



Australian Government

Australian Research Council

**Annual Report (2005) for the ARC/NHMRC
Research Network for Parasitology**

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1. A Statistical “Snapshot” of the ARC/NHMRC Research Network for Parasitology in 2005

- Number of (active) participants;
 - The Network defines a Participant as an active researcher (including postgraduate students) from a Participating Organisation that is a signatory to the Network Agreement (listed in the original application to the ARC), subscribed to the Network listserver and receiving the Network Newsletter. There are 299 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 499 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.
- Number of ECRs funded to do various activities;
 - 150 ECRs were given funding assistance to attend the First Conference of the ARC/NHMRC Research Network for Parasitology (Melbourne, July, 2005).
 - Eleven ECRs were awarded Network Researcher Exchange, Training and Travel awards in 2005, representing 73% of all successful applications for funding.
- Number of workshops, conferences or seminars conducted;
 - One – the First Conference of the ARC/NHMRC Research Network for Parasitology (Melbourne, July 7 and 8, 2005), attended by 210 researchers.

- 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 seven participants to spend time in international laboratories and funded three international visitors to Australia (two as invited lecturers to the Network Conference, one on a Researcher Exchange).
 - Additionally, 64 international visitors spent time in Australian parasitology groups during 2005 – they came from the UK (14), the USA (7), Vietnam (5), Germany (5), the Netherlands (4), Israel (4), Switzerland (4), China (3), Thailand (3), France (2), Iran (2), Canada (2), South Africa, Spain, Indonesia, Ireland, Egypt, Turkey, Taiwan, Denmark, Japan, Papua New Guinea and Kenya (all 1 each) –the Network claims no 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 31 reports in the media involving Network scientists in 2005 and 25 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;
 - 312 journal article, full conference papers or book chapters and 320 conference presentations and institutional seminars.
- Number of universities receiving funding;
 - Network Participants from 18 Participating Organisations received funding to attend the First Conference of the ARC/NHMRC Research Network for Parasitology.
 - Network Participants from 11 Participating Organisations received support from the Network Researcher Exchange, Training and Travel Fund.
- Number of Network web hits, articles downloaded;
 - Not known – facilities are being added to the Network website to make this assessment possible.
- The *URL* of the Research Network’s web site:
<http://www.parasite.org.au/arcnet>

2. 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

2.1 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
- 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.

2.2 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, however, some adjustment and reorientation of budget allocations were necessary in light of the granting of \$300,000 per annum from the ARC and NHMRC versus the requested ~\$500,000 per annum – this is explained further below.

2.3 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 2005 Management Committee was: A/Prof. Nick Smith (Convenor, University of Technology, Sydney); Dr David Jenkins (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 A/Prof. Leann Tilley (LaTrobe University). The Committee met in January, July and December 2005.

The Management Committee also received input from an Advisory Committee, which met jointly with the Management Committee in July 2005. The Advisory Committee for 2005 was:

- Professor Chris Bryant, AM (for achievement in parasitology and science communication); past Dean of Science at ANU and founder of the Centre for the Public Awareness of Science (CPAS).
- Dr John Horton; a recognised global expert on anthelmintics and drug development for tropical diseases, and highly respected consultant for the pharmaceutical industry and WHO.
- Professor Sornchai Looareesuwan; Secretary General of the SEAMO TROPED Network and an internationally renowned researcher at the forefront of malaria research.
- Professor Nancy Millis, AC and MBE (for her work in biological sciences and education); a pioneer of Australian biotechnology and current Chancellor of LaTrobe University.
- Dr Graham Mitchell, AO (for services to science, especially immunoparasitology); recognised as one of Australia's leading biological scientists and consultants.

The Information Technology Initiative of the Network is overseen by a subcommittee appointed by the Management Committee. This subcommittee is chaired by Professor Ross Coppel (Monash University). 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 reviews IT activities and approves new projects.

2.4 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 2005 was \$2,103,620.

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 2005.

3. The extent to which the objectives of the Research Network and the Approved Proposal have been met through the aims listed in section 2

3.1 Access to databases on parasites, parasite genomes, bioinformatics analysis tools, parasitology research resources and protocols through the 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 2005 activities and progress of the IT team are summarised below:

EST Database Development

As a proof of capabilities exercise, the Network IT team undertook a project to develop a *Sarcoptes scabiei* EST Database. An NHMRC Medical Genomics Grant had provided initial funding to sequence an EST library generated from mRNA obtained from scabies mites, however, bioinformatics activities were not adequately funded by the grant and the Network took over the analysis, construction of database and public release of the information. This has required a great deal of work as the project had to start from scratch, processing the raw sequencer reads for quality and assembling raw reads into contigs.

The scientific leader of the project is Deborah Holt who provided The Network IT team with two lots of sequences of three different size fractions from the original cDNA library. Half of the fractions were cloned without normalisation, the three other fractions were made from the cDNA pool, but came from using a long PCR procedure and normalisation.

After checking the data integrity, the IT team called the bases and assembled the ESTs using Phred/Phrap programs. This led to the formation of 6962 Contigs (EST assembly) and 3720 singlets (single sequence).

In order to store and process the ESTs, a database called EST-PAC (which stands for EST package), was developed. EST-PAC was designed to be a sequence managing database, where either nucleic or protein sequences in a FASTA format can be entered. Users are able to upload groups of sequences, then jobs can be applied to these groups. For now, jobs are restricted to the BLASTALL programs, PFAM searches and ESTScan2 predictions.

The contigs and singlets were first blasted against the non-redundant database from NCBI. The search was made with the default values usually used with BLAST. From the 6962 Contigs, 4006 sequences have a hit and 2956 sequences have no similarity to sequences present in the database. For the singlets 1040 have a hit, whereas 2680 don't. We also did some blasts against a database containing DNA or protein drug targets. 1281 translated contigs show similarity with protein and 32 with DNA sequences.

To easily be able to view the quality of the Contigs, a schematic drawing of the assembly was developed. After having uploaded the assembly file (.ace file), users can browse either through all the contigs or choose to see the assembly with or without blast hits. All the sequences are represented by bars, which facilitates the interpretation of the assembly.

The database is publically accessible at :

<http://vbc.med.monash.edu.au/~yvan/est-pac/login.php>

Username: guest

Password: guest

DB: EST-1

Results can be queried through the Query link. This page allows powerful searches based on any term inside the database. To use this page, users don't need to know the relations between the tables, it is sufficient to select the table with results of interest and choose what field should be displayed.

The current set-up of the database allows any user to perform jobs or even to delete data. To avoid loss of data, the IT team is planning to create a user, who is only able to search the results without the right to perform jobs or manipulate data. To even further restrict access to our data, a simpler version of the database is envisaged. This database would only have the query feature.

For gene discovery groups who want to have EST-PAC locally installed, we provide scripts and instructions for downloading and installation of the database at following address:
<http://vbc.med.monash.edu.au/~yvan/download.html>

The database runs under Linux, Mac OS X, and Windows XP operating systems and further descriptions will be sent for publication and will acknowledge the Network.

Currently, the IT team are developing procedures to maintain and clean the database by writing a 'cleaning' program, which will be activated each time the database is used. The team is also planning to recalibrate the ESTScan matrix using the programs provided by their developers. Finally, assembly and blast hit displays will be graphically displayed and we will develop a method to store and retrieve good quality annotations.

Network Bioinformatics Services

Advanced genomics and functional genomics platforms have been made available to Network scientists by arrangement with the Victorian Bioinformatics Consortium:

The Wasabi genome annotation system

Wasabi was designed to facilitate the rapid annotation of prokaryotic or eukaryotic genomes, and to allow browsing and searching of the annotated genomes. The main features of interest are protein coding regions, so Wasabi performs various analyses on the proteins beforehand. These analyses are used to provide an initial automatic annotation. They are also presented in a summarised form for use in manual curation; the annotator can easily verify or modify the automatic annotation. Multiple annotators can work on a genome simultaneously, and the annotations can be exported to standard file formats such as Genbank/EMBL, GFF and FASTA.

Wasabi has the idea of a "genome" that consists of one or more chunks of DNA, denoted "chromosomes" but could be any DNA sequence, such as a plasmid or contig. Each chromosome has many "features" (e.g. CDS, tRNA, rRNA, repeat_unit) which are wholly defined by their coordinates (stop,start) on a chromosome. These features may be annotated using standard labels such as "product", "function", "subcellular_location" and so on.

Usually a large set of features is imported into Wasabi when commencing a new genome annotation. Common sources for CDS features are from gene prediction software like GeneMarkS and Glimmer2, and tRNA-scan-SE is often used to get a list of candidate tRNAs. It is possible to add individual features later using the web interface. Another source of annotations is from an existing (possibly primitive) annotation in an EMBL or Genbank file, which may be imported.

There are two types of annotators, normal and heads. Head annotators have the ability to add and delete features and assign features to annotators (i.e. dole out the work). Each feature can be independently annotated by each annotator. This is useful when it is desired to get two or three times coverage on a genome. The individual annotations are then "merged" into a primary annotation at the end for publication.

The main characteristic of Wasabi that separates it from other feature annotation software is the large number of preliminary searches it does for you. When the user goes to annotate an ORF say, they are presented with a summarised set of evidence to help them make a decision as to what this feature does. The full search reports are also only a click away. The evidence currently provided for CDS features is:

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

This set of analyses can be extended by a plug-in-type architecture. It is also possible to bootstrap the annotation process by using these analyses to automatically perform an initial annotation. The human annotator then only needs to verify and possibly correct the automatic annotation. This saves much typing and expedites the annotation process.

Parasitology network scientists using the VBC installation of Wasabi only need a modern standards compliant web browser, e.g. Mozilla, Firefox, IE. From a users point of view it is platform independent. The Victorian Bioinformatics Consortium is able to host Network participants' genome data on its Wasabi server. It would only be visible and annotatable by specified users and is password protected. Access to the system is obtained by contacting torsten.seeman@infotech.monash.edu.au.

Microarray Tools

The VBC provides, to participants in the ARC/NHMRC Research Network for Parasitology, computing infrastructure to support microarray experiments and also provides statistical expertise particularly for the analysis of microarray data.

The VBC maintains computer servers that allow researchers to store microarray data securely and share the data with collaborators anywhere in the world. Researchers are able to store their microarray experiment results, and perform analysis all via a standard Web interface. Currently, the VBC microarray server contains the results of hundreds of experiments.

The VBC has provided, and continues to provide expertise in the rigorous statistical analysis of microarray data. This is generally performed using Open Source Software. Microarray analysis includes: appropriate normalisation of the data to remove as much bias as possible; the calculation of differentially expressed genes using appropriate statistical test; cluster analysis; visualisations such as Principal Component Analysis, or Multi-Dimensional Scaling.

Access to this service is via contacting David.Powell@med.monash.edu.au.

3.2 Organise and fund Scientific Conferences and Workshops for scientists, industry representatives, etc. including participation by international experts

The ARC/NHMRC Research Network for Parasitology hosted a scientific meeting - held at the Walter and Eliza Hall Institute for Medical Research, Melbourne - on July 7 and 8, 2005. The conference covered a wide variety of parasitology research, reflecting the diversity and multidisciplinary nature of Network Participants. The meeting was attended by 210 Network Participants, which was the maximum possible for the venue to accommodate. The delegates were from 18 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). Approximately 70% of attendees funded to attend the conference were early career researchers. Representatives from every parasitology research group in the Network were invited to present a snapshot of their research efforts in an effort to highlight both the strength of Australia's parasitology research but also in an effort to foster collaborative research by educating participants about the quality, scale and focus of research being conducted by Network Participants and the scope of expertise and facilities available around the country. Plenary lectures were delivered by four internationally recognised parasitologists: Dr Emanuela Handman (Walter and Eliza Hall Institute of Medical Research, Melbourne, Australia) Assoc. Prof. Mick Foley (LaTrobe University, Melbourne, Australia), Dr John Horton (Tropical Research, UK), Dr Gordon Langsley (Institut Cochin, Paris, France).

3.3 Researcher Exchange, Training and Travel Awards to foster 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

The Network modified its aspirations with respect to the provision of funding for research exchanges, training courses, grant writing workshops and mentoring schemes in light of the funding awarded by the ARC and NHMRC to the ARC/NHMRC Research Network for Parasitology, which was less than requested. The Management Committee was forced to make the difficult decision that the Molecular Parasitology Course and the Mentoring Scheme it had hoped to institute through the Network were not viable; in particular, the proposed Molecular Parasitology Course could not hope to be as comprehensive or intense as the already existing Woods Hole Biology of Parasitism Course, held annually in the USA. In order to maximise flexibility of funding for Researcher Exchanges, attendance of international training courses (most particularly the annual Woods Hole Biology of Parasitism Course in the USA, where

senior Australian researchers traditionally make a significant contribution to the training program) and Grant Writing Retreats, the Network Management Committee merged these three, previously separate, budget items, into a single item with a total annual budget of \$100,000. In 2005, the Network funded the following applications for assistance from its Researcher Exchange, Training and Collaboration Fund (eleven of the fifteen awards directly benefited research students or early career researchers - three of these awardees are highlighted as case studies in this report):

- Prof. Ray Norton and colleagues, to organise and host a workshop on "Malarial Protein Structure and Function" in February, 2006;
- Prof. Kieran Kirk and Prof. Geoff McFadden, to finance the exchange of a PhD student, Roselani Henry, and a postdoctoral fellow, Dr Kylie Mullin, between their laboratories in Canberra and Melbourne to learn new technologies related to the expression and transfection of genes for putative malarial membrane transport proteins.
- Ms Kate Mounsey (PhD student, Menzies School of Health Research), to travel to Prof. Roger Prichard's lab at McGill University's Institute for Parasitology in Canada to learn and apply novel techniques for expression of *S. scabiei* drug resistance genes.
- Dr Akin Adisa (Postdoctoral Fellow, LaTrobe University), to travel to Guy's Hospital, Kings's College London, to work with world leaders (Dr Lawrie Bannister and Dr Anton Dluzewski, working in the laboratory of Prof. Graham Mitchell) in electron microscopy of *Plasmodium* to resolve the ultrastructure of the golgi apparatus of the malaria parasite.
- Ms Paula Hawthorne (PhD student) of the Queensland Institute of Medical Research, who successfully applied to the Network for assistance to travel to Prof. Leann Tilley's laboratory at LaTrobe University to investigate the function of three malaria parasite proteins for her PhD.
- Ms Sarah Flowers (PhD student) of the Institute for the Biotechnology of Infectious Diseases, for assistance to travel to the laboratory of Professor Brian Chait at Rockefeller University in New York to take advantage of some unique proteomic analysis facilities and expertise important to her PhD project on apicomplexan oocyst and cyst wall development.
- Prof. Nick Hunt of the University of Sydney, who successfully applied to the Network for assistance to bring Prof. Jacob Golenser of the Hebrew University, Israel, to Australia to collaborate on a project examining the effects of immunomodulators on cerebral malaria. Nick and Jacob were also successful in securing funding from the Sir Zelman Cowen Universities Fund for this exciting project.
- Ms Julie-Anne Fritz (PhD student) of the Australian National University, to travel to the laboratory of Dr Marc Vidal's lab at the Dana-Farber Cancer Institute, Harvard Medical School in Boston, U.S.A. to identify a selection of essential nematode-specific genes in *C. elegans*, which have homologues in parasitic nematodes, and to characterise their functions using yeast two-hybrid technologies.
- Ms Louise Randall (PhD student) of the Queensland Institute of Medical Research, to attend the 2005 Woods Hole Biology of Parasitism Course. Louise was also successful in securing a scholarship from the Marine Biological Laboratory to attend the course.

Case Study 3: Network Travel Award for Molecular Parasitologist, Kate Mounsey

Kate Mounsey is PhD student at Darwin's Menzies School of Health working as part of Dr Shelley Walton's group. Kate won a Network Travel Award and in 2005 spent three months with Prof. Roger Prichard's laboratory in McGill University, Canada to help her research.

Kate Mounsey's research looks at the molecular mechanisms of drug resistance in scabies. The first case of Ivermectin resistance in the scabies mite was documented in crusted scabies patients in North Australia. As part of her PhD Kate is using molecular techniques to identify and characterise scabies mite genes that are involved in the drug resistance.

Kate says that she finds this work really challenging. She says that scabies mites are a difficult parasite to study; there is no animal model or *in vitro* culture system so she relies on scabies patients admitted to hospital to collect and study the mites. Kate finds these difficulties make it even more rewarding and exciting when she makes a breakthrough in her research. Scabies is a very important health problem, particularly amongst indigenous communities in remote central and northern Australia. The disease is particularly prevalent in children, and not only causes discomfort, but secondary skin infections which can lead to serious complications such as rheumatic heart and kidney disease. She says that her involvement with scabies patients constantly reminds her of why her work is important.

Kate to travel to Canada where she worked with parasitologists at McGill University in Prof. Roger Prichard's laboratory. Kate received training in techniques to investigate genes potentially involved with ivermectin resistance in scabies. This included using real-time PCR for the first time to study the expression of scabies mite ABC transporters. Additionally, plans were made for continued collaboration to further characterise a putative scabies mite chloride channel which may act as a drug receptor for ivermectin. This was a huge boost to her research work both practically, as she was able to work with the world-leaders of research into ivermectin resistance, and mentally, as a result of the confidence, motivation and enthusiasm gained from working at McGill. Kate finds this work very interesting and says that the collaborative work with McGill University is a direct result of her Network Travel Award.

Kate believes that the Network supports Australian research and encourages collaboration between groups which improves the collective expertise. She encourages other Network participants who are considering applying for a Network Travel Award to "go for it - there's nothing to lose"; and says that the application process is very user-friendly. Kate says that her trip to Canada and work at McGill was a fantastic opportunity and the highlight of her science career so far.

Kate's PhD is due to finish this year. She hopes to continue to work to improve the health and well-being of people who live in developing regions; and wants to continue her research work in molecular parasitology.

- Mr Bong Sze How (PhD student) of Murdoch University, 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.

Case Study 2: Network Travel Award for Immunoparasitologist, Louise Randall

Louise Randall is a PhD student at the Queensland Institute of Medical Research (QIMR) researching cerebral malaria. Louise received an ARC/NHMRC Research Network for Parasitology Travel Award that has facilitated her research in this area.

