Australian National University

Research School of Biology Newsletter

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ANU COLLEGE OF MEDICINE, BIOLOGY AND ENVIRONMENT

NEWS

Michael Roderick awarded John Dalton Medal

Michael Roderick (PS & RSES) has been awarded the John Dalton Medal of the European Geophysical Union for seminal contributions to the science of evaporation, including especially the role of vegetation and the interpretation of changes in evaporation in the context of global environmental change.

The citation for the award reads: "Michael Roderick is a true scientist of his age, a natural philosopher who has turned his mind to address a wide variety of problems in hydrologic science. His work has led to path breaking contributions in the areas of ecohydrology and remote sensing science." Dr Roderick is also praised for application of his new method "to benefit the estimation of water resource availability on a global scale".

New lab leaders

Loeske Kruuk (EEG) and **Patrick Meir** (PS) have taken up positions as Future Fellows in the school. Loeske will be based in the Banks Building, and Patrick in the Robertson Building. Both are Professors at the University of Edinburgh, to where they plan to return after their time in RSB. A profile of Loeske is shown overleaf.

Grant & Fellowship success

Staff of RSB have been successful in the latest NHMRC and ARC Grant and Fellowship rounds, the results of which have just been announced. See pages three and four for a full list of recipients and projects.

WELCOME

Megan McDonald has joined the Solomon lab (PS) on a two year postdoc position looking at genomes in wheat pathogens. Megan has just completed her PhD at ETH Zurich where she studied the evolution of plant pathogens.

Dan Warren has joined the Macroevolution & Macroecology group as a postdoc in the Cardillo lab (EEG) on an ARC-funded project on patterns and causes of diversification in the *Proteaceae*.

Teresa Iglesias also join the Cardillo lab (EEG) as an academic visitor, working on antipredator behaviour in birds.

RSB also welcomes **Zhongjin He** and **Siri Soendergaard** (both visiting masters students, Corry lab, BSB), **Megan Pavy** (Lab Technician, Callaghan lab, BSB), **Dan Warren** (Postdoc, Cardillo lab, EEG), **Thomas Condamine** (Occupational Trainee, Foley lab, EEG), **Mozes Blom** (PhD Student, Moritz lab, EEG), **Huyin Huai** (Visitor, Nicotra lab, EEG) **Allison Shaw** (Visitor, Kokko lab, EEG) and **Chloe Raderschall** (PhD Student, Zeil Lab, EEG).

