In Coherence

Winter 2012 Newsletter for ARC Centre of Excellence for Coherent X-Ray Science

CXS Writer's Workshop

Inside This Issue

CXS held its inaugural Writers' Workshop on 12 and 13 June 2012 at the beautiful Stonelea Country Resort nestled in the foothills of the scenic Cathedral Ranges.

A bus driven by Michael Jones transported workshop attendees to Stonelea on a very cold morning. Michael did a great job weaving in and out of the fog to deliver a busload of sleepy travellers to the venue.

Dr Margaret Cargill and Sean Mathai conducted informative sessions during the course of the two-day program.

Dr Cargill, an Adjunct Senior Lecturer (Research Communications) at the University of Adelaide, informed and guided workshop delegates. This resulted in a number of manuscripts being produced immediately following the workshop.

Sean Mathai, a locum publishing manager for NPG Nature – Asia-Pacific and NPG Language Editing talked about publishing

Attendees share ideas

issues and how authors should manage their craft.

Together our two guest presenters provided a great insight into scientific journal paper writing and the retreat offered the attendees ample opportunity to review works in progress, begin to write up some of their recent research or to polish off papers ready for submission to top quality journals. Stonelea proved a perfect escape to knuckle down and delve into the depths of this two-day manuscript mecca where the interchange of ideas and suggestions

Stonelea Country Resort

flowed like the nearby rivers to produce a pool of work.

Twenty-two aspiring and published writers will be sure to remember the time they spent away from the city and all its trappings to enjoy the tranquillity of the Stonelea Country Resort cabins, wild life and hot, hearty meals and as one delegate so aptly observed as he left the resort, "it was worth every single minute."

Due to the success of this retreat Dr Cargill will also conduct a follow up CXS Writers' Workshop to be held at La Trobe University in November 2012.

Many attendees spent their lunch time writing

Coming Events

Bragg Symposium

6 December 2012

Elder Hall, University of Adelaide

For further details please visit:

www.sapmea.asn.au/conventions/crystal2012/bragg.html

KOALA 2012

Conference on Optics, Atoms & Laser Applications

"Organised by Students for Students"

2 - 7 December 2012

Griffith University, Brisbane

For further details please visit:

http://www.koala2012.com/

Both events are proudly sponsored by CXS

In Brief

Publications:

A selection of publications for the first half of 2012 include:

Arharti, B.D., Harris, A.R., Paolini, A.G., Peele, A.G.,*"Enhanced X-ray imaging for a thin film cochlear implant with metal artifacts using phase retrieval tomography."* Journal of Applied Physics, 111(11), 114904 (2012)

McKimm-Breschkin J.L., Rootes, C., Mohr P.G., Marrett S., Streltsov, V.A., *"In vitro passaging of a pandemic H1N1/09 virus selecs for viruses with meuraminidase mutations conferring high level resistance to oseltamivir and peramivir but not for zanamivir."* Journal of Antimicrobial Chemotherapy, Advance Access, May 4, doi:10.1093/jac/dks150 (2012)

Dearnley, M.K., Yeoman, J.A., Hanssen, E., Kenny, S., Turnbull, L., Whitchurch, C.B., Tilley, L., Dixon, M.W.A., *"Origin, composition, organisation and function of the inner membrane complex of Plasmodium falciparum gametocytes."* Journal of Cell Science, 125:(8):2053-2063 (2012)

Martin, H.M., et al. *"Noise-robust coherent diffractive imaging with a single diffraction pattern."* Optics Express, 20, 16650-16661, 9 July (2012)

Xarpinelli, M. R., Wise, A. K., Arhatari, B. D., Bouillet, P., Manji, S., Manning, M. G., Cooray, A., Burt, R. A., *"Anti-apoptotic gene Bcl2 is required for stapes development and hearing."* Cell Death and Discease 3, e362; doi:10.1038/cddis.2012.100 (2012)

Dao, L. V., Call, C., Vu, H. L., Dinh, K. B., Balaur, E., Hannaford, P., Smith, T.A., *"Phase-matched generation of highly coherent radiation in the water window region. "* Applied Optics, 51(18), 4240-4245 (2012)

Dias, D. A., Smith, T. A., Ghiggino, K.P., Scollary, G. R., *"The role of light, temperature and wine bottle colour on pigment enhancement in white wine. "* Food Chemistry, 135, 2934-2941 (2012)

CXS Visitors:

Paul Janssen, Eindhoven University of Techonology is visiting the Ultra Cold Plasma Source Program team at the University of Melbourne from August to November.

