

FROM THE DIRECTOR



It was a genuine pleasure to participate in the Spetses Summer School in September. This activity was the Centre's principal scientific and international outreach venture for 2012. The Spetses Summer Schools (originally organised by NATO) have a history going back to the 1960s, when groups of senior scientists got together with PhD students and junior scientists for a week-long training course on

the wonderful Greek island of Spetses. The venture is now run and funded by the Federation of European Biochemical Societies (FEBS); the 2012 course was run jointly by the Centre and the University of Berne, home institute to Centre Board member Joachim Frey, with the topic "Pathogen-host-interactions of major animal infectious diseases and zoonoses". Details are reported later in this newsletter, but I would like to express here my sheer joy at the outcome of the course, which consisted of training lectures, discussion groups, poster sessions, networking, grant writing scenario and bioinformatics training. The feedback from the students was one of the most rewarding that I have experienced in 40 years of science and reinforced for me the importance of science education and of training the next generation of young scientists.

As we near the end of 2012, I again express my appreciation to all Centre staff and students and to Board members for their commitment and diligence which have made this another fantastic year.

With very best wishes for a relaxing break and an invigorated 2013.

Ben Adler
Director

RESEARCH HIGHLIGHTS

Novel gene product promotes survival of *Mycobacterium smegmatis* in macrophages

Mycobacteria replicate intracellularly, most commonly within the phagosomes of macrophages. Using non-pathogenic *Mycobacterium smegmatis* as a model, a novel gene (MSMEG_5817) has been identified that, when inactivated, leads to accelerated death of *M. smegmatis* within a macrophage cell line in the first eight hours following infection.

Complementation of the mutant with an intact copy of the gene restored survival to near wild type levels. Gene disruption did not affect growth compared to wild type *M. smegmatis* in axenic culture or in the presence of low pH or reactive oxygen intermediates, suggesting the growth defect is not related to increased susceptibility to these stresses. The gene in question is conserved in all mycobacteria for which genome sequence information is available. MSMEG_5817 therefore facilitates intracellular survival of mycobacteria. Although homology searches suggest that MSMEG_5817 is similar to the serine:pyruvate aminotransferase of *Brevibacterium linens* suggesting a possible role in glyoxylate metabolism, enzymatic assays comparing activity in wild type and mutant strains demonstrated no differences in the capacity to metabolize glyoxylate

MSMEG_5817 could provide a novel therapeutic target for intervention with anti-mycobacterial drugs. (Pelosi A, Smith D, Brammananth R, Topolska A, Billman-Jacobe H, Nagley P, Crellin P, Coppel R. 2012. Identification of a novel gene product that promotes survival of *Mycobacterium smegmatis* in macrophages. PLoS ONE 7(2): e31788.)

HIGHLIGHTS

Top ranking papers for 2011 in Veterinary Microbiology

Congratulations to Centre Director, Prof Ben Adler, who has 2 published papers ranked in the top 25 most downloaded papers in the journal *Veterinary Microbiology* in 2011. The 2 papers took out the top and the fourth rank. *Vet Microbiology* is a well-established journal, ranking 3rd out of 145 journals in veterinary science.

The 2 review papers which took the top and the fourth rank respectively are:

Adler, B. and de la Pena Moctezuma, A. *Leptospira* and leptospirosis. *Veterinary Microbiology*, January 2010, 140: 287-296.

Adler, B., Lo, M., Seemann, T. and Murray, G.L. Pathogenesis of leptospirosis: The influence of genomics. *Veterinary Microbiology*, November 2011, 153: 73-81.

OTHER NEWS

Centre PhD students visit in Japan

Centre PhD students Priya Alwis and June Treerat from the Adler/Boyce lab set off to Japan in September to present their work at the 11th Awaji International Forum on Infection and Immunity. They have also applied for Centre travel funds to visit the lab of A/Prof Hitomi Mimuro at the University of Tokyo. The experience of visiting the lab will give them opportunities to interact with fellow scientists working in similar field and also to see how the lab works.

