

Annual Report 2015



Introduction

I AM DELIGHTED TO PRESENT TO YOU THE 2015 ANNUAL REPORT FOR THE AUSTRALIAN SOCIETY FOR PARASITOLOGY INC., WHICH HAS BEEN PREPARED BY OUR ASP NETWORK TEAM, LISA JONES, IAN HARRIS AND NICK SMITH.

Research Achievements

Parasitology research in Australia continued to flourish, with over 510 research papers published in 2015 – this is a record and continues the steady increase in quantity and quality of research outputs produced by ASP members that has been seen for the last decade (from just over 300 papers in 2005, when we first started keeping records). At the same time, our journals go from strength to strength, reaching new heights in citation records. I thank very much our superb journal leadership teams: Maria Meuleman, Brian Cooke, Alex Loukas, Jan Slapeta and Ian Beveridge (The International Journal for Parasitology); Kevin Saliba and Andrew Koetze (IJP: Drugs and Drug Resistance); Andrew Thompson and Lydden Polley (IJP: Parasites and Wildlife); as well as Dale Seaton for his magnificent efforts on our behalf within Elsevier, the publisher of all three of our journals. Remarkably, these record publication numbers were achieved at a time when funding for our research has been at a sustained, 3 year low point, with the same number of research grants or fellowships (37) awarded to ASP members in 2015 as were awarded in 2014, with only a minor increase in value (from \$17 million to \$20 million). This stacks up very badly against 10-year averages of 60 grants (range, 37-87) and \$34 million (range, \$17-54 million) per year. Full lists of Australian parasitology publications and research grants are included as Appendix 1 and Appendix 2 to this annual report. The disturbing recent trend in research funding shows little sign of abating in the near future.



ASP President, David Emery

Researcher Exchange, Training and Travel Awards

The ASP, therefore, continued to offer Researcher Exchange, Training and Travel Awards and its Mentorship Scheme in 2015, looking to collaborations with international colleagues to help us maintain a leading global reputation in parasitology. Details and highlights of these awards appear elsewhere in this annual report. Additionally, scientific exchange opportunities for malaria researchers were provided via the OzeMalaR Researcher Exchange Scheme, which was administered by Lisa Jones through the ASP Network. These small grants have proved to be potentially major influences on the careers of our young researchers and it is encouraging to see that, in 2015, past recipients again won fellowships or grants to fund their research work, despite an extremely challenging funding environment in Australia. Sadly, the grant for OzeMalaR finished at the end of 2015. It has been a boon

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for the Society and I thank sincerely Geoff McFadden for his vision, commitment and energy to this great initiative. A full report on OzeMalaR is presented inside.

Honours

The ASP honoured several extremely deserving parasitologists in 2015: Ian Whittington was made a Fellow of the Society; Melanie Williams, Taher Uddin and Andrew Teo won JD Smyth Awards; Eric Hoberg and Ray Kaplan were named ASP International Lecturers; Clare Anstead took out the Best Early Career Researcher Presentation Prize at the annual conference, while Stephanie Ryan, Kate McSpadden and Andrea Lawrence won the Best Student Presentation Prizes. Other organisations also honoured several of our members: Abdul Jabbar won the Odile Bain Memorial Prize; Rama Jayaraj was given the Pride of Australia Inspiration Medal for the Northern Territory; Don McManus was elected to the Fellowship of the Australian Academy of Health and Medical Sciences; Dave Spratt won the Distinguished Service Award of the International Wildlife Disease Association; and Andreas Stroehlein was awarded the Sir Ian Clunies-Ross Prize by The University of Melbourne.

Annual Conference

The 2015 ASP Conference was held in conjunction with the New Zealand Society for Parasitology in Auckland in July, 2015. The meeting was a highlight, not just of 2015, but also of the Society's history – it was the first joint conference between our two great societies in over a decade and was attended by more than 200 delegates in a fantastic, collegial atmosphere. The ASP is extremely grateful to the conference organising committee: Victoria Chapman; Ian Scott; Dallas Bishop; Nick Smith; and Lisa Jones. The Society also owes a great debt to the ever-willing, Maria Meuleman and the army of student volunteers from Charles Sturt University, Massey University and the University of Otago, who helped keep the meeting running smoothly: Sara Baker; Abusha Beer; Tara Cassidy; Sheen Yee Goh; Olivia McPherson; Kate McSpadden; Katie O'Dwyer; Kandarp Patel; Trent Rasmussen; Jaydip Suthar; and Thomas Williams. The conference was sponsored generously by Virbac Animal Health, Bayer, The International Journal for

Parasitology, Elsevier Parasitology, Elanco, Zoetis, New Zealand Veterinary Pathology, Gribbles Veterinary, Merial, Ancare, PGG Wrightson and New England Biolabs. More details about our conference can be found inside this annual report.

Public Engagement and Outreach

ASP members continued to demonstrate a remarkable willingness and enthusiasm to embrace community engagement as a core activity of the Society, with public outreach activities reaching new heights in 2015 (see the highlights inside this annual report). Lisa Jones secured another grant from the Inspiring Australia Initiative of the Commonwealth Government in 2015. This grant included funding to launch National Science Week in Queensland, an amazing, but thoroughly deserved honour for Lisa, and also funded a remarkable "Science Meets Art" project with indigenous artist, Bernard Lee Singleton, to produce a stunning painting, interpretive dance performance, light show and movies. Public engagement and outreach by the ASP is truly second to none!

Advanced Parasitology Course

The year closed with our second Advanced Parasitology Course – Concepts in Parasitology, held at ANU's field station at Kioloa, on the NSW south coast; from all reports, it was, again, a resounding success and a continuing source of great pride for the Society. I thank Alex Maier for coordinating the course, ably assisted by his energetic curriculum and management committee members: Una Ryan; Stuart Ralph; Mal Jones, Rob Adlard; Giel van Dooren; Nick Smith; Lisa Jones; Robin Gasser; Denise Doolan; Aaron Jex; and David Emery. More information about the course within...

Our Committees

The success of the ASP is due to the energy, time and commitment of every Member but several deserve special thanks for their efforts in 2015.

First, the members of the Council of the Society, all of who work enthusiastically on behalf of all members. My thanks to Aaron Jex and Peter Rolfe (Treasurers), David Piedrafita and Colin Stack

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(Executive Secretaries), Robin Gasser (Past President and Vice-President), Giel van Dooren (ACT rep.), Ryan O’Handley (SA rep.), Colin Stack and Shokoofeh Shamsi (NSW reps), Melanie Leef and Barbara Nowak (Tasmanian reps), Benedikt Ley (NT rep.), Abdul Jabbar (Victorian rep.), Mark Pearson (QLD rep.), Stephanie Godfrey (WA rep.), Tina Skinner-Adams (Incorporation Secretary), Peter O’Donoghue and Mal Jones (Bancroft-Mackerras Medal Convenors), Alex Loukas and Brian Cooke (IJP Editors), Kevin Saliba and Andrew Kotze (IJP:DDR Editors), Andy Thompson (IJP:PAW Editor), Haylee Weaver (Archivist), Nick Smith (Network Convenor) and Lisa Jones (Newsletter Editor, Webmaster and Network Communications Coordinator).

Second, the Researcher Exchange, Training and Travel Assessment Committee, who had an exceptionally hard job in 2015, with a huge number of quality applications to consider and limited funding to dispense. Thanks to Una Ryan (Chair), Geoff McFadden, Rowena Martin, Kate Hutson, Brendan McMorran, Deb Holt, Nick Smith and Lisa Jones. I also thank the OzeMalaR Researcher Exchange Assessment Committee: Geoff McFadden; Denise Doolan; Ric Price; Chris Engwerda; Dominique Soldati-Favre; Andy Waters; Kevin Saliba; Nick Smith; and Lisa Jones.

Finally, a special thankyou to Lisa Jones who, in September 2015, accepted the fulltime position of ASP Executive Officer. This new position extended Lisa’s previous role as Network Communications Officer, adding financial planning, monitoring and accounting, plus strategic planning roles to her duties as Network Communications Coordinator, Newsletter Editor and Webmaster. It is the latest, most important step in the continuing professionalisation of operational management of our remarkable Society.

David Emery
President of the ASP



Cover: detail from Bernard Lee Singleton’s magnificent painting, Gula Guri Mayin (“Heal the body”), which explores themes of parasites and health.

Parasite images used during National Science Week events
at the Tanks Arts Centre, Cairns, July and August 2015.



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Research Achievements

The contribution of ASP Network for Parasitology to Australia's fundamental, strategic and applied research effort is evident in the quantity and quality of publications listed in Appendix 1 addressing Australia's National Research Priorities (see <http://www.innovation.gov.au/Research/pages/StrategicresearchPriorities.aspx>). ASP Members contribute significantly to three of Australia's stated research priorities:

[1] Living in a changing environment

By assessing the susceptibility to, and monitoring the prevalence of, parasitic disease in wildlife, ASP researchers generate new information that will assist in the management of terrestrial and marine ecosystems.

[2] Managing our food and water assets

ASP researchers work hard to: better understand the epidemiology and transmission dynamics of parasites; discover and develop better surveillance systems for parasites on land and in water; and find new ways to control parasites in our livestock and fisheries.

[3] Promoting population health and wellbeing.

ASP researchers carry out fundamental, strategic and translational research to: better understand host-parasite relationships; and discover and develop sustainable parasite control strategies. In so doing, they make a major contribution to the longterm, sustained discovery and development of strategies, drugs and vaccines to control, treat and prevent parasitic disease.

With over 500 publications involving Australian parasitologists in 2015, there were innumerable highlights. However, at least a few deserve special mention.

First, the continuing efforts in the -omics spheres reached new heights in 2015 with Australian parasitologists spearheading and contributing to numerous international efforts to understand the evolution, pathogenicity and development of parasites through their lifecycles. These efforts spanned all types of parasites, single- and multi-cellular, spanning each of the National Research

Priorities and have provided platforms to identify new targets for novel control strategies:

Herd KE, Barker SC, Shao R The mitochondrial genome of the chimpanzee louse, *Pediculus schaeffi*: insights into the process of mitochondrial genome fragmentation in the blood-sucking lice of great apes *BMC Genomics*. 2015 Sep 3;16:661

Woo YH, Ansari H, Otto TD, Klinger CM, Kolisko M, Michalek J, Saxena A, Shanmugam D, Tayyrov A, Veluchamy A, Ali S, Bernal A, del Campo J, Cihlar J, Flegontov P, Gornik SG, Hajduškov. E, Horak A, Janouškovec J, Katris NJ, Mast FD, Miranda-Saavedra D, Mourier T, Naeem R, Nair M, Panigrahi AK, Rawlings ND, Padron-Regalado E, Ramaprasad A, Samad N, Tomčala A, Wilkes J, Neafsey DE, Doerig C, Bowler C, Keeling PJ, Roos DS, Dacks JB, Templeton TJ, Waller RF, Lukeš J, Obornik M, Pain A Chromerid genomes reveal the evolutionary path from photosynthetic algae to obligate intracellular parasites *Elife*. 2015 Jul 15;4:e06974

Zhu XQ, Korhonen PK, Cai H, Young ND, Nejsum P, von Samson-Himmelstjerna G, Boag PR, Tan P, Li Q, Min J, Yang Y, Wang X, Fang X, Hall RS, Hofmann A, Sternberg PW, Jex AR, Gasser RB Genetic blueprint of the zoonotic pathogen *Toxocara canis* *Nat Commun*. 2015 Feb 4;6:6145

Anstead CA, Korhonen PK, Young ND, Hall RS, Jex AR, Murali SC, Hughes DS, Lee SF, Perry T, Stroehlein AJ, Ansell BR, Breugelmans B, Hofmann A, Qu J, Dugan S, Lee SL, Chao H, Dinh H, Han Y, Doddapaneni HV, Worley KC, Muzny DM, Ioannidis P, Waterhouse RM, Zdobnov EM, James PJ, Bagnall NH, Kotze AC, Gibbs RA, Richards S, Batterham P, Gasser RB *Lucilia cuprina* genome unlocks parasitic fly biology to underpin future interventions *Nat Commun*. 2015 Jun 25;6:7344 (see feature article following)

Cwiklinski K, Dalton JP, Dufresne PJ, La Course J, Williams DJ, Hodgkinson J, Paterson S The *Fasciola hepatica* genome: gene duplication and polymorphism reveals adaptation to the host environment and the capacity for rapid evolution *Genome Biol*. 2015 Apr 3;16:71

Walker RA, Sharman PA, Miller CM, Lippuner C, Okoniewski M,

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Eichenberger RM, Ramakrishnan C, Brossier F, Deplazes P, Hehl AB, Smith NC RNA Seq analysis of the *Eimeria tenella* gametocyte transcriptome reveals clues about the molecular basis for sexual reproduction and oocyst biogenesis BMC Genomics. 2015 Feb 18;16:94

Alam MM, Solyakov L, Bottrill AR, Flueck C, Siddiqui FA, Singh S, Mistry S, Viskaduraki M, Lee K, Hopp CS, Chitnis CE, Doerig C, Moon RW, Green JL, Holder AA, Baker DA, Tobin AB Phosphoproteomics reveals malaria parasite Protein Kinase G as a signalling hub regulating egress and invasion Nat Commun. 2015 Jul 7;6:7285

Bauer DC, McMorran BJ, Foote SJ, Burgio G Genome-wide analysis of chemically induced mutations in mouse in phenotype-driven screens BMC Genomics. 2015 Oct 26;16(1):866

Hehl AB, Basso WU, Lippuner C, Ramakrishnan C, Okoniewski M, Walker RA, Grigg ME, Smith NC, Deplazes P Asexual expansion of *Toxoplasma gondii* merozoites is distinct from tachyzoites and entails expression of non-overlapping gene families to attach, invade, and replicate within feline enterocytes BMC Genomics. 2015 Feb 13;16:66

Josling GA, Petter M, Oehring SC, Gupta AP, Dietz O, Wilson DW, Schubert T, L. ngst G, Gilson PR, Crabb BS, Moes S, Jenoe P, Lim SW, Brown GV, Bozdech Z, Voss TS, Duffy MF A *Plasmodium falciparum* Bromodomain Protein Regulates Invasion Gene Expression Cell Host Microbe. 2015 Jun 10;17(6):741-51

At the same time, more traditional medical and biological research approaches generated extremely important insights into parasitic diseases, and some feature stories on the following publications are included in the next few pages:

Robinson LJ, Wampfler R, Betuela I, Karl S, White MT, Li Wai Suen CS, Hofmann NE, Kinboro B, Waltmann A, Brewster J, Lorry L, Tarongka N, Samol L, Silkey M, Bassat Q, Siba PM, Schofield L, Felger I, Mueller I Strategies for understanding and reducing the *Plasmodium vivax* and *Plasmodium ovale* hypnozoite reservoir in Papua New Guinean children: a randomised placebocontrolled trial

and mathematical model PLoS Med. 2015 Oct 27;12(10):e1001891

Nicholas J. Clark, Sophie Olsson-Pons, Farah Ishtiaq, Sonya M. Clegg. Specialist enemies, generalist weapons and the potential spread of exotic pathogens: malaria parasites in a highly invasive bird. International Journal for Parasitology 45:891-899

Uboldi AD, McCoy JM, Blume M, Gerlic M, Ferguson DJ, Dagley LF, Beahan CT, Stapleton DI, Gooley PR, Bacic A, Masters SL, Webb AJ, McConville MJ, Tonkin CJ Regulation of Starch Stores by a Ca²⁺-Dependent Protein Kinase Is Essential for Viable Cyst Development in *Toxoplasma gondii* Cell Host Microbe. 2015 Dec 9;18(6):670-81

Coffey MJ, Sleebs BE, Uboldi AD, Garnham A, Franco M, Marino ND, Panas MW, Ferguson DJ, Enciso M, O'Neill MT, Lopaticki S, Stewart RJ, Dewson G, Smyth GK, Smith BJ, Masters SL, Boothroyd JC, Boddey JA, Tonkin CJ An aspartyl protease defines a novel pathway for export of *Toxoplasma* proteins into the host cell Elife. 2015 Nov 18;4. pii: e10809

Research Achievements

RELAPSED MALARIA INFECTIONS

ELIMINATING MALARIA IN THE ASIA-PACIFIC COULD PROVE MORE CHALLENGING THAN PREVIOUSLY THOUGHT. NEW RESEARCH BY LEANNE ROBINSON (WEHI) AND COLLEAGUES SHOWS THAT MOST CHILDHOOD INFECTIONS WITH PLASMODIUM VIVAX MALARIA IN ENDEMIC AREAS ARE THE RESULT OF RELAPSED, NOT NEW, INFECTIONS.

An international study found that four out of five children in Papua New Guinea (PNG) aged five to 10 years old were susceptible to recurring infection with the malaria parasite *Plasmodium vivax*, which can 'hide' undetected in the liver. *P. vivax* is the most widespread malaria parasite worldwide, and the predominant cause of malaria in the vast majority of countries outside Africa.



The discovery has significant repercussions for the country's – and region's – malaria control program, as well as other areas globally where *P. vivax* is a significant cause of malaria, such as Central and South America, South and South-East Asia and the Middle East.

The research study was led by Dr Leanne Robinson from the Walter

and Eliza Hall Institute and Papua New Guinea Institute of Medical Research and Professor Ivo Mueller from the Walter and Eliza Hall Institute and Barcelona Centre for International Health Research, Spain.

Dr Robinson said the research showed relapsing infections with *P. vivax* were responsible for 80 per cent of infections in PNG children aged five to 10 years.

"Our research has shown that one of the biggest problems in realising malaria eradication is relapsing *P. vivax* infections, which are critical for sustained transmission in the region," Dr Robinson said. "Children treated with drugs that targeted the liver and blood stages of infection had 80 per cent fewer malaria infections than those treated with drugs that only targeted the blood stage of infection."

Dr Robinson said *P. vivax* malaria was problematic for global

malaria control efforts, especially in PNG and the Asia-Pacific where it is the major cause of infection and illness in young children. "*P. vivax* parasites are able to hide in the liver for long periods of time before 'reawakening' to cause disease and continue the transmission cycle," she said. "Mass drug administration that includes a drug that

Above: Dr Leanne Robinson (far right) with patient Jonathan (far left), who is being tested for malaria by Nursing Officer Kay Kose (second from left) and microscopist Barbara Sambre (second from right).
Credit: Mayeta Clark/Walter and Eliza Hall Institute

Research Achievements

kills parasites in the liver is likely to be a highly effective strategy for eliminating malaria in PNG.”

Professor Mueller said mathematical modelling showed current programs would be unable to achieve elimination because the programs could not identify and treat children with dormant liver infections. “We need a better way of identifying children who are chronically infected with malaria so that they can be treated,” he said. “It is the only way to stop the malaria transmission cycle in PNG, and is likely to be the case for eliminating malaria in other parts of the Asia-Pacific and Americas.”

