



# The Bulletin 369

The Royal Society of New South Wales

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August 2013

## Future Events

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

### September

**Wednesday 4 September 2013**

**6:00 pm for 6:30 pm**

**1214th OGM**

**Open Science**

**Delivered by:**

Dr Mat Todd

**Union, University and Schools Club**

25 Bent St, Sydney

Members and Fellows: \$5.00

Non-members: \$10.00

**Wednesday 2 October 2013**

**6:00 pm for 6:30 pm**

**1215th OGM**

**Astrobiology: the latest from 'Curiosity'**

**Delivered by:**

Professor Malcolm Walter UNSW

**Union, University and Schools Club**

25 Bent St, Sydney

Members and Fellows: \$5.00

Non-members: \$10.00

Southern Highlands Branch

**Thu 12 Sep 2013**

**NB. 2nd Thu in month, not the usual 3rd Thu**

**6:00 pm for 6:30 pm**

**Dark Matter**

**Delivered by:**

Professor Ken Freeman

**The Performing Arts Centre**

Chevalier College, Bowral

Members and Fellows: \$5.00

Non-members: \$10.00

Wednesday 4 September 2013

## Open Science

Presented by Dr Mat Todd

Union, University & Schools Club, 25 Bent St, Sydney City

**6:00 for 6:30 pm**



Science today is typically practiced by groups working in isolation, frequently with barriers to the sharing of data that arise from our need to protect intellectual property. Papers frequently do not disclose negative results, and the danger of being "scooped" often arises because we are unaware of what others are doing.

The open source software community works in a different way, sharing data and ideas freely as part of distributed, meritocratic projects where anyone can participate.

In the last few years we have successfully applied these principles to science. We showed that the discovery of an improved method for the preparation of an important drug was accelerated by the project taking place completely in the public domain.

Finding effective medicines is hard. The traditional model is one based on competition and some level of secrecy. New moves by the pharmaceutical industry, called "open innovation", are operating along similar lines. Are we quickly discovering the medicines society needs? No. In the open source model of drug discovery all data and ideas are freely shared and anyone may participate at any level. This mechanism avoids patents. We recently started the world's first open source drug discovery project (for malaria) that has already identified highly promising leads.

Some technological and psychological barriers to working in the open arena will be described, as well as some of the thrills.

Dr Todd obtained a PhD in organic chemistry from Cambridge University in 1999 and subsequently worked at the University of California, Berkeley, Cambridge University, University of London and, since 2005, the School of Chemistry at the University of Sydney.

His research interests include the development of new ways to make molecules, particularly chiral molecules using new catalysts, as well as metal complexes that do unusual things when they meet biological molecules or metal ions.

He has a significant interest in open science and how it may be used to accelerate research, particularly in relation to the discovery of drugs and catalysts. He is chair of The Synaptic Leap, a non-profit organisation dedicated to open biomedical research, and he currently leads the Open Source Malaria consortium. In 2011 he was awarded a NSW Scientist of the Year award in the Emerging Research category for his work on open science. Dr Todd is a Sydney Ambassador of the Open Knowledge Foundation.

**Dress code: jacket and tie.**

### 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

# Report on the 1213rd Ordinary General Meeting

Held on Wednesday, 7 August 2013 at the  
Target Theatre, Powerhouse Musuem

## How numbers came to rule the world:

the impact of Luca Pacioli, Leonardo da Vinci and the merchants of Venice on Wall Street

By Jane Gleeson-White

At the 1213th meeting of the Society at the Powerhouse Museum on Wednesday, 7 August 2013, Jane Gleeson-White outlined the argument she presented in her best-selling book *Double Entry*, the history of the impact of double-entry accounting on the development of the capitalist model that has shaped Western civilisation.

Until the 13th century, the prevailing arithmetic system used in Europe was the Roman system which largely precluded complex operations such as multiple cache on and vision. During the Renaissance, the Hindu-Arabic number system and algebra were introduced. One major figure in this was Luca Bartolomeo de Pacioli, a Renaissance monk and mathematician, a colleague of Piero della Francesca and Leonardo da Vinci.

Pacioli wrote a number of major texts on mathematics and was one of the great influences on the development of maths during the Renaissance. He lived for a time in Venice and the merchants there were quick to introduce his system of double-entry book-keeping to record their mercantile transactions. (The double-entry system requires there to be two accounts for every transaction: one a credit account, the other a debit account. For every creditor there must be a debtor; and for every debtor there must be a creditor.

Although merchants had recorded their transactions from Phoenician



Jane Gleeson-White at the Powerhouse Museum

times, these records were largely narrative in nature. The merchants of Venice were able to abstract and summarise financial performance into a single accounting system that was independent of the goods being transacted. Over the next couple of centuries the double-entry bookkeeping system was adopted first throughout Europe and into the rest of the world.

