



The Bulletin 410

The Royal Society of New South Wales

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30 May 2017

For Your Diary:

15 June 2017

Southern Highlands Branch Lecture

Dr Michael Birrell

“Luxor Temple:

The Shrine of Amun-Re”

6:30 pm start

Venue: For up-to-date information, see
http://www.royalsocietyhighlands.org.au/lectures/lectures_2017.htm

5 July 2017

Ordinary General Meeting

Professor Andrea Morella

“Understanding Quantum Theory”

Union, University & Schools Club, 6:00 for 6:30

20 July 17

Southern Highlands Branch Lecture

Dr Wes Stein

“Solar Power Generation”

6:30 pm start

Chevalier College



Patron of The Royal Society of NSW

His Excellency General The Honourable
David Hurley AC DSC (Ret'd)
Governor of New South Wales

Open Lecture & OGM

Wednesday, 7 June

“Are You More Intelligent than a Slime Mould?”

Prof. Madeleine Beekman

Professor of Behavioural Ecology, University of Sydney



Continued on Page 3

Date: Wednesday, 7 June 2017; 6:00 pm for 6:30 pm

Venue: Union, University and Schools Club, 25 Bent Street, Sydney

Entry: \$10 for Members and Associate Members of the Society,
\$20 for Non-Members, which includes a welcome drink.

Dress: Business

Dinner (including drinks): \$80 for Members and Associate Members,
\$90 for Non-Members.

Reservations must be made at least 2 days in advance

Reservations: <https://nsw-royalsoc.currinda.com/register/event/32>

Enquiries: royalsoc@royalsoc.org.au Phone: 9431 8691

All are welcome.

From the President

President's Column May 2017



The excitement of the month was, of course, the annual dinner. His Excellency General The Honourable David Hurley AC DSC (Ret'd) and Mrs Hurley graced us with their presence, dutifully presenting awards and engaging with the Society and their guests. In a brief unscripted speech His Excellency mentioned that earlier in the day he had been pleased to present former President Don Hector with his AM at Government House.

Awardees were accompanied by family and friends, some from out of state, and the entire evening was conducted in a convivial, friendly atmosphere. I presented fellowship certificates and look forward to seeing our newest fellows at future meetings of the Society. Peter Baume AC Dist FRSN rounded out the evening with his Distinguished Fellow's Lecture "Don't blame the unemployed". I recommend the text of his talk, which will appear in the Journal and Proceedings. It is filled with stories, anecdotes and minutiae of parliamentary life, and of course wise and just advice for the times in which we find ourselves. His final plea was for the young, especially, to consider becoming politically involved – "So please enjoy your evening. And help run a better Australia.

At the dinner, Scientia Professor Justin Gooding FRSN was presented with the Liversidge Medal, and the Walter Burfitt Prize. On Thursday 11 May, Justin gave the Liversidge Lecture at UNSW, Sydney. The Dean of Science, Professor Emma Johnston FRSN, hosted the evening. There was an audience of around 150, a mix of UNSW staff and students (Justin has a very large group), RACI members, and members and fellows of the Royal Society. Working with single cells and single molecules, which of

course cannot be seen, Justin relies on clarity of explanation and some very nice cartoons and graphics to get his points across (see. page 3)

Another named lecture to look forward to, the Poggendorff Lecture, will be held at the SMSA in Pitt Street on Tuesday 29 August at 6.00 pm. It will be given by Associate Professor Andrew Robson of the University of New England. He will be telling us about remote sensing in agriculture and horticulture.

In a first for the Society, letters from Distinguished Fellow Eugenie Lumbers and your President were published in the Sydney Morning Herald on 19 April. The longer submitted text is published in *Bulletin 409*. We pride ourselves on being non-party political, but do think we should speak up when the need arises. The need here was the March for Science at which many of our members made a clear statement of why science is so important for society. Perhaps some of us were reliving our youth, but it was grand to see so many marching for something rather than against. The March also had a rather high standard of placard legends: my favourite being "What do want? – Science; when do we want it? – after Peer Review."

I shall be overseas for a few weeks so please look out for Vice President Ian Sloan, who will preside over the June OGM. As usual, please write with comment and suggestions to president@royalsoc.org.au.

