Annual Report (2006) for the ARC/NHMRC Research Network for Parasitology

Australian Government
Australian Research Council

Annual Report (2006) 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:

[1] An Environmentally Sustainable Australia.
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.

[2] Promoting and Maintaining Good 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.

[3] Frontier Technologies.
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.

[4] Safeguarding Australia.
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 reorientations 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). Official ratification of these new Participating Organisations will be sought in 2007.

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 five 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 be 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 2006 Management Committee was: A/Prof. Nick Smith (Convenor, University of Technology, Sydney); Dr Simon Reid (Vice President, Australian Society for Parasitology); Dr Alex Loukas (Queensland Institute of Medical Research); Prof. Geoff McFadden (University of Melbourne); A/Prof. Una Ryan (Murdoch University); Prof. Andrew Thompson (Murdoch University) and Dr Kevin Saliba (Australian National University). The Committee met in July and December 2006.

The Management Committee also received input from an Advisory Committee, the following of whom met jointly with the Management Committee in July, 2006. The Advisory Committee for 2006 was:

- Professor Sornchai Looareesuwan; Secretary General of the SEAMO TROPMED Network and an internationally renowned researcher at the forefront of malaria research.
- Dr Graham Mitchell, AO (for services to science, especially immunoparasitology); recognised as one of Australia's leading biological scientists and consultants.
- Professor Bob Sinden, representing Professor Artur Scherf; Director of the EU FP6 network, "BioMalPar";
- Professor Terry Spithill; Director of the Quebec Centre for Host-Parasite Interactions.

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), Dr Sabina Belli (University of Technology, Sydney) and Professor Lindsay Botten (University of Technology, Sydney). The subcommittee

meets three times per year 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. The total estimated value of in-kind contributions by Participating Organisations to the Network in 2006 was $1,882,124.

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 and were worth $191,000 in 2006 (NB, some organisations pre-paid their 2006 contribution in 2005).

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

Information Technology Initiative

The Network established 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. The 2006 activities and progress of the IT team are summarised below:

(1) Genomic Analysis
The Network funds personnel who supply a complete set of services for gene, genome and microarray analysis. Members of Network CI laboratories can contact Torsten Seeman torsten.seeman@infotech.monash.edu.au at the VBC who will either perform the requested analysis or refer the problem to other VBC personnel for solution. Services included all manner of gene analysis, BLAST searches, multisequence alignment, phylogenetic analyses etc. We also provided the Wasabi suite to perform multiple protein feature analyses on thousands of genes, returning the results via individual web pages of results for each gene. VBC Personnel performed full analyses of microarrays based on Affy chips, spotted cDNA and oligo arrays to identify up and down regulated genes. The VBC also provides a web-accessible database for storage, analysis and sharing of microarray results with collaborators in other laboratories or countries. All data is securely backed up and kept confidential.

(2) EST Analysis
The major informatics project of the year was the analysis of a *Sarcoptes scabei* EST collection. 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.

Availability:
Database: http://vbc.med.monash.edu.au/~yvan/Sarcoptes_scabiei/index.php
Scripts and installation instructions:
http://vbc.med.monash.edu.au/~yvan/est-pac

Findings:
Network IT personnel successfully used EST-PAC to manage and annotate ESTs obtained from the mite, *Sarcoptes scabiei*. Out of 43034 ESTs, they assembled 6962 contigs and 3720 singlets. In these sequences, 3849 (55%) relevant contig hits and 940 (25%) singlet hits were found in the non-redundant protein database of GenBank.

Summary of analysis
Preliminary 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 that 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.

(3) Provision of a web environment to support Network activities
This project involves a collaboration between scientists at the Victorian Bioinformatics Consortium 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 are 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.

Discussion in the IT committee identified two distinct collaborative capabilities to support the Network. One is an open web site in which discussion forums could be hosted, job adds, requests for technical assistance, reagent databases etc. The second is a private area in which smaller groups may meet for specific purposes such as applying for grants, undertaking research collaboration, planning conferences etc. We have developed two separate solutions:

- A Web-based Wiki hosted at http://crsu.science.uts.edu.au/pit
- The private room solution 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.

(4) Parasite Database

This project was scoped during the current period to define the most appropriate way forward. Two distinct subprojects have been identified:

- Web publication of the educational material produced by Professor Peter O'Donoghue at The University of Queensland. The Network will fund an illustrator to produce copyright free material and the IT group will design a database that will make the material available.
- A Wiki-based collaborative environment for other Network scientists to contribute information about parasites of relevance to Australia. This will be an exciting experiment in shared knowledge provision. IT scientists are evaluating current Wiki platforms and will select one for implementation in 2007.

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 Legends Hotel on the Gold Coast, QLD - from July 2 to 5, 2006. 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 International Symposium on Therapies for Parasitic Diseases, a major theme of the 2006 conference. Additionally, the 2006 conference saw the introduction of the “Elsevier Lectures”, including the “International Journal for Parasitology Lecture” and the “Trends in Parasitology Lecture”, delivered by Professors Simon Croft (Drugs for Neglected Diseases Initiative and COST B22) and Robert Sinden (Imperial College, London and BioMalPar), respectively. Sponsors for the conference included sanofi-pasteur, Novartis, Elsevier, The International Journal for Parasitology, Trends in Parasitology, Meat and Livestock Australia, Australian Wool Innovation, Virbac and Bayer.

The conference covered a wide variety of parasitology research, reflecting the diversity and multidisciplinarity of Network Participants. The meeting was attended by 256 delegates and included participants from 21 out of the Network’s 26 Participating Organisations. (By comparison, numbers of delegates to the previous three Australian Society for Parasitology Annual Conferences varied between 120 and 180

and the Network's first conference, in 2005, attracted 210 delegates). Over 50% (136) of attendees were early career researchers or students and there were 31 international delegates. Plenary and Symposium Lectures were delivered by:

International Symposium on Therapies for Parasitic Diseases

- Robert Sinden (Imperial College, London, UK and BioMalPar)
- Simon Croft (Drugs for Neglected Diseases Initiative, Switzerland, and COST B22)
- Sornchai Looareesuwan (Mahidol University, Thailand, and SEAMEO TROPMED Network)
- Stuart Ralph (Walter and Eliza Hall Institute of Medical Research, Australia)
- Kevin Saliba (Australian National University, Australia)
- Peter Hotez (George Washington University, USA)
- Michelle Wykes (Queensland Institute of Medical Research, Australia)
- Georg von Samson Himmelstjerna (Hannover School of Veterinary Medicine, Germany)
- Els Meeusen (Monash University, Australia)
- Terry Spithill (McGill University and the Quebec Centre for Host-Parasite Interactions, Canada)

Parasites in Aquaculture and Marine Biodiversity Symposium

- John Hooper (Queensland Museum, Australia)
- Thomas Cribb (The University of Queensland, Australia)
- Alistair Dove (Stonybrook University, USA)
- Barbara Nowak (University of Tasmania, Australia)
- Robert Adlard (Queensland Museum, Australia)
- Ingo Ernst (Australian Government Department of Agriculture, Fisheries and Forestry)

State of the Art Technologies Symposium

- Paul Brindley (Tulane University, USA)
- Brendan Crabb (Walter and Eliza Hall Institute of Medical Research, Australia)
- Malcolm McConville (The University of Melbourne, Australia)

Vector Biology Symposium

- Catherine Hill (Purdue University, USA)
- Elena Levashina (Insitut de Biologie Moleculaire et Cellulaire, Strasbourg, France)
- Scott O'Neill (The University of Queensland, Australia)

Bancroft Mackerras Award Oration

- Alex Loukas (Queensland Institute of Medical Research, Australia)

Australian Society for Parasitology Presidential Address

- David Piedrafita (Monash University)

The Network also sponsored – through its Researcher Exchange, Training and Travel Awards Scheme - the "Symposium on Malaria Protein Structure and Function", held in Lorne, Victoria, as a satellite meeting of the 31st Lorne Conference on Protein Structure and Function on February 3, 2006. The meeting was organised by Network Participants, Ray Norton, Tony Hodder, Alan Cowman and Brendan Crabb (from the

Walter and Eliza Hall Institute of Medical Research), Brian Cooke (from Monash University) and Leanne Tilley (from LaTrobe University). The Symposium attracted more than 80 Network Participants (58% early career researchers) from 10 Participating Organisations. Invited speakers included:

- Dan Goldberg (Washington University, USA)
- John Dalton (Institute for the Biotechnology of Infectious Diseases, UTS, Australia)
- Tony Hodder (Walter and Eliza Hall Institute of Medical Research, Australia)
- Tim Haystead (Duke University, USA)
- Melanie Rug (Walter and Eliza Hall Institute of Medical Research, Australia)
- Jake Baum (Walter and Eliza Hall Institute of Medical Research, Australia)
- Katja Becker (Justus Liebig University, Germany)
- Kiaran Kirk (Australian National University, Australia)
- Geoff McFadden (The University of Melbourne, Australia)
- Tobi Spielmann (Queensland Institute of Medical Research, Australia)
- Robin Anders (LaTrobe University, Australia)
- Brendan Crabb (Walter and Eliza Hall Institute of Medical Research, Australia)
- Ray Norton (Walter and Eliza Hall Institute of Medical Research, Australia)
- Bart Faber (Biomedical Primate Research Centre, The Netherlands)

Proceedings of the Symposium are available at
http://www/wehi.edu.au/news/events/MPSF2006/index.html

Researcher Exchange, Training and Travel Awards

In 2006, the Network funded the following applications for assistance from its Researcher Exchange, Training and Travel Award funds (17 of the 23 awards directly benefited research students or early career researchers). We have highlighted two case studies in this section, and also an interview (in the "Contributions of Particular Significance" section) with three young researchers from Australian National University and The University of Melbourne about work that was published in *Nature* and was directly related to collaborative work through a Network Travel Award given in 2005. (See boxed feature article in the media section of this report, page 62)

Bong Sze How of Murdoch University, who successfully applied to the Network for assistance to travel to the laboratory of Dr Mal Jones at QIMR to determine the ultrastructural changes in mature and immature *Schistosoma* induced by triclabendazole.

Nick Sangster of the University of Sydney (now Professor in Veterinary Pathobiology, at the Division of Veterinary Science, Charles Sturt University, Wagga Wagga NSW*)*, who successfully applied to the Network for assistance to travel to WEHI (to learn skills in genome annotation as used for *Plasmodium* from Toby Sargeant and Ken Simpson in the group under Terry Speed), and to the Faculty of Veterinary Science, University of Glasgow (to work with other members of the *Haemonchus* annotation team to start assembling the genome annotation). Nick presented two seminars to researchers in Melbourne and Brisbane:

Walter and Eliza Hall Institute of Medical Research, Melbourne

- *Tales of a twisted blood lover (Haemonchus contortus, the barber's pole worm of sheep)*
- *Towards (using) genomes for Haemonchus and sheep*

CSIRO Livestock Industries, Brisbane

- *Towards (using) genomes for Haemonchus and sheep*
- *The Editor knows all!*

Case Study 1: Professor in Veterinary Pathobiology, at the Division of Veterinary Science, Charles Sturt University won a Network Travel Award for a Researcher Exchange.

Professor Nick Sangster who was awarded an ARC/NHMRC Research Network for Parasitology Travel Award in 2006. In September 2006 Nick became Professor in Veterinary Pathobiology, at the Division of Veterinary Science, Charles Sturt University, Wagga Wagga NSW. In a candid interview, Lisa Jones talks to Nick about his Network Travel Award and his recent move to Wagga Wagga, NSW.

Tell me about your area of research?

Nick researches anthelmintic resistance in sheep nematodes. His aim is to improve the understanding and the means of diagnosis and he has used resistance as a tool to develop research on worms. Nick says that his studies on sheep parasites using worms are unique. He is also interested in the host-parasite relationship and controlling sheep parasites.

What particularly interests you about working in this area?

Nick says that, "Parasitism is a fundamental aspect of biology and I am interested in the opportunity to control parasites. It is a tough field to study. Internal parasites are the biggest problem of sheep and as a researcher it is hard to make much impact. These parasites are difficult to study - other parasites attract better resources and tools – but I have a fascination with the field and the nature of parasites and the intimate relationship they have with their host."

Tell me about your Network Travel Award and what part it has contributed to your research?

Nick says, “I really enjoyed my Network Researcher Exchange; it was a wonderful experience. I worked with some of the best scientists in the world and the Network has helped to bring these researchers together.”

During his Network Researcher Exchange Nick spent one month at The Walter and Eliza Hall Institute of Medical Research (WEHI) to gain skills in genome annotation and look at global tools for genomic mapping; and one month at CSIRO Livestock Industries in Brisbane on the sheep genomics programme.

Nick’s time at WEHI was spent using a computer programme to look for gene targets within the *Haemonchus* genome (a sheep parasite). This genome will be fully sequenced by the end of the year. Nick will use a component of the genome in his research. He worked with Terry Speed’s Bioinformatics group and Nick says, “It was great to be immersed in this research – this group are one of the best in the world.” WEHI have a range of locally developed tools that Nick can use in his current research.

Whilst working at CSIRO Livestock Industries in Brisbane, Nick worked with scientists he has previously collaborated with; he used the CSIRO online sheep genomics programme to browse sheep and cattle genomes and looked at individual genes. Nick is interested in the host-parasite relationship, especially the gene products sheep use to deal with parasites.

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

Nick has recently moved to Charles Sturt University at Wagga Wagga campus to head up Pathobiology at the new veterinary school. Nick says, “I will have better access to animals like sheep, cattle, and horses for my studies and will use both farm and lab animals.” Nick described the different types of animal studies within his research as a combination of epidemiology and field work and the highly controlled research conducted in the laboratory. Nick says, “The two are very different but lab work will help with developing diagnostics and this can be applied directly to the field. I can see the paddock from my window.” Nick is excited about the rural focus for this vet school. He says, “Because the students all have ‘bush’ backgrounds, this vet school will be building up a stock of people who have rural experience with good links to the local community. This will enable us to address and raise a range of broad issues in veterinary research that we haven’t come across previously. We will look for opportunities to study parasites that cause major production loss but not necessarily a lot of deaths.”

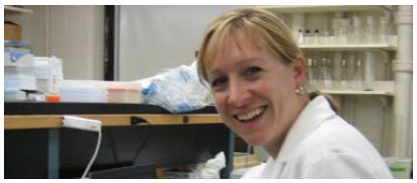
Any other comments?

Nick was part of the original committee who helped to form the ARC/NHMRC Research Network for Parasitology and, he says, “It is great to see the Network develop true to its original aims.”

Barbara Nowak, of the University of Tasmania, who successfully applied to the Network for assistance for the Researcher Exchange visit of Prof Iva Dyková from the Academy of Sciences of Czech Republic to do research on *Neoparamoeba* spp. and run a short training workshop.

Najju Ranjit of the Queensland Institute of Medical Research, **Nicholas Proellocks** of Monash University, and **Joanne McCoubrie** of the Walter & Eliza Hall Institute, who all successfully applied to the Network for assistance to attend the Biology of Parasitism – Modern Approaches course at the Marine Biological Laboratory (MBL), Woods Hole, USA in 2006.

Case Study 2: Joanne McCoubrie is a PhD student at The Walter and Eliza Hall Institute working as part of Dr Brendan Crabb and Professor Alan Cowman's groups.



In 2006 Joanne won a Network Travel Award which helped her to attend the Biology of Parasitism: Modern Approaches summer course held at the Marine Biological Laboratory in Wood's Hole. Joanne talked to Lisa Jones when she returned and was full of enthusiasm for the course and her parasitology research.

Tell me about your area of research?
Currently I am doing my PhD in the field of malaria and my research looks at the function of the serine repeat antigens in *Plasmodium falciparum* blood stages as well as using this gene family to investigate mechanisms of transcriptional control in this organism.

What interests you about working in this area?
I chose this area because I wanted to take part in helping treat or create a vaccine for a disease that is so devastating. Whilst I often find it frustrating that research can proceed quite slowly, I still feel that every day we gain more important knowledge about the organism so that in the future we may succeed in finding drugs for the prevention or treatment of malaria.

How do you see your research developing in the future?
Hopefully my project will be successful in identifying proteases responsible for parasite egress from or invasion of red blood cells. If this happens then I see the project expanding in the long term to develop new drug targets for therapy against malaria.

How has the Network travel award helped your research develop?
The Biology of Parasitism course in Woods Hole is very intensive and has a reputation for attracting world-renowned scientists to run courses and give lectures. These people have taught me a broad range of techniques and I now consider myself to have a sound knowledge of parasites other than *Plasmodium*. The expertise I gained has already been beneficial to the experimental design of my PhD work and I have also passed on protocols to my fellow workers. The course was also a particularly good opportunity for networking and I am confident I will be setting up collaborations with people from the course as part of my PhD in the coming months.

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

Don't hesitate in applying! The Network was really helpful and everything went very smoothly.

What advice do you have for science students who are considering parasitology as a career?
Hopefully everyone will be able to find an area of research that they are passionate about. I returned to the field of parasitology after working in the areas of cancer and HIV research, and the return has undoubtedly shown me that parasitology is indeed the field in which my passion for research resides. The fantastic thing about this field is that there are options for whatever science you are interested in such as cell biology, immunology, molecular biology, biochemistry or structural biology.

What do you see as the benefits of being part of the Network?
The Network is a great way to be kept informed of current research that other groups are doing, as well as conferences and positions available. This information fosters exchanges in expertise and collaborative work, aspects I believe are an essential part of today's research. The funding support offered by the Network is also an integral part of this as it enables people to gain expertise from opportunities overseas and bring that expertise back to Australia.

Tell me about the highlight of your science career so far?
Definitely attending the Biology of Parasitism course!

What would you like to do in the future? (What are your aspirations?)
First and foremost I want to complete my PhD, which should happen sometime in 2007. After this I would like to do a post doc overseas and I am sure that I will be visiting several of the Biology of Parasitism visiting lecturer's and module leaders when investigating post-doctoral positions. After that I envisage that I will return to Australia and would like to stay in the area of molecular parasitology.

Since returning from her course Joanne has found that the benefits keep coming. See "stories from our Network Travel Award Recipients" below.

The picture below shows fellow Network Award winners at the Biology of Parasitism course in 2006 from left to right Najju Ranjit, Joanne McCoubrie and Nicholas Proellocks.

Leslie Anne Chisholm and Elizabeth Perkins, of the University of Adelaide, who successfully applied to the Network for assistance for Researcher Exchanges to visit Centro de Investigaciones Biológicas del Noroeste in La Paz, México to investigate a genus of flatworm parasite, *Neobenedenia.*

Jake Baum, of the Walter & Eliza Hall Institute, who successfully applied to the Network for a Researcher Exchange to research malaria actin in the Pollard laboratory at Yale University, USA.

Craig Hayward, of the University of Tasmania, who successfully applied to the Network for a Researcher Exchange to undertake collaborative research on parasites of farmed and wild tunas in the waters off Pacific and Atlantic Mexico in North America.

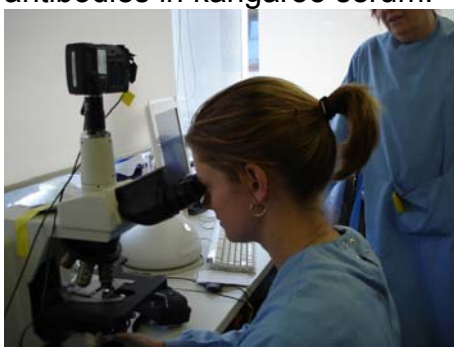
Craig collected assorted didymozoids parasites, which are the most common parasites of scombrid fishes

Dr David Jenkins, of the Hydatid Control & Epidemiology Program, who successfully applied to the Network for a Researcher Exchange to visit the laboratory of Prof Peter Deplazes in the Institute of Parasitology at the University of Zurich, to undertake collaborative research that will allow an assessment of the risks of hydatid infection to urban human populations from incursions of *E. granulosus*-infected wildlife.

Aaron Jex of The University of Melbourne, who successfully applied to the Network for a Researcher Exchange Natural History Museum in London to work with Dr Tim Littlewood to develop a high-throughput approach for sequencing and analysing mitochondrial genomes and building expertise bioinformatic platform Professor Ross Coppel at Monash University.

Ms Linda M McInnes, a PhD student from Murdoch University who successfully applied to the Network for assistance to travel to attend the European Medical Biology Organisation course on Advanced Techniques in Molecular Medicine course in Uppsala, Sweden in June and an Australian National University National workshop on Genetic Analysis for Population Studies in Canberra in July 2006.

Abbey Bestall, a PhD Student from Murdoch University, who successfully applied to the Network for assistance to travel to Melbourne to the Walter and Elisa Hall Institute for a Researcher Exchange with Dr. Emanuela Handman's Leishmania Laboratory to learn the ELISA technique to detect the presence or absence of anti-Leishmania antibodies in kangaroo serum.



Abbey Bestall

Neil Young, a PhD candidate from the University of Tasmania/Aquafin CRC Health Program for his Researcher Exchange to work with Professor Ben Koop's laboratory at the Centre for Biomedical Research, University of Victoria, Canada between August and October 2006. Neil is investigating amoebic gill disease (AGD), caused by a protozoan parasite *Neoparamoeba* spp., of Atlantic salmon cultured in sea-cages in Tasmania.

Matthew Dixon a PhD student from Queensland Institute of Medical Research who successfully applied to the Network for assistance for his Researcher Exchange to the laboratory of Dr Joanne Thompson at the Institute of Immunology and Infection Research, at the University of Edinburgh in August and September 2006. Through his Exchange Matthew will obtain knowledge in performing transfections in the rodent malaria's *P.berghei* and *P.chabaudi* and apply this to the study of commitment to gametocytogenesis in *Plasmodium*.

Mark Pellegrino, Post-graduate student (PhD candidate), from the Gasser laboratory, The University of Melbourne who successfully applied to the Network for assistance to participate in a Researcher Exchange with the laboratory of Alex Hajnal, at the University of Zurich in Switzerland to conduct parasitic nematode research.

Mai Tran, from the Helminth Biology Laboratory, Division of Infectious Diseases and Immunology at QIMR for a Researcher Exchange for two month's experimental research at the Biomedical Research Institute (MD, USA) and University of Pennsylvania (PA, USA).

Prof. Leann Tilley, for a Researcher Exchange for Professor David Ferguson, Oxford University to visit Australia to continue collaborative research with Leann's lab on the morphology of the malaria parasite, *P. falciparum*, Nick Smith's lab on the morphology of *Eimeria* spp. and *Toxoplasma gondii* and new collaborations with Andrew Thompson's lab on the morphology of developmental stages of *Cryptosporidium* and *Blastocystis*. Additionally, Professor Ferguson gave the following seminars, which were well attended by Network Participants, in each of Perth, Melbourne and Sydney:

- *Is there still a role for morphology/electron microscopy in this genomic/proteomic age?*

- *The role of morphology and microscopy in apicomplexan research*

Dr. Catherine Miller, IBID Research Fellow, University of Technology, Sydney, who participated in a Researcher Exchange with visit Prof. Emanuela Handman's *Leishmania* Laboratory at the Walter and Elisa Hall Institute in Melbourne for the purpose of training in the safe handling of the *Leishmania* parasite in October 2006.

Abbey Bestall and Kate Miller during their Researcher Exchange

Miss Mieke Burger, PhD student in Marine Parasitology, The University of Queensland, who successfully applied to the Network for assistance to attend the Fish Histopathology Workshop at the University of Tasmania in December 2006.

Prof. John Dalton, Institute for the Biotechnology of Infectious Diseases, University of Technology Sydney, who successfully applied to the Network for assistance for a Researcher Exchange to bring Wains International Fellow Dr. Mark Robinson to Australia for 12 months in 2007.

Prof. Alan Cowman, The Walter and Eliza Hall Institute of Medical Research, who successfully applied to the Network for assistance for a Researcher Exchange to bring Dr Gordon Langsley, Lab Head at the Institut Cochin, Paris, France to visit for a 2 week period in December 2006 to discuss future collaborative projects.

Dr Nathan Bott, Senior Research Officer at SARDI, who successfully applied to the Network for assistance to travel to the Fish Histopathology course in December 2006 at The University of Tasmania.

"What happened next?" – stories from our 2005 Network Travel Award Recipients

In the 2005 annual report for the ARC/NHMRC Research Network for Parasitology, we featured **Kate Hutson**, from The University of Adelaide, in our Network Travel Awards section as a case study. Kate won a Network Travel Award and in October 2005 visited laboratories in Queensland to help her research. One year on, Kate is just about to submit her thesis, so it is an exciting time! After completing her Network Travel Award Kate reported the following:

Two publications resulted from research conducted during her Travel Award

Hutson K.S. & Whittington I.D. 2006. *Paradeontacylix godfreyi n.* sp. (Digenea: Sanguinicolidae) from the heart of wild *Seriola lalandi* (Perciformes: Carangidae) in southern Australia. *Zootaxa* 1151: 55-68.

Hutson K.S., Mooney A.J., Ernst I. & Whittington I.D. (2007). Metazoan parasite assemblages of wild *Seriola lalandi* (Perciformes: Carangidae) from eastern and southern Australia. *Parasitology International* 56, 95-105.

Two seminars about the work conducted during her Travel Award

Hutson, K.S. 2006. 'Risk assessment for parasites of yellowtail kingfish *Seriola lalandi* in South Australian sea-cage aquaculture'. Australasian Aquaculture, Adelaide, South Australia, 30 August 2006.

Hutson, K.S. 2006. 'Why little guys matter! A new species of blood fluke infecting wild yellowtail kingfish (*Seriola lalandi*) in southern Australia'. Royal Society of South Australia, Adelaide, 10 August 2006.

For more information about Kate's research:
http://www.marinebiology.adelaide.edu.au/people/students/kate.html
http://www.adelaide.edu.au/directory/kate.hutson

Kate and a kingfish

Una Ryan and Simon Reid of Murdoch University, successfully applied to the Network for assistance in 2005 to assemble a multidisciplinary team to workshop and prepare a major grant application on protozoa in Australian fauna, including biodiversity, host specificity, evolutionary relationships and parasite transmission. Since the Travel Award, Una and her collaborators, Simon Reid, Michelle Power, Lee Skerratt, Peter O'Donoghue and Stephen Williams, have submitted a Discovery application entitled "Predicting climate change impacts on the emergence of disease in Marsupials". They will find out the outcome in November 2007.

Jake Baum from WEHI described the following outcomes from his Researcher Exchange to work on malaria actin in the Pollard laboratory at Yale University, USA:

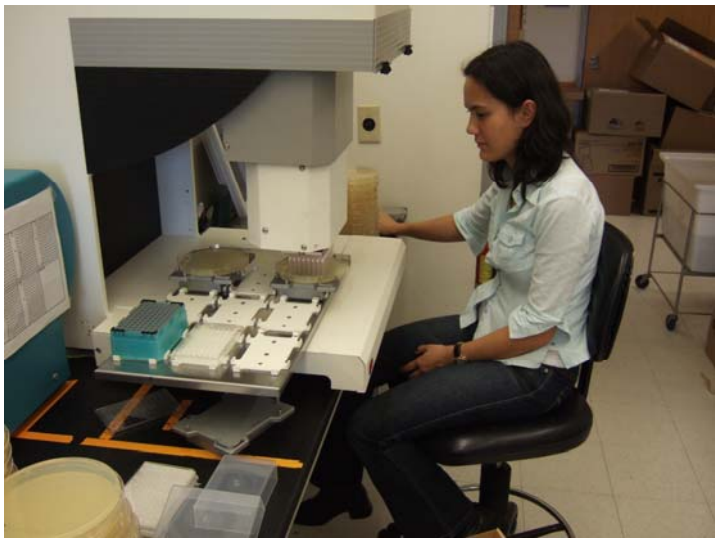
Jake has spoken about his research on three occasions since returning:

- The Biomolecular Dynamics Symposium (BIO21, Melbourne Feb 2007),
- The AIMRI Malaria Symposium (Eijkman Institute, Jakarta March 2007) and
- The weekly NHMRC Program grant seminar (Melbourne, March 2007)

Jake has just submitted a Project grant to the NHMRC as a direct outcome of the research undertaken at Yale, made possible by his Travel Award from the Network.

