



The Royal Society of New South Wales Bulletin and Proceedings 308

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September 2007

Future Events 2007

Lectures in Sydney are held in Lecture Room 1, Darlington Centre, University of Sydney at 7 pm on the first Wednesday of the month with drinks available from 6 pm.

Wednesday 3rd October

The life sciences revolution

How engineering, cell biology and IT intersect.

Professor Keith Williams

Co-founder of Proteome Systems, former Professor of Biology, Macquarie University.

Thursday 18th October 6.15 pm

Southern Highlands Lecture

Blast Off

Dr Ken McCracken

Drama Theatre, Frensham, Waverley Parade, Mittagong (see page 3 for details)

Wednesday 7th November

The future of Australian Astronomy

New earths, dark energy and giant telescopes

Professor Matthew Colless

Director, Anglo-Australian Observatory

Wednesday 5th December

The Clarke Memorial Lecture

Dr David Branagan and Professor Roy MacLeod

The Society's Christmas celebrations will follow the lecture. Details will appear in the next Bulletin.

Tuesday 30th October, 6.00 pm

Slade Lecture Theatre, School of Physics, University of Sydney

Value Added, A History of Uranium Enrichment in Australia

Dr Anna Binnie

Visiting Research Fellow History and Philosophy Department, UNSW Australian Institute of Physics, NSW Branch, October Public Talk

Professor Keith Williams

Lecture 3rd October 2007

The life sciences revolution: how engineering, cell biology and IT intersect

In this presentation I'll give my views on how several revolutionary changes are converging on Life Sciences to make for very interesting times and to dramatically change for the better the quality of life as we age. I shall review mechanical fixes, stem cells and e-health, each of which in different ways impacts on our health and well being.

Recent developments will be reviewed in the context of Australian science and corporate biotech, indicating that we are part of the game. I shall also mention a new e-health company, miVitals, with which I am involved.

Keith Williams (AM FTSE PhD) was born in Melbourne, and completed a BAgSci at Melbourne University, followed by a PhD in Biochemistry at ANU. He worked in biochemistry research in the UK (University of Oxford) and Germany (MaxPlanck Institut fur Biochemie) before returning to Sydney in 1984. Keith headed the Biotech program at Macquarie University and developed the concept of Proteomics, culminating in establishment of APAF (Australian Proteome Analysis Facility) the world's first Major National Proteomics facility in 1996. Keith established Proteome Systems Ltd in 1999 to commercialise Proteomic technologies and build new generation diagnostics and drugs. The business grew and was listed on the ASX in 2004.



Professor Keith Williams

In 2005 Keith stepped back from Proteome Systems to explore new opportunities in company building in the Life Sciences and IT areas. In 2006 Keith fulfilled an interest in making movies, as Executive Producer of mystery thriller *Butterfly Dreaming*.

Government support for Mathematical Sciences

Australian industry, research and education is to benefit from national support for mathematical sciences through an injection of \$3.2 million

Leaders of Australia's mathematical sciences community have welcomed a major Collaboration and Structural Reform grant to the Australian Mathematical Sciences Institute (AMSI). Through the increased funding for the teaching of mathematics and statistics, universities will be in the position to address a national need for more mathematics and statistics graduates.

Patrons

**His Excellency, Major General Michael Jeffery AC CVO MC (ret'd),
Governor General of the Commonwealth of Australia**

Her Excellency, Professor Marie Bashir AC CVO Governor of NSW

President's Column

September 2007

Thanks to those of you who provided comments on the new-look Bulletin. I think they were universally positive. I'd like to extend my personal thanks to Robyn Stutchbury for her efforts in this regard. More feedback is welcome, as are your contributions, as we would like the Bulletin to be a reflection of member interests and a vehicle for the exchange of relevant information.

Our Publications Sub-committee has also started to look at how we might make improvements to our website. We will be more conscious of the visual impact of the site, as well as its content and structure, and so over the next few months expect to see more photos and other images on the site. Once again, your input here will be required to ensure the site meets member needs.

The Journal will also be receiving some attention. Council at its last meeting approved the re-formation of an Editorial Board for the Journal. Other improvements are also being explored. Papers from members are always welcome.

Many thanks to one of our volunteers, Val Gregory, who has so ably stepped in to manage the Society's office while Irene Kelly was overseas. Thank you again Val.

John Hardie

National Science Week 2008

The 2008 National Science Week Grants Round will close on Friday, October 19, 2007 at 17:00 AEST. Individuals or organisations can apply for between \$2,000 and \$40,000 to run a science-themed activity for Science Week from 16 to 24 August 2008. For more information about the grants round and the online application process visit www.dest.gov.au/scienceweek

The Science Awareness Section, who administer these grants, can be contacted via scope@dest.gov.au or by phone (02) 6240 5078.

The National Science Week Grants are funded through the Science Connections Programme.

Alex Hamilton's lecture

September 5th 2007

Recent Progress in Quantum Electronics: What happens when electronic circuits are small enough that the laws governing their behaviour change from classical to quantum physics?

