



The Bulletin 409

The Royal Society of New South Wales

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26 April 2017

For Your Diary:

18 May 2017

Southern Highlands Branch Lecture

Prof Gregg Suaning
"The Bionic Eye"

6:30 pm start

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

11 May 2017

Liversidge Lecture

Scientia Professor J. Justin Gooding
"Sensing Our World: From Glucose Sensors
to Counting Single Molecules and Cells"

5:50 pm for 6:30 pm start

Tyree Room, John Niland Scientia Bldg, UNSW
See page 8 for more details

7 June 2017

Ordinary General Meeting

Prof. Madeleine Beekman

"Are You More Intelligent than Slime Mould?"
Union, University & Schools Club, 6:15 for 6:30



Patron of The Royal Society of NSW

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

RSNSW Annual Dinner and Awards

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,
and Mrs Hurley

Distinguished Fellow's Lecture

Hon Em Prof Peter Baume AC DistFRSN

"Don't Blame the Unemployed"



For more information, see page 3

Date: Wednesday, 3 May 2017: 6:30 for 6:45 pm (seating)

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

Dress: Black Tie

Dinner: \$125 for Members and Associate Members,
\$135 for Guests and Non-Members.

Deadline for reservations: 28 April, places are limited
Reservations must be made at least 2 days in advance

Reservations: <https://nsw-royalsoc.currinda.com/register/event/34>

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

All are welcome.

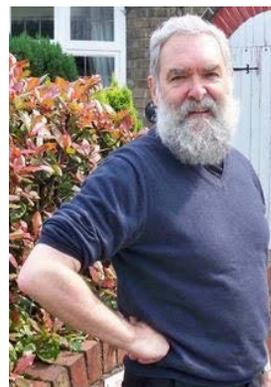
From the President

When our editor asked me to prepare my column early I was worried that there was not enough time from last month to have any particularly interesting news of our members and fellows. Not so!

Warwick Anderson FAAH, FASS, FAAHMS, FRSN, ARC Laureate Fellow and winner of the Society's 2105 History and Philosophy of Science Medal has been appointed to the Gough Whitlam and Malcolm Fraser Chair in Australian Studies, Harvard for the 2018-2019 academic year. (See p. 7 for details.)

Meanwhile we learnt over Easter of the breakthrough in molecular electronics of a group including Justin Gooding FAAS FRSN, the 2016 winner of the Walter Burfitt Prize and the 2016 Liversidge Lecture and Prize. They have made a single molecule diode attached to a silicon substrate that is stable and gives reproducible currents. (See <https://www.nature.com/articles/ncomms15056>). The paper is published in Nature Communications (Albert C. Aragonès, Nadim Darwish, Simone Ciampi, Fausto Sanz, J. Justin Gooding and Ismael Díez-Pérez, Single-molecule electrical contacts on silicon electrodes under ambient conditions, Nature Communications, 8, Article number: 15056 (2017), (<https://www.nature.com/articles/ncomms15056>).

Highlights of the April AGM and OGM were the election of all nominated Office Bearers and Councilors, including the new office of Honorary Webmaster, now filled by Christopher Bertram. We said farewell to Max Crossley and Hub Regtop, the outgoing Chair of the Southern Highlands Branch, and welcomed its new chair Ann Wood, who is no stranger to the Bulletin having provided the Southern Highlands report for some time.



Your new Council is:

President – Brynn Hibbert

Vice-Presidents – Donald Hector, Ian Sloan, Judith Wheeldon

Hon. Secretary (Editor) – Robert Marks

Hon. Secretary (General) – Herma Buttner

Hon. Librarian – Ragbir Bhathal

Hon Treasurer – Richard Wilmott

Hon. Webmaster – Chris Bertram

Ordinary Members – Erik Aslaksen, Mohammed Choucair, Desmond Griffin, John Hardie, Stephen Hill, Heinz Hora, Jim Kehoe, Bruce Milthorpe, Ian Wilkinson

Anne Wood is the Chair of the Southern Highlands Branch.

At the OGM, I was exceptionally pleased to present Margaret (Marty) Cameron with an Honorary Fellowship. The citation reads “Margaret Cameron is a supporter and benefactor of the RSNSW. She served on Council (2013 – 2015) and was Editor of the Bulletin in 2014 – 2015” Marty has also made a generous donation to the Library fund, which allowed us to obtain a copy of Barron Field's *Geographical Memoire on New South Wales* published in 1825.