FAREWELL

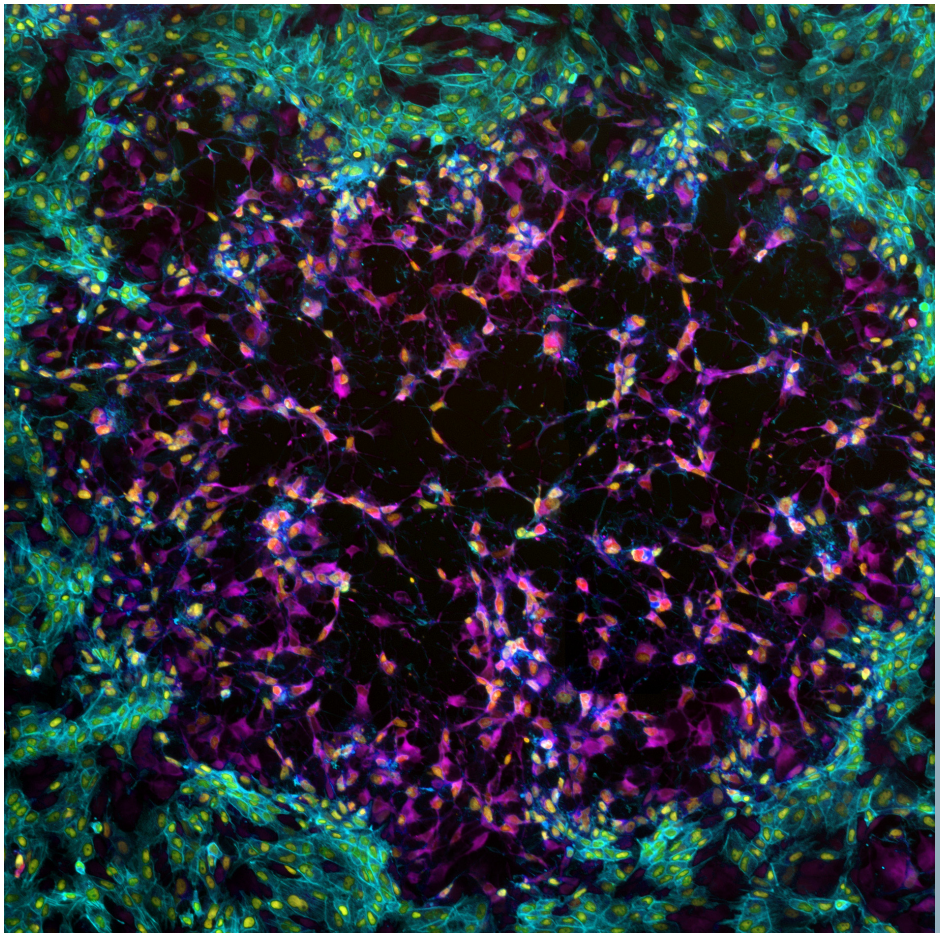
Paul Gauthier (Postdoc with Atkins and Evans labs, PS) is taking up a post-doctoral position at Princeton University in December.

Liam Cassidy is leaving the Solomon lab (PS) for a postdoc position in Germany.

Antti Mikkonen has left the Maier lab (BSB) to move to Melbourne.

CONGRATULATIONS

An image taken by **David Tscharke** and **Bianca Dobson's** (both BSB), together with colleagues from the University of Sydney, has been accepted for display in the Cell Picture Show. The image, 'Eye of the Storm' is displayed on the left.



Eye of the Storm

The viral plaque assay is a way to quantify the amount of infectious virus present by restricting spread of virus to neighboring host cells on a semi-solid medium. As the virus replicates and spreads, it destroys host cells and a dynamic, spreading zone of cells damaged by vaccinia virus is shown. The number of plaques formed can then be counted and used to enumerate the viral population. Image: Green fluorescent protein expressing vaccinia virus (pink) spreads from a single infected cell through an entire monolayer of green monkey kidney cells (blue with yellow nuclei) over three days. By Dean J. Procter (USyd), Bianca Dobson (ANU), David Tscharke (ANU) and Timothy P. Newsome (USYd)

Lab Leader Profile
Loeske Kruuk, EEG

Lab researching: "Microevolution in natural populations, and the impact of recent climate change on evolutionary and ecological processes. My work uses long-term studies of wild animal populations to investigate the core ingredients of evolution: natural selection and genetic variation, and how they operate in relevant ecological settings.

Greatest achievement? "Applying the tools of animal breeding quantitative genetics to evolutionary ecology, especially in wild populations, and showing the value of long-term field studies of animal populations for understanding genetic variation."

*Next big thing: "*A fuller understanding of the way genotype and environment interact to determine phenotype, and harnessing the power of the rapidly-expanding availability of genomic data."

*Science inspiration/hero? "*Any female scientist who has combined a scientific career with raising a family! A long-standing inspiration has been Mary Somerville (1780-1872, Scottish mathematician) for whom the term 'scientist' was first coined in 1834 because the phrase 'man of science' no longer applied. And my father for a love of natural history."

Fubao Sun, Michael Roderick, Wee Ho Lim and **Graham Farquhar's** article 'Hydroclimatic projections for the Murray-Darling Basin based on an ensemble derived from Intergovernmental Panel on Climate Change AR4 climate models' was awarded the 2011 Editor's Choice Awards of *Water Resources Research.* The award will be formally presented at the Hydrologic Sciences Luncheon of the Fall meeting of American Geophysical Union at San Francisco in December.

