Australian National University

Research School of Biology Newsletter

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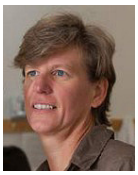
ANU COLLEGE OF SCIENCE

NEWS

Promotions



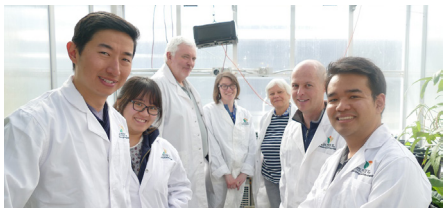
Congratulations to **Celeste Linde** (E&E), **Kevin Saliba** (BSB) and **Peter Solomon** (PS), who have been promoted to Professor (Academic Level E), effective 1 January 2019.

Rob Lanfear (E&E) has been promoted from Academic Level C to Associate Professor (Academic Level D).

Derek Collinge wins Vice-Chancellor's commendation

Derek Collinge (Pogson group, PS) was awarded the Vice-Chancellor's commendation for Innovation (Service and Solution) at the VC Awards ceremony this month. Derek is the lab manager for the CoEPEB, and the award recognises his contributions to the Centre and to the School. Read more here.

RIPE supplemental funding approved



Wil Hee, Eng Kee Au, Dean Price, Eiri Heyno, Susanne von Caemmerer, Ben Long and Nghiem Nguyen.

The Gates Foundation and the University of Illinois approved supplemental funding for the Realizing Improved Photosynthetic Efficiency (RIPE) project to accelerate translation of RIPE technologies into food crops this month.

Members of the RSB HDR conference organising committee, prize winners and HDR conveners at the prize-giving morning tea. Back row, from left, Jamie Robertson, Christiana McDonald-Spicer, Alex Chen, Naresh Verma, Rob Lanfear, Shagufta Iqbal, Chen Wang, Sally Buck, Spencer Whitney. Front row, Eve Cooper, Sanduni Hapuarachchi, Yu Zhou, Yi-Chang Sung. Image Sharyn Wragg. (See: News Item on page 2)

The work of **Dean Price** (PS), **Ben Long** (Badger, Price groups, PS) and team (see image below), on bicarbonate transporters and carboxysomes was one of the projects identified for funding. This will allow Dean Price's group at ANU to greatly strengthen the advances on engineering bicarbonate transporters, while also completing the carboxysome research to the extent that field trials of the complete system might be possible in 2022.

The carboxysome work will strengthen our novel finding that basic carboxysomes can be successfully built in tobacco chloroplasts (Long *et al*, 2018, Nature Communications). The total amount of the supplement funding allocated to ANU is US $721,527 (this includes indirect costs at 15%). This is in addition to ANU RIPE II funding of US $3,935,541 bringing ANU's total proposed budget to US $4,657,068, which will permit the project to hire two new postdocs and technical support. - **Susanne von Caemmerer** (PS).

ARC Grant outcomes

RSB secured a respectable 16% of the total successful ANU proposals in the latest ARC grant round, including two LIEF grants, six Discovery grants, five DECRAs, and the University's only successful Linkage grant.

Craig Moritz (E&E) and colleagues were awarded a Linkage grant worth $460,000 for a project aiming to improve the management of Australia's threatened mammals, using new genomics methods to measure the effects of small population size on genetic diversity and mutation load.

Adrienne Nicotra (E&E), **Justin Borevitz** (PS, E&E) and colleagues were awarded a $1,120,000 LIEF grant to establish the Australian Mountain Research Infrastructure Facility (AMRIF), which will will bring together leading institutions and researchers to produce world-leading ecosystem, evolutionary and biophysical science to guide adaptive management of High Mountains across Australia. It will support research to assess the extent and effects of changing climate, water and fire regimes on ecosystem processes and their feedback, and provide a structure for integrated research, management and governance of Australia's mountains. **Rod Peakall** (E&E), **Barry Pogson** (PS), **Guillaume Tcherkez** (PS), **Eric Stone** (CBBU) and colleagues secured a $489,045 LIEF for high resolution gas chromotography mass spectrometry for metabolic research, which will aid in the development of new technologies, commercial products and services, creating jobs and benefiting the agriculture, health and environmental sectors.

Discovery Projects were awarded to: **Lindell Bromham** (E&E), $462,000 for a project that aims to investigate the causes

Service team profile: Compliance

Jeremy Weinman, Tim Butler (left) and Paul Helliwell (right).

