Annual Report (2007) for the ARC/NHMRC Research Network for Parasitology
Annual Report (2007) for the ARC/NHMRC Research Network for Parasitology

- A summary of the overall goals and objectives, programs and research priorities and any changes to these that may have occurred during the past year

Objectives

The mission of the ARC/NHMRC Research Network for Parasitology (as stated in the application for funding) 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 Network aims to:

- create a website that will foster national and international collaborations by providing access to databases on parasites, parasite genomes, bioinformatics analysis tools, parasitology research resources and protocols, parasitology researchers – this will prevent duplication of research and promote the adoption of uniform protocols, which will fast track Australia's research effort;
- organise and fund conferences, workshops and meetings for scientists, industry representatives, end-users (eg 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;
- create research leadership and management opportunities for young investigators; and
- actively search for world-class recruits to enhance Australia’s parasitology research effort.
Research Priorities

At a series of national workshops held on December 17-18, 2003 and February 17, 2004, the following research priorities were developed for the ARC/NHMRC Research Network for Parasitology:

By assessing the susceptibility to, and monitoring the prevalence of, parasitic disease in wildlife the Network will generate new information that will assist in the management of terrestrial and marine ecosystems. The specific objectives of the Network are to enhance and focus Australia’s parasitology research effort in order to:
- assess parasite diversity in Australian fauna; and
- ensure the sustainability of wildlife and ecosystem health.

The young and the elderly are the most susceptible to parasitic diseases, both in the developed and the developing world. To address this, the Network will focus on the development of new vaccines and treatments for local and global populations and the creation of new technologies to monitor and prevent contamination of waterways with infectious stages of zoonotic parasites (a key source of disease). The specific objectives of the Network are to enhance and focus Australia’s parasitology research effort to:
- better understand host-parasite relationships; and
- discover and develop sustainable parasite control strategies.

A central goal of the Network is the development of new molecular tools and information resources. This includes the development of new databases and data management systems to enable the Network’s researchers to harness the vast quantity of information being generated by a growing number of genome sequencing projects. Developing new bioinformatic tools will create unprecedented opportunities to identify new vulnerabilities/targets for control in parasites. The specific objectives of the Network are to enhance and focus Australia’s parasitology research effort to:
- discover and develop molecular and bioinformatics tools for studying parasite biology; and
- discover and develop anti-parasite vaccines and therapies.

The Network will lead to the development of new technologies (eg sophisticated biosensors) to aid in the surveillance of our border areas and neighbours for exotic, emerging and re-emerging parasitic diseases. Thus, the specific objectives of the Network are to enhance and focus Australia’s parasitology research effort to:
- better understand the epidemiology and transmission dynamics of parasites; and
- discover and develop better surveillance systems.

There have been no significant changes to the overall goals, objectives, programs or research priorities of the Network. The adjustments and realignments of budget allocations reported in the 2005 Annual Report, in light of the granting of $300,000 per annum from the ARC and NHMRC versus the requested ~$500,000 per annum,
remain in operation. However, the Management Committee agreed in 2006 to
welcome three new Participating Organisations to the Network, namely, Macquarie
University, Charles Sturt University and the South Australian Research and
Development Institute (SARDI).

**Governance**

The Network is managed by a Management Committee comprised of the Network
Convenor, the President or Vice President of the Australian Society for Parasitology,
plus, in 2007, eight others. The following considerations, as well as gender balance,
are priorities in selection of the Management Committee: (i) at least two members
must be Young Investigators; (ii) the composition of the Management Committee
represents different disciplinary groups within the Network; and (iii) the composition
also includes geographical representation in its makeup but as a secondary factor.
The quorum for decision-making is five members. The responsibilities of the
Management Committee include, but are not limited to: creating a vision and
strategic plan for the Network; identifying research priorities for the Network;
providing advice on budgeting and planning (including making funding decisions, eg
for award of laboratory exchanges, workshops, grant writing “retreats”); ensuring
effective communications, both internally and externally, including coordination of the
preparation of reports and newsletters, and the organisation of workshops and
conferences; searching for and recruitment of Federation Fellows; and planning the
Network’s educational activities.

The 2007 Management Committee was: A/Prof. Nick Smith (Convenor, University of
Technology, Sydney); Dr Malcolm Jones (President, Australian Society for
Parasitology); Dr Alex Loukas (Deputy Convenor, Queensland Institute of Medical
Research); Prof. Geoff McFadden (University of Melbourne); A/Prof. Una Ryan
(Murdoch University); Prof. Andrew Thompson (Murdoch University), Dr Kevin Saliba
(Australian National University), Dr Rob Adlard (QLD Museum), Dr Jody Zawadzki
(Department of Primary Industries, Victoria), Dr Simon Reid (Murdoch University).
The Committee met in July 2007 and corresponded, as a Committee, regularly by
e-mail.

The Management Committee also received input from an Advisory Committee, the
following of whom met jointly with the Management Committee in July, 2007:

- Dr Graham Mitchell, AO (for services to science, especially immunoparasitology),
  recognised as one of Australia’s leading biological scientists and consultants.
- Professor Artur Scherf, Director of the EU FP6 network, “BioMalPar”;
- Professor John Horton; Vice-President of the Royal Society for Tropical Medicine
  and Hygiene;
- Professor Chris Bryant, AM (for achievement in parasitology and science
  communication), past Dean of Science at the ANU and founder of the Centre for
  the Public Awareness of Science (CPAS).

The Information Technology Initiative of the Network is overseen by a subcommittee
appointed by the Management Committee. This subcommittee is chaired by by
Professor Ross Coppel (Monash University) and other members of the subcommittee
are Professor Geoff McFadden (University of Melbourne), Professor Mathew Bellgard
(Murdoch University), and Professor Lindsay Botten (University of Technology,
Sydney). The subcommittee meets as required to review and prioritise IT activities and approve new projects.

- **Additional funding.**

In-Kind Contributions for Academic Time Contributions have been estimated using a conservative calculation that estimates Management Committee member’s commitment to Network activities as 10% of their time and for other participants at Level A academic and above as 5%. Thus, for most participants, in-kind contributions are based on 5% of their salary (including on-costs) with the addition of a value calculated by multiplying 5% of salary by 1.25 to provide an estimate of the value of facilities available to Network participants. In addition, 50% of the Convenor’s salary is contributed by the University of Technology, Sydney, and is included as an in-kind contribution. The total estimated value of in-kind contributions by Participating Organisations to the Network in 2007 was $1,874,694.

Cash commitments to the Network were made by the Australian Society for Parasitology Inc., the University of Technology, Sydney, the Queensland Institute of Medical Research, Monash University, Murdoch University, LaTrobe University, The University of Queensland, The Australian National University, The University of Sydney, the Walter and Eliza Hall Institute of Medical Research and the South Australian Museum.

- **The extent to which the objectives of the Research Network and the Approved Proposal have been met**

**Website and Newsletter**

The Network website was totally overhauled in 2007, producing a more attractive, functional, user-friendly and informative resource for Australia’s parasitology community. The website is at [www.parasite.org.au/arcnet](http://www.parasite.org.au/arcnet). The Network Newsletter was published, on average, every 2 months, keeping Network Participants up-to-date on developments and opportunities afforded by the Network and achievements of its participants.

**Information Technology Initiative**

The Network maintained an IT team with staff at the Victorian Bioinformatics Consortium (Monash University) and in the Computational Research Support Unit (Faculty of Science, the University of Technology, Sydney) - a member of the Australian Partnership for Advanced Computing (APAC) Grid Program. Additionally, in 2007, funding was provided to the University of Queensland (specifically Professor Peter O’Donoghue and Ms Lynn Prior) to commence development on an Australian parasite research and education web resource. The IT Subcommittee Chair is Professor Ross Coppel of Monash University. In 2007, the following activities (with some necessary reiteration of 2005 and 2006 activities) were carried out:

*Development and deployment of bioinformatics tools*

Network-funded personnel have developed a complete set of services for gene, genome and microarray analysis. These often involved extending existing analyses
developed for prokaryotic pathogens to eukaryotes. Services developed included all manner of gene analysis, BLAST searches, multisequence alignment, phylogenetic analyses etc. An important advance was the extension of Wasabi to eukaryotic organisms. This program is a suite that performs multiple protein feature analyses on thousands of genes, returning the results via individual web pages of results for each gene. Microarray capabilities include full analyses of microarrays based on Affy chips, spotted cDNA and oligo arrays to identify up- and down-regulated genes. The VBC also customized a web-accessible database for storage, analysis and sharing of microarray results with collaborators in other laboratories or countries. All data placed in the database is securely backed up and kept confidential. A single point of contact for all inquiries was established for Network members (previously David Powell and now Torsten Seeman torsten.seeman@infotech.monash.edu.au) who will either perform the requested analysis or refer the problem to other VBC personnel for action. Other services include advice and assistance with process automation and general computing advice on just about anything to do with scientific computing including Unix systems administration, installation and setup of bioinformatics software, database schema design, web site construction, design and construction of server hardware and deployment of storage arrays. Services are accessed at http://www.vicbioinformatics.com/parasitology.shtml

Development and deployment of collaborative environment and communication tools
The IT committee identified several distinct collaborative capabilities to support the Network. One was an open web site in which discussion forums could be hosted and job adds, requests for technical assistance, reagent databases etc deposited. The second was a private area in which smaller groups could meet for specific purposes such as applying for grants, undertaking research collaboration, planning conferences etc. Follow on discussions with users generated a request for a system to remotely manage a laboratory and interact with lab staff during overseas travels. This was later extended to a request for blog-type capabilities hosted in a non-public environment. The VBC commenced working on all three projects including a Plone-based system for the communication platform. However in late 2005, UTS offered computing resources to assist in this project and collaboration was established between scientists at the VBC at Monash University and the Computational Support Research Unit at the University of Technology Sydney. The CSRU is a member of the Australian Partnership for Advanced Computing (APAC) Grid Program, and the goal of the Program is to provide computing support to co-ordinated programs in research, education and technology. These goals were in-line with the Parasitology Network's IT program of providing computing and IT support to discovery in areas of research that have reached a bottleneck, as well as to create a web-based comprehensive resource for Parasitology Network members. The project was therefore split with the VBC to develop the collaborative tools and the CSRU to develop the communication platform. Current solutions available are:

b) The private room solution is available at http://www.arcparasitology.grouphub.com
The site has project management capabilities built in including creation and assignment of to-do lists to members, milestone tracking, file sharing, chat and message boards with threads and commenting.
c) Web-based secure blog for monitoring research progress within a laboratory. This is set up on a lab by lab basis on a dedicated web site. For an example see http://www.malariaresearch.net/malariaresearch/Cooke%20Blog.html
Sarcoptes scabei project
The aims of the project were to analyse and annotate sequencing data obtained from sequencing expressed sequence tags (ESTs), and analyse any protein sequence data obtained. To do this a multi-platform software package, called EST-PAC was developed. This consists of a database that can be installed locally and allows, through an open-source data-management environment, the synchronization of storage, powerful queries of results and administration of the annotation process.
Three aspects of EST annotations are made available through EST-PAC:

i) searching local or remote biological databases for sequence similarities using Blast services

ii) predicting protein coding sequence from EST data and,

iii) annotating predicted protein sequences with functional domain predictions

Results can be stored in the database or downloaded as a comma separated values file for importation to other programs.

Outcomes:
EST-PAC was used to manage and annotate ESTs obtained from the mite, Sarcoptes scabiei. Out of 43034 ESTs, we assembled 6962 contigs and 3720 singlets. In these sequences, we found 3849 (55%) relevant contig hits and 940 (25%) singlet hits in the non-redundant protein database of GenBank (Nov 2005).
Analysis of the EST dataset resulted in the identification of numerous putative antigens and allergens of the scabies mite. These included homologues of most of the known house dust mite allergens, including the group 1 cysteine proteases, group 3 serine proteases, group 8 glutathione transferases, group 11 paramyosin, and group 14 apolipoprotein. The group 1 and group 3 proteases were shown to be large multigene families of both putatively active and inactive proteases in contrast to the situation in the house dust mite where both types of protease were considered to be encoded by a single gene. Also of significance are molecules which have been implicated in drug resistance in other organisms. These are currently being investigated in light of recent evidence of both clinical and in vitro ivermectin tolerance of mites from patients who have received multiple doses of the drug. Other proteases were also identified including several cathepsin L like cysteine proteases and a cathepsin D like aspartic protease, and numerous mitochondrial sequences were identified.

Availability:

Wasabi toolkit
Wasabi was originally designed to facilitate the rapid annotation of prokaryotic genomes, and to allow browsing and searching of the annotated genomes. As most users are interested in protein coding regions, Wasabi precomputes various analyses on the proteins which are used to provide an initial automatic annotation. They are also presented in a summarized form for use in manual curation; the annotator can easily verify or modify the automatic annotation. Multiple annotators can work on a genome simultaneously, and the annotations can be exported to standard file formats such as Genbank/EMBL, GFF and FASTA. Searches supported are:

* the amino acid sequence
* the DNA bases immediately upstream of the start codon
* various biochemical measures of the sequence such as weight and pl
* rpsblast search results
* blastp against Genbank "nr" protein database
* blastp searches against other related peptide sequences
* tblastn searches against other related nucleotide sequences
* PSORT, PSORT-B and CELLO for the prediction of protein localization sites
* LipoP prediction of lipoproteins and signal peptides in Gram- bacteria
* SignalP predicts the presence and location of signal peptide cleavage sites
* TMHMM for prediction of transmembrane helices in proteins
* TMpred makes a prediction of membrane-spanning regions and their orientation
* InterProScan identifies protein domains

This set of analyses can be extended by a plug-in-type architecture. It is also possible to bootstrap the annotation process by using these analyses to automatically perform an initial annotation. The human annotator then only needs to verify and possibly correct the automatic annotation. This saves much typing and expedites the annotation process. Wasabi can be implemented for multiple users via a web browser and allows team annotation of a genome. Support by the Network allowed conversion of Wasabi to a program that supports eukaryotic genomes. The genome under study can be hosted at the VBC and would only be visible and annotatable by authorised users in a password-protected web-environment. This is very useful for re-annotation of a genome and was used in 2007 for searches for new *Plasmodium* gene models to list the full set of exported and vaccine-candidate proteins.

**Australian Parasite Research and Education Resource**

Worked commenced in 2007 on the Australian Parasite Research and Education Resource at The University of Queensland, led by Professor Peter O'Donoghue. The resource will be a web-based interactive site with illustrated keys to helminth, protozoan and arthropod parasites of Australian hosts relevant to undergraduate students, postgraduate students, teachers and researchers in biology, medical and veterinary sciences. The Network is co-sponsoring this initiative with the Australian Society for Parasitology Inc. In 2007, the textual contents for the site were essentially completed and work commenced on the graphics. This will continue in 2008 with a view to making the site active in 2009.

**Scientific Conferences and Workshops**

The ARC/NHMRC Research Network for Parasitology co-hosted a scientific meeting with the Australian Society for Parasitology Inc. - held at the Marque Hotel, Canberra - from July 8 to 11, 2007. The Network underwrote funding for the conference in order to keep registration fees for delegates to a minimum and thereby ensure access to as many delegates – especially early career researchers and students – as possible. The Network also coordinated the raising of sponsorship for the conference to further defray costs and ensure the attendance of top quality international invited speakers, especially for the *Drug Targets, Drugs and Drug Resistance in Tropical Parasites*, a major theme of the 2007 conference, which was co-sponsored by the Royal Society for Tropical Medicine and Hygiene as part of their centenary year celebrations. The 2007 conference saw the continuation of the “Elsevier Lectures”, including the “International Journal for Parasitology Lecture” and the “Trends in Parasitology Lecture”, delivered by Drs Matthew Berriman (Wellcome Trust Sanger Institute, UK)

Jim Goding (Monash University), Emanuela Handman (WEHI) and Alana Zakrezewski (IBID, UTS) at the opening of the 2007 Joint Conference of the Australian Society for Parasitology and ARC/NHMRC Research Network for Parasitology, Canberra, July, 2007

The conference covered a wide variety of parasitology research, reflecting the diversity and multidisciplinarity of Network Participants. The meeting was opened by Professor Margaret Clayton (Executive Director for Biological Sciences and Biotechnology, Australian Research Council) and was attended by 231 delegates. It included participants from 25 out of the Network’s Participating Organisations. Over 55% (129) of attendees were early career researchers or students and there were 24 international delegates. Plenary and Symposium Lectures were delivered by:

Functional Genomics
- Artur Scherf (Institut Pasteur, Paris, France)
- Eileen Devaney (University of Glasgow, UK)
- Alan Cowman (Walter and Eliza Hall Institute of Medical Research, Melbourne, Australia)
- Carolyn Behm (Australian National University, Canberra, Australia)

Evolutionary Biology of Parasites
- Robert Poulin (University of Otago, Dunedin, New Zealand)
- Ian Beveridge (The University of Melbourne, Australia)
- David Blair (James Cook University, Townsville, Queensland)

Parasites in Wildlife and Conservation Biology
- Peter Daszak (Consortium for Conservation Medicine, New York, USA)
- Michael Bull (Flinders University, Adelaide, Australia)
• David Jenkins (SE Australian Hydatid Control and Epidemiology Campaign, Canberra, Australia)

**Immunology, Immunomodulation and Vaccines**
• Maria Yazdanbakhsh (Leiden University, The Netherlands)
• Sheila Donnelly (Institute for the Biotechnology of Infectious Diseases, UTS, Sydney, Australia)
• Christian Engwerda (Queensland Institute of Medical Research, Brisbane, Australia)
• Magdalena Plebanski (Austin Research Institute, Melbourne, Australia)
• Nick Smith (Institute for the Biotechnology of Infectious Diseases, UTS, Sydney, Australia)
• Richard Grencis (University of Manchester, UK)

**Drug Targets, Drugs and Drug Resistance in Tropical Parasites**
*This theme was co-sponsored by the Royal Society of Tropical Medicine and Hygiene as part of its Centenary Year Celebrations*
• Scott Landfear (Oregon Health and Science University, USA)
• Akhil Vaidya (Drexel University College of Medicine, USA)
• Kiaran Kirk (Australian National University, Canberra, Australia)
• Kathy Andrews (Queensland Institute of Medical Research, Brisbane, Australia)
• Warwick Grant (LaTrobe University)
• Colin Sutherland (London School of Hygiene and Tropical Medicine, UK)

**Bancroft Mackerras Award Oration**
• Tom Cribb (The University of Queensland)

**Australian Society for Parasitology Presidential Address**
• Malcolm Jones (Queensland Institute of Medical Research)

The Network also sponsored, through its Researcher Exchange, Training and Travel Awards Scheme, three Symposia in 2007:

**“Parasites, Conservation and Evolutionary Ecology Symposium”** (Adelaide, June 21-22, 2007), organised by Professor Mike Bull (Flinders University) and attended by 160 scientists. Themes and speakers included:

**Parasites and Behaviour of Amphibians**
• Rick Shine (University of Sydney)
• Ross Alford (James Cook University)

**Parasite Ecology**
• Ian Beveridge (University of Melbourne)
• Hamish McCallum (University of Tasmania)
• David Gordon (Australian National University)
• Sandra Parsons (Australian National University)
• Kris Murray (University of Queensland)
• Shelley Lachish (University of Queensland)
• Stephanie Godfrey (Flinders University)

Reptiles and Birds
• Tim Jessop (Australian National University)
• Fabien Aubret (University of Sydney)
• Margot Orebeek (Flinders University)
• Dan Rogers (University of Adelaide)

Evolution in Reptiles
• Scott Keogh (Australian National University)
• Steve Donnellan (SA Museum)
• Mats Olsson (Wollongong University)

Conservation Issues
• Hugh Possingham (University of Queensland)
• Charlie Daugherty (Victoria University, Wellington, New Zealand)
• Chris West (Adelaide Zoological Gardens)
• David Paton (University of Adelaide)

Conservation and Population Genetics
• Annabel Smith (Flinders University)
• Joanna Summer (Australian National University)
• Nicki Nelson (Victoria University, Wellington, New Zealand)
• Wendy Foster (Adelaide Zoological Gardens & University of Adelaide)

Social Organisation
• Mike Gardner (Flinders University)
• Jen Moore (Victoria University, Wellington, New Zealand)
• Luke Chenowith (Flinders University)

“Northern Australia Malaria Symposium” (Brisbane, November 27, 2007), organised by Kathy Andrews, Michelle Gatton and Alberto Pinzon-Charry (Queensland Institute of Medical Research) and attended by 43 malariologists. Themes and speakers included:

Parasite Biology
• Chris Peaty (Queensland Institute of Medical Research)
• Franka Teuscher (Queensland Institute of Medical Research)
• Katharine Trenholme (Queensland Institute of Medical Research)
• Matthew Dixon (Queensland Institute of Medical Research)
• Norm Waters (Australian Army Malaria Institute)
• Luke Guddat (University of Queensland)
• Nanhua Chen (Australian Army Malaria Institute)

Drug Development and Resistance
• Kevin Saliba (Australian National University)
• Liz Fernandez (Griffith University)
• Tina Skinner-Adams (Queensland Institute of Medical Research)
• Alyson Duff (Australian Army Malaria Institute)
• Marina Chavchich (Australian Army Malaria Institute)
• Thanh Tran (Queensland Institute of Medical Research)
• Michelle Gatton (Queensland Institute of Medical Research)

Pathogenesis
• Joanne Baker (Australian Army Malaria Institute)
• Nelson Lee (Queensland Institute of Medical Research)
• Kathy Andrews (Queensland Institute of Medical Research)
• Fiona Amante (Queensland Institute of Medical Research)
• Louise Randall (Queensland Institute of Medical Research)

Immunology
• Tonia Woodbury (Menzies School of Health Research)
• Alberto Pinzon-Charry (Queensland Institute of Medical Research)
• Michelle Wykes (Queensland Institute of Medical Research)

“Genomic and Proteomic Analyses of Secretions of Parasitic Helminths” (Brisbane, March 27, 2007), organised by Dr Malcolm Jones (Queensland Institute of Medical Research) and attended by 20 helminthologists. Speakers included:

• Robin Gasser (University of Melbourne), Prospects in nematode genomics and bioinformatics
• Alex Loukas (Queensland Institute of Medical Research), Secreted proteins of human Helminths – their discovery and potential use as vaccines and anti-inflammatories
• Jason Mulvenna (Queensland Institute of Medical Research), Proteomics of helminth secretions
• Malcolm Jones (Queensland Institute of Medical Research & University of Queensland), Towards tissue-specific transcriptomics and proteomics of Helminths
• Gene Wijffels (CSIRO Livestock Industries), Worm ESPs: molecular diplomacy or war
• Aaron Ingham (CSIRO Livestock Industries), Gene expression changes following gastrointestinal nematode challenge
• Andrew Kotze (CSIRO Livestock Industries), Worm defence mechanisms
• Louise Jackson (Queensland Department of Primary Industries and Fisheries), The latest (and greatest) cattle tick vaccine project!