Gleeson-White argues that this innovation was fundamental to the development of capitalism and the consumer-oriented economic system that prevails worldwide today. It led to the system of national accounts that is used by governments that distils all human activity into a single number: gross domestic product or GDP. She further argues that double-entry book-keeping was a major influence on the scientific revolution and that together these led to the

industrialisation of the world and the unsustainable stress that it is currently facing. These claims are not uncontentious and there was a



Question time at the 1213rd OGM

lively discussion after the talk.

Jane's talk was recorded by the ABC and is expected to be broadcast on Radio National's *Big Ideas* in September.

**D**onald Hector

# The Poggendorff Memorial Lecture

Held on Tuesday, 13 August 2013 at  
Charles Sturt University

Professor Geoff Gurr

After a hiatus of 20 years, the Poggendorff Lecture was delivered in conjunction with Charles Sturt University, Orange, on Tuesday, 13 August 2013. The lecture was delivered by Professor Geoff Gurr, a biologist and entomologist and Professor of Applied Ecology at Charles Sturt University, where he specialises in the utilisation of natural solutions to agricultural pests to partially or completely replace synthetic pesticides. The thrust of Professor Gurr's work is that by integrating diverse approaches, including biological, cultural and chemical controls, hazards to humans and the environment can be minimised and, in many cases, productivity of agricultural systems can be improved. The principle underlying this is the acknowledgement that agricultural landscapes benefit from biodiversity and that this has significant benefit in terms of ecosystem services such as pollination of crops, reducing erosion, reducing contamination of water courses with excess nutrients and biological control of crop pests.

Generally, the greater the biological diversity, the fewer the pests. This is because the natural activity of predators, parasites and pathogens maintain potential pests' population densities at a lower level than would occur in their absence. In the case of monocultures, this balance is often upset, enabling the density of pests to get to plague proportions. The widely accepted agricultural response to this is to use synthetic pesticides which often exacerbate the problem by further reducing biological diversity. In turn, the levels of artificial agents required to control pests increases with the consequent damage to the environment.

Professor Gurr described an example in China where rice production was being



Professor Gurr delivering The Poggendorff Lecture

severely affected by a particular species of plant hopper. This species had evolved resistance to insecticides and was substantially reducing rice yield. Professor Gurr's group investigated the use of bund walls used to retain water in rice fields to plant vegetation selected because it was a host to predators for this species of plant hopper. They also introduced another species of plant hopper that did not affect rice yield and attacked the pest species. In addition, they planted species of flowers that attracted parasitic wasps that attacked the pest species. The result was a substantial reduction in the pest species, leading to significantly increased rice yield, with secondary benefits, for example increase in the frog population.

There is a common misconception that this type of biological control can have negative impact on yield but a meta-analysis of 286 projects demonstrated an average 80% increase in yield. The "green" approach to pest management potentially could double food production in 10 years: the challenge is

to identify the value of ecosystem services and how to utilise them.

Historically, agricultural science has focused on agricultural production and environmental science has focused on protecting the environment – these have coexisted almost as separate disciplines. If food security is to be accomplished in the next few decades, there needs to be an integration of agricultural and environmental protection practices. China has been very active in this. 24% of agricultural land in China has been allocated some form of conservation status. Similarly in Europe, there is a trend towards farmers being encouraged to consider themselves as stewards of the land, rather than owners.

Regrettably, Australia is not leading the way in this area. Nonetheless, there are examples of this type of approach such as "alley farming" that provide shelter for natural species and encourages biological diversity thereby reducing significantly the requirement for synthetic pesticides.

*(Continued on page 5)*

# Sub-Committees

To support the Council in achieving its large range of activities, Council has revised or set up several sub-committees. You are invited to express interest in joining Council members on the Committees to further the relevant Committee's objectives.

If you would like to assist the Council through one or more of these Committees, please contact Emma in the Royal Society's office ([royalsoc@royalsoc.org.au](mailto:royalsoc@royalsoc.org.au)) or Colin Bradley, Honorary Secretary ([secretary@royalsoc.org.au](mailto:secretary@royalsoc.org.au)).

## Events Committee

Develop and maintain an annual Events Program for the Society  
Objectives:

Develop an interesting and diverse Program of Events that supports and promotes the aims of the Society and attracts a good to large audience

Provide events covering a wide range of topics

Oversee the staging of each event

Ensure the financial viability of each event and the Events Calendar as a whole

### Required Skills:

Networks amongst the Science, Art, Literature and Philosophy fields and a strong understanding of the types of events that will attract audiences; event management

## Finance and Risk Committee

Identify and manage the governance, organisational, financial, OHS and other risks of the Society, including managing the annual financial statement process

### Objectives:

Ensure appropriate and adequate internal controls to ensure the members monies are spent in an economic, ethical, effective and efficient so that the society can provide sustained benefits to its members

Provide regular financial reporting to Council in relation to the Society finances

Annually provide financial statements that are unqualified and externally auditable.