Jake says that, “The Network Travel Award, and the work it sponsored, has dramatically shaped my interests and the direction in which I hope to go with my future research.”

Julie-Anne Fritz was awarded a Network Travel Award in 2005 to identify a selection of essential nematode-specific genes in *C. elegans* and to characterize their functions using yeast two-hybrid technologies. Julie-Anne presented work that included the results obtained during the Exchange at the ASP & Network Conference in 2006. She will also present these results at the International Worm Meeting to be held at UCLA in 2007.



Julie-Anne using one of the Genmate robots to spot yeast strains onto an agar plate for yeast two-hybrid mating experiments.

Joanne McCoubrie, featured above as one of the boxed case-studies for a Travel Award recipient in 2006, attended the Biology of Parasitism: Modern Approaches summer course held at the Marine Biological Laboratory in Wood's Hole, Boston, USA with her network Travel Award grant.

Joanne says that she has learnt a great deal from the course and can see that the techniques she learnt on the course have already impacted on her PhD work. Joanne has given several presentations on work she conducted during her travel award. Four presentations were given at the Wood's Hole course itself at the end of each module and since returning to Australia Joanne has presented a seminar outlining what I had learnt at the course at the Division of Infection and Immunity, at WEHI and at several lab meetings.

Joanne has had many discussions with her supervisors and with others about projects that they may be able to start up in the future. Some of these will be initiated by the end of Joanne's PhD and others will be in the longer term. Joanne is still in regular contact with three of the module leaders from the course and hopes to set up some collaborative projects in the coming year.

Joanne says the course has had a tremendously positive influence scientifically on her. She has learnt a great deal and had some wonderful networking opportunities with experts in the parasitology field. Joanne says she now feels much better positioned for a career in molecular parasitology and plans to visit the laboratories of several of the people she met to investigate post-doctoral positions overseas in the coming months.

Aaron Jex, from the Gasser Laboratory, Department of Veterinary Science, University of Melbourne, won his Travel Award for a Researcher Exchange to visit research partners Tim Littlewood (Natural History Museum, London, UK)and Ross Coppel (Monash University, Victoria) from August 1st-September 5th, 2006

During his Researcher Exchange Aaron travelled to the United Kingdom, to undertake preliminary work establishing an on-going research partnership with Dr Tim Littlewood at the Natural History Museum in London. The purpose of this partnership was to facilitate a cooperative approach to sequencing the complete mitochondrial genomes of a range of strategically important parasitic nematodes. As listed in the application, the main research goals related to this project were:

1. To develop a high throughput approach for sequencing whole mitochondrial genomes;
2. To develop an improved platform for bioinformatic analysis of mitochondrial sequences and gene arrangements;
3. Adapt the improved platform to perform automated analyses of large data sets; and
4. Use the large datasets generated to test current theories regarding the phylogeny of the Nematoda based on sequence data derived from the rRNA and other genes.

Aaron reports the following outcomes since completing his Travel Award:

Sequencing of the mitochondrial genomes of two important pathogenic nematode species (*Toxocara canus* and *Bunostomum phlebotomum*) is nearing completion

(~60% complete). Both of these genomes will result in outcomes that will be publishable in peer-reviewed international scientific journals later this year.

Aaron says that he has learned a tremendous amount with respect to a range of molecular techniques including molecular cloning and retrotransposon mediated sequencing using high-throughput robotics. In turn, Aaron says that they contributed greatly to their research collaborators understanding of the Nematoda and the socio-economic importance of the species being examined. Together, Prof Gasser, Dr Littlewood, Dr Wassenbach and Aaron have developed a new high-throughput methodology specifically tailored to suit the demands associated with sequencing whole mitochondrial genomes from minute quantities of starting material.

As a direct result of the Network Travel Award Prof Gasser, Dr Littlewood, Dr Wassenbach and Aaron collaborated on, and were awarded, an ARC Linkage International Grant, which will provide one year's salary for Dr Jex, as well as some research funds to contribute towards the project. This has further solidified the partnership created, by the ARC/NHMRC Research Network for Parasitology Travel Award scheme, between the Gasser and Littlewood laboratories, which, in turn, will contribute greatly to the team's ability to achieve their research aims (outlined above).

Aaron says that "We are very grateful for the assistance that has been provided to us by the ARC/NHMRC Research Network for Parasitology and offer our sincere thanks."

Leslie Chisholm & Elizabeth Perkins from The University of Adelaide won their Network Travel Award for a Researcher Exchange to collaborate with Juan Carlos Pérez Urbiola and Roxana Inohuye Rivera at Centro de Investigaciones Biológicas del Noroeste (CIBNOR) in La Paz, México.

One publication has already resulted from this Network Travel Award (with several others in preparation):

Whittington I.D. & Chisholm L.A. In Press. Diseases caused by Monogenea. In: *Fish Diseases*. Eiras J.C., Segner H., Wahlii T. & Kapoor B.G. (Eds.), Science Publishers, Inc., New Hampshire, USA.

There has been one presentation resulting from this Travel Award and additional presentations will be made by Perkins and by Chisholm at the 7th International Symposium for Fish Parasitology to be held in Italy, 2007;

Whittington I.D., Perkins E.M., Chisholm L.A. & Donnellan S.C. 2006. *Neobenedenia* '*melleni*' (Monogenea: Capsalidae): is this enigmatic infamous pest of fishes worldwide a cryptic species complex? 11th International Congress of Parasitology (ICOPA XI), August 6-11 2006, Scottish Exhibition & Convention Centre, Glasgow, UK. (Abstract with e-program).

During their travel award the following presentation was made by the senior member of their team Dr Ian Whittington;

A 1.5 hour seminar to scientists, technicians and students at CIBNOR entitled: Fundamental knowledge of the life-cycle of monogenean parasites and how Monogenea in Australia can affect aquaculture.

Leslie and Elizabeth reported that work carried out and collections made during this travel grant resulted in a 4-year ARC Discovery Grant proposal being submitted in the 2007 grant round for funding beginning in 2008 entitled: Flatworm pathogens of marine fish: contentious identities resolved by molecular genetics, morphology, statistical classification and image analysis. Leslie says that this will not only continue strong collaboration with colleagues at CIBNOR and CICIMAR in La Paz, but will also involve scientists in parasitology and aquaculture from around the world.

Leslie and Elizabeth reported that their Mexican collaborators were keen to develop a potential PhD project for a Mexican student to continue elements of the study they began in La Paz during this visit. They had discussions about the possibility for a student to investigate a broader diversity of *Neobenedenia* 'species' from serranid fishes in the northern part of the Bay of La Paz near San Evanisto where there are reportedly up to 10 species of Serranidae. This project, however, is contingent on colleagues at CIBNOR obtaining funds for a PhD scholarship and project support.

Mieke Burger, a PhD student at the University of Queensland and was one of the recipients of an ARC/NHMRC Research Network for Parasitology travel award to attend the Fish Histopathology Workshop at the University of Tasmania, Launceston from 11-14th December 2006.

Mieke says that this annual workshop is targeted towards postgraduate students and postdoctoral fellows who are interested in techniques in histopathology of aquatic animals. It was conducted by five highly regarded researchers in aquatic animal health: Dr Mark Adams: School of Aquaculture, University of Tasmania; Dr Judy Handlinger: Tasmania Department of Primary Industries, Water & Energy, Tasmanian Aquaculture & Fisheries Institute; Assoc. Prof. Barbara Nowak: School of Aquaculture, University of Tasmania;
Dr Mark Powell: Senior Lecturer, School of Aquaculture, University of Tasmania; Dr Stephen Pyecroft: Tasmanian Aquaculture & Fisheries Institute.

Attending this course has allowed Mieke to initiate one of the proposed projects of her PhD: analysing the histopathology produced by myxosporean parasites in the muscle of damsel fish.

Mieke says "Having the opportunity to participate in the workshop enabled me to meet some great people that I have really enjoyed learning from, sharing ideas with and our passion for science. I hope to have more to do with them in the future."

Matthew Dixon, PhD Scholar, Malaria Biology Laboratory, Queensland Institute of Medical Research won his Network Travel Award for a Researcher Exchange to the University of Edinburgh to obtain knowledge in performing transfections in the rodent malaria's *P.berghei* and *P.chabaudi* and apply this to the study of commitment to gametocytogenesis in *Plasmodium*.

Matthew says that the work is still ongoing and publications are planned. He says that a review article with Dr Joanne Thompson, although not directly related to the research, was published and this was helped through the collaborative efforts between Dr Joanne Thompson's laboratory and the Malaria Biology laboratory at QIMR.

Matthew reported that the techniques he learned during his Exchange will be shared with colleagues at QIMR after they establish transfection facilities.

Matthew was invited to give seminars at the Institute of Immunology and Infection Research, School of Biological Sciences, University of Edinburgh; at the London School of Hygiene and Tropical Medicine; at the Bernhard Nocht Institute for Tropical Medicine. Hamburg, Germany and at the Istituto Superiore di Sanita. Rome, Italy.

Matthew reported a new collaboration with Dr Lisa Ranford-Cartwright at the Institute of Biomedical and Life Sciences, University of Glasgow was set up between their laboratories to investigate the role of blood stage gametocyte proteins within the mosquito vector. He also reported that Collaborative research working on the role of early gametocyte proteins in the process of gametocyte development and sex specific gene regulation was established with Dr Pietro Alano. Istituto Superiore di Sanita. Rome, Italy.

Matthew also hopes that the Travel Award will help with future opportunities within the United Kingdom and Europe upon completion of his PhD.

- **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. Additionally, ARC/NHMRC Research Network for Parasitology Participants published 334 articles in journals or books during 2006. These are listed below 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 388 papers at conferences or by invitation at institutions across Australia and around the world (95 invited lectures at institutions, 90 keynote, plenary or symposium speeches at national and international conferences and 203 contributed papers at conferences). A comprehensive listing of these presentations is not documented here.

Likewise, research grants awarded to Network Participants in 2006 are listed below, as a benchmarking record, without claiming undue influence of the Network in the success of the applications.

Publications

[1] An Environmentally Sustainable Australia

Aken'Ova, T.O.L., Cribb, T.H. & Bray, R.A. *Helicometra* Odhner, 1902 (Digenea: Opecoelidae) in Australian waters: problems of species identification and a description of *H. sprenti* n. sp. *Systematic Parasitology* 63: 17-27.

Andrews R.H., Beveridge I., Bull C. M., Chilton N. B., Dixon B. & Petney T. Systematic status of *Aponomma tachyglossi* Roberts (Acarina: Ixodidae) from echidnas, *Tachyglossus aculeatus*, from Queensland, Australia. *Systematic and Applied Acarology* 11: 23-29

Attard, M., Crosbie, P.B.B., Adams, M.B. & Nowak, B.F. A preliminary study into the effects of seawater acclimation on the progression of Amoebic Gill Disease (AGD) in out of season Atlantic salmon *(Salmo salar*, L.). *Bulletin of the European Association of Fish Pathologists* 26: 275-279.

Besier R.B. Management of sheep worms: sustainable strategies for wool and meat enterprises. *International Journal of Sheep and Wool Science*: 54: pp. 1-7.

Besier R.B. Sustainable management of worms: the urgent need for refugia-based strategies. *Proceedings of the Australian Sheep Veterinarians Annual Conference (Wagga Wagga NSW, Sept. 2006)*16: 17-26.

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

Beveridge, I. Redescription of *Parastylochus astis* Bock, 1913 (Platyhelminthes: Polycladida) with new records from Western Australia and New Caledonia. *Transactions of the Royal Society of South Australia* 130: 109-112.

Beveridge I. & Justine J-L. Gilquiniid cestodes (Trypanorhyncha) from elasmobranch fishes off New Caledonia with descriptions of two new genera and a new species. *Systematic Parasitology* 65: 235-249.

Beveridge, I. & Spratt, D.M. Morphology, morphometrics, molecular mumbojumbo and cryptic wildlife host and parasites species: musings on the development of wildlife parasitology. pp 95-106 in National Parasitology Symposium - Festschrift for Dr John Walker. Centre for Infectious Diseases and Microbiology; Public Health: Australia. ISBN 1740183703.

Bezemer, B., Butt, D., Nell, J., Adlard, R. & Raftos, D. Breeding for QX disease resistance negatively selects one form of the defensive enzyme, phenoloxidae, in Sydney rock oysters. *Fish & Shellfish Immunology* 20: 627-636.

Blair, D. Ribosomal DNA variation in parasitic flatworms. Pages 96-123 In (A. Maule, Ed.) Parasitic Flatworms: Molecular Biology, Biochemistry, Immunology and Control CABI.

Blair, D., Waycott, M., Byrne, L., Dunshea, G., Smith-Keune, C., & Neil, K.M. Molecular discrimination of *Perna* (Mollusca: Bivalvia) species using the polymerase chain reaction and species-specific mitochondrial primers. *Marine Biotechnology* 8: 380-385.

Brant, S. V., Morgan J.A.T., Mkoji, G.M., Snyder, S.D., Rajapakse, R.P.V.J. & Loker E.S. A look at the diversity of schistosomes: new contributions among the phylogenetic relationships of blood flukes. *Journal of Parasitology* 92: 77-88.

Bray, R.A. & Cribb, T.H. (2006). *Overstreetia olsoni* n. sp. (Digenea: Zoogonidae) from the Capricorn silverside *Atherinomorus capricornensis* (Woodland) (Atherinidae) off Heron Island, southern Great Barrier Reef. *Systematic Parasitology* 63, 41-43.

Bray, R.A. & Cribb, T.H. *Stephanostomum talakitok* n. sp. (Digenea: Acanthocolpidae) from the golden trevally *Gnathanodon speciosus* (Perciformes: Carangidae) from Ningaloo Reef, Western Australia. *Zootaxa* 1104: 59-68.

Bshary, R & Grutter, A. Image scoring and cooperation in a cleaner fish mutualism. *Nature* 441: 975-978.

Bull CM & Burzacott DA . The influence of parasites in the retention of long-term partnerships in the Australian sleepy lizard, *Tiliqua rugosa*. *Oecologia* 146: 675-680

Bush, R.D., Toribio, J.A., Windsor P.A. The impact of malnutrition and other causes of losses of adult sheep in 12 flocks during drought. *Aust.Vet.J*. 84: 254-260

Campbell, R.A. & Beveridge, I. Three new genera and seven new species of trypanorhynch cestodes (family Eutetrarhynchidae) from manta rays, Mobula spp. (Mobulidae) from the Gulf of California, Mexico. *Folia Parasitologica* 53: 255-275

Campbell, R.A. & Beveridge, I. Two new species of *Pseudochristianella* Campbell & Beveridge, 1990 (Cestoda: Trypanorhyncha) from elasmobranch fishes from the Gulf of California, Mexico. *Parasite* 13:275-281.

Chambers, C. & Cribb, T.H. Phylogeny, evolution and biogeography of the *Quadrifoliovariinae yamaguti*, 1965 (Lecithasteridae: Digenea). *Systematic Parasitology* 63: 61-82.

Chilton NB, Huby-Chilton F, Gasser RB& Beveridge I The evolutionary origins of the bursate nematodes (order Strongylida) are related to predilection sites within hosts. *Molecular Phylogenetics and Evolution* 40: 118-128.

Chisholm L.A. & Whittington I.D. Revision of *Capsaloides* (Monogenea: Capsalidae) with a redescription of *C. magnaspinosus* Price, 1939 from the nasal tissue of *Tetrapterus audax* (Istiophoridae) collected off Nelson Bay, New South Wales, Australia. *Zootaxa* 1160: 1-20.

Covacin, C., Shao, R., Cameron, S. & Barker, S. C. (2006). Extraordinary numbers of gene rearrangements in the mitochondrial genomes of lice (Phthiraptera: Insecta). *Insect Molecular Biology* 15, 63-68.

de Gruijter JM, Blotkamp J, Gasser RB, Polderman AM. Morphological variability within *Oesophagostomum bifurcum* (Nematoda) among different primate species from Ghana. *Journal of Helminthology* 80:357-361.

Doupé, R.G., Lymbery, A.J. and Pettit, N.D. Stream salinisation is associated with reduced taxonomic, but not functional diversity in a riparian plant community. *Austral Ecology* 32: 388-393.

Dove, A.D.M., Cribb, T.H. Species accumulation curves and their applications in parasite ecology. *Trends in Parasitology* 22: 568-574.

Embar-Gopinath, S., Crosbie, P., Nowak, B.F. Concentration effects of *Winogradskyella sp*. on the incidence and severity of amoebic gill disease. *Diseases of Aquatic Organisms* 73: 43-47.

Glennon V., Chisholm L.A. & Whittington I.D. Three unrelated species, 3 sites, same host – monogenean parasites of the southern fiddler ray, *Trygonorrhina fasciata*, in South Australia: egg hatching strategies and larval behaviour. *Parasitology* 133: 55-66.

Glennon V., Chisholm L.A. & Whittington I.D. Redescription of *Calicotyle australis Johnston, 1934 (Monogenea: Monocotylidae*) from the type-host *Trygonorrhina fasciata (Rhinobatidae)* off Adelaide, South Australia, including descriptions of live and silver stained larvae. *Systematic Parasitology* 63: 29-40.

Glennon V., Chisholm L.A. & Whittington I.D. *Pseudoleptobothrium aptychotremae* Young, 1967 (Monogenea: Microbothriidae) redescribed from a new host, the southern fiddler ray, *Trygonorrhina fasciata* (Rhinobatidae) in South Australia with a description of the larva and post larval development. *Acta Parasitologica* 51: 40-46.

Godfrey SS, Bull CM, Murray K & Gardner MG. Transmission mode and distribution of parasites among groups of the social lizard *Egernia stokesii*. *Parasitology Research* 99: 223-230

Grant, L.J., Sluys, R., & Blair, D. Biodiversity of Australian freshwater planarians (Platyhelminthes: Tricladida: Paludicola): new species and localities, and a review of paludicolan distribution in Australia. *Systematics and Biodiversity* 4: 435-471.

Gunter, N.L., Cribb, T.H., Whipps, C.M. & Adlard, R.D. Characterization of *Kudoa monodactyli* n. sp. (Myxosporea: Multivalvulida) from the muscle of *Monodactylus argenteus* (Teleostei: Monodactylidae) from Moreton Bay, Queensland, Australia. *Journal of Eukaryotic Microbiology* 53: 374-378.

Gurney, R.H., Johnston, D.J., Nowak, B.F. The effect of parasitism by trypanorynch plerocercoids (Cestoda, Trypanorhyncha) on the digestive enzyme activity of *Carcinus maenas* (Linnaeus, 1758) (Decapoda, Portunidae). *Crustaceana* 79: 663-675.

Hallas G & Bull CM. The influence of drying time on nematode eggs in the scats of the scincid lizard *Egernia stokesii*. *J. Parasitol*. 92: 192-194.

Hutson K.S. & Whittington I.D. *Paradeontacylix godfreyi* n. sp. (Digenea: Sanguinicolidae) from the heart of wild *Seriola lalandi* (Perciformes: Carangidae) in southern Australia. *Zootaxa* 1151: 55-68.

Jex AR, Hu M, Rose HA, Schneider M, Cribb TH, Gasser RB. Genetic characterization of Thelastomatoidea (Nematoda: Oxyurida) from cockroaches in Australia – implications for systematics and ecology. *Parasitology* 133: 123-129.

Jex, A. R., Schneider, M. A., Rose, H. A. & Cribb, T. H. New Thelastomatoidea (Nematoda: Oxyurida) from Australian burrowing cockroaches (Blaberidae: Geoscapheinae, Panesthiinae). *Nematology* 8: 443-454.

Jex, A.R., Schneider, M.A. & Cribb, T.H. (2006). The importance of host ecology in thelastomatoid (Nematoda: Oxyurida) host specificity. *Parasitology International* 55: 169-174.

Jex, A. R., Schneider, M. A., Rose, H. A. and Cribb, T. H. (2006). Thelastomatoidea (Nematoda: Oxyurida) of the Australian giant burrowing cockroach, *Macropanesthia rhinoceros* (Blattodea: Geoscapheinae). *Nematology* 8: 347-357.

Kearn G.C., Whittington I.D. & Euzet L. The handling and fate of spermatophores in *Neoentobdella diadema* and *N. apiocolpos* (*Monogenea: Capsalidae: Entobdellinae*). *Folia Parasitologica* 53: 57-62.

Kerr G. D. & Bull C. M. Exclusive core areas in overlapping ranges of the sleepy lizard, *Tiliqua rugosa*. *Behavioural Ecology* 17: 380-391

Kerr G. D. and Bull C. M . Interactions between climate, host refuge use, and tick population dynamics. *Parasitological Research* 99: 214-222

Kerr G. D. & Bull C. M. Movement patterns in the monogamous sleepy lizard, *Tiliqua rugosa*: effects of gender, drought, time of year, and time of day. *J. Zoology* 269: 137-147

Knox, M.R., Besier, R.B., Carmichael, I.H. and Steel, J.W. Nutrition of parasite management. *International Journal of Sheep and Wool Science* 54: 14-21.

Ladds, P.W., Sammons, J. & Beveridge, I. Enteritis caused by *Cylicospirura heydoni* infection in two Tasmanian pademelons (*Thylogale billardierii*). *Australian Veterinary Journal* 84:412-413.

Lymbery, A.J., Doupé, R.G., Bennett, T. & Starcevich, M. R. Efficacy of a subsurface-flow wetland using the estuarine sedge *Juncus kraussii* to treat effluent from inland saline aquaculture. *Aquacultural Engineering* 34: 1-6.

Malik R, McKellar Stewart K, Sousa CA, Krockenberger MB, Pope S, Ihrke P, Beatty J, Barrs VRD, Walton SF. Crusted scabies (sarcoptic mange) in four cats due to *Sarcoptes scabiei* infestation *Journal of Feline Medicine & Surgery* 8: 327-339

Mooney A.J., Ernst I. & Whittington I.D. An egg-laying rhythm in *Zeuxapta seriolae* (Monogenea: Heteraxinidae), a gill parasite of yellowtail kingfish (*Seriola lalandi*). *Aquaculture* 253: 10-16.

Munoz, G. & Cribb, T.H. Parasite communities and diet of *Coris batuensis* (Pisces: Labridae) from Lizard Island, Great Barrier Reef. *Memoirs of the Queensland Museum* 52: 191-198.

Nolan, M. J. & Cribb, T. H. *Cardicola* Short, 1953 and *Braya* n. gen. (Digenea: Sanguinicolidae) from five families of tropical Indo-Pacific fishes. *Zootaxa* 1265: 1-80.

Nolan, M. J. & Cribb, T. H. An exceptionally rich complex of *Sanguinicolidae* von Graff, 1907 (Platyhelminthes: Trematoda) from *Siganidae, Labridae* and *Mullida*e (Teleostei: Perciformes) from the Indo-west Pacific Region. *Zootaxa* 1218: 1-80.

O'Donoghue P. Protistan biodiversity. In: Rohde K. (ed.) Marine Parasitology. CSIRO Publishing, Collingwood. pp. 11-17.

Reichel MP, Ellis JT. If control of *Neospora caninum* infection is technically feasible does it make economic sense? *Vet Parasitol.* 142: 23-34

Roberts-Thomson, A., Barnes, A., Fielder, S., Lester, R.J.G. & Adlard, R.D. Aerosol dispersal strategies of the fish pathogen, *Amyloodinium ocellatum. Aquaculture* 257: 118-123.

Sewell, K.B., Cannon, L.R.G. & Blair, D. A review of *Temnohaswellia* and *Temnosewellia* (Platyhelminthes: Temnocephalida) ectosymbionts from Australian crayfish *Euastacus* (Parastacidae). *Memoirs of the Queensland Museum* 52: 199-280.

Shao, R. & Barker, S.C. Mitochondrial genomics of parasitic arthropods: implications for studies of population genetics and evolution. Invited review. *Parasitology* 134: 153-167

Smit, N.J., Grutter, A.S., Adlard, R.D. & Davies, A.J. Haematozoa of teleosts from Lizard Island, Australia with some comments on their possible mode of transmission. *Journal of Parasitology* 92: 778-788.

Tyre A.J,, Tenhumberg B & Bull C. M. Identifying landscape scale patterns from individual scale processes. *Ecological Modelling* 199: 442-450

van Wyk JA, Hoste H, Kaplan RM, Besier RB. Targeted selective treatment for worm management - how do we sell rational programs to farmers? *Vet Parasitol* 139: 336-346.

Woodgate RG, le Feuvre A, van Burgel A, Love S, Carmichael I, Lyndall-Murphy M, Bailey A, Campbell N & Besier RB. Experiences with WormBoss – will Australian producers make use of the internet to assist sheep worm control ? *Proceedings of the Australian Sheep Veterinarians Annual Conference (Wagga Wagga NSW, Sept. 2006)* 16: 53-60

[2] Promoting and Maintaining Good Health

Andrews, KT, Fairlie DP, Madala PK, Ray J, Wyatt DM, Hilton PM, Melville LA,Beattie L, Gardiner DL, Reid RC, Stoermer MJ, Skinner-Adams T, Berry C, McCarthy JS. Potencies of Human Immunodeficiency Virus Protease Inhibitors *in vitro* against *Plasmodium falciparum* and *in vivo* against Murine Malaria. *Antimicrob. Agents Chemother.* 50: 639-648.

Anstey NM, Price RN, White NJ. Improving the availability of artesunate for severe malaria. *Med J Aust.* 184: 3-4.

Auliff, A., Wilson, D., Russell, B., Gao, Q., Chen, N., Anh, L.N., Maguire, J., O'Neil, M. and Cheng, Q. Amino acid mutations in *Plasmodium vivax* DHFR and DHPS from several geographical rerions and susceptibility to antifolate drugs. *Am. J. Trop. Med. Hyg* 75(4): 617-621.

Awandare GA, Hittner JB, Kremsner PG, Ochiel DO, Keller CC, Weinberg JB, Clark IA, Perkins DJ. Decreased circulating macrophage migration inhibitory factor (MIF) protein and blood mononuclear cell MIF transcripts in children with *Plasmodium falciparum* malaria. *Clin Immunol.* 119: 219-25

Balic A., Cunningham C.P. & Meeusen, E.N.T. Eosinophil interactions with *Haemonchus contortus* larvae in the ovine gastrointestinal tract. *Parasite Immunol.* 28: 107-115.

Barry AE, Leliwa-Sytek A, Man K, Kasper JM, Hartl DL, Day KP. Variable SNP density in aspartyl-protease genes of the malaria parasite, *Plasmodium falciparum. Gene* 376:163-7

Bartley, P.B., Ramm, G.A, Jones, M.K., Ruddell, R.G., Li, Y.S. and McManus, D.P. A contributory role for hepatic stellate cells in the dynamics of *Schistosoma japonicum* egg-induced fibrosis. *International Journal for Parasitology* 36: 993-1001.

Baum J, Papenfuss AT, Baum B, Speed TP, Cowman AF. Regulation of apicomplexan actin-based motility. *Nat Rev Microbiol*. 4: 621-8.

Baum J, Richard D, Healer J, Rug M, Krnajski Z, Gilberger TW, Green JL, Holder AA, Cowman AF. A conserved molecular motor drives cell invasion and gliding motility across malaria life cycle stages and other apicomplexan parasites. *J Biol Chem*. 281: 5197-208.

