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The Royal Society of New South Wales Bulletin and Proceedings 343

Future Events 2011

Lectures in Sydney are held on the first Wednesday of the month.

Wednesday 6 April 2011 at 5.30pm

Belief and Science: the Belief/Knowledge Dilemma David Malouf and Barry Jones

The discussion will be followed by the Society's Annual General Meeting.

(see details at right)

Friday 29 April 2011 at 11am

Beauty and Truth: Their Intersection in Mathematics and Science

Lord Robert May, Oxford University

Leighton Hall, Scientia Building,
University of New South Wales.

(see separate flyer)

Central West Branch AGM March Meeting

The Annual General Meeting of the Society's Central West Branch will be held on Thursday 31 March 2011 at 12.30 pm at Banjo's Bistro, 346 Leeds Pde, Orange. For further information please contact Kerry Madden at Charles Sturt University Orange on Tel: 02 6365 7500.

Southern Highlands Branch

Annual General Meeting

Thursday 21 April 2011 at 6pm

April lecture at 6.30pm

Dr Jamie Vandenberg, Victor Chang
Institute

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.

Belief and Science: the Belief/Knowledge Dilemma

David Malouf and Barry Jones

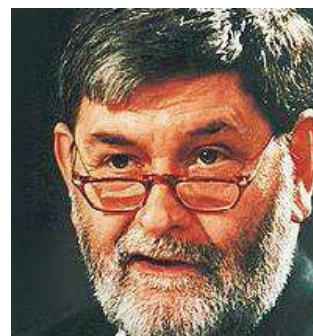
Wednesday, 6 April 2011 at 5:30pm Lecture Room 1, Darlington Centre,
University of Sydney

Topics like climate change seem to have not only polarised the population but also apparently forced practising scientists into a corner where they feel they need to 'believe' or be damned by their peers. Where has this thinking come from and what is it about us that causes us to suddenly suspend our 'scientific method' developed over hundreds of years in favour of 'mass religion'? Is it the fault of the media who are perpetually after their 5-second grab or are we ourselves to blame? The discussion will be followed by the Society's Annual General Meeting.

David Malouf is an acclaimed Australian writer. He won the inaugural Australia-Asia Literary Award in 2008 and has been short listed for the Booker Prize. For the past three decades most of his time has been spent in Sydney, but with prolonged absences in his house in Tuscany "where he could think and write in anonymity". The author of nine novels and five collections of short stories, Malouf has written several volumes of poetry and a play, *Blood Relations* (1988). He has written libretti for three operas including *Voss*, an adaptation of the novel of the same name by Patrick White. His memoirs, *12 Edmondstone Street*, were published in 1985. He was elected a Fellow of the Royal Society of Literature in 2008.



Barry Jones AO, FAA, FASSA, FAHA, FTSE, FACE is a writer, lawyer, social activist, quiz champion and former politician (including Science Minister). He is on the National Trust's list of Australian Living Treasures. Jones was Minister for Science in the Hawke government from 1983 to 1990, in which role he presided over the growth of organisations such as the CSIRO, the creation of the Australia Prize, Questacon and the Commission for the Future. In 1992 he was elected National President of the ALP, serving until 2000, and again in 2005–06. Jones was the chief architect of the ALP's Knowledge Nation education concept, as chair of the Chifley Research Centre's Knowledge Nation Taskforce. He was the first person elected Fellow of all four Australian learned academies.



Booking is not necessary. All welcome. Entry is free to RSNSW members. There is a charge of \$5 for non-members. Drinks will be available for purchase at the Forum Restaurant bar from 5:00pm prior to the event.

