Australian National University

# Research School of Biology Newsletter

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ANU COLLEGE OF SCIENCE

## NEWS

### Centre for Entrepreneurial Agri-Technology (CEAT) opens

The ACT Chief Minister, **Andrew Barr**, and ANU VC **Brian Schmidt** were among the speakers at the opening of the new Centre for Entrepreneurial Agri-Technology (CEAT), in Catcheside Court this month (see main image). CEAT is a partnership between ANU and CSIRO, with funding from the ACT Government, that will provide an environment where start-ups, small-medium enterprises and agri-tech firms can directly engage with ANU and CSIRO researchers to build relationships, co-develop ideas and solve problems. Read more about CEAT here.


ACT Chief Minister Andrew Barr and ANU Vice Chancellor Brian Schmidt at the opening of the new Centre for Entrepreneurial Agri-Technology. Image Lannon Harley, ANU. (See: News Item)

### ARC Future Fellowships awarded

Benjamin Schwessinger has been awarded an ARC Future Fellowship. Image Daniel Caddell.

Congratulations to **Benjamin Schwessinger** (PS) and **Caitlin Byrt** (joining the Plant Sciences Division in January 2019),

who have been awarded prestigious ARC Future Fellowships. Benjamin (above) will continue his work on wheat stripe rust, and Caitlin (left) will be working on deciphering how plant cells regulate solute transport.

### Open Day 2018

ANU VC Brian Schmidt makes algae balls for a photosynthesis experiment at the Scope Out Science exhibit at Open Day, while Alisha Duncan (centre) explains the theory. Image Paul Chapman, Mode Imagery.

Despite rather gloomy weather, many enthusiastic potential students attended ANU Open Day this month. **Sally Buck** (Whitney group, PS), **Alisha Duncan** (Furbank group, PS) and **Mel Norris** (RSB Coms Officer) engaged visitors with the algae balls photosynthesis test, and **Megan McDonald** (Solomon group, PS) demonstrated the MinION, all in the Scope Out Science lab in the Science Teaching Building. Vice Chancellor **Brian Schmidt** dropped in to Scope Out Science and had a go at making algae balls with Alisha, and Alisha and Megan both did a facebook live for the College of Science. **Susan Howitt** (BSB, BTLC) and **John Evans** (PS) gave talks, and **Panit Thamsongsana** (BTLC), **Rod Peakall** (E&E), **Juliey Beckman** (BTLC), **John Evans** (PS), **Allen Rodrigo** (CBBU), **Kevin Saliba** (BSB), **Uli Mathesius** (PS), **Owen Atkin** (PS), **Tony Millar** (PS), **Aude Fahrer** (BSB) and **Susan Howitt** (BSB, BTLC) manned the advisory booth at Llewellyn Hall.

### National Science Week - Shirty Science

Megan Head and Sophie Kristine show off their entry in this year's Shirty Science competition for National Science week.

Shirty Science pairs researchers with artists to develop shirt designs that represent their science. **Megan Head** (E&E) collaborated with artist Sophie Kristine to produce the 'Team Beetle Sex' shirt (see image), that illustrates how sexually transmitted infections (mites, in this case) influence the evolution of mating behaviour in native Australian beetles. Shirts from this and previous seasons can be found here.

### National Science Week - Science in ACTion

More than 10,000 people visited the Science in ACTion festival at the Old Bus Depot, on Friday 10 and Saturday 11 August. This included an estimated 2,800 school students and teachers on Friday, which is more than double the number from previous years. RSB was represented on four stands - the Australian Plant Phenomics Facility (APPF), the ARC Centres of Excellence for Plant Energy Biology (PEB) and Translational Photosynthesis (CoETP) and the ANU Parasitology Society.


Ming-Dao Chia explains to a group of children how to use the VR on the APPF stand. Andres Garcia (left) was on the PEB stand. Image Mel Norris.

