



The Royal Society of New South Wales Bulletin and Proceedings 342

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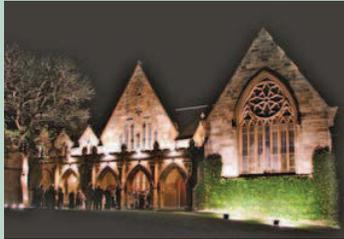
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February 2011

Future Events 2011

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 6.30 pm.

Friday 18 February 2011 at 6.30pm
2011 Annual Dinner
St Paul's College, Sydney
University



Thursday 24 February 2011 at 5.30pm
Annual Meeting of the Four Societies

Hamilton Room, Trade & Investment Centre, Industry & Investment NSW, Level 47, MLC Centre, 19 Martin Place, Sydney

(see details at right)

Tuesday 22 March 2011 at 6.30pm
Joint Meeting of Australian Institute of Physics & The Royal Society of New South Wales
Searching for Nanosecond Laser Pulses from Outer Space

Dr Ragbir Bhathal, School of Engineering, University of Western Sydney

Slade Lecture Theatre, School of Physics, University of Sydney

Wednesday 6 April 2011 at 7.00pm
Annual General Meeting of the Society

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.

Annual Dinner 2011

There are still places available for the Society's Annual Dinner on Friday 18 February at St Paul's College at Sydney University.

Her Excellency Professor Marie Bashir AC CVO, Governor of NSW is our guest of honour, and will present our Awards for 2010.

All members, friends, colleagues and family are encouraged to attend. The closing date has been extended to Friday 11 February. Dress: Black Tie

The Annual Meeting of the Four Societies



"Geothermal Energy - Current State of Play and Developments"

Dr. Stuart Mc Donnell, Chief Operating Officer for Geodynamics
Mr Stephen de Belle of Granite Power

Hamilton Room, Trade & Investment Centre, Industry & Investment NSW, Level 47, MLC Centre, 19 Martin Place, Sydney

Thursday February 24, 2011 5:30 for 6pm Free admittance

Registration: Preferred by Noon, Monday 21 February sydney@aie.org.au

For further technical information contact Denis Cooke on 0411 030 936 or denis@decoa.com.au

Venue kindly sponsored by 

The Society will conduct its February OGM at this meeting

March Meeting

Searching for Nanosecond Laser Pulses from Outer Space.

Our March Ordinary General Meeting will be held in conjunction with the Australian Institute of Physics on Tuesday 22 March at 6.30pm in the Slade Lecture Theatre, School of Physics, University of Sydney. The speaker will be Dr Ragbir Bhathal, a former President of the Society.

Dr Ragbir Bhathal



Patrons of The Royal Society of NSW

Her Excellency Ms Quentin Bryce AC

Governor-General of the Commonwealth of Australia

Her Excellency Professor Marie Bashir AC CVO Governor of NSW

Announcing our Award Winners for 2010

The Society takes great pleasure in announcing its Award Winners for 2010. As in past years, we received outstanding nominations from many quarters. The winners will be presented with their Awards at our Annual Dinner on 18 February by our Patron, Professor Marie Bashir, AC CVO Governor of NSW. Congratulations to our three winners.

The Clarke Medal

Kenton Campbell



Professor Kenton Campbell is Emeritus Professor of Geology at the Australian National University. He is Australia's senior palaeontologist, with a special interest in neuroanatomy. His research began in stratigraphy, and moved into the study of fossils and evolution. He became an international authority on the nervous system of the lungfish and the way in which it has evolved. He began publishing his scientific research in 1952. He worked at the Universities of Queensland and New England before going to the Australian National University in 1962. While most of his work has been done in Australia, he worked for short periods in Cambridge, Harvard, Chicago and London. He became a Fellow of the Australian Academy of Science in 1982, and won the Academy's Mawson Medal in 1986. He gave the Clarke Memorial Lecture of the Royal Society of New South Wales in 1975.