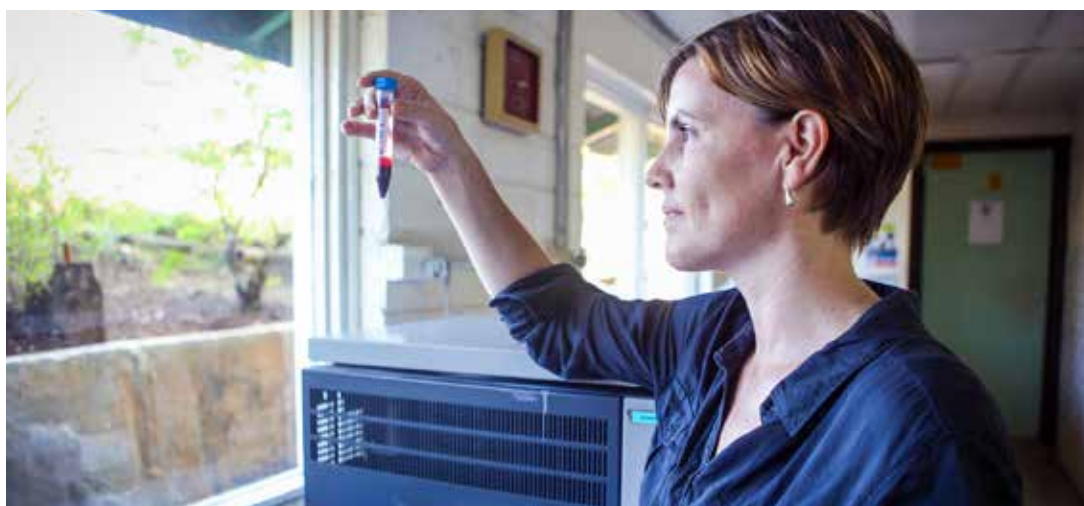
Professor Mueller and an international team of collaborators successfully secured a AUD\$1.15 million grant through the Global Health Innovative Technology (GHIT) Fund to accelerate development of a test that identifies people with dormant malaria parasites in their liver. GHIT is a public-private partnership between Japanese pharmaceutical companies, the Japanese government and the Bill & Melinda Gates Foundation to leverage Japanese biotechnology capabilities to fight neglected disease.

The team will work with Japan’s Ehime University, Switzerland’s Foundation for Innovative New Diagnostics (FIND), and Japanese biotech CellFree Sciences Co. Ltd. to develop biomarkers for *P. vivax* malaria that could drive the development of new diagnostic tools. This is only the second diagnostic project supported by the GHIT Fund and the first to be led by an Australian institute.

Professor Mueller said the GHIT Fund was a great model for

bringing together the best minds, technologies and resources to develop new diagnostics and treatments for diseases that are devastating the developing world, such as malaria. “The funding will support development of a diagnostic test to identify people with chronic malaria infections so that we can effectively treat them, which will be critical for achieving malaria eradication in PNG and in the Asia-Pacific region,” he said.

The research study, published in PLoS Medicine, was supported by the TransEPI consortium, funded by The Bill & Melinda Gates Foundation, National Health and Medical Research Council, Swiss National Science Foundation Grant, Cellex Foundation, International Centers of Excellence in Malaria Research and Victorian Government Operational Infrastructure Support Scheme. Preliminary work on the diagnostic test was supported by Australian Department of Foreign Affairs and Trade (DFAT) through FIND.



Above: Dr Leanne Robinson with a blood sample in the Papua New Guinea Institute of Medical Research laboratory in Madang, Papua New Guinea.

Credit: Mayeta Clark/Walter and Eliza Hall Institute

Story source: Walter and Eliza Hall Institute

<http://www.wehi.edu.au/news/relapsing-infections-could-challenge-malaria-eradication>

Research Achievements

DECODING LUCILIA CUPRINA

IN THEIR PAPER PUBLISHED IN NATURE COMMUNICATIONS, DR CLARE ANSTEAD AND PROFESSOR ROBIN GASSER DESCRIBE THE DECODING OF THE AUSTRALIAN SHEEP BLOWFLY GENOME, POWERFUL AMMUNITION IN THE BATTLE AGAINST ONE OF THE NATION'S MOST INSIDIOUS PESTS.

The decoding of the Australian Sheep Blowfly genome has revealed around 2000 genes not seen before in any other organism. These genes can now be investigated as potential drug and vaccine targets.

This blowfly is responsible for about \$280 million in losses to Australia's sheep industry each year from flystrike. All 14,544 genes of the blowfly (*Lucilia cuprina*) were identified by the international research team, led by the University of Melbourne, in partnership with the Baylor College of Medicine Human Genome Sequencing Center, and funded by the United States National Human Genome Research Institute and Australian Wool Innovation.

The research, published in Nature Communications, provides insights into the fly's molecular biology, how it interacts with the sheep's biology and, importantly, shows its potential to develop insecticide resistance. Blowfly maggots live on the skin of sheep and invade open wounds, where they feed on tissue and cause severe skin disease, known as myiasis or flystrike. It is an aggressive and notoriously difficult pest to control.

Lead researcher on the project, Dr Clare Anstead, of the University of Melbourne Faculty of Veterinary and Agricultural Sciences, said



the genome map has 'limitless potential' for fighting the blowfly at home and abroad.

"*Lucilia* is an extremely nasty parasite. The sheep is literally eaten alive. The *Lucilia* species are responsible for more than 90 per cent of flystrike in Australia and New Zealand," Dr Anstead said. "This fly is especially good at evolving to resist insecticides. It's exciting that we have now identified more than 2000 genes that have never been seen in any other animal or plant. Some of these 'orphan' genes hold the key to the parasitic relationship between the blowfly and the sheep. They could be targeted to develop a completely new method of control."

University of Melbourne Professor Robin Gasser, who oversaw the research, added: "If you want to develop effective interventions against this fly, you need to know it inside out and understand its biology, starting by identifying all the genes. And, we have done that."

Insecticides can be effective, however, the blowflies rapidly evolve to develop resistance to these chemicals.

To decode the genome, researchers used a combination of supercomputing and bioinformatic techniques to handle huge reams of data. They aim to use a powerful new technology called CRISPR to investigate switching off a number of genes, including the gene responsible for the blowfly's extraordinary sense of smell.

Lucilia cuprina is one of 30 insect species to have genome sequences generated at the Baylor College of Medicine Human Genome Sequencing Centre as part of a pilot project for the genome analysis of some 5000 arthropod species of medical, scientific, economic and agricultural importance.

Story: Jane Gardner, University of Melbourne
Read the paper at [nature.com http://rdcu.be/df5Z](http://rdcu.be/df5Z)

Research Achievements

AVIAN MALARIA

AN INVASIVE BIRD SPECIES IS CARRYING, AND POTENTIALLY SPREADING, A HIGH PREVALENCE OF AVIAN MALARIA THROUGHOUT ITS RANGE IN EASTERN AUSTRALIA.

Nicholas Clark found that up to 40% of Indian Mynas in the South East Queensland region can carry malaria parasites. While they can't infect humans, the parasites pose a significant threat to native wildlife.

"Mynas carry some malaria strains exotic to Australia, the spread of the Myna could put our native birds such as parrots, magpies and butcher birds at risk," Nick said.



Nick started his PhD in 2012 with the School of Environment, at Griffith University and is investigating avian malaria in birds. Nicholas took samples from birds that were part of a community trapping program all along the Queensland coast. Blood samples were taken at clinics to identify avian malaria using a standardised PCR protocol. His research found a high prevalence of malaria parasites in Indian Myna birds in Australia.

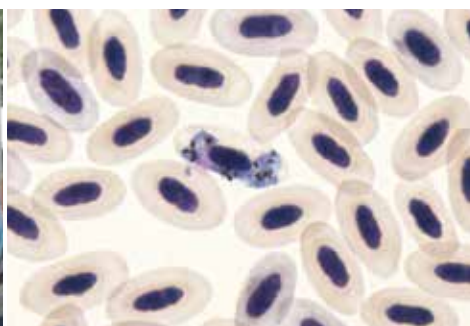
"Malaria parasites are common in Australian birds but through the use of genetic techniques I have discovered they are more diverse than originally thought and found strains of avian malaria that haven't previously been found in Australia," Nick said.

Nicholas said that some of the malaria parasites found in Australia

were probably introduced from other countries and are now being spread by the Myna, which was brought to Australia in the 1800s to control insect pests on crops. But today they are considered an aggressive pest that has the potential to cause significant negative impacts on biodiversity.

"These malaria parasites seem to have little effect on the Mynas but could be harmful to native birds as they come in contact with each other," Nick said.

Nick says Australia hasn't been well sampled with relation to birds and Nick plans to expand his research to other invasive species of birds such as starlings and sparrows.



Read the full research publication online.

Nicholas J. Clark, Sophie Olsson-Pons, Farah Ishtiaq, Sonya M. Clegg. Specialist enemies, generalist weapons and the potential spread of exotic pathogens: malaria parasites in a highly invasive bird. *International Journal for Parasitology*, 45:891-899
<http://www.sciencedirect.com/science/article/pii/S0020751915002519>

Article source Griffith University (<https://app.secure.griffith.edu.au/news/2015/10/22/invasive-birds-spreading-avian-malaria-in-eastern-australia/>) and interview with Lisa Jones.

Research Achievements

TOXOPLASMA & BEHAVIOUR

WEHI RESEARCHERS HAVE DISCOVERED HOW A COMMON PARASITE HIJACKS HOST CELLS AND STOCKPILES FOOD SO IT CAN LIE DORMANT FOR DECADES, POSSIBLY CHANGING ITS HOST'S BEHAVIOUR IN THE PROCESS.

Toxoplasma is a common parasite transmitted by cats and found in raw meat. Around 30 per cent of the population is infected. The research projects were led by Dr Chris Tonkin, Dr Justin Boddey, Dr Alex Uboldi, Mr James McCoy and Mr Michael Coffey from the Walter and Eliza Hall Institute.

Dr Tonkin said Toxoplasma required a human host cell – such as a brain cell (neuron) – to live in. The research team discovered how the parasite hijacks the host cell to enable its own growth and survival, hibernating for decades by creating its own food reserve. “Toxoplasma infection leads to massive changes in the host cell to prevent immune attack and enable it to acquire a steady nutrient supply,” Dr Tonkin said. “The parasite achieves this by sending proteins into the host cell that manipulate the host’s own cellular pathways, enabling it to grow and reproduce.”

Dr Boddey said some of these proteins might even influence the behaviour of the host. “There is a fascinating association between Toxoplasma infection and psychiatric diseases including schizophrenia and bipolar disorder. It is now possible to test whether proteins sent from the hibernating parasite into a host neuron disrupt normal brain function and contribute to

development of these diseases,” he said.

Once Toxoplasma parasites establish infection, they can lie dormant in our bodies for the rest of our lives. In people with suppressed immune systems, such as cancer patients, the parasite can reactivate and cause neurological damage and even death. Dr Tonkin said the teams had identified pathways that allow the parasite to establish chronic infections, unveiling potential avenues for treatment that clear the dormant parasite.

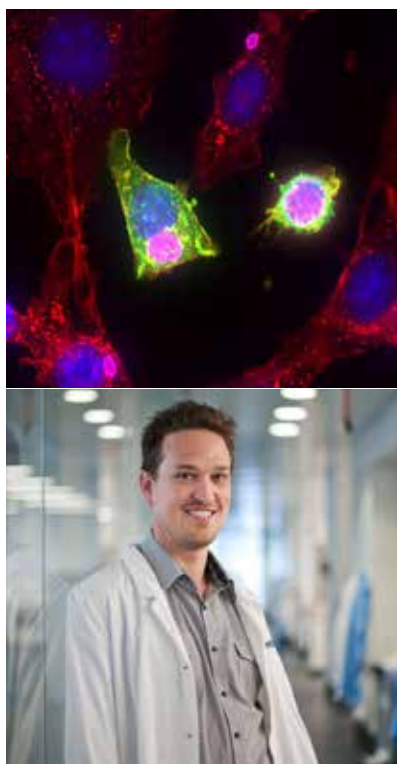
“We discovered that, similar to animals preparing for hibernation, Toxoplasma parasites stockpile large amounts of starch when they

become dormant,” he said. “By identifying and disabling the switch that drives starch storage, we found that we could kill the dormant parasites, preventing them from establishing a chronic infection.”

Dr Tonkin said the finding could lead to a drug to clear chronic Toxoplasma infections, or even a vaccine to prevent infection in at-risk people, such as pregnant women.

“Cats are one of the primary transmitters of Toxoplasma parasites,” Dr Tonkin said. “If the parasites are transmitted to pregnant women, for example through contact with kitty litter, there is a substantial risk of miscarriage or birth defects. We hope to use our discoveries to develop a vaccine that stops cats transmitting the parasite, to prevent these potentially catastrophic consequences.”

Dr Boddey said it had long been a mystery how the Toxoplasma parasite transported proteins into the host. “Our study showed that the parasite includes a signature on the exported proteins that ‘earmark’ them for transport into the host cell,” he said. “Blocking transport makes the parasite much less dangerous in infection models, suggesting this may also be a new way of treating Toxoplasma infections.”



Toxoplasma image: Visualising Toxoplasma modifying its host cell. All human cells in red and Toxoplasma parasites in purple. Toxoplasma changes the cell that it is living within, here represented by a change in colour from red to green. Dr Chris Tonkin pictured right. Credit: Chris Tonkin/Walter and Eliza Hall Institute

Story source: Walter & Eliza Hall Institute <http://www.wehi.edu.au/news/hijacking-and-hibernating-parasite-could-alter-behaviour>

Researcher Exchange, Training & Travel Awards

IN 2015, 24 NETWORK OR OZEMALAR RESEARCHER EXCHANGE, TRAINING AND TRAVEL AWARDS WERE PROVIDED, MOST GOING TO STUDENTS OR ECRs FOR VISITS TO OVERSEAS LABORATORIES AND TRAINING COURSES.

JD Smyth Travel Award winners

Melanie Williams, PhD Candidate, Walter and Eliza Hall Institute for Researcher Exchange to the laboratory of Professor Michael Geeves at the University of Kent in UK to learn biochemical and biophysical techniques for the purpose of investigating the mechanism of force production by the MyoA glideosome of apicomplexan parasites. and EMBO Practical Course: The Application of Transient Kinetic Methods to Biological Macromolecules

Taher Uddin, PhD student, School of BioSciences, University of Melbourne, for a researcher exchange to Ellen Yeh's (Assistant Professor of Biochemistry, Pathology, Microbiology and Immunology, Stanford School of Medicine.

Andrew Teo, PhD student, The University of Melbourne Research collaboration with Prof. Salanti, Prof. Theander and Prof. Hviid at the University of Copenhagen.

ASP Network Travel Award winners

Sabrina Chin, PhD Candidate, Australian National University, for Wageningen University Laboratory of Nematology training courses 16th March – 10th April, Basic course in Nematology and Molecular Identification of Nematodes.

Alejandro Trujillo, MPhil Candidate, Centre for Sustainable Tropical Fisheries and Aquaculture & School of Marine and Tropical Biology, James Cook University for a Researcher Exchange to the Institute of aquaculture "Torre de la Sal" for Morphological and molecular identification methods of protozoan and metazoan

parasites of imported ornamental fish.

Stephanie Tan, PhD Student, Walter and Eliza Hall Institute, Research exchange to Mahidol University and CRESIB 12th June – 1st August 2015.

Jessica Johnson-Mackinnon, PhD student, The University of Tasmania, for a researcher exchange to University of Victoria in Canada working with Dr. Ben Koop and Dalhousie University, to work with Professor John Archibold and for a Bioinformatics Course at Black Forest University, Germany 14th September – 12th October 2015.

Natalia Guimaraes Sampaio, PhD Student, WEHI for a Researcher exchange to the University of Nottingham and Laboratory of Prof. Luke O'Neill in Dublin Sept 5th - 15th, 2015.

Adelaide Dennis, PhD candidate, Kirk laboratory, ANU for a Researcher Exchange with the ESKITIS Institute for Drug Discovery, Griffith University, Brisbane.

John Holleran, Discovery Biology, ESKITIS Institute, Griffith University, Researcher exchange to Australia National University, Canberra.

Erick Tjhin, PhD student, Australian National University for a training course MBL's Biology of Parasitism Summer Course.

Taher Uddin, PhD student, University of Melbourne, to attend The Biology of Parasitism (BoP) summer course at the Marine Biological Laboratory, Woods Hole, MA.

Dhansekaran Sakthivel, PhD Candidate, LaTrobe University, for Macromolecular Crystallography training course organised by Okinawa Institute of Science and Technology, Japan.

Victoria Morin-Adeline, PhD Candidate, University of Sydney for a Researcher Exchange for 14 days (22nd August to 4th September 2015) in Prof John Dalton's lab at the University of Queens in Belfast, United Kingdom.

Researcher Exchange, Training & Travel Awards

Ali Raza, PhD student, The University of Queensland, Research exchange to Institute of Parasitology, University of Montreal, Canada and workshop Anthelmintics: Discovery to resistance II, San Diego, USA.

Jessica Engel, PhD student, Eskitis Insitute, Griffith University, for a Researcher Exchange with Professor Leann Tilley, Bio21, University of Melbourne.

Kate Hutson, James Cook University, for 3rd International Workshop on Symbiotic Copepoda on Heron Island Research Station, Queensland, Australia 10th to 16th of July 2016.

Heinrich Korner, Menzies Institute for Medical Research, Tasmania, Researcher exchange with Erlangen, Germany, Institute for Microbiology, Immunology and Hygiene.

OzEMaLaR Travel Award winners

Dr Michael Duffy, Laboratory Head, Peter Doherty Institute, University of Melbourne for a Researcher Exchange to Till Voss' laboratory, Swiss Tropical & Public Health Institute Swiss TPH, Department of Medical Parasitology and Infection

Charles Jennison, PhD Student, WEHI, Boddey Laboratory for a Researcher Exchange to London School of Hygiene and Tropical Medicine insectary and the Laboratory of Prof. Maria Mota, Instituto de Medicina Molecular, Lisbon Portugal.

Janavi Suresh Rambhatla, PhD Student, University of Melbourne, Department of Medicine (RMH) in Professor Stephen Rogerson's Laboratory for a Researcher Exchange to Professor Lars Hviid, Professor Thor Theander, & Dr Thomas Lavstsen at Department of International Health, Immunology and Microbiology, Centre for Medical Parasitology, University of Copenhagen, Denmark.

Michaela Petter, University of Melbourne, Department of Medicine, Peter Doherty Institute, Duffy Lab for a Researcher Exchange to Prof. Egbert Tannich at the Bernhard Nocht Institute, Department of Molecular Parasitology, Hamburg, Germany.

Jingyi Tang, Department of Medicine (RMH) of the University of Melbourne to attend the Wellcome Trust Chromatin Structure and Function Advanced Course in Genome Campus, Hinxton, Cambridge, UK.

Andrew Teo, PhD student, University of Melbourne, Department of Medicine, Rogerson Laboratory for a Researcher Exchange to Professor Ali Salanti, Professor Thor Theander and Professor Lars Hviid at the Department of International Health, Immunology and Microbiology, CMP University of Copenhagen, Denmark.

