

Annual Report
2013



Introduction

I AM DELIGHTED TO PRESENT TO YOU THE 2013 ANNUAL REPORT FOR THE AUSTRALIAN SOCIETY FOR PARASITOLOGY INC., WHICH HAS BEEN PREPARED BY OUR ASP NETWORK TEAM, LISA JONES AND NICK SMITH.

The ASP continued to offer Researcher Exchange, Training and Travel Awards and its Mentorship Scheme in 2013. Additionally, scientific exchange opportunities for malaria researchers were provided via the OzeMalaR Researcher Exchange Scheme, which was administered by the tirelessly inspiring, Lisa Jones, through the ASP Network. These small grants have proven ability to influence the careers of our young researchers and it is a thrill to see that, in 2013, several past recipients won fellowships or grants to fund their research work.

Parasitology research in Australia continued to flourish, with 480 research papers published in 2013, more than 25 million dollars worth of grants awarded (in an extremely challenging funding environment), and various honours bestowed on ASP Members.

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 2013.

First, the Council of the Society, all of who work enthusiastically on behalf of all members. My thanks to Kathy Andrews and Aaron Jex (Treasurers), Rob Adlard and David Piedrafita (Executive Secretaries), Denise Doolan (Vice-President), Richard Allen (ACT rep.), Lesley Warner and Ryan O'Handley (SA Rep.), Colin Stack (NSW rep.), Melanie Leef (Tasmania rep.), Jutta Marfult (NT rep.), Neil Young and Abdul Jabbar (Victorian reps) Terry Miller and Mark Pearson (QLD reps), Alan Lymbery (WA rep.), Chris Peatey (Incorporation Secretary), Roger Prichard and Peter O'Donoghue (Bancroft-Mackerras Medal Convenors), Jason Mulvenna



ASP President, Robin Gasser

(Webmaster), Alex Loukas (IJP Editor), Kevin Saliba & Andrew Kotze (IJP:DDR Editors), Andy Thompson (IJP:PAW Editor), Haylee Weaver (Archivist), Nick Smith (Network Convenor) and Lisa Jones (Newsletter Editor and Network Communications Coordinator).

Second, the Researcher Exchange, Training and Travel Assessment Committee had an exceptionally hard job in 2013, with a huge number of quality applications to consider and limited funding to dispense. Thanks to Una Ryan (Chair), Geoff McFadden, Jake Baum, Rowena Martin, Kate Hutson, Brendan McMorran, Deb Holt and, of course, Nick Smith and Lisa Jones. We also thank the OzeMalR Researcher Exchange Assessment Committee: Geoff McFadden, Denise Doolan, Ric Price, Chris Engwerda, Dominique Soldati-Favre, Andy Waters, Kevin Saliba, Klaus Lingelbach and, again, Nick Smith and Lisa Jones.

Introduction cont.

The 2013 ASP Conference was held in Perth in conjunction with the WAAVP Conference and was a highlight of the year. It was attended by over 600 delegates from 24 countries but more than 300 delegates were from Australia. The ASP is grateful to the conference organising committee, Andy Thompson, Brown Besier, Alan Lymberry, Amanda Ash, Robert Dobson, Stephanie Godfrey, Russ Hobbs, Caroline Jacobson, Louise Pallant, Dieter Palmer, Nick Smith and Lisa Jones. The Society is also extremely thankful to Cinzia Cantacessi and Terry Miller, and Amanda Ash for organising hugely successful training workshops on “Bioinformatics and Phylogeny” and “Wildlife Parasitology”, respectively, in Perth in August. Thankyou also to Andy Thompson and Mal Jones for hosting a thoroughly entertaining and informative public event in Perth in August – Parasites and Pets, Parasites and You...What do you really think you know? – which enthralled and amused members of the local public and conference delegates alike. This event was supported by a grant from the Inspiring Australia initiative. This grant, secured by Lisa Jones and Nick Smith, from the Commonwealth Government also financed hugely successful public events at Perth Zoo, Parasites in Focus (with thanks to Cinzia Cantacessi, Terry Miller and Kathy Andrews for their enthusiastic assistance to Nick and Lisa), a Young Parasitologists Club at the Perth Convention Centre (with thanks to Nick and Lisa’s able assistants, Maria Meuleman, Lind Ly, Melissa Martin, Gillian Fisher and Jess Engel) and a “Profs and Pints” evening at Aviary Rooftop Bar in Perth, featuring Peter O’Donoghue and Stephanie Godfrey. This grant is helping the ASP further its outreach and public education ambitions. It has facilitated the staging of events and workshops across Australia in 2012 and 2013 with more to come in 2014, especially in association with the ASP’s 50th Anniversary Conference in Canberra.

Robin Gasser
President of the ASP



Cover: Schoolchildren in Hunan Province, China, washing their lunch bowl (Photo: Franziska Bieri). Taken as part of the University of Queensland and Hunan Institute of Parasitic Diseases' *Magic Glasses* project.

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ASP Network

THE MISSION OF THE ASP NETWORK FOR PARASITOLOGY IS TO:

- FOCUS AND ENHANCE AUSTRALIA'S FUNDAMENTAL, STRATEGIC AND APPLIED PARASITOLOGY RESEARCH CAPABILITIES TO UNDERSTAND PARASITISM, PARASITE BIOLOGY AND PARASITIC DISEASE; AND
- TO USE THAT UNDERSTANDING TO DISCOVER AND DEVELOP SUSTAINABLE CONTROL STRATEGIES TO IMPROVE AND MAINTAIN THE HEALTH AND WELL-BEING OF HUMANS AND ANIMALS.

The ASP, through its Network aims to:

- organise and fund conferences, workshops and meetings for scientists, industry representatives, end-users (e.g. farmers, veterinarians, wildlife experts), government representatives and community groups, including participation by international experts;
- foster and finance exchange of staff between national and international research institutions to maximise access to key infrastructure, equipment, expertise and supervision and to encourage the growth of new collaborative relationships;
- provide mentoring, training and grant writing support for young investigators.

Contribution to the National Research Priorities

Australia's National Research Priorities were rewritten in 2013 (see <http://www.innovation.gov.au/Research/pages/StrategicresearchPriorities.aspx>). ASP Members contribute



This page and next:
Images from ASP/WAAVP,
Perth, August 2013

ASP Network cont.

significantly to three of Australia's stated research priorities (see the publication lists in Appendix 1 of this annual report):

[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.

Governance

The Network Convenor and Communications and Strategic Planning Coordinator report directly to the ASP Council and are responsible for implementing the strategies and initiatives agreed with Council. The Network has a specific committee for assessing Researcher Exchange, Training and Travel Awards:

Prof. Una Ryan (Chair; Murdoch University); Lisa Jones (Communications and Strategic Planning Coordinator; Executive Officer); Prof. Nick Smith (Convenor, James Cook University); Prof. Geoff McFadden (University of Melbourne); Dr Rowena Martin (Australian National University); Dr Brendan McMorran (Menzies Institute, University of Tasmania); Dr Kate Hutson (James Cook University); Dr Jake Baum (Walter and Eliza Hall Institute of Medical Research) and Dr Deb Holt (Menzies School, Darwin).



Progress on Initiatives

Website and Newsletter

The ASP website is administered by Dr Jason Mulvenna and Lisa Jones and the address is www.parasite.org.au. In combination with the ASP Newsletter, which was published four times in 2013, the website keeps ASP Members informed about developments and opportunities provided by the ASP, the ASP Network. It also highlights achievements of ASP members. Newsletters can be downloaded from the ASP website.

Scientific Conferences and Workshops: ASP Annual Conference

The 2013 annual meeting of the Australian Society for Parasitology Inc. was held at the Perth Convention Centre in August 2013, in conjunction with the WAAVP Conference. It attracted over 600 delegates from 24 countries, including over 300 delegates from Australian.

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

Elsevier Lectures

- Adrian Hehl (University of Zurich, Switzerland), IJP Lecturer - Filling the gaps: expression profiling of zoonotic Apicomplexa in definitive hosts
- Georg von Samson-Himmelstjerna (Freie Universität Berlin, Germany), IJP:DDR Lecturer - Specific and/or unspecific mechanisms of anthelmintic resistance: How could we tackle this conundrum?
- Susan Kutz (University of Calgary), IJP:PAW Lecturer - Wildlife Parasitism in a Changing Climate: Shifting boundaries, barriers, and paradigms

ASP Invited Lecturers

- John Dalton (McGill University, Canada), Immunomodulatory Molecules of *Fasciola hepatica*: Candidates for Both Vaccine and Immunotherapeutic Development
- Julie Fitzpatrick (Moredun Research Institute, Scotland), Global food security – the impact of veterinary parasites and parasitologists
- Susan Little (Oklahoma State University), Future Challenges for Parasitology: Vector Control and One Health in the Americas

Plenary Lecturers

- Brown Besier (Western Australian Department of Agriculture and Food) and Ian Beveridge (The University of Melbourne), Veterinary parasitology in Australia – a short history
- Johannes Eckert (University of Zurich, Switzerland), World Association for the Advancement of Veterinary Parasitology: The 50th Anniversary in 2013 - History, Achievements, and Future Perspectives
- Doug Gray (Australian Centre for International Agricultural Research), Parasitology for the hungrier, warmer, riskier world of 2050
- Ronald Kaminsky (Novartis Animal Health, Switzerland), Worms - A "License to Kill"
- Norbert Mencke (Bayer Animal Health, Germany), Future Challenges for Parasitology: Vector Control and One Health in Europe
- Yaowalark Sukthana (Mahidol University, Thailand), One World Health: Whose World, Whose Health?

Progress on Initiatives cont.



Images from ASP/WAAVP,
Perth, August 2013

- Paul Torgerson (University of Zurich, Switzerland), One World Health: Socioeconomic Burden and Parasitic Disease Control Priorities

ASP Presidential Address

Denise Doolan (Queensland Institute of Medical Research)

ECR Workshops

For the third time this year in conjunction with the ASP conference, ASP Workshops were held. These workshops were offered to students and early career researchers (ECRs). The themes were: Australian Wildlife Parasitology (organized by Amanda Ash) and Bioinformatics and Phylogenetics (organized by Terry Miller and Cinzia Cantanessi). Both were very well received by our ECRs on Sunday 25th August at Murdoch University. We would like to thank Amanda, Terry and Cinzia who put a lot of time and energy into organising these workshops and preparing course work material.

Researcher Exchange, Training and Travel Awards

JD Smyth Travel Award winners

Danika Hill, PhD Student, WEHI for a Researcher Exchange visit to CRESIB and Swiss TPH

Victoria Morin-Adeline, PhD Student, University of Sydney, for a Workshop: CLC bio and BioBam (Blast2GO) Brisbane 3 Day Workshop

Gabrielle Josling, PhD Student, University of Melbourne, for Researcher Exchange to visit Dr Raymond Hui, Structural Genomics Consortium, Toronto Canada

ASP Network Travel Award winners

Sarah Roseann Catalano, PhD Student, University of Adelaide, Researcher Exchange Santa Barbara Museum of Natural History (SBMNH) to work with the Curator of Malacology, Dr Daniel Geiger

Progress on Initiatives cont.

Dr Michelle Power, Macquarie University, for a Researcher Exchange to in the laboratory of Dr Yannick Moret at Équipe Écologie Évolutive, University of Bourgogne, Dijon France

Dr Louise Randall, University of Melbourne for a Human Placenta Workshop, Queen's University, Kingston, ON, Canada

Mark Polinski, PhD Candidate, University of Tasmania, Researcher Exchange to Autonomous University of Barcelona, Spain

Melanie Shears, PhD Student, The University of Melbourne, Training course 14 June – 28 September 2013 MBL Biology of Parasitism Course followed by a 4 week Researcher Exchange to Pennsylvania State University to work with Dr Manuel Linas

Shamista Selvarajah, PhD student, The University of Melbourne, Duffy Laboratory, Researcher Exchange to visit Dr. Richard Bartfai and Prof. Hendrik Stunnenberg in The Netherlands for a collaborative project on the ATP-dependent chromatin remodelling SWR1 complex in the malaria parasite *Plasmodium falciparum*

Em. Prof. Lesley Warner, SA Museum, for Researcher Exchange to finalize a book chapter for the Handbook of Zoology with Prof Horst Taraschewski, Department of Ecology and Parasitology, Zoological Institute, Karlsruhe Institute of Technology, Germany and to visit the Natural History Museum London to network with colleagues and visit the Museum Library

Esther Rajendran, PhD Candidate, The Australian National University funding to attend the BoP course held in Woods Hole, Massachusetts, at the Marine Biological Laboratories (MBL)

Dr Mark S Pearson, James Cook University, for Researcher Exchange to Professor Philip Felgner: Protein Microarray Laboratory and Infectious Disease School of Medicine, University of California, Irvine, CA, USA to spend 1 month in Dr Felgner's laboratory at University of California, Irvine

Leslie Vega, Veterinary Student Murdoch University for a Researcher Exchange to Omar Triana Chávez, Group for Biology

and Control of Infectious Diseases, University of Antioquia, Medellin Colombia

Dr Crystal Kelehear, University of Sydney for a Researcher Exchange with Dr Mark Torchin and Dr Roberto Ibáñez at the Smithsonian Tropical Research Institute (STRI) based in Panama.

OzEMalaR Travel Award winners

Congratulations to our latest OzEMalaR Travel Award winners:

- **Katherine Jackson**, Melbourne University, Bio21 will attend the Wellcome Trust Malaria Experimental Genetics workshop at Wellcome Trust Genome Campus, Hinxton, Cambridge.
- **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,

Progress on Initiatives cont.

Canberra, for a Research Exchange with Kenya Medical Research Institute, Centre for Geographic Medicine Research, Kilifi to Evaluation of the new ultra-sensitive 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 Welcome Trust 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, post-doctoral 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).