The Edgeworth David Medal

Angela Moles



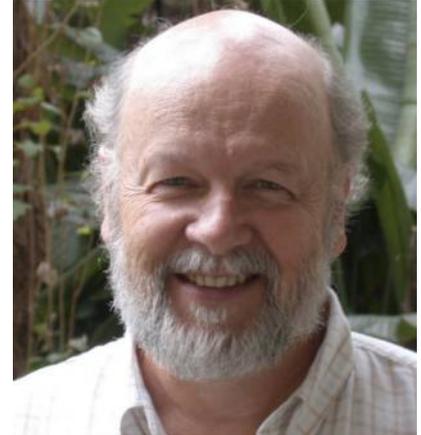
Angela Moles is an Associate Professor in the Evolution & Ecology Research Centre at the University of New South Wales. Her primary research goals are to understand the different ways in which plants grow and reproduce in different environments around the world, and to better understand the selective processes underlying plant ecological strategies.

Angela's main research projects at present are 1) "The World Herbivory Project", in which she travelled to 75 different ecosystems around the world to quantify global patterns in interactions between plants and animals, and the factors that affect these patterns, 2) Quantifying the extent to which introduced species have evolved since they arrived in Australia and 3) Using clonal plants to get new insights to the evolutionary advantages of sexual reproduction. At home, Angela and her partner Stephen are learning about the joys and sleep deprivation of parenting with their one year old son Sam.



Walter Burfitt Prize

Richard Shine



Rick is a Professor in Biology at the University of Sydney. His research spans a wide range of species, ecosystems and conceptual areas, but focuses most strongly on the ecology and evolution of reptiles and amphibians. In particular, his recent work explores ways in which fundamental field-based ecological research can be used to develop innovative approaches to conservation challenges. He has published more than 700 papers in scientific journals, and is among the world's most highly cited authors in his field. Rick has received numerous awards for excellence in research, including the E. O. Wilson Award by the American Society of Naturalists, the Mueller Medal by ANZAAS, the Eureka Prize for biodiversity research, and the Macfarlane Burnet Medal by the Australian Academy of Science. He was elected a Fellow of the Australian Academy of Science in 2003, and received an Order of Australia (AM) in 2005. He contributes regularly to media debates, and was included in the Sydney Magazine's list of Sydney's 100 most influential people for 2008.

For more information and lists of publications please see <http://sydney.edu.au/science/biology/sites/Shinelab/> For a general website about the cane toad project please see <http://www.canetoadsinoz.com>

From the President



Firstly I would like to wish everyone all the very best for the New Year. This year promises to be as interesting and exciting as 2010 with an array of interesting speakers at our monthly meetings and some special events in planning for later in the year. I always look forward to your feedback on what we do and how we do it so please feel free to contact me or any member of Council about the Society.

Last year's Studentship Awards on 1 December were again very impressive with high levels of professionalism and dedication to their fields of research shown by the three winners. We thank them for sharing their intelligence and enthusiasm with us. The Christmas Party that followed was a very enjoyable event. Once again the venue proved a major winner, with the coolness of the evening conducive to holding the event within the hallowed walls of one of St Paul's atmospheric common rooms.

We need to continue our quest for greater recognition of the important science advocacy work we do and in particular to translate this into funding support. We need your help to introduce the Society to others who may be unfamiliar with it with the view to their becoming members and ultimately supporters of and advocates for the Society.

As you would know, our Annual Dinner is coming up very shortly and I would encourage everyone who hasn't already done so to book your place at this important black-tie event, which this year will be held in the hallowed halls of St Paul's College. This year we are privileged to have the Governor of NSW, Professor Marie Bashir, as our guest-of-

honour. Not only will she be presenting our Awards for 2010, but she will also be conferring honours on our new Fellows. Full details appear elsewhere in this Bulletin.

We are fortunate in having established good relations with several like-minded organisations over the years. This has led to several joint activities which we are part of and which are now ongoing. This includes the forthcoming Four Societies meeting on the 24th of this month and the joint meeting with the Australian Institute of Physics on 22 March. In the same vein we were fortunate in having the support of the Royal Australian Chemical Institute for our Liversidge Lecture in November last year. These joint activities are to be encouraged and hopefully more will emerge over coming years.

This year is the International Year of Chemistry and we will be doing what we can to support it. The Royal Australian Chemical Institute is the overall organiser of the celebrations. Go to the IYC2011 website for more information <http://iyc2011.org.au/>.

We were saddened recently to hear of the death of a long-serving supporter of the Society, Professor Gavin Brown AO CorrFRSE FRSN, the former Vice-Chancellor of the University of Sydney and until recently, Director of the Royal Institution of Australia. We are truly indebted to Professor Brown's interest in the Society and its aims, philosophy and values and we will sorely miss him. I will be representing the Society at his Memorial Ceremony at Sydney University on 18 February. I have sent a message of condolence on behalf of the Society to his widow.