Louise's travel award paid for her to travel to the Marine Biological Laboratory at Woods Hole in the United States of America to attend the Biology of Parasitism Course from June to August 2005. This course is an intense 8 week course of parasitology lectures and research projects, all facilitated by researchers who are leaders in their fields. Louise didn't study parasitology during her undergraduate degree so this course has helped her to develop fundamental skills applicable to her research project.

Louise's current research involves characterising the role of the immune response and the pathways leading to cerebral malaria. She is passionate about this research because of the large proportion of deaths, particularly in children, that are caused by this disease. Often patients will die within the first few hours at the hospital, before treatments can be administered. Louise believes her work will help to improve scientific understanding of the mechanisms involved in cerebral malaria. She hopes that her findings in the experimental model can be translated to the human disease and that one day may help develop therapeutics to delay the development of cerebral malaria, allowing time for treatments to be administered.

The Biology of Parasitism Course taught Louise many new lab techniques which she uses in her research and she says that her lab has since formed new relations with other groups overseas and that this should facilitate work that wouldn't have otherwise happened. Louise thinks the Network does important work in enabling scientists to share techniques and expertise that will ultimately lead to new ways of answering some key research questions, and will move forward Australia's understanding of parasitology.

Louise is looking forward to finishing her PhD around August 2007. She then wants to pursue a career in immunoparasitology and undertake some field work overseas before returning back home to Australia.

- Mr Bennett Datu (PhD student) of the Queensland Institute of Medical Research, who applied to the Network for assistance to visit the labs of Dr John Hawdon at George Washington University, and Dr Tony Page, at Glasgow University to study the regulation of the transition from free-living larvae to adult endoparasite in hookworms using unique RNAi and transgenic technologies.
- Mr Robert Walker (PhD student) of the Institute for the Biotechnology of Infectious Diseases, who successfully applied to the Network for assistance to travel to the

laboratory of Dr Mal Jones at QIMR to carry out a series of experiments to isolate macrogametocytes and microgametocytes using laser catapult microscopy.

Case Study 3: Network Travel Award for Marine Parasitologist, Kate Hutson

Kate Hutson is a PhD student at the University of Adelaide working as part of Dr Ian Whittington's marine parasitology group. Kate won a Network travel award and in October 2005 visited laboratories in Queensland to help her research.

Kate Hutson's research looks at the management of parasites in sea cage aquaculture. As part of her PhD, Kate is documenting the parasite community of wild kingfish in Australia and providing a parasite risk assessment for kingfish farming.

Kate says that she finds parasites fascinating and loves working in the marine environment. Kate says that she particularly enjoys the element of discovery in her research. The findings of Kate's research can be directly applied to the management of parasites in aquaculture. The parasite risk assessment will identify parasites of potential threat to kingfish aquaculture in Australia. Identification of potential wild infection sources will help to determine suitable sea cage sites for kingfish as the industry expands. The risk assessment Kate has devised can also be applied to determine the risk and consequence of parasites for similar fish farming situations overseas, especially where transfer of parasites is possible between wild fish and farmed fish.

The Network travel award enabled Kate to travel to Brisbane where she worked closely with three Network parasitologists; Dr Robert Adlard from the Queensland Museum and Dr Thomas Cribb and Dr Matthew Nolan from the University of Queensland. Collaboration with these marine parasitology research groups enabled Kate to make identifications of some of the parasites she has detected on wild and farmed fish. As a result of this and other work, Kate has documented over forty parasite species from wild kingfish. Her work and discussions with Dr Nolan triggered Kate to describe a new species of blood fluke, which has been published in Zootaxa. <http://www.mapress.com/zootaxa/2006f/z01151p068f.pdf>

Kate thinks that the Network is an excellent initiative because it involves an assortment of parasitologists from all over Australia. She thinks it is a great way of meeting like-minded parasitologists and finding out about current research schemes. Kate says that the Network supports its members by encouraging them to share their knowledge and skills, by planning conferences and providing travel grants.

Kate hopes to secure a visiting post-doctoral fellowship overseas next year, and then return to Australia to continue marine parasitology research in association with aquaculture. Kate's ten-year goal is to begin a marine parasitology research group of her own in Australia.

- Prof. Nick Sangster of the University of Sydney, who successfully applied to the Network for assistance to travel to WEHI (to learn skills in genome annotation as used for *Plasmodium* from Drs Toby Sargeant and Ken Simpson in the group under Prof. 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).

- Assoc. Prof. Una Ryan and Dr Simon Reid of Murdoch University, 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.
- Ms Kate Hutson (PhD student) of the University of Adelaide, who successfully applied to the Network for assistance to travel to Assoc. Prof. Tom Cribb's and Dr Rob Adlard's labs at the University of QLD and the QLD Museum, respectively, to investigate the identification and taxonomy of trematode and protozoan parasites from kingfish (*Seriola* spp) for her PhD.

4. 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.

In addition to the Network IT Initiatives and the development of national and international collaborative research, summarised in section 3, ARC/NHMRC Research Network for Parasitology Participants published 312 articles in journals or books during 2005. 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 (particularly given that the Network has only been in operation for 12 months); 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. In addition to the printed publications detailed below, Network Participants presented 320 papers at conferences or by invitation at institutions across Australia and around the world (69 invited lectures at institutions, 95 keynote, plenary or symposium speeches at national and international conferences and 197 contributed papers at conferences). A comprehensive listing of these presentations is not documented here.

Likewise, research grants awarded to Network Participants in 2005 are listed below, as a benchmarking record, without claiming undue influence of the Network in the success of the applications.

4.1 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. sprengi* n. sp. *Systematic Parasitology*. Published on-line 21 November 2005

Barton, D.P. & Blair, D. Superfamily Pronocephaloidea Looss, 1899, In *Keys to the Trematoda*. Volume 2. (eds. Gibson, D.I., Jones, A. & Bray, R.A.). CABI Publishing, Wallingford, U.K. pp 357-359

Barton, D.P. & Blair, D. Family Notocotylidae Lühe, 1909. In *Keys to the Trematoda*. Volume 2. (eds. Gibson, D.I., Jones, A. & Bray, R.A.). CABI Publishing, Wallingford, U.K. pp 383-396

- Barton, D.P. & Blair, D. Family Nudacotylidae Barker, 1916, In Keys to the Trematoda. Volume 2. (eds. Gibson, D.I., Jones, A. & Bray, R.A.). CABI Publishing, Wallingford, U.K. pp 397-399
- Becker, J. H. A. and A. S. Grutter Client-fish ectoparasite loads and cleaner-shrimp hunger levels affect the cleaning behaviour of the cleaner-shrimp *Urocaridella* sp. c. *Animal Behaviour*. 70: 991-996
- Becker, J.H.A., Curtis, L., Grutter, A.S. Cleaner shrimp use rocking dance to advertise cleaning service to clients. *Current Biology*. 15: 760-764
- Beveridge I, Campbell RA. Three new genera of trypanorhynch cestodes from Australian elasmobranch fishes. *Syst Parasitol*. 60: 211-224.
- Beveridge, I., Jones, M.K. Australian Faunal Directory. Checklist for Class Cestoda. Australian Biological Resources Study. Department of the Environment and Heritage, Canberra. Web-site : <http://www.deh.gov.au/cgi-bin/abrs/fauna/tree.pl?pstrVol=CESTODA&pintMode=1>
- Blair D. Cestodes and Trematodes. pages 427-431. In *Marine Parasitology* (ed K. Rohde). CABI and CSIRO.
- Blair, D. Family Rhytidodidae Odhner, 1926. In Keys to the Trematoda. Volume 2. (eds. Gibson, D.I., Jones, A. & Bray, R.A.). CABI Publishing, Wallingford, U.K. pp 123-125.
- Blair, D. Family Microscaphidiidae Looss, 1900. In Keys to the Trematoda. Volume 2. (eds. Gibson, D.I., Jones, A. & Bray, R.A.). CABI Publishing, Wallingford, U.K. pp 193-211.
- Blair, D. Family Pronocephalidae Looss, 1899. In Keys to the Trematoda. Volume 2. (eds. Gibson, D.I., Jones, A. & Bray, R.A.). CABI Publishing, Wallingford, U.K. pp 361-380.
- Blair, D. Family Labicolidae Blair, 1979. In Keys to the Trematoda. Volume 2. (eds. Gibson, D.I., Jones, A. & Bray, R.A.). CABI Publishing, Wallingford, U.K. pp 381-382.
- Blair, D. Family Opisthotrematidae Poche, 1926. In Keys to the Trematoda. Volume 2. (eds. Gibson, D.I., Jones, A. & Bray, R.A.). CABI Publishing, Wallingford, U.K. pp 401-406.
- Blair, D. Family Rhabdiopoeidae Poche, 1926. In Keys to the Trematoda. Volume 2. (eds. Gibson, D.I., Jones, A. & Bray, R.A.). CABI Publishing, Wallingford, U.K. pp 407-411.
- Blair, D., Chang, Z.S., Chen, M.G., Cui, A.I., Wu, B., Agatsuma, T., Iwagami, M., Corlis, D., Fu, C.B. & Zhan, X.M. *Paragonimus skrjabini* Chen, 1959 (Digenea: Paragonimidae) and related species in eastern Asia: a combined molecular and morphological approach to identification and taxonomy. *Systematic Parasitology* 60: 1-21.
- Bott, N.J., Healy, J.M. & Cribb, T.H. Patterns of digenean parasitism of bivalves from the Great Barrier Reef and associated waters. *Marine and Freshwater Research* 56: 387-394.
- Bott, N. J. & Cribb, T.H. *Prosorhynchoides lamprelli* n. sp. (Digenea: Bucephalidae) from the brassy trevally, *Caranx papuensis* (Teleostei: Carangidae), from off Lizard Island on the Great Barrier Reef, Australia. *Zootaxa* 1059: 33-38
- Bott, N. J. & Cribb, T.H. First report of a bucephalid digenean from an apogonid teleost: *Prosorhynchoides apogonis* n. sp. from *Cheilodipterus macrodon* on the southern Great Barrier Reef, Australia. *Systematic Parasitology*. 60: 33-37
- Bott, N. J. and Cribb, T.H. First report of intramolluscan stages of a gorgoderid digenean from a marine bivalve. *Journal of Parasitology* 91: 838-842
- Bott, N. J. & Cribb, T.H. *Grammatorecynicola* n. g. (Bucephalidae: Dolichoenterinae) from *Grammatorecynus* spp. (Scombridae) from the Great Barrier Reef, Australia. *Systematic Parasitology* 61: 93-98.
- Bray, R.A. & Cribb, T.H. *Overstreetia olsoni* n. sp. (Digenea: Zoogonidae) from the Capricorn silverside *Atherinomorus capricornensis* (Woodland) (Atherinidae) off Heron Island, southern Great Barrier Reef. *Systematic Parasitology*. Published on-line 21 Nov. 2005.
- Bray, R.A. & Cribb, T.H. *Gorgocephalus yaaji* n. sp. (Digenea: Gorgocephalidae) from the brassy chub *Kyphosus vaigiensis* (Perciformes: Kyphosidae) off Lizard Island, northern Great Barrier Reef and further records of *G. kyphosi*. *Zootaxa* 1068: 39-46.
- Bray, R.A. & Cribb, T.H. Two new hemiurine species (Digenea: Hemiuridae) from *Spratelloides robustus* Ogilby (Clupeiformes: Clupeidae) off south-western Australia and records of *Parahemiurus merus* (Linton, 1910) from Australian and New Caledonian waters
- Bshary, R. and Grutter. Punishment and partner switching cause cooperative behaviour in a cleaning mutualism. *Biology Letters*. Proc. Roy. Soc. London In press

- Chisholm L.A. & Whittington I.D. *Dendromonocotyle lasti* n. sp. from the skin and *Monocotyle caseyae* n. sp. (Monogenea: Monocotylidae) from the gills of *Himantura* sp. (Dasyatidae) from Moreton Bay, Queensland, Australia. *Systematic Parasitology* 60: 81-89.
- Chisholm L.A., Glennon V. & Whittington I.D. *Dendromonocotyle bradsmithi* n. sp. (Monogenea: Monocotylidae) from the skin of *Myliobatis australis* (Elasmobranchii: Myliobatidae) off Adelaide and Perth, Australia: description of adult and larva. *Zootaxa* 951: 1-15.
- Chisholm L.A. & Whittington I.D. *Decacotyle cairae* n. sp. (Monogenea: Monocotylidae) from the gills of *Pastinachus* sp. (Elasmobranchii: Dasyatidae) from the South China Sea off Sarawak, Borneo, Malaysia. *Systematic Parasitology* 61: 79-84.
- Chisholm L.A. & Whittington I.D. *Empruthotrema stenophallus* n. sp. (Monogenea: Monocotylidae) from the nasal tissue of *Dasyatis kuhlii* (Dasyatidae) from Sabah, Borneo, Malaysia. *Journal of Parasitology* 91: 522-526.
- Cribb, T.H. Digenea (endoparasitic flukes). In *Marine Parasitology*. Ed. K. Rohde. CSIRO Publishing, Collingwood pp 76-87.
- Cribb, T.H. Family Apocreadiidae. In: Gibson, D.I., Jones, A. & Bray, R.A. (Eds) *Keys to the trematodes of vertebrates*. Volume 2. Wallingford: CAB International.
- Cribb, T.H. Family Opistholebetidae. In: Gibson, D.I., Jones, A. & Bray, R.A. (Eds) *Keys to the trematodes of vertebrates*. Volume 2. Wallingford: CAB International.
- Cribb, T.H. Family Batrachotrematidae. In: Gibson, D.I., Jones, A. & Bray, R.A. (Eds) *Keys to the trematodes of vertebrates*. Volume 2. Wallingford: CAB International.
- Cribb, T.H. Family Opecoelidae. In: Gibson, D.I., Jones, A. & Bray, R.A. (Eds) *Keys to the trematodes of vertebrates*. Volume 2. Wallingford: CAB International.
- Cribb, T.H. Superfamily Allocreadioidea. In: Gibson, D.I., Jones, A. & Bray, R.A. (Eds) *Keys to the trematodes of vertebrates*. Volume 2. Wallingford: CAB International.
- Dyková, I., Nowak, B.F., Crosbie, P.B.B., Fiala, I., Pecková, H., Adams, M., Macháčková, B., Dvořáková Neoparamoeba branchiphila n. sp. and related species of genus Neoparamoeba Page, 1987: morphological and molecular characterisation of selected strains. *Journal of Fish Diseases*, 28: 49-64.
- Fuller S.J., Bull C.M., Murray K. and Spencer R.J. Clustering of related individuals in a population of the Australian lizard, *Egernia frerei*. *Molecular Ecology* 14: 1207-1213.
- Glennon V., Chisholm L.A. & Whittington I.D. *Branchotenthes octohamatus* sp. n. (Monogenea: Hexabothriidae) from the gills of the southern fiddler ray, *Trygonorrhina fasciata* (Rhinobatidae) in South Australia: description of adult and larva. *Folia Parasitologica* 52: 223-230.
- Green, T., Powell, M.D., Harris, J.O. and Butler, R. Effects of dissolved organic carbon (DOC) and hardness in freshwater used to treat amoebic gill disease (AGD). *Aquaculture Research* 36: 398-404.
- Grutter, A.S., Glover, S., Bshary R. Does client size affect cleaner fish choice of client? An empirical test using client fish models. *Journal of Fish Biology*. 66: 1748-52.
- Hall, K.A. & Cribb, T.H. Revision of *Telotrema Ozaki*, 1933 (Digenea: Gyliachenidae Fukui, 1929), including the description of a new species from an acanthurid fish of the Great Barrier Reef, Queensland, Australia. *Zootaxa* 1071: 1-18.
- Hall, K. & Cribb, T.H. Family Gyliachenidae. In: Gibson, D.I., Jones, A. & Bray, R.A. (Eds) *Keys to the trematodes of vertebrates*. Volume 2. Wallingford: CAB International. pp 665-678.
- Hallas G., Bull C. M. and Bursey C. R. *Pharyngodon tiliquae* and *Thelandros trachysauri* (Nematoda: Pharyngodonidae), new parasite records for *Egernia stokesii* (Scincidae) from Australia. *Comparative Parasitology* 72: 119-120
- Heukelbach J, Walton SF, Feldmeier H. Ectoparasitic infections. *CID Reports* 7: 375-380.
- Holz PH, Beveridge I, Ross T. *Knemidocoptes intermedius* in wild superb lyrebirds (*Menura novaehollandiae*). *Aust Vet J*. 83: 374-5.
- Hu M, Gasser RB, Chilton NB and Beveridge I Genetic variation in the mitochondrial cytochrome c subunit 1 within three species of *Progamotaenia* (Cestoda: Anoplocephalidae) from macropodid marsupials. *Parasitology* 130: 117-129.
- Jex, A.R., Schneider, M.A., Rose, H.A. & Cribb, T.H. The *Thelastomatoidea* (Nematoda: Oxyurida) of two sympatric *Panesthiinae* (Insecta: Blattodea) from southeastern Queensland, Australia: taxonomy, species richness and host specificity. *Nematology* 7, 543-575.