Professor Jamie White, Juniata College in Hutingdon PA, USA visited the Ultra Cold Plasma Source Program at University of Melbourne in July, on sabbatical.

Conferences & Workshops:

Mac Luu and Michael Jones presented a talk at the Italio-Australian workshop on Synchrotron Radiation X-ray Imaging for Life Sciences and Cultural Heritage in May.

Isaac Peterson presented a talk at the Advanced Photon Source in Chicago, USA in April.

Paul McMillan presented new data from the OMX Blaze at the Melbourne Parasitology Network in July.

Harry Quiney presented at the Max Planck Symposium in Hamburg in May.

Robert Sang attended the Conference on Laser and Electron-Optics in San Jose, USA in May.

Tania Smith attended the Australasian Research Managers Conference in Queensland in September.

Bo Chen presented a talk at the International Conference on X-ray Microscopy in Shanghai in August.

Corey Putkunz was an invited speaker at the Coherence 2012 Conference in Fukuoka Japan in August.

Media:

Atom-Scale Ptychographic Electron Diffractive Imaging of Boron Nitride Cones were reported as Highlights from the Asia Pacific Region in Asia Pacific Physics Newsletter, Vol 1, 2012.

Andrew Peele was interviewed for an Article *On a beamline to discovery* that appeared in the Canberra Times 2 June 2012.

NADIA Software:

CXS held two workshops teaching new users how to use its Image Reconstruction Software known as NADIA.

To access the free software please go to:

http://www.coecxs.org/joomla/index.php/research-and-projects/nadia-software-project.html.

Welcoming New Members:

Experimental Methods Program:

- Ashish Tripathi
- Martin Scanlon
- Martin Williams
- Biswaranjan Mohanty

Outreach:

The Attosceond Science Facility at Griffith University was demonstrated to the public as part of the annual Griffith Univeristy Open Day in August.

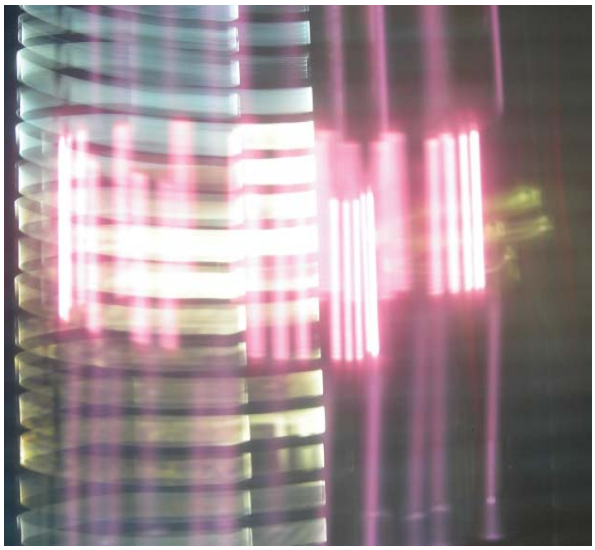
Robert Sang understood the annual Youth Lecture Tour sponsored by the Australian Institute of Physics QLD Branch. He delivered lectures in Brisbane, Hervey Bay, Toowoomba, Rockhampton, Cairns, Townsville, Mt Isa and the Sunshine Coast with over 1500 students attending.

Year 10 students from Parade College participated in the outreach "Sowing the Seeds of Science" hosted by Benedicta Arhatari from the Experimental Methods Program at La Trobe University.

