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In this issue...

Dear Network Participant,

As we enter a new year, Lisa, Wendy and I are busy putting together another annual report that will show how well parasitology research is flourishing in Australia. Our researchers continue to win grants for novel research and publish quality findings. And many of these success stories involve early career researchers, which is particularly heartening given the Network's efforts to support this cohort. The most recent highlight is the award of an NHMRC Career Development Award to Chris Tonkin to assist him in his efforts to establish a programme of research on cell invasion by *Toxoplasma gondii*. By a happy coincidence, this month's Newsletter profiles research on *Toxoplasma*.

On a not so bright note, recent communication from the ARC has effectively ruled out renewed funding for the Network scheme by the ARC. Whilst this is disappointing, the success of the last 5 years has given us something very tangible to build on and there is good reason to believe that the Network will have healthy future. Therefore, I have submitted a proposal to the Australian Society for Parasitology to continue the operation of Network activities such as the Researcher Exchange, Training and Travel Scheme, the Network Mentorship Scheme, and conference, workshop and outreach activities for the next 5 years. The long term intention is to transform the Network into a something akin to a "Graduate School in Parasitology" that will have at its core an emphasis on research collaboration and improved career structures for young parasitology researchers. This ambitious concept will take at least another 5 years to realise, hence the proposal for an ASP-led Network in the interim. The Council of ASP has commissioned a taskforce to investigate the logistics and financial implications of the proposal and we should be able to report back to you on the future of the Network at the Sydney2009 Conference.

In the meantime, I wish all of you a successful 2009.

Nick

(Nick Smith, Convenor, ARC/NHMRC Research Network for Parasitology; nick.smith@uts.edu.au)

Conference

The Sydney2009 Annual Parasitology Conference website, registration and abstract submission are now open:

The Sydney2009 conference website is

www.parasite.org.au/arcnet/conference

and registration and abstract submission are

www.conftool.net/parasitology2009

The Network is, once again, subsidising venue and invited speaker costs and, together with valuable support from a variety of sponsors, this has ensured that the meeting is as affordable as possible; we have been able to keep the same low levels enjoyed for Glenelg2008 including all lunches, tea breaks and evening meals & drinks in your registration fee.

The conference will be from July 12-15, 2009 in the historic Holme Building and Footbridge Theatre at The University of Sydney, with the Conference Banquet being held in the superb Great Hall at The University of Sydney.

Early bird registration and abstract submission close on April 24, 2009.

Following your conference survey responses, we are pleased to offer conference delegates the option of secure online credit card payment through Paypal when registering online, or payment by cheque.

Full details about the conference can be found at

www.parasite.org.au/arcnet/conference

Don't forget to refresh your webpage if it is still showing details from the 2008 conference. Please email Lisa (lisa.jones@uts.edu.au) if you have any problems viewing the 2009 conference pages.

Speakers and sessions:

Opening Plenary Lecture

- Genevieve Milon (Institut Pasteur, France)

Elsevier Plenary Lectures - Host Cell Modulation

- John Boothroyd (Stanford University, USA)
- Alan Sher (National Institutes of Health, USA)

Human Helminthiases

- David Dunne (University of Cambridge, UK)
- Tom Nutman (National Institutes of Health, USA)
- Jeff Bethony (George Washington University, USA)
- Banchob Sripa (Khon Kaen University, Thailand)
- Don McManus (QLD Institute of Medical Research, Australia)

Malaria Vaccine: Fact or Fantasy?

- Michael Good (QLD Institute of Medical Research, Australia)
- Richard Carter (University of Edinburgh, UK)
- Denise Doolan (QLD Institute of Medical Research, Australia)
- Louis Schofield (Walter and Eliza Hall Institute of Medical Research, Australia)

Immunopathology

- Georges Grau (University of Sydney, Australia)
- Christian Engwerda (QLD Institute of Medical Research, Australia)
- Nick Hunt (University of Sydney, Australia)

Environmental Health

- Nigel Beebe (University of QLD, Australia)
- Lydden Polley (University of Saskatchewan, Canada)

Ectoparasites of Livestock

- Shaun Coffey (Industrial Research Ltd, New Zealand)
- Gary Levot (Department of Primary Industries, New South Wales)

Congratulations

Congratulations to **Chris Tonkin** (WEHI) on winning an NHMRC Career Development Award to work on *Molecular dissection of proteins that regulate the invasion of Toxoplasma gondii into human cells.*

Network Researcher Exchange, Training and Travel Awards

Congratulations to the most recent Network Exchange, Training and Travel Award Winners:

Haylee Weaver (ANU) to fund a researcher exchange to the University of Nebraska.

