



## NEWS

### Carbon in soil poses climate change risk

**Patrick Meir** (PS) and colleagues in a consortium of researchers have shown that the response by soil microbial communities to changes in temperature increases the potential for more carbon dioxide to be released from the world's soils as global temperatures rise. Soils store more than twice as much carbon as is in the atmosphere, and changes in rates of decomposition and carbon dioxide release have long been considered to be one of the potentially most important positive feedbacks to climate change. This idea was examined experimentally using soils collected from a natural thermal gradient spanning from the Arctic to the Amazon rainforest.

The findings, published in *Nature* and the media, show that soil microbial community responses result, on average, in an increase in the effects of temperature on the rates of carbon dioxide release from soils, potentially making soil carbon stocks more vulnerable to warming than previously expected.

### ARC Future Fellowships

Two Future Fellowships in the 2014 round were awarded to members of the Research School of Biology:

**Ajay Narendra** (Zeil Group, EEG), to analyse visual information processing in animals, (including ants) that will have applications in computer vision and robotics (\$770k);

**Guillaume Tcherkez** (Université Paris-Sud, France, to join RSB Plant Sciences in January 2015). Guillaume's Future Fellowship will explore leaf respiration-related metabolism and will have applications in plant primary production (\$865k).



*Dolichoderus scabridus*, Square Rock, ACT. Image credit: Ajay Narendra.



Montane Andean to lowland Amazonian forest in Peru. This is the location of the tropical component of the Karhu study, with the work led by Patrick Meir's team (see under NEWS).

### 3-Minute Thesis competition

On August 1 approximately 90 students and staff from RSB were entertained by three minute talks from RSB PhD students competing in the 3 Minute Thesis (3MT) competition. This skills development activity challenges PhD students to explain their research project to a non-specialist audience in just three minutes. Despite this daunting task, all six speakers produced outstanding, captivating talks (making it difficult for the judges). The winner (**David Kainer**, EEG) and runner up (**Christina Delay**, PS), pictured below, represented RSB at the college 3MT competition on 21 August, but were not successful at the College round. For CMBE, the winner was Brendan Tonson-Older (ANUMS) and the runner-up was Rina Soetanto (JCSMR).



### Charles F. Kettering Award



Susanne von Caemmerer receiving the Charles F. Kettering Award. Photo (c) Naid Hasan.

**Susanne von Caemmerer** (PS) was awarded the Charles F. Kettering Award by The American Society of Plant Biologists for excellence in the field of photosynthesis in July. Susanne co-developed what is arguably the most widely used biochemical model in plant biology – the Farquhar, von Caemmerer and Berry model of C<sub>3</sub> photosynthesis, and went on to develop an equally widely used model of C<sub>4</sub> photosynthesis. She resolved the long debated question of why there is so much Rubisco by showing that under high-light Rubisco exerts very strong metabolic control in both C<sub>3</sub> and C<sub>4</sub> plants and therefore is not in excess. Most recently Susanne has led the way toward resolving anomalies around the critical issue of mesophyll conductance.

## Group Leader profile: Naomi Langmore (EEG)



### Group research focus:

We test evolutionary theory using field experiments on birds. Our recent work includes studies of coevolution between cuckoos and their hosts, the evolution of female birdsong, musical tool use in palmcockatoos and climate change impacts on species interactions and breeding biology.

### Teaching and research achievements:

The biggest buzz in my research has been discovering ingenious behavioural strategies in animals that have never been described before, such as cuckoos that lay 'invisible' eggs, and cuckoo chicks that can change their tune to match their host. These moments have led to some of the research achievements of which I'm most proud, as well as (I hope!) inspiring students by demonstrating how exciting behavioural ecology can be.

### What do you enjoy most about teaching?

Working closely with students to design, analyse and write up research projects.

### What do you enjoy most about research?

I think it's an incredible privilege to be able to spend much of my time in the field watching wildlife. My enjoyment of this has been greatly enhanced by collaborations with some inspiring colleagues and students.

