SPECIAL EDITION
POSTDOCTORAL RESEARCHERS IN BIOCHEMISTRY

NOVEMBER 2018

Welcome to this special edition update for October!

In this month's edition of the Department's newsletter, we are putting the spotlight on our postdoctoral researchers; offering an opportunity to foster conversation, communication, and professional development particularly for those who are at this early stage of their careers.

There are currently 22 postdoctoral researchers and research fellows working in the Department of Biochemistry. They have a wide range of backgrounds, both culturally and professionally.

Our researchers

DR MATTHIAS FELLNER

Q What do you like to do in your spare time?

A *Fantasy football*

Q Who is/are your heroes or people that you admire/look up to?

A *Rosalind Franklin*

Q What is your favourite place to eat/drink in Dunedin?

A *The Esplanade*

Using high-resolution crystal structures Matthias has recently discovered a rare twist of the protein backbone in an ethylene-forming enzyme, which is linked to its unusual chemistry (pictured). Matthias is experienced in solving and analysing protein structures. If colleagues can provide purified soluble protein, he will help them as far as possible on the long road towards determining the final deposited protein structure.

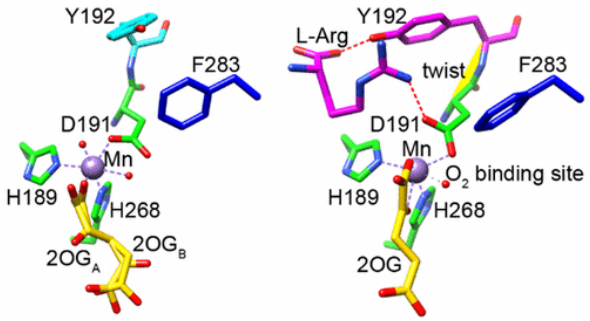


Figure from Matthias's paper: Structures and Mechanisms of the Non-Heme Fe(II)- and 2-Oxoglutarate-Dependent Ethylene-Forming Enzyme: Substrate Binding Creates a Twist. Martinez S & Fellner M *et al. J Am Chem Soc* 2017. 139 (34), pp11980-11988. DOI: 10.1021

DR ALEXANDRA "SASHA" GAVRYUSHKINA

Sasha Gavryushkina has developed a model that allows for the inclusion of multiple samples per species or per infected individual to estimate dated phylogenetic trees and evolutionary parameters (diversification or epidemiological parameters). Sasha has expertise in bioinformatics, Bayesian inference, and other statistical and computational methods, and mathematics. In particular, she has a good knowledge of mutation scoring methods (for phenotype-genotype studies) and methods for reconstructing dated phylogenetic trees and past evolutionary dynamics.

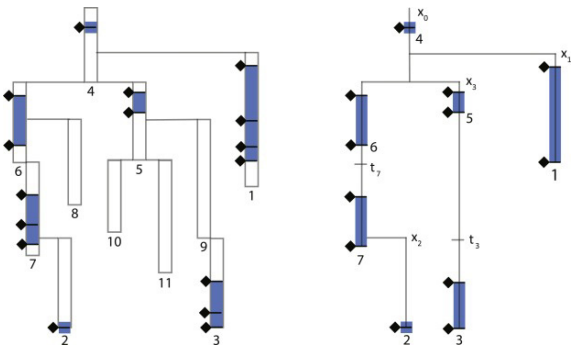


Figure from Sasha's paper: The fossilised birth-death model for the analysis of stratigraphic range data under different speciation modes. Stadler *et al. Journal of Theoretical Biology*, 41-55 (477), 2018.

DR MARTINA FOGLIZZO

Q What do you like to do in your spare time?

A *Swimming & reading books*

Q Who is/are your heroes or people that you admire/look up to?

A *My parents*

Q What is your favourite place to eat/drink in Dunedin?

A *The Esplanade, St Clair*

This year Martina and colleagues have solved the structure of the *Drosophila* Polycomb Repressive-Deubiquitinase (PR-DUB) complex, providing insight into its regulation and how cancer associated mutations disrupt PR-DUB activity. Martina's expertise is in protein production and purification, SEC-MALLS and crystallography. If any one is interested in post-translational modifications on histone proteins, she has also been developing her expertise in the characterisation of these histone marks.