Provide financial strategies, analysis and advice to the Council  
Develop a Risk Management Plan to identify, manage and mitigate the potential risks of the Royal Society of New South Wales

Manage the strategies included in the Risk Management Plan in accordance with the agreed schedules included in the Plan

Ensure a healthy and safe environment for staff, councillors, volunteers and members in their engagement with society

### Required Skills:

Understanding and knowledge of financial statements and auditing process

Ability to provide analysis of financial data and develop financial strategies

Understanding of organisational risks and their identification and management

Some understanding and awareness of Work Health and Safety Principles

An understanding of Human Resources

## Historical Assets Committee

Identify the historical assets of the Society and their value, and preserve and document these assets

### Objectives:

Provide a Historical Assets Plan for identifying and cataloguing the assets that makes formal recommendations for preserving and managing the assets of the Royal Society of New South Wales

Progress the Plan once approved by Council in accordance with the schedule in that Plan

### Required Skills:

Extensive knowledge within the Science, Art, Literature and Philosophy fields, an understanding of the historical significance of a range of assets, and ability to quantify and realise the value of these assets

## Marketing Committee

Role: Identify and manage the marketing activities of the Royal Society of New South Wales

### Objectives:

Develop a Marketing Plan(s) and, in accordance with that Plan and in liaison with relevant Council members, manage the marketing of

Events

Membership

Awards Applications and

Potential sources of income

Effective, ethical and economical management of Marketing based expenses

### Required Skills:

Networks amongst the Science, Art, Literature and Philosophy fields and knowledge of effective means to develop the Society's markets

Ability to develop, implement and report against marketing strategies and plans

## Publishing Committee

Manage the production of the publications of the Royal Society of NSW

### Objectives:

Produce the Society of New South Wales' publications in accordance with an agreed schedule:

Journal

Monthly Bulletin

Other publications as agreed

### Required Skills:

Networks amongst the Science, Art, Literature and Philosophy fields and ability to invite and encourage contributions to the publications

Members are encouraged to be more involved in the Society. Please contact Emma in the Society's office ([royalsoc@royalsoc.org.au](mailto:royalsoc@royalsoc.org.au)) or Colin Bradley, Honorary Secretary ([secretary@royalsoc.org.au](mailto:secretary@royalsoc.org.au)).

# Southern Highlands Branch

Report of August Meeting 2013

## Climate Science Forum

**What are the main factors affecting global temperature, and how do we know how much is contributed by each?**

**How reliable are the forecasts of global warming?**

Dr Michael Raupach, CSIRO Fellow; CSIRO Marine and Atmospheric Research,

Mr William Kininmonth, previously head of the National Climate Centre    Moderated by Dr Ken McCracken, foundation Director of the CSIRO Office of Space Science and Applications

Michael Raupach explained how the earth's climate has changed over the last century and a half, with the global average surface temperature increasing by about 0.8 deg C, and that it is very likely that greenhouse gas emissions (chiefly CO<sub>2</sub>) from human activities are the main cause. He went on to explain the scientific basis for this statement, and gave specific figures for the contribution made by various man-made and natural factors. He explained also that although many of the climate mechanisms were well understood, nevertheless climate and climate models were highly complex, and there were still some uncertainties. In particular, he noted that the sensitivity of the climate to CO<sub>2</sub> forcing was estimated at between 1.5 and 4.5 deg C per doubling of atmospheric CO<sub>2</sub> concentration. He warned that this rather large uncertainty could work in both directions, ie. that future climate change could be more modest or more severe.

William Kininmonth agreed that CO<sub>2</sub> did contribute to global warming, but went on to explain that the climate models did not make adequate allowance for the acceleration of the hydrological cycle with rising temperature, and hence that the models underestimate surface evaporation and overestimate the climate sensitivity to CO<sub>2</sub>. He estimated that with proper allowance for the rate of evaporation, the climate sensitivity to CO<sub>2</sub> would be around 0.7 deg C per doubling of atmospheric CO<sub>2</sub> concentration. He also explained that the global climate is sensitive to ocean circulations, which are inadequately represented in the models. He then demonstrated how variations in tropical ocean circulation account for much of the recent global air temperature variations, and suggested that the recent rising temperature trend may in fact be just a multi-decadal oscillation.

There were then a number of questions, both from the audience and from questions that had been submitted, as requested, in advance of the forum. Some included figures from published papers, this adding greatly to the content and impact of the subsequent answers. Both speakers gave detailed answers, with some points of agreement and some points of disagreement. Both speakers are to be congratulated for a highly informative evening, and – in what is such a politically sensitive subject - for sticking rigorously to the actual science of climate.

