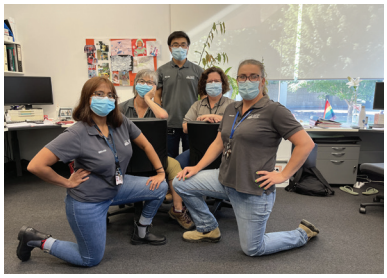
Australian National University

Research School of Biology Newsletter

Issue 134 | February 2022

Congratulations

We were notified on the last day of 2021 that the Biology Teaching Lab (**Melanie Trinick, Tammy Gomersall, Yiming Li, Fiona Roxburgh** and **Mrinalini Pratap**) were the recipients of the team award 'Commendation for Programs that Enhance Learning' in the College of Science Dean's Commendation for Excellence in Education 2021.



The Teams dedication and professionalism has allowed ANU biology students to continue to experience hands-on laboratory training throughout the last year. Due to the teaching lab team's dedication, students have been able to deepen their learning in multiple biology courses, and to develop critical skills, integral to their science degree.

We were also notified at the end of last year that **Ben Long** (Price and Badger Groups, PS) received a Dean's Commendations for Excellence in Education award for 'Excellence in Supervision'. The energy and integrity Ben brings to positions of leadership instils passion and a deep sense of equity in all he supervises, fostering a culture of diversity and creativity in the workplace. Ben is an effective Supervisor who knows when to give his students independence to explore their ideas and hypotheses, as well as when to direct productive discussion and thinking.

This month we celebrated the graduation of PhD students. Following the graduation ceremony, our PhD graduates joined with friends, family and supervisors to celebrate and acknowledge their magnificent achievements with some canapé's, drinks and a small congratulatory gift.

PhDs submitted

Jian Chen (Rathjen Group, PS) *Investigation of the signalling function of the plant resistance protein TIR domains.*

Sashika Richards (Whitney Group, PS) *Structure-function studies of multidrug resistance transporters of the malaria parasite.*

Cameron Turner (Magrath Group, E&E) *Using Information from Others: The Evolution and Cognition of Animal-to-Animal Information Use.*

Tanuka Sen *(Verma Group, BSB) Study of the functional roles of hypothetical proteins in the virulence of Shigella flexneri serotype 1c.*

Haochen Wei (Solomon Group, PS) *Using RNAseq to dissect virulence factors of wheat and barley pathogen Bipolaris sorokiniana.*

PhDs awarded

Upama Aich (Jennions Group, E&E) *The effects of age and mating history on male reproductive success.*

Sally Buck (Whitney Group, PS) *The chaperone mediated assembly of Rubisco and its SynBio potential.*

Yiheng Hu (Rathjen Group, PS) *Pathogen detection and microbial community compositions during fungal infections.*

Manuzza Rajput (Verma Group, BSB) *Study of O-acetyltransferase B (oacB) and three novel orfs encoded by Sf101 bacteriophage of Shigella flexneri.*

Yu Zhou (Whitney Group, PS) *Exploring the evolutionary protein landscape of red Rubisco towards improving plant photosynthesis.*

Welcome

Welcome to Professor **Colin Jackson** and his team who have recently established a research group within BSB. While the majority of Colin's group will remain at the Research School of Chemistry, the RSB sub-group will act as the Canberra node of the ARC Centre of Excellence in Synthetic Biology (https://www.coesb.com.au/), with projects at RSB focussed on the development of engineered enzymes and protein-tools to support the Centre of Excellence's primary goal of "engineering novel microbial cell factories to help establish an environmentally sustainable advanced biomanufacturing industry in Australia". The Group will initially be made up of a few Honours and PhD students, as well as Postdoc, **Joe Kaczmarski.** The Group will be based in the RN Robertson Building (C206), please come and say hi!. Colin and his group are looking forward to working closely with researchers from all Divisions of RSB and building upon the School's strengths in phylogenetics, bioinformatics and protein characterisation.

The Atkin lab has welcomed a new PhD student, **Xuan Hu,** who arrived from China in mid December. Xuan's PhD will investigate impacts of drought and heat on plant respiration, both in above and below ground organs.

Dr. Jing Zhang joins the Pogson lab as a Postdoc working as part of Barry's ARC laureate project looking in to the performance of SAL1 wheat lines in the field. Jing brings a great deal of crop experience to RSB after working at CSIRO for several years.

