Biochemistry News

The newsletter of the Department of Biochemistry at the University of Otago

editor: Bronwyn Carlisle

June 2013

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View from the corner

Welcome to the June 2013 Edition of the Biochemistry Department newsletter, our first of the year. As always, there is much going on and I hope you enjoy reading all about it inside this edition. Thanks, as always, to Bronwyn for putting it all together and thanks to you for contributing.

We started out 2013 welcoming the promotion of our two new Professors, Julian Eaton-Rye and Parry Guilford. These well-deserved promotions were based on years of outstanding work in photosynthesis and cancer genetics, respectively. We are looking forward to both of their Inaugural Professorial Lectures later this year.

Student numbers have been good this year and we welcomed a large group of talented fourth year students who are now pursuing their Masters and Honours degrees.

Early in the year we received the superb news that our department was the top scoring OSMS department in the Tertiary Education Commission's PBRF ranking. We were actually tied as the top-scoring department in the Division of Health Sciences. This rank is a testament to the large number of excellent researchers we have in our department and is also a tribute to the key careful hiring decisions made by the department under the leadership of previous HODs like John Cutfield, Warren Tate, and including back to George Peterson and Mervyn Smith. But more than that, it's a testament to the very strong team that has been assembled over many years in our research, teaching and general staff, as well as, to the development and maintenance of a department culture in which outstanding research is highly prized. It's good to be a part of such a very strong team. We should make every effort to maintain and build this culture for our current and future, staff and students.

In May we had our first Saturday morning graduation ceremony of the year which was well attended by about 100 staff, students, friends and family. Our special guest that morning was Warren Tate who shared a few wise words before going on to give an outstanding commencement address at the full graduation proceedings. I particularly enjoyed his comments about aiming high with ambition, but with the realization that the human aspect of science — i.e. the close relationships formed and the chance to help nurture the careers of others — are equally important and meant to be cherished.

The last two weeks of May were filled with a flurry of activities. The University worked hard to position itself to play a lead role in the National Science Challenges. Many in our department including Catherine Day and Peter Dearden are taking a lead role in these activities, and all of us are encouraged to engage in the process. Steven Sowerby

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became the latest from the department to receive a grant from the prestigious Bill and Melinda Gates Foundation. (Steven's extremely clever device has the potential to aid in the diagnosis of parasitic infections around the world.) And in May's last week last week our now annual Three Minute Thesis Competition was held to again highlight the breadth of the thesis projects within the Department. Congratulation to Oliver Watkins who gave the winning presentation and in addition won the People's choice award.

Last, but not least, we are so pleased to welcome Peter Mace back to the department following his OE in America at the Sanford-Burnham Institute. Peter's research will focus on the integration of signaling pathways into cellular responses to stress. He and his wife are expecting a baby as I write this and I fully expect an exciting announcement to appear elsewhere in this issue. Please stop by to welcome Peter when you have a chance, he will be setting up his research lab at the West end of the second floor. Enjoy the newsletter!

Kurt Krause

Rita Pearl Mace-David

Recent Publications

If you have publications that are not included in here, could you please send them to the editor. Sometimes our search parameters miss things, and these searches are what populates the publications page on our website.

Jacob J Lamb, Julian J Eaton-Rye, and Martin F Hohmann-Marriott

A Cost-Effective Solution for the Reliable Determination of Cell Numbers of Microorganisms in Liquid Culture.

The concentration of microorganisms in growth medium is an important parameter in microbiological research. One of the approaches to determine this parameter is based on the physical interaction of small particles with light that results in light scattering. Table-top spectrophotometers can be used to determine the scattering properties of a sample as a change in light transmission. However, a portable, reliable, and maintenance-free instrument that can be built from inexpensive parts could provide new research opportunities. In this report, we show how to build such an instrument. This instrument consists of a low power monochromatic light-emitting diode, a monolithic photodiode, and a microcontroller. We demonstrate that this instrument facilitates the precise determination of cell concentrations for the bacteria *Escherichia coli* and *Pseudomonas aeruginosa* as well as the cyanobacterium *Synechocystis sp. PCC 6803* and the green alga *Chlamydomonas reinhardtii*.

Current Microbiology, 2013

D W Reid, I L Lamont, D J Smith, A C Badrick, and G J Anderson

Airway Iron in Cystic Fibrosis Is Associated with Increased Inflammation, Enhanced Pseudomonas Aeruginosa Infection and Reduced Airway pH.

Respirology, 2013 vol. 18 pp. 62-62

M K Wu, N Sabbaghian, B Xu, S Addidou-Kalucki, C Bernard, D Zou, A E Reeve, M R Eccles, C Cole, C S Choong, A Charles, T Y Tan, D M Iglesias, P R Goodyer, and W D Foulkes

Biallelic DICER1 mutations occur in Wilms tumours.

Journal of Pathology, 2013 vol. 230 (2) pp. 154-164

Elizabeth J Duncan, Matthew A Benton, and Peter K Dearden

Canonical terminal patterning is an evolutionary novelty.

Patterning of the terminal regions of the *Drosophila* embryo is achieved by an exquisitely regulated signal that passes between the follicle cells of the ovary, and the developing embryo. This pathway, however, is missing or modified in other insects. Here we trace the evolution of this pathway by examining the origins and expression of its components. The three core components of this pathway: trunk, torso and torso-like have different evolutionary histories and have been assembled step-wise to form the canonical terminal patterning pathway of *Drosophila* and *Tribolium*. Trunk, torso and a gene unrelated to terminal patterning, prothoraciotrophic hormone (PTTH), show an intimately linked evolutionary history, with every holometabolous insect, except the honeybee, possessing both PTTH and torso genes. Trunk is more restricted in its phylogenetic distribution, present only in the *Diptera* and *Tribolium* and, surprisingly, in the chelicerate *Ixodes scapularis*, raising the possibility that trunk and torso evolved earlier than previously thought. In *Drosophila* torso-like restricts the activation of the terminal patterning pathway to the poles of the embryo. Torso-like evolved in the pan-crustacean lineage, but based on expression of components of the canonical terminal patterning system in the hemimetabolous insect *Acyrthosiphon pisum* and the holometabolous insect *Apis mellifera*, we find that the canonical terminal-patterning system is not active in these insects. We therefore propose that the ancestral function of torso-like is unrelated to terminal patterning and that torso-like has become co-opted into terminal patterning in the lineage leading to *Coleoptera* and *Diptera*. We also show that this co-option has not resulted in changes to the molecular function of this protein. Torso-like from the pea aphid, honeybee and *Drosophila*, despite being expressed in different patterns, are functionally equivalent. We propose that co-option of torso-like into restricting the activity of trunk and torso facilitated the final step in the evolution of this pathway; the capture of transcriptional control of target genes such as tailless and huckebein by this complex and novel patterning pathway.

Developmental Biology, 2013 vol. 375 (2) pp. 193-201

Minh Ha, Alaa El-Din Bekhit, Alan Carne, and David L Hopkins

Comparison of the Proteolytic Activities of New Commercially Available Bacterial and Fungal Proteases toward Meat Proteins.

