



# The Bulletin 356

of

The Royal Society of New South Wales

ABN 76 470 896 415

ISSN 1039-1843

June 2012

## Future Events

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

### July

**Wednesday 4 July 2012 at 6:00pm**  
for a 6:30 start.

***“Autoimmune diseases: obesity, nutrition, exercise and eating disorders”***

delivered by Professor Ian Caterson  
*Union, Universities & Schools Club*  
*25 Bent St, Sydney City*

**Please note dress code: Jacket and tie**  
Details at right.

### Dirac Lecture

Thursday July 19 at UNSW with Nobel Prize winner Prof Brian Schmidt — details coming soon.



Professor Brian Schmidt

## Southern Highlands Branch

### Advance Notice

**Saturday 20 October 2012**

### Where Art and Science Meet

Delivered by Dr Thomas H. Rich, Senior Curator, Museum Victoria.

## Wednesday 4 July 2012 1201st General Meeting

***“Autoimmune diseases: obesity, nutrition, exercise and eating disorders”***, delivered by Professor Ian Caterson.



Join us at the lovely Union University and Schools Club in the city for a fascinating talk, *“Autoimmune diseases: obesity, nutrition, exercise and eating disorders”*, delivered by Professor Ian Caterson.

Professor Ian Caterson AM is the Boden Professor of Human Nutrition at Sydney Medical School, University of Sydney. He is a recognised expert in insulin resistance, its causes, mechanisms and effects and also on obesity, its epidemiology, causes and management. He currently undertakes research in these areas, funded by the National Health and Medical Research Council.



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<https://www.facebook.com/RoyalSoc>

Attendees will need to register beforehand. Contact Emma in the Society's office on 02 9036 5282 or by email at [royalso@royalsoc.org.au](mailto:royalso@royalsoc.org.au).

The Society will be hosting a welcome drink on this occasion from 6 o'clock until 6:30 pm and dinner is available after the lecture at \$85 a head.

Registration and payment (for those who want to have dinner) must be made by Monday 2 July.

Union University and Schools Club,  
25 Bent street (cnr Bent and Phillip Streets), Sydney.

**Please note the Club has a strict dress code of jacket and tie for gentlemen and appropriate similar attire for ladies.**

## New Members of the Society

We welcome the following new members to the Society:

- Colin Bradley

For information about membership please contact the Society's office or visit the Society's website at

<http://royalsoc.org.au/membership/membership.htm>

## 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

## The Transit of Venus



Several Members of the Society were able to participate in one of the Transit of Venus viewing events held at Sydney Observatory on 6 June, thanks to the kindness of the Powerhouse Museum which manages the Observatory. Three sessions were held to cover the first and second contacts, the mid-point, and the third and fourth contacts, and good viewing was possible during breaks in the rather inclement weather. This was only the second time in our lifetimes that it was possible to view this event, the previous one occurring in 2004. We were also very fortunate to be able to see some of the telescopes and other equipment used in the 1874 viewing from Sydney. H C Russell, the then Government Astronomer, was very involved in the affairs of the Society at the time and published extensively in our *Journal and Proceedings*.

Several speakers augmented proceedings this time with talks related to the event, including one from Paul Brunton from the State Library of NSW who spoke of the historical background to Cook's voyage to Tahiti to view the 1769 transit.

The day was capped off by the Society's own event, **our 1200<sup>th</sup> Ordinary General Meeting, also held at the Observatory that evening, when one of the Observatory's curators, Dr Andrew Jacob, gave a full overview of the Transit phenomenon to a packed audience.**

John Hardie

## Report on our 1200th Ordinary General Meeting

"The transit of Venus: what we did and what we saw"

delivered by Dr Andrew Jacob

Early in the 17th century, Johannes Kepler predicted that every 120 years or so Venus would pass between the Earth and the Sun and on each occasion, there would actually be two transits about seven years apart. This was a particularly important prediction: Kepler's third Law had provided the means to accurately calculate the relative distances of each of the planets from the sun but there was no way to determine the absolute distance between them.

By observing a transit of Venus from different points on the Earth, observing the times at which the transits start and finish and the exact location of the observation, it is relatively simple to calculate the absolute distance between the Earth and Sun (referred to as one Astronomical Unit). From Kepler's third Law it is then possible to calculate the distance of the other planets from the sun but, more importantly, it then enables the calculation of distant astronomical



bodies using the Astronomical Unit as a baseline.