Researcher Exchange, Training and Travel Awards

In 2007, the Network funded the following applications for assistance from its Researcher Exchange, Training and Travel Award funds (21 of the 28 awards directly benefited research students or early career researchers). We have highlighted two case studies in this section, and also an interview (in the “What Happened Next” section) with another young researcher who won a Fulbright Scholarship after her Network Researcher Exchange.

• Catherine James, PhD candidate from the Institute for the Biotechnology of Infectious Diseases at the University of Technology, Sydney for a Researcher
Exchange to visit the laboratory of Professor Roger Prichard at McGill University, Institute for Parasitology, Quebec, Canada for 4 months from February/March 2007 through to June/July 2007.

- **Annette Dougall**, a Doctor of Philosophy candidate from Menzies School of Health Research, Charles Darwin University for a Researcher Exchange for 4 weeks of research and training at the Liverpool School of Tropical Medicine, UK and 2 weeks field training and laboratory teaching in Teresina, Brazil in June and July 2007.

- **Melanie Andrews**, PHD Candidate from the Tasmanian Aquaculture and Fisheries Institute, University of Tasmania for a six week Researcher Exchange at the Norwegian School of Veterinary Science, National Veterinary Institute in Oslo, Norway from 5 August – 15 September 2007.

- **Jack Richards**, WEHI, for laboratory work and field studies at the PNG Institute for Medical Research.

- **Leanne Robinson**, PhD Student, The Walter & Eliza Hall Institute of Medical Research to attend the annual Epidemiology & Control of Infectious Diseases Training Course course at St Mary’s Hospital Campus of Imperial College in Paddington, London, from September 3-14, 2007.

- **Jody Zawadzki**, Project Leader and Senior Research Scientist, Department of Primary Industries Victoria, for a Research Exchange to the Novartis Centre de Recherche Santé Animale CH-1566 St-Aubin to undertake a short Research & Development project under the supervision of Dr Ronald Kaminsky, Head of Parasitology and also to the University of Bern and the University of Zurich to meet with Professor Maser and Professor Seeberger to develop international networks and discuss collaborative projects for the future.

- **Darren Krause**, from the Australian Army Malaria Institute, for a Researcher Exchange to work in Prof. Leann Tilley’s lab to do live cell staining from Monday 5 - 9 March 2007.

- **Danielle Smyth**, Queensland Institute of Medical Research, to visit the Centro de Pesquisas Rene Rachou, FIOCRUZ and the Federal University of Minas Gerais in Brazil to develop RNA interference protocols for parasitic nematodes.

- **Celio Pasay**, Queensland Institute of Medical Research, to travel to Wright University, Ohio, USA, to study drug resistance in scabies mites.

- **Adele Lehane**, PhD candidate from the Australian National University to attend the Biology of Parasitism Course at Woods Hole USA from June - August 2007.
Case Study 1: Adele Lehane is a PhD candidate in Prof. Kieran Kirk’s lab in the School of Biochemistry and Molecular Biology, at The Australian National University. Adele won a Network Travel Award to attend the Woods Hole Biology of Parasitism course in June 2007. Adele speaks to Lisa Jones about her experiences on the course and how it has helped her research.

Adele Lehane at the Woods Hole Biology of Parasitism Course

Adelle, tell me about your area of research?

“I’m doing my PhD on malaria, concentrating particularly on the parasite’s digestive vacuole, which is the acidic organelle where the antimalarial drug chloroquine accumulates and poisons the parasite. Chloroquine-resistant parasites accumulate much less chloroquine in the digestive vacuole – but we don’t know the reason why. So far my work has focused on how chloroquine-resistant parasites are able to stop the build-up of chloroquine in their digestive vacuoles. We’ve found out that there’s a pathway through which chloroquine can exit from the digestive vacuole in chloroquine-resistant parasites. I’d like to go on to investigate other aspects of the physiology of this organelle.”

What particularly interests you about working in this area?

“The development of resistance to chloroquine has had a devastating impact on malaria control. Any clues on how to circumvent it or prevent other drugs from suffering the same fate could prove valuable. I’m also interested in learning about the basic physiology of the digestive vacuole because, although it is very important in the malaria parasite physiology, very little is known about it. Its intracellular location in an intracellular parasite makes it a challenge to study.”

How has the Network Travel Award helped your research develop?

“The Network travel award made it possible for me to attend the Biology of Parasitism course in Woods Hole. This eight-week course combines the benefits of a conference and hands-on training in techniques, and has given me valuable direction for my research. It provided a great opportunity to meet leaders in the field of parasitology, as well as committed parasitology students from around the world. This resulted in many valuable discussions and I envisage that some collaborations will arise from our time together. I’m also confident that many of the new techniques that I learned will be useful, both for my PhD and for other members of the lab.”
What advice do you have for other Network scientists who want to apply for a travel award?

“I’d encourage other Network scientists to apply. My experience in Woods Hole confirmed for me the value of the fresh perspectives and training opportunities that overseas experience can provide.”

What advice do you have for science students who are considering parasitology as a career?

“I’d certainly encourage science students to pursue parasitology if that’s where their interest lies. Parasitic diseases are a huge global problem and dedicated researchers with diverse experiences and skills are needed to tackle them. Parasitology offers a whole range of interesting research opportunities whether your interest is in molecular biology, cell physiology, chemistry, or a range of other disciplines.”

What do you see as the benefits of being part of the Network?

“Being part of the Network helps in keeping up to date with parasitology research in Australia, through the website, newsletters and meetings, as well as offering opportunities for funding support for interstate and overseas training. All of this fosters skills development, the exchange of ideas, and collaborative research.”

Tell me about the highlight of your science career so far?

“The Biology of Parasitism course is definitely one of the highlights.”

What would you like to do in the future?

“I hope to finish my PhD in 2009, and afterwards I’d like to stay in parasitology and work overseas for a while. Ultimately I’d like to return to Australia and set up my own lab. I’d like to keep working on parasites that cause human disease. Attending the Biology of Parasitism course gave me a broader perspective on active areas of parasitology research, which will certainly help when the time comes to make a decision on what research direction to take after my PhD.”

- **Stephane Hemmerter**, Institute for the Biotechnology of Infectious Diseases, University of Technology, Sydney to attend the Workshop on Molecular Evolution, Woods Hole, Massachusetts USA from 22 July to the 10 August 2007.
- **Nevi Parameswaran**, from Murdoch University for a Researcher Exchange August 27th to September 8th ’07, Salford UK: 2 weeks with Geoff Hide, The Centre for Molecular Epidemiology and Ecology, University of Salford, and September 8th to 26th, Washington D.C, USA: 2 weeks with Michael Grigg, National Institute of Health (NIH) and 3 days with Mark Jenkins, Animal Parasitic Disease Laboratory, United States Department of Agriculture (USDA).
- **Philippe Boeuf**, Research Fellow, Department of Medicine (RMH/WH) The University of Melbourne for a Researcher Exchange to Academic Unit of Child Health University of Manchester.
• **Rogan Lee**, Senior Scientist, Institute of Clinical Pathology and Medical Research, Westmead Hospital for a Researcher Exchange and Visiting International Lectureship to bring Dr **Colin Sutherland** to Australia from 1 June – 31 August 2007.

• **Michelle Power**, Postdoctoral Research Fellow at Macquarie University for a one-month Researcher Exchange to visit the Laboratories of Dr Donald Duszynski at the SouthWest Museum of Biology and Assoc Prof. Rob Miller at the University of New Mexico, both in Albuquerque, USA to learn methodology for describing new *Eimeria* species, obtain samples of *Eimeria* from North and South American marsupials, to isolate and extract DNA from these samples and ship back to Australia and to establish a collaboration to investigate co-evolution of *Eimeria* and marsupials.

• **Stephanie Godfrey** PhD student, Flinders University of South Australia for a Researcher Exchange 27th May – 18th June 2007: 3 week visit to Prof. J. Krause's laboratory at the University of Leeds (UK), and Dr. Dick James at the University of Bath (UK) to learn social network analysis and modelling techniques.

• **Leann Tilley**, La Trobe University, for a Researcher Exchange by international student **Silvia Haase** from Dr Tim Gilberger's laboratory in the Bernhard Nocht Institute for Tropical Medicine, Hamburg, for collaborative research.

• **Una Ryan**, School of Veterinary and Biomedical Sciences, Murdoch University, for a Researcher Exchange to visit Dr Caccio Department of Infectious, Parasitic and Immunomediated Diseases, Istituto Superiore di Sanita', Italy from August 07 until October 07.

• **Ying Zhu**, post-doctoral research fellow, The Walter & Eliza Hall Institute of Medical Research to attend the Optical Microscopy & Imaging in the Biomedical Sciences course at Woods Hole, October 9 - 18, 2007.

• **Fiona McCallum**, PhD student, The Walter and Eliza Hall Institute of Medical Research, for a Research Exchange to the Kenya Medical Research Institute (KEMRI), Kilifi, to work in KEMRI malaria laboratory, 17 July - 30 September 2007.

• **Philip Crosbie**, Aquafin CRC Research Fellow, University of Tasmania, for an exchange visit to the Institute of Parasitology, Academy of Sciences Ceske Bud Jovice in the Czech Republic to investigate the latest technologies for studying *Neoparamoeba* infection of fish.

• **Min Hu**, Postdoctoral Researcher, The University of Melbourne, for an exchange visit to the California Institute of Technology, to collaborate with Paul Sternberg on Helminth genomics.

• **Andrew Thompson**, Murdoch University, to bring Tim Paget from Medway School of Pharmacy, University of Kent, and Lydden Polley of the University of Saskatchewan, to Australia to collaborate on research into the molecular epidemiology of zoonotic parasites.

• **Jennifer M Covello**, PhD Candidate at School of Aquaculture, University of Tasmania for a Researcher Exchange to visit the Scottish Fish Immunology Research Centre in Aberdeen, Scotland to investigate molecular aspects of the striped trumpeter immune response as it relates to host-parasite interactions under the direction of Prof. Chris Secombes from May-June 2007.
Case Study 2: Jen Covello, PhD Candidate at the School of Aquaculture, University of Tasmania speaks to Lisa Jones about her experiences on her researcher exchange.

**Jen, tell me about your area of research?**

“I work with a species of fish called the striped trumpeter. It has been under investigation as a species for commercial culture in Tasmania since the 1980s. A lot of progress has been made in terms of closing the life cycle and early rearing, and earlier this year the first trial cohort was put to sea. My project focuses on gaining an understanding of the immune system in terms of when the antibody response begins and how the fish reacts to pathogens. This will help in the future if vaccine development or other disease mitigation measures become necessary.

Recently new species of parasites have been identified on the striped trumpeter and I will be involved in a project looking at the host’s response to these parasites. Any information we can gain about how the parasite is affecting the host can be helpful to developing mitigation strategies if these parasites become a problem in a commercial culture situation.”

**What interests you about working in this area?**

“I think it’s exciting to work with a new species. Even though we know a lot about certain fish like salmon, each species can be really different and it’s interesting to see those differences. I also like the idea that the knowledge generated by my project can be directly applied to industry.”

**How do you see your research developing in the future?**

“The idea of my project is to get a general understanding of the immune system of the striped trumpeter in terms of its ontogeny and also how it reacts to pathogens. By using a few generic models like model antigens and ectoparasites, we can gain background knowledge that can be built upon if disease problems develop as striped trumpeter culture grows. The plan is to lay the groundwork so that if problems do arise we are in a position to deal with them.”

**How has the Network travel award helped your research develop?**

“The network travel award allowed me to head to Aberdeen in Scotland for two months to conduct some of my research. The lab I visited is the leading fish cytokine laboratory in the world. They are extremely well equipped in terms of both equipment and knowledge when it comes to finding cytokine genes. Because my project is the first to look at the immune system of this fish, we didn’t have any sequences to work with so I had to identify some key immune genes to look for. I was able to find 6 genes while I was there. Two of them will allow me to further my work on the ontogeny of the immune response and the other four will be used to look at host parasite interactions.”

**What advice do you have for other Network scientists who want to apply for a travel award?**
“I would say they should just do it. I think the travel award is a great way to gain experience in a different lab and learn about how other groups are approaching similar research areas.”

What advice do you have for science students who are considering parasitology as a career?

“I think that parasitology is a really exciting field to work in. There is a never ending list of parasites that are constantly doing battle with their hosts so there is definitely no shortage of areas of study.”

What do you see as the benefits of being part of the Network?

“I have only been a part of the network for about a year, but I think it is a great way to keep on top of what other scientists are doing. It’s a really great way to get in touch with other researchers that are working in areas similar to your own. Obviously the awards system is a great way to not only learn from others, but to also get your science to a wider group of people.”

Tell me about the highlight of your science career so far?

“I am very early in my career as I am only half way through my PhD at the moment, but there have definitely been a few highlights. I really enjoy taking the knowledge we gain in a more confined laboratory setting and discovering ways to apply it so that it can be beneficial to the aquaculture industry.”

What would you like to do in the future? (What are your aspirations?)

“The first goal is to complete my PhD. After that I think that I would like to continue in research but possibly in the private sector. Working in the fish health industry, researching solutions to some of the major pathogens that affect cultured fish would be my ideal job.”

- Lesley Warner, of the SA Museum, to travel to the Bernice Bishop Museum in Hawaii, to carry out some taxonomic studies on parasites of a unique fauna collections.
- Leann Tilley, of LaTrobe University, to visit and use the unique x-ray and optical microscope facilities at the University of California.
- Barbara Nowak, for a visit to the Pacific Biological Station and salmon farms on the Pacific Coast of Canada and the USA as part of collaborative research on the parasites of farmed salmon.
- Kate Hutson, University of Adelaide, to visit the University of Valencia and the British National History Museum to carry out collaborative research on marine parasites.
“What happened next?” – stories from our 2005 and 2006 Network Researcher Exchange, Training and Travel Award Recipients

In the 2006 annual report for the ARC/NHMRC Research Network for Parasitology, we featured a story on a publication in *Nature* that included work conducted under a Network Researcher Exchange, Training and Travel Award to Professors Kieran Kirk (ANU) and Geoff McFadden (University of Melbourne). The Award allowed the exchange of several young researchers and the sharing of novel technologies between these two laboratories. The collaboration is still very much alive and continues to produce some very notable highlights including:

- The award of an NH&MRC Australian Based Biomedical Fellowship for the project, “Trafficking of the malaria parasite’s chloroquine resistance transporter”, to Dr Rowena Martin, one of the young researchers involved in the project – this fellowship will allow Rowena to work for 2 years in Geoff McFadden’s laboratory at the University of Melbourne before returning to the ANU for the final two years of the fellowship.
- The award of an NH&MRC Project Grant, also to Rowena Martin for “Characterization of the chloroquine resistance transporter of the malaria parasite”.

In 2006, the Network awarded Mai Tran, an early career researcher at QIMR, a Researcher Exchange, Training and Travel Award to visit laboratories in the United States. Mai soon also secured a Fulbright Fellowship to enhance and extend that exchange (see Case Study 3 below).
Case Study 3: Mai Tran (pictured below) is a postdoctoral fellow at the Helminth Biology Laboratory, Queensland Institute of Medical Research (QIMR). She was awarded a Fulbright Scholarship, connected to her ARC/NHMRC Research Network for Parasitology Researcher Exchange, Training and Travel Award to visit the Biomedical Research Institute (NIAID/NIH) in Rockville, USA early in 2007. Mai talks to Lisa Jones about her Network Travel Award and her Fulbright Scholarship.

Mai, tell me about your area of research?

“I work on schistosomiasis which is caused by the blood fluke, Schistosoma. Currently treatment of schistosomiasis relies on widespread chemotherapy and there is no available vaccine.

At QIMR, we have identified a surface protein called tetraspanin (TSP-2) as a vaccine target. Mice immunised with recombinant TSP-2 and then challenged with schistosomes elicit reduction in adult worm burden, liver and fecal egg counts by more than 50%. An interesting finding is that in endemic areas, individuals who are thought to be resistant to Schistosoma mansoni develop significantly higher IgG1 and IgG3 antibody responses against TSP-2 in comparison to chronically infected people or control groups.

Tetraspanins are expressed on the surface of schistosomes where host-parasite interact. We wish to determine the biological function of tetraspanins on the surface of schistosomes and the host molecule(s) they interact with. We also aim to further investigate TSP-2 as a schistosomiasis vaccine candidate.”

Mai started her career in cancer research and then moved into parasitology. Mai, what interests you about working in this area?

“The project has so much diversity - molecular cloning, protein expression and purification, parasite culture, mouse vaccine trials, immunology and many more. I am always learning new techniques or improving my techniques to work efficiently.”

How has the Network travel award helped your research develop?

“First of all, I’d like to thank the Network for the travel award. It has enabled me to visit the Biomedical Research Institute (NIAID/NIH) in Rockville, USA. The Institute maintain schistosome life cycle and supply parasites to over 50 laboratories worldwide free of charge.”
I was able to collect and culture large quantities of young schistosomes which will be utilised to study differential expression by microarray."

**What advice do you have for other Network scientists who want to apply for a travel award?**

"I think one of the hardest things in science is finding money for travel whether it's for conference, course or visit to another lab to enhance one's research. With the travel award, the Network has eased the burden on many laboratory heads. Moreover, the experience gained during the travel can be added and improve ones CV."

**What advice do you have for science students who are considering parasitology as a career?**

“There are so many different types of parasites; science students are likely to find one or a group which will interest them. It is amazing to look at schistosomes in culture – how they elongate, feed on blood and the interaction between male and female adult worms. Other area of science such as immunology, molecular biology and biochemistry can be applied to parasitology.”

**Tell me about winning the Fulbright Scholarship?**

“The Fulbright Program is the largest international educational and cultural exchange program in the world, operating between US and over 150 countries worldwide”. The program offers PhD, Postdoctoral and professional awards to all areas of study including science and technology. If members of the Network wish to conduct research in the US, I encourage them to visit the Fulbright website (www.Fulbright.com.au). Short-listed PhD and Postdoctoral candidates are required attend an interview with a multi-discipline panel (barrister, US consulate general, editor of newspaper and head of a university department).

The Fulbright scholarship has given me an opportunity to extend my current research project. In July this year I will join the laboratory of Prof Ed Pearce at The School of Veterinary Medicine, University of Pennsylvania, Philadelphia to gain experience in RNA interference and aim to silence tetraspanin genes in young schistosomes. In addition, I will work at the Biomedical Research Institute (NIAID/NIH) in Rockville, Maryland to conduct more vaccine trials in mouse model of schistosomiasis and determine the efficacy of TSP-2 as a schistosomiasis vaccine candidate.

Fulbright scholars are also involved in ambassadorial responsibility and I look forward to these commitments and meeting scholars from other countries.”

**How do you see your research developing in the future?**

“Hopefully after a year research in the US, I will have a better understanding of tetraspanin and its association with schistosomes. In collaboration with US and
Brazil, the Helminth Biology Laboratory aim to apply funding through NIH or the Gates Foundation to develop a human schistosomiasis vaccine.”

**What do you see as the benefits of being part of the Network?**

“The Network has provided excellent opportunities to communicate and collaborate, exchange wealth of information and expertise and also funding.”

**Tell me about the highlight of your science career so far?**


**What would you like to do in the future?**

“I would like to be CI or co-CI on a grant – funded, of course!”

Two students awarded Network Researcher Exchange, Training and Travel Awards have gone from strength to strength in their PhD studies, winning Best Student Awards at conferences where they have presented some of the findings resulting from their research exchanges:

- **Elizabeth Perkins** (University of Adelaide) for her presentation at the 7th *International Symposium on Fish Parasites* held in Viterbo, Italy, September 24-28 2007, on “*Neobenedenia melleni*” (Monogenea: Capsalidae): novel mitochondrial genes to unravel the mystery of the taxon”; and

- **Kate Mounsey** (Menzies School of Health Research) for her presentation at the Australian Society for Parasitology and ARC/NHMRC Research Network for Parasitology Annual Conference, 8-11 July, 2007, Marque Hotel, Canberra, ACT for her work on “A pH-gated, ivermectin sensitive chloride channel from *Sarcoptes scabiei*”.

