



ABN 76 470 896 415

ISSN 1039-1843

August 2009

# The Royal Society of New South Wales

## Bulletin and Proceedings 328

### Future Events 2009

Lectures in Sydney are held in Lecture Room 1, Darlington Centre, University of Sydney at 7 pm on the first Wednesday of the month with drinks available from 6 pm.

Wednesday 2 September 2009 7pm

### Weird Animal Genomes and Sex

**Professor Jenny Graves,**  
Head, Comparative Genomics  
Research Group, Australian  
National University

Wednesday 7 October 2009 7pm

### The SKAMP Project - a telescope reborn to look back in time

**Prof Anne Green**  
Head of School of Physics  
University of Sydney

### Southern Highlands Branch

Meetings are held on the third Thursday of each month in the Drama Theatre at Frensham School, Mittagong (enter off Waverley Parade), at 6.30pm.

### next talk

Thursday 17 September, at 6.30pm

Saturday 5 September, at 5pm

### Harmonious Revolutions

Clubbe Hall at Frensham School,  
Mittagong - see p. 4



### Lecture 2 September 2009, Darlington Centre at 7pm

### Weird Animal Genomes and Sex

**Professor Jenny Graves, Head, Comparative Genomics Research Group, Australian National University**  
**Director, ARC Centre of Excellence for Kangaroo Genomics,**  
**Professorial Fellow, Department of Zoology, University of Melbourne**

Whether a baby develops as a boy or girl depends on a single gene on the Y chromosome. In humans and other mammals, females have two X chromosomes, but males have a single X and a Y that bears the testis-determining gene (SRY) that induces testis differentiation and switches on hormones that masculinize the embryo. The human X is a middle-sized, ordinary chromosome, though it is rich in genes involved in reproduction and intelligence (often both). But the tiny Y is a genetic wasteland – full of genetic junk and bearing only 45 genes, most active only in testis. How did human sex chromosomes get to be so weird?

Our strategy is to compare the chromosomes, genes and DNA in distantly related mammals and even birds and reptiles (which have completely different sex determining systems). The genomes of Australia's unique kangaroos and platypus, now being completely sequenced, are a goldmine of new information. Kangaroo sex chromosomes reveal the original mammal sex chromosomes, while the bizarre platypus sex chromosomes (more related to those of birds) tell us that our sex chromosomes are relatively young.

Our work shows that the human X and Y evolved from an ordinary chromosome pair just 150 million years ago. It is degrading progressively and I predict it will disappear in just 5 million years. If humans don't become extinct, new sex determining genes and chromosomes must evolve, maybe leading to the evolution of new hominid species.



In the 1970s, Jenny stumbled on the potential of Australia's unique fauna (mammals, birds, and reptiles) to study genetic structures and regulation systems conserved from the earliest vertebrates through to humans. By exploiting the genetic diversity of Australia's unique mammals, her group have gained insights into mammalian sex, development, genetic disease, defence mechanisms, and species survival. Her lab's unique contributions to understanding the evolution, function and organization of the mammalian genome have had major impacts on current thinking in the field.

Jenny has been an enthusiastic advocate for comparative genomics. She set up and directs the ARC Centre of Excellence for Kangaroo Genomics, which has secured a key role for Australia in the sequencing and analysis of the kangaroo genome. Her contributions to science have been recognized by election to the Australian Academy of Science in 1999, a Centenary Medal in 2002 and the Macfarlane Burnet Medal in 2005. She is a 2006 Laureate of the L'Oréal-UNESCO Awards For Women in Science.

### Patrons

**Her Excellency Ms Quentin Bryce AC**

**Governor-General of the Commonwealth of Australia**

**Her Excellency Professor Marie Bashir AC CVO Governor of NSW**

## What will the Great Barrier Reef look like in 2050?

**Associate Professor Peter Ralph, Executive Director Plant Functional Biology & Climate Change Cluster, University of Technology, Sydney**

**Lecture delivered for the Society's 1173rd Ordinary General Meeting**

Corals are wimps that live in marine deserts. Associate Professor Peter Ralph explained to a very interested audience at the August OGM that corals have been almost wiped out at least five times in the geological past, mostly due to climate change and changes in ocean chemistry. However, so far they have always bounced back and present reefs have exceptional biodiversity with 25% of all fish species and 32 of the 34 known animal phyla (rainforests, those terrestrial hotspots of biodiversity, have only 9 animal phyla).