ASP Student Conference Travel Grant

The following 69 ASP students were awarded 2013 ASP Student Conference Travel Grants: Harshanie Abeywardena, Mahdis Aghazadeh, Brendan Ansell, MD Shakif-UI-Azam, Leah Brunt, Greta Busch, Alice Butterworth, Timothy Cameron, Sarah Catalano, Candy Chuah, Leah Cronin, Stephen Daniels, Pablo Diaz, Narelle Dybing, Tim Elliott, Samantha Emery, Jessica Engel, Gillian Fisher, Christie Foster, Stephen Goodswen, Catherine Gordon, Alison Hillman, Chris Hosking, Vanessa Howieson, Krista Jones, Jane Kelley, Eleanor Kerdo, Wan Koh, Melanie Koinari, Pasi Korhonen, Rasika Kumarasingha, Yee Leow, Siew May Loh, Natch Lorsuwannarat, Matthew Lott, Linda Ly, Md Abdullah Al Mamun, Stefano Mangiola, Melissa Beata Martin, Timothy Merritt, Adebayo Molehin, Victoria Morin-Adeline, Josephine Ng, Lan Nguyen, Gabor Pali, Unaiza Parkar Amanda Peers-Adams, Piyumali Perera, Sarah Preston, Shiwanthi Ranasinghe, Vignesh Rathinasamy, Elizabeth Read, Simone Reynolds, Ranbir Sarai, Leigh Schulte, Mary Shuttleworth, Felicity Smout, Melissa Sykes, Kingsley Tam, Craig Thompson, Yi Hui Ting, Erick Tjhin, Shu Qin Toh, Hasanah Uswatun, Wenqi Wang, Thomas Williams, Grennady Wirjanata, Amanda Worth, Tao Xu



Images from ASP/WAAVP, Perth, August 2013



Progress on Initiatives cont.

RESEARCHER EXCHANGE REPORTS

ALEXANDER BRAZENOR, PHD STUDENT FROM JAMES COOK UNIVERSITY, TOWNSVILLE WON AN ASP NETWORK FOR PARASITOLOGY TRAVEL AWARD FOR A RESEARCHER EXCHANGE TO VISIT DR TERRY BERTOZZI AT THE SOUTH AUSTRALIAN MUSEUM AND ASSOCIATE PROFESSOR IAN WHITTINGTON AT THE UNIVERSITY OF ADELAIDE AND THE SOUTH AUSTRALIAN MUSEUM. ALEXANDER REPORTS HERE ON HIS VERY SUCCESSFUL RESEARCHER EXCHANGE.

Flatworms of the genus *Neobenedenia* (Monogenea: Platyhelminthes) are recognised as serious and virulent parasites of tropical and subtropical marine finfishes. *Neobenedenia* spp. have been linked to a number of epizootic outbreaks in wild and farmed fishes. Understanding the host specificity of species within *Neobenedenia* is crucial to being able to predict and manage future outbreaks. Little is known about which species of *Neobenedenia* infect fish in Australian waters. The absence of distinguishing morphological characters between isolates hinders the ability to distinguish between species based on morphological examination (Whittington, 2004). As such, the aims of this exchange trip to Adelaide University were to determine how many species of *Neobenedenia*, pathogenic or otherwise, there are in tropical north Australia and which fish they parasitize. Investigation into the genetic relationships within and between *Neobenedenia* species will aid in distinguishing species that cause disease and epizootic events from those that do not. This will be crucial in being able to manage these parasites in aquaculture and aquaria.

I travelled to the University of Adelaide/South Australian Museum between the 1st and the 29th of March, 2013 in order to work on the population genetics of *Neobenedenia* isolates from wild and farmed fish. As part of this trip to Adelaide University, I took *Neobenedenia* isolates from 11 wild and 12 captive fish host species from a variety of locations across northern Australia and sequenced two nuclear genes, histone H3 and 28S, for five fluke individuals from each population. These genes were chosen so that my sequences could be integrated with that of Perkins et al. (2009), which has the best molecular framework for identification of capsalids. Assoc Prof Ian Whittington provided additional specimens from five different host fish for comparison.

Dr Terry Bertozzi possesses extensive knowledge in the molecular genetic analysis of capsalid monogeneans and his careful instruction ensured that I learnt how to extract DNA, perform PCR amplifications, run gel electrophoreses and analyse species sequence information obtained from the preserved *Neobenedenia* specimens. Assoc Prof Ian Whittington assisted in the morphological identification of many of the samples to genus level and also in slivering smaller specimens for DNA extraction. Extracting DNA from all preserved specimens occupied most of the first week in Adelaide with few complications. The remaining time was spent performing PCRs and fine tuning the parameters for maximal DNA amplification for the genes of interest. I also



Progress on Initiatives cont.

tried to build on a preliminary genetic framework for *Neobenedenia* based on the mitochondrial gene cytochrome B, however this study is in its infancy and I was not able to amplify my samples due to an incompatibility of the primers available. The work on this gene is being continued by Dr Terry Bertozzi and myself in correspondence. I was able to obtain sequences from the nuclear genes histone H3 and 28S for the majority of capsalid samples. Sequencing results are currently being compiled and analysed. This research significantly adds to broader questions that both Dr Terry Bertozzi and Assoc Prof Ian Whittington intend to work on pertaining to capsalid genetics.

The skills obtained during this trip will be useful not only in my PhD but for the rest of my scientific career. Both Dr Terry Bertozzi and Assoc Prof Ian Whittington offered unique and integral scientific educational experiences to developing and improving my knowledge of Monogenea and overall research abilities. The work undertaken during this researcher exchange trip contribute to the proposed publication, "Identifying *Neobenedenia* distribution and host-specificity by molecular characterisation" intending to be published in *Molecular Phylogenetics & Evolution*. This work comprises a major component of my PhD thesis on *Neobenedenia* sp. ecology, biology and physiology and represents the first of six data chapters in my PhD. I plan to continue to develop this research and present the results gained from this researcher exchange at the 2014 ASP conference in Canberra.



DR RAMA JAYARAJ FROM CHARLES DARWIN UNIVERSITY REPORTS ON HIS VISIT TO THAMMASAT UNIVERSITY IN THAILAND FOR HIS WORK ON LIVER FLUKES. RAMA WAS FUNDED THROUGH THE ASP NETWORK FOR PARASITOLOGY RESEARCHER EXCHANGE SCHEME.

I completed a one month researcher exchange in July 2013 to visit Thailand to work with Professor Rudi Grams at Thammasat University. Professor Grams is a world renowned parasitologist working in Thailand. The objective of my researcher exchange was to investigate the Immunolocalisation and in situ hybridization of stage specific cathepsin B and cathepsin L within the liver fluke, *Fasciola*. I was particularly keen to learn immunolocalisation techniques such as Immunofluorescence staining and Immunogold labelling and then implement and establish those techniques in our parasitology laboratory at Charles Darwin University. This has been a great success thanks to Dr Amornrat in Rudi's laboratory.

Most importantly, this training allowed me to sharpen my parasitological and immunolocalisation skills and they can now be used to expand the skill base and enable the formation of an immunoparasitology laboratory at the Charles Darwin University. Furthermore, it gave me the opportunity to personally interact with International scientists from different research facilities. This is something I don't often have the opportunity to do due to the isolated location of Darwin. I consider that the intensive research training I received in Thailand was a great professional development for me. Whilst in Thailand, I also gave a talk on "Cutting Edge Lecture: Molecular Parasitology" on 24th July 2013 at Thammasat University.

Previous page: Alexander Brazenor

This page: Rama Jayaraj training with Dr Amornrat

Progress on Initiatives cont.

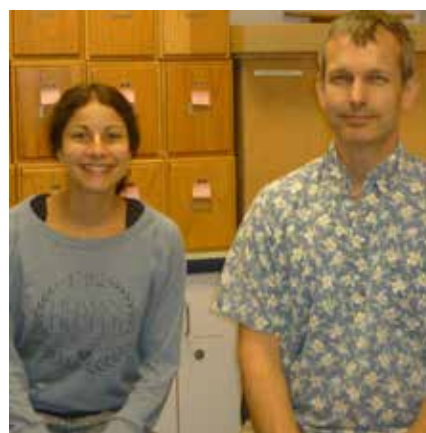
SARAH CATALANO, A PHD CANDIDATE AT THE UNIVERSITY OF ADELAIDE, DESCRIBES HER RESEARCHER EXCHANGE TO THE SANTA BARBARA MUSEUM OF NATURAL HISTORY (SBMNH), CALIFORNIA, USA.

This program allowed me to capitalize on my visit to North America, where I firstly attended and presented at the 88th Annual Meeting of the American Society of Parasitologists held in Quebec City, Canada. I was awarded a meritorious student prize for my presentation on dicyemid research in Australian waters, and subsequently invited by Prof Armand Kuris to give a presentation to his lab group at the University of California, Santa Barbara (UCSB), while visiting the SBMNH. This was an exciting and unexpected outcome which I accepted with delight. For my visit to the UCSB, I was given a tour of the campus, met undergraduate and graduate students in the lab group and learnt about their studies, presented my research on dicyemid parasites and explored possibilities for future projects and collaborations with Prof Kuris and his research team. Such an unanticipated opportunity would not have been possible without funding provided by the ASP for travel to Santa Barbara in the first instance.

The main purpose of my trip was to examine the extensive dicyemid type and voucher collections at the SBMNH. Over the past six months, the collection has been catalogued and systematically arranged, although a large proportion still included material of uncertain standing and without identification to genera and species. Upon examination of this material, I believe two previously described genera within Dicyemida are not valid. A manuscript will be drafted to explore this finding, with the possibility of molecular tools also being incorporated to support this notion.

Additionally, I was able to provide Dr Geiger with identifications on dicyemid species that were previously unknown. As the collection is extensive and not all material could be examined during my stay, Dr Geiger has offered to loan material for further examination on my return to Adelaide. A proportion of the collection also contains material from cephalopod species that have not been described. This material will be included in loans and new species descriptions will be drafted and published.

A final outcome of this visit to SBMNH was having the opportunity to meet and liaise with Dr Eric Hochberg, who has studied dicyemid parasites for over 35 years. Dr Hochberg has recently retired from the Museum, however he has a wealth of knowledge about this group and was enthusiastic and willing to share this



Sarah Catalano with Dr Eric Hochberg, Prof Armand Kuris and Dr Daniel Geiger

Progress on Initiatives cont.

information with me. He provided me with his personal notes on the standings and classifications of each genera, as well as access to older, obscure literature and notes by a past author, Dr Robert Short, who described the first dicyemid species from the southern hemisphere (New Zealand). We also discussed theories on the unknowns in the dicyemid life cycle and how transmission to the next host individual may occur. Dr Hochberg was in charge of managing and updating the webpage on Dicyemida in the World Register of Marine Species (WoRMS), however due to his retirement, he feels this is an obligation he can no longer fulfill. He offered this role over to me and it will now be my responsibility to ensure this list is frequently updated and reflects the valid

taxonomic entities within Dicyemida.

This research exchange has been nothing short of amazing! As I approach the end of my postgraduate studies, I am eagerly exploring the possibility of postdoctoral research. This research exchange has opened the door for me to overseas collaborations and allowed me to 'market' myself to an international network of researchers. In line with the aims of the ASP, the research exchange has definitely helped me to promote and facilitate interactions between colleagues, peers and potential research partners as well as create future professional development opportunities.



The entrance to the Santa Barbara Museum of Natural History

Progress on Initiatives cont.

LESLIE VEGA, VETERINARY STUDENT MURDOCH UNIVERSITY WON AN ASP NETWORK FOR PARASITOLOGY RESEARCHER EXCHANGE TO VISIT OMAR TRIANA CHÁVEZ, GROUP FOR BIOLOGY AND CONTROL OF INFECTIOUS DISEASES, UNIVERSITY OF ANTIOQUIA, MEDELLIN COLOMBIA.

I spent 9 weeks in Medellin, Colombia at the University of Antioquia, Group for the Biology and Control of Infectious Diseases. The aim was to study the epidemiology of Chagas disease and investigate the prevalence of the disease in the rural community of Peñon Duran, a territory of Talaigua Nuevo of the Bolivar department located on a fluvial island known as Margarita Island or Mompos Island. We also elected to include investigation of *Leishmania* based on reports of its presence in the region.

I had the opportunity to train under the guidance of Dr Lina Carrillo MV MSc, [Program for Study and Control of Tropical Disease, University of Antioquia] in Puerto Valdivia for two days. I assisted in collecting blood samples and skin biopsies from dogs for a project investigating *Trypanosoma cruzi* and cutaneous

leishmaniasis infection. I also had the opportunity to assist in field anesthesia, blood and skin sampling for any wildlife species that were caught in the area, including *Didelphis marsupialis*. This training aided me in preparing and organizing the laboratory work and fieldwork for my project in Peñon Duran.

The project in Peñon Duran was part of a larger public health campaign of Margarita Island. We met with the Secretary of Health of the region, Dr. Alexis de la Peña to review the aims of the project and discuss future campaigns for continuing surveillance of Chagas disease in this area. We were interviewed by the local news to promote the campaign in the hope that further studies can be performed uninhibited in the future and to promote awareness of the disease.

We were able to collect samples from 42 dogs, one *Didelphis* (opossum) and 50 community members. We visited the houses of community members to discuss the campaign, explain the process of Chagas and *Leishmania* transmission, and provide identification guides for the common triatomine species in the area.

Skill sets acquired include:

- Collaboration with research teams and community members utilizing Spanish as a second language
- Methods for identification and collection of Triatominae and Phlebotominae species
- Methods for trapping and handling sylvatic species for blood and tissue collection
- Methods for *Trypanosoma cruzi* diagnosis utilizing xenodiagnosis, ELISA and IFAT, and DNA extraction for PCR for *T. cruzi* and *Leishmania* diagnosis.



Left: Leslie Vega collecting a canine sample

Progress on Initiatives cont.

GABRIELLE JOSLING, PHD STUDENT, UNIVERSITY OF MELBOURNE WON A JD SMYTH TRAVEL AWARD FOR A RESEARCHER EXCHANGE TO VISIT DR RAYMOND HUI, AND TO ATTEND THE STRUCTURAL GENOMICS CONSORTIUM, TORONTO, IN AUGUST, 2013.

My visit Dr. Raymond Hui at the Structural Genomics Consortium, Toronto, was part of a collaborative project on bromodomain proteins in the malaria parasite *Plasmodium falciparum*.

Our lab has been investigating novel bromodomain proteins found only in alveolates. The bromodomain is a conserved motif that binds to acetylated lysine residues in histone tails. Acetylated histones are usually associated with active genes, so bromodomain proteins are generally involved in gene activation. Bromodomain inhibitors have recently been shown to be effective in treating models of cancer, inflammation and HIV, and thus novel bromodomain proteins in *P. falciparum* are promising drug targets.

