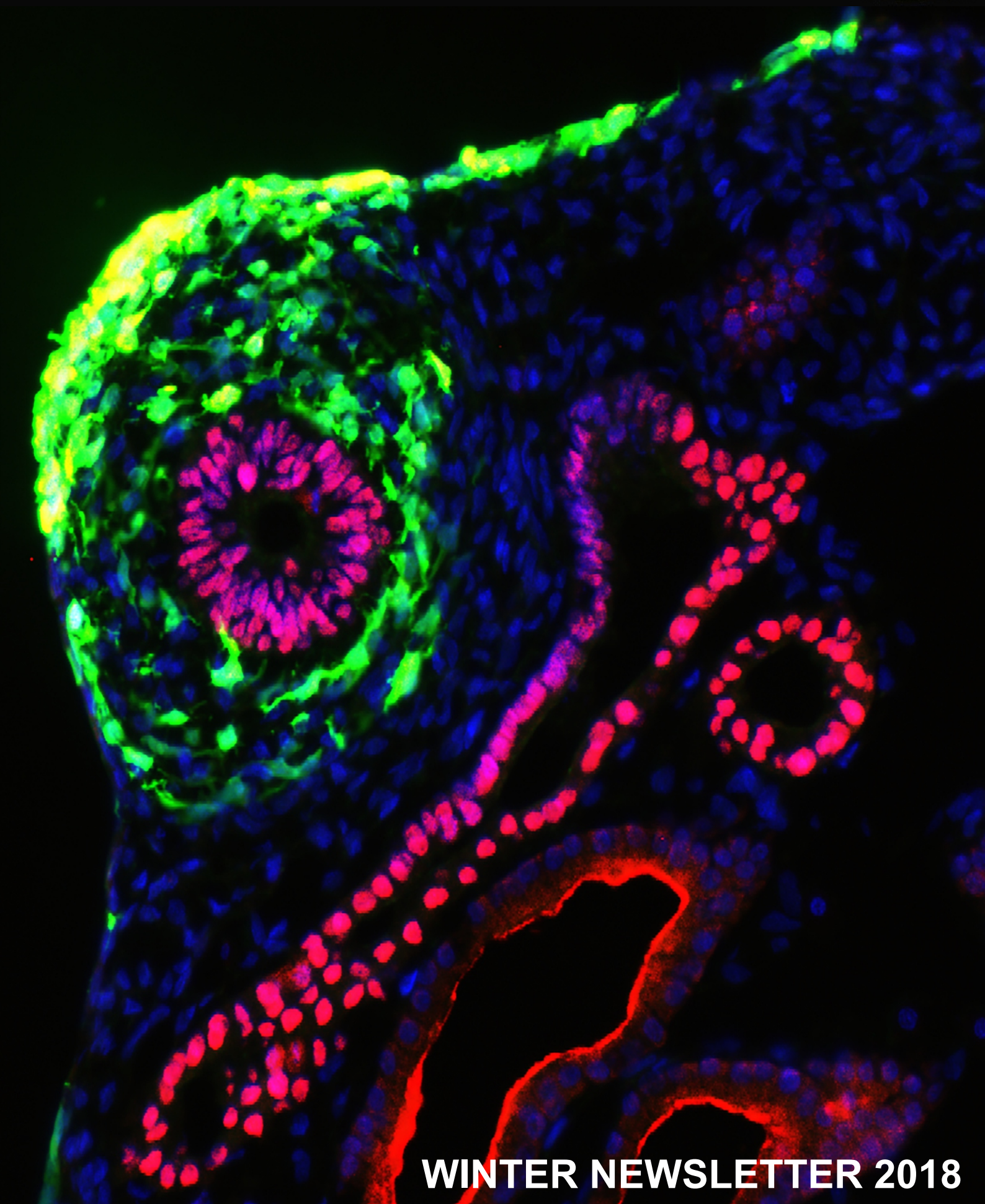
ANZSCDB

Australia and New Zealand Society for
Cell and Developmental Biology Inc.



WINTER NEWSLETTER 2018

ANZSCDB

Australia and New Zealand Society for Cell and Developmental Biology Inc.