The key question is: can they survive global warming? Peter started by giving a quick refresher course on Coral Biology 101. Corals are tripartite symbiotic communities of Cnidarian polyp animals (that create the hard calcium carbonate skeleton), special photosynthetic algae that live inside the polyps (zooxanthellae) and diverse consortia of marine bacteria (whose importance is often greatly underestimated – they probably act as a scalable immune system and may play a role in coral bleaching).

The photosynthetic algae provide about 90% of the community's energy requirements and this is what enables the corals to live in marine deserts where the water lacks nutrients. However, the algae only provide "junk food" (carbohydrates, amino acids, glucose and glycerol) and the small amount of nutrients provided by water are essential to the coral's ability to grow or resist environmental stress.

Their exact concentration is critical. Too much, and seaweeds will proliferate, suffocating the corals (unless there are lots and lots of fish to keep down the seaweed). Too little, and the corals will slowly starve and be wiped out by the first environmental stress. And corals are remarkably sensitive to stress. Just about any disturbance can upset the delicate balance between the polyps and their photosynthetic algae. The polyps then expel their zooxanthellae and the coral bleaches, turning a ghostly white. Bleaching can be caused by: elevated

temperatures (more than 2°C above the summer mean), low temperatures, exposure, eutrophication, pollution (herbicides are particularly dangerous), bacteria, freshwater dilution, hyper-saline water, sedimentation, turbid waters or acidification.

Without their zooxanthellae, the polyps starve to death within a month. Fortunately healthy coral can often recover from a bleaching event by taking in new zooxanthellae.

The precise mechanism that causes coral to expel their zooxanthellae is still an open question. Peter outlined the eight leading theories, including his group's work on symbiosis breakdown (the details of the exchange between zooxanthellae are still obscure and host bacteria are probably more important than is commonly recognized).

Global warming is coming, so we need to know "can corals adapt?". Recent work by Peter's group suggests that some corals can. Polyps reproduce only every 4 years, which is much too slow to cope with climate change. However, zooxanthellae reproduce every two weeks. Large scale experiments by Nik Császár, one of Peter's students, have shown that some Great Barrier Reef corals can adapt to water at even 32 °C.

So there is a real prospect that if the water temperature does not rise too rapidly, most of the inshore and middle reef corals may survive. Things look much more problematic for the outer reefs.

A critical factor in the ability of a reef to adapt is the health of the reef, particularly the health of its fish ecosystem. Rising temperatures favour macroalgae, such as seaweeds. If the fish stocks are healthy then the fish devour the extra seaweed and the corals have a fighting chance to adapt. However, if the fish have been depleted, say by over fishing, then the seaweed take over, suffocating the coral and killing the reef (this has already happened to most of the Caribbean reefs).

Fortunately the fish stocks of the Great



Barrier Reef are in good shape. So there is a reasonable prospect that the reef will survive global warming, although it will have to change to do so. As will we all.

Jim Franklin,  
Councillor, Activities Coordinator

## New Members

Seven new members were announced at the July meeting of the Society:

Anthony Walter Muscio - Full Member  
Stephen William Toth - Full Member  
Henry James Blackboro - Full Member  
Robert Bruce Lavender - Full Member  
Eva Papp - Full Member  
David Brynn Hibbert - Full Member  
Jonathan Cramb - Associate

We welcome them into the Society.

## RACI News

Weekly E-News  
(including forthcoming events)



of The Royal Australian Chemical Institute Inc. NSW Branch are obtainable on their web site at <http://www.chem.unsw.edu.au/raci/News.html>

## From the President

The high level meeting with the Sydney Harbour Foreshore Authority about Science House, which I referred to in my last column, was most successful. Robyn Stutchbury and I met with its CEO, Robert Domm, and their General Manager, Property, Sharon Roes, on 21 July. We were encouraged by their positive response to our plan for the building, and the shared sense of community engagement necessary to make the project viable and sustainable. There was a general understanding that both SHFA and the Society could work together for their mutual benefit in order to see the building utilised for science in the long term.

