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Royal Society of NSW Awards 2020

The Awards and Citations for 2020 were announced at the 1289th Ordinary General Meeting of the Society, held on Wednesday, 9 December 2020. These included the Cook Medal, which is the Society's highest honour, awards for research and scholarly excellence, and awards which recognise substantial service to the Society.

In 2021, nominations will be sought for the following:

- James Cook Medal
- Clarke Medal and Memorial Lecture
- Edgeworth David Medal
- History and Philosophy of Science Medal
- Pollock Memorial Lecture
- Warren Prize
- Archibald Ollé Prize, and
- the Royal Society of NSW Scholarships

See the RSNSW web site for details.

James Cook Medal — Scientia Professor Richard Bryant AC

The winner of the James Cook Medal for 2020 is **Scientia Professor Richard Bryant AC FASSA FAA FAHMS** of UNSW (Sydney). Professor Bryant has made many seminal advances in the diagnosis, treatment, and identification of neural, genetic, and cognitive markers of post-traumatic psychopathology. His work has challenged the pre-existing notions of acute psychological response to trauma leading to major policy and practice shifts internationally in relation to how trauma survivors are managed. Professor Bryant has translated his findings into improving the mental health of communities throughout the Southern Hemisphere (as well as many trauma-affected countries in the northern hemisphere).

The Clarke Medal and Lecture — Distinguished Professor Michelle Leishman

The Clarke Medal 2020, in the field of Botany, has been awarded to **Distinguished Professor Michelle Leishman** of the Department of Biological Sciences at Macquarie University. Professor Leishman is internationally recognised for her work in plant ecology. In particular, her studies are directed towards understanding the success of invasive plant pathogens, vegetation responses and adaptation to climate change, plant conservation, and facilitating resilient urban green spaces. She has a number of active research programs which include development of a database for greening urban space, studying invasive plants and pathogens and climate vegetation response and adaptation to global climate change.

Edgeworth David Medal — Associate Professor Brett Hallam

The Edgeworth David Medal for 2020 has been awarded to **Associate Professor Brett Hallam** of the School of Photovoltaic and Renewable Energy Engineering at UNSW (Sydney). In less than six years from completion of his PhD, Scientia Fellow Brett Hallam has established himself as a national and international leader in the highly competitive field of crystalline silicon photovoltaics, particularly in the areas of light induced degradation, hydrogen passivation and defect engineering. Although he has made a major impact on photovoltaics globally, this is in addition to his profile and leadership in crystalline silicon photovoltaics in Australia. Professor Hallam's research addresses one of the key challenges in sustainability — that is, access to clean electricity. His work on hydrogen passivation to avoid light induced degradation of solar cells means that the cost of photovoltaics can be reduced greatly, increasing the competitiveness of this form of electricity compared with that generated by fossil fuels.

History and Philosophy of Science Medal — Professor Alison Bashford FRSN

The Medal for 2020 has been awarded to **Professor Alison Bashford FRSN FAHA FBA FRHistS**, an ARC Laureate Fellow from the Faculty of Arts and Social Sciences at UNSW (Sydney). Professor Bashford is one of Australia's most eminent historians, recognised internationally for her ground-breaking and transformative historical studies of the biomedical and environmental sciences. Her scholarly distinction is recognised by fellowships of both Australian and British academies. Professor Bashford has greatly enlarged and raised our understanding of past conceptions of race, population and place in Australia and the world. She has brought the history of the human and environmental sciences into the scope of world history. She has written five acclaimed books and numerous other published works in which she reveals connections of science and medicine with national projects and global ambitions. Further, her extensive and various studies have reoriented the history of science toward the southern hemisphere and the Pacific, showing us how natural knowledge has been assembled in Australia and the region.

Liversidge Lecture — Professor Richard Payne FRSN

The Liversidge Lecture for 2020 was awarded to **Professor Richard Payne FRSN FRACI FRSC** of the School of Chemistry of the University of Sydney. Professor Payne's research focusses on the development of technologies for the chemical synthesis of therapeutic peptides and proteins. These technologies have facilitated the preparation of numerous proteins bearing modifications that enhance activity and stability — critical features in the quest to develop efficacious protein therapeutics. His approaches have also been combined with recombinant methods to generate large therapeutic proteins and even antibodies — methods that have been widely adopted in the laboratories of international academics and pharmaceutical companies alike. He has developed synthetic proteins that are amongst the most potent antithrombotic agents ever reported, and which have an enormous therapeutic potential for thrombo-embolic disorders. Professor Payne has been awarded numerous prizes and medals including the 2014 RSNSW Edgeworth David Medal and the H G Smith and A J Birch Medals of the RACI.

Poggendorff Lectureship — Professor Angela Moles FRSN

Professor Angela Moles FRSN, of the School of Biological, Earth and Environmental Sciences of UNSW (Sydney), has been awarded the Poggendorff Lectureship for 2020. Professor Moles is an international leader in the field of large-scale evolutionary ecology. In particular, she studies the processes that shape global patterns and the way plants grow, reproduce, and interact with animals. She has a highly cited publication record, and the innovation and quality of her work has been recognised by numerous awards.

The Jak Kelly Award — Mr Matthew Donnelly

The winner of the Jak Kelly Award for 2020 is **Matthew Donnelly**, a PhD candidate at the University of NSW. Mr Donnelly is researching monolithic donor structures in silicon and their application in spin-based quantum computing, with a focus on using 3D fabrication techniques to precisely control tunnel rates and other parameters critical to the operation of spin qubits.

