

FROM THE DIRECTOR



I have often said in the past that the communication of science is just as important as the science itself, especially when much of our research is funded by the taxpayers. It was therefore both disappointing and worrying to see the results of a recent survey which showed a disturbing lack of knowledge about basic scientific principles (such as the

time the earth takes to go round the sun) in the Australian population. I am aware of similar results obtained in several other countries. It is clear that many members of the public are unaware of the enormous beneficial impact of scientific research, both basic and applied, on improving our day to day lives. Many of these benefits are now taken for granted. It is therefore incumbent upon all of us as scientists to take every opportunity to educate and engage with our non-scientific friends, family members, politicians and others and to reverse this alarming trend.

As this newsletter appears, the issue of multi drug resistant bacteria, often referred to as “superbugs” in the press, is once again in the media. Bacterial genomics as one of the foundations of our Centre continues to play a major role in elucidating our understanding of the evolution and spread of these bacteria, which constitute a major threat to animal and human health. It is therefore timely that as part of National Science Week, Centre Associate Professor Dena Lyras will present a public lecture on the topic “Will superbugs inherit the earth?” See details below.

I also believe that it is very important that we make an effort to support science and scientists in countries that are not as fortunate as ours, where many talented scientists are doing excellent work with more limited resources than we have available to us. In that regard, I was honoured to spend 10 days in Colombia recently (as outlined below) and I was humbled by the welcome and impressed with the quality of much of the science in the area of bacterial infectious diseases. I am confident that exchanges and collaborations will follow.



Ben Adler
Director

RESEARCH HIGHLIGHTS

Leptospiral outer membrane protein LipL41 is not essential for acute leptospirosis but requires a small chaperone protein, Lep, for stable expression

LipL41 is the third most abundant lipoprotein found in the outer membrane of pathogenic leptospires and has been considered a putative virulence factor. LipL41 is encoded on the large chromosome 28bp upstream of a small open reading frame encoding a hypothetical protein of unknown function. This gene was named *lep*, for LipL41 expression partner. In this study, *lipL41* was found to be co-transcribed with *lep*. Two transposon mutants were characterized: a *lipL41* mutant and a *lep* mutant. In the *lep* mutant, LipL41 protein levels were reduced by approximately 90%. Lep was shown through cross-linking and co-expression experiments to bind to LipL41. Lep is proposed to be a molecular chaperone essential for the stable expression of LipL41. The roles of LipL41 and Lep in the pathogenesis of *Leptospira interrogans* were investigated; surprisingly, neither of these two unique proteins was essential for acute leptospirosis. (King A, Bartpho T, Sermswan R, Bulach D, Eshghi A, Picardeau M, Adler B and Murray G. 2013. Leptospiral outer membrane protein LipL41 is not essential for acute leptospirosis but requires a small chaperone protein, Lep for stable expression. *Infection and Immunity* 81(8): 2768)

Note: First author of the above paper, Amy King, will be giving her PhD final oration on “The characterisation of putative virulence factors of *Leptospira interrogans*” on Thursday 22 Aug, 4pm in Lecture Theatre S3 (Building 25) at Monash Clayton campus.

HIGHLIGHTS

Joint Chief Editor, Veterinary Microbiology



Congratulations to Centre Director, Prof Ben Adler, who has been appointed Joint Chief Editor of the journal Veterinary Microbiology. He was also recently invited to join the International Advisory Committee for the 2014 International Union of Microbiological Societies Conference, the only Australian on the committee.

OTHER NEWS

Malaysia Visit

A team of three academic staff members (Prof Raja Noor Zaliha, Dr Adam Chor and Dr Mohd Shukuri) from the faculty of Biotechnology and Biomolecular Sciences at University Putra Malaysia visited the Centre on 9 April. Their aim was to learn how our Centre operates so that they can set up and run a similar centre in their own university. During their visit, they spoke with some of the CIs about their research and also learnt more about the equipment and research technology platforms made available for the Centre's research projects. The UPM team chose to visit our Centre because of its reputation in microbial genomics and structural biology and also through the ongoing collaboration that the Centre already has with other institutions in Malaysia.



L-R: Dr Adam Low, Dr Mohd Shukuri and Prof Raja Noor Zaliha in the Protein Production Unit with Dr Noelene Quinsey

Centre Director Visit to Colombia

Centre Director, Prof Ben Adler, was invited on a lecture tour of Colombia in June. He visited six universities in four cities and presented seminars on Centre research projects on fowl cholera and leptospirosis. He was also able to promote other Centre research activities and generate interest in future research and educational collaborations.