The hydrolytic activity of 3 commercially available protease preparations (bacterial protease G, fungal 31000, and fungal 60000) were examined using fluorescent-labeled casein, azo dye-impregnated collagen, and meat protein extracts from bovine M. semimembranosus and Achilles tendon, and compared to that of papain. Assays showed that all proteases exhibited little activity at low temperature (5 °C), and maximal activity at 45 °C. The pH, at which optimal activity was observed for each of the protease preparations, differed and ranged from pH 5.0 to 8.0. Kinetic parameters (K(M) and V(max)) were also different between protease preparations, with the bacterial protease G and papain exhibiting significantly higher V(max) values ($P < 0.001$) and lower K(M) values ($P < 0.01$) for the casein substrate than the 2 fungal protease preparations. Meat protein hydrolysis was displayed on SDS-PAGE and proteins analyzed with mass spectrometry. The protease preparations were shown to have varying affinity toward different meat proteins. The bacterial protease G preparation was efficient at hydrolyzing most myofibril and collagen proteins, and appeared to be more efficient than papain at hydrolyzing collagen proteins. On the other hand the 2 fungal protease preparations showed a selective specificity toward meat myofibrillar proteins, and the fungal 60000 protease preparation exhibited high affinity toward collagen γ and collagen type I chain B proteins. The results generated in this study demonstrated that these commercial proteases have good potential for use in meat tenderization applications due to their mild and complementary effects on different meat proteins. Practical Application: Bacterial and fungal protease preparations exhibited varying affinities for hydrolyzing meat proteins. This selective moderate capability of microbial proteases compared to papain is potentially an advantage in avoiding over-tenderization in meat. On the other hand, the bacterial protease G preparation, which appeared to be more efficient at hydrolyzing connective tissue proteins than papain, could be beneficial in tenderizing meat with high connective tissue content. The synergistic effect of these protease preparations could be incorporated into a meat tenderizing formula to give the tenderizer a broad activity spectrum, thus able to target different cuts of meat.

Journal of food science, 2013

Tracy M Josephs, Matthew D Liptak, Gillian Hughes, Alexandra Lo, Rebecca M Smith, Sigurd M Wilbanks, Kara L Bren, and Elizabeth C Ledgerwood

Conformational change and human cytochrome c function: mutation of residue 41 modulates caspase activation and destabilizes Met-80 coordination.

Cytochrome c is a highly conserved protein, with 20 residues identical in all eukaryotic cytochromes c. Gly-41 is one of these invariant residues, and is the position of the only reported naturally occurring mutation in cytochrome c (human G41S). The basis, if any, for the conservation of Gly-41 is unknown. The mutation of Gly-41 to Ser enhances the apoptotic activity of cytochrome c without altering its role in mitochondrial electron transport. Here we have studied additional residue 41 variants and determined their effects on cytochrome c functions and conformation. A G41T mutation decreased the ability of cytochrome c to induce caspase activation and decreased the redox potential, whereas a G41A mutation had no impact on caspase induction but the redox potential increased. All residue 41 variants decreased the pK (a) of a structural transition of oxidized cytochrome c to the alkaline conformation, and this correlated with a destabilization of the interaction of Met-80 with the heme iron(III) at physiological pH. In reduced cytochrome c the G41T and G41S mutations had distinct effects on a network of hydrogen bonds involving Met-80, and in G41T the conformational mobility of two Ω-loops was altered. These results suggest the impact of residue 41 on the conformation of cytochrome c influences its ability to act in both of its physiological roles, electron transport and caspase activation.

Journal of biological inorganic chemistry : JBIC : a publication of the Society of Biological Inorganic Chemistry, 2013

H T Nguyen, T R Merriman, and M A Black

CNVrd, a Read-Depth Algorithm for Assigning Copy-Number at the FCGR Locus: Population-Specific Tagging of Copy Number Variation at FCGR3B.

PLoS ONE, 2013 vol. 8 (4)

Paulina Hanson-Manful and Wayne M Patrick

Construction and analysis of randomized protein-encoding libraries using error-prone PCR.

In contrast to site-directed mutagenesis and rational design, directed evolution harnesses Darwinian principles to identify proteins with new or improved properties. The critical first steps in a directed evolution experiment are as follows: (a) to introduce random diversity into the gene of interest and (b) to capture that diversity by cloning the resulting population of molecules into a suitable expression vector, en bloc. Error-prone PCR (epPCR) is a common method for introducing random mutations into a gene. In this chapter, we describe detailed protocols for epPCR and for the construction of large, maximally diverse libraries of cloned variants. We also describe the utility of an online program, PEDEL-AA, for analyzing the compositions of epPCR libraries. The methods described here were used to construct several libraries in our laboratory. A side-by-side comparison of the results is used to show that, ultimately, epPCR is a highly stochastic process.

Methods in molecular biology (Clifton, NJ), 2013 vol. 996 pp. 251-267

Ambarish Biswas, Joshua N Gagnon, Stan J J Brouns, Peter C. Fineran, and Chris M Brown

CRISPRTarget: Bioinformatic prediction and analysis of crRNA targets.

The bacterial and archaeal CRISPR/Cas adaptive immune system targets specific protospacer nucleotide sequences in invading organisms. This requires base pairing between processed CRISPR RNA and the target protospacer. For type I and II CRISPR/Cas systems, protospacer adjacent motifs (PAM) are essential for target recognition, and for type III, mismatches in the flanking sequences are important in the antiviral response. In this study, we examine the properties of each class of CRISPR. We use this information to provide a tool (CRISPRTarget) that predicts the most likely targets of CRISPR RNAs (bioanalysis.otago.ac.nz/CRISPRTarget). This can be used to discover targets in newly sequenced genomic or metagenomic data. To test its utility, we discover features and targets of well-characterized Streptococcus thermophilus and Sulfolobus solfataricus type II and III CRISPR/Cas systems. Finally, in Pectobacterium species, we identify new CRISPR targets and propose a model of temperate phage exposure and subsequent inhibition by the type I CRISPR/Cas systems.

RNA biology, 2013 vol. 10 (5)

Mayank Saraswat, Ralph S Grand, and Wayne M Patrick

Desalting DNA by Drop Dialysis Increases Library Size upon Transformation.

It is often desirable to obtain gene libraries with the greatest possible number of variants. We tested two different methods for desalting the products of library ligation reactions (silica-based microcolumns and drop dialysis), and examined their effects on final library size. For both intramolecular and intermolecular ligation, desalting by drop dialysis yielded approximately 3-5 times more transformants than microcolumn purification.

Bioscience, biotechnology, and biochemistry, 2013 vol. 77 (2) pp. 402-404

Brie Sorrenson, Rachel J Suetani, Michael J A Williams, Vivienne M Bickley, Peter M George, Gregory T Jones, and Sally P A McCormick

Functional rescue of mutant ABCA1 proteins by sodium 4-phenylbutyrate.