Bob Clancy FRSN bid at auction and obtained a nice copy of Field's book at a very reasonable price.

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RSNSW Annual Dinner and Awards

At the dinner, the Society will present the following awards for 2016:

Clarke Medal (Geology – Professor Simon P. Turner)

The Clarke Medal is awarded each year for distinguished research in the natural sciences conducted in the Australian Commonwealth and its territories. The fields of botany, geology, and zoology are considered in rotation.

Edgeworth David Medal – Dr Muireann Irish

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.

History and Philosophy of Science Medal – Emeritus Professor Roy MacLeod

This medal is awarded each year to recognise outstanding achievement in the History and Philosophy of Science, with preference being given to the study of ideas, institutions and individuals of significance to the practice of the natural sciences in Australia

James Cook Medal – Scientia Professor David Cooper

The James Cook Medal is awarded from time to time for outstanding contributions to both science and human welfare in and for the Southern Hemisphere.

Walter Burfitt Prize – Scientia Professor Justin Gooding

The Walter Burfitt Prize consists of a bronze medal and \$150, awarded every three years for research in pure or applied science, deemed to be of the highest scientific merit. The winner must be a resident in Australia or New Zealand. The papers and other contributions must have been published during the past six years for research conducted mainly in these countries

Archibald Liversidge Research Lecture Medal – Scientia Prof Justin Gooding

The medal is awarded every two years on the recommendation of the Royal Australia Institute of Chemistry and the University of Sydney for the encouragement of research in Chemistry

Poggendorf Lecture Award – A/Prof. Andrew Robson

The Poggendorf Lecture is awarded every two to three years for research in plant biology and more broadly agriculture.



Professor Michael Kennedy MD, MB BS, FRACP

Post-Mortem Drug Studies:

What happens to drugs after death



Post mortem pharmacology is a relatively new and challenging area of science. Professor Kennedy noted that poisonings by antimony and arsenic were commonplace in the 19th century, until the development of chemical assays enabled causative agents to be identified in tissue samples from murdered individuals. Analytical techniques have advanced considerably since that time, and it is now possible to ascertain an individual's drug taking history over a period of months from a few centimetres of hair. Post mortem detection of drugs has now reached the point where laboratories routinely measure nanogram quantities of drugs from samples of blood, urine, vitreous humour in the eye, bile, gastric contents and often liver. They can also undertake analysis of hair, bone, brain and other body parts.

Michael Kennedy presented a great deal of surprising data on the changes that occur in drug concentrations in the body after death. Prior to death, the concentration of a drug in any part of the body will be a function of drug absorption, its distribution throughout the body, metabolism and elimination. After death however, when there is disruption of cellular membranes, alterations in the acidity of the blood, chemical breakdown of some molecules, as well as rapid bacterial invasion from the digestive tract, drug concentrations are seen to rise, fall or even disappear completely. Bodies that have been altered by fire, immersion in water, animal consumption, burial or by a long period of time since death each provide additional unique difficulties.

Within hours of death, bacteria such as *Escherichia coli* will have moved from the intestinal tract and invaded most of the body. Many drugs such as the benzodiazepines are metabolized by these bacteria, and this lowers their concentration and can even make them disappear entirely. Bacteria can also have the reverse effect and metabolise glucose to alcohol, with alcohol levels at times being above the driving limit of 0.05 g/100 mL. This is a very important factor when considering the sobriety or otherwise of airline pilots or train drivers who have died in accidents. Cocaine, in contrast, is broken down by residual esterase activity in the blood, causing concentrations to fall after death.

Michael Kennedy pointed out the case of Diane Brimble who died on a cruise ship in 2002. In this case, the substance under question was gamma hydroxyl butyrate (GHB), also known as “fantasy”, “grievous bodily harm” and by many other street names. GHB is a normal neurotransmitter whose synthesis continues after death with the result that it will be detected in post mortem blood at concentrations that can resemble drug overdoses. These GHB concentrations were an important factor in the court proceedings.