Collaboration efforts continue with Malaysia

Centre CI Prof Jamie Rossjohn has renewed its collaboration with the Malaysia Genome Institute. This time they are working on structural genomics of the extremophilic microbes. Currently, his lab has 2 Malaysian PhD students and 1 Malaysian post-doc who are here in Melbourne on a short term attachment.



L-R: Nur Athira Yusof, Dr Mohd Anuar Jonet, Siti Aishah binti Rashid from Malaysia Genome Institute, currently on attachment in Rossjohn Lab

IVVDC Conference



For the first time, the International Veterinary Vaccines and Diagnostics Conference held its tri-annual meeting in the southern hemisphere, in Cairns in late July. The Centre was awarded the opportunity to host the 6th IVVDC meeting at the Cairns Convention Centre. The meeting attracted about 150 delegates from over 25 countries with good representation from both academia and industry. Industry representatives who also sponsored the conference include Merial, Merck Animal Health and Virbec Animal Health. Delegates were impressed with the conference and the program met their expectations in terms of the scientific content as well as gaining an insight in how the vaccine industry functions and how to work with them. The conference was also profiled in the Cairns local newspaper and on the Nine news.

Spetses Summer School



In collaboration with our International Board Member, Prof Joachim Frey at the University of Bern, the Centre co-organised a week long summer school on the beautiful Spetses Island of Greece. Sponsored by the Federation of European Biochemical Societies (FEBS), the summer school was targeted at advanced PhD students and early post-docs. The summer school was aimed at providing a forum for learning and discussing the latest insights into the molecular mechanisms of pathogen infections in their natural animal hosts. Being experts in their respective fields, CIs Ben Adler, Ross Coppel and Julian Rood were part of the teaching team. About 30 participants from 13 countries signed up for the summer school which was very praised by all attendees as hugely successful. According

to the CIs that participated, it was one of the best teaching experiences they had.

Outreach Activity for National Science Week



This year for National Science Week, the theme chosen for the Centre's outreach activity centred on parasites. Led by Centre Associate, A/Prof David Piedrafita, the major event was a 1-day workshop held on 17 August for Year 10 and 11 students (16-17 years of age) to explore the nature and diversity of parasitic organisms and their impacts on human health and agriculture. This workshop was jointly organised by the Gene Technology Access Centre and the Australian Society for Parasitology. Approximately 150 students from 8 different high schools around Melbourne took part in this program. After hearing a morning lecture given by A/Prof David Piedrafita, the students then got down to working in the laboratories to study the parasites in detail. Centre PhD students Hamish McWilliam, Sarah Preston and Amanda Peers-Adams were on board as lab demonstrators.

Also in conjunction with National Science Week, A/Prof David Piedrafita gave a public lecture titled 'Parasites – what's eating you!' on 19 August at the Monash Gippsland campus.

NEW STUDENTS

Please welcome the following PhD students who have recently joined our Centre.



Timothy Fitzsimons

Origin: Melbourne

Thesis: Structure and function of bacterial type six secretion systems

Supervisors: Dr John Boyce



Christopher Hosking

Origin: Melbourne

Thesis: Engineering local antibody probes to identify vaccines and therapeutic targets in the blood fluke, *Schistosoma japonicum*

Supervisor: Prof Els Meeusen, Dr Michael de Veer, Dr Leodevico Ilag



Melanie Neeland

Origin: Australia

Course: Thesis: Lymphatic immune responses to novel vaccine and adjuvant formulations

Supervisors: Prof Els Meeusen, Dr Michael de Veer



Amanda Peers-Adams

Origin: New Zealand

Thesis: Innate immune markers of resistance/susceptibility of parasite GI infections in sheep

Supervisors: Prof Els Meeusen, A/Prof David Piedrafita, Dr Mike de Veer

STAFF PROFILE

Trudi Bannam



Dr Trudi Bannam has been a Research Fellow in the ARC Centre of Excellence in Structural and Functional Microbial Genomics since its inception. She works together with Professor Julian Rood on a project aimed at understanding the functional role of plasmids in the biology of the disease causing anaerobic bacterium *Clostridium perfringens*.