I have been characterising two bromodomain proteins called BDP1 and BDP2 using techniques such as immunofluorescence assays, histone binding assays, and chromatin immunoprecipitation. These have shown that they are found in the parasite nucleus and are able to bind to parasite histones. In addition, I have shown that BDP1 is enriched in 5' untranslated regions of genes, which contain important regulatory regions. These observations are consistent with predicted role for both proteins in gene regulation.

To learn more bromodomain protein function, I have also made a malaria parasite line which allows BDP1 to be conditionally knocked down. This is the first time that this system has been used successfully in *P. falciparum* to functionally characterise an epigenetic regulator. Using this parasite line, I have shown that BDP1 is important in regulating parasite growth. Cells that produce lower levels of BDP1 show a dramatic growth defect due to a reduced ability to invade red blood cells. This exciting result shows that BDP1 is a regulator of genes involved in the essential

process of invasion, and is thus a potential drug target.

Dr Hui is an expert in structural biology who has already expressed the bromodomains of both BDP1 and BDP2 and has solved the structure of BDP1. During my visit to Dr. Hui's lab at the Structural Genomics Consortium, I attempted to crystallise the bromodomain protein BDP2 so that its structure could be solved. Having a structure for the protein will provide insight into the protein's function and mechanism of action, and will also be extremely useful in the development of bromodomain inhibitors for the treatment of malaria.

This visit to Dr. Hui's lab allowed me to learn about protein purification and crystallisation, which will be very useful for future work. This visit also allowed me to discuss the project in more detail to gain new ideas and perspectives on how to improve the project. This exchange also helped our labs establish a long lasting relationship which will lead to future collaborations.

Below: Gabrielle Josling



Significant Contributions and Highlights for 2013

2013 WAS ANOTHER YEAR OF RECONITION FOR AUSTRALIA'S PARASITOLOGY STARS.

In 2013, the ASP recognised the lifetime achievements in research of an outstanding parasitologist, **Professor David Kemp**, of the Queensland Institute of Medical Research, by making him a Fellow of the Society. (See our feature story)

The ASP recognised three of its young rising-stars by awarding them a JD Smyth Award: **Danika Hill** (Walter and Eliza Hall Institute of Medical Research); **Victoria Morin-Adeline** (The University of Sydney); and **Gabrielle Josling** (The University of Melbourne).

The Society also recognised the research achievements of several outstanding students and early career researchers at its 2013 conference:

Best Student Poster Prizes were won by **Victoria Morin-Adeline**, The University of Sydney (ASP Best Student Poster); **Felicity Smout**, James Cook University (WAAVP Best Student Poster).

Best Student 2 Minute Research Presentation Prizes were won by **Melissa Sykes**, Griffith University (ASP Best 2 Minute Student Presentation), and **German Canton**, Moredun Research Institute, Scotland (WAAVP Best 2 Minute Student Presentation).

Best Oral Presentation Prizes were won by **Samantha Emery**, Macquarie University (ASP Best Student Presentation), and **Sarah Catalano**, The University of Adelaide (WAAVP Best Oral Contributed Paper).

ASP Award for Best Presentation by an Early Career Researcher was won by **Rina Wong**, The University of Western Australia.

Elsevier Awards went to **Tarun Keswani**, University of Calcutta, India, **Sabine Richards**, University of Pretoria, South Africa and **Getachew Mulgeta Adako**, The Donkey Sanctuary, United Kingdom

The ASP recognised three excellent international colleagues with ASP 2013 International Invited Lectureships:

John Dalton (McGill University, Canada), Immunomodulatory Molecules of *Fasciola hepatica*: Candidates for Both Vaccine and Immunotherapeutic Development

Julie Fitzpatrick (Moredun Research Institute, Scotland), Global food security – the impact of veterinary parasites and parasitologists

Susan Little (Oklahoma State University), Future Challenges for Parasitology: Vector Control and One Health in the Americas

Other ASP Members honoured in 2013 included:

Don McManus (QIMR Berghofer Medical Research Institute) was elected a Fellow of the Society of Biology (FSB) (UK).

Franziska Bieri (QIMR Berghofer Medical Research Institute) was awarded the Research Australia Discovery Award. (See our feature story)

Cinzia Cantacessi (James Cook University) was awarded the 2013 NHMRC Frank Fenner Fellowship for Excellence in Biomedical Research (<https://www.nhmrc.gov.au/research-highlights/profile/cinzia-cantacessi>).

Jenefer Blackwell (The University of Western Australia) was awarded a Lifetime Contribution Award (in recognition of inestimable contribution to the field of leishmaniasis) at Worldleish 5 – The Fifth International Congress on Leishmaniasis, Porto de Galinhas, Brazil, in May, 2013.

Alan Cowman (Walter and Eliza Hall Institute of Medical Research) was awarded two prizes in 2103: the Victoria Prize for Science and Innovation through VESKI (Victorian Government) on 8/10/13 and The Mahathir Science Award from Malaysia on 31/10/13. (See our feature story)

Significant Contributions cont.

Alan Cowman, Emanuela Handman, Terry Speed, Malcolm McConville, Brendan Crabb, Graham Brown and Geoff McFadden (Walter and Eliza Hall Institute of Medical Research and The University of Melbourne) were ranked in the “Ten of the Best” NHMRC-funded research projects for 2013 for their work on malaria and leishmaniasis.

Alex Loukas (James Cook University) was also ranked in the “Ten of the Best” NHMRC-funded research projects for 2013 for his work on hookworms and schistosomes.

Barbara Nowak (University of Tasmania) was awarded the 2013 National Seafood Industry Awards Research Development and Extension Award for her FRDC Project 2008/228, Maintaining SBT High Health Status – understanding SBT parasites and investigating ways to mitigate their influence on SBT production. This collaborative project included ASBTIA, SARDI, Flinders University, University of Queensland, Queensland Museum, University of Tasmania and private veterinarians. Barbara was also awarded the 2013 Best R&D project at South Australian Seafood Awards for her project, Maintaining SBT High Health Status – understanding SBT parasites and investigating ways to mitigate their influence on SBT production.

Bernd Kalinna (The University of Melbourne) was appointed Editor in Chief of Experimental Parasitology.

Kieran Kirk (The Australian National University) was appointed Dean of the College of Medicine, Biology and the Environment at ANU. (See our feature story)

In the most challenging funding environment that many can ever recall, ASP members enjoyed some great successes in 2013, winning 55 new research grants and fellowships, securing over \$25 million of funding, from a diverse array of funding agencies, both at home and abroad. These are presented as Appendix 2.

With 480 publications involving Australian parasitologists in 2013 (see Appendix 1), there were innumerable highlights. However, at least a few deserve special mention.

First, the discovery and application of new drugs against parasites proceeded at a startling pace in 2013 with a diverse series of outstanding publications, including:

Burgess IF, Barker SC, Mumcuoglu KY. [Topical ivermectin lotion for head lice](#). N Engl J Med. 2013 Mar 7;368(10):966-7.

Goodman CD, Useglio M, Peirú S, Labadie GR, McFadden GI, Rodríguez E, Gramajo H. [Chemobiosynthesis of new antimalarial macrolides](#). Antimicrob Agents Chemother. 2013 Feb;57(2):907-13.

Klonis N, Xie SC, McCaw JM, Crespo-Ortiz MP, Zaloumis SG, Simpson JA, Tilley L. [Altered temporal response of malaria parasites determines differential sensitivity to artemisinin](#). Proc Natl Acad Sci U S A. 2013 Mar 26;110(13):5157-62.

Lucantoni L, Duffy S, Adjalley SH, Fidock DA, Avery VM. [Identification of MMV malaria box inhibitors of plasmodium falciparum early-stage gametocytes using a luciferase-based high-throughput assay](#). Antimicrob Agents Chemother. 2013 Dec;57(12):6050-62.

Miyamoto Y, Kalisiak J, Korthals K, Lauwaet T, Cheung DY, Lozano R, Cobo ER, Upcroft P, Upcroft JA, Berg DE, Gillin FD, Fokin VV, Sharpless KB, Eckmann L. [Expanded therapeutic potential in activity space of next-generation 5-nitroimidazole antimicrobials with broad structural diversity](#). Proc Natl Acad Sci U S A. 2013 Oct 22;110(43):17564-9.

Moyle PM, Hartas J, Henningham A, Batzloff MR, Good MF, Toth I. [An efficient, chemically-defined semisynthetic lipid-adjuvanted nanoparticulate vaccine development system](#). Nanomedicine. 2013 Oct;9(7):935-44.

Spillman NJ, Allen RJ, McNamara CW, Yeung BK, Winzeler EA, Diagana TT, Kirk K. [Na\(+\) regulation in the malaria parasite Plasmodium falciparum involves the cation ATPase PfATP4 and is a target of the spiroindolone antimalarials](#). Cell Host Microbe. 2013 Feb 13;13(2):227-37. **(See feature story)**

WorldWide Antimalarial Resistance Network (WWARN) DP Study Group. [The effect of dosing regimens on the antimalarial efficacy](#)

Significant Contributions cont.

[of dihydroartemisinin-piperazine: a pooled analysis of individual patient data.](#) PLoS Med. 2013 Dec;10(12):e1001564.

Second, veterinary and human parasitologists alike, embraced a new nanotechnology solution to vaccination:

Ahmad Fuaad AA, Jia Z, Zaman M, Hartas J, Ziora ZM, Lin IC, Moyle PM, Batzloff MR, Good MF, Monteiro MJ, Skwarczynski M, Toth I. [Polymer-peptide hybrids as a highly immunogenic single-dose nanovaccine.](#) Nanomedicine (Lond). 2014 Jan;9(1):35-43.

Gamvrellis A, Gloster S, Jefferies M, Mottram PL, Smooker P, Plebanski M, Scheerlinck JP. [Characterisation of local immune responses induced by a novel nano-particle based carrier-adjuvant in sheep.](#) Vet Immunol Immunopathol. 2013 Sep 1;155(1-2):21-9.

Third, genomes of parasites were decoded:

Gohil S, Kats LM, Seemann T, Fernandez KM, Siddiqui G, Cooke BM. [Bioinformatic prediction of the exportome of Babesia bovis and identification of novel proteins in parasite-infected red blood cells.](#) Int J Parasitol. 2013 Apr;43(5):409-16.

Schwarz EM, Korhonen PK, Campbell BE, Young ND, Jex AR, Jabbar A, Hall RS, Mondal A, Howe AC, Pell J, Hofmann A, Boag PR, Zhu XQ, Gregory TR, Loukas A, Williams BA, Antoshechkin I, Brown CT, Sternberg PW, Gasser RB. [The genome and developmental transcriptome of the strongylid nematode Haemonchus contortus.](#) Genome Biol. 2013 Aug 28;14(8):R89.

Zerlotini A, Aguiar ER, Yu F, Xu H, Li Y, Young ND, Gasser RB,

Protasio AV, Berriman M, Roos DS, Kissinger JC, Oliveira G. [SchistoDB: an updated genome resource for the three key schistosomes of humans.](#) Nucleic Acids Res. 2013 Jan;41(Database issue):D728-31.

Zheng H, Zhang W, Zhang L, Zhang Z, Li J, Lu G, Zhu Y, Wang Y, Huang Y, Liu J, Kang H, Chen J, Wang L, Chen A, Yu S, Gao Z, Jin L, Gu W, Wang Z, Zhao L, Shi B, Wen H, Lin R, Jones MK, Brejova B, Vinar T, Zhao G, McManus DP, Chen Z, Zhou Y, Wang S. [The genome of the hydatid tapeworm Echinococcus granulosus.](#) Nat Genet. 2013 Oct;45(10):1168-75.

Fourth, intricacies of the host parasite relationship of malaria were dissected at increasingly finer resolution:

Boeuf P, Aitken EH, Chandrasiri U, Chua CL, McInerney B, McQuade L, Duffy M, Molyneux M, Brown G, Glazier J, Rogerson SJ. [Plasmodium falciparum malaria elicits inflammatory responses that dysregulate placental amino acid transport.](#) PLoS Pathog. 2013 Feb;9(2):e1003153.

Botté CY, Yamaryo-Botté Y, Rupasinghe TW, Mullin KA, MacRae JI, Spurck TP, Kalanon M, Shears MJ, Coppel RL, Crellin PK, Maréchal E, McConville MJ, McFadden GI. [Atypical lipid composition in the purified relict plastid \(apicoplast\) of malaria parasites.](#) Proc Natl Acad Sci U S A. 2013 Apr 30;110(18):7506-11.

Cockburn IA, Amino R, Kelemen RK, Kuo SC, Tse SW, Radtke A, Mac-Daniel L, Ganusov VV, Zavala F, Ménard R. [In vivo imaging of CD8+ T cell-mediated elimination of malaria liver stages.](#) Proc Natl Acad Sci U S A. 2013 May 28;110(22):9090-5.



This page and next:
ASP-Inspiring Australia event
Perth Zoo, August 2013

Significant Contributions cont.

Dutta S, Dlugosz LS, Drew DR, Ge X, Ababacar D, Rovira YI, Moch JK, Shi M, Long CA, Foley M, Beeson JG, Anders RF, Miura K, Haynes JD, Batchelor AH. [Overcoming antigenic diversity by enhancing the immunogenicity of conserved epitopes on the malaria vaccine candidate apical membrane antigen-1](#). PLoS Pathog. 2013 Dec;9(12):e1003840.

Good MF, Reiman JM, Rodriguez IB, Ito K, Yanow SK, El-Deeb IM, Batzloff MR, Stanisic DI, Engwerda C, Spithill T, Hoffman SL, Lee M, McPhun V. [Cross-species malaria immunity induced by chemically attenuated parasites](#). J Clin Invest. 2013 Jul 1. 123:3353-62.

Pinzon-Charry A, Woodberry T, Kienzle V, McPhun V, Minigo G, Lampah DA, Kenangalem E, Engwerda C, López JA, Anstey NM, Good MF. [Apoptosis and dysfunction of blood dendritic cells in patients with falciparum and vivax malaria](#). J Exp Med. 2013 Jul 29;210(8):1635-46.

