

# The Bulletin 358

of

## The Royal Society of New South Wales

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Aug 2012

### Future Events

Lectures in Sydney are held on the first Wednesday of the month at 6:30pm.

#### September

**Wednesday 5 September 2012**

**6:00pm for a 6:30 start.**

**“Climate change, regional drought and forest mortality: are we seeing a new global phenomenon?”**

Delivered by Prof Derek Eamus  
*Union, Universities & Schools Club*  
*25 Bent St, Sydney City*

**Please note dress code: Jacket and tie**  
Details at right.

#### Southern Highlands Branch

**Advance Notice**

**Saturday 20 October 2012**

**“Where Art and Science Meet”**

Delivered by Dr Thomas H. Rich, Senior Curator, Museum Victoria.

There is no need to book in advance. After each lecture, members and non-members are welcome to attend a dinner with the lecturer at *The Briars, Burradoo*.

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**Wednesday 5 September 2012**  
**1203rd Ordinary General Meeting**

*“Climate change, regional drought and forest mortality: are we seeing a new global phenomenon?”*  
delivered by Prof Derek Eamus

Join us at the lovely Union University and Schools Club in the city for a fascinating talk, delivered by Professor Derek Eamus.

Attendees will need to register beforehand. Contact Emma in the Society's office by phone on 02 9036 5282 or by email at royalsoc@royalsoc.org.au.

The Society will be hosting a welcome drink on this occasion from 6 o'clock until 6:30 pm and dinner is available after the lecture at \$70 a head.

**Please note the Club has a strict dress code of jacket and tie for gentlemen and appropriate similar attire for ladies.**

Professor Eamus joined UTS in 2000, coming down from the wild Northern Territory where he had worked on savanna ecophysiology for 10 years.

Since arriving in Sydney he has focussed on questions pertaining to the interactions amongst woodland function (especially C and water fluxes), climate and groundwater availability.

He currently has a lab populated by postgraduate students, postdoctoral researchers and technical staff who continue to challenge him on a daily basis.

Derek has published more than 150

papers and has co-authored two or three textbooks and is currently writing his next. Widespread (regional scale) and long-term (several years to decadal length) droughts have been increasingly observed on all forested continents over the past 30 years.

Global climate models predict that hot dry conditions will be experienced more frequently and for longer durations in the 21st century.

Regional-scale forest die-back has major implications for regional water budgets and carbon budgets and also influences the feedback between climate and landscapes, including the exchange of heat and mass between land surfaces and the atmosphere.

This talk will examine issues on a global and regional scale.



Professor Derek Eamus

#### Patrons of The Royal Society of NSW

Her Excellency Ms Quentin Bryce AC CVO, Governor-General of the Commonwealth of Australia

Her Excellency Professor Marie Bashir AC CVO Governor of NSW

## From the President



It's very encouraging to see attendance at our monthly meetings continuing to increase. The CBD location at the Union University and Schools Club certainly has been well received. The speaker at the July meeting, Federation fellow Professor Ben Eggleton, a world-leader in photonics, talked about the cutting-edge science being done at the Centre for Excellence for Ultrahigh-bandwidth Devices for Optical Systems (CUDOS). This consortium of universities and industry is working on the next generation ultra high-speed photonics devices that promise to bring a step change in transmission speeds.

As mentioned in my report last month, the process to determine the Society's highly prestigious awards is now well under way. The Society's awards committee is chaired by Professor Brynn Hibbert and, for the first time this year, is being advised by a panel chaired by the Chief Scientist and Engineer of NSW, Professor Mary O'Kane. We are delighted that this advisory panel will consist of Deans of Science from NSW-based universities.

In addition to the awards, the Liversidge Lecture in chemistry will be delivered in November – we expect to have the dates finalised shortly.

Should you have in mind deserving nominees for these awards, please submit them to Professor Hibbert.