This newsletter is archived at [biology.anu.edu.au/news-events/newsletter](http://biology.anu.edu.au/news-events/newsletter)

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## Teaching Fellowships

**David Rowell** and **Adrienne Nicotra** (EEG) have been elected as Senior Fellows of the Higher Education Academy (HEA) through the ANU Educational Fellowship Scheme.

## Tipping the bucket for research

**Paul Cooper** (EEG), who lectures in BIOL1008 on how nerves maintain muscle activity and in nerve-muscle feedback systems, took up the Icebucket challenge on 22 August.

The Ice Bucket Challenge is a social media campaign that supports people living with Motor Neuron Disease (MND) and MND research. The challenge raised \$150 for Motor Neuron Disease Australia, and Paul passed on the challenge to the Deans and Heads of the biological areas. A video of Paul's drenching is posted on the Science at ANU Facebook page.



## Student awards

**Michaela Purcell**, a PhD student (Rowell Group, EEG), won first prize in the student poster competition (there were 127 posters) at the 8<sup>th</sup> International Congress of Dipterology in Potsdam, Germany in August.

**Borbala (Bori) Cser** (Pryke Group, EEG), was awarded a University Medal for her Honours thesis, entitled 'Hot under the collar: colour and contest resolution in frillneck lizards (*Chlamydosaurus kingii*)'.

**Trevor Murray** (Magrath Group, EEG) was awarded First prize for his talk 'Honest signalling on alarming wings' at the Australasian Association for the Study of Animal Behaviour (ASSAB) annual conference.

**Chloé Raderschall** (Zeil Group, EEG) was awarded the Runner-up prize for her talk on head stabilisation in ants. Chloé also won the Heiligenberg Travel Award to present her work at the 2014 Neuroethology meeting in Japan.

**Sara Wood** (Zeil Group, EEG) won the National Indigenous Legal Student of the Year. Sara obtained first class honours for her thesis entitled 'Blaming the Brain for Homicide: The Relevance of Neurological Abnormalities to Assessing Criminal Responsibility for Homicide in NSW, the ACT and the Commonwealth'.

## MEDIA

**Peter Solomon** (PS) and members of his Group have a paper highlighted in the 20 August Crop Biotech Update newsletter as a Research highlight'. The paper was published in *BMC Plant Biology*.

A paper by **Ryszard Maleszka** (EEG) and members of his Group was highlighted on The Royal Society Publishing blog, that advertises selected publications to a broader community. It was also discussed by Ryszard on Sydney 2UE radio. The paper was published in *Open Biology*, and featured on the cover (see under PUBLICATIONS).

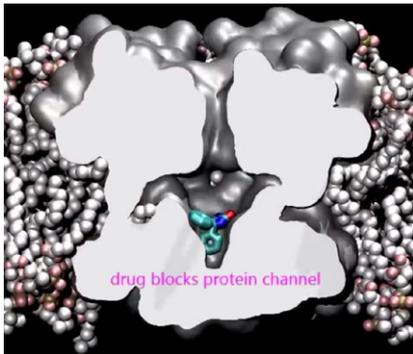
A study by **Kastoori Hingorani, Spencer Whitney, Tom Wydrzynski, Warwick Hillier** and colleagues was featured in the ANU media. Kastoori, pictured below with Professor Ron Pace (RSC), also gave an interview on Channel 7. The paper was published in *BBA-Bioenergetics* (see under PUBLICATIONS).



A paper by **Tiffany Russell, David Tucharke** (BSB) (pictured below) and colleagues has been featured in the media. The study found that the Herpes Simplex Type 1 virus, which causes coldsores, is more active in host cells than previously thought.



**Ben Cory** and **Lewis Martin** (BSB) developed a detailed computer model that revealed for the first time how benzocaine, a local anaesthetic, and phenytoin, an anti-epilepsy drug, enter into nerve cells and prevent the pain signals being transmitted to the brain. The findings of the paper were featured in the media, along with a video modelling the drug blocking the protein channel (see under PUBLICATIONS).