Prof Ben Adler (L) being introduced at one of his seminars by Dr Salim Mattar (R), Director of the Institute of Tropical Biological Research, University of Cordoba, Colombia,

STAFF PROFILE

Michael de Veer



Dr Mike de Veer joined the Centre as part of Professor Els Meeusen's group 3 years ago. He has been part of Els's group for over 6 years and heads the Innate Immunity Laboratory within the Department of Physiology at Monash.

Mike began his research career at Monash in the Department of Biochemistry and Molecular Biology where he did his Honours and PhD in the Laboratory of Dr Steven Ralph working on how interferon restricts viral infections. After completing his PhD, he and his new wife moved to the USA where he continued his work on anti-viral molecules at the Cleveland Clinic in Ohio with Professor Bryan Williams. It was here where he developed an interest in how the innate immune system detects pathogens.

To further this interest Mike returned to Melbourne on a Peter Doherty Fellowship to work with Professor Louis Schofield at The Walter and Eliza Hall Institute. He was interested in how the malaria and *Leishmania* parasites were detected by the immune system. With a new found interest in parasites and vaccines, he left WEHI and joined Professor Els Meeusen's group at the University of Melbourne Veterinary School to build a group aimed at discovering how parasitic worms activate the immune system. The group moved to Monash University and established the Biotechnology Research Laboratories which later joined the Centre. The parasitic work continued within the Centre where Mike helped develop an anti-parasitic vaccine for "Barber's Pole worm" which is a major problem for Australia's sheep industry. Mike is now also collaborating with Centre staff member Dr Marina Harper and Centre Associate Dr John Boyce on *P. multocida* bacteria, as they are the only major pathogen class he has not worked on.

His broad experience in immune activation by pathogens and vaccine development has led him to his current research interests, which revolve around using sheep models to characterise how vaccines induce immunity and

how we can use this knowledge to build better vaccines. This work has led to two large ARC-Linkage Grants with Pfizer and Glaxo Smith Kline on commercial vaccines.

Mike is a local who grew up on the Mornington Peninsula where he met and married his high school sweetheart and they have two children, an 11 year old daughter and a 9 year old son. On the weekends you can find him out on his boat with his 9 year old son attempting to catch a few fish. He used to catch fish; however, it is now impossible to get near a fishing rod with a fish on it as his son is much faster than he is. His son does let his father do all the bait chopping, untangling lines and anchor lifting though!! Mike also enjoys a game of golf, brewing his own beer and watching his kids play sports.

STUDENT PROFILE

Amy King



Amy studied BSc at Monash and first became interested in microbiology in first year biology and thought it was fascinating how little packages of protein and DNA could cause serious disease. She then completed her Honours with Prof Ben Adler and Dr Gerald Murray, and became hooked on *Leptospira*.

Her PhD project is focused on characterising virulence-associated determinants of *Leptospira interrogans*. The Adler/Boyce lab which she is attached to has generated a library of *L. interrogans* transposon mutants enabling direct evaluation of virulence-associated factors. During her PhD, she identified that highly abundant outer membrane protein LipL41 is not essential for leptospirosis, which was a very surprising result. She did however identify a heat shock protein that is essential for leptospirosis, where the mutant no longer caused acute disease nor could colonise the renal tubules of the carrier host, a major source of transmission of *Leptospira*. It would be interesting to pursue the relationship between this heat shock protein mutant and the different hosts.

During her PhD, she has been able to attend the national BacPath conference, and also head to the US for the Gordon Conference on the biology of spirochaetes and rub shoulders with the bigwigs in the spirochaete field. Later this year in October, she will be heading to Fukuoka, Japan for the International Leptospirosis Society conference and present some of the work from her PhD.

After she completes her PhD, she would like to continue in research and take on a post-doc position. It will be a fantastic challenge. She has a strong interest in infectious diseases, pathogenesis, and how the pathogen interacts with the host.

During her down time, she likes to read, check out some live music, and watch a good HBO series; she is currently rehashing "The Wire". She likes to cook and would love to do more travelling!

UPCOMING EVENTS

National Science Week Lecture

Associate Professor Dena Lyras, one of our Centre Associates will deliver a lecture as part of National Science Week on 15 August. The talk is entitled "Will the Superbugs Inherit the Earth?" and will be held at 5pm at Lecture Theatre S1 (Building 25) at the Monash Clayton campus. For more information, visit www.microbialgenomics.net

ARC Centre Annual Scientific Meeting

This year, the Centre's Annual Scientific Meeting will be held from 8-10 December at Yarra Valley Lodge. Centre staff and students are expected to attend. If you have not received your registration form, please see Desmond. More details to come.

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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