**Mark Robinson**, a promising young Irish researcher, brought to Australia on a Network Researcher Exchange, Training and Travel Award, to strengthen the proteomics expertise in Professor **John Dalton**’s laboratory at the Institute for the Biotechnology of Infectious Diseases at UTS in 2007 was recently awarded a UTS Chancellor’s Research Fellowship Award to study the “Protection against human inflammatory diseases by helminth cysteine proteases” for the next few years. Mark also won a UTS Early Career Researcher grant to support this research – so, Mark’s 1 year visit has been transformed into a 4 year collaboration, at least.

**Jake Baum** from WEHI, awarded a Researcher Exchange, Training and Travel Award in 2006 to work on malaria actin in the Pollard laboratory at Yale University, USA, continues to benefit from the experience. Jake won one of the Networks two Early Career Researcher Awards at the 2007 conference for his research on malaria actin and was also the recipient of an NHMRC RD Wright Fellowship and an NHMRC
Project Grant to continue his research into the “Regulation of actin polymerization during malaria parasite invasion of human the erythrocyte.”

Several other tangible outcomes of research and collaboration resulting from Network support are listed below under “The achievements of the Research Network, Network Participant contributions to the Research Network and other outputs achieved resulting from the use of the Funds, including any advances in knowledge, relevant publications, or international collaboration”.

**Early Career Researcher Initiatives**

The Network organised and sponsored an **Early Career Researcher Breakfast** on Monday, July 9, 2007 to enable postdoctoral researchers and students to speak to prominent parasitologists about their career and to meet like-minded peers. They learnt how some of Australia’s highly successful parasitology researchers developed their career and arrived at the point they are today and had the opportunity to question these research leaders in a relaxed, informal setting.

The breakfast also marked the official launch of the **Network’s Mentoring Scheme**, whereby early career researchers are given the opportunity to (confidentially, via the Network Convenor) arrange mentoring partnerships with senior parasitology researchers – not necessarily from their current host institution – to discuss their personal career aspirations and development and seek advice on annual and longer-term goals and career planning. Several young parasitologists have already taken advantage of this new scheme.
The Early Career Researcher Breakfast was attended by 60 early career researchers (including research students) from 17 different institutions within the ARC/NHMRC Research Network for Parasitology.

The aim of this event was to inspire young parasitologists to think about their own careers in parasitology and we hoped there would be opportunities for the young scientists to discuss their own careers with peers and mentors and network with other people in similar situations. There were seven speakers who were able to give an insight into their research careers and represented a broad range of experiences of scientists and research parasitologists:

- Associate Professor Nick Smith (Convenor, ARC/NHMRC Research Network for Parasitology);
- Professor Margaret Clayton (Executive Director for Biological Sciences and Biotechnology, Australian Research Council);
- Dr Brendan Crabb (Editor, International Journal for Parasitology)
- Associate Professor Una Ryan (Murdoch University);
- Professor Nick Sangster (Charles Sturt University);
- Dr Emaunuela Handman (Walter and Eliza Hall Institute of Medical Research);
- Professor Kiaran Kirk (Head, School of Biochemistry and Molecular Biology, ANU).

We surveyed the breakfast attendees and 39 responded.

Almost all respondents agreed (31%) or strongly agreed (47%) that the speakers were inspirational to listen to, and found the whole experience of attending the early career and student breakfast valuable (90%). Many felt the event gave them the opportunity to meet other early career researchers and discuss their future career (65%).

There were 27 comments with feedback for running this type of event, and a further 17 general comments about the event. The general comments about this event are highlighted below:

- I think many of us know what needs to be done but the opportunities are too few and far between. It was interesting to hear about others success, but to hear it is more about luck is not all that helpful.
- That the panel move around tables so that you have the opportunity to talk to people in your own interest field.
- Seeing well-established researchers gave us hope that it's achievable and they all gave lovely talks to the point and all were very inviting to discuss any questions we had. They were all very supportive and encouraging in their words.
- Was great but maybe needed an activity to break the ice between students and the speakers.
- Great event and highly recommended.
- It was nice to hear the story of each researcher, although serendipity was mentioned a bit too often (I'm sure for each speaker hard work had more to do with a successful career). I would have liked to hear something more concrete such as 'it's possible for you as an ecr in Australia to get funding here or here or here etc' or 'you should try to get x number of publications by this time...'
I really enjoyed the opportunity to talk with a neutral person on the prospects of my future and advice on career moves. Would be very interested in attending if it was held again next year.

Thumbs up.
A must have in future years.
It was a good idea and a nice atmosphere to meet other students and researchers.
It was great.
Very good and very worthwhile. I was very glad I attended.
I heard good comments and wish that I had attended. I think it is an important initiative to help early career researchers to start to communicate with successful researchers, to hear their stories and to make connections with people that they can approach for advice etc.
I thought it was well done
Some of the speakers were quite senior and may not have had to face the same kinds of challenges that researchers face today. Would be good to hear from a new NHMRC Career Development Award Fellow or similar (ie just out of ecr stage). But the program was good nonetheless.

Some people wanted more time for this event, their comments are listed below:

Give people a time limit for speaking so we can get to the panel discussion as I was really looking forward to this aspect
Less rush. We ran out of time to question the whole panel
Have a longer discussion time, if possible
More time or less on the program!!
I think that we need more time and need to make sure that we address all groups ie BSc Hons, PhD students, post docs and early career. Their needs are different.
I enjoyed it thoroughly. I know there isn't much time but it would have been nice to have the opportunity to talk to more of the presenters. Even though they went overtime, it was extremely insightful and I wouldn't change that for future events.
I found this event extremely useful and worthwhile and I got some really good ideas and suggestions from the speakers. Next time, it would be good if we had time to ask questions to a panel as well.
I felt limited to interact with the speaker at my table. It would be useful to speak to other speakers whose career path was similar to how I perceive mine to go. I realise there were time constraints so perhaps this would have occurred / will occur in future. I did feel it was somewhat rushed. A more convenient time slot would allow for more interaction with relevant speakers.
It was different to what I expected, but I enjoyed it thoroughly. We didn't really get any chance to talk about our own career choices.
Breakfast was good and talks were interesting however there was limited time to chat to other ECR and research careers
I think it would have been extremely valuable to be able to ask our questions to the panel as some questions were more relevant to some than others (ie the person at your table). This wasn't possible as we ran out of time. Perhaps there could be less speakers or a more stringent time frame placed on the speakers to allow a panel discussion to occur.
• More time, we were a bit rushed and didn't have much time to talk to the invited speakers
• Also needed more time to talk with speakers - rotate speakers so that you have the chance to talk to 2-3 with different experiences.
• Good idea, maybe a bit longer than necessary with all the speakers.

Many gave suggestions that we will consider when planning for the early career researcher and student event at the 2008 Network and ASP Annual Conference in July at Glenelg, S.A. These comments are listed below:

• The talkers were very inspirational and interesting, and it was good to have the opportunity to talk to one of them personally. Everyone seemed to stay at the table that they were sitting at; I would have liked the speakers to move around from table to table. The breakfast was also a good idea.
• have a rotation system for the speakers so could talk to more than one speaker at each table
• Workshop table for student to share their ideas
• Perhaps similar type of event with specific focus i.e. lessons learnt - grant proposals, publications career moves, academia versus industry
• Provide discussion questions and have a leader for each group that gets everyone to talk.
• Have the guest speakers available at a lunch session on the same day so students can sit and talk with them. Had to leave in the morning for the conference so it was difficult to ask questions
• It was very early (not a morning person at all) and the speakers finished just prior to the start of the conference, so there was not much opportunity to just chat as a group. A slightly later start would be preferable for me, especially if the first day of the conference. Possibly fewer speakers (there seemed to be a fair bit of repetition though the comments were interesting). Not sure having exactly the same format would continue to be valuable if repeated each year - would recommend changing the content or format a bit each year to maintain interest of repeat attendees.
• ECRs should come up with a list questions and/or their research plan post-PhD or in the next couple of year - these questions are then forwarded to the panel to be discuss and share with other ECRs during the event

• The achievements of the Research Network, Network Participant contributions to the Research Network and other outputs achieved resulting from the use of the Funds, including any advances in knowledge, relevant publications, or international collaboration.
Progress on the Network IT Initiatives and the development of national and international collaborative research are summarised above.

Publications

ARC/NHMRC Research Network for Parasitology Participants published 328 articles in journals or books during 2007. These are listed in Appendix 1, at the end of this report, under the National Research Priority that best describes the major theme of each paper. By presenting this list of publications, the Network does not mean to claim undue credit for their production; rather, the list serves as a summary of the research activity of Network Participants, and as a benchmark for reporting and assessing the impact of the Network in subsequent years. The list is also a very useful reference source about and for Australia’s parasitology research community. Publications arising specifically from Network Funding are listed separately in the “Contributions of Particular Significance” section. In addition to the printed publications detailed below, Network Participants presented 332 papers at conferences or by invitation at institutions across Australia and around the world (115 invited lectures at institutions or conferences, and 207 contributed papers at conferences). A comprehensive listing of these presentations is not documented in this report.

Network Participants reported 13 publications arising directly from work carried out under Network Researcher Exchange, Training and Travel Awards:


Henry RJ, Martin RE, Howitt SM, Kirk K. Localisation of a candidate anion transporter to the surface of the malaria parasite. *Biochem Biophys Res Commun.* 16: 288-91


Proellocks NI, Kovacevic S, Ferguson DJP, Kats LM, Morahan BJ, Black CG, Waller KL, Coppel RL. *Plasmodium falciparum* Pf34, a novel GPI-anchored rhoptry protein found resistant to detergent resistant microdomains IJP 37: 1233-41


Sutherland CJ, Drakeley CJ, Schellenberg D. How is childhood development of immunity to *Plasmodium falciparum* enhanced by certain antimalarial interventions? *Malar J*. 6: 161


**Network Participants reported 11 seminar presentations arising directly from work carried out under Network Researcher Exchange, Training and Travel Awards:**


Baum J *Regulation of actin polymerization by two conserved classes of formins in motile Apicomplexan parasites*. Biomolecular Dynamics & Interactions Symposium, Bio21 Molecular Science and Biotechnology Institute, University of Melbourne, Parkville. 2nd February 2007:

Baum J, *Regulation of actin polymerization by malaria formins*. Australian Society for Parasitology and ARC/NHMRC Research Network for Parasitology Annual Conference, 8-11 July, 2007, Marque Hotel, Canberra, ACT.


Burger M, *Genetic diversity of kudoid parasites: including new examples from pomacentrid fishes*. 7th International Symposium on Fish Parasites (Viterbo, Italy), September 24-28 2007.

Burger M, *Do reef fish act as reservoirs for parasite disease in aquaculture?* 8th International Invertebrate Biodiversity and Conservation Conference in Brisbane, Australia, December 2007.


**Grants**

Research grants awarded to Network Participants in 2007 are listed in Appendix 2 at the end of this report, as a benchmarking record, without claiming undue influence of the Network in the success of the applications. ARC/NHMRC Research Network Participants once again enjoyed considerable success in the ARC and NHMRC grant rounds, securing over $3.4 million in grants, fellowships and major equipment from the ARC and more than $35 million in grants, programmes and fellowships from the NHMRC. Additionally, Network Participants attracted 30 grants from other national and international sources such as the National Institutes of Health, USA, Medicines for Malaria Venture, Australian Biological Resources Study, Drugs for Neglected Diseases Initiative, ACIAR, Foundation for Innovative New Diagnosis, World Health Organisation, ACT Health, NiKem S.r.l., Italy, the Sheep Genomics Program, the EH Graham Centre, the Italian Science foundation, the Turkish Science Foundation, Sarantis Ltd, Australian Wool Innovation, Meat and Livestock Australia, Novartis Animal Health, Pfizer Australia, the Mosquito and Arbovirus Research Committee Inc., the Fisheries Research and Development Corporation, Australian Sheep Industry CRC, Australia-Germany Joint Research Cooperation Scheme, the Broad Foundation, Sabin vaccine Institute; the value of these grants was more than $17 million.
In 2007, Network Participants reported that research carried out under Network Researcher Exchange, Training and Travel Awards led to the submission and ultimate awarding of the following research grants and fellowships:

Mark Robinson (Institute for the Biotechnology of Infectious Diseases, University of Technology, Sydney) was awarded a UTS Chancellor’s Research Fellowship for “Protection against human inflammatory diseases by helminth cysteine proteases”.

Mark was also awarded a UTS Early Career Researcher Grant, for “Alteration of macrophage phenotype and function by pathogen cysteine proteases”.

Jake Baum (WEHI) was awarded a National Health and Medical Research Council of Australia (NHMRC) Project Grant (with Chris Tonkin) for “Regulation of actin polymerization during malaria parasite invasion of human the erythrocyte”.

Jake was also awarded a NHMRC Career Development Award/R.D. Wright Fellowship for the same project.

Rowena Martin (ANU) was awarded a NH&MRC Project Grant for the project, “Characterisation of the chloroquine resistance transporter of the malaria parasite”.

Rowena was also awarded a NH&MRC Australian Based Biomedical Fellowship for the inter-related project, “Trafficking of the malaria parasite’s chloroquine resistance transporter”.

Additionally, Dr Malcolm Jones, organiser of the Network-sponsored “Genomic and Proteomic Analyses of Secretions of Parasitic Helminths” Symposium, reported that “…a number of follow-up meetings have been held in Brisbane to discuss our research and look for new collaborations. A number of collaborations have commenced amongst participants. One highlight is the funding of Alex Loukas and James McCarthy, together with Dr John Croese from Townsville, of a Broad Foundation grant to study the immuno-modulation of humans by hookworm secretions”:

John Croese (James Cook University), James McCarthy and Alex Loukas (QIMR) *Inoculating celiac subjects with Necator americanus, a human hookworm: does contrived parasitisation of naive adults inhibit autoimmunity?* Broad Foundation

**How the Research Network has facilitated the internationalisation of research and international linkages – links to international networks.**

Aside from the Research Exchange, Training and Travel Fund awards (27 out of 28 of which involved international collaboration), and the financing of international invited guest speakers to the annual conference, The Network Management Committee has devoted substantial attention and effort into cementing international
linkages with various significant EU, Asian and North American parasitology networks:

- European Union COST Action 857 “Apicomplexan Biology in the Post-Genomic Era” (Chair: Dr Fiona Tomley, fiona.tomley@bbsrc.ac.uk);
- European Union Network of Excellence “BioMalPar – Biology and Pathology of Malaria” (Director: Prof. Artur Scherf, ascherf@pasteur.fr);
- European Union COST Action B22 “Drug Development for Parasitic Diseases” (Chair: Prof. Fred Opperdoes, opperdoes@trop.ucl.ac.be);
- The Quebec Centre for Host-Parasite Interactions (Canada) (Director: Prof. Terry Spithill, terry.spithill@mcgill.ca).
- The Southeast Asian Ministers of Education Organisation (SEAMEO)– Regional Tropical Medicine and Public Health Network (Secretary General: Prof. Sornchai Looareesuwan, tmslr@mahidol.ac.th).

The ARC/NHMRC Research Network for Parasitology has in place agreements to:

[1] Establish an email list that includes all of the ARC/NHMRC Network participants and associates plus the Chairs/Directors of the various international networks. The Communications Coordinator of the ARC/NHMRC Network posts news concerning Network activities, success stories, job advertisements, conference notices, funding opportunities etc to the email list and the Chairs/Directors of the European and Canadian networks determine which items are relevant to their members and forwards these items to their membership as appropriate.

[2] Welcome delegates from the European and Canadian networks at the annual conference of the ARC/NHMRC Network with the same registration subsidy as members of the ARC/NHMRC Network.

[3] Award prizes to early career researchers (one or two each year) for the best presentations at the ARC/NHMRC Network annual conference. The prizes are funding for travel to attend the annual conference of the international network that is most relevant to that researcher. The international networks will guarantee a speaking slot for the prize winners – Rowena Martin (ANU) and Jake Baum (WEHI) were the 2007 awardees and will represent the Network at the 2008 BioMalPar conference.

[4] Invite the Chairs/Directors of the various international networks to sit on the Advisory Committee of the ARC/NHMRC Research Network for Parasitology, which meets annually.
Our sponsorship arrangement with Elsevier Publishing (including Trends in Parasitology and The International Journal for Parasitology) saw the continuation the “Elsevier Lectures” as a feature of the annual conference, allowing us to bring to Australia Drs Matthew Berriman (Wellcome Trust Sanger Institute, UK) and Eileen Devaney (University of Glasgow, UK).

Associate Professor Smith and Dr John Horton (Vice President of the Royal Society of Tropical Medicine and Hygiene - RSTMH) cooperated with the Organising Committee for the 2007 Joint ARC/NHMRC research Network for Parasitology and ASP Conference (A/Prof Carol Behm, Prof Kieran Kirk, Dr Kevin Saliba, Ms Julie-Anne Fritz, Dr David Piedrafita, Ms Lisa Jones) to include a special symposium on “Drug Targets, Drugs and Drug Resistance in Tropical Parasites” as part of the RSTMH’s Centenary Celebrations.

In 2007, negotiations commenced between Associate Professor Smith, representing the Network, and Professor Artur Scherf, the Director of BioMalPar, to put in place a formal Memorandum of Understanding between the two networks to facilitate and
enhance future interactions and explore co-funding opportunities. The MoU will be signed in early 2008.

- **Contributions to the Research Network of particular significance during 2007**

There were several highlights for the Network in 2007, perhaps most notably the increasingly strong uptake of the opportunity to establish and strengthen collaborative research via the Network’s Researcher Exchange, Training and Travel Fund, the continuing excellent registration at the Joint Conference of the ARC/NHMRC Research Network for Parasitology and ASP, the very successful staging of three other symposia (all described above) and a series of outstanding public awareness initiatives including *Parasites in Focus, Hypothetical – Global Warming and Parasites,* and *Travel Bugs,* amongst others (all described below in Outreach Activities).

Most pleasingly, tangible outcomes from the Network’s Researcher Exchange, Training and Travel Fund continued to emerge in 2007 in the form of publications in peer-reviewed international journals, conference presentations and successful research grants and fellowships (detailed above).

A major personal achievement in 2007, that deserves particular mention here, was **Professor Alan Cowman (WEHI) being awarded an inaugural Australian Fellowship.** The highly prestigious Australian Fellowships were introduced by the NHMRC “to provide support for the most outstanding health and/or medical researchers [and] outstanding research teams…to undertake research that is of major importance in its field and of significant benefit to Australian health and medical research.” Each Fellowship is worth $4 million over five years and will enable WEHI’s research teams to intensify their efforts in defining the mechanisms of some of humanity’s most deadly diseases and seeking more effective treatments.

Alan will apply his funding to the continuing search for better treatments for malaria. Worldwide, this parasitic disease infects an astonishing 600,000,000 people – about 10% of humanity – and kills up to 3,000,000 people every year. The World Health Organisation (WHO) has stated that overcoming malaria would be one of the greatest single contributions to alleviating poverty in the developing world. Professor Cowman and his team will intensify their research into malaria vaccine and drug development, with a particular three-fold focus: preventing the parasite from disguising itself from the immune system; inhibiting the ability of the parasite to invade red blood cells; and preventing infected red blood cells from sticking to blood vessel walls.

There were a number of other major research successes by Network Participants, which deserve to be highlighted. A particular feature of these success stories is the considerable international collaboration that characterises much of Australian parasitology research:

- The continuing strength of Australia’s research effort in marine parasitology, with particular regard to the cataloguing of the ecology and biodiversity of parasites of marine fish and shellfish, including their impact on Australia’s aquaculture industry – many new species of marine parasites were described during 2007 by researchers around the country;
• New drugs to control parasites and understanding why some existing drugs are failing was a hot topic in Australian researchers working on protozoan diseases, and resulted in some very fine quality publications in 2007 (eg, Tang et al., Bioorganic & Medicinal Chemistry Letters; Martin & Kirk Blood; Lehane et al., J. Biol. Chem.; Ratcliff et al., The Lancet; Dunn et al., Int. J. Antimicrob. Agents);

• Australia’s malaria researchers continued to lead the world, publishing cutting edge papers on the immunopathology of the disease, especially with regard to cerebral malaria (eg, de Walick et al., J. Immunol; Amante et al., Am. J.Pathol.; Montgomery et al., Mol. Microbiol.).

• Australian pre-eminence in vaccine development for helminth parasites was still in evidence in 2007 with the publication of a promising trial of a subunit vaccine against hookworms in dogs using a protein that is also very common in hookworms that infect humans (Fujiwara et al., Clinical and Vaccine Immunology);

• Australian researchers collaborated on a major international collaborative effort to sequence the genome of the sexually-transmitted parasite, Trichomonas foetus, published in Science in 2007 (see below).

---

**Prof. Peter Upcroft and Dr Jacqui Upcroft, parasitologists from the Queensland Institute of Medical Research (QIMR), and their PhD student, Rebecca Dunn, are part of a group of 64 researchers worldwide who have recently published “Draft Genome Sequence of the Sexually Transmitted Pathogen Trichomonas vaginalis” in Science (Vol 315 12 January 2007 www.sciencemag.org).**

*Trichomonas vaginalis* is a flagellated protist that causes trichomoniasis, a common but often overlooked sexually transmitted human infection with approximately 170 million cases worldwide. The extracellular parasite resides in the urogenital tract of both sexes. Acute infections are associated with pelvic inflammatory disease, increased risk of HIV-1 infection and adverse pregnancy outcomes.