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

Lecture delivered for the Four Societies Meeting held on 24 February 2011

Geothermal Energy - Current State of Play and Developments

Dr. Stuart Mc Donnell, Chief Operating Officer for Geodynamics

Mr Stephen de Belle of Granite Power

The annual meeting of the “Four Societies” – the Royal Society of NSW, the Australian Nuclear Association, the Nuclear Engineering Panel of Engineers Australia (Sydney Division), and the Australian Institute of Energy – heard two perspectives on geothermal energy as a major energy source for the generation of electric power. The speakers were Dr Stuart Mc Donnell, chief operating officer of Geodynamics Ltd and Stephen de Belle, managing director of Granite Power Ltd. Both companies are developing “hot rocks” technology for the generation of electricity. The technological concept behind this technology is straightforward enough: a source of hot rock – typically granite at temperatures of 150-300° C at depths between 1500 m and 5000 m below the Earth’s surface – is identified. The rock is fractured and water is pumped under high pressure from the surface down through the hot rock where it is heated to very high temperatures. When the water returns to the surface, the energy is used to drive turbines which in turn generate electricity. The thermal resources in Australia are huge – in the Cooper Basin alone, there are hot rock deposits capable of generating as much electricity as burning 750 million tonnes of coal or 16 trillion cubic feet of natural gas.

Of course, the devil is in the detail. It is technologically challenging and expensive to drill to these depths. In addition, there are other significant technological challenges that need to be resolved such as fluid chemistry when the hot water reacts with the minerals in the rock and the components in the system, the ability to manage multiple fracture-zones in order to extract the maximum amount of heat, the gradual reduction of the temperature of the resource over time, and the challenges in creating viable, efficient heat exchanger designs in rock several kilometres beneath the Earth’s surface.

If these technological and economic issues can be overcome, geothermal generation is well placed to provide a substantial proportion of Australia’s base-load electricity demand. This could be as high as 2,300 MW of base-load capacity by 2020. Some government and private

funding has already been committed with the intention to seek further capital from institutional investors during 2011.

Donald Hector

From the President



In my previous report I omitted to let you know that Vice-President Professor Heinrich Hora and Hon. Secretary (Editorial) Dr Don Hector accompanied me on a conducted tour of the ANSTO premises at Lucas Heights in early February. This proved to be quite an eye-opener in terms of the range of activities ANSTO is involved with, which include climatology, nuclear medicine and particle physics. We had an opportunity to have a wide-ranging discussion with several ANSTO staff members following the tour. The broad spectrum of interests of the Society and of ANSTO proved equally appealing and it may be that the Society is able to arrange activities involving ANSTO staff in the near future.

I have had some preliminary discussions with Ms Virginia Mudie, Deputy Director of the Australian Antarctic Division, about celebrating the centenary of Douglas Mawson’s 1911 expedition to the Antarctic. The focus of the celebrations would probably be in November/December this year when we mark the departure of the expeditioners from Hobart. This will probably be a Royal Societies of Australia event as it is national.

As I foreshadowed in my last Bulletin, I attended the memorial service in Sydney

of 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 and a long-serving supporter of the Society. Our Patron, Professor Marie Bashir, as Chancellor of the university, gave a moving tribute to him.

Our Annual Dinner on 18 February was a great success with over 60 members and guests gathering in the hallowed halls of St Paul’s College. This year we were privileged to have the Governor of NSW, Professor Marie Bashir, as our guest-of-honour. She very graciously presented our Awards for 2010, invested two of our new Fellows and spoke eloquently about the important role of the Society past and present. Full details appear elsewhere in this Bulletin.

We are fortunate in having one of our new Fellows, Lord May of Oxford, visit us at the end of April to receive his award. It will be presented by Professor Bashir at Government House on 29 April. We have been able to persuade him, in conjunction with the Faculty of Science at the University of NSW, to deliver the next Dirac Lecture earlier that day. His topic, *Beauty and truth: their intersection in mathematics and science*, is very appealing to our Society.

The first two of our meetings this year have been joint events with other like-minded organizations. The first was the so-called Four Societies meeting on 24 February and the second the joint meeting with the Australian Institute of Physics on 22 March. These will now both be annual events. I imagine more joint events will be organized in the near future as each society can leverage off the other for greater benefit.

I’m very pleased we were able to entice Barry Jones and David Malouf to come and talk to each other in front of the Society about one of the most serious philosophical issues confronting us today – the question of the rise of ‘belief’ among scientists and its implications. It is important for the Society to address its obligations in relation to its original stated aims in the Preamble to its Act of Incorporation, which embrace not only science but also art, literature and philosophy. This event gives us the opportunity to do so. I encourage you to attend this important event.

John Hardie

Southern Highlands Branch

Report of February Meeting

Tomorrow's treatment for Cancer?

