



The Bulletin 396

The Royal Society of New South Wales

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29 February 2016

OPEN LECTURE & 1241th OGM

Wednesday, 2 March 2016

Dr. Len Fisher

**“How to Win an IgNobel Prize and Other
Adventures in Communicating Science”**



In 1999, Dr. Len Fisher was awarded an IgNobel Prize for using physics to work out the best way to dunk a biscuit. He wanted to help make science more accessible to non-scientists. Showing how a scientist might think about familiar activities seemed to provide an effective avenue for this wider communication. However, there are now doubts whether this and other approaches to wider communication are largely preaching to the converted. With the anti-science movement gaining ground in many parts of the world, and with scientific advice to governments often being ignored for the sake of political expediency, perhaps it is time for a rethink. In this talk, Dr. Fisher will discuss the problems that he and other science communicators face. With the help of the audience, he will explore the directions that such a rethink might take. *(Go to the last page for details about Dr. Fisher.)*

Union, Universities, & Schools Club, 25 Bent St, Sydney

6:00 for 6:30 pm, Welcome drink at 6:00 pm

Fellows & Members \$5; Guests, \$20

Please note dress code: jacket and tie

All are welcome.

To register for the event and dinner afterward, please go to

<https://nswroyalsoc.currinda.com/register/event/16>

or email the Society at royalsoc@royalsoc.org.au.

For Your Diary:

Southern Highlands Branch Special Event

Dr Christian Heim & Dr Caroline Heim
“An Afternoon with Chopin and
George Sand”

The Performing Arts Centre,
Chevalier College, Bowral
1:30 pm, Saturday, 12 March
See page 3 for further details

Joint Meeting with the Australian Institute of Physics Prof. Ron Grunstein

“From Snoring to Somnambulism –
The Mystery of the Sleeping Brain”
6-7 pm, Wed, 16 March,
Trinity Grammar School
See pp. 7-8 for further details

AGM & 1242nd OGM

Dr. Donald Hector

Presidential Address
5:30 pm for 5:45 pm start
Wednesday, 6 April 2016
Union, University & Schools Club
25 Bent Street, Sydney
*See last page for a summary of
Events scheduled so far for 2016*

Patron of The Royal Society of NSW

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



From the President

The Society certainly is off to a great start in 2016! At the first public lecture of the year at the Union University and Schools Club there were presentations by three of the four 2015 Royal Society of NSW Scholarship winners (the first presented before Christmas as the Jak Kelly Award winner). As usual, these were outstanding pieces of work presented by particularly talented postgraduate students. The work was diverse (pure maths, biology, and theoretical physics), eminently understandable and delivered a powerful message that scientific discovery and innovation in Australia is in good hands if these young people are any indicator.

The annual Four Societies Lecture is coming up soon, this year hosted by the Royal Society of NSW. The topic, on energy policy, is a particularly

important one and will be delivered by one of the Society's Distinguished Fellows, Professor Bob Clark.

As I mentioned in my report last month, the annual general meeting will take place in the first week of April and the Council would like to encourage anyone in the Society who is interested in contributing either on Council or committees to put their name forward. There is a great deal of enthusiasm about the Society's programme, given our recent successes. If you would like to discuss how you might contribute, please contact me or any of the current Council members. Nominations for Council membership need to be received in early March to allow time for them to be circulated with the meeting notice for the AGM.

We were delighted to learn during February that the Governor would like to host the Royal Society of NSW and Four Academies Forum again this year and planning has commenced for this event.

I look forward to seeing you at the forthcoming meetings. It's great that we are off to a good start and looking forward to another successful year. As always, I am easily contacted by email at president@royalsoc.all.au and would like to hear from you.

Don Hector



RSNSW Scholarship Award Ceremony. (L-to-R) **Yevgeny Stadnik** (UNSW) "Manifestations of Dark Matter ..."; **Adrian W. Dudek** (ANU) "Problems and Prime Numbers"; Dr. Donald Hector, President of the Society; **Charles Foster** (University of Sydney) "How Old Are Flowers?"

