Australian National University

Research School of Biology Newsletter

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ANU COLLEGE OF MEDICINE, BIOLOGY AND ENVIRONMENT

NEWS

Self-Organised Complexity of Shape

The 'Self-Organised Complexity of Shape Symposium' (SOCS) on April 6 drew participants from across the ANU as well as other Australian universities together to explore the science, and art, of shape. The symposium took an interdisciplinary approach to explain the evolution of shape in biology, using leaves as a case study. Biologists, mathematicians, engineers and physicists joined with ANU artists for a thought provoking day of presentations and discussions.

SOCS participants, seated from left: Sharon Field (botanical artist), Tom Buckley (U. Sydney, biology), Arezki Boudaoud (ENS Lyon, biophysics), **Adrienne Nicotra*** (EEG), Vanessa Robins* (RSPE), **Amit Singh*** (Nicotra group, EEG); first row standing from left centre: **Susanne von Caemmerer** (PS), Elisabetta Matsumoto (Harvard, mathematics), Mary Byrne (U Sydney, biology), **Graham Farquhar** (PS); second row standing: Abe Stroock (Cornell, bio-engineering), Julie Brooke (visual artist), **Cathy Franzi** (ceramic artist, RSB visiting fellow), Marcus Heisler (U Sydney, biology), Siobhann Braybrook (Cambridge, biology), Adrian Sheppard (RSPE), John Close* (RSPE), **Justin Borevitz*** (PS), Michael Barnsley (RSPE); back row: John Reid (art and science, ANU), Roland Fleddermann (RSPE), Tim Brodribb (U Tasmania, biology). *organisers. Image: Sharyn Wragg.

The Computational Biology and Bioinformatics Unit

The Computational Biology and Bioinformatics Unit (CBBU) is now a formal administrative unit of the RSB. The CBBU was set up to house academics, including the Director, **Allen Rodrigo**, whose research focuses on computational biology and cuts across the Divisions. The CBBU also has a service role, with the School's bioinformatician, **Marcin Adamski,** providing computational research support to staff and students in the RSB. As a Unit, the CBBU has no administrative, technical or financial support beyond that already available to its members. Current academic members of the CBBU are **Justin Borevitz** (joint with PS, EEG), **Gavin Huttley** (joint with EEG), and **Allen Rodrigo**. **Eric Stone**, the incoming Director of the Centre for Genomics, Metabolomics and Bioinformatics, will be a member of the CBBU when he arrives in July. As an active research unit, plans are already underway to launch a Computational Journal Club at the CBBU – all are welcome! - Allen Rodrigo.

Tired but happy, staff and students from Invertebrate Zoology (Biol2113), at the end of their recent field trip to the ANU Kioloa Coastal Campus (photo: Dave Rowell).

School Bioinformatician Marcin Adamski teaching a recent CBBU workshop, 'Software Carpentry introduction to programming with R'. (photo: Jack Simpson) (see news item).

Celebrating C_4 Photosynthesis: 50 years of discovery and innovation

C4 conference organisers and VIPS: Murray Badger (PS), Oula Ghannoum (Western Sydney University), Susanne von Caemmerer (PS), Bob Furbank (PS), Hal Hatch and Roger Slack. (photo: Natalia Bateman) (see News item).

2016 marks 50 years since Hal Hatch and Roger Slack discovered the C_4 photosynthesis pathway, while working on sugarcane.

The C_4 Photosynthesis Conference 2016: Past, Present and Future took place this month in Canberra, to celebrate their monumental discovery. The RSB was one of the main sponsors and 45 institutions from all over the world participated in the event, which was organised by the ARC Centre of Excellence for Translational Photosynthesis.

In 2002, Hal Hatch described the discovery as "having many of the elements of a good mystery thriller". This conference has shown that C4 Photosynthesis hasn't lost its excitement and that plant scientists continue to find plenty of fascinating and unexpected turns and applications in this thriller, which is less and less a mystery.

During the Plenary Lecture, **Bob Furbank** (PS) walked the audience through the C4 pathway, from the 1960s when space travel was morphing from science fiction to fact, and ending with the promising future impacts of this research. In the following three days, 60 poster presentations and 34 invited speakers presented research on C4 photosynthesis, ranging from historical perspectives, enzymes and pathways, molecular biochemistry, genomics and evolution, cell biology, physiology and future impacts and applications of this research.

Around 240 people attended the public lecture given by Rowan Sage (University of Toronto),

Teaching faculty profile:

Juliey Beckman

Research interests

My research interests centre around the evolution of life history strategies in carnivorous marsupials and more broadly the ecology of small mammal communities. In more recent times I have developed a keen interest in the urban ecology of birds; specifically, comparing bird behaviour among populations inhabiting areas that differ in human population densities.

Who is your science hero?

There are so many ! As an ecologist with an interest in small mammal population dynamics myself, Charley Krebs stands out because he has made a great contribution to the science of ecology (and still is).

What do you enjoy most about teaching?