Viridiana Silva Perez (Evans lab, PS) was awarded a prize at ComBio for her poster 'High throughput screening for photosynthetic efficiency and capacity in wheat'.

Kristen Barratt (PhD student, Arkell lab, EEG) has been awarded a Company of Biologist International Travel Fellowship. Kristen will use the fellowship to study at the NIH National Human Genome Research Institute (Bethesda, USA) for three months next year.

Michael Wong (PhD student, Tscharke lab, BSB) won a bursary to attend the upcoming Annual Meeting of the Australasian Society for Immunology in Melbourne.

Jochen Zeil has accepted the invitation to join the Advisory Board of the *Journal of Comparative Physiology A.*

Research on ant navigation by **Jan Hemmi**, **Ajay Narendra**, **Sam Reid** and **Jochen Zeil** has featured prominently in a recent feature article in *Current Biology* called 'How ants find their way' (Gross, M. Current Biology, 22(16), 615-618).

This monthly newsletter is archived at biology.anu.edu.au/newsletter

Content: Casey Hamilton.
Editing: Kiaran Kirk & Casey Hamilton.

Contact Casey Hamilton to submit content or to be added to the newlsletter distribution list.

PUBLICATIONS

Ali, R.G., Bellchambers, H. & Arkell, R.M. Zinc fingers of the cerebellum (Zic): transcription factors and co-factors. *International Journal of Biochemistry & Cell Biology.*

Alkaladi, A., How, M., & Zeil, J. Systematic variations in microvilli banding patterns along fiddler crab rhabdoms. *Journal of Comparitive Physiology A.*

Anderson, J.M. Lateral heterogeneity of plant thylakoid protein complexes. *Philosophical Transactions of the Royal Society B: Biological Sciences.*

Anderson J.M. Towards elucidation of dynamic structural changes of plant thylakoid architecture. *Philosophical Transactions of the Royal Society B: Biological Sciences.*

Banea, J.P., Nahimana, G., Kuwa, N., Bradbury, J.H., Denton, I.D. & Mandombi, C. Preventive control of konzo in the Democratic Republic of Congo. *Food & Chemical Toxicology.*

Barrand, M.A., Winterberg, M., Ng, F., Nguyen, M., Kirk, K. & Hladky, S.B. Glutathione export from human erythrocytes and *Plasmodium falciparum* malaria parasites. *Biochemistry Journal.*

Booksmythe, I., Schwanz, L. & Kokko, H. The complex interplay of sex allocation and sexual selection. *Evolution.*

Busch F.A. Current methods for estimating the rate of photorespiration in leaves. *Plant Biology.*

Cardillo, M. The phylogenetic signal of species co-occurrence in high-diversity shrublands: different patterns for fire-killed and fire-resistant species. *BMC Ecology.*

Chan, K.X., Wirtz, M., Phua, S.Y., Estavillo, G.M. & Pogson, B.J. Balancing metabolites in drought: the sulfur assimilation conundrum. *Trends in Plant Science.*

Chen, R. & Chung, S.H. Binding modes and functional surface of anti-mammalian scorpion α-toxins to sodium channels. *Biochemistry.*

Chen, R. & Chung, S.H. Structural basis of the selective block of Kv1.2 by maurotoxin from computer simulations. *PLoS One.*

Cvitanovic, C., Wilson, S., Fulton CJ et al. Critical research needs for managing coral reef Marine Protected Areas: perspectives of academics and managers. *Journal of Environmental Management*.