Team responsibilities
Advising on and coordinating regulatory compliance - Work Health & Safety, Genetically Modified Organisms, Biosecurity (Quarantine), Radiation (including Lasers and Nuclear material), Tobacco growing, Diving - also providing back-up for fieldwork and vehicles
Liaising with the ANU (Work Environment Group, Institutional Biosafety Committee) or external regulators (Office of the Gene Technology Regulator, Department of Agriculture and Water Resources, Australian Radiation Protection and Nuclear Safety Agency, Australian Tax Office, Australian Federal Police, ACT Health and Dept Health (Cwth)).

Team members
Dr Jeremy Weinman, Tim Butler, Paul Helliwell.

What does a typical day look like?
Fortunately there's few 'typical' days - though doing CMS stocktake work can seem endless. Often an email read over breakfast or while walking in from the car park means any previous plans go out the window and generates a flurry of activity to research and provide a quick response or tackle a suddenly urgent task.

What else would you like RSB to know about your team?
One of RSB's strengths is that it has chosen to use people with experience working in biological research in its compliance area. Jeremy has been a research fellow in plant molecular biology and a PI on grants, lectured undergraduates and supervised graduate students. Tim previously worked as a lab manager in medical labs in Queensland and JCSMR. Paul's background is in pesticide testing and later bee behavior research. Jeremy and Tim now also have qualifications in WHS.

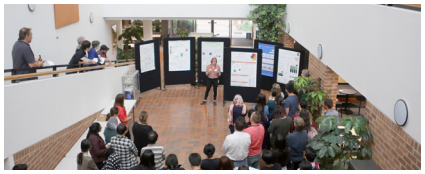
What's the best part of the job?
Best part of the job is the large range of activities in RSB we are able to cover and being able to interpret and simplify the bureaucracy for an RSB member.

This newsletter is archived at biology.anu.edu.au/news-events/newsletter.
Layout: Mel Norris
Editing: Scott Keogh & Mel Norris

and consequences of variation in the rate of DNA sequence evolution across three kingdoms of life. This project will test reliability of current methods, identify potentially misleading estimates of disease origin or conservation priorities, and develop new approaches with empirically-informed models of rate change.
Michael Jennions (E&E) and colleagues, $470,000 for a project that will examine the fitness consequences of age-dependent changes in cognitive abilities of invasive fish. This project will test the prediction that individuals with above average cognitive performance when young are below average when old, or whether some individuals stay relatively smarter than others throughout their lives.
Scott Keogh (E&E), $432,000 for a project that will use new methodological and analytical tools to test the influence of climate, habitat and evolutionary history on driving convergent morphological evolution across multiple independent animal groups. This work will also improve public awareness of Australia's unique animals and their history.
Loeske Kruuk, **Andrew Cockburn** (both E&E) and **Martijn van de Pol,** $600,000 for a project that aims to dissect the ecological and evolutionary processes causing a decline in an iconic Australian bird species. The project expects to provide essential information for the improved management of Australian bird populations, and for understanding the effects of environmental change on natural systems globally.
Craig Moritz (E&E) and colleague, $422,000 for a project that aims to determine whether species that have small geographic ranges and which live in historically stable refugia, have evolved narrow climatic tolerances. The project expects to provide improved guidance for ecological management of biodiversity hotspots.
John Rathjen (PS), $430,000 for a project that aims to investigate the roles of plant malectin receptor kinases in pathogen recognition and response. Expected outcomes of this project include a better understanding of how pathogens manipulate plant cells to their benefit, and greater knowledge of which host molecules participate in this process, which should provide a new theoretical basis to engineer crop plants for resistance against diseases.
Eric Stone (CBBU), $360,000 for a project that aims to investigate deep connections between genetic structure (population genetic processes, linkage disequilibrium and population structure) and the ability to statistically detect genetic variants responsible for variation in traits.
Additionally, two RSB researchers are Chief Investigators on external grants. They are:
Uli Mathesius (PS), on a project that aims to build a model of the signals that regulate root nodule formation, based at the University of Tasmania. This project will provide fundamental information on why some species can form nitrogen-fixing nodules by examining the role of plant hormones and will build the knowledge base required to potentially expand this symbiosis into non-legumes, harnessing the huge advantage nodule forming species have in staple crops.
Patrick Meir (PS), on a project that aims to examine how resilient Eucalyptus species are to future droughts by combining data synthesis, manipulative experiments and modelling, based at UNSW. This work will develop a strong evidence- and process-based understanding to quantify the functional behaviour of drought-adapted Eucalyptus species and use this insight to make future model projections.
Discovery Early Career Researcher Awards (DECRAs) have been awarded to:
Helen Bothwell (Borevitz group, PS), $419,406 to work on the genomics of drought adaptation in endangered Eucalyptus woodlands.
David Duchene (Moritz group, E&E), $344,682 to investigate the drivers of genome evolution and diversification in marsupials.
Xia Hua (Bromham group, E&E) $418,386 for a project that aims to provide a suite of theories, methods and software to enhance our understanding on how the generation of variation at molecular level is linked to the generation of species richness at lineage level.
Jana Sperschneider (Rathjen group, PS, Stone group, CBBU) $362,000 to seek a new understanding of how rust fungi cause devastating plant diseases, and devise strategies for effective rust disease management that will in the future lessen the impact of rust diseases on agriculture and natural ecosystems in Australia.
Darren Wong (Peakall group, E&E), $391,743 for a project that investigates the molecular systems biology of novel flower colour evolution.