Baumeister, S., Winterberg, M., Duranton, C., Huber, S., Lang, F., Kirk, K. & Lingelbach, K. Evidence for the involvement of *Plasmodium falciparum* proteins in the formation of new permeability pathways in the erythrocyte membrane. *Molec. Microbiol.* 60: 493-504

Beattie, L., C. R. Engwerda, M. Wykes and M. F. Good. $CD8^+$ T Lymphocytes-mediate loss of marginal metallophilic macrophages following infection with *Plasmodium chabaudi chabaudi AS. J Immunol.* 177: 2518-26.

Beeson JG, Mann EJ, Byrne TJ, Caragounis A, Elliott SR, Brown GV, Rogerson SJ. Antigenic differences and conservation among placental *Plasmodium falciparum*-infected erythrocytes and acquisition of variant-specific and cross-reactive antibodies. *J Infect Dis*. 193: 721-30.

Belli, S.I., Smith, N.C., Ferguson, D.J. The coccidian oocyst: a tough nut to crack! *Trends in Parasitology* 22: 416-23.

Benet A, Khong TY, Ura A, Samen R, Lorry K, Mellombo M, Tavul L, Baea K, Rogerson SJ, Cortes A.. Placental malaria in women with South-East Asian ovalocytosis. A*m J Trop Med Hyg*. 75: 597-604.

Bethony J, Brooker S, Albonico M, Geiger SM, Loukas A, Diemert D, Hotez PJ. The soil-transmitted helminth infections: ascariasis, trichuriasis, and hookworm infection. *Lancet* 367: 1521–32.

Boutlis CS, Yeo TW, Anstey NM. Malaria tolerance – for whom the cell tolls? *Trends in Parasitology* 22: 371-377.

Bridle, A., Morrison, R., Cupit Cunningham, P.M., Nowak, B. Quantitation of immune response gene expression and cellular localisation of interleukin-1β mRNA in Atlantic salmon, *Salmo salar* L., affected by amoebic gill disease (AGD). *Veterinary Immunology and Immunopathology* 114: 121-134.

Bridle, A.R., Morrison, R.N., Nowak, B.F. The expression of immune-regulatory genes in rainbow trout, *Oncorhynchus mykiss*, during an amoebic gill disease (AGD) infection. *Fish and Shellfish Immunology*, 20: 346 - 364

Chen, H., Lin, D, Li, Y.S., Liu, Y.M., McManus, D.P. Huang, X.H, Feng, Z. Studies on effect of artemether to control infection and prevent acute infection of *S. japonicum* in high endemic areas. *Chinese Journal of Schistostomiasis Control* 18: 32-35.

Clark IA, Budd AC, Alleva LM, Cowden WB. Human malarial disease: a consequence of inflammatory cytokine release. *Malar J.* 5: 85

Clark IA, Budd AC, Hsue G, Haymore BR, Joyce AJ, Thorner R, Krause PJ. Absence of erythrocyte sequestration in a case of babesiosis in a splenectomized human patient. *Malar J.* 5: 6

Coley, A.M., Parisi, K., Masciantonio, R., Hoeck, J., Casey, J.L., Murphy, V.J., Harris, K.S., Batchelor, A.H., Anders, R.F. & Foley, M. The most polymorphic residue on *Plasmodium falciparum* apical membrane antigen 1 determines binding of an invasion-inhibitory antibody. *Infect Immun.* 74: 2628-36.

Coltel N, Combes V, Chimini G, Grau GE. Cell vesiculation and immunopathology: implications in cerebral malaria. *Microbes Infect.* 8: 2305-16.

Combes V, Coltel N, Faille D, Wassmer SC, Chimini G, Grau GE. Pathogenic interactions at the blood-brain barrier in cerebral malaria: direct cell-cell contact or action via microparticles? *Int J Parasitol.* 36: 541-6.

Combes V, Grau GE. Cytokines in defence and pathology of the central nervous system. In: Ransohoff RM & Benveniste EN, eds. *Cytokines and the CNS*, 2nd edition, CRC Press.

Combes V, Lou JN, Grau GE. Microvascular endothelium and cerebral malaria. In: Aird, W., Ed. *The Endothelium: A Comprehensve Reference*, 1st edition, CRC Press.

Cooke, BM., Buckingham, DW., Glenister, FK., Fernandez, KM., Bannister, LH., Marti, M., Mohandas, N. & Coppel, RL. A Maurer's cleft-associated protein is essential for expression of the major malaria virulence antigen on the surface of infected red blood cells. *J Cell Biol.* 172: 899-908.

Cottee PA, Abs EL-Osta YG, Nisbet AJ, Gasser RB. Ubiquitin-conjugating enzyme genes in *Oesophagostomum dentatum*. *Parasitology Research* 132: 691-708.

Cowman AF, Crabb BS. Invasion of red blood cells by malaria parasites. *Cell* 124: 755-66.

Cowman AF, Kappe SH. Malaria's stealth shuttle. *Science*. 313:1245-6.

Cromer D, Evans KJ, Schofield L & Davenport MP Preferential invasion of reticulocytes during late-stage *Plasmodium berghei* infection accounts for reduced circulating reticulocyte level. *Int. J. Parasitol.* 36: 1389-97.

Dalton, J.P., Caffrey, C.R., Sajid, M., Stack, C., Donnelly, S., Loukas, A., Don, T., McKerrow, J.H, Halton, D.W. & Brindley, P.J. Proteases in trematode biology. *In* Parasitic Flatworms: Protein function, Metabolism and Physiology (Aaron Maule, Ed.), CAB International, Wallingford, Oxon, UK.

Debierre-Grockiego F, Schofield L, Azzouz N, Schmidt J, Santos de Macedo C, Ferguson MAJ & Schwarz RT. Fatty acids of *Plasmodium falciparum* origin down-regulate the toxic activity of malaria glycosylphosphatidylinositols *Infect. Immun.* 74: 5487-5496.

Delahaye N, Coltel N, Puthier D, Flori L, Houlgatte R, Iraqi F, Nguyen C, Grau GE, Rihet P. Gene expression profiling discriminates cerebral malaria-susceptible mice and cerebral malaria-resistant mice. *J Infect Dis.* 193: 312-321.

Dent A, Malhotra I, Mungai P, Muchiri E, Crabb BS, Kazura JW, & King CL. Prenatal malaria immune experience affects acquisition of *Plasmodium falciparum* merozoite surface protein-1 invasion inhibitory antibodies during infancy. *J Immunol*. 177: 7139-45

Dembo EG, Phiri HT, Montgomery J, Molyneux ME, Rogerson SJ. Are *Plasmodium falciparum* parasites present in peripheral blood genetically the same as those sequestered in the tissues? *Am J Trop Med Hyg* 74: 730-732.

Don T, Oksov Y, Lustigman S, Loukas A . Saposin-like proteins from the intestine of the blood-feeding hookworm, *Ancylostoma caninum*. *Parasitol* 17:1-10

Dong Y., Tang Y., Chollet J., Matile H., Wittlin S., Charman S.A., Charman W.N, Santo Tomas J., Scheurer C., Snyder C., Scorneaux B., Bajpai S., Alexander S.A., Wang X., Padmanilayam M., Rao C.S., Brun R. & Vennerstrom J.L.. Effect of functional group polarity on the antimalarial activity of spiro and dispiro-1,2,4-Trioxolanes. *Bioorg. Med. Chem.* 14: 6368-6382.

Donnelly, S., Dalton, J.P. & Loukas, A.C. Proteases in Helminth- and Allergen- Induced Inflammatory Responses. *In* Parasites and Allergies (*Chemical Immunology and Allergy Series*) (M. Capron and F. Trottein, eds.) Karger Publishers, Basel, Switzerland, Munich, Germany

Downie, M.J., Saliba, K.J., Howitt, S.M., Bröer, S. & Kirk, K. Transport of nucleosides across the *Plasmodium falciparum* parasite plasma membrane has characteristics of PfENT1. *Molec. Microbiol.* 60: 738-748

Duncan AM, Ren H, Bound F, Tully J, Chandler DS, Sandeman RM. Assessment of novel inhibitors of *Helicoverpa aminopeptidases* as anti-insect agents. *Pest Management Science* 62: 1098-108.

Duffy MF, Caragounis A, Noviyanti R, Kyriacou HM, Choong EK, Boysen K, Healer J, Rowe JA, Molyneux ME, Brown GV, Rogerson SJ. Transcribed *var* genes associated with placental malaria in Malawian women. *Infect Immun* 74: 4875-4883.

Duffy MF, Maier AG, Byrne TJ, MartyA, Elliott SR, O'Neill MT, Payne PD, Rogerson SJ, Cowman AF, Crabb BS, Brown GV. VAR2CSA is the principal ligand for chondroitin sulfate A in two allogeneic isolates of *Plasmodium falciparum. Mol Biochem Parasitol*. 148: 117-24

Evans KJ, Hansen DS, van Rooijen N, Buckingham L and Schofield L. Severe malarial anemia of low parasite burden in rodent models results from accelerated clearance of uninfected erythrocytes. *Blood* 107: 1192-1199.

Fischer K, Holt DC, Currie BJ, Walton SF, Kemp DJ. Scabies mite inactivated protease paralogues. *International Congress Series* 1289: 85-88

Flanagan K.L., Plebanski M., Odhiambo K., Sheu, E. Mwangi, T, Gelder C., Hart, K., Kortok M., Lowe, B., Robson, K.J., Marsh, K., & Hill, A.V.S. Cellular reactivity to the P falciparum protein TRAP in adult Kenyans: novel epitopes, complex cytokine patterns and the impact of natural variation *Am. J. Trop. Med. Hyg.* 74: 367-75.

Fowler, E.V., Chavchich, M., Chen, N., Peters, J.M., Kyle, D., Gatton, M.L & Cheng, Q. Physical linkage to drug resistance genes results in conservation of *var* genes among West Pacific *Plasmodium falciparum* isolates. *J. Infect. Dis*. 194: 939-948.

Frankland S, Adisa A, Horrocks P, Taraschi TF, Schneider T, Elliott SR, Rogerson SJ, Knuepfer E, Cowman AF, Newbold CI, Tilley L. Delivery of the malaria virulence protein PfEMP1 to the erythrocyte surface requires cholesterol-rich domains. *Eukaryot Cell* 5: 849-60.

Fujiwara RT, Loukas A, Mendez S, Williamson AL, Bueno LL, Wang Y, Samuel A, Hotez PJ, Bethony JM Vaccination with irradiated *Ancylostoma caninum* third stage larvae induces a Th2-like response in dogs. *Vaccine* 24: 501-9.

Gan, X., Zeng, X-P., Wang, Y., Ding, J-Z., Shen, H-Y., Shen, L.Y., McManus, D.P., Brindley, P.J. & Fan, J.J. Recombinant tegumental protein SVLBP as a vaccine candidate against *Schistosoma japonicum. Memórias do Instituto Oswaldo Cruz.*101: 9-13.

Gardiner, D.L. & Good, M.F. A case of 'hit-and-run' in *Plasmodium* genetics. *Trends in Parasitology* 22: 493-495.

Gardiner DL, Trenholme KR, Skinner-Adams TS, Stack CM & Dalton JP. Over-expression of Leucyl Aminopeptidase in *Plasmodium falciparum* Parasites: Target for the Anti-Malaria Activity of Bestatin. *J. Biol. Chem*. 281:1741-5. I

Gatton, M.L & Cheng, Q. *Plasmodium falciparum* infection dynamics and transmission potential following treatment with sulfadoxine-pyrimethamine. *J. Antimicrob. Chemother.* 58: 47-51.

Gauci, C. & Lightowlers, M. Conservation of the vaccine antigen gene, TSOL18, among genetically variant isolates of *Taenia solium*. *Molecular and Biochemical Parasitology* 146: 101-104.

Gauci, C. & Lightowlers, M. *Taenia solium* and *Taenia ovis*: Stage-specific expression of the vaccine antigen genes, TSOL18 and TSOL16, and homologues, in oncospheres. *Experimental Parasitology* 113: 272-275.

Gibbs MJ, Smeianov VV, Steele JL, Upcroft P, Efimov BA. Two families of rep-like genes that probably originated by interspecies recombination are represented in viral, plasmid, bacterial, and parasitic protozoan genomes. *Mol Biol Evol* 23: 1097-100.

Gilson PR, Nebl T, Vukcevic D, Moritz RL, Sargeant T, Speed TP, Schofield L, & Crabb BS. Identification and stoichiometry of GPI-anchored membrane proteins of the human malaria parasite *Plasmodium falciparum*. *Mol. Cell. Proteomics*. 5: 1286-99

Godfrey DI, McConville MJ, Pellicci DG. Chewing the fat on natural killer T cell development. *J Exp Med.* 203:2229-32.

Golenser J, Waknine JH, Krugliak M, Hunt NH, Grau GE. Current perspectives on the mechanism of action of artemisinins. *Int J Parasitol.* 36: 1427 – 41.

Golenser J, McQuillan J, Hee L, Mitchell AJ, Hunt NH. Conventional and experimental treatment of cerebral malaria. *Int. J. Parasitol.* 36: 583-593.

Gross, K., Alcorn, S., Murray, A., Morrison, R., Nowak, B. *In vivo* interactions between *Neoparamoeba* spp. and salmonid leucocytes, the effects of parasite sonicate on anterior kidney leucocyte function. *Journal of Fish Biology* 69: 293-300.

Guo, J., Li, Y.S., Gray, D., Ning, A., Hu, G., Chen, H., Davis, G., Sleigh, A., Feng, Z., McManus, D.P. & Williams, G.M. A drug-based intervention study on the importance of buffalo for human *Schistosoma japonicum* infection around Poyang Lake, China. *American Journal of Tropical Medicine and Hygiene* 74: 335-341.

Hassan, M. F., Y. Zhang, C. R. Engwerda, P. M. Kaye, H. Sharp & Q. D. Bickle. The *Schistosoma mansoni* hepatic egg granuloma provides a favourable microenvironment for sustained growth of *Leishmania donovani. Am J Pathol* 169: 943-53.

Hayward, R., Saliba, K.J. & Kirk, K. The pH of the digestive vacuole of *Plasmodium falciparum* is not associated with chloroquine resistance. *J. Cell Science*, 119: 1016-1025

Hunt NH, Golenser J, Chan-Ling T, Parekh S, Rae C, Potter S, Medana IM, Miu J, Ball HJ. Immunopathogenesis of cerebral malaria. *Int. J. Parasitol.* 36: 569-582.

Hunt N, Grau GE. Blood-brain barrier in parasitic disease. *Int J Parasitol.* 36: 503-4.

Jiang, C.P., McManus, D.P. & Jones, M. Liver alveolar echinococcosis in China: clinical aspect with relative basic research. *World Journal of Gastroenterology* 11: 4611-7.

Jones, MK & McManus, D.P. Trematodes. *Manual of Clinical Microbiology, 9th edition*, 2006, ASM Press, Washington.

Jorgensen WK, Anderson GR, Jeston PJ, Blight GW & Molloy JB Selection and characterisation of two attenuated vaccine lines of *Eimeria tenella* in Australia. *Australian Veterinary Journal* 84: 100-105.

Jorgensen W K, Richards G & Anderson G R. Evaluation of changes in body weight, feed conversion ratio, oocyst output, gross lesion score and microscopic lesion count as parameters to measure infectivity of a precocious line of *Eimeria acervulina* in poultry. *Australian Veterinary Journal* 84: 428-430.

Kats LM, Black CG, Proellocks NI, Coppel RL. *Plasmodium* rhoptries: how things went pear-shaped. *Trends Parasitol.* 22: 269-76

Kedzierski L, Malby RL, Smith BJ, Perugini MA, Hodder AN, Ilg T, Colman PM, Handman E. Structure of *Leishmania mexicana* phosphomannomutase highlights similarities with human isoforms. *J Mol Biol*. 363: 215-27.

Koumoundouros E., Bischof R.J., Meeusen E.N., Mareels I. MY & Snibson, K.J. Chronic airway disease: deteriorating pulmonary function in sheep associated with repeated challenges of house dust mite. Exp Lung Res. 32: 321-30

Kyngdon, C., Gauci, C., Verastegui, M., Rolfe, R., Veláspuez Euzmán, J., Farfán Salazar, M., Gonzales, A., Garcia, H., Gilman, R., Strugnell, R. & Lightowlers, M. In vitro oncosphere – killing assays to determine immunity to *Taenia pisiformis, Taenia ovis, Taenia saginata* and *Taenia solium* larvae. *Journal of Parasitology* 92: 273-281.

Kyngdon, C., Gauci, C., Gonzalez, A., Flisser, A., Zoli, A., Read, A., Strugnell, R. & Lightowlers, M. Antibody responses and epitope specificities to the *Taenia solium* cysticercosis vaccines TSOL18 and TSOL45-1A. *Parasite Immunology* 28: 191-199.

Lahoud MH, Proietto AI, Gartlan KH, Kitsoulis S, Curtis J, Wettenhall J, Sofi M, Daunt C, O'keeffe M, Caminschi I, Satterley K, Rizzitelli A, Schnorrer P, Hinohara A, Yamaguchi Y, Wu L, Smyth G, Handman E, Shortman K, Wright MD. Signal regulatory protein molecules are differentially expressed by CD8- dendritic cells. *J Immunol.* 177: 372-82.

Lee, E. A., Flanagan, K. L., Minigo, G., Reece, W. H., Bailey, R., Pinder, M., Hill, A. V., & Plebanski, M. Dimorphic *Plasmodium falciparum* merozoite surface protein-1 epitopes turn off memory T cells and interfere with T cell priming. *European Journal of Immunology* 36: 1168-78.

Lee, N., Baker, J., Andrews, K., Gatton, M., Bell, D., Cheng, Q. & McCarthy, J. The effect of sequence variation in *Plasmodium falciparum* Histidine-Rich Protein 2 on the binding of specific monoclonal antibodies: implications for Rapid Diagnostic Tests for malaria. *J. Clin. Microb* 44: 2773-2778.

Lee, N., Baker, J., Bell, D., McCarthy, J. & Cheng, Q. Assessing the genetic diversity of *Plasmodium falciparum* and *Plasmodium vivax* aldolases and its potential effect on the performance of Aldolase-based Rapid Diagnostic Tests (RDTs). *J Clin Microb* 44: 4547-4549.

Lightowlers, M.W. Cestode vaccine development. In *Parasitic Flatworms: Molecular biology, biochemistry, Immunology and Control,* A. Maule ed. CAB International, Wallingford.

Lightowlers, M.W. Vaccines against cysticercosis and hydatidosis: foundations in cestode immunology. *Parasitology International* 55(suppl.): S39-S43.

Lightowlers, M.W. Antipodean connections in the development of anti-cestode vaccines. In National Parasitology Symposium. Festschrift for Dr John Walker. Centre for Infectious Diseases and Microbiology; Public Health: Australia. ISBN 1740183703.

Lightowlers, M.W. Cestode vaccines: origins, current status and future prospects. *Parasitology* 133(suppl.): S27-S42

Lin E, Pappenfuss T, Tan RB, Senyschyn D, Bahlo M, Speed TP, Foote SJ. Mapping of the *Plasmodium chabaudi* resistance locus char2. *Infect Immun*. 74: 5814-9.

Loukas A, Bethony J, Brooker S, Hotez PJ Hookworm Vaccines – past, present and future. *Lancet Infect Dis.* 6: 733-41.

Lopransri BK, Anstey NM, Stoddard GJ, Mwaikambo ED, Boutlis CS, Tjitra E, Maniboey H, Hobbs MR, Levesque MC, Weinberg JB, Granger DL. Elevated plasma phenylalanine in severe malaria: implications for pathophysiology of neurological complications. *Infect Immun.* 74: 3355-3359.

Maerki S., Brun R., Charman S., Dorn A., Matile H., Wittlin S. *In vitro* assessment of the pharmacodynamic properties and the partitioning of OZ277 / RBx-11160 in cultures of *Plasmodium falciparum. J. Antimicrob.Chemother.* 58: 52-58, 2006.

Mamutni, W., Sako, Y., Xiao, N., Nakaya, K., Nakao, M., Yamasaki, H., Lightowlers, M.W. , Craig, P.S. & Ito, A. *Echinococcus multilocularis*: Developmental stage-specific expression of Antigen B 8-kDa subunits. *Experimental Parasitology* 113: 75-82.

Mamuti, W., Sako, Y., Nakao, M., Xiao, N., Nakaya, K., Ishikawa, Y., Hiroshi, Y., Lightowlers, M.W. & Ito, A. Recent advanced in the characterization of antigen B. *Parasitology International* 55(suppl.): 1557-1562

Marty AJ, Thompson JK, Duffy MF, Voss TS, Cowman AF & Crabb BS Evidence that *Plasmodium falciparum* chromosome end clusters are cross-linked by protein and are the sites of both virulence gene silencing and activation. *Mol Microbiol*. 62: 72-83

McManus, D.P. Back to the future for schistosome vaccines? *Parasite Immunology* 28: 246-247.

McManus, D. P. & Dalton, J.P. Vaccines against the zoonotic trematodes *Schistosoma japonicum, Fasciola hepatica* and *Fasciola gigantica. Parasitology* 133(suppl.): S543-561.

Mello, F., Alvarez, R., Smith, N.C. & Michael, A. A novel approach to coccidiosis control. *International Hatchery Practice* 20: 7-13

Melville LA, Sykes AM, McCarthy JS. The beta-tubulin genes of two *Strongyloides* species. *Exp Parasitol.* 112: 144-51.

Meshnick SR, Mwapasa V, Rogerson SJ. Protecting Pregnant Women from Malaria in Areas of High HIV Infection Prevalence. *J Infect Dis* 194: 273-275.

Montgomery J, Milner DA, Jr., Tse MT, Njobvu A, Kayira K, Dzamalala CP, Taylor TE, Rogerson SJ, Craig AG, Molyneux ME. Genetic analysis of circulating and sequestered populations of *Plasmodium falciparum* in fatal pediatric malaria. *J Infect Dis* 194: 115-122.

Morrison R.N., Cooper G.A., Koop B.F., Rise M.L., Bridle A.R., Adams M.B., Nowak B.F. Transcriptome profiling of the gills of amoebic gill disease (AGD)-affected Atlantic salmon (*Salmo salar* L.) - A role for the tumor suppressor protein p53 in AGD-pathogenesis? *Physiological Genomics* 26: 15-34.

Morrison, R.N., Koppang, E.O., Hordvik, I., Nowak, B.F. MHC class II^+ cells in the gills of salmon experimentally infected with amoebic gill disease. *Veterinary Immunology and Immunopathology* 109: 297-303.

Mounsey KE, Holt DC, McCarthy J, Walton SF. Identification of ABC Transporters in *Sarcoptes scabiei. Parasitology* 132: 883-892

Mullin KA, Lim L, Ralph SA, Spurck TP, Handman E, McFadden GI. Membrane transporters in the relict plastid of malaria parasites. *Proc Natl Acad Sci U S A*. 103: 9572-7.

Naderer T, Ellis MA, Sernee MF, De Souza DP, Curtis J, Handman E, McConville MJ. Virulence of *Leishmania major* in macrophages and mice requires the gluconeogenic enzyme fructose-1,6-bisphosphatase. *Proc Natl Acad Sci U S A*. 103: 5502-7.

Nisbet AJ, Geldhof P, Pellegrino M, Gasser RB. Characterisation of a DM domain-containing transcription factor from *Trichostrongylus vitrinus* (Nematoda: Strongylida). *Parasitology International* 55:155-157.

Nikolaou, S., Hartman, D., Nisbet, A.J., & Gasser, R.B. *Haemonchus contortus*: prokaryotic expression and enzyme activity of recombinant HcSTK, a serine/threonine protein kinase. *Experimental Parasitology,* 113: 207-214

Nikolaou, S., Hu, M., Chilton, N.B., Hartman, D., Nisbet, A.J., Presidente, P.J.A., & Gasser, R.B. Class II myosins in nematodes – genetic relationships, fundamental and applied implications. *Biotechnology Advances,* 24: 338-350

Nikolaou, S., Hu, M., Chilton, N.B., Hartman, D., Nisbet, A.J., Presidente, P.J.A., & Gasser, R.B. Isolation and characterisation of class II myosin genes from *Haemonchus contortus*. *Parasitology Research,* 99: 200-203

Okada F, Kobayashi M, Tanaka H, Kobayashi T, Tazawa H, Iuchi Y, Hosokawa M, Fujii J, Dinauer MC, Hunt NH. Essential role of phagocyte-derived reactive oxygen species in the acquisition of metastatic ability of tumour cells. *Am. J. Pathol.* 169: 294-302.

Padmanilayam M., Dong Y., Chollet J., Matile H., Charman S.A., Charman W.N, Santo Tomas J., Scheurer C., Wittlin S., Brun R. & Vennerstrom J.L. Antimalarial activity of N-alkyl amine, carboxamide, sulphonamide and urea derivatives of a dispiro-1,2,4-trioxolane piperidine. *Bioorg. Med. Chem.*, 16: 5542-5545.

Page W, Dempsey K, McCarthy JS. Utility of serologic followup for chronic strongyloidiasis after anthelmintic chemotherapy. *Trans R Soc Trop Med Hyg* 100: 1056-62.

Parekh SB, Bubb WA, Hunt NH, Rae C. Brain metabolic markers reflect susceptibility status in cytokine gene knockout mice with murine cerebral malaria. *Int. J. Parasitol.* 36: 1409-1418.

Pasay CJ, Walton SF, Fischer K, Holt D, Mc Carthy J. A PCR-based assay to survey for knockdown resistance to pyrethroid acaricides in human scabies mites (*Sarcoptes scabiei* var *hominis*). *American Journal of Tropical Hygiene and Medicine* 74: 649-657.

Perry C.S., Charman S.A., Prankerd R.J., Chiu F.C.K., Dong Y., Vennerstrom J.L. & Charman W.N.. Chemical kinetics and aqueous degradation pathways of a new class of synthetic ozonide antimalarials. *J. Pharm. Sci.,* 95: 737-747.

Perry C.S., Charman S.A., Prankerd R.J., Chiu F.C.K., Scanlon M.J., Chalmers D. & Charman W.N.. The binding interaction of synthetic ozonide antimalarials with natural and modified cyclodextrins. *J. Pharm. Sci.,* 95: 146-158,.

Perry C.S., Chiu F.C.K., McIntosh K.A., Prankerd R.J., Charman W.N. & Charman S.A.. Alteration of the intravenous pharmacokinetics of a synthetic ozonide antimalarial in the presence of a modified cyclodextrin. *J. Pharm. Sci.,* 95: 256-267.

Plebanski, M., Lopez, E., Proudfoot, O., Cooke, B.M., Von Isztein, M. & Coppel, R.L. Economic and practical challenges to the formulation of vaccines against endemic infectious diseases such as malaria. *Methods* 40: 77-85.

Potter SM, Chan-Ling T, Rosinova E, Ball HJ, Mitchell A, Hunt NH. A critical role for Fas–Fas ligand interactions during the terminal neurological processes of experimental cerebral malaria. *J. Neuroimmunol.* 173: 96-107.

Potter SM, Chan-Ling T, Ball HJ, Mitchell A, Maluish L, Mansour H, Hunt NH. Perforin-mediated apoptosis of cerebral microvascular endothelial cells during experimental cerebral malaria. *Int. J. Parasitol.* 36: 485-496.

Price RN, Uhlemann AC, van Vugt M, Brockman A, Hutagalung R, Nair S, Nash D, Singhasivanon P, Anderson TJ, Krishna S, White NJ, Nosten F.
Molecular and pharmacological determinants of the therapeutic response to artemether-lumefantrine in multidrug-resistant *Plasmodium falciparum* malaria. *Clin Infect Dis.* 42: 1570-7.