WINTER NEWSLETTER – AUGUST 2018

Dear ANZSCDB members,

As we prepare for more grant reviewing and winter is at its peak here in Adelaide, as always I share with you the news of the Society. In June, we were very pleased to announce the winners of the two major society awards, the President's Medal to Professor Sally Dunwoodie and the Emerging Leader Award to Associate Professor Mike Piper. Congratulations again to Sally and Mike. We received many worthy nominations for both awards, so it was great to see that the Cell and Developmental Biology disciplines are in the hands of some excellent scientific leaders. More about Sally and Mike's work elsewhere in this newsletter.

Our annual scientific meeting (and the AGM) are just around the corner, with ComBio2018 to be held at the International Convention Centre in Sydney from 23-26 September. The meeting program is now on-line and looks outstanding, thanks to Annemiek Beverdam, the Program Chair of ComBio2018. This year the International Society of Differentiation is also joining us at ComBio, sponsoring a number of international speakers. So please join us in Sydney, for what promises to be great meeting.

The state meetings are our most exciting meetings, which provide the local members and non-members alike a great opportunity to engage with each other and present their work. These meetings are also fantastic avenues for students and early career researchers to network. Several of these are planned for the last few months of the year, so please check with your state representative(s). I am very pleased to say, thanks to our exceptional and ever engaged treasurer Leonie Quinn, for the first time there is a meeting planned for Canberra (a "Territory" meeting?).

Another conference that should be of interest to the developmental biology community in Australia and New Zealand is the 2018 Indian Society for Developmental Biology (InSDB) Biennial Meeting in Kanpur, India. This meeting, as you will note from their website, is being promoted as a joint meeting between InSDB and ANZSCDB. Several members of the ANZSCDB, including Natasha Harvey, Ben Hogan, Leonie Quinn, Ian Smyth, Edwina McGlinn, Jo Bowles and Michael Piper (the winner of the ANZSCDB Emerging Leader Award) will be presenting their work at this meeting and showcasing the outstanding depth and diversity of the developmental biology research conducted by our members. Such joint meetings provide us an opportunity to engage with our region in a meaningful way, which hopefully will result in new research collaborations. More information about the InSDB meeting can be found here.

In this issue

Cover Art by Zahida Roly (VIC)

As always, the Society's Newsletter (thanks to our tireless Secretary Michael Samuel) provides a forum for all Members of our Society. We are always looking for brief profiles of our members for the Newsletter, so whether you are a student, an ECR, a new PI setting up her/his lab or a more seasoned cell and/or developmental biologist with a story to share, please write to us.

I look forward to catching up with many of you next month at ComBio2018.

Best wishes

Sharad Kumar

Key Dates

31st August 2018: 28th Annual Combined Biological Sciences Meeting, The University Club, University of Western Australia. The WA branch of the ANZSCDB will hold their annual meeting here in conjunction with several other WA societies. Registration and Abstract submission are now open.

10th – 13th September 2018: Embryonic-Extraembryonic Interactions: from Genetics to Environment; the British Society for Developmental Biology Autumn Meeting, Corpus Christi College, Oxford, UK. Registration is open.

23rd–26th September 2018: ComBio2018 at the International Convention Centre, Darling Harbour, Sydney. The full programme is now available.

27th September 2018 (TBC): Annual ANZSCDB NSW Cell & Development Biology Meeting. Veterinary Conference Centre, University of Sydney.

13th November 2018: 8th ANZSCDB Adelaide Meeting, the UniSA CRI Building, Cnr. North Terrace and Morphett Street Bridge, Adelaide.

22nd November 2018: Inaugural ANZSCDB ACT Cell and Developmental Biology Meeting, The John Curtin School of Medical Research, Australian National University, Canberra

29th November - 1st December 2018: Aussiemit 2018; 6th Biennial Australian conference for mitochondrial research, Bio21 Institute, Melbourne.

11th – 15th December 2018: InSDB Biennial Meeting 2018, jointly organised with ANZSCDB.

18th – 22nd March 2019: The Hunter Meeting, Hunter Valley NSW. You can register your interest and stay tuned for registration information.

ANZSCDB Corporate Member News:

We would like to thank the following corporate sponsors. Please visit their websites below and peruse their advertisements at the end of this newsletter.

Promega Australia

Australian BioResources

NewSpec Pty. Ltd.

Pakair Cargo Specialists

ATA Scientific Pty. Ltd.

Interview with the 2018 ANZSCDB President's Medallist: Prof. Sally Dunwoodie

NSW State Representative Sophie Pageon interviewed **2018 ANZSCDB President's Medal winner Professor Sally Dunwoodie.** Sally is a world leader in human development and the genetics underlying birth defects. Her scientific breakthroughs have the potential to prevent recurrent miscarriages and certain types of birth defects. Currently, she is the head of the Embryology Laboratory at the Victor Change Cardiac Research Institute, Sydney.