- Jones, A. & Blair, D. Superfamily Microscaphidioidea Looss, 1900, In Keys to the Trematoda. Volume 2. (eds. Gibson, D.I., Jones, A. & Bray, R.A.). CABI Publishing, Wallingford, U.K. pp 189-191.
- Jones, A. & Blair, D. Family Mesometridae Poche, 1926, In Keys to the Trematoda. Volume 2. (eds. Gibson, D.I., Jones, A. & Bray, R.A.). CABI Publishing, Wallingford, U.K. pp 213-219.
- Jones, C. Grutter, A.S. Cultured parasitic isopods (*Gnathia* sp.) reduce haematocrit in captive *Hemigymnus melapterus* (Bloch) (Pisces: Labridae) on the Great Barrier Reef. *Journal of Fish Biology*. 66: 860-864.
- Jorgensen WK "Babesiosis" In: The Merck Veterinary Manual 9th edn. Ed C Kahn. Merial, Dulith, GA pp 20-23.
- Kearn G.C. & Whittington I.D. *Neoentobdella* gen. nov. for species of *Entobdella* Blainville in Lamarck, 1818 (Monogenea, Capsalidae, Entobdellinae) from stingray hosts, with descriptions of two new species. *Acta Parasitologica* 50: 32-48.
- Li AX, D'Amelio S, Paggi L, He F, Gasser RB, Lun ZR, Abollo E, Turchetto M, Zhu XQ Genetic evidence for the existence of sibling species within *Contracaecum rudolphii* (Hartwich, 1964) and the validity of *Contracaecum septentrionale* (Kreis, 1955) (Nematoda: Anisakidae). *Parasitology Research* 96: 361-366.
- Li AX, Wu YY, Xie MQ, Lin RQ, Gasser RB, Zhu XQ PCR-based identification and delineation of members within the *Pseudorhabdosynochus lantauensis* complex (Monogenea: Diplectanidae). *Parasitology Research* 98: 34-37.
- Li FJ, Gasser RB, Zheng JY, Claes F, Zhu XQ, Lun ZR Application of multiple DNA fingerprinting techniques to study the genetic relationships among three members of the subgenus *Trypanozoon* (Protozoa: Trypanosomatidae). *Molecular and Cellular Probes* 19: 400-407.
- Lucas, T., O'Brien, E. K., Cribb, T. & Degnan, B.M. Digenean trematodes infecting the tropical abalone *Haliotis asinina* have species-specific cercarial emergence patterns that follow daily or semilunar spawning cycles. *Marine Biology* 148: 285-292.
- McManus, DP, Feng Z., Guo, J, Li Y., Bartley, P.B., Loukas, A and Williams, G.M. Pathways to improved, sustainable morbidity control and prevention of schistosomiasis in the People's Republic of China. In: *Schistosomiasis. Series: World Class Parasites, Vol. 10* (eds Secor, W. Evan; Colley, Daniel G.), XII, 159-175.
- Miller, T.L. & Cribb, T.H. A new genus and species of cryptogonimid from *Lutjanus* Spp. (Pisces: Lutjanidae) on the Great Barrier Reef and New Caledonia. *Journal of Parasitology* 91: 922-925.
- Murrell, A. & Barker, S.C. Multiple origins of parasitism in lice: phylogenetic analysis of SSU rDNA indicates that the Phthiraptera and Psocoptera are not monophyletic. *Parasitology Research* 97, 274-280.
- Murrell, A., Dobson, S. J., Walter, D. E., Campbell, N.J.H., Shao, R. and Barker, S. C. Relationships among the three major lineages of the Acari (Arthropoda: Arachnida) inferred from small subunit rRNA: paraphyly of the Parasitiformes with respect to the Opilioacariformes and relative-rates of nucleotide substitution. *Invertebrate Systematics* 19, 383-389.
- Munoz, G., Grutter, A.S. & Cribb, T.H. Endoparasite communities of five fish species (Labridae: Cheiliniinae) from Lizard island: how important is the ecology and phylogeny of the hosts? *Parasitology* published on-line Dec 2005.
- Muñoz, G. & Cribb, T.H. Infracommunity structure of parasites of *Hemigymnus melapterus* (Pisces: Labridae) from Lizard Island, Australia: the importance of habitat and parasite body size. *Journal of Parasitology* 91: 38-44.
- Nolan, M. J. and Cribb, T. H. The use and implications of ribosomal DNA sequencing for the discrimination of digenean species. *Advances in Parasitology* 60: 101-163.
- Nolan, M.J. & Cribb, T.H. *Sanguinicola maritimus* n. sp. (Digenea: Sanguinicolidae) from Labridae (Teleostei: Perciformes) of southern Australian waters. *Systematic Parasitology* 61: 99-106.
- Nolan, M.J. & Cribb, T.H. *Chaulioleptos haywardi* n. g., n. sp. (Digenea: Sanguinicolidae) from *Filimanus heptadactyla* (Perciformes: Polynemidae) of Moreton Bay, Australia. *Journal of Parasitology* 91: 630-634 .
- Nowak, B. *Sarcomastigophora* (amoebae and flagellates). In: *Marine Parasitology* (K. Rohde, ed), 17-20.
- Otranto D, Testini G, Deluca F, Hu M, Gasser RB Analysis of genetic variability within *Thelazia callipaeda* (Nematoda: Thelazioidea) from Europe and Asia by sequencing and mutation scanning of mitochondrial cytochrome c oxidase subunit 1. *Molecular and Cellular Probes* 19: 306-313.
- Östlund-Nilsson, S., Curtis L., Nilsson, G.E., Grutter, A.S. Parasitic isopod *Anilocra apogonae*, a drag for cardinal fish *Cheilodipterus quinquelineatus* Mar. Ecol. Prog. Ser. 287: 209-216.

Shao, R., Mitani, H., Barker, S.C., Takahashi, M. & Fukunaga, M. Novel mitochondrial gene content and gene arrangement indicate illegitimate inter-mtDNA recombination in the parasitic chigger mite, *Leptotrombidium pallidum*. *Journal of Molecular Evolution* 60: 764-773.

Shao, R., Barker, S.C., Mitani, H., Aoki, Y. & Fukunaga, M. Evolution of duplicate control regions in the mitochondrial genomes of Metazoa: a case study with Australasian Ixodes ticks. *Molecular Biology and Evolution* 22: 620-629.

Thompson, RC, Olson, ME, Zhu, G, Enomoto, S, Abrahamsen, MS, Hijjawi, NS. *Cryptosporidium* and cryptosporidiosis. *Adv Parasitol.* 59: 77-158.

Urcroft JA, Abedinia M & Urcroft P. Rearranged subtelomeric rRNA genes in *Giardia duodenalis*. *Eukaryot Cell* 4: 484-6.

Whittington I.D. & Kearn G.C. The precocious oncomiracidium of *Neotentobdella parviteciculata* (Monogenea: Capsalidae: Entobdellinae). *Parasitology Research* 96: 331-334.

Whittington I.D. Monogenea Monopisthocotylea (ectoparasitic flukes). In: *Marine Parasitology*. Rohde K (Ed.), pp. 63-72. CSIRO Publishing, Melbourne, Australia.

Yang, Y.R, Rosenzvit, M.C., Zhang L.H., Zhang, L.H. and McManus, D.P. Molecular study of *Echinococcus* from west-central China. *Parasitology* 131:547-555.

Yang, Y.R., Sun, T., Li, Z., Li, X., Zhao, R., Cheng, L., Pan, X., Vuitton, D.R., Craig, P.S. and McManus, D.P. Echinococcosis, Ningxia, China. *Emerging Infectious Diseases* 11:1314-1316.

[2] Promoting and Maintaining Good Health

Abrams ET, Kwiek JJ, Mwapasa V, Kamwendo DD, Tadesse E, Lema VM, Molyneux ME, Rogerson SJ, Meshnick SR. Malaria during pregnancy and foetal haematological status in Blantyre, Malawi. *Malar J* 25: 39.

Alker AP, Mwapasa V, Purfield A, Rogerson SJ, Molyneux ME, Kamwendo DD, Tadesse E, Chaluluka E, Meshnick SR. Mutations Associated with Sulfadoxine-Pyrimethamine and Chlorproguanil Resistance in *Plasmodium falciparum* isolates from Blantyre, Malawi. *Antimicrob Agents Chemother* 49: 3919-21.

Bai T, Becker M, Gupta A, Strike P, Murphy VJ, Anders RF, Batchelor AH. Structure of AMA1 from *Plasmodium falciparum* reveals a clustering of polymorphisms that surround a conserved hydrophobic pocket. *Proc. Natl. Acad. Sci. U S A.* 102: 12736-41.

Baker J, McCarthy JS, Gatton M, Kyle DE, Belizario V, Luchavez J, Bell D, Cheng Q. Genetic diversity of *Plasmodium falciparum* histidine-rich protein 2 (PfHRP2) and its effect on the performance of PfHRP2-based rapid diagnostic tests. *J Infect Dis.* 192: 870-7.

Baum J, Maier AG, Good RT, Simpson KM, Cowman AF. Invasion by *P. falciparum* Merozoites Suggests a Hierarchy of Molecular Interactions. *PLoS Pathog.* 1:e37 [Epub ahead of print]

Baum J, Richard D, Healer J, Rug M, Krnjajski Z, Gilberger TW, Green JL, Holder AA, Cowman AF. A conserved molecular motor drives cell invasion and gliding motility across malaria lifecycle stages and other apicomplexan parasites. *J Biol Chem.* Dec 1; [Epub ahead of print]

Becker K, Koncarevic S, Hunt NH. Oxidative stress and antioxidant defense in malarial parasites. In: "Molecular approaches to malaria". Ed. Sherman, IW. American Society for Microbiology Press, Washington DC, pp. 365-383.

Beeson JG, Duffy PE. The immunology and pathogenesis of malaria during pregnancy. *Curr Top Microbiol Immunol.* 297: 187-227.

Beeson JG, Rogerson SJ, Elliott SR, Duffy MF. Targets of protective antibodies to malaria during pregnancy. *J Infect Dis.* 192: 1647-50

Behrens, S.J., Brayton, K.A., Molloy, J.B., Bock, R.E., Lew, A.E. and McElwain, T.F. MSA-2 proteins of *Babesia bovis* Vaccine Breakthrough Isolates Contain a Unique Hypervariable Region Composed of Degenerate Repeats. *Infection and Immunity* 73: 180-189.

Bethony JM, Loukas A, Smout MJ, Bottazzi ME, Lustigman S, Goud GN, Mendez S, Hotez PJ Anti-ASP-2 antibodies reduce the intensity of hookworm infection in humans and laboratory animals. *FASEB J* 19: 1743-5

Black CG, Wu T, Wang L, Topolska AE, Coppel RL: MSP8 is a non-essential merozoite surface protein in *Plasmodium falciparum*. *Mol Biochem Parasitol* 144: 27-35.

- Boutlis CS, Reilly E, Anstey NM, D'Souza JB. Glycosylphosphatidylinositols in malaria pathogenesis and immunity: Potential for therapeutic inhibition and vaccination. *Curr Topics Microbiol Immunol* 297: 145-185
- Bray P.G., Martin, R., Tilley, L., Ward, S., Kirk, K. and Fidock, D.A. Defining the role of pfert in *P. falciparum* chloroquine resistance. Review. *Molecular Microbiology* 56: 323-33. (SCI: 5.959)
- Bray, P.G., Deed, S., Fox, E. Kalkanidis, M., Deady, L.W. and Tilley, L. Primaquine synergises the activity of chloroquine against chloroquine-resistant *P. falciparum*. *Biochemical Pharmacology* 70:1158-66
- Bridle, A.R., Carter, C.G., Morrison, R.N., Nowak, B.F. The effects of beta-glucan administration on macrophage respiratory burst activity and Atlantic salmon (*Salmo salar* L.) challenged with amoebic gill disease (AGD) - evidence of inherent resistance. *Journal of Fish Diseases*, 28: 347 - 356
- Chen, N., Wilson, D., Pasay, C.M., Bell, D., Martin, L., Kyle, D. and Cheng, Q. The origin and dissemination of novel mutant Pfert allelic Types of *Plasmodium falciparum* in the Philippines. *Antimicrob. Agent. Chemother* 49: 2102-2105.
- Y. Chen, D. Donald, K. Savin, PJ Presidente and D Hartman *Haemonchus contortus*: molecular cloning, sequencing and expression analysis of the gene coding for the small subunit of ribonucleotide reductase. *Experimental Parasitology* 111: 250- 254
- Chung, W.Y., Gardiner, D.L., Hyland, C., Gatton, M.L., Kemp, D.J., Trenholme, K.R. Enhanced invasion of blood group A1 erythrocytes by *Plasmodium falciparum*: evidence for a parasite lectin. *Mol Biol Para* 144: 128-130.
- Chung, WY, Gardiner DL Trenholme KR. *Plasmodium falciparum* and red cell polymorphisms. *Aust J Med Sci*. 26: 150-156.
- Combes V, De Souza JB, Renia L, Hunt NH, Grau GE. Cerebral malaria: Which parasite? Which model? (Review). *Drug Discovery Today* 2: 141-147
- Cortes A, Mellombo M, Mgone CS, Beck HP, Reeder JC, Cooke BM: Adhesion of *Plasmodium falciparum*-infected red blood cells to CD36 under flow is enhanced by the cerebral malaria-protective trait South-East Asian ovalocytosis. *Mol Biochem Parasitol* 142: 252-257.
- Cortes A, Mellombo M, Masciantonio R, Murphy VJ, Reeder JC, Anders RF. Allele specificity of naturally acquired antibody responses against *Plasmodium falciparum* apical membrane antigen 1. *Infect. Immun.* 73: 422-30.
- Cook, M.T., Hayball, P.J., Nowak, B.F., Hayball, J.D. The opsonising activity of a pentraxin-like protein isolated from snapper (*Pagrus auratus*, Sparidae) serum. *Developmental and Comparative Immunology*, 29: 703-712.
- Cooke BM, Mohandas N, Cowman AF, Coppel RL: Cellular adhesive phenomena in apicomplexan parasites of red blood cells. *Vet Parasitol* 132: 273-295.
- Cowman AF, Crabb BS. Revealing the molecular determinants of gender in malaria parasites. *Cell*. 121: 659-60
- Dao NVH, Ngoa NP, Thuy LT, The ND, Bui Dai, Binh VQ, Anh LN, Rieckmann KH, Edstein MD. Fatty-food does not alter blood mefloquine concentrations in the treatment of *falciparum* malaria. *Trans Roy Soc Trop Med Hyg* 99: 927-931
- de la Fuente, J, Lew, A., Lutz, H., Meli, M.L., Hofmann-Lehmann, R., Shkap, V., Molad, T., Mangold, A.J., Almazán, C., Naranjo, V., Gortázar, C., Torina, A., Caracappa, S., Garcia-Perez, A.L., Barral, M., Oporto, B., Ceci, L., Carelli, G., Blouin, E.F., Kocan, K.M. Genetic diversity of *Anaplasma* species major surface proteins and implications for anaplasmosis serodiagnosis and vaccine development. *Animal Health Research Reviews* 6: 75-89.
- Donnelly, S., Sekiya, M., Mulcahy, G., O'Neill, S. and Dalton, J.P. Thioredoxin peroxidase secreted by *Fasciola hepatica* induced alternative activation of macrophages. *Infection and Immunity* 73: 166-173.
- Dougall A, Holt DC, Fischer K, Kemp DJ, Currie BJ, Walton SF. Identification and characterization of *Sarcoptes scabiei* and *Dermatophagoides pteronyssinus* glutathione s-transferases: implication as a potential major allergen in crusted scabies. *American Journal of Tropical Hygiene and Medicine* 73: 977-984.
- Drew DR, Sanders PR, Crabb BS. *Plasmodium falciparum* merozoite surface protein 8 is a ring-stage membrane protein that localizes to the parasitophorous vacuole of infected erythrocytes. *Infect Immun.* 73: 3912-22.
- Duffy MF, Byrne TJ, Elliott SR, Wilson DW, Rogerson SJ, Beeson JG, Noviyanti R, Brown GV. Broad analysis reveals a consistent pattern of var gene transcription in *Plasmodium falciparum* repeatedly selected for a defined adhesion phenotype. *Mol Microbiol* 56: 774-88.

- Duraisingh MT, Cowman AF. Contribution of the *pfmdr1* gene to antimalarial drug-resistance. *Acta Trop.* 94: 181-90
- Duraisingh MT, Voss TS, Marty AJ, Duffy MF, Good RT, Thompson JK, Freitas-Junior LH, Scherf A, Crabb BS, Cowman AF. Heterochromatin silencing and locus repositioning linked to regulation of virulence genes in *Plasmodium falciparum*. *Cell.* 121: 13-24.
- Elliott, S.R., Kuns, R.D. and Good, M.F. Heterologous immunity in the absence of variant-specific antibodies after exposure to sub-patent infection with blood stage malaria. *Infection and Immunity*, 73: 2478-2485
- Elliott SR, Brennan AK, Beeson JG, Tadesse E, Molyneux ME, Brown GV, Rogerson SJ. Placental malaria induces variant-specific antibodies of the cytophilic subtypes immunoglobulin G1 (IgG1) and IgG3 that correlate with adhesion inhibitory activity. *Infect Immun.* 73: 5903-7
- Elliott SR, Duffy MF, Byrne TJ, Beeson JG, Mann EJ, Wilson DW, Rogerson SJ, Brown GV. Cross-reactive surface epitopes on chondroitin sulfate A-adherent *Plasmodium falciparum*-infected erythrocytes are associated with transcription of *var2csa*. *Infect Immun.* 73: 2848-56
- Embar-Gopinath, S, Butler, R. and Nowak, B. Influence of salmonid gill bacteria on development and severity of amoebic gill disease. *Diseases of Aquatic Organisms*, 67; 55-60.
- Engwerda, C.R., and Good, M.F. Interactions between malaria parasites and the host immune system. *Current Opinion in Immunology* 17: 381-387
- Engwerda C. R, L. Beattie, and F. Amante. The importance of the spleen in malaria. *Trends in Parasitol* 21:75.
- Foote SJ, Handman E. Genetics of murine leishmaniasis. *Brief Funct Genomic Proteomic.* 4: 270-6.
- Foth BJ, Stimmler LM, Handman E, Crabb BS, Hodder AN, McFadden GI. The malaria parasite *Plasmodium falciparum* has only one pyruvate dehydrogenase complex, which is located in the apicoplast. *Mol Microbiol.* 55: 39-53.
- Gardiner DL, Dixon MWA, Spielman T, Skinner-Adams TS, Hawthorne PL, Ortega MR, Kemp DJ, Trenholme KR. Implication of a *Plasmodium falciparum* gene in the switch between asexual reproduction and gametocytogenesis. *Mol. Biochem. Parasitol* 140: 153-60
- Gloster, S., Scalzo, K., Crimeen, B. and Plebanski, M. Getting the balance right: under and over-reactions in the immune system. *Current Drug Targets-Immune, Endocrine & Metabolic Disorders* Bentham Science Publishers 5: 413-22
- Gomez Gallego S, Loukas A, Neva FA, Varatharajalu R, Nutman TB, Brindley PJ. Astacin-like metallo-proteinase from the infective larvae of *Strongyloides stercoralis*. *Parasitol Int* 54: 123-33
- Good, M.F., Xu, H., Wykes, M., and Engwerda, C.R. Development and regulation of cell-mediated immune responses to the blood stages of malaria: Implications for vaccine research. *Annual Review of Immunology* 23: 69-99
- Good, M.F. Identification of early cellular immune factors regulating growth of malaria parasites in humans. *Immunity* 23: 241-242
- Gross, K.A., Powell, M.D., Butler, R., Morrison, R.N., Nowak, B.F. Changes in the innate immune response of Atlantic salmon (*Salmo salar*) exposed to experimental infection with *Neoparamoeba* sp. *Journal of Fish Diseases*, 28: 293-299
- Handman E, Elso C, Foote S. Genes and susceptibility to leishmaniasis. *Adv Parasitol.* 59: 1-7
- Hansen DS, Evans KJ, D'Ombra MC, Bernard NJ, Sexton AC, Buckingham L, Scalzo AA, Schofield L. The natural killer complex regulates severe malarial pathogenesis and influences acquired immune responses to *Plasmodium berghei* ANKA. *Infect Immun.* 73: 2288-97
- Hayward, R., Saliba, K.J. and Kirk, K. Mutations in *pfmdr1* modulate the sensitivity of *Plasmodium falciparum* to the intrinsic antiplasmodial activity of verapamil. *Antimicrob. Agents Chemotherapy*, 49: 840-842.
- Hayward, R., Saliba, K.J. and Kirk, K. *pfmdr1* mutations associated with chloroquine resistance incur a fitness cost in *Plasmodium falciparum*. *Molec. Micro.* 55: 1285-1295
- Healer J, Triglia T, Hodder AN, Gemmill AW, Cowman AF. Functional analysis of *Plasmodium falciparum* apical membrane antigen 1 utilizing interspecies domains. *Infect Immun.* 73: 2444-51.
- Huntley, J.F., van den Broek, A., Machell J., Mackellar A., Pettit D., Meikle L., Barcham G., E.N.T. Meeusen and D. Smith. The effect of immunosuppression with Cyclosporin A on the development of sheep scab. *Vet. Parasitol.* 127: 323-32