For those of us who grew up with the thermionic valve powering all electronic devices, including Australia's first computer, the invention of the transistor was a revelation. Compact, low voltage, last forever, no heater cooking the components. Just replace the valves with individual transistors, modify the circuit a bit and all would be well. We should have known better. What radically new invention is ever content to just replace the old? They take on a life of their own and gallop off in directions that even their inventors had never considered.

Modern computers consist of millions of transistors each of which is switched on, allowing current to flow, or is off. Computer operations consist of the transistor-like components asking each other "Are you on or off?" Or in digital talk "0 or 1?" The more transistors the more memory and operational power, so modern integrated circuits have billions of transistors in a square cm. One classical result is that thermodynamics wins again, as with our old valves, cooling is a major problem. Far more interesting however are the quantum mechanical consequences which formed the basis of this lecture.

When things get very small, like atoms, classical mechanics fails and quantum mechanics takes over. Are they waves or particles? Where are they exactly? Electrons have always been quantum objects but when they move in great herds, as they do in older bigger devices, classical predictions work. At the tiny transistor size needed for billion transistor chips we are approaching atomic dimensions and operating with only a few electrons so quantum mechanics rules.

Although upsetting to engineers of traditional chips, the new regime is a fascinating challenge to physicists, which our speaker discussed. We already have lasers and high frequency transistors. Modern crystal growth and lithography now give precise 3D control of devices down to the size of the electron's wavelength. He described work in progress on really fundamental quantum problems such as a "whichpath?" detector in wave particle duality interference experiments, spintronics and the future of quantum computers. The engineering solution to the valve replacement problem has come full circle and is now at the centre of fundamental physics.

I cannot end this all too brief summary without remarking on the excellence of his slide presentation. For clarity, relevance, interest and technical excellence they were the best I have seen.

Jak Kelly

Professor Alex Hamilton is in Physics at UNSW. He leads a group working on the design and fabrication of nanoscale devices and the study of their quantum electronic behaviour.

The Edge

September 27th, 1pm, Stanton Library, 234 Miller Street, North Sydney. Free. Phone 9936 8400

Go behind the surgeon's mask as Dr Mohamed Khadra recounts stories from his life as a surgeon on call, lifted from his new impressionistic memoirs.

Members

You are invited to contribute articles and notices to the Bulletin. Do you have comments to make? Are there events coming up that we should all know about? Please send in your contributions by the end of the first week of the month to the Society's office (contact details p4)

Southern Highlands Branch

The Southern Highlands Branch of the Royal Society of NSW is back on track with its lecture series. After a successful lecture by Professor Juerg Beer on Thursday 20th September 2007, the next lecture is to be **Blast Off presented by Dr Ken McCracken in the Drama Theatre, Frensham, Waverley Parade, Mittagong at 6.15 pm, Thursday 18th October 2007**

Australian prize winning physicist **Dr. Ken McCracken** will talk about his adventures as a scientific researcher in the space age. His fascinating and varied career has encompassed several different fields of space research from cosmic ray research to x-ray astronomy, building scientific instruments for satellites to pioneering mineral exploration by remote sensing in Australia.

Dr McCracken will talk about the uncertainties, fears and spectacular mistakes made at the beginning of the space age. He will give an "insiders" view of the spacecraft that made the pioneering measurements of inter-planetary space and the rockets that initiated the new science of x-ray astronomy. He will summarise how the very simple spacecraft built in the 60s paved the way for the Apollo flights to the moon, the Voyager 1 spacecraft that left the solar system 30 years after it was launched and the present day "Stereo" spacecraft with their very high resolution measurements of the sun in 3-dimensions.

Ken continues his studies of the Sun and interplanetary space using ice cores obtained in Greenland and Antarctica.

Those wishing to come to the dinner after the lecture please contact the Fitzroy Inn directly on 4872 3457.

Whitley Awards 2007

The Royal Zoological Society of NSW Whitley Awards for 2007 were presented at a ceremony at The Australian Museum in Sydney to this year's winners. The awards are for outstanding publications that deal with the promotion and conservation of Australasian fauna. Of the awards, the Whitley Medal is the most sought after prize in Australian zoological publishing. The Whitley Awards, first presented in 1979, are a tribute to Gilbert Whitley (1903-1975), the Curator of Fishes at the Australian Museum from 1922 to 1964.

This year's Whitley Medal winner is *Australia's Mammal Extinctions, a 50,000 Year History*, by Chris Johnson and published by Cambridge University Press. Chris Johnson is a Professor in the School of Tropical Biology at James Cook University, North Queensland. His book covers the demise of Australia's mammal fauna and brings to those readers without specialist knowledge the debate about what might have caused the great mammal extinctions.

The Awards also include Certificates of Commendation and this year these were awarded to 12 publications, including books and electronic media.