The President of the Geographical Society of NSW, Professor Kevin Dunn, has offered support to our cause and to see how the two Societies can work together on this project.

Last week saw the possible beginnings of a new Branch of the Society in the Bathurst/Orange area. I have held initial discussions with the Dean of Science at Charles Sturt University and some of his colleagues with the view to planning for a new Branch to begin some time this year. I am proposing that the launch of the Branch be held in



conjunction with the next Poggendorff Memorial Lecture, traditionally given on topics related to agriculture, horticulture or viticulture. I will keep you posted as this new venture unfolds.

Finally, the Society has taken a giant leap and changed the cover of its *Journal and Proceedings* for the first time in over 30 years. All the same information that appeared on the old cover appears on the new one, so no librarians will get upset. Look out for your new *Journal* when it arrives in a week or two and let us know what you think. We want to make sure all Members' views are heard.

John Hardie

## Your chance to help preserve the Society's collection at Prestons

### Background

The Royal Society of NSW currently has a considerable portion of its library of books, monographs and bound serials and other printed material in commercial storage in Prestons near Liverpool.

The Prestons collection comprises twelve shrink-wrapped pallets with some 25 cartons on each. During 2006 John Hardie, David Branagan, Robyn Stutchbury and Peter Tyler examined a sample of about 25 per cent of this collection as part of the work undertaken through the 2006 Community Heritage Grant funded by the Australian Government and managed by the National Library of Australia. The grant was awarded in order to assess the state of conservation and the significance of the Society's collection. There was sufficient funding to engage the services of professional historian, Dr Peter Tyler and scientific scholar, Dr David Branagan. The Prestons investigation revealed that some of the rarest and most significant items of the Society's collection are located at this site, where they are totally inaccessible to researchers. Further assessment and/or management of the collection is impeded by the lack of a complete inventory or listing of the Prestons material.

In his report, David Branagan stated:

"Approximately 9000 volumes, mainly of

older serials, are presently in temporary storage at Prestons .... Many of these were retained in Sydney when the bulk of the serials, some 30 000 volumes, was moved to the University of New England in the 1980s. It is clear that the presently stored volumes were considered by the Society's then librarian and Council to be important, in every sense of the word, and worthy of retention at the Society's head office in Sydney. These volumes were included in a summary listing this author made of the Society's holdings, when they were housed at the Macquarie University site in 2000. It was not possible, in the limited time available for the recent inspection, to carry out a complete check of these volumes in storage, so the range of age and condition still need to be assessed. However a brief statement is given of the sampling carried out there with a listing of the sample items examined."

Because the cartons are housed in a warehouse alongside perishable goods, there is serious risk of damage by rodents or insect pests, despite the precautions taken by the property owner. Further, the Royal Society material is taking up useful space in the warehouse. It is therefore a matter of considerable urgency that this material be relocated and properly catalogued."

And to quote Peter: 'Which is why we are going back there three years later!'

In March 2009, at the instigation of Royal Society President, John Hardie, and with his direct involvement, the project was revived. John, along with Vice-President Robyn Stutchbury, Society Historian Peter Tyler and former Mitchell Librarian Elizabeth Ellis, agreed to continue as a voluntary operation the work on the collection begun in 2006. In addition to listing box contents, there was also some judicious culling of items which were considered to have no future place in the collection.

The group has now spent two sessions on 23 March and 20 May 2009 working through boxes stored on two pallets. It is estimated that the contents of more than four pallets still remain to be listed. Depending on the number of people involved, this would take between four working days (with the present complement) or two working days (if the number of people working on the project is increased to eight).

A meeting was held on 1 July 2009 at the Royal Society rooms, Darlington, with John Hardie, Robyn Stutchbury, Peter Tyler and Elizabeth Ellis present. The purpose was to discuss progress to date and future directions of the project.

### Issues

If the number of workers can be increased, then two teams of four members are suggested to provide

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## Southern Highlands Branch

### Report of July Meeting

*Crooks, Cranks and Charlatans* by Brynn Hibbert

A particular topic which has fascinated Brynn Hibbert for many years has been the history and analysis of perpetual motion machines, and that was the subject he selected to present to the forty attendees at the Royal Society Southern Highlands Branch meeting on the chilly Highlands evening of July 16.