John Hardie

New Members

Six new members were announced at the December meeting of the Society:

David Baker – Full Member
Roger Garland – Full Member
Dennis Black – Associate Member
Kerensa McElroy – Associate Member
Lidia Matesic – Associate Member
John White – Associate Member
We welcome them into the Society.



This year the Royal Society celebrated its 350th anniversary. It has been a fantastic year for the Society, in part thanks to your enthusiasm for science and its discoveries that has shaped our life today.

Many activities were planned this year to celebrate the past 350 years and to help to inform science for the next 350 years. These included a wide range of events in London as well as throughout the country as part of the Capital Science scheme and the Local Heroes programme. Ten Discussion Meetings were specially chosen for this year which focused on mapping the future of areas of great importance to science, many marking developments with lasting significance.

A major highlight of our anniversary year has been the See Further: The Festival of Science + Arts that was held at Southbank Centre in London from 25th June to 4th July. This was a unique celebration of science and culture that included a series of talks and debates, as well as an enhanced version of the Society's annual Summer Science Exhibition.

To celebrate the range of science discussed during the Royal Society's 350th anniversary year, we have launched Science sees further – offering an opportunity for all those interested in science to look at the key scientific issues of today, and those of tomorrow.

Available online with a host of interactive audio and video material, Science sees further contains 12 chapters based on the subjects of the Discussion Meetings in 2010, comprising a subject summary (authored by the meeting organisers) and short historical context using material from the Society's Centre for History of Science.

Discover more at www.royalsociety.org/further

Royal Society of NSW Fellows for 2010

At the Livingside Research Lecture for 2010 held on 26 November, the President announced that the Society had created five new Fellows. This honour is awarded for distinguished contributions to science. The formal presentation ceremony will occur on 18 February at the Society's Annual Dinner in Sydney. The Society's new Fellows will continue their work to promote the importance of scientific endeavour in Australia. They are now entitled to use the postnominal FRSN.

Robert, Professor Lord May of Oxford, OM AC Kt FRS FAA FRSN



Robert, Lord May of Oxford, holds a Professorship jointly at Oxford University and Imperial College, London and is a Fellow of Merton College, Oxford. He was until recently President of The Royal Society of London (2000-2005), and before that Chief Scientific Adviser to the UK Government and Head of the UK Office of Science and Technology (1995-2000). He is also, amongst others things, a member of the UK Government's Climate Change Committee, a Non-Executive Director of the UK Defence Science & Technology Laboratories and until recently Chaired the Trustees of the Natural History Museum.

His career includes a Personal Chair in Theoretical Physics at Sydney University aged 33, Class of 1877 Professor of Zoology and Chairman of the Research Board at Princeton, and in 1988 a move to Britain and Oxford as Royal Society Research Professor.

He was awarded a Knighthood in 1996, and appointed a Companion of the Order of Australia in 1998, both for "Services to Science". In 2001 he was one of the first 15 Life Peers created by the "House of

Lords Appointments Commission". In 2002, The Queen appointed him to the Order of Merit (the fifth Australian in its 100-year history).

His many honours include: the Royal Swedish Academy's Crafoord Prize (bioscience and ecology's equivalent of a Nobel Prize); the Swiss-Italian Balzan Prize; and the Japanese Blue Planet Prize. He is a Foreign Member of the US National Academy of Sciences, an Overseas Fellow of the Australian Academy of Sciences, and an Honorary Fellow of the Royal Academy of Engineering and several other Academies and Learned Societies in the UK, USA and Australia. In 2007 he received the Royal Society's Copley Medal, its oldest (1731) and most prestigious award, given annually for "outstanding achievements in research in any branch of science".

Professor Elizabeth Blackburn AC FRS FRSN



Dr. Elizabeth H. Blackburn, Morris Herzstein Professor of Biology and Physiology in the Department of Biochemistry and Biophysics at the University of California, San Francisco, 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 genetic information – and the ribonucleoprotein enzyme telomerase. Blackburn and her research team are working with various cells including human cells, with the goal of understanding telomerase and telomere biology.

Blackburn earned her B.Sc. (1970) and M.Sc. (1972) degrees from the University

of Melbourne, and her Ph.D. (1975) from the University of Cambridge in England. She did her postdoctoral work in molecular and cellular biology from 1975 to 1977 at Yale.