**George Olah** (a PhD student based at Fenner, and co-supervised by Rod Peakall, EEG), is using genetic techniques to study Peru's Macaw population, and the impact of a massive road project on the breeding and gene flow in these birds. George's paper found that the birds had similar breeding success in natural and artificial nest sites. George is currently crowd-funding a project to make a documentary.

A study by **Michaela Blyton** (Gordon Group, EEG), Rod Peakall, David Gordon and colleagues has found unexpected patterns in the transmission of *E. coli* in possum populations, which could shed light on human epidemics. The findings have been featured in the media. Possum image courtesy Dr Sam Banks.



## PHDs SUBMITTED

**Andrew Bowerman** (Cooper Group, EEG) 'Investigating sugar signalling in wheat'.

**Bianca Dobson** (Tscharke Group, BSB) 'Strain-specific genetic requirements for growth of vaccinia virus in culture'.

**Brian Garms** (Rowell Group, EEG) 'Native insects as guides for understanding potential impacts of exotic species'.

**Andrew Khan** (Jennions Group, EEG) 'Let's talk about sex: sexual selection, sex allocation and parental care in animals'

**Nelson Simiken** (Cooper Group, EEG) 'Biology and ecology of Grapevine Scale *Parthenolecanium persicae* (Fabricius) and Frosted Scale *Parthenolecanium pruinosum* (Cocquillet) (Hemiptera: Coccidae) on grapevines *Vitis vinifera* L'.

**WeiWei Zhang** (Hardham Group, PS) 'Characterisation of regulated secretion in *Phyophthora*'.

## PHDs AWARDED

**Michaela Blyton** (Gordon Group, EEG) 'The evolution of social interactions in the Mountain Brushtail Possum'.

**Diana Garnica** (Rathjen Group, PS) 'Strategies for Wheat Stripe Rust pathogenicity identified by "omics" technologies'.

**Laura Gunn** (Whitney Group, PS) 'Exploring novel in planta and in vitro approaches for bioengineering Rubisco'

**Divya George** (Verma Group, BSB) 'Elucidating the role of AnsB, Ggt and YfiD in the pathogenesis of *S. flexneri*'.

**Emily Hanna** (Cardillo Group, EEG), 'Drivers of mammalian extinction and decline'.

**Amrit Nanda** (Masle Group, PS) 'The role of the *ERECTA* gene family in *Arabidopsis thaliana* seed development, and salt signalling during germination'.

**Nimeka Ramanayake** (Saliba Group, BSB) 'Vacuolar-type proton pumping pyrophosphatases (V-H<sup>+</sup>-PPases) in the malaria parasite, *P. falciparum*'.

**Danswell Starrs** (Fulton Group, EEG) 'Early life history ecology of Australian tropical freshwater fishes'.

**Tom Wallenius** (Peakall Group, EEG) 'A volatile relationship: The pollination system of the Australian cycad *Macrozamia communis*'.

## WELCOME

**Florence Reyes Danila** has joined the von Caemmerer Group (PS) as a PhD Student. Florence was awarded a Lee Foundation Rice scholarship and will be studying at ANU, CSIRO and The

International Rice Research Institute (IRRI). **Timothy Ryan** has also joined the Group as an Honours Student.

**Frances Jacomb** has joined the Jennions Group (EEG) as an Honours Student.

**Michele Lamb** has joined the ARC Centre of Excellence for Translational Photosynthesis as the Centre Administrator. Michele came from the iCAM team in the Fenner School and brings a wealth of relevant experience and knowledge to the Centre. Michele will be the key contact for enquiries and administrative matters for the Centre.

**Darren Marsh** has replaced Ljube Cvetkoski in the Plant Services team as a Horticultural Technician.

**Lingda Zeng** from Huizhou University, China, will work in the Chow Group on the longevity of the cytochrome *bf* complex *in situ*, often thought to be a bottleneck of photosynthetic electron flow.

