Australian National University

Research School of Biology Newsletter

Issue 46 | 30 August 2013

ANU COLLEGE OF MEDICINE, BIOLOGY AND ENVIRONMENT

NEWS

A new commercial partnership has been established between ANU, represented by the RSB, ANU Enterprise (ANUE), and LI-COR. The partnership, initiated by **Graham Farquhar** (PS), connects Australian-based LI-COR Environmental customers to an ANU researcher who is able to provide support and expert advice.

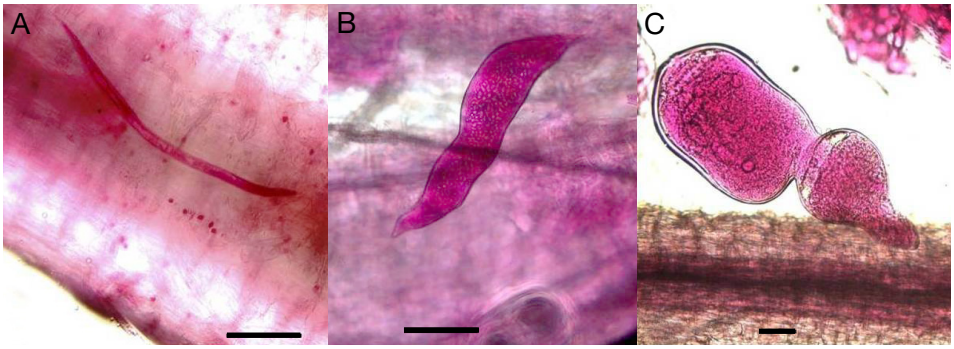
David Kainer (Foley lab, EEG) and **Kathy Schneebeli** (Mathesius lab, BSB) competed in the ANU College of Medicine, Biology & Environment (CMBE) Three Minute Thesis (3MT) final on 22 August. Kathy Schneebeli was Runner Up with her talk 'Genetic variation in resistance of *Brachypodium* to *Rhizoctonia* root rot', and qualifies for the ANU final. Eleven finalists from across the ANU will compete for $4K and a place in the grand final, which is an international competition to be held later this year. The ANU 3MT Final will be held on Wednesday 18 September, 6.30 pm in Manning Clark Theatre 1.

Chris Fulton (EEG) and Mae Noble (ARC Centre of Excellence for Coral Reef Studies) are visiting eight NSW High Schools to talk with students about some of the exciting discoveries they've made recently in marine ecosystems on the NSW coast, share their stories of how they left rural towns to study at university, and explain what it means to be a marine scientist.

These outreach activities are done in co-operation with ANU Student Equity as part of the ANU Regional Partnerships Program. Over 300 regional secondary school students will have the opportunity speak directly with these inspiring scientists in the coming months, as Chris and Mae will go on to visit an additional five Regional Partnership Schools this year.

PhD awards

Nurul Wahida Othman (Cooper lab, EEG), Salivary gland morphology and regulation in orthopteroid insects: *Teleogryllus commodus* (Walker) and *Gastrimargus muciscus* (Fabricius)'.



The plant parasitic nematode *Meloidogyne javanica* inside the root of *Medicago truncatula*. Scale bar: 100 µm. A) Juvenile in host root, B) later stage nematode in a 'root knot' feeding site, C) female laying eggs. (Photos: Lauren Venugoban, Behm and Mathesius labs, BSB.)

Andrew Walker (Cooper lab, EEG), 'Relating the structure of insect silk proteins to function'.

PhD submission

Brani Igic (Magrath lab, EEG), 'Vocal mimicry in the brown thornbill'.

Vale Dave Shaw

Dave Shaw died on 27 August after a short illness. Dave came to Canberra in 1972 to join the Department of Population Biology in RSBS. His research involved a long term study of hybrid zone dynamics in the grasshopper *Caledia captiva*. This remains one of the most intensive and extensive characterisation of hybrid zones in the literature. Dave supervised many PhD students including Chris Moran, Dave Rowell, Craig Moritz, Bert Kohlmann, Les Christidis, Mike Arnold, Adam Marchant, Julia Playford, Bryan Clarke and Lynne McIntyre. He retired from RSBS in the late 1990's but remained involved in biological research. Dave was well known and (mostly) liked for his sharp and cutting wit and his mischievous behaviour as well as his strangely endearing grumpiness. He is survived by his wife Bridget, children Melanie and Jamie, and their families.