Hi Sally, congratulations on receiving the ANZSCDB President's Medal for 2018! From your personal perspective, what has been your greatest scientific breakthrough and how did it come about?

That would have to be the 12-year research project that culminated in a publication last year in the *New England Journal of Medicine*. In this work, we identified mutations in babies with complex structural birth defects that were caused by a deficiency in nicotinamide adenine dinucleotide (NAD). We generated mice with the same mutations as the patients and we were able to override the effects of the mutations- that is NAD deficiency and birth defects- by feeding pregnant mice with vitamin B3. This project took many years as technology and our ability to interpret data were not sufficiently advanced. It all started in 2005 when a clinical geneticist asked us to see if we could identify the mutation that caused her patient to be born with heart and vertebral and kidney defects, among others. A few years later we had another patient with similar defects. A few years after that we discovered that they had mutations in related genes that are involved in NAD synthesis. Then we had to generate mouse models and work out what was likely to have happened in the patients during development. It certainly took time to get the complete story. This project involved hard work from a lot of people – from many people working in my own lab to many collaborators. This was a very gratifying discovery, not only because of the duration of the project, but also because of its potential impact in preventing birth defects in humans.

Which were the key moments in your career that you believe brought you to where you are today?

That is a very interesting question. If I go way back, I think that the realisation that it's all "down to me" was one of the defining moments of my career. Realising that I can't expect others to do things for me, be it writing, thinking, planning research, creating opportunities. I had to be proactive, I had to do things for myself, this was necessary if I was going to have a shot at becoming an independent researcher. I certainly had loads of help in all these areas, but I realised that I could not expect this from others all the time.

A second key time in my career was my postdoctoral research in Rosa Beddington's lab in London. She was a wonderful embryologist, who inspired me by being an inspirational researcher who motivated me to work as hard as I could. She was sadly diagnosed with breast cancer and passed away during my postdoc, this was such a challenging and emotional time, but as she said, "you get on with it". I often think that it would be wonderful to get her opinion now on many aspects of my research.

Finally, the third key moment is more of a practical one. In 2000 I was offered an independent position at the Victor Chang Institute and this is such a wonderful place to work. I am surrounded by wonderful and supportive colleagues. It really is a blessing to work in such a supportive environment. A career in research is definitely hard work, but I am grateful to my colleagues and especially to Bob Graham, the head of the VCCRI, for their support.

As a female professor in science, what are the challenges you have faced throughout your career? Do you have any specific words of advice for aspiring female scientists?

It hasn't been easy, but I'm certain that it must have been harder for other women. The challenges are significant, but you have to

ask yourself “what do you really want?” The hardest thing is to combine having children (and I have the privilege of having two wonderful children) with the relentless ticking of the clock by which funding bodies judge our progress. It’s a real juggling act and it really helps to surround yourself with supportive people who can help you. Choose your colleagues and your partner well! My main advice would be to make the decision of what you really want out of a research career and then give it all you’ve got, with kids in tow.

Do you have a scientific role model?

There is not any one person that I would consider as my role model. Over time, I have tried to observe how the people around me interact with others and how they handle different situations and I have tried to take this information to mould myself into someone with the best of all this gathered information, to be the best version of myself. There is much room for improvement and one thing I certainly need to work on is to make “everything look easy” as I fear I make things look harder than they are. I feel very fortunate to have benefited from lots of people and I would like to thank them all – including Edna Hardeman, Peter Gunning, Rosa Beddington, Patrick Tam, Richard Harvey and Bob Graham.

What are the most satisfying aspects of your work? And what are the most challenging?

I would like to start with the most challenging! The most challenging aspect of my work is finding funding. But also trying to have a vision for a piece of work in order to pull it all together to get a complete story – orchestrating a multidisciplinary project, which involves communicating with many different people with different skills and priorities, collecting all the data required, managing people, basically “keeping all the balls in the air”. To make a vision become a reality is extremely challenging, but when it all comes together and you see a complete story emerging, this is the most gratifying aspect of my work.

Have you ever considered a different career?

No… no. I haven’t. I am lucky that I have not had to. Lucky that I have always had a fellowship or the right funding at the right time. I can’t imagine doing anything else! And I have never considered a different career.