## FAREWELL

**Toni Asher** (HDR Student Administration) has left the Biology Teaching and Learning Centre to take up a position at the Research School of Earth Sciences.

**Helen Muirhead** has retired from her role as Operations Manager and is travelling Australia with her husband. Helen came to RSBS in October 2002 to take up the



role of Manager of Plant and Animal Culture. In 12 years, Helen has had to deal with a series of Directors, managers, bushfires, and the formation of RSB. She

has made integral contributions towards the growth in size and complexity of the plant and animal facilities and the laboratories, and served the school well in brokering good outcomes between the scientists and regulations.

**Monique Pereira** (Cooper Group, EEG) has finished her six month visit from the Entomology Laboratory, Bioscience Institute, UNESP - São Paulo State University and has returned to Brazil.

**Nelson Simbiken** (Cooper Group, EEG) has submitted his PhD will return to PNG.

## PAPERS ACCEPTED

Banea, JP, Bradbury, JH, Mandombi, C, Nahimana, D, Denton, IC, Foster, MP, Kuwa, N, & Tshala Katumbay, D, Prevention of konzo in the Democratic Republic of Congo (DRC) using the wetting method and correlation between konzo incidence and percentage of children with high urinary thiocyanate level. *African Journal Food Science*

Browne, TK, A role for philosophers, sociologists and bioethicists in revising the DSM, *Philosophy, Psychiatry and Psychology*.

Esquivel, FR, Zeil, J, & Narendra, A, The antennal sensory array of the nocturnal bull ant, *Myrmecia pyriformis*, *Arthropod Structure and Development*.

Feeney, WE, Stoddard, MC, Kilner, RM, & Langmore, NE, 'Jack of all trades' egg mimicry in the brood parasitic Horsfield's bronze-cuckoo? *Behavioral Ecology*

Ferguson, BJ, & Mathesius, U, Phytohormone regulation of legume-rhizobia interactions, *Journal of Chemical Ecology*

Galmés, J, Andralojc, PJ, Kapralov, MV, Flexas, J, Keys AJ, Molins, A, Parry, MAJ, & Conesa, MÀ, Environmentally driven evolution of Rubisco and improved photosynthesis and growth within the *C<sub>3</sub>* genus *Limonium* (Plumbaginaceae), *New Phytologist*

Galmés, J, Kapralov, MV, Andralojc, PJ, Conesa, MÀ, Keys, AJ, Parry, MAJ, Flexas, J, Expanding knowledge of the Rubisco kinetics variability in plant species: environmental and evolutionary trends, *Plant, Cell & Environment*

Gloag, R, Keller, L-A, & Langmore, NE, Cryptic cuckoo eggs hide from competing cuckoos, *Proceedings of the Royal Society: Biological Sciences*

Grabowski, PP, Morris, GP, Casler, MD, Borevitz, JO, Population genomic variation reveals roles of history, adaptation and ploidy in switchgrass. *Molecular Ecology*

Grant-Downton, RT, Terhem, RB, Kapralov, MV, Mehdi, S, Rodriguez-Enriquez, MJ, Gurr, SJ, van Kan, JAL, & Dewey, FM, A novel *Botrytis* species is associated with a newly emergent foliar disease in cultivated *Hemerocallis*. *PLoS ONE*

Hane, JK, Williams, AH, Taranto, AP, Solomon, PS, & Oliver, RP,

Repeat-induced point mutation: a fungal specific, endogenous mutagenesis process. In 'Genetic transformation in Fungi', M van den Berg & K Maruthachalam, *Spinger*

Haris Saslis-Lagoudakis, C, Moray, C, & Bromham, L, Evolution of salt tolerance in Angiosperms: A phylogenetic approach, In 'Plant ecology and evolution in harsh environments' eds. N Rajakaruna, RS Boyd, & TB Harris. *Nova Publishing*

Harts A, Schwanz, L, & Kokko, H, Demography can favour female-advantageous alleles, *Proceedings of the Royal Society of London B*.