In 1978, Blackburn joined the faculty at the University of California at Berkeley in the Department of Molecular Biology. In 1990, she joined the Department of Microbiology and Immunology at UC San Francisco, where she served as Department Chair from 1993 to 1999. Blackburn is currently a faculty member in the Department of Biochemistry and Biophysics at UCSF. She is also a Non-Resident Fellow of the Salk Institute.

Throughout her career, Blackburn has been honoured by her peers as the recipient of many prestigious awards. She was elected President of the American Society for Cell Biology for the year 1998. Blackburn is an elected Fellow of the American Academy of Arts and Sciences (1991), the Royal Society of London (1992), the American Academy of Microbiology (1993), and the American Association for the Advancement of Science (2000).

She was elected Foreign Associate of the National Academy of Sciences in 1993, and was elected as a Member of the Institute of Medicine in 2000. She was awarded the Albert Lasker Medical Research Award in Basic Medical Research (2006). In 2007 she was named one of TIME Magazine's 100 Most influential People and she is the 2008 North American Laureate for L'Oreal-UNESCO For Women in Science.

In 2009, Dr. Blackburn was awarded the Nobel Prize in Physiology or Medicine.

Professor Kurt Lambeck AO FRS FAA FRSN



Professor Kurt Lambeck has been at the Australian National University since 1977, including ten years as Director of the Research School of Earth Sciences. He is the immediate past President of the Australian Academy of Science and a member of the Antarctic Ecosystem and Environment CRC. Before returning to Australia he was Professor at the University of Paris. He has also worked at the Smithsonian and Harvard Observatories in Cambridge, USA. He has studied at the University of New South Wales, the Technical University of Delft, Netherlands, the National Technical University of Athens and Oxford University from which he obtained DPhil and DSc degrees. He has held visiting appointments in Belgium, Britain, Canada, France, Netherlands, Norway and Sweden.

He was elected to the Australian Academy of Science in 1984 and to the Royal Society in 1994. He is a foreign member of the Royal Netherlands Academy of Arts and Sciences (1993), Norwegian Academy of Science and Letters (1994), Academia Europaea (1999), the Académie des Sciences, Institut de France (2005), and the US National Academy of Sciences (2009). He has received a number of international prizes and awards including the Tage Erlander Prize from the Swedish Research Council (2001), the Prix George Lemaître from the Université catholique de Louvain (2001), and the Eminent Scientist Award from the Japan Society for the Promotion of Science (2004).

He has published two books and more than 250 papers on subjects in geophysics, geology, geodesy, space science, celestial mechanics, environmental geoscience, and glaciology.

Professor Michelle Simmons FAA FRSN



Professor Michelle Simmons is a Federation Fellow and Director of the Atomic Fabrication Facility at the University of NSW. In the 1990s, she spent six years as a Research Fellow working with Professor Sir Michael Pepper FRS at the Cavendish Laboratory in Cambridge, UK, in quantum electronics. Her research in nanoelectronics combines molecular beam epitaxy and scanning tunnelling microscopy to develop novel electronic devices at the atomic scale. She has published more than 260 papers in refereed journals (with over 3200 citations), published a book on Nanotechnology, four book chapters on quantum electronics, has filed four patents and has presented over 50 invited and plenary presentations at international conferences.

In 2005 she was awarded the Pawsey Medal by the Australian Academy of Science and in 2006 became the one of the youngest elected Fellows of this Academy. Professor Simmons is the only woman in Australia to have twice received a Federation Fellowship, the Australian Research Council's most prestigious award of this kind. She was one of the first women to be made a professor of physics in Australia.

Emeritus Scientia Professor Eugenie Lumbers FAA FRSN



Professor Eugenie Lumbers is an internationally respected authority on foetal and maternal physiology. For many years she has worked in cardiovascular and renal physiology, with particular reference to blood pressure regulation in the renin-angiotensin system. She graduated MBBS in Adelaide in 1965 and received an MD in 1970. She was awarded a DSc at the University of NSW in 1986 where she was given a personal chair in 1988. She received the Vice Chancellor's Award for Teaching Excellence in 1997,

became Scientia Professor in 1999 and Emeritus Scientia Professor in 2003. She was elected Fellow of the Australian Academy of Science in 2002.

In 2007 she developed new research interests at the University of Newcastle and was awarded an NHMRC grant in 2008. She further expanded her research interests in 2009 with three other NHMRC grants. She received the Centenary Medal of Federation, Australia in 2001.