What do you like to do in your spare time? I like to try and get fit, get an hour of exercise here and there when I can, such as cycling or rowing. It is also a great pleasure for me to spend time with my children, especially since I never spend as much time with them as I would like to. And I like doing both of these things somewhere near the sea. All in all, my ideal way to spend my spare time would be doing some exercise, with my children, near the sea!

Sally and her postdoctoral adviser Rosa Beddington in London in 1996. “We were having a bet about my research project- I bet her that I could do it and she that I could not- I like to think that I won the bet. The problem is that I cannot actually remember the details!”

Interview with the 2018 ANZSCDB Emerging Leader: Assoc. Prof. Michael Piper


Michael Piper

QLD State Representatives Samantha Stehbens and Larisa Haupt interviewed 2018 ANZSCDB Emerging Leader award winner Associate Professor Michael Piper. Michael grew up in a small town in North West Tasmania, receiving his Bachelor's degree from the University of Tasmania in Hobart. He completed his Honours year in 1997 at the University of Tasmania, under the supervision of Dr. Michael Feitz, studying the regulation of the hedgehog gene in Drosophila. He then moved to the Sunshine State, going on to complete his PhD under the mentorship of Prof. Melissa Little at the University of Queensland. Here he studied the Slit Gene family and their putative receptors, the Robo genes, in the developing murine kidney. Following his PhD, in 2003 he redirected his research focus to understanding the molecular and cellular mechanisms underlying neurodevelopmental and degenerative disorders. A relocation to the University of Cambridge with Prof. Christine Holt resulted in him exploring the role of Slit2 using Xenopus retinal growth cones and the NF-proto cadherin-mediated cell-cell adhesion in axonogenesis. In 2006, he returned to Australia to work with Prof. Linda at the Queensland Brain Institute, investigating transcription factors in CNS development. He currently runs a laboratory at the School of Biomedical Sciences at UQ. The goal of The Piper lab's research program is to under-

What inspired you to become a scientist?
I think two defining traits for many scientists are a curiosity and a love of the natural world. Both of these were important to me growing up, and I also had some wonderful teachers who encouraged this when I was at school.

What questions is your lab focusing on right now?
Our lab is trying to understand the transcriptional programs that control the biology of stem cells within the developing

Mike taking a break at a recent conference in Japan to visit an Owl Café.

and adult brain, and the consequences of abnormal neural stem cell biology.

Which model system do you use to address these questions?
We predominantly use the mouse as a model system.

What attracted you to this field and what recent findings do you find most exciting?
The complexity of the brain, and the fact that we still know so little about its development and function was what drew me to this field. Some of the single-cell sequencing data that is defining the diversity of neural stem cell populations is exciting currently.

What is the best science-related advice you ever received?
Work hard, publish often.

How do you achieve a work–life balance when you're trying to establish yourself as an independent investigator?
Being married to a very understanding wife, and having a great family helps. Running keeps me sane as well.

To date, what have been the pivotal points in your career?
Delving into neuroscience in my first post-doc was a pivotal point in my career. Also having access to great mentors and leaders.

If you weren't a scientist, what would you be?
Kindy teacher.

If you had the chance to change one thing within the funding structure in Australia, what would you change?
A greater emphasis on funding basic, fundamental research.

Could you tell us an interesting fact about yourself that people wouldn't know by looking at your CV?
Always loved Frank Zappa. (We also have it from a reliable source that Mike likes *"...pina coladas and walks in the rain."*)

2015 Buffalo Stampede Sky Marathon. This photo was taken prior to Mike and Jim Palmer spending 7 hours out on the trails. Photo Credit: Sarah Piper.

Organoids are us – 25th June 2018, Melbourne

By Prof Elizabeth Vincan (Doherty Institute) and Dr Maree faux (Walter and Eliza Hall Institute), symposium organisers.

"Organoids Are Us" was a one-day symposium to highlight the game changing advances to science and medicine that are the direct result of more than 30 years' of fundamental research into the Wnt signalling pathway. This symposium follows on from the first EMBO workshop on Wnt signalling held at Cable Beach, Broome in 2014. Leaders in the Wnt field delivered talks on advances in stem cell (Karl Willert, Nick Barker and Arial Zeng) and cancer (David Virshup and Ram Dasgupta) fields. Elizabeth Vincan opened the first session with a symposium overview and a summary of her team's research into the role of Frizzled 7 in the GI tract.