Hilder, TA, Ridone, P, Nakayama, Y, Martinac, B & Chung, S-H, Binding of fullerenes and nanotubes to MscL, *Scientific Reports*

Hingorani K, Pace R, Whitney S, Murray JW, Smith P, Cheah MH, Wydrzynski T, Hillier W, Photo-oxidation of tyrosine in a bio-engineered bacterioferritin 'reaction centre'-A protein model for artificial photosynthesis, *BBA Bioenergetics* (see under MEDIA)

Karhu, K, Auffret, MD, Dungait, JAJ, Hopkins, Meir, P, *et al*, Temperature sensitivity of soil respiration rates enhanced by microbial community response, *Nature* 513 81-84 (see under NEWS)

Kokko, H, Griffith, SC & Pryke, S, The hawk-dove game in a sexually reproducing species explains a colorful polymorphism of an endangered bird. *Proceedings of the Royal Society of London B*.

Ma, JZ, Russell, TA, Spelman, T, Carbone, FR, & Tschärke, DC (2014) Lytic gene expression is frequent in HSV-1 latent infection and correlates with the engagement of a cell-intrinsic transcriptional response, *PLOS Pathogens* (see under MEDIA)

Maleszka, R, Mason, P, & Barron, A, Epigenomics and the concept of degeneracy in biological systems, *Briefings in Functional Genomics*

Maleszka, R, The social honey bee in biomedical research: realities and expectations, *Drug Discovery Today: Disease Models*

Mappes, J, Kokko, H, Ojala, K, & Lindström, L, Seasonal changes in predator community switch the direction of selection for prey defenses, *Nature Communications*.

Martin, LJ & Corry, B. Locating the route of entry and binding sites of benzocaine and phenytoin in a bacterial voltage gated sodium channel, *PLOS Computational Biology* (see under MEDIA)

McCully ME, Canny MJ, Baker A, Miller C. Some properties of the walls of metaxylem vessels of maize roots, including tests of the wettability of their luminal wall surfaces. *Annals of Botany*

Lockett, G, Wilkes, F, Helliwell, P, & Maleszka, R, Contrasting effects of histone deacetylase inhibitors on reward and aversive olfactory memories in the honey bee, *Insects*.

Maleszka, R, *et al* (as a member of the Honey Bee Genome Sequencing Consortium), Finding the missing honey bee genes: lessons learned from a genome upgrade, *BMC Genomics*

Rae, BD, Long, BM, Badger, MR, & Price, GD, Functions, compositions, and evolution of the two types of carboxysomes: Polyhedral microcompartments that facilitate CO<sub>2</sub> fixation in Cyanobacteria and some Proteobacteria, *Microbiology and Molecular Biology Reviews*

Walczevska-Szewc, K & Corry, B, Do bifunctional labels solve the problem of dye diffusion in FRET analysis? *Physical Chemistry Chemical Physics*

Winterberg, B, Du Fall, LA, Song, X, Pascovici, D, Care, N, Molloy, M, Ohms, S, & Solomon, PS, The necrotrophic effector protein SnTox3 re-programs metabolism and elicits a strong defence response in susceptible wheat leaves, *BMC Plant Biology* (see under MEDIA)

Wojciechowski, M, Rafalski, D, Kucharski, R, Maleszka, J, Bochtler, M, & Maleszka R, Insights into DNA hydroxy-methylation in the honey bee from in-depth analyses of TET dioxygenase. *Open Biology*

(see under MEDIA)

Yap, HYY, Chooi, YH, Firdaus-Raih, M, Fung, SY, Ng, ST, Tan, CS, & Tan, NH, The genome of the Tiger Milk mushroom, *Lignosus rhinocerotis*, provides insights into the genetic basis of its medicinal properties, *BMC Genomics*.