Liting Lim (University of Melbourne) for a COST Apicomplexan Biology Training Workshop in Geneva.

Terry Spithill and colleagues to organise a grant writing workshop.

Jake Baum (WEHI) for a project, co-funded with the Fluorescent Applications Network, to visit Rob Sinden in London, to develop live imaging of the insect-stage of malaria.

Natalie Spillman (ANU) to visit Nick Klonis at LaTrobe to measure ion fluxes in single malaria-infected cells.

Kathy Andrews (QIMR) to visit Zbnek Bozdech at Nanyang University, Singapore, to investigate synthetic HDAC inhibitors as antimalarials.

Abdul Jaffar (University of Melbourne) to visit Zdzislaw Swiderski and Daniel Mloccki at Warsaw Medical University to study syncytial structures in tapeworm oncospheres.

Rama Jayarai (Menzies School) to attend a workshop on Materials and Methods for Lateral Flow Applications in San Diego.

Ashlie Hartigan (University of Sydney) to visit Prof Dyokova for training in protist biology and taxonomy.

Janelle Wright (Charles Sturt University) to visit Prof Alan Wilson (University of York) for training and collaboration in helminth proteomics.



Alan Dargantes, PhD student at Murdoch University during his Network Researcher Exchange Travel Award to visit the laboratory of David Piedrafita, Monash University, for training on the serological diagnosis of *Fasciola gigantica* infections in livestock using ELISA

Network Travel Award Profiles

Dr Mike Grigg is from the Molecular Parasitology Unit in the National Institute of Allergy and Infectious Diseases, National Institutes of Health in the U.S.A. Mike is Chief Investigator in the Laboratory of Parasitic Diseases and recently travelled to Australia to visit Prof Andy Thompson's laboratory at Murdoch University and A/Prof Nick Smith's lab at IBID, University of Technology, Sydney as part of a Network Travel Award Researcher Exchange. Here, Mike talks to Lisa Jones about his research.

Mike, how did you become interested in studying *Toxoplasma*?

"I've worked on a lot of other parasitic systems but none so easy to work with as *Toxoplasma*, because we can manipulate both the parasite and the host to study pathogenesis of disease".

Mike and his team study the biology of *Toxoplasma* pathogenesis – Mike says, "We are parasite-centric in our approach and are interested in *Toxoplasma* at a population level. We aim to understand how much the parasite strain contributes to disease and how many strains there are. Our hypothesis is that the cat produces lots of *Toxoplasma gondii* strains that are: (1) asymptomatic, where the host is exposed and the disease is non-transmissible; (2) asymptomatic or symptomatic, where the disease is transmissible; and (3) lethal. We're looking at *Toxoplasma* disease outbreaks to find out which hosts are dying, which are chronically infected and which are exposed but don't produce a chronic infection...and why."

Is there much disease associated with *Toxoplasma*?

"Oh yes, there is widespread disease. Globally 2 billion people are infected with *Toxoplasma* and whilst most don't have any disease – almost no symptoms at all - it is a real problem for people who become immunocompromised," Mike says, "and, of course, has serious repercussions for women who become infected for the first time whilst pregnant – they can lose their babies or their babies can be born with serious congenital problems, particularly neural developmental problems and sight problems. What is not commonly appreciated is that 2% of infected humans will get ocular toxoplasmosis, which can result in conditions like blinding chorioretinitis. One of the problems is that there is no universal treatment for ocular toxoplasmosis – clinicians are not clear about the best treatment options and sometimes the outcomes depends on which treatment you start with."