Mutations in the ATP-binding cassette transporter A1 (ABCA1) are a major cause of decreased HDL cholesterol (HDL-C), which infers an increased risk of cardiovascular disease (CVD). Many ABCA1 mutants show impaired localization to the plasma membrane. The aim of this study was to investigate whether the chemical chaperone, sodium 4-phenylbutyrate (4-PBA) could improve cellular localization and function of ABCA1 mutants. Nine different ABCA1 mutants (p.A594T, p.I659V, p.R1068H, p.T1512M, p.Y1767D, p.N1800H, p.R2004K, p.A2028V, p.Q2239N) expressed in HEK293 cells, displaying different degrees of mislocalization to the plasma membrane and discrete impacts on cholesterol efflux, were subject to treatment with 4-PBA. Treatment restored localization to the plasma membrane and increased cholesterol efflux function for the majority of mutants. Treatment with 4-PBA also increased ABCA1 protein expression in all transfected cell lines. In fibroblast cells obtained from low HDL-C subjects expressing two of the ABCA1 mutants (p.R1068H and p.N1800H), 4-PBA increased cholesterol efflux without any increase in ABCA1 expression. Our study is the first to investigate the effect of the chemical chaperone, 4-PBA on ABCA1 and shows that it is capable of restoring plasma membrane localization and enhancing the cholesterol efflux function of mutant ABCA1s both in vitro and ex vivo. These results suggest 4-PBA may warrant further investigation as a potential therapy for increasing cholesterol efflux and HDL-C levels.

The Journal of Lipid Research, 2013 vol. 54 (1) pp. 55-62

James D Doecke, Lisa A Simms, Zhen Zhen Zhao, Ning Huang, Katherine Hanigan, Krupa Krishnaprasad, Rebecca L Roberts, Jane M Andrews, Gillian Mahy, Peter Bampton, Peter Lewindon, Timothy Florin, Ian C Lawrance, Richard B Gearry, Grant W Montgomery, and Graham L Radford-Smith

Genetic Susceptibility in IBD: Overlap Between Ulcerative Colitis and Crohn's Disease.

BACKGROUND:: The etiology of ulcerative colitis (UC) and Crohn's disease (CD) involves both genetic and environmental components. Multiple UC and CD susceptibility genes have been identified through genome-wide association studies and subsequent meta-analyses. These studies have also highlighted the presence of genes common to both diseases, and shared with several other autoimmune disorders. The aim of this study was to identify single nucleotide polymorphisms (SNPs) recently identified by the International IBD Genetics Consortium (IIBDGC) demonstrating that highly significant associations with CD could also confer genetic susceptibility to UC. METHODS:: Statistical modeling was performed on 29 CD-associated SNPs. The study comprised of 1652 UC cases from the Australia and New Zealand IBD Consortium and 2363 Australian population-based controls. RESULTS:: After adjustment for multiple comparisons, only one SNP, rs3024505, was significantly associated with UC (P = 0.001). Independent chi-square analyses identified odds ratios of 2.22 (1.48-3.37) for the rare homozygous genotype, and 1.20 (1.06-1.35) for the minor allele. Five other SNPs demonstrated moderate to weak associations with UC. CONCLUSIONS:: Of the 29 SNPs conferring high genetic susceptibility to CD, 28 were not associated with UC, thus indicating that for this SNP set there is a low level of overlap between the two major forms of IBD. Only one SNP, rs3024505 (Chr 1q32.1, upstream of IL10), was associated with susceptibility to UC. The identification of this SNP replicates a finding from Franke et al (2008), where the rs3024505 SNP was strongly associated with UC across multiple European populations.

Inflammatory Bowel Diseases, 2013

O Hyink, F Laas, and P K Dearden

Genetic tests for alleles of complementary-sex-determiner to support honeybee breeding programmes.

Apidologie, 2013 vol. 44 (3) pp. 306-313

J S Munday, M Dunowska, S F Hills, and R E Laurie

Genomic characterization of *Felis catus* papillomavirus-3: A novel papillomavirus detected in a feline Bowenoid in situ carcinoma.

Veterinary Microbiology, 2013

J L Ludgate, G Le Mée, R Fukuzawa, E J Rodger, R J Weeks, A E Reeve, and I M Morison

Global demethylation in loss of imprinting subtype of wilms tumor.

Genes, Chromosomes and Cancer, 2013 vol. 52 (2) pp. 174-184

Robinson, P.C., T R Merriman, P Herbison, and J Highton

Hospital admissions associated with gout and their comorbidities in new zealand and england 1999-2009.

Rheumatology (United Kingdom), 2013 vol. 52 (1) pp. 118-126

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M M Najafpour, M A Tabrizi, B Haghighi, J. J. Eaton-Rye, R Carpentier, and S I Allakhverdiev

Imidazolium or guanidinium/layered manganese (III, IV) oxide hybrid as a promising structural model for the water-oxidizing complex of Photosystem II for artificial photosynthetic systems

Photosynthesis Research, 2013 pp. 1-9

A Girardin, J McCall, M A Black, F Edwards, V Phillips, E S Taylor, A E Reeve, and R A Kemp

Inflammatory and regulatory T cells contribute to a unique immune microenvironment in tumor tissue of colorectal cancer patients.

International Journal of Cancer, 2013 vol. 132 (8) pp. 1842-1850

S Sawaya, A Bagshaw, E Buschiazzo, P Kumar, S Chowdhury, M A Black, and N Gemmell

Microsatellite Tandem Repeats Are Abundant in Human Promoters and Are Associated with Regulatory Elements.

PLoS ONE, 2013 vol. 8 (2)

D W Reid, R Latham, I L Lamont, M Cámara, and L F Roddam

Molecular analysis of changes in Pseudomonas aeruginosa load during treatment of a pulmonary exacerbation in cystic fibrosis.

Journal of Cystic Fibrosis, 2013

Anita K Dunbier, Zara Ghazoui, Helen Anderson, Janine Salter, Ashutosh Nerurkar, Peter Osin, Roger A'hern, William R Miller, Ian E Smith, and Mitchell Dowsett

Molecular profiling of aromatase inhibitor-treated post-menopausal breast tumors identifies immune-related correlates of resistance.

PURPOSE: Estrogen withdrawal by treatment with aromatase inhibitors is the most effective form of endocrine therapy for postmenopausal estrogen receptor positive (ER+) breast cancer. However, response to therapy varies markedly and understanding of the precise molecular effects of AIs and causes of resistance is limited. We aimed to identify in clinical breast cancer those genes and pathways most associated with resistance to aromatase inhibitors by examining the global transcriptional effects of aromatase inhibitor treatment. EXPERIMENTAL DESIGN: Baseline and 2-week post-treatment biopsies were obtained from 112 postmenopausal women with ER+ breast cancer receiving neoadjuvant anastrozole. Gene expression data was obtained from 81 baseline and 2-week paired samples. Pathway analysis identified (i) the most prevalent changes in expression and (ii) the pretreatment genes/pathways most related to poor antiproliferative response. RESULTS: 1327 genes were differentially expressed after 2 weeks treatment (FDR<0.01). Proliferation-associated genes and classical estrogen-dependent genes were strongly downregulated while collagens and chemokines were upregulated. Pre-treatment expression of an inflammatory signature correlated with antiproliferative response to anastrozole and this observation was validated in an independent study. Higher expression of immune-related genes such as SLAMF8 and TNF as well as lymphocytic infiltration were associated with poorer response ($p<0.001$) and validated in an independent cohort. CONCLUSIONS: The molecular response to AI treatment varies greatly between patients consistent with the variable clinical benefit from AI treatment. Higher baseline expression of an inflammatory signature is associated with poor antiproliferative response and should be assessed further as a novel biomarker and potential target for AI-treated patients.