Brynn Hibbert, FRSN

(continued from page 1)

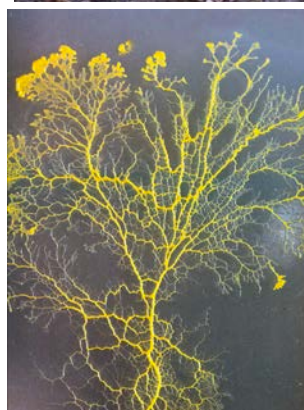
Professor Madeleine Beekman

In this talk, we will investigate if the slime mould, a unicellular organism with no brain or central nervous system, is as smart as we are. And you may be surprised by the answer. Over the last few years the acellular slime mould, *Physarum polycephalum* (literally the multi-headed slime mould) has emerged as a model system for decision making.

This organism, despite its simplicity, is capable of rather complex behaviour. For example, the slime mould is capable of finding the shortest path through a maze, can construct networks as efficient as those designed by humans, solve computationally difficult puzzles, make multi-objective foraging decisions, balance its nutrient intake, and even behave irrationally. Are the slime mould's achievements simply 'cute', worthy of mentioning in passing, but nothing to take too seriously? Or do they hint at the fundamental processes underlying all decision-making? This talk will address this question after reviewing the decision-making abilities of the slime mould.

Madeleine Beekman is Professor of Behavioural Ecology at the University of Sydney and a Fellow of the Royal Society of NSW. She previously held prestigious research fellowships such as the Australian Research Council (ARC) Queen Elizabeth II Fellowship (2003-2012), an ARC Future Fellowship (2013-2016), and a Sydney University Senior International Research Fellowship (2006-2010).

Madeleine did her PhD in at the University of Amsterdam and was a postdoctoral research at the University of Sheffield before she moved to Australia to join the University of Sydney in 2001. She has been editor of numerous scientific journals and is currently the Deputy Head of School of the School of Life and Environmental Sciences, as well as the Chair of Ecology, Evolution and Environment. Her main model organism besides the slime mould is the honeybee.



Physarum polycephalum

Liversidge Lecture 2017

Scientia Professor J. Justin Gooding FRSN, winner of the Liversidge Award, delivered the associated lecture at UNSW Sydney on 11 May. He spoke on "Sensing Our World: From Glucose Sensors to Counting Single Molecules and Cells"

Biosensors are solid state analytical devices made by integrating a biological molecule that can recognise a biomarker of interest. The classical examples of such devices are the glucose meters that have revolutionised the lives of diabetic patients, and pregnancy test kits. There is a whole family of related devices developed for uses ranging from disease diagnosis to water quality testing.

Prof Gooding's presentation covered the state-of-the-art research in this field, explored some of the challenges to wider adoption of such devices in daily life, and outlined the work of the Smart Materials and Surfaces research group at UNSW in this area. He focused on advances in surface chemistry and nanotechnology that will lead to the next generation of sensors that detect single molecules.



and cells. Such devices not only represent the ultimate sensor in being able to detect a single thing, but will solve many challenges with existing sensor technologies.

By being able to detect many single molecules or cells, such that the devices essentially count the number of entities to be measured, they will solve the main challenges in sensors of calibration and nonspecific signals, as well as create a whole new type of sensor.

The presentation concluded with a discussion of some of the work on bringing this exciting vision of our sensing future towards a reality.

Report of 18 May 2017 Meeting Royal Society – Southern Highlands Branch

Professor Gregg Jørgen Suaning,
Graduate School of Biomedical Engineering
University of New South Wales



“The Bionic Eye”

With nearly 40 million people suffering from blindness worldwide and another 124 million affected by low vision, it is no surprise that researchers such as Professor Gregg Suaning and his team are intent on developing novel ways to restore sight. One such effort is the development of a so-called bionic eye.

Bionic eye scientists have one common goal: to develop technology that is as effective for visual disabilities as cochlear implants have become for auditory ones. Gregg Suaning has had an extraordinary career as a biomedical engineer, a background which has prepared him as no other could, to investigate and develop technology for a bionic eye. From 1992-1997, he was the R&D Engineer/Manager of Process Development Engineering for Cochlear Ltd, moving on to the Cooperative Research Centre for Eye Research and Technology at UNSW from 1997-2001. From 2014 to the present, he has held the position of Professor of Biomedical Engineering at UNSW. He openly states that his period at Cochlear prepared him as no other could for his present research into the bionic eye.