Mike says that his research team are most interested when *Toxoplasma* is producing an unusual response in their host – and they try to understand why it is different. "What's particularly fascinating," says Mike, "is that there are many different natural hosts and, when we do genetics on the parasites from out-of-the-ordinary hosts, we find unusual genotypes of the parasite associated with disease. Naturally, the next important question is whether or not unusual strains of the parasite are also associated with human disease; information coming out of Brazil, and now other places, suggests that the answer to that question is yes."

How will that knowledge impact on treatment or prevention?

Mike says, "It is important to identify *Toxoplasma* infection diagnostically and to treat those strains that are dangerous and tailor medicine around the disease. In places like France, Belgium and South America they have screening programmes and can screen for a strain to identify those people that might need treatment. They can then treat prophylactically before the patient develops the disease and its complications."

"If we can identify specific strains associated with chorioretinitis then we can tailor the treatment to fit the disease. This is a whole new model for medicine that involves screening the host, identifying the parasite strain and then treating prophylactically. This model takes into account the disease-forming agent and the susceptibility of the patient."

Mike predicts that in the next decade eukaryotic pathogenesis will be the next big area to study. "These are complex, highly regulated genomes with an infinite number of possibilities to break past the host defences so they are much more complex," Mike says. "Right now there is a global epidemic of three strains of *Toxoplasma*; the cat produced them and is producing more strains all the time. It is only a matter of time before one or more new strains of *Toxoplasma* are produced. And the cat is critical." Mike warns.

"Since relatively little is known about eukaryotic pathogenic processes as compared to the field of bacterial or viral pathogenesis, it is likely that entirely new mechanisms and principles of pathogenesis will emerge from our work," Mike says.

Network Travel Award Profiles cont...

I've heard that *Toxoplasma gondii* is a food and water-borne parasite – what food and water sources should we be wary of?

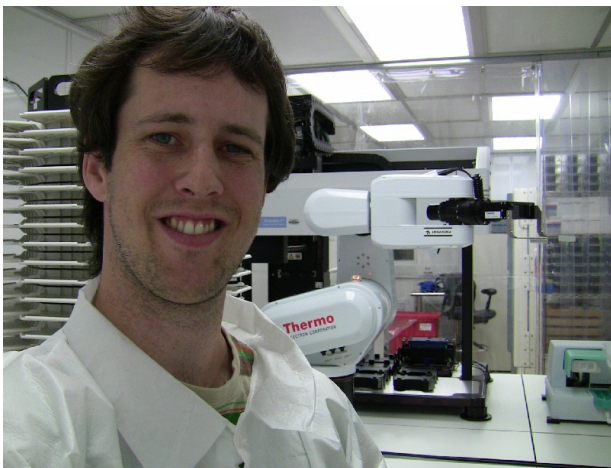
"Undercooked food, especially pig and sheep, unfiltered water (though it's important to remember that the parasites can survive chlorine too)."

Should more researchers be investigating *Toxoplasma*?

Mike is extremely enthusiastic about his research and thinks that we should have more scientists studying *Toxoplasma* to try and understand the sexual cycle better.

"It's a great time to be working on *Toxoplasma*. Today we have parasitologists mixing with specialist immunologists and veterinarians in an integrated approach to tracking new *Toxoplasma* strains and their zoonotic potential so that scientists can understand how new strains cause disease."

Mike says of the *Toxoplasma gondii* parasite, "If you can understand the basic biology you can find their Achilles heel but we need more basic research on the pathways important to *Toxoplasma* and, most importantly, we need to develop new drugs for treatment of the disease, as well as vaccine development".



Michael Lees, (pictured above on his Researcher Exchange) studying towards a PhD in Nick Smith's laboratory at IBID, The University of Technology, Sydney recently won a Network Travel Award for a Researcher Exchange to visit Prof. Rima McLeod's laboratory at The University of Chicago. Hot on the heels of his return, Michael writes here of his experience on his very successful travel award.