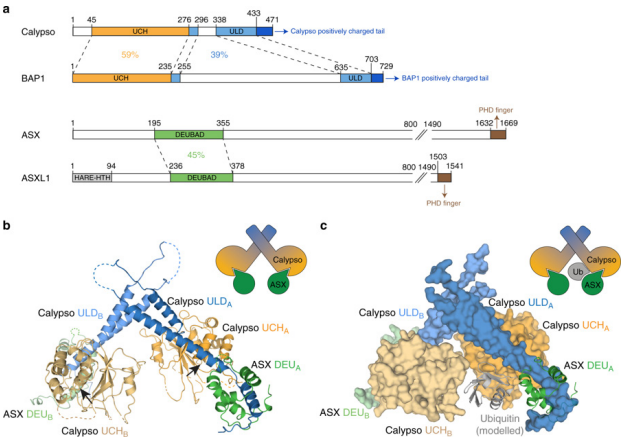
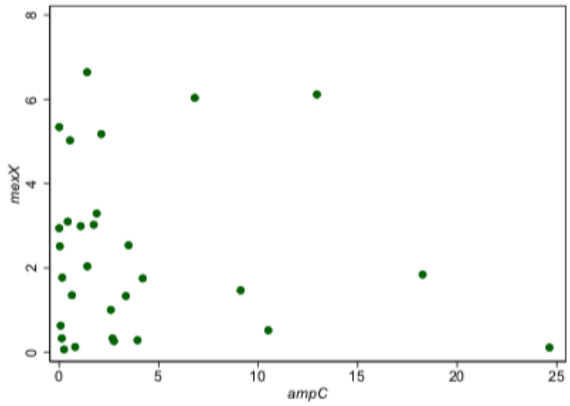


***Figure from Martina's paper**: These show the crystal structure of the Drosophila PR-DUB complex*

Foglizzo M, Middleton AJ, Burgess AE, Crowther JM, Dobson RCJ, Murphy JM, Day CL and Mace PD. (2018) A bidentate Polycomb Repressive-Deubiquitinase complex is required for efficient activity on nucleosomes. Nature Communications 2018 Sep 26;9(1):3932. doi: 10.1038/s41467-018-06186-1 .

DR KAY RAMSAY

Kay is a microbiologist, with experience in bacterial genetics and bioinformatics. This year she has contributed to work on two key *Pseudomonas aeruginosa* resistance genes, *ampC* and *mexX*. The results from these studies showed that these genes are associated with clinical antibiotic resistance, are readily expressed during infections, and differ between patients.



A figure from Kay's paper showing comparative expression of the antibiotic resistance genes, ampC and mexX, in the sputum samples of cystic fibrosis patients with infections. This work was published in: Martin LW *et al*. Expression of *Pseudomonas aeruginosa* antibiotic resistance genes varies greatly during infections in cystic fibrosis patients. AAC 2018.

DR ANDREW CRIDGE

Q What do you like to do in your spare time?

A *Sleep*

Q Who is/are your heroes or people that you admire/look up to?

A *Sir Edmund Hillary*

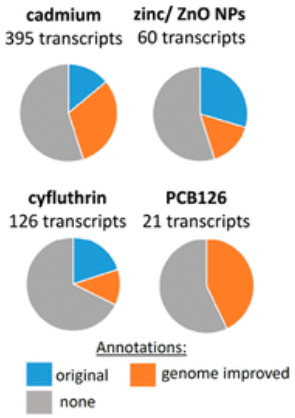
Q What is your favourite place to eat/drink in Dunedin?

A *Paasha*

Andrew is the man to see about qPCR, including primer design, RNA purification and data analysis. He is currently developing a high-throughput Metagenomics (16S and ITS) pipline, which includes automated DNA extraction, PCR amplification and purification.

This year Andrew has discovered that insects use radial expansion of P450 genes to adapt to toxic environments. His work has recently been published in the Journal: Environmental Science & Technology. Andrew has also recently received an MBIE Smart Ideas Grant of ~$1M.

Figure from Andrew's paper: Showing genomic assembly of *Hyalella azteca* , a cryptic species complex of epibenthic amphipods of interest to ecotoxicology and evolutionary biology. The *H. azteca* genome will facilitate the development of genomic tools for environmental assessments and for understanding how evolution shapes toxicological pathways important for human health. Poynton et al., The Toxicogenome of Hyalella azteca: A Model for Sediment Ecotoxicology and Evolutionary Toxicology (2018), Environmental Science & Technology 2018 52 (10), 6009-6022.



DR ADAM MIDDLETON

Adam is a structural biologist, so his main area of expertise is in protein production, purification, crystallography, data collection, and data processing. He has quite a bit of experience working with the major data processing software applications, as well as with PyMol (and a bit with Chimera). In addition, he has recently dived headfirst into working with M13 bacteriophage, so he can also help if anyone has any questions about these.