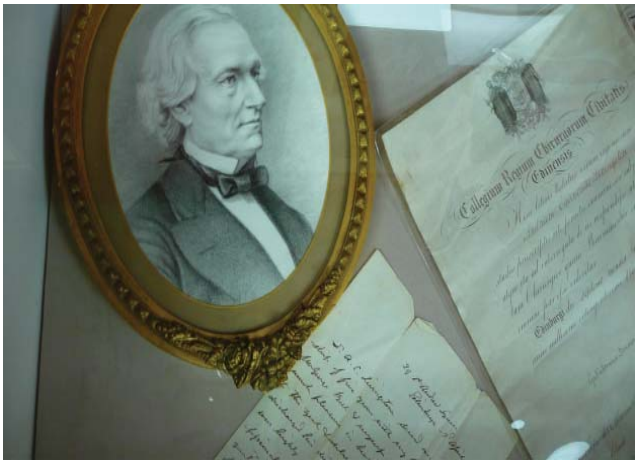
Paul McMillan gave a seminar at the Seattle Biomedical Research Institute USA in August.

Awards:

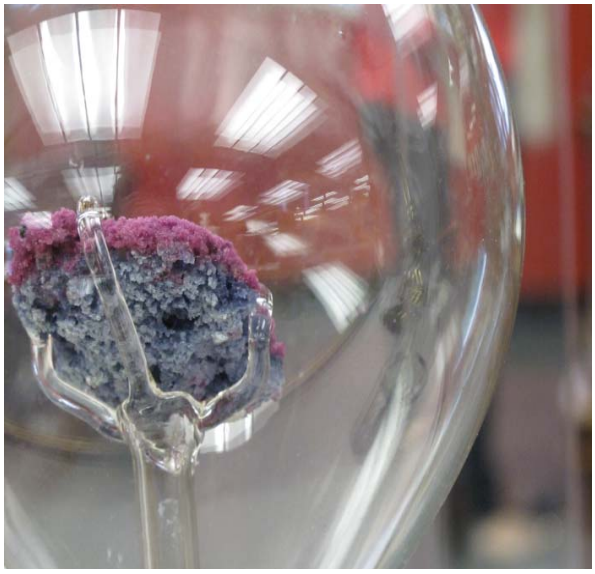
Ved Mooga was awarded a Poster Prize at the Melbourne Protein Group held at Monash University in July.



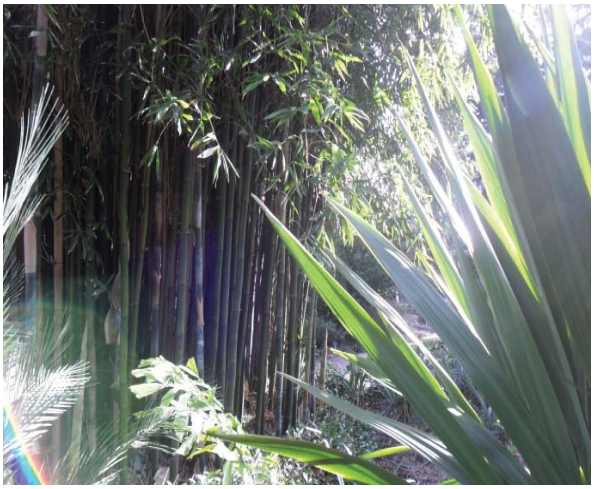
Fast Forward by Emi Uili



History of Science by Maggie Saunders



Held Quartz by Jasmine Ung



Colour Vision by Jedda Atkinson

GROWING TALL POPPIES

The Growing Tall Poppies program held its first media work experience group with CXS. The theme for this group's project was "The Culture of Science" incorporating all aspects of science as seen through each student's lens.

With the assistance of their mentor, Tania Smith, the group of 15 year old students visited various locations around the University of Melbourne learning different photography techniquies and methodology.

The end result was the students interpretation of "The Culture of Science"; a gallery of photos based around the community of science, scientists and elements that support science. Each student presented a display of their work for voting by the public. Over 70 people attended the viewing and voting, and the winning photos were entered into the Pixel Prize Photography Competition held by the Australian Catholic University.

Congratulations to Emi Uili, Jasmine Ung, Jedda Atkinson and Maggie Saunders, whose work is now on display at the Pixel Prize exhibition of photographs from high school students across Victoria.

The exhibition will be offically opened on Friday 19 October 2012, 6.30pm - 8pm at The Vault, ACU Melbourne Campus, 115 Victoria Parade, Fitzroy.

Exhibition dates: 20 October - 2 November 9am to 5pm weekdays.