- Imwong, M., Pukrittayakamee, S., Cheng, Q., Moore, C., Looareesuwan, S., Snounou, G., White, N.J. and Day, N.P.J. Limited polymorphism in the dihydropteroate synthetase gene (dhps) of *Plasmodium vivax* isolates from Thailand. *Antimicrob. Agent. Chemother.* 49: 4393-4395
- Kirk, K., Martin, R.E., Bröer, S., Howitt, S.M. and Saliba, K.J. *Plasmodium* Permeomics: Membrane transport proteins in the malaria parasite. *Current Topics in Microbiology and Immunology: Malaria* (S. Krishna and D. Sullivan, eds), 295: 325-356
- Khaznadji, E., Collins, P., Dalton, J.P., Bigot, Y. and Moiré, N. A new member of the cystatin superfamily expressed by *Fasciola hepatica*. *Int. J. Parasitol.* 35: 1115-1125
- Knuepfer E, Rug M, Cowman AF. Function of the plasmodium export element can be blocked by green fluorescent protein. *Mol Biochem Parasitol.* 142: 258-62
- Knuepfer, E., Rug, M., Klonis, N., Tilley, L. and Cowman, A.F. Trafficking of the major virulence factor to the surface of transfected *P. falciparum*-infected erythrocytes. *Blood* 105: 4078-87
- Knuepfer, E., Rug, M., Klonis, N., Tilley, L. and Cowman, A.F. Trafficking determinants for PfEMP3 export and assembly under the *Plasmodium falciparum*-infected red blood cell membrane. *Molecular Microbiology* 58: 1039 - 1053
- Laha T, Kaewkai N, Loukas A, Brindley PJ Characterization of SR3 reveals abundance of non-LTR retrotransposons of the RTE clade in the genome of the human blood fluke, *Schistosoma mansoni*. *BMC Genomics* 6: 154
- Leef, M. Harris, J.O. and Powell, M.D. Respiratory pathogenesis of amoebic gill disease (AGD) in experimentally infected Atlantic salmon (*Salmo salar*). *Diseases of Aquatic Organisms* 66: 205-213
- Leef, M.J., Harris, J.O., Hill, J.V. and Powell, M.D. Post-surgical recovery in three salmonid species affected with amoebic gill disease (AGD). *Journal of Comparative Physiology B* 175: 523-532
- Lei Y, Davey MW, Ellis JT Attachment and invasion of *Toxoplasma gondii* and *Neospora caninum* to epithelial and fibroblast cell lines in vitro. *Parasitology* 131: 583-590
- Lei Y, Birch D, Davey MW, Ellis JT Subcellular fractionation and molecular characterisation of the pellicle and plasmalemma of *Neospora caninum*. *Parasitology* 131: 467-475
- Lei Y, Davey MW, Ellis JT Autofluorescence of *Toxoplasma gondii* and *Neospora caninum* tissue cysts in vitro. *Journal of Parasitology* 91: 17-23
- LeRoith, T., Brayton, K.A., Molloy, J.B., Bock, R.E., Hines, S.A., Lew, A.E., McElwain, T.F. Sequence variation and immunologic cross-reactivity among *Babesia bovis* merozoite surface antigen 1 proteins from vaccine strains and vaccine breakthrough isolates. *Infection and Immunity* 73: 5388-5394.
- Liu S. M., Smith T. L., Palmer D. G., Karlsson L. J. E., Besier, R. B. and Greeff J. C. Biochemical differences in Merino sheep selected for resistance against gastro-intestinal nematodes and genetic and nutritional effects on faecal worm egg output. *Animal Science* 81: 49-157
- Liu S.M., Smith T.L., Karlsson L.J.E., Palmer D.G. and Besier R.B. The costs for protein and energy requirements by nematode infection and resistance in Merino sheep. *Livestock Production Science* 97: 131-139
- McCarthy JS. Is anthelmintic resistance a threat to the program to eliminate lymphatic filariasis? *Am J Trop Med Hyg.* 73: 232-3
- McCarthy K., Villavedra M., To J., Morrison R.N., Crosbie P., Broady K., Raison R.L. Changes in the antigenic profile of cultured *Neoparamoeba* sp., causative agent of amoebic gill disease in farmed salmon. *International Journal of Parasitology* 35: 1417-1423
- McMillan, PJ, LM Stimmler, BJ Foth, GI McFadden, and S Muller. The human malaria parasite *Plasmodium falciparum* possesses two distinct dihydrolipoamide dehydrogenases. *Mol Microbiol.* 55: 27-38
- Maguire GP, Handojo T, Pain MCF, Kenangalem E, Price RN, Tjitra E, Anstey NM. Lung injury in uncomplicated and severe malaria: a longitudinal study in Papua, Indonesia. *J Infect Dis* 192: 1966-7
- Mansell B., Powell M.D., Ernst I. & Nowak B.F. Effects of the gill monogenean *Zeuxapta seriolae* (Meserve, 1938) and treatment with hydrogen peroxide on pathophysiology of kingfish, *Seriola lalandi* Valenciennes, 1833. *Journal of Fish Diseases* 28: 253-262.
- Marti, M., Rug, M., Baum, J., Tilley, L. and Cowman, A.F. Signal mediated export of proteins from the malaria parasite to the host erythrocyte. *Journal of Cell Biology* 171: 587-92
- Martin, R.E., Henry, R.I., Abbey, J.L., Clements, J.D, and Kirk, K. The 'permeome' of the malaria parasite: an overview of the membrane transport proteins of *Plasmodium falciparum*. *Genome Biology* 6, R26.

- Meeusen E. N.T., Balic A. and V. M. Bowles. Cells and molecules associated with rejection of gastrointestinal nematode parasites. *Vet. Immunol. Immunopathol.* 108: 121-125
- Miller CM, Quinn HE, Ryce C, Reichel MP and Ellis JT Reduction in transplacental transmission of *Neospora caninum* in outbred mice by vaccination *Int. J. Parasitol.* 35; 821-828
- Mitchell AJ, Hansen AM, Hee L, Ball HJ, Potter SM, Walker JC, Hunt NH. Early cytokine production is associated with protection from murine cerebral malaria. *Infect Immun* 73: 5645-5653
- Morrison, R.N., Lyons, A.B., Nowak, B.F., Hayball, J.D. Assessment of snapper (*Pagrus auratus*) natural IgM binding to bromelain treated sheep erythrocytes. *Fish and Shellfish Immunology*, 18: 91-99
- Morrison, R.N., Crosbie, P., Adams, M.B., Cook M.T., Nowak, B.F. Cultured gill derived *Neoparamoeba pemaquidensis* fail to elicit AGD in Atlantic salmon (*Salmo salar*). *Diseases of Aquatic Organisms*, 66: 135-144
- Nebi T, De Veer MJ, Schofield L. Stimulation of innate immune responses by malarial glycosylphosphatidylinositol via pattern recognition receptors. *Parasitology.* 130 Suppl: S45-62
- 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.). Humana Press Inc., Totowa, NJ, USA.
- Pearce JA, Mills K, Triglia T, Cowman AF, Anders RF. Characterisation of two novel proteins from the asexual stage of *Plasmodium falciparum*, H101 and H103. *Mol Biochem Parasitol.* 139: 141-51
- Pearson MS, McManus DP, Smyth DJ, Lewis FA, Loukas A. In vitro and in silico analysis of signal peptides from the human blood fluke, *Schistosoma mansoni*. *FEMS Immunol Med Microbiol* 45: 201-11
- Pei X, An X, Guo X, Tarnawski M, Coppel R, Mohandas N: Structural and functional studies of interaction between *Plasmodium falciparum* knob-associated histidine-rich protein (KAHRP) and erythrocyte spectrin. *J Biol Chem* 280: 31166-31171
- Perkins DJ, Hittner JB, Mwaikambo ED, Granger DL, Weinberg JB, Anstey NM. Impaired systemic prostagalandin E2 production in children with cerebral malaria. *J Infect Dis* 191: 1548-57
- Perugini MA, Griffin MD, Smith BJ, Webb LE, Davis AJ, Handman E, Gerrard JA. Insight into the self-association of key enzymes from pathogenic species. *Eur Biophys J.* 34: 469-76
- Phillips D. J., K. L. Jones and I. J. Clarke, J-P. Y. Scheerlinck and D. M. de Kretser Activin A: From sometime reproductive factor to genuine cytokine. *Vet. Immunol. Immunopathol.* 108: 23-27
- Plebanski, M., Hannan, C.M., Benhboudi, S., Flanagan, K.L., Apostolopoulos, V. Sinden, R.E. and Hill A.V.S. Direct processing and presentation of antigen from malaria sporozoites by professional antigen presenting cells in the induction of MHC class I-restricted T cell responses *Immunol Cell Biol* 83: 307
- Potter SM, Mitchell AJ, Cowden W, Sanni LA, Dinauer M, de Haan J, Hunt NH. Phagocyte-derived reactive oxygen species do not influence the progression of murine blood-stage malaria infections. *Infect Immun* 73: 4941-4947
- Pouniotis DS, Proudfoot O, Bogdanoska V, Scalzo K, Kovacevic S, Coppel RL, Plebanski M: Selectively impaired CD8+ but not CD4+ T cell cycle arrest during priming as a consequence of dendritic cell interaction with plasmodium-infected red cells. *J Immunol* 175: 3525-3533
- Powell, M.D., Harris, J.O., Carson, J and Hill, J.V. Effects of gill abrasion and experimental infections with *Tenacibaculum maritimum* on the respiratory physiology of amoebic gill disease affected Atlantic salmon, *Salmo salar* L. *Diseases of Aquatic Organisms* 63: 169-174
- Powell, M.D., Speare, D.J., Daly, J and Lovy, J. Different metabolic rate in responses to infection with *Loma salmonae* in rainbow trout (*Oncorhynchus mykiss*) and brook trout (*Salvelinus fontinalis*). *Diseases of Aquatic Organisms* 67: 233-237
- Przyborski JM, Miller SK, Pfahler JM, Henrich PP, Rohrbach P, Crabb BS, Lanzer M. Trafficking of STEVOR to the Maurer's clefts in *Plasmodium falciparum*-infected erythrocytes. *EMBO J.* 24: 2306-17
- Roberts, S.D and Powell, M.D. The viscosity and glycoprotein biochemistry of salmonid mucus varies with species, salinity and presence of amoebic gill disease. *Journal of Comparative Physiology B* 175: 1-11
- Sakthianandeswaren A, Elso CM, Simpson K, Curtis JM, Kumar B, Speed TP, Handman E, Foote SJ. The wound repair response controls outcome to cutaneous leishmaniasis. *Proc Natl Acad Sci U S A.* 102: 15551-6
- Sanders PR, Gilson PR, Cantin GT, Greenbaum DC, Nebi T, Carucci DJ, McConville MJ, Schofield L, Hodder AN, Yates JR 3rd, Crabb BS. Distinct protein classes including novel merozoite surface antigens in raft-like membranes of *Plasmodium falciparum*. *J. Biol. Chem.* 280: 40169-40176

- Satchell, J. F., Klonis, N., Smith, B., Malby, R. L., Adisa, A., Alpyurek, A., Gulbis, J. M., Tilley, L. and Colman, P. M. The structure of glyceraldehyde 3-phosphate dehydrogenase from *Plasmodium falciparum*. *Acta Crystallographica D* 61: 1213-21
- Scheerlinck J-P Y. and H-H. Yen Veterinary Applications of Cytokines. *Vet. Immunol. Immunopathol.* 108: 17–22
- Snibson, K.J., Bischof, R.B., Slocombe, R.F. Meeusen E.N. Airway remodeling and inflammation in sheep lungs after chronic airway challenge with house dust mite. *Clin. Exp. Immunol.* 35: 146-152
- Schofield L, Grau GE. Immunological processes in malaria pathogenesis. *Nat Rev Immunol.* 5: 722-35
- Sheriff, J.C., Kotze, A.C., Sangster, N.C. Hennessy, D.R. Effect of ivermectin on feeding by *Haemonchus contortus* in vivo. *Veterinary Parasitology* 128: 341-346
- Silva MD, Cooke BM, Guillotte M, Buckingham DW, Sauzet JP, Le Scanf C, Contamin H, David P, Mercereau-Puijalon O, Bonnefoy S: A role for the *Plasmodium falciparum* RESA protein in resistance against heat shock demonstrated using gene disruption. *Mol Microbiol* 56: 990-1003
- Skinner-Adams, TS, Guddat LW, Gardiner DL, McCarthy JS and Andrews, KT. Are *Plasmodium falciparum* plasmepsins the target of HIV protease inhibitors? *J. Infect. Dis.* 191: 1382-1383
- Stewart, J, J Curtis, TP Spurck, T Ilg, A Garami, T Baldwin, N Courret, GI McFadden, A Davis, and E Handman Characterisation of a *Leishmania mexicana* knockout lacking guanosine diphosphate-mannose pyrophosphorylase. *Int J Parasitol.* 35: 861-73
- Struck NS, de Souza Dias S, Langer C, Marti M, Pearce JA, Cowman AF, Gilberger TW. Re-defining the Golgi complex in *Plasmodium falciparum* using the novel Golgi marker PfGRASP. *J Cell Sci.* 118: 5603-13
- Stubbs J, Simpson KM, Triglia T, Plouffe D, Tonkin CJ, Duraisingh MT, Maier AG, Winzeler EA, Cowman AF. Molecular mechanism for switching of *P. falciparum* invasion pathways into human erythrocytes. *Science.* 309: 1384-7
- Trenholme, K.R., Boutlis, C.S., Kuns, R., Lagog, M., Bockarie, M.J., Gatton, M., Kemp, D.J., Good, M.F., Anstey, N.M., Gardiner, D.L. Antibody reactivity to linear epitopes of *Plasmodium falciparum* cytoadherence-linked asexual gene 9 in asymptomatic children and adults from Papua New Guinea. *Am J Trop Med Hyg* 72: 708-713
- Triglia T, Duraisingh MT, Good RT, Cowman AF. Reticulocyte-binding protein homologue 1 is required for sialic acid-dependent invasion into human erythrocytes by *Plasmodium falciparum*. *Mol Microbiol.* 55: 162-74
- van Dooren GG, Marti M, Tonkin CJ, Stimmler LM, Cowman AF, McFadden GI. Development of the endoplasmic reticulum, mitochondrion and apicoplast during the asexual life cycle of *Plasmodium falciparum*. *Mol Microbiol.* 57: 405-19
- 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* 23: 439
- Waller, RF and GI McFadden, The apicoplast: a review of the derived plastid of apicomplexan parasites. *Curr Issues Mol Biol.* 7: 57-80
- Wykes, M., Zhou, Y., Liu, X.Q., and Good, M.F. *Plasmodium yoelii* can ablate vaccine-induced long term protection in mice. *Journal of Immunology* 175: 2510-2516
- Yang, Y.R., Vuitton, D.A., Jones, M.K., Craig, P. & McManus, D.P. Brain metastasis of alveolar echinococcosis in a hyperendemic focus of *Echinococcus multilocularis* infection. *Transactions of the Royal Society of Tropical Medicine and Hygiene*, 99: 937-941
- Zhang, W-B, Jones, M.K., Li, Jun, McManus, D.P. Pre-culture of *Echinococcus granulosus* protoscoleces in vitro significantly increases development and viability of secondary hydatid cysts in mice. *Experimental Parasitology* 110: 88-90
- Zhang, L.H., McManus, D.P., Sunderland, P., Lu, X.M., Ye, J.J., Loukas, A.C. and Jones, M.K. The cellular distribution and stage-specific expression of two dynein light chains from the human blood fluke *Schistosoma japonicum*. *International Journal of Biochemistry and Cell Biology* 37: 1511-1524

[3] *Frontier Technologies*

- Asojo OA, Goud G, Dhar K, Loukas A, Zhan B, Deumic V, Liu S, Borgstahl GEO, Hotez PJ X-ray structure of Na-ASP-2, a Pathogenesis Related-1 protein from the nematode parasite, *Necator americanus*, and a vaccine antigen for human hookworm infection. *J Mol Biol* 346: 801-14