A game-changing advance spawned by the Wnt field is organoid technology – more specifically, tissue-restricted adult stem cell derived organoids. This advance was led by the Clevers group (Netherlands), who worked out a way to coerce adult tissue stem cells to do in tissue culture what they do in the body i.e. make tissue. These mini-replicas of tissues, termed "organoids", meaning "organ-like", can be readily manipulated, genetically or pharmaco-logically, to understand what makes a stem cell be a stem cell, and what changes occur in a normal stem cell to make them become cancer cells. Furthermore, organoids can be established from patient-derived tumours for anti-cancer drug pre-screening. The response of the tumour organoids to drug treatment matches the response of the patient to therapy. Thus, we can truly personalise therapy and avoid unnecessary treatment. In his plenary talk, Hans Clevers said that clinicians in Europe now order an "organoid" test, which forms an integral part of their diagnosis and treatment decision. "Organoid" testing is also applicable to conditions with a defined genetic cause, such as cystic fibrosis. Australia is well on the way to introducing similar organoid-based testing [see Australian Living Organoid Alliance (ALOA) website, ALOA headed by Prof Tony Burgess, Walter and Eliza Hall Institute].

The new frontier for organoid technology is organoids as models of infectious disease. The organoids faithfully recapitulate the key features and function of the intact tissue e.g. cell types present and tissue architecture, making them innovative models of natural infection, enabling the study of diverse human viruses that until now lacked suitable cell culture or animal models. Dr Mike Catton, Director of the Victorian Infectious Diseases Reference Laboratory (VIDRL) at the Doherty Institute said that organoid culture is an "innovative advance for virology…for fundamental research and public health". At the Doherty, we are perfectly placed to advance this field, given the multi-disciplinary groups (VIDRL, Epidemiology, Department of Microbiology and Immunology, Royal Melbourne Hospital laboratories etc) all housed in the one institute. The symposium was attended by 400 delegates from diverse backgrounds and was generously supported by STEMCELL Technologies, Perkin Elmer, Geneworks, Thermo Fisher Scientific and VIDRL. Huge thanks to Susan Northfield (University of Melbourne's Therapeutic Technologies Research Initiative), Patricia Gigliuto (Centre for Stem Cell Systems, University of Melbourne), Helen Braybrook (Stem Cells Australia), Finian Scallan (Doherty Institute); and Jean Moselen, Renate Schwab and Bang Tran (Vincan laboratory, Doherty Institute) for their invaluable help with organising this event.

L-R: Profs. Liz Vincan, Tony Burgess and Hans Clevers.

Hunter Meeting 2018

By A/Prof. Natasha Harvey, Convenor

This year's Hunter Meeting delivered four days of spectacular science spanning the fields of cell, developmental and systems biology in the midst of Semillon-laden Hunter Valley vineyards. The meeting started out with sessions focussed on stem cells and the Hippo pathway, both of which provided fascinating insight into the mechanics underlying stem cell fate decisions influencing development, regeneration and disease. International speakers Sara Wickstrom (University of Helsinki) and Georg Halder (CCB-Leuven Centre for Cancer Biology) presented captivating work that set the scene for these sessions and were followed by Jose Polo, Christine Wells, Ian Smyth, Ernst Wolvetang (Stem Cells and Development) and Kieran Harvey, Enzo Porello, Andy Cox and Kristin Brown (The Hippo Pathway). These exciting presentations were followed by the first plenary lecture, delivered by Andy Ewald (Johns Hopkins University), who inspired us with incredible live imaging illustrating the mechanisms of motility employed by metastatic cancer cells.

Day 2 illuminated us with "Building the cardiovascular system", led by elegant work, again featuring stunning imaging, from Li-Kun Phng (Riken), Emma Gordon and Kelly Smith, followed by exciting new discoveries in the world of hemogenic endothelial cell fate specification and cardiac organoid regeneration from Vashe Chandrakanthan and James Hudson, respectively. Next up, we delved into the world of cancer cells and their microenvironment featuring Jane Visvader, Edwin Hawkins, Thomas Cox, Michael Samuel and Sean Warren and yet more amazing three dimensional and real time imaging. This session was followed by "Signalling Networks", a powerhouse of signalling pathways and dynamics underlying cell behaviour featuring Christina Mitchell, David James, Sean O'Donoghue, Vi Wickramasinghe and Michael Lazarou. Incredible new insights to cellular behaviour in response to insult were prominent in "Cell Death and Inflammation", featuring Masayuki Miura (University of Tokyo), Ben Kile, Kate Schroder, Gemma Kelly and Antony Cesare. To top off Day 2, Marino Zerial (MPI-CBG) delivered a masterclass in how endosomal traffic is dynamically regulated to control cell signalling and metabolism.