ASP Student Conference Travel Grant

The following ASP students were awarded 2015 ASP Student Conference Travel Grants: Mahdis Aghazadeh (QIMR Berghofer), Vincent Aw (ANU), MD. Shakif-UI Azam (Monash), Sara Baker (CSU), Jimena Balli Garza (UTas), Amanda Barbosa (Murdoch), Rebecca Black (LaTrobe), Samantha Bui (UMelb), Timothy Cameron (LaTrobe), Tara Cassidy (CSU), Chris Chiu (WEHI), Ming Chua (Griffith), Crystal Cooper (UWA), Madalyn Cooper (USyd), Shannon Donahoe (USyd), Samantha Emery (Macquarie), Jessica Engel (Griffith), Deepani Fernando (QIMR Berghofer), Gillian Fisher (Griffith), Michelle Gazdik (WEHI), Hagos Gebremikael (UMelb), Edward Guiney (LaTrobe), Pradip Gyawali (UQ), Vanessa Howieson (ANU), Jessica Johnson-Mackinnon (UTas), Jane Kelley (LaTrobe), Rasika Kumarasingha (Monash), Mackenzie Kwak (UMelb), Emily Lau (QIMR Berghofer), Andrea Lawrence (USyd), Leanne Low (Griffith), Md Abdullah Al Mamun (Monash), Storm Martin (UQ), Kate McSpadden (CSU), Sally Molero (LaTrobe), Webster Nyakudya (UTS), Emily Onizawa (USyd), Piyumali Perera (UMelb), Catherine Perez (Murdoch), Anita Poupa (CSU), Shiwanthi Ranasinghe (QIMR Berghofer), Mohammed Rashid (UMelb), Vignesh Rathinasamy (LaTrobe), Ali Raza (UQ), Stephanie Ryan (JCU), Isabella Rynia (LaTrobe), Dhanasekaran Sakthivel (Monash), Sabine Schiller (Macquarie), Mary Shuttleworth (UMelb), Andreas Stroehlein (UMelb), Leah Stroud (UWS), Jaydipbhai Suthar (CSU), Melissa Sykes (Griffith), Thomas Teoh (UMelb), Elke Vermeulen (Macquarie), Kosala Weerakoon (QIMR Berghofer), Thomas Williams (CSU), Amanda Worth (Murdoch), Jerald Yam (UQ), Russell Yong (UQ), Alireza Zahedi Abdi (Murdoch).

Researcher Exchange, Training & Travel Awards

RESEARCHER EXCHANGE & TRAVEL REPORTS

KYLIE JAMES (MALARIA IMMUNOLOGY LABORATORY, QIMR BERGHOFFER MEDICAL RESEARCH INSTITUTE) WON \$5000 FOR AN OZEMALAR RESEARCHER EXCHANGE TO WELLCOME TRUST SANGER INSTITUTE AND THE EUROPEAN BIOINFORMATICS INSTITUTE, HINXTON, CAMBRIDGESHIRE AND TELLS US ABOUT HER EXCHANGE HERE.

Last year I was both delighted and honored to receive a travel award from OzEMalaR to go on exchange for 10 weeks in the laboratories of Dr Oliver Billker at the Wellcome Trust Sanger Institute (WTSI) and Dr Sarah Teichmann at the European Bioinformatics Institute (EBI), Hinxton, Cambridgeshire.

My interest and PhD project lies in how the antigen-specific CD4⁺ T cell proliferation and differentiation

into effector cells can be controlled by innate immune factors during blood-stage malaria. Considering the significant global impact of malaria (caused by infection with the protozoan parasite *Plasmodium*), I believe a better understanding of the protective CD4⁺ T cells response is critical in advancing the feasibility of improving the host adaptive immune response to malaria, either via vaccination or during recrudescence infection in the field. I have already uncovered a role for interferon regulatory factors in boosting the appropriate CD4⁺ T cell response, and that this is likely facilitated by an innate immune cell. My next goal was to



determine when and in which cell these factors are exerting their effects. This is where our new collaborators come into the picture.

Using the extensive expertise in parasite biology and infection of Dr Oliver Billker's group, combined with the single-cell RNAseq knowledge and experience of Dr Sarah Teichmann's group, we set out to investigate the differential gene expression of CD4⁺ T cells and antigen presenting cells over the course of the same blood-stage malaria infection. We used the C1 Fluidigm system to automate this process and achieve single-cell resolution in order to discern heterogeneity within populations previously assumed to be homogeneous.

I really enjoyed working between these laboratories because it afforded me the opportunity to work alongside inspiring and passionate scientists from diverse backgrounds and benefit from their extensive knowledge and expertise. On a day-to-day level, I worked closely with Tapio Lonnberg (Post-doc in the Teichmann team) and Ruddy Montandon (Post-doc in the Billker team). We successfully sorted and captured CD8a⁺ and CD8a⁻ dendritic

cells early during experimental *Plasmodium* infection, and antigen-specific CD4⁺ T cells throughout the infection. We obtained high quality cDNA from the cells, all of



which are currently being sequenced. With further help from the Teichmann team, I look forward to learning the bioinformatics necessary to unravel the complexity of the CD4⁺ T cell response and its interaction with innate cells that is hidden in the sequencing results we are generating. We anticipate publishing exciting findings from this collaboration that will not only shed some light on the immune response to malaria, but also have significant implication on our understanding of the differentiation of CD4⁺ T cells during any infection.

Above: Kylie James at Wellcome Trust Sanger Institute, UK.

Researcher Exchange, Training & Travel Awards

During my stay I was also invited to speak about my PhD project and the work that I was undertaking at the WTGC at the WTSI Malaria Program meeting and also at the Teichmann laboratory meeting. At each presentation, I gratefully acknowledged the funding support I have received from OzEMalaR.

When I wasn't in the laboratory, I made the most of the Cambridge experience. I went punting on the Cam, rode my bicycle to Grantchester to eat scones in the Orchard, and attended Trinity Christmas dinner. My trip coincided with Halloween, Guy Fawkes day and the commemoration of the centenary of World War I, all of which were unique experiences. I also fit in trips to London to meet mentors and friends from around the world. Some of the highlights included a visit to the Wellcome Trust head quarters at Euston Square and watching a play in Shakespeare's Globe Theatre. The people I met and had the pleasure of getting to know during my stay at the WTGC and Cambridge made my trip all the more rewarding.

I would like to thank OzEMalaR and ASP for providing me with a travel award, as well as my supervisor Dr Ashraf Haque and everyone who helped make this trip successful. The knowledge, experience and connections that I have gained will greatly benefit my PhD and future career.

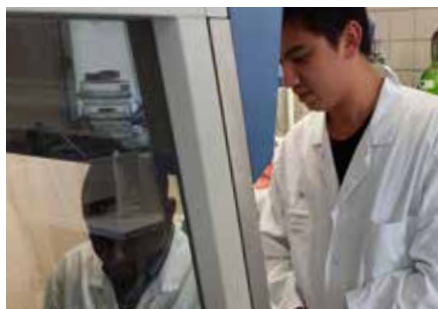


STEVEN KHO IS A RESEARCH ASSISTANT IN THE MALARIA, GLOBAL AND TROPICAL HEALTH LABORATORY AT MENZIES SCHOOL OF HEALTH

RESEARCH IN DARWIN. STEVEN WON AN OZEMALAR RESEARCHER EXCHANGE TO VISIT PROFESSOR HERNANDO DEL PORTILLO IN BARCELONA AND DR PIERRE BUFFET IN PARIS.

My role at Menzies School of Health Research is based around activities in Indonesia, where extensive clinical malaria studies have been conducted. As part of ongoing immunology studies led by Dr Tonia Woodberry and Dr Gabriela Minigo, my current research focuses on studying the role of dendritic cells and regulatory T cells in patients with uncomplicated and severe malaria, and in individuals that have developed asymptomatic immunity to malaria. My experience as a research assistant has affirmed my interest to pursue a career in research and has prepared me with the skills to carry out my PhD project at Menzies in 2015. My project will include studying the role of the spleen in the pathology of falciparum and vivax malaria, where recent evidence of malaria parasites accumulating in the spleen has

been proposed to be a possible mechanism for severe disease. My project will be carried out in Indonesia at a site uniquely placed to carry out fundamental studies on splenic



pathology and function due to high malaria transmission and high rates of splenectomy. I am extremely grateful to OzEMalaR for granting me a researcher exchange award that has allowed me to visit Professor Hernando del Portillo's laboratory in Barcelona, Spain, and Dr Pierre Buffet's laboratory in Paris, France. This exchange has allowed me to prepare for my PhD project by meeting with experts in spleen biology, learning various techniques to handle and process spleen tissue, and establishing collaborations with specialised European research groups, including sharing of expertise for quality control, and transfer of

Above: Steven Kho, Menzies School of Health Research visiting labs at the Barcelona Centre for International Health Research.

Researcher Exchange, Training & Travel Awards

specialised malaria antibodies and an ex vivo system designed to replicate splenic clearance.

DR GAOQIAN FENG (BURNET INSTITUTE) TRAVELLED TO KEMRI-WELCOME TRUST IN KILIFI, KENYA ON AN OZEMALAR TRAVEL AWARD.

He was able to work with one of the world leading malaria group and conduct research using a recently developed method to study the function of antibodies among malaria exposed children. This trip also enabled Gaoqian to have further discussion with Dr Francis Ndungu to exchanged ideas and set up new collaborations.

Gaoqian conducted the proposed research to explore the function of antibodies from malaria exposed children and was able to demonstrate these antibodies were functional in promoting opsonic phagocytosis and activating complement cascade.



As he worked in KEMRI-Welcome Trust, he also helped them establish the assays to quantify the function of antibodies promoting opsonic phagocytosis and activating complement cascade, giving him experience in transferring technology to a new laboratory and teaching, which is a big advantage for future career development.

Gaoqian also had discussed research interest and potential collaboration opportunities with Dr Ndungu and learned extensively of conducting ADRB assay to quantify the function of antibodies in activating neutrophil respiratory burst. He will bring

this technique back to the Burnet Institute and apply to Burnet's research.

SABRINA CHIN (A PHD STUDENT AT ANU) WON AN ASP NETWORK RESEARCHER EXCHANGE, TRAINING AND TRAVEL AWARD, WHICH ENABLED HER TO ATTEND TWO TRAINING COURSES IN THE LABORATORY OF NEMATOLOGY AT WAGENINGEN UNIVERSITY, NETHERLANDS.

The aim of my visit to the Netherlands was to learn essential nematology skills in handling and identifying plant- parasitic nematodes and to network with Dutch nematologists. At



Wageningen University, it was a great privilege to meet Joost Riksen, Sven van den Elsen, Casper van Schaik, Assoc. Prof. Hans Helder and Assistant Prof. Geert Smant; Prof. Gerrit Karssen from the

Netherlands Food and Consumer Product Safety Authority, and other students who have made the trip even more enjoyable.

My PhD work revolves around the plant- parasitic nematode, *Meloidogyne javanica*. I study the role of the plant secondary metabolite, flavonoids in the interaction between *M. javanica* and the plant model, *Medicago truncatula*. *Meloidogyne* spp. is the most economically significant plant-parasitic nematode because they cause extensive productivity loss (5-50%) by resulting in nutritional deficiency in its host and its ability to infect the roots of

Above left: Gaoqian Feng, Burnet Institute
Above right: Casper van Schaik, Luuk Reijmers, Maarten Smits, Sabrina Chin, Joost Riksen, Lissy de Rooi, Kevin Walgering and Chris Bisperink.

Researcher Exchange, Training & Travel Awards

more than 200 plant species. Flavonoids may be a key mediator in the plant-nematode interaction because they are involved in modulating the plant development and in defense response. Hence, these nematodes may “kill two birds with one stone” by down-regulating flavonoids that act as defense compounds and to up-regulate and/or down-regulate specific flavonoids that control plant development pathway to induce their feeding sites in the plant root. In the long run, the elucidation of the role of flavonoids in this interaction could lead to the development of new control method. Therefore, an extension of my project is to test flavonoids on other plant-parasitic nematodes. Although I am trained to work with *M. javanica*, I lack the skills and experience to work with other plant-parasitic nematodes.

Assoc. Prof. Hans Helder and two lab technicians, Joost and Sven delivered the training courses. The first training course, basic handling in nematology has taught me important nematology skills such as the extraction of nematodes from plant material and soil, the analysis of the extracts, nematode staining and fixing. In addition, I received an intensive training to identify the free-living stages of 14 plant- parasitic nematode genera of economic importance, based on their morphology using a dissecting microscope. These 14 nematode genera are *Pratylenchus*, *Paratylenchus*, *Tylenchorhynchus*, *Rotylenchus*, *Helicotylenchus*, *Heterodera* larvae, *Meloidogyne* larvae, *Hemicycliophora*, *Criconeematidae*, *Tylenchus*, *Aphelenchus*, *Trichodorus*, *Ditylenchus* and *Heteroderidae* males. The second course, which is in the molecular identification of nematodes using PCR- based techniques. For this course, I extracted nematode DNA from field-isolated nematodes as templates and used nematode-specific primers in quantitative RT-PCR. This provided a high-throughput and resolution method to distinguish nematodes on the family level and to determine their relative quantity in a large sample of mixed population. This work was largely based on the research of Dr. Helder's group in nematode phylogenetic analysis using small subunit of ribosomal DNA sequences. This course also demonstrated how to clone nematode DNA fragments into a cloning vector for further amplification in bacteria, as a long-term storage solution to obtain the DNA of rare nematodes.

During my time in Wageningen, I had the opportunity to meet

Assistant Prof. Geert Smant who works on nematode secretion in *Meloidogyne* spp and other nematodes. We discussed our own research and aspects of nematode parasitism. He also kindly allowed me to visit his lab, where his technician, Casper van Shaik, demonstrated their *Meloidogyne* culturing and handling techniques. Through this, I learnt new tricks that I intend to apply on my own *Meloidogyne* techniques. In addition, I also met Prof. Gerrit Karssen who is a nematode taxonomist who specializes in nematode identification for biosecurity purposes. He kindly provided me a tour of the laboratory and the facilities in the Wageningen campus of the Netherlands Food and Consumer Product Safety Authority. He also showed the institute's comprehensive nematode collection from the Netherlands, Belgium and different parts of the world, highlighting the importance of accurate nematode identification for biosecurity.

The support from ASP is a strong encouragement and affirmation to continue my work in plant-parasitic nematodes, especially since Australia lacks research in plant-parasitic nematodes. I plan to raise the profile and garner interests in plant-parasitic nematodes through teaching. I will be teaching in the lab of a parasitology course at ANU in a few months time. With the skills I've learnt from Wageningen University, I will isolate some free-living nematodes from the soil for students to observe the diversity of nematodes. I am also interested in establishing a rapport with Prof. Gerrit Karssen by sending some nematode samples to him and in networking with local nematologists by meeting them in Toowoomba later this year.

In conclusion, I've learnt a lot about plant- parasitic nematodes, from their evolution to how evolution is very useful in phylogenetics, and comprehensive practical skills to isolate and accurately identify them at both morphological and molecular levels, the creative use of modern laboratory techniques to conduct research and above all, the importance of research in plant- parasitic nematodes. I plan to utilize these skills in isolating and identifying plant-parasitic nematodes when I expand my project to include more plant-parasitic nematodes.

Researcher Exchange, Training & Travel Awards

STEPHANIE HING, A PHD STUDENT AT MURDOCH UNIVERSITY, WON AN ASP TRAVEL AWARD FOR HER RESEARCHER EXCHANGE TO CHARLES STURT UNIVERSITY AND TALKS TO LISA JONES ABOUT HER TRIP.

Stephanie, tell us about your research.

When you get stressed do you find you get sick more easily? Now imagine you're an endangered species facing numerous stressful threats. If you're stressed out, what will that mean for your health and the future of your species? My PhD research focuses on stress, immunity and infection in the context of wildlife conservation, specifically efforts to save a unique critically endangered Australian marsupial the woylie (*Bettongia penicillata*). While stress has been associated with parasite infection dynamics in man and domestic species, these links have rarely been explored in wildlife. It is important to characterise how stress may influence infection dynamics in wildlife populations as this may have flow on effects for conservation, animal and public health.

How did the Researcher Exchange help your research?

A key part of my research is to investigate how patterns in woylie 'stress hormones' relate to parasite infection patterns. I owe a great deal of thanks to ASP for the Researcher Exchange grant which enabled me to travel over east to work with my external co-supervisor, Dr Edward Narayan an expert in wildlife endocrinology based at Charles Sturt University. During this Researcher Exchange I received essential training in every step of the process from hormone metabolite extraction to running the endocrine assays. Important milestones were reached and skills acquired that will aid in our efforts to understand the role of stress in parasite infection.

What has been the highlight of your science career so far?

Working with wildlife takes me to some incredible far flung places

and crazy situations with amazing animals. Vivid memories range from assisting a choking elk to collecting semen from a saltwater crocodile but the highlight so far is parasitological. For my Masters, I conducted the first parasitological survey of wild Bornean elephants and coming face to face with them was a life changing experience.

Where to from here?

After all the blood, sweat and tears, almost two years of fieldwork and painstaking sample preparation, I am very excited about analysing all the samples and results! What a nerd! I hope to continue to progress through my research and aim to complete in 2016. Then I'd love to be able to build upon my PhD and continue to do my small part to aid wildlife conservation.

This project is also generously supported by Murdoch University School of Veterinary and Life Sciences, Australian Academy of Science Margaret Middleton Foundation, Foundation for National Parks and Wildlife and Holsworth Research Endowment.



ADELAIDE DENNIS (PHD CANDIDATE, KIRK LABORATORY, ANU), SPENT A WEEK IN THE VICKY AVERY LABORATORY IN THE ESKITIS INSTITUTE FOR DRUG DISCOVERY AT GRIFFITH UNIVERSITY. THIS REPORT BY ADELAIDE DENNIS, THE AUSTRALIAN NATIONAL UNIVERSITY

During my week in the Avery Lab, I had the fortune of working closely with Sandra Duffy (Senior research assistant, Avery Laboratory) and Sasdekumar Loganathan (Research assistant, Avery Laboratory).

Above : Stephanie Hing

Researcher Exchange, Training & Travel Awards

This visit was part of Researcher Exchange award, where previously John Holleran (former Research Fellow at the Avery laboratory) visited the Kieran Kirk Laboratory at the ANU and worked closely with Adele Lehané (post-doctoral fellow, Kirk Lab) and myself.

The researcher exchange award helped foster collaboration between the Avery and Kirk laboratories. The two skills of the two labs are complementary and should, if all goes to plan, lead to joint publications.

I enjoyed my time in the Avery laboratory, where I developed new skills and gained a different perspective on the study of malaria. Sandra Duffy taught me her method for attaining tightly synchronous parasites, allowing stage dependent analysis of the malaria parasite with an age spread of half an hour. Sas Loganathan showed me the high-throughput splenic filtration assay using the OPERA system to measure parasitaemia.

It is hoped that data obtained from the visit will be included in a joint publication between the Kirk and Avery laboratories.

VICTORIA
MORIN-
ADELINE,
UNIVERSITY
OF SYDNEY,
REPORTS

ON TWO WEEKS SPENT IN PROFESSOR
JOHN P. DALTONS' LAB AT QUEENS
UNIVERSITY BELFAST.

In August 2015, I had the opportunity to do a 2-week researcher exchange/training stint in Professor John P. Dalton's lab at Queens University in Belfast, UK. My visit to Queens University was organised in-between presenting my work at the 25th

International Conference of the World Association for the Advancement of Veterinary Parasitology (WAAVP), Liverpool, UK and the VII European Congress of Protistology and International Society of Protistology joint international conference (VII ECOP-ISOP) held in Seville, Spain during which I was able to represent the ASP on at all three of my presentations. While the research carried out in the Dalton Lab on *Fasciola hepatica* is different to my PhD work on *Tritrichomonas foetus*, I was very excited at the prospects of using my time between conferences to expand my knowledge and network.

During the exchange, not only was I welcomed to participate in lab meetings and hear about the labs' on-going projects, but I was able to fulfil the main purpose for my research exchange. This was to learn about recombinant protein production and purification which are the primary techniques used in the Dalton lab. My interest in acquiring these skills stems from my recent publication of three transcriptome libraries for the bovine, feline and porcine *T. foetus* isolates that revealed an interesting transcription pattern of protease virulence factors between the two parasitic isolates

(bovine and feline) and the commensal isolate (porcine) of the parasite. Further investigation of these virulence patterns require recombinant expression of the peptides, which I have had limited

exposure to during my PhD. During my time in the Dalton Lab, I was able to learn about the techniques and equipment the lab uses, discuss potential avenues to approach the project, as well as discuss pitfalls of the techniques in relation to the project with Prof. Dalton, his postdocs and PhD students. As an added bonus to my visit, I gained experience using a cell bioreactor (Prof. Dalton calls it his 'toy'). I worked closely with Prof. Dalton to understand how 'the toy' works and we managed to get a culture going which was very exciting and sparked new ideas of a possible collaboration. So keep an eye on this space!