Farewell

Sally Buck has been an influential parts of RSB both as a PhD student in the Whitney lab, a leader of the social-hour team, and more recently working as a Postdoc in the Atkin lab. We say thank you and farewell to Sally as she takes up a position at CSIRO Black Mountain in February 2022 and best of luck on the adventure ahead.

The Atkin Group is sad to say goodbye to **Brad Posch** who has submitted his PhD in November 2021 and will soon leave the Atkin lab to take up a post doc at Texas Tech University, working with Associate Professor Nick Smith.

After nearly a year of providing excellent support as an IT Client Services Officer, we farewell **Nicolette Yue**, and wish her well in her new role in the ACT Government. Nicolette's last day was 4 February.

Farewell to **Jessica McLachlan**, who is completing her post-doc in the Langmore lab after a herculean effort in the field this summer. We couldn't have done it without you Jess!

News

On February 17, Upper Snowy Landcare Network planted out the first of 1,400 eucalyptus trees that **Justin Borevitz, Helen Bothwell, Tim Brown, Shagufta Iqbal** and **Chloe Tan** have been growing in RSB's Plant Phenomics Facility to measure their response to contrasting climate conditions. This is part of a collaborative research program to genomically quantify and predict climate adaptation traits of two groups of tableland and mountain Eucalyptus species from all over the state with funding from the Environmental Trust and the Landcare Led Bushfire Recovery Program. The trees were planted in a Travelling Stock Reserve near Berridale that has been ravaged by a eucalyptus dieback event that spanned an area the size of the ACT, as documented by Fenner School's Cris Brack and Catherine Ross. The Landcare group in this partnership is led by **Margaret Mackinnon,** Honorary Associate Professor at RSB.

Grants awarded

Barry Pogson, Diep Ganguly, Marten Moore (both Pogson Group, PS) and their colleagues received an ARC DP22 grant that will investigate the regulation of protein translation in plant productivity.

Owen Atkin, Andrew Scafaro (Atkin Group, PS), **Danielle Way** and their external colleagues received an ARC DP22 grant on modelling the relationship between respiration and photosynthesis in leaves.

Papers

Behruznia M, O'Brien CL & Gordon DM. Prevalence, diversity and genetic structure of *Escherichia coli* isolates from septic tanks. *Environmental Microbiology Reports*. https://doi.org/10.1111/1758-2229.13035

Bohman B, Tan MMY, Flematti GR & Peakall R. Drakolide structure-activity relationships for sexual attraction of Zeleboria wasp pollinator. *Journal of Chemical Ecology*. https://doi.org/10.1007/s10886-021-01324-4

Bromham L. Meaning and purpose: using phylogenies to investigate human history and cultural evolution. *Biological Theory.*

Carstens E, Linde CC, Fourie PH, Bester-van der Merwe AE et al. Spatial and temporal genetic analyses of Phyllosticta citricarpa in two lemon orchards in South Africa reveal a role of asexual reproduction within sexually reproducing populations. *Phytopathology.* https://doi.org/10.1094/PHYTO-05-20-0203-R

Dagvadorj B, Outram M, Williams SJ, Solomon PS. The necrotrophic effector ToxA from *Parastagonospora nodorum* interacts with wheat NHL proteins to facilitate Tsn1-mediated necrosis. *The Plant Journal.* https://doi.org/10.1111/tpj.15677

Dougherty LR, Skirrow MJA, Jennions MD & Simmons LW. Male alternative reproductive tactics and sperm competition: A meta-analysis. *Biological Reviews of the Cambridge Philosophical Society.*

Fan Y, Scafaro AP, Asao S, Furbank R, Agostino A, Day DA, von Caemmerer S, Danila F, Rug M, Atkin OK et al. Dark respiration rates are not determined by differences in mitochondrial capacity, abundance and ultrastructure in C4 leaves. *Plant,Cell and Environment.* https://doi.org/10.1111/pce.14267

Gade M, Tan LL, Damry AM, Brock JS, Jackson CJ et al. Substrate dynamics contribute to enzymatic specificity in human and bacterial methionine adenosyltransferases. JACS Au. https://doi.org/10.1021/jacsau.1c00464.