Regev-Rudzki N, Wilson DW, Carvalho TG, Sisquella X, Coleman BM, Rug M, Bursac D, Angrisano F, Gee M, Hill AF, Baum J, Cowman AF. [Cell-cell communication between malaria-infected red blood cells via exosome-like vesicles](#). Cell. 2013 May 23;153(5):1120-33. **(See feature story)**

Riglar DT, Rogers KL, Hanssen E, Turnbull L, Bullen HE, Charnaud SC, Przyborski J, Gilson PR, Whitchurch CB, Crabb BS, Baum J, Cowman AF. [Spatial association with PTEX complexes defines regions for effector export into Plasmodium falciparum-infected erythrocytes](#). Nat Commun. 2013;4:1415.

Walker PG, Griffin JT, Cairns M, Rogerson SJ, van Eijk AM, ter Kuile F, Ghani AC. [A model of parity-dependent immunity to placental malaria](#). Nat Commun. 2013;4:1609.

Fifth, a potentially zoonotic hookworm was discovered in Australian dingoes:

Smout FA, Thompson RC, Skerratt LF. [First report of Ancylostoma ceylanicum in wild canids](#). Int J Parasitol Parasites Wildl. 2013 May 13;2:173-7. **(See feature story)**

Sixth, a novel, high-pressure freezing technique helped expose the subcellular location of a leading vaccine candidate in schistosomes:

Schulte L, Lovas E, Green K, Mulvenna J, Gobert GN, Morgan G, Jones MK. [Tetraspanin-2 localisation in high pressure frozen and freeze-substituted Schistosoma mansoni adult males reveals its distribution in membranes of tegumentary vesicles](#). Int J Parasitol. 2013 Sep;43(10):785-93. **(See feature story)**

And, seventh, a highly innovative and effective health education tool was developed:

Bieri FA, Gray DJ, Williams GM, Raso G, Li YS, Yuan L, He Y, Li RS, Guo FY, Li SM, McManus DP. [Health-education package to prevent worm infections in Chinese schoolchildren](#). N Engl J Med. 2013 Apr 25;368(17):1603-12. **(See feature story)**



Significant Contributions cont.

DAVID KEMP

PROFESSOR ALAN COWMAN'S CITATION FOR PROFESSOR DAVID J KEMP WHO AS BEEN ADMITTED AS A FELLOW OF THE AUSTRALIAN SOCIETY FOR PARASITOLOGY

Professor Kemp received a Bachelor of Science from the University of Adelaide in 1969 and completed his PhD in 1973. He then accepted a position as Research Scientist at the Commonwealth Scientific and Industrial Research Organisation (CSIRO) in the Department of Plant Industry. This was followed by two-years of postdoctoral work at Stanford University. In 1978 he returned to Australia and was appointed as Research Fellow at the Walter and Eliza Hall Institute of Medical Research (WEHI) in Melbourne. Initially his research was on the structure and function of immunoglobulin but he converted his laboratory's research to parasitology and from these small beginnings he became a major



international figure in the field of malaria research. He was named a Howard Hughes Medical Institute International Research Scholar in 1992. In the same year, Professor Kemp left WEHI to become the Deputy Director at the Menzies School of Health Research in Darwin. In 1992 he was also appointed Professor at the Faculty of Medicine, University of Sydney. He continued his work in the malaria field and also commenced research on the ectoparasite *Sarcoptes scabiei*. In 2000 he moved to the Queensland Institute of Medical Research (QIMR) in Brisbane where he was Head of the Malaria and Arbovirus Unit and appointed Professor, Australian Centre for International and Tropical Health and Nutrition at the University of Queensland. He has remained at QIMR and is currently an honorary Senior Principal Research Fellow within the Scabies Laboratory. During his career Dave Kemp has made a huge contribution to parasitology both nationally and internationally.

Professor Kemp was appointed as a Fellow of the Australian Academy of Sciences in 1996 in recognition of his contribution to Australian science and for his standing internationally. He was awarded the Centenary Medal in 2001 for contributions to Australian society and science in molecular biology. Additionally, he was awarded the Medal of the Order of Australia in 2008 for service to medical research as a molecular biologist, particularly in the areas of tropical health and infectious diseases. To date, Professor Kemp has published over 225 peer-reviewed papers, many in top ranking journals including an impressive 8 papers in *Nature*, 5 papers in *Cell*, and 18 papers in *Proceedings of the National Academy of Science USA*. His papers have been cited more than 13,300 times and his H-index is 56.

Professor Kemp began his career in South Australia where he undertook a PhD with Dr George Rogers in the Department of Biochemistry at the University of Adelaide. His major achievement during this time was demonstrating that keratin genes constituted one of the first known multigene families. Results were published in *Nature* as a single-author feature article, an outstanding feat for a PhD student. He was awarded the William Culross Prize for the best thesis of the year in 1973. He then undertook a short postdoctoral period at the CSIRO with Dr Jim Peacock before moving overseas with the award of an Eleanor Roosevelt fellowship to study the molecular biology of *Drosophila* with

Significant Contributions cont.

Professor David Hogness at Stanford University. . During this time at Stanford he learnt and contributed to the new recombinant DNA technology inventing and developing, in collaboration with Drs Jim Alwine and George Stark, the widely used “Northern blot” for detecting RNA. This was a major technical development since it allowed identification and analysis of specific RNA species. The resulting paper has had over 1,800 citations since its publication in 1977.

Professor Kemp returned to Australia in 1978 bringing with him the new techniques in recombinant DNA technology and was appointed as a Research Scientist at WEHI. He studied immunoglobulin gene transcription and rearrangements with Drs. Jerry Adams and Suzanne Cory at WEHI. A major contribution at the time was the demonstration that multiple genes were a major basis of VH gene diversity and for this work he was awarded the Boehringer Medal in 1981.

In 1979 he began his career in parasitology at WEHI. He invented a method to use antibody screening of expression libraries in 1981 and successfully applied it to the isolation of *Plasmodium falciparum* antigens in 1983 , in collaboration with others. This has been one of the most widely used approaches in immunoparasitology and represents a major contribution to the field. Professor Kemp initiated studies on the genetics of *P. falciparum* in 1984 demonstrating that the chromosomes of this parasite could be detected and separated by the new approach of pulsed field electrophoresis, leading to a much greater understanding of chromosome structure.

Additionally, he invented a generally applicable technique in molecular biology, ‘Inverted PCR’, which has now been cited over 650 times. He also invented diagnostic detection of PCR products by binding them to the walls of a microtitre dish and using ELISA technology to detect them, for which he was awarded the Wellcome Prize for Diagnostics. The group at WEHI became an internationally recognised centre of excellence for malaria research with Professor Kemp as a major contributor. In recognition of his contribution and leadership of malaria research at WEHI, he was appointed as Head of the Immunoparasitology Unit in 1990, which he led for two years before accepting the

Deputy Directorship at the Menzies School of Health Research.

During his time at the Menzies School of Health Research he continued his internationally recognised work on malaria and, together with his colleagues, used molecular fingerprinting to show that the scabies mite from human and dog hosts in Ohio, Panama and Aboriginal communities in northern Australia were genetically distinct. Because of the apparent genetic separation between human scabies and dog scabies, this suggested that control programs for human scabies in endemic areas did not require resources directed against zoonotic infection from dogs. Additionally, with his colleague, Katja Fischer, families of serine and cysteine proteases that appear to be critical for the ability of the parasite to survive in the face of the host were identified.

In light of his outstanding contributions to the field of Parasitology, Professor David Kemp is clearly an extremely worthy recipient of the title, Fellow of the Australian Society for Parasitology.

**Citation by
Professor Alan Cowman**

**Head, Division of
Infection and Immunity,
The Walter and Eliza Hall Institute
of Medical Research
Fellow, Australian Society for Parasitology**

Significant Contributions cont.

FRANZISKA BIERI

CONGRATULATIONS TO DR FRANZISKA BIERI FROM QIMR BERGHOGER WHO HAS WON THE RESEARCH AUSTRALIA DISCOVERY AWARD FOR HER "MAGIC GLASSES" PROJECT

QIMR Berghofer Medical Research Institute visiting scientist Dr Franziska Bieri has won the Research Australia Discovery Award. The award recognises an early career researcher who has already demonstrated work of importance or impact.

While still a PhD student at QIMR Berghofer, Dr Bieri helped produce an animated cartoon promoting hygiene to counteract intestinal worm infections in rural China. When the DVD was shown in Chinese schools, the parasitic worm infection rates halved in the Hunan province.

The work, led by QIMR Berghofer's Professor Don McManus in collaboration with Chinese colleagues and scientists at University of Queensland, was published earlier this year in the prestigious and influential New England Journal of Medicine (NEJM).

"This is wonderful recognition of a highly promising young researcher," Professor McManus said.

"As part of her PhD, Fransizka developed and trialled an education package, including a DVD called 'Magic Glasses' which was tailored for school children.

"Intestinal worms are one of the most wide-spread and disabling chronic infections, affecting more than a third of the world's population. This work has the potential to help eliminate infections globally and we're continuing to develop the program here at QIMR Berghofer and with our collaborators."

The Research Australia Awards are an annual event recognising and celebrating achievements across health and medical research.

Image source: researchaustralia.org Story source: QIMR Berghofer



Images from ASP/WAAVP,
Perth, August 2013

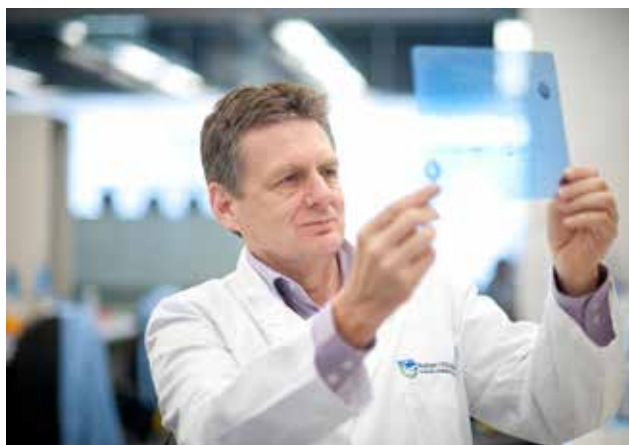
Significant Contributions cont.

2 AWARDS FOR ALAN COWMAN

PROFESSOR ALAN COWMAN HAS WON THE MAHATHIR SCIENCE AWARD IN TROPICAL MEDICINE.

Professor Alan Cowman has won the Mahathir Science Award in Tropical Research, awarded by the Mahathir Science Award

Photograph of Alan Cowman courtesy of WEHI



Foundation through the Academy of Sciences Malaysia, in recognition of his substantial contributions to understanding malaria.

Professor Cowman has been integral to the global malaria research effort. His work has led to the development of two potential malaria vaccines, one of which is in clinical trials in the US and the other in preclinical development.

Professor Cowman said he was delighted to receive the award. "The Mahathir Science Award in Tropical Medicine is an outstanding accolade for the many scientists I have collaborated with at the Walter and Eliza Hall Institute and beyond who have made possible the advances we have made in understanding malaria."

Tun Ahmad Sarji Abdul Hamid, Foundation Chairman, said Professor Cowman was chosen from 29 nominees across 11 countries. "Each nomination has undergone a stringent selection process conducted by the distinguished Fellows of the Academy of Science Malaysia, and also evaluated by an International Advisory Panel comprising Nobel Laureates and world-renowned scientists," he said.

The Mahathir Science Award recognises scientists and institutions worldwide that solve problems of the tropics through science and technology. The winner receives a gold medal and US \$100,000. An official prize-giving ceremony will be held in 2014.

PROFESSOR ALAN COWMAN HAS BEEN AWARDED THE 2013 VICTORIA PRIZE FOR SCIENCE AND INNOVATION FOR HIS WORK ON ERADICATING MALARIA.

Malaria researcher Professor Alan Cowman from the Walter and Eliza Hall Institute has been awarded the 2013 Victoria Prize for Science and Innovation in recognition of his outstanding

contributions in the quest to eradicate malaria.

The \$50,000 Victoria Prize for Science and Innovation in the life sciences recognises Professor Cowman's significant achievements in malaria research. Professor Cowman from the Infection and Immunity division has dedicated his nearly 30-year career to understanding what makes the malaria parasite 'tick' in order to create a vaccine that would eradicate this devastating disease. Minister for Innovation The Hon. Louise Asher MP presented Professor Cowman with the prize at an awards

Significant Contributions cont.

ceremony at Parliament House this evening.

Professor Cowman and his research team have made significant inroads into understanding how *Plasmodium falciparum*, the parasite responsible for the most severe form of malaria, infects humans and persists in the body by evading the immune system. He has made major contributions to understanding malarial drug resistance, unravelling the mechanism the parasite uses to become resistant to some of the most important antimalarial drugs. This has had implications for the development of new antimalarial treatments and opened the way for surveillance of the geographic spread of drug-resistant strains of malaria.

Professor Cowman's work has led to the development of two potential malaria vaccines, one of which reached clinical trials in the US and a second of which is in preclinical development.

Institute director Professor Doug Hilton said he was thrilled to see Professor Cowman's achievements recognised by the Victorian Government's highest award for life science research. "Malaria is a significant global disease burden, infecting up to 250 million people each year," Professor Hilton said. "Alan's research has vastly improved our understanding of malaria biology, which is instrumental for developing new treatments or vaccines to prevent malaria. His discovery of how the malaria parasite develops drug resistance has informed government strategies to prevent or

mitigate malaria transmission in many countries, saving countless lives."

Professor Cowman said he was honoured to receive the award. "Throughout my career I have been fortunate to work with some incredibly talented researchers and I would like to thank them for their support," Professor Cowman said. "Science research in Victoria and across the country is world-class and I am lucky to be able to facilitate these potentially life-changing discoveries."

Professor Cowman is a Fellow of the Royal Society and the Australian Academy of Science. He has received numerous national and international grants and fellowships and his many awards include the Howard Taylor Ricketts Medal for Infectious Diseases from the University of Chicago, the Commonwealth of Australia Centenary Medal and the Australian National Health and Medical Research Council Research Achievement Award.

The Victoria Prize was first awarded in 1998 and celebrates leadership, determination, endeavour and creativity as well as highlighting the many ways in which research and development of international significance are conducted in Victoria. Professor Cowman is the sixth researcher from the Walter and Eliza Hall Institute to receive the honour; previous winners are Professor Terry Speed, Professor Andreas Strasser, Professor Peter Colman, Professor David Vaux and Professor Don Metcalf.