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Southern Highlands Branch Special Event: “An Afternoon with Chopin and George Sand”



1:30 pm, Saturday, 12 March,
The Performing Arts Centre,
Chevalier College, Bowral



Presented by:
Dr. Christian Heim &
Dr. Caroline Heim

Frederic Chopin’s turbulent relationship with the nineteenth century fiction writer George Sand is told through his music and her writing. Featuring Christian Heim on piano and Caroline Heim playing the notorious “George” Sand.

Dr Christian Heim

Christian Heim is a specialist doctor who held positions in several Australian universities as a lecturer in Music. Christian studied music with Peter Sculthorpe and also in Vienna, Paris and New York. As a Churchill fellow, he studied the healing uses of music in European hospitals. His original music and theatre works have been performed in Australia and New York and he has published on the benefits of music for dementia sufferers. His CD, *Prayer Dances* (Move records) can be heard on ABC classic FM.

Dr Caroline Heim

Caroline Heim holds a doctorate in Theatre Studies and is a lecturer at the Queensland University of Technology and a freelance theatre critic for *The Australian* newspaper. She studied acting in New York and worked for 7 years on US stages winning a Drama League Award and receiving critical acclaim from *The New York Times*. Her first book *Audience as performer: the changing role of audiences in the twenty-first century* was published by Routledge in August. Both Caroline and Christian have produced theatre productions in New York, Sydney and Brisbane.



**Report of 18 February 2016 Meeting
Royal Society
Southern Highlands Branch**

Speaker: Professor Charley Lineweaver
School of Astronomy and Astrophysics and Earth Sciences, ANU

**Topic: Death and Nothingness. Why did Death Evolve?
Why is there Something Rather than Nothing?**



In this entertaining and intriguing lecture, the 75 attendees in the Chevalier Performing Arts Centre were presented with Professor Lineweaver's controversial conclusion that the evolutionary origin of death is intimately entwined with the origin of sex. A situation he likened to a Faustian bargain.

Life emerged about 4 billion years ago and for the first 2 billion years, bacterial binary fission was the only form of reproduction. There was no programmed death, no lifespan as we know it today. There was no difference between the germline cells and somatic cells. Thus, life forms were immortal, just as bacteria and archaea are today. However, it must be noted that they could, and can be, killed.

Lineweaver showed a video of bacteria reproducing, demonstrating the relationship between binary fission and the immortality of bacteria. In the sense that each bacterium divided into two, and in turn those two divided into two more, with the process ongoing, it is clear that bacteria do not die as we know it. Binary fission ensures the immortality of bacteria.

Continued on next page

After the first 2 billion years, sexual reproduction emerged. Evolving along with it was programmed death, and the development of germline/somatic cell differentiation. It should also be noted that these developments are closely related to aerobic metabolism and the rise of oxygen about 2.5 billion years ago. Charley Lineweaver emphasized that while programmed cell death seems uncontroversial amongst biologists, programmed death of an organism certainly lies in the controversial arena.

The majority of biologists support the proposition that the lifespan of an individual eukaryote is the result of unavoidable obsolescence, that is, wearing out or breaking down. In contrast, Charley Lineweaver is clearly of the view that the lifespan of an individual eukaryote is the result of an evolved, adaptive built-in obsolescence.

A particularly fascinating feature of this lecture was a video of the life cycle of Dictyostelium, a cellular slime mold which could be described as an intermediate being, having phases of its lifecycle in both single cell form and multicellular form, and demonstrating both sexual and asexual reproduction at different stages of the cycle. In the feeding stage of the lifecycle, solitary haploid amoebas engulf bacteria. Then, during sexual reproduction, two haploid amoebas fuse and form a zygote which becomes a giant cell by consuming haploid amoebas. After developing a resistant wall, the giant cell undergoes meiosis followed by several mitotic divisions. The resistant wall then ruptures releasing new haploid amoebas.