Hoops D, Whiting MJ & Keogh JS. A smaller habenula is associated with increasing intensity of sexual selection. Brain, Behavior and Evolution. https://doi.org/10.1159/000521750

Hsiao Y & Oberprieler RG. Bionomics and new host plant records of the Australian trunk-boring cycad weevils (Coleoptera, Curculionidae). The Coleopterists Bulletin. https://doi.org/10.1649/0010-065X-75.3.695

Hua X, Cardillo M & Bromham L. Adapting to extremes: reconstructing evolution in response to changing climate over time and space in the diverse Australian plant genus Acacia. *Journal of Biogeography*. https://doi.org/10.1101/2021.05.08.443013

Kanyuka K, Igna A, Solomon PS, Oliver PS. The rise of necrotrophic effectors. *New Phytologist.* https://doi.org/10.1111/nph.17811

Lawes MJ, Crisp MD, Clarke BJ et al. Appraising widespread resprouting but variable levels of postfire seeding in Australian ecosystems: the effect of phylogeny, fire regime and productivity. *Australian Journal of Botany*. https://doi.org/10.1071/BT21110

Marques AJD, Hanson JO, Camacho-Sanchez M, Moritz C et al. Range-wide genomic scans and tests for selection identify non-neutral spatial patterns of genetic variation in a non-model amphibian species (*Pelobates cultripes*). *Conservation Genetics.* https://doi.org/10.1007/s10592-021-01425-3

Nakagawa S, Lagisz M, Jennions MD, Noble DWA et al. Methods for testing publication bias in ecological and evolutionary meta-analyses. *Methods in Ecology and Evolution.* https://doi.org/10.1111/2041-210X.13724

Neville SL, Sjöhamn J, Watts JA, Fairweather SJ et al. The structure of the ABC transporter PsaBC shows that bacterial manganese import is achieved by unique architectural features that are conserved across the kingdoms of life. *Acta Crystallographica Section A: Foundations and Advances*. https://doi.org/10.1107/S0108767321095799

Ortiz D, Chen J, Outram MA, Williams SJ et al. The stem rust effector protein AvrSr50 escapes Sr50 recognition by a substitution in a single surface exposed residue. *New Phytologist.* https://doi.org/10.1111/nph.18011

Pavón-Vázquez CJ, Esquerré D & Keogh JS. Ontogenetic drivers of morphological evolution in monitor lizards and allies (*Squamata: Paleoanguimorpha*), a clade with extreme body size disparity. *BMC Ecology and Evolution.* https://doi.org/10.1186/s12862-022-01970-6

Pisokas I, Rössler W, Webb B, Zeil J & Narendra A. Anesthesia disrupts distance, but not direction, of path integration memory. *Current Biology*. https://doi.org/10.1016/j.cub.2021.11.039

Posch BC, Hammer J, Atkin OK, Coast O et al. Wheat photosystem II heat tolerance responds dynamically to short and long-term warming. *Journal of Experimental Botany*. https://doi.org/10.1101/2021.11.01.466822

Putra R, Waterman JM, Mathesius U et al. Benefits of silicon-enhanced root nodulation in a model legume are contingent upon rhizobial efficacy. *Plant and Soil*. In press

Rahimi F & Abadi ATB. Is Omicron the last SARS-CoV-2 variant of concern? *Archives of Medical Research*. https://doi.org/10.1016/j.arcmed.2022.01.001

Rahimi F & Abadi ATB. A commentary on "Omicron SARS-CoV-2 variant: reasons of emergence and lessons learnt" (Int J Surg 2022;97:106198) contact-tracing and global vaccine equity: crucial responses to emergence of the Omicron SARS-CoV-2 variant. *International Journal of Surgery.* https://doi.org/10.1016/j.ijsu.2022.106244

Ridgway MC, Cihalova D, Brown SHJ, Tran P, Maier AG et al. Analysis of sex-specific lipid metabolism of *Plasmodium falciparum* points to the importance of sphingomyelin for gametocytogenesis. *Journal of Cell Science.* https://doi.org/10.1242/jcs.259592

Ying H, Hayward DC, Klimovich A, Neeman T, Forêt S, Huttley G, Ball EE et al. The role of DNA methylation in genome defense in Cnidaria and other invertebrates. *Molecular Biology and Evolution.* https://doi.org/10.1093/molbev/msac018

Yu DS, Outram MA, Crean E, Smith A, Sung YC, Darma R, Sun X, Ma L, Jones DA, Solomon PS, Williams SJ. Optimized Production of Disulfide-Bonded Fungal Effectors in Escherichia coli Using CyDisCo and FunCyDisCo Coexpression Approaches. *Molecular Plant-Microbe Interactions*. https://doi.org/10.1094/MPMI-08-21-0218-TA