- Asojo OA, Loukas A, Deumic V, Hotez PJ. Crystallization and preliminary X-ray analysis of Na-ASP-1, a multi-domain Pathogenesis Related-1 protein from *Necator americanus*. *Acta Cryst D* 61: 391-394
- Behm, C.A., Bendig, M.M., McCarter, J.P. and Sluder, A.E. RNA interference-based discovery and validation of new drug targets in filarial nematodes. *Trends in Parasitology*, 21: 97-100
- Belli, S.I., Walker, R.A. and Flowers, S.A. Global protein expression analysis in apicomplexan parasites- Current Status. *Proteomics* 5: 918-24
- Besier, RB Targeted treatment of sheep nematodes using automated weighing technology. *Proc Aust Sheep Veterinarians annual conf*, May 2005, Gold Coast, 15: 24-29
- Brownlie, J.C., Johnson, N.M. and Whyard, S. The *Caenorhabditis briggsae* genome contains active *CbmaT1* and *Tcb1* transposons. *Molecular Genetics and Genomics* 273: 92-101
- Charles S.D., Altreuther G., Reinemeyer C.R., Buch J., Settje T., Cruthers L., Kok D.J., Bowman D.D., Kazakos K.R., Jenkins D.J., Schein E. Evaluation of the efficacy of emodepside + praziquantel topical solution against cestode (*Dipylidium caninum*, *Taenia taeniaeformis*, and *Echinococcus multilocularis*) infection in cats. *Parasitology Research* 97: S33-S40
- Cody SH, Xiang SD, Layton MJ, Handman E, Lam MH, Layton JE, Nice EC, Heath JK. A simple method allowing DIC imaging in conjunction with confocal microscopy. *J Microsc.* 217: 265-74
- Coppel RL, Black CG: Parasite genomes. *Int J Parasitol* 35: 465-479
- Corbett AJ, Caminschi I, McKenzie BS, Brady JL, Wright MD, Mottram PL, Hogarth PM, Hodder AN, Zhan Y, Tarlinton DM, Shortman K, Lew AM. Antigen delivery via two molecules on the CD8- dendritic cell subset induces humoral immunity in the absence of conventional "danger". *Eur J Immunol.* 35: 2815-25
- Crabb BS, Beeson JG. Promising functional readouts of immunity in a blood-stage malaria vaccine trial. *PLoS Med.* 2:e380. Epub 2005 Nov 8.
- Edstein, M.D., Kotecka, B.M., Anderson, K.L., Pombo, D.J., Kyle, D.E., Rieckmann, K.H. and Good, M.F. Lengthy antimalarial activity of atovaquone in human plasma following Malarone administration. *Antimicrobial Agents and Chemotherapy*, 49: 4421-4422
- Embar-Gopinath, S., Crosbie, P. B.B., Nowak, B. Use of potassium permanganate to disinfect Atlantic salmon (*Salmo salar*) gills. *Bulletin of the European Association of Fish Pathologists*, 25: 291-296
- Emery DL & Beh KJ Genetic and biological approaches to modulate nematode resistance mechanisms in sheep. *Proc. Assoc. Adv. Anim. Breed. Genet.*, 16: 385-388
- Ernst I, Whittington I.D., Corneillie S. & Talbot C. Effects of temperature, salinity, desiccation and chemical treatments on egg embryonation and hatching success of *Benedenia seriola* (Monogenea: Capsalidae), a parasite of farmed *Seriola* spp. *Journal of Fish Diseases* 28: 157-164
- Feng, Z-P., Keizer, D.W., Stevenson, R.A., Yao, S., Babon, J.J., Murphy, V.J., Anders, R.F. & Norton, R.S. Structure and inter-domain interactions of domain II from the blood stage malarial protein, apical membrane antigen 1. *Journal of Molecular Biology* 350: 641-656
- Fu J, Saenz FE, Reed MB, Balu B, Singh N, Blair PL, Cowman AF, Adams JH. Targeted disruption of *maebl* in *Plasmodium falciparum*. *Mol Biochem Parasitol.* 141: 113-7
- Gardiner, D.L., McCarthy, J.S. and Trenholme, K.R. Malaria in the Post-Genomics Era: Light at the End of the Tunnel or Just another Train? *Postgrad Med J* 81: 505-509
- Gauci C, Heath D, Chow C, Lightowers MW. Hydatid disease: vaccinology and development of the EG95 recombinant vaccine. *Expert Rev Vaccines.* 4: 103-112
- Gobert G.N. and McManus, D.P. Update on paramyosin in parasitic worms. *Parasitology International* 54: 101-107
- Gobert, G.N., Moertel, L. and McManus, D.P. Microarrays: new tools to unravel parasite transcriptomes. *Parasitology* 131: 439-448
- Gonzalez AE, Gauci CG, Barber D, Gilman RH, Tsang VC, Garcia HH, Verastegui M, Lightowers MW Vaccination of pigs to control human neurocysticercosis. *Am J Trop Med Hyg.* 72: 837-9
- Good, M.F. Vaccine-induced immunity to malaria parasites and the need for novel strategies. *Trends in Parasitology* 21: 29-34
- Good, M.F. Australians lead the way in vaccine research for malaria and other infectious diseases. *Australian Life Scientist* P23, March/April Edition, 2005

- Good, M.F. Genetically modified Plasmodium highlights the potential of whole parasite vaccine strategies. *Trends in Immunology*. 26: 295-297
- Goodwin, A.E., Park, E., Nowak.B.F. Successful treatment of Largemouth Bass (*Micropterus salmoides* L.) with epitheliocystis hyperinfection. *Journal of Fish Diseases*, 28: 623-625
- Goud GN, Bottazzi ME, Zhan B, Mendez S, Wen J, Deumic V, Liu S, Pleiskatt J, Solanki M, Asojo O, Saul A, Bethony JM, Loukas A, Roy M, Hotez PJ Cloning, Expression in *Pichia pastoris*, Purification, and Process Development of the Na-ASP-2 Human Hookworm Vaccine. *Vaccine* 23: 4754-64
- Gupta A, Bai T, Murphy V, Strike P, Anders RF, Batchelor AH. Refolding, purification, and crystallization of apical membrane antigen 1 from *Plasmodium falciparum*. *Protein Expr. Purif.* 41: 186-98
- Harris, J.O., Powell, M.D., Attard, M.G. and DeHayr, L. Clinical assessment of Chloramine-T as a treatment for the control of gill amoebae in farmed Tasmanian Atlantic salmon, *Salmo salar* L. *Aquaculture Research* 29: 1-9
- Harris KS, Casey JL, Coley AM, Masciantonio R, Sabo JK, Keizer DW, Lee EF, McMahon A, Norton RS, Anders RF and Foley M. Binding ‘hot-spot’ for invasion inhibitory molecules on *Plasmodium falciparum* AMA1. *Infect. Immun.* 73: 6981-9
- Hotez PJ, Arora S, Bethony J, Bottazzi ME, Loukas A, Correa-Oliveira R, Brooker S Helminth Infections of Children: Prospects for Control. In “Hot Topics in Infection and Immunity: Advances in Experimental Medicine and Biology” (eds Pollard AJ, Finn A), Kluwer, London
- Johnson, N.M., Behm, C.A. and Trowell, S.C. Heritable and inducible gene knockdown in *C. elegans* using Wormgate and the ORFeome. *Gene*, 359: 26-34.
- 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*. 2005 Sep 6; [Epub ahead of print]
- Kotze, A.C., Coleman, G.T., Mai, A. and McCarthy, J.S. Field evaluation of anthelmintic drug sensitivity using in vitro egg-hatch and larval motility assays with *Necator americanus* recovered from human clinical isolates. *Int J Parasitol* 35: 445-53
- Le Feuvre A, Woodgate RG, Carmichael I, Bailey A , Love S, Campbell N, Besier B, Page P WormBoss. Proc Aust Sheep Veterinarians annual conf, May 2005, Gold Coast, 15: 85-88
- Lew AE, Jackson LA, Bellgard MI. Comparative genomic analysis of non-coding sequences and the application of RNA interference tools for bovine functional genomics. *Australian Journal of Experimental Agriculture* 45: 995-1010
- Li, Y.S., Chen, H., He, H., Hou, X., Ellis, M. and McManus, D. P. A double-blind field trial on the effects of artemether on *Schistosoma japonicum* infection in a highly endemic focus in southern China. *Acta Tropica* 96: 184-190
- Loukas A, Bethony JM, Mendez S, Fujiwara RT, Goud GN, Zhan B, Bottazzi ME, Hotez PJ Vaccination with recombinant aspartic hemoglobinase reduces parasite load and protects against anemia after challenge infection with blood-feeding hookworms in dogs. *PLoS Med* 2: e29
- Loukas A, Hotez P Anthelmintics - drugs used in the chemotherapy of helminth infections. Goodman & Gilman's *The pharmacological basis of therapeutics*, 11th edition. McGraw-Hill Professional, New York.
- McCarthy, J.S. Malaria chemoprophylaxis: in war and peace. *Med. J. Aust.* 182: 148-9
- McManus DP, Feng Z, Guo J, Li Y, Bartley PB, Loukas A, Williams GM Pathways to improved, sustainable morbidity control and prevention of schistosomiasis in the people’s republic of China. In “World Class Parasites” (eds Secor E & Colley D), Kluwer, USA.
- McManus, D.P. Prospects for development of a transmission blocking vaccine against *Schistosoma japonicum*. *Parasite Immunology* 27: 297-308
- Meissner M, Krejany E, Gilson PR, de Koning-Ward TF, Soldati D, Crabb BS. Tetracycline analogue-regulated transgene expression in *Plasmodium falciparum* blood stages using *Toxoplasma gondii* transactivators. *Proc Natl Acad Sci U S A*. 102: 2980-5
- Morrison, R.N., Nowak, B.F. Bath treatment of Atlantic salmon (*Salmo salar*) with amoebae antigens fails to affect survival to subsequent amoebic gill disease (AGD) challenge. *Bulletin of European Association of Fish Pathologists*, 155-160.
- Roberts, S.D. and Powell, M.D. Oral L-cysteine ethyl ester (LCEE) reduces amoebic gill disease (AGD) in Atlantic salmon, *Salmo salar* L. *Diseases of Aquatic Organisms* 66: 21-28

- RG Woodgate, A Le Feuvre, A Bailey, RB Besier, N Campbell, I Carmichael, S Love WormBoss - a national Australian computer-based sheep worm control tool. *Proceedings, Agribusiness Sheep Update, DAWA, Aug 2005.*
- Sachdeva S, Mohmmmed 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.* 2005; Dec 6; [Epub ahead of print]
- Saliba, K.J., Ferru, I. and Kirk, K. Pro-vitamin B5 (pantothenol) inhibits the growth of the intraerythrocytic malaria parasite. *Antimicrob. Agents Chemotherapy*, 49: 632-637
- Saliba, K.J. and Kirk, K. CJ-15,801, a fungal natural product, inhibits the intraerythrocytic stage of *Plasmodium falciparum* in vitro via an effect on pantothenic acid utilisation. *Molec. Biochem. Parasitol.*, 141: 129-131
- Saul A, Lawrence G, Allworth A, Elliott S, Anderson K, Rzepczyk C, Martin LB, Taylor D, Eisen DP, Irving DO, Pye D, Crewther PE, Hodder AN, Murphy VJ, Anders RF. A human phase 1 vaccine clinical trial of the *Plasmodium falciparum* malaria vaccine candidate apical membrane antigen 1 in Montanide ISA720 adjuvant. *Vaccine.* 23: 3076-83
- Shanks DG, Edstein MD. New Developments in the Chemoprophylaxis of Malaria. *Drugs* 65: 2091-2110
- Simpson KM, Baum J, Good RT, Winzeler EA, Cowman AF, Speed TP. A comparison of match-only algorithms for the analysis of *Plasmodium falciparum* oligonucleotide arrays. *Int J Parasitol.* 35: 523-31
- Spry, C., Chai, C.L.L., Kirk, K., Saliba, K.J. A class of pantothenic acid analogs inhibits *Plasmodium falciparum* pantothenate kinase and represses the proliferation of malaria parasites, *Antimicrob. Agents Chemother.*, 49: 4649-4657
- Stack, C.M., Dalton, J.P., Cunneen, M. and Donnelly, S. De-glycosylation of *Pichia pastoris* – produced *Schistosoma mansoni* cathepsin B eliminates non-specific reactivity with IgG in normal human serum. *J. Immunol. Meth.* 304: 151-157
- Suter RJ, McKinnon EJ, Perkins NR and Besier RB The effective life of ivermectin on Western Australian sheep farms - a survival analysis. *Prev Vet Med* 63: 257-269
- The SEAQUAMAT Trial Group. Artesunate versus quinine for treatment of severe falciparum malaria: a randomised trial. *Lancet* 366: 717-725
- von Samson-Himmelstjerna G, Harder A Sangster NC, Coles GC Efficacy of the two cyclooctadepsipeptides PF1022A and emodepside against anthelminti- resistant nematodes in sheep and cattle. *Parasitology* 130: 343-347
- Wang L, Kedzierski L, Schofield L, Coppel RL. Influence of glycosylphosphatidylinositol anchorage on the efficacy of DNA vaccines encoding *Plasmodium yoelii* merozoite surface protein 4/5. *Vaccine.* 23: 4120-7
- Zhan B, Liu S, Perally S, Fujiwara R, Brophy P, Liu Y, Feng J, Williamson AL, Wang Y, Bueno L, Mendez S, Goud G, Hawdon JM, Loukas A, Jones K, Hotez PJ Vaccine potential of a heme binding glutathione transferase (GST) from adult hookworm *Ancylostoma caninum*. *Infect Immun* 73: 6903-11

[4] *Safeguarding Australia*

- Abe, N, Read, C, Thompson, RCA, Iseki, M. Zoonotic genotype of *Giardia intestinalis* detected in a ferret. *Journal of Parasitology*, 91: 179-182
- Alfredo AAN Jonsson NN Finch TM Neves L Molloy JB and Jorgensen WK Serological survey of *Babesia bovis* and *Anaplasma marginale* in Tete province, Mozambique. *Tropical Animal Health and Production.* 37: 121-131
- Appelbee, AJ, Thompson, RC, Olson, ME. *Giardia* and *Cryptosporidium* in mammalian wildlife—current status and future needs. *Trends Parasitol.* 21: 370-6
- Beebe, N.W., Whelan, P.I., van den Hurk, A.F., Ritchie, S.A. and Cooper, R.D. Genetic diversity of the dengue vector *Aedes aegypti* in Australia and implications for future surveillance and mainland incursion monitoring. *Commun. Dis. Intell.* 29: 299-304
- Cacciò, SM, Thompson, RCA, McLauchlin, J, Smith, HV. Unravelling *Cryptosporidium* and *Giardia* epidemiology. *Trends in Parasitology*, 21: 430-437
- Chai, J.-Y., Murrell, D. and Lymbery, A.J. Fishborne parasitic zoonoses: status and issues. *International Journal for Parasitology* 35: 1233-1254

- Chalmers RM, Ferguson C, Cacciò S, Gasser RB, Abs EL-Osta YG, Heijnen L, Xiao L, Elwin K, Hadfield S, Sinclair M, Stevens M Direct comparison of selected methods for genetic categorisation of *Cryptosporidium parvum* and *Cryptosporidium hominis*. *International Journal for Parasitology* 35: 397-410
- Chambers C.B. & Ernst I. Dispersal of the skin fluke *Benedenia seriola* (Monogenea: Capsalidae) by tidal currents and implications for sea-cage farming of *Seriola* spp. *Aquaculture* 250: 60-69
- Crosbie, P.B.B., Macload, C., Forbes, S. and Nowak B. Distribution of *Neoparamoeba* sp. in sediments around marine finfish farming sites in Tasmania. *Diseases of Aquatic Organisms*, 67: 61-66
- Dargantes, A., Campbell, R.S.F., Copeman, D.B., Reid, S.A. Studies of experimental *Trypanosoma evansi* infection in the goat: II Pathology. *Journal of Comparative Pathology*. 133: 267-276
- Dargantes, A., Reid, S.A., Copeman, D.B. Studies of experimental *Trypanosoma evansi* infection in the goat: I Clinical signs and clinical pathology. *Journal of Comparative Pathology*. 133: 261-266
- de Gruijter JM, Gasser RB, Polderman AM, Asigri V and Dijkshoorn L High resolution DNA fingerprinting by AFLP to study the genetic variation among *Oesophagostomum bifurcum* (Nematoda) from human and non-human primates in Ghana. *Parasitology* 130: 229-237
- de Gruijter JM, van Lieshout L, Gasser RB, Verweij JJ, Brienen EAT, Ziem JB, Yelifari L, Polderman AM PCR-based differential diagnosis of *Ancylostoma duodenale* and *Necator americanus* in humans from northern Ghana. *Tropical Medicine and International Health* 10: 574-580
- Deveney, M.R., Bayly, T.J., Johnston, C.J., Nowak, B.F. A parasite survey of farmed Southern bluefin tuna (*Thunnus maccoyii* Castelnau). *Journal of Fish Diseases*, 28: 279-284
- Douglas-Helders, M, Saksida, S, Nowak, B.F Questionnaire-based risk assessment for amoebic gill disease (AGD) and evaluation of freshwater bathing efficacy of reared Atlantic salmon (*Salmo salar* L.). *Diseases of Aquatic Organisms*, 63: 175-184
- Douglas-Helders, M., Nowak, B., Butler, R. The effect of environmental factors on the distribution of *Neoparamoeba pemaquidensis* in Tasmania, *Journal of Fish Diseases*, 28: 583 - 592
- Frances, SP, DGE Waterson, NW Beebe and RD Cooper. Field Evaluation of commercial repellent formulations against mosquitoes (Diptera: Culicidae) in Northern Territory, Australia. *J. Am. Mosq. Control Assoc.* 21: 480-482
- Frances, SP, RM Marlow, CC Jansen, RL Huggins and RD Cooper. Laboratory and field evaluation of commercial repellent formulations against mosquitoes (Diptera: Culicidae) in Queensland, Australia. *Aust J. Entomol.* 44: 431-436
- Gasser RB, Hu M, Abs EL-Osta, Zarlenga DS and Pozio E Genetic analysis of *Trichinella* populations by ‘cold’ single-strand conformation polymorphism. *Veterinary Parasitology* 132: 23-26
- Gasser RB, Williamson RMC and Beveridge I *Anoplocephala perfoliata* of horses – significant scope for further research, improved diagnosis and control. *Parasitology* 131: 1-13
- Gasser RB, Skinner R, Fadavi R, Richards DG, Morris G High throughput capillary electrophoresis for the identification and differentiation of seven species of *Eimeria* from chickens. *Electrophoresis* 26: 3479-3485
- Gobert, G.N., Chai, M., Duke, M. and McManus, D.P. Copro-PCR based detection of *Schistosoma* eggs using mitochondrial DNA markers. *Molecular and Cellular Probes* 19: 250-254
- Heath, D.D., Zhang, L.H. and McManus, D.P. Inadequacy of yaks as hosts for the sheep-dog strain of *Echinococcus granulosus* or for *Echinococcus multilocularis*. *American Journal of Tropical Medicine and Hygiene* 72: 289-290
- Hunter, PR, Thompson, RC. The zoonotic transmission of *Giardia* and *Cryptosporidium*. *Int J Parasitol.* 35: 1181-90.
- Jenkins D.J. *Echinococcus granulosus* in Australia, widespread and doing well! *Parasitology International* 35: 733-740
- Jenkins D.J., Romig, T., Thompson, R.C.A. Emergence/re-emergence of *Echinococcus* spp – a global update. *International Journal for Parasitology* 35: 1205-1219
- Jenkins D.J. Hydatid control in Australia: where it began, what we have achieved and where to from here. *International Journal for Parasitology* 35: 733-740
- Jenkins D.J., Murray A. J., Claridge A. W., Story G. L., Bradshaw H. and Craig P. S. The contribution of spotted-tailed quolls in the transmission of *Echinococcus granulosus* in the Byadbo Wilderness Area of the Kosciuszko National Park, Australia. *Wildlife Research* 32: 37-41

Jiang, C., McManus, D.P. & Jones M.K. Liver alveolar echinococcosis in China: Clinical aspect with relative basic research. *World Journal of Gastroenterology*, 11: 4611-4617

Johnston FH, Morris PS, Speare R, McCarthy JS, Currie B, Ewald D, Page W, Dempsey K. Strongyloidiasis: a review of the evidence for Australian practitioners. *Aust J Rural Health*. 13: 247-54

King SW and Hutchinson GW Hydatids -- you, too, can be affected. NSW Department of Primary Industries Agfact A0.9.43, second edition, pp12, available at <http://www.agric.nsw.gov.au/reader/an-diseases/hydatids-you-too-affected.htm>.

