



Proceedings of the Royal Society of New South Wales The 2019 programme of events — Sydney

Held at the State Library of NSW (SLNSW), Shakespeare Place, Sydney; Sydney Mechanics' School of Arts (SMSA), 280 Pitt Street, Sydney or otherwise stated.

Wed 6 Feb	1270 th Ordinary Meeting 2018 RSNSW Scholarship winners, at SLNSW; 3MT presentation	Fiona McDougall, Macquarie University Evelyn Todd, University of Sydney Mr Chuhao Liu, University of Wollongong	Human-associated bacteria and antibiotic resistance in grey-headed flying foxes Using genetics to improve athletic performance in thoroughbred horses Finding the best-fitting jeans for railway foundations
Mon 25 Feb	Annual Meeting of the Four Societies 2019 Held in conjunction with the Nuclear Engineering Panel of the Sydney Branch of Engineers Australia, the Australian Nuclear Association and the Australian Institute of Energy. Held at Allens.	Helen Cook, GNE Advisory	Legal considerations pertaining to nuclear energy as an option for Australia
Tue 26 Feb	SMSA/RSNSW Speaking of music, lecture 1 at SMSA	Dr. Wesley J. Watkins IV, Jazz and Democracy Project	Jazz and democracy
Wed 6 Mar	1271 st OGM and open lecture at SLNSW	Katherine Belov, School of Life and Environmental Sciences, University of Sydney	Using genomics to conserve Australia's biodiversity
Thu 21 Mar	SMSA/RSNSW Women and Science, lecture 1 at SMSA	Suzanne Burdon	Mary Shelley, scientist, and Frankenstein
Wed 3 Apr	1272 nd Ordinary Meeting and 152 nd Annual General Meeting at SLNSW	Emeritus Professor Brynn Hibbert, School of Analytical Chemistry, UNSW	Measuring what we can: or how to lose weight on May 20 th
Thu 2 May	SMSA/RSNSW Women and Science, lecture 2, at SMSA	Susannah Fullerton OAM FRSN	Ada Lovelace, without whom we might not have computers

Fri 10 May	Annual Dinner: Distinguished Fellow's Lecture and presentation of the Society's 2018 awards, at Swissôtel	Guests of honour: The Society's Vice-Regal Patron, Her Excellency The Honourable Margaret Beazley AO QC, Governor of NSW and Michelle Simmons FRS FAA FTSE DistFRSN Australian of the Year 2018 ARC Laureate Professor Scientia Professor of Physics, UNSW	The new field of atomic electronics
Wed 5 Jun	1273 rd Ordinary Meeting at SLNSW	Dr Kate Faasse School of Psychology UNSW	This talk may cause side effects: nocebo effects in medicine
Thu 20 Jun	RSNSW/SMSA Women and science: lecture 3, at SMSA	Professor Lesley Hughes FRSN Dept. of Biological Sciences Macquarie University	Climate change and our life support system
Wed 3 Jul	1274 th Ordinary Meeting at SLNSW	Emeritus Professor Robert Burford FRSN UNSW	Past, present and future of polymers: is the plastics age over?
Mon 23 Jul	RSNSW/SMSA Women and science: lecture 4, at SMSA	Emerita Professor Barbara Gillam FASSA FRSN School of Psychology, UNSW	Visual perception in Aboriginal art
Wed 7 Aug	1275 th Ordinary Meeting at SLNSW	Professor Peter Shergold AC FRSN, Chancellor, Western Sydney University	Democracy under challenge: how can we restore a sense of citizenship?
National Science Week (NSW) talks held at SMSA.			
Mon 12 Aug	NSW talk 1	Dr Ragbir Bhathal FRSN	Aboriginal astronomy
Tues 13 Aug	NSW talk 2	Emeritus Professor Robert Clancy AM FRSN	Unexpected results — Australian science to 1950
Thu 15 Aug, 12:30	NSW talk 3	Dr Josh Harle	Machine aesthetics of the human body
Thu 15 Aug, 18:30	NSW talk 4	Professor Mikhail Prokopenko FRSN, University of Sydney	Computer modelling of epidemics

