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The Royal Society of New South Wales Bulletin and Proceedings 346

Future Events 2011

Lectures in Sydney are held on the first Wednesday of the month at 6.30pm.

Wednesday 6 July 2011 at 6.30 pm

1193rd OGM

Stem Cells and Regenerative Medicine: Prospects for Realising the Prometheus Myth

Dr John Rasko

Centenary Institute, Sydney University
Lecture Theatre 106, New Law School,
University of Sydney.

Southern Highlands Branch

Meetings are held on the third Thursday of each month in the Drama Theatre at Frensham School, Mittagong (enter off Waverley Parade), at 6.30pm.

Thursday 21 July 2011 at 6.30 pm

Who Cares About The Weather In Space

Dr Marc Duldig

Drama Theatre at Frensham School,
Mittagong (enter off Waverley Parade)

Central West Branch

For further information please contact Kerry Madden at Charles Sturt University Orange on Tel: 02 6365 7500.

The 1193rd Ordinary General Meeting of the Society - Stem Cells and Regenerative Medicine: Prospects for Realising the Prometheus Myth

Professor John E. J. RASKO - Centenary Institute, University of Sydney

Wednesday, 6 July 2011 at 6.30pm, Lecture Theatre 106, New Law Building, Eastern Avenue, University of Sydney.

Without doubt, the Greek god Prometheus is the poster boy of regenerative medicine. Countless articles on the science of regeneration begin with his story—or at least its most gruesome episode. As punishment for defying Zeus, Prometheus was bound to a crag in the Caucasus Mountains where, every day, an eagle feasted on his ever-regenerating liver. Stem cells have generated a great deal of excitement, with frequent claims that they are revolutionising the field of regenerative medicine. However, for those not directly involved in stem cell research, it can be difficult to separate fact from fiction, realistic expectation from wishful thinking. In this presentation I will seek to offer a clear and concise introduction to the field. I will consider the three main varieties of stem cell – adult, embryonic, and induced pluripotent – comparing their likely advantages and disadvantages for clinical medicine.

Professor Rasko is a pioneer in the biology of adult stem cells and clinical gene therapy. He continues to practise as a clinical haematologist while directing the Department of Cell and Molecular Therapies at Royal Prince Alfred Hospital and heading the Gene and Stem Cell Therapy Program at the Centenary Institute, University of Sydney.

John Rasko is an acclaimed physician-scientist with a productive track record in gene and stem cell therapy, experimental haematology and molecular biology. In over 130 papers he has made major contributions to the understanding of stem cells and haemopoiesis, gene transfer technologies, oncogenesis, human aminoacidurias and non-coding RNAs. He serves on hospital, state and national bodies including Chair of GTTAC, Office of the Gene Technology Regulator – responsible for regulating all genetically-modified organisms in Australia. Contributions to scientific organisations include co-founding (2000) and past-President (2003-5) of the Australasian Gene Therapy Society; Vice President, International Society for Cellular Therapy (2008-12) and founder (2009) ISCT-Australia; Scientific Advisory Committees for philanthropic foundations and several Ethics Committees.



Patrons of The Royal Society of NSW

Her Excellency Ms Quentin Bryce AC

Governor-General of the Commonwealth of Australia

Her Excellency Professor Marie Bashir AC CVO

Governor of NSW

Australian College of Educators Dinner

Reflections from the 2011 Sydney Metro Event

Monday, 6 June 2011

The Sydney based regions of the Australian College of Educators banded together to support a combined dinner meeting of the 2011 Sydney Metro Event, at the Waterview Convention Centre, Bicentennial Drive, Olympic Park on Monday 6th June. We were privileged to have Professor Schwartz (Vice-Chancellor, Macquarie University) as our distinguished guest speaker on the topic of "Higher Education should be a moral enterprise". From its earliest classical origins, argues Professor Steven Schwartz, higher education's real purpose was to build "character" so that graduates could take up their role in their society and contribute to the good of everyone. Universities once had clear ethical purposes but over the years they have lost their moral direction. They no longer have a moral role; they have given it up for one that is strictly utilitarian. In the words of the Government, for example, the purpose of universities is "to grow the knowledge-based economy". To fulfil their true purpose, says Professor Schwartz, universities need to get back on course - they need to "re-moralise". Universities need to reclaim a moral purpose to distinguish themselves from other businesses, he said.

Professor Schwartz's talk outlined what needs to be done for universities to change direction. He said universities are losing sight of their ethical function

in their desire to turn a profit. "The purpose of university research was the discovery and dissemination of knowledge for the benefit of society," he stated. "Making money was never their goal." Giving an example from his childhood in New York, Schwartz recalls how a polio vaccine was created by a university researcher, Jonas Salk. The vaccine was trialled on 2 million primary schoolchildren, including Professor Schwartz. The drug worked but the researcher did not become rich.