Jane Carlton, of The Institute for Genomic Research (TIGR) and now at New York University School of Medicine, was the leader of this very successful project, in collaboration with Patricia Johnson, University of California, Los Angeles and with funding from the U.S. National Institutes of Health. Additionally, the *Trichomonas* research community collaborated together over the past 2 years to help analyse the *T. vaginalis* genome data. Each research group was responsible for different aspects of the analysis and everyone shared their data.

The QIMR researchers played a dual role in mapping the *T. vaginalis* genome: they were involved in analysing the proteins involved in drug resistance to metronidazole in *T. vaginalis*, taking advantage of their 20+ years of experience on the same subject in another anaerobic protist, *Giardia*; and they also used pulse field gels to separate chromosomes to genotype for preliminary mapping..
“Trichomonas vaginalis is very difficult to map” Jacqui said, adding that, “CC Wang postulated many years ago that it has a very large genome but this idea was initially shunned by the parasitological world. However, we soon realised that we were either looking at something very unusual or something very large – and it turned out to be large. CC was right!” The assembly size of the *T. vaginalis* genome is estimated at 160Mb and the research group identified a core set of 60,000 protein-coding genes endowing *T. vaginalis* with one of the highest coding capacities among eukaryotes.

Jacqui says that, “*T. vaginalis* parasite has no business being what it is.” It appears that *T. vaginalis* genome expansion may have occurred when the parasite moved from a gut to a urogenital tract environment, in comparison to the oral parasite, *Trichomonas tenax*, which doesn’t appear to have the same repeated genome and is likely smaller in cell size.

Why so large? The *T. vaginalis* genome has lots of repeated elements: at least 65% of it is repetitive and analysis of the large gene families shows there are more than 900 protein kinases, but that they are not involved in signalling, and more than 650 in the BspA-like gene family. The size of the genome and the volume of the typical *T. vaginalis* cell are positively correlated. This large cell size may be adaptive; *T. vaginalis* is a highly predatory parasite that phagocytoses bacteria, vaginal epithelial cells, and host erythrocytes and is itself ingested by macrophages. The group speculate that given these interactions, an increase in cell size could have been selected for to augment the parasite’s phagocytosis of bacteria and to reduce its own phagocytosis by host cells. Increased surface area may confer advantages for colonisation of vaginal mucosa.

The *Trichomonas vaginalis* genome consortium has at least two remaining burning ambitions: to secure further funding to sequence another *Trichomonas* (for valuable comparative studies); and to use the information from the genome to develop new therapies and novel methods for diagnosis.

Jacqui and Peter have been researchers at QIMR for the past 25 years and have made a huge contribution to parasitology research worldwide, culminating in their recent collaborations to sequence the *Trichomonas vaginalis* genome. Peter was a founding molecular biologist and developed the technique to transfect genes into viruses. When Jacqui was first working as a post-doctoral fellow at Harvard Medical School she was purifying restriction enzymes from scratch! Aside from their role in the *Trichomonas* genome project, they are now part of a multi-million dollar collaboration to find new drugs to control another ancient protist, *Giardia*.

- Outreach activities and how these may have been reported by the media.

In 2007, our Network members engaged in numerous outreach activities that highlighted their research. The audience was widespread, ranging from talk-back radio viewers, children’s television, Rotarians, and rural communities. Our Network scientists recognise the important role they can play in communicating to the wider community with the aim to stimulate more interest in science and health.
MEDIA REPORTS

In total, 48 stories promoting the ARC/NHMRC Research Network for Parasitology participants were reported in the media. In addition to radio and TV interviews and newspaper articles, some of our Network scientists have been featured in documentaries and film.

Mike Bull featured on the documentary ‘Life in Cold Blood Program’ narrated by David Attenborough.

David Jenkins made contributions to two films. One was a film on faeces by Quincy Russell (Mona Lisa Productions) for the French/German public TV channel ARTE. He featured as a professional ‘poo’ detective examining faeces for evidence of parasite infection. The other feature was for a film on dingo biology for the “Daily Planet” Discovery Channel, Canada. Dave also featured in radio and in newspaper media:

- ABC Gippsland radio interviewed by Gerrard Cullen on the subject of the new wild dog bounty and risks of hunters contracting hydatid disease.
- He commented on parasites including hydatids in domestic pets and wildlife on ABC Canberra radio 666 2CN.
- The Canberra Times featured an article on the importance of dingoes as top order predators and the possible impacts of hybridisation with domestic dogs.

There has been keen media interest in the work of Rob Adlard resulting in the following press radio, newspaper, TV and internet reports:

- ABC National AM and ABC Newcastle talk show on oyster disease breakthrough.
- Oyster disease breakthrough featured in the Brisbane Courier Mail and Sydney Morning Herald
- Network 10 National News, describing a breakthrough in oyster disease research.
- Network 10 program Totally Wild presented an interview about oyster disease research.
- ABC National Science Show Catalyst, interview about QX disease of commercial oysters updated and the Museum research using DNA diagnostics.
Barbara Nowak reported the following media stories on *Neoparamoeba perurans* as aetiological agent of amoebic gill disease:

- ABC News Online, 31 May 2007, ‘Breakthrough in salmon disease’
- ABC Radio Country Hour 26 July 2007, participated in an interview with Dr Richard Morrison and Neil Young.
- *FishSite* 4 June 2007, ‘Scientists report salmon disease breakthrough’.
- *UniTas* Issue 310 13 June 2007
- *Australasian Science* September 2007
- *Aquaculture Health International* August 2007
- *Fish Farming International* December 2007 (p 32 - "2007 - the year in review").

[http://norwegiansalmon.biz/NorwegianSalmon/AtlanticSalmon/tabid/122/articleType/CategoryView/categorId/9/Norwegian-Salmon.aspx](http://norwegiansalmon.biz/NorwegianSalmon/AtlanticSalmon/tabid/122/articleType/CategoryView/categorId/9/Norwegian-Salmon.aspx)
Jody Zawadzki’s research was featured as ‘Vaccine the aim’, in the *Weekly Times*, 28 March 2007.

Alyssa Barry gave a press release at the International Conference of Science Journalists Opportunities in Science Symposium.

Nigel Beebe was interviewed by various ABC radio stations in response to transgenic mosquito research conducted at Johns Hopkins University and DDT use in a malaria epidemic in the highlands of PNG.

Robin Anders and Michael Foley were quoted in an article on ‘Malaria fight gets fresh lease of life’, *Weekend Australian*, 13-14 October, 2007.

Following publication in the *Journal of Experimental Medicine* discussing the results of arginine therapy in human malaria, Nick Anstey was featured nationally on ABC TV and Radio (October 2007).

Els Meeusen contributed to ‘Parasite vaccines’, *Intervet Ltd.*, The Netherlands.

Vern Bowles featured in articles relating to head lice treatments:

http://nature.com/nature/journal/v450/n7168/full/450322a.html#top#top>450:322.

Leann Tilley reported the following media stories from her group:

The ‘Parasites in Focus’ Photographic Exhibition (see below) sparked much interest following a morning radio interview on ABC 612 4QR and a public lecture entitled ‘Parasites and People’ presented by Malcolm Jones as part of the ‘Queensland Connections’ lecture series:
- The Brisbane *Courier Mail* featured the Exhibition in the ‘What’s on this weekend’ section on 12 December 2007, and in “Weekend Life’ on 22 December 2007.

OUTREACH PRESENTATIONS AND ACTIVITIES

In total Network Participants were involved in over 40 Outreach presentations and activities across Australia during 2007. Following a number of highly successful Outreach events in 2006, our Network scientists were delighted to participate in these events again in 2007 as well as involve new presentations. Public lectures help the ARC/NHMRC Research Network for Parasitology meet one of its aims in promoting Australia as a centre for parasitic research. Utilising these opportunities to showcase the hard work of Australian parasitologists is a perfect way to engage a curious public.

Workshops and Exhibitions

To celebrate National Science Week in August 2007, Network scientists were involved in the Australian Museum’s Science in the City (6-8 August, 14-16 August), and the Ultimo Science Festival (22 August) coordinated by the Powerhouse Museum, University of Technology Ultimo TAFE and ABC. Over six days, the Network’s parasitology exhibition stand was hosted by University of Technology, Sydney scientists, Lisa Jones, Kate Miller, Rowan Ikin, Michelle and Mark Robinson, and Rob Walker. The interactive display gave over 8000 students and teachers an opportunity to have a close-up view of parasites. Shelia Donnelly, a scientist from University of Technology, Sydney gave the now famous presentation, ‘Revenge of the Bodysnatchers’. More than 400 high school students were horrified and surprised to see gory photographic evidence as to how Helminths, or worms can devour and multiply in host tissue.

The hands-on parasitology DNA workshop developed by Network scientists in 2006 proved popular again for visiting secondary students. As part of the Ultimo Science Festival 22 August 2007, Lisa Jones and Kate Miller guided 75 students through a series of laboratory investigations into a case of a seriously ill ‘patient’ with a suspected worm infection. Based on the findings, students were required to report an appropriate course of treatment. This workshop was also run to students from
Hornsby Girls High School and St Aloysius School as part of a careers program. In December 2007, Kate Miller and Wendy Relf conducted the DNA Workshop for the Siemens Science Experience hosted by University of Technology, Sydney.

The Science in the Bush program is a part of the Science in the City project run by the Australian Museum and the University of Sydney. Our Network members Lisa Jones and Kate Miller travelled to Tocal NSW on 4 May 2007 to entertain 50 children from schools in the surrounding region. Lisa and Kate performed a play that explained different steps in scientific identification. Children performed fingerprinting and used microscopes to distinguish between fleas and ticks.

In September 2007, Lisa Jones and Shelia Donnelly visited Ravenswood School for Girls. A hands-on workshop highlighted how easily microorganisms can spread from a single 'infected' individual. The students also enjoyed Shelia Donnelly’s gruesome presentation, ‘Revenge of the Bodysnatchers’.

‘Parasites In Focus’ Photographic Exhibition

This exhibition was a new initiative by the Network in 2007. The Exhibition featured twenty-six superb colour photographic prints showing the amazing microscopic world of the parasite. It included up close images of head lice, ticks, fleas, fish parasites, tapeworms and organisms that cause malaria. This exhibition was developed by the Network, the Australian Society for Parasitology, Questacon and DEST. The first display was launched at Questacon - the National Science Centre following on from the ASP/NHMRC Annual Conference on Parasitology held in Canberra in July 2007.

After a successful stint from July to October at Questacon, the exhibition was transported to display at the Queensland Museum South Bank from 8 December 2007 to 27 February 2008 during the busy school holiday period. During this time, the total number of visitors to the Museum was just under 100,000, which included 2400 visitors in groups. The groups were mostly school groups who were given an information sheet about parasites and parasitology to assist teachers with learning.
“Most people think that parasites are disgusting. But the parasitic way of life is the most common on the planet, and parasites are the most ingenious and manipulative of all life forms. We believe that there are more parasites than all other organisms put together. Like them or loathe them, they are a part of life and this is an unusual exhibition because the hidden beauty of these organisms has been creatively captured. Seeing them in this way might persuade some to look deeper at them.” Dr Rob Adlard, Queensland Museum’s resident parasitologist and head of Marine Zoology.
An exciting free public event organised by the Network, "Hypothetical - global warming and parasites" was held at the Great Hall, Parliament House, Wednesday 11th July 2007.

This entertaining event was hosted by Robyn Williams (ABC). Scientists and policy makers debated issues of global warming and the effects on parasites - whether rising temperatures will lead to the spread of deadly and debilitating parasitic diseases in Australia and internationally.

The expert panel of scientists, legislators and politicians who participated were:

- **Senator Lyn Allison**, Leader of the Australian Democrats and spokesperson for Education; Health and Ageing; Resources, Energy and Infrastructure; Treasury and Commonwealth-State Relations.

- **Dame Bridget Ogilvie**, Companion to the Order of Australia for services to science policy and parasitology. Former chief of the Wellcome Trust and researcher on parasite immunology.

- **Lieutenant Colonel Bob Cooper**, Director of the Army Malaria Institute.

- **Prof Bart Currie**, Head of the Tropical and Emerging Infectious Diseases Division at the Menzies School of Health Research in Darwin, Senior Infectious Diseases Physician at Royal Darwin Hospital and Professor in Medicine at the Northern Territory Clinical School, Flinders University.

- **Dr Peter Daszak**, Executive Director of the Consortium for Conservation Medicine in the U.S.A.
Dr Eva Bennet-Jenkins, CEO of the Australian Pesticide & Veterinary Medicines Authority.

Panellists, Senator Lyn Allison and Dame Bridget Ogilvie; Hypothetical – Global Warming and Parasites, Canberra, July, 2007

347 people in total - 232 conference participants and 115 members of the general public - enjoyed being part of hypothetical event and a survey of about one-third of the general public who attended revealed that more females (76%) than males responded to the survey and they mostly heard about the hypothetical event through newspaper advertising (29%), word of mouth (17%) or an email sent to the workplace (17%). Their ages ranged, roughly evenly, from 21 to over 65 years (and some younger children attended the event with their parents). Many respondents said they attended public events often – once or more times per year; only one person indicated this was their first public event. Most respondents booked by email and many indicated they would attend another public event about parasites if it were held in Canberra (62% definitely, 37% “not sure”). When asked about the location for this event a majority said it was very easy to get to New Parliament House, parking was easy and that it was an “ideal location” to hold the event. When asked about what they thought of the event most respondents (88%) enjoyed attending the hypothetical event and thought it interesting (88%) and entertaining (80%). Most agreed that Robyn Williams was a good host (88%), and many indicated they learnt something new particularly about global warming and the effect on infectious disease after attending (80%).

There were some very positive comments from members of the general public:

“It was very well run and engaged the audience well”
“An easy and entertaining way to obtain a lot of information about complex and interrelated issues”

“Very enjoyable. Pleased that members of public were able to attend. My daughter (a student in Year 12) found it very informative, and related to many of her school subjects.”

“We really enjoyed it for an early evening out, entertaining, informative and relatively easy to understand”

“My friends who came - without any university education or parasite background - found they were able to understand most of the debate and learn from it.”

“It was a good concept overall - and would like to attend future events.”

And one person gave some constructive criticism:

“The coverage was too broad, with Robyn Williams and panellists rapidly 'tip-toeing' across many issues, so the hypothetical lacked any depth at all.”

**Travel Bugs**

ARC/NHMRC Research Network for Parasitology members based at the Queensland Institute of Medical Research held “Travel Bugs” (March 27, 2007) an informative and entertaining public event on parasites, travellers' health and tropical diseases. About 50 people attended. Associate Professor Nick Smith introduced the audience to the ARC/NHMRC Research Network for Parasitology and chaired the evening. The other speakers were:

- Professor Michael Good on malaria
- Dr Malcolm Jones on schistosomes
- Dr Alex Loukas on hookworms
- Ms Charlene Willis on scabies
- Dr Jacqui Upcroft on *Giardia*

There were many highlights from the night including learning the ABCD of malaria protection (*Awareness of risk, Bite avoidance, Chemoprophylaxis and Diagnosis made promptly*) and Jacqui’s warning of the perils of drinking margaritas in Mexico. The discussion panel was a great success with the audience appreciating the opportunity to ask the experts about everything parasitological.

**Some other outreach activities**

Rob Adlard gave a public lecture in the Queensland Museum Lecture Theatre on “Dusting off DNA: tracking aquatic disease in open aquaculture” and a NSW Department of Primary Industries and Oyster Industry Seminar entitled “Polychaetes implicated in the life-cycle of QX disease in rock oysters.”

Malcolm Jones spoke at the Queensland Integrated Refugee Community Health Clinic Dec 4 2007, Mater Hospital, Brisbane on ‘Schistosomiasis Awareness issues’.
Wayne Jorgensen was involved with Laboratory training for Year 12 students on ‘Designer genes – Molecular techniques in Animal Disease Research’ as part of the Sheep Cooperative Research Centre sponsored ‘Fresh Futures – Smart Science and Careers in Primary Industries’ initiative in July 2007.

Brian Kay gave numerous lectures to Vietnamese health professionals while working in Vietnam.


Stephen Barker is the resident scientist at Durack State School, Brisbane. He takes a science class once per week and discusses topics such as parasites, and reptiles and birds.


Heinrich Korner was a member of a panel for the ‘Day of Immunology’, at Southbank Convention Centre, Townsville, April 2007.

Michael Foley presented lectures to Year 9 Ivanhoe Grammar students, at La Trobe University, Melbourne.

Marshall Lightowlers represented the University of Melbourne at a meeting with Victorian Government Cabinet members.

Ian Whittington, of the SA Museum, reported the following outreach activities:

His article on ‘Parasites of Sharks and Rays’ was published in the Focus Section of the Oceania Chondrichthyan Society Newsletter.

The ‘Parasites and Parasitism’ display in Biodiversity Gallery SA Museum, was contributed by Ian Whittington.

Brendan Crabb continues to serve on the Board of Management of Gene Technology Access Centre, an organisation that brings science to schools.

- **Contribution to the National Benefit**

The contribution of ARC/NHMRC Research Network for Parasitology Network to Australia’s fundamental, strategic and applied research effort is evident in the quantity and quality of publications listed in Appendix 1 for the research priorities identified at the point of origin of the Network to address Australia’s National Research Priorities. With regard the Network more directly, 2007 has been a year where national and international collaboration has been strongly fostered by the Network through its Researcher Exchange, Training and Travel Fund and through the continuation of formal links with international networks in Europe, North America and Southeast Asia. Additionally, the Network has created substantial training and networking opportunities for research students and early career researchers, again through the Researcher Exchange, Training and Travel Fund, but also via financial
support for the Annual Conference of the ARC/NHMRC Research Network for Parasitology, which attracted nearly 130 early career parasitology researchers, and other Network-sponsored symposia held throughout the year (and described above). Both these strategies are now paying off with young researchers publishing their research undertaken on Network funding and winning grants and fellowships, either as spin-offs of research undertaken under the Network Researcher Exchange, Training and Travel Award scheme or as a result of linkages forged at Network-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 Network.

- An indication of the activities and strategies for the coming year (2008)

The ARC/NHMRC Research Network for Parasitology will continue to support conferences and workshops and its successful Researcher Exchange, Training and Travel Fund in 2008, at higher levels than for 2005, 2006 and 2007, due to the increasing demand for, and success of, the scheme. The IT Initiative will also be supported in 2008 and its specific goals for 2008 are outlined below. New initiatives for early career researchers will continue to be introduced in 2008 and the Network’s communication strategy (presented in details in our 2006 Annual Report) will continue to be implemented.

**IT Initiative**

The development of tools, software and resources by the Network IT Initiative is now largely complete. The Network will continue to support provision of services such as a web-accessible database for storage, analysis and sharing of microarray results with collaborators in other laboratories or countries. This service provides a base where data is securely backed up and kept confidential (hosted by the Victorian Bioinformatics Consortium). Likewise, EST analysis services will be maintained, building on the expertise gained in the development of the *Sarcoptes scabei* EST collection. The major project planned for the 2008 to 2009 period is a parasite nematode EST database in collaboration with Professor Robin Gasser of the University of Melbourne. This project is a high-throughput pipeline for the annotation of mitochondrial genomes of helminths. In summary, the pipeline consists of the following steps:-

- Start with mitochondrial genome sequences as input
- Find the Open reading frames with ORFinder
- Identify the genes with tBLASTx
- Produce multiple alignments with clustalW to characterise putative genes
- Search for tRNA genes and display their location on the genome as well as their secondary structure
- Search for ribosomal subunits
- Try to annotate the uncharacterised region with BLASTn
- Determine secondary structure and AT rich regions

Finally, work will continue on the development and refinement of the Australian Parasite Research and Education Resource, with a view to launching an active website in 2009.
New Early Career Researcher Initiatives

Following the positive and constructive feedback from the Early Career Researcher Breakfast held on Monday, July 9, 2007 to enable postdoctoral researchers and students to speak to prominent parasitologists about their career and to meet like-minded peers, the Network intends to stage a more intensive, longer event in conjunction with the 2008 annual conference in Glenelg, South Australia. The event will run for about 5 hours and include presentations and discussion by some leading Network researchers on topics such as: laboratory leadership; time and project management; mentoring and being mentored; getting published; establishing and increasing profile; setting up collaborations; getting funded.

The Network’s Mentoring Scheme will continue in 2008. Under this scheme, early career researchers will be given the opportunity to (confidentially, via the Network Convenor) arrange mentoring partnerships with senior parasitology researchers – not necessarily from their current host institution – to discuss their personal career aspirations and development and seek advice on annual and longer-term goals and career planning.

Communications Strategy

In 2008, the Network will continue to develop and host a series of several public information and education events as described above for 2007.

The Network’s photographic exhibition, “Parasites in Focus” will continue to tour the country with venues already booked for Brisbane, Adelaide, Sydney and Perth.

