ARC/NHMRC RESEARCH NETWORK FOR PARASITOLOGY

Network Newsletter, Friday 6 October 2006

Dear Network Participant,

The October edition of the ARC/NHMRC Research Network for Parasitology Newsletter holds the following items for you:

[1] Network scientists solve one of the biochemical mysteries of malaria (published in *Nature* today)…p2
[2] 2006 ASP & ARC/NHMRC Research Network for Parasitology Annual conference survey results…p2
[3] Kyoto Encyclopedia of Genes and Genomes…p2
[4] Emanuela Handman on Australian Academy of Science Exchange Program in the US…p2
[5] Andrew Thompson and Zablon Njiru awarded international grant to develop novel diagnostics for Human African Sleeping Sickness…p2
[6] PLoS Neglected Tropical Diseases website is now live at *www.plosntds.org …p3*

Awards
[7] 2006 ASP Fellows…p3
[8] Network Travel Award Winners…p3

Profiles
[9] A/Prof Emanuela Handman…p4
[10] Roselani Henry and Megan Downie from the Australian National University and Dr Kylie Mullin from the University of Melbourne…p7

Conferences
[11] "In vitro and in vivo screenings of new antiparasitic compounds: State-of-the-art and new developments" …p9
[12] Centenary Conference of the Royal Society of Tropical Medicine and Hygiene ONE HUNDRED YEARS OF TROPICAL MEDICINE …p9
[13] 5th European Congress on Tropical Medicine and International Health May 24 - 28, 2007 - Amsterdam, Netherlands …p10
[14] Announcing: Malaria 2007 and Pathogenic Helminths …p10

Positions vacant
[15] Scientific Assistant (Assistant Professor) at the University of Karlsruhe…p10
[16] Research Scientist (Arachno-Entomology) at the Institute of Parasitology, University of Zurich…p11

[1] Network scientists solve one of the biochemical mysteries of malaria (published in *Nature* today).

Although it has long been known that *P. falciparum* increases the sodium concentration inside the cells it infects, it took a study by Kiaran Kirk and colleagues, published online today by *Nature*, to work out why.

Meet three of the young researchers involved in this work, Lani Henry, Megan Downie and Kylie Mullen, who are featured in the Profile section (page7) of this newsletter.

[2] 2006 ASP & ARC/NHMRC Research Network for Parasitology Annual conference and survey results

The 2006 ASP & ARC/NHMRC Research Network for Parasitology Annual Conference was held at Legends Hotel on the Gold Coast, Queensland from 2 – 5 July. Here are the results from the survey of conference participants and interested others.
http://www.parasite.org.au/arcnet/conf06/conferencesurvey2006.pdf

[3] Kyoto Encyclopedia of Genes and Genomes and MPMP site

KEGG (Kyoto Encyclopedia of Genes and Genomes) has now integrated the complete metabolic maps for the TriTryps into the database available on the web. These maps are based on the latest versions of the genome database as available in GeneDB. You can access the metabolic maps for the respective organisms by clicking on the following links:

Leishmania major, Trypanosoma brucei and T. cruzi
MPMP (http://sites.huji.ac.il/malaria/)

[4] Emanuela Handman on Australian Academy of Science Exchange Program in the US

Emanuela Handman from WEHI will be going to the US on an Australian Academy of Science Exchange Program to work on a collaborative project to develop a diagnostic kit for leishmaniasis at the Walter Reed Army Institute in Washington. Emanuela will also be visiting a collaborator at the Iowa State University to work on a joint grant proposal.

[5] Andrew Thompson and Zablon Njiru awarded international grant to develop novel diagnostics for Human African Sleeping Sickness

Congratulations to Andrew Thompson and Zablon Njiru from Murdoch University who have recently been awarded an international grant for a project to develop novel diagnostics for Human African Sleeping Sickness (HAT) by the Geneva-based Foundation for Innovative New Diagnostics (FIND - www.finddiagnostics.org).

[6] PLoS Neglected Tropical Diseases website is now live at www.plosntds.org.

Included in the web-site are:

- the mission
- the scope of the journal (http://www.plosntds.org/scope.php)
- the most current editorial board listing (http://www.plosntds.org/edboard.php)
- a collection of articles on NTDs from the other PLoS journals (http://www.plosntds.org/ntd_collection.php)

Awards

[7] 2006 ASP Fellows

Congratulations to **A/Prof Emanuela Handman, Prof Peter O'Donoghue** and **Prof Nicholas Sangster** who were awarded ASP Fellows at the 2006 ASP & Network conference. A profile of Emanuela appears below; coming issues of the Newsletter will feature Nick Sangster and Peter O'Donoghue.