Judicial decisions rely heavily on the interpretation of post mortem drug concentrations by forensic clinical pharmacologists. Every death has unique features, and while the blood concentrations are important, they form only a fraction of the many factors that need to be considered. Large
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2017 Events

Royal Society – Southern Highlands Branch

Date*	Event	Speaker	Topic	Location**
18-May-17	Public Lecture	Prof Gregg Suaning	The Bionic Eye	Chevalier College, Bowral
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

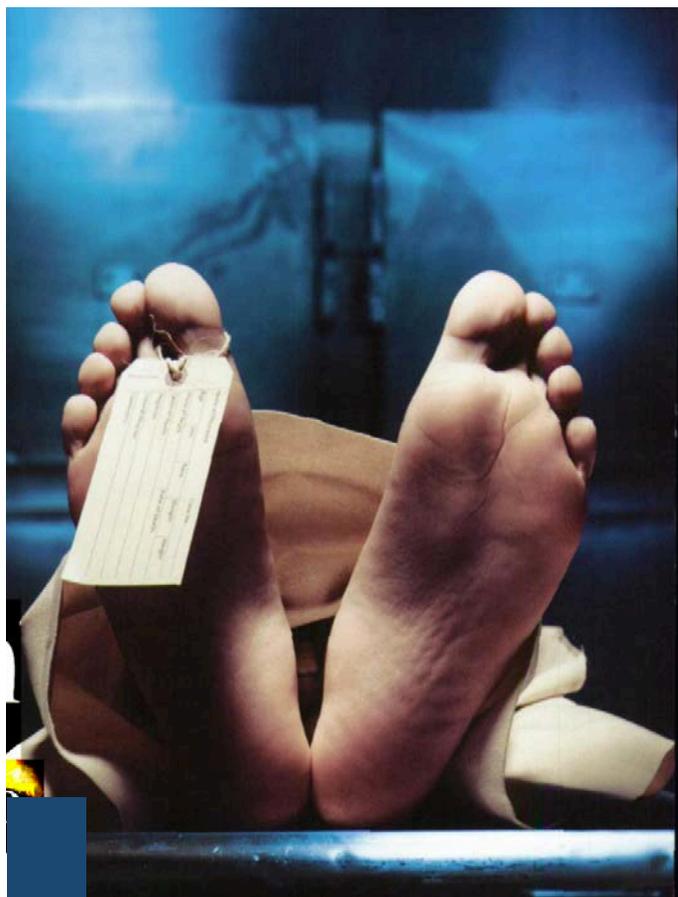
*Lectures are the third Thursday of each month. **Location may change due to renovations

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Post-Mortem Drug Studies

published tables stating therapeutic, toxic and lethal concentrations of many drugs are of limited use in interpreting post mortem findings. One reason for this is that therapeutic ranges are derived from living subjects and are almost always obtained from plasma. Post mortem samples are almost always obtained from blood. Because of factors such as blood/plasma partition ratios and other considerations, post mortem concentrations cannot be directly compared with ones that have been obtained in patients or in normal subjects participating in scientific investigations of the drug.

The Southern Highlands audience of 55 persons was most appreciative of this intriguing and unusual lecture. Professor Kennedy closed his lecture with the comments that as technology advances and the evidence base expands, interpretation of results will become more precise. If interest and funding is sustained, it will soon be very difficult for any drug related death, toxicity or poisoning to go undetected.



Anne Wood FRSN

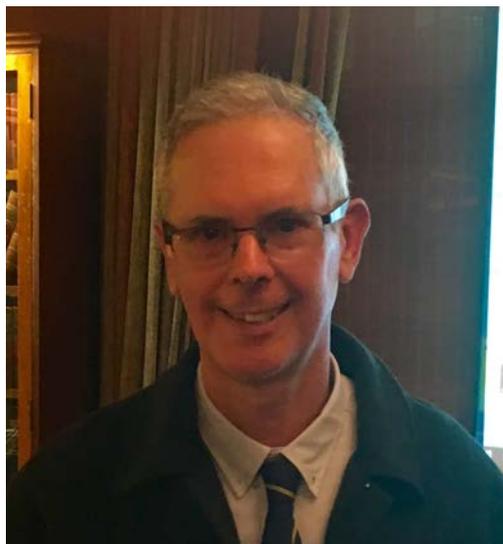
Report of the 1252nd OGM

Wednesday, 5 April 2017

“The Science of Beer”

Dr Greg Organ

Sensory Specialist for Lion Pty Ltd



Dr Greg Organ, Sensory Specialist for the brewer Lion, presented “The Science of Beer”. Following a description of beer’s four ingredients – yeast, water, malt and hops – he provided an overview of the steps of the brewing process. First, there is the soaking and sprouting of the barley followed by roasting for the malt. Second, wort production uses 90,000-litre kettles for boiling the mashed malt with sugar and hops. Third, the wort is fermented, and, fourth, the resulting beer is filtered and pasteurised, ready for filling barrels, cans, and bottles, at the rate of 900 bottles per minute.