Community Heritage Project Progress report

Peter Tyler has now finished working through the 48 boxes held by the Mitchell Library. The good news is that for the last weeks he was working there, the library staff recognised his load and the work he was doing and made every effort to assist him with his task.

We are now at the stage of writing up. I am entering his notes that list in detail the contents of each of the boxes together with their historical significance and condition in terms of conservation while he is preparing the body of the report due in to the National Library by November.

Peter has collected material he believes will form the basis to a history of the development of science in Australia and the important role played by the Royal Society of New South Wales.

Robyn Stutchbury

Meet our President, John Hardie

John joined the Royal Society as an Associate Member in 1972 while studying at Sydney University. He has been a Member of the Society ever since. He has served on the Council of the Society for many years, as Hon Secretary for several years and as President in 1994/5. He is currently serving his second term as President.



John Hardie

He says that he saw the benefit of an eclectic approach to all things through his geological studies. "Geology touches on most of the

sciences and was the originator of my belief that all sciences benefit from colliding with one another from time to time." he said.

John has spent most of his working life in the field of education, particularly distance education, and is currently a Chief Education Officer in the Centre for Learning Innovation, a unit within the NSW Department of Education and Training.

Music plays a pivotal role in his life, and while not an active player, he can be seen from time to time enjoying concerts and the opera. Cold climate gardens are another fascination.

JH

Editor's Note

This is the first of our planned 'getting to know you' columns. Our next Bulletin will feature Past President, Professor Jak Kelly and eventually we will work through all Council members one by one. However, this should not prevent members from contributing their stories, preferably accompanied by a digital photograph of reasonable quality. There is no reason for us not to have more than one members' article per issue. Those members I have spoken to have some very impressive tales to tell.

Robyn Stutchbury

Gould's Bird Calendar 2008 **The Royal Society of Tasmania**

is producing a calendar for 2008 featuring Gould's birds.

The calendar will be available from late September and is designed to fit in an A4 envelope for easy posting. The stunning images include the Rainbow Pitta, Yellow Wattlebird, Gouldian Finch, Crested Shrike-tit and Wedgetailed Eagle. They have been taken from the Society's volumes of Gould's *Birds of Australia*. Funds raised will assist the Society's activities of supporting and promoting science.

For further information and orders, contact Donna Hartley, Administrative Assistant, The Royal Society of Tasmania Telephone: 03 6211 4177; GPO Box 1166 Tasmania 7001, Australia.

Prime Minister's Science Awards

Dr Peter Waterhouse and Dr Ming-Bo Wang were awarded the 2007 Prime Minister's Prize for Science this week. Each was presented with a gold medallion and a cheque for \$150,000 at a ceremony at Parliament House in Canberra.

Their discovery of how to harness a plant's own viral defence mechanism is a major scientific breakthrough that has put Australia at the forefront of gene technology.

Four awards for science and science teaching were also presented to two of Australia's most promising young researchers and two exceptional science teachers.

Professor Kurt Lambeck at the National Press Club

You are invited to an address at the National Press Club on Wednesday 26 September by Kurt Lambeck, the President of the Australian Academy of Science.

The address, entitled *Roadmap for a prosperous Australia in a competitive world*, will provide a platform to launch the Academy's policy statement for 2007. The address will be broadcast live on ABC TV.

Details: 11.45am – 1.30pm, Wednesday 26 September 2007 at the National Press Club, 16 National Circuit, Barton ACT 2600. Cost: \$49 Member; \$66 Guests

ABC broadcast from 12.30pm More information about Professor Lambeck is available from: www.science.org.au/academy/council/lambeck

A transcript of the address will be available from: www.science.org.au/events/speeches

Registration forms: www.npc.org.au/assets/files/documents/speakers/kurtlambeck260907.pdf

National code on responsible research released

A new national code on responsible research practices and handling misconduct has been released by the National Health and Medical Research Council (NHMRC), the Australian Research Council (ARC) and Universities Australia.

The Australian Code for the Responsible Conduct of Research advocates and describes best practice in research for researchers and institutions, as well as setting out a framework for handling breaches of the Code.

The Code provides advice on how to manage research data and materials; how to publish and disseminate research findings (including proper attribution of authorship); obligations in peer review; how to collaborate across institutions; and how to manage conflicts of interest. The Code also provides guidance to institutions when establishing independent external inquiries to evaluate allegations of serious misconduct. The Code is at www.nhmrc.gov.au

Receiving your copies of the Bulletin

Thanks to all those who responded to our request to let us know your preferences for receiving the Bulletin and Proceedings. Eventually it would be ideal to be able to send the Bulletin out by email or via the Society's Website. However, there are many who do not yet have access to the internet and so we will continue to send copies by post.

For those who have not yet done so, please send your name and contact phone number or email address together with your preference for receiving the Bulletin either by email or post. If by email you will receive your copy in colour as a pdf attachment. If by post, your copy will be in black and white printed on both sides of two A4 sheets.

A special thanks to those who commented so favourably on the new format. It is encouraging to hear from you.
Robyn Stutchbury

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