Riley EM, Wahl S, Perkins DJ & Schofield L. Regulating immunity to malaria. *Parasite Immunology* 28: 35-49.

Rogerson SJ, Menendez C. Treatment and prevention of malaria in pregnancy: opportunities and challenges. *Expert Rev Anti Infect Ther* 4: 687-702.

Rogerson S. What is the relationship between haptoglobin, malaria, and anaemia? *PLoS Med* 3:e200.

Rosenzvit MC, Zhang W, Motazedian H, Smyth D, Pearson M, Loukas A, Jones MK, McManus DP Identification of membrane-bound and secreted proteins from *Echinococcus granulosus* by signal sequence trap. *Int J Parasitol* 36: 123-30.

Rug, M., Prescott, SW., Fernandez, KM., Cooke, BM. & Cowman AF. The role of KAHRP domains in knob formation and cytoadherence of *P falciparum*-infected human erythrocytes. *Blood.* 108: 370-378.

Russell B, Suwanarusk R, Lek-Uthai U. *Plasmodium vivax* genetic diversity: microsatellite length matters. *Trends Parasitol* 22: 399-401.

Sachdeva S, Mohmmed A, Dasaradhi PV, Crabb BS, Katyal A, Malhotra P, & Chauhan VS. Immunogenicity and protective efficacy of *Escherichia coli* expressed *Plasmodium falciparum* merozoite surface protein-1(42) using human compatible adjuvants. *Vaccine*. 24: 207-16

Sanders PR, Kats LM, Drew DR, O'Donnell RA, O'Neill M, Maier AG, Coppel RL, & Crabb BS. A set of glycosylphosphatidyl inositol-anchored membrane proteins of *Plasmodium falciparum* is refractory to genetic deletion. *Infect Immun*. 74: 4330-8

Saliba, K.J., Martin, R.E., Bröer, A., Henry, R.I., McCarthy, C.S., Downie, M.J., Allen, R.J.W., Mullin, K.A., McFadden, G.I., Bröer, S. & Kirk, K. Sodium-dependent uptake of inorganic phosphate by the intracellular malaria parasite. *Nature* 443: 582-585.

Sargeant TJ, Marti M, Caler E, Carlton JM, Simpson K, Speed TP, Cowman AF. Lineage-specific expansion of proteins exported to erythrocytes in malaria parasites. *Genome Biol*. 7: R12.

Scalzo K, Plebanski M, Apostolopoulos V. Regulatory T-cells: immunomodulators in health and disease. *Curr Top Med Chem.* 6: 1759-6

Schofield L & Mueller I. Clinical immunity to malaria. *Curr. Mol. Med.* 6: 205-221.

Sek L., Boyd B.J., Charman W.N. & Porter C.J.H. Examination of the impact of a range of Pluronic surfactants on the *in vitro* solubilisation behaviour and oral bioavailability of lipidic formulations of atovaquone. *J. Pharm. Pharmacol.,* 58: 809-820.

Sekiya, M., Mulcahy, G., Irwin, J.A, Stack, C.M., Donnelly, S.M, Xu, W., Peter Collins, P. & Dalton, J.P. Biochemical characterisation of the recombinant peroxiredoxin (FhePrx) of the liver fluke, *Fasciola hepatica*. *FEBS Lett*. 580: 5016-5022.

Sernee MF, Ralton JE, Dinev Z, Khairallah GN, O'Hair RA, Williams SJ, McConville MJ. *Leishmania* beta-1,2-mannan is assembled on a mannose-cyclic phosphate primer. *Proc Natl Acad Sci U S A.* 103: 9458-63.

Siswantoro H, Ratcliff A, Kenangalem E, Wuwung M, Maristela R, Rumaseuw R, Laihad F, Ebsworth P, Anstey NM, Price RN, Tjitra E. Efficacy of existing antimalarial drugs for uncomplicated malaria in Timika, Papua, Indonesia. *Med J Indonesia* 15: 251-258.

Shao, R., Barker, S. C., Mitani, H., Tabuchi, N., & Fukunaga, M. Molecular mechanisms for the variation of mitochondrial gene content and gene arrangement among parasitic chigger mites of the genus *Leptotrombidium* (Acari: Acariformes). *Journal of Molecular Evolution* 63: 251-261.

Skinner-Adams T.S., Andrews K. T., Melville L ,McCarthy J. & Gardiner D.L. Synergistic interactions of antiretroviral protease inhibitors saquinavir and ritonavir with chloroquine and mefloquine against *Plasmodium falciparum in vitro Antimicrob. Agents Chemother.* 51: 759-762.

Smyth, D.J., Glanfield, A., McManus, D.P., Hacker, J., Blair, D., Anderson, G.J. & Jones, M.K. Two isoforms of a divalent metal transporter (DMT1) in *Schistosoma mansoni* suggest a surface-associated pathway for iron absorption in schistosomes. *Journal of Biological Chemistry* 281: 2242 - 2248.

Spielmann, T., Hawthorne, P.L., Dixon, M.W.A., Hannemann, M., Klotz, K., Kemp, D.J., Klonis, N., Tilley, L., Trenholme, K.R., Gardiner, D.L. A cluster of ring stage-specific genes linked to a locus implicated in cytoadherence in *Plasmodium falciparum* codes for PEXEL negative and PEXEL positive proteins exported into the host cell. *Molecular Biology of the Cell* 17: 3613-24.

Spielmann, T, Gardiner, DL, Beck, HP, Trenholme, KR, Kemp DJ. Organisation of ETRAMPs and EXP-1 at the parasite-host cell interface of malaria parasites. *Mol. Micro*. 59: 779-94.

Spycher C, Rug M, Klonis N, Ferguson DJ, Cowman AF, Beck HP, Tilley L. Genesis of and trafficking to the Maurer's clefts of *Plasmodium falciparum*-infected erythrocytes. *Mol Cell Biol*. 26: 4074-85.

Stark, D., Beebe, N.W., Marriott, D., Ellis, J.T. & Harkness, J. Evaluation of three diagnostic methods, including real-time PCR, for detection of *Dientamoeba fragilis* in stool specimens. *J. Clin. Microbiol*. 44: 232-235.

Stark, D. Beebe, N., Marriott, D., Ellis, J.T. & Harkness, J. Dientamoebiasis: clinical importance and recent advances. *Trends Parasitol.* 22: 92-96

Steen, N.A., Barker, S.C. & Alewood, P.F. A review of the saliva of the Ixodida (ticks). *Toxicon* 47: 1-20.

Tilley, L., Davis, T. & Bray P. Prospects for treatment of drug-resistant malaria parasites. *Future Microbiology* 1: 127-141.

Tonkin CJ, Roos DS, McFadden GI. N-terminal positively charged amino acids, but not their exact position, are important for apicoplast transit peptide fidelity in *Toxoplasma gondii. Mol Biochem Parasitol.* 150: 192-200.

Tonkin CJ, Pearce JA, McFadden GI, Cowman AF. Protein targeting to destinations of the secretory pathway in the malaria parasite *Plasmodium falciparum. Curr Opin Microbiol* 9: 381-7.

Tonkin CJ, Struck NS, Mullin KA, Stimmler LM, McFadden GI. Evidence for Golgi-independent transport from the early secretory pathway to the plastid in malaria parasites. *Mol Microbiol* 6: 614-30.

Tran MH, Pearson MS, Bethony JM, Smyth DJ, Jones MK, Duke M, Don TA, McManus DP, Correa-Oliveira R, Loukas A. Tetraspanins on the surface of *Schistosoma mansoni* are protective vaccine antigens in mice and *Sm*-TSP-2 is selectively recognized by naturally resistant individuals. *Nature Med* 12: 835-40.

Treeck M, Struck NS, Haase S, Langer C, Herrmann S, Healer J, Cowman AF, Gilberger TW. A conserved region in the EBL proteins is implicated in microneme targeting of the malaria parasite *Plasmodium falciparum*. *J Biol Chem*. 281: 31995-2003.

Uboldi AD, Lueder FB, Walsh P, Spurck T, McFadden GI, Curtis J, Likic VA, Perugini MA, Barson M, Lithgow T, Handman E. A mitochondrial protein affects cell morphology, mitochondrial segregation and virulence in *Leishmania. Int J Parasitol*. 36: 1499-514.

Upcroft JA, Dunn LA, Wright JM, Benakli K, Upcroft P, Vanelle P. 5-Nitroimidazole Drugs Effective Against Metronidazole-Resistant *Trichomonas vaginalis* and *Giardia duodenalis. Antimicrob. Agents Chemother*. 50: 344-347

Van Der Heyde HC, Nolan J, Combes V, Gramaglia I, Grau GE. A unified hypothesis for the genesis of cerebral malaria: sequestration, inflammation and hemostasis leading to microcirculatory dysfunction. *Trends Parasitol.* 11: 503-8.

Vincent, B.N., Morrison, R.N., Nowak, B.F. Amoebic Gill Disease (AGD) affected Atlantic salmon *Salmo salar* L. are resistant to subsequent AGD challenge. *Journal of Fish Diseases* 29: 549-559.

Voss TS, Healer J, Marty AJ, Duffy MF, Thompson JK, Beeson JG, Reeder JC, Crabb BS, Cowman AF. A *var* gene promoter controls allelic exclusion of virulence genes in *Plasmodium falciparum* malaria. *Nature* 439: 1004-8.

Wang, L., Yang, Z., Li, Y., Yu, F., Brindley, P.J., McManus, D.P., Wei D., Han,Z., Feng, Z., Li,Y., Hu, W. Reconstruction and *in silico* analysis of the MAPK signaling pathways in the human blood fluke, *Schistosoma japonicum. FEBS Letters* 580: 3677-3686.

Wassmer SC, Cianciolo GJ, Combes V, Grau GE. LMP-420, a new therapeutic approach for cerebral malaria? *Med Sci (Paris)* 22: 343-345.

Wassmer SC, Combes V, Candal F, Juhan-Vague I, Grau GE. Platelets potentiate brain endothelial alterations induced by *Plasmodium falciparum. Infect Immun.* 74: 645-653.

Wassmer SC, De Souza JB, Frere C, Candal FJ, Juhan-Vague I, Grau GE. Tgf-alfa released from activated platelets can induce TNF-stimulated human brain endothelium apoptosis: a new mechanism for microvascular lesion during cerebral malaria. *J Immunol.* 176: 1180-1184.

Williamson AL, Lustigman S, Oksov Y, Deumic V, Plieskatt J, Mendez S, Zhan B, Bottazzi ME, Hotez PJ, Loukas A. *Ac*-MTP-1, an astacin-like metalloprotease secreted by infective hookworm larvae, is involved in tissue migration. *Infect Immun.* 74: 961-7.

Willis C, Fischer K, Walton SF, Currie BJ, & Kemp DJ. Scabies Mite Inactive Serine Protease Paralogues are present both internally in the mite gut and externally in faeces. *American Journal of Tropical Hygiene and Medicine* 75: 683-687

Wilson NS, Behrens GM, Lundie RJ, Smith CM, Waithman J, Young L, Forehan SP, Mount A, Steptoe RJ, Shortman KD, de Koning-Ward TF, Belz GT, Carbone FR, Crabb BS, Heath WR, & Villadangos JA. Systematic activation of dendritic cells by Toll-like receptor ligands or malaria infection impairs cross-presentation and antiviral immunity. *Nat. Immunol*. 7: 165-72

Wykes, M. & Good, M.F. Memory B cell responses and malaria. *Parasite Immunology* 28: 31-34.

Zauner S, Lockhart P, Stoebe-Maier B, Gilson P, McFadden GI, Maier UG. Differential gene transfers and gene duplications in primary and secondary endosymbioses. *BMC Evol Biol*. 6: 38.

Zhang, W., Zhuang, Z. Z., Baoxin, S., Li, J., Hong, Y., Gunlor, T., Xinsheng, D., Yingchun, S., Turhong, Y., Jincheng, W., Jones, M.K. & McManus, D.P. (2006) Vaccination of dogs against *Echinococcus granulosus*, the cause of cystic hydatid disease in humans. *Journal of Infectious Diseases,* 194: 966-974

Zhang, W. & McManus, D.P. Recent advances in the immunology and diagnosis of echinococcosis. *FEMS Immunology and Medical Microbiology* 47: 24-41.

Zhang, D., Pan, W., Qian, L., Duke, M., Shen, L. & McManus, D.P. Investigation of recombinant *Schistosoma japonicum* paramyosin fragments for immunogenicity and vaccine efficacy in mice. *Parasite Immunology;* 28: 77-84.

[3] Frontier Technologies

Babon, J.J., McManus, E.J., Yao, S., DeSouza, D.P., Mielke, L., Willson, T.A., Hilton, D.J, Nicola, N.A., Baca, M., Nicholson, S.E. & Norton, R.S. The structure of SOCS3 reveals the basis of the extended SH2 domain function and identifies an unstructured insertion that regulates protein stability. *Molecular Cell* 22: 205-216.

Bahlo M, Stankovich J, Speed TP, Rubio JP, Burfoot RK, Foote SJ. Detecting genome wide haplotype sharing using SNP or microsatellite haplotype data. *Hum Genet.* 119: 38-50.

Briese, M., Esmaeili, B., Johnson, N. & Sattelle, D. pWormgatePro enables promoter-driven knockdown by hairpin RNA interference of muscle and neuronal gene products in *Caenorhabditis elegans*. *Invertebrate Neuroscience* 6: 5-12.

Cameron, S.L., Barker, S.C. & Whiting, M.F. Mitochondrial genomics and the new insect order Mantophasmatodea. *Molecular Phylogenetics & Evolution* 38: 274-279.

Chai M, McManus DP, McInnes R, Moertel L, Tran M, Loukas A, Jones MK, Gobert GN. Transcriptome profiling of lung derived and *in vitro* derived *Schistosoma japonicum* larvae. *Cell Mol Life Sci.* 63: 919-29.

Charman S.A., Perry C.S., Chiu F.C.K., McIntosh K.A. & Charman W.N. Alteration of the pharmacokinetics of a new chemical entity in the presence of a substituted cyclodextrin. *J. Pharm. Sci.,* 95: 256-267.

Charman, W.N., Charman, S.A. & Porter, C.J.H. Lipid based systems, drug exposure and lead optimisation. In "Optimization of Drug-like Properties During Lead Optimization", Eds. R.T. Borchardt, E.H. Kerns, M.J. Hageman, D. Thakker & J.L. Stevens, Washington DC, Chapter 6, pp. 131-150, 2006.

Cottee PA, Nisbet AJ, Abs EL-Osta YG, Webster TL, Gasser RB. Construction of gender-enriched cDNA archives for adult *Oesophagostomum dentatum* by suppressive subtractive hybridization and a microarray analysis of expressed sequence tags. *Parasitology* 129: 479-490.

Dalton, J. P. Parasite Immune-omics: mapping host-parasite interaction using high-throughput expression libraries. *Parasite Immunol.* 28: 244-245.

de Gruijter JM, Polderman AM, Roberts H, Ziem J, Kunwar CB, Gasser RB. AFLP fingerprinting for the analysis of genetic diversity within *Necator americanus. Molecular and Cellular Probes* 20: 317-321.

De Souza DP, Saunders EC, McConville MJ, Likic VA. Progressive peak clustering in GC-MS Metabolomic experiments applied to *Leishmania* parasites. *Bioinformatics* 22: 1391-6.

Feng, Z.P., Zhang, X., Han, P., Arora, N., Anders, R.F. & Norton, R.S. Abundance of intrinsically unstructured proteins in *P. falciparum* and other apicomplexan parasite proteomes. *Mol Biochem Parasitol.* 150:2 56-67.

Gatton, M.L., Peters, J.M, Gresty, K., Fowler, E.V., Chen, N. & Cheng Q. Detection sensitivity and quantitation of *Plasmodium falciparum var* gene transcripts by real-time RT-PCR in comparison with conventional RT-PCR. *Am. J. Trop. Med. Hyg.* 75: 212-218.

Gasser RB. Molecular tools – advances, opportunities and prospects. *Veterinary Parasitology* 36: 69-89.

Gasser RB. Molecular technologies in parasitology, with an emphasis on genomic approaches for investigating parasitic nematodes. *Parassitologia* 48: 9-11.

Gobert, G.N., McInnes, R., Moertel, L., Jones, M.K., Hu, W., McManus, D.P. Transcriptomics tool for the human blood flukes *Schistosoma* using microarray gene expression profiling. *Experimental Parasitology* 114: 160-172.

Gooley PR, Mertens HD, Tull D, McConville MJ. (1)H, (13)C and (15)N Resonance Assignments of SMP-1: A Small Myristoylated Protein from *Leishmania major. J Biomol NMR.* 36(suppl. 5):26.

Guerrero, F.D., Nene, V.M., George, J.E., Barker, S.C., & Willadsen, P. Sequencing a new target genome: the southern cattle tick, *Boophilus microplus* (Acari: Ixodidae). *Journal of Medical Entomology* 43: 9-16.

Han, P-F., Zhang, X-Z., Norton, R.S. & Feng, Z-P. Predicting disordered regions in proteins based on decision trees of reduced amino acid composition. *Journal of Computational Biology* 13: 1579-1590.

Hotez PJ, Bethony J, Bottazzi ME, Brooker S, Diemert D, Loukas A. New Technologies for the Control of Human Hookworm Infection. *Trends Parasitol* 22: 327-31

Hu M & Gasser RB. Mitochondrial genomes of parasitic nematodes: progress and perspectives. *Trends in Parasitology* 22: 78-84

Inoue M, Uga S, Oda T, Rai SK, Vesey G, Hotta H. Changes of physical and biochemical properties of *Cryptosporidium* oocysts with various storage conditions. *Water Res.* 40: 881-9

Jones, M.K. & Good, M.F. Malaria parasites up close. *Nature Medicine* 12: 170-171.

Kalkanidis, M., Pietersz G., Xiang, S., Crimeen, B., Ardijpadjia, K., Mottram, P.M. & Plebanski, M. Methods for nanoparticle vaccine formulation and evaluation of immunogenicity. *Methods* 40: 20-29.

Katneni K., Charman S.A., Porter C.J.H. Permeability assessment of poorly water soluble compounds under solubilising conditions: The reciprocal permeability approach. *J. Pharm. Sci.,* 95: 2170-2185.

Kennedy NJ, Spithill TW, Tennent J, Wood PR & Piedrafita D. DNA vaccines in sheep: CTLA-4 mediated targeting and CpG motifs enhance immunogenicity in a DNA prime/protein boost strategy. *Vaccine* 24: 970-979

Kosaisavee V, Suwanarusk R, Nosten F, Kyle DE, Barrends M, Jones J, Price R, Russell B, Lek-Uthai U. *Plasmodium vivax*: isotopic, PicoGreen, and microscopic assays for measuring chloroquine sensitivity in fresh and cryopreserved isolates. *Exp Parasitol*. 114: 34-9.

Laha T, Kewgrai N, Loukas A, Brindley PJ. The *dingo* non-long terminal repeat retrotransposon from the genome of the hookworm, *Ancylostoma caninum. Exp Parasitol* 113: 142-53.

Liu, F., Lu, J., Hu, W., Wang, S-Y., Cui, S-J., Chi,, M., Yan, Q., Wang, X-R., Song, H-D., Xu, X-N., Wang, J-J., Zhang, X-L., Zhang, X., Wang, Z-Q., Xue, C-L., Brindley, P.J., McManus D.P., Yang, P-Y., Feng Z., Chen, Z. & Han, Z-G. New perspectives on host parasite interplay by comparative transcriptomic and proteomic analyses of the human blood fluke *Schistosoma japonicum*. *PLOS Pathogens* 2: e29.

Maier AG, Braks JA, Waters AP, Cowman AF. Negative selection using yeast cytosine deaminase/uracil phosphoribosyl transferase in *Plasmodium falciparum* for targeted gene deletion by double crossover recombination. *Mol Biochem Parasitol*. 150: 118-21.

McManus, D.P. Molecular characterization of taeniid cestodes. *Parasitology International* 55S:S31-S37.

Moertel, L., McManus, D.P., Piva, T.J., Young, L., McInnis, R.L & Gobert, G.N. Oligonucleotide microarray analysis of strain- and gender- associated gene expression in the human blood fluke, *Schistosoma japonicum*. *Molecular and Cellular Probes* 20: 280-289.

Morrison R.N., Cooper G.A., Koop B.F., Rise M.L., Bridle A.R., Adams M.B., Nowak B.F. Transcriptome profiling of the gills of amoebic gill disease (AGD)-affected Atlantic salmon (*Salmo salar* L.) - A role for the tumor suppressor protein p53 in AGD-pathogenesis? *Physiological Genomics,* 26: 15-34.

Moyle, P.M., Olive, C., Good, M.F. & Toth, I. Method for the synthesis of highly pure vaccines using the lipid core peptide system. *Journal of Peptide Science* 12: 800-807.

Nicolazzo J.A., Charman S.A. & Charman W.N. Methods to assess drug permeability across the blood-brain barrier. *J. Pharm. Pharmacol.,* 58: 281-293.

Nikoalou, S. & Gasser, R.B. Prospects for exploring molecular developmental processes in *Haemonchus contortus*. *International Journal Parasitology* 36: 859-868

Persson KE, Lee CT, Marsh K, Beeson JG. Development and optimization of high-throughput methods to measure *Plasmodium falciparum*-specific growth inhibitory antibodies. *J Clin Microbiol*. 44: 1665-73.

Rae C, Moussa CEH, Griffin JL, Parekh SB, Bubb WA, Hunt NH, Balcar VJ. A metabolomic approach to ionotropic glutamate receptor subtype function: a nuclear magnetic resonance in vitro investigation. *J. Cerebr. Blood Flow Metab.* 26: 1005-1017.

Ranjit N, Jones MK, Stenzel DJ, Gasser RB, Loukas A. A survey of the intestinal transcriptomes of the hookworms *Ancylostoma caninum* and *Necator americanus* using tissues extracted after laser microdissection microscopy. *International Journal for Parasitology* 36: 701-710.

Rosenzvit MC, Zhang W, Motazedian H, Smyth D, Pearson M, Loukas A, Jones MK, McManus DP. Identification of membrane-bound and secreted proteins from *Echinococcus granulosus* by signal sequence trap. *Int J Parasitol* 36: 123-30.

Ross JA, Zvyagin AV, Heckenberg NR, Upcroft JA, Upcroft P, Rubinstein-Dunlop H. Measurment of action spectra of light-activated processes. *J Biomed Opt* 11: 14008.

Sedgmen B.J., Lofthouse S.A. & Meeusen, E.N.T.. The ovine nasal mucosa: an alternative tissue site for mucosal immunization. *Methods* 38: 112-116

Spielmann T, Dixon MWA, Hernandez-Valladares M, Hannemann M, Trenholme KR, & Gardiner DL. Reliable transfection of *Plasmodium falciparum* using non-commercial plasmid mini preparations. *Int. J. Parasitol*. 36: 1245-8.

Stankovich J, Cox CJ, Tan RB, Montgomery DS, Huxtable SJ, Rubio JP, Ehm MG, Johnson L, Butzkueven H, Kilpatrick TJ, Speed TP, Roses AD, Bahlo M, Foote SJ. On the utility of data from the International HapMap Project for Australian association studies. *Hum Genet.* 119: 220-2.

Upcroft JA, Delgadillo-Correa MG, Dunne RL, Sturm AW, Johnson PJ, Upcroft P. Genotyping *Trichomonas vaginalis*. *Int J Parasitol* 36: 821-28.

van der Peet P, Gannon CT, Walker I, Dinev Z, Angelin M, Tam S, Ralton JE, McConville MJ, Williams SJ. Use of click chemistry to define the substrate specificity of *Leishmania* beta-1,2-mannosyltransferases. *Chembiochem.* 7: 1384-91.

van Dooren GG, Stimmler LM, McFadden GI. Metabolic maps and functions of the *Plasmodium* mitochondrion. *FEMS Microbiol Rev.* 30: 596-630.

Xiang, S, Scholzen, A., David, C., Minigo, G., Apostolopoulos, V., Mottram, P.M. & Plebanski M. Pathogen recognition and the development of particulate vaccines- does size matter? *Methods* 40: 1-9.

Zawadzki, J.L., Presidente, P.J.A., Meeusen, E.N. & De Veer, M.J. RNAi in *Haemonchus contortus*: a potential method for target validation. *Trends in Parasitology,* 22: 495-499

[4] Safeguarding Australia

Aiken, H., Hayward, C, Nowak, B.F. An epizootic and its decline of a blood fluke, *Cardicola forsteri* in farmed Southern Bluefin Tuna, *Thunnus maccoyii*. *Aquaculture,* 254: 40-45.

Attard, M., Crosbie, P.B.B., Adams, M.B., Nowak, B.F. A preliminary study into the effects of seawater acclimation on the progression of Amoebic Gill Disease (AGD) in out of season Atlantic salmon *(Salmo salar*, L.). *Bulletin of the European Association of Fish Pathologists*, 26: 275-279.

Barta, JR & Thompson, RCA. What is *Cryptosporidium*? – Time to reappraise its biology, taxonomy and phylogenetic affinities. *Trends in Parasitology*, 22: 463-468.

Bruno, D.W., Nowak, B., Elliott, D.G. Guide to identification of fish protozoan and metazoan parasites in stained tissue sections. *Diseases of Aquatic Organisms,* 70: 1-36.

Colditz Ian G., Le Jambre L.F., Sandeman R.M., Palmer D.G., & Besier R.B. New diagnostic tools for monitoring parasites of sheep. *International Journal of Sheep and Wool Science* 54: 9-13.

Cooper, R.D., Waterson, D.G.E., Frances, S. P., Beebe N.W. and Sweeney, A.W. The anopheline fauna of Papua New Guinea. *J. Am. Mosq. Control Assoc*. 22: 213-231.

Ellis, M., Li, Y.S., Rong, Z., Chen, H. & McManus, D.P. Familial aggregation of human infection with *Schistosoma japonicum* in the Poyang Lake region, China. *International Journal for Parasitology* 36: 71-77.

Ferguson C, Deere D, Sinclair M, Chalmers RM, Elwin K, Hadfield S, Xiao L, Ryan U, Gasser R, Abs EL-Osta Y, Stevens M - Application of Genotyping Methods to Assess Risks from *Cryptosporidium* in Watersheds. *Environmental Health Perspectives* 114: 430-434.

Goff WL Molloy JB Johnson WC Suarez CE Pino IRhalem A Sahibi H Ceci L Carelli G Adams DS McGuire TC Knowles DP & McElwain TF. Validation of a Competitive Enzyme-Linked Immunosorbent Assay for Detection of Antibodies against *Babesia bovis. Clinical and Vaccine Immunology* 13: 1212–1216.

Hall CA, Reichel MP, Ellis JT. Prevalence of *Neospora caninum* infection in Australian (NSW) dairy cattle estimated by a newly validated ELISA for milk.
Vet Parasitol. 142: 173-8

Hall CA, Reichel MP, Ellis JT. Performance characteristics and optimisation of cut-off values of two enzyme-linked immunosorbent assays for the detection of antibodies to *Neospora caninum* in the serum of cattle. *Vet Parasitol.* 140: 61-8

Hampton, J, Spencer, PBS, Elliot, AD, Thompson, RCA. Prevalence of zoonotic pathogens from feral pigs in major public drinking water catchments in Western Australia. *EcoHealth*: 3:103-108.

Jacobson CL, Bell K, Forshaw D, Besier RB. (2006) Investigation of causes of “low worm egg count diarrhoea” in sheep in Western Australia. *Proceedings Australian Sheep Veterinarians Annual Conference (Wagga Wagga NSW, Sept. 2006)* 16: 188-197.

