of COVID-19.

Our Sustaining Members

ASBMB welcomes the following new Sustaining Members:

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KE Select

MEXEC

SHIMADZU

Shimadzu's Imaging Mass Microscope

An imaging mass microscope is a mass spectrometer with both a mass microscopy probe and an optical microscope. This enables overlayed analysis using both microscope images and compound distribution information from mass spectrometry.

The iMScope QT offers a high-precision stage and extremely stable UV laser in combination with a quadrupole time-of-flight (Q-TOF) mass spectrometer. Together these achieve world-leading spatial resolution of 5 µm as well as fast image acquisition speeds.

The mass spectrometer and microscope units can be easily coupled or detached by the user themselves. Removing the microscope section and installing a liquid chromatograph allows the system to be used as the LCMS-9030 Q-TOF LCMS system. Customers who already own a Shimadzu LCMS-9030 Q-TOF system can carry out imaging mass microscopy by acquiring the microscope unit.

The iMLayer matrix vapor deposition system supports the iMScope QT high resolution capabilities. By using this device very fine matrix crystals can be produced, and with the automated control, the important matrix coating thickness can be reproducibly controlled.

Shimadzu instruments provide total support for cutting-edge mass imaging research, offering superior technology and performance from pre-treatment through to data analysis.

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info@shimadzu.com.au
Freecall 1800 800 950

IDT
INTEGRATED DNA TECHNOLOGIES

During the past years, science has focused on identifying and tracking viral pathogens. To test for viruses, samples are subjected to DNA extraction and qPCR to analyse gene expression. In addition, 2X concentrated master mix formulations deplete faster, which can be problematic when there are supply chain issues. To support the growing need for an inhibitor resistant, high-performance, 4X concentrated master mix that allows for direct amplification of crude samples, Integrated DNA Technologies has developed the PrimeTime™ 1-Step 4X Broad-Range qPCR Master Mix.

PrimeTime One-Step 4X Broad-Range qPCR Master Mix exhibits many attributes that will ease the workflow issues experienced by scientists researching viruses or other gene expression applications. The new Master Mix has shown high endpoint fluorescence in crude samples, which increases researchers' confidence in their data interpretation. In addition, the Master Mix is resistant to inhibitors (heparin, hematin, and humic acid) often found in challenging samples, and therefore, reduces time and cost associated with crude sample purification steps. With its 4X concentration and ability to support both extracted samples and crude samples with a single, inhibitor-resistant formula, IDT's PrimeTime One-Step 4X Broad-Range qPCR Master Mix can help accelerate the road to discovery.

For research use only. Not for use in diagnostic procedures. Unless otherwise agreed to in writing, IDT does not intend these products to be used in clinical applications and does not warrant their fitness or suitability for any clinical diagnostic use. Purchaser is solely responsible for all decisions regarding the use of these products and any associated regulatory or legal obligations.

SAPPHIRE BIOSCIENCE

Cayman Chemical Cell Death Detection Tools

Cell death occurs for both physiological and pathological reasons. Varying modes of death are either programmed to safely remove healthy cells that are no longer useful or to stimulate an inflammatory response to clear cells that are useful but no longer healthy. To distinguish among the multiple ways a cell can self-destruct, distinct morphological changes, triggers, and biochemical hallmarks are monitored. However, crosstalk between certain modes of death can also occur, making it important to examine more than one readout when identifying the types of cell death in your experiments.

Cayman Chemical offers a comprehensive portfolio of Cell Death Detection Tools to investigate multiple molecular pathways (apoptosis, necrosis, necroptosis, pyroptosis, ferroptosis, and NETosis) and cell death markers to help you determine the cell death mechanism(s) occurring under your experimental circumstances.

- Assay Kits
- Biochemicals
- Antibodies
- Compound Libraries

Cayman Chemical's products are distributed in Australia, New Zealand, and Southeast Asia by Sapphire Bioscience.

For more information, contact:
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Evolution or Revolution? Introducing the Award-winning ORCA®-Quest qCMOS Camera

Since the 1980s, Hamamatsu Photonics developed high-sensitivity, low-noise cameras using its unique camera design technology… strongly contributing to the development of cutting-edge scientific and technological research.

From Hamamatsu Photonics and SDR Scientific, we are proud to release the ORCA-Quest: the world's first camera to incorporate the qCMOS image sensor and to be able to resolve the number of photoelectrons using newly-developed, dedicated technology.

The ORCA-Quest offers you the following:

- Low readout Noise: 0.27 electrons rms (Ultra-quiet scan)
- High QE: 90% @ 475nm: Back-Illuminated qCMOS
- High Speed: 120fps@ 4096 x 2304 pixels (16 bit)
- High resolution: 4096 x 2304, 9.4 Megapixels
- Impressive Pixel Size: 4.6 x 4.6um
- Dynamic Range 25,900:1 (Ultra-quiet scan)

This camera achieves the ultimate in quantitative imaging, and has been awarded accordingly:

- ORCA-Quest qCMOS Camera Named SPIE Prism Awards 2022 Finalist
- ORCA-Quest Camera wins the Innovation Award 2022, Biophotonics & Medical Engineering Category

Evolution or revolution... we'll let you decide!

SDR Scientific is proud to represent Hamamatsu in Australia/New Zealand. Discover the ORCA-Quest or other members of the Hamamatsu imaging family by reaching out to your friendly SDR Scientific Technical Sales and Support Specialist on 02 9882 2882 or by clicking Here.

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Created "by scientists for scientists", NEB is renowned for consistently providing exceptional product quality and unsurpassed technical support. For over four decades, NEB has been shaping the landscape of bioscience research by discovering, developing and supporting superior research reagents. From our founding principles – placing the advancement of science and the stewardship of the environment as our highest priorities – to our unique corporate culture, NEB's philosophy can be distilled down to three core values: passion, humility and being genuine.