When food is depleted, hundreds of amoebas congregate in response to a chemical attractant and form a sluglike aggregate which signals the beginning of asexual reproduction. Clearly seen is the formation on the slug of a stalk from which spores are released in a process known as stalk altruism. In a favorable environment, amoebas emerge from the spore coats and begin feeding. The life cycle of this intermediate creature is then complete.

As for us, the possibilities open to Dictyostelium as regards sexual and asexual reproduction are not possible. We are largely somatic individuals who, once germline/somatic cell differentiation evolved, have had to pay a very high price, the price of programmed death, to ensure the immortality of our germline through our testes and ovaries. It is easy to see why Professor Charley Lineweaver draws the analogy of a Faustian bargain.



Anne Wood

Dictyostelium colony in process of aggregation (left) and resulting Pseudoplasmodium "slug" (right). (Source: Bruno in Columbus, 2008, Wikipedia Commons)



Joint Meeting of
Australian Institute of Physics &
The Royal Society of New South Wales



“From Snoring to Somnambulism –
The Mystery of the Sleeping Brain”

Professor Ron Grunstein

*Professor of Sleep Medicine, Woolcock Institute of Medical Research,
University of Sydney and Royal Prince Alfred Hospital, Head, Sleep
and Circadian Research Group, Woolcock Institute of Medical
Research and NHMRC Senior Principal Research Fellow*

Wednesday 16th March 2016 @ 6:00 PM

At the

Trinity Grammar School, Latham Theatre, 119 Prospect Road, Summer Hill



Summary of Talk

Sleep is a complex behaviour that is pivotal to good health and survival. Sleep medicine is a relatively new field driven by the science of sleep measurement and understanding of the biological basis of many sleep disorders and their treatments. Current data suggests 20% of people have insufficient sleep length, 5-10% have chronic insomnia with major daytime dysfunction and up to 40% of middle-aged men and 20% of women have moderate to severe sleep apnea. Sleep loss in animals results in impairment of the glymphatic system’s ability to clear the brain of “toxins” and there is increasing evidence of the impact of sleep loss on neurodegeneration in humans. Restricted sleep hours or sleep apnea accelerate cardio-metabolic dysfunction and results in human error and crashes. Our work has focused on a number of areas. Translating knowledge of respiratory and sleep pathophysiology into new treatments for sleep apnea, integrating psychology into implementing better management of sleep disorders and determining impact of sleep loss on chronic disease such as cardiovascular disorders obesity and insulin resistance. We have established new research tracks into the neurobiology of insomnia and sleep apnea, molecular chronobiology, sleep and pain, and sleep in neurodegenerative disease. As well we provide clinical care to patients with a wide range of sleep disorders, some common and some rare and bizarre. Over the past decade, there has been pivotal research increasing understanding of the sleeping brain that assists in better caring for our patients. I will highlight some of these disorders and their treatments.

(Go to next page for more information)



Ron Grunstein is Professor of Sleep Medicine, Woolcock Institute of Medical Research, University of Sydney and senior staff physician in Respiratory and Sleep Medicine at Royal Prince Alfred Hospital, Sydney. He heads the NHMRC Centre of Clinical Research Excellence (NHMRC CRE) for Translational Research in Sleep and Circadian Neurobiology (“NeuroSleep”) and has been a Practitioner Fellow of the NHMRC since 2002. From 2016, he will be a Senior Principal Research Fellow of the NHMRC. He leads the Sleep and Circadian Research Group, Woolcock Institute of Medical Research and has been lead investigator for three successive NHMRC CREs since 2004 and is currently a program leader in the Co-operative Research Centre for Alertness, Safety and Productivity. Professor Grunstein was President of the Australasian Sleep Association (1994-1997) and the President of the World Sleep Federation (2007-2011) which represents over 12,000 researchers and sleep clinicians globally.