Jenkins D.J., McKinlay A., He D. Bradshaw H. & Craig P.S. Detection of *Echinococcus granulosus* coproantigens in faeces from naturally infected rural domestic dogs in south eastern Australia. *Australian Veterinary Journal* 84; 12-16.

Jenkins D.J. *Echinococcus granulosus* in Australia, widespread and doing well! *Parasitology International* 35; 733-740.

Kapel, CM, Torgerson, PR, Thompson, RC, Deplazes, P. Reproductive potential of *Echinococcus multilocularis* in experimentally infected foxes, dogs, raccoon dogs and cats. *Int J Parasitol*. 36: 79-86.

Le, T.H., De, N.V, Blair, D. Sithitharworn, P. & McManus, D.P. *Clonorchis sinensis* and *Opisthorchis viverrini*: development of a mitochondrial DNA-based multiplex PCR for their identification and discrimination. *Experimental Parasitology* 112: 109-114.

Le, T.H., De, N.V., Blair, D., McManus, D.P., Kino, H. & Agatsuma, T. *Paragonimus heterotremus* Chen & Hsia, 1964, in Vietnam: a molecular identification and phylogeny of isolates from different hosts and geographic origins. *Acta Tropica* 98: 25-33.

Lee, N., Baker, J., Bell, D., McCarthy, J. & Cheng, Q. Assessing the genetic diversity of *Plasmodium falciparum* and *Plasmodium vivax* aldolases and its potential effect on the performance of Aldolase-based Rapid Diagnostic Tests (RDTs). *J Clin Microb* 44: 4547-4549.

Li MW, Zhu XQ, Gasser RB, Lin RQ, Sani RA, Lun ZR, Jacobs DE. The occurrence of *Toxocara malaysiensis* in cats in China, confirmed by sequence-based analyses of ribosomal DNA. *Parasitology Research* 99: 554-557.

McManus, DP. Genetic Discrimination of *Echinoccocus* species and strains.In: *Parasitic Flatworms*: *Molecular Biology, Biochemistry, Immunology and Physiology* (eds. Maule, A.; Marks, N.J.). pp 81-95. CABI. Wallingford, Oxon, U.K.

McInnes, L.M., Irwin, P., Palmer, D. G., Ryan, U.M. *In vitro* Isolation and Characterisation of the First Canine *Neospora caninum* isolate in Australia. *Veterinary Parasitology*. 137: 355-63

McInnes, L., Ryan, U. M., O'Handley, R., Sager, H., Forshaw, D., Palmer, D. Diagnostic significance of *Neospora caninum* DNA detected by PCR in cattle serum. *Veterinary Parasitology*. 142: 207-13.

McMeniman, C. J. & Barker, S. C. Transmission ratio distortion in the human body louse, *Pediculus humanus* (Insecta: Phthiraptera). *Heredity* 96: 63-68.

McMillen L & Lew AE. Improved detection of *Tritrichomonas foetus* in bovine diagnostic specimens using a novel probe-based real time PCR assay. *Veterinary Parasitology* 141: 204-215.

Molad, T., Mazuz, M.L., Fleiderovitz, L., Fish, L., Savitsky, L., Krigel, Y., Leibovitz, B., Molloy, J., Jongejan, F. & Shkap, V. Molecular and serological detection of *A. centrale*- and *A. marginale*-infected cattle grazing within an endemic area. *Veterinary Microbiology* 113: 55-62.

Morris GM, Gasser RB. Biotechnological advances in the diagnosis of avian coccidiosis and the detection of genetic variation in *Eimeria*. *Biotechnology Advances* 24: 590-603.

Naidich, A., McManus, D.P., Canova, S.G., Gutierrez, A.M., Zhang, W., Guarnera, E.A. & Rosenzvit, M.C. Patent and pre-patent detection of *Echinococcus granulosus* in the definitive host. *Molecular and Cellular Probes* 20: 5-10.

Njiru, ZK, Constantine, CC, Masiga, DK, Reid, SA, Thompson, RC, Gibson, WC. Characterization of *Trypanosoma evansi* type B. *Infection Genetics and Evolution*, 6: 292-300.

Nowak, B.N., La Patra, S. Epitheliocystis in teleost fish - a review. *Journal of Fish Diseases*, 29: 573-588.

Nowak, B., Mladineo, I., Aiken, H., Bott, N., Hayward, C. Results of health surveys of two species of farmed tuna: southern bluefin tuna (*Thunnus maccoyii*) in Australia and northern bluefin tuna (*Thunnus thynnus*) in the Mediterranean. *Bulletin of European Association of Fish Pathologists,* 26: 38 - 42.

O'Brien DP, Leder K, Matchett E, Brown GV, Torresi J. Illness in returned travelers and immigrants/refugees: the 6-year experience of two Australian infectious diseases units. *J Travel Med.* 13: 145-5

O'Neill, S.M., Mulcahy, G., Dalton, J.P. Isolation of Cathepsin L and use in the serological diagnosis of human fasciolosis. In Food Borne Pathogens: Methods and Protocols. (Catherine Adley, Ed.). pp191-202. Humana Press Inc., Totowa, NJ, USA.

Panaretto KS, Dallachy D, Larkins S, Manessis V, Tabrizi S, Upcroft J, Garland S. Cervical smear participation and prevalence of sexually transmitted infections in urban Aboriginal and Torres Strait Islander women in Queensland. *Aust N Z J Public Health* 30: 171-6.

Parkar, U, Traub, RJ, Kumar, S, Mungthin, M, Vitali, S, Leelayoova, S, Morris, K & Thompson, RCA. Direct characterisation of *Blastocystis* from faeces by PCR and evidence of zoonotic potential. *Parasitology* 134: 1-9.

Pasay C, Walton S, Fischer K, Holt D, Mc Carthy JS. A PCR-based assay to survey for knockdown resistance to pyrethroid acaricides in human scabies mites (*Sarcoptes scabiei var hominis*) *Am J Trop Med Hyg*. 74: 649-57.

Peng W, Yuan K, Peng G, Zhou X, Hu N, Hu M, Gasser RB. Experimental infections of pigs and mice with particular genotypes of *Ascaris. Parasitology.* 133: 651-657.

Ritchie, S.A., Moore, P., Russell, R., Carruthers, M., Williams, C., Montgomery, B., Foley, P., Ahboo, S.,van den Hurk, A.F., Lindsay, M.D., Cooper, R.D., Beebe, N.W. & Russell, R.C. Discovery of a widespread infestation of *Aedes albopictus* in the Torres Strait, Australia. *J. Am. Mosq. Cont. Assoc*. 22: 358-65.

Savioli, L, Smith, H, Thompson, A. *Giardia* and *Cryptosporidium* join the 'Neglected Diseases Initiative'. *Trends Parasitol*. 22: 203-208.

Signor RS, Ashbolt NJ. Pathogen monitoring offers questionable protection against drinking-water risks: a QMRA (quantitative microbial risk analysis) approach to assess management strategies. *Water Sci Technol.* 54: 261-8

Smith, HV, Caccio, SM, Tait A, McLauchlin, J, Thompson, RC. Tools for investigating the environmental transmission of *Cryptosporidium* and *Giardia* infections in humans. *Trends Parasitol*. 22: 160-167.

Stark DJ, Fotedar R, Ellis JT, Harkness JL. Locally acquired infection with *Entamoeba histolytica* in men who have sex with men in Australia. *Med J Aust.* 185: 417

Stark, D., Beebe, N.W., Marriott, D., Ellis, J.T. & Harkness, J. Evaluation of three diagnostic methods, including real-time PCR, for detection of *Dientamoeba fragilis* in stool specimens. *J. Clin. Microbiol*. 44: 232-235.

Sweeney, A.W., Beebe, N.W., Cooper, R.D., Bauer, J.T. & Peterson, A.T. Environmental factors associated with the distribution and range limits of the malaria vector *Anopheles farauti sensu stricto* in Australia. *J. Med. Entomol.* 48: 1063-1075.

Thompson, RC, Boxell, AC, Ralston, BJ, Constantine, CC, Hobbs, RP, Shury, T, Olson, ME. Molecular and morphological characterization of *Echinococcus* in cervids from North America. *Parasitology* 132: 439-447.

Thompson, RC, Kapel, CM, Hobbs, RP, Deplazes, P. Comparative development of *Echinococcus multilocularis* in its definitive hosts. *Parasitology*. 19: 1-8

Traub, RJ, Hobbs, RP, Adams, PJ, Behnke, JM, Harris, PD, Thompson, RCA. A case of mistaken identity – Reappraisal of the species of canid and felid hookworms (*Ancylostoma*) present in Australia and India. *Parasitology* 134: 113-119

Varcasia, V., Canu, S., Lightowlers, M.W., Scala, A & Garippa, G. Molecular characterization of *Echinococcus* strains from Sardinia. *Parasitology Research* 98: 273-277.

Verweij JJ, Campbell BE, Gasser RB - Differentiation of *Entamoeba histolytica* from *Entamoeba dispar* by PCR-coupled non-isotopic single-strand conformation polymorphism (SSCP) analysis. *Electrophoresis.* 27: 4419-22.

Yang, Y.R., Sun, T., Zhang, J.Z. & McManus, D. P. Molecular confirmation of a case of multi-organ cystic echinococcosis. *Journal of Parasitology* 92: 206-208.

Yang, Y.R., Ellis, M., Sun, T., Li, Z., Li, X., Vuitton, D.R. Bartholomot, B., Giradoux, P., Craig, P.S., Boufana, B., Wang, Y., Feng, X., Wen, H., Ito, A. & McManus, D.P. Unique family clustering of human echinococcosis cases in a Chinese community. *American Journal of Tropical Medicine and Hygiene* 74: 487-494.

Yang, Y.R., Vuitton, D.R. Bartholomot, B.,Wang, Y.H., Ito, A., Craig, P.S., & McManus, D.P. Simultaneous alveolar and cystic echinococcosis of the liver. *Transactions of the Royal Society of Tropical Medicine and Hygiene* 100: 597-600.

Yang, Y.R., Cheng, L., Yang, S.K, Pan, X., Sun, T., Li, X., Hu, S., Zhao, R., Craig, P.S., Vuitton, D.A. & McManus, D.P. A hospital-based retrospective survey of human cystic and alveolar echinococcosis in Ningxia Hui Autonomous Region, PR China. *Acta Tropica* 97: 284-291.

Yang, Y.R., Williams, G.M., Craig, P.S., Sun, T., Yang, S.K., Cheng, L., Vuitton, D.A., Giraudoux, P., Li, X., Hu, S., Liu , X., Pan, X. & McManus, D.P. Hospital and community surveys reveal the severe public health problem and socio-economic impact of human echinococcosis in Ningxia Hui Autonomous Region, China. *Tropical Medicine and International Health* 11: 880-888.

Yang, Y.R., Sun , T., Li, Z., Zhang, J., Teng, J., Liu, X., Liu, R., Zhao, R., Wang, Y., Wen, H., Feng, X., Zhao, Q., Zhao, Y., Shi, D., Bartholomot, B., Vuitton, D.A., Pleydell, D., Giraudoux, P., Ito, A., Danson, M.F., Boufana, B., Craig, P.S., Jones, M.K., Williams, G.M. & McManus, D.P. Community surveys and risk factor analysis of human alveolar and cystic echinococcosis in Ningxia Hui Autonomous Region, PR China. *Bulletin of the World Health Organisation* 84: 714-721.

Zalunardo M., Cargill C., & Sandeman RM. (2006) Identification of auto-antigens in skin scrapings from scabies infected pigs. *International Journal for Parasitology* 36: 1133-1141.

Grants

ARC/NHMRC Research Network for Parasitology scientists were very successful in the 2006 ARC and NHMRC funding rounds, being awarded over twenty grants and fellowships worth over $13 million:

ARC Federation Fellowship

Geoff McFadden (The University of Melbourne)

ARC Discovery Projects

Kiaran Kirk and Kevin Saliba (Australian National University)
Ion transport in the malaria parasite and parasitised erythrocyte

Georges Grau and Nick Hunt (The University of Sydney)
Microparticles as effectors of microvascular alterations in brain inflammation

ARC Linkage Projects

Andrew Thompson, Alan Lymbery and colleagues (Murdoch University)
The nature, diversity and potential impact of infectious agents in Western Australian threatened mammals

Shelley Walton (Menzies School of Health Research) and colleagues
Evaluating the impact of new interdisciplinary interventions to enhance dog health to benefit community health outcomes in remote Indigenous communities

John Ellis (University of Technology, Sydney) and colleagues
Gastrointestinal parasites and their diagnosis

ARC Linkage International Project

Robin Gasser, Aaron Jex (The University of Melbourne) and Dr DT Littlewood (UK)
A high-throughput method for unlocking the mitochondrial genomes of significant pathogens

ARC Linkage Infrastructure, Equipment and Facilities Grant

Frances Separovic (The University of Melbourne), Mibel Aguilar (Monash University) and Leann Tilley (LaTrobe University)
Membrane protein structure and function facility

NHMRC Project Grants and Fellowships

Kiaran Kirk (Australian National University)
Chloroquine resistance and the physiology of the malaria parasite's digestive vacuole

Ian Clark (Australian National University)
Research Fellowship

Georges Grau, David Cook, Nick Hunt (The University of Sydney)
Relationship between cell-cell interactions and disease severity in patients with cerebral malaria

Shelley Walton, Bart Currie (Menzies School of Health Research)
An immunodiagnostic assay for scabies

Alex Loukas, Mal Jones (Queensland Institute of Medical Research)
Role of tetraspanins in the schistosome tegument

Mal Jones, Alex Loukas, Don McManus (Queensland Institute of Medical Research)
Transport pathways of host-derived iron in schistosome parasites

Don McManus, Geoff Gobert (Queensland Institute of Medical Research), Paul Brindley (Tulane University)
Transcriptome profiling of the human pathogen Schistosoma japonicum

Michelle Wykes, Michael Good, Susan Pierce (Queensland Institute of Medical Research)
Malaria and long term immunity

Dave Kemp (Queensland Institute of Medical Research)
Research Fellowship

Alex Loukas (Queensland Institute of Medical Research)
Research Fellowship

Alyssa Barry (Burnett Institute)
Howard Florey Centenary Fellowship

Leann Tilley (LaTrobe University)
Trafficking of the cytoadherance-mediating protein to the host cell surface in malaria parasite-infected erythrocytes

Bernd Kalinna (The University of Melbourne), Paul Brindley (Tulane University)
Transduction of Schistosoma mansoni using Boudicca, an endogenous retrotransposon of schistosomes

Brendan Crabb, Stuart Ralph (Walter and Eliza Hall Institute of Medical Research)
Epigenetic control of antigenic variation in Plasmodium falciparum

Alex Maier, Melanie Rug (Walter and Eliza Hall Institute of Medical Research)
Functional genomic analysis of exported DNA J molecules in the malaria parasite Plasmodium falciparum

Tim Davis, Harin Karunajeewa, Ivo Mueller, Kevin Batty, Prof Ken Ilett (The University of Western Australia), A/Prof Stephen Rogerson (The University of Melbourne)
Antimalarial drugs in pregnancy: preclinical and clinical studies of conventional and novel agents

Network Participants also secured aprroximately $5 million from a variety of other Australian funding bodies, foundations and through commercial partnerships:

RobIn Gasser, Aaron Jex and Bronwyn Campbell (The University of Melbourne)
Catchment sources of waterborne pathogens (Melbourne Water Corporation)

Robin Gasser (the University of Melbourne) and colleagues
Molecular diagnosis of ovine parasitism (Meat and Livestock Australia)

Chris Engwerda (Queensland Institute of medical Research) and colleagues
Charaterisation of the immunomodulatory properties of bromelain cystein proteases (Sarantis Ltd)

Wayne Jorgensen and Ala Lew (Queensland Department of Primary Industries and Fisheries)
A cattle tick vaccine for tropical and subtropical beef industries; a reverse vaccinology genomics approach (QLD Department of State Development and Trade Smart State Fund)

Thomas Cribb (The University of Queensland)
Taxonomy and host-specificity of Oipecoelidae of tropical Australian fishes (Australian Biological Resources Study)

Shelley Walton (Menzies School of Health Research)
Australian Leishmania lifecycle investigation (Australian Biosecurity CRC)

William Charman and Susan Charman (Monash University)
Lead optimisation studies (A collaborative funding venture with several commercial partners through the Centre for Drug Candidate Optimisation)

Rob Adlard (Queensland Museum)
Identification of host interactions in the lifecycle of QX disease (Fisheries Research and Development Corporation)

James McCarthy (Queensland Institute of Medical Research)
Queensland Clinical Research Fellowship (QLD Government)

Michael Good, James McCarthy and Alberto Pinzon-Charry (Queensland Institute of Medical Research)
Vaccine studies of human malaria (Australian Rotary Health Research Fund)

Alyssa Barry (Burnett Institute)
Innovation Fellowship (Victorian Endowment for Science Knowledge and Innovation)

Georges Grau (The University of Sydney)
Statins, microparticles and cerebral malaria (Rebecca Cooper Foundation)

Mark Sandeman (LaTrobe University)
The identification of target molecules to produce new controls for blowfly strike on sheep (Australian Wool Innovation)

Eithne Cunningham and John Dalton (Institute for the Biotechnology of Infectious Diseases, UTS)
Australian-Europe Endeavour Scholaraship (Department of Education, Science and Technology)

John Barta and Andrew Thompson (Murdoch University)
Endeavour Australian Research Fellowship (Department of Education, Science and Technology)

Network Participants were also partners in grants worth over $20 million from diverse international agencies including WHO/TDR, the DANA Foundation for Human Immunology, Foundation for Innovative New Diagnostics, the Wellcome Trust, the Bill and Melinda Gates Foundation, the Royal Society (UK), the Wain International Travel Fellowship scheme, Enterprise Ireland, European Union FP6 Program and the Medicines for Malaria Venture:

Malcolm Jones & Geoff Gobert (Queensland Institute of Medical Research)
A hidden antigen approach to schistosomiasis vaccination (WHO TDR)

Andrew Thompson and Zablon Njiru (Murdoch University)
Novel diagnostics for Human African Sleeping Sickness (HAT) (Foundation for Innovative New Diagnostics - FIND - www.finddiagnostics.org)

Don McManus (Queensland Institute of Medical Research, Australia), Yuesheng Li (Hunan Institute of Parasitic Diseases, China), Thomas Wynn (National Institutes of Health, USA)
Immunopathogenic mechanisms in human schistosomiasis (WHO TDR)

Don McManus, Geoff Gobert and Paul Brindley (Queensland Institute of Medical Research and Tulan University)
Transcriptome profiling of the human pathogen Schistosoma japonicum (DANA Foundation for Human Immunology)

Peter Hotez and Alex Loukas (George Washington University & the Sabin Vaccine Institute and the Queensland Institute of Medical Research)
Development and clinical testing of the Na-APR-1 hookworm vaccine.
Bill and Melinda Gates Foundation

Shelley Walton and Bart Currie (Menzies School of Health Research)
An immunodiagnostic assay for scabies (The Royal Society, UK)

Georges Grau (The University of Sydney) and colleagues
The role of von Willebrand Factor in malaria pathogenesis (Wellcome Trust)

Mark Robertson and John Dalton (Institute for the Biotechnology of Infectious Diseases, UTS)
Immunoregulation in helminth parasites (Wain International Travel Fellowship)

Grace Mulcahy (University College Dublin) and John Dalton (Institute for the Biotechnology of Infectious Diseases, UTS)
Vaccine for sea lice of salmonids (Enterprise Ireland)

John Dalton (Institute for the Biotechnology of Infectious Diseases, UTS)
Sustainable control of liver fluke disease in Europe (European Union FP6 Programme)

William Charman and Susan Charman (Monash University
New inhibitors of Plasmodium dihydrofolate reductase (Medicines for Malaria Venture)

William Charman and Susan Charman (Monash University)
Identification of a potent orally active antmalarial trioxaline (Medicines for Malaria Venture)

- **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 (19 out of 23 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 will be 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 – Alberto Pinzon-Charry (QIMR) and Lukasz Kierdzaski (WEHI) were the 2006 awardees and will represent the Network at the 2007 BioMalPar conference and a special workshop on leishmaniasis, hosted by COST B22, respectively.
[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.

Additionally, Professor Opperdoes and Associate Professor Smith co-organised “The International Symposium on Therapies for Parasitic Diseases”, held in conjunction with the ASP and ARC/NHMRC Research Network for Parasitology conference in July, 2006. Several very high profile speakers were secured to speak at the symposium (though, unfortunately, Professor Opperdoes was himself a late withdrawal).

The Network’s links to COSTB22 were featured in the November, 2006 edition of *“Feast Focus”*, the regular news magazine of the Forum for European-Australian Science and Technology Cooperation (see article below).

Research & development expenditure by business sector in 2002-2003 (as % of total R&D expenditure)

Japan:	73.9
Sweden:	71.9
USA:	67.3
EU (25):	55.4
Australia:	48.8
UK:	46.7

Source: Eurostat and ABS

Drug development for parasitic diseases

The main objective of the COST Action B22 that started in 2003 is to support identification, evaluation and development of new drugs to treat protozoal diseases, with emphasis on the tropical diseases such as malaria, leishmaniasis, human African trypanosomiasis (sleeping sickness) and S. American trypanosomiasis (Chagas disease). The Action works to provide a wide body of expertise and to maintain close contacts between academia, the pharmaceutical industry and international organizations. Among the latest the Australian Research Network for Parasitology has developed efficient tools to be part of the action and other international projects

B22

The presentation of this COST Action (see page 7) was made by the researchers who met through the previous COST Action B9 "*Chemotherapy of Protozoal Infections*" that was due to end in 2002. While this previous action's aim was to develop links between experts in EU countries, the new COST proposal exploits the identified expertise and link groups in academia and industry together along the established drug development structure "*from molecules to man*".

COST's strength is that it does not provide financial support for research activities. However, the group of scientists who interact and develop collaborations through the Action, either in the management of or through regular participation in COST activities, represents a considerable body of expertise (building on knowledge and skills), in that case ranging from molecular biology to chemistry and pharmacology. The integration of a group of European (and beyond) scientists that have proven research productivity adds to applications for financial support for research projects.

The major activity in the COST Action is the expert meetings and workshops held by the five working groups that address specific stages of the drug identification and development process:

- drug target identification;
- target characterisation and inhibitor design;
- drug evaluation;
- preclinical development; and
- drug resistance.

Other activities include scientific missions. They are short term scientific missions for the training, the development of joint projects and the development of contacts for junior researchers. Finally, annual conferences are another vehicle for the action's goal in forging links inside and outside Europe. The 4th Annual Conference for the Cost B22 action will be organised in June 2007 in Dundee, Scotland.

Working together

The ARC/NHMRC Research Network for Parasitology has established links with international networks like COST B22 to share information about the activities of these networks and other news. Dr. Frederik Opperdoes (chairman of the Action B22) is an international member of the Network advisory board and Nick Smith (Network Convenor, University of Technology, Sydney) sits as an observer on the COST B22 Management Group.

"*Each year we look to include speakers from COST B22 in our annual conference and look at ways to co-organise conferences*" says Nick Smith, the Convenor of the ARC/NHMRC Research Network for Parasitology. This year Simon Croft (London School of Hygiene and Tropical Medicine and initiator of the COST action) was one of the Keynote speakers at the ASP & Network conference in July in Queensland. "*We also have an agreement to include the annual winners of our Network Early Career Researcher Award as invited speakers in the COST B22 conference (when appropriate for our Awardee). Our Network Travel Grants Scheme often supports Australian scientists to travel overseas for Researcher Exchanges or to attend internationally-based training courses and thus we have many successful collaborations between Australian and international laboratories*".

Sources Nick Smith and Lisa Jones

ARC/NHMRC Research Network for Parasitology

The Network is funded under the Australian Research Council's Special Research Initiatives Scheme. It is also supported by the National Health and Medical Research Council, the Australian Society for Parasitology and other organisations around Australia. The Network's membership is drawn from 60 research laboratories from 26 different universities and other research organisations around Australia. The aim of the ARC/NHMRC Research Network for Parasitology is to:

- investigate parasites and the diseases they cause humans and animals;
- develop treatments and means of eradication of parasites;
- develop early detection systems that can warn when Australia's quarantine barriers have been broken;
- promote Australia as a centre for parasitic research; and
- foster scientific interaction both within Australia and internationally and create an exciting, multidisciplinary research environment for Australian parasitology.

For more information about the ARC/NHMRC Network: http://www.parasite.org.au/arcnet/
and more information about the COST action B22: www.icp.ucl.ac.be/cost/costB22

A sponsorship arrangement with Elsevier Publishing (including *Trends in Parasitology* and *The International Journal for Parasitology*) established the "Elsevier Lectures" as a feature of the annual conference, allowing us to bring to Australia Professors Robert Sinden (Imperial College, London and BioMalPar) and Simon Croft (Drugs for Neglected Diseases Initiative and COST B22).

Associate Professor Smith and Dr John Horton (Vice President of the Royal Society of Tropical Medicine and Hygeine - RSTMH) have cooperated with the Organising Committee for the 2007 Joint ARC/NHMRC research Network for Parasitology and ASP Conference (A/Prof Carol Behm, Prof Kiaran 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.

As a direct result of the Network Travel Award to a postdoctoral researcher, Aaron Jex, Prof Gasser, Dr Littlewood, Dr Wassenbach and Aaron collaborated on, and were awarded, an ARC Linkage International Grant, which will provide one year's salary for Dr Jex, as well as some research funds to contribute towards the project. This has further solidified the partnership created, by the ARC/NHMRC Research Network for Parasitology Travel Award scheme, between the Gasser and Littlewood laboratories, which, in turn, will contribute greatly to the team's ability to achieve the their research aims.

- **Contributions to the Research Network of particular significance during 2006**

There were several highlights for the Network in 2006, 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 (see above) and the excellent registration at the Joint Conference of the ARC/NHMRC Research Network for Parasitology and ASP.

Tangible outcomes from the Network's Researcher Exchange, Training and Travel Fund began to emerge in 2006 in the form of publications in peer-reviewed international journals and conference presentations. Of particular note was a publication in *Nature*:

Saliba, K.J., Martin, R.E., Bröer, A., Henry, R.I., McCarthy, C.S., Downie, M.J., Allen, R.J.W., Mullin, K.A., McFadden, G.I., Bröer, S. & Kirk, K. Sodium-dependent uptake of inorganic phosphate by the intracellular malaria parasite. *Nature* 443: 582-585.

(This research is highlighted in more detail in the "Outreach" section of this report, as it attracted significant media attention).

Other publications and conference presentations arising from the Network's include:

Hutson K.S. & Whittington I.D. 2006. *Paradeontacylix godfreyi n.* sp. (Digenea: Sanguinicolidae) from the heart of wild *Seriola lalandi* (Perciformes: Carangidae) in southern Australia. *Zootaxa* 1151: 55-68.

Hutson K.S., Mooney A.J., Ernst I. & Whittington I.D. (2007). Metazoan parasite assemblages of wild *Seriola lalandi* (Perciformes: Carangidae)

from eastern and southern Australia. *Parasitology International* 56, 95-105.

Whittington I.D. & Chisholm L.A. In Press. Diseases caused by Monogenea. In: *Fish Diseases*. Eiras J.C., Segner H., Wahlii T. & Kapoor B.G. (Eds.), Science Publishers, Inc., New Hampshire, USA.

Hutson, K.S. 2006. 'Risk assessment for parasites of yellowtail kingfish *Seriola lalandi* in South Australian sea-cage aquaculture'. Australasian Aquaculture, Adelaide, South Australia, 30 August 2006.