**International Year of
CHEMISTRY
2011**
Australia 

International Year of Chemistry 2011

The United Nations Organisation has declared 2011 as the International Year of Chemistry (IYC 2011). IYC 2011 is a worldwide celebration of the achievements of chemistry and its contributions to the well-being of humankind. In Australia, the International Year of Chemistry will be spearheaded by the Royal Australian Chemical Institute (RACI). The RACI has been furthering the field of chemistry since its founding in 1917. The RACI is both the qualifying body in Australia for professional chemists and a society dedicated to the promotion and practice of chemistry. 2011 will be an exciting year for chemistry, with events, activities, promotional opportunities and media events emphasising that chemistry is a creative science, essential for sustainability and on-going improvements to our way of life.

More details at <http://iyc2011.org.au/>

Archibald Liversidge, FRS: Imperial Science under the Southern Cross

by Roy McLeod

Extract from chapter 8 *Dean and Doctor*

In 1874, when William Macleay 'broke off' from the Royal Society of NSW to form the Linnean Society, many feared that the colony's small scientific community would not survive. Liversidge's reforms were a calculated response, and as we have seen, won a reprieve. Even so, the Royal Society entered the 1880s unsure whether the specialist sections of engineering and medicine were going to follow the Linneans, and break away. To preserve solidarity at home, the Society needed to reach abroad.

These arguments were played out against a growing tide of colonial nationalism. In November and December 1883, Sydney hosted an intercolonial conference to discuss the future of Papua and New Guinea. To forestall the expansionist interests of imperial Germany, Queensland's Premier had raised the Union Jack at Port Moresby in February, and in April announced its 'annexation'. The British government of Lord Derby at first repudiated the act, but in October 1884 changed its mind and formally claimed the southern coast of New Guinea, ten days before Bismarck informed Britain that the north eastern quarter of the island was already a German protectorate. In Sydney and Melbourne, proceedings focused on a place that had been of scientific and strategic interest since W.J. Macleay's *Chevert* expedition in 1875.

Not for the first time, political events captured scientific interest. In April 1883, Edmond Morin La Meslée, a member of the Paris Geological Society then living in Sydney, called a public meeting at which he proposed the creation of a 'Federal Geographical Society of Australasia'. Rejecting ties with either the Royal Society of NSW or Britain's Royal Geographical Society, La Meslée argued for an association 'independent and national', not colonial: 'Geography is a science that cannot wait,' he said, 'as our very future depends upon the more or less perfect acquaintance which is gained of the natural resources of the country.' A new society was needed to serve the 'information and benefit of the people of Australasia', he said, commanding the 'commercial, political and natural sciences,' across

an arc stretching from New Guinea to Antarctica. The idea, he pointed out, was not before its time. Through *Petermann's Mittheilungen*, he claimed, German geographers knew more about Australia than Britons did.

The significance of these events was lost neither upon Liversidge nor the Royal Society of NSW. Although safe in its 'castle' on Elizabeth Street, the Society was always grateful to be alive. In 1883, its President, Christopher Rolleston – veteran public servant and councillor of the Society since Denison's day – greeted the Society's survival with near-disbelief: 'I think it not exaggerating,' he told the membership, 'when I say the Society is acquiring such a station in the public estimation that we may, without presumption, look forward to the time when its advice and assistance on questions of public interest involving scientific enquiry may be sought by the Government of the Country.' Such a happy outcome would see the Society – 'respectfully,' in the steps of what Rolleston called our 'great English prototype', the Royal Society of London – become an unofficial 'department of science'.

This uplifting forecast, and the upturn in membership revenue on which it was based, spoke well for Liversidge's reforms. But Rolleston exaggerated the Society's vitality. Although its members were many, its leaders were few. Since relieving the Governor of the day from the automatic courtesy title of president, the Society had elected a 'scientific' president, so following its venerable parent society in London. But only six men served as president through the 1880s, and these rotated in a game of musical chairs, with Rolleston, Russell and Liversidge each serving twice. The same few faces dominated its program. Of the 500 members in 1886, only thirty-six contributed papers, and most of these papers were the work of only seven or eight. Liversidge himself delivered thirty-three papers, making him easily the Society's single most productive member.