Suaning is a prolific inventor with important patents in the medical device field, primarily in sensory bionics. He has authored over 150 book chapters, along with numerous papers, and has raised more than \$56 million in competitive research funding during his academic career. He is a recipient of the Bartimaeus Award from the Detroit Institute of Ophthalmology in

recognition of his service to the blind community and in recognition of his collegiality in the advancement of the field of visual neuroprosthesis. He serves on the organising committees of the world’s largest biomedical engineering conferences to be held in 2017 and 2018. He was instrumental in securing the same conference for Sydney in 2023. Suaning’s research includes robust collaborative links with industry to bring about the next generation of cochlear neuroprostheses for the deaf, and leading-edge work to bring about neuroprosthetic therapies to restore vision to the blind.

In describing the long path that researchers are forced to walk in developing new technologies for complicated prostheses such as the bionic eye, Suaning drew a comparison with the implantable pacemaker which today is taken for granted. Arne Larsson (1915- 2001) received the first implantable pacemaker on 8 October, 1958. He then received the second implantable pacemaker the next day. The first one did not work at all, and the second failed after three hours. By the time of his death at the age of 86, Arne Larsson had received 27 pacemakers.

The 45 person audience was highly appreciative of this intriguing and expertly delivered lecture, as evidenced by the lengthy applause, and the numerous questions asked of Professor Suaning at the conclusion of the evening.

Anne Wood FRSN

2017 Annual Dinner



Prof Baume

For this year's Society's Annual Dinner and Awards, over 250 fellows, members, and guests filled the large dining room of the University Union and Schools Club on the evening of 3rd May. In the presence of His Excellency General The Honourable David Hurley AC DSC (Ret'd), Governor of New South Wales, Patron of the Royal Society of New South Wales, accompanied by Mrs. Hurley, the convivial dining and conversation were interspersed with the presentation of awards and speeches.

Under the guiding hand of Ms Judith Wheeldon as compere, twelve new fellows were awarded their certificates (see pages 8-10 for photos and brief descriptions of the new fellows). The focus then moved to the Annual Awards. A group of six distinguished researchers in medicine, geochemistry, chemistry, neuroscience, history, and agriculture all stepped forward to receive their medals from His Excellency (see pages 6-7 for photos and commendations).

The culminating highlight of the evening was the Distinguished Fellow's Lecture by the Honourable Emeritus Professor Peter Baume AC DistFRSN.

Entitled "Don't Blame the Unemployed," Prof. Baume surveyed the challenges facing Australian society, especially people who are losing their jobs as result of technological change. Subsequently, they may find themselves either unemployed for extended periods or under-employed in deskilled jobs. According to Prof. Baume, these circumstances are beyond their control. Hence, blaming them for their predicament is undeserved.

Prof. Baume continued to discuss the "tragedy of democracy," at least as it is often practiced in today's parliament. He noted that the membership of political parties has declined, as well as being increasingly dominated by professional politicians. He also decried the progressive loss of bipartisanship. He reflected back on his own service as a Liberal Senator (1974 -1991). Among other things he recalled how senators of different parties had warm, collegial relationships. In some notable cases, senators had a mutual trust based on their shared experience of imprisonment in Changi during World War 2. Prof. Baume talked of his own bipartisan work with Neal Blewett to stem the AIDS epidemic of the 1980s. He also recalled his high regard for members of his own party, among them former Senator Fred Chaney.

Prof Baume's speech was received with rapt attention by the audience, followed by a vote of thanks by Ms. Wheeldon. She also thanked the able staff of the University Union and Schools Club, who were so attentive to our needs. In conclusion, this year's dinner wonderfully reflected the growth and vibrancy of the Society.

Annual Awards



Scientia Professor David Cooper received the **James Cook Medal**. This Medal is awarded from time to time for outstanding contributions to both science and human welfare in and for the Southern Hemisphere. Professor Cooper's research has been focused on the understanding and treatment of the global scourge of HIV/AIDS. He introduced one of the first tests for HIV infection and, since, has made numerous contributions in areas such as antiretroviral therapy, complications of HIV treatment, and HIV pathogenesis.