Detailed Schedule for Wednesday, 16th March 2016

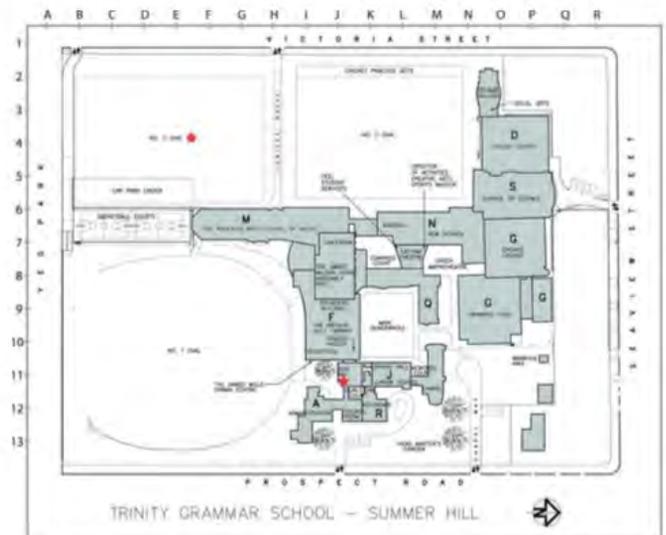
• **6:00 – 6:30: Refreshments**
Latham Theatre

• **6:30 – 7:30: Lecture**
Latham Theatre

• **8:00 pm: Dinner with
Prof. Grunstein at Maranello’s
Restaurant, 24 Lackey Street,
Summer Hill**

E-mail Dr Fred Osman
**(fosman@trinity.nsw.edu.au) if you will
be able to join us for dinner.**

**Parking: There is complimentary
parking available in the school grounds.
Entry to car park is located on Jubilee
Drive off Victoria Street under No. 2
Oval. The Latham Theatre is located
close to the main parking (see map
below).**



Letter to the Editor

Innovation – The Role of Engineering?

“Innovation” has always had a good sound to it; something promising, like the goose that laid the gold eggs. And now we have the report entitled “National Innovation and Science Agenda” < <http://innovation.gov.au>>. The Report skips from “innovation and science” to “business creating new products” and “tech entrepreneurs” without missing a beat, ending with the promise that \$1.1 billion of taxpayers’ money “will drive smart ideas that create business, growth, local jobs and global success.”

Despite this dazzling vista, the Report contains no mention of engineering. Turning scientific knowledge into commercially successful products is driven mainly by engineers. The reason even small countries like Sweden and Switzerland are successful in creating new products is their strong engineering culture. The absence of engineering in the Report is all the more puzzling as it identifies that our problem is not with science and research. The Report assures us that “Australians have great ideas – both from our world class research and from traditional Australian ingenuity,” that Australia is “Home to some of the highest quality scientific research organisations in the world” and is “punching above our weight” in science.

The association implied in “innovation and science”, or in the even more popular “science and technology,” promotes a dangerously skewed picture of the role of engineering in the industry-research collaboration. A symptom of this picture is the turn of engineering education towards the image of science education, with a lack of

emphasis on the skills needed to create commercially successful products, to the extent that many lecturers and professors have little or no industrial experience. An analogy would be a professor of cardiovascular surgery who has never performed an operation.

By ignoring engineering, the Report also neglects the prospects for innovation in Australian engineering; that is, in the way engineers are employed and how their capabilities are used. It is generally accepted that many new jobs driven by innovation will be in areas of “high” technology, e.g., information technology, biotechnology, mechatronics, robotics, and the like. However, the Australian engineering profession is dominated by civil/structural engineering, disciplines that are embedded in the construction industry. Moreover, a significant proportion of engineers in Australia do work that could better be done by technicians, leading to disillusionment. Thus, young engineers are going overseas to seek a larger range of interesting opportunities to use their talents.

Sincerely,

Erik W. Aslaksen, PhD, FRSN

Opinions expressed in letters to the editor are not necessarily those of the Royal Society of New South Wales.

