



The Royal Society of New South Wales Bulletin and Proceedings 318

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August 2008

Future Events 2008

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 3 September

Telomeres and Telomerase in Health and Disease

Professor Elizabeth Blackburn
Professor of Biology & Physiology,
University of California, USA.

Saturday 6 September

Science then and now - what 100 years have done for science

Prof. Jak Kelly, Vice President RSNWS
2-4pm, Science House, 157
Gloucester St, Sydney. (see page 3)

Wednesday 1 October

Exploring the Milky Way: The Past, Present and Future

Dr Naomi McClure-Griffiths
Galactic Interstellar Medium Group,
ANTF, CSIRO.

Wednesday 5 November

Global Climate Change

Professor Matthew England
Climate and Environmental
Dynamics Laboratory, School of
Mathematics, University of NSW.

Southern Highlands Branch 6.15pm Thursday 18 September

From sulphur chemistry to new cancer treatments

Professor Philip Hogg
(see details on page 2)

Tuesday 23 September

Commercialising Research - From Scientist to Entrepreneur and Back Again

Dr Viv Robinson, ETP Semra Pty Ltd
Australian Institute of Physics NSW
6pm, Slade Lecture Theatre, School
of Physics, University of Sydney.

Lecture 3rd September 2008

Roles of telomeres and telomerase in human health and disease

Dr Elizabeth H. Blackburn

**Morris Herzstein Endowed Professor in Biology & Physiology
Department of Biochemistry & Biophysics, University of California**

Telomeres consist of simple DNA sequences, which bind cellular protein factors and make a "cap", thus securing each end of every chromosome. Without telomeric DNA and its special way of replicating, chromosome ends dwindle away as their telomeric DNA erodes, eventually causing cells to stop dividing altogether. Telomerase, a specialized ribonucleoprotein reverse transcriptase, is important for long-term eukaryotic cell proliferation and genomic stability, because it replenishes the DNA at telomeres. Thus, depending on cell type, telomerase partially or completely counteracts the progressive shortening of telomeres that otherwise occurs. Telomerase is over-active in many human malignancies, and a potential target for anti-cancer approaches.

Human telomerase activity is present not only in malignant cancer cells, but also in stem cells and germline tissues. Although telomerase activity is normally diminished in adult human somatic cells, throughout life a minimal level of telomerase is still required for replenishment of tissues, such as the immune system. In collaborative studies we showed that telomerase activity in peripheral blood mononuclear cells of the body is depressed by caregiving stress in a cohort of caregiver mothers: the longer the caregiving situation had lasted, and the higher the quantifiable level of perceived stress, the lower the telomerase, and the shorter the telomeres. Low telomerase levels in the normal white blood cells was associated with six prominent risk factors, including chronic psychological stress, for cardiovascular disease. Furthermore, a recent collaborative interventional, longitudinal clinical study was performed with early prostate cancer patients. We found that following a 3 month period of documented comprehensive health intervention, telomerase increased - within the healthy range - in normal white blood cells, in association with quantified improvements in cardiovascular disease risk factors and the patients' prostate cancer biopsy gene profiles. Implications of these and related findings for human disease progression and health will be discussed.

Prof. Blackburn is a leader in the area of telomere and telomerase research. She discovered the molecular nature of telomeres - the ends of eukaryotic chromosomes that serve as protective caps essential for preserving the genetic information - and discovered the enzyme telomerase, which replenishes telomeres. Throughout her career, Blackburn has been honoured by her peers as the recipient of many prestigious awards, including The Albert Lasker Medical Research Award in Basic Medical Research (2006), and she is the 2008 North American Laureate for L'Oreal-UNESCO For Women in Science. In 2007 she was named one of TIME Magazine's 100 Most influential People.



Patrons

**His Excellency, Major General Michael Jeffery AC CVO MC (ret'd),
Governor General of the Commonwealth of Australia**

Her Excellency, Professor Marie Bashir AC CVO Governor of NSW

Meet our Councillors Bruce Welch (Hon. Sec.)