Clinical cancer research : an official journal of the American Association for Cancer Research, 2013

Nathan J Kenny and Peter K Dearden

NMDA receptor expression and C terminus structure in the rotifer *Brachionus plicatilis* and long-term potentiation across the Metazoa.

The C termini of N-methyl-D-aspartate (NMDA) receptor NR2 subunits are thought to play a major role in the molecular establishment of memory across the Bilateria, via the phenomenon known as long-term potentiation (LTP). Despite their long history of use as models in the study of memory, the expression and structure of the NR2 subunit in the Lophotrochozoa has remained uncategorized. Here, we report the phylogenic relationships of NR subunits across the Bilateria, and the cloning and in situ analysis of expression of NMDA NR1 and NR2 subunits in the monogont rotifer *Brachionus plicatilis*. RNA in situ hybridization suggests expression of NMDA receptor subunits in *B. plicatilis* is neural, consistent with expression observed in other species, and ours is the first report confirming NR2 expression in the lophotrochozoan clade. However, the single NR2 subunit identified in *B. plicatilis* was found to lack the long C terminal domain found in vertebrates, which is believed to modulate LTP. Further investigation revealed that mollusc and annelid NR2 subunits possess long intracellular C terminal domains. As data from molluscs (and particularly *Aplysia californica*) are the basis for much of our understanding of LTP, understanding how these diverse lophotrochozoan C termini function in vivo will have many implications for how we consider the evolution of the molecular control of learning and memory across the Metazoa as a whole and interpret the results of experiments into this vital component of cognition.

Invertebrate neuroscience : IN, 2013

C M Porteous, D K Menon, F I Aigbirhio, R.A.J. Smith, and M.P. Murphy

P-glycoprotein (Mdr1a/1b) and breast cancer resistance protein (Bcrp) decrease the uptake of hydrophobic alkyl triphenylphosphonium cations by the brain.

Biochimica et Biophysica Acta - General Subjects, 2013 vol. 1830 (6) pp. 3458-3465

S Burut-Archanai, J. J. Eaton-Rye, A Incharoensakdi, and S Powtongsook

Phosphorus removal in a closed recirculating aquaculture system using the cyanobacterium *Synechocystis* sp. PCC 6803 strain lacking the SphU regulator of the Pho regulon.

Biochemical Engineering Journal, 2013 vol. 74 pp. 69-75

N Dalbeth, M E House, G D Gamble, A Horne, B Pool, L Purvis, A Stewart, M Merriman, M Cadzow, A Phipps-Green, and T R Merriman

Population-specific influence of SLC2A9 genotype on the acute hyperuricaemic response to a fructose load.

Annals of the Rheumatic Diseases, 2013

Margi I Butler, Peter A Stockwell, Michael A Black, Robert C Day, Iain L Lamont, and Russell T M Poulter

***Pseudomonas syringae pv. actinidiae* from Recent Outbreaks of Kiwifruit Bacterial Canker Belong to Different Clones That Originated in China.**

A recently emerged plant disease, bacterial canker of kiwifruit (Actinidia deliciosa and A. chinensis), is caused by Pseudomonas syringae pv. actinidiae (PSA). The disease was first reported in China and Japan in the 1980s. A severe outbreak of PSA began in Italy in 2008 and has spread to other European countries. PSA was found in both New Zealand and Chile in 2010. To study the evolution of the pathogen and analyse the transmission of PSA between countries, genomes of strains from China and Japan (where the genus Actinidia is endemic), Italy, New Zealand and Chile were sequenced. The genomes of PSA strains are very similar. However, all strains from New Zealand share several single nucleotide polymorphisms (SNPs) that distinguish them from all other PSA strains. Similarly, all the PSA strains from the 2008 Italian outbreak form a distinct clonal group and those from Chile form a third group. In addition to the rare SNPs present in the core genomes, there is abundant genetic diversity in a genomic island that is part of the accessory genome. The island from several Chinese strains is almost identical to the island present in the New Zealand strains. The island from a different Chinese strain is identical to the island present in the strains from the recent Italian outbreak. The Chilean strains of PSA carry a third variant of this island. These genomic islands are integrative conjugative elements (ICEs). Sequencing of these ICEs provides evidence of three recent horizontal transmissions of ICE from other strains of Pseudomonas syringae to PSA. The analyses of the core genome SNPs and the ICEs, combined with disease history, all support the hypothesis of an independent Chinese origin for both the Italian and the New Zealand outbreaks and suggest the Chilean strains also originate from China.

PLoS ONE, 2013 vol. 8 (2) p. e57464

Yoshio Nakatani, Torsten Kleffmann, Katrin Linke, Stephen M. Condon, Mark G Hinds, and Catherine L Day

Regulation of ubiquitin transfer by XIAP, a dimeric RING E3 ligase.

RING domains of E3 ligases promote transfer of Ub (ubiquitin) from the E2~Ub conjugate to target proteins. In many cases interaction of the E2~Ub conjugate with the RING domain requires its prior dimerization. Using cross-linking experiments we show that E2 conjugated ubiquitin contacts the RING homodimer interface of the IAP (inhibitor of apoptosis) proteins, XIAP (X-linked IAP) and cIAP (cellular IAP) 2. Structural and biochemical analysis of the XIAP RING dimer shows that an aromatic residue at the dimer interface is required for E2~Ub binding and Ub transfer. Mutation of the aromatic residue abolishes Ub transfer, but not interaction with Ub. This indicates that nuleophilic attack on the thioester bond depends on precise contacts between Ub and the RING domain. RING dimerization is a critical activating step for the cIAP proteins; however, our analysis shows that the RING domain of XIAP forms a stable dimer and its E3 ligase activity does not require an activation step.

The Biochemical journal, 2013 vol. 450 (3) pp. 629-638

D F B Wright, L K Stamp, T R Merriman, M L Barclay, S B Duffull, and N H G Holford

The population pharmacokinetics of allopurinol and oxypurinol in patients with gout.

European Journal of Clinical Pharmacology, 2013 pp. 1-11

F M Imhoff, D Yang, S F Mathew, A N Clarkson, Y Kawagishi, W P Tate, K Koishi, and I S McLennan

The type 2 anti-Müllerian hormone receptor has splice variants that are dominant-negative inhibitors.

FEBS Letters, 2013

R P Fitzgerald, M Legge, and N Frank

When biological scientists become health-care workers: Emotional labour in embryology.

Human Reproduction, 2013 vol. 28 (5) pp. 1289-1296

C S F Bah, A.E.-D.A. Bekhit, A Carne, and M A Mcconnell

Slaughterhouse blood: An emerging source of bioactive compounds.

Comprehensive Reviews in Food Science and Food Safety, 2013 vol. 12 (3) pp. 314-331

Megan J Wilson and Peter K Dearden

RNA localization in the honeybee (*Apis mellifera*) oocyte reveals insights about the evolution of RNA localization mechanisms.