Following this overview, Dr. Organ focussed on the fundamentals of sensory science and the role of each of the senses plays. He emphasised that, unlike year-to-year variations in wine, beer consumers expect their beer to always taste the same. Consequently, Lion has rigorous quality control program in which expert testers repeatedly sample each batch of beer. This sensory evaluation includes the beer’s aroma, taste, aftertaste, texture, and appearance. Aroma is the dominant contributor to flavour. For taste, we distinguish between sweet, sour, salty, bitter, and umami, which has been described as the source of brothy or meaty sensations. Texture includes the mouth feel, body, astringency, and carbonisation.

The testers themselves are carefully selected and rigorously trained. Even so, testers are more

sensitive than others to different aspects of the beer. Thus, they cross-check each other and undergo repeated testing themselves to ensure that they are consistent. Commonly, a triangle test is used to determine whether tasters can accurately recognise differences. In this test, the taster is given three glasses of beer, two being the same and one being different.

Dr. Organ also explained some of beer chemistry, e.g. the use of yeast-derived esters, the Maillard reaction, and oxidation. Beer itself is 99.9% sugar free; the calories come from the alcohol. Lion does not add preservatives, but beer is pasteurised. During the follow-up questions, Dr. Organ reported that producing zero- and low-alcohol beers has proved difficult, because extracting the alcohol by processes such stopping the fermentation, warming up and/or reverse osmosis had also extracted flavour.

In order to enjoy your beer, Dr Organ advised: keep it cold, drink it fresh, and keep it away from bright light. He also noted that green bottles were more susceptible to being adversely “light struck” than brown bottles.



Liversidge Lecture – A joint RACI and RSNSW event

“Sensing Our World: From Glucose Sensors to Counting Single Molecules and Cells”

Scientia Professor J. Justin Gooding, FAA, FISE, FRSN, FRACI, FRSC

5:50 pm light refreshments for 6:30 pm start

Thursday, 11 May 2017,

Tyree Room, John Niland Scientia Building, UNSW

Schedule of RSNSW Meetings 2017

Date	Event	Speaker(s)	Topics and Presentations	Location
3/05/2017	Annual Dinner	Prof. Peter Baume AC DistFRSN	Distinguished Fellows Lecture: “Don’t Blame the Unemployed” Annual Dinner and 2016 Award Presentation	Union, University & Schools Club
7-Jun-17	Ordinary General Meeting	Prof. Madeleine Beekman University of Sydney	Are You More Intelligent than Slime Mould?	Union, University & Schools Club
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 University of New South Wales	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

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President's Report

The book, in fact, includes four papers that appeared in the 1822 *Transactions of the Philosophical Society of Australia*, which was the predecessor to the Society's *Journal and Proceedings of the Royal Society*, which started in earnest in 1867.

