Australian National University

Research School of Biology Newsletter

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ANU COLLEGE OF MEDICINE, BIOLOGY AND ENVIRONMENT

NEWS

Congratulations to new Future Fellows

Janet Gardner (EEG) and **Denisse Leyton** BSB and ANUMS) have been awarded prestigious 4-year ARC Future Fellowships.

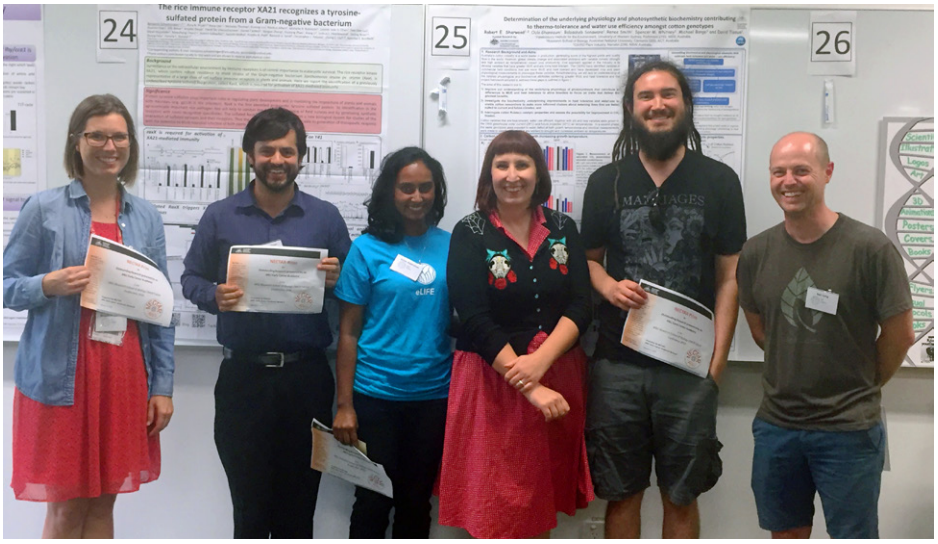
Inaugural EMCR Conference

Our first Early and Mid Career Researchers (EMCR) Future Conference in over 10 years was a great success! Around 200 people attended and created opportunities for the three departments to integrate and hear about the research being undertaken by EMCR. We had a great range of diverse presentations and the keynote speakers - Aidan Byrne and Amber Beavis, provided valuable insight into future career pathways. Two poster prizes were awarded to **Trevor Murray** (EEG) and **Ben Long** (PS) and three talk prizes were awarded to **Esther Rajendran** (BSB), **Danswell Starrs** (EEG) and **Megan McDonald** (PS). This conference was possible through the sponsorship from RSB, ARC Centres of Excellence (Translational Photosynthesis & Plant Energy Biology), NECTAR, eLife, Axios, Frontiers of Plant Science and Faculty 1000. Other sponsors included Merck Millipore, VWR International, John Morris Group and Bio-Strategy. We hope this is the start of many more to come, as >95% of the feedback indicates people want to see this happen again! - **Sally Potter** (Moritz group, EEG).

LT Evans Plant Growth Facility opening

John Evans, Murray Badger, Spencer Whitney (PS) and **Florence Danila** (von Caemmerer group, PS) attended the opening on January 21 of a new plant growth facility donated by the Australian Government to the International Rice Research Institute (IRRI) in the Philippines. The building was named after John's father who served on the board of IRRI and whose advocacy had resulted in a phytotron being donated to IRRI previously. The opening took place during IRRI Science week and all four RSB representatives contributed talks to the IRRI-Australia symposium. RSB has close ties with IRRI as it is part of the Bill and Melinda Gates C4 rice consortium along with **Susanne von Caemmerer, Robert Furbank** and **Florence Danila**, and Paul Quick (IRRI), who are all part of the ARC Centre of Excellence for Translational Photosynthesis.

John Evans spoke on behalf of the Evans family at the opening.



Prize winners from the inaugural Early and Mid Career Researchers conference: Megan McDonald (Solomon group, PS), Danswell Starrs (EEG), Esther Rajendran (Kirk, van Dooren groups, BSB), keynote speaker Amber Beavis, Trevor Murray (Zeil group, EEG), and Ben Long (Badger, Price groups, PS) Photo: Elena Martin Avila (see News item).