RSB HDR conference
More than 100 talks were presented by RSB HDR students at their annual conference this month. Three

separate sessions ran concurrently to accommodate all the 8 minute talks, which were arranged by theme. Posters were also on display and there was a 1 minute 'Elevator Pitch' competition, where students had 1 minute to pitch their poster to the crowd.



Sally Buck giving a 1-minute 'Elevator Pitch' to a packed crowd in Catcheside Court. Image Sharyn Wragg..

Winners were announced at the school morning tea on Tuesday 27 November (see main image). Winners of the Hiroto Naora prize for best conference presentations were **Eve Cooper** (Kruuk group, E&E), **Sanduni Hapuarachchi** (van Dooren group, BSB), and **Yu Zhou** (Whitney group, PS). Runner-up awards went to **Nishank Shah** (Bröer group, BSB), **Yi-Chang Sung** (Solomon group, PS) and **Alyssa Weinstein** (Peakall group, E&E). **Alyssa Weinstein** also won the people's choice Elevator Pitch competition.

Thanks to session chairs - **Tim Bonnet** (Kruuk group, E&E), **Christina Spry** (Saliba group, BSB), **Megan McDonald** (Solomon group, PS), **Rebecca Bathgate** (Jennions group, E&E), **Amanda Buyan** (Corry group, BSB), **Xiao Xiao Zhang** (Rathjen group, PS), **Piet Arnold** (Kruuk group, E&E), **Juan Jose Perez** (Corry group, BSB), **Michael Groszmann** (Evans group, PS), **Ben Kaehler** (Huttley group, E&E, CBBU), **Stephen Fairweather** (Bröer group, BSB), and **Tory Clark** (von Caemmerer group, PS); IT helpers - **Arild Arifin** (Linde group, E&E), **Sashika Richards** (Martin group, BSB), **Annamaria De Rosa** (Evans group, PS), **Tobias Hayashi** (Peakall group, E&E), **Xiaojun Yuan** (Leyton group, BSB), **Michael Taleski** (Djordjevic group, PS), **Lauren Ashman** (Rowell group, E&E), **Sarah Shafik** (Martin group, BSB), **Yi-Chang Sung** (Solomon group, PS), **Upama Aich** (Jennions group, E&E), **Julie Leroux** (Pogson group, PS) and **Han Lee** (Djordjevic group, PS), and of course the conference organising team - **Sally Buck** (Whitney group, PS), **Alex Chen** (Fulton group, E&E), **Shagufta Iqbal** (Callaghan group, BSB), **Christiana McDonald-Spicer** (Moritz group, E&E), **Jamie Robertson** (Martin group, BSB), and **Chen Wang** (Solomon group, PS).

CompBioFest II

Computational biologists from RSB and beyond met for two days for CompBioFest II this month. With 20 speakers, including guests from Austria, Canada, New Zealand, UK and USA, the meeting covered a broad range of computational biology topics, including phylogenetics, genome assembly, protein structures, molecular evolution and metagenomics. "The breadth of topics presented in the meeting suggests that computational biology has a key role not just in bioinformatics, but also in areas such as cell biology, animal behaviour and even language evolution", said **Xia Hua** (Bromham group, E&E), one of the organisers. "This meeting aimed to promote communication among computational biologists in different areas and provide a platform for interdisciplinary collaboration through our common language of mathematics and statistics", she said.

Thanks to the organising committee: **Xia Hua** (Bromham group, E&E), **Ben Kaehler** (Huttley group, E&E, CBBU), **Benjamin Schwessinger** (PS), **Minh Bui** (Lanfear group, E&E) and **Thomas Wong** (Rodrigo group, CBBU), plus **Rob Lanfear** (E&E) who funded accommodation for invited speakers, and **Allen Rodrigo** (CBBU) who intiated and funded the meeting.