[8] Network Travel Award Winners

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

- **Mark Pellegrino**, Post-graduate student (PhD candidate),from the Gasser laboratory, The University of Melbourne who will participate in a Researcher Exchange with the laboratory of Alex Hajnal, at the University of Zurich in Switzerland to conduct parasitic nematode research.
- **Mai Tran**, from the Helminth Biology Laboratory, Division of Infectious Diseases and Immunology at QIMR for a Researcher Exchange for two month's experimental research at the Biomedical Research Institute (MD, USA) and University of Pennsylvania (PA, USA).
- **Prof. Leann Tilley**, for a Researcher Exchange for Professor David Ferguson, Oxford University to visit Australia to continue collaborative research with Leann's lab on the morphology of the malaria parasite, P. falciparum, Nick Smith's lab on the morphology of *Eimeria* spp. and *Toxoplasma gondii* and new collaborations with Andrew Thompson's lab on the morphology of developmental stages of *Cryptosporidium* and *Blastocystis*.

Profiles

[9] A/Prof Emanuela Handman

A/Prof Emanuela Handman is an NHMRC Principal Research Fellow at The Walter and Eliza Hall Institute of Medical Research and an Associate Professor at The University of Melbourne. Emanuela was awarded an ASP Fellow at the recent ASP & Network Conference on the Gold Coast in July 2006. Lisa Jones speaks to Emanuela about her career in parasitology.

Tell me about your area of research?

Emanuela describes herself as a microbiologist and says that her main interest is "to try to understand the interaction between the host and the parasite…and to identify targets for drugs or vaccines". More specifically Emanuela is currently working on;

- Mechanisms of invasion and survival of Leishmania parasites
- Host genes that determine susceptibility, resistance and disease manifestations in leishmaniasis
- Development of vaccines and drugs against leishmaniasis.

Emanuela works on leishmaniasis, which is caused by an obligatory intracellular protozoan parasite. It is a spectrum of diseases ranging from self-healing cutaneous ulcers to mutilating skin destruction to extensive visceral involvement, which is often fatal. There are at least 12 million affected individuals and 1-2 million new cases world-wide each year. The spectrum of disease manifestations and severity reflects the interaction between the genome of the host and that of the parasite. To date, there are no vaccines against leishmaniasis and the drugs available are toxic, difficult to administer and increasingly under threat from emerging drug resistance. Emanuela says, "the long-term aim of our *Leishmania* program is better understanding of disease mechanisms, leading ultimately to the development of better drugs and vaccines."

Over the last 20 years, Emanuela's laboratory has focused on two main themes: on the parasite side, the elucidation of the structure, function and biochemistry of parasite surface molecules involved in invasion of host cells

and establishment of infection; and on the host side, the dissection of host responses to infection and their role in susceptibility or resistance to disease.

Emanuela says that *Leishmania* have evolved specific molecules that enable them to interact with the host and establish in the hydrolytic environments of the sandfly gut and the macrophage phagolysosome. The ability of the host immune system to sense and respond appropriately to infection determines success or failure to control infection. Emanuela and her team look at the host and investigate what determines the degree of severity of the infection; both disease promoting, and protection, factors. For example, they study those animals or people who are able to heal skin ulcers. Emanuela says that "there is a close link between immunity and tissue repair and that cells involved in immunity start to *'shake the tree'*." Emanuela and her team have also used functional genetics to map the loci in *Leishmania* that determine susceptibility of the host to infection; although they have narrowed down the region, there are still many genes and they are trying to find out which ones are important.

How did you become involved in parasitology research?

Emanuela's PhD research work was in microbiology at the Hebrew University, Jerusalem, Israel. Emanuela says "the parasitologists were very inspiring teachers" and believes that an important factor in deciding on a career in parasitology was the enthusiasm and energy of these teachers. One of those was her PhD supervisor Aviva Zuckerman, who was a powerful and inspiring role model.

Following her PhD Emanuela wanted to travel overseas and was enthused by a series of teaching lectures of Gus Nossal, then the Director of the Walter and Eliza Hall Institute of Medical Research (WEHI), and Graham Mitchell, then just establishing a laboratory of Immunoparasitology (WEHI). Emanuela applied successfully for both a World Health Organization Fellowship for Research and Training in Tropical Diseases to travel to Australia and a Fogarty International Fellowship to travel to the US to do post-doc work at Harvard with John David. Emanuela chose to take up the WHO Fellowship to become a Postdoctoral Fellow in the Laboratory of Immunoparasitology, (WEHI), Melbourne, Australia.

This was also the beginning of her love-story as Emanuela met her would-be husband Jim Goding in Australia. At the end of her Fellowship they both went to Stanford where Emanuela was a Postdoctoral Fellow working on *Toxoplasma* with Jack Remington in the Department of Medicine (Division of Infectious Diseases), Stanford University School of Medicine, Palo Alto, California. Jim is an immunologist/biochemist and Emanuela says they often discuss research problems together. She says that Jim is completely impartial towards the research, which means that he sees things differently and this is an advantage.