Above left: Sas Loganathan and Adelaide Dennis in the Avery Lab.
Above right: Victoria Morin-Adeline and Professor John Dalton.

Researcher Exchange, Training & Travel Awards

In all, my trip to the Dalton Lab, albeit short, was a great success and fun. I really enjoyed the company of all of my lab colleagues and the new networks I've created. I am especially thankful to Krystyna Cwiklinski (postdoc) for welcoming me into her home and exploring Belfast by-day with me, and along with Tara Barbour (PhD student) and Eduardo de la Torre (postdoc in Dr. Mark Robinson's lab), the trio entertained my urge to experience Belfast by-night as well. I am immensely grateful to Prof. Dalton for his amazing hospitality during the 2 weeks and for allowing me unlimited access to pick his brain about his work, his experiences in academia, his jaw-dropping knowledge on the history of Belfast and for sharing his life-long wisdom on what constitutes the perfect Guinness!

JESSICA JOHNSON-MACKINNON
PHD STUDENT, THE UNIVERSITY OF
TASMANIA,
REPORTS
ON HER
VISIT TO
PROF JOHN
ARCHIBALD
AT
DALHOUSIE
UNIVERSITY;
PROF BEN KOOP AT UNIVERSITY OF
VICTORIA AND DR. AHMED SIAH AT BC
CENTRE FOR AQUATIC ANIMAL HEALTH
SERVICES.

The first part of my exchange took place at Dalhousie University in Halifax N.S. I spent two weeks working with Prof. John Archibald's

Lab with the intention of sharing knowledge. Dr. Archibald's group are primarily bioinformaticians that focus on gene and genome evolution, secondary endosymbiosis, the evolution of photosynthetic organelles and molecular evolution and systematics of microbial eukaryotes. In particular Dr. Archibald's Lab has sequenced genomes of *Neoparamoeba pemaquidensis* and *Paramoeba invadens*. Several new directions of research were discussed including the use of sister genomes for uncovering target genes, comparative genomics of the endosymbionts and host genomes. Project logistics are currently being discussed between the two labs which will lead to collaboration sometime in the near future.

The next part of my exchange took place in Victoria B.C. where I went to the University of Victoria and met with Prof Ben Koop's Lab. Their lab focuses on Molecular Biology, Genetics and Evolution. They have several large projects including work on Sea Lice and the Salmon Genome project. They allowed me to use of their lab for sample processing and allowed me to gain some valuable insight into Salmon genomics and the roles that this might play in parasite-

host interactions and host immune response.

During my trip I was unexpectedly given the opportunity to visit BC Centre for Aquatic Health Services and a salmon farm on

Vancouver Island. During this period I worked with the BC Centre for Aquatic Health Services, specifically Dr. Ahmed Siah. The trip was very successful with all samples collected being viable. I was also able to extend my trip down the coast of the United States where AGD outbreaks have been reported since mid 1980s. I was able to obtain samples from a farm along the coast and with lab space generously offered by the USGS Western Fisheries Research Centre, was able to process those samples and have them sent back to my home lab. These samples were again viable and will be an extremely useful addition to my research.



Above left : Queens University, Belfast.
Above right: Jessica Johnson-Mackinnon on a sampling trip.

Researcher Exchange, Training & Travel Awards

I was also able to give several presentations during my trip, which allowed me to discuss the research being done by my lab and myself, and also promote the ASP and parasitology in Australia. On my return I have given a presentation outlining the trip and its benefits to my lab group and encouraged those who are not members already to join the ASP.

ANDREW TEO
(UNIVERSITY OF
MELBOURNE)
TRAVELLED TO
DENMARK FOR
HIS OZEMALAR
TRAVEL AWARD
TO VISIT
PROFESSOR
ALI SALANTI,
PROFESSOR
THOR
THEANDER,
PROFESSOR
LARS HVIID AND
DR. MORTEN
NIELSEN AT THE
DEPARTMENT OF
INTERNATIONAL
HEALTH, IMMUNOLOGY AND
MICROBIOLOGY, CMP UNIVERSITY OF
COPENHAGEN.

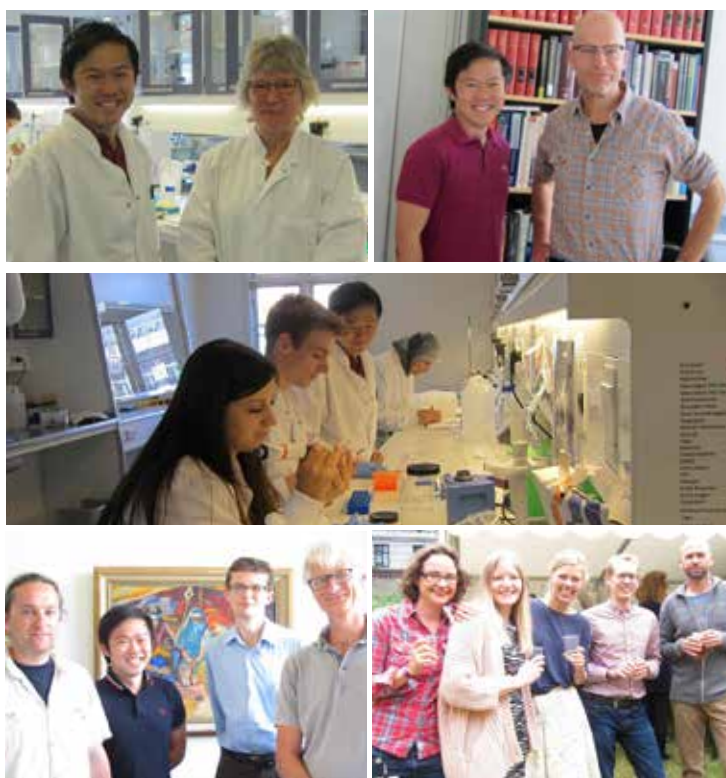
After a very successful visit to the Centre for Medical Parasitology in 2014, which led to further collaboration between both laboratories, I was awarded a travel scholarship from both OzeMalar and ASP (JD Smyth Postgraduate Travel Award). I am deeply grateful for the funding as this has allowed me to learn new experimental technique, the high-throughput adhesion-inhibition assay (recently published assay, Nielsen and Salanti 2015, Methods Mol Bio), which I will be setting it up in Melbourne for

the very first time. This will definitely bring about more collaboration within the malaria research community in Australia.

Exposure to malaria leads to the development of antimalarial antibodies, however, it remains unclear how these antibodies are protective against malaria. Bringing this technology back to Australia will allow us to do in vitro testing of functional malarial antibodies and to compare the different kinds of functional antibodies as correlates of protection, which will contribute to the understanding of malaria vaccine design.

During my visit I also managed to exchange ideas with the researchers in CMP, which will lead to more collaborations in the future.

The data generated will be used for a forthcoming publication.



Above: Andrew Teo and colleagues in Copenhagen

Honours

New Fellows of the Society

In 2015, the ASP recognised the lifetime achievements of the late Professor Ian Whittington (1960-2014) by making him Fellow of the Society. Matthew Whittington received the Fellowship Award on behalf of his father at the 2015 Conference. (See the feature on Professor Whittington later in this report.)

Other ASP awards and prizes

The ASP recognised some of its young rising-stars by awarding them the JD Smyth Award: **Melanie Williams** (Walter and Eliza Hall Institute), **Taher Uddin** (University of Melbourne), **Andrew Teo** (University of Melbourne)

The Society also recognised the research achievements of several outstanding students and early career researchers at its 2015 conference including the:

- Best ASP Student Poster Prize won by **Stephanie Ryan**, (James Cook University) for "High-throughput approach for the screening of Immunotherapeutics in Hookworm Excretory/Secretory (ES) Products."
- Best ASP Student 2 minute Poster Presentation Prize won by **Kate McSpadden** (Charles Sturt University) for "Occurrence and prevalence of parasites of wild canids in south-eastern Australia with emphasis on *Linguatula serrata*."
- Best ASP Student Presentation – Contributed Paper Prize won by **Andrea Lawrence** (University of Sydney) for "Integrated morphological and molecular identification of cat fleas (*Ctenocephalides felis*) and dog fleas (*Ctenocephalides canis*) vectoring *Rickettsia felis* in central Europe."
- Best ASP Early Career Researcher Presentation Prize won by **Clare Anstead** (University of Melbourne) for "Lucilia cuprina genome and transcriptomes – critical resources to underpin biological investigations and biotechnological outcomes".

ASP Invited International Lecturers for 2015 were Professor **Ray Kaplan**, The University of Georgia, U.S.A. and Professor **Eric Hoberg**, United States Department of Agriculture, U.S.A.. Ray Kaplan visited the lab of Robin Gasser at University of Melbourne and then Dave Leathwick at AgResearch in New Zealand the week of June 22-26, prior to the ASP & NZSP 2015 conference. Eric Hoberg visited the laboratory of Andrew Thompson at Murdoch

Pictured below, left to right, 2015 ASP Conference Award Winners. Best ASP Student Poster: **Stephanie Ryan**, James Cook University . Best ASP Student Presentation – 2 minute Poster Presentation: **Kate McSpadden**, Charles Sturt University. Best ASP Student Presentation – Contributed Paper: **Andrea Lawrence**, University of Sydney Best ASP Early Career Researcher Presentation: **Clare Anstead**, University of Melbourne



Honours

University following the conference and then went on to visit Ian Beveridge and colleagues at The University of Melbourne 8-15 July 2015.

Awards from other bodies

Other ASP Members honoured in 2015 included:

- **Abdul Jabbar** (University of Melbourne), awarded the Odile Bain Memorial Prize (See the feature later in this report.)
- **Rama Jayaraj** (Charles Darwin University), awarded the 2015 Pride of Australia Inspiration Medal for the Northern Territory. (See the feature later in this report.)
- **Don McManus** (QIMR Berghofer Medical Research Institute) was elected to Fellowship of the Australian Academy of Health and Medical Sciences
- **Dave Spratt** (CSIRO) was awarded the Distinguished Service Award of the International Wildlife Disease Association on 30th July, 2015 “for his continued outstanding contribution to sharing the study and understanding of the diseases of wildlife.”
- **Andreas Stroehlein** was awarded the Sir Ian Clunies-Ross Prize by The University of Melbourne for research contributions in the field of parasitology that benefit the Australian Sheep and Wool Industry.



Right: Professor Alex Loukas was presented with an award by ASP President Robin Gasser to mark the Society's gratitude for Alex's six years of service as editor of the International Journal for Parasitology

Honours

RECOGNITION FOR ASP MEMBERS

CONGRATULATIONS TO THE ASP VICTORIAN STATE REP AND VETERINARY PARASITOLOGIST AT THE UNIVERSITY OF MELBOURNE, ABDUL JABBAR, FOR BEING AWARDED THE ODILE BAIN MEMORIAL PRIZE WINNER 2015.

The "Odile Bain Memorial Prize" (OBMP) is awarded annually by Parasites & Vectors in association with Merial, to perpetuate the memory of Odile Bain (1939–2012), an outstanding contributor to parasitology and great supporter to young parasitologists.

Dr Abdul Jabbar is a veterinary parasitologist at the University of Melbourne currently working on epidemiology and control of economically important parasitic diseases of livestock. Abdul describes his research as collaborating or working on drug discovery, evolution, genetics, mitochondrial genomics and molecular diagnosis of parasites of economic significance.



Abdul describes how important the field of parasitology is in an agricultural country like Australia. "As animals are reared on extensive grazing systems that expose them to a variety of parasites all the time and also resistance against major antiparasitic drugs is widespread," Abdul said. "Veterinary parasitologists have a key role in not only understanding the direct economic losses caused by these parasites, but also helping in controlling these parasites to increase the productivity of production animals. The main challenge is the drug resistance in parasitic nematodes."

Source: <http://blogs.biomedcentral.com/bugbitten/2015/10/30/abduljabbar-veterinary-parasitology/>

CONGRATULATIONS TO RAMA JAYARAJ FROM CHARLES DARWIN UNIVERSITY WHO RECEIVED THE 2015 PRIDE OF AUSTRALIA "INSPIRATION MEDAL" FOR THE NORTHERN TERRITORY (NT) IN OCTOBER 2015.

Dr Rama Jayaraj has made significant contributions to Indigenous education and provided high-quality student support, while contributing to cancer and parasitology research. He inspired his students and initiated partnerships with many organisations that provide support for his student's projects.

"I am really honoured to receive the award," Rama said. His research in Australia started with mentors from the ASP (which he thinks of as a "mother" to his professional life), particularly his research with Prof Peter Smooker from RMIT and Prof David Pie-



drafitia from Federation University on the liver fluke's stage-specific and multivalent recombinant protein and DNA vaccines. His research with A/Prof Shelley Walton contributed to a rapid diagnostic test devel-

opment for scabies using IgE specificity for a recombinant allergen of *Sarcoptes scabiei*.

More recently Rama has been working on community engagement and cultural activities focusing on Australian Indigenous alcohol-associated assaults and violence.

"The whole team at CDU is excited about the award," he said. "We hope it helps to promote the importance of health research and education in the NT."

Honours

IAN D. WHITTINGTON FASP

PROFESSOR IAN D. WHITTINGTON (1960-2014) WAS MADE FELLOW OF THE AUSTRALIAN SOCIETY FOR PARASITOLOGY AT THE 2015 ASP ANNUAL CONFERENCE IN AUCKLAND. IAN'S SON, MATTHEW WHITTINGTON, RECEIVED THE FELLOWSHIP AWARD ON BEHALF OF HIS FATHER.

Ian David Whittington completed his PhD at the University of East Anglia, UK in 1986 with Dr Graham Kearn, a leading authority on Monogenea. Ian moved to Queensland, Australia, in 1987 where he worked at the University of Queensland (UQ) in Brisbane as a Postdoctoral Fellow in the School of Biological Sciences. He won a prestigious Queen Elizabeth II Fellowship in 1990 and continued his work in the Department of Parasitology at UQ before accepting a Lectureship at the same institution (1993-1996). He maintained high research productivity during his Directorship of UQ's Heron Island Research Station (1996 to 1999) and was appointed to Senior Lecturer in 1997. During his 15 years at UQ, Ian built and led the Monogenean Research Laboratory – the only Australian research team dedicated to the study of monogeneans. In July 2001, his group had the honour of hosting the 4th International Symposium on Monogenea, demonstrating significant international recognition for Ian's research during his early to mid-career.

In January 2002, Ian moved his research group to Adelaide, South Australia, for a joint appointment as a Senior Research Scientist at the University of Adelaide and head of the Parasitology Section at the South Australian Museum (SAMA). In 2006, he was promoted to Associate Professor/Principal Research Scientist. From 2012 he worked as Head of Biological Sciences at SAMA and was actively engaged in research and administrative duties until his death.

Ian promoted innovative studies of whole parasites to understand parasitism in relation to structure, ecology, life history, systematics and taxonomy and that of their host(s). His holistic studies on live parasite biology, behaviour, life cycles, systematics and evolution included many significant contributions.

Ian published more than 170 peer-reviewed papers over his career and led 25 major research projects (ARC Large, Discovery, Small & Linkage grants) to completion. Ian attracted many students and colleagues through his expertise and knowledge of marine parasites, humorous nature and welcoming personality. He was a dedicated mentor, lecturer and supervisor and provided a supportive, professional environment conducive to productive science and promotion of excellence and exceptional quality. Over his career he supervised and graduated 9 PhD and 16 Honours students and mentored 6 postdoctoral fellows. Many of his former students now work in senior roles in aquaculture, academia and government. He received several notable awards during his career including a Queen Elizabeth II Fellowship (1990–1992), a Visiting Professorship Centro de Investigaciones Biológicas del Noroeste, La Paz (2006) and the prestigious Fish Parasitologist of the Month (<http://www.diplectanum.talktalk.net/fish/>).

Ian's research is well respected internationally and he made considerable contributions to the field through service. He received more than sixteen invitations to speak about his research at national and international conferences and contributed more than fourteen invited peer-reviewed publications. He acted as a grant assessor for numerous national (ARC [IntReader], ABRs, Australian Academy of Sciences) and international (Canada, Czech Republic, Scandinavia, South Africa, UK, USA) schemes. Ian served on the Editorial boards of numerous scholarly journals.

Ian Whittington will be remembered as an inspirational mentor, who changed and shaped the lives of his students and had the admiration and respect of his colleagues. Ian's contribution to the study of the Monogenea, his dedication to training and supporting early career researchers and his service to the ASP make Ian David Whittington worthy to be elected Fellow of the Australian Society for Parasitology.



ASP Annual Conference

The 2015 annual meeting of the Australian Society for Parasitology Inc. was held jointly with the New Zealand Society for Parasitology at the Crowne Plaza Hotel in Auckland between June 29th and July 2nd. It attracted over 200 delegates.