Once again, it would be wonderful if we were able to have more members participate in the activities of the Society. If you have an interest in working on the Society's historical assets (19th and 20th century collection of books and other materials), if you would like to assist in projecting our presence on the internet, or if you would simply like to participate as an active member of the Council or one of its committees, I would be delighted to hear from you. I am easily contacted by e-mail at [president@royalsoc.org.au](mailto:president@royalsoc.org.au).

**D**onald Hector

## The Assembled Self

*What kind of truth does your genetic profile tell about you?*

The Assembled Self is a project about the experience of genotyping (genetic testing) and how this affects an individual's sense of self. It is driven by our interest in how genetic testing alters the narratives through which people anchor their own, their families, and their communities' identities. The project involves a collaboration of researchers and artists conducting a creative research project where artists produce new works (phase 1) to be presented to generate public conversations around genetic testing and identity (phase 2).

We are holding a research development workshop on Saturday 22nd September to think through these ideas and find artist collaborators. Subject to a successful funding application, 8 artist collaborators will be provided with financial and logistical support for their artistic contribution to The Assembled Self.

The Assembled Self is now inviting artists to submit an expression of interest.

For more information please visit <http://theassembledself.wordpress.com/> or contact Estelle Noonan or Julie Mooney-Somers [assembled.self@sydney.edu.au](mailto:assembled.self@sydney.edu.au).



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<https://www.facebook.com/RoyalSoc>

# Photonic circuits for the new information age: faster, smaller, smarter and greener

Professor Benjamin J. Eggleton

Presentation to the Society's 1202nd OGM , 1 August 2012



The ARC Centre for Excellence for Ultrahigh-Bandwidth Devices for Optical Systems (CUDOS) is a world-leader in research in photonics and the development of photonic devices. Its director, Professor Ben Eggleton, gave a wide-ranging talk about the Centre's work and photonics generally.

The use of light to communicate information is by no means a novel concept. Signals such as flags and lights for sending information have been used for many hundreds if not thousands of years. In the last couple of hundred years, various systems have been devised such as collimators and various lens systems. Three major breakthroughs of the last half-century or so were the invention of microelectronic

devices, the invention of the laser and, importantly, the discovery by Charles Kao in 1966 that the physical properties of glass fibres were ideal for transmitting optical signals. Photonics, which combines these technologies, provides extraordinary capability for extremely high-speed transmission of data through optical fibre.

The reason that glass fibre is suitable is that there is a narrow part of the absorption spectrum in glass about 25 THz wide where attenuation of the signal is only about 0.2 dB per kilometre. Lasers can generate discrete packets of visible light that can be transmitted down the fibre. Importantly, the photons do not interfere with one another and can be separated at the other end and the data encoded in the packets of light can be read. The relatively small signal loss can be managed by periodically installing amplifiers along the fibre-optic cable. There are now fibre-optic networks joining all major continents and these are the primary means for moving digitised data around the world.

A significant advantage of this fibre-optic technology has been its scalability. Developments in photonics have vastly increased the capacity of fibre-optic cables since the first ones were laid over 20 years ago. The National Broadband Network that Australia is currently installing is intended to deliver 1 Mb per second to well over 90% of households in Australia. There has been some speculation that this may become obsolete but this is unlikely as technological pathways to upgrade this to one terabit per second are already on the horizon.

One of the areas that CUDOS is working in is the application of nanotechnology and the development of materials with physical properties that do not occur in nature. These are giving rise to some novel applications such as "cloaking" (where photonics can be applied to make things appear invisible in certain parts of the spectrum). Other real possibilities of nanotechnologies are the development of three-dimensional microchips that would allow major steps forward in processing speed.

Although in principle, photons do not interact with one another in a vacuum, in a medium such as glass, high-intensity laser excitation can cause a non-linear response of the glass medium and cause the photons to interact with one another. Conceptually, this may make possible the development of ultrahigh speed devices, switching as quickly as 1 trillionth of a second. This would make them up to 1000 times faster than current optical devices.