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Wed 14 Aug	Poggendorff lecture at University of Sydney	Professor Robert Park School of Life and Environmental Sciences University of Sydney	Cereal killers: how plant diseases affect food security
Fri 16 Aug	UNSW Centre for Ideas event, the inaugural Gerald Westheimer Lecture	Professor Elizabeth Blackburn AC FAA FRS DistFRSN Dept. of Biochemistry and Biophysics, UC San Francisco	The telomere effect
Wed 4 Sep	1276 th Ordinary Meeting at SLNSW 3MT presentation	Professor Hans Pols FRSN Head, School of History and Philosophy of Science University of Sydney Miss Lingzhi Kang, University of Wollongong	Physicians as public intellectuals: Indonesian physicians in the Dutch East Indies Biofabricated platforms for wound healing and skin regeneration
Thu 19 Sep	Sci-Fi Series — The future is here, at the National Maritime Museum	Professor Emma Johnston AO, Dean of Science, UNSW Sydney, RSNSW Clarke Medal Recipient Professor Andy Pitman, Director, ARC Centre of Excellence for Climate Extremes Associate Professor Tracy Ainsworth, Scientia Fellow, Centre for Marine Science & Innovation, UNSW	The Flying Eyes: How ecologists are using new technology to see hidden worlds The day after tomorrow: What does climate change mean for us? Deep Blue Sea: Solving the coral reefs crisis
Mon 23 Sep	RSNSW/SMSA Women and science: lecture 5, at SMSA	Anne Harbers	Electricity, astronomy, and natural history: from colonial Sydney to Royal Sweden, and a ladies' academy of science in between
Wed 2 Oct	1277 th Ordinary Meeting at SLNSW	Professor Peter Godfrey-Smith The University of Sydney	Bodies and minds in animal evolution
Thu 17 Oct	RSNSW/SMSA Women and science, lecture 6, at SMSA	Susan Pond AM FTSE FAHMS FRSN	Women at the frontiers of biotech
Wed 6 Nov	1278 th Ordinary Meeting at SLNSW	Professor Herbert Huppert FRS FRSN University of Cambridge	The Beginning of Weather Forecasting: Matthew Maury, Robert FitzRoy FRS, and L. F. Richardson FRS

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Thu 7 Nov	RSNSW and Four Academies Forum, Government House, Sydney	Hosted by Her Excellency The Honourable Margaret Beazley AO QC, Governor of NSW and Patron of the Royal Society of NSW	Making SPACE for Australia
Held in cooperation with the Australian Academy of Science, the Australian Academy of Technological Sciences and Engineering, the Australian Academy of the Humanities and the Academy of Social Sciences in Australia.			
Tue 12 Nov	Joint AIP, RSNSW, and RACI Open Lecture 2109, at UTS	Professor Jodie Bradby ANU	Diamonds and high pressure physics
Held in conjunction with the Australian Institute of Physics, RSNSW and the Royal Australian Chemical Institute.			
Thu 21 Nov	RSNSW/SMSA Women and science, lecture 7, at SMSA	Emerita Professor Ann Green FTSE FASA FAIP FRSN	An accidental astronomer
Wed 5 Dec	1279 th Ordinary Meeting followed by the Society's Christmas Party at SLNSW	Royal Society of NSW 2019 Jak Kelly Award: Gayathri Bharathan, Macquarie University	All-integrated mid-infrared laser sources

The 2019 programme of events—Southern Highlands

Held at the Mittagong RSL, 1st Floor, Joadja/Nattai Rooms.

Thu 21 Feb	Prof Rodney Croft The Australian Centre for Electromagnetic Bioeffects Research (ACEBR)	The Effect of Non Ionisation Electromagnetic Radiation on our Health
Thu 21 Mar	Susannah Fullerton OAM Author. President of the Jane Austin Society of Australia. Patron of the Rudyard Kipling Society of Australia	The Life and Diary of Samuel Pepys.
Thu 18 Apr	Prof Richard Kemp UNSW School of Psychology	Psychology of Eyewitness Memory
Thu 16 May	Dr Damian Wrigley ANU Botanical Gardens	The Importance of a Seed Bank in Future Preservation of Plant Species
Thu 20 Jun	Prof Ken Baldwin Director of the Energy Change Institute at ANU. Deputy Director of the Research School of Physics and Engineering.	Nuclear Energy
Thu 18 Jul	Dr Christian Heim and Dr Caroline Heim	Understanding the Mental Health Crisis and how your Relationships can save you
Thu 15 Aug	Prof Rick Shine AM School of Life and Environmental Sciences, Uni of Sydney	Sequencing the Cane Toad Genome (DNA)
Thu 19 Sep	Dr Rebecca Carey Volcanologist, Senior Lecturer Earth Sciences, University of Tasmania	Volcanology
Thu 17 Oct	Dr Ian Bryce Rocket Scientist and Ethics Teacher	The Physics of the Mind: Exploring sentience, freewill, and morality
Thu 21 Nov	Dr Steven Harrison	Porcelain through History — Discoveries and analyses of ancient porcelain from around the world