Images from ASP/WAAVP,
Perth, August 2013

Significant Contributions cont.

KIARAN KIRK

CONGRATULATIONS TO PROFESSOR KIRAN KIRK WHO HAS BEEN APPOINTED DEAN OF THE COLLEGE OF MEDICINE, BIOLOGY AND ENVIRONMENT AT THE AUSTRALIAN NATIONAL UNIVERSITY.

Professor Kirk has been with ANU since 1996, coming initially from the University of Oxford to head the then Faculty of Science's Department of Biochemistry and Molecular Biology.

He has held a succession of senior leadership positions at the University, and he has been a member of the University Council.



ANU's Vice-Chancellor, Professor Ian Young AO, said that Professor Kirk is a natural leader and an outstanding scientist.

"He is widely recognised for his teaching and research supervision. He has won both University and national teaching awards and he delivered this year's 'Last Lecture' - an award that was voted on by students. I've even seen the fan page on Facebook that students have set up in his honour," says Professor Young.

Professor Kirk's research is on the biology of the malaria parasite, with a focus on antimalarial drugs and drug-resistance. He has published over 130 papers, held multiple prestigious biomedical research fellowships and been recognised by research awards from several scientific societies.

"Kieran is, by any measure, a high-achieving academic with impeccable credentials in research, education and leadership. I am looking forward to continuing to work with him as part of the University's leadership group," says Professor Young.

Professor Kirk will take up his new position in April 2014, replacing Professor Andrew Cockburn who is retiring on completion of his term as Dean of the College, and who will continue his research at the University as an Emeritus Professor.

Image and story courtesy of ANU

Significant Contributions cont.

NATALIE SPILLMAN

RESEARCHERS HAVE DISCOVERED HOW A NEW CLASS OF ANTIMALARIAL DRUGS KILLS THE MALARIA PARASITE, SHOWING THAT THE DRUGS BLOCK A PUMP AT THE PARASITE SURFACE, CAUSING IT TO FILL WITH SALT.

In work conducted at the Research School of Biology (RSB) at The Australian National University (ANU), and published in *Cell Host & Microbe*, Dr Natalie Spillman (pictured) showed that the malaria parasite has at its surface a protein that serves as a molecular salt pump, pushing sodium ions out of the parasite.

"It was within a week or two of our identification of the pump protein that a paper came out reporting the discovery of the spiroindolone antimalarials," Dr Spillman said.

"The authors of the spiroindolone study identified the pump protein as being of particular interest from the point of view of how the spiroindolones might work, but the exact mechanism was a mystery.

Linking up with members of the spiroindolone-development team in Singapore (Novartis Institutes for Tropical Diseases) and the US (Genomics Institute of the Novartis Research Foundation), Dr Spillman showed that spiroindolones block the parasite's salt pump, causing the cell to fill rapidly with salt.

"We believe the spiroindolones kill the parasite by causing a salt overload," Dr Spillman said.

RSB Director Professor Kieran Kirk, the senior author on the study, says this vulnerability in the parasite's physiology can be exploited to develop much needed new antimalarial drugs.

"The malaria parasite's salt pump would seem to be an Achilles

heel for the parasite, particularly vulnerable to attack. Knowing this, we can now look for other drugs that block this pump. We can also start to investigate how the parasite might be able to change the shape of the pump and thereby develop resistance to this class of drugs. Both of these aspects are going to be very important in our ongoing battle with the parasite."

The spiroindolones are the first genuinely novel class of chemicals to be tested in malaria patients for over 20 years.

"We desperately need new antimalarials and the spiroindolones, now in advanced clinical trials, are looking extremely promising," Professor Kirk said.

"Understanding how these compounds kill the parasite gives us a tremendous advantage."

The malaria parasite is a single-celled organism that invades the red blood cells of its human host, killing more than a million people each year. It is becoming increasingly resistant to most of the antimalarial drugs that are currently in use.

Story courtesy Australian National University



Significant Contributions cont.

SEJAL GOHIL AND BRIAN COOKE

SEJAL GOHIL, LEV KATS, TORSTEN SEEMANN, KATE FERNANDEZ, GHIZAL SIDDIQUI AND BRIAN COOKE (MONASH UNIVERSITY) RECENTLY PUBLISHED THEIR INTERNATIONAL JOURNAL FOR PARASITOLOGY ARTICLE “BIOINFORMATIC PREDICTION OF THE EXPORT OF *BABESIA BOVIS* AND IDENTIFICATION OF NOVEL PROTEINS IN PARASITE-INFECTED RED BLOOD CELLS”. SEJAL AND BRIAN TALK TO LISA JONES ABOUT THEIR *BABESIA BOVIS* RESEARCH.

LJ: Tell us about the history of your *Babesia bovis* research and how it led to the identification and characterisation of the three novel exported parasite proteins in your recent IJP publication.

After more than a decade of research on *Plasmodium falciparum*, the Cooke laboratory also focused its interests to study a related parasite (*Babesia bovis*) that causes a disease similar to human malaria in animals – especially cattle. Sejal Gohil found out about this as an undergraduate student and joined Brian’s group, first to do honours and then her PhD. ‘We soon found out why no one else seemed to be doing much work on this parasite’ Sejal said – ‘no way to culture the parasite reliably *in vitro*, no way to synchronise or purify it, very few reagents to work with, no genomes, no molecular tools for genetic manipulation – I am surprised that I ever agreed to it!’. Now, 4 years on, it is a completely different story. We have set up *in vitro* culture systems, developed transfection tools and protocols, generated antibodies and reagents for the study of this parasite and learned much more

about its overall basic biology – but we still have a long way to go. One of the exciting discoveries (reported in this current paper) was to use bioinformatics to identify exported parasite proteins that are likely to have roles in the pathogenesis of bovine babesiosis. We think that the proteins identified using this approach would be located in appropriate places in the infected cell and have features that make them suitable as targets for the development of novel vaccines

What is Babesiosis and is there any cure or vaccine available to protect animals and humans from developing it?

Babesiosis is of major national and international importance. *Babesia spp.* are tick-transmitted protozoan parasites that replicate inside red blood cells (RBCs) of a number of species and cause severe disease and death in susceptible hosts, particularly cattle, horses and dogs. As many as half a billion cattle worldwide are at risk of infection by *Babesia* parasites and the economic consequences, particularly for beef and dairy industries are enormous. In Australia, *B. bovis* is the major causative agent of babesiosis in cattle. Transmission of the parasite between infected cattle by the ixodid tick *Rhipicephalus microplus* is endemic throughout the northern half of our continent and reduces the profitability of the beef and dairy cattle industry in Australia by up to \$30m annually.

In the case of *B. bovis* infection, infected-RBCs sequester in post-capillary venules in a variety of organs, including the brain, for the majority of the parasites intra-erythrocytic lifecycle. For the parasite, sequestration of PRBCs is likely necessary to avoid their destruction in the spleen, but for the host, it is highly detrimental and is associated with the development of severe clinical syndromes such as cerebral babesiosis, that unless treated promptly are frequently fatal. In 2007, our laboratory showed that sequestration occurs as a result of infected-RBCs becoming abnormally adhesive for vascular endothelial cells and significantly more rigid. Associated with these alterations is the appearance of ridge-like structures on the surface of *B. bovis*-infected RBCs that resemble the knob-like protuberances on the surface of human RBCs infected with the malaria parasite, *Plasmodium falciparum* and we have demonstrated that these *Babesia* ridges are related to

Significant Contributions cont.

the parasites ability to cause severe disease.

For almost 50 years, a chilled or frozen live attenuated vaccine has been made in Queensland at the Tick Fever Centre and deployed worldwide for the control of bovine babesiosis. We truly believe, however, that sustainable control of this disease will require the development of recombinant or subunit vaccines to eliminate the current difficulties associated with a live attenuated vaccine.

What impact will your results have for animals and humans at risk or suffering from Babesiosis?

Unfortunately, despite our and others significant advances in the field, we still know very little about the virulence determinants of this important pathogen at the molecular level. So much so, that the vaccine currently in use has been developed without any rational genetic basis and therefore has a number of limitations associated with the use of live attenuated parasites. We envisage that our work will significantly increase our understanding of the biology of *Babesia* parasites and will lead to the development of a better vaccine – one that could be deployed without the need for a cold chain.

Tell us about your supporters and how they have helped your research progress.

None of this work would ever have got off the ground without the early support and tremendous encouragement from Bob

Dalglish, Bert DeVos, Wayne Jorgensen, John Molloy, Russel Bock and numerous others from The Animal Research Institute and Tick Fever Centre (Tick Fever Research Centre as it was known then) in Queensland. With Peter Rolls now at the helm, their support remains unwavering. In addition, none of the work described in our recent paper would have been possible without the support of the ARC, who awarded us with a Discovery grant to enable this work to go forward.

Tell us what happens next in your *Babesia bovis* research?

Clearly we have learned a lot over the past few years but there is a very long way to go yet. We are currently sequencing and analysing the genomes, transcriptomes and proteomes of Australian *Babesia* isolates to increase our knowledge of this parasite and how it causes disease. In combination with our established cellular and molecular biology techniques, we are convinced that we will be able to identify suitable novel proteins as the targets for the next generation of vaccines both for *Babesia* and other important apicomplexan diseases of animals. Whether this happens of course depends on whether the lab can continue to get funding. 'Times are tough', Brian said 'and with shrinking budgets, basic research like this, particularly in the veterinary sciences, is no doubt going to suffer a bit more than our human work. We will plough on though. Given that the majority of the global burden of this disease is borne by Australia and South America, it should be our responsibility and priority to do something about it - because we can.'



Sejal Gohil and Brian Cooke. Source: Monash University

Significant Contributions cont.

NETA REGEV-RUDZKI

RESEARCHERS AT WEHI HAVE MADE THE SURPRISE DISCOVERY THAT MALARIA PARASITES CAN ‘TALK’ TO EACH OTHER – A SOCIAL BEHAVIOUR TO ENSURE THE PARASITE’S SURVIVAL AND IMPROVE ITS CHANCES OF BEING TRANSMITTED TO OTHER HUMANS. THE FINDING COULD PROVIDE A NICHE FOR DEVELOPING ANTIMALARIAL DRUGS AND VACCINES THAT PREVENT OR TREAT THE DISEASE BY CUTTING THESE COMMUNICATION NETWORKS.

Professor Alan Cowman, Dr Neta Regev-Rudzki, Dr Danny Wilson and colleagues from the Walter and Eliza Hall Institute in collaboration with Professor Andrew Hill from the University of Melbourne showed that malaria parasites are able to send out messages to communicate with other malaria parasites in the body. The study was published recently in the journal *Cell*.

Professor Cowman said the researchers were shocked to discover that malaria parasites work in unison to enhance ‘activation’ into sexually mature forms that can be picked up by mosquitoes, which are the carriers of this deadly disease.

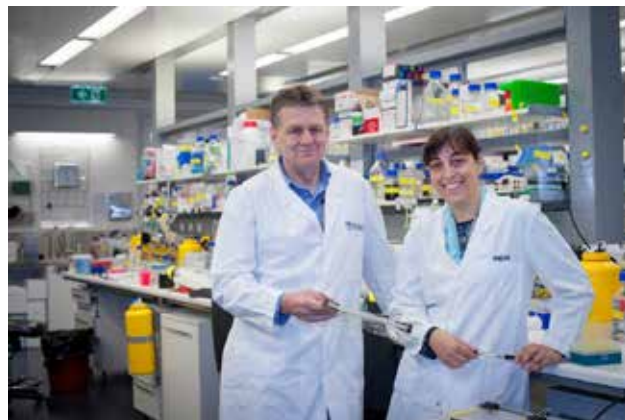
“When Neta showed me the data, I was absolutely amazed, I couldn’t believe it,” Professor Cowman said. “We repeated the experiments many times in many different ways before I really started to believe that these parasites were signalling to each other and communicating. But we came to appreciate why the malaria parasite really needs this mechanism – it needs to know how many other parasites are in the human to sense when is the right time to activate into sexual forms that give it the best chance of being transmitted back to the mosquito.”

Dr Regev-Rudzki said the malaria parasites inside red blood cells communicate by sending packages of DNA to each other during the blood stage of infection. “We showed that the parasites inside infected red blood cells can send little packets of information from one parasite to another, particularly in response to stress,” she said.

The communication network is a social behaviour that has evolved to signal when the parasites should complete their lifecycle and be transmitted back to a mosquito, Dr Regev-Rudzki said. “Once they receive this information, they change their fate – the signals tell the parasites to become sexual forms, which are the forms of the malaria parasite that can live and replicate in the mosquito, ensuring the parasites survives and is transmitted to another human.”

Professor Cowman said he hopes to see the discovery pave the way to new antimalarial drugs or vaccines for preventing malaria. “This discovery has fundamentally changed our view of the malaria parasite and is a big step in understanding how the malaria parasite survives and is transmitted,” he said. “The next step is to identify the molecules involved in this signalling process, and ways that we could block these communication networks to block the transmission of malaria from the human to the mosquito. That would be the ultimate goal.”

Story and picture (Alan Cowman and Neta Regev-Rudzki) courtesy WEHI



Significant Contributions cont.

FELCITY SMOUT

FELICITY SMOUT'S IJP:PAW PAPER ON *ANCYLOSTOMA CEYLANICUM* IN WILD CANIDS IS A DIRECT RESULT OF ASP TRAVEL AWARD SUPPORT FOR MOLECULAR RESEARCH AT MURDOCH UNIVERSITY. FELICITY TALKS TO LISA JONES ABOUT HER PARASITIC NEMATODE RESEARCH.

LJ: Tell us about the history of your parasitic nematode *Ancylostoma ceylanicum* research.

FS: My original PhD project was to determine the disease burden of wild dogs in the Wet Tropics of North Queensland and the mechanisms and risk of transmission of diseases of wild dogs to wildlife, domestic animals and humans. I have expanded upon this to include investigations into Indigenous communities and camp dogs and their associated diseases. As *Ancylostoma ceylanicum* had recently been reported in domestic dogs in Australia and given its potential to cause a patent infection in humans, I was interested to see if it was also present in dingoes. Due to the history of misidentification of *A. braziliense* as *A. ceylanicum* in Australia, and elsewhere, I was extremely careful to ensure I had identified the correct parasite. So by using Biocca's (1951) morphological description along with expertise from parasitologists such as Aileen Elliott and confirmation with molecular biological techniques, I was happy that I had found the right worm.