The Network will also continue to develop an interactive, hands-on, travelling exhibition about parasites and the importance of Australian parasitology research. The exhibition plans were described in detail in our 2006 report. Development will occur throughout 2008 and into 2009, with the official launch planned to coincide with Australia’s hosting of the International Congress of Parasitological Associations, the major research conference for the discipline, to be held in Melbourne in 2010. The exhibition is being developed in collaboration with Questacon – the National Science Centre.

Future Planning

The major topic for discussion by the Network Management and Advisory Committees at their meeting in Canberra on July 12, 2007, was the future of the Network after the end of current ARC/NHMRC funding in 2009. Unanimously and enthusiastically, the joint committee drafted a plan for a fully mature Network that operates in collaboration with networks like BioMalPar but with an Asia-Pacific focus.

The draft plan is best described as a “Parasitology Graduate School” that is heavily geared at (a) promoting collaborative research and (b) improving training and career development for parasitology researchers, and includes the following features:
• An enhanced Researcher Exchange, Training and Travel Award Scheme based on our existing, increasingly successful award scheme;
• Application of an initiative pioneered by BioMalPar, namely, the establishment of PhD scholarships that include cross-institutional, shared supervision of students to foster collaborative research and enhance research student experiences;
• Establishment of a Postdoctoral Fellowship scheme, built on the same principles as the above PhD scholarship scheme;
• Implementation of a “tenure-track” initiative whereby the Network provides 3-5 year funding for the salaries of suitable candidates for tenured university positions – ie, the Network supports promising academics, in the field of parasitology for 3-5 years, on the understanding that, at the end of that time and subject to performance, the university promotes that parasitologist to a tenured faculty position;
• Support for an annual scientific conference and special workshops and symposia;
• Development of an intensive postgraduate course in parasitology to be held annually or biannually and mirroring the highly esteemed “Biology of Parasitism” course, which is run as a 8-9 week intensive course each year at Woods Hole (USA) – it was even suggested that this course could be officially aligned with the US course, at which many Australian parasitologists are employed as instructors and/or lecturers.

• How the Research Network has tackled or plans to tackle issues in a manner that may not otherwise have been achievable without the mechanism of a Research Network

The Network’s Research Exchange, Training and Travel Fund creates opportunities for collaborative research that would otherwise not exist. This has proved particularly valuable for research students and early career researchers who have been granted the opportunity to work in different laboratories in Australia and overseas, gaining access to specialised equipment and expertise and exposure to a wider variety of research cultures than would normally be possible. Additionally, the subsidisation of scientific meetings by the Network has brought more opportunities for young parasitology researchers to interact with their peers and senior researchers. If the hopes outlined above for a future iteration of the Network are realized, then these opportunities for collaborative research and career development will increase even further.

Career guidance opportunities for early career researchers has been enhanced by the introduction of the Network Mentoring Scheme at the Early Career Researcher Breakfast in Canberra in July, 2007. We anticipate growing uptake of the opportunities afforded by this initiative throughout 2008 and 2009.

Increased public awareness about parasites and parasitology research has been a goal of the Australian parasitology community for many years but is being realised now on a larger scale, thanks to the Network grant. In particular, the ability to employ a professional science communicator – Lisa Jones – has facilitated interactions with the media and general public.
• How the Research Network has increased or is planning to increase the scale and focus of research activities.

Aside from facilitating collaborative research via the Researcher Exchange, Training and Travel Fund, which has begun to bear fruit in the submission, and award, of new grant applications and the production of collaborative research papers, the Network Management Committee has discussed extensively and drawn up a list of international researchers that it wishes to target for recruitment back to Australia, especially – but not exclusively - via the Federation Fellowship scheme. This list is discussed, and added to, by the Network Management and Advisory Committees, annually, and contact subsequently made with researchers to encourage and support the submission of applications. Similarly, the Management and Advisory Committees identify groups of researchers and areas of research focus that appear good candidates for development of larger scale, program-style or Centre or Excellence applications – the Researcher Exchange, Training and Travel Fund provides a mechanism for these groups to gain funding to bring people together to prepare large-scale grant applications.

• Any surveys carried out of members to ascertain any benefits gained from membership of the Network - Results for the 2007 ARC/NHMRC Research Network for Parasitology Annual Survey.

Participant Information

This survey was made available to the Network participants to complete online. Responses were monitored over four weeks and a total of 132 Network participants responded. Respondents were self-selected.

Survey respondents represented 38 different institutions with the highest number being based at QIMR 15%, The University of Melbourne 12% WEHI 7.5%, ANU 7% and UTS, QLD DPI and Murdoch University, each 5% (Figure 1). Two respondents indicated that they represented two different institutions.
When asked about their highest qualification the majority of survey respondents reported having a PhD (65%) or BSc Hons (15%) (Figure 2).

The responses to “year gained highest qualification” spanned 45 years with the most recent being gained in 2007 and the earliest in 1962, the majority were gained between 1996 and 2007(Figure 3). Of the 129 survey respondents, 53 were identified as early career researchers (10 years or less since gaining their PhD, Doctorate, or Masters qualification).
Network Survey Respondents represented a good spread of ages ranging from 21 to over 65 years, with a majority of respondents aged between 26 and 50 years (Figure 4). Both male and female respondents were fairly evenly represented, with more females (55%) than males (45%) (Figure 5).

**Figure 4: 2008 Network Survey Respondents by age range (n=131)**

<table>
<thead>
<tr>
<th>Age range</th>
<th>Number of respondents</th>
</tr>
</thead>
<tbody>
<tr>
<td>21 - 25 years</td>
<td>10</td>
</tr>
<tr>
<td>26 - 30 years</td>
<td>15</td>
</tr>
<tr>
<td>31 - 35 years</td>
<td>18</td>
</tr>
<tr>
<td>36 - 40 years</td>
<td>14</td>
</tr>
<tr>
<td>41 - 45 years</td>
<td>13</td>
</tr>
<tr>
<td>46 - 50 years</td>
<td>14</td>
</tr>
<tr>
<td>51 - 55 years</td>
<td>13</td>
</tr>
<tr>
<td>56 - 60 years</td>
<td>12</td>
</tr>
<tr>
<td>61 - 65 years</td>
<td>10</td>
</tr>
<tr>
<td>Over 65 years</td>
<td>4</td>
</tr>
</tbody>
</table>

**Figure 5: 2008 Network Survey Respondents by gender (n=131)**

- Male, 59, 45%
- Female, 72, 55%

**Network funding for participants**

48% of Survey respondents (n=93) have either applied for or are planning to apply for Network funding for a travel grant (Figure 6). To be eligible for Network funding applicants must be an Active Network Participant.
Figure 6: 2008 Network survey respondents and Network Travel Awards (n=129)

<table>
<thead>
<tr>
<th>Reason</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Yes have applied for a Travel Award</td>
<td>24%</td>
</tr>
<tr>
<td>Planning to apply</td>
<td>48%</td>
</tr>
<tr>
<td>No have not applied for Travel Award</td>
<td>18%</td>
</tr>
<tr>
<td>Didn't think I could apply</td>
<td>2%</td>
</tr>
<tr>
<td>Not eligible to apply</td>
<td>8%</td>
</tr>
</tbody>
</table>

**Network website**

The Network website is constantly being updated and this year we have tried to direct more Network Participants to the website for Network news, event information, jobs in parasitology, for conference information, to download forms to apply for Travel Awards and more. The profile and use of the website is growing amongst Network members and this is reflected in the responses to questions about the website in this survey and also anecdotally as we have noticed a higher number of members supplying information for the website and the Network Newsletters.

Most Survey Respondents had accessed the website sometime in the past year (n=116) and Figure 7 indicates frequency of access. Like previous years the frequency of accessing the Network website reflects when the Network Newsletter is circulated by email and is made available on the website (approximately monthly).
Network Survey respondents who had accessed the website (n=115) reportedly did so for:

- obtaining conference information (77%);
- reading the Network Newsletter (62%);
- finding out about Network Funding available for participants (53%); or
- finding out information about Network Participants (30%).

Figure 8 shows a complete list of reasons for accessing the Network website and a comparison between 2007 and 2008 Network Survey respondents shows very similar results. (Respondents were able to select more than one option and list others.)

Network Survey Respondents were asked to rate (on a scale of 1 – 5) how strongly they agreed with the following statements:

1. The website content has all of the information I need. (113 Responses)
2. The layout of the website enabled me to find the information I was looking for easily. (113 Responses)

3. The website design means that information is accessible and easy to read. (111 Responses)

Figure 9 shows that a majority of respondents either agreed or strongly agreed with each statement. 15 respondents gave additional comments about the website with some useful suggestions listed below:

- I found a little more difficult than I expected to find information about principle investigators and their research. It might be useful if they were listed by general topics or by the parasites they studied.
- Send reminders on email when new content appears.
- I would like to see the profile of all members on the website.
- It would be useful if you sent each member an email containing the Network URL maybe every 6 months.

![Figure 9: 2008 Network Survey respondents comment on Network website content, layout and design](image)

**Overall view of the Network**

When asked about being part of the ARC/NHMRC Research Network for Parasitology, 72% either agreed or strongly agreed with the statement that being a part of the Network was beneficial for their career, while 24% were neutral, and only 3% disagreed or strongly disagreed. (Figure 10)
One respondent commented that, “As it operates presently, it appears to benefit me and Australian parasitology generally.” Another respondent said “The involvement with conference planning and organisation, from the perspective of local organisers, is wonderful.”

Network Survey Respondents were asked about changes to the Network and suggestions for additional activities/schemes that the Network should be involved with; 30 respondents gave suggestions and comments, which include the following:

- A focus on specialist sub-groups (eg. immunoparasitology).
- More publicity for courses or qualifications.
- Greater emphasis on taxonomy.
- Emphasis on interactions among labs.
- Perhaps via the website a more comprehensive updating and review of interesting literature could be provided.
- Get a bigger budget!
- On top of promoting interactions within the Network, it could also promote interactions inter-Networks such as with the Fluorescence Network for example for imaging of parasites by fluorescence microscopy. This is just one example.
- I would like to see it (the Network - sic) ongoing. I haven't been working in parasitology recently, but aim to return and the Network provides support to early career researchers that is not available from any other source.
- The only changes required are that the individuals (me included) need to increase their level of involvement.
- I think that the Network has done a good job of increasing the visibility of parasitology in Australia. I would like to see the Network and the ASP working more closely together to further develop parasitology both in Australia and overseas.
- Assistance with Museum displays at regional centres such as WA, SA, Qld, Sydney etc to help raise the public’s profile of parasites. ‘Parasites in Focus’ photography exhibition has been good in this respect.
• I found the early career researcher's breakfast very useful. I would like to see the Network plan more activities for early career researchers or opportunities for ECRs to meet principle investigators both domestically and internationally.
• More local networking opportunities - twice per year?
• Helping to find potential collaborators for projects etc.
• Career coaching activities for all levels.
• Perhaps, as well as the (annual ASP & Network – sic) parasitology meeting, the Network could organise sessions within larger meetings e.g. ASMR.
• I think it would be great if the Network could direct some funding into start-up projects. Competitively awarding a few stipends for e.g. graduate trainees, oversees interns, RAs to spend a few months (4-6) getting a new project off the ground such that a suitable PhD project subsequently can be proposed would be very helpful.
• Mentoring program for PhD students.
• Maybe mentorship for early career researchers when it comes to grant writing for example. Basically acknowledging the fact that even post-docs are still training and learning so trying to give them as much help and support as possible.
• I think the Network and the ASP should look at different ways that they can work together to lift the profile of parasitology which would be of benefit to the whole community. Parasitology is such a vast discipline and it impacts on our lives in many ways. Both the Network and the ASP have a duty to educate the general public about the discipline which will spark the interest of the next generation of parasitologists.
• funding for postdoctoral fellowships and small research grants
A Statistical Snapshot of the ARC/NHMRC Research Network for Parasitology in 2007

- Number of (active) participants;
  - The Network defines a Participant as, most importantly, an active researcher (including postgraduate students) from a Participating Organisation, self-subscribed to the Network listserv and receiving the Network Newsletter. There were 332 of these Participants in 2007 and they were all fully eligible to apply for funding from the Network Researcher Exchange, Training and Travel Fund, benefit from the Network’s co-sponsorship of an annual scientific research conference with the ASP and enjoy access to the Network IT Initiative’s developments.
  - Additionally, the Network recognises Australian Society for Parasitology Incorporated (ASP) members as associates by virtue of the ASP’s cash contribution to the Network. These associates receive the Network Newsletter, benefit from the Network’s co-sponsorship (with the ASP) of an annual scientific research conference and enjoy access to the Network IT Initiative’s developments. These associates are not eligible for support from the Network Researcher Exchange, Training and Travel Fund. There were 354 such associates (additional to the Participants) receiving the Network Newsletter in 2007.

- Number of ECRs funded to do various activities;
  - 129 ECRs (including research students) were effectively given funding assistance to attend the Joint Conference of the ARC/NHMRC Research Network for Parasitology and ASP (Canberra, July, 2007) via the Network’s subsidisation of this event.
  - 22 ECRs and students were effectively subsidised by the Network’s support of the Northern Australia Malaria Symposium (Brisbane, November 27, 2007).
  - 21 ECRs were awarded Network Researcher Exchange, Training and Travel awards in 2007, representing 75% of all successful applications for funding.

- Number of workshops, conferences or seminars conducted;
  - Four conferences – the Joint Conference of the ARC/NHMRC Research Network for Parasitology & the ASP (Canberra, July, 2007), attended by 231 researchers, the “Parasites, Conservation and Evolutionary Ecology Symposium” (Adelaide, June 21-22, 2007), attended by 160 scientists, the “Northern Australia Malaria Symposium” (Brisbane, November 27, 2007), attended by 43 malarialogists, and the “Genomic and Proteomic Analyses of Secretions of Parasitic Helminths” (Brisbane, March 27, 2007) attended by 20 helminthologists.
• Number of international visits, both by Network members in Australia to overseas destinations, international events, and short and long term visits by international researchers to Australia;
  o The Network funded 25 participants to spend time in international laboratories and funded, or co-funded with the ASP, Elsevier, *Trends in Parasitology* and *The International Journal for Parasitology*, 12 international visitors to Australia (ten as invited lecturers to the Network Conference, two on Researcher Exchanges).
  o In total, 56 international visitors spent time in Australian parasitology groups during 2007 – they came from the UK (8), the USA (9), Germany (6), Switzerland (4), Vietnam (4), China (2), Canada (3), Indonesia (2), Papua New Guinea (2), India (2), Thailand, France, Spain, Ireland, New Zealand, Malawi, the Netherlands, Brazil, Iran, Japan, West Indies, Italy, South Africa and the Czech Republic (all 1 each).
  o International conference attendances are not listed in this report as there are several hundred and this is considered routine for Australian researchers.

• Number of outreach activities including public lectures (or other forms of engagement with people outside the research community including schools, industry and government agencies);
  o There were 48 reports in the media involving Network scientists in 2007 and more than 40 documented outreach activities where Network scientists presented to, or engaged with, the general public and/or specific community groups about their research work.

• Number of publications produced;
  o 328 printed publications and 332 conference presentations and institutional seminars.

• Number of universities receiving funding;
  o Network Participants from 26 Participating Organisations were effectively funded to attend the Annual Conference of the ASP and the ARC/NHMRC Research Network for Parasitology and other Symposia via the subsidisation of these events by the Network.
  o Network Participants from 16 Participating Organisations received support from the Network Researcher Exchange, Training and Travel Fund.