Day 3 started off with "Cell Traffic"; Paul Gleeson, Rohan Teasdale, Nathan Pavlos, Senthil Arumugam and David Williams shared new insights to the mechanisms by which endosomes and cellular organelles navigate their course along subcellular highways. This theme was continued in "Wiring Networks", in which Roger Pocock, Fred Meunier, Jess Nithianantharajah, Lindsay Parker and Annie Quan described mechanisms underlying the relay of neuronal signals. Day 3's afternoon sessions took us deep into the fascinating world of "Mitochondria and Metabolism" and "Cellular Ultrastructure". Mike Ryan spearheaded our foray into understanding how the powerhouses of our cells generate energy, while Aleksandra Filipovska and Diana Stojanovski described how mitochondrial dysfunction results in human mitochondrial disease. Vijay Rajagopal explained how mitochondrial architecture fuels energy production in cardiomyocytes and Xuan Shun revealed that aged haematopoietic stem cells can be rejuvenated by vitamin B12. Clodagh O'Shea drew on Indiana Jones to illustrate the technology her team developed to reveal the stunning structure of chromatin using electron microscopy tomography, while James Whisstock, Rob Parton, Brett Collins and Patrick Humbert each described their employment of state-of-the-art EM techniques used to uncover new insights to cell signalling. Yohanns Bellaiche delivered a stunning plenary lecture to end the Day 3 program in which he unveiled tricellular junctions in epithelial cell sheets as crucial determinants of cell polarity and tissue organisation.

The final day of the meeting started out with "Programming cell identity"; John Pimanda, Susie Nilsson, Mat Francois, Heather Lee and David Elliott shared their work focussed on understanding how cell identity is genetically and epigenetically programmed from single cells to whole tissues. "Cell Architecture" shifted focus to the cytoskeleton and the mechanisms by which the microenvironment impacts the cytoskeleton to transmit signals important for cellular responses, a focus of many exciting presentations of this meeting. Edna Hardeman, Sarah Russell, Guillermo

Gomez, John Lock and Kate Miroshnikova all provided fantastic insight to this topic. The final session of the day "Post-translational

modification and regulation of signal transduction" featured Helen Walden (University of Glasgow), who provided a fascinating journey through her structural and functional studies of Parkin mediated ubiquitination, while Sharad Kumar, Yeesim Khew-Goodall, James Burchfield and Jacqui Stoeckli relayed novel insights to the regulation of signalling by ubiqutination, phosphorylation and de-phosphorylation. The meeting wrapped up on a high with Elaine Dzierzak (University of Edinburgh), a pioneer in the field of developmental haematopoiesis, who illuminated us with her latest work investigating the regulation of developmental haematopoiesis by GATA2. A highlight of her talk, fitting with a recurring theme throughout this meeting, was the use of advanced imaging techniques to visualise transcription factor activity in real time.

In short, and as per usual for Hunter Meetings, we left the Hunter Valley stimulated! Huge thanks to our sponsors, the organising committee, session chairs and all participants of the Meeting for a fantastic week! We hope to see everyone next year!

Keeping up to date

Thanks to Megan Wilson and Leonie Quinn, the **ANZSCDB** has a Facebook page for news updates and is also on Twitter as @ANZSCDB.

Please engage with us via social media for society news and updates and tag us in your work-related posts.

Would you like to contribute to the ANZSCDB newsletter?

Please send items to Michael Samuel, the society Secretary.

The newsletter will be published approximately every three months and distributed to all ANZSCDB Members via e-mail.