This is because he and the University of Pittsburgh, the private university where he worked, licensed the vaccine to anyone who wanted to manufacture it, he said "The ethical premise driving Salk's work was simple." He contrasts the situation to today, where famous medical researchers lend their names to articles written by drug companies to boost sales. Ghost writing has benefited researchers by giving them additional publications to add to their resumes, he says. The problem, which has alarmed medical editors in the US, arises when "publications are the coin of the realm in university scientific careers", Professor Schwartz stated. The Australian College of Educators thanks Professor Schwartz for his outstanding presentation!

Dr Fred Osman

Southern Highlands Branch

Report of May 2011 Meeting:

Geothermal Energy – Current Status of Development in Australia

Robert Hogarth, B.Eng (Hon)
Geodynamics Ltd

Electricity demand continues to expand worldwide, with consumption projected to grow by nearly 100% by 2020. Electricity generation generally relies on burning fossil fuel which produces carbon dioxide (CO₂) as one of its waste products. Concern has developed over the last decade about the effects of carbon dioxide on the atmosphere, particularly with respect to global warming. Incentives are now in place in most developed nations to promote the development of clean, renewable energy.

The expansion of the nuclear power industry appears to be socially unacceptable and not without its problems. Solar and wind power cannot replace fossil fuels, although they can augment them. Clearly they are limited in scope, intermittent and unreliable. Research is now pointing to hot fractured rock as having the potential, worldwide, to significantly reduce our dependence on fossil fuels.

Robert Hogarth described the potential of geothermal energy to deliver large-scale, zero emissions, base load power supply to the market. He stated that it is the lowest cost source of renewable energy for base load (24/7) power generation, and that it can be integrated with other technologies such as solar and gas. It has the smallest environmental footprint of all energy types, and it is scalable for on and off-grid projects.

The concept behind Enhanced Geothermal Systems (EGS) geothermal energy is relatively simple. Heat is generated by high heat producing granites by circulating water through enhanced fracture systems within the granite body – in essence, an underground heat exchanger. The extraction of EGS thermal energy relies on existing technologies and engineering processes such as drilling and hydraulic fracture stimulation,



ACE distinguished guests at the NSW Sydney Metro Dinner Event

Southern Highlands Branch

techniques established by the oil and gas industry.

Australia has large volumes of identified high heat producing granites within 3 to 5 km from the earth's surface, much of the heat being due to the radioactive isotopes of potassium, uranium and thorium. Robert Hogarth emphasised that finding buried granites does not require new technology, and that the compressive stress environment leads to the potential for large scale fractures. Australia has the hottest rocks in the world with these stress conditions – the Innamincka granites.

Robert Hogarth described the key technical areas which now require resolution to make such geothermal projects competitive with other power generation methods. These include increasing the water flow rates through the development of multiple reservoirs, better management of overpressure in fractures, increased drilling rates in hard formations, and the reduction of drilling costs.

Once these technical situations are better refined, Australia should find itself with a vast supply of clean, zero emission, base load power. Robert Hogarth concluded that such an achievement would herald a significant contribution to Australia's future energy mix and the green economy.

The audience of 57 asked numerous questions of the speaker at the conclusion of the lecture. Robert Hogarth later commented what a pleasure it had been for him to address such a well-informed and appreciative audience. The vote of thanks was given by Anne Wood.



Who Cares About The Weather In Space?

Dr Marc Duldig

Thursday, 21 July 2011

Space weather is the name given to variations in the physical and the radiation environment in the near Earth space and the consequences of those variations.

The consequences can be quite dramatic and have significant economic impact. To understand space weather it is first necessary to understand the processes generating the high-speed solar plasma and its dynamic interaction with the Earth. The development of the solar wind, its embedded magnetic field and its propagation to the Earth is described. The interaction of this plasma with the Earth's magnetic field and atmosphere and the range of effects that result are presented. These effects include but are not limited to: electricity grid disruption; telecommunication disruption; increased pipeline joint corrosion; satellite memory failures, surface charging, solar cell degradation and increased atmospheric drag; navigation disruption; increased aircraft passenger radiation exposure; astronaut radiation hazards; and the benign but beautiful aurorae.

Many of these effects have significant economic impact and reliable forecasting of space weather storms is highly desirable. The quality of space weather predictions has improved dramatically over the past decade but still needs to be developed much further. Australia has a significant role to play in both space weather research and prediction. Instruments at the Australian Antarctic bases, at Macquarie Island, in Tasmania, mainland Australia and its offshore smaller islands are essential to space weather research and prediction.