Rene Catullo (Moritz group, E&E) spoke about phylogenetics of complex groups at Compbiofest II. Image Thomas Wong.

Visits by politicians representing education and agriculture

Education Minister Hon. **Dan Tehan** visited RSB this month during a visit to campus to make an announcement about graduate employability. After the announcement, he met and talked with honours students working in the lab - **Alexandra Catling** (Nicotra group, E&E), **Krish Sanghvi** (Head group, E&E) and **Suyan Yee** (Pogson group, E&E).

Education Minister Dan Tehan shares a joke with RSB honours students Ali Catling (centre), Krish Sanghvi and Suyan Yee. Members of the ANU Media multimedia team are behind the cameras.(Image: Scott Keogh)

Shadow Agriculture Minister Hon. **Joel Fitzgibbons** visited RSB this month. He wanted to learn more about food security, and RSB, College of Engineering, CoE for Translational Photosynthesis and the Centre for Entrepreneurial Agri-Technology (CEAT) showed some of their projects and talked about their science. Mr Fitzgibbons visited the new CEAT space in the Gould building to learn more about what ANU is doing to build agricultural-industry capacity, by creating collaborations across disciplines and sectors. He also saw the new Growth Capsules to get a sense of where the technology in research is going. Thanks to all the presenters and tour leaders - **Owen Atkin** (PS), **Megan McDonald** (Solomon group, PS), **Brad Posch** (Atkin group, PS), **Suyan Yee** and **Melanie Carmody** (both Pogson group, PS), **Richard Poiré** (Borevitz group, PS), **John Evans** (PS) and **Rob Mahoney, Gerard Kennedy** and **Brock Holland** from the ANU College of Engineering, and to the CEAT team, **Emma Burns**, **Alisha Duncan** and **Ursula Cringle**. - **Alisha Duncan**, Events and Industry Engagement Co-ordinator, CEAT.

Shadow Minister Joel Fitzgibbons talks to Melanie Carmody and Suyan Yee in the lab (Image: Lannon Harley, ANU).

Outreach News

Alex Maier (BSB) did three outreach workshops for the Goethe Institute this month. The event was for 60 year nine students from 4 different high schools. "The students learn German at school, but they also had an interest in STEM and therefore the scientific talks were given both in German and English, which was quite a challenge", said Alex. "Nonetheless it was great to see so many enthusiastic and engaged students asking bright questions."

IN THE MEDIA

A short version of the Gender Equity Report produced by **Christiana McDonald-Spicer** (Moritz group, E&E), **Benjamin Schwessinger** (PS) and **Susan Howitt** (BSB) was published on the eLife blog this month.

Ben Long (Badger, Price groups, PS) and **Rob Sharwood** (Furbank group, PS) were interviewed by Robyn Williams on the ABC's Science Show to discuss

their recent work published in Nature Plants and Nature Communications on improving photosynthesis in food crops. The interview is available here.

WELCOME

The Ball group (PS) welcomes **Helen Holmlund** (PhD student, Univ California, Santa Cruz) who has arrived to spend a year studying water relations, leaf hydraulics and eco-physiological functioning in mangrove ferns, the only ferns known to be salt tolerant. Helen is the recipient of a prestigious NSF GROW Award that supports graduate research opportunities worldwide.

The Pogson group (PS) welcomes and congratulates **Melanie Carmody**, who received a CSIRO Synthetic Biology Future Science Fellowship to optimise ROS/redox-sensitive, reversible bioswitches as tools for transient on-demand monitoring and control of biosystems. She is returning to RSB after 4 years Postdoc'ing in Finland in the lab of Prof. Jaakko Kangasjärvi and will work closely with Barry Pogson, Craig Wood (CSIRO) and Colin Jackson (RSC).

The Atkin group (PS) welcomes back **Andrew Scafaro** who has returned to RSB after spending the last 2 years as a postdoc in VIB Ghent, Belgium, undertaking research into heat stress tolerance in wheat funded by a Marie Curie Postdoctoral Fellowship awarded in 2016.

MPHIL SUBMITTED

Sophie Johns (Jennions group, E&E) 'Modelling host evolutionary responses to infection'.

PHDS SUBMITTED

Stefanie Oberprieler (Moritz group, E&E) 'Incorporating terrestrial invertebrates in conservation planning: diversity, distribution and cross-taxon congruence in an Australian tropical savannah landscape'.