The 2019 programme of events—Hunter Branch

Wed 9 Oct	Inaugural Meeting, Hunter Branch of the Royal Society of NSW, and open lecture, at the Newcastle Club	Professor Hugh Durrant-Whyte FRSN, NSW Chief Scientist and Engineer	Industries of the Future
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Awards 2019

1) James Cook Medal 2019 — Scientia Professor Matthew England

The James Cook Medal is awarded from time to time for outstanding contributions to both science and human welfare in and for the Southern Hemisphere.

Professor Matthew England, of the UNSW Climate Change Research Centre, is recognised as one of the world’s foremost experts in how the world’s oceans control regional and global climate on time scales from seasons to millennia. His field of research spans physical oceanography and climate dynamics, where he has written seminal papers on Southern Ocean water-mass formation, Antarctic ocean-atmosphere-ice interactions, climate modes of variability, and ocean ventilation processes. Importantly, in the context of the James Cook Medal, England has a sustained track record of outstanding research and discovery in areas that make an impact on human welfare, both here in Australia and across other regions of the Southern Hemisphere, including improved predictions of rainfall and climate variability, discoveries of the oceanic drivers of severe drought and flooding rains, and quantification of the impacts of climate change and the fate of ocean pollution.

2) Edgeworth David Medal 2019 — Professor Si Ming Man

The **Edgeworth David Medal** is awarded each year for distinguished research by a young scientist under the age of 35 years for work done mainly in Australia or for contributing to the advancement of Australian science.

Professor Si Ming Man, of the John Curtin School of Medical Research at the Australian National University, is an outstanding young researcher in the field of innate immunology, attaining a full professorship only six years after his PhD graduation. Six of his recent papers are recognised as “highly cited,” being in the top 1% of the field. His research has identified a class of disease-fighting “killer” proteins, produced by the cell, which can directly attack bacteria, causing these pathogens to die and release signals that can rapidly trigger activation of the immune system. Further studies have shown that immune receptors have critical roles in preventing gut inflammation and the development of colorectal (bowel) cancer, while most recently he has discovered that toxins from foodborne bacteria can be detected and blocked by immune receptors to prevent sepsis.

3) Clarke Medal for Geology 2019 — Professor Dietmar Müller

The **Clarke Medal** is awarded each year for distinguished research in the natural sciences conducted in the Australian Commonwealth and its territories. The fields of botany, geology, and zoology are considered in rotation. For 2019, the medal was awarded in Geology.

Professor Dietmar Müller, of the School of Geosciences at the University of Sydney, is internationally renowned for discoveries that have transformed our fundamental understanding of the Earth’s evolution, environments and geological resources. Many of these discoveries were made possible only through Müller’s international research efforts in building a Virtual Earth Laboratory to “see” deep into the Earth in four dimensions (space and time), opening

up the Earth's dynamic history going back 200 million years. His scientific discoveries are outstanding, with contributions to the field including age and tectonic evolution of the ocean basins, earthquake hazard mapping, Australia's intraplate stress through time, sea floor image analysis, the evolutions of continental basins and margins, and linking plate tectonics and mantle convection to Australia's surface topography through time.

4) History and Philosophy of Science Medal 2019 — Professor Evelleen Richards

The **Society's History and Philosophy of Science Medal** is awarded each year for outstanding achievement in the History and Philosophy of Science, especially the study of ideas, institutions, and individuals of significance to the practice of the natural sciences in Australia.