This year's winner of the **Clarke Medal** was **Professor Simon P. Turner**. As a geochemist, his most notable contributions have involved the application of short-lived Uranium-series isotopes to estimate the time scales of magma formation, transport, and differentiation as well as soil production and erosion rates. The Clarke Medal is awarded on three-year rotation for distinguished research in the natural sciences conducted in the fields of botany, geology, and zoology, all of which are considered in the rotation. For 2016, the medal was awarded in Geology.



The **Walter Burfitt Prize** and the **Archibald Liversidge Medal** were awarded to **Scientia Professor Justin Gooding**. He is a leading authority in the field of surface modification of electrodes, mostly focused on bioelectronics interfaces. He has had a number of pioneering achievements, including understanding electron transfer at surfaces, making silicon compatible with aqueous solutions, advanced electrochemical techniques, and single nanoparticle sensors.

The Walter Burfitt Prize is awarded every three years for research in pure or applied science published in the past six years. The Archibald Liversidge Medal is awarded at intervals of two years in conjunction with the Royal Australia Chemical Institute. It was established under the terms of a bequest to the Society by Professor Archibald Liversidge

Annual Awards *(continued)*

The **Edgeworth David Medal** was awarded to **Dr Muireann Irish**. Her research focuses on memory disruption in dementia. Her contributions to cognitive neuroscience include establishing the impairment of planning in dementia patients and differentiation among dementia syndromes at initial presentation. She is also a spokesperson for women in science. The Edgeworth David Medal is awarded each year for distinguished research by a young scientist under the age of 35 years for work done mainly in Australia or for contributing to the advancement of Australian science.



Emeritus Professor Roy MacLeod received the **History and Philosophy of Science Medal** for his outstanding achievements. He is an historian of science focusing on the 19th and 20th centuries. He has opened enquiries in the history of British imperial science, history of science in Australasia and the Pacific, Museum studies, and the development of science policy. He also co-founded the international journal *Social Studies of Science*. A copy of his book “Archibald Liversidge: Imperial Science under the Southern Cross” was presented to the Governor of NSW at the recent celebrations for the 150th anniversary of Royal patronage of the RSNWS.

The **Poggendorf Lecture** was awarded to **Associate Professor Andrew Robson** of the University of New England’s Precision Agriculture Research Group. He is a leader in agriculture remote sensing research and development. This research is set to provide a network of sensors that collect “big data” in real time concerning threats to food crops across Australia, thus equipping farmers with the best possible information for decisions about their produce. The Poggendorf Lecture is awarded every two to three years for research in plant biology and more broadly agriculture.



New Fellows



Eileen Baldry

Professor Eileen Baldry has contributed significantly to scholarly knowledge and theory in the field of criminology using innovative research methods including data linkage employing quantitative and qualitative analyses. She is sought as a commentator and public speaker on criminological matters especially on prisons and vulnerable people.



Philip Gale

Professor Gale is a supramolecular chemist who is known internationally for his work on recognition and lipid bilayer transport of anionic species. This work is leading to the development of compounds that may be used as tools for the

study of transmembrane ion transport processes and may in the future be applied to the treatment of diseases caused by dysregulation of anion transport.



Mark Hoffman

Professor Hoffman works in the area of structural integrity, specifically the design of materials for high reliability in complex environments through a combination of computational modelling and investigation using an extensive mechanical property research laboratory at UNSW. Professor Hoffman's research covers fracture mechanics, fatigue, and wear and tribology from the macro- to nano-scale. He has obtained over \$17m in research and project funding and publishes extensively. He is presently Dean of the Faculty of Engineering at UNSW.



**The Royal Society
of
New South Wales**

Continued next page

New Fellows *(continued)*



Paul Jeans

Chancellor Paul Jeans has done much to extend the capacity of industry in both the Hunter and Illawarra by furthering engineering technologies and the engineering profession. Under his guidance the University of Newcastle continues to expand, offering a practical approach to both the education of future professionals but also in ensuring that its research is applied to practical outcomes.



Katrina Jolliffe

Professor Katrina (Kate) Jolliffe has made internationally recognised contributions to the discipline of chemistry. Her research focuses on the design and synthesis of molecules capable of performing specific functions for a diverse range of applications.



Emma Johnston

Professor Johnston is a leading authority in the field of coastal ecology whose world-class research, outreach and advocacy initiatives have greatly advanced both scientific and public understanding of coastal ecosystems.