The science of caves (speleology) has consumed much of my spare time since joining the Sydney University Speleological Society (SUSS) when I was



about 16 and I have specialised in highly accurate cave surveying, especially at Jenolan Caves. In 1976 I edited the SUSS publication *The Caves of Jenolan 2; The Northern Limestone* – a definitive work on all non-tourist caves north of the Devils Coach House. During the documentation stages of this book I was fortunate to discover and name a major new cave, Spider Cave, which was the single most important new cave discovery of the 20th century at Jenolan. I am an honorary life member of SUSS. I was Secretary of the Speleological Research Council Ltd, a not for profit company promoting speleology, and was Business Manager of *Helectite*, a refereed journal of cave research. In more recent times I have co-authored a book on the Wee Jasper caves and just last month a book on the Wellington Caves.

Other activities include battling inappropriate development at Jenolan Caves, stopping destruction of Rookwood Cemetery, a stint as a Green Alderman (Councillor) on Marrickville Council 1991-95. I was a founding member of the NSW Cave Rescue Group and am a member of the Jenolan Caves Historical & Preservation Society, and Marrickville Heritage Society.

My current specialisation is book production and much of my spare time recently has been taken up with the forthcoming book on Archibald Liversidge (written by Roy MacLeod) which is to be jointly published by the RSNSW and Sydney University Press.

This year I ran a one-day course at the NSW Writers' Centre on Photoshop & InDesign as well as a short session at History House for a WEA/RAHS course on history writing.

Interestingly, both my grandfathers were associated with the RSNSW, M.B. Welch was a member and councillor and E.L. Walter was a member.

Alzheimer's Disease: The man, the discovery, and the prospects for avoidance

A summary of the August lecture by Dr Bruce Warren

This is the 102nd anniversary of Alois Alzheimer's discovery of the all too common form of dementia that bears his name. As Dr Warren pointed out, almost 10% of Australians over 65 will show some form of cognitive decline, and half of this is due to Alzheimer's disease. So this disease is a major public health issue.

Dr Warren set the scene for the discovery with some fascinating photographs of Alzheimer's homeland in 19th and early 20th century Germany. Dr Warren then gave a wide-ranging picture of Alzheimer's research and the times in which he lived. Alzheimer was a unique individual, with great insight into diseases of the brain. His work on general paralysis, a manifestation of tertiary syphilis, was the standard text for many decades; despite the fact that he wrote it before the bacterium causing the disease had been identified.

At the turn of the century Alzheimer started microscopic investigations of thin sections of the brain using a new stain developed by his friend and colleague, Fanz Nissl. The Nissl stain enabled him to explore brain structures in unprecedented detail. In 1906 Alzheimer studied the brain of an old patient, August Deter, who had suffered from progressive disorientation, impaired memory, difficulties in reading and gradual loss of higher mental functions. His microscopic examination of the brain using the new stain revealed thinned cerebral cortex, neuritic plaques and neurofibrillary tangles. In 1910 Emil Kraepelin named this condition Alzheimer's disease in his honour. As Dr Warren pointed out, Alzheimer's description of the neuritic plaques and neurofibrillary tangles is still the (post mortuum) "gold standard" for diagnosis. However, definitive diagnosis in the living is still difficult in the early stages of the disease.

Dr Warren outlined what can currently be done to avoid Alzheimer's disease. Mental exercise helps ("use it or lose it"), as do physical exercise and a healthy diet. In fact anything that promotes cerebrovascular health is good. Unfortunately, there is still no silver bullet.

Jim Franklin

Next meeting of the Southern Highlands Branch

Thursday 18 September 6:30pm

From sulphur chemistry to new cancer treatments

Professor Philip Hogg

Genes encode proteins, which are the machinery of life. All life forms make proteins that contain strong bonds between pairs of cysteine amino acids called disulphide bonds. Most disulphide bonds stabilize a protein's structure. A minor population of disulphide bonds serves a functional role. Philip and his team have shown that some disulphide bonds have evolved to control how proteins work by breaking or forming in a precise way. He has called these bonds 'allosteric disulphides'. Application of this basic research has led to the development of a novel class of cancer drugs and a cell death imaging agent. The lead cancer drug is currently being trialled in cancer patients. The imaging agent non-invasively detects dying and dead tumour cells. The agent could be used, for instance, to assess the efficacy of cancer therapy. The technology has been licensed to Pharma for clinical development.