Dr Anita Hoskins, Garvan Institute

Dr Anita Hoskins was greeted by an audience of 51 when she arrived accompanied by the acting CEO of the Garvan Institute, Gabriella Lang, to address the February meeting of the Southern Highlands branch at 6.30pm on February 17th in the Drama Theatre, Frensham School, Mittagong.



Dr Hoskins' lecture focused on the latest developments in translational cancer research, particularly in the areas of breast and prostate cancer research. Translational research has transformed the way scientists research cancer today, driving new clinical therapies to reduce cancer incidence, morbidity and mortality. Research publications from the Garvan speak for the quality and quantity of medical research being conducted in the area of cancer and many other fields. Since 2005, research publications have numbered 995. In 2010 alone, scientists produced 195 publications.

The lecture described in detail the development and progression of cancer at the cellular level with particular emphasis on the Garvan's quest to find "Cancer's Achilles heel". Dr Hoskins discussed how targeted therapies are helping to deliver personalised medicine for all cancer patients, particularly in breast and prostate cancer sufferers. It was clear that as a result of these targeted therapies, the treatments of tomorrow will differ greatly from those in use now and in the past.

Sobering cancer statistics show that 1:2 men and 1:3 women will develop cancer during their lifetime, and that over 100 000 new cases were diagnosed in Australia in 2005. The number of new cases is projected to grow by over 3000 people per year. The rising incidence of cancer is largely due to increasing life

expectancy in both males and females. In 2010, 1.5 million people worldwide were told that they had developed breast cancer.

Researchers into the ultimate goal of "personalised medicine" for cancer treatment through targeted therapies are currently facing problems on several fronts. These include the development of drug resistance, and the fact that these treatments do not work for all cancers or cancer subtypes. Examples of targeted therapies in use today include Trastuzumab (Herceptin) – breast cancer, Erbitux (Cetuximab) – colorectal cancer, Imatinib (Gleevec) – chronic myeloid leukemia, Gefitinib (Iressa) – non-small cell lung cancer, and PLX4032 – melanoma. Dr Hoskins said research must be aimed at identifying new targeted therapies and ways of identifying patients who will respond to those treatments. Incorporating a patient's molecular information, such as protein biomarkers in the blood or genes in tumours would be one way of guiding treatment decisions in such a personalised medicine approach.

Dr Hoskins concluded her lecture with comments on the significant progress that has been made in recent years in the treatment of breast and prostate cancer. Both now have 5-year survival rate exceeding 90%. She emphasised that we are in an age of discovery, and that the only way we will achieve personalised medicine will be through translational cancer research.

The audience showed their appreciation of the lecture through their wide-ranging questions, and their comments on the excellent presentation by Dr Hoskins.

Anne Wood

Report of March Meeting

When the staff of life becomes a rod for your back: tackling the rising problem of coeliac disease

Dr Jason Tye-Din, MBBS, FRACP, PhD

Once considered a medical curiosity afflicting young infants, coeliac disease is now understood to be a strikingly prevalent disorder in adults, affecting at least 1 in 100 Australians, with most remaining undiagnosed. The identification in the 1950s that gluten from wheat, rye and barley causes

the disease led to the treatment we still use today – a lifelong gluten free diet. However the disease is often not diagnosed, the role of the gluten free diet is not fully understood, and general misconceptions abound.



Dr Tye-Din talked of the emerging epidemic of coeliac disease, and described how research has progressed from a primitive understanding of gluten to a comprehensive molecular characterization that is now opening up avenues for novel diagnostics and therapies that could one day mean an end to the gluten free diet. His presentation coincided with Coeliac Awareness Week, so it was hardly surprising that many in the 47-strong audience were sufferers of the disease.

Coeliac Disease (CD) is a systemic inflammatory illness caused by gluten. While small bowel villous atrophy is characteristic, multiple organ systems are targeted. CD is now more than twice as common as type 1 diabetes, and more frequently diagnosed in adults without overt malnutrition. Despite improvements in disease awareness and serologic testing, CD remains frequently overlooked. Untreated CD is associated with increased morbidity and mortality – a major concern given that 80% of the more than 210 000 Australians with CD remain undiagnosed.