Professor Hibbert began his lecture asking why people hanker after perpetual motion and other scams. Claims for perpetual motion were presented as long ago as 1518, when Anthony Zimara produced his plans for a machine which was basically a windmill attached with long strings to bellows. The idea behind this machine was that the wind would turn the windmill, which in turn would operate the bellows, which then would produce more wind to turn the windmill! It was not difficult for Brynn Hibbert to find numerous other examples of claims for perpetual motion from 500 years ago to the present time.

Reasons why people throughout the ages have wanted to believe in perpetual motion devices were varied. Some wanted cheap energy, others wanted to see established scientists proved wrong, some wanted to get rich, while others saw such ideas as possibilities for never having to die. Whatever the reason, Perpetual Motion machines have always had willing believers who were prepared to ignore the laws of thermodynamics in a quest for the impossible.

It was clear to Brynn Hibbert that scams involving perpetual motion machines could readily generate income for the fraudster. Some have sold the plans for such machines for other people to make, then when the machine does not live up to expectations, blame the purchaser for not having followed the plans correctly. Others try patenting bits of the machine, then sell the rights to the invention. People have made money by exhibiting their machine and charging admittance, while others have even managed to obtain grants to study the effect of their invention further.

Professor Hibbert's advice to the audience was to "run while you have the chance" if the answer to any of the following questions is YES:

- Is it claimed that there is more energy coming out of the device than going in?
- Has God asked the inventor to solve the World's energy problems?
- Have they been working at this for more than ten years?
- Have you been invited to invest in the invention?

Professor Hibbert's wide-ranging interests have frequently made him the obvious choice as an expert witness in scam cases. One such case involved the *Ion Mat* which was marketed in Australia as a cure-all for health problems ranging from insomnia

to arthritis and more. The evidence given by Hibbert was that the claimed negative ions were not produced by the mat at all, and that the mat in fact generated the electric field of a toaster!

The final words of this very entertaining and informative lecture were those of Albert Einstein: *All our science, measured against reality, is primitive and childlike – and yet it is the most precious thing we have.*

At the conclusion of the lecture, Professor Hibbert was asked numerous questions by the audience. The vote of thanks was given by Anne Wood.

Anne Wood

SPECIAL EVENT: SATURDAY 5 SEPTEMBER 5PM

## HARMONIOUS REVOLUTIONS

### GALILEO & THE MUSIC OF THE SPHERES

A MOVING AND POETIC EARLY MUSIC MULTIMEDIA EVENT

\* **Sequenced Astro-Photography** of Professor David Malin & the Anglo-Australia Observatory, plus JAXA, NASA, et al.

\* **Early Italian Baroque music & poetry** by the Galilei family & the Florentine Camerata performed on Period Instruments by some of Australia's leading exponents; +

\* **Socratic dialogues** scripted from the writings of Galileo Galilei, his musician father Vincenzo, Classical authors, & the Inquisition trial documents, exploring Pythagorean/Platonic myth, heresy, & the birth of modern science, read by Paul Brunton.

*Script and artistic direction: Andrew Byrne*

**A Royal Society of NSW Presentation**

5th September

Arrive at 4.45pm for 5pm start

Clubbe Hall,

Waverley Parade,

Frensham School, Mittagong

\$35 per person

Phone 0414 621 650 for queries



## NOTICES

### NOTIFICATION OF CHANGES TO THE BY-LAWS OF THE SOCIETY

At its 29 July 2009 meeting, the Council of the Royal Society of New South Wales resolved to amend By-law 17.2 (c) replacing the word 'two' with 'if necessary'. This allows greater confidentiality and more flexibility in the selection and decision-making process. The new wording is as follows.

17 Royal Society of NSW Fellows

(c) Appointments will be ratified by a Fellowship Nomination Committee consisting of the President, a Vice President, the Honorary Secretary and, if necessary, other persons appointed by Council who may or may not be Councillors but should have knowledge of the field in which the appointment is to be made.



The Einstein Lecture 2009 - Einstein: Why is it so? Dr Roger Rassool, University of Melbourne  
6 pm, Monday August 24, 2009, Powerhouse Museum, Sydney

### Australian Institute of Physics NSW Branch



AIP NSW Branch Public Talk 2: 2009  
EINSTEIN LECTURE: Monday 24 August  
2009 at 6.00 pm.