Deakin, J.E. Marsupial Genome Sequences: Providing insight into evolution and disease. *Scientifica.*

Edwards, M.J. & Deakin, J.E. The marsupial pouch: implications for reproductive success and mammalian evolution. *Australian Journal of Zoology.*

Fairweather, S.J., Bröer, A., O'Mara, M., & Bröer, S. Intestinal peptidases form functional complexes with the neutral amino acid transporter B_0AT1. *Biochemistry Journal.*

Fulton, C.J., Starrs, D., Ruibal, M.P. & Ebner, B.C. Counting crayfish: active searching and baited cameras trump conventional hoop netting in detecting *Euastacus armatus*. *Endangered Species Research.*

Gardiner, D.M., McDonald, M.C., Covarelli, L., Solomon, P.S., Rusu, A.G., Marshall, M., Kazan, K., Chakraborty, S., McDonald, B.A. & Manners, J.M. Comparative pathogenomics reveals horizontally acquired novel virulence genes in fungi infecting cereal hosts. *PLoS Pathogens.*

Heskel, M.A., Anderson, O.R., Atkin, O.K., Turnbull, M.H. & Griffin, K.L. Leaf- and cell-level carbon cycling responses to a nitrogen and phosphorus gradient in two Arctic tundra species. *American Journal of Botany.*

Hilder, T.A. & Chung, S.H. Conductance properties of the inwardly rectifying channel, Kir3.2: Molecular and Brownian dynamics study. *Biochimica et Biophysica Acta.*

Hilder, T.A., Pace, R.J. & Chung, S.H. Computational design of a carbon nanotube fluorofullerene biosensor. *Sensors.*

Horridge, A. Arthropod Brains. In: *Brain, Behaviour and Evolution.*

Horridge, A. The anti-intuitive visual system of the honey bee. *Acta Biologica Hungarica.*

Horridge, A. What does the honeybee see ? In *How animals see the world.* Eds: Lazareva, O., Shimizu, T. & Wasserman. E. Oxford University Press.

Jalasvuori, M., Palmu, S., Gillis, A., Kokko, H., Mahillon, J., Bamford, J.K.H. & Fornelos, N. Identification of five novel tectiviruses in *Bacillus* strains: analysis of a highly variable region generating genetic diversity. *Research in Microbiology.*

Kerr, P.J., Ghedin, E., DePasse, J.V., Fitch, A., Cattadori, I.M., Hudson, P.J., Tscharke, D.C., Read, A.F., & Holmes, E.C. Evolutionary history and attenuation of *myxoma* virus on two continents. *PLoS Pathogens.*

Kokko, H., Booksmythe, I. & Jennions, M.D. Causality and sex roles: prejudice against patterns? A reply to Ah-King. *Trends in Ecology & Evolution.*

Kokko, H., Klug, H., & Jennions, M.D. Unifying cornerstones of sexual selection: operational sex ratio, Bateman gradient, and the scope for competitive investment. *Ecology Letters.*

Kornfeld, A., Heskel, M., Atkin, O.K., Griffin, K.L., Gough, L., Horton, T.W. & Turnbull, M.H. Respiratory flexibility and efficiency are affected by simulated global change in Arctic plants. *New Phytologist.*

Krauss, K.W. & Ball, M.C. On the halophytic nature of mangroves. *Trees Structure and Function.*

Periasamy, P., Tan, J.K.H., & O'Neill, H.C. Novel splenic antigen presenting cells derive from a Lin-ckitlo progenitor. *Journal of Leukocyte Biology.*

Reef, R., Schmitz, N., Rogers, B.A., Ball, MC & Lovelock, C.E. Differential responses of the mangrove *Avicennia marina* to salinity and abscisic acid. *Functional Plant Biology.*

Roderick, M.L., Sun, F. & Farquhar, G.D. Water cycle varies over land and sea. *Science.*

Rodríguez Delgado, C.L. & Deakin, J.E. The evolution of mammalian X chromosomes and X chromosome inactivation. In: *Sex Chromosomes: New Research*. Eds: M. D'Aquino & V. Stallone.