The University of Melbourne
Melbourne Vic 3010
Australia
Phone: 03 8344 5444
Fax: 03 9347 8912
E-mail: cxsenquiries@ph.unimelb.edu.au

The ARC Centre of Excellence for Coherent X-ray Science (CXS) is an Australian Government Initiative which began in July 2005 to explore what can be achieved with coherent X-ray optics; including an understanding of exotic phenomena such as X-ray phase discontinuities.

CXS headquarters is located at the University of Melbourne in Victoria, Australia, with participating nodes at La Trobe University, Monash University, Swinburne University of Technology, Griffith University and the CSIRO. Its mission is to be the world leader in the development of non-crystallographic techniques for the determination of protein structures.

“In Coherence” is produced quarterly (or there abouts) by CXS. Contributions are welcome and should be forwarded to Ms. Tania Smith, CXS Chief Operating Officer, University of Melbourne, Parkville, Vic, 3010, fax to +61 3 9347 8912, email: cxsenquiries@ph.unimelb.edu.au or Ms. Rosslyn Ball, Administration, email: r.ball@ph.unimelb.edu.au

This work was produced with the assistance of the Australian Research Council under the ARC Centre of Excellence Program. CXS would like to thank Rosslyn Ball for her contribution of articles and the GTP media students from Santa Maria College.

Martin Scanlon Under the Microscope

CXS is pleased to welcome Associate Professor Martin Scanlon, Dr Martin Williams and Dr Biswaranjan Mohanty of the Monash University Institute of Pharmacy and Pharmaceutical Sciences to the CXS Biological Sciences Program.

Martin, the groups leader, hails from the UK and came to Australia as a postdoctoral scientist, initially working at the Biomolecular Research Institute with Professor Ray Norton, before moving to Queensland to work at the Centre for Drug Design and Development. He then took a faculty position at Monash University in 2000.

During his postdoctoral training he developed an interest in characterising the interaction of proteins with small molecules and this remains the major research area in his laboratory. Martin and his team use a range of biophysical methods including surface plasmon resonance spectroscopy (SPR), isothermal titration calorimetry (ITC), fluorescence spectroscopy as well as NMR and X-ray crystallography. The latter approaches enable the group to study the structrures of protein-ligand complexes at molecular resolution.

There are two major research themes in Martin’s group – both of which rely on measurement of protein-ligand interactions. The first involves implementation of an approach that is termed “fragment-based drug design” (FBDD) to develop potent ligands for therapeutically interesting protein targets. FBDD is a technique that has been developed for the rapid and efficient identification of key building-blocks for drug development against a specific target. The technology relies on the measurement of interactions between a therapeutic target and small molecular ‘fragments’ that are not, in themselves, candidate drug molecules but represent pieces of the sorts of chemical entities commonly found in drugs. By screening very small molecules it is possible to identify individual chemical entities that contribute favourably to the interaction. These can be combined so as to develop more potent compounds. By measuring the interaction made by these individual fragments rather than larger molecules containing many different functional groups it is possible to explore a much larger number of possible interactions.

The second major theme of research is investigating the interaction of drug molecules with intracellular proteins and how this affects their distribution and activity within cells. Many drugs act by binding to proteins that are either contained within or project from the cell membrane. This makes them relatively easy for the drugs to access. In contrast, many newer therapeutic targets are inside the cell, and in some cases contained within particular organelles within the cell. Consequently, a drug has to both enter the cell and gain access to the appropriate organelle in order to exert its biological effect. This creates a problem as many drugs have physicochemical properties which favour them partitioning into membranes. This problem is also faced by endogenous molecules such as sterols, vitamins and fatty acids acids that are poorly water soluble yet display biological activity at specific intracellular sites. They are able to do so in many cases by binding to intracellular proteins that dictate their distribution in cells. One such class of proteins is the intracellular lipid binding proteins (iLBPs). They have demonstrated that several of these iLBPs are able to bind not only to endogenous compounds, but also to certain drugs. As such iLBPs are potentially able to direct drugs towards (or in some cases away from) their intended targets. By doing so these iLBPs regulate intracellular drug disposition and activity. Research in the group involves characterising the drug-binding specificity of different iLBPs and the effect that binding to iLBPs has on drug activity.

For more information on the team and its research please contact Martin Scanlon at martin.scanlon@monash.edu or visit their website at http://www.pharm.monash.edu.au/

Associate Professor Martin Scanlon