What is *Ancylostoma ceylanicum* and is there any cure or vaccine to protect animals or humans from contracting it?

Ancylostoma ceylanicum is a common hookworm of domestic dogs and cats in countries throughout Asia. A heavy infection can result in bloody diarrhoea and iron-deficient anaemia. Human infection with *A. ceylanicum* can cause severe abdominal discomfort



and diarrhoea as well as cognitive impairment and should be considered to be of significant zoonotic importance. At this stage there is no vaccine available to protect animals or humans from contracting this parasite. However, a simple and safe treatment is readily available in Benzimidazoles such as Albendazole.

What impact will your results have for animals and humans at risk or suffering from *Ancylostoma ceylanicum*?

The zoonotic potential of this parasite should not be underestimated. These results will give both veterinarians and human health care workers the information necessary to encourage the use of simple treatment against hookworm infections in dogs, cats and humans. Indigenous communities are at particular risk because of the limited management of domestic dog health and the presence of free-roaming community dogs that can be exposed to parasite eggs and larvae in soil contaminated by wild dogs. Together with the warm, moist conditions of the tropics this provides an ideal scenario for the success of soil-transmitted helminth infections.

Significant Contributions cont.

Tell us about your supporters and how they have helped your research progress.

I would like to thank CSIRO Atherton, Cairns Council and Damian Marrant for assistance with sample collection. I am also very grateful for the support I have received from the people in Yarrabah and Mossman Aboriginal communities. Funding assistance was received from the ASP Network for Parasitology Researcher Exchange Travel Award which allowed me to travel to Murdoch University and spend six months working in Professor Andrew Thompson's lab learning molecular biology techniques. An ARC linkage grant has also funded much of my project and I have received an APAI scholarship along with assistance from JCU.'s School of Public Health, Tropical Medicine and

Rehabilitation Sciences and the School of Marine and Tropical Biology.

Tell us what happens next in your *Ancylostoma ceylanicum* research.

Given that *A. ceylanicum* has previously been found in cats and wild felids, further investigation is necessary to evaluate the hookworm population of domestic and feral cats in the region. Future studies will also concentrate on animals in potentially high risk Indigenous communities to determine the extent of *A. ceylanicum* infection in Far North Queensland and to assess the risk of zoonotic transmission and disease.



Above Residents of Omphalong in Northern Laos where control measures are being implemented for *Taenia solium* including the vaccination of pigs with the TSOL18 vaccine. Photograph by Marshall Lightowlers.

Significant Contributions cont.

LEIGH SCHULTE

LEIGH SCHULTE, MALCOLM JONES AND COLLEAGUES HAVE BEEN WORKING ON THE PARASITE *SCHISTOSOMA MANSONI* FOR THE PAST 15 YEARS. LEIGH TALKS TO LISA JONES ABOUT THIS RESEARCH

LJ: Tell me about your research on *Schistosoma mansoni*?

Leigh: I started researching schistosomes when I began my honours degree with Mal in 2009 and then started my PhD the year after. My PhD focuses on the tegument of the worm and how it transforms upon host infection and how it is maintained throughout the adult worms long life.

Tell me about this technique you used to prepare the parasite for viewing with immuno-electron microscopy. What is important about this technique?

High pressure freezing and cryosubstitution with uranyl acetate has been applied to a number of organisms in the past and we have applied this technique to adult schistosomes for the first time. The main advantage of this technique is that it combines excellent ultrastructure and membrane preservation, while preserving antigenicity of the tissues so that we can localise proteins of interest in the tissues. This is especially important for investigating membrane-resident proteins of tegument. In this paper we have shown the localisation patterns of *Schistosoma mansoni* tetraspanin 2. We have used the same technique to localise other important tegumental proteins that are the focus of my PhD to give insight into the role of these proteins in schistosome biology.

Your IJP publication discussed vaccine development against *Schistosoma mansoni* -tell us what stage this vaccine idea is at



and how will your research help to achieve this goal?

SmTSP2 is known as a leading vaccine candidate against schistosomiasis. But we really don't know what role SMTSP2, along with other important tegumental proteins, has in the biology of the tegument. This localisation data, together with investigations on the interaction biology of the protein I have conducted, and structural studies by Sidney Jia and Jason Mulvenna at QIMR Berghofer will help us to understand the importance of this molecule in membrane maintenance and turnover and most importantly, when and where in parasite development the molecule is exposed to the host immune system.

Tell us what happens next in this *Schistosoma mansoni* story?

This localisation data combined with a large amount of protein interaction data I have generated provides us with more details about the interaction of TSPs with other tegumental proteins involved in the dynamics of the tegument. The final step we have undertaken to understand the function of tegumental proteins is to knock them down using RNA interference, leading to a detectable phenotype. With funding from ASP JD Smyth travel award I was able to travel to Conor Caffrey's lab at University of California, San Francisco to learn more about this technique and bring these skills back to QIMR Berghofer to perform my own experiments. High pressure freezing and cryosubstitution with uranyl acetate applied to schistosomes (the larval stage) during host infection would allow us to localise proteins at different stages of tegument transformation. This would help us learn more about host-parasite interactions during host infection.

Significant Contributions cont.

THE MAGIC GLASSES

RESEARCHERS AT THE QUEENSLAND INSTITUTE OF MEDICAL RESEARCH, THE UNIVERSITY OF QUEENSLAND AND HUNAN INSTITUTE OF PARASITIC DISEASES HAVE REPORTED HUGE SUCCESS WITH A CARTOON DVD PROMOTING HYGIENE ACROSS RURAL CHINA.

"The Magic Glasses" movie has been shown in schools in Hunan province, showing children how to avoid parasitic worm infection, a major issue in rural communities.

Professor Don McManus and PhD student Franziska Bieri, from QIMR's Molecular Parasitology Laboratory, Dr Darren Gray and Prof Gail Williams from UQ's School of Population Health and Dr Li Yuesheng from Hunan Institute of Parasitic Diseases showed that infection rates halved when the 10 minute cartoon was played in schools.

"Sometimes it just takes a simple change in behaviour and attitudes to make a drastic difference in the spread of disease," Professor McManus said.

"In this case, we've managed to make a real difference with a fun cartoon in Mandarin which explains the importance of hand washing, wearing shoes, covering food and using lavatories."

Intestinal worms such as roundworm, whipworm, and hookworm are a major issue in rural Chinese communities and can lead to malnutrition and stunted growth and cognitive development in children. Worldwide, 2 billion people are infected with parasitic worms.

In the cartoon DVD, when a small child puts on "magic glasses" they can suddenly see worm eggs and larvae in bright colours.

"The research was a major part of my PhD and included a cluster-



randomized intervention trial where about 1700 children aged 9-10 were followed during one school year, and we screened the cartoon in some schools but not others," Ms Bieri said.

"We assessed the children's knowledge of infection before and after viewing the DVD and compared the effectiveness of the cartoon, against traditional posters.

"We found that tailoring the message to the children made an enormous difference to disease rates. There is an accessible cure for these worms, but the problem is reinfection because of poor hygiene," Ms Bieri said.

The team has just secured 1.5 million Swiss Francs from the UBS Optimus Foundation to expand the educational program into other regions of China. They'll work also with the Research Institute of Tropical Medicine in Manila, to make a similar DVD for schoolchildren in The Philippines.

"Worm infections are also a considerable public health problem in Australia's indigenous communities and this cartoon has enormous potential to make a difference at home," Professor McManus said.

*

The Magic Glasses" can be viewed at http://www.qimr.edu.au/page/Home/Magic_glasses

This research is funded by the UBS Optimus Foundation, Switzerland and by Australia's NHMRC.

Significant Contributions cont.



Significant Contributions cont.



Outreach

Inspiring Australia Events in 2013

Our joint ASP-Inspiring Australia public outreach events in Perth with our partners Perth Zoo, Scitech and Murdoch University were lots of fun, and well attended by the public and featured our own fabulous ASP members and international colleagues.

Parasites in Focus at Perth Zoo on Saturday 24th August 2013 attracted more than 300 of the 3000 visitors to the Zoo that day and gave people from all ages the chance to engage with ASP parasitologists and explore the fascinating world of parasites with activities suitable for everyone to enjoy, and an opportunity for zoo patrons to get “under the skin” of Australia’s parasitologists.

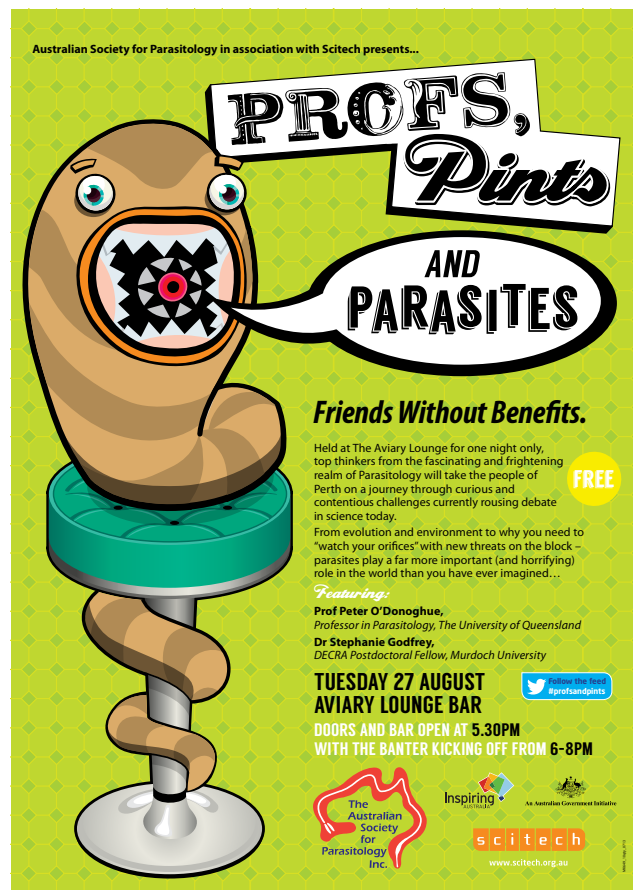
“Parasites and Pets, Parasites and You – What do you really think you know?” our Free public event for the whole family took place on Sunday, 25th August, 5-6 pm, at the Perth Convention Exhibition Centre, Riverside Theatre. Professor Susan Little, Oklahoma State University, Professor Malcolm Jones, University of Queensland and Professor Andrew Thompson from Murdoch University gave a lively performance on stage and hosted a quiz with prizes (for non-parasitologists) exploring such fascinating questions as “Can parasites really burrow through your skin or be a cure for gut diseases?”

At the same time young budding scientists could book into our **“Young parasites science club”** free, fun, supervised science activities for young scientists during the presentation.

Murdoch University even offered a free parasite check for the first hundred people to register to bring in a pet poo sample. These two Inspiring Australia, ASP & Murdoch University events were attended by 150 members of the general public and over 500 parasitologists and their feedback has been a resounding thumbs up for a very entertaining and informative event.

Videos of “Parasites and Pets, Parasites and You – What do you really think you know” are available on the ASP YouTube channel <http://www.youtube.com/user/ASPParasiteNetwork>.

Our final IA-ASP public event in Perth was the **“Profs, Pints and Parasites. Friends Without Benefits.”** held on Tuesday 27th



Above and next page: images from Profs, Pints and Parasites

August, at the Aviary Rooftop Bar in Perth city. This inspiring and energetic event was hosted by Renae Sayers from Scitech and featured Professor Peter O'Donoghue and Stephanie Godfrey doing parasite interpretive dance and wide discussion from evolution and environment to why you need to “watch your orifices” with new threats on the block – parasites play a far more important (and horrifying) role in the world than you have ever imagined.

Outreach cont.



Outreach cont.



On this page: images ASP-Inspiring Australia public events with Murdoch University, Perth 2013
Above: Susan Little, Malcolm Jones and Andrew Thompson



Outreach cont.

Inspiring Australia Plans for 2014

Our ASP-Inspiring Australia "Parasites in Power" and National Science Week events will be a highlight in 2014 with public exhibitions, presentations, movies and children's workshops taking place across Canberra in June, July and August.

Parasites in Focus will be on display in the Gallery, CSIRO Discovery Centre, 9 June – 3 August 2014.

At the Australian War Memorial (AWM) in Canberra we will run a two-part public lecture series "Parasites: the war years" in June and August.

"War on Parasites" will take place Sunday 29th June, from 2pm at the Australian War Memorial Lecture Theatre. Parasites have been affecting soldiers for centuries in times of both war and peace. In the first of this fascinating lecture series "Parasites: the war years" Professor Alex Loukas from the Australian Society for Parasitology will discuss the latest research into some of these parasites. Dr Graham Mitchell will give an introduction to this fascinating lecture.

Our War Worms interactive workshop for children aged 5 and over will take place at the Australian War Memorial Tuesday 8th July, 10.30 am – 12.30 pm. Participants in our Young Parasites Science Club will find out about parasites that have been affecting soldiers for centuries. Make larger than life models and masks of parasites and investigate what they look like close up.

"Aliens amongst us" join us on Tuesday 8th July, 5.30 – 8.30pm at the National Film and Sound Archive (NFSA) in the Arc Cinema for a screening of the 1979 cult American science-fiction horror movie Alien directed by Ridley Scott, and starring Sigourney Weaver. Pre-movie parasites discussion "Revenge of the Bodysnatchers" included!

"Malaria in wartime" will take place Sunday 17th August, from 2pm at the Australian War Memorial Lecture Theatre. Dr Rowena Martin from the Australian Society for Parasitology will describe some of the devastating effects caused by the malaria parasite.

Parasites will feature at Science in ACTION which will run from about the 15th – 17th August at ANU in Melville Hall and the Manning Clarke theatres.

ASP Member Outreach 2013

The following stories highlight both public outreach delivered by ASP members and outreach relating to international research projects by ASP Members.