Australia's geographic isolation has made it heavily reliant on satellite technology and this dependence will only increase in the future. Evidence is mounting that the space era may have been an unusually quiet time for space weather activity and that a greater level of disruption may be possible in the future. It is in our national interest to

develop a space weather strategy that optimises national research, ensures rapid distribution of observational data for space weather forecasting and develops appropriate forecast warning procedures for industry and government use.

Dr Marc Duldig completed his BSc in Physics at Monash University in 1974. He moved to Hobart in 1975 for one year to undertake an Honours degree in X-ray astronomy. He is still there today! In the meantime Marc completed a PhD at the University of Tasmania in X-ray and Radio astronomy and joined the Australian Antarctic Division in its cosmic ray research program in 1980. (Note the noise in his postgraduate experiments became the signal in his professional research career!) In 1985 he took over leadership of the cosmic ray research group and was subsequently appointed Program Leader of the Division's Space and Atmospheric Sciences Program in 2001. In 2006 he became manager of the atmospheric component of the Ice, Ocean Atmosphere and Climate program following a restructure and more recently acted as manager of the Division's Data Centre.

Marc is a Fellow and the current President of the Australian Institute of Physics. He has been national Secretary of the Astronomical Society of Australia for a quarter of a century and is an Honorary (life) Fellow of that organisation. He has been a member of several Academy of Science subcommittees. He is a Council member of the Association of Asia Pacific Physical Societies and has just stood down after 6 years as a Secretary of the Solar Terrestrial Section of the Asia Oceania Geosciences Society. For the past 5 years he has also been Editor-in-Chief of the Solar Terrestrial volumes of *Advances in Geosciences*. In 2003 Marc was a Senior Visiting Fellow of the Japanese Society for the Promotion of Science. Marc has published over 100 international refereed research papers and an equal number of conference and other papers and has spent 5 summers in Antarctica. Marc is married with a 13 year old daughter and two mature Alaskan Malamutes.

From the President



Our Patron, Professor Marie Bashir, Governor of NSW, held a reception at Government House, Sydney on Friday 10 June which I attended on behalf of the Society. It marked the official birthday of HM The Queen. It also coincided with the 90th birthday of HRH The Prince Phillip, Duke of Edinburgh, so a toast was offered to both of them.

At the reception I was fortunate in being able to speak to the Premier, Barry O'Farrell, about the Royal Society and about Science House. It was a brief discussion but I think the outcome will be positive for the Society. He indicated he would follow up with his ministers about Science House. It is felt that establishing a NSW Science Centre with government funding may be a way the government can show that it indeed does support science and scientists.

On 20 May I had the privilege of delivering the Occasional Address to a Science and Engineering graduation

ceremony at the University of Sydney in the presence of the Chancellor, our Patron, Professor Marie Bashir. The twin themes of the address were the value to new graduates of getting involved in professional societies and associations and the importance of effective science communication. The two go hand in hand but through the example of Archibald Liversidge I was able to show how critical attention to these two matters could be for the furtherance of scientific knowledge and its relationship with the other three facets of our charter – art, literature and philosophy. If you are interested, the full address has been posted on our website in the News and Events section.

On 31 May I represented the Society at the launch by State Records of Dr Peter Tyler's new book on the history of NSW State Records to mark their 50th anniversary. The launch was held at Parliament House in Macquarie Street. Dr Tyler, as you will know, is the Society's historian, and he was kind enough to donate a copy of his new book to the Society. The book is available for perusal in the Society's rooms.

You will be pleased to know that as a result of the initiative of Tony Nolan, our Hon. Librarian, we now have the first book from our valuable library collection registered in the National Library of Australia's Trove website. This is a first step in getting our library collection recognised and more accessible to researchers.

Finally, I was honoured to be invited as a guest of the Australian College of Educators to a dinner on 6 June at which the Vice-Chancellor of

Macquarie University, Professor Steven Schwartz spoke on the place of ethics in universities. I was fortunate in being sat next to Professor Schwartz during the dinner and he expressed his support for what the Society is trying to do. My thanks to Dr Fred Osman, President of the College in NSW and a member of our Council, for the invitation.

John Hardie

From the Hon. Librarian



I am pleased to announce that our library has been registered with Libraries Australia, and we have catalogued our first book. Our library code is NRSOC. If you would like to see how our collection is growing, you can use this link <http://trove.nla.gov.au/>. Type NRSOC in the search field and click the search button. Our collection will appear. This is the start of a long process in cataloguing our collection, and I am after volunteers to help me with the process by recording the titles of the books for me to enter and to copy the catalogue.

Tony Nolan

Contact your office bearers

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