



The Bulletin 361

The Royal Society of New South Wales

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Nov 2012

Future Events

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

December

Wednesday 5 December 2012

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

Scholarship Awards & Christmas Party

St Paul's College

University of Sydney

\$35 fall inclusive for the party

Details at right.

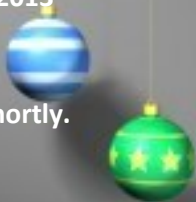
Southern Highlands Branch

Season's Greetings

Our program for 2013

Will be posted

on our website shortly.



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5 December 2012

1206th Ordinary General Meeting

Scholarship Awards and Christmas Party

Join the Society for the annual presentation of our sought after Scholarship Awards.

Each recipient of an award will make a short address outlining their area of expertise and current work.

The scholarship recipients are Jendi Kepple from the University of New South Wales, Helen Smith from the University of Sydney and Anwen Krause-Heuer from the University of Western Sydney.

Andrew Ong from the University of New South Wales will be presented with the 2012 Royal Society of NSW **Jak Kelly Scholarship** prize, from the recent AIP Postgraduate Awards day.

After the Ordinary General Meeting we will hold our Christmas Party.

Please join your fellow members and guests at 6:00pm for a 6:30pm start at St Paul's College.



WEDNESDAY 5 December 2012

St Paul's College

University of Sydney

\$35 for members and guests

RSVP

by 30 November

Payment can be made by credit card, cheque or direct deposit.

Please see separate flyer.

**Cost: \$35 each
RSVP essential**



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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

The unexpected nuclear renaissance: nuclear techniques benefiting mankind

Dr Adi Paterson,

CEO, Australian Nuclear Science and Technology Organisation (ANSTO)

Presented to the Society's 1205th OGM, 7 November 2012



The Society was privileged to have Dr Paterson, Chief Executive Officer of ANSTO, address our meeting on Wednesday 7 November in Sydney.

There has been great excitement in recent months with reports that two experiments at the CERN Large Hadron Collider (LHC) had detected phenomena indicating the existence of the Higgs boson. The CERN LHC is the current pinnacle of cyclotron accelerator technology that was first developed in the 1930s. Not only is this technology at the forefront of experimental physics but the spin-offs, such as PET imaging and hadron therapy have been major developments in medical diagnosis and treatment. There are now over 860 cyclotrons worldwide, with 11 of these in Australia.

The cyclotron is one of two great traditions in nuclear physics – the other is the research nuclear reactor. Generally, nuclear isotopes that are useful for diagnosis can be generated in cyclotrons while the radioactive isotopes for therapy are more often produced in nuclear reactors, such as the Opal Research Reactor at Lucas Heights.

An example of the use of isotopes in the diagnosis of disease is early detection of Alzheimer's dementia. Alzheimer's is difficult to diagnose in its early stages and, often, can only be positively identified post-mortem. However, positron emission tomography (PET) scanning technology can detect markers that appear to be associated with abnormal amyloid-beta production, a phenomenon that appears to be associated with Alzheimer's disease. PET diagnostic techniques utilise a radiopharmaceutical compound called florbetapir-fluorine-18 that contains the radionuclide fluorine-18. Fluorine-18 is a radioisotope of fluorine that emits positrons as it decays and these can be detected in a PET scanner. It has a short half-life (about 110 minutes) and has essentially disappeared from the body in about 12 hours. Similar techniques are also being used in diagnosing the effects of haemorrhagic stroke and the progress of insulin cells in diabetes patients.

The Opal Research Reactor at Lucas Heights is an important source of short half-life isotopes used for a variety of medical and non-medical purposes. These can be as diverse as researching the structure and physics of new generation batteries, sensing

explosives using photo luminescent films, understanding the morphology and structure of organic light-emitting diodes (an important new technology), studying the structure of cell membranes, stress evaluation in steel (for example, analysing the heads of railway track in order to predict failure). Medical treatment is a critical role for the Opal Reactor, particularly for supplying short-lived isotopes for radiation treatment of cancer patients.

The other important facility in Australian nuclear physics is the Australian Synchrotron that is being used for medical imaging and therapy and a range of other applications. One of the critical applications for the synchrotron is protein crystallography. This technology emerged from Nobel Prize-winning work in determining the structure of various proteins, that could not be done otherwise.

The important message that we were left with is that the Australian Synchrotron and the Opal Reactor are complimentary technologies. Together they provide critically important resources in a range of Australian industries from medical diagnosis and treatment to latest technologies across a variety of science and engineering applications. Furthermore, they give us a place at the table internationally in leading-frontier "big science".

Donald Hector

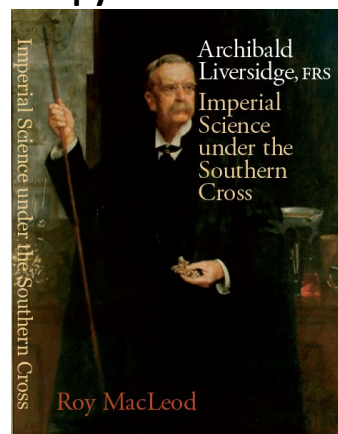


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Who was Liversidge?
Order a copy to find out...



From the President



The last couple of months have been quite busy for the Society. The **Liversidge Lecture** was delivered by **Professor Thomas Maschmeyer** on Monday 19 November at the University of Sydney. The lecture commemorates **Archibald Liversidge**, a distinguished chemist, the first Dean of the Faculty of Science at the University of Sydney and one of the outstanding figures of science of the late 19th and early 20th centuries. **Professor Maschmeyer** is one of Australia's most notable chemists and

certainly is a worthy successor to Liversidge. Thomas' topic was "Low carbon technologies: from brown coal and biomass to solar hydrogen" and described his work, done over many years, developing new processes and catalysts for converting relatively low-grade energy sources such as brown coal and biomass to high value products such as synthetic crude oil and synthetic black coal. It was great to see such a large audience in attendance, with over 150 people at the lecture.