What interests you about working in this area?

Emanuela says that “the excitement of discovery - mine and others - keeps me interested and motivated as a parasitologist and I want to transmit this excitement to others.”

Emanuela is attracted by the very big discoveries recently made in parasitology. She says, “There are huge changes and opportunities today for scientists - it is a wonderful time to be working in biology. The difficulty now is the vast amount of information and keeping up with the papers that are relevant to your research.”

How do you see your research developing in the future?

Emanuela believes that, as always, it is the creative individual who makes the next big discovery in any area of research - it is never a team, no matter what we may say about the need to work in teams. Emanuela thinks that teams are good for pushing projects through, but the discovery belongs always to one individual. She says that “creativity is a very personal thing and we just need to provide the right environment” and that “Australian scientists have an advantage of being a bit isolated from the rest of the world – they can ‘*think outside of the box’* and not be too constrained by the prevailing dogma or fashion.”

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

Emanuela still gets a lot of joy out of having papers accepted in journals. When asked about a highlight of her career Emanuela describes her team’s research that led to the discovery of the surface glycolipid antigen on *Leishmania* and working out how it helps the parasite attach to, and invade, host macrophages. She says, “every experiment worked and I kept thinking ‘something will go wrong soon….’ but it didn’t and led to the first of many papers.” Emanuela believes there is no alternative to “seeing” in the laboratory; she says “you are there and you see things; it could be your next discovery.” More recently, the discovery of leishmaniasis in kangaroos in the Northern Territory has been a real kick because Australia was considered the only continent free of leishmaniasis. Now Emanuela thinks we can ask interesting questions about how ancient these organisms may be, whether they cause disease in humans etc.

Tell me about your involvement with the ASP?

Emanuela joined the Australian Society for Parasitology in the early 1980’s but has only sporadically attended the annual ASP meetings. She was “tickled pink” to be awarded an ASP Fellow at the 2006 meeting. She says it was “a wonderful experience to be sponsored/proposed by colleagues; and then to be elected was just wonderful. Personally it means belonging to a prestigious club, it is very rewarding and makes me feel very proud to be seen as one of these people.”

What would you like to do in the future?

Emanuela says, “We are at a very exciting stage of our research looking at host and parasite; we have identified three parasitic molecules that are very good drug targets and hopefully good things will come out of these.” Emanuela’s team have the enzymes and their crystal structure and are searching for inhibitors for those enzymes; they have also identified other target molecules which are at an earlier stage. Drug development is the next stage and Emanuela says “it is a good stage to be in working with WHO and public-private partnerships who are interested in potential *Leishmania* drugs.”

Within genetics Emanuala says that they are “at cross-roads asking ‘Are the mouse genes that we showed to be involved in resistance to disease also important in humans? Can we prevent severe manifestations of *Leishmania*?’” She doesn’t know how it will work out and “that,” she says, “is the beauty of science.”

We wish Emanuela and her team all the very best in their research on Leishmania and congratulate Emanuela once again on being awarded an ASP Fellow at the 2006 ASP and ARC/NHMRC Research Network for Parasitology Annual Conference.

[10] Roselani Henry and Megan Downie from the Australian National University and Dr Kylie Mullin from the University of Melbourne

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

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

Dr Kylie Mullin has been working as a Postdoctoral Fellow in Geoff McFadden's lab for the past 5 years and works on the apicoplast of *Plasmodium*. This organelle is described as a relic chloroplast; it is essential for the malaria parasite's survival and Kylie's long-term aim is to isolate the apicoplast, study its functions and pathways, and hopefully discover new drug targets for the malaria parasite. Kylie has been sharing her expertise in tagging proteins and then transfecting DNA into parasites with Lani and Megan.

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

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

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

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

quest for knowledge about the apicoplast and hope that she continues to enjoy her research work.

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

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

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

Conferences

[11] "In vitro and in vivo screenings of new antiparasitic compounds: State-of-the-art and new developments" – a meeting of COST B-22 (Drug Development for Parasitic Diseases) to be held in Basel, Nov 20-21, 2006.

http://www.icp.ucl.ac.be/cost/costB22/programCOSTWG3-WG4_Basel.pdf

[12] Centenary Conference of the Royal Society of Tropical Medicine and Hygiene ONE HUNDRED YEARS OF TROPICAL MEDICINE Meeting the Millennium Development Goals

13-15 September 2007 • London, UK

The Centenary meeting of the Royal Society of Tropical Medicine and Hygiene will describe ways in which scientists working in many different disciplines can contribute to alleviation of poverty and ill-health in the developing world in line with the Millennium Development Goals.