Nonetheless, by 1886, the Society had money in the bank, and due to a timely gift from the Fairfax family, negotiated

by Liversidge, had repaid its mortgage. Thanks to the Jennings' government, subsequently confirmed by James Inglis, Parkes' Minister of Public Instruction, its endowment was doubled by a grant of matching funds, pound for pound based on subscription income. In 1887, this brought in £400 in public funds, and with it new growth. By 1890, the library, housed in handsome cases, was beginning to burst at the seams. But prosperity bred caution. No anniversary address failed to recall the hardship of earlier years. In 1888, the ageing Sir Alfred Roberts supposed it might be 'difficult to measure the exact amount of good which has been accomplished up to the present time'. But he hoped that, with its 'primary difficulties' now surmounted, at last the Society could become 'increasingly productive of practical good' – particularly in what he called 'Nature's own great laboratory,' the Antarctic, where there were real prospects for intercolonial cooperation.

In 1885, following an appeal by Baron von Mueller, an Australian Antarctic Exploration Committee was set up in Melbourne, convened jointly by the Royal Society of Victoria and the Victorian Branch of the Royal Geographical Society. In April 1887, Captain Crawford Pasco, RN, and H.K. Rusden, representing the Committee, asked the Royal Society of NSW to mobilise the NSW Branch of the Royal Geographical Society and the Linnean Society in asking the NSW government to support an intercolonial expedition. This was a foretaste of things to come. So too, was the approach, in August that year, from the Royal Society of South Australia, which asked the Society's help in persuading the NSW Government to offer concessionary rail fares to doctors attending the first Intercolonial Medical Congress in Adelaide. The Society agreed. Throughout this correspondence, the hand of Liversidge (bracketed with Leibius) was always in evidence. 'Indefatigable' was the sobriquet Smith applied to both, a term his successors ritually copied. Given their energy, it is not accidental that the Royal Society of NSW became the host of the first pan-Australasian gathering of science.

The immediate inspiration for this meeting arose in September 1884; the occasion, the annual Congress of the British Association in distant Montreal. That year, for the first time in its fifty-three-year history, the BA held its annual meeting outside Britain. The sea voyage was intended to give new life to a body showing signs of senility, and an imperial boost to British science in a corner of Empire where ties of kinship were being weakened by American enterprise. Towards costs, the Canadian Government voted \$25,000, the city of Montreal gave \$5000, and local citizens, a further \$10,000, producing \$40,000 (or £8000) which covered the travel of British participants. It was to the Biology Section of this meeting that Liversidge relayed a telegram he had just received from William Hay Caldwell, a 'Balfour Student' of Caius College, Cambridge, then working on the Burnett River in Queensland. 'Monotremes oviparous, ovum meroblastic', read the famous lines in which Caldwell announced his discovery of the oviparous nature of the platypus. For H.N. Moseley of Oxford, President of the Section, who knew Sydney from the visit of HMS *Challenger* in 1874, 'no more important telegram in a scientific sense had ever passed through the submarine cables'.

Behind that terse message, lay a story of Liversidgean influence at its most typical – understated, private, persevering, definitive – focusing an international light upon a uniquely Australian object. Liversidge's contact with Caldwell dated from Cambridge days, but drew upon his interest in Australian caves and rivers. During his visit to England in 1878, Liversidge met Professor W. Boyd Dawkins, of Owens College Manchester, who was accumulating evidence from Europe and Asia to argue that early man lived at the same time as the extinct marsupials that Richard Owen had described. Liversidge's reading of the *Diprotodon* and other fossil discoveries – quickened by visits to collections in New Zealand and Paris – induced him to help Dawkins, and he proposed to study a number of caves in NSW. William Forster, Agent-General for NSW in London, had sent a similar request in 1876 at the behest of Richard Owen and Sir George Macleay. When, however, the governments of South Australia, Tasmania, Victoria, Queensland, and New Zealand were invited to join, all

declined. There was perhaps little reason to support a study likely to interest only one colony.

Henry Parkes agreed to sponsor a survey of caves by Edward Ramsay and the Australian Museum, but his government fell before it could get a vote (estimated at £340) into its budget for 1878. When Parkes returned again to power in December 1879, he still found the venture promising. Even so, two years elapsed before money and opportunity combined. In 1881, Liversidge again put the question, this time through the Trustees of the Australian Museum. Funds were granted, and at his request, the Museum constituted a Committee to Manage the Exploration of Caves and Rivers, its first scientific expedition since Alexander Thomson's near-fatal experience of 1867. With James Cox and C.S. Wilkinson, Liversidge was authorised 'to take all necessary steps for the expenditure of the money voted for the purpose', and between June 1881 and March 1882, supervised four surveyors and taxidermists at a cost of £1200 to search the Wellington Caves, the caves near Yass, the rivers to the west and north, and other deserving sites.