• The URL of the Research Network’s web site
  http://www.parasite.org.au/arcnet

59
### Register of Network Participants

<table>
<thead>
<tr>
<th>Name</th>
<th>Institution</th>
<th>Role in Network</th>
</tr>
</thead>
<tbody>
<tr>
<td>D Jenkins</td>
<td>AHCEP</td>
<td>Participant - Senior Researcher</td>
</tr>
<tr>
<td>Q Cheng</td>
<td>Australian Army Malaria Institute, Qld</td>
<td>Participant - Senior Researcher</td>
</tr>
<tr>
<td>R Cooper</td>
<td>Australian Army Malaria Institute, Qld</td>
<td>Participant - Senior Researcher</td>
</tr>
<tr>
<td>M Edstein</td>
<td>Australian Army Malaria Institute, Qld</td>
<td>Participant - Postdoctoral Researcher</td>
</tr>
<tr>
<td>A Auliff</td>
<td>Australian Army Malaria Institute, Qld</td>
<td>Student Participant</td>
</tr>
<tr>
<td>D Shanks</td>
<td>Australian Army Malaria Institute, Qld</td>
<td>Participant - Senior Researcher</td>
</tr>
<tr>
<td>D Krause</td>
<td>Australian Army Malaria Institute, Qld/Queensland Institute of Medical Research</td>
<td>Student Participant</td>
</tr>
<tr>
<td>G Vesey</td>
<td>BTF, NSW</td>
<td>Participant - Senior Researcher</td>
</tr>
<tr>
<td>T Grillo</td>
<td>Charles Sturt University, Wagga Wagga Campus, NSW</td>
<td>Participant - Postdoctoral Researcher</td>
</tr>
<tr>
<td>NC Sangster</td>
<td>Charles Sturt University, Wagga Wagga Campus, NSW</td>
<td>Participant - Senior Researcher</td>
</tr>
<tr>
<td>RB Besier</td>
<td>Department of Agriculture Western Australia</td>
<td>Participant - Senior Researcher</td>
</tr>
<tr>
<td>S Binos</td>
<td>Department of Primary Industries, Victoria</td>
<td>Participant - Postdoctoral Researcher</td>
</tr>
<tr>
<td>D Hartman</td>
<td>Department of Primary Industries, Victoria</td>
<td>Participant - Postdoctoral Researcher</td>
</tr>
<tr>
<td>P Presidente</td>
<td>Department of Primary Industries, Victoria</td>
<td>Participant - Senior Researcher</td>
</tr>
<tr>
<td>J Sexton</td>
<td>Department of Primary Industries, Victoria</td>
<td>Participant - Senior Researcher</td>
</tr>
<tr>
<td>J Zawadzki</td>
<td>Department of Primary Industries, Victoria</td>
<td>Participant - Senior Researcher,</td>
</tr>
<tr>
<td>M Bull</td>
<td>Flinders University of South Australia</td>
<td>Participant - Senior Researcher</td>
</tr>
<tr>
<td>M Oorebeek</td>
<td>Flinders University of South Australia</td>
<td>Student Participant</td>
</tr>
<tr>
<td>S Godfrey</td>
<td>Flinders University of South Australia</td>
<td>Student Participant</td>
</tr>
<tr>
<td>H Korner</td>
<td>James Cook University, Qld</td>
<td>Participant - Senior Researcher</td>
</tr>
<tr>
<td>W Melrose</td>
<td>James Cook University, Qld</td>
<td>Participant - Senior Researcher</td>
</tr>
<tr>
<td>L Skerratt</td>
<td>James Cook University, Qld</td>
<td>Participant - Postdoctoral Researcher</td>
</tr>
<tr>
<td>R Speare</td>
<td>James Cook University, Qld</td>
<td>Participant - Senior Researcher</td>
</tr>
<tr>
<td>D Blair</td>
<td>James Cook University, Qld</td>
<td>Participant - Senior Researcher</td>
</tr>
<tr>
<td>C Adda</td>
<td>La Trobe University Vic</td>
<td>Participant - Postdoctoral Researcher</td>
</tr>
<tr>
<td>A Adisa</td>
<td>La Trobe University Vic</td>
<td>Participant - Postdoctoral Researcher</td>
</tr>
<tr>
<td>A Alpyurek</td>
<td>La Trobe University Vic</td>
<td>Student Participant</td>
</tr>
<tr>
<td>R Anders</td>
<td>La Trobe University Vic</td>
<td>Participant - Senior Researcher</td>
</tr>
<tr>
<td>J Casey</td>
<td>La Trobe University Vic</td>
<td>Participant - Postdoctoral Researcher</td>
</tr>
<tr>
<td>A Coley</td>
<td>La Trobe University Vic</td>
<td>Student Participant</td>
</tr>
<tr>
<td>M Foley</td>
<td>La Trobe University Vic</td>
<td>Participant - Senior Researcher</td>
</tr>
<tr>
<td>S Frankland</td>
<td>La Trobe University Vic</td>
<td>Student Participant</td>
</tr>
<tr>
<td>K Harris</td>
<td>La Trobe University Vic</td>
<td>Student Participant</td>
</tr>
<tr>
<td>K Jackson</td>
<td>La Trobe University Vic</td>
<td>Student Participant</td>
</tr>
<tr>
<td>N Klonis</td>
<td>La Trobe University Vic</td>
<td>Participant - Postdoctoral Researcher</td>
</tr>
<tr>
<td>P Parker</td>
<td>La Trobe University Vic</td>
<td>Student Participant</td>
</tr>
<tr>
<td>J Schloegel</td>
<td>La Trobe University Vic</td>
<td>Student Participant</td>
</tr>
<tr>
<td>J Scoble</td>
<td>La Trobe University Vic</td>
<td>Participant - Postdoctoral Researcher</td>
</tr>
<tr>
<td>L Tilley</td>
<td>La Trobe University Vic</td>
<td>Participant - Senior Researcher</td>
</tr>
<tr>
<td>J Burgess</td>
<td>La Trobe University Vic</td>
<td>Student Participant</td>
</tr>
<tr>
<td>Name</td>
<td>Institution</td>
<td>Role</td>
</tr>
<tr>
<td>------------------</td>
<td>--------------------------------------</td>
<td>--------------------------------</td>
</tr>
<tr>
<td>S Cotton</td>
<td>La Trobe University Vic</td>
<td>Student Participant</td>
</tr>
<tr>
<td>M Crespo</td>
<td>La Trobe University Vic</td>
<td>Student Participant</td>
</tr>
<tr>
<td>S Deed</td>
<td>La Trobe University Vic</td>
<td>Student Participant</td>
</tr>
<tr>
<td>Y Fu</td>
<td>La Trobe University Vic</td>
<td>Student Participant</td>
</tr>
<tr>
<td>E Hanssen</td>
<td>La Trobe University Vic</td>
<td>Participant - Postdoctoral</td>
</tr>
<tr>
<td>R Masciantonio</td>
<td>La Trobe University Vic</td>
<td>Participant - Senior Researcher</td>
</tr>
<tr>
<td>P Mehrpouian</td>
<td>La Trobe University Vic</td>
<td>Participant - Postdoctoral</td>
</tr>
<tr>
<td>K Munro</td>
<td>La Trobe University Vic</td>
<td>Student Participant</td>
</tr>
<tr>
<td>V Murphy</td>
<td>La Trobe University Vic</td>
<td>Student Participant</td>
</tr>
<tr>
<td>K Parisi</td>
<td>La Trobe University Vic</td>
<td>Student Participant</td>
</tr>
<tr>
<td>M Sandeman</td>
<td>La Trobe University Vic</td>
<td>Participant - Senior Researcher</td>
</tr>
<tr>
<td>K Vingas</td>
<td>La Trobe University Vic</td>
<td>Student Participant</td>
</tr>
<tr>
<td>A Barry</td>
<td>MacFarlane Burnet Institute, Vic</td>
<td>Participant - Senior Researcher</td>
</tr>
<tr>
<td>M Power</td>
<td>Macquarie University, NSW</td>
<td>Participant - Postdoctoral</td>
</tr>
<tr>
<td>N Anstey</td>
<td>Menzies School of Health Research, NT</td>
<td>Participant - Senior Researcher</td>
</tr>
<tr>
<td>A Brockman</td>
<td>Menzies School of Health Research, NT</td>
<td>Participant - Senior Researcher</td>
</tr>
<tr>
<td>B Bruce</td>
<td>Menzies School of Health Research, NT</td>
<td>Participant - Postdoctoral</td>
</tr>
<tr>
<td>B Currie</td>
<td>Menzies School of Health Research, NT</td>
<td>Participant - Senior Researcher</td>
</tr>
<tr>
<td>C Darcy</td>
<td>Menzies School of Health Research, NT</td>
<td>Student Participant</td>
</tr>
<tr>
<td>A Dougall</td>
<td>Menzies School of Health Research, NT</td>
<td>Student Participant</td>
</tr>
<tr>
<td>N Anstey</td>
<td>Menzies School of Health Research, NT</td>
<td>Participant - Senior Researcher</td>
</tr>
<tr>
<td>K Mounsey</td>
<td>Menzies School of Health Research, NT</td>
<td>Participant - Senior Researcher</td>
</tr>
<tr>
<td>K Mounsey</td>
<td>Menzies School of Health Research, NT</td>
<td>Participant - Senior Researcher</td>
</tr>
<tr>
<td>R Price</td>
<td>Menzies School of Health Research, NT</td>
<td>Participant - Senior Researcher</td>
</tr>
<tr>
<td>A Ratcliff</td>
<td>Menzies School of Health Research, NT</td>
<td>Participant - Postdoctoral</td>
</tr>
<tr>
<td>A Slender</td>
<td>Menzies School of Health Research, NT</td>
<td>Student Participant</td>
</tr>
<tr>
<td>R Suwanarusk</td>
<td>Menzies School of Health Research, NT</td>
<td>Participant - Postdoctoral</td>
</tr>
<tr>
<td>S Walton</td>
<td>Menzies School of Health Research, NT</td>
<td>Participant - Senior Researcher</td>
</tr>
<tr>
<td>T Woodberry</td>
<td>Menzies School of Health Research, NT</td>
<td>Participant - Postdoctoral</td>
</tr>
<tr>
<td>S Foote</td>
<td>Menzies Institute (University of Tasmania)</td>
<td>Participant - Senior Researcher</td>
</tr>
<tr>
<td>B Cooke</td>
<td>Monash University, Vic</td>
<td>Participant - Senior Researcher</td>
</tr>
<tr>
<td>R Coppel</td>
<td>Monash University, Vic</td>
<td>Participant - Senior Researcher</td>
</tr>
<tr>
<td>C Black</td>
<td>Monash University, Vic</td>
<td>Participant - Postdoctoral</td>
</tr>
<tr>
<td>E Meeusen</td>
<td>Monash University, Vic</td>
<td>Participant - Senior Researcher</td>
</tr>
<tr>
<td>D Piedrafita</td>
<td>Monash University, Vic</td>
<td>Participant - Postdoctoral</td>
</tr>
<tr>
<td>M Plebanski</td>
<td>Monash University, Vic</td>
<td>Participant - Senior Researcher</td>
</tr>
<tr>
<td>S Prickett</td>
<td>Monash University, Vic</td>
<td>Participant - Postdoctoral</td>
</tr>
<tr>
<td>N Proellocks</td>
<td>Monash University, Vic</td>
<td>Student Participant</td>
</tr>
<tr>
<td>K Waller</td>
<td>Monash University, Vic</td>
<td>Participant - Postdoctoral</td>
</tr>
<tr>
<td>T Armstrong</td>
<td>Murdoch University, WA</td>
<td>Student Participant</td>
</tr>
<tr>
<td>A Boxell</td>
<td>Murdoch University, WA</td>
<td>Student Participant</td>
</tr>
<tr>
<td>C Constantine</td>
<td>Murdoch University, WA</td>
<td>Student Participant</td>
</tr>
<tr>
<td>R Hobbs</td>
<td>Murdoch University, WA</td>
<td>Participant - Senior Researcher</td>
</tr>
<tr>
<td>P Irwin</td>
<td>Murdoch University, WA</td>
<td>Participant - Senior Researcher</td>
</tr>
<tr>
<td>L Lumbao</td>
<td>Murdoch University, WA</td>
<td>Student Participant</td>
</tr>
<tr>
<td>Name</td>
<td>Institution</td>
<td>Role</td>
</tr>
<tr>
<td>-----------------------</td>
<td>--------------------------------------------------</td>
<td>----------------------------------------------------------------------</td>
</tr>
<tr>
<td>A Lymberry</td>
<td>Murdoch University, WA</td>
<td>Participant - Senior Researcher</td>
</tr>
<tr>
<td>L McInnes</td>
<td>Murdoch University, WA</td>
<td>Student Participant</td>
</tr>
<tr>
<td>Z Njiru</td>
<td>Murdoch University, WA</td>
<td>Student Participant</td>
</tr>
<tr>
<td>C Palmer</td>
<td>Murdoch University, WA</td>
<td>Student Participant</td>
</tr>
<tr>
<td>B Ralston</td>
<td>Murdoch University, WA</td>
<td>Student Participant</td>
</tr>
<tr>
<td>S Reid</td>
<td>Murdoch University, WA</td>
<td>Participant - Senior Researcher, Management Committee Member</td>
</tr>
<tr>
<td>R Thompson</td>
<td>Murdoch University, WA</td>
<td>Participant - Senior Researcher, Management Committee Member</td>
</tr>
<tr>
<td>A Bestall</td>
<td>Murdoch University, WA</td>
<td>Student Participant</td>
</tr>
<tr>
<td>S Bong</td>
<td>Murdoch University, WA</td>
<td>Student Participant</td>
</tr>
<tr>
<td>N Parameswaran</td>
<td>Murdoch University, WA</td>
<td>Student Participant</td>
</tr>
<tr>
<td>U Ryan</td>
<td>Murdoch University, WA</td>
<td>Participant - Senior Researcher, Management Committee Member</td>
</tr>
<tr>
<td>L Jackson</td>
<td>Queensland Department of Primary Industries</td>
<td>Participant - Senior Researcher</td>
</tr>
<tr>
<td>W Jorgensen</td>
<td>Queensland Department of Primary Industries</td>
<td>Participant - Senior Researcher</td>
</tr>
<tr>
<td>A Lew</td>
<td>Queensland Department of Primary Industries</td>
<td>Participant - Senior Researcher</td>
</tr>
<tr>
<td>J Mulvenna</td>
<td>Queensland Institute for Medical Research</td>
<td>Participant - Postdoctoral Researcher</td>
</tr>
<tr>
<td>F Amante</td>
<td>Queensland Institute for Medical Research</td>
<td>Participant - Postdoctoral Researcher</td>
</tr>
<tr>
<td>K Andrews</td>
<td>Queensland Institute of Medical Research</td>
<td>Participant - Postdoctoral Researcher</td>
</tr>
<tr>
<td>W Chung</td>
<td>Queensland Institute of Medical Research</td>
<td>Student Participant</td>
</tr>
<tr>
<td>K Clark</td>
<td>Queensland Institute of Medical Research</td>
<td>Student Participant</td>
</tr>
<tr>
<td>T Don</td>
<td>Queensland Institute of Medical Research</td>
<td>Student Participant</td>
</tr>
<tr>
<td>L Dunn</td>
<td>Queensland Institute of Medical Research</td>
<td>Participant - Postdoctoral Researcher</td>
</tr>
<tr>
<td>R Dunne</td>
<td>Queensland Institute of Medical Research</td>
<td>Student Participant</td>
</tr>
<tr>
<td>C Engwerda</td>
<td>Queensland Institute of Medical Research</td>
<td>Participant - Senior Researcher</td>
</tr>
<tr>
<td>K Fischer</td>
<td>Queensland Institute of Medical Research</td>
<td>Participant - Postdoctoral Researcher</td>
</tr>
<tr>
<td>D Gardiner</td>
<td>Queensland Institute of Medical Research</td>
<td>Participant - Senior Researcher</td>
</tr>
<tr>
<td>G Gobert</td>
<td>Queensland Institute of Medical Research</td>
<td>Participant - Senior Researcher</td>
</tr>
<tr>
<td>M Good</td>
<td>Queensland Institute of Medical Research</td>
<td>Participant - Senior Researcher</td>
</tr>
<tr>
<td>M Jones</td>
<td>Queensland Institute of Medical Research</td>
<td>Participant - Senior Researcher, Management Committee Member</td>
</tr>
<tr>
<td>D Kemp</td>
<td>Queensland Institute of Medical Research</td>
<td>Participant - Senior Researcher</td>
</tr>
<tr>
<td>A Loukas</td>
<td>Queensland Institute of Medical Research</td>
<td>Participant - Senior Researcher, Deputy Convenor, Management Committee Member</td>
</tr>
<tr>
<td>J McCarthy</td>
<td>Queensland Institute of Medical Research</td>
<td>Participant - Senior Researcher</td>
</tr>
<tr>
<td>D McManus</td>
<td>Queensland Institute of Medical Research</td>
<td>Participant - Senior Researcher</td>
</tr>
<tr>
<td>C Pasay</td>
<td>Queensland Institute of Medical Research</td>
<td>Participant - Postdoctoral Researcher</td>
</tr>
<tr>
<td>M Pearson</td>
<td>Queensland Institute of Medical Research</td>
<td>Participant - Postdoctoral Researcher</td>
</tr>
<tr>
<td>L Randall</td>
<td>Queensland Institute of Medical Research</td>
<td>Student Participant</td>
</tr>
<tr>
<td>T Skinner-Adams</td>
<td>Queensland Institute of Medical Research</td>
<td>Participant - Postdoctoral Researcher</td>
</tr>
<tr>
<td>M Smout</td>
<td>Queensland Institute of Medical Research</td>
<td>Student Participant</td>
</tr>
<tr>
<td>A Stanley</td>
<td>Queensland Institute of Medical Research</td>
<td>Participant - Postdoctoral Researcher</td>
</tr>
<tr>
<td>M Tran</td>
<td>Queensland Institute of Medical Research</td>
<td>Student Participant</td>
</tr>
<tr>
<td>Name</td>
<td>Institution</td>
<td>Role</td>
</tr>
<tr>
<td>--------------------</td>
<td>--------------------------------------------------</td>
<td>-------------------------------------------</td>
</tr>
<tr>
<td>K Trenholme</td>
<td>Queensland Institute of Medical Research</td>
<td>Participant - Postdoctoral Researcher</td>
</tr>
<tr>
<td>P Upcroft</td>
<td>Queensland Institute of Medical Research</td>
<td>Participant - Senior Researcher</td>
</tr>
<tr>
<td>J Upcroft</td>
<td>Queensland Institute of Medical Research</td>
<td>Participant - Senior Researcher</td>
</tr>
<tr>
<td>J Wright</td>
<td>Queensland Institute of Medical Research</td>
<td>Student Participant</td>
</tr>
<tr>
<td>H You</td>
<td>Queensland Institute of Medical Research</td>
<td>Student Participant</td>
</tr>
<tr>
<td>W Zhang</td>
<td>Queensland Institute of Medical Research</td>
<td>Participant - Postdoctoral Researcher</td>
</tr>
<tr>
<td>S Beckham</td>
<td>Queensland Institute of Medical Research</td>
<td>Participant - Postdoctoral Researcher</td>
</tr>
<tr>
<td>B Datu</td>
<td>Queensland Institute of Medical Research</td>
<td>Student Participant</td>
</tr>
<tr>
<td>M Dixon</td>
<td>Queensland Institute of Medical Research</td>
<td>Student Participant</td>
</tr>
<tr>
<td>M Gatton</td>
<td>Queensland Institute of Medical Research</td>
<td>Participant - Postdoctoral Researcher</td>
</tr>
<tr>
<td>M Glanfield</td>
<td>Queensland Institute of Medical Research</td>
<td>Student Participant</td>
</tr>
<tr>
<td>P Hawthorne</td>
<td>Queensland Institute of Medical Research</td>
<td>Student Participant</td>
</tr>
<tr>
<td>L Hugo</td>
<td>Queensland Institute of Medical Research</td>
<td>Participant - Postdoctoral Researcher</td>
</tr>
<tr>
<td>T Hurst</td>
<td>Queensland Institute of Medical Research</td>
<td>Participant - Postdoctoral Researcher</td>
</tr>
<tr>
<td>J Jeffery</td>
<td>Queensland Institute of Medical Research</td>
<td>Participant - Postdoctoral Researcher</td>
</tr>
<tr>
<td>B Kay</td>
<td>Queensland Institute of Medical Research</td>
<td>Participant - Senior Researcher</td>
</tr>
<tr>
<td>S Kopp</td>
<td>Queensland Institute of Medical Research</td>
<td>Student Participant</td>
</tr>
<tr>
<td>A Pinzon-Cherry</td>
<td>Queensland Institute of Medical Research</td>
<td>Participant - Postdoctoral Researcher</td>
</tr>
<tr>
<td>N Ranjit</td>
<td>Queensland Institute of Medical Research</td>
<td>Student Participant</td>
</tr>
<tr>
<td>P Ryan</td>
<td>Queensland Institute of Medical Research</td>
<td>Participant - Postdoctoral Researcher</td>
</tr>
<tr>
<td>D Smyth</td>
<td>Queensland Institute of Medical Research</td>
<td>Participant - Postdoctoral Researcher</td>
</tr>
<tr>
<td>T Spielmann</td>
<td>Queensland Institute of Medical Research</td>
<td>Participant - Postdoctoral Researcher</td>
</tr>
<tr>
<td>T Tran</td>
<td>Queensland Institute of Medical Research</td>
<td>Student Participant</td>
</tr>
<tr>
<td>C Willis</td>
<td>Queensland Institute of Medical Research</td>
<td>Student Participant</td>
</tr>
<tr>
<td>L Zhang</td>
<td>Queensland Institute of Medical Research</td>
<td>Participant - Postdoctoral Researcher</td>
</tr>
<tr>
<td>R Adlard</td>
<td>Queensland Museum</td>
<td>Participant - Senior Researcher, Management Committee Member</td>
</tr>
<tr>
<td>A Lopata</td>
<td>RMIT University, Vic</td>
<td>Participant - Senior Researcher</td>
</tr>
<tr>
<td>I Whittington</td>
<td>South Australia Museum</td>
<td>Participant - Senior Researcher</td>
</tr>
<tr>
<td>J Allen</td>
<td>The Australian National University, ACT</td>
<td>Participant - Postdoctoral Researcher</td>
</tr>
<tr>
<td>C Behm</td>
<td>The Australian National University, ACT</td>
<td>Participant - Senior Researcher</td>
</tr>
<tr>
<td>M Downie</td>
<td>The Australian National University, ACT</td>
<td>Student Participant</td>
</tr>
<tr>
<td>J-A Fritz</td>
<td>The Australian National University, ACT</td>
<td>Student Participant</td>
</tr>
<tr>
<td>R Hayward</td>
<td>The Australian National University, ACT</td>
<td>Student Participant</td>
</tr>
<tr>
<td>R Henry</td>
<td>The Australian National University, ACT</td>
<td>Student Participant</td>
</tr>
<tr>
<td>N Johnson</td>
<td>The Australian National University, ACT</td>
<td>Student Participant</td>
</tr>
<tr>
<td>K Kirk</td>
<td>The Australian National University, ACT</td>
<td>Participant - Senior Researcher</td>
</tr>
<tr>
<td>R Kumarasinghe</td>
<td>The Australian National University, ACT</td>
<td>Student Participant</td>
</tr>
<tr>
<td>R Martin</td>
<td>The Australian National University, ACT</td>
<td>Participant - Postdoctoral Researcher</td>
</tr>
<tr>
<td>K Saliba</td>
<td>The Australian National University, ACT</td>
<td>Participant - Senior Researcher, Management Committee Member</td>
</tr>
<tr>
<td>A Knight</td>
<td>The Australian National University, ACT</td>
<td>Student Participant</td>
</tr>
<tr>
<td>A Lehane</td>
<td>The Australian National University, ACT</td>
<td>Student Participant</td>
</tr>
<tr>
<td>R Marchetti</td>
<td>The Australian National University, ACT</td>
<td>Student Participant</td>
</tr>
<tr>
<td>Name</td>
<td>Affiliation</td>
<td>Role</td>
</tr>
<tr>
<td>-----------------------</td>
<td>------------------------------------</td>
<td>-------------------------------------------</td>
</tr>
<tr>
<td>C Spry</td>
<td>The Australian National University, ACT</td>
<td>Student Participant</td>
</tr>
<tr>
<td>R Teng</td>
<td>The Australian National University, ACT</td>
<td>Participant - Postdoctoral Researcher</td>
</tr>
<tr>
<td>D van Schalkwyk</td>
<td>The Australian National University, ACT</td>
<td>Participant - Postdoctoral Researcher</td>
</tr>
<tr>
<td>C Chambers</td>
<td>The University of Adelaide, SA</td>
<td>Participant - Postdoctoral Researcher</td>
</tr>
<tr>
<td>L Chisholm</td>
<td>The University of Adelaide, SA</td>
<td>Participant - Postdoctoral Researcher</td>
</tr>
<tr>
<td>V Glennon</td>
<td>The University of Adelaide, SA</td>
<td>Participant - Postdoctoral Researcher</td>
</tr>
<tr>
<td>K Hutson</td>
<td>The University of Adelaide, SA</td>
<td>Participant - Postdoctoral Researcher</td>
</tr>
<tr>
<td>A Mooney</td>
<td>The University of Adelaide, SA</td>
<td>Student Participant</td>
</tr>
<tr>
<td>D Schmarr</td>
<td>The University of Adelaide, SA</td>
<td>Student Participant</td>
</tr>
<tr>
<td>R Williams</td>
<td>The University of Adelaide, SA</td>
<td>Student Participant</td>
</tr>
<tr>
<td>P Boeuf</td>
<td>The University of Melbourne, Vic</td>
<td>Participant - Postdoctoral Researcher</td>
</tr>
<tr>
<td>N Bott</td>
<td>The University of Melbourne, Vic</td>
<td>Participant - Postdoctoral Researcher</td>
</tr>
<tr>
<td>A Colebrook-Robinson</td>
<td>The University of Melbourne, Vic</td>
<td>Student Participant</td>
</tr>
<tr>
<td>P Dolezal</td>
<td>The University of Melbourne, Vic</td>
<td>Participant - Postdoctoral Researcher</td>
</tr>
<tr>
<td>A Jex</td>
<td>The University of Melbourne, Vic</td>
<td>Participant - Postdoctoral Researcher</td>
</tr>
<tr>
<td>B Kalinna</td>
<td>The University of Melbourne, Vic</td>
<td>Participant - Senior Researcher</td>
</tr>
<tr>
<td>M Pellegrino</td>
<td>The University of Melbourne, Vic</td>
<td>Student Participant</td>
</tr>
<tr>
<td>S Ralph</td>
<td>The University of Melbourne, Vic</td>
<td>Participant - Senior Researcher</td>
</tr>
<tr>
<td>A Read</td>
<td>The University of Melbourne, Vic</td>
<td>Student Participant</td>
</tr>
<tr>
<td>J Shaw</td>
<td>The University of Melbourne, Vic</td>
<td>Participant - Postdoctoral Researcher</td>
</tr>
<tr>
<td>S Shokoofeh</td>
<td>The University of Melbourne, Vic</td>
<td>Student Participant</td>
</tr>
<tr>
<td>A Umbers</td>
<td>The University of Melbourne, Vic</td>
<td>Student Participant</td>
</tr>
<tr>
<td>I Beveridge</td>
<td>The University of Melbourne, Vic</td>
<td>Participant - Senior Researcher</td>
</tr>
<tr>
<td>J Blaszak</td>
<td>The University of Melbourne, Vic</td>
<td>Student Participant</td>
</tr>
<tr>
<td>V Bowles</td>
<td>The University of Melbourne, Vic</td>
<td>Participant - Senior Researcher</td>
</tr>
<tr>
<td>G Brown</td>
<td>The University of Melbourne, Vic</td>
<td>Participant - Senior Researcher</td>
</tr>
<tr>
<td>M deVeer</td>
<td>The University of Melbourne, Vic</td>
<td>Participant - Postdoctoral Researcher</td>
</tr>
<tr>
<td>M Duffy</td>
<td>The University of Melbourne, Vic</td>
<td>Participant - Postdoctoral Researcher</td>
</tr>
<tr>
<td>R Gasser</td>
<td>The University of Melbourne, Vic</td>
<td>Participant - Senior Researcher</td>
</tr>
<tr>
<td>D Goodman</td>
<td>The University of Melbourne, Vic</td>
<td>Participant - Postdoctoral Researcher</td>
</tr>
<tr>
<td>E Mann</td>
<td>The University of Melbourne, Vic</td>
<td>Student Participant</td>
</tr>
<tr>
<td>M McConville</td>
<td>The University of Melbourne, Vic</td>
<td>Participant - Senior Researcher</td>
</tr>
<tr>
<td>G McCfadden</td>
<td>The University of Melbourne, Vic</td>
<td>Participant - Senior Researcher, Management Committee Member</td>
</tr>
<tr>
<td>V Mollard</td>
<td>The University of Melbourne, Vic</td>
<td>Student Participant</td>
</tr>
<tr>
<td>A Mount</td>
<td>The University of Melbourne, Vic</td>
<td>Student Participant</td>
</tr>
<tr>
<td>K Mullin</td>
<td>The University of Melbourne, Vic</td>
<td>Participant - Postdoctoral Researcher</td>
</tr>
<tr>
<td>R Opperman</td>
<td>The University of Melbourne, Vic</td>
<td>Student Participant</td>
</tr>
<tr>
<td>N Robinson</td>
<td>The University of Melbourne, Vic</td>
<td>Student Participant</td>
</tr>
<tr>
<td>S Rogerson</td>
<td>The University of Melbourne, Vic</td>
<td>Participant - Senior Researcher</td>
</tr>
<tr>
<td>R Smith</td>
<td>The University of Melbourne, Vic</td>
<td>Student Participant</td>
</tr>
<tr>
<td>T Spurck</td>
<td>The University of Melbourne, Vic</td>
<td>Participant - Postdoctoral Researcher</td>
</tr>
<tr>
<td>Name</td>
<td>University</td>
<td>Position</td>
</tr>
<tr>
<td>--------------------</td>
<td>---------------------------</td>
<td>------------------------------</td>
</tr>
<tr>
<td>L Stimmler</td>
<td>The University of Melbourne, Vic</td>
<td>Student Participant</td>
</tr>
<tr>
<td>J Tonkin</td>
<td>The University of Melbourne, Vic</td>
<td>Student Participant</td>
</tr>
<tr>
<td>G van Dooran</td>
<td>The University of Melbourne, Vic</td>
<td>Student Participant</td>
</tr>
<tr>
<td>M Hu</td>
<td>The University of Melbourne, Vic</td>
<td>Participant - Postdoctoral Researcher</td>
</tr>
<tr>
<td>J Lackenby</td>
<td>The University of Melbourne, Vic</td>
<td>Student Participant</td>
</tr>
<tr>
<td>M Lightowlers</td>
<td>The University of Melbourne, Vic</td>
<td>Participant - Senior Researcher</td>
</tr>
<tr>
<td>M Burger</td>
<td>The University of Queensland</td>
<td>Student Participant</td>
</tr>
<tr>
<td>P O'Donoghue</td>
<td>The University of Queensland</td>
<td>Participant - Senior Researcher</td>
</tr>
<tr>
<td>R Traub</td>
<td>The University of Queensland</td>
<td>Participant - Postdoctoral Researcher</td>
</tr>
<tr>
<td>S Barker</td>
<td>The University of Queensland</td>
<td>Participant - Senior Researcher</td>
</tr>
<tr>
<td>J Becker</td>
<td>The University of Queensland</td>
<td>Student Participant</td>
</tr>
<tr>
<td>C Covacín</td>
<td>The University of Queensland</td>
<td>Student Participant</td>
</tr>
<tr>
<td>T Cribb</td>
<td>The University of Queensland</td>
<td>Participant - Senior Researcher</td>
</tr>
<tr>
<td>P Ebert</td>
<td>The University of Queensland</td>
<td>Participant - Senior Researcher</td>
</tr>
<tr>
<td>R Fogelman</td>
<td>The University of Queensland</td>
<td>Student Participant</td>
</tr>
<tr>
<td>V Gamboa</td>
<td>The University of Queensland</td>
<td>Student Participant</td>
</tr>
<tr>
<td>A Grutter</td>
<td>The University of Queensland</td>
<td>Participant - Senior Researcher</td>
</tr>
<tr>
<td>C Jones</td>
<td>The University of Queensland</td>
<td>Student Participant</td>
</tr>
<tr>
<td>C June</td>
<td>The University of Queensland</td>
<td>Student Participant</td>
</tr>
<tr>
<td>P McCracken</td>
<td>The University of Queensland</td>
<td>Student Participant</td>
</tr>
<tr>
<td>G Muñoz</td>
<td>The University of Queensland</td>
<td>Student Participant</td>
</tr>
<tr>
<td>A Murrell</td>
<td>The University of Queensland</td>
<td>Participant - Postdoctoral Researcher</td>
</tr>
<tr>
<td>J Pickering</td>
<td>The University of Queensland</td>
<td>Student Participant</td>
</tr>
<tr>
<td>M Rix</td>
<td>The University of Queensland</td>
<td>Student Participant</td>
</tr>
<tr>
<td>J Rumney</td>
<td>The University of Queensland</td>
<td>Student Participant</td>
</tr>
<tr>
<td>R Shao</td>
<td>The University of Queensland</td>
<td>Participant - Postdoctoral Researcher</td>
</tr>
<tr>
<td>S Waller</td>
<td>The University of Queensland</td>
<td>Student Participant</td>
</tr>
<tr>
<td>G Grau</td>
<td>The University of Sydney, NSW</td>
<td>Participant - Postdoctoral Researcher</td>
</tr>
<tr>
<td>H Ball</td>
<td>The University of Sydney, NSW</td>
<td>Participant - Senior Researcher</td>
</tr>
<tr>
<td>D Emery</td>
<td>The University of Sydney, NSW</td>
<td>Participant - Postdoctoral Researcher</td>
</tr>
<tr>
<td>A Mitchell</td>
<td>The University of Sydney, NSW</td>
<td>Participant - Postdoctoral Researcher</td>
</tr>
<tr>
<td>J Miu</td>
<td>The University of Sydney, NSW</td>
<td>Student Participant</td>
</tr>
<tr>
<td>S Parekh</td>
<td>The University of Sydney, NSW</td>
<td>Student Participant</td>
</tr>
<tr>
<td>S Potter</td>
<td>The University of Sydney, NSW</td>
<td>Student Participant</td>
</tr>
<tr>
<td>S Weiser</td>
<td>The University of Sydney, NSW</td>
<td>Student Participant</td>
</tr>
<tr>
<td>P Windsor</td>
<td>The University of Sydney, NSW</td>
<td>Participant - Senior Researcher</td>
</tr>
<tr>
<td>N Hunt</td>
<td>The University of Sydney, NSW</td>
<td>Participant - Senior Researcher</td>
</tr>
<tr>
<td>R Jambou</td>
<td>The University of Sydney, NSW</td>
<td>Participant - Postdoctoral Researcher</td>
</tr>
<tr>
<td>J Slapeta</td>
<td>The University of Sydney, NSW</td>
<td>Participant - Postdoctoral Researcher</td>
</tr>
<tr>
<td>B Nowak</td>
<td>The University of Tasmania</td>
<td>Participant - Senior Researcher</td>
</tr>
<tr>
<td>S Roberts</td>
<td>The University of Tasmania</td>
<td>Student Participant</td>
</tr>
<tr>
<td>E Sridiví</td>
<td>The University of Tasmania</td>
<td>Student Participant</td>
</tr>
<tr>
<td>E Perkins</td>
<td>University of Adelaide, SA</td>
<td>Student Participant</td>
</tr>
<tr>
<td>N Ashbolt</td>
<td>University of New South Wales</td>
<td>Participant - Senior Researcher</td>
</tr>
<tr>
<td>M Adams</td>
<td>University of Tasmania</td>
<td>Participant - Postdoctoral Researcher</td>
</tr>
<tr>
<td>H Aiken</td>
<td>University of Tasmania</td>
<td>Participant - Postdoctoral Researcher</td>
</tr>
<tr>
<td>M Andrews</td>
<td>University of Tasmania</td>
<td>Participant - Postdoctoral Researcher</td>
</tr>
<tr>
<td>J Covello</td>
<td>University of Tasmania</td>
<td>Participant - Postdoctoral Researcher</td>
</tr>
<tr>
<td>Name</td>
<td>Organization</td>
<td>Role</td>
</tr>
<tr>
<td>-------------------</td>
<td>--------------------------------------</td>
<td>-------------------------------------------</td>
</tr>
<tr>
<td>P Crobbie</td>
<td>University of Tasmania</td>
<td>Participant - Postdoctoral Researcher</td>
</tr>
<tr>
<td>R Florent</td>
<td>University of Tasmania</td>
<td>Student Participant</td>
</tr>
<tr>
<td>C Hayward</td>
<td>University of Tasmania</td>
<td>Participant - Postdoctoral Researcher</td>
</tr>
<tr>
<td>R Morrison</td>
<td>University of Tasmania</td>
<td>Participant - Postdoctoral Researcher</td>
</tr>
<tr>
<td>M Powell</td>
<td>University of Tasmania</td>
<td>Participant - Postdoctoral Researcher</td>
</tr>
<tr>
<td>N Young</td>
<td>University of Tasmania</td>
<td>Student Participant</td>
</tr>
<tr>
<td>R Gurney</td>
<td>University of Tasmania</td>
<td>Student Participant</td>
</tr>
<tr>
<td>S Hemmerter</td>
<td>University of Technology, Sydney</td>
<td>Student Participant</td>
</tr>
<tr>
<td>R Ikin</td>
<td>University of Technology, Sydney</td>
<td>Student Participant</td>
</tr>
<tr>
<td>C James</td>
<td>University of Technology, Sydney</td>
<td>Student Participant</td>
</tr>
<tr>
<td>A Zakrzewski</td>
<td>University of Technology, Sydney</td>
<td>Student Participant</td>
</tr>
<tr>
<td>N Beebe</td>
<td>University of Technology, Sydney</td>
<td>Participant - Senior Researcher</td>
</tr>
<tr>
<td>J Dalton</td>
<td>University of Technology, Sydney</td>
<td>Participant - Senior Researcher</td>
</tr>
<tr>
<td>M Davey</td>
<td>University of Technology, Sydney</td>
<td>Participant - Senior Researcher</td>
</tr>
<tr>
<td>S Donnelly</td>
<td>University of Technology, Sydney</td>
<td>Participant - Postdoctoral Researcher</td>
</tr>
<tr>
<td>J Ellis</td>
<td>University of Technology, Sydney</td>
<td>Participant - Senior Researcher</td>
</tr>
<tr>
<td>S Flowers</td>
<td>University of Technology, Sydney</td>
<td>Student Participant</td>
</tr>
<tr>
<td>A Hudson</td>
<td>University of Technology, Sydney</td>
<td>Student Participant</td>
</tr>
<tr>
<td>M Johnson</td>
<td>University of Technology, Sydney</td>
<td>Participant - Postdoctoral Researcher</td>
</tr>
<tr>
<td>M Lees</td>
<td>University of Technology, Sydney</td>
<td>Student Participant</td>
</tr>
<tr>
<td>K Mai</td>
<td>University of Technology, Sydney</td>
<td>Student Participant</td>
</tr>
<tr>
<td>C Miller</td>
<td>University of Tasmania</td>
<td>Participant - Postdoctoral Researcher</td>
</tr>
<tr>
<td>N Smith</td>
<td>University of Technology, Sydney</td>
<td>Participant - Senior Researcher, Convenor</td>
</tr>
<tr>
<td>I Sotirchos</td>
<td>University of Technology, Sydney</td>
<td>Student Participant</td>
</tr>
<tr>
<td>A Sweeney</td>
<td>University of Technology, Sydney</td>
<td>Participant - Senior Researcher</td>
</tr>
<tr>
<td>R Walker</td>
<td>University of Technology, Sydney</td>
<td>Student Participant</td>
</tr>
<tr>
<td>M Wallach</td>
<td>University of Technology, Sydney</td>
<td>Participant - Senior Researcher</td>
</tr>
<tr>
<td>J Boddey</td>
<td>Walter and Eliza Hall Institute of Medical Research</td>
<td>Participant - Postdoctoral Researcher</td>
</tr>
<tr>
<td>D Bullen</td>
<td>Walter and Eliza Hall Institute of Medical Research</td>
<td>Student Participant</td>
</tr>
<tr>
<td>F Carvalho</td>
<td>Walter and Eliza Hall Institute of Medical Research</td>
<td>Participant - Postdoctoral Researcher</td>
</tr>
<tr>
<td>A Chen</td>
<td>Walter and Eliza Hall Institute of Medical Research</td>
<td>Participant - Postdoctoral Researcher</td>
</tr>
<tr>
<td>S Elliott</td>
<td>Walter and Eliza Hall Institute of Medical Research</td>
<td>Participant - Postdoctoral Researcher</td>
</tr>
<tr>
<td>M Hommel</td>
<td>Walter and Eliza Hall Institute of Medical Research</td>
<td>Participant - Postdoctoral Researcher</td>
</tr>
<tr>
<td>K Howell</td>
<td>Walter and Eliza Hall Institute of Medical Research</td>
<td>Participant - Postdoctoral Researcher</td>
</tr>
<tr>
<td>J Judd-Mole</td>
<td>Walter and Eliza Hall Institute of Medical Research</td>
<td>Student Participant</td>
</tr>
<tr>
<td>L Kedzierski</td>
<td>Walter and Eliza Hall Institute of Medical Research</td>
<td>Participant - Postdoctoral Researcher</td>
</tr>
<tr>
<td>K Leykauf</td>
<td>Walter and Eliza Hall Institute of Medical Research</td>
<td>Participant - Postdoctoral Researcher</td>
</tr>
<tr>
<td>F McCallum</td>
<td>Walter and Eliza Hall Institute of Medical Research</td>
<td>Student Participant</td>
</tr>
<tr>
<td>K Persson</td>
<td>Walter and Eliza Hall Institute of Medical Research</td>
<td>Participant - Postdoctoral Researcher</td>
</tr>
<tr>
<td>Name</td>
<td>Institution</td>
<td>Position</td>
</tr>
<tr>
<td>-----------------------------</td>
<td>--------------------------------------------------</td>
<td>---------------------------------</td>
</tr>
<tr>
<td>S Pilat</td>
<td>Walter and Eliza Hall Institute of Medical Research</td>
<td>Participant - Postdoctoral Researcher</td>
</tr>
<tr>
<td>L Reiling</td>
<td>Walter and Eliza Hall Institute of Medical Research</td>
<td>Participant - Postdoctoral Researcher</td>
</tr>
<tr>
<td>D Richard</td>
<td>Walter and Eliza Hall Institute of Medical Research</td>
<td>Participant - Postdoctoral Researcher</td>
</tr>
<tr>
<td>J Richards</td>
<td>Walter and Eliza Hall Institute of Medical Research</td>
<td>Participant - Postdoctoral Researcher</td>
</tr>
<tr>
<td>L Robinson</td>
<td>Walter and Eliza Hall Institute of Medical Research</td>
<td>Student Participant</td>
</tr>
<tr>
<td>A Sakthianandeswaren</td>
<td>Walter and Eliza Hall Institute of Medical Research</td>
<td>Student Participant</td>
</tr>
<tr>
<td>W-H Tham</td>
<td>Walter and Eliza Hall Institute of Medical Research</td>
<td>Participant - Postdoctoral Researcher</td>
</tr>
<tr>
<td>C Tonkin</td>
<td>Walter and Eliza Hall Institute of Medical Research</td>
<td>Participant - Postdoctoral Researcher</td>
</tr>
<tr>
<td>T Triglia</td>
<td>Walter and Eliza Hall Institute of Medical Research</td>
<td>Student Participant</td>
</tr>
<tr>
<td>J Volz</td>
<td>Walter and Eliza Hall Institute of Medical Research</td>
<td>Participant - Postdoctoral Researcher</td>
</tr>
<tr>
<td>Y Zhu</td>
<td>Walter and Eliza Hall Institute of Medical Research</td>
<td>Participant - Postdoctoral Researcher</td>
</tr>
<tr>
<td>J Babon</td>
<td>Walter and Eliza Hall Institute of Medical Research</td>
<td>Participant - Postdoctoral Researcher</td>
</tr>
<tr>
<td>J Baum</td>
<td>Walter and Eliza Hall Institute of Medical Research</td>
<td>Participant - Postdoctoral Researcher</td>
</tr>
<tr>
<td>J Beeson</td>
<td>Walter and Eliza Hall Institute of Medical Research</td>
<td>Participant - Senior Researcher</td>
</tr>
<tr>
<td>A Cowman</td>
<td>Walter and Eliza Hall Institute of Medical Research</td>
<td>Participant - Senior Researcher</td>
</tr>
<tr>
<td>B Crabb</td>
<td>Walter and Eliza Hall Institute of Medical Research</td>
<td>Participant - Senior Researcher</td>
</tr>
<tr>
<td>M D'Ombraint</td>
<td>Walter and Eliza Hall Institute of Medical Research</td>
<td>Student Participant</td>
</tr>
<tr>
<td>T DeKoning-Ward</td>
<td>Walter and Eliza Hall Institute of Medical Research</td>
<td>Participant - Postdoctoral Researcher</td>
</tr>
<tr>
<td>Z Feng</td>
<td>Walter and Eliza Hall Institute of Medical Research</td>
<td>Participant - Postdoctoral Researcher</td>
</tr>
<tr>
<td>P Gilson</td>
<td>Walter and Eliza Hall Institute of Medical Research</td>
<td>Participant - Postdoctoral Researcher</td>
</tr>
<tr>
<td>E Handman</td>
<td>Walter and Eliza Hall Institute of Medical Research</td>
<td>Participant - Senior Researcher</td>
</tr>
<tr>
<td>D Hansen</td>
<td>Walter and Eliza Hall Institute of Medical Research</td>
<td>Participant - Postdoctoral Researcher</td>
</tr>
<tr>
<td>J Healer</td>
<td>Walter and Eliza Hall Institute of Medical Research</td>
<td>Participant - Postdoctoral Researcher</td>
</tr>
<tr>
<td>T Hodder</td>
<td>Walter and Eliza Hall Institute of Medical Research</td>
<td>Participant - Senior Researcher</td>
</tr>
<tr>
<td>R Lundie</td>
<td>Walter and Eliza Hall Institute of Medical Research</td>
<td>Student Participant</td>
</tr>
<tr>
<td>A Maier</td>
<td>Walter and Eliza Hall Institute of Medical Research</td>
<td>Participant - Postdoctoral Researcher</td>
</tr>
<tr>
<td>T Nebel</td>
<td>Walter and Eliza Hall Institute of Medical Research</td>
<td>Participant - Postdoctoral Researcher</td>
</tr>
<tr>
<td>C Nie</td>
<td>Walter and Eliza Hall Institute of Medical Research</td>
<td>Student Participant</td>
</tr>
<tr>
<td>R Norton</td>
<td>Walter and Eliza Hall Institute of Medical Research</td>
<td>Participant - Senior Researcher</td>
</tr>
<tr>
<td>A Pearce</td>
<td>Walter and Eliza Hall Institute of Medical Research</td>
<td>Participant - Postdoctoral Researcher</td>
</tr>
<tr>
<td>Name</td>
<td>Institute and Position</td>
<td></td>
</tr>
<tr>
<td>-----------</td>
<td>-------------------------------------------------------------</td>
<td></td>
</tr>
<tr>
<td>M Rug</td>
<td>Walter and Eliza Hall Institute of Medical Research, Postdoctoral Researcher</td>
<td></td>
</tr>
<tr>
<td>L Schofield</td>
<td>Walter and Eliza Hall Institute of Medical Research, Senior Researcher</td>
<td></td>
</tr>
<tr>
<td>J Stubbs</td>
<td>Walter and Eliza Hall Institute of Medical Research, Student Participant</td>
<td></td>
</tr>
<tr>
<td>A Uboldi</td>
<td>Walter and Eliza Hall Institute of Medical Research, Postdoctoral Researcher</td>
<td></td>
</tr>
<tr>
<td>D Wilson</td>
<td>Walter and Eliza Hall Institute of Medical Research, Student Participant</td>
<td></td>
</tr>
<tr>
<td>S Yao</td>
<td>Walter and Eliza Hall Institute of Medical Research, Postdoctoral Researcher</td>
<td></td>
</tr>
<tr>
<td>D Stanisic</td>
<td>Walter and Eliza Hall Institute of Medical Research, Postdoctoral Researcher</td>
<td></td>
</tr>
<tr>
<td>R Lee</td>
<td>Walter and Eliza Hall Institute of Medical Research, Senior Researcher</td>
<td></td>
</tr>
</tbody>
</table>
Appendix 1
Publications by Participants of the ARC/NHMRC Research Network for Parasitology in 2007