The meeting will focus on the most vulnerable groups – children and pregnant women - and on major infections. Environmental and social issues will also be addressed.

Topics, on which abstracts for oral and poster presentation are currently invited, will include:

• Reducing child mortality
• Improving maternal health
• Combating HIV/AIDS/TB
• Combating malaria
• Tropical medicine and the environment
• Control of major parasitic diseases
• Challenges of tropical medicine, science, politics and economics
• The future of tropical medicine
Abstracts should be submitted online at: **www.rstmh.elsevier.com** by **9 February 2007**.

[13] 5th European Congress on Tropical Medicine and International Health May 24 - 28, 2007 - Amsterdam, Netherlands

Please visit our website www.trop-amsterdam2007.com for:

- **The latest scientific program**
- **Registration**
- **Accommodation**
- **Abstract submission**

[14] Announcing: Malaria 2007 and Pathogenic Helminths

MALARIA 2007
Starts April 21st, 2007 in Dakar, Senegal
Meeting Home Page & Details: www.mangosee.com/malaria2007

PATHOGENIC HELMINTHS
Starts May 1st, 2007 in Dakar Senegal
Meeting Home Page & Details: www.mangosee.com/helminths2007

Positions vacant

[15] Scientific Assistant (Assistant Professor) at the University of Karlsruhe, Faculty of Chemistry and Biological Sciences, Zoological Institute, Division of Ecology and Parasitology

The University of Karlsruhe, Faculty of Chemistry and Biological Sciences, Zoological Institute, Division of Ecology and Parasitology seeks a Scientific Assistant (Assistant Professor). The position is available from 1 December 2006 for 3 years initially.

The position offers an opportunity for independent research in the field of Ecological and Environmental Parasitology or Host-Parasite Interactions, preferably in a novel field involving interdisciplinary research.

The holder of the position is expected to participate in the teaching duties of the Division of Ecology and Parasitology such as taxonomic practical sessions, marine biological excursions, parasitological courses and aquatic ecological courses. He/she is also welcome to organize and offer new courses or lecture series.

We are looking for a postdoctoral fellow with enthusiasm for research and teaching who has been successful in organizing projects and obtaining funding. He/she should be socially competent, capable of team work, fluent in English and in German, or should show the ambition to learn German.

Some more information about the institute can be found at www.uni-karlsruhe.de/~dc20.

Applications with the usual documents such as CV and list of publications and references should be directed until October 31st, 2006 to:
E-mail: dc20@rz.uni-karlsruhe.de

Universität Karlsruhe (TH)
Prof. Dr. Horst Taraschewski
Zoologisches Institut
Kaiserstr. 12
76131 Karlsruhe
Germany

[16] Research Scientist (Arachno-Entomology) at the Institute of Parasitology, University of Zurich

The Institute of Parasitology, University of Zurich, are seeking a highly motivated Research Scientist (Arachno-Entomology)

Applicants should have a strong background in experimental entomology and establish internationally competitive research with the potential to raise extramural money. In addition, the successful candidate should help establish the diagnostic repertoire for the identification (morphologic, genetic) of relevant insects including the setting up of a collection of reference material (within the frame of our Institute recently being appointed National Reference Laboratory for Epizootic-Related Arthropod Vectors by the Swiss Federal Veterinary Office). The Institute of Parasitology consists of several research groups (veterinary parasitology, molecular epidemiology, cell biology, mathematical modelling) with which collaborations are feasible.

The position, which is available immediately, is for a three year period in the first instance. Salary is in the range of SFR 85'000-95'000 per annum.

Informal inquiries can be made to Alexander Mathis (Alexander.mathis@access.unizh.ch)

Full applications should be send to the Institute's secretariat or electronically to parasito@vetparas.unizh.ch.

If you have any parasitology news stories please contact me by email Lisa.Jones@uts.edu.au or telephone 02-95144006. Don't forget that the Network newsletters can now be downloaded http://www.parasite.org.au/arcnet/Newsletter/Newsletter_061006.pdf

Please send me items for the next newsletter by 27 October 2006.

Best wishes,

Lisa
Communications Coordinator,
ARC/NHMRC Research Network for Parasitology

ARC/NHMRC Research Network for Parasitology, Institute for the Biotechnology of Infectious Diseases, University of Technology, Sydney, PO Box 123, Broadway, NSW, 2007, Australia. Telephone: +61-2-9514 4006; FAX: +61-2-9514 4201; E-mail: Lisa.Jones@uts.edu.au Website: http://www.parasite.org.au/arcnet

Supported by the Australian Research Council, the National Health and Medical Research Council and the Australian Society for Parasitology.