The program was multidisciplinary and included the following themes and invited speakers:

Elsevier Plenary Lectures

Robert Poulin (University of Otago, New Zealand) *The ups and downs of life: population expansion and bottlenecks of helminth parasites through their complex life cycle*

Eric P. Hoberg (US National Parasite Collection, USDA, Agricultural Research Service, and Smithsonian Institution) *Ecological collision: climate, perturbation and colonization- lessons about assembly of the biosphere*

Ray M Kaplan (University of Georgia, USA) *Uncovering the mysteries of anthelmintic resistance: the more we learn the less we seem to know*

Plenary Lectures

Valery Combes (University of Technology, Sydney) *Microparticles - contributors to the pathogenesis of cerebral malaria and potential biomarkers?*

Paul Robert Giacomin (James Cook University) *Regulation of immunity and inflammation during parasitic helminth infections*

Shelley Walton (University of the Sunshine Coast) *Exploring the immune response in scabies: pathways to diagnostics and therapy*

Symposium Lecturers

Andrew P.Shinn (Fish VetGroup Asia Limited, Bangkok, Thailand; Institute of Aquaculture, University of Stirling), *Economic impact of aquatic parasites on Asian and global mariculture*

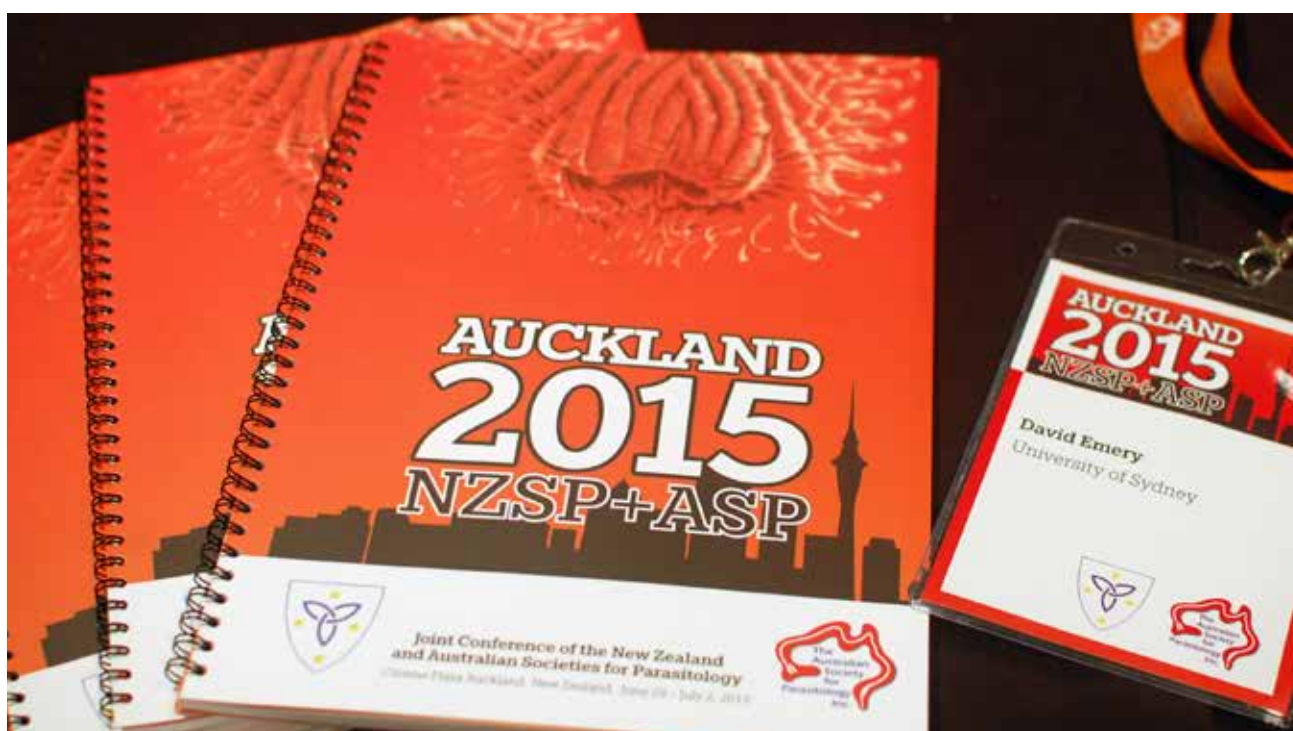
Jetsumon Prachumsri (Mahidol University, Thailand) *Diagnostics, Detection and Control*

Haseeb Sajjad Randhawa (University of Otago, New Zealand)



Above:
Images from the 2015 joint ASP-
NZSP Conference in Auckland

ASP Annual Conference



Parasite source-sink dynamics of giant squid

Adele M. Lehane (Australian National University) *Ion homeostasis in the malaria parasite: a vulnerable drug target*

Simone Louise Reynolds (QIMR Berghofer Medical Research Institute) *Investigating the biological roles of scabies mite cysteine proteases and their potential as drug targets*

Laryssa Howe (Massey University, New Zealand) *An image-based platform identifies compounds with novel activity against Trypanosoma cruzi*

Stephanie Godfrey (Murdoch University) *Do parasites spread along host contact networks? Empirical and experimental*

insights from reptilian host-parasite systems.

Una Ryan (Murdoch University) *Characterisation and detection of Cryptosporidium using platform technologies*

David Piedrafita (Federation University) *Effective immunity to Haemonchus contortus worm infection in sheep - clear as mud?*

David Duncan Heath (AgResearch New Zealand) *Chasing the end of the rainbow: a history of the 55 years of development, technology transfer and commercialisation of a vaccine to protect grazing animals against Echinococcus granulosus*

Ivo Mueller (Walter & Eliza Hall Institute; 2ISGlobal, Barcelona Centre for International Health, Spain) *Malaria Elimination in the Asia-Pacific: Addressing the P. vivax challenge*

Dave Malcolm Leathwick (AgResearch New Zealand) *Antiparasite immunity, worm burdens and illthrift in adult sheep?*

ASP Annual Conference

Samantha J. Emery (Macquarie University) *Differential stimulation of Giardia duodenalis trophozoites between host soluble signals and host cell attachment during in vitro interactions*

Louise Jackson (Department of Agriculture and Fisheries, Australia) *Veterinary parasitology in a diagnostic laboratory - a Queensland perspective*

Mark Simon Pearson (Australian Institute of Tropical Health and Medicine, James Cook University) *Of monkeys and men: immunomic profiling of sera from humans and non-human primates resistant to schistosomiasis reveals novel potential vaccine candidates*

Student and Early Career Researcher Breakfast

We held a Student and Early Career Researcher breakfast event for 60 participants on the first morning of the 2015 ASP & NZSP conference, Tuesday, 30th June 2015 from 7:00am with breakfast and presentations from our International Journal for Parasitology

(IJP) Editor Brian Cooke and Dale Seaton, Executive Publisher, Biology and Parasitology at Elsevier. As a result of this event one of the early career researchers, Nicholas Clarke, went on to publish his research in IJP on Indian Mynas in the South East Queensland region carrying malaria parasites (see Research Achievements in this report).



Above and on next page:
Images from the 2015 joint ASP-
NZSP Conference in Auckland

ASP Annual Conference



Journals

IJP

INTERNATIONAL JOURNAL FOR PARASITOLOGY

INTERNATIONAL JOURNAL FOR
PARASITOLOGY (IJP)

2015 HIGHLIGHTS

www.journals.elsevier.com/international-journal-for-parasitology

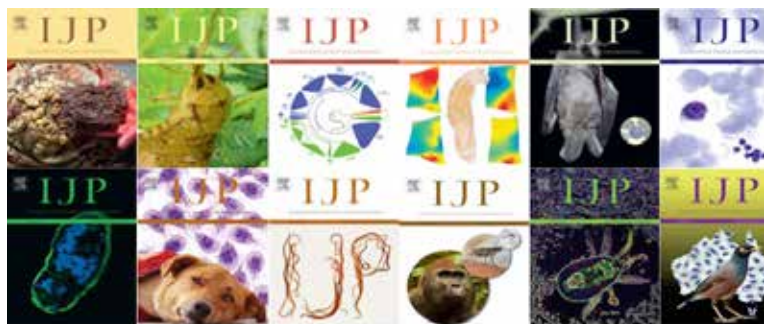
Editor In Chief: Brian Cooke

The major IJP news in 2015 was a change in Editor-in-Chief (E-i-C), with Brian Cooke taking on to the E-i-C role commencing April 2015. Alex Loukas has stayed on as a Deputy Editor after completing 6 years in the E-i-C role - no mean feat in this day and age.

The IJP team remain confident that the IJP will continue to prosper under Brian's leadership and are looking forward to what lies ahead over the next few years.

Some other highlights from 2015 include:

- IJP joined social media, with a Facebook page started in March 2015 ('liked' by 892 people to date; www.facebook.com/IJPara) and Twitter in October 2015 (22 followers to date; @IJPara. Look for the green on black



Editors are working on some Special Issues to look forward to in 2016

- Symposium for International Research and Innovations in Schistosomiasis (SIRIS)

IJP logo (the 'real' IJP page). We now feature a 'story behind the cover' for each IJP issue, so if you have a paper accepted for publication, see what you can do to create an amazing cover image and submit it to us for consideration. If your submitted image is selected for the journal cover it, and your article, will be promoted both on Facebook and Twitter.

- Together with Dale Seaton of Elsevier, Brian developed a talk, tailored to early-career researchers, based around the Elsevier Publishing Campus on 'how to publish your papers'. Brian and Dale first presented the talk at a very successful Early Career Researcher breakfast at the joint NZSP+ASP conference in Auckland in June 2015.
- Brian also presented the 'how to publish' talk at the ASP Concepts in Parasitology course in December, where IJP had sponsored lab coats for course participants. (Image bottom right of 2015 ASP CIP participant Kamil Braima (University of Malaya) with Brian, next page CIP participants and lab coats.
- Nick Clark and colleagues (45:14 pp 891-899) created the most social media activity to date for an IJP paper and was featured on ABC News and Radio National. His paper is a fascinating piece of work on the high prevalence of avian malaria parasites in invasive Indian Mynahs and their potential threat to native wildlife and domestic birds.

Journals

2016 conference (publication planned for March)

- Singapore Malaria Network (SingMalNet) 2016 meeting (publication planned for September)
- Molecular Approaches to Malaria (MAM) 2016 conference (publication planned for October)
- International Congress for Tropical Medicine and Malaria (ICTMM) 2016 (publication planned for November)
- A Special Issue dedicated to the life and works of the late Klaus Lingelbach (publication date to be determined)

As usual, 2015 was a busy year for IJP. We are grateful to the Editorial Board members, reviewers and authors who continue to make IJP the highest cited journal dedicated to parasitology and publishing original research articles, with its highest impact factor to date of 3.872 (Thomson Reuters© 2015 Journal Citation Reports). We can only achieve our goal of 'breaking the 4 barrier' with your continued help and support – so please stick with us!



INTERNATIONAL JOURNAL FOR PARASITOLOGY: PARASITES AND WILDLIFE (IJP:PAW) 2015 HIGHLIGHTS

www.journals.elsevier.com/international-journal-for-parasitology

Editors: R.C. Andrew Thompson, Lydden Polley

IJP-PAW has had a great year in 2015 with 70 articles submitted at the time of writing which is a slight increase compared to 2014. Our processing time, from receipt to acceptance, is less than 5 weeks and I hope we can reduce this further in 2016.



L-R: Maria Meuleman, Jan Šlapeta, Alex Loukas and Brian Cooke

Journals

The majority of the articles that we have published to date are from the USA, Australia and Canada with the UK slowly catching up which is good to see. We plan to heavily promote the journal at next April's British Society for Parasitology meeting at Imperial College in London.

It is really gratifying to see the diversity of topics covered in the papers published in IJP-PAW, not only in terms of parasites - all groups including annelids this year - and areas of research, but also hosts with bees the subject of a recent review by Peter Graystock from the Department of Entomology at the University of California, Riverside.

In addition to the review on bees, Dave Spratt, Ben Mans and Shannon Donahue contributed excellent reviews on *Angiostrongylus* in wildlife, *Theileria* diagnostics, and *Neospora caninum* infections in wildlife, respectively.

We have published two special issues this year with one more 'in press'. These comprised invited papers and reviews from the International Congress on Parasites of Wildlife (Kruger National Park, 2014), the inaugural international conference on the Impact of Environmental Changes on Infectious Diseases (IECID, Sitges, Spain, 2015), and the 25th International Conference of the World Association for the Advancement of Veterinary Parasitology (WAAVP, Liverpool, UK, 2015).

Lydden Polley and I were invited by Trends in Parasitology (TIP) to be Guest Editors of a special issue on Parasites

and wildlife, which in the end comprised two issues of TIP. We saw this as an opportunity to promote to the broad parasitological community some key current foci in wildlife parasitology, particularly those that are neglected, emerging, or in need of rejuvenation (see TIP 31:123-4). In turn, our hope was to promote IJP-PAW as a new vehicle for the publication of papers on parasites and wildlife.

Elsevier printed a selection of the invited reviews published in IJP-PAW since 2013 in time for The WAAVP meeting in July. Seven reviews were included including those mentioned above, as well as: The role of wildlife in urban areas (Mackenstedt et al.), Wild and synanthropic species of *Leishmania* in the Americas (Roque et al), Host-parasite interactions in an extreme environment (Kutz et al.) and

Zoonotic *Babesia*: the role of wildlife (Yabsley et al.) These printed reviews will be available at forthcoming conferences.

Although we are still waiting for our impact factor to be released, our average overall citation rate for

articles and reviews on "parasites" and "wildlife" published since 2012 is 3.4 cites per paper (of 441 papers searched in Scopus), which is encouraging.

Thanks to all our AEs, authors and reviewers for supporting the journal during 2015.



Above: bee image courtesy Stephanie Godfrey, elephant image courtesy of Andrew Thompson.

Journals



INTERNATIONAL JOURNAL FOR PARASITOLOGY: DRUGS AND DRUG RESISTANCE (IJP:DDR) 2015 HIGHLIGHTS

www.journals.elsevier.com/international-journal-for-parasitology-drugs-and-drug-resistance/

Editors In Chief: Andrew Kotze & Kevin Saliba

The journal continues to grow, with submissions increasing each year. We have now published over 120 papers. Full length Original Research Articles have been dominant, although we have also published a number of Invited Reviews. Our impact factor increased from 2.51 to 3.29 in the latest figures released in mid 2015, placing us at a ranking of eighth among all the Parasitology journals. The journal was recently accepted into MEDLINE – an important milestone for any journal.

We are excited to be compiling two Special Issues for 2016, based around two scientific meetings: the "Drug Discovery for Parasitic Diseases" Keystone Symposium in Tahoe City in January, and the "Anthelmintics: From Discovery to Resistance" meeting to be held in San Diego in February.

We would like to encourage all ASP members to consider IJPDDR as a place to publish their work in the areas of drugs and drug resistance, and we also ask the membership to encourage colleagues to consider publishing in the journal.

Selected papers from 2015

Joachim Müller, Samuel Rout, David Leitsch, Jathana Vaithilingam, Adrian Hehl, Norbert Müller. 2015. Comparative characterisation of two nitroreductases from *Giardia lamblia* as potential activators of nitro compounds. 5, 37-43.

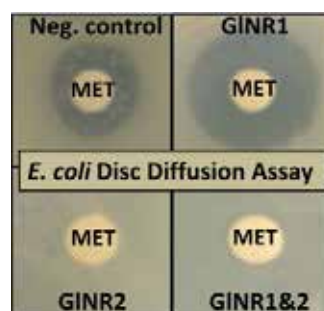


Image copyright Joachim Müller, Samuel Rout, David Leitsch, Jathana Vaithilingam, Adrian Hehl, Norbert Müller. 2015.

Jana I. Janssen, Jürgen Krücken, Janina Demeler, Georg von Samson-Himmelstjerna. 2015. Transgenically expressed *Parascaris* P-glycoprotein-11 can modulate ivermectin susceptibility in *Caenorhabditis elegans*. 5, 44-47.

Fabrice E. Graf, Nicola Baker, Jane C. Munday, Harry P. de Koning, David Horn, Pascal Mäser. 2015. Chimerization at the AQP2–AQP3 locus is the genetic basis of melarsoprol–pentamidine cross-resistance in clinical *Trypanosoma brucei* gambiense isolates 5, 65-68.



Image copyright Joachim Müller, Samuel Rout, David Leitsch, Jathana Vaithilingam, Adrian Hehl, Norbert Müller. 2015.

Jessica A. Engel, Amy J. Jones, Vicky M. Avery, Subathdrage D.M. Sumanadasa, Susanna S. Ng, David P. Fairlie, Tina

Journals

S. Adams, Katherine T. Andrews. 2015. Profiling the anti-protozoal activity of anti-cancer HDAC inhibitors against *Plasmodium* and *Trypanosoma* parasites. 5, 117-126.

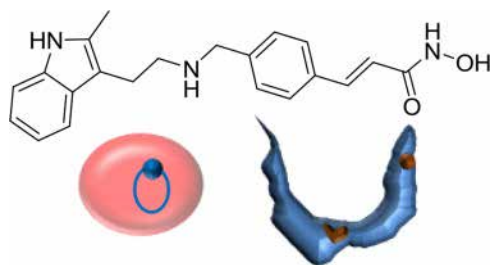


Image copyright Jessica A. Engel, Amy J. Jones, Vicky M. Avery, Subathdrage D.M. Sumanadasa, Susanna S. Ng, David P. Fairlie, Tina S. Adams, Katherine T. Andrews. 2015.

Maeghan O'Neill, James F. Geary, Dalen W. Agnew, Charles D. Mackenzie, Timothy G. Geary. 2015. In vitro flubendazole-induced damage to vital tissues in adult females of the filarial nematode *Brugia malayi*. 5, 135-140.

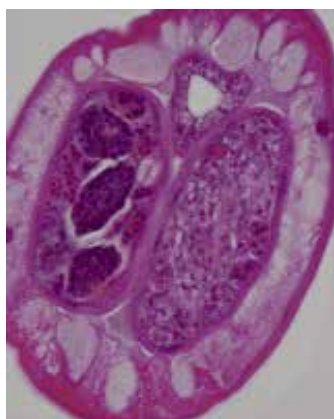


Image copyright Maeghan O'Neill, James F. Geary, Dalen W. Agnew, Charles D. Mackenzie, Timothy G. Geary. 2015.

Gabriel Rinaldi, Alex Loukas, Paul J. Brindley, Jeff T. Irelan, Michael J. Smout. 2015. Viability of developmental stages of *Schistosoma mansoni* quantified with xCELLigence worm real-time motility assay (xWORM). 5, 141-148.



Image copyright Gabriel Rinaldi, Alex Loukas, Paul J. Brindley, Jeff T. Irelan, Michael J. Smout. 2015.

Natalie Jane Spillman, Kiaran Kirk. 2015. The malaria parasite cation ATPase PfATP4 and its role in the mechanism of action of a new arsenal of antimalarial drugs. 5, 149-162.

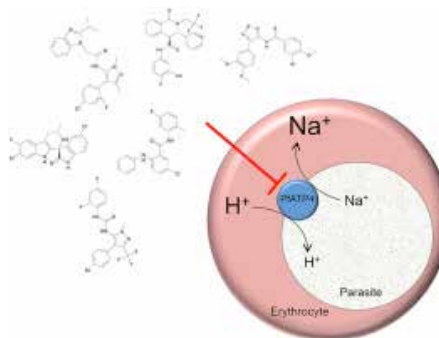


Image copyright Natalie Jane Spillman, Kiaran Kirk. 2015.

Thomas Geurden, Christophe Chartier, Jane Fanke, Antonio Frangipane di Regalbono, Donato Traversa, Georg von Samson-Himmelstjerna, Janina Demeler, Hima Bindu Vanimisetti, David J. Bartram, Matthew J. Denwood. 2015. Anthelmintic resistance to ivermectin and moxidectin in gastrointestinal nematodes of cattle in Europe. 5, 163-171.

Public Engagement and Outreach

IN 2015, THE OUTSTANDING ENTHUSIASM OF ASP MEMBERS FOR PUBLIC ENGAGEMENT AND OUTREACH RESULTED IN NUMEROUS HIGHLIGHTS AND NOVEL INITIATIVES AND EVENTS.

Funding from the Inspiring Australia scheme of the Commonwealth Government facilitated an amazing collaboration with indigenous artist, Bernard Lee Singleton, resulting in a stunning painting, interpretive dance performance and lightshow, and movies, all showcased at the Queensland Launch of National Science Week, which was coordinated by Lisa Jones in 2015 (see accompanying feature article).

ASP Student member, Amy Jones, showed great initiative, organising a National Science Week event at the Queensland Museum, Brisbane, "Should Science be Sexy? And how can we Inspire Future Scientists?" Amy also teamed up with Melissa Sykes to organise and staff a stall at the Educational Pavilion, Royal Queensland Show (EKKA), Brisbane.

A team of Victorian parasitologists worked with long-time ally, Tony Chiovitti from the Gene Technology Access Centre, to stage a "Parasites in Focus" workshop for Year 10 & 11 students and teachers (see accompanying feature article).

Una Ryan and Simon Reid wrote an article for The Conversation,

in December 2015, on swimming pool-associated health risks (<https://theconversation.com/what-lies-beneath-the-bugslurking-in-your-swimming-pool-51028>) which has been read over 60,000 times and was followed up with a segment on The Project on Channel 10 and an appearance on Channel 9's Today Extra.

The QIMR Scabies Research group teamed up with the Lowitja Institute to produce "Science and Young Minds: Youth Engagement in Skin Health" to two schools located in remote northwest Queensland (see accompanying feature article).

Harsha Sheorey coordinated an innovative Parasitic e-Diagnosis service, an international collaboration of human and veterinary parasitology experts for diagnosis and management of difficult and rare (human/zoonotic) parasitic infections via email and electronic media.

Our Tasmanian team of public education enthusiasts, led by Tina Oldham and Melanie Leef, continued to build on their past success to put on another kid's fish parasitology day (see feature article) and, likewise, the ANU parasitology team delivered "Parasite Detectives" to the Canberra public, continuing to build a loyal following in the nation's capital (see feature article).