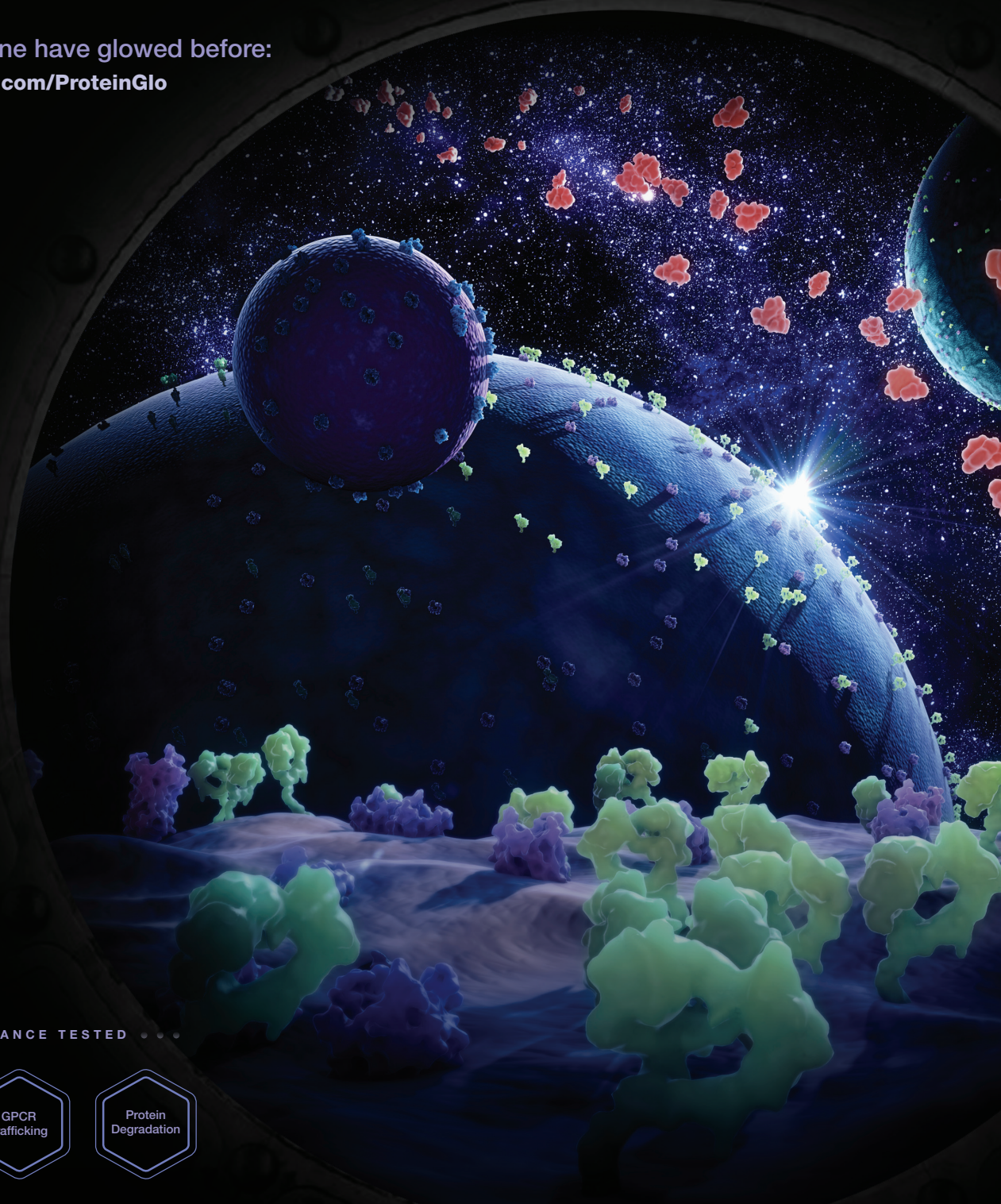
Please ensure that your submissions are no more than 100 words and have been fact-checked.

Promega

A New Frontier in Protein Detection

Sensitive enough to operate beyond the limits of other protein tags. Bright enough to detect and quantify proteins at endogenous levels. *The HiBiT Protein Tagging System* allows direct detection of protein abundance in cells or at the cell surface with a simple bioluminescent signal—no antibodies and no overexpression required.

Glo where none have glowed before:
www.promega.com/ProteinGlo



PERFORMANCE TESTED

CRISPR Knock-Ins

GPCR Trafficking

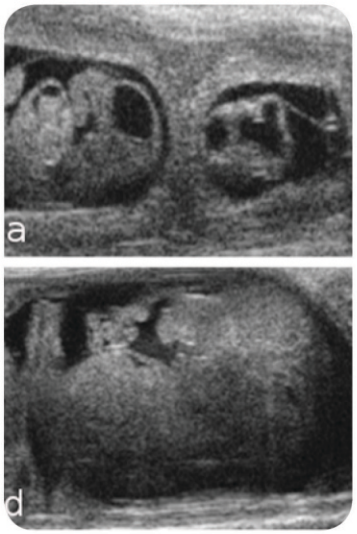
Protein Degradation

Australian BioResources

Due to popular demand C57BL6/NJAusb mice will be available from August 2018!