It has been very pleasing to see such strong attendances at monthly meetings since we moved the venue to the CBD. The Council is currently putting the programme together for next year and we believe we have identified some very interesting speakers. As soon as this is confirmed, we will let members know and post details on the website.

The awards committee, advised by the panel chaired by the Chief Scientist and Engineer of NSW, **Professor Mary O'Kane**, is in the midst of considering excellent submissions. We expect these to be announced formally before Christmas and the awards will be presented at the Annual Dinner in the first half of next year. We anticipate this dinner will be well attended – attendances have been growing for the last several years – and that it will become one of the major science events in NSW.

The Council has started working more closely with the **Southern Highlands** branch and we hope to coordinate our programmes closely in 2013. We also expect to have a new web presence for the Southern Highlands branch in the near future.

A reminder that the Society Scholarships, the first of our awards will be presented at the meeting on **Wednesday 5 December at St Paul's College**. This will be the last meeting for the year and will be followed by our Christmas party – see the website for registration details.

As this will be the final bulletin for the year, I take the opportunity to wish all members and their families a very happy festive season and a prosperous 2013.

If there are any issues you would like to raise with me, I am easily contacted by e-mail at president@royalsoc.org.au and would like to hear from you.

Donald Hector



Did you know?

The Royal Society of New South Wales traces its origins to the Philosophical Society of Australasia, established on 27 June 1821 and was the first scientific society in the British Colony of New South Wales.

The Society was formed "with a view to enquiring into the various branches of physical science of this vast continent and its adjacent regions". On his arrival in Sydney late in 1821 the new Governor-General (as he was then called), Sir Thomas Brisbane, was offered and accepted the position of President.

Following a period of informal activity, the Society was revitalised and renamed the Australian Philosophical Society on 19 January 1850. On 12th December 1866, Queen Victoria granted Royal Assent to the Society and it was renamed The Royal Society of New South Wales. The Society was incorporated by Act of the New South Wales Parliament in 1881.

The rules of the Society provided that the Governor of New South Wales should be President ex officio. After the establishment of the Commonwealth of Australia in 1901, the Governor-General became Patron of the Society, and the New South Wales State Governor the Vice-Patron. Since 1938 the Society has been under the joint patronage of the Governor-General and the State Governor.



Southern Highlands Branch

November 2012

"Australian Energy at the Crossroads – spoiled for choice, which direction will we choose?"

Delivered by Dr John Wright

Dr Wright's presentation was unique for the Southern Highlands branch, in that his subject took the form of a short introduction, followed by a long session of discussion questions from the 50 member audience. It was in essence an Energy Forum which worked very well indeed, and was clearly appreciated by those attending.

John Wright described the Australian situation as different from most other developed countries in many aspects. We are one of the few countries that are net energy exporters – two thirds of our energy is exported. We are also "spoiled for choice" having options such as coal (\$44 billion), gas (exports of LNG going up 4-fold over the next 15 years), uranium (over 30% of known world reserves), renewables such as wind, biomass, solar, geothermal and even ocean energy. The only negatives concern oil and hydroelectric generation, where oil production is decreasing and hydroelectric power is static and will remain so.

The questions were then posed that, in light of the many forms of energy available in Australia, why is there still so much uncertainty about our future energy directions? Why are we in the lucky energy country faced with ever increasing electricity prices of late? John Wright stated that although we have excellent resources, it is a different matter to turn them into safe, secure, affordable and environmentally responsible energy for the population, with

the big issue of Greenhouse Gas (GHG) emissions to consider.

While Australians produce only 1.4% approximately of the world's GHG emissions, we have close to the highest emissions per head of population in the world – larger than USA and very much larger than China. The reason for this is the nature of our energy structure – good quality fossil fuels (particularly coal), low and remaining low hydro power, and no nuclear power – these latter two give a lot of other countries a lower GHG profile than Australians can achieve under the present circumstances.

Wright noted that our government is taking some ambitious steps to reduce our GHG intensity – carbon tax, renewable targets, assistance to develop lower emission technologies and the like. He felt that steps such as these would have a large influence on our future energy directions, in particular the recent release of the Energy White Paper, described by Wright as an important document as close to an energy policy as we are likely to see.

The Energy White Paper gives big emphasis to gas – conventional, coal seam and shale gas. Coal too is given a high priority. We must keep our exports going, and continue to support "clean coal" technologies, principally carbon capture and storage. Uranium exports too must be maintained in the form of "yellow cake" (uranium oxide). As for rising electricity prices, attempts to cur-

tail them are being addressed through the introduction and spread of "smart grid" technologies. Dr Wright noted however that the linking of the smart grid with variable sources of inputs such as increased wind, solar and other RE technologies will be very difficult to achieve.

Dr Wright's closing comments reminded the audience that energy infrastructure is expensive and relatively long-lived, so decisions made over the next 5-10 years will be critical. The session was then thrown open to questions from the audience. It had to be called to a close an hour later as time had run out. There were still many questioners waiting for the chance to pose their questions even so. All agreed that with so many changes occurring in the energy field, a similar Energy Forum should be held in 2013.

Anne Wood



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The Bulletin is issued monthly by the Royal Society of New South Wales

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