The Society was fortunate to be able to mark the transit of Venus at Sydney Observatory with a talk given by Dr Andrew Jacob, the Observatory's assistant curator. Not only is the transit of Venus an important and rare astronomical event, astronomy and, in particular, the transit of Venus, play an important part in both the history of Australia and the history of the Society.

The first predicted transit was in 1631 but there is no record of any successful observation is being made. The next, in 1639, was observed by Jeremiah Horrocks who was able to calculate the Astronomical Unit to an accuracy of about 50%. The next pair of transits were in 1761 and 1769. Lieutenant James Cook was ordered to sail to Tahiti to observe the 1769 transit which he did successfully and the rest, as they say, is history.

The next pair of transits in the 19th century (1874 and 1882) were observed using much more sophisticated instruments, including photography and these observations enabled very precise estimates of the Astronomical Unit.

The first of the 21st-century transits in 2004 was noted as an interesting phenomenon but not of any particular scientific importance. However, in the few years between 2004 and the 2012 transit, the discovery of hundreds of "exoplanets" (planets orbiting far-away stars) led astronomers to realise that precise observations of the phenomena caused by the transit of Venus could allow a much more precise and detailed characterisation of exoplanets.

It is notable that the Royal Society of NSW traces its origins to 1821 when the Philosophical Society of Australasia invited the Governor, Sir Thomas Brisbane, to become its first president. Brisbane was a keen astronomer and made important contributions to the science both in Australia and when he returned to Scotland.

Donald Hector

## Donate to our Library Fund or to our Student Scholarship Program by 30 June and claim a tax deduction this financial year

The Society has a large and priceless library collection dating back to the seventeenth century, but most of it is in boxes awaiting evaluation, repair or revival. We aim to have all our collection on display and available to researchers within a reasonable time frame and your donation can help achieve this worthy goal.

In addition, we offer student scholarships every year to encourage young researchers to aspire to the highest levels in their chosen field and to provide them with an opportunity to present their research to a general audience in order to have it better understood and appreciated.

Every year the Society needs to raise funds from a variety of sources, including members, the public and through sponsorship to ensure its continued existence. Donations to our Library Fund and to our Scholarship Fund are tax deductible over \$2.

Your help and that of your friends and colleagues is greatly appreciated.

**You can make your donation by contacting our office on:**

**Phone:** (02) 9036 5282

**Fax:** (02) 8215 4660

**or send a cheque to the Society:** Made out to: 'Royal Society of NSW \_\_\_\_\_ Fund' (insert 'Library' or 'Scholarship' as appropriate).

Post to: The Royal Society of NSW,  
Building H47, University of Sydney NSW  
2006

## From the President



The Council elected at the AGM in April has now met twice and we have agreed on our programme for the remainder of this year.

We are conscious that we have limited resources and we have decided to focus on three important areas: building our membership numbers; re-energising our events programme; and continuing to publicise our awards, some of which are among the most prestigious scientific awards in Australia.

Membership of the Society has been steady or even declining for some years. We are by no means unique in facing this challenge – there has been an extraordinary increase in the number of activities available to people to participate across a very wide range of special-interest areas. The Council believes that if we have events and publications that have broad public appeal, together with our awards, there is a great deal of value that we can offer potential members. One of the problems currently is that too few people know about the Society and its activities.

In April, we had the second Royal Society of NSW Forum, in conjunction with the ABC and the Powerhouse Museum. It was well attended and the entire proceedings were broadcast on the ABC's "Big Ideas" programme (if you missed it, you can listen to it on the ABC's web-site). We intend to make The Forum an annual event and continue to develop sponsorship and support networks to publicise it.

Our June meeting, on Wednesday 6 June, the date of the transit of Venus, was held at Sydney Observatory, again in conjunction with the Powerhouse Museum. We were fortunate to have the Assistant Curator of Sydney Observatory describing the events that the Observatory ran during the day. These were attended by a number of Society members.

On Thursday 19 July, the Society will host, in conjunction with the University of New South Wales, the next Dirac Lecture. The speaker will be Professor Brian Schmidt, the 2011 Nobel laureate for physics. I encourage you to come along for this important event.

For the last couple of years, attendance at monthly meetings has been mixed. We believe that part of the problem over the last year or so has been the venue. The Council has decided to hold some monthly meetings at a CBD location at the Union University and Schools Club. The first of these will be on Wednesday 4 July, at which Professor Ian Caterson AM will be talking about obesity and diabetes, one of the biggest public health challenges that not only Australia but the world faces.

We expect to have fewer monthly meetings (perhaps only five or six a year) but more "signature" meetings held in conjunction with other like-minded organisations. We also intend to extend our public outreach, publicising far more widely our existing activities, such as the formal awards and lectures and seeking media coverage of these.