Subcellular localization of RNAs is a critical biological process for generation of cellular asymmetries for many cell types and a critical step in axis determination during the early development of animals. We have identified transcripts localized to the anterior and posterior of honeybee oocyte using laser capture microscopy and microarray analysis. Analysis of orthologous transcripts in *Drosophila* indicates that many do not show a conserved pattern of localization. By microinjecting fluorescently labeled honeybee transcripts into *Drosophila* egg chambers we show that these RNAs become localized in a similar manner to their localization in honeybee oocytes, indicating conservation of the localization machinery. Thus while the mechanisms for localizing RNA are conserved, the complement of localized RNAs are not. We propose that this complement of localized RNAs may change relatively rapidly through the loss or evolution of signal sequences detected by the conserved localization machinery, and show this has occurred in one transcript that is localized in a novel way in the honeybee. Our proposal, that the acquisition of novel RNA localization is relatively easy to evolve, has implications for the evolution of symmetry breaking mechanisms that trigger axis formation and development in animal embryos.

Developmental Biology, 2013

Elizabeth J Duncan, Megan P Leask, and Peter K Dearden

The pea aphid (*Acyrthosiphon pisum*) genome encodes two divergent early developmental programs.

The pea aphid (*Acyrthosiphon pisum*) can reproduce either sexually or asexually (parthenogenetically), giving rise, in each case, to almost identical adults. These two modes of reproduction are accompanied by differences in morphology of the ovaries and the developmental environment, with sexual forms producing eggs that are laid, whereas asexual development occurs within the mother. Here we examine the effect each mode of reproduction has on the expression of key maternal and axis patterning genes; orthodenticle (*otd*), hunchback (*hb*), caudal (*cad*) and nanos (*nos*). We show that three of these genes (*Ap-hb, Ap-otd* and *Ap-cad*) are expressed differently between the sexually and asexually produced oocytes and embryos of the pea aphid. We also show, using immunohistochemistry and cytoskeletal inhibitors, that *Ap-hb* RNA is localized differently between sexually and asexually produced oocytes, and that this is likely due to differences in the 3' untranslated regions of the RNA. Furthermore, *Ap-hb* and *Ap-otd* have extensive expression domains in early sexually produced embryos, but are not expressed at equivalent stages in asexually produced embryos. These differences in expression likely correspond with substantial changes in the gene regulatory networks controlling early development in the pea aphid. These data imply that in the evolution of parthenogenesis a new program has evolved to control the development of asexually produced embryos, whilst retaining the existing, sexual, developmental program. The patterns of modification of these developmental processes mirror the changes that we see in developmental processes between species, in that early acting pathways in development are less constrained, and evolve faster, than later ones. We suggest that the evolution of the novel asexual development pathway in aphids is not a simple modification of an ancestral system, but the evolution of two very different developmental mechanisms occurring within a single species.

Developmental Biology, 2013

News from Around the Department

Cold Adaptation Laboratory

Much change in the Cold Adaptation laboratory for this newsletter. Lincoln just endured his PhD oral and now has corrections to make and he can then be addressed as Dr Mackenzie. James (Baby) submitted his MSc thesis a few weeks ago and is waiting for the examiners' reports. In the meantime, he's working for Monica assaying alcohol dehydrogenase. Melanie has finished her work and is thinking about her next steps.

Abhishek has essentially finished his laboratory work and is writing his thesis and some papers (but not necessarily in any particular order). The rate-limiting step in this process is me. Brendon's beetles have been doing some interesting but unexpected things and we're looking forward to getting some of the data that will tell us a little about what is going on. Anna's nematode cooperate on some days but not on others but there are some very positive signs that we'll tell you all about next time.

Craig has been dealing with the usual mountain of paper work and procedural matters but has managed to make some progress on a couple of manuscripts and on the annual ritual of grant applications and requests for funding. So pretty much business as usual.

Ledgerwood Lab

The Ledgerwood Lab has welcomed four new members, and Tracy has left for Melbourne. Kirstin McDonald and Mathew Powell have both finished their degrees in Biochemistry at the University of Otago and are starting Masters projects. Rewi Stirrat finished his Masters in Biomedical Sciences at the University of Auckland in February and is on a two-year contract as an Assistant Research Fellow, and Kevin Ly is on a six-month contract as Assistant Research Fellow, having finished his PhD in the Physiology Department. Four new people in the lab has meant that PhD candidate Lily Ong has had the great honour of showing everyone where everything belongs, on top of her role as laboratory techniques instructor extraordinaire.

Kevin is working on finding the candidates that are oxidised by Prx1 in redox signalling. Mathew is observing the reducing capabilities of thioredoxin to the as-yet unidentified targets of Prx1 oxidation. Kirstin is observing the effects of Cytochrome C mutation on apoptosis and platelet production. Rewi is continuing Tracy's work in monitoring mutant Cytochrome C mice genotypes in the animal facilities, as well as performing platelet lifespan assays for reference to Thrombocytopenia Cargeeg families. Lily is continuing her work in megakaryocyte culture, and neglecting to tell people about her recent birthday. Meanwhile Liz attended an excellent Gordon conference on the Cell Biology of Megakaryocytes and Platelets in Galveston (yes, the one in the song) and returned with new ideas and good contacts for Lily's project.

Life in the Lamont lab, 216 .....

216 would like to welcome "new" members Annabelle, Astra and Jess. Annabelle arrived from Brisbane in late January to start work as an Assistant Research Fellow and is well used to people asking how she is surviving the Dunedin climate, she has even enticed her parents to come and visit and check out Otago's attractions. Astra is carrying out her BSc (Hons) research project in the lab, life has been (further) brightened by the arrival of her two horses. Jess survived her summer project in 216, but has switched to a different project for her Honours.

Older hands continue to thrive. Tom is continuing in the lab after his Honours project last year, completing experiments required for a paper on his Hons project. His birds fly around Otago but always seem to make it home. Leo is in the final throes of his PhD thesis and may be submitted by the time the newsletter comes out (don't ask though!! You will know by the grin). Andrea is not far behind and Tash is also slaving away on her thesis, so lab celebrations are definitely on the agenda. Becky has combined a trip to the American Microbiology Society annual meeting with an extended US road trip, she may make a guest appearance in the lab later this month.

Ex labbite Richard Draper passed through recently, along with new son Hamish – all thriving though only Hamish getting enough sleep. Richard returned to graduate in late May, congratulations Dr Draper!! Not-quite-escaped MSc student Katy is gainfully and profitably employed by ESR, happily settled in Upper Hutt and writing her thesis in her "spare" time.

Lois "just keeps working". Iain is reading drafts of theses, trying to use non-teaching time to write papers, and still pretending to be sane.

McCormick Lab News

The two newbies to the Department, Tanjina and Monika have settled in and were recently treated to their very first SNOW (imagine never having seen the white stuff before, needless to say snowmen were made!). On warmer days they can be seen frequenting the Rob Roy dairy for one of our famous kiwi icecreams. Meanwhile in the lab, Sally can't get samples quick enough for Monika and in her spare time she has developed a fascination with ubiquination requiring Sally to go chat with a certain expert down the corridor. Tanjina has completed her first Journal club and handed in her literature review and has now returned to do battle with her glutathione and oxidised phospholipid assays.

Then there's Carolyn (not so newbie) who has been beavering away in the lab doing something for everyone, screening mice for Tanjina, sizing apo(a)'s for Anne and Monika, measuring Lp(a) in samples from Perth for Sally (Jack of all trades that girl, what would we do without her!)