Hutson, K.S. 2006. 'Why little guys matter! A new species of blood fluke infecting wild yellowtail kingfish (*Seriola lalandi*) in southern Australia'. Royal Society of South Australia, Adelaide, 10 August 2006.

Whittington I.D., Perkins E.M., Chisholm L.A. & Donnellan S.C. 2006. *Neobenedenia* '*melleni*' (Monogenea: Capsalidae): is this enigmatic infamous pest of fishes worldwide a cryptic species complex? 11th International Congress of Parasitology (ICOPA XI), August 6-11 2006, Scottish Exhibition & Convention Centre, Glasgow, UK.

Fritz, J-A, Vidal M & Behm C. A nematode-specific gene involved in epidermal fundtion and integrity in *Caenorhabditis elegans.* Joint Conference of the ARC/NHMRC Research Network for Parasitology and the ASP, Gold Coast, July, 2006.

There were a number of other major research successes by Network Participants, which deserve to be highlighted:

- 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, but also with regard the fundamental evolutionary biology of parasitism and mutualism in fish communities (Bshary & Grutter, *Nature*);
- Australia's malaria researchers continued to lead the world, publishing landmark papers on the role of actin in the motility of *Plasmodium* (Baum *et al. Nature Rev. Microbiol.*), cell invasion (Cowman and colleagues, *Cell, Science*), the membrane transport biology of the malaria parasite (Hayward *et al. J. Cell Science,* Mullin *et al. PNAS,* Saliba *et al. Nature*) and the development of a new class of antimalarial drugs (Charman *et al. J. Pharm. Sci.* and the award of a major collaborative grant from the Medicines for Malaria Venture);
- Australian pre-eminence in vaccine development for helminth parasites was highly evident in 2006 with seminal publications in *Nature Medicine* and *Vaccine* (Tran *et al.*), *Lancet Infect. Dis.* (Fujiwara *et al.*), *Mol. Biochem. Parasitol., Exp. Paraistol.* (Gauci *et al.*) and *J. Parasitol.* and *Parasite Immunol.* (Kyngdon *et al.*);

- Australian researchers collaborated on important fundamental research on parasite virulence (Naderer *et al. PNAS,* Sernee *et al. PNAS,* Uboldi *et al. Int. J. Parasitol.*, Voss *et al. Nature,* Wilson *et al. Nature Immunol.*);
- The formation of strong collaborative teams was a feature of successful grant applications for major research programs awarded by international research agencies such as the Bill and Melinda Gates Foundation, the Foundation for Innovative New Diagnostics and the World Health Organisation.

Finally, several Network Participants were recognised for their research efforts with the award of very prestigious prizes or fellowships:

- Network Deputy Convenor, **Dr Alex Loukas,** of the Queensland Institute of Medical Research, was awarded Bancroft Mackerras Medal by the Australian Society for Parasitology in recognition of his outstanding contributions to the science of parasitology. It is based particularly on work published over the last 5 years and, though nominations are called yearly, it is only presented when a suitable candidate is recognized, emphasizing its prestige. Alex was also a finalist in the *Eureka Prizes People's Choice Award* in 2006.

- **Professor Ray Norton**, from the Walter and Eliza Hall Institute of Medical Research (WEHI), was accorded the top honour of the Australian and New Zealand Society for Magnetic Resonance, the ANZMAG Medal, for outstanding contributions to the field of magnetic resonance.

- **Dr Brendan Crabb** (WEHI) was awarded the 2006 David Syme Research Prize by The University of Melbourne for the best original research work in biology, physics, chemistry or geology produced during the preceding 2 years.

- Howard Hughes International Scholar, **Professor Geoff McFadden**, based at the Botany School, at the University of Melbourne was awarded the 2006 Julian Wells Medal for his outstanding contribution to our understanding of gene action, genome organisation and genomic evolution. Geoff was also awarded an ARC Federation Fellowship in 2006 (see box below).

Geoff is the first parasitologist to win a Federation Fellowship and he talked to Lisa Jones about the award on 30 May 2006.

Why is your area of research important?
"I research the malaria parasite. Malaria is a major global health problem, with an estimated five million people dying from the disease every year. Existing therapeutic drugs are no longer as useful in treating malaria because, over the years, the parasites have become resistant to them. Our research involves finding new drugs and new parasite-specific targets through looking at plant evolutionary history and the history of the parasite. Our research group was the first to identify a relict chloroplast in malaria parasites and this revolutionised our understanding of the parasite's evolution. We've now identified a whole new range of drugs that weren't previously considered anti-malarials, including herbicides - but identifying targets and leads is relatively easy, now it is a matter of their potency."

What does being awarded an ARC Federation Fellowship mean for your research?

"We will be able to expand our research group and do totally new things that we couldn't do before. The Federation Fellowship money will be used to create a malaria mosquito facility in Melbourne to enable scientists to study the parasite in the mosquito phase of its life cycle. The new facility will also be used to study insect-borne viruses and develop new and sophisticated gene targeting technologies for malaria parasite research."

"We will use the facility and funds to build a mosquito colony, infect them with malaria and then investigate what is happening to their organelles. This new knowledge of the basic biology of the malaria parasite will help in the development of new drugs."

"The ARC Federation Fellowship means that I will have more flexibility and be able to focus on my research. I think that the new facility will attract collaborators worldwide as there are few of these types of research facilities; the Institut Pasteur in Paris and Imperial College London offer similar research facilities."

What are the steps you need to take once you have developed new anti-malaria drugs so that people infected with malaria can benefit from your research?

"The process of identifying and developing new drugs to combat malaria might be a long process. Initially we will identify a lead or a target and then assess its economic viability…find out how cheap is it to make and how difficult to synthesise - herbicides are manufactured on a massive production scale so they are generally pretty cheap to make."

"Next we test the lead against parasites in the lab (in culture); then test the lead in animal models (usually mice)."

"The next stage is to find out about the pharmacokinetics of the new drug and finally the drug goes to clinical trials."

"We will collaborate with other scientists throughout the process of identifying leads and testing them; we have good links with industry and NGO's like the Medicines for Malaria Venture (Initiative) who help our research".

"With this process in mind the ARC Federation Fellowship is not a bad timeframe (5 years) for the research work that I do."

What sort of advantages do you anticipate the new malaria mosquito facility in Melbourne will give to this area of research?

"This facility will hopefully encourage collaborations within the malaria research community; scientists will be able to study parasite lifestyle, develop new drugs to target malaria, and study how these drugs affect motility of and invasion by the parasite."

"The malaria research community in Melbourne (includes scientists from Monash University, University of Melbourne, LaTrobe University, and WEHI) are leaders in malaria cell biology. There is already a critical mass in Melbourne who use sophisticated technologies, have a great knowledge in immunology and cell biology and have a strong bioinformatics facility. I hope that the facility will be a magnet,

attracting additional staff and visiting scientists. We will bring scientists in to tap into new techniques and to share some of our own skills."

The ARC invests $41.5 million over five years into the Federation Fellowship award scheme; 90 Federation Fellowships have been taken up since the first awards in 2002. What sort of impact do you think this award scheme is having on science research both within Australia and internationally?

"The ARC Federation Fellowship is a fantastic scheme - it means that scientists are right up there at the top with world-class facilities and attractive remuneration, as most high-end jobs are. The Fellowship scheme is a great opportunity for me; and I think it helps to keep people in Australia. It would be good if there were even more opportunities available for Australian scientists – this would help Australia move away from being a resource-based country and to create more opportunities for scientific development."

"Being involved in setting up the ARC/NHMRC Research Network for Parasitology helped my application. The ARC has supported my career since day one and the ARC Federation Fellowship will give me the independence and flexibility to enable me to direct malaria research." *This interview was published in full on the Network website http://www.parasite.org.au/arcnet/news*

- **Professor Alan Cowman** (WEHI) was awarded the the most prestigious award of the Australian Society for Biochemistry and Molecular Biology, the Lemberg Medal, for his work on the malaria parasite.

- **Professors Peter O'Donoghue** (The University of Queensland) and **Professor Nick Sangster** (then at The University of Sydney, now at Charles Sturt University) were made Fellows of the Australian Society for Parasitology in 2006, for their outstanding contributions to Australian parasitology.

- **Dr Emanuela Handman** (WEHI) was awarded an Australian Academy of Science Exchange Fellowship to the Walter Reed Army Institute in Washington, USA. Emanuela was also made a Fellow of the Australian Society for Parasitology in 2006, in recognition of her outstanding contribution to parasitology.

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

In 2006 our Network participants extended their scientific role and engaged in numerous outreach activities ranging from presenting their research to, and interacting with - students, Rotary groups, farmers and rural communities, indigenous communities, international students, politicians - to giving media interviews about fish parasites. Our Network scientists take their role as science communicators seriously; Prof Don McManus says, "I regard communication with the public as a highly important responsibility and one that I enjoy."

Australian parasitologists are represented across a broad range of boards, committees and advisory panels and are often called upon to give expert advice to official bodies or assess grant applications.

An article describing the genesis and goals of the Network was published in the world's top ranked parasitology journal, *Trends in Parasitology*:

An Australian network to support the understanding and control of parasites. Smith NC, Tilley L, Thompson RC, Ryan UM, Loukas A, Jenkins D, McFadden GI. *Trends in Parasitology* 22: 97-9.

Media

The ARC/NHMRC Research Network for Parasitology sent out media releases for the 2006 ASP & Network Annual Conference in July. As a result of these media releases there were two radio interviews during the conference with ABC Brisbane and Coast radio stations, and two stories in the Australasian Science Magazine published in December 2006. Further media interest developed through the stories published in Australasian Science Magazine and Dr Nicky Boulter was in demand over the Christmas period with interviews on radio and for newsprint, these are listed below.

In total 85 stories involving ARC/NHMRC Research Network for Parasitology Participants were reported in the media and these are listed below along with other reports of Network scientists and the media:

- Media coverage resulting from the 2006 ASP & Network Annual Conference "Ten things you don't know about parasites" press release:
  - Dr David Jenkins was interviewed by ABC Brisbane 06/07/06
  - Dr Nicky Boulter was interviewed by ABC Coast FM (covering the Gold and Sunshine Coasts) on 03/07/06, on 2/01/07 3AW (Melbourne) 12:31 pm and gave another two radio interviews.
  - Dr Nicky Boulter and Dr Catherine Miller from IBID, UTS each published a story for Australasian Science magazine January/February 2007.
  - Nicky's story was reported in at least 30 print/web media across the world including: on the 26/12/06 news.com.au "Parasite turns women into sex kittens", Yahoo!7 News "Parasite turns women into sex kittens"; on the 27/12/06 The Australian "A parasite with appeal", Ballarat Courier (Vic) "Some women have love bug", Canberra Times "Parasite turns her sexy, him stupid", Courier Mail (QLD) "Bug takes control", Daily Advertiser "Parasite makes men "stupid"", Daily Telegraph (Sydney) "Parasite a hit with women", Gold Coast Bulletin (QLD) "Bug makes girl sexy, men dumb", Herald Sun (Melb) "From alley cat to sex kitten", Hobart Mercury (Tas) "Parasite makes women 'sexy'", Newcastle Herald (NSW) "Parasite is turning men into morons", Sydney Morning Herald "Bug creates human sex kittens", West Australian "Bug makes you a sex kitten or an alley cat", AAP Newswire "Mind-altering parasite turns women into sex kittens", Townsville Bulletin "Parasite has odd effects", Border Mail (Vic) "Stupid men can blame parasite" ; on the 28/12/06 Kalgoorlie Miner (WA) "Parasite's side effects vary"; on the 29/12/06 AAP Newswire "Common parasite alters sex behaviour"; on the 8/01/07 Burnie Advocate (Tas) "mind-altering parasite",

Launceston Examiner (Tas) “Mind-altering parasite turns women into sex-kittens”.
  - Nicky’s story was reported on 2 radio programmes: on 26/12/06 2GB (Sydney); on 28/12/06 ABC 720 Perth.

- Rob Adlard and Queensland Museum education staff launched the QX disease website (http://www.qm.qld.gov.au/qx/index.html) as an interactive learning tool for high school biology reported in Brisbane Courier Mail, 29th November 2006 ‘Web tracks destruction of disease’.

- Geoff McFadden at the Science Cafe, Heart of Philosophy Society, Oct 16th, presenter Media forum, “Scientists and the Media – Partnership or Parody?”

- Geoff McFadden at the Sponsorship Launch, 5th World Conference of Science Journalists, was a Panelist Nov 30th.

- Alex Loukas described the following articles featuring their helminth vaccine research that appeared in the TV, radio and print media in 2006:
  - ABC news channel 2, ABC TV, July 2006
  - ABC radio (separate interviews for Innovations and news reports)
  - Courier Mail newspaper
  - Brisbane News magazine
  - Herald Sun newspaper

- Brown Besier gave three radio talks aimed at sheep farmers in October 2006.

- Ian Whittington reported the following media stories from their group:

o On the death of the Crocodile Hunter, Steve Irwin, Dr Leslie Chisholm was identified as a local expert on stingrays from her extensive work on their ectoparasites. Leslie conducted 8 radio interviews with news stations in Victoria and South Australia for expert commentary on stingray behaviour. She also had a downloadable podcast available through the Adelaide newspaper, The Advertiser (September 4 and 5, 2006). Leslie also appeared on Channel 7 News in Adelaide in a media story about Steve Irwin’s death (September 5th 2006).

o There has been intense media interest in work by PhD student Kate Hutson, which has featured in the following press radio, Internet and television reports:

  - Anon. 2006. Kingfish tagging helps determine potential for parasite interactions. Fisheries and Research Development Corporation

  - ARC/NHMRC Network for Parasitology Network newsletter (2006) ‘Network travel Award for Marine Parasitologist, Kate Hutson’ April 11 (featured in 2005 Network Annual report)

  - Gray S ‘Weigh your catch project update’ In: Fishcare Southwest Inc. Future Fins Issue 10, 05/06

- Popular science article: Hutson K.S. 2006. Northern Spencer Gulf: where fish go troppo! South Australian Angler Magazine, August/September 2006.

o During fieldwork at the Toyota 2006 Interclub Game Fishing tournament organised by the New South Wales Game Fishing Association at Port Stephens (February-March 2006), the parasitological activities of Associate Professor Ian Whittington, Dr Leslie Chisholm and PhD students Elizabeth Perkins and Vanessa Glennon attracted interest from Win News (Channel 9) in the Newcastle region. A short news story aired on Friday March 3rd 2006 and achieved higher billing than a story about swimmer, Ian Thorpe.

- Leann Tilley featured on Channel 7. Today Tonight. Reporter: Jackie Quist. Interview on Feb 14th, 2006, regarding malaria as a problem in Australia. Aired March 9.

- Leann Tilley on her Fluorescence Correlation Spectroscopy Microscope LIEF grant for the La Trobe Bulletin, 13th July 2006. Shining light through membranes for better medicine.

- Mike Bull reported that, at various times over 2006, the BBC have filmed their research work on three lizard population stories for an upcoming David Attenborough program called "Life in Cold Blood". This culminated in a four day visit by Sir David himself in November 2006 and some filming. One of the focuses of the stories was their research on social organisation and the parasite induced costs of living close together.

- Jody Zawadzki reported the following media stories

  - Jody Zawadzki featured in a Media release from the Victoria Minister for Innovation and the Minister for Agriculture, on "New Laboratory techniques kill sheep gut parasites", 9 April 2006, Bio2006 Conference, Chicago.

  - Jody Zawadzki: Parasite killers, The Weekly Times, Wednesday April 12 2006, page 4

  - Jody Zawadzki: Biotech leads war on worms, Stock and Land 96(15):10, Thursday April 15 2006

  - Jody Zawadzki: Research Revolution, Stock Journal, Thursday May 11 2006

  - Jody Zawadzki: Jody's results a knockout, The Weekly Times, Wednesday October 11 2006

- Dave Jenkins "*Echinococcus granulosus* transmission in Australia." Featured as an unrefereed article in the Newsletter of the Victorian Division of the Australian Veterinary Association, pp 10-11.

- Vern Bowles featured on Channel 7 News, Thursday 5th October, 2006 at 6.30pm 'Towards a new treatment for head lice'.

- Kiaran Kirk was interviewed by a range of media outlets, including an interview on the BBC World Service's Science Show, following the publication of their paper in Nature, 6th October 2006, (Vol 443, 582-5) ***(see full story in the box below)***

Network scientists solve one of the biochemical mysteries of malaria

6th October 2006

Prof Kiaran Kirk, Head of the School of Biochemistry and Molecular Biology (BaMBi) at the Australian National University (ANU) (pictured left) and Prof Geoff McFadden, at the University of Melbourne won a Network travel award for Researcher Exchanges between their labs for their work on the malaria parasite *Plasmodium falciparum*. Their collaborative research has resulted in a Nature paper published 6 October 2006 and Roselani Henry, Megan Downie and Dr Kylie Mullin, three of the young researchers from their labs who all took part in this Researcher Exchange are profiled here.

Roselani (Lani) Henry and Megan Downie are both about to complete their PhD's at ANU. Both researchers work in Kiaran Kirk's lab where they study the physiology of the malaria parasite, *Plasmodium falciparum*, and apply their knowledge to identify new drug targets and investigate how drugs can be targeted to the malaria parasite. Their research focuses on the point of the parasite's lifecycle where it lives in the red blood cells of human hosts and how the parasite takes up its nutrients and transports them across the red blood cell membrane into the malaria parasite, and also how it gets rid of its waste products. Lani is particularly interested in the transport of ions into the malaria parasite whilst Megan's research focuses on nucleosides.

All three were all part of a collaborative research project published in *Nature* (Vol 443, 582-5). The study reveals why the malaria parasite, *Plasmodium falciparum*, increases the sodium content inside its host's red blood cells. The increase sodium content of the host cell enables the parasite to use a sodium-powered transport system to 'steal' an essential nutrient - inorganic phosphate - from the host cell.

Dr Kevin Saliba and Dr Rowena Martin are joint first authors of the study which, as well as the Kirk and McFadden labs, involved another ANU lab, headed by Associate Professor Stefan Bröer. A bioinformatic analysis led to the hypothesis that the parasite encodes a sodium-dependent transporter for inorganic phosphate. Using parasites isolated from their host blood cells the team showed that the uptake of phosphate by the parasite is energised by sodium. They then cloned the transporter and expressed it in frog oocytes, showing that its physiological characteristics matched those of the pathway involved in the uptake of phosphate into the parasite.

As part of the study, Lani travelled to Geoff's lab in Melbourne, supported by the Network Travel Award, with the aim of accessing the McFadden lab's expertise in using parasite transfection technology to tag and localise malaria parasite proteins.

Lani's aim was to find out precisely where in the parasitised red blood cell the phosphate transporter is located. She showed that it was localised to the surface of the parasite, perfectly positioned to take advantage of the increased sodium content of the host cell compartment. A long-term collaboration has been established through this Researcher Exchange and since then scientists in the Kirk lab have been using these new techniques to investigate other transport proteins in the malaria parasite. Megan is currently at the University of Melbourne using these techniques to investigate nucleoside transporter proteins.

Also as part of this Researcher Exchange, Kylie travelled to Canberra to try to express the apicoplast triose-phosphate transporters in frog oocytes using techniques taught by the ANU team. She is still working on this technique and said that the collaboration has been invaluable. Kylie is fascinated by the apicoplast and says that there is a real need for cell biology research on *Plasmodium* and so much potential for future research and that this keeps her interested and motivated. A highlight for Kylie was the latest paper she worked on "Membrane transporters in the relic plastid of malaria parasites" published in PNAS (2006, Vol 103, 9572-7). We wish Kylie all the best in her quest for knowledge about the apicoplast and hope that she continues to enjoy her research work.

Lani believes that the team have answered a biological problem and have gained more information about the malaria parasite's physiology as a result of this research. Both Lani and Megan are fascinated by this malaria parasite, in particular its physiology and the fact that it hides in the human red blood cell as part of its lifecycle. Lani also enjoys working on such an important health problem. "We need to develop new malaria drugs and understand the mechanism of drug resistance so that we can learn how to administer these drugs in a way that avoids the development of drug resistance," Lani said.

Megan really enjoys the collaborative nature of science research; next year she will move to Oklahoma City in the US to take up a postdoctoral position with Ira Blader at the University of Oklahoma to work on *Toxoplasma*. She is looking forward to learning new techniques as well as experiencing a difference research environment and we wish her all the best.

Lani said the Researcher Exchange was a highlight of her career; she enjoyed travelling to Melbourne and working with different people to learn new techniques. Lani enjoys her research and sees her future in science research and medicine and we wish her all the very best.

- James McCarthy's 2006 publication on the antimalarial effect of antiretrovirals raised significant media interest, and in 2006 James participated in an ABC Quantum piece on malaria.

- Brian Cooke featured in the media release: Knocking out malaria http://www.monash.edu.au/news/newsline/story/791.

- Lexa Grutter reported the following media stories:

- New York Times science. Observatory: Trust you? What's in it for me? by Henry Fountain June 27 2006
- The Sun Herald Selfless, sensitive, altruistic? It's the cleaner fish. 25 June
- Nature News and Views Trust in fish. Lee Alan Dugatin Nature 441, 937-938 (22 June 2006) doi:10.1038/441937a
- News@Nature.com Fussy fish prefer trustworthy cleaners
- Sea bream choose cleaners they've already spied hard at work. Jacqueline Ruttimann Published online: 21 June 2006; doi:10.1038/news060619-8
- Spektrumdirekt. Prüfender Blick Putzerfisch-Qualitäten werden kritisch beäugt(translates as"Proofreading View: Cleaner fish quality are critically observed"). Antje Findeklee. 23 June 2006 http://www.wissenschaft-online.de/abo/ticker/843944
- ScienceNOW Daily News. If You Want to Eat, Don't Cheat. Laura Blackburn http://sciencenow/sciencemag.org/cgi/content/full/2006/621/5
- News in Science, ABC online. Fishing for the best cleaner. Jacqui van Santen. http://www.abcnet.au/science/news/stories/s1668581.htm
- 2006 Featured in the children's book Science adventures on the coral reef. Sneed Collard 3rd, Published by Marshall Cavendish. New York.43p.

Outreach Presentations and activities

In total Network participants were involved in 26 Outreach presentations and 16 Outreach activities across Australia (and some international). The 2006 Outreach events that our Network Scientists were involved in, including presentations and activities, are described below:

National Science Week 2006

To celebrate National Science Week 12 – 20 August 2006, Network scientists have been involved in the Australian Museum's Science in the City activities and the Ultimo Science Festival (Powerhouse Museum, University of Technology, Ultimo TAFE and ABC headquarters).

Dr Dave Jenkins, the Director of the Australian Hydatid Control and Epidemiology Program gave Museum guests a fascinating insight into the world of *Echinococcus granulosus*, a potentially deadly species of tapeworm, during the Twilight Science

Lecture Series, part of *Science in the City* at the Australian Museum on Wed 2 August 2006 with his talk entitled "*Echinococcus granulosus*…the purveyor of hydatid disease is alive and well and living in Australia."

Dr Sheila Donnelly, a scientist from the Institute for the Biotechnology of Infectious Diseases at the University of Technology, Sydney, presented the very gory "Combating the Body Snatchers" lecture to over 400 high school students revealing how Helminths, or worms, have snatched our bodies – and they consume blood or tissue so they can produce large numbers of off-spring.
Sheila explained that liver and blood flukes can produce 30,000 off-spring per hour (!)…but that their best trick is how they alter the host immune system to ensure they are not expelled....

Dr Catherine Miller, Dr Rowena Lock, Robert Walker, Kelly Mai, Michael Lees, and A/Prof Nick Smith, scientists from IBID, University of Technology, Sydney, were all on-hand to help Lisa Jones at the Network's parasitology exhibition stand that gave over 8,000 students and their teachers a close look at some parasites and a chance to "pin the parasite on Polly-(parasitosis)". Their parasitology exhibition featured at the Australian Museum's S*cience in the City Expo* 1 – 3 and 8 – 10 August 2006 and *Science in the Suburbs at Sydney Olympic Park* on September 11 and 12, 2006.

Parasitology workshops for secondary school students

Lisa Jones, Dr Catherine Miller, Dr Nicola Boulter and Dr Rowena Lock developed a hands-on parasitology workshop suitable for secondary school students and ran three of these for Pymble Ladies College students visiting UTS in November 2006. The workshop gave students the opportunity to investigate the case of a very ill person who presented with symptoms of a heavy worm infection. Students learnt about the different worm infections, then extracted "patient DNA" and using gel electrophoresis concluded which infection the person had.

- Geoff McFadden gave the Occasional Address at the Graduation Ceremony, The University of Melbourne, Dec19th 06.

- At the Recreational Fisheries Advisory Committee meeting 22 August 2006 Barbara Nowak gave an evaluation of environmental impact statement for the proposed Gunns Pulp Mill.

- Brown Besier gave demonstrations in laboratory to high school groups and talks at farmer meetings/field days.

- Don McManus coordinated workshops in China in relation to field study design techniques, genomics and microarray technology and presented seminars to university science students both home and abroad.

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

- Shelley Walton, Deborah Holt and M Mounsey presented "Antibodies, proteases and ABC transporters: what do these have to do with scabies

control" as part of the Menzies School of Health Research Seminar Series, Darwin, NT.

- Michael Good gave the following addresses:

  - Welcome Address, High School Students Lecture Series, QIMR, 4 April, 2006
  - 'Exciting frontiers for Medical Research', Address to Rotary Club, Brisbane, 12 May, 2006
  - 'QIMR Research', Rotary Club of Noosa Ball, Noosa, 13 May, 2006
  - 'Malaria vaccine research', Address to Rotary Club, Hamilton, Brisbane, 6 June, 2006

- Sabina Belli gave the opening Keynote address at the UTS Annual Research Student's Conference, 8th Sept, 2006

- Michelle Power was a judge for the Sydney Girls High Year 10 Science conference.

- Bill Charman gave the following addresses:

  - Achieving change in an academic environment. AVCC leadership program for middle managers. Deakin Management Centre, May, 2006.
  - Lead optimisation: A key driver of value for drug candidates. Wellcome Trust Drug Discovery Frontiers Meeting, Wellcome Trust Genome Research Centre, Cambridge, UK, May, 2006.
  - Public private partnerships: A new model for drug discovery in malaria and other neglected diseases. Victorian College of Pharmacy Public Lecture, October, 2006.

- Carolyn Behm participated in UNICEF/UNDP/World Bank/WHO Special Programme for Research and Training in Tropical Diseases (TDR) Meeting of Experts to Advise TDR on the proposed Helminth Initiative to enhance R&D for new products, Tokyo, Japan, March 23-25.

- Dave Jenkins gave his talk "Hydatids have not gone away, they are alive and well and living in Australia." as part of a nation wide continuing education initiative entitled "Empower your Practice" for veterinarians by Novartis Animal Health. Dave presented in Brisbane and Melbourne 2006.

- Dave also supplied parasite transmission information (mainly regarding hydatid disease but also other intestinal worms of dogs and cats) to:
  - The Senior Regional Animal Health Manager (South Coast) Department of Primary Industries, Elizabeth Macarthur Agricultural Institute.
  - Regional Veterinarian Cooma Rural Lands Protection Board.
  - Vet School, Charles Sturt University, Wagga, NSW.
  - Several worried members of the public seeking information following being diagnosed with hydatid disease.
  - Veterinarians from veterinary two pharmaceutical companies.
  - Numerous practicing veterinarians wanting more information following my continuing education lectures for Novartis Animal Health.

- Several school teachers requesting hydatid information and a copy of a hydatid disease teaching CD I have had made.