Burnet Media 2013

ABC 774 radio interview with Brendan Crabb discussing malaria. July 2013

ABC NewsRadio. Dr Freya Fowkes, head of malaria and infectious disease epidemiology. August 2013

Children help researchers solve malaria vaccine puzzle. Melbourne Age. 21/07/2013. Syndicated to the following papers:

Sydney Morning Herald; The Ararat Advertiser; Barossa & Light Herald; Bathurst Western Advocate; Bendigo Advertiser; Braidwood Times; Camden Advertiser; Canberra Times

Central Midlands & Coastal Advocate; Central Western Daily; Cowra Guardian; Daily Liberal; Farm Weekly; Lakes Mail; Moree Champion; Mudgee Guardian; Newcastle Herald; North Queensland Register; Northwest Tasmania Advocate; Port Macquarie News; Queensland Country Life; Riverina Rural; South Coast Register; St Marys Star;

Sunraysia Daily; Tenterfield Star; The Ridge News; Town & Country Magazine; Wauchope Gazette; Yass Tribune.

IMPACT, Summer 2013

"Advancing efforts in reducing malaria with vaccines, treatment and prevention"

http://www.burnet.edu.au/system/impact_newsletter/file/19/IMPACT_Summer_2013-_LR-RGB.pdf

Ala Lew (The University of Queensland) provided an update to the Queensland Government's 'Cattle Tick Management Committee' in regards to cattle tick vaccine development and her laboratory provided a lab demonstrations (tick dissections, PCR, cloning, electrophoresis) for the 'National Youth Science Forum' (high school students).

Outreach cont.

Ala was also selected and attended Bill & Melinda Gates Foundation 'Agricultural Research Connections Workshop – Livestock' 21-26th July 2013, with the aim to mentor african scientists applying for 'Program for Emerging Agricultural Research Leaders' (<http://www.gatesfoundation.org/How-We-Work/General-Information/Grant-Opportunities/Program-for-Emerging-Agricultural-Research-Leaders>)

Lexa Grutter (The University of Queensland) was featured in Australasian Science. "From cleaning fish to cleaner fish" by Stephen Luntz. May p. 37.

Terry Spithill was interviewed for radio station RRR, The Australian, the Weekly Times and Radio Australia on his work developing a vaccine for live fluke in livestock. Reports also appeared in The Leader and Stock and Land newspapers.

Nigel Beebe (The University of Queensland) was referenced in the media –

1. April 5, 2014: "Totally Wild" (Ch. 10) – on basic mosquito biology and behaviour

2. January 18th 2014 in The Weekend Australian Magazine – feature by Greg Bearup – entitled "They want to suck your Blood"

3. August-October 2013, a series of interviews for radio and print media on mosquito-borne disease threats to Australia resulted in > 30 pieces of media as logged by ISENTA media portal

4. May-June 2013: Australian Geographic (issue 114). Twelve page feature story and a 6-minute video on our malaria mosquito research in the Solomon Islands. An AG photographer and journalist followed us into the Solomon Islands

Shokoofeh Shamsi (Charles Sturt University) co-hosted more than 150 high school students from across the Riverina visited Charles Sturt University on 14 June 2013. Shokoofeh ran a workshop on "parasites and their impacts on our daily life" for students and spoke to them about study and career opportunities in Parasitology. This workshop was part of the Graham Centre's Science and Agriculture Enrichment Day which is to give agriculture and primary industries students the opportunity to participate in work done by agricultural and animal scientists, and to learn more about career opportunities.

Parasite campaigners at the University of Sydney Camden Small Animal Veterinary Clinic, from left Kim Le BVSc, Michelle Siskovic (SA Nurse), Jenni Green BVSc and Chris McIver BVSc. Cats from the left Sheldon, Flea and Claude. Chris is holding a jar with horse roundworms. Read the story on the next page.



Outreach cont.

THE ESKITIS/ASP PHOTOGRAPHY EXHIBITION AT THE QUEENSLAND MUSEUM

Professor Denise Doolan, President of the ASP, and other members of the ASP Executive were present for the launch of the Eskitis/ASP photography exhibition on Wednesday 24th July at the Collector's Café Queensland Museum SouthBank Brisbane.



Above right: Denise Doolan and Ron Quinn



The program for the evening consisted of:

- A welcome to the Museum and introductions of the speakers by Dr John Hooper, Head of Natural and Ancient Environments Program
- Introduction to the Eskitis Institute – Prof Ron Quinn, Director, Eskitis Institute
- Introduction to the Eskitis photo competition – Prof Alan Mackay-Sim, Director, National Adult Stem Cell Research Centre, Eskitis Institute
- Introduction to Parasites-in-Focus images – Prof Denise Doolan, President of the Australian Society for Parasitology

PARASITE AWARENESS MONTH AT CAMDEN SMALL ANIMAL VETERINARY CLINIC, UNIVERSITY OF SYDNEY

Veterinarians use the word 'parasite' often. But do clients actually know who the parasites are? Veterinarians at the University Veterinary Teaching Hospital, Camden, set about educating clients with an initiative called Parasite Awareness Month.

This included a free diagnostic service and an "Ask the Vet" article in the local newspaper. This was written by students and had a different theme for each week of the month - fleas, worms, mites and ticks.

Jan Slapeta, lecturer in Veterinary Parasitology, presented an evening lecture "Weird and wonderful world of pet parasites" for clients of the veterinary clinic. Jan introduced some of the well known as well as lesser known parasites. The evening lecture and the discussion afterwards brought together clients with veterinarians, academics as well as representatives of pharmaceutical companies.

Outreach cont.

MELANIE LEEF DESCRIBES A VERY FRUITFUL PERIOD FOR ASP-SPONSORED STATE OUTREACH EVENTS ORGANISED BY MEMBERS AT THE UNIVERSITY OF TASMANIA

Pizzas for Parasitology

Victoria Valdenegro and Mark Polinski organized a pizza night for second and third year undergraduate students who were interested in completing Honours in parasitology with the University of Tasmania's Aquatic Animal Health group. The event was attended by approximately 20 people and both Victoria and Mark gave presentations about their experiences as PhD students and also about the skills and techniques they have learnt as part of their parasitology research. Dr Melanie Leef also gave a presentation about the Aquatic Animal Health undergraduate unit which covers a significant portion of parasitology related material and offers the ASP best undergraduate student award. After the presentations students were able to talk to Aquatic Animal Health members including Victoria, Mark, Melanie and group leader Professor Barbara Nowak over pizza and drinks. Current and Past Honours students Kingsley Tam and Catarina Norte dos Santos also attended to share their personal experiences.

"Parasite Corner" at the UTAS/AMC Open Day

Catarina Norte dos Santos also organized an outreach event that was held during the the UTAS/AMC Open Day. This event targeted young future parasitologists who were encouraged to make their own parasites with craft material. A colouring competition of different parasites by a local primary school was also displayed as part of the event. This outreach event was very successful with participation not just from the young ones but also some adults (either parents who were accompanying their children, or young adults that wanted to participate). While children were busy learning about parasites the parents were able to look at real versions under the microscope at the fish parasitology stand that was opposite the children's event. The adults parasitology

stand was organized by new PhD student Lukas Neumann who is currently a proposed ASP member. One of the big highlights for the children, as well as getting to take home a custom made parasite, was the large poster of a fish with parasites. This poster proved invaluable to help explain where the parasites could be found on the fish. The event was so popular Catarina has been asked to visit local schools with her display.

Science week

Two PhD students – Victoria Valdenegro and Fu Dingkun and Prof Barbara Nowak gave public lectures at a Royal Society of Tasmania special event during Science Week. Victoria talked about her research on AGD and Barbara covered significance of fish parasites in biodiversity, fisheries research, mariculture and human health. The event was well attended and had press coverage (Examiner).

Although she is currently based in Townsville, Tasmanian ASP student member Melissa Beata Martin recently contributed to two Queensland outreach programmes. Melissa volunteered for the Museum of Tropical Queensland Townsville to promote "Science Week: Fossil" during the Cultural Festival (14-18th August), where kids get their hands dirty in fossil-making, a fun approach in learning about fossils and their formation. The second event was a short taxonomic course held for MSc students at the Museum of Tropical Queensland (5th September), organized by Dr Niel Bruce, which covered museum research (general and specific), importance of museum natural history collections and the importance of taxonomy and it's applied science.

Lady Gowrie Day Care Centre

Melanie Leef and Catarina Norte dos Santos visited the Lady Gowrie day care facility. This event was aimed at the educators and children (between the ages of 2-6 years of age) Both Melanie and Catarina visited the Day Care Centre and provided the educators from 2 classes with knowledge and tools to facilitate an increased awareness of fish parasites. the educators from each class were given a large colour laminated poster of a fish with detachable fish parasites (amoeba, isopod, copepod and fluke). The poster and detachable parasites were designed by Catarina.

Outreach cont.



Contribution to the National Benefit

The contribution of ASP members to Australia's fundamental, strategic and applied research effort is evident in the quantity and quality of publications listed in Appendix 1 for Australia's National Research Priorities, which were rewritten in 2013. With regard to the ASP more directly, 2013 has been a year where national and international collaboration has been strongly fostered by the ASP through its, and OzEMaLaR's, Researcher Exchange, Training and Travel Funds. Additionally, the ASP has created substantial training and networking opportunities for research students and early

career researchers, again through these Researcher Exchange, Training and Travel Funds. Young researchers are publishing their research undertaken on ASP funding and winning grants and fellowships, either as spin-offs of research undertaken under the ASP Researcher Exchange, Training and Travel Award scheme or as a result of linkages forged at ASP-sponsored events. Fostering the exposure, profile and opportunities of young researchers is seen as key to the future of parasitology research in Australia and is, therefore, a high priority for the ASP.

Statistical Snapshot 2013

Number of (active) members;

Australian Society for Parasitology Incorporated (ASP) had 551 financial members in 2013.

Number of ECRs funded to do various activities;

69 ASP Student Members were given funding assistance to attend 2013 ASP Annual Conference via the ASP Student Member Conference Grant scheme.

21 students and ECRs were awarded ASP Network or OzEMaLaR Researcher Exchange, Training and Travel awards in 2013.

Conferences supported;

2013 ASP Annual Conference and WAAVP attended by over 600 parasitologists from 24 countries, including over 300 Australians.

Number of international visits;

The ASP, including its journals, funded six international visitors to Australia (as invited lecturers to the 2013 Annual Conference);

The ASP funded 22 researchers to travel to, and work in, overseas laboratories in 2013.

Number of publications produced;

480 printed publications.

Research funding received;

In 2012, Australia's parasitologists received 55 research grants securing more than \$25 million in new research grant funding.

Websites

ASP web site
<http://www.parasite.org.au>

ASP Facebook page
<http://www.facebook.com/ASPParasitology>

ASP Twitter account
https://twitter.com/#!/AS_Para

ASP YouTube channel
<http://www.youtube.com/user/ASPParasiteNetwork>

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

OzEMaLaR website
www.ozemalar.org.au

OzEMaLaR Facebook page
<http://www.facebook.com/ozemalar>

OzEMaLaR Twitter account
<https://twitter.com/#!/OzEMaLaR>

Appendix 1: Publications by ASP Members in 2013

WHERE APPLICABLE, LINKS TO ABSTRACTS IN PUBMED HAVE BEEN PROVIDED FOR 2013 PUBLICATIONS.

A Changing Environment

Ansell BR, Schnyder M, Deplazes P, Korhonen PK, Young ND, Hall RS, Mangiola S, Boag PR, Hofmann A, Sternberg PW, Jex AR, Gasser RB. Insights into the immuno-molecular biology of *Angiostrongylus vasorum* through transcriptomics--prospects for new interventions. *Biotechnol Adv*. 2013 Dec;31(8):1486-500.

Atkinson JA, Gray DJ, Clements AC, Barnes TS, McManus DP, Yang YR. Environmental changes impacting *Echinococcus* transmission: research to support predictive surveillance and control. *Glob Chang Biol*. 2013 Mar;19(3):677-88.

Atkinson JA, Williams GM, Yakob L, Clements AC, Barnes TS, McManus DP, Yang YR, Gray DJ. Synthesising 30 years of mathematical modelling of *Echinococcus* transmission. *PLoS Negl Trop Dis*. 2013 Aug 29;7(8):e2386.

Beebe NW, Ambrose L, Hill LA, Davis JB, Hapgood G, Cooper RD, Russell RC, Ritchie SA, Reimer LJ, Lobo NF, Syafruddin D, van den Hurk AF. Tracing the tiger: population genetics provides valuable insights into the *Aedes* (*Stegomyia*) *albopictus* invasion of the Australasian Region. *PLoS Negl Trop Dis*. 2013 Aug 8;7(8):e2361.

Beebe, N. W., Russell, T. L., Burkot, T. R., Lobo, N. F. & Cooper, R. D. (2013) The systematics and bionomics of malaria vectors in the southwest Pacific. In *Anopheles mosquitoes - New insights into malaria vectors* (ed. by S. Manguin), pp. (359-394). InTech, New York.

Beveridge I, Campbell RA. A new species of *Grillotia* Guiart, 1927 (Cestoda: Trypanorhyncha) with redescription of congeners and new synonyms. *Syst Parasitol*. 2013 Jun;85(2):99-116.

Beveridge I, Jabbar A. New species of *Kiluluma* Skrjabin, 1916 (Nematoda: Strongylida) from the white rhinoceros *Ceratotherium simium* (Burchell), with a redescription of *K. solitaria* Thapar, 1924. *Syst Parasitol*. 2013 Jun;85(2):131-45.

Botero A, Thompson CK, Peacock CS, Clode PL, Nicholls PK, Wayne AF, Lymbery AJ, Thompson RC. Trypanosomes genetic diversity, polyparasitism and the population decline of the critically

endangered Australian marsupial, the brush tailed bettong or woylie (*Bettongia penicillata*). *Int J Parasitol Parasites Wildl*. 2013 Mar 29;2:77-89.

Bott NJ, Miller TL, Cribb TH. Bucephalidae (Platyhelminthes: Digenea) of *Plectropomus* (Serranidae: Epinephelinae) in the tropical Pacific. *Parasitol Res*. 2013 Jul;112(7):2561-84.

Boutellis A, Mediannikov O, Bilcha KD, Ali J, Campelo D, Barker SC, Raoult D. *Borrelia recurrentis* in head lice, Ethiopia. *Emerg Infect Dis*. 2013 May;19(5):796-8.