"Stepping off the plane in Chicago, I knew I was heading into a politically charged environment when airport security instructed me to "make like Obama and move to your left!" Thus was the tone on campus for the rest of my three month visit to the University of Chicago. Without a shadow of doubt, I can safely say that I have never ever been offered so many pieces of political merchandise as what I was in the months leading up to the presidential election. Pavements became canvases for elaborate Obama murals and homes were plastered with billboards endorsing their local man. Nevertheless, I couldn't get too caught up in all this excitement as I reminded myself that I was in fact in Chicago to work with Prof. Rima McLeod and her energetic team.

Rima McLeod is Professor of ophthalmology and visual science medicine and pathology at the University of Chicago. Her primary research interest is in aiming to understand the genetic basis for susceptibility to congenital toxoplasmosis. Prof. McLeod has developed a unique and extremely important cohort of approximately 200 families (NCCCTS) involving a child who has suffered congenital toxoplasmosis. Regular visits to the University of Chicago Hospital are scheduled across the course of the child's life, with visits consisting of consultations from several specialists with the careful documentation of clinical data, and collection of blood from the child and family members where possible. It was a great honour to be in contact with Prof. McLeod and a privilege to be invited to work in her lab in order to augment the work I had already conducted for my PhD in revealing a role for the P2X₇ receptor in the innate response to *Toxoplasma gondii*."

"The aim for my visit was to determine if a loss in P2X₇ receptor function indicated by a known SNP, correlates with a phenotypic change in the ability of a patient's cultured cells to kill the intracellular parasite following activation of the receptor. In order to complete this experiment, the use of haplotype data on the cohort obtained from Prof. Jennie Blackwell (University of Western Australia) was employed to help select the most appropriate patient samples for analysis. The experiment required the development and optimisation of an assay that allowed regular monitoring of intracellular *T. gondii* replication in a 384 well plate format to minimise the number of cells required. I was extremely fortunate to be able to work with the Cellular Screening Facility at the University of Chicago, which helped to program a robotics platform that would perform hourly measurements of fluorescent intracellular *T. gondii* numbers using an Acumen eX3 instrument. The results show that loss of P2X₇ receptor function correlates with inability of the cells to reduce the numbers of intracellular *T. gondii* compared to a wild-type receptor.

Other secondary goals during my visit were to assess methods for reducing P2X₇ expression for further experiments that could be conducted upon my return to Australia. These goals were also achieved in a human cell

Network Travel Award Profiles cont...

line, with the successful knockdown of P2X₇ expression using a passive siRNA delivery system as well as the construction of a knockout plasmid for later transfection.”

“As a whole, it would be easy for me to describe my time at the University of Chicago as successful, valuable and worthwhile to my research. However that would be a gross understatement as to how great an impact this has had for me on many different levels. Experimental results aside, the experience I gained working in Prof. McLeod’s lab has further primed and inspired me in continuing my research career. Furthermore, Prof. McLeod has also offered the option for me to return following the completion of my PhD for a postdoctoral position.”

“Finally, I will always be grateful to Rima McLeod, William Witola and Ernest Mui for their invaluable guidance and friendship during my visit.”

“None of this would have been possible were it not for the financial support I have received from the ASP and the ARC/NHMRC Research Network for Parasitology. I also sincerely thank my supervisor, A/Prof Nick Smith for his continuing support throughout my PhD. I could not ask for better supervision and support from my scientific community, which I am proud to have represented during my time in the United States.”

Andrew Thompson is Professor at Murdoch University and researches molecular epidemiology and biology of *Giardia*, *Cryptosporidium*, *Blastocystis* GI helminths, *Echinococcus*, *Trypanosoma*, *Toxoplasma* and food-borne zoonoses.

Andy’s research team apply molecular tools in defined endemic foci and correlate molecular data with traditional parasitological characteristics and epidemiological data with a view to controlling parasitic diseases and developing novel detection methods for parasites. They also work on anti-parasite drug discovery – using novel targets and a range of customised analogues with activity against protozoan and helminth tropical parasitic diseases of medical and veterinary significance.