Trudi's interest in microbiology started during her Honours project and subsequent PhD project with Professor Julian Rood on the functional genetics of *Clostridium perfringens* transposable element Tn4551. Subsequently, she undertook a post-doctoral position with Howard Goldfine and Dan Portnoy at the University of Philadelphia School of Medicine investigating the role of phospholipase enzymes in the pathogenesis of intracellular bacterium *Listeria monocytogenes*. During her time within the ARC centre she has been involved in several projects which have included understanding the mechanism of plasmid conjugation in *Clostridium perfringens*, understanding the mechanism of action of the pore-forming toxin NetB and attempting to discover protective antigens that may be used to prevent avian necrotic enteritis.

Trudi was born in Mt Gambier in South Australia and was raised in the idyllic beach country town of Portland in Victoria. During this time she focussed on study and sport and often not in that order. She played A-grade men's squash, was western district junior squash champion, ran in state level athletic meetings and was a bronze medallion surf-life saver for many years. In addition, she played netball for 25 years and is currently involved in netball coaching.

STUDENT PROFILE

Hamish McWilliam



Hamish McWilliam is a Centre PhD student studying the zoonotic blood fluke, *Schistosoma japonicum*, with Prof. Els Meeusen and A/Prof. David Piedrafita. His project focuses on identifying novel vaccine targets against this helminth parasite by studying the local antibody response during infection.

Hamish has found himself working with parasites of various forms since completing his BSc in 2002. After completing Honours at Deakin University in 2003 studying a parasitic amoeba of Atlantic salmon, Hamish worked as a Research Assistant with Els when she was situated at the University of Melbourne vet school, looking at parasite-induced eosinophils. He then headed overseas where he worked for a couple of years on a horse intestinal parasite, developing a diagnostic test. In 2009, Hamish returned to Melbourne to begin a PhD with Els and David, choosing to continue the parasite thread to research the schistosomes.

During his PhD, Hamish has studied the local immune response against the larval stages of the schistosomes, which are an ideal target for vaccination. After initially looking at a model of infection in rats, he was then able to study the natural infection in the water buffalo. For this he travelled to rural China, supported by a Centre travel grant. The planning and conducting of this large experiment, and working with colleagues from China, was a great opportunity for him and a personal highlight. Hamish has also been fortunate enough to attend and present his work at international conferences in Italy and Brazil, and several local conferences in Australia.

In his spare time Hamish likes to draw, and has illustrated for several books. He also loves to travel, and has made the most of the opportunities during his PhD to experience other cultures.

RECENT EVENTS

VETPATH 2012

The Centre's flagship event, the second Prato Conference on the Pathogenesis of Bacterial Diseases of Animals, was held from 9-12 October at the Monash Prato Centre, Italy. A report will follow in the next newsletter. VetPath 2014 is already planned. For more information, visit www.vetpath2014.org

ARC Centre Annual Scientific Meeting

This year, the Centre's Annual Scientific Meeting was held on 27 November at the Monash Biomedical Imaging complex at Monash University. More details will appear in the next newsletter.

CONTACT

Suggestions for articles are welcomed, as well as requests to be placed on the mailing list, and should be sent to:

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The ARC Centre of Excellence in Structural and Functional Microbial Genomics is an Australian Research Council (ARC) funded institute through the Centre of Excellence program. It aims to elucidate key aspects of microbial pathogens and the hosts they infect. The ARC Centres of Excellence are an Australian Government initiative designed to create prestigious hubs of expertise where high-quality researchers can maintain and develop Australia's international standing in research areas of national priority.

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