A supplier-of-choice for scientists across the globe, NEB offers the largest selection of recombinant and native enzymes for genomic research. While restriction enzymes remain part of our core product portfolio, our ever-expanding catalogue also includes products related to PCR, gene expression, sample preparation for next generation sequencing, synthetic biology, glycobiology, epigenetics and RNA analysis. Additionally, NEB is focused on strengthening alliances that enable new technologies to reach key market sectors, including molecular diagnostics development.

NEB Australia is the 8th subsidiary of NEB Inc. With a dedicated team of local scientists and a fully stocked on-site warehouse, we aim to provide world-leading technical support and service to our valued customers Down Under.

Learn more at www.nebiolabs.com.au

Our Sustaining Members

CreoptixWAVE for Label-free Binding Kinetics and Affinity Analysis

Conventional bioassays, like Surface Plasmon Resonance (SPR) have relied on enzyme or fluorescent labels to detect and monitor biomolecular interactions, but these methods tend to capture just one point in time and are fraught with non-specific binding issues that can skew results.

Malvern Panalytical's Creoptix® WAVEsystem, is a label-free technology that delivers deeper insight into previously undetectable interactions. Kinetic rate parameters and affinity constants (ka, kd, KD) along with binding specificity are derived in real-time from even the most challenging sample types in a wide range of biological matrices.

The power behind the Creoptix WAVEsystem is in the patented Grating-Coupled Interferometry (GCI) technology and non-clog WAVEchip microfluidics system. GCI is unique and measures the evanescent wave across the entire sensor surface and isn't affected by temperature drifts or vibrations, allowing for more sensitive measurement. The kinetics of weakly binding fragments and large molecules with high affinity and slow dissociation can be measured simply (even native proteins in complex matrices) without purification. The waveRAPID method can also be used to increase throughput, particularly in screening applications, by generating a pulsating concentration profile. Calibration-Free Concentration Analysis (CFCA) offers a reliable, quick and easy calibration-free approach to quantify active protein concentration.

For further details, contact:
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Azure Biosystems Biomolecular Imagers

Azure Biomolecular Imagers are high performance Western blot imaging systems capable of NIR fluorescence, visible fluorescence, and chemiluminescence. They cover the full spectrum of capabilities for documentation and quantitative analysis of gels, Western blots, slides, tissue samples, small animal models, plants, media plates and more.

Azure's family of Imagers offers fast, sensitive, high-resolution 9MP CCD-based detection in a small, benchtop-friendly footprint. Choose from the 200/280/300/400/500/600 series. The Azure Imaging Systems are multichannel, multimodal imagers, with near-infrared, visible light, and UV excitation channels. Detect Cy dyes, Alexa dyes, Safe dyes, Trihalo compound-based gels, and more.

The basic 200 is for streamlined gel documentation and densitometry (white light, blue light, and UV) and then upgrade later as your studies change.

Upgrade to the 300 to add the ability to detect chemiluminescence at the same sensitivity as film.The 300 is also upgradable to the 400, which adds visible (RGB) fluorescence detection, or the 500 for Infrared laser excitation for quantitative Western Blot imaging in the NIR.

All models can be upgraded to the 600 which combines all of these detection modes – white light, blue light, UV, chemiluminescence, visible fluorescence, and NIR fluorescence – in a single powerful instrument. Two near-infrared (NIR) lasers (660nm and 785nm) help keep signal high and background low.

For labs that need the highest levels of imaging performance – sensitivity (pg to fg), resolution (down to 10µm), dynamic range (over 6-log), field-of-view (25cm x 25cm scannable area) - or want an imager that can keep up with their diverse and dynamic research needs, Azure offers the Sapphire Biomolecular Imager. This instrument combines a unique, patent-pending three detector design with the background-minimizing, focused excitation of a laser scanner. The result is a hybrid laser scanner-CCD imager that delivers best-in-class chemiluminescent detection, visible and NIR fluorescence detection, and phosphorimaging.

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BMG LABTECH

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New eBook on Cellular Assays and Their Detection

Cell-based assays are on the rise! This eBook, published with SelectScience, explores different cell-based applications and shows how microplate readers can facilitate cellular assays.

Researchers can find it challenging to select the right measurement technology for their needs, and to stay informed about current trends and new technology options. Microplate readers and their add-ons can provide a valuable alternative to microscopes for researchers and drug developers looking to get the best results quickly, and in real time, at an affordable cost.

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Read more: www.selectscience.net type in the search function 'Microplate-based cellular assays and their detection'

CapellaScience

The Bead Ruptor 24 Elite bead mill homogeniser is ideally suited for extraction of DNA, RNA, proteins and small molecules from even the toughest of samples. The BR24 Elite is the most powerful and advanced bead mill homogeniser available today.

The Elite features a touchscreen user interface which allows users to easily monitor and control homogenisation preferences and is customisable with programmable protocol settings for speed, power, time, number of runs, and dwell time. The Elite's 8-gigabyte memory allows users to store over 100 protocol settings and includes a 'quick-run' feature and tutorial.

Specifically designed for laboratories that require high throughput sample disruption, the Elite's optimised tube motion, with speeds up to 8 meters/second, results in rapid and efficient sample disruption. Unrivaled in versatility, the Elite is compatible with the widest range of accessories, including an array of interchangeable tube carriages capable of processing sample volumes from 250µL to 50mL. Up to 24 x 2mL samples can be processed simultaneously.

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

ASBMB Council 2023

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Monday 6 February 2023

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