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Research School of Biology Newsletter

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ANU COLLEGE OF MEDICINE, BIOLOGY AND ENVIRONMENT

NEWS

Graham Faquhar awarded Rank Prize

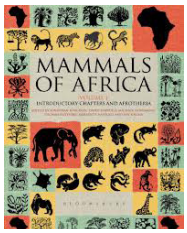
Graham Farquhar (PS) and CSIRO Fellow Dr Richard Richards have won a coveted international science prize for 'pioneering the understanding of isotope discrimination in plants and its application to breed wheat varieties that use water more efficiently'.

The award relates to a discovery in the 1980's, where the pair found a way to predict the amount of water needed to grow different types of wheat. "On a global scale, water limitation is probably the biggest limitation to agriculture production, so we think there's probably quite a wide applicability to other crops as well," Graham says.

The UK-based Rank Prize Funds is a charitable organisation which seeks to recognise excellence in specific fields of research and reward innovators for their dedication and outstanding contribution, and have as their objectives the advancement and promotion for the public benefit of knowledge, education and learning in sciences of nutrition and optoelectronics.

The Rank Prize was presented to Graham Farquhar and Richard Richards in London on 10 February, with each receiving a GBP £40K prize.

Dartmouth Medal



The American Library Association has announced 'Mammals of Africa', six volumes and 3,500 pages, co-edited by Tom Butynski, **David Happold** (Emeritus Fellow, EEG), **Meredith Happold** (Visiting Fellow, EEG), Mike Hoffmann, Jan Kalina and Jonathan Kingdon, as the 2014 Dartmouth Medal award winner.

The Dartmouth Medal, established in 1974, honours the creation of a reference source of outstanding quality and significance. 'Mammals of Africa' was judged to be the best new reference source published in 2013. The six volumes are the result of 15 years of detailed work, and cover every known mammal in Africa.

Graham Farquhar is presented with the Rank Prize at a ceremony in London.

National Science Youth Forum

The **Solomon Lab** (PS) hosted groups of students from the National Science Youth Forum in late January and early February. The students are about to enter their final year of secondary school, and the forum provided an opportunity to learn about what scientists do in a working biology lab. The students took part in exercises in bioinformatics, fungal microbiology and gel electrophoresis. The forum was very successful and the students were left with very positive impressions of biology and science more broadly.

PHDs SUBMITTED

Divya George (Verma Lab, BSB) 'Characterisation of novel virulence factors of *S. flexneri* and developing *C. elegans* as an animal model for *Shigella* infection'.

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

PHDs AWARDED

Dominique Roche (Jennions Lab, EEG) 'Effects of biotic and physical stressors on fish swimming performance and behaviour'.

MEDIA

A study on the effects of sea level rise on Oystercatchers, in which **Liam Bailey** and **Martijn van de Pol** (EEG) are involved, featured in a Dutch television documentary which attracted over a million viewers, and shows beautiful visualisation of bird movements over time. The research investigates whether birds adapt their nest site selection in response to increased flooding events as a results of sea level rise by moving to higher areas, using a combination of long-terms datasets and high resolution GPS movement data.

A paper published by **Dominique Roche,** (Jennions Lab, EEG) **Sandra Bining** (Keogh and Backwell Labs, EEG) et al, has been featured in the media. The study, published in the *Journal of Experimental Biology,* found that fish used more energy swimming through intense waves, but some were able to adapt and temporarily use their momentum to glide, saving energy. Dominique also has a paper in PLoS Biology on troubleshooting public data archiving, which was featured in the Editors Weekly Picks, PloS Biologue, and was shared nearly 100 times on Twitter.

Lab Leader profile: Michael Roderick

Joint appointment with RSES and RSB (PS)

Lab research: Mainly looking at how water availability has changed, both globally, and in Australia, and how it might change in future, with special reference to both agricultural and natural ecosystems.

Greatest achievement:
Development of a general physical basis for understanding why pan evaporation has been declining worldwide. By establishing that physical basis, we are now in a strong scientific position to understand the more complex biological (e.g. agricultural, ecological) and hydrologic impacts of climate change.

Next big thing:
We are just beginning to use climate models on the ANU supercomputer. We hope to be able to tackle some new challenges including (i) how changes in the land surface (e.g. land clearing, CO_2 fertilisation) feedback to the regional climate, and (ii) whether current climate models can reproduce the observed decline in pan evaporation. In the longer term I see an increasing focus on plant water use, elevated CO_2 and irrigation.