Tom has done a runner (again). This time to the UK where we can't track him down. Most importantly, however, Sally has cited the first two chapters of his Masters thesis!

Anne is busy as usual making sense of mountains of MS data for several different studies.

And Sally is just emerging from under the Med Teaching Umbrella and her last ever marking of all things BIOC 355 (sad face/happy face).

Cancer Genetics Lab

CGL is starting to split at the seams again: We've welcomed 7 new 4th year students to the lab this year. Andrew & James are fighting the gastric cancer synthetic lethal (SL) battle with bioinfo-magician help from Tom K. Tom B is applying the SL notion to childhood cancers. Sophia and Louise are investigating immune response in breast cancer cell lines when treating with common chemo drugs and NSaIDs while Narnie is characterizing one of the ER associated ORFs

The 'New to us' PhD students are squeezed in too: Chris is back applying his R skills to finding another causative gene for HDGC. Henry is making a CDH1-/- isogenic cell line to enhance the SL work and Aziz has moved upstairs and is a few weeks into the scrutiny of endocrine therapy response in breast cancer.

The OSMS also seem to like the SL idea with Andrew's summer studentship abstract being selected for the OSMS presentation award & Bryony's talk coming 2nd at the postgrad colloquia. Parry's just back from a conference in Seattle focusing on SL treatments for cancer, and is heading off again this week to a gastric cancer conference in Italy. Bryony is heading back to Melbourne next month to present at the RNAi Australia conference.

Feel like getting a 6-pack from laughing so much??

Mud Sweat and Tears is back, on August 25th at Wingatui race course. The CTCR "Paua Rangers' took part last year – personal favourite was the 50m mud slide! Give Tanis a shout if you're keen to join us! Fancy dress optional… We're looking for old lab coats to be given a new lease of life in the CTCR dress-up box. Labs will be reimbursed with eternal gratitude and a photo of said lab coat in action on said mud-slide!

On a more sensible note: we're looking to get the CTCR army back out in force on the Moro marathon track. Last year we had a great presence, this year we'd like the entire finish line to be aware of us so we need YOU in one of our amazing t-shirts (which you get to keep as thanks!). If you're keen to run, jog or walk it, come see Tanis in 326 and we'll kit you out.

**Last year James Piho walked it in jandals, 12 weeks after having his stomach removed – If he can, YOU can! **

JER Lab

We are just about half way through the year and it feels like it's just started!

To start the year rolling: Back in April and once everyone had settled in to the lab, we decided the usual 308 dinner was in order to welcome the new students, and so the three groups comprising of JER, RCM and LRB trotted off to the new Lone Star. A rather civil night was had by all, so no incriminating stories to report.

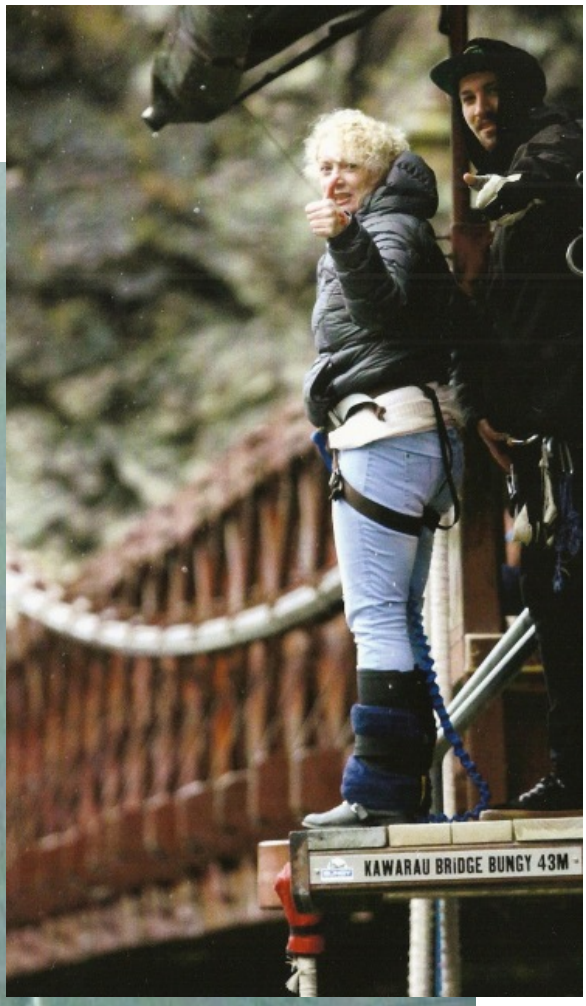
The JER lab is significantly quieter this year, with the predicted mass exodus actually occurring. To take the places of the departed (Jake, Simon C and Ryan) we have Jack Hervey, who was in the lab as a summer student and has not been put off too much, decided to stay and do his honours with us on purification and characterization of PSII assembly. Simon Jackson has even let him use the fancy new AKTA machine! Shiny Varghese has joined us very recently to do her Masters looking at an old PsbB mutant which we have some newly acquired sequencing results on.

As for the usual suspects, Simon Jackson is keeping Gary in the workshop on his toes with all sorts of inventions, making chambers for the growth cabinets. Gary has told me on many occasions that our quota in the workshop has well and truly been used up with Simon's creations. (We all know he secretly loves it). Asher has been getting great results on his mutants, which means we will hopefully hear the tapping of a keyboard very soon, as he churns out his thesis. Harvinder has been down in the Wilbanks lab running protein gels with Peter Mabbitt's help. Tim Crawford has just returned from the American Society of Microbiology conference in Denver, USA which he thoroughly enjoyed, and has a publication submitted, so all systems go for him. As I type, Julian is in Azerbaijan at the International Conference on Photosynthesis. (Go and Google maps Azerbaijan – you know you want to). Then most of the lab will be attending the International Congress on Photosynthesis to be held in St. Louis, USA in August, so the stress levels will start rising as last minute experiments are done for posters etc.

Until next time, keep warm!

Admin Team

Frances did a bungy jump.



Krause Lab

In the last few months, the Krause lab went through some big changes. Three new students joined the group, two valuable and experienced members moved to new positions, and one group member did very well in a departmental competition.

Our new students include Emily Davis who joined us last summer but is staying on for her Master's degress. She will be working on alanine racemase as a drug design target. Harry Stanley is doing his Biochemistry Honours degree in the laboratory and his topic is immunomodulatory proteins in smallpox, with a focus on the variola chemokine binding protein. Sailesh Narsinhbhai , who has a passion to understand ocean bioluminescence, has signed on for a Master's degree on the topic of dinoflagellate bioluminescence.

Our postdoctoral fellow Karen Knapp left in March for greener pastures; she and her husband are now living in Bangor. Never heard of it? It's a university city in the North West of Wales (It's one of the smallest cities in Britain according to Wikipedia!) with a population similar to Dunedin. She's currently enjoys exploring her new environment by foot and the occasional paragliding trip.

Sylvia Luckner, postdoctoral fellow and chief organiser of social events in our lab, has gone over to the "other side". She's now the new sales representative for Global Science in Otago and Southland. Lucky for us, it means that we can look forward to the occasional visit by her in the Department. And how about a Morning tea organised by Global Science?