The APPF did virtual reality demonstrations of the plant cell to illustrate the function of chloroplasts and mitochondria, and

## Group leader profile: Benjamin Schwessinger (PS)

**Group research focus**
For a start we will have two focal points. The first one orbits around the question of how genome structure of diploid organisms, think fully phased whole chromosomes, relates to evolution and adaptation. Our focus will be on dikaryotic rust fungi, which have two haploid nuclei. We will overlay this question by comparing adaptation in wild and agricultural ecosystems. The second focal point will be pathogen identification and how infection changes the leaf microbiome. Both research areas will allow for collaborations across divisions at RSB. I am excited to contribute our expertise to many whole genome projects answering fundamental questions in biology.

**Teaching and research achievements**
Since I graduated high school, I have attracted eight independent fellowships the latest being a DECRA and now the Future Fellowship 18. These are pleasant achievements and I hope they convert to a pathway to long-term stability at some point.
I am excited to contribute to teaching at RSB focusing on bioinformatics and genomics. This will provide an exciting opportunity to further my teaching skills that I have applied mostly on an ad-hoc and informal basis. In preparation for this, I will attend instructor training from The Carpentries.

**What is your teaching focus?**
While my skill set is fairly broad, I will focus my teaching on bioinformatics and genomics during my Future Fellowship. What I would really like to contribute in addition is content that focuses on reproducible research at the HDR level. Still to date this comes often as an afterthought. I am currently working in an international collaboration developing teaching material around this topic (e.g. here) and I hope to integrate this at RSB as well.

**What else do you have underway?**
I am excited to be chair of the RSB equity committee. We hope to make a positive impact at the school and college level to generate a more equitable and inclusive environment. For balancing all the science, I aim at competing in multiple long distance oceanswim races in the next couple years to refresh the mind and to realign.

*The Schwessinger group (PS) officially commences in October 2018.*

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

presented an FLIR infra-red camera display to show how plant scientists use technology to determine stress in plants, useful for experiments where scientist are identifying plants that can cope with drought, heat or salinity stress. Thanks to volunteers **Tim Brown**, **Gareth Dunstone**, **Ellen Levingston**, **Ming-Dao Chia** and **Aly Weirman** (all Borevitz group, PS).

Aaron Smith talks about leaf respiration with children visiting the PEB stand. Image Tim Brown.

PEB set up leaf peel demonstrations and showed prepared peels on the screen. We discussed the importance of leaf respiration and the location/number of stomata in relation to drought tolerance in plants, and directed teachers towards our 3d VPC you-tube clip to play in the classroom to demonstrate the internal mechanics of plants. Thanks to volunteers **Naomi Hawley**, **Aaron Smith**, **Marten Moore**, **Bethany Stone**, **Julie Leroux**, **Suyan Yee** (all Pogson group, PS), **Clarissa Alves Negrini**, **Reshmi Gaju**, **Brad Posch**, **Deping Zhai**, **Andres Garcia** (all Atkin group, PS), **Ming-Dao Chia** and **Ashley Jones** (both Borevitz group, PS).
**Esther Rajendran** (van Dooren group, BSB) and **Christina Spry** (Saliba group, BSB) organised a revamped ANU Parasitology stand, while **Erick Tjhin**, **Cibelly Goulart**, **Edwin Tjhin**, **Sanduni, Hapuarachchi**, **Yi Xue**, **Soraya Zwahlen** (all van Dooren group, BSB), **Alex Maier** (BSB), **Ben Lodder**, **Meenu Pratap** (both Maier group, BSB), **Adele Lehane** (BSB), **Sarah Shafik**, **Sashika Richards** (both Martin group, BSB), **Ayman Hemasa**, and **Vanessa Howieson** (both Saliba group, BSB), along with **Melanie Rug** (JCSMR), **Sadaf Ilyas** (JCSMR) and budding parasitologists **Oskar and Phoebe Maier**, developed new exhibits for the stall and volunteered their time to share their enthusiasm for parasites. **Hannah Lewis** (Medical School) also drew a crowd with her popular parasite face painting.


RSB Director Allen Rodrigo took a chance and stuck his hand in the 'parasite mystery box', with Esther Rajendran, Yi Xue and Cibelly Goulart looking on. Image Mel Norris.

Alisha Duncan and John Evans at the CoETP stand. Image Mel Norris.