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Cribb TH, Bray RA, Cutmore SC. *Peracreadium akenovae* sp. nov. (Trematoda: Opecoelidae) parasitising the highfin moray eel *Gymnothorax pseudothyrsoides* (Anguilliformes: Muraenidae) from Moreton Bay, Australia. *Acta Parasitol*. 2013 Sep;58(3):324-7.

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Curtis LM, Grutter AS, Smit NJ, Davies AJ. *Gnathia aureamaculosa*, a likely definitive host of *Haemogregarina balistapi* and potential

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vector for *Haemogregarina bigemina* between fishes of the Great Barrier Reef, Australia. *Int J Parasitol.* 2013 Apr;43(5):361-70.

Cutmore SC, Miller TL, Curran SS, Bennett MB, Cribb TH. Phylogenetic relationships of the Gorgoderidae (Platyhelminthes: Trematoda), including the proposal of a new subfamily (Degeneriinae n. subfam.). *Parasitol Res.* 2013 Aug;112(8):3063-74.

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Appendix 2: Research grants awarded to ASP Members in 2013

IN 2013, ASP MEMBERS SECURED OVER \$25 MILLION IN NEW RESEARCH GRANTS AND FELLOWSHIPS. (NOTE, INSTITUTION NAMES IN THE LIST BELOW REFER TO THE AUSTRALIAN ADMINISTERING INSTITUTION, NOT NECESSARILY THE HOME INSTITUTION OF INDIVIDUAL RESEARCHERS).

ARC and NHMRC Fellowships and Grants

ARC Linkage Project Grants

Spithill, Prof Terence W; Anderson, Dr Glenn R; Dempster, Dr Robert P; *Development of a novel vaccine targeting parasite tegument proteins for liver fluke disease in livestock;* LaTrobe University and Virbac (Australia) Pty Ltd.

Gasser, Prof Robin; Jex, Dr Aaron R; Gilbert, A/Prof Jack A; Haydon, Dr Shane R; Stevens, Dr Melita; *Establishing next-generation technology platforms for the detection and monitoring of microorganisms in Melbourne water catchments;* The University of Melbourne and Melbourne Water Corporation.

Gasser, Prof Robin; Pozio, Dr Edoardo; Young, Dr Neil D; Boag, Dr Peter R; Sternberg, Prof Paul W; Chang, Dr Bill C; *Harnessing next-generation technologies to tackle major food-borne parasites and design new interventions;* The University of Melbourne and YourGene Biosciences Australia Pty Ltd.

Capon, Prof Robert J; Knowles, Dr Aleta G; *Antiparasitic agents to safeguard Australian livestock;* The University of Queensland and Eli

Lilly Australia.

Irwin, A/Prof Peter J; Ryan, Prof Una M; Bunce, A/Prof Michael; Banks, A/Prof Peter; Gilbert, Prof Marcus T; Rees, Dr Robert L; Mencke, Dr Norbert R; *Troublesome ticks: a new molecular toolkit to investigate zoonotic tick-borne pathogens in Australia;* Murdoch University, Bayer Australia Ltd and Bayer HealthCare.

Ryan, Prof Una M; Haile, Dr James; Halliwell, Dr David J; Ball, Dr Andrew; Bath, Dr Andrew; Xiao, Dr Lihua; *Innovative approaches to understanding and limiting the public health risks of Cryptosporidium and Giardia in animals in Australian catchments.* Murdoch University, Centres for Disease Control and Prevention, USA, Water Quality Research Australia Ltd, Water Corporation of WA, and Sydney Catchment Authority.

Thompson, Prof Richard C; Godfrey, Dr Stephanie S; Lymbery, Dr Alan J; McCallum, Prof Hamish I; Morris, Mr Keith D; Wayne, Dr Adrian F; *The ecology of parasite transmission in fauna translocations;* Murdoch University and WA Department of Environment and Conservation.

NHMRC Early Career Fellowships for funding commencing in 2014

David Riglar, The Walter and Eliza Hall Institute

Natalie Spillman, Australian National University

NHMRC Career Development Fellowships for funding commencing in 2014

Jacob Baum, CDA2, The Walter and Eliza Hall Institute of Medical Research

Appendix 2 cont.

Stuart Ralph, CDA2, University of Melbourne

NHMRC Practitioner Fellowships for funding commencing in 2014

Professor Timothy Davis, PF2, University of Western Australia

NHMRC Research Fellowships for funding commencing in 2014

Doctor Christian Engwerda, SRF A
Queensland Institute of Medical Research

Professor Raymond Norton, PRF
Monash University

Professor Magdalena Plebanski, SRF A,
Monash University

Professor Malcolm McConville, PRF,
University of Melbourne

NHMRC – European Union Collaborative Research Grants (NHMRC – EU Scheme) for Funding Commencing in 2014

Associate Professor Katherine Andrews, Anti-Parasitic Drug
Discovery in Epigenetics, Griffith University

NHMRC Project Grants for funding commencing in 2014

CIA - **Doctor Seth Masters**

CIB - **Doctor Christopher Tonkin**
Regulation of toxoplasma by the NLRP1 inflammasome,
The Walter and Eliza Hall Institute

CIA - **Doctor Diana Hansen**

CIB - **Prof Daniel Schofield**

Understanding the development of humoral immunity to malaria merozoites,
The Walter and Eliza Hall Institute

CIA - **Prof Malcolm McConville**

CIB - **Doctor Fiona Sansom**
Identifying metabolic pathways in Leishmania parasites and their host cells required for virulence,
University of Melbourne

CIA - **Prof Leann Tilley**

CIB - **Prof Philip Rosenthal**

CIC - **Doctor Arjen Dondorp**
Elucidating the mechanisms of action of and resistance to endoperoxide antimalarials,
University of Melbourne

CIA - **Doctor Freya Fowkes**

CIB - **A/Prof Julie Simpson**

CIC - **Prof Francois Nosten**,
Human malarial immunity and assessment of emerging artemisinin resistance,
Macfarlane Burnet Institute

CIA - **Prof Stephen Rogerson**

CIB - **A/Prof Anthony Jaworowski**
Wrong parasite, wrong host? How Plasmodium falciparum erythrocyte membrane protein 1 expression and the host's innate immune response combine to influence the inflammatory response to malaria in vitro and in vivo. Implications for severe malaria,
University of Melbourne

CIA - **A/Prof Richard Payne**

Appendix 2 cont.

CIB - **Prof Nicholas Hunt**

CIC - **Doctor Sheena McGowan**

CID - **Prof Susan Charman**

CIE - **Prof Philip Rosenthal**

Development of Antimalarial Drug Leads Through Inhibition of Food Vacuole Falcipain,
University of Sydney

CIA - **Prof Robin Gasser**

CIB - **Prof Patrick Tan,**

Global molecular exploration of liver fluke,
University of Melbourne

CIA - **Doctor Sheena McGowan**

CIB - **Prof Peter Scammells,**

Targeting the Plasmodium falciparum Metalloaminopeptidases for Development of New Antimalarial Agents,
Monash University

CIA - **Prof Justine Smith**

Toxoplasma gondii Infection of Human Retinal Pigment Epithelium,
Flinders University

CIA - **A/Prof Brendan McMorran**

CIB - **Prof Simon Foote**

CIC - **Doctor Gaetan Burgio,**

The role of Duffy and PF4 in the platelet killing of malaria parasites,
Macquarie University,

CIA - **Doctor Katja Fischer**

CIB - **Doctor Deborah Holt**

CIC - **Doctor Simone Reynolds**

CID - **Prof Robert Pike**

CIE - **Prof Ben Dunn,**

Scabies mite intestinal proteases as targets for novel therapeutics,
Queensland Institute of Medical Research

CIA - **Doctor Emily Eriksson**

Development, regulation and role of innate immunological memory in malaria,
The Walter and Eliza Hall Institute

CIA - **Prof Vicky Avery**

CIB - **Doctor Graeme Stevenson**

CIC - **Prof Susan Charman**

Investigating the therapeutic potential of FTY720 for Human African Trypanosomiasis,
Griffith University

CIA - **Prof Alan Cowman**

CIB - **Doctor Neta Regev-Rudzki**

CIC - **Doctor Danny Wilson,**

The role of exosome-like vesicles in cell-cell communication between P. falciparum-infected red blood cells,
The Walter and Eliza Hall Institute

CIA - **Prof Denise Doolan**

CIB - **Doctor Nadine Dudek**

CIC - **Prof Anthony Purcell**

Immunodominance and protective immunity in the context of a complex host-pathogen system,
Queensland Institute of Medical Research

CIA - **Prof Christian Doerig**

CIB - **Doctor Teresa Carvalho**

Appendix 2 cont.

CIC - **Prof Andrew Tobin**

Functional characterisation of the essential Aurora kinase family in the human malaria parasite Plasmodium falciparum,
Monash University

CIA - **Doctor Louise Randall**

CIB - **Prof Stephen Rogerson,**

The immune modulatory function of chondroitin sulphate A in placental malaria: protecting the fetus, promoting the parasite?,
University of Melbourne

CIA - **Prof Brendan Crabb**

CIB - **A/Prof Travis Beddoe**

CIC - **A/Prof Tania de Koning-Ward**

CID - **Doctor Paul Gilson**

The structural resolution of PTEX, the translocon of virulence proteins and malaria parasites,
Macfarlane Burnet Institute,

ARC Future Fellows

Katja Fischer, Queensland Institute of Medical Research, 2013-2017

Freya J Fowkes, Macfarlane Burnet Centre for Medical Research, 2013-2017

ARC Discovery Project

Robin B Gasser, Abdul Jabbar, Andreas Hofmann, Paul W Sternberg, The University of Melbourne, Monash University, Deakin University, Macfarlane Burnet Centre for Medical Research,

2014 – 2016

ARC LIEF Grants

Ronald J Quinn, Tanja Grkovic, Jennifer C Wilson, Mark von Itzstein, Sally-Ann Poulsen, Robert M Wellard, Kathleen M Mullen, Steven E Bottle, Huai-Yong Zhu, Colleen C Nelson, Ben W Greatrex, Christopher M Fellows, Michelle K Taylor, Daniel J Keddie, Brian R Wilson, Scott F Cummins, Kate E Mounsey, Joanne Macdonald, David J McMillan, Kirsten Benkendorff, Graham J King, Richard T Bush, Leigh A Sullivan, Griffith University Queensland University of Technology, The University of New England, University of the Sunshine Coast, Southern Cross University, 2014

David J Miller, Dean R Jerry, Alexander C Loukas, Gregory E Maes, Cinzia Cantacessi, James Cook University, 2014

William R Heath, Scott N Mueller, Elizabeth L Hartland, Jose Villadangos, Erica K Sloan, Irina Caminschi, Michael Hickey, Jamie Rossjohn, Geoffrey I McFadden, Tania F de Koning-Ward, Brendan S Crabb, The University of Melbourne, Monash University, Deakin University, Macfarlane Burnet Centre for Medical Research, 2014

James Vickers, David H Small, Barbara F Nowak, Emily F Hilder, Gustaaf M Hallegraef, University of Tasmania, 2014

Peter W Gunning, Hongyuan R Yang, Lars M Ittner, Edna C Hardeman, Maria Kavallaris, Nicholas J King, Georges E Grau, Jennifer R Gamble, Wolfgang Weninger, The University of New South Wales, The University of Sydney, 2014

Other Research Grants

Andrews, KT, Skinner-Adams, T. (Griffith University), Delayed death QCL library screening. Medicines for Malaria Venture

Andrews, KT. (Griffith University), Alexander von Humboldt

Appendix 2 cont.

Foundation Travel Award to attend BioMalPar in Heidelberg, Germany

Beebe NW, Ambrose L, Cloonan, N. (The University of Queensland), *Evolutionary investigations into insect olfaction and host choice using a mosquito model system*. Hermon Slade Foundation

Irwin P. (Murdoch University), *Dogs, ticks and pathogens: the search for new and potentially zoonotic pathogens*, Canine Research Foundation

Irwin P. (Murdoch University), *Is Rhipicephalus sanguineus implicated in the transmission of Coxiella burnetii (the agent of Q fever) to dogs?* Australian Companion Animal Health Foundation

Lymbery A, Kueh (Murdoch University), *Edwardsiella ictaluri survey in wild catfish populations*, Fisheries Research and Development Corporation grant

McManus D. (QIMR Berghofer Institute of Medical Research) *Magic Glasses" Program to fight parasitic worms*, UBS Optimus Foundation, Switzerland, 2013-2018

McManus D. (QIMR Berghofer Institute of Medical Research), *Further investigations of the biological activity of BDM-I against agents of human schistosomiasis*, BioDiem Ltd

McNamara M., Adlard R.D., Ernst I. (QLD Museum), *Neptune – aquatic animal pathogen database project Phase 2*. Fisheries Research and Development Corporation grant

N. King, Cls: MB. Graeber, M. Naylor, J. Slapeta, R. Quinnell, K. Charles, T. Owens, R. Bourne, F. Braet, B. Hambly, J. Stone, R. Overall, S. Twigg, A. Hardikar, G. Halliday, D. Richardson, M. Byrne, K. Keay, D. Marsh, VM. Howell, C. Pollock, X. Chen. (The University of Sydney), *A high-throughput, bright-field and fluorescence digital slide scanning platform*, University of Sydney NHMRC Equipment Grants Scheme

Power M. (Macquarie University), *Is it a oneway street? Pathogen transfer between flyingfoxes and humans*, Ian Potter Foundation Grant

Rug, M. (Australian National University), awarded a Fellowship by the German Academics Exchange Service (DAAD): "Research Stays and Study Visits for University Academics and Scientists; Re-invitation Programme for Former Scholarship Holders" to spend three months in two German labs (Berlin: Prof. Andreas Herrmann; HU Berlin, Department of Molecular Biophysics; Heidelberg: Dr. Yannick Schwab, EMBL, Electron Microscopy Facility) from November 2013-end of January 2014. The purpose of the research stay was to establish new collaborative links with these two labs and to obtain new skill sets (Berlin: model membranes; Heidelberg: Correlative Light and Electron Microscopy).

Skinner-Adams, T. (Griffith University), *Plasmepsin X*. Griffith University New Researcher Grant