Acting as the expedition's manager, Liversidge logged thousands of specimens that Ramsay's team sent back to the Museum – including 'an almost perfect *ramus* of *Thylacoleo*, with the articulating condyle so anxiously looked for by Professor Owen', together with the teeth of a *Diprotodon*, the toe-bones of a large Echidna, and the pelvis of a giant kangaroo. From the Wellington Caves came 10,000 specimens, with fragments of thirty species of mammals, birds and reptiles; while Alexander Morton came back from the Burdekin and Mary Rivers of Queensland with 2000 specimens, some of which William Macleay pronounced 'undescribed' and certainly 'new to the Sydney Museum'.

Not surprisingly, the Caves and Rivers expedition was voted the 'most important work carried out by the Trustees in 1882'. Two consequences followed. First, Harrie Wood, Minister of Mines and Liversidge's friend, announced that the government would conserve the Wellington Caves by setting aside 129 acres and appointing a keeper to collect fossils for the Geological and Australian Museums. This was not the first step towards environmental conservation in NSW; credit for this went to John Lucas

and Parkes' establishment of the [Royal] National Park in 1879. But it signified a continuing trend that Liversidge would do his best to maintain.

Second, it contributed to the realisation of Liversidge's plans for intercolonial cooperation. The story began in 1882, when Alexander Morton had canvassed the rivers of Queensland, looking for specimens of ganoid and dipnoid fishes. He found one specimen of the dipnoi, the *Ceratodus*, a species internationally famous since its discovery and description by Krefft in 1869. It was likely that anyone seeking further evidence of this 'living fossil' would follow Morton to the Burnett River, and the following year, Morton was followed by William Caldwell, a student of Michael Foster's *protégé* (and Liversidge's contemporary), the brilliant embryologist, F.M. (Frank) Balfour.

For a long moment in 1882, British biology mourned the death of its twin sons, Charles Darwin and Frank Balfour – the one of age, the other by accident. In tribute to Balfour, Foster and George Humphry established a scholarship for research in experimental biology. Scientists at home and overseas, including Liversidge, contributed to this 'Balfour Memorial'; and in 1883, Caldwell became the first 'Balfour Student', with a stipend of £200 a year for three years.

Caldwell was a dedicated biologist and skilled instrument maker who, with Threlfall and Dew-Smith, had invented a precision microtome for preparing tissue sections. For three years, sharing Balfour's interest in unusual and possibly transitional species, Caldwell had worked on the embryology of Australian fauna, a subject long the preserve of Richard Owen. Like Owen, he was interested in two questions – the reproductive mechanism of the marsupial, and the proper taxonomic classification, by reproductive evidence, of the monotremes.

For decades, studies of the monotremes (that is, the platypus and the echidna) had made them metaphorical metronomes, oscillating between rival theories. Some naturalists believed they were oviparous, laying eggs outside their bodies, like birds and reptiles. Owen and Bennett, however, believed they were ovoviviparous, hatching their eggs within their bodies. Since 1833, Owen's work on 'On the Structure, Generation

and Development of Living Australian Monotremes and Marsupials' dominated the field. Thanks to Liversidge, George Bennett and Gerard Krefft, many specimens were sent to England and several to Owen – 'some few even alive', as the *Herald* charitably put it. But Owen's interpretation remained untested. No one had seen proof in nature. 'To form a sound basis of taxonomy', in Huxley's phrase, it was necessary to study *in situ* these bizarre creatures that fascinated science.

Caldwell arrived in Australia in September 1883, and made Sydney his forward base. William Macleay lent him a temporary laboratory until the government, at Liversidge's request, found him premises in Macquarie Street to store his goods and specimens. He then spent several months riding through the colony, collecting and observing marsupials, and in April, rode north to the Burnett District to look for *Ceratodus* and monotremes during their breeding season. Assisted by as many as thirty Aboriginal trackers, he spent months collecting echidna eggs, until finally, in August 1884, he had the luck to encounter – and the misfortune to shoot – a platypus that had just laid an egg in the river bank. Caldwell's observation formed the basis of the memorable message, relayed by a neighbouring cattle station, to Liversidge in Sydney, thence to the BA in Montreal. He brought back to Sydney a large collection of echidna and platypus eggs – 'quite easy to get', he wrote Liversidge confidently, 'I cannot understand how they have not been got before' – and a number of *Ceratodus*, which he studied for the next six months.