Andy talks to Lisa Jones about his *Toxoplasma* research.

Andy, tell us about your research on *Toxoplasma* and your recent Network Travel Award for a Researcher Exchange for Dr Mike Grigg?

Andy, Alan Lymbery, Andy Smith and their team have been investigating parasites of wildlife for many years. The Western Australia Department of Environment and Conservation has a very active research Division with numerous sampling sites for most of the threatened marsupials across the state and Andy’s team have taken samples from the majority of native marsupials. Over recent years, Andy says, they have started to see *Toxoplasma* in many marsupial samples. Andy and his team want to characterise the parasite, genotype it, and find out if *Toxoplasma* in wildlife is clinically relevant. One of the problems of their sampling is that as soon as animals become moribund, whether due to *Toxoplasma* or another disease, they become prey for others so they see *Toxoplasma* in healthy animals but not necessarily clinical cases. The clinical cases written up about *Toxoplasma* have been principally animals in captivity. Currently Andy and his team are interested in *Toxoplasma* found in the Burrowing Bettong - “Woylie” - found in SW WA; *Toxoplasma* is evident in dying Bettongs but not observed in healthy specimens.

Nevi Parameswaran has just completed her PhD with Andy and was investigating whether vertical transmission of *Toxoplasma* was occurring (i.e. from mother to their unborn baby); she visited Dr Mike Grigg’s laboratory in U.S.A. to characterise some strains of *Toxoplasma*. Nevi found that within Bettongs and Kangaroos vertical transmission of *Toxoplasma* does occur.

Andy has a new PhD student, Shuting Pan, who will be investigating the molecular characterisation of wildlife hosts of *Toxoplasma* and part of Mike Grigg’s visit was to help Shuting with this research.

The team have discovered novel strains of *Toxoplasma* not found elsewhere and their aim is to find out whether *Toxoplasma* was here before the feral cat (the presumed definitive host responsible for the spread of *Toxoplasma*); if it was here prior to the cat then how was it maintained and what, therefore, is the definitive host? Andy and his team will be looking at several hundred samples stored over the past 10 years to help them answer their research questions.

Network Travel Award Profiles cont...

***Toxoplasma gondii*, is a protozoan parasite, discovered 100 years ago by an Italian physician in Brazil and by two French researchers in Tunisia. Research on *Toxoplasma* has been going on for over a century.**

Why is it important to study *Toxoplasma* and what more can we learn?

"It is important to learn more about *Toxoplasma* because of anecdotal reports of its association with declining numbers of native fauna due to this parasite. We are looking at how variation in *Toxoplasma* strains relates to virulence of the parasite and by studying it we will have a better understanding of the biology of *Toxoplasma*."

Is one of your aims to control disease associated with *Toxoplasma*?

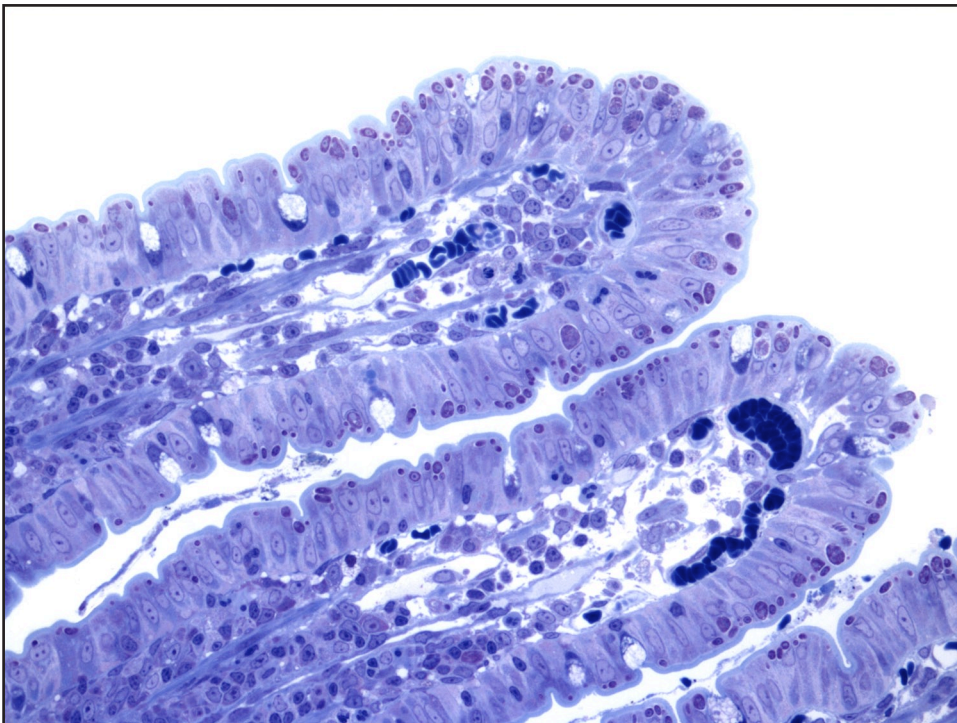
Andy says "yes" - they do aim to control *Toxoplasma* if they find that it is significant in causing clinical disease in