Professor Evelleen Richards, an Honorary Professor in the School of History and Philosophy of Science at the University of Sydney, is an Australian scholar of outstanding achievement and international standing. Her work is particularly notable in that she has made significant contributions to answering key questions in the history of science, especially in the history and historiography of evolutionary theory, as well as to the study of contemporary research policy in science and medicine. Her studies in the contextual history of evolutionary biology are internationally regarded as offering a major advance in the understanding and interpretation of the scientific past. Her recent book on the genesis and reception of Charles Darwin's concept of sexual selection, *Darwin and the Making of Sexual Selection*, has generated substantial international impact, being awarded the 2018 Suzanne J. Levinson Prize of the U.S. History of Science Society. Equally remarkable during her career has been her engagement with the history and socio-politics of medicine and their policy implications, demonstrating the importance of historical and sociological analyses in illuminating medical practices and policy, particularly in relation to clinical trials and drug regulation.

5) Walter Burfitt Prize 2019 — Professor Kourosh Kalantar-Zadeh

The **Walter Burfitt Prize** is awarded every three years to a resident of Australia or New Zealand for research in the pure or applied sciences that is deemed to be of the highest scientific merit, judged according to scientific output published during the preceding six years.

Professor Kourosh Kalantar-Zadeh, of the School of Chemical Engineering at UNSW Sydney, is renowned for his research and development in the areas of liquid metals, atomically thin materials and ingestible sensors. He is a prolific researcher, recognised in 2018 by Clarivate Analytics as a "Highly Cited Researcher." Over the past six years, his contributions have been frequently first-in-world and have set the agenda for research fields internationally in areas such as two-dimensional (2D) materials, liquid metals and microfluidics, and point-of-care diagnostic systems and sensors.

6) Jak Kelly Award 2019 — Mrs Gayathri Bharathan

The winner of the **Jak Kelly Award** for 2019 is **Gayathri Bharathan** from Macquarie University. Her research pursues the development of mid-infrared fibre lasers for medical and spectroscopic applications.

The Jak Kelly Award encourages excellence in postgraduate research in physics. The winner was selected from a short list of candidates who made presentations at a recent joint meeting at UNSW of the Australian Institute of Physics NSW Branch, the Royal Australian Chemical Institute, and the Royal Society of NSW.

7) Royal Society of New South Wales Scholarships 2019

The **Royal Society Scholarships**, valued at \$500, together with a complimentary year of associate membership of the Society, are awarded annually in order to acknowledge outstanding achievements by young researchers in any field of science. Applicants must be enrolled as research students in a university in either NSW or the ACT on 1 January in their year of nomination.

For 2019, the RSNSW Scholarships have been awarded to:

- Ms Emma Austin — The University of Newcastle
- Mr Shayam Balaji — The University of Sydney
- Mr Michael Papanicolaou — University of Technology Sydney and the Garvan Institute of Medical Research
- Mr Thomas Pettit — University of Technology Sydney

Note on Gazetting

The Government Gazette of the State of New South Wales is managed by the New South Wales Parliamentary Counsel's Office and has published Government notices, regulations, forms and orders since 1832. It went on line in 2001 and since 2014 is only to be found at <https://www.legislation.nsw.gov.au/#/gazettes>.



Government Gazette

of the State of
New South Wales
Number 8
Thursday, 31 January 2019

On the initiative of RSNSW Fellow Robert Whittaker AM FRSN, the Society approached His Excellency the Governor to formally gazette fellows of the Society. All current fellows were included in the first gazetting in 2018, and subsequently at the beginning of each year fellows elected in the previous year will appear in the Gazette.

As the Gazette of Thursday 31 January 2019 says:

“His Excellency, General The Honourable David Hurley AC DSC (Ret'd), Governor of New South Wales, as Patron of The Royal Society of New South Wales and in furtherance of the aims of the Society in encouraging and rewarding the study and practice of Science, Art, Literature and Philosophy, is pleased to advise and acknowledge the election of the following as Fellows and Distinguished Fellows of the Society.”

Fellows

Proven leaders and experts in their field, entitled to use the post nominal FRSN. Please note Professorial titles — including adjuncts, conjoint, and professors of practice — have been used where applicable. Details as to their field of expertise, their resident university (or universities) or institution may be ascertained from the Royal Society of New South Wales.