The Centre for Excellence for Ultrahigh-Bandwidth Devices for Optical Systems is recognised as one of the top few photonics research centres in the world. It is a collaboration of eight of Australia's top universities and number of industry participants. Expectations are high that it will make a major contribution in the emerging field of photonics.

Donald Hector

## New Members of the Society

We welcome the following new member to the Society:

- Paul Jeffares

For information about membership please contact the Society's office or visit the Society's website at

<http://royalsoc.org.au/membership/membership.htm>

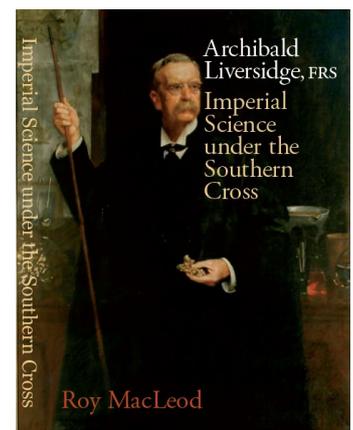
## Royal Society of NSW Ties

Every purchase helps support the Society.

Contact the Society's office for an order form.



Just \$40.00 plus postage & handling.



Copies of Roy MacLeod's wonderful book about the development of science in Australia are available from the Society's office.

Contact the office to order your copy at the special member's price of \$39.95.

# Southern Highlands Branch

## Report of June 2012 Meeting

### “Serial Sexual Homicide ” Delivered by Dr Stephen H. Allnutt

Conjoint Senior Lecturer UNSW, Clinical Director NSW Community Forensic Mental Health Services

This wide ranging lecture was delivered to an audience of 45 people at the Chevalier College Performing Arts Centre, Burradoo, a most comfortable and attractive venue.

Allnutt’s scientific interest lies in the bizarre, the deviant and the dangerous. His fascinating lecture provided an overview of three forensic psychiatric concepts and behaviours that likely underpin serial sexual killers, namely stalking, psychopathy and sexual deviance.

Allnutt described the three distinct characteristics of the killer’s behavior as follows. The first was the paraphilia, sexual sadism, which gave the killer the drive, desire and need to commit the crime. The second involved the lack of internal inhibitors, which was usually satisfied by the killer’s psychopathic or schizoid personality, and the third was the ability to overcome external inhibitors. This third characteristic was usually demonstrated by recurrent preoccupation with fantasy, and by stalking behavior which is in fact a behavioral try-out.

The paraphilia, sexual sadism, which gave the killer the drive to commit the

crime, was described by well defined characteristics. The act was non-consensual, the killer demonstrating lack of empathic feelings when inflicting pain or humiliation. More force than necessary was used to complete the sex act, and the violence itself was a source of pleasure.

Regarding the lack of internal inhibitors, Allnutt presented Hare’s criteria for psychopaths. (Hare, 1991) Pathological narcissism, “Factor 1”, described numerous criteria such as glibness and superficial charm, grandiose sense of self-worth, pathological lying, conning/manipulative behavior, lack of remorse or guilt, shallow emotions, callous/lack of empathy, parasitic lifestyle, non-acceptance of responsibility and being prone to boredom.

Impulsive/deviant lifestyle, Hare’s “Factor 2”, listed the following characteristics: poor behaviour controls (hair-trigger), early behavior problems (cruel kids), juvenile delinquency (bad kids), promiscuity (indiscriminate), lack of realistic long-

term goals (absolute dreamers), impulsivity (lives for the spur of the moment), irresponsibility (no loyalty), revocation of conditional releases (the law does not apply to me) and criminal versatility (master of all trades).

At the end of this fascinating, wide-ranging lecture full of crime and behavioral statistics, Allnutt’s sobering concluding comments described how a psychopathic serial killer will dazzle you with charm, exploit your weaknesses, feed on your trust, use props to distract your attention from his deception and leave you hurt, poor, alone and wondering or dead. His advice was to never marry one, go into business with one, or take a country trip with one.

Anne Wood



Find details of Society events in the Souther Highlands on Facebook.

<https://www.facebook.com/RoyalSoc>

## Contact your office bearers

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