Leo, N.P. & Barker, S.C. Unravelling the origins of the head lice and body lice of humans. *Parasite Research* 98: 44-47

Leo, N.P., Hughes, J.M., Yang, X., Poudel, S.K.S., Brogdon, W.G., & Barker, S.C. The head and body lice of humans are genetically distinct (Insecta: Phthiraptera: Pediculidae): evidence from double infestations. *Heredity* 95: 34-40

Lew AE, Jorgensen WK. Molecular approaches to detect and study the organisms causing bovine tick borne diseases: babesiosis and anaplasmosis. *African Journal of Biotechnology* 4: 292-302

Li, Y.S. Li, Y., Luo, X.S., Yu, X.L., Ross, A.G.P., McManus, D.P. Acquired immunity and reinfection due to *S. japonicum* in the Dongting Lake, China. *Bulletin of Medical Research* 34: 27-28

Li, Y.S., Zhao, Z., Ellis, M. and McManus, D. P. Applications and outcomes of periodical epidemiological surveys for schistosomiasis and related economic analysis in the People's Republic of China. *Acta Tropica* 96: 266-275

Lowery, C. J., Xiao, L., Ryan, U. M., Dooley, J. S., Millar, B. C. and Moore, J. E. Molecular Biology Methods for Detection and Identification of *Cryptosporidium* Species in Feces, Water, and Shellfish. In: *Methods in Biotechnology*, Vol. 21: Food-Borne Pathogens: Methods and Protocols (ed. C.C. Adley). Humana Press Inc., Totowa, NJ. pp 203-214

Lun Z-R, Gasser RB, Lai DH, Li AX, Zhu XQ, Yu XB, Fang YY Clonorchiasis: a key foodborne zoonosis in China. *Lancet Infectious Diseases* 5: 23-33

McManus, D.P. and Ito, A. Application of molecular techniques for identification of human *Taenia* spp. In: WHO/FAO/OIE Guidelines for the Surveillance, Prevention and Control of Taeniosis/Cysticercosis, OIE Publications, Paris, France, 2005, 52-55.

Monis, PT, Giglio, S, Keegan, AR, Thompson, RCA. Emerging technologies for the detection and genetic characterisation of protozoan parasites. *Trends in Parasitology* 21: 340-6

Molloy J.B. Anderson G.R. Fletcher T.I. and Knight B.C. Evaluation of a commercially available enzyme-linked immunosorbent assay for detecting antibodies to *Fasciola hepatica* and *Fasciola gigantica* in cattle, sheep and buffaloes in Australia. *Veterinary Parasitology* 130: 207-212

Mounsey KE, Holt DC, Fischer K, Kemp DJ, Currie BJ, Walton SF Analysis of *Sarcoptes scabiei* finds no evidence of infection with *Wolbachia*. *International Journal of Parasitology* 35: 131-135

Njiru, ZK, Constantine, CC, Guya, S, Crowther, J, Kiragu, JM, Thompson, RCA, Dávila, AMR. The use of ITS1 rDNA PCR in detecting pathogenic African trypanosomes. *Parasitology Research*, 95: 186-192

Peng W, Keng Y, Hu M, Zhou X, Gasser RB Mutation scanning-coupled analysis of haplotypic variability in mitochondrial DNA regions reveals low gene flow between human and porcine *Ascaris* in endemic regions of China. *Electrophoresis* 22: 4317-4326

M. L. Power, N. C. Sangster, M. B. Slade and D. A. Veal Patterns of *Cryptosporidium* oocyst shedding by eastern grey kangaroos inhabiting an Australian watershed. *Applied and Environmental Microbiology* 71: 6159-6164

M.L.Power. Kangaroo *Cryptosporidium*: Is it a wildlife disease? (2005) *Australian Microbiology*

Ratcliff A, Siswantoro H, Kanangalem E, Ebsworth P, Edstein M, Anstey NM, Tjitra E, Price RN. High prevalence of multidrug resistant *P. falciparum* and *P. vivax* in Papua, Indonesia. *Int Med J (Suppl)*; 35: A87

Roberts LJ, Huffam SE, Walton SF, Currie BJ. Crusted scabies: clinical and immunological findings in seventy-eight patients and a review of the literature. *J Infect* 50: 375-381

Ryan, U. M., Read, C., Hawkins, P., Warnecke, M., Swanson, P., Deere, D. and Cox, P. Genotypes of *Cryptosporidium* from Sydney water catchment areas. *Journal of Applied Microbiology*. 98: 1221-1229

Ryan U, Bath C, Read C, Elliott A, McInnes L, Besier, B. Sheep may not be an important zoonotic reservoir for *Cryptosporidium* and *Giardia*. *Applied and Environ. Micro* 71: 4992-4997

Schindler AR, de Gruijter JM, Polderman AM, Gasser RB (2005) Definition of genetic markers in nuclear ribosomal DNA for a neglected parasite of primates, *Ternidens deminutus* (Nematoda: Strongylida) – diagnostic and epidemiological implications. *Parasitology* 131: 539-546.

Stark, D. Beebe, N.W., Marriott, D., Ellis, J.T. and Harkness, J. Dientamoebiasis: clinical importance and recent advances. *Trends in Parasitology*. 22: 92-6.

Stark, D. Beebe, N.W., Marriott, D., Ellis, J.T. and Harkness, J. Prospective study of the prevalence, genotyping, and clinical relevance of *Dientamoeba fragilis* infections in an Australian population. *J. Clinical Microbiology*. 43: 2718-2723

Stark, D., Beebe, N., Marriott, D., Ellis, J.T. and Harkness, J. Detection of *Dientamoeba fragilis* in fresh stool specimens using PCR. *Int. J. Parasitol.* 35: 57-62

Syafruddin D, Asih PB, Casey GJ, Maguire J, Baird JK, Nagesha HS, Cowman AF, Reeder JC. Molecular epidemiology of *Plasmodium falciparum* resistance to antimalarial drugs in Indonesia. *Am J Trop Med Hyg.* 72:174-81.

Traub, R, Wade, S, Read, C, Thompson, A, Mohammed, H. Molecular characterization of potentially zoonotic isolates of *Giardia duodenalis* in horses. *Vet Parasitol.* 130: 317-21

Traub, RJ, Robertson, ID, Irwin, PJ, Mencke, N, Thompson, RCA. Canine gastrointestinal parasitic zoonoses in India. *Trends in Parasitology*, 21: 42-48

Ugarte CE, Thomas DG, Gasser RB, Hu M, Scott I, Collett MG *Spirometra erinacei* in a feral cat with chronic intermittent diarrhoea from the Manawatu. *New Zealand Veterinary Journal* 53: 347-51

van Lieshout L., de Gruijter J.M., Adu-Nsiah M., Haizel M, Verweij JJ, Brienen EAT, Gasser RB, Polderman AM *Oesophagostomum bifurcum* in non-human primates is not a potential reservoir for human infection in Ghana. *Tropical Medicine and International Health* 10: 1315-1320

Weng YB, Hu YJ, Li Y, Li BS, Lin RQ, Xie DH, Gasser RB and Zhu XQ Survey of intestinal parasites in pigs from intensive farms in Guangdong Province, People's Republic of China. *Veterinary Parasitology* 127: 333-336

4.2 Grants

Network Participants were extremely successful in the 2005 NHMRC grant round. Included in the results were six Fellowships, one Program Grant and nine Project Grants. The total value of these grants is over \$22 million over the lifetime of the grants.

Fellowship recipients included:

- Ian Clark (ANU - Senior Principal Research Fellow);
- Shelley Walton (Menzies School of Health Research - Biomedical Career Development Award);
- Marshall Lightowlers (The University of Melbourne - Principal Research Fellow);
- Louis Schofield (WEHI - Principal Research Fellow);
- Emanuela Handman (WEHI - Principal Research Fellow); and
- Alan Cowman (WEHI - Senior Principal Research Fellow).

Program Grant - Host Parasite Interactions: Disease, Pathogenesis and Control

- Alan Cowman (WEHI), Graham Brown (The University of Melbourne), Brendan Crabb (WEHI), Emanuela Handman (WEHI), Malcolm McConville (The University of Melbourne), Geoff McFadden (The University of Melbourne), Louis Schofield (WEHI) and Terry Speed (WEHI).

Research Project Grant Recipients included:

- Nick Hunt (University of Sydney, in collaboration with Roland Stocker) for "Tryptophan metabolism and vascular tone";
- Nick Hunt and Helen Ball (University of Sydney) and Nick Anstey (Menzies School of Health Research), in collaboration with Georges Grau for "Lung disease in malaria";
- Alex Loukas (QIMR, in collaboration with Peter Hotez) for "Hookworm digestive proteases";
- Chris Engwerda (QIMR, in collaboration with Paul Kaye and Manabu Ato) for "Defining the roles of TNF, LT and LIGHT in experimental visceral leishmaniasis";
- Malcolm McConville (University of Melbourne, in collaboration with Spencer Williams) for "New drug targets in *Leishmania* parasites";
- Stephen Rogerson (University of Melbourne, in collaboration with Anthony Jaworowski) for "HIV and immunity to malaria";
- Ludasz Kedzierski (WEHI) for "New drugs and vaccines to treat leishmaniasis";
- James Beeson (WEHI) and Stephen Rogerson (University of Melbourne) for "Immunity to placental malaria";
- Terry Speed (WEHI, in collaboration with Gordon Smyth and Melanie Bahlo) for "Bioinformatic analysis and functional genomics".

Network Participants were also successful in the ARC grant rounds, securing over \$2.5 million in funding over the lifetime of the grants. The following Network Participants were awarded ARC Discovery Grants:

- Mike Bull from Flinders University and colleagues for their project "Ecological dynamics of parasite infections in reptiles";
- Robin Gasser and Alex Loukas from The University of Melbourne and QIMR for their project "Discovery of early developmental events in the transition to parasitism in the hookworm *Ancylostoma caninum* using genomic technologies";
- Geoff McFadden from The University of Melbourne (and Dr RF Waller) for their project "Infrakingdom Alveolata: searching for a defining structural feature";
- Ray Norton from The University of Melbourne for his project "Malarial parasite surface proteins: structure and interactions of key merozoite antigens";
- Sabina Belli and Nick Smith from the University of Technology, Sydney for their project "The biosynthesis of structural proteins in parasites";
- John Dalton, Don Gardiner, and Katherine Trenholme from the University of Technology, Sydney and QIMR (and Dr J Grembecka) for their project "Aminopeptidases involved in regulating the amino acid pool in malaria parasites";

- Nick Smith and Jim Wiley from the University of Technology, Sydney and The University of Sydney for their project "Parasite virulence: the role of activation and suppression of P2X7 receptors";
- Renfu Shao was awarded an ARC Australian Postdoctoral Fellowship to work on "Recombination of mitochondrial genomes: what can we learn from chigger mites?" in Steve Barker's lab at The University of Queensland.

The following Network Participants were awarded ARC Linkage Grants or ARC Linkage International Grants:

- Robin Gasser, Ian Beveridge, and Alex Loukas from The University of Melbourne and QIMR (and Professor S Ranganathan) for their project "Targeted mining for new drugs against parasitic nematodes of animals: a synergy of integrated, frontier technologies and a committed partnership with industry";
- Marshall Lightowlers, and Dave Jenkins from The University of Melbourne and the Australian National University (and Dr LA Hinds) for their project "Evaluation of the EG95 vaccine against hydatid infection in macropodid marsupials";
- Ian Clark from The University of New South Wales (and Professor CL Geczy) for their project "Identification of novel markers of inflammation";
- Sabina Belli, Nick Smith (University of Technology, Sydney) and Brian Chait (Rockefeller University, USA) for their project "Identification of structural proteins in the tissue cyst wall of *Toxoplasma gondii*".

Network Participants were also awarded industry or community backed funding from Cooperative Research Centres, Meat and Livestock Australia, Australian Wool Innovations, Fisheries Research and Development Corporation, the Grains research and Development Corporation, the WA Cattle Compensation Fund, the Commercial Ready Grants Scheme, Primary Industries and Resources South Australia, Holsworth Wildlife Research Fund, the Ramacotti Foundation, the Channel 7 Children's Research Foundation of South Australia, the Wildlife Conservation Fund and the Sir Mark Mitchell Research Foundation worth more than \$5 million for more than 20 research projects including:

- The award of Meat and Livestock Australia and Australian Wool Innovation grants to Brown Besier (AgWA) and colleagues for "Commercial development of a dipstick method for on-farm diagnosis of *Haemonchus* infections in ruminants"; Nick Sangster and David Emery for "Characterisation of critical genes in the sheep/*Haemonchus* relationship."
- The granting of a Commercial Ready Grant to Vern Bowles (Hatchtech and The University of Melbourne) and colleagues for "Development and Commercialisation of a Novel Technology for the Treatment of Ectoparasites".
- The award of funding by the Australian Security CRC to Simon Reid and colleagues (Murdoch University) for "Development of tools to improve the surveillance for surra".

- The award of a CRC for Aboriginal Health grant to Shelley Walton, Bart Currie, Deborah Holt, Kate Mounsey (Menziess School of Health Research), Dave Kemp, James McCarthy, Michael Good, Katja, Fischer, (QIMR) and colleagues for “The Healthy Skin Program”.

Network Participants also collaborated internationally to help secure 20 grants worth approximately \$40 million from international agencies such as the National Institutes of Health, USA, the Bill and Melinda Gates Foundation, The World Health Organisation, the EU Sixth Framework Program, Atlantic Philanthropies, the Wellcome Trust, the Drugs for Neglected Diseases Initiative, DEST Endeavour Award, the Japanese Society for the Promotion of Science and the Australian Academy of Science, the Sir Zelman Cowen Universities Fund and the Howard Hughes Medical Institute. Some of the people and projects funded included:

- The award of Howard Hughes Medical Institute Infectious Disease and Parasitology Awards to Network Participants, Alan Cowman (WEHI), Brendan Crabb (WEHI), Simon Foote (WEHI), Geoff McFadden (The University of Melbourne) and Louis Schofield (WEHI).
- The award of National Institutes of Health grants to Mick Foley, Robin Anders and Ray Norton (LaTrobe University and WEHI) for “Inhibitory epitopes in malaria vaccine candidates”; Qin Cheng (AMI) and colleagues for “Artemisinin induced dormancy and malaria treatment failure”; Alex Loukas (QIMR) and colleagues for “Pathogenesis of liver fluke induced cancer in Thailand”; Alex Loukas (QIMR) and colleagues for “Immunomodulation by hookworms”; Alan Cowman (WEHI) for “Adherence of malaria-infected red cells”
- The award of WHO grants to James McCarthy (QIMR), Qin Cheng (AMI) and colleagues for “Effect of Plasmodium falciparum Histidine-rich protein II (PfHRP II)-specific Monoclonal Antibodies on the performance of PfHRP II-based Rapid Diagnostic Tests”; Emanuela Handman (WEHI) for “A new model to study the role of innate immunity in the pathophysiology of Leishmania major infection”.
- Wellcome Trust awards to Marshall Lightowlers (The University of Melbourne) and colleagues for “Optimisation and field testing of a practical vaccine against taenia solium cysticercosis in pigs”; James Beeson (WEHI) and colleagues for “An integrated program on the immuno-epidemiology of human blood stage immunity to P. falciparum malaria”.
- Bill and Melinda Gates Foundation awards to James Beeson, Luis Schofield (WEHI), Steve Rogerson (The University of Melbourne) and colleagues for “Intermittent preventive treatment during EPI for the prevention of malaria and anaemia in Papua New Guinean infants”; Alan Cowman (WEHI) and colleagues for “A protective genetically attenuated P. falciparum sporozoite vaccine”.
- The award of an ACIAR grant to Simon Reid and colleagues (Murdoch University) for “The identification of constraints and possible remedies to livestock production by zoonotic diseases in the South Pacific”.

- The award of a Drugs for Neglected Diseases Initiative grant to Andrew Thompson (Murdoch University, Bill Charman (Monash University) and colleagues for a project entitled, "Novel, orally available drug candidates for trypanosome infections".

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

A majority (8 out of 15) of the Research Exchange, Training and Travel Fund awards involved international collaboration, this included an international symposium on malaria proteins structure and function. Additionally the Network Management Committee has devoted substantial attention and effort into cementing international linkages. Thus, in May 2005, the Convenor (Associate Professor Smith) travelled to Europe and North America to meet with the heads of various significant EU and Canadian parasitology networks and solidify linkages with them:

- 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).

A similar agreement was subsequently reached with 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, as a result of these meetings agreed 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, for the Communications Coordinator of the ARC/NHMRC Network to post news concerning Network activities, success stories, job advertisements, conference notices, funding opportunities etc - the Chairs/Directors of the European and Canadian networks will determine which items are relevant to their members and forward 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);
- [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 agreed to co-organise “The International Symposium on Therapies for Parasitic Diseases”, to be held in conjunction with

the ASP and ARC/NHMRC Research Network for Parasitology conference in July, 2006. Several very high profile speakers from the international networks have been secured to speak at the symposium.