We were immensely sad to let them go; but we very much wish them both 'Pob lwc' and 'viel Erfolg'!!!

We can't close without noting that Oliver Watkins, won first prize in the departmental Three Minute Thesis competition as well as the People's Choice award. The presentation entitled "How do glowworms glow? Shining light into the luminescent reaction of the friendly New Zealand glow maggot" received a 'glowing' review. Oliver joined our lab a while back as a PhD student of Kurt and A/P Nigel B. Perry from the Chemistry Department. Apart from studying "glowworm smoothies", he's a fire bug and a bookworm….Nothing wrong with that!

Macknight and Brownfield Labs

New York. Melbourne. Sydney. Dunedin.

This issue has a truly cosmopolitan feel about it. Rowan Herridge has settled in to his post-doctoral position at Cold Spring Harbor Laboratory (the 'New York' bit), working with plant epigenetics connoisseur, Professor Rob Martienssen. Rowan graduated in December, along with Lux and Simon Jackson from the JER lab.

In February, we said farewell to Kelsey Picard, who has gone to University of Melbourne. Kelsey has started an MSc, looking at control of xylan synthesis (a component of plant cell walls) in an asparagus model. Kelsey is working in a lab where Lynette worked for her Hons and PhD and even uses her old locker. Kelsey had a fruitful time in our lab, and was first author of a recently published book chapter, describing a novel transient assay technique for the discovery of downstream transcription factor targets in legumes. This work arose from collaboration with Dr Roger Hellens, Plant and Food Research, Mt Albert.

Richard and Jared are off to the International Conference on Arabidopsis Research (ICAR) in Sydney at the end of June. A quick check of the shirts packed in their luggage might be in order prior to departure, following both of them wearing the same shirt to work one day, in an attempt to boost the standard of dress in 308.

Meanwhile in Dunedin, all the students mentioned in last issue have actually returned for further study. Ben and Wen Hann (the new PhD student duo down our end of the lab) started studies recently. Lynette has been easing herself back into work after six months on maternity leave. Blossoming from successful work on flowering time in onions, Robyn has coined a cute new scientific term, 'bulbigen', for a molecule she discovered which promotes the onset of bulb formation and is linked to flowering time. This gracefully follows on from florigen and tuberigen for flowering and tuber development signal molecules, respectively. Next time one purchases or eats onions, one should contemplate bulbigen and Robyn.

J. Fudge

Merrimen

Well, it has been a while since we've reported anything so here is a snapshot what the Merriman lab has been up to of late.

We had four students working over the summer for 10 weeks. However, they are well cleared out now. Ed, one of our bioinformatics gurus, has taken to the corporate world and is now up in Wellington. Aimee has written up her MSc, moved to Nelson and had a baby girl. We also welcomed Cushla back from parental leave and Tahzeeb Fatima from Pakistan, who is doing a PhD with us. Jarrod Moors has also come back, this time to do an MSc.

From Tahzeeb- *I joined the Biochemistry Department at the start of April and am doing a Ph.D as an international student. It is the first time I have lived somewhere without my family, but the friendly behavior of people around me is making things easier for me. I am very happy with the weather of Dunedin firstly because it is bit fascinating for me experiencing winters in June; and secondly I can drink my favorite coffee and eat chocolates whenever I want.*

Sara is back with us for about 6 weeks. She has completed her PhD oral examination (and passed), and is working on corrections before jetting back to her husband in Adelaide. So, she has been very busy, and also has a bun in the oven, due in November.

Humaira has recently been to Wellington for a workshop by Education New Zealand (who provide her with her PhD scholarship), and has been advertising the benefits of coming to our Biochemistry Department and the University of Otago in preference to going to the UK to study. She was especially selected to represent Education New Zealand for this workshop.

Mandy, Hoang and Cushla have begun the school run with their kids Amelia, Ta Nan and Anya all turning 5 years old and starting school over the last few weeks.

Mandy has been busy (again) doing fundraising for her boys' childcare centre, Russell Street – most recently, rustling up participants for a beef tasting fundraiser. Thanks to those who helped out! She has also been winning prizes again, the latest being tickets to the Taieri Society's production of Les Miserables.

Mansour says he has been up to nothing (yeah right!). However, he has been demonstrating, working at Southern Community Laboratories, doing his PhD work and is about to become an athlete now his daughter, Tanya, has started cruising around the furniture.

Ruth just returned from Taranaki where she'd been with her family for a wedding (and getting out of processing some of the Daily Life Study incoming samples from Psychology Department collaborators). Unfortunately, she came back to a mountain of emails – always the downside of going away! She also has a new cell phone after her old one took a dunking.

Edana went off to Brisbane and the Gold Coast for a week, and thoroughly enjoyed the ballet she attended. Meanwhile, James, our computer science convert, has had to resort to going to the airport (in Christchurch) to study for his exams… According to his Facebook page he is going to Australia for 'weeding'. We will see a whole lot more of James in Semester 2, as he will be developing software for us to use in the lab.

Anna has done a lot of reading about malaria, hyperuricaemia and Pacific colonisation, but also keeps getting distracted by the vast quantities of fiction that keeps turning up in her letterbox as a result of her book-buying addiction.

Murray has bought a home and got two cats, Monty and Poncho. He reckons the value of his property is skyrocketing given the recent events at St Clair esplanade. And that soon, he and Hana will have a beachfront property. Not long ago, Murray received the New Zealand Defence Service Medal for serving three years as a combat medical technician in the Territorial Army.

Anna has been cruising around various archaeological places including the Wairau Bar up near Blenheim and the Bay of Islands as part of her project. Anna is clearly looking for a nomination for best morning tea with her yummy caramel square.

Tony and Marilyn are boosting the local economy by having their house painted (and doing all the other jobs which go with this) and doing alterations. They are getting used to tradesmen arriving at 730am. They are having to extend their kitchen/dining area as their home can no longer hold the all our families that turn up for the annual lab mid-winter pot luck dinner.

Because Tony hasn't been away on many domestic trips recently, we have had to listen to his rather varied range of music more than usual. Like Will.I.am, Psy, Ke$ha, Rihanna. Sometimes we have to go into his office and yell 'veto!' especially when the same song plays 3 times in a row and he hasn't noticed. On a more positive note, a few weeks ago Tony was awarded 'best science' prize at the Australian Rheumatology Association meeting in Perth.

Tanya also has been winning prizes: she came third in the Biochemistry 3-minute thesis speech competition. She enjoyed having her family visit from Taranaki for a combined birthday and graduation celebration in May, and has otherwise been busy with her PhD and hockey including coaching.

The lab has had numerous incoming and outgoing samples, and has had to purchase a world map so we know where all our collaborators are.

Lastly, I know you won't believe this:- but Tony has been feeding the entire lab sugary drinks. He asked them to taste two varieties of coca cola, and tell him which they thought was which. One was the regular NZ stuff and the other was sweetened with the dreaded High Fructose Corn Syrup from the USA. The results were 'not as expected' because it was split 50/50 as to which was the evil HFCS coke. The difference in flavour between the two was not as marked as had been expected. Still, 50% of the lab was right. There were a few victorious fist pumps after the result was announced.