We think we have an exciting programme for the remainder of this year and look forward to bringing you further information as we finalise the details for these events.

**D**onald Hector

**Do we have your address correct ?**

Email the Society  
[royalsoc@royalsoc.org.au](mailto:royalsoc@royalsoc.org.au)

# Southern Highlands Branch

## Report of May 2012 Meeting

“Coal Seam Gas (CSG): What Does Science Tell Us About The Impacts?”

Delivered by Associate Professor Bryce Kelly

Connected Waters Initiative affiliated with the National Centre for Groundwater Research and Training, School of Biological, Earth and Environmental Sciences, University of New South Wales

Billions of dollars have already been spent on the development of Coal Seam Gas (CSG) exploration and infrastructure development. Extracting the gas from coal will clearly be part of our future in Australia, particularly in New South Wales and Queensland. If mistakes are made in extracting the CSG, then there are good reasons to be concerned about the resulting environmental impacts. These include groundwater contamination, aquifer interference, small earthquakes and contribution to greenhouse gases.

Bryce Kelly described how at each CSG production site there will be different impacts, depending on the manner in which the coal at that location has been formed. He gave examples of a variety of processes of coal formation. For example the black Permian coals in NSW and the Bowen Basin in QLD were formed 300 to 250 million years ago, where plate tectonic movements resulted in crustal extension along the now eastern portion of Australia. As the land subsided, large basins formed and extensive cold climate peatlands developed. The Walloon seams in QLD however are Jurassic (200 to 145 million years old) and formed in lakes surrounded by humid tropical forests.

Locally the coals in QLD underwent very different processes compared to those in NSW.

CSG is produced by the technique of hydraulic fracturing (fracking), which involves injecting water, some sand, and small quantities of additives into the well under extremely high pressures. The water helps to expand the fractures in the coal seams and deliver the sand and chemicals. The grains of sand help to prop open the fractures and improve the longer term capacity to extract gas.

The fracking chemicals or additives used depend on the company, local laws and the geological setting. Most CSG companies list major fracking fluid constituents on their websites.

Additives used include acids, salts, gelatine and enzymes. These chemicals help change the surface tension between the gas and coal substrate, enhance the viscosity of fluid movement along the fractures, dissolve minerals in the fractures, stabilize the clays and prevent corrosion. Depressurisation should draw the fracking chemicals towards the production well. Bryce Kelly noted that should any of these additives leak into adjacent aquifers, then the longer term ramifications are not yet known. He did add however that scientifically validated cases of fracking chemical contamination of groundwater due to shale or coal gas production are very rare.

Earthquakes too can be caused by injection techniques similar to those used in the fracking process. Kelly emphasised the management implications required in these situations, namely continuous seismic and borehole stress measurements near CSG developments that are close to residential areas.

The large audience of ninety was clearly pleased with the presentation which was objective and highly informative, without the usual overtones of emotion and politics that so many of them had experienced in recent local rallies in the Southern Highlands. They had been presented with the view that CSG is a very acceptable source of energy for the future, provided the development of management techniques and scientific research into the process are ongoing.

**A** nne Wood

### Membership Reminder

Is your membership up to date?

The Society's office will be posting out reminder notices for membership payments.

Please direct enquiries to the Society's office.

## Contact your office bearers

<b>Dr Donald Hector President</b>	<b>02 9484 9007</b>	<b>Prof. Heinrich Hora Vice President</b>	<b>02 4627 7769</b>
<b>Mr John R Hardie Vice President</b>	<b>02 9363 9630</b>	<b>Prof. D. Brynn Hibbert Vice President</b>	<b>02 9398 9134</b>
<b>Mr David Beale Hon. Treasurer</b>	<b>02 9498 1503</b>	<b>Dr Donald Hector Hon Secretary (Editorial)</b>	<b>02 9484 9007</b>
<b>Mr Tony Nolan OAM Hon. Librarian</b>	<b>0417 270 664</b>	<b>Brendon Hyde</b>	<b>02 9498 3520</b>
<b>Mr Clive Wilmot (SHB rep)</b>	<b>02 4886 4199</b>	<b>Dr Frederick Osman</b>	<b>0418 444 477</b>
<b>Professor Richard Banati</b>	<b>0408 121 362</b>	<b>A/Prof Maree Simpson (C/W Branch)</b>	<b>02 6365 7818</b>
<b>Dr William Kneprath</b>	<b>02 9581 6000</b>		

The Bulletin is issued monthly by the Royal Society of New South Wales  
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