MEDIA

Peter Cowman (Bromham lab, EEG), and colleague have published a paper in *Proceedings of the Royal Society B.* The findings, featured in ANU media, describe how hard barriers, like a land bridge that physically splits a population, and soft barriers, like vast distances or strong water currents, play important roles in the evolution of coral reef taxa.

APPOINTMENTS

Anne–Sophie Dielen joins the Badger and Price labs (PS) as a Postdoctoral Fellow. Anne-Sophie is molecular biologist who fell for biochemistry and microscopy six years ago. After working on viruses and on starch, she is now researching CO_2 concentration mechanisms as part of the Realizing Increased Photosynthesis Efficiency (RIPE) network.

Sonya Geange, who was a summer scholar in RSB in 2011 has returned to the Nicotra lab (EEG) to start her PhD after completing her degree in New Zealand. She'll be conducting a comparative ecological study on phenotypic plasticity in water use traits.

Shiraz Kaderuppan joins the Atkin and Badger labs (PS). Shiraz's Honours project will assess the relationship between leaf respiration and photosynthesis in wildtype and Rubisco antisense lines of *Arabidposis*.

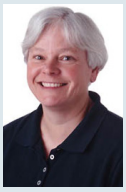
Jessica McLachlan joins the Magrath lab (EEG) for three months to research avian behaviour. Jessica recently completed her Masters degree at the University of Bristol, which was based on fieldwork on parent-offspring communication in white-browed scrubwrens carried at at the ANU.

Martin Rono, a Postdoctoral Fellow based at the KEMRI-Wellcome Trust Research Program in Kilifi, Kenya, has been visiting the Kirk lab (BSB) for the past two weeks.

Andrew Walker joins the Saliba lab (BSB) to work on the sodium-proton exhanger of the malaria parasite, and on its role in quinine resistance. **John Fu** joins the same lab as a PhB student, and will work on the antimalarial action of pantothenamides.

Lab Leader profile:

Susanne von Caemmerer (PS)



Lab researching:
The lab has two main research foci:

1) Understanding regulation of C_4 photosynthesis with the aim of introducing the C_4 photosynthetic pathway into C_3 crops such as rice to increase yield. This work is part of the research of the international C4 rice consortium funded by the Bill and Melinda Gates Foundation.

2) Understanding the function of guard cell chloroplasts and photosynthesis in the opening and closing response of stomatal pores on the leaf surface. This will provide a better mechanistic understanding of stomatal function that regulates CO_2 uptake and water loss by leaves. Plant water use efficiency (the amount of CO_2 fixed per water lost) determines plant yield and survival.

Greatest achievement:
Building of simple mathematical models of C_3 and C_4 photosynthesis together with Graham Farquhar and Joe Berry (Carnegie Institute, Stanford, USA). These models are now used world-wide in many different applications. You can read about the development of these models in a review we wrote in 2001 [Models of photosynthesis; Farquhar, von Caemmerer, Berry, *Plant Physiology* **125** 42-45].

Next big thing:
Completion of a C_4 rice prototype within the next 3 years.

What do you see as future challenges for your field of research?
Wonderful new 'omics' technologies (phenomic, genomics, proteomics, metabolomics etc.) are being developed. These provide tantalising new opportunities to a plant physiologist like myself. But I see data (overload) management and analysis as one of the many challenges ahead.

This monthly newsletter is archived at biology.anu.edu.au/newsletter
Content & layout: Sharyn Wragg
Editing: Kiaran Kirk & Sharyn Wragg

Caela Welsh joins the Zeil lab (EEG) to work with Fiorella Ramirez Esquivel on obstacle avoidance in ants as part of her ASC Special Project.

Sujuan Zhang joins the Hiller Lab (PS) as a Visiting Fellow for a 12 month term. Sujuan is currently an Associate Professor at the Institute of Photonics & Photon-Technology, Northwest University, Xi'an, and a specialist in ultrafast laser spectroscopy. Sujuan holds a CSC travel fellowship and will study light-activated intermediates of photosynthesis using kinetic spectroscopies. These reactions are the basis for energy capture by photosynthesis and of interest for understanding structural changes on the sub-micro second time scale.