[1] An Environmentally Sustainable Australia


Besier B. Internal parasites of livestock and perennial pastures In: *Perennial pastures for Western Australia*, eds. G. Moore, P. Sanford, T. Wiley. Department of Agriculture and Food Western Australia Bulletin 4690, pp 42-43

Beveridge I. Revision of the *Progamaotaenia zschokkei* (Janicki, 1905) complex (Cestoda: Anoplocephalidae), with the description of six new species. *Systematic Parasitology* 66: 159-194


Beveridge, I. & Justine, J.-L. Redescriptions of four species of *Otobothrium* Linton, 1890 (Cestoda: Trypanorhyncha), including new records from Australia, New Caledonia and Malaysia, with the description of *O. parvum* n. sp. *Zootaxa* 1587: 1-25

Beveridge, I. & Justine, J.-L. *Pseudolacistorhynchus nanus* n. sp. (cestoda: Trypanorhyncha) parasitic in the spiral valve of the zebra shark, *Stegostoma fasciatum* (Hermann, 1783). *Transactions of the Royal Society of South Australia* 132: 177-183


Bray, R.A. and Cribb, T.H. *Holorchis gigas* n. sp. (Digenea: Lepocreadiidae) from the yellow-striped sweet-lips *Plectrorhynchus chrysotaenia* (Perciformes: Haemulidae) from Lizard Island, Great Barrier Reef, with observations on *Aephnidiogenes major*. *Zootaxa* 1517: 63-68.