[This reminds me of a Science Fair project from last year. Dear wee soul had done some complicated statistical analysis of his test subjects comparison tasting of NZ and US Sprite to compare HFCS and sucrose. But he had omitted to read the ingredients list - there was significantly more HFCS in the US version than sucrose in the NZ one - Ed]

Gout Man, our lab mascot just says "keep up your vitamin D levels and keep warm".

That is all for now.

Four Papers, Two Doctorates and a Baby

First from the Wilbanks Lab, congratulations to Dr. Souness, who picked up his doctoral diploma in May and to Peter who has submitted the final, bound copies of his thesis, so is just a few steps across the Town Hall stage from being Dr. Mabbitt.

Congratulations are also due to Jess for a superhero performance and second place finish the departmental Three Minute Thesis competition. At the competition Matthias also did the lab proud, promoting the best amino acid of all to a wider audience.

While not practicing public speaking, Matthias, along with Egor and the Lamont Lab, is making great headway on moving the cysteine dioxygenase project into the prokaryotic realm. the remaing member of the cysteine dioxygenase team, Casey, is picking up some of Richard's cysteine dioxygenase interests, from DFT to crystallography. On teh Hsp70 side, Rachel has confirmed that the first of her Hsc70 constructs for FRET are ready for their own debut and has moved from the plate reader to the fluorimeter. At the other end of the electromagnetic spectrum, Jess and Aimée are diffracting and scattering X-rays from various Hsp70 family members. Antonia continues to take her lactoperoxidase interests on the road, first to Christchurch and the Kettle Lab and now to Grenoble

and the International Conference on Bioinorganic Chemistry. You may recall that our last instalment found Antonia in Europe - she clearly has a future as an academic!

With Shereen and Malcolm informing us with their journal club presentations and Laura introducing her project in the Chemistry Department honours presentations, our fourth year students have been the public face of the lab. Yes, Malcolm has become a fourth year student, as part of a game of Pass the Project. He has handed split inteins to Shereen, who is learning some of the Gerth lab cloning tricks to encourage them (the inteins, not the Gerth dwellers) to do new tricks. Meanwhile Malcolm has moved on to join Rachel in the single molecule FRET project, and Aimée, while not abandoning Hsp70s, has tried her hand at the MIF crystallography that Malcolm pioneered in the lab.

Which reminds your correspondent that since our last instalment Malcolm has had a paper on the MIF:inhibitor structure in *Acta Cryst F,* and honorary lab member Madhu reported the structure of product-bound lumazine synthase in *Acta Cryst D,* both in collaboration with Joel Tyndall. Meanwhile, Tracy's next paper is out in *J. Biol. Inorg. Chem.*, and she is off to Melbourne for postdoctoral crystallography and other fun. In other news of other lab alumni, Rob has found time during his postdoctoral studies to get a paper on his Otago WT1 work out in *Prot. Express. Purif.*

As well as his first paper, and more significantly, Madhu's first daughter is new since your correspondent last wrote. We will close with a picture of Rishika in late September.

Tate lab Newsletter

The Tate lab would like to begin their news by officially welcoming our two new students to the lab! Nikita Sue (Biochem honours) and Joshua Prendergast (2yr Masters) are studying ME/CFS and Alzheimer's respectively and have brought great energy and enthusiasm, contributing positively to the lab environment. Niki is so smiley and Josh so 'calm' that we are all benefitting! We reluctantly said goodbye to our summer medical student, the wonderful Kieran Bunn who worked diligently and with such profound intellect that he got results! He was also a great guy and took us to great heights (he could have been a basketball player!). While with us he represented the University in the UK in debating and was a podium winner – he always had *plenty* to say! Thanks to you Kieran and best wishes as you continue with medical school studies. Our friendly German internship Masters student Nicki Mietrac from Potsdam, also left us in March (sorry Bronwyn we missed the last deadline!). She was working with the memory and Alzheimer's research team in-between tramping to near Gorge River inspired by "Wife of Gorge River" (Catherine Stewart - a follow on book from "A life of Gorge River"-Robert Long or Beanstalk), and Frisbee tournaments (her love!) Somehow, in between time she contributed significantly to our work and got results for her Masters.

Our wonderful mentor/boss, Professor Tate was asked to give the graduation address to the Science students in May, an honour which he embraced and not unlike the Dalai Llama gave a speech filled with encouragement, positivity, mindfulness and oh yeah turn off your phone!

Warren has also had funding success through Lotteries health to continue working on the ME/CFS project and his PhD student Angus McKay has also won a scholarship through Lotteries health with will see him financially supported for the next 3 years.

Finally members of the Tate lab attended the Brain Health Research Conference that was held on 7th June in Dunedin. Focused on Alzheimer's disease it featured the family of an affected person, and the International vice Chair of Alzheimer's Disease International, Wendy Fleming, who spoke on Dementia –the epidemic is here (Warren said she was inspirational - but could not remember what she said! –is he part of the epidemic?). A significant talk from Australian Professor Peter Schofield on the International DIAN study of familial Alzheimer's has shown early indicators appear up to 20 years before the memory loss and other symptoms we know about occur. Ex lab member and now part of the Abraham/Hughes research team, Luci Schoderboeck, introduced as 'home grown' (well Austria is our nearest neighbour isn't it?) gave an excellent talk on her new-born baby neurons and their imagery.

Happy Hour

If Barry Marshall managed to win a Nobel prize for an experiment with sample size one, I am sure you'll forgive that this article is based on a single sampling.

More specifically, as of writing this, Happy Hour has been under new management for a single evening and we are proud to say it went smoothly. By we, I mean Tom (Russell's lab slave) and myself, Matteo (Wayne's lab sloth).

Happy Hour is a fortnightly event where departmental folk can socialise over a couple of beers and messy handfuls of crisps.

Regarding the socialising, pub conversations are notoriously inane —in Happy Hour this is no different, maybe a tad worse. Some unsuccessful, for example we were unable to agree on centaur internal anatomy (the two ribcages problem), while other successful, such as how would one go about making methamphetamines biosynthetically and how drug-lord wages compare to tutoring —the usual pub banter.

Regarding the beverages, I collected data for analysis and spent more time analysis it that at Happy Hour itself. The analyses (n=1) show that larger is most popular thanks to Moa beer, which like its namesake went extinct (depleted sock) and by doing so outsold the pride of the South (11% and 9%); whereas I would have guessed dark beers (16%) would do better, but were outsold by lagers (29%) and pilsners (20%). However, Happy Hour does not only stock beers, wines and ciders, but also non-alcoholic beverages, which nearly outsold IPAs (6% vs. 7%), the fourth ranking in sales. In fact, everyone is welcome to Happy Hour, even cerevisiaphobics —a condition I just made.

During the year, Happy Hour hosts several special events, the next is on the 30th of August and is a brewing competition, where everyone is welcome along either as a competitor, judge or simply a spectator there to enjoy the company.

There was a great turnout last year, so it is definitely worth adding to one's calendar —as are all other Happy Hours!

And remember, the sample size, as of writing this, is only one, so your choices could skew the data quite easily. Are you up to the challenge?

Of all the Grand Challenges grants awarded, only five were featured on This Facebook page!

You should take particular note of the comments.