The insightful, challenging and probing questions that our students often ask. I have taught at all undergraduate levels, but I most enjoy interacting with first year students. I get to teach every student enrolled in first year biology and it is such a great pleasure of mine to introduce them to the breadth of biological disciplines that they can study and research here at RSB. Helping to provide pathways for students who are newly discovering and expanding their own interests and passions is very fulfilling. It is also satisfying to know that I have helped many students transition into the independent learning environment of the tertiary sector; an adjustment that can be difficult.

What is your teaching focus?

I teach a range of undergraduate subjects including physiology, ecology, systematics and evolution. When I am teaching, my favourite times are when I find myself completely immersed in a practical or tutorial class. It might sound a bit cliché, but I try to include some form of discovery for students in every class. Providing opportunities for “aha” moments and seeing genuine interest from students in their experimental activities, observations or discussions creates a vibrant learning environment that makes teaching all the more stimulating and rewarding.

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

at the Shine Dome on The evolution of C4 photosynthesis. - Natalia Bateman.

Teaching opportunities for Early Career Academics in RSB

Last month the RSB EMCR Committee hosted a pancake brunch to discuss teaching opportunities within the school. **Steve Eichten** (Borevitz group, PS) cooked the pancakes and **Stefan Broer** (BSB) and **Dave Rowell** (EEG, BTLC) talked about graduate and undergraduate teaching opportunities respectively, at RSB. Stefan talked about an outcome of the recent RSB organizational review, where postdocs are encouraged to contribute to training/ teaching of PhD and Honours students by designing and implementing workshops in their areas of expertise. Dave suggested contacting course conveners directly to get lecturing experience, and also talked about teaching options outside the standard lecture series arrangement. He mentioned that **Mel Norris** is looking for people who want to be involved in presentations to high school students. A detailed synopsis of teaching opportunities within RSB, by Britta Forster, has been posted on the EMCR webpage. - Brendan Conlan.

Ben Long (Price group, PS), Florian Busch (Farquhar group, PS) and Wil (Wei) Hee (Price group, PS) help themselves to delicious pancakes at the EMCR event. (see news item).

Congratulations

Peter Solomon (PS) has been accepted onto the management Committee of the European COST Action FA1208, which is focussed on pathogen-informed strategies for sustainable broad-spectrum crop resistance.

Chris Fulton (EEG) was an invited keynote speaker at the EU COST FITFISH workshop in Belgrade, Serbia, where he spoke about how water flow speeds in aquaculture systems should be tailored to suit the varying swimming physiology of tropical fish species.

Awards

Megan McDonald (PS) won a poster prize for her work on the fungal pathogen *Zymoseptoria tritici*, at the 13th European Conference of Fungal Genetics (ECFG13). Her abstract was entitled 'Utilising gene tree variation to identify candidate effector genes in *Zymoseptoria tritici*'.

Honours scholar **Lucy Wenger** and PhD scholar **Joshua van Lier** (Fulton Fishlab, EEG) have both won awards from the Linnean Society of NSW: Lucy won the Julian E. Tenison Woods Award for her research into the ecology and evolution of reef fish habitat-specialisation, and Josh won the Joyce W. Vickery Award for his investigation into how acuate habitat disturbance affects seaweed-associated fishes at Ningaloo reef in Western Australia.

Sara Chica Latorre (MBall group, PS) has received the Chancellor’s Letter of Commendation for outstanding academic achievement in 2015.

PhD student **Florence Danila** (von Caemmerer group, PS) was awarded first prize for her poster presentation at the C4 Photosynthesis Conference 2016. The prize was sponsored by the Journal of Experimental Biology and awarded by popular vote of conference particpants. Florence’s poster was entitled 'Plasmodesmata in rice and *Setaria*: a comparison of symplastic transport mechanisms in C3 and C4 plants'.

Grants

Tamara Browne (BTLC) has been awarded a Brocher Foundation Residency fellowship to work on her project 'Rethinking parental autonomy in sex selection', in Geneva in the summer of 2017. The Brocher Foundation is a non-profit Swiss organisation that hosts experts studying the ethical, legal and social implications of medical research and biotechnology development.

Peter Solomon (PS) has received more funding from the GRDC as an investment towards 'Biosecurity preparedness of the grains industry against wheat blast'.

IN THE MEDIA

Chris Fulton (EEG) and **Mae Noble**'s (formerly EEG, now Fenner) work on the Murray crayfish was still attracting media attention this month, with a story in the New York Times, appearing on the front page of the NYT website.

Research on orchid semiochemicals used by Australian sexually deceptive orchids by **Rod Peakall**'s group (EEG) has been reported in the feature article in Current Biology magazine, entitled 'Could plants have cognitive abilities?'

Susanne von Caemmerer, **Bob Furbank** and **Rowan Sage** (from the University of Toronto) were interviewed by ABC Rural about the C4 Photosynthesis Conference on a story entitled Feeding the world by synthesizing

change. Bob was interviewed on the same day by Radio New Zealand. The story also appeared in the Weekly Times.

NEW APPOINTMENTS

Gavin Huttley has transferred to the RSB from the JCSMR. Gavin is an evolutionary and computational geneticist who will be jointly located in the CBBU (computational biology and bioinformatics unit) and EEG.