- AMAL, Scientia Professor Rose Amal AC FRSN
AUSTIN-BROOS, Professor Emerita Diane Austin-Broos FRSN
BATHURST, The Honourable Chief Justice Thomas Bathurst AC FRSN QC
BELOV, Professor Katherine Belov FRSN
BHATHAL, Dr Ragbir Bhathal FRSN
BIRD, Professor Trevor Bird FRSN
BLACKBURN, Air Vice Marshal John Blackburn AO FRSN
BORODY, Professor Thomas Borody FRSN
BROADBENT, Chancellor Dr Jillian Broadbent AO FRSN
BUTLER, Rear Admiral (USA) John Butler CBE FRSN DSM(US)
CARMICHAEL, Professor David Carmichael FRSN
CARTER, Emeritus Professor John Carter AM FRSN
CHOUCAIR, Dr Mohammad Choucair FRSN
COMPTON, Professor Mark Compton AM FRSN
COVELL, Emeritus Professor Roger Covell AM FRSN
DAVIS, Emeritus Professor Jeremy Davis AM FRSN
DI PIETRO, Commodore Vincenzo Di Pietro AM CSC FRSN
DOOLEY, Professor Anthony Dooley FRSN
EDMOND, Professor Gary Edmond FRSN
FARNSWORTH, Dr Alan Farnsworth AM FRSN
HARRIS, Chancellor Mr James Harris FRSN
HARRISON, Conjoint Professor Alexander Harrison FRSN
HIBBERD, Professor Adrian Hibberd FRSN
HILTON, Dr John Hilton FRSN
HINTZE, Sir Michael Hintze AM FRSN
HUPPERT, Emeritus Professor Herbert Huppert FRS FRSN
HUSH, Dr David Hush FRSN
HUSH, Associate Professor Julia Hush FRSN
HUTCHINSON, Chancellor Ms Belinda Hutchinson AM FRSN
JEFFERY, Dr, Major General, The Honourable Philip Michael Jeffery AC AO(Mil) CVO MC FRSN
KARA, Professor Sami Kara FRSN
KARSKENS, Professor Grace Karskens FRSN
KINGSFORD, Professor Richard Kingsford FRSN
KIRBY, The Honourable Michael Kirby AC CMG FRSN
LOOSLEY, Mr Stephen Loosley AM FRSN
MacDONALD, Professor Heather MacDonald FRSN
MACKIE, Professor Vera Mackie FRSN
MASON, The Honourable, Sir Anthony Mason AC KBE FRSN QC
MIDDLETON, Emeritus Professor Jason Middleton FRSN
MORONEY, Commissioner (Rtd) Dr Kenneth Moroney AO FRSN
NEW, Associate Professor Elizabeth New FRSN
OZDOWSKI, Commissioner (Rtd) Dr Seweryn Ozdowski AM FRSN
PALMER, Mr George Palmer AM FRSN QC
POND, Dr Susan Pond AM FRSN
QUILTY, Dr Ben Quilty FRSN
RICHARDS, Honorary Professor Evellen Richards FRSN
SAHAJWALLA, Scientia Professor Veena Sahajwalla FRSN
SENGELMAN, Major General Jeffrey Sengelman DSC AM CSC FRSN
SHARPE, Ms Wendy Sharpe FRSN
SILBERBERG, Dr Ronald Silberberg AO FRSN
SMITH, Professor Lee Smith FRSN
SPENCE, Vice Chancellor and President Dr Michael Spence AC FRSN

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STODDART, Professor Sir James (Fraser) Stoddart
FRS FRSN

STORRIER, Dr Timothy Storrier AM FRSN

SWAN, Professor Peter Swan AO FRSN

TABBAA, Commissioner (Rtd) Ms Inaam Tabbaa
AM FRSN

THOMAS, Mr Robert Thomas AM FRSN

TISDELL, Professor Christopher Tisdell FRSN

TORERO, Dr Jose Torero FRSN

TROWELL, Dr Stephen Trowell FRSN

VANN, Vice Chancellor and President Andrew Vann
FRSN

WATERHOUSE, Emeritus Professor Richard Water-
house FRSN

WELLINGS, Vice Chancellor and President Professor
Paul Wellings CBE FRSN

WILLIAMSON, Professor Geordie Williamson FRS
FRSN

WILLIS, Professor George Willis FRSN

ZHAO, Professor Chuan Zhao FRSN

The following had been previously admitted as Fellow of the Society but were not appropri-
ately attributed in the NSW Government Gazette:

FLAMBAUM, Scientia Professor Victor Flambaum
FRSN

GRIFFIN, Dr Desmond Griffin AM FRSN

HILL, Emeritus Professor Stephen Hill AM FRSN

HERRMANN, Dr Jan Herrmann FRSN

IRISH, Associate Professor Muireann Irish FRSN

MOYAL, Dr Ann Moyal AM FRSN

ROBERTS, Scientia Professor John Roberts FRSN

TAYLOR, Professor Mark Taylor FRSN

Archibald Liversidge: Imperial Science under the Southern Cross

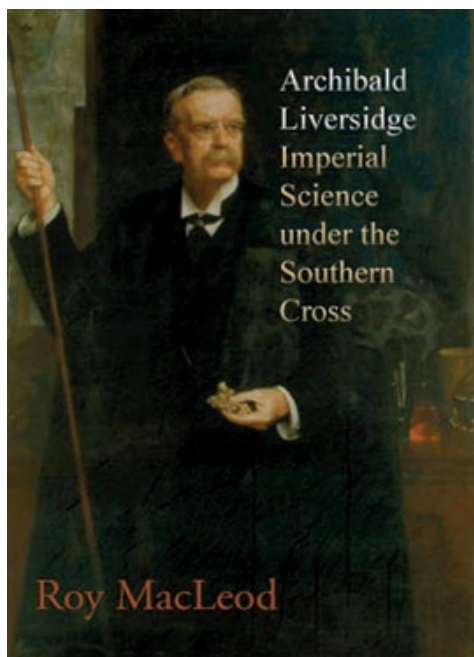
Roy MacLeod

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When Archibald Liversidge first arrived at the University of Sydney in 1872 as Reader in Geology and Assistant in the Laboratory, he had about ten students and two rooms in the main building. In 1874, he became Professor of Geology and Mineralogy and by 1879 he had persuaded the University Senate to open a Faculty of Science. He became its first Dean in 1882.

In 1880, he visited Europe as a trustee of the Australian Museum and his report helped to establish the Industrial, Technological and Sanitary Museum which formed the basis of the present Powerhouse Museum's collection. Liversidge also played a major role in establishing the *Australasian Association for the Advancement of Science* which held its first congress in 1888.

This book is essential reading for those interested in the development of science in colonial Australia, particularly the fields of crystallography, mineral chemistry, chemical geology and strategic minerals policy.



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The Royal Society of New South Wales



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Manuscripts are only accepted in digital format and should be e-mailed to: journal-ed@royalsoc.org.au

The templates available on the Journal website should be used for preparing manuscripts. Full instructions for preparing submissions are also given on the website.

If the file-size is too large to email it should be placed on a CD-ROM or other digital media and posted to:

The Honorary Secretary (Editorial),
The Royal Society of New South Wales,
PO Box 576,
Crows Nest, NSW 1585
Australia

Manuscripts will be reviewed by the Editor, in consultation with the Editorial Board, to decide whether the paper will be considered for publication in the Journal. Manuscripts are subjected to peer review by at least one independent reviewer. In the event of initial rejection, manuscripts may be sent to other reviewers.

Papers (other than those specially invited by the Editorial Board) will only be considered if the content is either substantially new material that has not been published previously, or is a review of a major research programme. Papers presenting aspects of the historical record of research carried out within Australia are particularly encouraged. In the case of papers presenting new research, the author must certify that the material has not been submitted concurrently elsewhere nor is likely to be published elsewhere in substantially the same form. In the case of papers reviewing a major research programme, the author must certify that the material has not been published substantially in the same form elsewhere and that permission for the Society to publish has been granted by all copyright holders. Letters to the Editor, Discourses, Short Notes and Abstracts of Australian PhD theses may also be submitted for publication. Please contact the Editor if you would like to discuss a possible article for inclusion in the Journal.

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