Biology Olympiad Summer School

Past Biology Olympiad Students preparing to welcome the new summer school students at ANU
Photo: J Beckman

Once again the Biology Olympiad Summer School was a great success this January thanks to the work of **Juliey Beckman** and the Teaching Lab team **Mel Trinick, Peta Moisis, Tammy Gomersall, Fiona Roxburgh** and **Yiming Li**. Twenty-one college level students qualified to attend the intensive two weeks of learning. This year we had one student from Canberra - the rest came from interstate. The students were here to soak up lots of biology with the hope to eventually compete on the Australian Team. The international competition will be held in Korea later this year. One of the students who attended summer camp in 2015 has just moved from Melbourne to commence Science (Advanced), majoring in Biology here at ANU.

Vale Sally Stowe

Sally Stowe (14 July 1951 - 11 January 2016) managed the ANU Electron Microscopy Unit (ANUEMU) in Building 46 for 24 years, until her retirement in 2008. Sally will be remembered for her immense technical skill, modest demeanour and enduring helpfulness. Sally's vale has been published on the RSB website.

AWARDS

Loeske Kruuk (EEG) was awarded the Genetics Society UK Mary Lyon medal, for mid-career researchers in genetics, at the Population Genetics Group conference in Edinbugh. Loeske has also been appointed Editor of the Proceedings of the Royal Society London Series B.

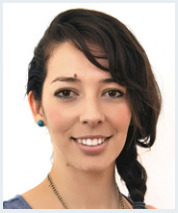
Stefan Broer gave the invited plenary lecture at the 2015 Australian Physiological Society (AuPS) conference in Hobart, and was presented with a medal to mark the occasion. The photo, left, shows AuPS president Graham Lamb and Stefan at the presentation.

Andrew Scafaro (Atkin group, PS, CoEPEB) has been awarded a Marie Curie Post Doctoral Fellowship to work with Bayer Crop Science in Gent, Belgium, starting mid-2016.

Early career researcher profile:

Elena Martin Avila (PS)

Research background



I studied a B.Sc. in Biology and Biochemistry at the University of Salamanca (Spain) and from there I moved to the UK to undertake a PhD in Plant Biotechnology at The University of Manchester. My PhD work involved developing innovative applications to manipulate the plastid genome as a production platform of high-value products for industry and health. During this time I became more interested in issues related to sustainable agricultural development and food security, and that's why I came to do a Postdoc here at ANU.

Current research interests

I am currently working in the Whitney Lab (aka Rubisco Lab), as part of the ARC Centre of Excellence for Translational Photosynthesis. It is a great place to do science and I consider myself extremely fortunate to be surrounded by some of the most internationally prominent researchers in the field!

In the Whitney Lab we focus on studying the enzyme Rubisco, involved in the CO_2-fixing step of the Calvin-Benson cycle during photosynthesis. Rubisco is a crucial enzyme to sustain life on earth, but its catalytic properties frequently limit the growth capacity of many plants. We are targeting these catalytic inadequacies via genetic manipulation with the aim of supercharging photosynthesis to improve growth efficiency in crops.

Within this goal, one of my main interests has been to apply my biotechnology background to develop strategies for expressing Rubisco small subunits in plastids, in order to easily manipulate them individually and validate their catalytic role.

What do you see as challenges for your field of research?

As a scientist working on developing technologies directed to contribute to the battle of food security, I often feel frustrated when I witness ferocious opposition to GMOs. With millions of people lacking access to sufficient nutritious food, I believe that turning GM crops down is a privilege that many can't afford. Informing and educating the public is as crucial to the food security battle as developing these technologies, and probably one of our biggest challenges ahead.

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

Stephen Fairweather (Broer group, BSB) has been awarded the 2016 Phyllis Montgomerie Award from the Royal Commonwealth Society, worth $5000 towards his current research. He also won the best poster prize at the Protein Structure and Function Joint Symposium, in November 2015.

PhD candidate **Florence Danila** (von Caemmerer, Furbank groups, PS) won 2nd prize in a micrograph competition sponsored by the Australian Microscopy and Microanalysis Research Facility (AMMRF) on her PEA-CLARITY work showing pitfields in monocot leaf, Panicum bisulcatum, at the biennial Australian Conference on Microscopy and Microanalysis (ACMM) held in early 2016.

GRANTS

Martijn van de Pol (EEG) was awarded a $2.3M grant, with collaborators from Radboud University and the Dutch Centre for Field Ornithology to develop a framework to quantify the cumulative human impacts on populations by linking the many threats acting at different spatio-temporal scales to the meta-population dynamics of Oystercatchers.

IN THE MEDIA

John Rivers (Pogson group, PS) has published a magazine article on the Asia & the Pacific Policy Society's 'Policy Forum' website, which discusses how plant genomics can be translated into agricultural and environmental innovations, specifically as part of the Australian Government's 'Ideas Boom'.

Thomas Wallenius (Rowell group, Cooper group, EEG) was interviewed by the Cooma Monaro Express, for an article about the blackheaded cockchafer beetles that appeared in huge numbers in Cooma in January.