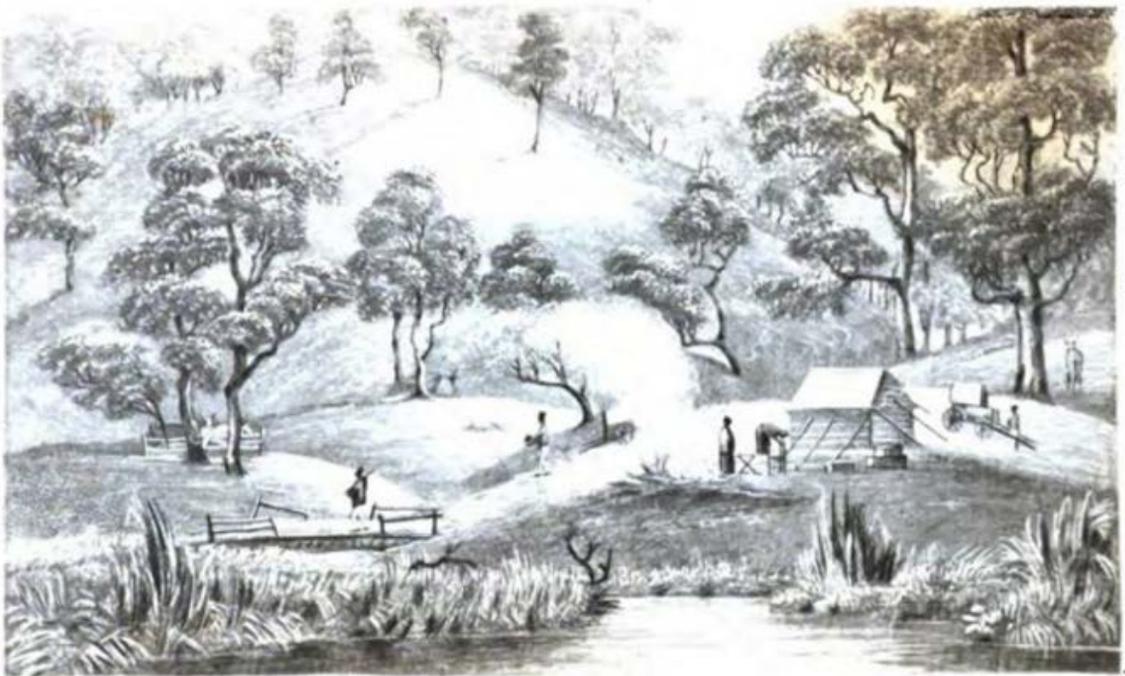
I read out part of the Preface which has this delightful reflection on the politics of the day: "Such of them as are part of the *Transactions of the Philosophical Society of Australia* are printed by the permission of their respective authors; for I am sorry to add, that that infant society soon expired in the baneful atmosphere of distracted politics, which unhappily clouded the short administration of its President, the present Governor of New South Wales [Sir Thomas Brisbane]. Let me hope that it is only a case of suspended animation, and that our little society will be resuscitated by the new colonial government; ... "

A couple of weeks ago I had the pleasure of calling on the Governor of NSW, His Excellency General The Honourable David Hurley AC DSC (Ret'd) to tell him of the Society's plans for the year. Once again His Excellency offered to host the Four Academies and RSNSW Forum and a reception on the evening before. This year, the forum which is entitled "The future of rationality in a post-truth world" will be held on Wednesday 29th November at Government House. Registrations will open in good time, and unlike last year there will be only one registration for the reception and forum.

I look forward to seeing many of you at the Annual Dinner on Wednesday May 3rd. (See page 1 for details.)

As usual, please write with comment and suggestions to president@royalsoc.org.au.

Brynn Hibbert



Campbell's River NSW. Frontispiece to *Geographical Memoires on NSW*.

The text of the book can be found at <http://gutenberg.net.au/ebooks13/1304421h.html>,

Society Participates in the March for Science

Fellows and members of the Royal Society of New South Wales joined thousands of others in Sydney and approximately 500 other locations around the world in the “March for Science” on Saturday, 22 April. According to its website, “The March for Science is the first step of a global movement to defend the vital role science plays in our health, safety, economies, and governments.”

In advance of the March, the Society’s President, Emeritus Prof. Brynn Hibbert sent the following letter of support to *The Sydney Morning Herald*, where it appeared in abridged form on 19 April, along with another letter of support from Distinguished Fellow Prof. Eugenie Lumbers.

The letter states: At its meeting in March the Council of the Royal Society of New South Wales, the oldest learned society in the Southern Hemisphere, passed the resolution “The Society supports the principles upon which the “March for Science” is based and encourages Fellows and

Members of the Society to participate in it.” Like Professor Field of the Australian Academy of Science, the RSNW Council “strongly supports US scientists who have established the March for Science”, but unlike the Academy, we will be on the Australian March itself. Having thought about and discussed the issues we cannot believe that turning out on the streets of Sydney will somehow brand us a “detached elite”. In fact seeing real people, who happen to be scientists, sufficiently concerned about the fate of our country and world might bring it home that we are far from nerdy folk who never get out of the lab. Professor Johnston has said that coming out onto the streets shows that there is something very important at stake. Indeed we believe what is at stake is not just jobs and research grants for Australian scientists, but everyone’s lives and futures.

Yours sincerely
Brynn Hibbert



Some signs, Fellows, and Members at the March.

L to R: Mike Archer, Chris Bertram, Des Griffin, and Ian Wilkinson