And, in March, 2015, Brian Cooke represented the ASP at the annual Science Meets Parliament event to great effect (see feature article).

Public Engagement and Outreach

PARASITES, PEOPLE, ART

WITH FUNDING FROM INSPIRING AUSTRALIA, THE AUSTRALIAN SOCIETY FOR PARASITOLOGY HAS ENTERED INTO A UNIQUE PARTNERSHIP WITH A GROUP OF ARTISTS IN FAR NORTH QUEENSLAND.

The project, which centres around Indigenous artist Bernard Lee Singleton's magnificent painting, **Gula Guri Mayin** (which means "Heal the body"), explores themes of parasites and health. In addition to Bernard's painting, the project was captured through digital art by Tai Inoue. In Tai's film (<https://youtu.be/oW7e2j1S-EA>), Bernard describes the

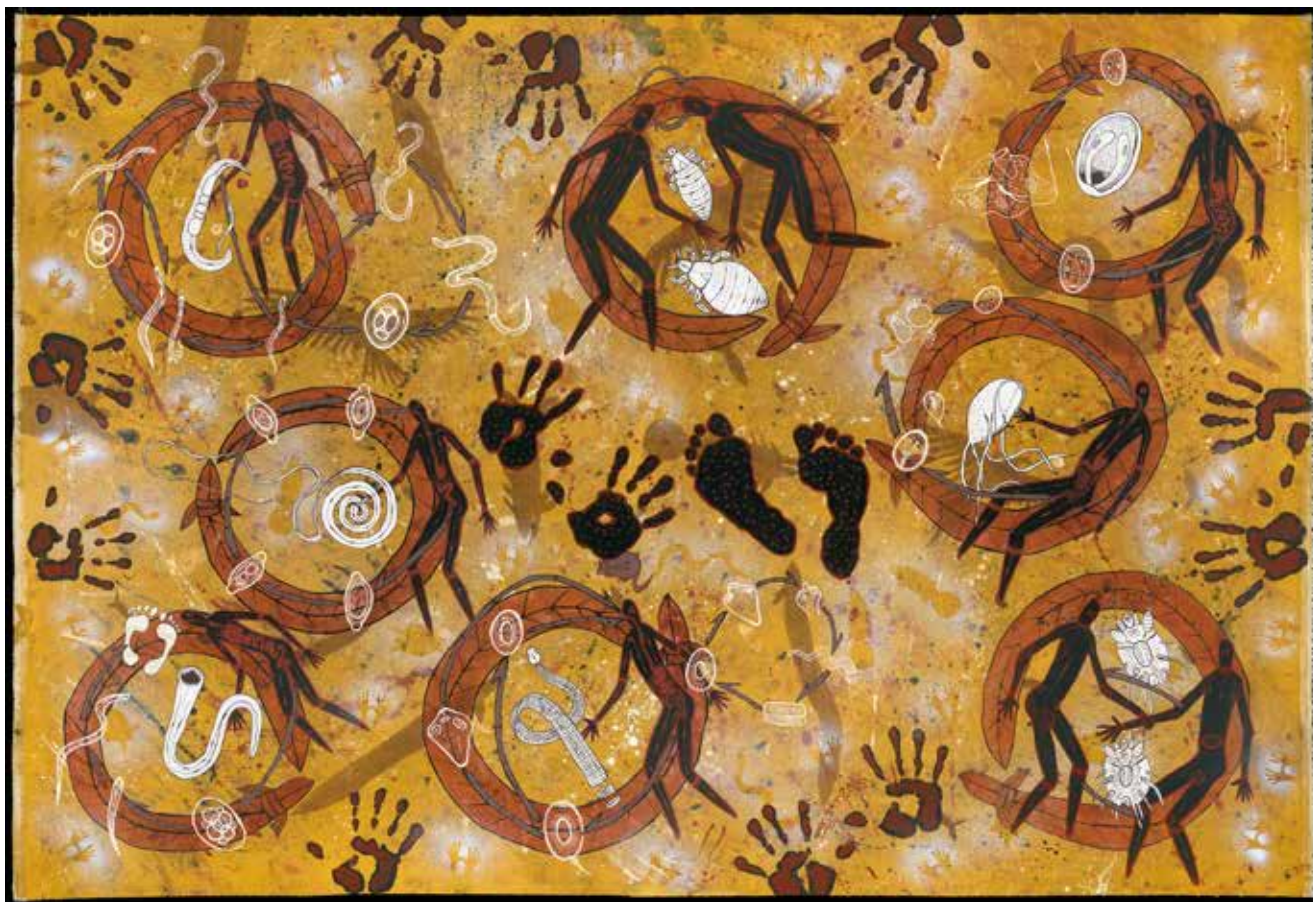
process he went through to create **Gula Guri Mayin** and a performance piece (https://youtu.be/ZFRCsDq_kf4) which incorporated work by Bernard, Tai and Dave Masters.

The project represented the final part of a larger national \$30K Inspiring Australia grant that the Australian Society for Parasitology won to host free public events to explore the world of parasites. The work formed a central part of James Cook University's National Science Week activities in August, and was part of the Cairns Children's Festival in May – both at the Tanks Arts Centre in Cairns. It was also exhibited to Rural and Remote Nurses Conference in October. Over 4500 visitors have enjoyed **Gula Guri Mayin** during 2015 and we hope that other venues across Australia will host the art piece over the next few years.



Above: Tai Inoue (L) and Bernard Lee Singleton (R)

Public Engagement and Outreach



BERNARD LEE SINGLETON **GULA GURI MAYIN (HEAL THE BODY)**

Bernard Lee Singleton is an artist born in Cairns and raised in the small Aboriginal community of Coen, Cape York. Bernard's mother is a Djabuguy woman born in Mona Mona mission and his father is an Umpila (east coast Cape York)/Yirrkandji man from Yarrabah mission. In this painting, Bernard explores the life of parasites, their environment and how they are transmitted to people and cause disease. It is an interpretation of parasitic lifecycles and it gives the message that people live in the world of the parasite, not the

other way around; by understanding and accepting this fact, we can then see how to avoid infection. The painting gives an overview of eight parasites that affect people in Australia, most particularly our Indigenous communities. From top left, clockwise, the parasites depicted are: *Strongyloides stercoralis* (a roundworm); *Pediculus humanis capitis* (the head louse); *Cryptosporidium hominis*; *Giardia duodenalis*; *Sarcoptes scabiei* (the scabies mite); *Hymenolepis nana* (the dwarf tapeworm); *Ancylostoma duodenale* (the hookworm); and *Trichuris trichiura* (the whipworm).

www.parasite.org.au/outreach/gula-guri-mayin/

Public Engagement and Outreach

ASP MEMBER OUTREACH: GTAC

ON AUGUST 21ST 2015, FOLLOWING THE SUCCESS OF THE 2014 EVENT, 89 STUDENTS OF YEARS 10 & 11 AND 10 TEACHERS FROM VICTORIAN SCHOOLS ATTENDED THE "PARASITES IN FOCUS" PROGRAM HELD AT THE GENE TECHNOLOGY ACCESS CENTRE (GTAC) IN MELBOURNE.

The program was supported by an ASP Outreach grant. Robin Gasser (University of Melbourne) gave the opening address followed by three rotating laboratory workshops.

Using preserved specimens as demonstrations, Robin provided students with an engaging introduction to the field of parasitology. He discussed parasite diversity, life cycles, and their global impacts on livestock and on humans. At the conclusion of the presentation, students asked Prof. Gasser probing questions about parasites,



how they are studied, and how the conditions they cause are managed. Some of the questions reflected the personal experience and understandings of the rural students. The audience feedback was great, " Really great lecture, not only discussing his work but pathways to get into parasites as well." and " Amazing to hear from such a passionate scientist"



Above: students in action at "Parasites in Focus". Left: Prof. Robin Gasser with GTAC workshop co-ordinators, Tony Chiovitti (left), Rachael Rutkowski, and Chris Szwed.

During the three rotating 1-hour laboratory workshops students worked in small groups of ~7 students mentored by practising scientists.

- **Hooked on Parasites.** Students used microscopy to explore how endoparasites locate, attach, feed and reproduce in their hosts. Particular case studies included equine bot fly larvae and tape worms, plus chemotaxis experiments with live nematodes.
- **A Case of Cross-Border Detection.** An exploration in the application of biotechnology to medical parasitology, students used PCR and gel electrophoresis to diagnose which *Plasmodium* species was infecting a patient recently returned from an adventure holiday.
- **Parasites Getting it Under Control** Using the NetLogo simulation software, students modelled the impacts of the parasitoid wasp, *Trichogramma carverae* to assess it as a potential biological control for the agricultural pest, the light brown apple moth.



Report and photos by Tony Chiovitti, GTAC.

Public Engagement and Outreach

ASP MEMBER OUTREACH: UTAS

ANOTHER SUCCESSFUL PARASITOLOGY OUTREACH EVENT FOR CHILDREN, ORGANISED BY ASP MEMBERS TINA OLDHAM AND MELANIE LEEF, WAS HELD DURING THE UNIVERSITY OF TASMANIA'S OPEN DAY IN AUGUST 2015.

This event targeted children between ages 5 to 10 years old who were visiting the University of Tasmania, Institute for Marine and Antarctic Studies 'Open Day' with family members.

A large fish poster showed the location of infection of four species of parasites (amoeba, blood fluke, isopods and copepods) which are researched by the Aquatic Animal Health research group. To encourage active participation we also had foam sheets, pre-cut in the body shape of the parasites presented in the poster, which kids could decorate with a wide variety of materials including glitter glue, pom poms, pipe cleaners, gems and markers. Once completed the parasites were mounted on wooden dowels which allowed them to be used as fancy dress masks and taken home by the children.

In addition to making parasites, there was a colouring station with cartoons of the four different parasites discussed and information on how they affect their fish hosts. At another station children could look at labelled plasticine models of each parasite to learn more about their anatomy and shape. Finally, if kids completed both the colouring and mask making activity, they were given

the opportunity to play a fishing game. A kiddie pool was filled with water and populated with floating fish "infected" by the four parasites of focus. Children were given fishing poles with magnetic lures and allowed to catch fish. If they caught one fish infected with each of three parasites and properly identified the parasites they were allowed to choose a prize from a selection of plush parasites (Giant Microbes – Amoeba & Copepod). Throughout the activities PhD students from the research group worked with participants and provided more information.

The ASP event was very successful with many children joining in

the activities. Also some parents participated with their children to make their own parasites, or to help the younger ones. The ASP sponsored funds for this event were used to purchase the materials necessary to construct and decorate at all activities. Many of the resources created will be available for future events including the fishing game and colouring sheets.

This event was advertised by UTAS and AMC centrally as part of the Open Day. Many children experienced their first exposure to fish parasites and clearly demonstrated the absorption of new knowledge. The interactive

participation in activities helped to foster curiosity about parasitology. Being able to take parasites home will help them retain the information and hopefully share the knowledge with other family members. The ASP logo was printed on all colouring sheets and informational signage used to draw in participants. Additionally a large ASP banner was on display at the Aquatic Animal Health station amidst all of the activities.

All of the activities received very good feedback from both the visitors and the IMAS staff.



Public Engagement and Outreach

ASP MEMBER OUTREACH: ANU

IN JANUARY 2015, PARASITOLOGISTS FROM THE RESEARCH SCHOOL OF BIOLOGY AT THE AUSTRALIAN NATIONAL UNIVERSITY DELIVERED “PARASITE DETECTIVES” TO THE NATIONAL YOUTH SCIENCE FORUM IN CANBERRA.

Meng is an intrepid traveller with a love of languages who recently returned from backpacking through South East Asia. She spent much of her time in a local village near the Thai-Cambodian border. Since her return to Australia, Meng has experienced increasingly severe cycles of headaches, fevers and chills. In a race against time, 42 National Youth Science Forum students donned their labcoats, focused their microscopes and honed their pipetting skills in an attempt to diagnose and cure Meng of her ills.

This summer, as for the past 30 summers, some of Australia's brightest and most enthusiastic high school science students converged on Canberra to participate in the

National Youth Science Forum (NYSF). Supported in large part by Rotary International, NYSF students from every corner of Australia spend two weeks in and around Canberra, visiting universities, research institutes and government departments to learn more about research science and the myriad career paths on offer to them.

This year, parasitologists from the Research School of Biology at the Australian National University devised a ‘Parasite Detective’ prac for the NYSF. NYSF students were asked to become infectious

disease experts for the day. Patients (who, conveniently enough, doubled as demonstrators for the prac) had come to the NYSF students with some unusual symptoms that indicated they were suffering from a mysterious parasitic infection. The students’ brief was to use modern approaches to diagnose their patients, and, through consultation with the medical literature, suggest an appropriate treatment.

Using DNA samples from their patients, students performed diagnostic polymerase chain reactions to determine the identity of the parasite. They also examined microscope slides with blood smears and tissue samples to look for the presence of parasites in their patients. When they had established the likely cause of their patient’s illness, the students examined the medical literature to determine an appropriate course of treatment. In addition to their crucial role in diagnosing their patients/demonstrators, the NYSF students got to chat with research scientists at various stages of their career, learning what it’s like to investigate the fascinating world of parasite biology. They also got a tour of a modern research lab to learn about the sort of equipment that scientists use to

investigate parasites.

The students soon learned that Meng was infected with *Plasmodium falciparum*. Without rapid treatment, Meng’s future looked grim. The region of Cambodia where

Meng acquired her infection is rife with parasites that are resistant to many common medications. Meng was prescribed with a course of artemisinin combination therapy, one of the very few antimalarial treatments still effective. Of course, prevention is better than cure. Examining Meng’s case history, students saw that she had not been sleeping in bed nets, nor had she take prophylactic anti-malarial medication, both of which would likely have avoided the predicament she found herself in. After a stern talking to, the NYSF students left Meng to her recovery and continued on their paths of scientific discovery in the nation’s capital.

The ‘Parasite Detectives’ pracs were conducted by Meng Zhang, Edwin Tjhin, Esther Rajendran and Giel van Dooren (Research School of Biology, ANU), with wonderful assistance from Peta Moisis and her team at the ANU Biology Teaching and Learning Centre. Melanie Rug and Kathryn Parker also contributed to the design.



Public Engagement and Outreach

ASP MEMBER OUTREACH: QIMR BERGHOFFER

THANKS TO FUNDING FROM THE LOWITJA INSTITUTE, AND WITH ADDITIONAL FINANCIAL HELP FROM THE AUSTRALIAN SOCIETY OF PARASITOLOGY, THE SCABIES RESEARCH GROUP FROM THE QIMR BERGHOFFER MEDICAL RESEARCH INSTITUTE DELIVERED "SCIENCE AND YOUNG MINDS: YOUTH ENGAGEMENT IN SKIN HEALTH" HIGH SCHOOL EDUCATION WORKSHOPS TO TWO SCHOOLS LOCATED IN REMOTE NORTHWEST QUEENSLAND.

Northwest Queensland has a population of less than 1% of the state's total, with over 25% of the population identifying as indigenous. The infrastructure is not like in metropolitan regions and the health burden of infectious skin conditions in this region is significant, in particular regarding scabies and associated pyoderma. This project aims to relay the value of medical research and health related professions to senior high school students,

particularly targeting engagement of students with Indigenous background.

For two and half days each school's classroom was transformed into a 'real-life' research lab with everyone in lab coats and protective wear. Students did 'hands on' experiments in the areas of molecular parasitology and microbiology. They enjoyed a series of presentations about Medical Parasitology and Microbiology, a 'Parasite Quiz' and a 'Career in Health and Medical Research' workshop, which stimulated many interesting discussions. In late July a few lucky students will visit us in Brisbane for a week long 'work experience' at the QIMR Berghofer Medical Research

Institute, including various orientation activities in Brisbane's major Universities.



Report provided by Katja Fischer, Scabies Group, QIMR Berghofer MRI

Photos of QIMR Berghofer MRI researchers working with students from remote rural communities in northwest Queensland To engage young people in discussions, learning and hands on activities about skin health and medical research.

Public Engagement and Outreach

SCIENCE MEETS PARLIAMENT

AT THE END OF MARCH 2015, BRIAN COOKE REPRESENTED THE ASP, AT THE 15TH ANNUAL SCIENCE MEETS PARLIAMENT. THIS ANNUAL, INVITATION ONLY EVENT BRINGS AROUND 200 MEMBERS OF SCIENCE AND TECHNOLOGY AUSTRALIA TO CANBERRA TO IMPROVE COMMUNICATION BETWEEN SCIENCE, POLICYMAKERS, PARLIAMENTARIANS AND THE MEDIA.

During two exhausting, yet highly enjoyable and rewarding days, Brian engaged in professional development workshops with policy advisers, journalists, analysts and politicians on how to more effectively engage with the media, politicians and the policymaking process. Among the highlights, there was face to face meetings with parliamentarians at Parliament House, a nationally televised Keynote Address to the National Press Club by Chief Scientist for Australia, Professor Ian Chubb AC, and a Gala Dinner at Parliament House (MC'd by science broadcaster and comedian Adam Spencer) with guests including The Hon Ian Macfarlane MP, Minister for Industry and Science, The Hon Bill Shorten MP, Leader of the Opposition, Catherine Livingstone AO, President, Business Council of Australia and numerous scientific leaders and members of Parliament.

Brian was proud to promote the numerous and disparate activities of the ASP, both nationally and internationally, and highlight the critical role of the discipline of parasitology, and of basic and

applied research, in a healthy, wealthy, safe, secure, smart and sustainable Australia of the future.

Brian said that what was clear on everyone's minds was to impress on Government the need for clearer research priorities and policies and for increased funding to prevent an inevitable loss of some of the finest next generation leading Australian scientists to positions overseas if we do not invest more in science and health and medical research.

One particular highlight of the meeting was the release by Professor Chubb of the results of a new and elegant study, conducted with the Australian Academy of Science and The Centre for International Economics, that quantifies, for the first time, the contribution of advanced physical and mathematical sciences to Australia's GDP [1]. The study estimates this to be approximately \$145 billion a year - equivalent to about 11% of GDP. When all of the indirect flow-on effects of these sciences are considered, this figure doubles to \$292 billion per year - 22% of Australia's

economic activity. Furthermore, for the sake of better accuracy, this study deliberately focussed only on the physical and mathematical sciences. Although undoubtedly more difficult to estimate with such accuracy, it will be interesting to see if, in the near future, the group can put a figure on the worth of health and biomedical research in Australia.

Brian's attendance at Science meets Parliament was funded by the Australian Society for Parasitology.

[1] <http://www.chiefscientist.gov.au/wp-content/uploads/Importance-of-Science-to-the-Economy.pdf>



Education



Concepts in Parasitology

A two-week parasitology course for postgraduates and Early Career Researchers

THE 2015 ASP ADVANCED COURSE, CONCEPTS IN PARASITOLOGY, TOOK PLACE BETWEEN NOVEMBER 29TH AND DECEMBER 12TH AT THE ANU'S KIOLOA CAMPUS, A FIELD STATION ON THE NSW SOUTH COAST. IN A BEAUTIFUL LOCATION, SURROUNDED BY NATIONAL PARK. COURSE PARTICIPANTS CARRIED OUT LABORATORY WORK IN MODERN, PC2 FACILITIES.

Course Convenor was Associate Professor Alex Maier (ANU). A large faculty of prominent parasitologists contributed during the two weeks.