With a fourfold increase in prevalence in the past 50 years, the burden of CD continues to grow, with a substantial rise in diagnosed cases projected over the next decade. The cause for this rate of prevalence is unknown. Typically CD begins in early childhood, but may not manifest until adulthood and even old age. Dr Tye-Din noted that in Victoria, new members joining the Coeliac Society are generally females of median age 40 years. He suggested that a disproportionately higher rate of coeliac serology testing in females is likely to explain the sex differences in the rate of diagnosed CD rather than substantial differences in biological risk.

Dr Tye-Din stressed the clinical need for a less restrictive and more effective therapy for CD. Insight into the molecular mechanisms underpinning CD pathogenesis provides several opportunities for novel therapeutic development. An understanding of the gluten peptides driving CD pathogenesis has formed the basis of an immunotherapy ('coeliac vaccine') designed to induce tolerance of gluten. This has recently completed a phase I trial in Australia.

New approaches also under development include oral protease supplements ('glutenases') that digest toxic gluten peptides, blockers of small intestine permeability (zonulin antagonists) to reduce the absorption of peptides, and inhibitors of the enzyme transglutaminase. Several of these new investigations have already been subjected to early-phase human clinical trials.

Although much research work lies ahead, these proposed therapies offer a ray of hope for CD sufferers. Dr Tye-Din feels that the challenge of ensuring satisfactory gluten detoxification means that most therapeutics are likely to supplement the gluten free diet and provide a safeguard against inadvertent gluten exposure, but not replace the gluten free diet completely. The possibility always exists however that, in the future, long-acting agents that qualitatively modify the immune response to gluten may entirely replace the gluten free diet.

At the conclusion of this excellent lecture, all agreed that Dr Jason Tye-Din and the Royal Society had presented an outstanding event for Coeliac Awareness Week. Jason was warmly applauded.

Anne Wood

New Members

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

Tara Andrews – Full Member
Mark Swan – Full Member
Jonathan Aitchison – Full Member
John Butterworth – Full Member
Herma Buttner – Full Member
Julian King – Associate Member

We welcome them into the Society.

Annual Dinner 2011

The Society held its Annual Dinner for 2011 at St Paul's College, University of Sydney on Friday 18 February 2011. Our guest-of-honour was the Governor of NSW, Her Excellency Professor Marie Bashir AC CVO, one of our two Patrons and a long-standing supporter of the Society. We were also pleased to have three Deans of Science from universities in Sydney present. In her Occasional Address Her Excellency made reference to the antecedents of the Society and the work of one of her predecessors, Governor Lachlan Macquarie, in creating a climate in which Societies such as ours might germinate. We appreciate her support and that of the unbroken line of her predecessors.



The Governor, Marie Bashir, presents Fellowship to Professor Michelle Simmons



The Governor, Marie Bashir, presents Fellowship to Emeritus Scientia Professor Eugenie Lumbers



The Governor, Marie Bashir, congratulates Dr Ken Campbell on his award of the Clarke Medal



The Governor, Marie Bashir, presents Assoc. Prof. Angela Moles with the Edgeworth David Medal



The Governor, Marie Bashir, presents Prof. Rick Shine with the Walter Burfitt Prize



The Governor, Marie Bashir, presents Dr Julian King with the joint AIP/Royal Society of NSW Studentship Award



The Governor, Marie Bashir, with Society President John Hardie after he presented her with a token of the Society's appreciation. .



Vice President, Heinrich Hora, gives the vote of thanks.

Archibald Liversidge, FRS: Imperial Science under the Southern Cross

by Roy McLeod

Extract from chapter 8 *Dean and Doctor*

I am sure that such an Association must come sooner or later if we are to hold our own,' he wrote. '[It] would not only do a great deal for the advancement of science in other Colonies, but would also favour their progress in other ways.' The aim of Caldwell's morphology, as the *Herald* put it, was to show 'the common unity underlying living structures'; no simile could more neatly convey Liversidge's plan for the unification of Australian science.

Liversidge's proposal was aired at a reception given by the Royal Society to mark Caldwell's triumphant return to Sydney in November 1884. But after a brief flurry of interest, it was shelved. Larger issues of federalism distracted the political and popular press. Proposals for 'empire federation' had been canvassed in Britain since the 1840s, but a fresh impulse came in November 1884 with the Imperial Federation League and its vision of a single parliament, linking all the British colonies to Britain, 'for Britain's better security'. Although the League eventually failed for want of party support, daughter branches survived in Canada, New Zealand, and in the capital cities of Australia, where local sections of the pro-Empire 'Round Table' recruited Liversidge and several of his colleagues and students.