The Australian Journal of Zoology featured

one of **David Happold**'s (EEG) study species, *Mastacomys fuscus*, on the front cover of the issue in which his recent paper appeared. (Photo by Ken Green, former PhD student).

PHDS SUBMITTED

Joanne Lee (Millar Group PS) 'Understanding the interaction between RNA-directed DNA methylation and DNA demethylases and its role in *Fusarium oxysporum* disease response in *Arabidopsis thaliana*'.

David Duchene (Cardillo Group EEG) 'The importance of phylogenetic model assessment for macroevolutionary inference'.

Marta Vidal Garcia (Keogh Group EEG) 'Morphological evolution in Australian frogs'.

Emrah Tumer (Broer Group BSB) 'Transcriptional regulation of Slc6a19 along the crypt-villus axis".

Heli Barron Pastor (Gordon Group EEG) 'Gut microbiome in rats: Effects of diet on community structure and host-microbiome interactions'.

PHDS AWARDED

Ana Clarissa Alves Negrini (Atkin Group PS) 'Physiological and biochemical responses of barley (*Hordeum vulgare* L.) to nitrogen availability'.

WELCOME

Professor **Rick Harrison** from Cornell

University is visiting EEG until mid April. Rick has broad interests in evolution, including speciation and hybrid zones. He can be contacted on rgh4@cornell.edu and his office is in Gould 207. He would welcome drop-in visitors for a chat.

Delin Sun joins the Corry group (BSB) as a postdoc, to work on an industry-funded project, investigating the mechanism of action of local anaesthetic drugs.

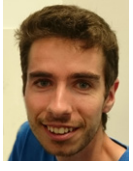
PhD student **Pawan Parajuli** joins the Verma group (BSB). He has an Endeavour

Postgraduate award, and will be working on bacteriophages of *Shigella flexneri* and their role in its virulence. This will involve isolating novel bacteriophages, molecular characterization and determining their role in pathogenesis.

PhD student **Annamaria de Rosa** has joined the Evans group (PS) to work on manipulating the expression of aquaporins associated with CO_2 transport.

Foteini Spagopoulou is a visiting PhD student from Uppsala University (Sweden), who will be doing a project in the Jennions group (EEG).

Masters student **Pierrick Bru**,from the



University of Montpellier, France, is visiting the Jones group (PS) until mid July. He is working on identification of the *Fusarium oxysporum* Avr7 gene corresponding to the tomato I-7 resistance gene identified recently in the Jones group by **Yvonne Gonzalez-Cendales**.

FAREWELL

Michael Whitehead (Peakall group, EEG) is leaving to take up a short Endeavour Fellowship with the University of Wisconsin Milwaukee (USA), followed by the McKenzie Postdoctoral Fellowship at the University of Melbourne. Michael has been at RSB since he was a PhD student in 2008.

PAPERS ACCEPTED

Alonso-Cantabrana, H, von Caemmerer, S, Carbon isotope discrimination as a diagnostic tool for C4 photosynthesis in C3-C4 intermediate species, *Journal of Experimental Botany.*

Barbour, MM, Evans, JR, Simonin, KA, von Caemmerer, S, On-line CO_2 and H_2O oxygen isotope fractionation allows estimation of mesophyll conductance in C4 plants, and reveals that mesophyll conductance decreases as leaves age in both C4 and C3 plants, *New Phytologist.*

Betti, M, Bauwe, H, Busch, FA, *et al,* Manipulating photorespiration to increase plant productivity: recent advances and perspectives for crop improvement, *Journal of Experimental Botany.*

Binks, O, Meir, P, Rowland, L, *et al*., Plasticity in leaf-level water relations of tropical rainforest trees in response to experimental drought, *New Phytologist.*

Cardillo, M, Warren, DL, Analyzing patterns of spatial and niche overlap among species at multiple resolutions, *Global Ecology & Biogeography.*

Clark, HL, Backwell, PRY, Male mating success in a fiddler crab: a lesson in sample sizes, *Journal of Ethology.*

Fan, D-Y, Fitzpatrick, D, Oguchi, RMW, Kou, J, Chow, WS, Obstacles in the quantification of the cyclic electron flux around Photosystem I in leaves of C3 plants, *Photosynthesis Research.*

Feng, X, Feakins, SJ, ... Meir, P, *et al*. Source to sink: Evolution of lignin composition in the Madre de Dios River system with connection to the Amazon basin and offshore fan, *Journal of Geophysical Research - Biogeosciences.*

Happold, DCD, A 10-year demographic study of a small mammal community in the Australian Alps, *Australian Journal of Zoology.*