Srinath Perera

Professor Perera is the only the second individual to occupy the Chair of Construction at Western Sydney University (WSU) where he occupies a critical leadership position in the School of Computing Engineering and Mathematics after holding a similar position at Northumbria University in the UK.

New Fellows *(continued)*



Josua Pienaar

Professor Josua Pienaar PhD held senior positions in both the South African and Middle East construction industry before immigrating to Australia where he is now Pro Vice Chancellor of the Higher Education Division of CQU having managed that university's Sydney CBD Campus and the online delivery of a number of its programmes.



Nicholas Schofield

Professor Schofield has conducted world-leading research on the origin of the Earth, Moon and planets; improving river health; understanding and remediating salinisation; advancing minesite rehabilitation and silvicultural practices; controlling pesticides; improving irrigation efficiency; reducing eutrophication; advancing methodologies for research priority setting and evaluation



John Roberts

Professor John Roberts was the Australian and New Zealand Marketing Academy's Inaugural Distinguished Research Award and he won the Distinguished Educator the subsequent year. He has been a Finalist in the Society for Marketing Science's Little Award three times and its Lilien Award three times.



Peter Scott

Professor Scott is a leading knowledge media researcher, was founding President of the European Association of Technology Enhanced Learning and ex-Director of the UK Open University Knowledge Media Institute and serves as Pro Vice-Chancellor (Education) at the University of Technology Sydney.

New Fellows *(continued)*

Anthony Weiss

Professor Anthony S. Weiss established and dominates the field of synthetic human tropoelastin and recombinant human elastin technologies. His discoveries span fundamental structure and function to the innovative translation of human tropoelastin



Southern Highlands Branch Lecture, 15 June 2017

Dr. Michael Birrell

“Luxor Temple: The Shrine of Amun-Re”

For more information, see http://www.royalsocietyhighlands.org.au/lectures/lectures_2017.htm

Dr Michael Birrell obtained his BA(Hons) in Archaeology at Sydney University in 1988 and subsequently received an MA and a PhD in Egyptology from Macquarie University. He is a part-time lecturer and tutor in the Ancient History Department at Macquarie University, and has taught a number of courses for Continuing Education. He has worked on numerous archaeological excavations in both Egypt and Israel, and has travelled widely in the Middle East, Asia and Europe. Dr Birrell has research interests in ancient Egyptian religion and government, and is currently writing a book on New Kingdom temple architecture.

Schedule of RSNSW Meetings 2017

Date	Event	Speaker(s)	Topics and Presentations	Location
5-Jul-17	Ordinary General Meeting	Professor Andrea Morella	Understanding Quantum Theory	Union, University & Schools Club
2-Aug-17	Ordinary General Meeting	Prof. Ann Williamson FRSN UNSW	Self Driving Cars: Will They Help?	Union, University & Schools Club
6-Sep-17	Ordinary General Meeting	Dr. Helen Mitchell Conservatorium of Music	Complexity of Music	Union, University & Schools Club
4-Oct-17	Ordinary General Meeting	Prof. Pip Patterson	Science of Social Networks	Union, University & Schools Club
1-Nov-17	Ordinary General Meeting	Pamela Griffith FRSN	Women in Art	Union, University & Schools Club
6-Dec-17	Ordinary General Meeting	Jak Kelly Award Winner	2017 Jak Kelly Award Presentation & Christmas Party	Union, University & Schools Club

RSNSW - Southern Highlands Branch 2017

Date*	Event	Speaker	Topic	Location**
15-Jun-17	Public Lecture	Dr Michael Birrell	Luxor Temple: the shrine of Amun-Re	Chevalier College, Bowral
20-Jul-17	Public Lecture	Dr Wes Stein	Solar Power Generation	Chevalier College, Bowral
17-Aug-17	Public Lecture	Hugh MacKay AO	The changing place of religion in Australia	Chevalier College, Bowral
21-Sep-17	Public Lecture	Prof Peter Schofield	Alzheimer's Disease	Chevalier College, Bowral
19-Oct-17	Public Lecture	Prof Dean Rickles	Quantum Gravity	Chevalier College, Bowral
16-Nov-17	Public Lecture	Yik Lung (Jeremy) Chan	Effects of Maternal Cigarette Smoke Exposure	Chevalier College, Bowral

*Lectures are the third Thursday of each month. **Location may change due to renovations

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