marsupials. In that circumstance, they want to understand the stresses that give rise to the clinical disease so that they can limit *Toxoplasma* being clinically significant and better managed in wildlife.

What do you see as the future for drug discovery or vaccine development in relation to *Toxoplasma*?

"There are currently no reliable drugs or vaccines for wildlife affected by *Toxoplasma*," says Andy. "Furthermore, *Toxoplasma* can be better managed by understanding the clinical symptoms in animals. We need better drugs for humans, domestic animals and some livestock affected by *Toxoplasma* and this is an area we can investigate through the drug discovery work at Murdoch". Currently Andy is also looking at sleeping sickness, and has found good potential drug targets for *Toxoplasma* also.

We look forward to hearing about developments in *Toxoplasma* research from all of our featured parasitologists.



Parasite image *Toxoplasma* developing in the villi of the cat small intestine.

Image copyright 2007 D J P Ferguson, University of Oxford, UK.

Events

Check out the latest parasitology events on the Network website

www.parasite.org.au/arcnet/events

The ASP & ARC/NHMRC Research Network for Parasitology present "Parasites in Focus" photography exhibition

Twenty-six superb photographic prints showing the amazing microscopic world of the parasite.

until end Feb 2009

Perth Zoo

20 Labouchere Rd, South Perth, Western Australia

For more information visit www.perthzoo.wa.gov.au



This parasite is called *Campanulotes bidentatus compar* (common name: small pigeon louse). These lice parasitise birds and mammals; they have a worldwide distribution, and are highly specialised for life on their hosts. This suborder, the Ischnocera, appear to be the most host-specific insect parasites of vertebrates. Image courtesy Cath Covacin and Stephen Barker picture/SEM taken by Rick Webb, The University of Queensland. This image is just one of many beautiful and unique "Parasites in focus" photographs.

Announcements

Download the latest COST - Action Life or death of protozoan parasites (BM0802) Newsletter from the Network website

http://www.parasite.org.au/arcnet/links/LODOPnet_newsletter_Dec_08.pdf

The British Society for Parasitology will be holding its joint Spring and Malaria annual meeting at The University of Edinburgh, Scotland from the 5th - 8th April 2009.

The session "Genetic Manipulation and Gene Silencing in Helminths" will feature invited speaker Professor Paul Brindley (Department of Microbiology, Immunology & Tropical Medicine, George Washington University Medical Centre, Washington, USA) who will give a presentation entitled 'Transgenesis of Schistosomes'.

Deadlines for abstract submission and registration:

Submission of abstracts: Friday 16th January 2009

Early registration: Friday 30th January 2009

For further details

<http://www.bsp.uk.net/>

Network Mentorship Scheme

Early career researchers are encouraged to apply to the Network Convenor (nick.smith@uts.edu.au), in strict confidence, for funding to participate in the Network Mentorship Scheme. The scheme allows young investigators to be paired with experienced, successful researchers to discuss, plan, prioritise and set targets for their career. Typically, the early career researcher will fly to the institute of a senior parasitologist and spend a day there. Arrangements for professional development and progress to be reviewed by the pair annually can also be arranged.