6. Contributions to the Research Network of particular significance during 2005

There were several highlights for the Network in 2005 perhaps, most notably, the initial 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 high number of registrations at the First Conference of the ARC/NHMRC Research Network for Parasitology. There were also a number of major research successes by Network Participants, which deserve to be highlighted, and are listed below:

- The continuing strength of Australia's research effort in marine parasitology, as evidenced by the productivity of its researchers, who published quality papers in both fundamental ecological and evolutionary studies but also more applied research of direct relevance to the aquaculture industry;
- The strength of Australia's research in parasite transmission and epidemiology was evident, not just in the quality and quantity of papers published in this field featuring Australian collaborators, but also the international recognition via awards to two Australian parasitologists – one well established and one early career researcher – in 2005 (Professor RC Andrew Thompson of Murdoch University received the 2005 World Association for the Advancement of Veterinary Parasitology/Bayer HealthCare Award for Excellence in Research and Dr Min Hu of the University of Melbourne received the 2005 World Association for the Advancement of Veterinary Parasitology Peter Nansen Young Scientist Award);
- Australia's malaria researchers continued to lead the world, publishing landmark papers on cell invasion, intracellular trafficking, gene polymorphism and virulence, immunoregulation and vaccine development (highlighted in the box below) throughout 2005 in the highest quality international journals (including Proceedings of the National Academy of Sciences, USA, Journal of Biological Chemistry, Cell, Journal of Immunology, EMBO Journal, Trends in Parasitology, Journal of Cell Science, Science, Nature and Trends in Immunology) – five of Australia's malaria researchers were also recognised as Howard Hughes Medical Institute International Scholars in 2005;

Vaccine for malaria

Queensland Institute of Medical Research (QIMR) scientists have found that that, in animal studies, an immune response can protect against infections of different strains of the malaria parasite. Malaria vaccine trials in humans are expected to start in Brisbane early next year.

Professor Michael Good from QIMR talks to the ARC/NHMRC Research Network for Parasitology about the malaria vaccine trials.

"The vaccine works by stimulating an immune response that recognises the infection, the real infection when it comes, and destroys it or limits its growth. The real challenge in malaria vaccines is to identify a way to stimulate an immune response that will cover all strains of the parasite and be effective in controlling their growth. What we've found is, if we use a low dose of the parasite as opposed to, say, a large dose, the immune response is even more immunogenic again. It's focused on cell mediated immunity in preference to an antibody focus.

"The biggest challenge in this approach, I think, is the idea of convincing people that we can make a safe vaccine when you inject whole organisms grown in red blood cells. People are understandably concerned about inducing immune responses to the red blood cells. We have to go to extraordinary lengths to make sure that ... the blood product is safe."

"One of the important parts of doing any vaccine trial is to look at safety and immunogenicity. As part of the vaccine trial work-up, we would be looking initially at safety and immunogenicity initially in adults and then, if it was safe and immunogenic in adults, we would look at children."

The main issues for using this vaccine in other countries "are showing immunogenicity in different populations and issues of shelf life."

"It's anticipated that human trials should start in about a year's time. After that, the next thing to do is grow the *Plasmodium falciparum* parasites as GMP cells. Obviously we do grow *Plasmodium falciparum* parasites now, but we don't grow them in a way that would be regulated or allowed by the TGA to inject into people. We would have to use blood that we know is safe and clean and we have to grow these parasites under very stringent, reproducible conditions so that we can do the same thing again and again and again. And we have to produce the adjuvant at GMP."

- Australian researchers are developing pre-eminent international reputations in the use of RNA interference to discover and validate new drug targets for parasitic nematodes;
- Australian researchers collaborated on paradigm-shifting research (published in Proceedings of the National Academy of Sciences, USA) describing the initiation of immune responses that help control leishmaniasis;
- 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 National Institutes of Health, USA, the Wellcome Trust and Atlantic Philanthropies as well as the NHMRC Program Scheme.

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

In 2005 our Network participants extended their scientific role and engaged in numerous outreach activities ranging from presenting their research to, and interacting with, students, senior citizen groups, farmers, politicians and Rotarians, to giving media interviews about Australian malaria researchers. Australian parasitologists are represented across a broad range of boards, committees and advisory panels.

There were 31 reports in the media involving Network scientists and these are listed below:

7.1 Media

1. The Flinders University Research Group were involved in the early stages of development of the next David Attenborough series: "Life in Cold Blood". In 2006 they have started filming sequences from three lizard studies from our research group, where the story will be about how social organisation evolved in reptiles, with a parasitological slant.
2. *"Malaria: Why Australian researchers are leading the world"* Australian Life Scientist, Sept/Oct 2005 (Graham O'Neill).
"Chloroquine-primaquine combination could be use to treat CQ-resistant malaria parasites"
3. Radio National interview (Fran Kelly) Malaria Fight. 6:35am - 27 September 2005
4. Interview: Plenty Valley FM 88.6 Community Radio (Wlima Hammond). 10.30 am 5th October.
5. Item reported on Tony Delroy's Nightlife, AM 774, 11th October.
6. New Scientist October 1, 2005 (Emma Young) – "Shot in Arm for Tired Malaria Drug".
7. Item reported by Agence France-Presse, BBC News, Media Corp News, Channel NewsAsia, British Nursing News, TerraNet, Yahoo News
8. The Age Nov 21, 2005 "Still a sting in the tail", article by Geoff Maslen
<http://www.theage.com.au/news/education-news/still-a-sting-in-the-tail/2005/11/18/1132016985474.html#>
9. Nature Research Highlights - A Fish Cooperative. 436: 606.
10. Plongee Magazine - Elle etudie les poisons nettoyers. Martine Carret. Vol 67 April/May.
11. Spiegel. Bizzare krebse. Wer am meisten wackelt, darf putzen. 26 April
<http://www.spiegel.de/wissenschaft/erde/0,1518,353376,00.html>
12. Australasian Science. (Steve Lutz).

13. ABC radio interview. (Justine Becker).
14. Science Now. "This shrimp's got rhythm". (Kelli Whitlock).
15. The Helix Something fishy about sunscreen. CSIRO magazine. (Ruth Hardmand). 100:4.
16. ABC Townsville radio interview on sunscreen project. Feb. 3. (Nicole Dyer).
17. ABC Rockhampton radio interview on sunscreen project. Feb. 2. (Chris Lawson).
18. ABC Cairns radio interview on sunscreen project. Jan. 31.
19. Article about University of Sydney / Hebrew University of Jerusalem collaborative research in the Australian Jewish News, September, 2005.
20. Feature article, Australian Biochemist, Vol 36, April 2005, "Institute for the Biotechnology of Infectious Diseases".
21. Labwatch, Sydney Morning Herald, July 21, 2005.
22. "Parasite network aims to focus research efforts", Australian Biotechnology News, July 12, 2005.
23. ABC TV News, July 7, 2005 (interview on Gates Foundation Grand Challenge awards and the First Conference of the ARC/NHMRC Research Network for Parasitology).
24. "Bug catchers unite for security", The Australian, July 6, 2005.
25. "Malaria research receives significant boost", ABC Radio – The World Today, July 7, 2005.
26. "Multi-million dollar malaria grant", The Courier Mail, July 7, 2005.
27. 'The Age' article, 'Connecting the dots' and Australian Biotechnology News - front page article on Plebanski Lab's vaccine work.
28. Interview with ABC TV "Landline" for a program on hydatid disease in a rural community, Springsure Qld - went to air 23/10/05.
29. Radio interview ABC Gippsland.
30. Article on hydatid disease for the News Letter of the Queensland Division of the Australian Veterinary Association. "The Veterinarian" magazine published November 2005.
31. Radio interview ABC Goulburn Hydatids/wild dogs in NSW.

7.2 Presentations

There were 25 documented outreach activities where Network scientists presented to, or engaged with, the general public and/or specific community groups about their research work. A selection of these are highlighted below.

R.B. Besier from the Department of Agriculture Western Australia delivered numerous presentations to sheep farmers, students, veterinarians.

Prof. John Dalton presented a public talk, 'The Body Snatchers', at Parliament House, Sydney, (BioFirst Award Ceremony), March 2005.

Dr T Cribb delivered a "Bright Minds" public Lecture to Secondary School teachers and students on Marine Parasitology.

Dr Malcolm Jones was a guest lecturer in "Medical Parasitology", Ningxia Medical College, Ningxia, China. This intensive course was set up to train teachers in an international course in medicine conducted by the College

Alan Lymbery delivered a presentation to the Rotary Club of Carlton on the use of vaccination to eradicate or control infectious diseases.

Dr David Jenkins gave presentations and seminars to Wild Dog Control Working Groups; the NSW Agriculture Vertebrate Pest Control Workshop; the NSW National Parks & Wildlife Service, Dorrigo NSW; and veterinarians.

Dr Ala Lew was involved in career symposiums at Griffith University and "Science As A Career For Women" for Year 10 students University of Queensland.

Dr Ian Whittington gave public lectures to the CSIRO Double Helix Club at Reynella East Primary School, Adelaide: "Parasites: 'stuff' you may have been too afraid to ask about!"; and the joint Australian Societies for Microbiology & Parasitology, Adelaide "Monogenean parasites of fish: an overview".

Dr Shelley Walton's group participated in "2005 Scabies – what is it and what can we do about it?" at the Danila Dilba Aboriginal Health Centre Workshop, Darwin, Australia

8. Contribution to the National Benefit

The contribution of ARC/NHMRC Research Network for Parasitology Network to Australia's fundamental, strategic and applied research effort is evident in the quantity and quality of publications listed in Section 4 for the research priorities identified at the point of origin of the Network to address Australia's National Research Priorities. With regards to the Network more directly, 2005 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 establishment 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 to attend the First Conference of the ARC/NHMRC Research Network for Parasitology, which attracted 150 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.

9. An indication of the activities and strategies for the coming year (2006)

The ARC/NHMRC Research Network for Parasitology will continue to support conferences and workshops and its successful Researcher Exchange, Training and Travel Fund in 2006, at the same levels as for 2005. The IT Initiative will also be supported in 2006 but, obviously, the specific goals for 2006 will differ and are outlined in section 9.2. In addition to these established activities, a more focused effort into the development of the Network's communication strategy will be evident in 2006 – this is summarised below in section 9.1.

9.1 Communications strategy

The aim of this strategy is to plan and promote effective communication both within the ARC/NHMRC Research Network for Parasitology, and with external stakeholders, about the Network and its activities.

Objectives:

- to raise awareness and understanding of the ARC/NHMRC Research Network for Parasitology amongst the parasitology community, sponsors and potential sponsors, the media, and the general public;
- to streamline internal communications within the Network to increase efficiency and effectiveness; and
- to manage external communications from the Network to maximise impact on external stakeholders, sponsors, the media and the general public.

Key messages:

- The importance of parasites;
- The cost of parasitic diseases in humans and animals to the economic and social welfare of Australia; and
- The significance of Australian researchers in improving the understanding of all aspects of the parasitic lifestyle.

Strategies:

1. By communicating the aims and objectives of the Network and the achievements of its participants and by working closely with the Network's sponsors and supporters;

2. By providing communication materials and by using appropriate communication channels and vehicles specifically for internal stakeholders; and
3. By providing communication materials and by using appropriate communication channels and vehicles specifically for external stakeholders, the media and the general public.

In line with the communications strategy the following aims will be met by the end of 2006:

- A redesigned, more visually appealing Network website with enhanced functionality and manageability will be launched;
- Network website content will be updated (including the production of profiles of parasitologists and updating of publications and grants);
- A strategy and timetable for public lectures and events will be developed (including nationwide participation by researchers in the Network in National Science Week activities – DEST funding will be sought for this);
- A network of media contacts will be developed in collaboration with the marketing and publicity arms of each of the Network's Participating Organisations and the Australian Science Media Centre;
- A media training course will be developed for Network Participants;
- A toolkit for presentations will be made available for Network Participants; and
- A comprehensive 3 year communications strategy will be finalised.

9.2 IT Initiative

Parasite EST and genome databases.

Procedures will be developed to maintain and clean the scabies EST database by writing a 'cleaning' program, which will be activated each time the database is used. We are further planning to recalibrate the ESTScan matrix using the programs provided by their developers. Finally, assembly and blast hit displays will be graphically displayed and we will develop a method to store and retrieve good quality annotations. New EST and genome projects will be considered during 2006, once the platform for the scabies database has been finalised and validated.

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 Research Support Unit at the University of Technology Sydney. The priority for 2006 will be to build a user-friendly, virtual organisation platform that is web-based and searchable, and that provides a comprehensive resource for access to parasite databases, parasite genomes, bioinformatic analysis tools, as well as parasitology resources and protocols. In addition, it will provide calendaring capabilities, discussion groups and job advertisements, etc. It is planned to extend the capability to enable web conferencing where remote member laboratories can share data and plan experiments. A number of platforms are being assessed.

The Australian Parasite Database.

The final project undertaken by the IT Initiative Team will be the construction of a comprehensive database to store many different forms of data about various parasite species. This will be more than a genomic database (such as, for example, PlasmoDB) but, rather, an attempt to list every parasite affecting Australian livestock, pets, wildlife and humans, and include information on taxonomy, host specificity, lifecycles, epidemiology, socio-economic

impact, pathology, treatments, protocols for sample collection and diagnosis, a list of expert parasitologists who may be consulted, a list of research groups investigating particular parasites and summaries of their research, a list of important publications, and links to similar international databases. Geographical distribution of parasites will be available in the form of maps, which will provide information on co-location of parasites. Data on neighbouring countries that contain parasites of potential economic and health importance, if introduced, will also be included. This information on parasite biology and phenotype will be linked to genomic information for different parasites. The database will support complex queries through a web interface and can be configured to provide different levels of access to data for particular user groups, such as researchers, teachers, quarantine services, human and animal health professionals, and the general public.

The initial focus will be on aquatic parasites. Contact has been made by the IT Initiative Team with a group of Australian parasitologists working on parasites of fish. During initial discussions we were made aware of a database that has already been developed for aquatic animal pathogens and diseases by the Australian Government Department of Agriculture, Fisheries and Forestry. This database, while not focussing on parasites, has parasites as the majority of its entries. The database although still in a relatively early stage of construction, is operational. It requires further development to improve useability and features, to bring data entries up to date and to validate entries. The IT Initiative Team is meeting in early April with Dr Ingo Ernst of the Aquatic Animal Health Unit at the Federal Department of Agriculture, Fisheries and Forestry to discuss how the ARC/NHMRC Research Network for Parasitology can work with the Department on the further development of the database and to assess whether their efforts provide a useful starting design for our more general database for other parasites.

10. 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. A survey conducted about the First Conference of the ARC/NHMRC Research Network for Parasitology, indicated that 40% of respondents had never before attended a national parasitology conference in Australia.

11. 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, the Network Management Committee has discussed extensively and drawn up a

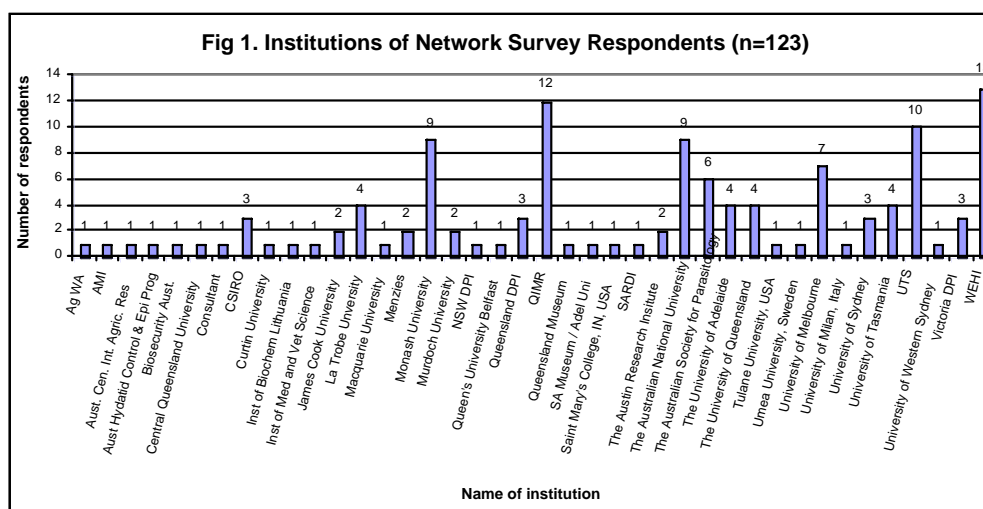
list of international researchers (principally ex patriat Australian scientists) that it wishes to target for recruitment back to Australia, especially – but not exclusively - via the Federation Fellowship scheme. This list will be discussed with the Network Advisory Committee in 2006 and contact will subsequently be made with these researchers. Similarly, the Management Committee has identified groups of researchers and areas of research focus that appear good candidates for development of larger scale, program-style or “Centre of Excellence” applications. These groups will be discussed with the Advisory Committee and, subsequently, approached to explore possible funding to facilitate the preparation of applications.