Adam works in Professor Catherine Day's laboratory, and has recently spent the winter working at the University of Toronto where he worked with bacteriophage to perform phage display. His trip was quite successful, so stay tuned for future news!

Adam visited and worked in Sachdev Sidhu's laboratory: http://sites.utoronto.ca/sidhulab/

DR TANYA MAJOR

Q What do you like to do in your spare time?

A *Play hockey (& coach hockey), read, watch TV, sew, draw (in MS paint)*

Q Who is/are your heroes or people that you admire/look up to?

A *JK Rowling - 'coz she wrote those books while she was on the benefit & being a single mum, and now she constantly gives away her money to charities, so much so that she isn't on the list of richest women anymore. Also have you seen her Twitter game?*

Q What is your favourite place to eat/drink in Dunedin?

A *Etrusco (for dinner) and anywhere that sells good poached eggs for brunch*

Dr Tanya Major: while she was in Edinburgh she got stuck for 4-days after the "Beast from the East" snow storm and missed a conference in Paris but it looks like she had a good time anyway!

Tanya's area of expertise is in human disease genetics, handling large genetic and phenotypic datasets. She is proficient in several coding languages (mainly R & Bash / Unix) and a variety of statistical methodologies. She is also a qualified Carpentries Trainer, regularly teaching coding skills to students / staff from across the university.

Last month Tanya had a paper accepted for publication in The British Medical Journal which presents some controversial results showing diet has very little effect on population variant in serum urate levels (raised serum urate is necessary for gout). Her work was featured on TV1 news and in newspapers and magazines around the world.

Major *et al*., An evaluation of the diet-wide contribution to serum urate levels: meta-analysis of population based cohorts. *The BMJ* (2018) 363, k3951.

This year Tanya spent five months in Scotland working at the Institute of Genetic and Molecular Medicine learning about more complicated genome-wide genetic analyses.

DR JODI BREWSTER

What do you like to do in your spare time?

A *Swim and train at the gym (and write papers)*

Q Who is/are your heroes or people that you admire/look up to?

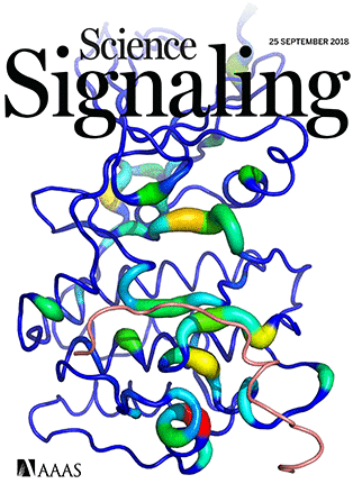
A *Dorothy Hodgkin - a pioneer of X-ray crystallography*

Q What is your favourite place to eat/drink in Dunedin?

A *Etrusco - mmmm pasta and primitivo*

This year Jodi has started working on Kinases with Peter Mace, her expertise is in HPLC and recombinant protein expression/purification and the biophysical characterisation of proteins.

Pseudokinases are structurally similar to kinases but lack catalytic activity; instead, they typically function as scaffolds, often promoting the degradation of substrate proteins by bringing them into close proximity with ubiquitin ligases. Jameison *et al* have shown that the pseudokinase TRIB1 is implicated in leukemia and other cancers and can bind to clinically approved kinase inhibitors.



Jodi has contributed to work featured on the cover of Science Signalling in the 25th September, 2018 Issue of Science Signalling. Jamieson *et al* 2018. Substrate binding allosterically relieves autoinhibition of the pseudokinase TRIB1. *Science Signalling.* 11: 25, eaau0597.

DR. LUCIA SCHWEITZER (SCHODERBÖCK)

Luci's core expertise is in the use of viral vectors, both in cultured primary neurons, *in vivo*. She is carrying out her research at Biochemistry in conjunction with the Department of Psychology with the Brain Health Research Centre, and is interested in the processes necessary for memory formation and retrieval.

Luci started at Otago working with Professor Warren Tate, studying secreted amyloid precursor protein alpha and its role in Alzheimer's disease. She is now working with Professor Cliff Abraham and Dr Stephanie Hughes investigating adult neurogenesis.

She is currently utilising primary neuronal cell cultures to shed more light on why overexpression of an inhibitor of protein phosphatase 2A leads to a very drastic phenotype in a mouse model of Alzheimer's disease.