Title: "Einstein: Why is it So?"

Speakers: Dr Roger Rassool- University of  
Melbourne. With special guest: Lawrence  
Krauss

Location of talk: Powerhouse Museum,  
500 Harris Street, Ultimo- See weblink for  
flyer details: <http://www.nsw.aip.org.au/>

### 7th General Meeting 2009

Tuesday 22 September 2009 at 6:30pm  
Climate Forcing by Atmospheric  
Aerosols  
A/Professor Michael Box  
University of NSW

Location of talks: Slade Lecture Theatre,  
School of Physics, University of Sydney.  
Refreshments are available from  
6:00pm. Entrance to all events is free.

Dinner to follow at Buon Gusto  
Restaurant, Abercrombie St.  
Please contact Dr Fred Osman on 0418  
444 477 to book.

### Climate modelling and climate change: why listen to the science?

Professor Matthew England, Co-director  
of the UNSW Climate Change Research  
Centre.

Sunday 23 August 2009, 2pm – 3pm

Coles Theatre, level 2, Powerhouse  
Museum.

Climate models form the basis of  
predicting future climate change. But  
can we believe them?

Leading climatologist Professor  
Matthew England will outline the main  
components of climate models, how  
they interact, and what physics they  
are based on. Professor England led  
the 2007 Bali Climate Declaration by  
Scientists and is co-chair of the CLIVAR  
Southern Ocean panel. He is an expert  
in the ocean's role in regional climate  
variability and global climate change.

This special 'Talks After Noon' is part of  
the Ultimo Science Festival.

MEET THE SPEAKER: Join Professor  
England for an informal discussion and  
complimentary refreshments.

Members Lounge, level 4, 3pm – 3.30pm.

'Talks After Noon' is a series of lectures,  
held twice a week, from Museum  
curators, experts and special guests.

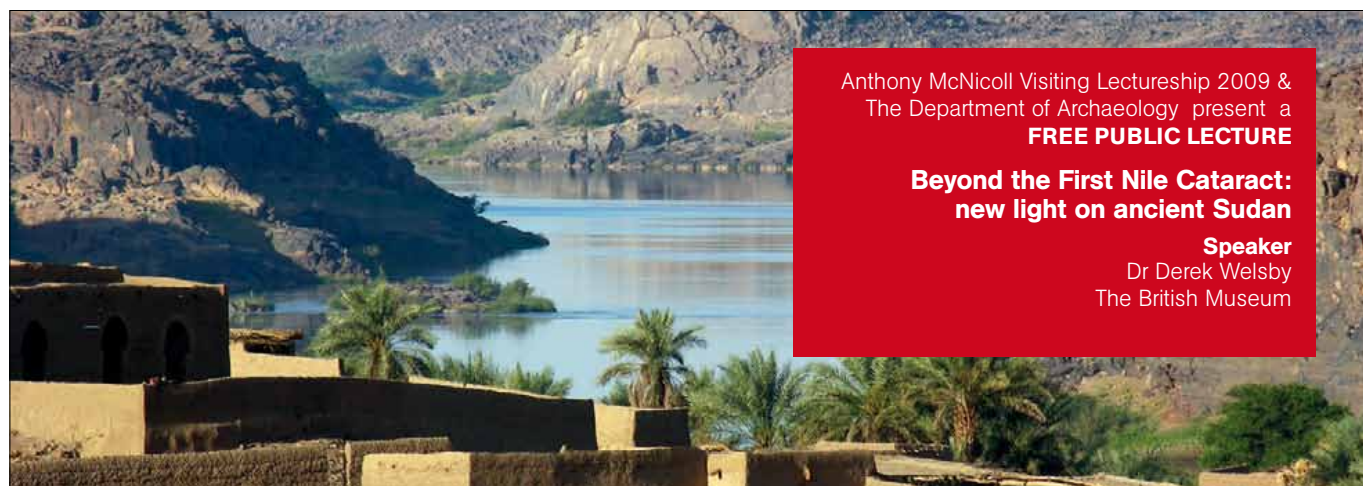
Free with Museum admission (\$10  
adult/\$6 concession).

Powerhouse Museum 500 Harris Street,  
Ultimo.