Harris, KS, Durek, T, ...Conlan, BF, *et al*, Efficient backbone cyclization of linear peptides by a recombinant asparaginyl endopeptidase, *Nature Communications.*

Harts, A, Kristensen, N, Kokko, H, Predation can select for later and more synchronous arrival times in migrating species, *Oikos.*

Howitt, S, Wilson, A, Scaffolded reflection as a tool for surfacing complex learning in undergraduate research projects, *Council on Undergraduate Research Quarterly.*

Hua, X, Bromham, L, PHYLOMETRICS: an R package for detecting macroevolutionary patterns, using phylogenetic metrics and backward tree simulation, *Methods in Ecology and Evolution.*

Huisman, J, Kruuk, LJ, Ellis, PA, *et al*., Inbreeding depression across the lifespan in a wild mammal population, *Proceedings of the National Academy of Sciences of the United States of America.*

Lin, HC, Karki, S, Coe, RA, ... Danila, FR, ...von Caemmerer, S, Furbank, RT, *et al*., Targeted knockdown of GDCH in rice leads to a photorespiratory deficient phenotype useful as a building block for C4 rice, *Plant Cell Physiology.*

McDonald, MC, McGinness, L, Hane, JK, Williams, AH, Milgate, A, Solomon, P, Utilizing gene tree variation to identify candidate effector genes in *Zymoseptoria tritici*, *G3.*

Mourocq, E, Bize, P, ... van de Pol, M, *et al.*, Lifespan and reproductive cost explain interspecific variation in the optimal onset of reproduction, *Evolution.*

Moya, A, ...Forêt, S, ...Hayward, DC, Ball, EE, *et al*., Functional conservation of the apoptotic machinery from coral to man: the diverse and complex Bcl-2 and caspase repertoires of *Acropora millepora, BMC Genomics.*

Nottingham, AT, Turner, BL,... Meir, P, *et al.*, Temperature sensitivity of soil enzymes along a 4 km gradient in the Peruvian Andes, *Biogeochemistry.*

Okubo, N, Hayward, DC, Forêt, S, Ball, EE, A comparative view of early development in the corals *Favia lizardensis, Ctenactis echinata*, and *Acropora millepora* - morphology, transcriptome, and developmental gene expression, *BMC Evolutionary Biology.*

Pavitt, AT, Pemberton, JM, Walling, CA, Kruuk, LEB, Testosterone and cortisol concentrations vary with reproductive status in wild female red deer, *Ecology & Evolution.*

Potvin, DA, Välimäki, K, Lehikoinen, A, Differences in shifts of wintering and breeding ranges lead to changing migration distances in European birds, *Journal of Avian Biology.*

Rolland, V, Badger, MR, Price, GD, Redirecting the cyanobacterial bicarbonate transporters BicA and SbtA to the chloroplast envelope: Soluble and membrane cargos need different chloroplast targeting signals in plants, *Frontiers in Plant Science.*

Salmon, Y, Torres-Ruiz, JM, ... Meir, P, et al., Balancing the risks of hydraulic failure and carbon starvation: a twig scale analysis in declining Scots pine. *Plant Cell and Environment.*

Schwessinger, B, Li, X, Ellinghaus, TL, et al., A second-generation expression system for tyrosine-sulfated proteins and its application in crop protection, *Integrative Biology.*

Smith, NE, Corry, B, Mutant bacterial sodium channels as models for local anaesthetic block of eukaryotic proteins, *Channels.*

Stürzl, W, Zeil, J, Boeddeker, N, Hemmi, JM, How wasps acquire and use views for homing, *Current Biology.*

Tran, PN, Brown, SH, Rug, M, Ridgway, MC, Mitchell TW, Maier, AG, Changes in lipid composition during sexual development of the malaria parasite *Plasmodium falciparum*, *Malaria Journal.*

Walker, BJ, Skabelund, DC, Busch, FA, Ort, DR, Measuring the impact of multiple CO_2 conductances on the apparent photorespiratory CO_2 compensation point through slope-intercept regression using improved theory, *Plant, Cell & Environment.*

NOTICES

Quarantine audit preparation

To assist areas using material subject to quarantine, we have prepared a pre-audit checklist that enables self assessment. We can also do 'mock' audits if you would like a more thorough preparation. - **Jeremy Weinman**, Compliance Coordinator.

Workshops in bioinformatics and statistics

CBBU, COMBINE, and SCU are organizing a series of introductory bioinformatics and statistics workshops. The workshops are primarily aimed at students, postdocs and early-mid career researchers, but are open to everybody from our College. More information on the RSB Events page.

Mass Spectrometry training and education

A series of education and training activities, intended to give a better insight into mass spectrometry and how it can be used to benefit research begins in March. For details, see the RSB Events page.