12. Survey carried out of members to ascertain any benefits gained from membership of the Network - Results for the 2006 ARC/NHMRC Research Network for Parasitology Annual Survey

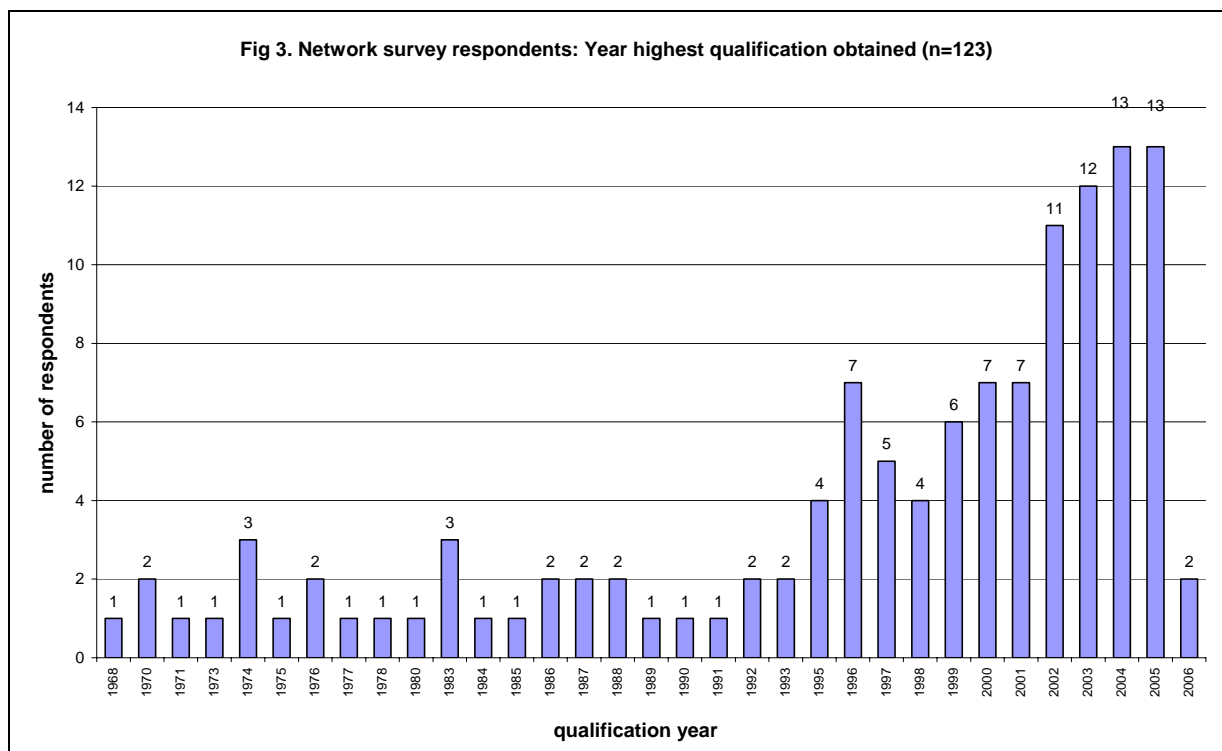
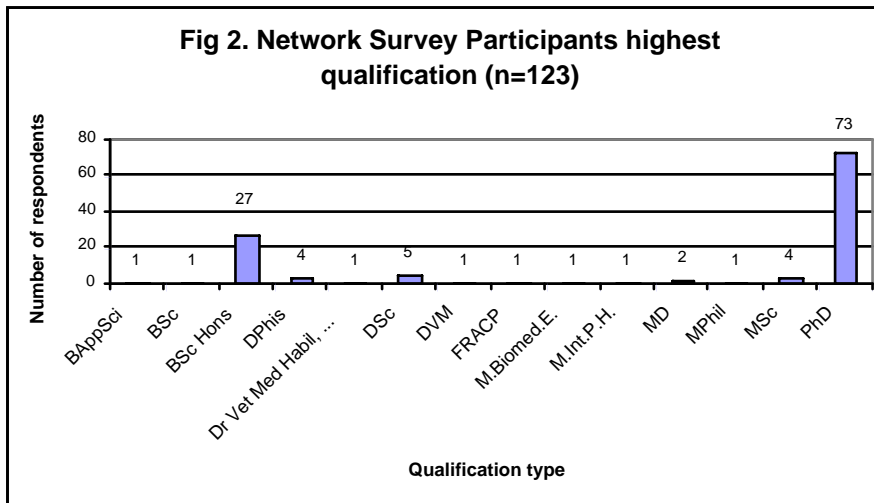
12.1 Participant Information

This survey was made available to the Network participants to complete online. Responses were monitored over two weeks and a total of 126 Network Participants responded. Respondents were self-selected. The number of valid responses was 123.

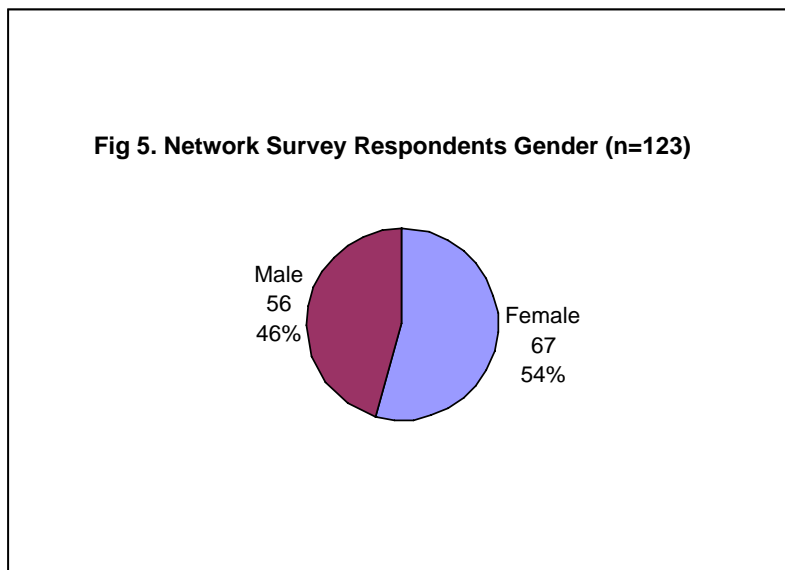
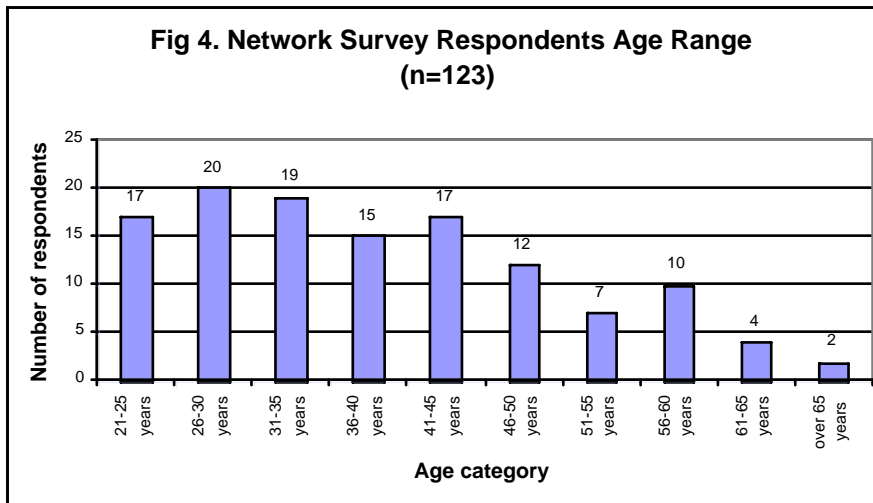
Survey respondents represented 39 different institutions with the highest number being based at WEHI 11%, QIMR 10%, and UTS 8% (see Figure 1).



When asked about their highest qualification the majority of survey respondents reported having a PhD (60%) or BSc Hons (22%) (Figure 2). The responses to “year gained highest qualification” spanned 38 years with the most recent being gained in 2006 and the first in 1968. The majority were gained between 1996 and 2005 (Figure 3).



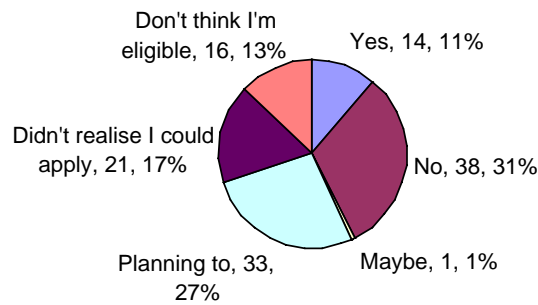
Network Survey Respondents represented a good spread of ages ranging from 21 to 80 years, with a majority of respondents aged between 21 and 45 years (Figure 4). Both male and female respondents were fairly evenly represented, with slightly more females (54%) than males (46%) (Figure 5).



Network funding for participants

38% of Survey respondents have either applied for or are planning to apply for Network funding for a travel grant. 31% are not planning to apply, whilst 17% didn't realise they could apply and 13% did not think they were eligible; to be eligible for Network funding applicants must be an Active Network Participant (Figure 6).

Fig 6. Network Survey Respondents Financial Assistance from the Network



Network website

Most Survey Respondents (40%) had last accessed the website in the past month (Figure 7) and most (46%) reported that they accessed the website sometimes – 1-2 times per month (Figure 8). This probably reflects an increase in website activity/interest resulting from the monthly Network Newsletters that are circulated to all Network participants.

Fig 7. Network Survey Respondents: Last accessed Network website (n=114)

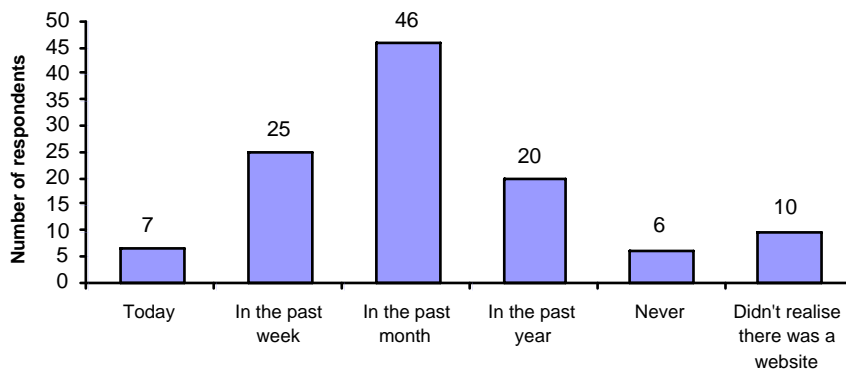
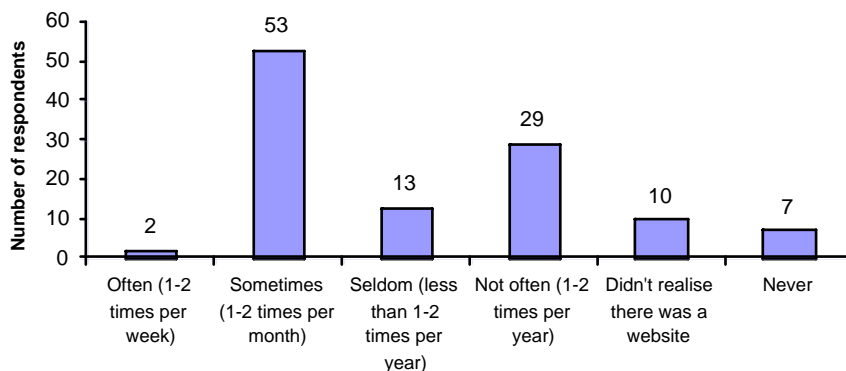


Fig 8. Network Survey Respondents: Frequency access Network website (n=114)



Network Survey respondents who had accessed the website reportedly did so for:

- obtaining conference information (27%);
- reading the Network Newsletter (17%);
- finding out about Network Funding available for participants (13%); or
- finding out general information about the Network.

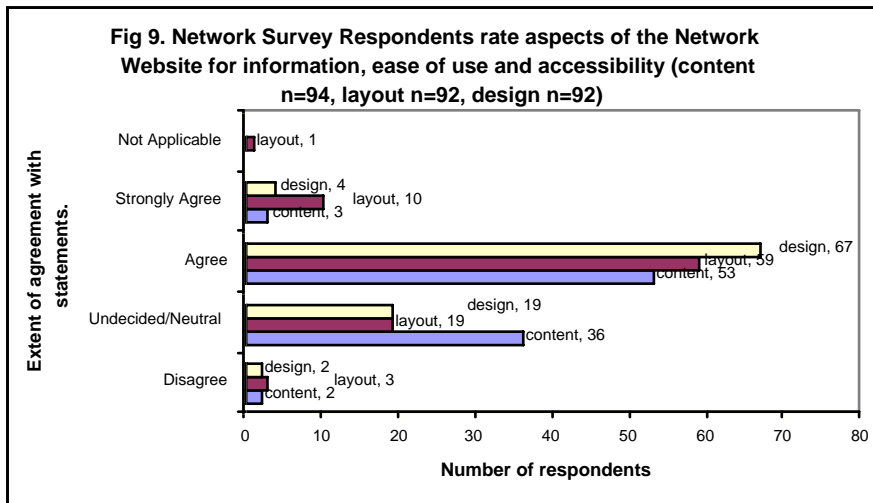
See Table 1 below for a complete list of reasons for accessing the Network website; respondents were able to select more than one option and list others.

Reason	Number of respondents	% of total reasons
Network funding available for participants	35	13%
Network Newsletter	43	17%
Conference information	70	27%
Network aims and objectives	16	6%
Information about Network participants	18	7%
Parasitology news stories	23	9%
Information about the Network's IT initiatives	3	1%
General information about the Network	30	11%
How to contact Network staff members	8	3%
Information about Parasites	6	2%
(to) keep up with the future	1	0%

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

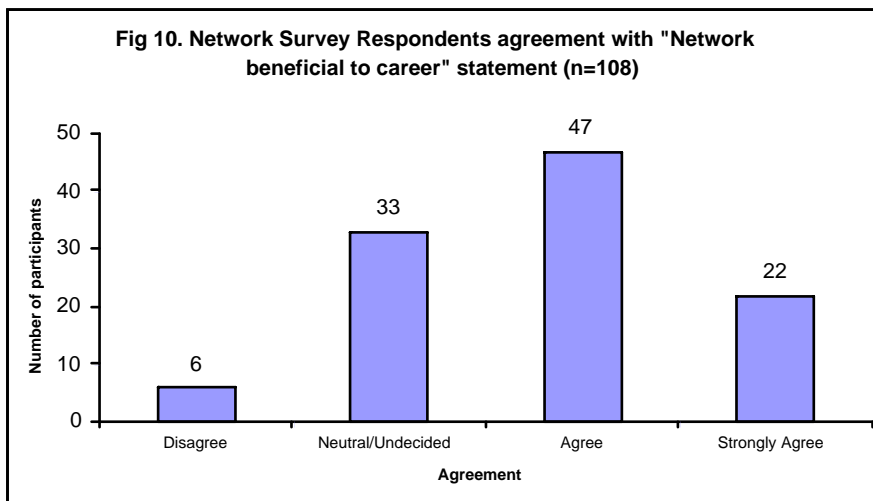
1. The website content has all of the information I need (94 Responses);
2. The layout of the website enabled me to find the information I was looking for easily (92 Responses); and
3. The website design means that information is accessible and easy to read (92 Responses).

Figure 9 shows that a majority of respondents either agreed or strongly agreed with each statement. Results suggest that the website content requires the most amount of work to make sure that it provides all of the information Network Participants need. This should be addressed in conjunction with the reasons for accessing the website (Table 1.) Additionally, one respondent suggested that a search option on the website would be useful.



Overall view of the Network

When asked about being part of the ARC/NHMRC Research Network for Parasitology; 67% (69 respondents) either agreed or strongly agreed with the statement that being a part of the Network was beneficial for their career while 31% were undecided or neutral, and only 6% (6 respondents) disagreed (Figure 10).



Network Survey Respondents were asked about changes to and suggestions for additional activities offered by the Network; 24 respondents gave suggestions and comments which include the following:

- Increased budget so that seed grants can be offered.
More annual awards for researchers.
- More specialised, smaller sponsored meetings.
- Report of research in parasitology in every country with sources of funding.
- Travel grants for students wishing to attend parasitology conferences.
- Including CSIRO in a more meaningful way.
- Focus on biodiversity as well as molecular/medical parasitology
- Promote Network scientists and funding opportunities.
- Lobby Canberra for more funding opportunities.

- Workshops focused on techniques.
- Information of parasitology courses.
- Womens fellowships and support schemes.
- More student inclusion events, lectures, seminars etc.
- The Network provided very valuable seed funding to run a workshop on malaria protein and function in Melbourne this February; this sort of focused workshop is a valuable adjunct to the more general ASP/Network meetings.
- Host-parasite databases/checklists.
Parasitology e-book
- Short courses in key techniques to share ideas across the network, e.g. microscopy techniques.
- Retreat to encourage postdoctoral and doctoral students to meet and share ideas.

One respondent gave an insightful comment about the progress of the Network thus far: “The Network has fulfilled expectations by linking parasitologists and providing a broader framework for discourse. The challenge is to maintain momentum, particularly after specific Network funding ceases.”

13. Register of Network Participants

Network Participant Name	Department & Institution
A/Prof. NC Smith	IBID, University of Technology, Sydney
Prof MG Wallach	IBID, University of Technology, Sydney
Prof R Raison	IBID, University of Technology, Sydney
Prof JP Dalton	IBID, University of Technology, Sydney
A/Prof. K Broady	IBID, University of Technology, Sydney
A/Prof. M Davey	IBID, University of Technology, Sydney
Dr N Beebe	IBID, University of Technology, Sydney
Dr SI Belli	IBID, University of Technology, Sydney
Dr CMD Miller	IBID, University of Technology, Sydney
Dr N Boulter	IBID, University of Technology, Sydney
Dr W Relf	IBID, University of Technology, Sydney
Dr M Villavedra	IBID, University of Technology, Sydney
Dr DM Witcombe	IBID, University of Technology, Sydney
Dr S Donnelly	IBID, University of Technology, Sydney
Dr C Stack	IBID, University of Technology, Sydney
Dr A Sweeney	IBID, University of Technology, Sydney
Dr N Shtayer	IBID, University of Technology, Sydney
Mr M Johnson	IBID, University of Technology, Sydney
Mr M Padula	IBID, University of Technology, Sydney
Mr S Minns	IBID, University of Technology, Sydney
Ms S Lemke	IBID, University of Technology, Sydney
Ms S Flowers	IBID, University of Technology, Sydney
Ms K Mai	IBID, University of Technology, Sydney
Mr R Panwar	IBID, University of Technology, Sydney
Ms I Sotirchos	IBID, University of Technology, Sydney
Mr R Walker	IBID, University of Technology, Sydney
Ms G Sandhu	IBID, University of Technology, Sydney
Mr M Lees	IBID, University of Technology, Sydney
Ms A Hudson	IBID, University of Technology, Sydney
Prof JT Ellis	CMB, University of Technology, Sydney
Dr R Fotedar	CMB, University of Technology, Sydney
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Ms N Leo	Mic&Par, The University of Queensland
Mr M Rix	Mic&Par, The University of Queensland
Ms C June	Mic&Par, The University of Queensland
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Dr L Jackson	QDPI&F
Dr A Lew	QDPI&F
Dr G Anderson	QDPI&F
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Dr R Cooper	AMI
Dr M Edstein	AMI
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Prof D McManus	Queensland Institute of Medical Research
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Ms N Ranjit	Queensland Institute of Medical Research
Mr T Tran	Queensland Institute of Medical Research
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Mr M Dixon	Queensland Institute of Medical Research
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