Predictably, Caldwell's reading of the platypus was queried by Bennett, who was close to Owen, and also by Ramsay, who described himself as a 'doubting Thomas'. But by the time Caldwell's account appeared in the *Philosophical Transactions of the Royal Society*, the scientific world had accepted his conclusions, together with their insight into the possible evolutionary relationships between egg-laying monotremes, birds, reptiles and amphibians. His discovery, which confirmed the prediction of Geoffroy-Saint-Hilaire, made necessary a fundamental correction to the vertebrate taxonomies that were codified by Georges Cuvier in the 1820s, and taught by Owen ever since.

Then and later, Liversidge properly disclaimed any credit for Caldwell's success, but it was widely known that his encouragement had made it possible. Both the Australian and the British press, beginning with *The Times*, fumbled in reporting the news. Coincidentally, the same day, Wilhelm Haacke, Director of the South Australian Museum, announced a similar discovery to his colleagues in Adelaide. But all ears were turned overseas, and British Empire scientists meeting at Montreal became the first to hear the news. 'The honours of the occasion,' exclaimed the *Australian Town and Country Journal*, 'have been carried off by the duck-billed platypus – an ornament to the zoological world which has covered all the curiosities of Canada with the shadow of a great eclipse.' The colonial press rejoiced at the international reception given to Australian fauna; while *Melbourne Punch* satirised the *naïveté* of British scientists

discovering Australian 'natives'. Few papers gave a passing thought to the Aboriginal trackers who had presumably known this for ever. Any suggestion that Australia had been merely a suitable piece of real estate, plundered by a British researcher, was dispelled. James Service, Premier of Victoria, saw an opportunity to put Australia on the map. Within days, he telegraphed an invitation to the BAAS, suggesting that it hold one of its future congresses in Melbourne. Service's invitation was timely. The BAAS, warmed by its experience of 'social imperialism' in Canada, was interested in a voyage to the antipodes. So was Liversidge. On 16 September 1884, in a letter to the *Herald*, subsequently reproduced in England, Liversidge seized the initiative from Victoria, and gave it a twist. Whilst agreeing that Australia always merited a visit, he calculated that, given the distance, fewer than fifty of the BA's 2000 subscribers would make the trip, as against the 400 to 500 who normally attended a congress in Britain. Instead, therefore, of having a British Association meeting in Australia, he proposed that Australasia establish its own Association – a 'federation or union of the members of the various scientific societies in Australia, Tasmania and New Zealand' – with its first meeting in 1888, timed to coincide with the centennial of British settlement in Sydney.

Continued in next issue

This excellent book is available from the Society to members at \$54 collected or \$65 posted (within Australia)

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Royal Society of NSW

Proposed Rule change

At a meeting of the Society's Executive on 9 February 2011 it was agreed that a change to Rule 10 was required. This change will be presented to Members for consideration at the Society's Ordinary General meeting on 22 March.

Rule 10: Election of Members of Council

Current wording of Section (d):

- (d) Any financial member of the Society shall be eligible for nomination for any position on the Council of the Society except that no member shall be eligible for election as:
 - (i) President if the member has served as President for the whole of the preceding four years.
 - (ii) a member of the Executive Council if they have been elected as a member of the Executive Council for the preceding 5 years, except by a special resolution of the Society at the Annual General Meeting.
 - (iii) an ordinary Member of the Council if the member has been elected to the Council for the five preceding years.

Proposed new wording of Section (d) with changes underlined:

- (d) Any financial member of the Society shall be eligible for nomination for any position on the Council of the Society except that no member shall be eligible for election as:
 - (i) President if the member has served as President for the whole of the preceding five years, except by a special resolution of the Society at the Annual General Meeting.
 - (ii) a member of the Executive Council if they have been elected as a member of the Executive Council for the preceding 5 years, except by a special resolution of the Society at the Annual General Meeting.
 - (iii) an ordinary Member of the Council if the member has been elected to the Council for the five preceding years, except by a special resolution of the Society at the Annual General Meeting.