Ultrasound confirmation of pregnancy in mice

- Pregnancy can be confirmed from day 10 of gestation for time mated client strains or time mated orders of sale strains.
- Confirmation reduces mouse wastage, lost time and resources associated with the shipping of non pregnant females.
- Pregnancy can be guaranteed from 10 days gestation.



Please see:
http://www.abr.org.au/ordering/price-lists
for further information

The Jackson Laboratory

www.abr.org.au
Ph: (02) 9295 8565
E: *enquiries@abr.org.au*

Celebrating 10 years of supporting medical research.

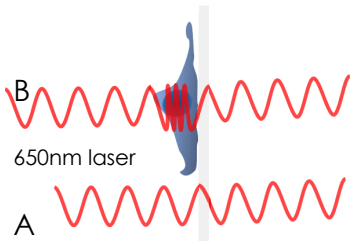
NATA

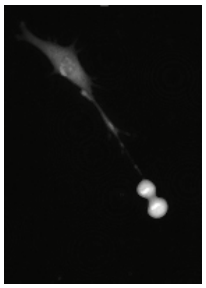
LIVECYTE: LABEL-FREE LIVE CELL IMAGING AND ANALYSIS

GENERATE HIGH CONTRAST CELL IMAGES UNDER LOW INTENSITY ILLUMINATION WITHOUT THE NEED FOR CELL LABELLING.

LiveCyte is a new modality which uses ***Ptychographic Quantitative Phase Imaging*** to segment and follow individual cells for accurate quantification of cell behaviour. LiveCyte delivers a continuous field of view with no loss of resolution permitting even highly motile cells to be tracked during time-lapse imaging. LiveCyte eliminates the need for manual tracking and achieves seamless integration of image acquisition and analysis to provide deeper insights into biological processes and disease conditions.

PTYCHOGRAPHY IS A NEW MODALITY





In passing through the cell, wave B becomes delayed relative to wave A.

The extent of delay is dependant upon cellular properties: thickness & cell material (RI).

Interfered light creates a diffraction pattern, used to reconstruct each image frame & create time lapse movie.

Results in high contrast information rich images.

For further information contact ATA Scientific, local distributor for the LiveCyte Cell Imaging and Analysis system developed by Phasefocus™.

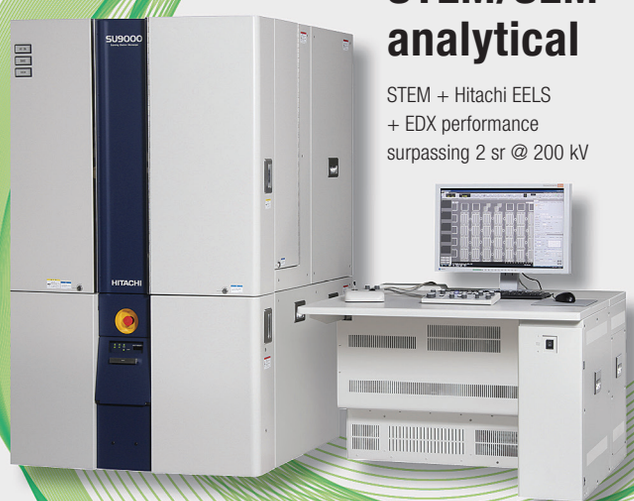
HITACHI
Inspire the Next

TM4000 Desktop SEM

NEW

Low-Voltage STEM/SEM analytical

STEM + Hitachi EELS
+ EDX performance
surpassing 2 sr @ 200 kV



Think Outside the Lab

NEW

HT7800 Series 120 kV TEM

The NEXT generation of modern
Transmission Electron Microscopes

Hitachi provides comprehensive solutions to support your success inside the lab and beyond through innovative, reliable, ergonomic, and robust products.

NEW

FlexSEM 1000
Variable-Pressure SEMs

NEW

Regulus Series
Field-Emission SEMs

NEW

ArBlade 5000
Ion-Milling System

NEW

ZONE II Specimen Cleaner

Atomic Force Microscopy

Your Australian & New Zealand specialists for Hitachi High-Tech / **Sales** / **Service** / **Support** /

Call (08) 8463 1967 sales@newspec.com.au

NewSpec

Head Office
330 Glen Osmond Rd
Myrtle Bank SA 5064
newspec.com.au