PAPERS ACCEPTED

Albrecht-Borth V, Kauss D, Fan D, Marri S, Hu Y, Chow WS, Pogson BJ, et al. A novel proteinase, SCO4, is required for photosynthetic acclimation to higher light intensities in *Arabidopsis. Plant Physiology.*

Banea JP, Bradbury JH, Mandombi C, Denton IC, et al. Control of konzo by detoxification of cassava flour in three villages in the Democratic Republic of Congo. *Food and Chemical Toxicology*.

Banea JP, Bradbury JH, Mandombi C, Denton IC, et al. Effectiveness of wetting method for control of konzo and reduction of cyanide poisoning by removal of cyanogens from cassava flour. *Food and Nutrition Bulletin.*

Cazzonelli CI, Vanstraelen M, Yin K, Carron-Arthur A, Nisar N, Tarle G, Cuttriss AJ, Mathesius U, Masle J & Pogson BJ. Role of the *Arabidopsis* PIN6 auxin transporter in auxin homeostasis and auxin-mediated development. *PLoS ONE.*

Delay C, Imin N & Djordjevic MA. Regulation of *Arabidopsis* root development by small signaling peptides. *Frontiers in Plant Systems Biology*.

George D, Stephenson D, Tran E, Verma N, et al. Complete genome sequence of SfII: a serotype converting bacteriophage of the highly prevalent *Shigella flexneri* serotype 2a. *GenomeA.*

Heskel MA, Atkin OK, Turnbull MH, et al. Bringing the Kok effect to light: Integrating daytime respiration and net ecosystem exchange. *Ecosphere.*

Heskel MA, Greaves H, Kornfeld A, Atkin OK, et al. Differential physiological responses to environmental change promote woody shrub expansion. *Ecology and Evolution*.

Holleley CE, Nichols RA, Whitehead MR, et al. Testing single-sample estimators of effective population size in genetically structured populations. *Conservation Genetics.*

Jayatilaka P, Raderschall CA, Narendra A & Zeil J. Individual foraging patterns of the jack jumper ant, *Myrmecia croslandi. Myrmecological News.*

Jung H-S, Crisp P, Estavillo GM, Pogson BJ, et al. A subset of heat-shock transcription factors required for the early response of *Arabidopsis* to excess light. *PNAS*.

Kerr P, Rogers M, Fitch A, Tscharke D, et al. Comparative analysis of the complete genome sequence of the Californian MSW strain of myxoma virus reveals potential host adaptations. *Journal of Virology.*

Martorell S, Diaz-Espejo A, Medrano H, Ball MC & Choat B. Rapid hydraulic recovery in *Eucalyptus pauciflora* after drought: linkages between stem hydraulics and leaf gas exchange. *Plant, Cell & Environment.*

Narendra A, Alkaladi A, Raderschall CA, Ribi WA, et al. Compound eye adaptations for diurnal and nocturnal lifestyle in the intertidal ant *Polyrhachis sokolova. PLoS ONE.*

Peakall R & Whitehead MR. Floral odour chemistry defines species boundaries and underpins strong reproductive isolation in sexually deceptive orchids. *Annals of Botany*.

Periasamy P & O'Neill HC. *In vitro* hematopoiesis reveals a novel dendritic-like cell also present in murine spleen. *Current Stem Cell Research and Therapy.*

Stanton DE, Merlin M, Bryant G & Ball MC. Water redistribution determines photosynthetic responses to warming and drying in two polar mosses. *Functional Plant Biology*.

Tjhin ET, Staines HM, van Schalkwyk DA, Saliba KJ, et al. Studies with the *Plasmodium falciparum* hexokinase reveal that PfHT limits the rate of glucose entry into glycolysis. *FEBS Letters.*

Wijesundara DK, Jackson RJ, Tscharke DC, et al. IL-4 and IL-13 mediated down-regulation of CD8 expression levels can dampen anti-viral CD8+ T cell avidity following HIV-1 recombinant pox viral vaccination. *Vaccine.*

Wong YC, Smith SA & Tscharke DC. Systemic TLR ligation and selective killing of DC subsets fail to dissect priming pathways for anti-vaccinia virus CD8+ T cells. *Journal of Virology.*

Zeil J, Narendra A & Stürzl W. Looking and homing: how displaced ants decide where to go. *Philosophical Transactions of the Royal Society B.*