Science Hero:
Science hero: Willard Gibbs (1839-1903) - considered to be one of the main contributors to modern equilibrium thermodynamics. Two papers, published in an obscure journal in 1873 and 1875, laid the foundation for nearly all of modern physical chemistry including current understanding of osmotic pressure that remains so central to understanding plant water relations.

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

A paper published by **Haris Saslis-Lagoudakis** (Bromham Lab, EEG), et al, in the *Royal Society Proceedings B*, has been featured in the media. The study found that the way indigenous cultures around the globe use traditional medicines and pass on knowledge developed over centuries is directly linked to the natural environment, and this makes indigenous cultures susceptible to environmental change, a threat that comes on top of the challenges posed by globalisation.

A paper published by **Sawang Petvises** and **Helen O'Neill** (BSB) entitled 'Distinct progenitor origin distinguishes a lineage of dendritic-like cells in spleen' was one of the most viewed *Frontiers in Immunology* research articles in January. This landmark study reveals a lineage of dendritic-like cells developing in the spleen microenvironment which appear to arise from endogenous progenitors laid down in spleen during embryogenesis. It was listed third out of the ten most popular viewed articles.

WELCOME

Shao-Yu Lin from Taiwan has joined the Solomon Lab (PS) and commenced her PhD on the topic 'The characterisation of necrotrophic promoters and gene expression'.

Wolfgang Stürzl and **Iris Grixa** from the German Aerospace Centre (DLR) are visiting Ajay Narendra and Jochen Zeil (EEG). Their visit is supported by the ARC Centre of Excellence in Vision Science and they will be using a laser scanner and camera-based methods to build three-dimensional models of insect navigation habitats (see www.insectvision.org).

NEW APPOINTMENTS

Josie Ginty rejoins the Dewar Lab (PS) as a PhB student, to build on her progress last semester applying maximum entropy to the evolutionary optimization of Rubisco.

Meng Zhang, Maier Lab (BSB), completed Honours last year and has recently started her PhD on the topic 'Role of Maurer's clefts proteins in PfEMP1 trafficking and Maurer's clefts biogenesis'.

Thilaga Velusamy has joined the Tscharke Lab (BSB) as a PhD student and will be working on a project that aims to improve our understanding of herpes simplex virus latent infections. Thilaga previously worked with plants in the Masle Lab (PS).

PAPERS ACCEPTED

Briceño VF, Harris-Pascal, D, Nicotra, AB, & Ball, MC, Variation in snow cover drives differences in frost resistance in seedlings of an alpine herb *Aciphylla glacialis, Journal of Environmental and Experimental Botany*

Cabrita, P, Thorpe, M, & Huber, G, Hydrodynamics of steady state phloem transport with radial leakage of solute, *Plant Science*

Henshaw, J, Jennions, MD, & Kokko, H, The economics of egg-trading: mating rate, sperm competition, and positive frequency-dependence, *Dynamic Games and Applications*

Heskel, MA, Greaves, H, Turnbull, MT, Atkin, OK, e al, Thermal acclimation of shoot respiration in an Arctic woody plant species subjected to 22 years of warming and altered nutrient supply, *Global Change Biology*

Kaczmarski, J, & Corry, B, Investigating the size and dynamics of voltage-gated sodium channel fenestrations: a molecular dynamics study, *Channels*

Jia, H, Liggins, JR, & Chow, WS, Entropy and biological systems: Experimentally-investigated entropy-driven stacking of plant photosynthetic membranes, *Scientific Reports*

Reluga, TC, & Shaw, AK, 'Optimal migratory behavior in spatially-explicit seasonal environments', *Discrete and Continuous Dynamical Systems - Series B*

Russell, TA, & Tscharke, DC, Strikingly poor CD8+ T-cell immunogenicity of vaccinia virus strain MVA in BALB/c mice, *Immunology and Cell Biology*

Saslis-Lagoudakis, CH, Hawkins, JA, Greenhill, S, et al, The evolution of traditional knowledge: environment shapes medicinal plant use in Nepal, *Proceedings of the Royal Society B.* (See item under 'MEDIA')

Weerasinghe, WLK, Creek, D, Crous, KY, Atkin, OK, et al, Canopy position affects the relationships between leaf respiration and associated traits in a tropical rainforest in Far North Queensland, *Tree Physiology*

Whitehead MR, & Peakall R, Pollinator specificity drives strong prepollination reproductive isolation in sympatric sexually deceptive orchids, *Evolution.*