Angelin Samuel (Gordon group, E&E) 'Genotypic and survival characteristics of *Escherichia coli* phylogroup B2 from water'.

PHDS AWARDED

Bonnie Flohr (Evans group, PS) 'Stabilising the flowering time of wheat in response to autumn rainfall decline'.

Sara Milward (Whitney group, PS) 'Interrogating Plant Rubisco-Rca Interactions'.

Chun Wai Yu (Pogson group, PS) 'Studies on Multi-Layer Aleurone Mutants in Cereals and Their Nutritional Significance'.

Zihui Zheng (Millar group, PS) 'The miR159-GAMYB pathway: conservation and divergence of target silencing efficacy and function of GAMYB homologues amongst diverse plant species'.

PAPERS ACCEPTED

Chen W, Salari H, Taylor MC, Jost R, Berkowitz O, Barrow R, Qiu D, Branco R, Masle J, NMT1 and NMT3 N-Methyltransferase activity is critical to lipid homeostasis, morphogenesis, and reproduction, *Plant Physiology*.

Chen W, Taylor M, Barrow R, Croyal M, Masle J, Loss of phosphoethanolamine N-methyltransferases abolishes phosphatidylcholine synthesis and is lethal, *Plant Physiology*.

Crisp PA, Smith AB, Ganguly DR, Murray KD, Eichten SR, Millar AA, Pogson BJ, RNA Polymerase II read-through promotes expression of neighbouring genes in SAL1-PAP-XRN retrograde signaling, *Plant Physiology*.

Deans RM, Brodribb TJ, Busch FA, Farquhar GD, Plant water-use strategy mediates stomatal effects on the light induction of photosynthesis, *New Phytologist.*

Esquerre D, Brennan IG, Catullo RA, Torres-Perez F, Keogh JS, How mountains shape biodiversity: The role of the Andes in biogeography, diversifiation and reproductive biology in South America's most species rich lizard radiation (Squamata: Liolaemidae), *Evolution*.

Fox RJ, Fromhage L, Jennions MD, Sexual selection, phenotypic plasticity, and female reproductive output, *Philosophical Transactions of the Royal Society B*.

Goh C-H, Nicotra AB, Mathesius U, Genes controlling legume nodule numbers affect phenotypic plasticity responses to nitrogen in the presence and absence of rhizobia, *Plant Cell and Environment*.

Guan J, Tjhin ET, Howieson VM, Kittikool T, Spry C, Saliba KJ, Auclair, K, Structure-activity relationships of antiplasmodial pantothenamide analogues reveal a new way by which triazoles mimic amide bonds, *ChemMedChem.*

Hick L, Meir P *et al*., Carbon and nitrogen inputs differentially affect priming of soil organic matter in tropical lowland and montane soils, *Soil Biology and Biochemistry.*

Igic B, Ratnayake CP, Radford AN, Magrath RD, Eavesdropping magpies respond to the number of heterospecifics giving alarm calls but not the number of species calling, *Animal Behaviour.*

Iglesias TL, Boal JG, Frank MG, Zeil J, Hanlon R, Cyclic nature of the REM sleep-like state in the cuttlefish *Sepia officinalis*, *Journal of Experimental Biology*.

McDonald-Spicer CJ, Schwessinger B, Howitt S, Departmental-level approaches to gender equity in biology, *Peer J Preprints.*

Nanayakkara BS, O'Brien CL, Gordon DM, Diversity and distribution of *Klebsiella* capsules in *E. coli*, *Environmental Microbiology Reports*.

Newman SJ, Errors as a primary cause of late-life mortality deceleration and plateaus, *PLOS Biology*.

Newman SJ, Plane inclinations: a critique of hypothesis and model choice in Barbi *et al., PLOS Biology*.

Togashi HF, Atkin OK, Bloomfield KJ, Bradford M, Cao K, Dong N, Evans BJ, Fan Z, Harrison SP, Hua Z, Liddell MJ, Lloyd J, Ni J, Wang H, Weerasinghe LK, Prentice IC, Functional trait variation related to gap dynamics in tropical moist forests: a vegetation modelling perspective. Perspectives in Plant Ecology, *Evolution and Systematics*.

NOTICES

New PARSA College of Science Reps

Andrew Almonte (Fahrer group, BSB) (left) and **Jess Hargreaves** (RSES) (below left) are the new PARSA reps for the College of Science. Andrew and Jess are primarily responsible for supporting and advocating for students in the College of Science. Should students wish to contact either of them for questions about PARSA services and events, or request support in their degree, they can email their COS representatives at parsa.cos@anu.edu.au or feel free to visit them in person.