Professor Philip Hogg graduated with a PhD in biochemistry from the University of Queensland in 1987. Following postdoctoral stints in the USA and Sweden he returned to Sydney in 1991. He is now Director of the UNSW Cancer Research Centre and will lead adult cancer research in the new Lowy Cancer Research Centre that is currently being built on the UNSW campus. Philip has won numerous awards for his research, has published over 100 research articles and is an inventor on 24 patents.



HISTORY WEEK PROGRAM EVENT

presented by the Society

Science then and now - what 100 years have done for science

Reminder to all members; come and hear the lecture, come and see this magnificent building in The Rocks and see what all the fuss is about (see President's Report below and article at right). This is a free event and bookings are not essential.

2 – 4pm Saturday 6 September

Science House, 157 Gloucester Street (corner of Essex and Gloucester Sts) in the city.

From the President

At the end of July our small 'Science House' team was able to meet with Minister Verity Firth about our push to keep science in Science House. This proved to be a very positive experience for us as the Minister was very receptive to our ideas and has indicated she will try to help us achieve our goal. Thanks are due to David Ellyard for helping to organise this meeting.

Following the meeting it was decided to proceed with the formation of a new not-for-profit company, Science House Sydney Limited, to allow for the establishment of the proposed consortium of scientific-based organisations which will form a new hub for scientific communication and promotion and a home for many scientific organisations in Sydney. The first meeting of the Board is planned for early September. I will keep you informed as we progress.

At its last meeting the Council of the Society voted to support the proposal for the creation of Fellows of the Society. This important decision was taken after much debate over several meetings of Council. It follows the Royal Society of Victoria model and will allow us to enrich our Society even further through the exposure these awards will give the Society. A full outline of the arrangements for these awards will appear in our next Bulletin.

Towards the end of July I was fortunate in being able to attend the inaugural lecture of the new Vice-Chancellor and Principal of the University of Sydney, Dr Michael Spence, in the Great Hall of the University, and then subsequently to have an opportunity to have a brief word with him about the Society. He has invited me to speak with him in greater depth about the possibilities for increased interaction and co-operation between the Society and the University.

The next day I attended a 'History in July' reception at History House in Macquarie Street on your behalf at the invitation of the Professional Historians Association. This was an important event as it allowed historians and others to hear more about our rich history and some of the work we are doing to make this information more public. Our History Week event at Science House on 6 September will be an opportunity to extend our activities in this important area. I look forward to seeing many of you at this event.

Lastly I would like to report that the Donovan Trust is alive and well. It provides small amounts of funding to promote astronomy through education. I participated in the selection of recipients of grants from the Trust at a recent meeting.

John Hardie



The Royal Society returns to Science House for History Week



Since February this year you have been hearing of our endeavours to return Science to Science House. Here is the opportunity you have been waiting for. This year the Royal Society has been invited to participate in History Week and where better to stage an event than the heritage-listed Science House in the heritage-listed Rocks.

Our former president, Professor Jak Kelly will present 'Science then and now - what 100 years have done for science'. Jak will both act and dress for the role when he delivers an important scientific paper exactly as it was delivered to a meeting of the Royal Society of NSW around the turn of the 20th Century. An equally eminent scientist will demonstrate the advances since that time when delivering an equivalent address on the topic.

Authentic technology and equipment of the period with copies of the original paper will help to transport the audience back to those heady days when science was considered of paramount importance.

Southern Highlands Branch Meetings

These are held on the 3rd Thursday of each month at 6:30pm in the Drama Theatre at Frensham School, Mittagong (enter off Waverley Parade).

The price for the Lecture only is: Members \$5, Non-members \$10, or Lecture and Dinner with Speaker including drinks: Members \$45, Non-members \$50. For bookings for the dinner only, please call 0414 621 650.

Acting editor, this issue, Bruce Welch

More history

Not to be totally outdone, Robyn Stutchbury has been invited to address the Blue Mountains Historical Society on exactly the same day. Her address, 'Unearthing the buried treasures of the Royal Society of NSW' will focus on the work we have been doing on the Society's collection as a result of two Community Heritage Grants (CHG) from the National Library of Australia.

She will report on the problems of maintaining our collection and the steps we are taking to overcome these.



Guests take the opportunity to examine some of the Society's highly significant collection during the soirée held at the Nicholson Museum within the University of Sydney during September 2006

The assessments reported by the two professional historians engaged through the CHG funding indicate that we are the custodians of a highly significant collection both culturally and historically. We are now faced with the problems of how to carefully conserve the collection and how to make it available to researchers and the public alike.