Subject to conventional editorial discretion, letters received by the 15th of each month will be published on or about the 24th of that month. Letters of 250 words or fewer are preferred.

Schedule of RSNSW Events 2016

Date	Event/Location	Speaker	Topic
16-Mar-16	Joint Meeting with AIP Trinity Grammar School	Prof. Ron Grunstein	"From Snoring to Sommambulism – The Mystery of the Sleeping Brain"
06-Apr-16	AGM + 1242nd OGM Union, University & Schools Club	Dr. Don Hector	Presidential Address
TBA	Clarke Memorial Lecture Union, University & Schools Club	TBA	TBA
04-May-16	Annual Dinner Union, University & Schools Club	Prof. Eugenie Lumbers	Science Policy and University Research
01-Jun-16	1243rd OGM Union, University & Schools Club	Prof. Peter Hiscock	Archaeologists in Film
06-Jul-16	1244th OGM Union, University & Schools Club	Prof. Itai Ianev	From Sand and Rice Bubbles to Earthquakes and Volcanos
03-Aug-16	1245th OGM Union, University & Schools Club	Mr Jimmy Turner, Royal Botanic Garden	TBA
07-Sep-16	1246th OGM Union, University & Schools Club	Mr Richard Neville, State Library of NSW	History of the Society
05-Oct-16	1247th OGM Union, University & Schools Club	Mr Rob Young	WB Clarke Biography
02-Nov-16	1248th OGM: Jak Kelly Award Union, University & Schools Club	Prof. E. James Kehoe	Courses for Horses: Advances in Instructional Design
17-Nov-16	AIP Postgraduate Awards Day Slade Theatre, University of Sydney	TBA	TBA
07-Dec-16	1249th OGM: Jak Kelly Award Union, University & Schools Club	TBA	TBA

Southern Highlands Branch - 2016 (So Far)

Date	Event/Location	Speaker	Topic
18-Feb-16	Lecture (See Below) The Performing Arts Centre, Chevalier College, Bowral	Dr. Charley Lineweaver	Death and Nothingness: Why did Death Evolve? Why is there Something Rather than Nothing?
12-Mar-16	Special Event The Performing Arts Centre, Chevalier College, Bowral	Dr Christian Heim and Dr Caroline Heim	An Afternoon with Chopin and George Sand
17-Mar-16	Lecture The Performing Arts Centre, Chevalier College, Bowral	TBA	TBA
21-Apr-16	Lecture The Performing Arts Centre, Chevalier College, Bowral	Prof. Gordon Parker	TBA

Future lectures and other events will be scheduled, usually for the third Thursday in each month

(Continued from Page 1 – Dr. Len Fisher)

Dr. Fisher specialises in the science of food, biophysics, and nano-engineering and was, for many years a senior scientist at CSIRO. He now splits his time between Australia and the UK. While he is still involved in fundamental research, he is primarily a writer, speaker and broadcaster, working to make science accessible by showing how scientists think about the problems of everyday.

He has made many radio and television appearances and published feature articles, including three series for BBC Radio 4 (*The Science of DIY*, *The Sweet Spot*, and *Redesigning the Body*), appearances on the ABC's *Lateline*, *The Science Show*, and *Ockham's Razor*.

Dr. Fisher uses light-hearted projects on how scientists tackle the questions of everyday life. These include the physics of biscuit dunking (leading to the IgNobel Prize), the absorption of gravy by a roast dinner, whether hot or cold water freezes faster in a bird bath in winter, the formula for the perfect cheese sandwich, and how best to stir porridge

His popular science books have done much to uncover some of the mysteries science to a general audience. These include: *Weighing the Soul: The Evolution of Scientific Ideas* (2004); *Rock, Paper, Scissors: Game Theory in Everyday Life* (2008); *The Perfect Swarm: The Science of Complexity in Everyday Life* (2009); and *Crashes, Crises and Calamities: How We Can Use Science to Read the Early Warning Signs* (2011).