Amanda Buyan joins the Corry group (BSB) as a postdoc, to work on an industry-partnered project, investigaring the potential of voltage gated sodium channels as drug targets.

Postdoc **Emma Sherratt** joins the Keogh group (EEG). She will be working on macroevolutionary studies of phenotypic variation in Australian herps, in particular, patterns of morphological evolution as it relates to ecology in larval Australian frogs. She is also a software developer of the R package geomorph.

Welcome back to **Denise Higgins**, who will be working as a research assistant for **Susan Howitt** (BSB). Denise was previously in RSB but has spent the last two years working as an academic developer in CAP. Part of her role will be to support development of the new courses resulting from our curriculum review.

WELCOME

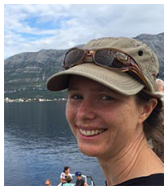
The RSB has a new artist in residence. **Cathy Franzi**, a recent PhD graduate from the ANU School of Art ceramics workshop, has received a 2016 Vice-Chancellor's Visiting Artist Fellowship to collaborate with **Adrienne Nicotra** (EEG). Cathy's work investigates the ways historical and contemporary representations of Australian flora on ceramic objects express botanical and environmental knowledge.

PhD student **Lily Chen** has joined the Furbank group (PS).She will be investigating the role of SWEET proteins in C4 plants, using the model C4 grass *Setaria viridis*. SWEETs are relatively recently characterised plasma membrane transporters which move sugars out of plant cells. They are thought to be involved in phloem loading of photosynthate in leaves and in unloading sugars to storage tissues such as stems and grain.

Rafael Coopman (Universidad Austral de Chile) will be working with Marilyn Ball from April-August on two projects: top-down rehydration in mangroves and drought stress in sub-Antarctic cushion plants.

Helder Espírito Santo from the Instituto Nacional de Pesquisas da Amazônia in Brazil is visiting the Fulton Fishlab (EEG) for two months to conduct research on the behavioural ecology of tropical freshwater fishes.

Kimberley Hunnam has joined the Fulton group (EEG), as a joint PhD student, also at Charles Darwin University. She will be investigating the ecological, socio-economic and food security aspects of the sardine fishery in Timor-Leste.



The Whitney group (PS) has a new PhD student - **Emmanuel Young**, who will be working on better understanding the biology of Rubisco Activase, the chiropractor helper protein of the CO_2-fixing enzyme Rubisco.

Spanish PhD student **Maider Iglesias Carrasco** is visiting the Jennions group (EEG) for three months.

FAREWELL

RSB Operations Manager **Simon Foxcroft** has moved across campus to the Research School of Physics and Engineering, where he will be Building Project Manager.

PAPERS ACCEPTED

Bavi, N, Cortes, MD, Cox, CD, Corry, B, *et al.*, Role of the N-terminal helix in the gating of MscL indicates a blueprint for bilayer-mediated gating of mechanosensitive channels, *Nature Communications.*

Bromham, L, Dinnage, R, Hua, X, Interdisciplinary research has consistently lower funding success, *Nature.*

Browne, TK, Why parents should not be told the sex of their fetus: a response to the commentaries, *Journal of Medical Ethics.*

Guan, J, Hachey, M, Puri, L, Howieson, V, Saliba, KJ, Auclair, K, A cross metathesis approach to novel pantothenamide derivatives, *Beilstein Journal of Organic Chemistry.*

Jennions, MD, Graphic illustration of a potential problem: a commentary on Morrissey (2016), *Journal of Evolutionary Biology.*

Long, BM, Rae, BD, Rolland, V, Förster, B, Price, GD, Cyanobacterial CO2-concentrating mechanism components: Function and prospects for plant metabolic engineering, *Current Opinion in Plant Biology.*

Mohamed, AR, Ball, EE, Miller, DJ, *et al.*, The transcriptomic response of the coral *Acropora digitifera* to a competent *Symbiodinium* strain: the symbiosome as an arrested early phagosome, *Molecular Ecology.*

Rowland, L, Zaragoza-Castells, J, Bloomfield, KJ, Atkin, OK, Meir, P, *et al.*, Scaling leaf respiration with nitrogen and phosphorus in tropical forests across two continents, *New Phytologist*.

Shibata, Y, Ojika, M, Sugiyama, A, Jones, DA, *et al.*, Full-size ABCG transporters, Nb-ABCG1 and Nb-ABCG2, are involved in both pre- and post-invasion defense against *Phytophthora infestans* in *Nicotiana benthamiana. Plant Cell.*

Turnbull, MT, Griffin, KL, Fyllas, N, Lloyd, J, Meir, P, Atkin, OK, Separating species and environmental determinants of leaf functional traits in temperate rainforest plants along a soil-development chronosequence. *Functional Plant Biology.*

NOTICES

The application method for quarantine import permits changed considerably in late 2015. Now it is through BICON and you need an importer account for this. The RSB has a multi-user account and will register you with a sub-account for applications. For account set up, or assistance with preparing applications, email compliance.rsb@anu.edu.au or call Jeremy on x57942. - Jeremy Weinman.