- Rob Adlard and Queensland Museum education staff launched the QX disease website (http://www.qm.qld.gov.au/qx/index.html) as an interactive learning tool for high school biology

- Peter Windsor gave the following workshops in 2006:

  - ACIAR Workshop on Project Proposal AH/2005/086, 'Best practice cattle and buffalo health and husbandry systems for Cambodia and Laos'. Lao Plaza Hotel, Vientiane, October 2nd and ACIAR Workshop on Project Proposal AH/2005/086, 'Best practice cattle and buffalo health and husbandry systems for Cambodia and Laos', at the Sunway Hotel, Phnom Penh October 6th and on October 19th.

  - Integration of research led teaching in ruminant veterinary medicine and rural public practice for improved outcomes in veterinary public health. Showcase on Research led Teaching, Faculty of Sciences, University of Sydney, November 2.

  - "Keep the farm gate open, but how?" - a presentation at a conference on enhancing the extramural training experience for 5th year veterinary science interns, Partner Practices Seminar, University of Sydney, Faculty of Veterinary Science, July.

- Hutchinson: "Worms and Things", NSW Farmers Hawkesbury Branch AGM.

- James McCarthy is a great advocate for science communication and describes his outreach activities below:

  - Each year James hosts High School students for work experience attachments in his laboratory, and in addition, two indigenous high school students for one week each year. Each summer James hosts a vacation summer student from the University of Queensland.

  - James has made several visits to Indigenous Communities in Western Australia, Queensland, and the Northern Territory to consult regarding health research priorities as perceived by the community, and their relationship to possible research projects. In 2005, in his laboratory James hosted the first student of indigenous background to undertake BSc Honours at QIMR. James has led four projects (hookworms, scabies, *Strongyloides* and CA-MRSA) that have direct translational effect on significant problems in Indigenous Health.

  - James is a regular consultant to the Brisbane Refugee & Asylum Seeker Health Network (BRASHN) and to the National Australasian Refugee Health Interest Group, a discussion group for health professionals involved in the care of recently arrived refugees to Australia or New Zealand. His role is to provide expert advice on the appropriate investigation and treatment of refugees with health problems within his area of expertise.

- Dave Emery gave a presentation “Opportunities for links in worm resistance research”- to the Veterinary Training and research Initiative (VTRI), Uni Edinburgh, Scotland, August 06.

- Nathan Bott gave the following Industry Presentations:

  - Nathan J. Bott & Kathy Ophel-Keller. Detection of SBT pathogens in environmental and netting samples. SBT Scientific Meeting. Boston Bay Winery, Pt. Lincoln. June 8, 2006.

  - Nathan J. Bott & Kathy Ophel-Keller. Detection of SBT pathogens in environmental and netting samples. SBT Industry Workshop. Boston Bay Winery, Pt. Lincoln. November 28, 2006.

• 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 above 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, 2006 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 over 130 early career parasitology researchers. 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 (2007)

The ARC/NHMRC Research Network for Parasitology will continue to support conferences and workshops and its successful Researcher Exchange, Training and Travel Fund in 2007, at the same levels as for 2006. The IT Initiative will also be supported in 2007 and the specific goals for 2007 are outlined below. In addition to these established activities, some new initiatives for early career researchers will be trialled in 2007 and a more publicly focused effort in the Network’s communication strategy will be evident in 2007 and subsequent years – this is summarised below.

IT Initiative

The Network will continue to provide a web-accessible database for storage, analysis and sharing of microarray results with collaborators in other laboratories or countries. All 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. Work will continue on the development and refinement of a web environment to support Network activities and will tackle the development of a "Parasite Database" in 2007 and 2008. This project was scoped during 2006 to define the most appropriate way forward and two distinct subprojects have been identified:

- Web publication of the educational material produced by Professor Peter O'Donoghue at The University of Queensland. The Network will fund an illustrator to produce copyright free material and the IT group will design a database that will make the material available.
- A Wiki-based collaborative environment for other Network scientists to contribute information about parasites of relevance to Australia. This will be an exciting experiment in shared knowledge provision. IT scientists are evaluating current Wiki platforms and will select one for implementation in 2007.

New Early Career Researcher Initiatives

The Network is organising and sponsoring 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 will learn how some of Australia's highly successful parasitology researchers developed their career and arrived at the point they are today and have the opportunity to question these research leaders in a relaxed, informal setting. The breakfast will also mark the official launch of the Network's Mentoring Scheme, whereby 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

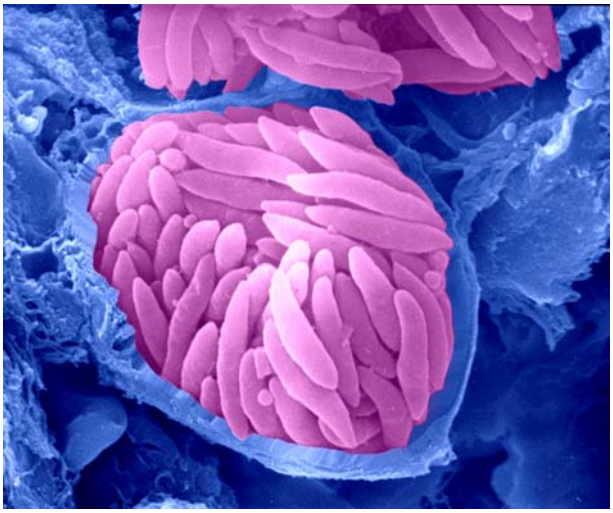
In 2007, the Network will develop and host the first in a series of several public information and education events on specific themes, for example, "Travel Bugs - Tropical Parasites and How to Avoid Caching Them", in Brisbane in March 2007, and "Parasitic Diseases of Livestock", for presentation to rural communities in the later half of 2007.

The Network is also planning a parasite photography exhibition which will be launched and displayed at Questacon - The National Science and Technology Centre concurrent with the 2007 ASP & Network Annual Conference. This exhibition will depict the beautiful and unusual world of parasitology with images of parasites and their hosts.

The Network will be running a public event in the Great Hall of Parliament House in Canberra to coincide with the 2007 ASP & Network Annual Conference. This highly entertaining and lively event will feature a hypothetical debate hosted by Robyn Williams (ABC). Scientists, policy makers and influencers of public opinion will debate global warming, climate change and the effects on parasites. Scientists and the public will be asked: What do you think will happen? How will this affect the spread of parasitic diseases? Who will be most affected? Could this scenario be real? How should governments, health officials, the defence force react?

The Network is also planning to develop and tour an interactive, hands-on, travelling exhibition about parasites and the importance of Australian parasitology research. The exhibition brief is featured below. Development will occur throughout 2007 and into 2008.

Parasites – up close and personal…



Eimeria tenella schizont image by Prof. David Ferguson, University of Oxford

Parasites are normally thought of as disgusting and are regarded as an aberration but, in fact, the parasitic way of life is the most common way of life on the planet and parasites are the most ingenious and manipulative of all life forms. No other group of organisms is as successful – scientists believe there are more parasites than all the other organisms put together.

If scientists can find a way to control parasites such as malaria, human hookworms, schistosomes, and veterinary parasites, the lives of millions of people will be saved, their crops and livestock will be more productive and the impact on reducing poverty in the Third world will be immense.

Parasites – up close and personal…

Main Message:
Parasites are everywhere and they affect your life.

Vision:
A touring hands-on, interactive exhibition that communicates the success story of parasites, and how scientists (in particular Australian scientists) are investigating life cycles of parasites that cause a lot of death and disease to try to exploit their weaknesses and control them.

Audience:
The exhibition audience will be:

- **children, adults** (family and educational groups), **potential science students**,
- **parasitologists**
- **supporters of parasitology research**
- **general public** (especially those who have been touched by exotic diseases)
- **rural and remote communities**
- **indigenous** communities
- specific **interest groups** - like Armed forces (because of the parasitic diseases they are exposed to whilst based in other countries)

Touring:
This exhibition could tour for the next 5-10 years at:

- Museums, Science Centres and galleries
- University exhibition areas
- Libraries
- Public exhibition areas
- Schools
- Shopping centres
- Community centres (especially in rural and remote communities)

The exhibition:
This exhibition will be built as a series of "pods" that are stand-alone, interactive stations. These will be accessible for all, lightweight and small for easy transport, and self-installing (easy to set-up and pack away). Each "pod" will have 1-3 interactive stations arranged around a triangular base with a canvas banner over the top for marketing/theming. Additional educational material will travel with the exhibition to support communications. The concept will translate into an excellent model for educational exhibits around the world.

The interactive exhibits will be built around different themes:

- **What's at school?**
- **What's in your water?**
- **What's in your pets?**
- **What's on your holidays?**
- **What's in your food?**
- **What's in our wildlife?**
- **What's in our plants?**
- **What's on your bushwalks with you?**
- **What about tropical diseases and public health?**

- **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.

Increased public awareness about parasitology 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.**

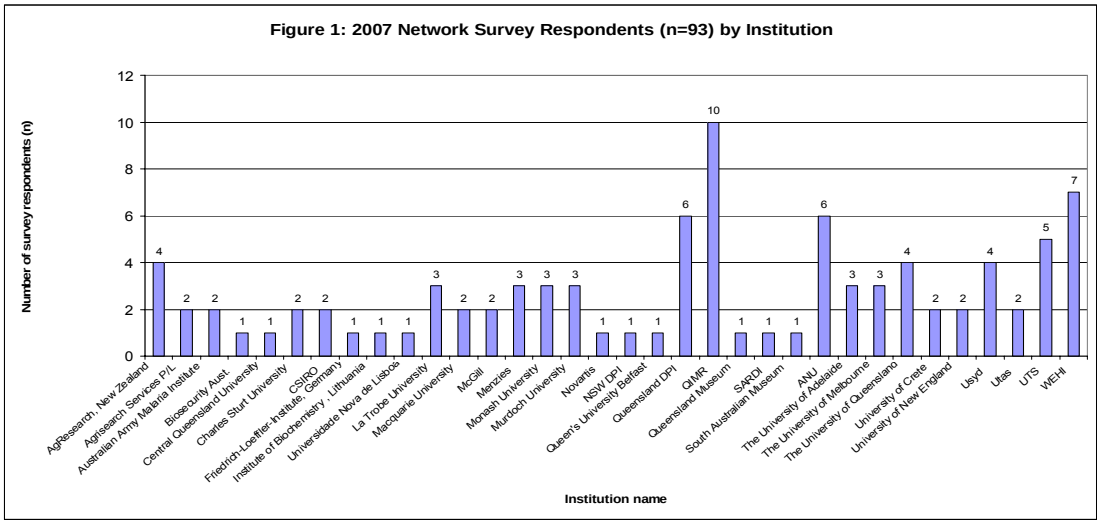
Aside from facilitating collaborative research via the Researcher Exchange, Training and Travel Fund, which has begun to bear fruit in the submission of new grant applications and the production of collaborative research papers, the Network Management Committee has discussed extensively and drawn up a list of international researchers (principally ex patriat Australian scientists) 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.**

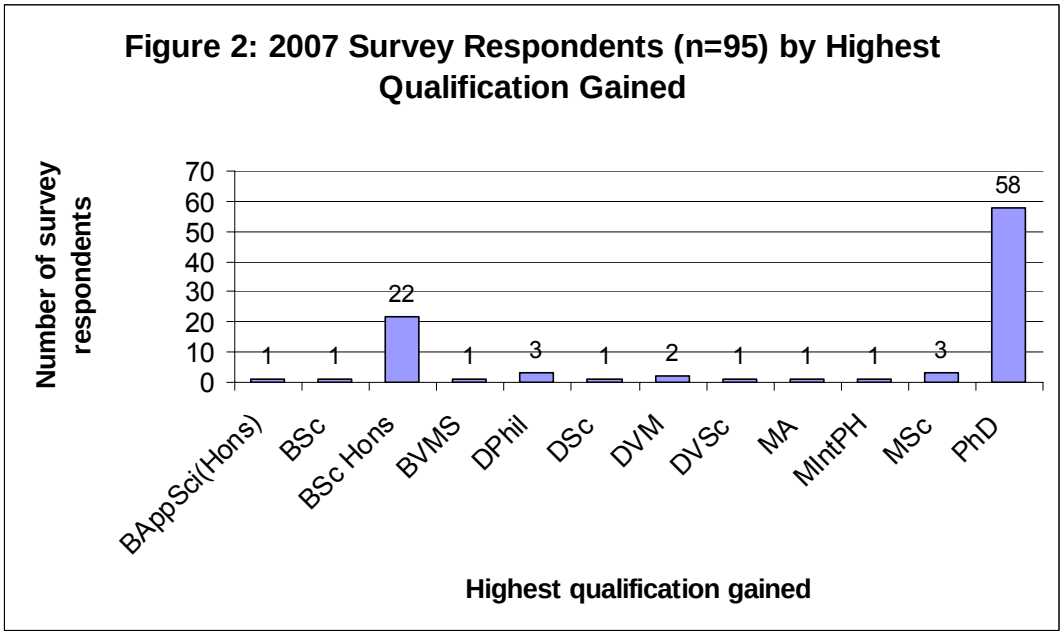
Participant Information

This survey was made available to the Network participants to complete online. Responses were monitored over two weeks and a total of 95 Network participants responded. Respondents were self-selected.

Survey respondents represented 39 different institutions with the highest number being based at QIMR 11%, WEHI 7.5%, ANU 6% and UTS 6% (Figure 1).

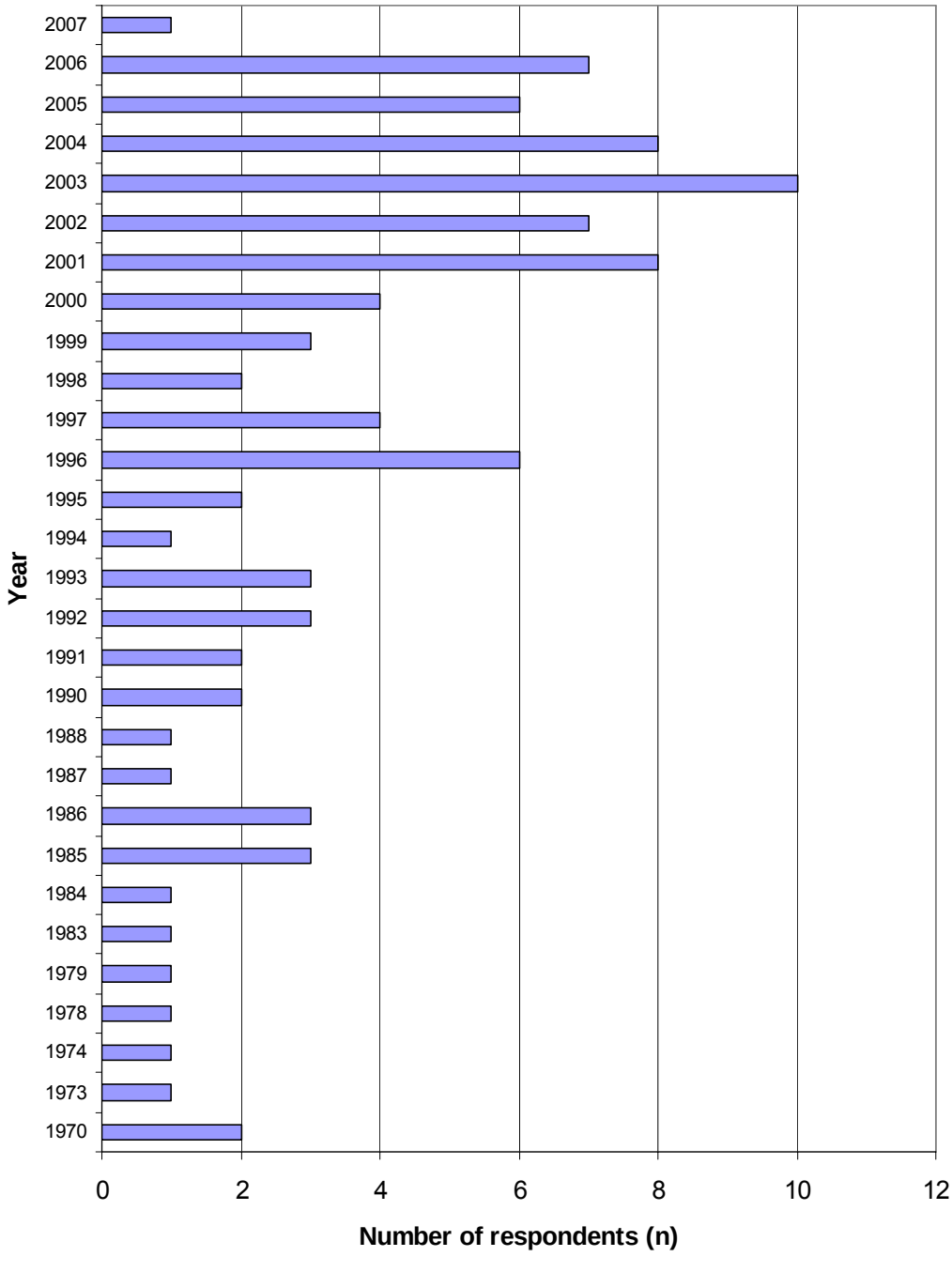


When asked about their highest qualification the majority of survey respondents reported having a PhD (61%) or BSc Hons (38%). (Figure 2)



The responses to “year gained highest qualification” spanned 37 years with the most recent being gained in 2007 and the earliest in 1970, the majority were gained between 1996 and 2006(Figure 3). Of the 95 survey respondents, 34 were identified as early career researchers (10 years or less since gaining their PhD, Doctorate, or Masters qualification).

Figure 3: 2007 Network Survey Respondents by year of their highest qualification (n=95)



Network Survey Respondents represented a good spread of ages ranging from 21 to over 60 years, with a majority of respondents aged between 26 and 50 years. (Figure

4). Both male and female respondents were fairly evenly represented, with slightly more males (53%) than females (47%). (Figure 5)

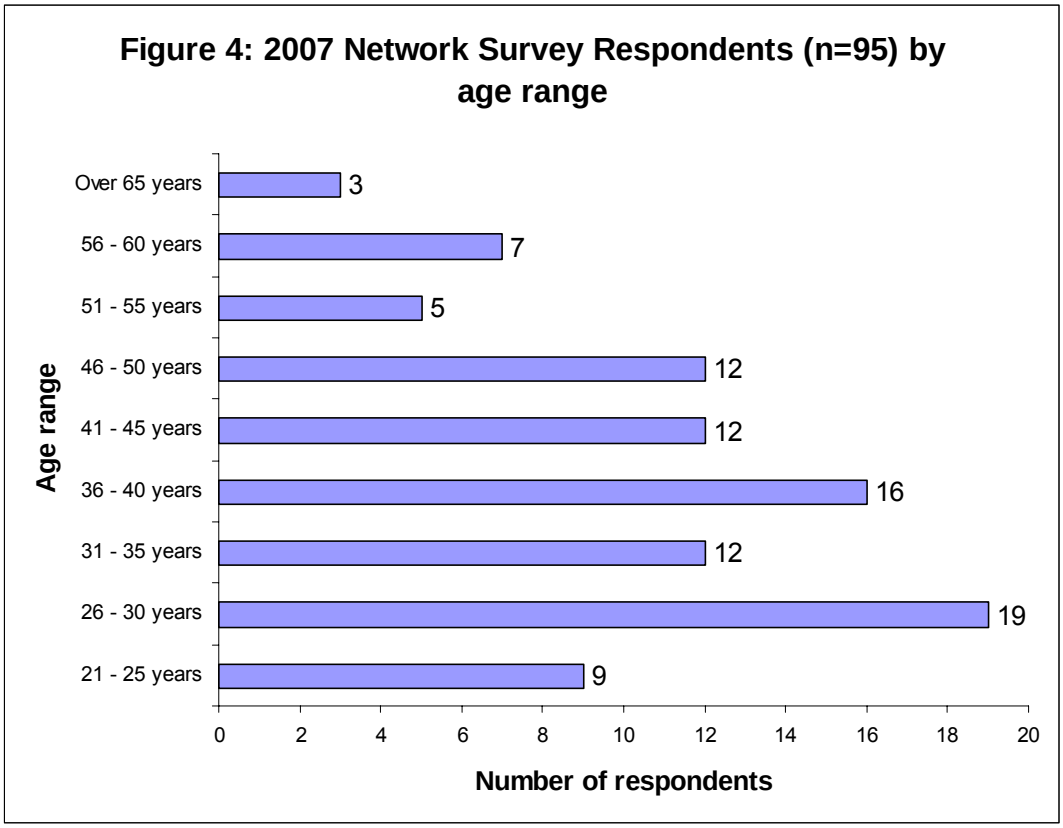


Figure 4: 2007 Network Survey Respondents (n=95) by age range

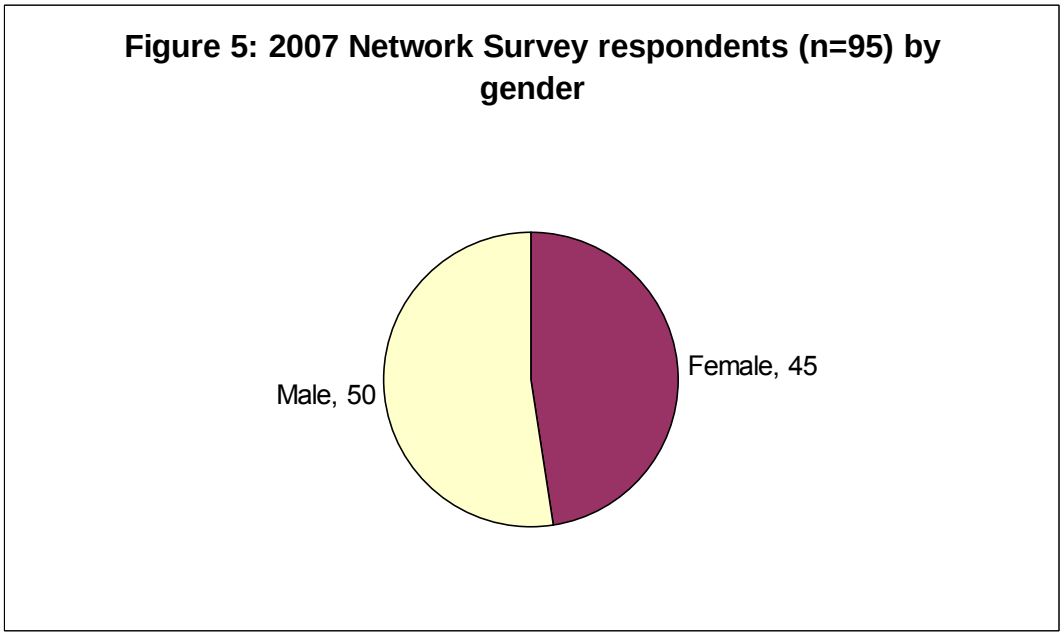
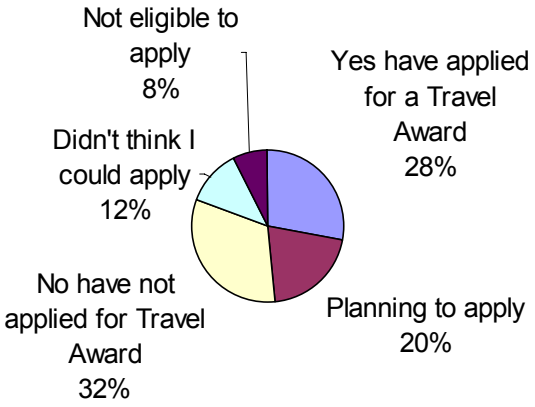


Figure 5: 2007 Network Survey respondents (n=95) by gender

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: Network Travel Awards and 2007 Network Survey Respondents (n=93)

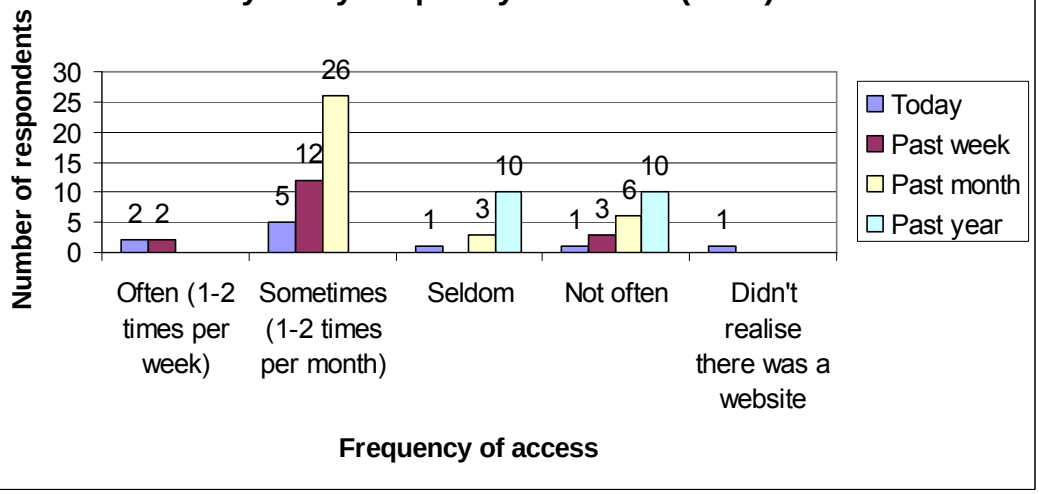


Network website

The Network website was recently redesigned and the "new-look" site launched early in January 2007. Website content is still in the process of being updated and this is reflected in the responses to questions about the website in this survey.

Most Survey Respondents who had accessed the website sometime in the past year (n=82) indicated how frequently they accessed the website in Figure 7. Frequency of accessing the Network website probably reflects when the Network Newsletter is circulated by email and made available on the website (approximately monthly).

Figure 7: 2007 Network Survery Participants who accessed the Network website sometime in the past year by frequency of access (n=82)



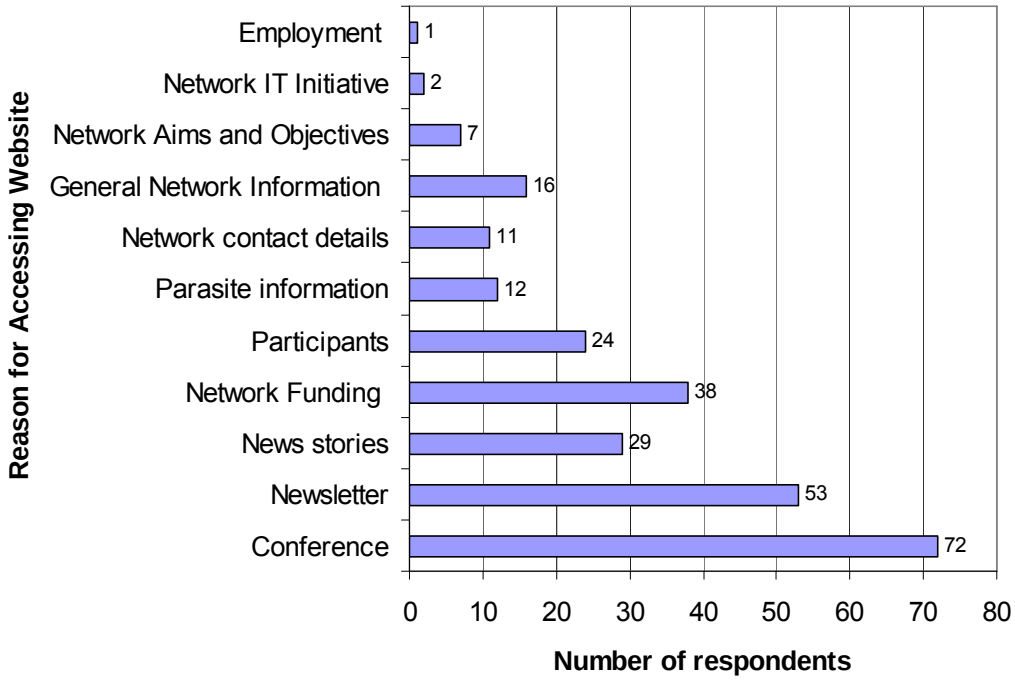
Network Survey respondents who had accessed the website (n=82) reportedly did so for:

- obtaining conference information (86%);
- reading the Network Newsletter (63%);
- finding out about Network Funding available for participants (45%); or

- finding out information about Network Participants (29%).