- Rob Adlard (Queensland Museum)
- Glenn Andersen (Virbac Australia)
- Vicky Avery (Griffith University)
- Nigel Beebe (University of Queensland)
- Ian Beveridge (University of Melbourne)
- Brian Cooke (Monash University)
- Tom Cribb (University of Queensland)
- Christian Doerig (Monash University)
- Giel van Dooren (Australian National University)
- Paul Giacomini (James Cook University)
- Stephanie Godfrey (Murdoch University)
- David Jenkins (Charles Sturt University)
- Aaron Jex (University of Melbourne)
- Malcolm Jones (University of Queensland)
- Martine Keenan (Epichem)
- Steve Lee (Australian National University)
- Alan Lymbery (Murdoch University)
- Alex Maier (Australian National University)
- Geoff McFadden (University of Melbourne)
- Peter O'Donoghue (University of Queensland)
- Stuart Ralph (University of Melbourne)
- Louise Randall (University of Melbourne)
- Melanie Rug (Australian National University)
- Una Ryan (Murdoch University)
- Kevin Saliba (Australian National University)
- Chris Tonkin (Walter and Eliza Hall Institute)

Education



Above: images from Concepts in Parasitology 2015

Statistical Snapshot 2015

Number of (active) members;

Australian Society for Parasitology Incorporated (ASP) had 451 financial members in 2015.

Number of ECRs funded to do various activities;

61 students were given funding assistance to attend the 2015 ASP Annual Conference.

19 students and ECRs were awarded ASP Network or OzEMalaR Researcher Exchange, Training and Travel, out of a total of 24 awards made in 2015.

Conferences supported;

2015 Joint ASP-NZSP Annual Conference attended by over 200 parasitologists.

Number of publications produced;

511 printed publications.

Research funding received;

In 2015, Australia's parasitologists received 37 research grants securing more than \$20 million in new research grant funding.

Newsletters

Four newsletters were published during the year, pictured below.

Volume 26.1 January 2015 Volume 26.2 June 2015 Volume 26.3 October 2016 Volume 26.4 December 2015

Websites

ASP web site | www.parasite.org.au

ASP Facebook page | www.facebook.com/ASParasitology

ASP Twitter account | twitter.com/#!/AS_Para

ASP YouTube channel | www.youtube.com/user/ASPParasiteNetwork

ASPParasiteNetwork

The ASP's Google Plus account | <https://plus.google.com/100938254649203422506/posts>

OzEMalar website | www.ozemalar.org.au

OzEMalaR Facebook page | www.facebook.com/ozemalar

OzEMalaR Twitter account | twitter.com/#!/OzEMalaR

International Journal for Parasitology web site | www.journals.elsevier.com/international-journal-forparasitology

IJP Facebook: www.facebook.com/IJPara

IJP Twitter: @IJPara

IJP Instagram: ijpara

International Journal for Parasitology – Parasites and Wildlife | www.journals.elsevier.com/international-journalfor-parasitology-parasites-and-wildlife/

IJP:PAW Facebook | www.facebook.com/IJPPAW/

International Journal for Parasitology – Drugs and Drug Resistance website | www.journals.elsevier.com/international-journal-forparasitology-drugs-and-drug-resistance/

IJP:DDR Facebook | www.facebook.com/IJPPDDR/



Appendix 1: Publications by ASP Members in 2015

WHERE APPLICABLE, LINKS TO ABSTRACTS IN PUBMED HAVE BEEN PROVIDED FOR 2015 PUBLICATIONS.

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Appendix 1

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Appendix 2: Research grants awarded to ASP Members in 2015

IN 2015, ASP MEMBERS SECURED OVER \$20 MILLION IN NEW RESEARCH GRANTS AND FELLOWSHIPS.

INSTITUTION NAMES IN THE LIST BELOW REFER TO THE AUSTRALIAN ADMINISTERING INSTITUTION, NOT NECESSARILY THE HOME INSTITUTION OF INDIVIDUAL RESEARCHERS)

NHMRC Research Fellowships

Professor Don McManus, New interventions to end neglected tropical diseases in Asia, Queensland Institute of Medical Research

Professor Marshall Lightowlers, Immunological control of cysticercosis and hydatid disease, University of Melbourne

NHMRC Career Development Fellowship

Doctor Neil Young, Genomic-based tools to support the control of urogenital schistosomiasis and hepatic opisthorchiasis, University of Melbourne

NHMRC Project Grants

CIA - Professor Don McManus; CIB - Professor Gail Williams; CIC - Associate Professor Darren Gray; CID - Professor Archie Clements; CIE - Professor Xiao-Nong Zhou; CIF - Professor Yuesheng Li; CIG - Professor Juerg Utzinger, Conquering schistosomiasis in China: the last mile, Queensland Institute of Medical Research

CIA - Professor Nicholas Anstey; CIB - Doctor Tsin Yeo; CIC - Professor Stephen Duffull, Targeting microvascular dysfunction

in severe malaria, Menzies School of Health Research

CIA - Doctor Katja Fischer; CIB - Doctor Deborah Holt; CIC - Doctor Simone Reynolds; CID - Associate Professor Lutz Krause; CIE - Professor Bart Currie, A targeted molecular approach to treating scabies and associated bacterial infections, Queensland Institute of Medical Research

CIA - Associate Professor Katherine Andrews; CIB - Doctor Tina Skinner-Adams; CIC - Professor David Fidock; CID - Doctor Jack Ryan; CIE - Doctor Oliver Hutt, Proguanil: Old Drug, New Tricks, Griffith University

CIA - Professor Raymond Norton; CIB - Professor Peter Scammells; CIC - Doctor Sheena McGowan; CID - Associate Professor Martin Scanlon, Anti-Malarial Agents Targeting Apical Membrane Antigen 1, Monash University

CIA - Professor Leann Tilley; CIB - Professor Malcolm McConville; CIC - Doctor Matthew Dixon, Targeting commitment to sexual differentiation in Plasmodium, University of Melbourne

CIA - Professor Raymond Norton; CIB - Associate Professor Philip Thompson; CIC - Professor Sebastien Perrier, Novel Anti-Infective Agents that Act by Enhancing the Host Innate Response, Monash University

CIA - Professor Georges Grau; CIB - Doctor Valery Combes; CIC - Emeritus Professor Nicholas Hunt; CID - Doctor Bernadette Saunders, Antigen Presentation In Cerebral Malaria Pathogenesis: A Role For Brain Microvascular Endothelium And Microparticles, University of Sydney

CIA - Professor Malcolm McConville; CIB - Associate Professor Spencer Williams, Targeting carbohydrate metabolism in Leishmania, University of Melbourne

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CIA - Associate Professor Julie Simpson; CIB - Associate Professor James McCaw; CIC - Doctor Freya Fowkes; CID - Professor Francois Nosten, Slowing the spread of malaria drug resistance by extending the lifespan of the artemisinin derivatives, University of Melbourne

CIA - Professor Jonathan Baell; CIB - Doctor Darren Creek; CIC - Professor Vicky Avery; CID - Associate Professor Michael Edstein; CIE - Doctor Stuart Ralph, New treatments for malaria targeting both the sexual and asexual stages of the causative parasite, *Plasmodium falciparum*, Monash University

CIA - Professor Ivo Mueller; CIB - Professor Daniel Schofield; CIC - Doctor Wai-Hong Tham; CID - Associate Professor Harin Karunajeewa; CIE - Doctor Leanne Robinson; CIF - Doctor Jetsumon Prachumsri; CIG - Doctor Moses Laman, Novel serological tools to aid malaria elimination in the Asia-Pacific, The Walter and Eliza Hall Institute of Medical Research

CIA - Professor Robin Gasser; CIB - Doctor Neil Young; CIC - Doctor Aaron Jex; CID - Professor David Rollinson; CIE - Professor Paul Brindley, Genome-based tools to support urogenital schistosomiasis control, University of Melbourne

CIA - Associate Professor Katherine Andrews; CIB - Doctor Tina Skinner-Adams; CIC - Doctor Jack Ryan; CID - Doctor Oliver Hutt; CIE - Professor Andrew Davey, New drugs for malaria prevention, Griffith University

CIA - Doctor John Croese; CIB - Doctor Paul Giacomini; CIC - Associate Professor Graham Radford-Smith; CID - Associate Professor Tony Rahman; CIE - Mrs Louise Marquart, Hookworm therapy for Coeliac Disease: A randomised, double blind, placebo-controlled clinical trial, James Cook University

CIA - Doctor Lynette Beattie; CIB - Doctor Geoffrey Gobert, The role of IL-17 in regulating liver macrophage permissiveness for Leishmania infection, Queensland Institute of Medical Research

CIA - Professor Geoffrey McFadden, Can malaria parasite resistance to an important drug spread?, University of Melbourne

ARC Discovery Grants

Associate Professor Tania de Koning-Ward & Dr Paul Gilson (Deakin University) This project aims to explore the mechanism that enables malaria parasites to thrive in their host cells. Parasites that cause the disease malaria reside inside erythrocytes, a very basic cell that lacks a vesicular trafficking pathway. To survive and thrive in this environment, the parasite has evolved a completely unique cell biological phenomenon termed PTEX to transport its proteins into the host cell. The aim of this project is to determine how this novel PTEX machinery exports proteins into erythrocytes and whether PTEX is also required for parasite survival during the initial stages of a host infection when malaria reside in hepatocytes.

Professor Geoffrey McFadden (The University of Melbourne) This project aims to improve our understanding of malarial genetics. The sexual cycle of malaria parasites occurs in mosquitoes. After sex, parasite progeny multiply to form infective spores that are injected into people by mosquito bite. Development of male and female malaria parasite gametes and their fusion to produce a diploid zygote are well understood, but the subsequent process of meiosis, development of a cyst stage and the sporogonic process to create haploid progeny for new infections are poorly understood in molecular genetic terms. The project aims to dissect the unique genetics of these insect stages using a rodent malaria model to generate crosses of different malaria parasite lines to determine when recombination takes effect.

Dr Stuart Ralph & Dr Aaron Jex (The University of Melbourne) The project intends to provide a detailed picture of how alternative splicing is regulated in four biologically diverse apicomplexan parasites, and to explain why parasites need this molecular trick to survive. Alternative splicing is an important means by which organisms increase the diversity of proteins encoded by their genome. Although this mechanism is well studied in humans, little is known about the extent of this phenomenon in other organisms, nor how the process is regulated. The project plans to test if alternative splicing is required to transition between different life stages, just as alternative splicing is required for tissue differentiation in animals, and describe how alternative splicing

Appendix 2

contributes to apicomplexan proteome diversity.

ARC Early Career Researcher Award

Dr Adele Lehane (The Australian National University), This project aims to determine how Apicomplexan parasites regulate their sodium and chloride levels to support the development of new parasite control measures. Apicomplexan parasites cause devastating animal and human diseases. Little is known about the physiology of these parasites, and options for controlling them are few. Apicomplexan parasites must precisely control their internal ion compositions in order to survive, but how they do so is not understood. Recent work has identified a unique Apicomplexan sodium transporter and revealed a number of chloride transporter candidates. Using a combination of molecular biology and physiological techniques, this project aims to characterise the Apicomplexan sodium transporter in detail and elucidate the molecular mechanisms of chloride transport.

ARC Lief Equipment Grants

Professor Gavin Reid; Associate Professor Ute Roessner; Professor Malcolm McConville; Professor Tony Bacic; Associate Professor Peter Meikle; Dr Suresh Mathivanan; Dr Damien Callahan; Dr Nicholas Williamson; Professor Colin Barrow; Professor Andrew Hill; Dr Oliver Sieber; Dr Andrew Webb; Associate Professor Vera Ignjatovic; Professor John Bateman (The University of Melbourne) An ultra-high-resolution mass spectrometry facility for lipidomics research: This proposal aims to establish an ultra-high-resolution, accurate mass spectrometry facility in Australia for comprehensive lipidomics research. The platform would consist of a Thermo Scientific Orbitrap Fusion mass spectrometer interfaced with ultra-high-pressure high-performance liquid chromatography. This proposal will address a major need for advanced mass spectrometry-based lipid analysis capabilities across mammalian, plant, parasite, and microalgae research disciplines, as well as enabling fundamental studies of lipid separation, chemistry and reactivity. The instrumentation would be applicable to a diverse range of projects including studies of the role of lipid metabolism in mammalian biochemistry and cell

biology, plant biology and parasitology, and micro algae biofuel production.

Professor David Sampson; Professor Michael Berndt; Professor Shaun Collin; Dr Elin Gray; Dr Massimiliano Massi; Associate Professor Kevin Pflieger; Dr Jeremie Rossy; Professor Ian Small; Dr Killugudi Swaminatha-Iyer; Professor Richard Thompson; Professor Mel Ziman (The University of Western Australia), A single-molecule super-resolution microscopy facility in Western Australia: The project aims to establish a facility combining single-molecule imaging with super-resolution microscopy to enable biologists in Western Australia to resolve and directly observe interacting macromolecules in plants, animals and organisms, Interacting macromolecules form the basis of cell biology. Imaging and characterising such interactions in living cells and tissues has become possible with the latest molecular imaging techniques and super-resolution optical microscopy (with spatial resolutions of 20 nanometres or better). The facility seeks to advance science across diverse regional priorities in agriculture, environment, marine ecology, medicine and health.

Associate Professor Martin Scanlon; Professor Joel Mackay; Associate Professor Paul Gooley; Professor Raymond Norton; Professor Nicholas Dixon; Professor Peter Lewis; Professor Peter Scammells; Professor Jacqueline Matthews; Associate Professor Aaron Oakley; Dr Ann Kwan; Associate Professor Richard Hughes (Monash University), Distributed facility for fragment based drug discovery: The facility aims to provide researchers with the ability to generate small molecules that modulate therapeutically and biologically important protein targets. Fragment-based drug design (FBDD) provides a rational approach to generate such biologically active compounds. The facility is designed to allow researchers throughout Australia to access the necessary infrastructure to undertake FBDD projects against a range of biologically important targets. The facility aims to enable access to high-throughput nuclear magnetic resonance spectroscopy and surface plasmon resonance, and to generate the capacity for automation in chemical synthesis and sample preparation to expedite the development of novel bioactive molecules. The development of better approaches to hit development may benefit many researchers in Australia employing

Appendix 2

FBDD.

Other research grants

ASP members have reported the following additional research grants.

Vicky Avery, DnDi, 2015: Leishmania in vitro Assays and Lead Optimisation

Vicky Avery, GHIT, funding for 2015 activities (part 1)

Tonya Woodberry 2015 Channel 7 Children's Research Foundation Grant ID 151016. Understanding dendritic cell dysfunction in children with malaria.

Rob Adlard, Ian Beveridge, Shokoofeh Shamsi, Mike Bennett, Terry Miller, Scott Cutmore, Rod Bray, Geoff Boxshall, Nico Smit, Delane Kritsky, Tom Cribb Australian Biological Resources Study (ABRS) Grant, Parasites of commercial fishes of Moreton Bay: a multi-disciplinary analysis of diversity.

Geoff McFadden, Jane Melville McCoy Foundation Project Seed Fund, Establishing a multi-purpose Wildlife Pathogen Biobank and corresponding database of wildlife pathogens.

Peter Hunt, Nishi Sharma Poultry CRC, Practical implications of A. galli infection in Australian free-range poultry

Wanji S., Kamgno J., **Prichard, R.K.**, Bourguinat C., Boussinesq M. 2015 – 2016. WHO – TDR. Research for genetic markers of Onchocerca volvulus response to ivermectin and development of an onchocerciasis control programme surveillance tool

Prichard R.K., Bourguinat C. 2015-2016. Merial. Genomic analysis of Dirofilaria immitis

Prichard R.K., Bourguinat C. 2015 – 2016. Zoetis. Genotyping isolates of Dirofilaria immitis.

Lespine A., **Prichard R.K.** 2015–2017. Bayer HealthCare. Optimizing macrocyclic lactones for improved control of ML resistant parasites.

Peregrine A., **Prichard R.K.**, Bourguinat C. 2015 – 2017. Ontario Pet Trust Research Awards. Genotype analysis to evaluate the occurrence of macrocyclic lactone resistance in Dirofilaria immitis infecting dogs in Ontario.

Appendix 3: OZeMalaR final report



Australia – Europe Malaria Research Cooperation

On 25 February 2010 The National Health and Medical Research Council (NHMRC) - European Union (EU) Collaborative Research Grants scheme supporting Australian participation in leading international collaborative research under FP7 awarded Geoff McFadden (The University of Melbourne), Kevin Saliba (Australian National University) and colleagues \$830,000 over 5 years for their project grant application for Australia - Europe Malaria Research Cooperation – OZeMalaR.

Malaria is a global problem with no single solution. A large, but sometimes disjointed, research community is addressing the problem, but more collaboration is vital. OZeMalaR was able to link 49 Australian labs with 47 European, African & Indian malaria researchers. The funding enabled exchange of modern technologies by supporting early career researchers (PhD and postdocs) and other researchers from Australia to work and be trained in top European labs whilst European trainees used reciprocal EU support (OzMalNet) to work and receive training from Australian malariologists.

On World Malaria Day this year the World Health Authority (WHO) reported “For the first time all countries in the WHO European Region reported in 2015 zero indigenous cases of malaria, down from 90 000 cases in 1995. Outside this region, 8 countries reported zero cases of the disease in 2014: Argentina, Costa Rica, Iraq, Morocco, Oman, Paraguay, Sri Lanka and United Arab Emirates. Another 8 countries each tallied fewer than 100

indigenous malaria cases in 2014. And a further 12 countries reported between 100 and 1000 indigenous malaria cases in 2014.”

A year after the World Health Assembly resolved to eliminate malaria from at least 35 countries by 2030, the WHO report showed this goal, although ambitious, was achievable.

Malaria causes much suffering for people living in tropical and subtropical regions of the world. Much of the research focuses on finding new drugs or drug targets and vaccine development.

OZeMalaR aimed to:

- promote and facilitate interaction between colleagues, peers and potential research partners;
- communicate the scientific achievements of OZeMalaR participants; and
- create professional development opportunities for them, in particular for postgraduate students and early career postdoctoral fellows.

Approximately 50 lab heads made up the OZeMalaR network and contact details for their labs and research staff and students is on the website www.ozemalar.org/registry

We used website, Facebook page and twitter to communicate malaria news from Australia and around the world to OZeMalaR participants.