Sutherland, W. J., Freckleton, R.P., Godfray, H.C.J., Beissinger, S.R., Benton, T., Cameron, D.D., Carmel, Y., Coomes, D.A., Coulson, T., Emmerson, M.C., Hails, R.S., Hays, G.C., Hodgson, D. J., Hutchings, M. J., Johnson, D., Jones, J. P.G., Keeling, M.J., Kokko, H., Kunin, W.E., Lambin, X., Lewis, O.T., Malhi, Y., Mieszkowska, N., Milner-Gulland, E.J., Norris, K., Phillimore, A.B., Purves, D.W., Reid, J.M., Reuman, D.C., Thompson, K., Travis, J.M.J., Turnbull, L.A., Wardle, D.A. & Wiegand, T. Identification of 100 fundamental ecological questions. *Journal of Ecology.*

Sun,F., Roderick, M.L. & Farquhar, G.D. Changes in the variability of global land precipitation. *Geophysical Research Letters.*

Thomsen, N., Ali, R. G., Ahmed, J. N., & Arkell, R. M. High Resolution Melt Analysis (HRMA); a Viable Alternative to Agarose Gel Electrophoresis for Mouse Genotyping. *PLoS One.*

Watkins-Chow, D.E., Cooke, J., Pidsley, R., Edwards, A., Slotkin, R., Leeds, K.E., Mullen, R., Baxter, L.L., Campbell, T.G., Salzer, M.C., Biondini, L., Gibney, G., Phan, Dinh Tuy, F., Chelly, J., Morris, H,D., Riegler, J., Lythgoe, M.F., Arkell, R.M., Loreni, F., Flint, J., Pavan, W.J., Keays, D.A. Mutation of the Diamond-Blackfan anemia gene Rps7 in mouse results in morphological and neuroanatomical phenotypes. *PLoS Genetics.*

Williams, P.H., Eyles, R. & Weiller, G. Plant microRNA prediction by supervised machine learning using C5.0 decision trees. *Journal of Nucleic Acids.*

Xiang, S., Reich, P.B., Sun, S. & Atkin, O.K. Contrasting leaf trait scaling relationships in tropical and temperate wet forest species. *Functional Ecology.*

Zhang, B., Carrie, C., Ivanova, A., Narsai, R., Murcha, M.W., Albrecht, V., Pogson, B., Giraud, E., Van Aken, O. & Whelan, J. LETM play a role in the accumulationbof mitochondrially encoded proteins in *Arabidopsis thaliana* and AtLETM2 displays parent of origin effects. *Journal of Biological Chemistry.*

GRANTS & FELLOWSHIPS

NHMRC

FELLOWSHIP

Rowena Martin (BSB), R.D. Wright Biomedical Fellowship - Level 1, Understanding how to combat drug resistance in the malaria parasite: Examination of two proteins that are key to the parasite's ability to evade the toxic effects of antimalarial drugs, $397,724

PROJECT GRANTS

CIA – **Ryszard Maleszka (EEG),** Unlocking the secrets of Royal Jelly:

from recent breakthrough to novel drugs targeting Anaplastic Lymphoma Kinase, $337,144.

CIA - **Kiaran Kirk (BSB),** Targeting an ion pump in the malaria parasite with multiple compound classes, $371,500.

CIA - Livia Hool**,** CIB - Killugudi Swaminatha-Iyer, CIC - **Ben Corry (BSB)**, Optimising efficacy of a peptide derived against the alpha-interacting domain of the L-type calcium channel in reduction of ischemia-reperfusion injury, $391,000.

CIA - Boris Martinac, CIB - **Ben Corry (BSB)**, CIC - Charles Cranfield, Investigation of lipid-protein interactions of mechanosensitive ion channels, $396,476.

CIA - Megan O'Mara, CIB - Alan Mark, CIC - **Richard Callaghan (BSB)**, Understanding multidrug resistance in cancer: identification of the substrate and inhibitor binding sites in P-glycoprotein, $274,723.