Attendance was 73. A number of attendees expressed their appreciation for the high quality of the speakers and of their presentations. There were also requests for the speakers' presentation material to be made available. Both speakers agreed to this, and the material will be published on the branch website when it is received.

**M**ike Jonas

*(Continued from page 3)*



### Paperless Bulletin?

If you have the capability to read the Bulletin digitally please email the office.

royalsoc@royalsoc.org.au.

### New Members of the Society

We welcome the following new member to the Society:

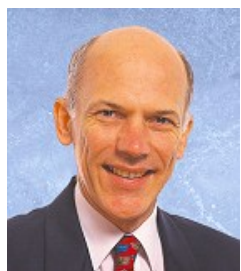
- David Harris Faerber

For information about membership please contact the Society's office or visit the Society's website or contact Emma at royalsoc@royalsoc.org.au

We encourage members to introduce new members to the Society.

Professor Gurr concluded by observing that the world cannot double food production with the current agricultural practices – they are simply unsustainable. If we learn to value ecosystem services, in particular recognising the importance of biodiversity, doubling food production, a requirement to feed the projected world population is both achievable and potentially beneficial to the global ecosystem.

# From the President



August was a busy month. On Wednesday 7 August, Jane Gleeson-White presented her talk “How numbers

came to rule the world: Luca Pacioli, Leonardo da Vinci and the merchants of Venice on Wall Street” at the Powerhouse Museum. The event was very well attended and there was a lively discussion after the lecture. (Jane’s lecture will be broadcast on ABC Radio National’s “Big Ideas” on Tuesday 3 September.)

The following week, on Tuesday 13 August the Poggendorf Lecture was presented in conjunction with Charles Sturt University in Orange. The lecture had not been presented since 1993, so the Council was keen to re-establish it and what better place in Orange, where Walter Poggendorf had so much influence. The lecture was presented by Professor Geoff Gurr, Professor of Applied Ecology at Charles Sturt and was well attended by a large group of faculty members and members of the Orange community. One of the mainstays of the Orange branch has

been Professor Maree Simpson but she recently informed the Council that unfortunately she is not able to continue beyond this year and that the branch may close. Such was the interest at the Poggendorf Lecture that it now looks almost certain that the branch will continue and that the Society will gain a number of new members from the Orange community.

As mentioned last month, the Society’s 2013 awards process is underway, with Professor Brynn Hibbert of UNSW chairing the awards committee. As happened in 2012 for the first time, the Chief Scientist and Engineer of NSW, Professor Mary O’Kane, has agreed to chair an advisory panel to provide the awards committee with an independent assessment of award submissions. The advisory panel will include the Deans of Science of all the NSW-based universities. Full details of how to nominate candidates for awards are available on our website at <http://royalsoc.org.au/awards/awards.htm>.

Also as mentioned briefly last month, the Council is in the midst of a substantial review of the Rules and

Bylaws and expects to call a general meeting of the Society within the next couple of months to consider some necessary changes to modernise the Society and to better place it to attract members. We believe these changes will enable us to increase our membership base and put us in a position to pursue alliances with other like-minded organisations. We anticipate this will add substantial value to members.

And don’t forget forthcoming meetings in Sydney include (on Wednesday 4 September) Dr Matthew Todd talking about the concept of open science – an important and topical issue amongst the academic community and, in the Southern Highlands, (Thursday 12 September) Professor Ken Freeman talking about dark matter.

It has been encouraging over the last few months to see a surge of interest in the Society with quite a number of new membership applications. We need to keep the momentum going!

**D**onald Hector

## Contact your office bearers

<b>Dr Donald Hector President</b>	<b>02 9484 9007</b>	<b>Em. Prof Heinrich Hora Vice President</b>	<b>02 4627 7769</b>
<b>Mr John R Hardie Vice President</b>	<b>02 9036 5282</b>	<b>Em. Prof D. Brynn Hibbert Vice President</b>	<b>02 9398 9134</b>
<b>Mr Colin Bradley Hon. Secretary</b>	<b>0421 478 670</b>	<b>Prof. Michael Burton Hon.Secretary (Editorial)</b>	<b>02 9036 5282</b>
<b>Mr Shakti Ram Hon. Treasurer</b>	<b>02 9036 5282</b>	<b>Dr Frederick Osman</b>	<b>0418 444 477</b>
<b>Mr Brendon Hyde</b>	<b>02 9498 3520</b>	<b>Ms Janette Searle</b>	<b>02 9036 5282</b>
<b>Mr Hub Regtop (SHB rep)</b>	<b>02 4872 4713</b>	<b>Dr William Kneprath</b>	<b>02 9581 6000</b>
<b>Professor Richard Banati</b>	<b>0408 121 362</b>	<b>Mr David Beale</b>	<b>02 9036 5282</b>
<b>Em. Professor Roy MacLeod</b>	<b>02 9036 5282</b>		

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