While an empire federalism dominated by London had its advocates, some – like Richard Jebb and Liversidge – preferred a federal structure linked to colonial self-government. An Australian federation, uniting the six colonies into one, followed by an alliance of 'equals' between Australia and the United Kingdom, spoke to the spirit of an emerging Australian nationalism that had many supporters in England.

In the meantime, technology was coming to the assistance of colonial integration. In June 1883, the railway brought Melbourne closer to Sydney; in January, 1887, Adelaide came to Melbourne, and in January, 1888, Sydney met Brisbane – steps that confronted the contradictions of inconsistent gauges, and what the Victorian Premier, Sir James Patterson, called the 'barbarism of borderism'. Political federation was on its way. The question was whether science would join the train.

For many, the message was clear enough. In 1886, Clement Wragge, the controversial meteorologist who made his name by giving female names to cyclones, caught the sentiment exactly, in his opening address to the newly founded Meteorological Society of Australasia at Adelaide. 'As in politics,' he said, 'so in science, we desire federation.' While politicians wrestled with constitutional niceties, scientists saw federation as a practical solution to the tyrannies of distance, isolation and fragmentation.

Meanwhile, on the other side of the world, British interests conspired with these colonial aspirations. In November 1885, during his Presidential Address to the Royal Society of London, T.H. Huxley – who had since become a Liberal Unionist and anti-Home Ruler as well – proposed the creation of a union of English-speaking men of science, one which would co-opt the United States and the 'settler colonies' into a single professional community, united by language, culture and tradition. Huxley had returned from a visit to the Philadelphia Centennial Exhibition in 1876 impressed by the potential of American science. Now, as Britain was daily bombarded by Germany's successes in applied science and industry, an Anglo-American alliance seemed more than ever vital to imperial interests. Touching on imperial politics, Huxley went on to say, 'Whatever may be the practicality of political federation for more or fewer of the rapidly growing English-speaking peoples of the globe, some sort of scientific federation should surely be possible.' The solution must not offend the *internationale* of science. 'Nothing is baser than scientific Chauvinism,' he said, but added, thoughtfully, 'blood is thicker than water.'

Huxley's thoughts struck an harmonious chord with Liversidge who, not yet forty years old, had just been elected President of the Royal Society's colonial counterpart. After a decade on Council, this seemed an ideal moment to revisit the question of scientific federation, which had been incubating since well before his return from Europe in 1879, and on which he had spoken in 1884. Federation would place Australia securely in the context of 'Greater Britain'

– and give Australian science the status of a partner among equals.

It was therefore fitting that, as Huxley's protégé, Liversidge devoted his Presidential Address of 5 May 1886 to a variation of Huxley's message. To promote the fraternal spirit of Australian and New Zealand science, he suggested that 'arrangements should be made for holding a meeting of those who wished to form an Australasian Association in 1888'. Recasting his ideas of 1879 and 1884, Liversidge proposed to draw on the thirty-eight 'recognized scientific societies' of Australia and New Zealand, comprising on paper between 2000 and 3000 members. He drafted a constitution virtually identical to that of the British Association – with provision for a general committee (or council), local committees to prepare congresses, and specialist sections to promote research – but with the addition of a significant new feature, to appoint delegates from the colonial societies to the larger body. One day, perhaps, the metropolitan BAAS might visit Australia; but until it did, an intercolonial association would speak for itself. Its congresses and committees would have an immediate effect, Liversidge added, by raising the 'high-water mark of thought' in all the colonies. Politically, 'it would tend to stimulate all classes, and disseminate a taste for all branches of knowledge'. Personally, its success would shine like a jewel in the crown of his presidency.

In July 1886, with the backing of his Council, Liversidge wrote to all the learned societies in Australia and New Zealand, inviting a number of delegates (one for each 150 members) to a constitutional convention to be held in Sydney on 10 November. Their purpose: to plan for an inaugural congress in 1888 to 'take stock' of 'all scientific matters ... concerned with Australasia'. The Royal Society of NSW would play host; the University of Sydney would supply the venue.