If you prefer a day in the Blue Mountains, then please come along.

Blue Mountains Society headquarters, "Hobby's Reach" 99 Blaxland Road, Wentworth Falls. Saturday 6 September, 10.30 – 12 noon

One Hundred Years Ago ...

On the 5th August 1908 at the meeting of the Society two papers were read. The first paper reported on was "On the Pines of Australia, No. 1 — *Callitris glauca*, R.Br., White or Cypress Pine" by Richard T. Baker, F.L.S., Curator and Government Economic Botanist, and Henry J. Smith, F.C.S., Assistant Curator and Economic Chemist, Technological Museum, Sydney.

The second paper reported on was "Contributions to the Flora of Australia" by Alfred J. Ewart, D.Sc., Ph.D., F.L.S., Government Botanist of Victoria and Professor of Botany at Melbourne University, and Jean White, M.Sc., Government Research Scholar, assisted by J. R. Tovey, First Herbarium Assistant, National Herbarium Melbourne. This later paper was communicated by J. H. Maiden. In those days only a member of the Society could read their paper at a meeting, non members were required to "communicate" their paper through a member.

"On the Pines of Australia, No. 1 — *Callitris glauca*, R.Br., White or Cypress Pine"

This is a series of papers on the pines of Australia, this paper being the first. The Cypress Pine is covered first "as it has the greatest geographical range on this island continent, of all the species of that most widely distributed genus *Callitris*, and it may therefore be regarded as the most representative of the group." A complete description of this plant is given; its physical characteristics, habitat and the anatomy of the leaves right down to the cellular level. The oil glands and the resin cavities are discussed at length due to their economic importance. Alcohols, aromatics, esters, terpenes, phenol and other components are obtained from the distillation and fractionation of these oils and their chemical and physical properties are discussed in some detail. The bark also contains resin cells and these can also be extracted. It is reported that "There also appears on the market from time to time a similar resin, which since it is exported from Australia, is commonly known as 'White Pine Resin' or 'Australian Sandarac'". The timber is of course the obviously valuable part of these trees and this is extensively covered.

"Contributions to the Flora of Australia"

This talk was essentially a descriptive talk on the characteristics of about 30 species of plants. "Shrub 1½ to 3 feet high. Leaves opposite, crowded towards the ends of the stems. Broad-linear, with a small petiole, the surface of the lamina, especially on the underside are crowded with glands. Somewhat thick, blunt at the tip, slightly incurved at the margin...." Most of these descriptions took an entire page and one wonders how many members nodded off. In regards to some species there was some discussion about whether particular variants should be merged, particularly when some species have quite variable characteristics. The paper also covers introduced plants such as *Galencia secunda* (a South African weed introduced via ballast tanks from ships) and erroneous records of naturalized aliens. The article would be a valuable resource as it often refers to the locality where a particular variety was found. There are seven plates accompanying this paper.

Michael Lake (August 2008)

Contact your office bearers

John Hardie President	02 9363 9360	Prof Jak Kelly Vice President	02 9419 6877
Clive Wilmot Vice President	02 4886 4199	Prof Tony Baker Vice President	02 9514 1764
Marian Haire Hon Treasurer	02 8467 3575	Bruce Welch Hon. Secretary	02 9569 9928
Prof Peter Williams Hon Sec (Editorial)	02 9685 9914	Christine van der Leeuw Hon Librarian	02 9680 3598
Alan Buttenshaw	02 9569 0236	Jim Franklin	02 9514 2195
Prof Heinrich Hora	02 9547 1424	Dr Michael Lake	02 9514 2238
Jill Rowling	02 9697 4484	A/Prof Bill Sewell	02 9295 8434
Robyn Stutchbury	02 9427 6747		

The Bulletin and Proceedings is issued monthly by the Royal Society of New South Wales
Postal address: Building H47, UNIVERSITY OF SYDNEY, NSW 2006, AUSTRALIA
Val Gregory, Office Manager • Phone: 61 2 9036 5282; Fax: 61 2 9036 5309;
Email: royalsoc@usyd.edu.au • Web page: <http://nsw.royalsoc.org.au>