Website www.ozemalar.org

Twitter @OZeMalaR

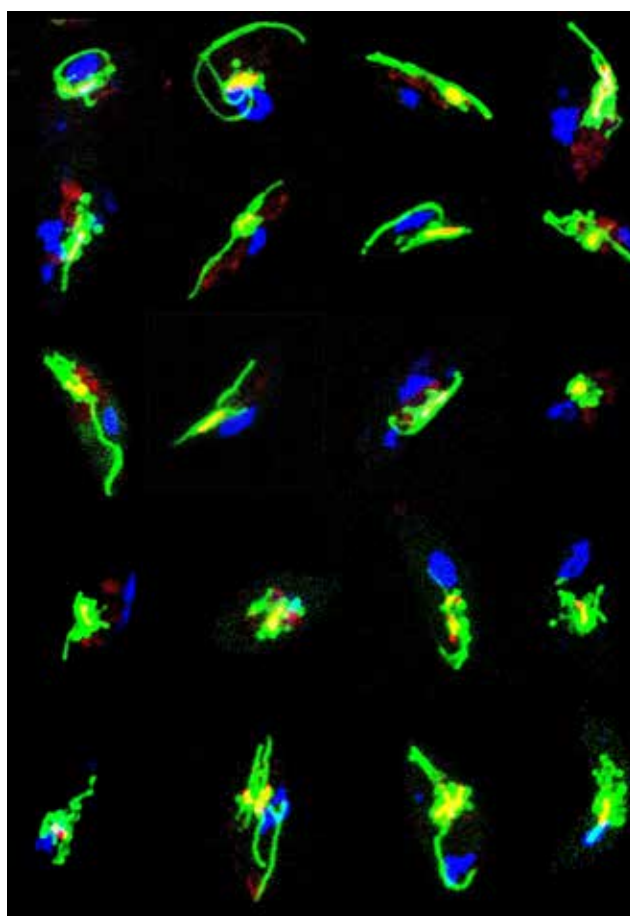
Facebook <https://www.facebook.com/ozemalar>

OZeMalaR news also features in the regular newsletters for the Australian Society for Parasitology Inc. www.parasite.org.au

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Image *Plasmodium falciparum* gametocytes courtesy
Okamoto, University of Melbourne

Source: http://www.geoffmcfadden.com/McFadden_Lab/Gallery.html



OzEMalaR Travel Award Scheme

Between 2010 and 2015 the OzEMalaR Travel Award Scheme awarded over \$881,000 for 75 Australian malaria researcher exchanges/training programmes to European laboratories within EviMalaR. OzEMalaR Travel Awardees said “it is one of the most rewarding scientific experiences” of their research careers. Since 2010 OzEMalaR the following researchers and their exchanges/

training programmes have taken place:

- Melanie Rug, Walter and Eliza Hall Institute, for her Researcher Exchange collaboration with Drs. Marek Cyrklaff and Freddy Frischknecht at University of Heidelberg.
- Gaetan Burgio, Menzies Research Institute Tasmania) for a Researcher Exchange to visit the Malaria biology and genetics unit, (Pr Robert Menard), Pasteur Institute Paris: from the 8th to the 19th of November 2010; to attend a Bioinformatic and genomics of *Plasmodium falciparum* workshop: 22-23 November 2010, Paris Museum National d’Histoire Naturelle; and visit Division of Parasitology (Jean Langhorne’s group), National Institute for Medical Research, London, UK.
- Fiona Angrisano, Walter and Eliza Hall Institute, for a Researcher Exchange for training and research at Imperial College, London with Prof Robert Sinden.
- Justin Boddey, Walter & Eliza Hall Institute of Medical Research, for a Researcher Exchange to undertake a short research project in Dr. Maria Mota’s laboratory Institute of Molecular Medicine, Lisbon, Portugal.
- Julia Cutts, Walter and Eliza Hall Institute, for her Researcher Exchange to attend Malaria Experimental Genetics Training Course (Wellcome Trust), and grant writing retreat at the Laboratory of Prof. Andy Waters, Wellcome Trust Centre for Molecular Parasitology.
- Sarah Charnaud, The Burnet Institute, for a Researcher Exchange to visit the Lingelbach Laboratory, Philipps Universitat, Marburg, Germany .
- Philippe Boeuf, University of Melbourne, for a Researcher Exchange to visit the Centre for Medical Parasitology, Copenhagen, Denmark.
- Ben Woodcroft, University of Melbourne, for a Researcher Exchange to visit the Voss group, Swiss Tropical and Public Health Institute

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- Ellen Nisbet, University of South Australia, for a Researcher Exchange to attend the 2011 Malaria Experimental Genetics Advanced Course run by the Wellcome Trust in Hinxton.
- James McCarthy, Queensland Institute of Medical Research, for a Researcher Exchange to visit Professor Sauerwein's laboratory in the Netherlands.
- Melanie Rug, The Walter and Eliza Hall Institute for Medical Research, for a Researcher Exchange to visit Drs. Marek Cyrklaff and Freddy Frischknecht, Department of Parasitology, University of Heidelberg, Germany.
- Vanessa Mollard, University of Melbourne, for a Researcher Exchange to visit A/Professor Robert Ménard at the Pasteur Institute in Paris and Professor Bob Sinden at the Imperial College in London.
- Clare Smith, Menzies Research Institute, for a Researcher Exchange to visit Professor Odile Puijalon, Pasteur Institute, Paris, France.
- Megan Dearnley, La Trobe University, for a Researcher Exchange to visit Bernhard Nocht Institute for Tropical Medicine collaborating with Prof. Tim Gilberger and Dr. Tobias Spielmann.
- Jo-Anne Chan, Burnet Institute, for a Researcher Exchange to visit Malaria Centre laboratories London School of Hygiene and Tropical Medicine, UK.
- Phuong Ngoc Tran, PhD student, La Trobe University, Dr. Alex Maier's lab for a Researcher Exchange to visit Professor Kai Matuschewski's lab, Parasitology Unit, Max Planck Institute for Infection Biology, Berlin, Germany.
- Jutta Marfurt, Senior Research Officer, Menzies School of Health Research to attend the advanced course on "Genomic Epidemiology of Malaria" with the Mahidol Oxford Research Unit (MORU), Faculty of Tropical Medicine, Mahidol University, Bangkok and for Researcher Exchanges to London School of Hygiene & Tropical Medicine (LSHTM) and Wellcome Trust Sanger Institute (WTSI), Hinxton, UK.
- Michaela Petter, PhD student, University of Melbourne for a Researcher Exchange to visit A/Prof Till Voss from the Swiss Tropical and Public Health Institute, currently visiting at Nanyang Technological University, Singapore
- Dr. Ashraful Haque, NH&MRC Career Development Fellow (CDA1) & Senior Research Officer, QIMR for a Researcher Exchange to Dr. Oliver Billker, Malaria Programme, & Prof. Gordon Dougan, Wellcome Trust Sanger Institute, Hinxton, UK.
- Dr. Jake Baum, Laboratory Head, Walter & Eliza Hall Institute for a Researcher Exchange to visit Pasteur Institute, Paris.
- Michael Duffy, Senior Research Fellow, University of Melbourne for a Researcher Exchange to visit the laboratory of Prof. Thor Theander at the Centre for Medical Parasitology, University of Copenhagen, Denmark.
- Hayley Bullen, PhD student, The Burnet Institute, Crabb/Gilson laboratory for a Researcher Exchange to visit University of Geneva, Soldati-Favre laboratory.
- Dr Sarah Auburn, Menzies School of Health Research, Darwin, Crabb/Gilson laboratory for a Researcher Exchange to visit Wellcome Trust Sanger Institute, Cambridge, UK April 4th-13th 2012 Sequenom genotyping in Plasmodium isolates and to attend a workshop at University of Leipzig, Leipzig, Germany March 17th- April 1st 2012 Programming for Evolutionary Biology.
- Charlie Jennison, PhD student, Walter and Eliza Hall Institute, Barry laboratory for a Researcher Exchange to visit Sanger Institute, UK, Matt Berriman and Sutherland laboratory, LSHTM.
- Dr Philippe Boeuf, Research Fellow, The University of Melbourne for a Researcher Exchange to visit Pr Hviid's

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laboratory (Surface team), Centre for Medical Parasitology, Copenhagen, Denmark

- Dr Sarah Erickson, The Walter and Eliza Hall Institute of Medical Research, Cowman laboratory, for a Researcher Exchange to visit; Imperial College London, Dr. Robert Sinden Laboratory; Centre for Clinical Malaria Studies, Nijmegen, The Netherlands, Laboratory of Dr. Robert Sauerwein; Leiden Malaria Research Group, Leiden, The Netherlands, Dr. Chris J. Janse Laboratory; and University of Glasgow, Scotland, Dr. Lisa Ranford-Cartwright Laboratory.
- Pravin Rajasekaran, Walter & Eliza Hall Institute, for a Researcher Exchange to visit Professor Robert Menard at Pasteur Institute, Paris, France.
- Michelle Boyle, Burnet Institute, for a Researcher Exchange to visit Kenya Medical Research Institute, Peter Bull to use plasma samples available in Kilifi to investigate the role of complement in humoral immunity targeting *P.falciparum* infected RBCs (pRBCs) and develop assays to measure complement fixation by antibodies.
- Dr Simon Apte, QIMR, to attend Cyto2012, Workshop - Malaria Cytometry in Leipzig Germany and then a Researcher Exchange to National Institute for Medical Research, Mill Hill, London; Prof. Jean Langhorne's Laboratory to help the host immune response to infection, in particular the role of CD4+T cells.
- Uyen To Nguyen, The Australian National University, for a Researcher Exchange to visit Odile PUJALON Institut Pasteur, Molecular Parasite Immunology Unit, Dept of Parasitology and Mycology to learn protocols and techniques in tissue culture and in the manipulation of isolated perfused human spleens and micro-beads systems and then conduct the perfusion experiments with human spleen.
- Chaitali Dekiwadia, PhD, Postdoc Research Officer, Laboratory of Dr. Stuart Ralph, Department of Biochemistry and Molecular Biology, The University of Melbourne for a Researcher Exchange to visit Dr. Friedrich Frischknecht Universitätsklinikum Heidelberg Dept. für Infektiologie, Parasitologie Heidelberg, Germany to gain practical and theoretical experience in cryoelectron tomography, a method that is expertly practiced in EviMalar Laboratories at the University of Heidelberg.
- Carla Proietti, PhD, Post-doctoral fellow, Molecular Vaccinology Laboratory (Doolan Laboratory), Queensland Institute of Medical Research for a Researcher Exchange to visit the Laboratory of Professor Chris Newbold, Weatherall Institute of Molecular Medicine, University of Oxford, UK, and Wellcome Trust Workshop "Working with Parasite Database Resources", Wellcome Trust Sanger Institute (WTSI), Hinxton, UK.
- Dr Clare Smith, University of Tasmania/ Menzies Research Institute Tasmania. Researcher exchange to investigate the role of host enzymes in the liver-stage of malarial infection in the laboratory of Maria Mota, Malaria Unit, Institute of Molecular Medicine, University of Lisbon.
- Melanie Shears, PhD candidate, McFadden Laboratory, The School of Botany, The University of Melbourne. Metabolomics of Protozoan Parasites Workshop, University of Glasgow and Strathclyde University.
- Dr Cyrille Botté, Research Fellow, McFadden Laboratory, The School of Botany The University of Melbourne Metabolomics of Protozoan Parasites Workshop, University of Glasgow and Strathclyde University.
- Ghizal Siddiqui, PhD student, Monash University, Cooke Laboratory, Researcher exchange to the laboratory of Leicester University, Tobin Laboratory to gain technical expertise.
- Katherine Jackson, Melbourne University, Bio21 will attend the Wellcome Trust Malaria Experimental Genetics workshop at Wellcome Trust Genome Campus, Hinxton, Cambridge.

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- Shamista Selvarajah, Department of Medicine, RMHIWH, University of Melbourne will travel to The Netherlands for a Research Exchange with Dr Richard Bartfai and Prof Hendrik Stunnenberg at the Department of Molecular Biology, Radboud University, Nijmegen and the Center for Molecular Life Sciences, Nijmegen for a collaborative project on the ATP-dependent chromatin remodelling SWR1 complex in *Plasmodium falciparum*.
- Dr Ming Kalanon, Postdoctoral researcher, School of Medicine, Deakin University for a Research Exchange with Prof. Robert Menard laboratory at Institut Pasteur, in France.
- Mr Lee M Yeoh, PhD student, University of Melbourne for a Training program EMBL-EBI/Wellcome Trust Summer School in Bioinformatics at Wellcome Trust Genome Campus, Hinxton, Cambridge, UK.
- Renate Zelger, PhD student, The Australian National University, Research School of Biology, Maier Lab, Canberra, for a Research Exchange with Kenya Medical Research Institute, Centre for Geographic Medicine Research, Kilifi to Evaluation of the new ultrasensitive immuno-qPCR assay for detection of malaria parasites in clinical samples in Kilifi, Kenya
- Dr. Wilson Wong, Research Officer, Walter and Eliza Hall Institute/ Dr. Jake Baum's Laboratory, for a Research Exchange to Sanger Institute, Hinxton and the Laboratory of Molecular Biology, Cambridge to combine parasitology with state of the art cryoelectron microscopy towards solving or establishing the foundations to solve the ribosome structure.
- Rebecca Stewart, PhD Candidate, Tonkin Lab, Walter and Eliza Hall Institute, for a Research Exchange to Frischknecht Lab, Heidelberg University and for the EMBL Advanced Course in Fluorescent Imaging in Heidelberg.
- Christopher N Weir, Ph.D student, Walter and Eliza Hall Institute, Prof. Alan Cowman's lab, for a Research Exchange to Dr Sarah Reece's group at the Institutes of Evolution, Immunology and Infection Research (University of Edinburgh) to investigate the evolution, diversity and importance of the essential *Plasmodium falciparum* parasite protein, PfRh5 and its interacting partner PfRipr.
- Leonardo Lucantoni, PhD, postdoctoral fellow, Griffith University / Eskitis Institute for Drug Discovery / Discovery Biology/ Prof. Vicky Avery's laboratory, for a Research Exchange to Istituto Superiore di Sanità / Dipartimento di Malattie Infettive, Parassitarie ed Immunomediate / Dr. Pietro Alano's laboratory (Italy).
- Andrew Teo, PhD student, University of Melbourne, Department of Medicine, Rogerson Laboratory, for a Research Exchange to Professor Ali Salanti, Professor Thor Theander and Professor Lars Hviid at the Department of International Health, Immunology and Microbiology, CMP University of Copenhagen, Denmark 9 May 2014 - 27 June 2014
- Sarah Charnaud, PhD student, Brendan Crabb and Paul Gilson laboratory, Burnet Institute, Melbourne, for a Research Exchange to Sanger Institute, Hinxton, Cambridge, UK 6 weeks in May, to coincide with the EviMalaR Conference, EMBL Heidelberg 12-14 May (co-funded with ASP Network for Parasitology Travel Award scheme
- Fiona Angrisano, PhD student, Walter & Eliza Hall Institute – Baum Laboratory, for a Research Exchange to Laboratory of Dr Oliver Billker, Wellcome Trust Sanger Institute, Hinxton, Cambridgeshire, UK, 19th May - 19th August 2014
- Clara Lin, PhD Candidate, Walter and Eliza Hall Institute of Medical Research, Infection and Immunity, Cowman Lab, for a Research Exchange to University of Heidelberg, Department of Parasitology, Friedrich Frischknecht 5 May to 3 September 2014 with BioMalPar Conference from 12 May –14 May and visit to EMBL Hamburg for 1 week in between for research exchange with Svergun group.
- Professor James McCarthy, QIMR Berghofer Medical Research Institute, for EviMalaR-funded workshop: "Plasmodium

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falciparum host parasite interplay in the Human Bone Marrow” and Research Visit Location: Harvard School of Public Health, Boston, June 23 – 27, 2014

- Professor Leann Tilley, Department of Biochemistry and Molecular Biology, The University of Melbourne, for EviMalaR-funded workshop: “Plasmodium falciparum host-parasite interplay in the Human Bone Marrow and Research Visit Location: Harvard School of Public Health, Boston, June 23 – 28, 2014
- Dr Matthew Dixon, NHMRC Research Fellow, Department of Biochemistry and Molecular Biology, The University of Melbourne, for EviMalaR funded workshop: “Plasmodium falciparum host-parasite interplay in the Human Bone Marrow and Research Visit Location: Harvard School of Public Health, Boston, June 23 – 30, 2014
- Kylie Renee James, QIMR Berghofer Medical Research Institute, to visit Laboratories of Dr Oliver Billker and Dr Sarah Teichmann at the Genome Campus, Hinxton, UK
- Grennady Wirjanata, Menzies School of Health Research, to visit Lanzer lab, University of Heidelberg, Germany
- Dr Johanna Dups, The John Curtin School of Medical Research, ANU, for collaborative field and laboratory work with Drs Francis Ndungu and Kevin Marsh at The Kenya Medical Research Institute (KEMRI)
- Dr Philippe Boeuf, The University of Melbourne, to visit Prof Artur Scherf and Prof Chetan Chitnis at the Pasteur Institute, Paris, France
- Dr Gaoqian Feng, The Burnet Institute to visit Centre for Geographic Medicine Research of the Kenya Medical Research Institute in Kilifi, Kenya (Dr Francis Ndungu and Dr Faith Osier)
- Steven Kho, Menzies School of Health Research, Darwin to visit Professor Hernando del Portillo, Barcelona Centre for International Health Research (CRESIB), Hospital Clinic - Universitat de Barcelona, Barcelona, Spain & Dr Pierre Buffet, Parasitology and Mycology Unit, and French National Center for Metropolitan Malaria, de l'Hôpital Pitié-Salpêtrière, Paris, France
- Dr Sarah Auburn, Menzies School of Health Research to visit the laboratory of Prof Dominic Kwiatkowski at the Wellcome Trust Centre for Human Genetics, Oxford, UK
- Dr Teresa Carvalho, Monash University to visit Menard lab at Pasteur Institute & Gamain's lab at Institut National de Transfusion sanguine, Paris, France
- Jingyi Tang, University of Melbourne, for a EMBO practical course of Analysis of HighThroughput sequencing data and Wellcome Trust Chromatin structure and function advanced course Genome Campus, Hinxton, UK
- Dr Sabine Fletcher, Eskitis Institute for Drug Discovery, Griffith, to visit Ponzi's lab at Instituto Superiore de Sanita, Rome, Italy
- Prof Christian Doerig, Monash University to visit Billker/ Rayner groups at Wellcome Trust Sanger Institute Hinxton, UK and collaborators in Bern (Volker Heussler), Pasteur/Paris (Artur Scherf) and Montpellier (Catherine Braun-Breton)
- Dr James McCarthy, QIMR Berghofer MRI to visit visit Dr Simon Draper at University of Oxford
- Danushka Marapana PhD student, WEHI, Cowman laboratory for a Researcher Exchange to University of Heidelberg/ Friedrich Frischknecht
- Sofonias Tessema, PhD student, WEHI, Barry laboratory for a Researcher Exchange to the Lavstsen laboratory at the University of Copenhagen.
- Dr Michael Duffy, Laboratory Head, Peter Doherty Institute, University of Melbourne for a Researcher Exchange to Till

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Voss' laboratory, Swiss Tropical & Public Health Institute Swiss TPH, Department of Medical Parasitology and Infection

- Charles Jennison, PhD Student, WEHI, Boddey Laboratory for a Researcher Exchange to London School of Hygiene and Tropical Medicine insectary and the Laboratory of Prof. Maria Mota, Instituto de Medicina Molecular, Lisbon Portugal.
- Janavi Suresh Rambhatla, PhD Student, University of Melbourne, Department of Medicine (RMH) in Professor Stephen Rogerson's Laboratory for a Researcher Exchange to Professor Lars Hviid, Professor Thor Theander, & Dr Thomas Lavstsen at Department of International Health, Immunology and Microbiology, Centre for Medical Parasitology, University of Copenhagen, Denmark.
- Michaela Petter, University of Melbourne, Department of Medicine, Peter Doherty Institute, Duffy Lab for a Researcher Exchange to Prof. Egbert Tannich at the Bernhard Nocht Institute, Department of Molecular Parasitology, Hamburg, Germany.
- Jingyi Tang, Department of Medicine (RMH) of the University of Melbourne to attend the Wellcome Trust Chromatin Structure and Function Advanced Course in Genome Campus, Hinxton, Cambridge, UK.
- Andrew Teo, PhD student, University of Melbourne, Department of Medicine, Rogerson Laboratory for a Researcher Exchange to to Professor Ali Salanti, Professor Thor Theander and Professor Lars Hviid at the Department of International Health, Immunology and Microbiology, CMP University of Copenhagen, Denmark.
- Geoff McFadden, University of Melbourne, for Researcher Exchanges with the Kenya Medical Research Institute in Kilifi, Kenya in November 2010, December 2011 and July 2012.