Plant DNA extraction was a popular activity on the CoETP stand – they went through 40 punnets of strawberries! Visitors could also explore how light is used by plants and learn about some of the Centre's recent innovations to help produce more food for the future. Our gratitude goes to **Annamaria de Rosa** (Evans group, PS), **Spencer Whitney** (PS), **John Evans** (PS), **Tory Clarke** (von Caemmerer group, PS), **Chandra Bellasio** (Farquhar group, PS), **Benjamin Schwessinger** (Rathjen group, PS), **Munazza Rajput** (Verma group, BSB), **Yu Zhou** (Whitney group, PS), **Yiheng Hu** (Rathjen group, PS), **Sally-Anne Buck** (Whitney group, PS), **Loraine Rourke** (Price group, PS), **Brendon Conlan** (Whitney group, PS), **Alisha Duncan** and **Natalia Bateman** (both Furbank group, PS).

**Women in Science Lunch**
**Susan Howitt** (BTLC, BSB) joined other women from across the Colleges of Science in a panel discussion on women in science. This was organized by ANUSA to celebrate Science Week. There was a wide-ranging discussion on why people choose science, opportunities within and outside universities, barriers to gender equity and what we can all do about them.

## IN THE MEDIA

Recent research by **Rob Magrath** (E&E), **Chaminda Ratnayake** (Magrath group, E&E) and colleagues has been covered widely in the international media. The work showed that fairy wrens can learn to recognise alarm calls without having to see a predator, just by listening to the familar sounds around them. It was covered in Gizmodo, The Guardian, the Daily Mail, US ABC news, news.com.au, New Zealand Herald, stuff.co.nz, Japan Times, Chicago Tribune, Xinhua, Science Daily and many other outlets, including a Scientific American podcast. You can listen to Rob's interview on Radio New Zealand here, and read the ABC News story here.

**Benjamin Schwessinger** (PS) was interviewed on ABC Radio Canberra Drive

this month about protecting wheat crops from fungal outbreaks.

The Leyton group (BSB) was featured in the August edition of the Australian Society for Biochemistry and Microbiology magazine, in the 'Publications with Impact' section (page 8). The article features the paper 'Folding Vector - a New Role for the Autotransporter ß-barrel Domain', published in Nature Communications.

**Megan Head** (E&E) was featured in a Canberra Times article about her Shirty Science collaboration with artist Sophie Kristine.

## WELCOME

**Bayantes Dagvadorj** (from Mongolia)

has joined the Solomon group (PS) for a 3 year postdoctoral position working on dissecting the molecular basis to effector-triggered susceptibility.

**Reynaldi (Rey) Darma** has joined the

Solomon group (PS) to do a PhD on dissecting barley diseases. Rey is originally from Indonesia but completed his Masters at the University of Melbourne.

The Fahrer group (BSB) welcomes **Andrew Almonte**, our new Ph.D. student. Andrew

will be taking over work on our cancer project, identifying mechanisms to improve our cancer immunotherapy. Andrew will be well known to many of you, as he has completed his Masters of Biological Science from ANU in 2016, and has spent the last year working as a research assistant in the Borevitz (PS) and Tcherkez (PS) groups.

A warm welcome to **Riichi Oguchi** from Tohoku University, Japan, back to the Chow group (PS) (now for the third time)

in Building 46 during two Canberra winter months over the next three years. Riichi will work with **Barry Osmond** and **Fred Chow** on Arabidopsis ecotypes originating from different latitudes in terms of their photosynthetic responses to stress.

## NEW APPOINTMENTS

Two postdoctoral fellows working in the Evans group (PS) on a GRDC funded International Wheat Yield Partnership project are moving on. **Hammad Khan** has taken up a four year fellowship with Everard Edwards at the Waite (CSIRO) in Adelaide to work on grapevine management. He will be sorely missed as he has been collecting hyperspectral reflectance data in the Mexican field site at Obregon. **Tory Clarke** is also leaving, but only down a floor to join **Susanne von Caemmerer** (PS) on the renewed RIPE project funded by Bill and Melinda Gates Foundation. - **John Evans**.