Tel (02) 9217 0509

Email [adultlearning@phm.gov.au](mailto:adultlearning@phm.gov.au)

Full program online  
[powerhousemuseum.com/whatson](http://powerhousemuseum.com/whatson)



Anthony McNicoll Visiting Lectureship 2009 &  
The Department of Archaeology present a  
**FREE PUBLIC LECTURE**

**Beyond the First Nile Cataract:  
new light on ancient Sudan**

**Speaker**  
Dr Derek Welsby  
The British Museum

**Date** 7pm-8pm, Thursday 27th August 2009,  
**Venue** Eastern Avenue Auditorium, Eastern Avenue, University of Sydney.



## One Hundred Years Ago . . .

Dear Members,

This week's discussion in Federal Parliament about climate change and carbon trading has led me to submit for your consideration this extract from E. Du Faur in our *Journal and Proceedings* from 1907 in which he quotes Baron von Richthofen. It is indeed a timely reminder that scientists are sometimes ahead of their time.

### The Effect of Polar Ice on the Weather

By E. Du Faur, F.R.G.S.

Read before the Royal Society of N. S. Wales, December 4, 1907

The distinguished scientist Baron von Richthofen wrote, shortly before his death in 1905 :

"We can guess that the greater or less heaping up of ice round the poles may explain the changes in the climates of the world. We know, from careful observations, that the beautiful heights of our Alps already show that their ice covering is diminishing . The same thing is taking place in the Andes of Ecuador, and on Kilimanjaro – in the Arctic regions the recession of the ice has been noticed ... *All points to a general drying up.* It is now an important question whether this is also the case in the Antarctic regions. Is this withdrawal observed there, or is it different from what has been observed in the North? ... At a spot visited by Ross there were

exact observations taken, they show that the ice-edge of the Ross is now thirty miles further south than it was in his day, and that the Glaciers of Victoria Land have gone far back. In Ross' time the glaciers reached the sea, but they no longer do so. The German Antarctic Expedition discovered traces of glacier recession on Gaussberg. It was necessary in order to determine the rapidity of this recession, to decide the present position of the ice by measurement, in order that future observers may be able to ascertain changes that have taken place in an interval of a few years. So far as we can judge, this retirement of the ice cap is of the highest importance for future generations. Still, at any moment, changes of an opposite character may take place; and to recognise the changes certain lines are necessary, such as were fixed at Gaussberg. ... Far seeing researchers in recent years show that the changes in the distribution of ice, and the changes in the currents of the sea round Greenland have an important influence on the changes of climate in Germany. The time does not seem to be far distant when it will be possible to predict the character of the seasons months beforehand. This is only the beginning of the practical use of these researches."

From: *Journal and Proceedings of the Royal Society of N. S. Wales*. Vol. XLI 1907. pp. 176-189

Dr Michael Lake  
July 2009

continued from page 3

further impetus for the project. Each team should comprise a supervisor, and three others, one of whom would be a recorder, preferably with PC skills, and two persons capable of lifting and sorting. Each team should include at least one of those who have previously worked on the collection during 2009.

In order to assist with the process, it will be necessary to outline the project's terms of reference, including:

- General outline of key tasks, and timing
- General guidelines for material to be retained or disposed
- General definitions of significance pertinent to this collection

### Summary

If the project is to be completed, then a larger group of workers needs to be recruited from Royal Society members. Ideally these people will have a great interest in both the Society's history and its superb collection. The project is an immediate priority, with the aim that it should be completed by the end of 2009.

Therefore, the most pressing issue is to recruit assistants willing and able to commit two days of their time during the forthcoming months. We look forward to hearing from those of you keen to preserve the society's heritage.

Robyn Stutchbury

### Contact your office bearers

John Hardie President	02 9363 9360	Prof Heinrich Hora Vice President	02 9547 1424
Clive Wilmot Vice President	02 4886 4199	Robyn Stutchbury Vice President	02 9427 6747
Bruce Welch Hon. Secretary (General)	02 9569 9928	Prof Jak Kelly Hon. Secretary (Editorial)	02 9419 6877
Marian Haire Hon Treasurer	02 8467 3575	Alan Buttenshaw	02 9569 0236
Jim Franklin	02 9514 2195	A/Prof Bill Sewell	02 9295 8434
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