DR INDRANIL BASAK

Indranil has recently started working at a postdoctoral fellow in Dr. Stephanie Hughes's lab. His research focused on understanding the underlying mechanisms involved in neurodegeneration in Batten disease (a childhood rare brain disease), and he is developing pure cultures of electrically active human neurons from induced pluripotent stem cells (iPSCs), using his previous iPSC experience. This system is unique, as it is rapid, efficient, editable, scalable, and suitable for accurate modelling of human neuronal cell biology. In addition, Indranil has experience in CRISPR-Cas9 technology.

Indranil moved to New Zealand to reunite with his family and to follow his passion studying genetics and neurodegeneration, his work will investigate differential proteomic, epigenetic and transcriptomic profiles in Batten disease, aiming to identify potential therapeutic targets for this devastating disease.

Indranil has always followed his parents' footsteps and learned to never give up and to never stop helping people. He likes to explore different cultures/places which is why, Indranil has lived, worked and travelled in 4 different continents. Besides research, Indranil is passionate about photography and perhaps he can't be in any better place than New Zealand. Moving to Dunedin has been a wonderful experience for Indranil and he likes to refer Dunedin as a 'cute city' with an awe-inspiring view of the Milky way. Indranil loves seafood and hence, he loves to visit restaurants like The Reef, Plato and Carey's Bay in and around Dunedin.

DR. DEBINA SARKAR

Debina joined Dr Sarah Diermeier's lab in April 2018 and is currently investigating the function of a long non-coding RNA (hMaTAR17) that is likely driving breast cancer progression.

She did her PhD at the University of Auckland, where she was looking at another long non-coding RNA (ANRIL) and its association with melanoma. Being in Auckland for the past 5 years gave her the opportunity to explore New Zealand's North Island and she is now looking forward to exploring the South Island.

Having worked in the field of RNA for the past 5 years, she has extensive experience in PCR techniques and other basic molecular biology techniques and cell culture. The latest technique that Debina has learnt is called ChIRP (Chromatin Isolation by RNA Purification) which enables pull-down of an RNA of interest, thereby enabling the detection of its interaction partners (DNA, RNA, and protein) which provides an insight into the function of the molecule of interest.

Outside of the lab, Debina enjoys going on hikes and bush walks, and she has an ardent interest in food. Her favourite place to eat in Dunedin is Speight's.

Other current Post-doctoral and Research Fellows

Nicola Bougen-Zhukov
Postdoctoral Fellow
Room 3.26

Margi Butler
Research Fellow
Room 3.13b

Augustine Chen
Research Fellow
Room 3.26

Rob Day
Research Fellow
Room 3.26

Nikita Deo
Postdoctoral Fellow
Room 2.01

Tom Harrop
Postdoctoral Fellow
Room 1.01

Rowan Herridge
Postdoctoral Fellow
Room 3.08

Megan Leask
Postdoctoral Fellow
Room 3.15

Cassidy Moeke
Postdoctoral Fellow
Room 3.15

Soledad Perez Santangelo
Postdoctoral Fellow
Room 3.08

Claudia Rossig
Postdoctoral Fellow
Room 3.08

Professional development opportunities

CAREER DEVELOPMENT WORKSHOP

Andrew Cridge is organising a career development workshop for our postdoctoral researchers and fellows for early next year (2019). The workshop aims to empower PhDs and increase their awareness of what they need to do to manage their careers effectively, regardless of their career goals. The date is TBC and more details will be provided closer to the workshop.

SHUT-UP AND WRITE!

The 'Shut Up and Write' concept originated in San Francisco and is now adopted internationally amongst local groups of creatives and researchers who are serious about putting aside some structured time for their writing assignments – all in a relaxed and supportive social environment!

We want to trial a similar sort of thing in our department so please register your EOI at: slack-biochem-pds-rfs#shutupandwrite and watch this space for more updates.

For more information on how it works, here's an excellent article that covers all bases: https://thesiswhisperer.com/shut-up-and-write/

BITESIZE BIO

Wide ranging articles ranging from offering advice on technical skills to how to be proactive about your career planning.

https://bitesizebio.com

SOME HANDY RESOURCES

The HEDC Center

The University's Higher Education Development Centre (HEDC) run professional development workshops all year round. For more information and to register go to: http://hedc.otago.ac.nz/workshop/list.do?type=HEDC

NATURE MASTERCLASSES

Want to hone your peer review and general editing skills but don't know where to start? Nature Masterclasses are a valuable resource.

A free course covering the 101 on peer review is available, and there are loads more helpful courses delivered by editors at Nature.

Check out the website to have a look at the offerings: https://masterclasses.nature.com

An institutional subscription is required for full access so feel free to send an EOI to slack-biochem-pds-rfs expressing your interest and we will then seek Departmental support if there is enough interest.