It may not have surprised Sir Patrick Jennings, then Premier and Treasurer, to receive two urgent appeals for aid to science that August. Just as Threlfall was delivering his *ultimata* to the University's Senate, and they, to the government, Liversidge asked Jennings for assistance –

'as is done elsewhere', he said – towards the expenses of the Association's first congress. The proposal was discussed, and amidst parliamentary confusion, almost defeated. But it was rescued by a combination of parsimony and pride. On the one hand, it was too expensive to bring the British Association to Australia. On the other hand, a distinctly Australasian Association would give 'lectures on the general principles of science, for the general public; [but also] encourage a closer examination of [Australia as] a scientific continent'. Neither object could be achieved by a British body that would merely 'come and go', conceded Sydney's *Daily Telegraph*, 'leaving no better organisation than there is at present among colonial scientists'. A visit from the BAAS would become 'more an opportunity for Australian hospitality than Australian science'.

Against this background, the Agent-General of NSW in London quietly withdrew the tentative invitation made to the BAAS, whilst leaving the door ajar, ready to be reopened at a later date. In Sydney, the *Herald* and the *Telegraph*, and in Melbourne, the *Argus* and the *Age*, reported Liversidge's plan, and Henry Parkes endorsed a 'scheme which will be confined to the Australian Colonies, and which will be acceptable to all classes of this country'. 'It should be the central idea', his backbench colleague, Thomas Garrett added, 'to keep it a purely Australian matter'.

And so an 'Australian matter' it became – albeit with the addition of New Zealand. Soon, political circumstances changed – an election in January 1887 turned Jennings out of office; the Sydney Centenary Exhibition planned for 1888

fell through; and Melbourne set about having an international exhibition instead. But Liversidge went ahead with his preparatory meeting on 10 November 1886. The difficulties were not easily denied. Of the twenty-seven delegates nominated by the thirty-eight societies, only sixteen actually turned up. But these – seven from NSW, two from New Zealand, two from Queensland, and five from Victoria – were of like mind, and agreed upon a constitution. Adopting Liversidge's reading of the BAAS, they resolved to meet and hold elections for officers sixteen months later, on 7 March 1888. The first Congress was scheduled for September. The Victorians, led by Professor W.C. Kernot of Melbourne University, offered Liversidge their warm support, assuring him that his sister colony did not begrudge him 'the honour of initiating' the Association. 'No one,' Kernot said, 'had any shadow of misgivings to the thing being good, and the sooner it was done the better.'

In six short months, Liversidge had swept to a consensus that had been six years in the making. In London, *Nature* summarised the sequence of events, while regretting that the British Association could not 'see their way to visit Australia during the Centennial year'. What British readers made of this is not clear, but it seemed that colonials were to be independent *malgré eux*. According to *Nature's* correspondent, theirs would be an Association 'thoroughly Australian in character'. However, imperial loyalties were not to be diminished. On the contrary, the new body was to be, in Liversidge's words, not an independent agency, but an 'Australian offshoot'. The metaphor of family, the sense of organic

unity that Huxley preached, Liversidge warmly embraced.

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

Vale Fred Blanks

The Society was saddened to hear of the death on 15 March of the longest-serving member of the Society, Fred Blanks AM, aged 85. The President represented the Society at his funeral.

Born Fritz Mayer in Germany, he migrated to Australia with his family in 1939. He completed a science degree at Sydney University, then worked as a chemist with Imperial Chemical Industries (ICI – now Orica) for 36 years. He joined the Royal Society of NSW in 1948.



At university he became interested in classical music, and became a music critic at the *Sydney Morning Herald*. After he retired, he was music critic for the *North Shore Times* for ten years. Up to the end of 2007 he had attended 11,572 concerts at which over 25,000 works were played by over 3,000 composers!

In 1988, Mr Blanks was awarded the Order of Australia for services to music.

He is survived by his wife and children.

Contact your office bearers

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Clive Wilmot Vice President	02 4886 4199	Bruce Welch Hon. Secretary (General)	02 9569 9928
Dr Don Hector Hon. Secretary (Editorial)	02 9484 4378	Marian Haire Hon Treasurer	02 8467 3575
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