Bray, R.A. and Cribb, T.H. *Ningalooia psammoperca* n. g., n. sp. (Digenea: Acanthocolpidae) from the Waigieju seaperch *Psammoperca waigensis* (Cuvier) (Perciformes: Latidae) on the Ningaloo Reef, Western Australia *Systematic Parasitology* 66: 131-135.


Campbell, R.A. & Beveridge, I. A new species and new records of Parachristianella Dollfus, 1946 (Cestoda: Trypanorhyncha) from the Gulf of California, Mexico. Comparative Parasitology 74: 218-228.

Chilton, N.B., O'Callaghan, M., Beveridge, I. & Andrews, R.H. Genetic markers to distinguish Moniezia expansa from M. benedeni (Cestoda: Anoplocephalidae) and evidence of the existence of cryptic species in Australia. Parasitology Research 100: 1187-1192.


Cruz-reyes, A, Constantine, CC, Boxell, AC, Hobbs, RP and Thompson, RCA. Echinococcus granulosus from Mexican pigs is the same strain as that in Polish pigs. Journal of Helminthology 81: 287-292


Fenner A.L. & Bull C.M. Bothriocroton hydrosauri (Formerly Aponomma hydrosauri) (Denny, 1943) (Acarina: Ixodidae), new parasite record for the endangered pygmy bluetongue lizard, Tiliqua adelaidensis (Scincidae) from Australia. Comparative Parasitology 74: 378-379


Hayward, C.J., Aiken, H.M., Nowak, B.F. Metazoan parasites on gills of Southern Bluefin Tuna (*Thunnus maccocyii*) do not rapidly proliferate after transfer to seacages. *Aquaculture* 262: 10-16.


Jex AR, Ryan UM, Ng J, Campbell BE, Xiao L, Stevens M and Gasser RB. Specific and genotypic identification of *Cryptosporidium* from a broad range of host species by nonisotopic single-strand conformation polymorphism (SSCP) analysis of nuclear ribosomal DNA. *Electrophoresis* 28: 2818-2825.


Jones CM, Nagel L, Hughes GL, Cribb TH, Grutter AS Host specificity of two species of Gnathia (Isopoda) determined by DNA sequencing blood meals. *International Journal for Parasitology* 37: 927-935


Leonhard, S, Pfister, K, Beelitz, P, Wielinga, C. and Thompson, RCA. The molecular characterisation of *Giardia* from dogs in Southern Germany. *Veterinary Parasitology* 150: 33-38


Miller, T.L. and Cribb, T.H. Two new cryptogonimid genera *Beluesca* n. gen. and *Chelediadema* n. gen. (Digenea : Cryptogonimidae) from tropical Indo-West Pacific Haemulidae (Perciformes). *Zootaxa* 1543: 45-60.


Nakao, M., McManus, D.P., Schantz, P.M., Craig, P.S. and Ito, A. A molecular phylogeny of the genus *Echinococcus* inferred from complete mitochondrial genomes. *Parasitology* 134: 713-722


Pavlasek I, Ryan U. The first finding of a natural infection of *Cryptosporidium* muris in a cat. *Vet Parasitol.* 31: 349-52


Robertson, M.D., Ovenden, J.R. & Barker, S.C. Identification of small juvenile scombrids from northwest tropical Australia using mitochondrial cytochrome b sequences. *Ichthyological Research* 24: 246-252


Smales LR Acanthocephala from amphibians (Anura) and reptiles (Squamata) from Brazil and Paraguay with the description of a new species. *Journal of Parasitology* 93: 392-398.

Smales LR Acanthocephalans of amphibians and reptiles (Anura and Squamata) from Ecuador, with the description of *Pandosentis napoensis* n.sp. (Neoechinorhynchidae) from *Hyla fasciata*. *Zootaxa* 1445: 49-56.


Smales LR Oligacathoryhnchidae (Acanthocephala) from mammals from Paraguay with the description of a new species of *Neoncicola*. *Comparative Parasitology* 74: 237-243.

Smales L.R., Sasal, P. and Taraschewski, H. *Acanthocephalus reunionensis* n. sp. (Acanthocephala: Echinorhynchidae), a parasite of *Anguilla* species (Anguillidae) from Reunion Island. *Parasite* 14:131-134.


Wielinga, CM, and Thompson, RCA. Comparative evaluation of *Giardia duodenalis* sequence data. *Parasitology* 134: 1795-1821


**[2] Promoting and Maintaining Good Health**


Adisa, A., Frankland, S., Rug, M., Jackson, K., Maier, A., Cowman, A.F., Tilley, L. Re-assessing the location of components of the classical vesicle-mediated trafficking machinery in transfected *Plasmodium falciparum*. *International Journal for Parasitology* 37: 1127-1141


Anstey NM, Pain MC, Price RN, Maguire GP. Tumor necrosis factor and increase in alveolar capillary barrier in malaria. *J Infect Dis* 196: 647-8


Beeson JG, Andrews KT, Boyle M, Duffy MF, Choong EK, Byrne TJ, Chesson JM, Lawson AM, Chai W. Structural basis for binding of *Plasmodium falciparum* erythrocyte membrane protein 1 to
chondroitin sulfate and placental tissue and the influence of protein polymorphisms on binding specificity. J Biol Chem. 282: 22426-36


D’Ombrain MC, Voss TS, Maier AG, Pearce JA, Hansen DS, Cowman AF and Schofield L *Plasmodium falciparum* Erythrocyte Membrane Protein-1 suppresses early IFN-g Production by $\gamma\delta$-T, NK and $\alpha\beta$-T cells via a CD36 independent pathway. *Cell Host & Microbe* 2: 130-138


Good MF & Doolan DL. Malaria's journey through the lymph node. *Nat Med.* 13: 1023-1024


Kopp SR, Kotze AC, McCarthy JS, Traub RJ, Coleman GT. Pyrantel in small animal medicine: 30 years on. Vet J. (in press)


McConville, MJ and Handman, E The molecular basis of *Leishmania* pathogenesis. *Int. J. Parasitol.*, 37: 1047-1051

83


Mertens, HDT, Callaghan JM, McConville, MJ, Gooley, PR Elucidation of the high resolution solution structure of a trypanosomatid FVYE domain, LMS-1. *Protein Science,* 16: 2552-9


Nie CQ, Bernard NJ, Schofield L, Hansen DS. CD4+ CD25+ regulatory T cells suppress CD4+ T-cell function and inhibit the development of Plasmodium berghei-specific TH1 responses involved in cerebral malaria pathogenesis.


Raadsma HW, Kingsford NM, Suharyanta, Spithill TW, Piedrafita D. Host responses during experimental infection with Fasciola gigantica or Fasciola hepatica in Merino sheep I. Comparative immunological and plasma biochemical changes during early infection. Vet Parasitol. 143: 275-86.


Turni C., Lee R.P. & Jackson L.A. The effects of salivary gland extracts from *Boophilus microplus* ticks on mitogen-stimulated bovine lymphocytes. *Veterinary Research Communications* 31: 545-552


Weiser S, Miu J, Ball HJ, Hunt NH. Interferon-γ synergises with tumour necrosis factor and lymphotoxin-α to enhance the mRNA and protein expression of adhesion molecules in mouse brain endothelial cells. *Cytokine* 37: 84-91.

White NJ, Day NP, Dondorp A, Anstey N. UK recommendations for severe malaria are worrying. *BMJ* 334: 490


**[3] Frontier Technologies**


Constantinoiu CC, Molloy JB, Jorgensen WK, and Coleman GT. Purification of IgY From Chicken Sera by Thiophilic Gel Chromatography. Poultry Science 86: 1910-1914.


Dong Y, Creek D, Chollet J, Matile H, Charman SA, Wittlin S, Wood JK, Vennerstrom JL. Comparative Antimalarial Activity of Six Pairs of 1,2,4,5-Tetraoxanes (Peroxide Dimers) and 1,2,4,5,7,8-Hexaoxonanes (Peroxide Trimers), Antimicrob. Agents Chemother. 51: 3033-3035.


Ferrari BC, Power ML and Bergquist PL. Closed-tube DNA extraction using a thermostable proteinase is highly sensitive, capable of single parasite detection. Biotechnology Letters 29: 1831-1837.


Li FJ, Gasser RB, Lai DH, Claes F, Zhu XQ, Lun ZR. PCR for the detection of *Trypanosoma brucei* and *T. equiperdum* and their differentiation from *T. evansi* based on maxicircle kinetoplast DNA. *Molecular and Cellular Probes* 21: 1-7.


Nikolaou S, Gasser RB Extending from PARs in *Caenorhabditis elegans* to homologues in *Haemonchus contortus* and other parasitic nematodes. *Parasitology* 134: 461-482.


Shafir SC, Sorvillo FJ, Upcroft JA, Upcroft P. A novel method to increase the viability of *Trichomonas vaginalis* in urine. *Sex Transm Dis* 34: 485-487


**[4] Safeguarding Australia**

Barutzki, D, Thompson, RCA, Wielinga, C, Parker, U. and Schaper, R. Observations on *Giardia* infection in dogs from veterinary clinics in Germany. *Parasitology Research* 101: 153-156


Morris GM, Woods WG, Richards DG and Gasser RB The application of a polymerase chain reaction (PCR)-based capillary electrophoretic technique provides detailed insights into *Eimeria* populations in intensive poultry establishments. *Molecular and Cellular Probes* 21: 288-294


Thompson RCA, Palmer CS, O'Handley R. The public health and clinical significance of *Giardia* and *Cryptosporidium* in domestic animals. *Vet J* (in press).


Appendix 2
Research Grants Awarded to ARC/NHMRC Research Network for Parasitology Participants in 2007

NHMRC AUSTRALIA FELLOWSHIP

Alan Cowman, WEHI

NHMRC PROGRAMME GRANTS

Brian Kay, Scott O’Neill, QIMR and The University of QLD
Development of innovative approaches to manage insect transmitted diseases

David Kemp, Michael Good, Don McManus, Istvan Toth, Nick Anstey, Kabada Sriprakash, Denise Doolan, Chris Engwerda, Alex Loukas, QIMR
Immunity and pathogenesis in tropical and infectious diseases: implications for vaccines and drug development

NHMRC FELLOWSHIPS

Rowena Martin, ANU and University of Melbourne

Jacob Baum, WEHI
Alex Maier, WEHI
Don Gardiner, QIMR
Michelle Gatton, QIMR
Mark Pearson, QIMR
Magda Plebanski, Monash University
Brendan Crabb, WEHI
Terry Speed, WEHI
Nick Anstey, Menzies School of Health Research
James McCarthy, QIMR

NHMRC Training Fellowships

Charlene Willis, QIMR & Griffith University
Kate Mounsey, Menzies School of Health Research
Nelson Lee, QIMR
Kylie Home (University of Melbourne)
NHMRC PROJECT GRANTS

Rowena Martin, Australian National University
*Characterisation of the chloroquine resistance transporter of the malaria parasite*

Nick Hunt, Helen Ball, Georges Grau, The University of Sydney
*Dysregulation of cytokine networks: a key determinant of the pathogenesis of cerebral malaria*

John Dalton, Sheila Donnelly, Institute for the Biotechnology of Infectious Diseases, UTS
*Regulation of immune mechanisms by pathogen cysteine proteases*

Heinrich Korner, James Cook University
*Modulation of leishmaniasis by the proinflammatory cytokine, TNF*

James McCarthy, Shelley Walton, Cielo Pasay, Deb Holt, QIMR and Menzies School of Health Research
*Diagnostics for drug resistance in scabies*

Jacqui Upcroft, Peter Upcroft, QIMR
*The mechanism of action of new 5-nitroimidazole drugs which are effective against metronidazole-resistant Giardia*

Mal Jones, Wenbao Zhang, QIMR
*Molecular cascades determining asexual/sexual development in Echinococcus granulosus*

Mick Foley, Andrew Coley, LaTrobe University
*Structural basis for inhibition of malaria invasion by targeting the apical membrane antigen of Plasmodium falciparum*

John Reeder, Alyssa Barry, Macfarlane Burnet Institute
*Population genomics of Plasmodium falciparum surface antigen genes*

Stephen Rogerson, Jocelyn Glazier, The University of Melbourne
*Placental malaria, placental function, nutrient transport and foetal growth restriction*

Louis Schofield, Campbell Witt, Frank Christiansen, Ivo Mueller, WEHI
*Role of NK receptors is susceptibility and resistance to human malaria*

Alan Cowman, James Beeson, WEHI
*Trafficking and expression of PfEMP1 on the surface of p. falciparum-infected erythrocytes*

Jake Baum, Chris Tonkin, WEHI
*Regulation of actin polymerisation during malaria parasite invasion of the human erythrocyte*

Paul Gibson, Tania de Konig-Ward, Justin Boddey, WEHI
*Identification of Plasmodium falciparum translocon that exports parasite proteins into their erythrocytic hosts*

Thomas Nebl, Tony Hodder, WEHI
*A comprehensive immunoproteomic analysis of the repertoire and dynamics of human antibody responses to malaria*

James Beeson, WEHI
Antibodies against erythrocyte invasion ligand of Plasmodium falciparum and protection from malaria

Tim Davies, Harin Karunajeewa, Ivo Mueller, John Vince, University of WA

Severe malaria in children in Papua New Guinea: a longitudinal study of pathophysiology, management and outcome

ARC AUSTRALIAN RESEARCH FELLOWSHIP

Alex Maier, WEHI

ARC DISCOVERY PROJECTS

Alex Maier, WEHI

Functional Genomic Analysis of Exported DNAJ Molecules in the Malaria Parasite Plasmodium falciparum

Mike Bull, Flinders University of SA

Lizard social networks and the spread of parasites

Michael Duffy and Graham Brown, The University of Melbourne

Transcriptional control of antigenic variation in the malaria parasite Plasmodium falciparum

Dr V Likic and Malcolm McConville, The University of Melbourne

Characterization of metabolic networks in a microbial pathogen

Stuart Ralph, The University of Melbourne

Chromatin barriers in Plasmodium falciparum gene regulation

Andrew Thompson; Paul Monis; Dr PL Clode; Ryan O’Handley; Merle Olson, Murdoch University

Interaction of Cryptosporidium lifecycle stages with aquatic biofilm communities

ARC LINKAGE INTERNATIONAL PROJECTS

Min Hu, Robin Gasser, Prof PW Sternberg, The University of Melbourne

Using integrated frontier and smart technologies to identify new drug targets for parasites causing major diseases in humans and animals

Aaron Jex, Robin Gasser, Dr DT Littlewood, The University of Melbourne

MitoGenomics of key pathogens – an international co-operative

ARC LIEF GRANT

Prof IW Dawes; Em/Prof PL Bergquist; Prof RJ Trent; Prof RJ Scott; Prof PJ Hogg; Prof MR Wilkins; Prof JK Reichardt; Nick Hunt; Prof MS Baker; Prof PR Dunkley (The University of Sydney)

Advanced high throughput functional genomics and gene mapping
ARC LINKAGE PROJECT

Dr AM Walmsley; Prof BC Finnin; Prof JD Hamill; Els Meeusen; A/Prof GD Sanson; Dr SR Webb, (Monash University)
Plant Cells for Improved Oral Delivery of Vaccines

OTHER NATIONAL GRANTS

W. Ballard, Richard Russell, Nigel Beebe and D. Yeates (University of Queensland)
Australian Biological Resources Study.

Andrew Thompson (Murdoch University) and colleagues
Management of pig associated zoonoses in the Lao People’s Democratic Republic.
ACIAR

Kevin Saliba (ANU)
Riboflavin utilisation by the malaria parasite as an antimalarial drug target.
ACT Health

David Piedrafita (Monash University)
Sheep Genomics Program

Tiggy Grillo (Charles Sturt University)
Population genetic analysis of the parasitic nematode Ostertagia circumcincta in Australia.
EH Graham Centre

Carol Behm (ANU), Jody Zawadzki (DPI Victoria), Andrew Kotze (CSIRO Livestock Industries)
Identification and validation of new drug targets for control of gastrointestinal nematode parasites of sheep
Australian Wool Innovation and Meat & Livestock Australia

David Jenkins (Charles Sturt University)
A survey Australian dogs (Tasmania, Victoria, NSW, ACT) from rural, semi rural and outer suburban homes for coproantigens of Echinococcus granulosus.
Novartis Animal Health

Denise Doolan (QIMR)
Pfizer Australia Research Fellowship

Brian Kay (QIMR)
Prioritised research on vector biology, transmission of arboviruses and their control.
Mosquito and Arbovirus Research Committee, Inc.

Kate Hutson and Ian Whittington (University of Adelaide and SA Museum)
Metazoan parasites of selected macro-inshore fish of Australia, including species of commercial importance
Australian Biological Resources Study and Fisheries Research and Development Corporation

Ian Whittington (University of Adelaide and SA Museum)
Checklist of Australian Monogeneans.
Australian Biological Resources Study

Brown Besier (Agriculture WA), Ian Carmichael (SA Research and Development Institute), Steve Walkden-Brown (University of New England)
Decision rules for targeted treatment.
Australian Sheep Industry CRC

Brown Besier (Agriculture WA)
Commercialisation of novel diagnostics
Australian Sheep Industry CRC

INTERNATIONAL GRANTS

William and Susan Charman (Monash University) and colleagues (University of Texas Southwestern Medical Center, University of Washington)
Optimizing novel dihydroorotate dehydrogenase inhibitors for treating malaria.
National Institutes of Health, USA.

William and Susan Charman W (Monash University) and colleagues (University of Nebraska, Swiss Tropical Institute, F. Hoffman La Roche)
Synthetic peroxide drug discovery program.
Medicines for Malaria Venture.

Andrew Thompson (Murdoch University) and colleagues
Drugs for Neglected Diseases Initiative

James McCarthy (QIMR and Qin Cheng (Australian Army Malaria Institute)
Foundation for Innovative New Diagnosis (FIND)

Kevin Saliba (ANU)
P. falciparum pantothenate kinase high throughput screening assay
World Health Organisation

Kevin Saliba (ANU)
Proton pump inhibitors as potential antimalarials.
NiKem S. r. l., Milan, Italy

L. Eckmann, F. Gillin, Jacqui Upcroft (QIMR), Peter Upcroft (QIMR), B. Sharpless
New drugs against metronidazole-resistant Giardia.
National Institutes of Health, USA

A Varcasia and Marshall Lightowlers (University of Melbourne
Trial against TM.
Italian Science Foundation

G Vural and Marshall Lightowlers (University of Melbourne)
Investigation of the potential to create a combined hydatid, enterotoxaemia vaccine for livestock.
Turkish Science Foundation
Don Gardiner, Katharine Trenholme (QIMR) and John Dalton (University of Technology, Sydney)
High through-put screening of Plasmodium falciparum aminopeptidases.
National Institutes of Health, USA

Kiaran Kirk (ANU)
Molecular identification of novel permeation pathways induced by malaria parasites.
Australia-Germany Joint Research Co-operation Scheme

John Croese (James Cook University), James McCarthy and Alex Loukas (QIMR)
Inoculating celiac subjects with Necator americanus, a human hookworm: does contrived parasitisation of naive adults inhibit autoimmunity?
Broad Foundation

Alex Loukas (QIMR), J Bethony and Peter Hotez
Development and clinical testing of the SM-TSP-2 schistosomiasis vaccine.
Sabin Vaccine Institute

R Quinn, V. Avery, Michael Good and Kathy Andrews (QIMR), William Charman (Monash University) and Mike Edstein (Australian Army Malaria Institute)
Lead generation via high-throughput screening of malaria targets against a large natural product extract library.
Medicines for Malaria Venture