Importantly, mentors need not be from an individual's home institution but can be drawn from across the Network. The scheme has proved very valuable for several young researchers and their mentors already.

To apply, simply write to Nick with a brief outline of your research interests and aspirations. You can also indicate a preferred mentor or ask Nick for advice on whom amongst the Network participants may be most suitable.

Positions Vacant

Check out the latest parasitology jobs on the Network website

www.parasite.org.au/arcnet/jobs

Australian Seafood CRC Postgraduate Scholarship

\$26,140 per annum (indexed yearly)

"Using the mucosal antibody response to recombinant Neoparamoeba perurans attachment proteins to design an experimental vaccine for amoebic gill disease (AGD)"

In collaboration with the University of Tasmania and CSIRO Marine and Atmospheric Research, the Australian Seafood CRC offers a scholarship of \$26,140 per annum (indexed yearly) for three years for a Postgraduate Student. The scholarship has an additional operating budget of \$5,000 per year for three years and \$300 towards thesis binding in the third year. A further \$1,000 per year is also available for defined mentor activities to be approved by the CRC. As a Seafood CRC student, the successful candidate will be fully engaged in the CRC PhD program, which will support the development of the student as a scientist in a number of innovative ways through annual workshops and mentoring programs (see www.seafoodcra.com).

For further details please contact:

Assoc. Prof. Barbara Nowak, National Centre for Marine Conservation and Resource Sustainability, University of Tasmania, Launceston, TAS

Email: B.Nowak@utas.edu.au

OR;

Dr Mathew Cook, CSIRO Marine and Atmospheric Research, PO Box 10041 Adelaide BC, SA 5000. Email: Mathew.cook@csiro.au

Closing date for applications: January 31, 2009.

Menzies School of Health Research Research Officer or Assistant Skin Pathogens Laboratory

\$46,781- \$63,485 (dependant on experience and qualifications)

Menzies is a leader in Indigenous health research in Australia. We are seeking a full-time Research Officer or Research Assistant to assist in the investigation of the development of drug resistance in scabies mites, with the aim of developing molecular diagnostic tests which will enable monitoring and control of the spread of resistance.

The ideal candidate will have a PhD and/or extensive experience in a molecular biology research laboratory. You will have an interest in Indigenous Health issues, project management skills, knowledge of laboratory procedures and safety requirements and excellent attention to detail.

Aboriginal and Torres Strait Islander people are strongly encouraged to apply.

Menzies is a Health Promotion Charity (HPC). HPC salary packaging arrangements can significantly increase your effective salary. Menzies also provides generous superannuation benefits and 6 weeks annual leave.

For information on how to apply for these positions and to obtain the Position Description and Selection Criteria please visit www.menzies.edu.au/opportunities or phone 08 8922 7667/6914.

For further information contact: Dr Deborah Holt 08 8922 8599 or deborah.holt@menzies.edu.au

Applications for this position close on 30th January 2009.

Positions Vacant cont...

Internships at The University of Western Australia

2009 Internships, Biomedical, Biomolecular and Chemical Sciences

A few possibilities are available for graduate interns to spend 6-12 months in Perth, Western Australia. Return travel and a modest stipend will be paid to work on:

1. Structure/function analysis of chaperones from the malaria pathogen *Plasmodium falciparum* (Dr. WA Stanley, Prof. CS Bond);
2. Using natural products as lead compounds in drug design (Prof. PM Watt, Dr. RM Hopkins, Dr. WA Stanley, Prof. CS Bond, a cooperation with Phylogica Ltd.); or
3. Using novel nanomaterials to improve protein solubility, folding and crystallisation (Dr. KL Swaminathan Iyer, Dr. WA Stanley, Prof. CS Bond, Prof. CL Raston Centre for Strategic Nanofabrication)

Interested?? Send Will Stanley (email: will.stanley@uwa.edu.au) your CV and an indication of your scientific interests by 28th February 2009.