See Figure 8 below for a complete list of reasons for accessing the Network website, respondents were able to select more than one option and list others.

Figure 8: 2007 Network Survey Respondents reasons for accessing the Network Website (n=84)

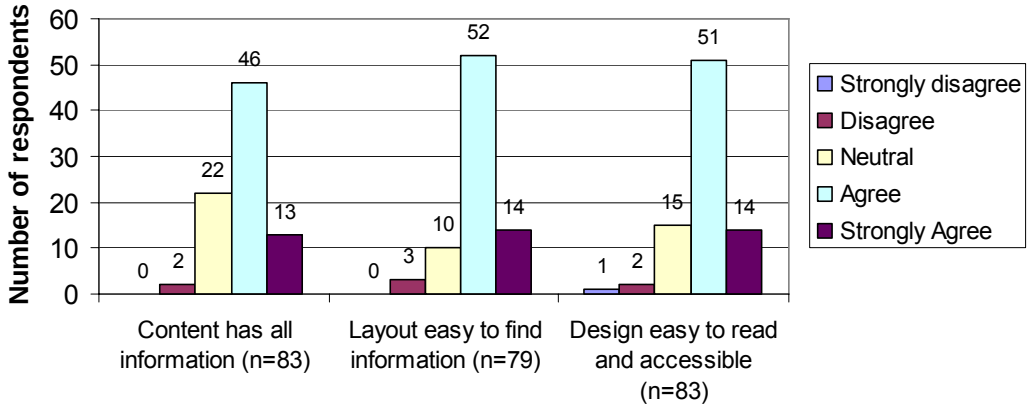


Network Survey Respondents were asked to rate (on a scale of 1 – 5) how strongly they agreed with the following statements:

1. The website content has all of the information I need. (83 Responses)
2. The layout of the website enabled me to find the information I was looking for easily. (79 Responses)
3. The website design means that information is accessible and easy to read. (83 Responses)

Figure 9 shows that a majority of respondents either agreed or strongly agreed with each statement. Additionally one respondent suggested that a search option on the website would be useful.

Figure 9: 2007 Network Survey Respondents comment on the Network Website content, layout and design

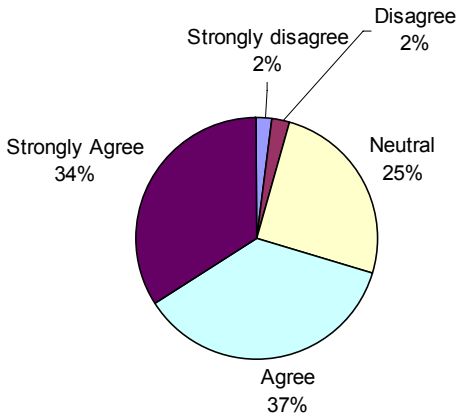


Overall view of the Network

When asked about being part of the ARC/NHMRC Research Network for Parasitology, 70% either agreed or strongly agreed with the statement that being a part of the Network was beneficial for their career, while 25% were neutral, and only 4% disagreed or strongly disagreed. (Figure 10)

One respondent commented that, “The more opportunities to network at all scales (local, regional, national and international) the better – it’s who you know in this business.”

Figure 10: 2007 Network Survey Respondents comment on the statement that being a Network Participant is beneficial for their career (n=91)



Network Survey Respondents were asked about changes to the Network and suggestions for additional activities/schemes that the Network should be involved with; 24 respondents gave suggestions and comments which include the following:

- “Always good to see more money distributed towards research.”

- “We need more advocacy for science in general. This is key to our future as we follow US trends. We need to be more effective in communicating to the public, (our ultimate supporters) and politicians”
- “The Network could benefit by more community exposure. Taking Parasitology to every-day person and remind them that it is an interesting and important part of biology and not just ‘yiki’ worms.”
- “Funding for small scale projects that the Network helped to start e.g. For a Researcher Exchange to learn new technologies, make some money available to these researchers on their return to help set up the technology at their institute.”
- “Mentoring or workshops on grant writing. University research offices provide a lot on information but knowledge from peers who have experience with review processes etc. would be worthwhile.”
- “mentoring”
- “help in career development for early post doc's.”
- “More training workshops for early career scientists for example in grant writing, as well as technical issues.”
- “Funding for PhD scholarships, postdoctoral fellowships and sponsored chairs in parasitology.”
- “IT Initiative more effective and accessible.”
- “I think the Network at this stage is working very well and is a great thing to be a part of.”
- “After attending last year's conference and reading the outline for this year's meeting, I was and am extremely pleased with the work being done. The inclusion of the career discussion breakfast this year adds to what was already a brilliantly arranged set-up.”
- “I hope that the Network continues to improve communication between Australian and international researchers and maybe improves chances for new researchers to successfully find postdoctoral placements overseas.”
- “Contacts for overseas parasitologists.”
- “Foster exchanges with international partner networks perhaps by inviting partner scientists to attend Network annual meeting. Funding is always tight but perhaps an award toward an airfare would assist partners to attend.”
- “Discussions of continuation beyond the life of the Network.”
- “Internally funded small courses or “think tanks” on techniques or speciality topics. More support for Student/Postdoc Exchanges between labs.”

One respondent gave an insightful comment about the definition of a “parasitologist” and why this is important to the future of parasitology research and funding this research: “There are a hell of a lot of people who consider themselves "Parasitologists" at heart, but who have had little opportunity to persue a Parasitology career, but rather work in other fields such as Environmental Management, Microbiology, Animal Health, Grazing Systems, Woodland Ecology etc. There is a huge wealth of talent and interest in Parasitology that is being lost over time as people find it necessary to pursue these other fields to maintain their employment. I am an excellent example of these "Parasitologists" who are not, in fact, “practicing Parasitologists". It would be handy to develop innovations to tap into these people who really are a resource that is being lost, and to maintain affiliations of those who need to work in other fields but are interested in Parasitology.”

A Statistical Snapshop of the ARC/NHMRC Research Network for Parasitology in 2006

- 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 listserver and receiving the Network Newsletter. There are 318 of these Participants and they are 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 are currently 340 such associates (additional to the Participants) receiving the Network Newsletter.
- Number of ECRs funded to do various activities;
    - 136 ECRs (including 85 students) were effectively given funding assistance to attend the Joint Conference of the ARC/NHMRC Research Network for Parasitology and ASP (Gold Coast, July, 2006) via the Network's subsidisation of this event.
    - 51 ECRs and students were effectively subsidised by the Network's support of the Malaria Protein Structure and Function Symposium (Lorne, February, 2006).
    - Seventeen ECRs were awarded Network Researcher Exchange, Training and Travel awards in 2006, representing 74% of all successful applications for funding.
- Number of workshops, conferences or seminars conducted;
    - Two conferences – the Joint Conference of the ARC/NHMRC Research Network for Parasitology & the ASP (Gold Coast, July, 2006), attended by 256 researchers, and the Symposium on Malaria Protein Structure and Function (Lorne, February, 2006), attended by 88 researchers.
    - Ten seminars were presented by Network Researcher Exchange, Training and Travel awardees as part of their exchanges in 2006.
- 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;
    - The Network funded 15 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*, 14 international visitors to Australia (ten as invited lecturers to the Network Conference, four on Researcher Exchanges).

- In total, 76 international visitors spent time in Australian parasitology groups during 2006 – they came from the UK (13), the USA (18), Germany (6), Switzerland (4), China (6), Thailand (7), France (2), Canada (2), Sweden (3), Denmark (2), Spain, Ireland, Papua New Guinea, India, New Zealand, Norway, Malawi, Malaysia, Uruguay, the Netherlands, Israel, Kenya and the Czech Republic (all 1 each) – again, the Network claims no direct credit for these visits but documents them as a benchmark of international collaboration by Network Participants.
- 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);
  - There were 85 reports in the media involving Network scientists in 2006 and 42 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;
  - 334 printed publications and 388 conference presentations and institutional seminars.
- Number of universities receiving funding;
  - Network Participants from 21 Participating Organisations received funding to attend the Annual Conference of the ARC/NHMRC Research Network for Parasitology.
  - Network Participants from 14 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

- **Register of Network Participants**

Network Participant Name	Department and Institution
Dr D Jenkins	AHCEP
Dr JW Allen	BAMBI, The Australian National University
AProf C Behm	BAMBI, The Australian National University
Prof I Clark	BAMBI, The Australian National University
Ms ME Downie	BAMBI, The Australian National University
Ms J-A Fritz	BAMBI, The Australian National University
Mr R Hayward	BAMBI, The Australian National University
Ms RI Henry	BAMBI, The Australian National University
Mr N Johnson	BAMBI, The Australian National University
Prof K Kirk	BAMBI, The Australian National University
Ms Knight	BAMBI, The Australian National University
Mr R Kumarisinghe	BAMBI, The Australian National University
Ms Lehane	BAMBI, The Australian National University
Ms R Marchetti	BAMBI, The Australian National University
Ms R Martin	BAMBI, The Australian National University
Dr K Saliba	BAMBI, The Australian National University
Ms C Spry	BAMBI, The Australian National University
Dr Teng	BAMBI, The Australian National University
Dr D van Schalkwyk	BAMBI, The Australian National University
Dr R Lee	Westmead Hospital, The University of Sydney
Dr G Vesey	BTF
Dr Grillo (BVMS MRCVS)	School of Agricultural & Veterinary Sciences,Charles Sturt University, Wagga Wagga Campus
Prof NC Sangster	School of Agricultural & Veterinary Sciences, Charles Sturt University, Wagga Wagga Campus
Prof N Ashbolt	CiEnvEng, University of New South Wales
Dr H Ball	Pathol., The University of Sydney
AProf D Emery	Vet. Sci., The University of Sydney
Prof. E Grau	Vascular Immunology Unit, The University of Sydney
Prof N Hunt	Pathology, The University of Sydney
Ms G Maitland	Vet. Sci., The University of Sydney
Ms K McMaster	Vet. Sci., The University of Sydney
Dr A Mitchell	Pathol., The University of Sydney
Ms J Miu	Pathol., The University of Sydney
Mr S Parekh	Pathol., The University of Sydney
Ms S Potter	Pathol., The University of Sydney
Dr M Power	Department of Biological Sciences, Macquarie University
Ms S Weiser	Pathol., The University of Sydney
AProf P Windsor	Vet. Sci., The University of Sydney
Dr N Beebe	IBID, The University of Technology, Sydney
Dr SI Belli	IBID, The University of Technology, Sydney
Dr N Boulter	IBID, The University of Technology, Sydney
AProf K Broady	IBID, The University of Technology, Sydney
Prof JP Dalton	IBID, The University of Technology, Sydney
AProf M Davey	IBID, The University of Technology, Sydney
Dr S Donnelly	IBID, The University of Technology, Sydney
Prof JT Ellis	CMB, The University of Technology, Sydney
Ms S Flowers	IBID, The University of Technology, Sydney

Dr R Fotedar	Department of Cell and Molecular Biology, The University of Technology, Sydney
Ms A Hudson	IBID, The University of Technology, Sydney
Miss CE James	IBID, The University of Technology, Sydney
Mr M Johnson	IBID, The University of Technology, Sydney
Mr M Lees	IBID, The University of Technology, Sydney
Ms K Mai	IBID, The University of Technology, Sydney
Dr CMD Miller	IBID, The University of Technology, Sydney
Dr J Slapeta	IBID, The University of Technology, Sydney
Ms I Slapetova	IBID, The University of Technology, Sydney
AProf NC Smith	IBID, The University of Technology, Sydney
Ms I Sotirchos	IBID, The University of Technology, Sydney
Dr C Stack	IBID, The University of Technology, Sydney
Dr A Sweeney	IBID, The University of Technology, Sydney
Dr M Villavedra	IBID, The University of Technology, Sydney
Mr R Walker	IBID, The University of Technology, Sydney
Prof MG Wallach	IBID, The University of Technology, Sydney
AProf N Anstey	Scabies and Skin Pathogen Research Lab, Menzies
Dr A Brockman	Scabies and Skin Pathogen Research Lab, Menzies
Dr B Bruce	Scabies and Skin Pathogen Research Lab, Menzies
Prof B Currie	Scabies and Skin Pathogen Research Lab, Menzies
Ms C Darcy	Scabies and Skin Pathogen Research Lab, Menzies
Ms A Dougall	Scabies and Skin Pathogen Research Lab, Menzies
Dr D Holt	Scabies and Skin Pathogen Research Lab, Menzies
Ms K Mounsey	Scabies and Skin Pathogen Research Lab, Menzies
Ms K Piera	Scabies and Skin Pathogen Research Lab, Menzies
Dr R Price	Scabies and Skin Pathogen Research Lab, Menzies
Dr A Ratcliff	Scabies and Skin Pathogen Research Lab, Menzies
Ms A Slender	Scabies and Skin Pathogen Research Lab, Menzies
Dr R Suwanarusk	Scabies and Skin Pathogen Research Lab, Menzies
Dr S Walton	Scabies and Skin Pathogen Research Lab, Menzies
Dr T Woodberry	Scabies and Skin Pathogen Research Lab, Menzies
Ms A Auliff	Australian Army Malaria Institute
Dr Q Cheng	Australian Army Malaria Institute
Dr R Cooper	Australian Army Malaria Institute
Dr M Edstein	Australian Army Malaria Institute
Mr D Krause	Australian Army Malaria Institute/Queensland Institute of Medical Research
Prof. D Shanks	Australian Army Malaria Institute
AProf D Blair	Trop.Biol., James Cook University
Dr W Melrose	Public Health and Tropical Medicine, James Cook University
Dr L Skerratt	Vet.Sci, James Cook University
Prof. R Speare	SPHTMRS, James Cook University
Dr L Jackson	QDPI
Dr W Jorgensen	QDPI
Dr A Lew	QDPI
Dr F Amante	Queensland Institute of Medical Research
Dr K Andrews	Queensland Institute of Medical Research
Dr S Beckham	Queensland Institute of Medical Research
Ms WY Chung	Queensland Institute of Medical Research
Ms K Clark	Queensland Institute of Medical Research
Mr B Datu	Helminth Biology Lab, Queensland Institute of Medical Research
Mr M Dixon	Queensland Institute of Medical Research

Ms T Don	Queensland Institute of Medical Research
Dr L Dunn	Queensland Institute of Medical Research
Ms RL Dunne	Queensland Institute of Medical Research
Dr C Engwerda	Queensland Institute of Medical Research
Dr K Fischer	Queensland Institute of Medical Research
Dr D Gardiner	Queensland Institute of Medical Research
Dr M Gatton	Queensland Institute of Medical Research
Ms A Glanfield	Queensland Institute of Medical Research
Dr G Gobert	Queensland Institute of Medical Research
Prof MF Good	Queensland Institute of Medical Research
Ms P Hawthorne	Queensland Institute of Medical Research
Dr M Jones	Queensland Institute of Medical Research
Prof D Kemp	Queensland Institute of Medical Research
Dr A Loukas	Queensland Institute of Medical Research
AProf J McCarthy	Queensland Institute of Medical Research
Prof D McManus	Queensland Institute of Medical Research
Dr C Pasay	Queensland Institute of Medical Research
Dr M Pearson	Queensland Institute of Medical Research
Dr A Pinzon-Charry	Molecular Immunology Laboratory,Queensland Institute of Medical Research
Ms L Randall	Queensland Institute of Medical Research
Ms N Ranjit	Queensland Institute of Medical Research
Dr T Skinner-Adams	Queensland Institute of Medical Research
Mr M Smout	Queensland Institute of Medical Research
Dr Smyth	Helminth Biology Laboratory, Queensland Institute
Dr T Spielmann	Queensland Institute of Medical Research
Dr A C Stanley	Queensland Institute of Medical Research
Mr T Tran	Queensland Institute of Medical Research
Ms M Tran	Queensland Institute of Medical Research
Dr K Trenholme	Queensland Institute of Medical Research
Dr J Upcroft	Queensland Institute of Medical Research
AProf P Upcroft	Queensland Institute of Medical Research
Ms C Willis	Queensland Institute of Medical Research
Ms J Wright	Queensland Institute of Medical Research
Mrs H You	Queensland Institute of Medical Research
Dr LH Zhang	Queensland Institute of Medical Research
Dr W Zhang	Queensland Institute of Medical Research
Dr R Adlard	Qld Museum
AProf S Barker	Mic&Par, The University of Queensland
Miss J Becker	Zool&Ent, The University of Queensland
Miss MAA Burger	School of Molecular and Microbial Sciences, The University of Queensland
Ms C Covacin	Mic&Par, The University of Queensland
Dr T Cribb	Mic&Par, The University of Queensland
Dr P Ebert	Zool&Ent, The University of Queensland
Miss R Fogelman	Zool&Ent, The University of Queensland
Miss V Gamboa	Anatomy, The University of Queensland
Dr A Grutter	Zool&Ent, The University of Queensland
Mr C Jones	Zool&Ent, The University of Queensland
Ms C June	Mic&Par, The University of Queensland
Ms N Leo	Mic&Par, The University of Queensland
Miss P McCracken	Zool&Ent, The University of Queensland
Miss G Munoz	Mic&Par, The University of Queensland
Dr A Murrell	Mic&Par, The University of Queensland

Prof. P J O'Donoghue	School of Molecular and Microbial Sciences, The University of Queensland
Miss J Pickering	Zool&Ent, The University of Queensland
Mr M Rix	Mic&Par, The University of Queensland
Miss J Rumney	Zool&Ent, The University of Queensland
Dr R Shao	Mic&Par, The University of Queensland
Miss S Waller	VTHRC, The University of Queensland
Dr R Traub	Veterinary Science, The University of Queensland
Dr C Chambers	Earth&En, The University of Adelaide
Dr L Chisholm	Earth&En, The University of Adelaide
Ms V Glennon	Earth&En, The University of Adelaide
Ms K Hutson	Earth&En, The University of Adelaide
Mr A Mooney	Earth&En., The University of Adelaide
Mr M O'Callaghan	Earth&En, The University of Adelaide
Mr D Schmarr	Earth&En, The University of Adelaide
Ms R Williams	Earth&En, The University of Adelaide
Prof M Bull	Biology, Flinders University
Ms M Oorebeek	Flinders University
Dr I.D. Whittington	Parasitology, SA Museum
Mr N Bott	Diagnostics, SARDI
Ms E Perkins	Earth&En, The University of Adelaide
Dr MB Adams	Aquacult, University of Tasmania
Mr HM Aiken	Aquacult, University of Tasmania
Ms M Andrews	Tasmanian Aquaculture & Fisheries Institute, University of Tasmania
Ms JM Covello	School of Aquaculture, University of Tasmania
Dr PBB Crosbie	Aquacult, University of Tasmania
Ms RL Florent	Aquacult, University of Tasmania
Mr RH Gurney	Aquacult, University of Tasmania/CSIRO
Dr C Hayward	Aquacult, University of Tasmania
Dr RN Morrison	Aquacult, University of Tasmania
Dr B Nowak	Aquacult., University of Tasmania
Dr M Powell	Aquacult, University of Tasmania
Mr SD Roberts	Aquacult., University of Tasmania
Mrs EG Sridevi	Aquacult., University of Tasmania
Mr N Young	University of Tasmania
AProf M Plebanski	Austin / Burnett Institute
Dr A Barry	Austin / Burnett Institute
Dr S Binos	DPI Vic
Dr D Hartman	DPI Vic
Dr P Presidente	DPI Vic
Dr J Sexton	DPI Vic
Dr J Zawadzki	DPI Vic
Dr C Adda	Biochem., La Trobe University
Dr A Adisa	Biochem., La Trobe University
Mr A Alpyurek	Biochem., La Trobe University
Prof R Anders	Biochem., La Trobe University
Ms J Burgess	Agric., La Trobe University
Dr J Casey	Biochem., La Trobe University
Dr A Coley	Biochem., La Trobe University
Mr S Cotton	Agric., La Trobe University
Ms M Crespo	Biochem., La Trobe University
Ms S Deed	Biochem., La Trobe University
AProf M Foley	Biochem., La Trobe University

Ms S Frankland	Biochem., La Trobe University
Ms Y Fu	Biochem., La Trobe University
Ms K Harris	Biochem., La Trobe University
Ms K Jackson	Biochem., La Trobe University
Dr N Klonis	Biochem., La Trobe University
Ms R Masciantonio	Biochem., La Trobe University
Dr P Mehrpouian	Agric., La Trobe University
Ms Munro	Biochem., La Trobe University
Mr V Murphy	Biochem., La Trobe University
Ms K Parisi	Biochem., La Trobe University
Mr P Parker	Nutrition, LaTrobe University
A/Prof. M Sandeman	Agric., La Trobe University
Mr J Schloegel	Biochem., La Trobe University
Dr J Scoble	Biochem., La Trobe University
Prof L Tilley	Biochem., La Trobe University
Ms K Vingas	Biochem., La Trobe University
Ms C Black	Monash University
Dr B Cooke	Microbiol, Monash University
Prof R Coppel	Microbiol, Monash University
Prof. Els N.T. Meeusen	Animal Biotechnology Research Laboratories (ABRL), Monash University
Ms Prickett	Monash University
Mr N Proellocks	Department of Microbiology, Monash University
Ms K Waller	Dept. of Microbiology, Monash University
Mr S Barber	CAB, The University of Melbourne
Dr I Beveridge	VetSci., The University of Melbourne
Mr J Blaszak	Medicine, The University of Melbourne
Dr P Boeuf	Department of Medicine (RMH/WH), The University of Melbourne
Dr V Bowles	CAB, The University of Melbourne
Prof G Brown	Medicine, The University of Melbourne
Ms A Colebrook-Robinson	The University of Melbourne
Dr M deVeer	CAB, The University of Melbourne
Dr P Dolezal	Bio21-Molecular Science and Biotechnology Institute, The University of Melbourne
Dr M Duffy	Medicine, The University of Melbourne
Dr S Elliott	Medicine, The University of Melbourne
AProf R Gasser	VetSci., The University of Melbourne
Dr D Goodman	Botany, The University of Melbourne
Dr A Jex	Gasser Laboratory, The University of Melbourne
Dr B H Kalinna	Head Schistosome Group, Centre for Animal Biotechnology, The University of Melbourne
Mr N Kennedy	CAB, The University of Melbourne
Ms J Lackenby	University of Melbourne
Prof M Lightowlers	VetSci., The University of Melbourne
Ms E Mann	Medicine, The University of Melbourne
AProf M McConville	Bioc&Mol, The University of Melbourne
Prof G McFadden	Botany, The University of Melbourne
Mrs VPA Mollard	Botany, The University of Melbourne
Ms A Mount	Medicine, The University of Melbourne
Dr K Mullin	Botany, The University of Melbourne
Mr R Opperman	Botany, The University of Melbourne
Mr. M Pellegrino	The University of Melbourne

Dr D Piedrafita	CAB, The University of Melbourne
Miss J Pleasance	CAB, The University of Melbourne
Dr S Ralph	The University of Melbourne
Mr A Read	The University of Melbourne
Mr N Robinson	CAB, The University of Melbourne
AProf S Rogerson	Medicine, The University of Melbourne
Dr Shaw	The University of Melbourne
Mr S Shokoofeh	Department of Parasitology, The University of Melbourne
Miss R Smith	CAB, The University of Melbourne
Dr T Spurck	Botany, The University of Melbourne
Ms LM Stimmler	Botany, The University of Melbourne
Dr W-H Tham	Medicine, The University of Melbourne
Mr J Tonkin	Botany, The University of Melbourne
Mr GG van Dooran	Botany, The University of Melbourne
Dr J Babon	SB, The Walter and Eliza Hall Institute of Medical Research
Dr J Baum	The Walter and Eliza Hall Institute of Medical Research
Dr J Beeson	The Walter and Eliza Hall Institute of Medical Research
Prof A Cowman	The Walter and Eliza Hall Institute of Medical Research
Dr B Crabb	The Walter and Eliza Hall Institute of Medical Research
Miss M D'Ombrain	The Walter and Eliza Hall Institute of Medical Research
Dr T DeKoning-Ward	The Walter and Eliza Hall Institute of Medical Research
Dr K Evans	The Walter and Eliza Hall Institute of Medical Research
Dr Z Feng	SB, The Walter and Eliza Hall Institute of Medical Research
Dr S Foote	The Walter and Eliza Hall Institute of Medical Research
Dr P Gilson	The Walter and Eliza Hall Institute of Medical Research
AProf E Handman	The Walter and Eliza Hall Institute of Medical Research
Dr D Hansen	The Walter and Eliza Hall Institute of Medical Research
Dr J Healer	The Walter and Eliza Hall Institute of Medical Research
Dr T Hodder	The Walter and Eliza Hall Institute of Medical Research
Dr L Kedzierski	The Walter and Eliza Hall Institute of Medical Research
Miss R Lundie	The Walter and Eliza Hall Institute of Medical Research
Dr A Maier	The Walter and Eliza Hall Institute of Medical Research
Dr M Marti	The Walter and Eliza Hall Institute of Medical Research
Miss A Marty	The Walter and Eliza Hall Institute of Medical Research
Miss J McCoubrie	The Walter and Eliza Hall Institute of Medical Research
Dr T Nebl	The Walter and Eliza Hall Institute of Medical Research
Miss C Nie	The Walter and Eliza Hall Institute of Medical Research
Prof R Norton	SB, The Walter and Eliza Hall Institute of Medical Research
Dr A Pearce	The Walter and Eliza Hall Institute of Medical Research
Dr M Rug	The Walter and Eliza Hall Institute of Medical Research
Dr L Schofield	The Walter and Eliza Hall Institute of Medical Research
Dr D Stanisic	Infection and Immunity Division, The Walter and Eliza Hall Institute of Medical Research
Miss J Stubbs	The Walter and Eliza Hall Institute of Medical Research
Dr A Uboldi	The Walter and Eliza Hall Institute of Medical Research
Dr T Voss	The Walter and Eliza Hall Institute of Medical Research
Mr D Wilson	The Walter and Eliza Hall Institute of Medical Research
Dr S Yao	SB, The Walter and Eliza Hall Institute of Medical Research
Dr Zhu	Infection and Immunity, The Walter and Eliza Hall Institute of Medical Research
Dr RB Besier	Animal Health Laboratory, Albany, Department of Agriculture, WA
Ms T Armstrong	Vet&Bio, Murdoch University
Ms A Bestall	Murdoch University

Mr Sze Bong	Vet&Bio, Murdoch University
Ms A Boxell	Vet&Bio, Murdoch University
Dr C Constantine	Vet&Bio, Murdoch University
Ms N Giles	Vet&Bio, Murdoch University
Mr R Hobbs	Vet&Bio, Murdoch University
Dr P Irwin	Vet&Bio, Murdoch University
Ms L Lumbao	Vet&Bio, Murdoch University
Dr A Lymberry	Vet&Bio, Murdoch University
Ms L McInnes	Vet&Bio, Murdoch University
Dr A Mounsey	Vet&Bio, Murdoch University
Mr Z Njiru	Vet&Bio, Murdoch University
Ms C Palmer	Vet&Bio, Murdoch University
Ms B Ralston	Vet&Bio, Murdoch University
Dr S Reid	Vet&Bio, Murdoch University
Prof J Reynoldson	Vet&Bio, Murdoch University
AProf UM Ryan	Vet&Bio, Murdoch University
Prof RCA Thompson	Vet&Bio, Murdoch University