## PHDS SUBMITTED

**Amit Singh** (Nicotra group, E&E)
'On growth and form of leaves in 3 dimensions: Applications of machine vision and advanced optics'.
**Divya Muthiah** (Callaghan group, BSB)
'Strategies to overcome ABCB1 and ABCG2 mediated drug resistance in cancer'.

## PHD AWARDED

**Diep Ganguly** (Pogson group, PS)
'Training Memory: Exploring the Intersection of Plant Stress Signalling and DNA Methylation'.

## PAPERS ACCEPTED

Bromham L, Hua X, Cardillo M, Schneemann H, Greenhill SJ, Parasites and politics: why cross-cultural studies must control for relatedness, proximity and covariation, *Royal Society Open Science.*

Clark IA, Vissel B, Therapeutic implications of how TNF links APOE, P-tau, α-synuclein, ß-amyloid, and insulin resistance in neurodegenerative diseases, *British Journal of Pharmacology*.

Clark IA, Vissel B, The inflammatory nature of post-surgical delirium predicts benefit of agents with anti-TNF effects, such as dexmedetomidine, *Frontiers in Neuroscience*.

Cooper, EB, Kruuk, LEB, Ageing with a silver-spoon: A meta-analysis of the effect of developmental environment on senescence, *Evolution Letters*.

Fox RJ, Head ML, Barber I, Good parenting may not increase reproductive success under environmental extremes, *Journal of Evolutionary Biology*.

Jayatilaka P, Murray T, Narendra A, Zeil J, The choreography of learning walks in the Australian jack jumper ant *Myrmecia croslandi*, *The Journal of Experimental Biology*.

Lanfear R, Schalamun M, Kainer D, Wang W, Schwessinger B, MinIONQC: fast and simple quality control for MinION sequencing data, *Bioinformatics*.

Lawrence N, Dennis ASM, Lehane AM, *et al.*, Novel defense peptides from human platelet factor 4 kill *Plasmodium* by selective membrane disruption, *Cell Chemical Biology*.

Long BM, Hee W-Y, Sharwood RE, Rae BD, Kaines S, Lim Y-L, Nguyen ND, Massey B, Bala S, von Caemmerer S, Badger MR, Price GD, Carboxysome encapsulation of the CO2-fixing enzyme Rubisco in tobacco chloroplasts, *Nature Communications*.

Meir P, Mencuccini M, Binks O, *et al.*, Short-term effects of drought on tropical forest do not fully predict impacts of repeated or long-term drought: gas exchange vs growth, *Philosophical Transactions of the Royal Society of London B.*

Nottingham A, Fierer N, *et al.*, Kruuk L, Meir P, Microbes follow Humboldt: temperature drives plant and soil microbial diversity patterns from the Amazon to the Andes, *Ecology*.

Perrakil A, DeFalco TA, ... Schwessinger B, *et al.*, Phosphocode-dependent functional dichotomy of a common co-receptor in plant signalling, *Nature*.

Potter S, Deakin JE, Cytogenetics: an important inclusion in the conservation genetics toolbox, *Pacific Conservation Biology.*

Rosling JEO, Ridgway MC, Summers RL, Kirk K, Lehane AM, Biochemical characterization and chemical inhibition of PfATP4-associated Na+-ATPase activity in *Plasmodium falciparum* membranes, *Journal of Biological Chemistry.*

Sarabipour S, Wissink EM, *et al.*, Schwessinger B, Preprints:good for science and public, *Nature.*

Schalamun M, Nagar R, Kainer D, Beavan E, Eccles D, Rathjen JP, Lanfear R, Schwessinger B, Harnessing the minION: an example of how to establish long-read sequencing in a laboratory using challenging plant tissue from *Eucalyptus pauciflora, Molecular Ecology Resources*.

de Sena Oliveira I, Ruhberg H, Rowell DM, Mayer G, Revision of Tasmanian viviparous velvet worms (Onychophora : Peripatopsidae) with descriptions of two new species, *Invertebrate Systematics*.

Shimono H, Farquhar G, Brookhouse M, Busch FA, *et al.*, Pre-screening from large populations as a tool for identifying e[CO2]-responsive genotypes in plants, *Functional Plant Biology.*