CIA - Matthew Cook, CIB - **David Tscharke (BSB)**, CIC - David Fulcher, Genomic medicine for human immune deficiency, $517,097.

ARC

DECRA FELLOWSHIPS

Lyanne Brouwer (EEG) Family matters: kin selection and competition in cooperative breeders $375K.

Yit-Heng Chooi (PS) A synthetic biology approach for mining the secondary metabolomes of fungal phytopathogens $373K.

Sylvain Foret (EEG) The molecular basis of division of labour in the beehive $374K.

Maxine Piggott (EEG) New technology for accurate freshwater biodiversity assessment using environmental DNA $375K.

DISCOVERY GRANTS

Owen Atkin (PS), Patrick Meir (PS), Mathew Turnbull, Stephen Sitch, Kevin Griffin & Vaughan Hurry. Disentangling climate and evolutionary controls over the temperature dependence of leaf respiration $460K.

Christopher Cazzonelli (PS), Barry Pogson (PS), Asaph Aharoni. The hunt for Ribonucleic Acid riboswitches and genetic sensors of metabolic flux in plants $375K.

Michael Crisp (EEG) & Lyn Cook. Evolution of Australia's globally unique hotspot of floral diversity $350K.

Graham Farquhar (PS) Mineral content of leaves and the ratio of water loss to carbon gain: environmental and genetic controls and comparison with stable isotopic measures $300K.

Adrienne Hardham (PS), David Jones (PS), Peter Dodds, & Jeffrey Ellis, Molecular basis of rust infection and host plant resistance $540K.

Anthony Millar (PS), Peter Waterhouse & Christopher Helliwell. The use of molecular sponges to inhibit small Ribonucleic acid activity in plants $490K.

Helen O'Neill (BSB) microenvironments which support extramedullary hematopoiesis $390K.

Graeme Price (PS) & Murray Badger (PS) New approaches to unravelling post-translational controls operating on the cyanobacterial carbon dioxide concentrating mechanism $465K.

Spencer Whitney (PS) Exploring the catalytic role of the Rubisco small subunit: a new target for improving carbon dioxide-fixation in plants $390K.

Benjamin Phillips & **Craig Moritz (EEG)** Peripheral isolates as hotbeds of adaptive diversity $485K.

Christopher Bull, **David Gordon (EEG),** Stephanie Godfrey & Andrew Sih. What drives parasite spread through social networks: lessons from lizards $535K.

LIEF Grants

William Foley (EEG), Adam Carroll (PS), Murray Badger (PS), Barry Pogson (PS), Justin Borevitz (PS), David Tissue, David Ellsworth, Benjamin Moore, Markus Riegler, Paul Rymer, Ian Small, Ryan Lister, Charles Warren, Mark Adams & Penelope Smith. High-throughput sample preparation robotics to enable emerging large-scale plant genomics, metabolomics and proteomics research $280K.

Justin Borevitz (PS), Susanne von Caemmerer (PS), Sureshkumar Balasubramanian, Andrew Millar, Ian Small, **Barry Pogson (PS), Murray Badger (PS)** & John Bowman. Spectral climate chamber facilities for phenomic studies of plant light response adaptation $500K

Michael Bird, Lindsay Hutley, Karen Gibb, **Lucas Cernusak (PS), Graham Farquhar (PS)** & Marc Leblanc. Mobile Australian field isotope alliance $160K

Other agencies

Marilyn Ball (PS) and **Graham Farquahar (PS)**, along with Dana Bergstrom (Australian Antarctic Division), John Finnigan (CSIRO), Gary Bryant (RMIT) and Lawren Sack (UCLA) have secured a $165K Australian Antarctic Science Grant for "Predicting change: Will morphological constraints on hydraulic function limit acclimation of subantarctic plants to a warmer climate?"

Amanda Edworthy (Langmore lab, EEG) has been awarded a Paddy Pallin Science Grant ($7000).