Warren Prize — Dr Simon Devitt

The Warren Prize of the Royal Society of NSW has been awarded to **Dr Simon Devitt** of the Centre for Quantum Software and Information at the University of Technology Sydney. The Prize, which was awarded for the first time in 2020, recognises research of national or international significance by engineers and technologists in their early to mid-careers. The judges were impressed with Dr Devitt's portfolio of achievements, including his publication in top-tier journals, and his activity in commercialising ideas in the realm of quantum computing through start-up companies. Dr Devitt, who completed his PhD in 2007 at the University of Melbourne, has held positions at the National Institute of Informatics, Ochanomizu University, Keio University and Riken in Japan, and has worked as research fellow for the ARC Centre of Excellence in Engineered Quantum Systems (EQUS) at Macquarie University. He has developed key quantum computing architectures in atom-optics, diamond and ion trap systems, and invented quantum communications designs, second and third-generation repeaters and the quantum sneakernet. Most recently, his work has focussed on the design of programming, compilation, and optimisation techniques for large-scale quantum technology.

Archibald Ollé Prize — The late Dr Ann Moyal

The 2020 Archibald Ollé Prize has been awarded to the late **Dr Ann Moyal AM FRSN** for the paper "P.A.M. Dirac and the Maverick Mathematician," *Journal & Proceedings of the Royal Society of New South Wales*, vol. 150, part 2, 2017, pp. 188–194. The paper's abstract: "Historian of science Ann Moyal recounts the story of a singular correspondence between the great British physicist, P. A. M. Dirac, at Cambridge, and J. E. Moyal, then a scientist from outside academia working at the de Havilland Aircraft Company in Britain (later an academic in Australia), on the question of a statistical basis for quantum mechanics. A David and Goliath saga, it marks a paradigmatic study in the history of quantum physics."

Royal Society of New South Wales Scholarships — Mr Sajad Razavi Bazaz, Mr Daniel Fox, and Ms Phillipa Specker

Mr Sajad Razavi Bazaz, PhD candidate at the University of Technology Sydney. In his PhD, Mr Razavi Bazaz studies the use of 3D printing for microfluidics. Microfluidics is a science which allows the manipulation of fluid samples, typically in the range of microlitres, within networks of channels ranging from tens to hundreds of micrometres. Microfluidic systems are becoming increasingly promising tools for the advancement of chemical and biological research with evident benefits. Today, 3D printing technologies have gained significant traction, being dubbed a third industrial revolution. Due to the expanding use of microfluidic systems in laboratories, 3D printing has emerged as an alternative method to traditional costly fabrication processes. Mr Razavi Bazaz has developed a new method for the fabrication of microfluidic devices and has validated it. He and his colleagues have established a start-up company to develop 3D-printed microfluidic devices for selective sperm selection for the IVF market.

Mr Daniel Fox, PhD candidate at the Australian National University. Mr Fox is studying the clinically important, but much neglected, human and foodborne pathogen, B Cereus, and has discovered that enterotoxins produced by this bacterium can activate cytosolic innate immune inflammasome sensors which mediate host defence against pathogens. The sensing of pathogens by inflammasome sensor proteins results in the assembly of the inflammasome complex. Mr Fox has identified a toxin NHE as a novel activator of the NLRP3 inflammasome because it triggers formation of a lytic pore that promotes the efflux of potassium ions. He has also found it mediates the killing of cells from multiple lineages and hosts. It acts synergistically with another toxin secreted by the same organism, HBL.

Ms Phillipa Specker, PhD candidate at UNSW (Sydney). Ms Specker investigating the role of emotional regulation in the management of post-traumatic stress disorder (PTSD) in refugees. Refugees represent one of the largest at-risk groups in the development of PTSD, with current treatments being much less efficacious compared to other trauma-exposed groups. Research suggests that emotion regulating strategies that refugees used to manage stress may be critically important in their recovery from PTSD. In the first part of her PhD program, she found that there were individual differences in the types of emotion regulation strategies that refugees used to manage stress and that those refugees who were better able to concurrently use cognitive reappraisal and emotional suppression had fewer PTSD symptoms. Currently, she is testing a novel experimental paradigm to investigate whether providing refugees with adaptive emotion regulation skills training will reduce PTSD symptomology and ultimately improve well-being.

Royal Society of NSW Medal — Emerita Professor Mary O'Kane AC FRSN

Emerita Professor Mary O'Kane AC FRSN FTSE Hon FIEAust was appointed as the first New South Wales Chief Scientist and Engineer in 2008 and remained in the position until 2018. Prior to that she was Vice-Chancellor and President of the University of Adelaide from

1996 to 2001. From 1994 to 1996 she was Deputy Vice-Chancellor (Research) and Professor of Electrical Engineering at the University of Adelaide. From 1989 to 1993 she was Dean of the Faculty of Information Sciences and Engineering at the University of Canberra.

Early on, as the New South Wales Chief Scientist and Engineer, she established a relationship between her office and the Royal Society of New South Wales which, in essence, provided the Society with access to the State Government. She was a strong supporter of the Society, providing funding for the publication of the *Journal and Proceedings*. Later she provided funding and hosted the Four Societies Lecture when it was the Royal Society's turn to organise this event. She also instigated an awards mechanism for the Society, by which the Science Deans of NSW and ACT universities came together under her chairmanship to make recommendations for the Society's prizes and scholarships. She advocated for the Society in government and also was a strong supporter of the Royal Society of New South Wales and Four Academies Forum held annually at Government House, Sydney.

Royal Society of NSW Citation — Emeritus Professor Heinrich Hora FRSN FAIP FInstP

Emeritus Professor Heinrich Hora, of UNSW (Sydney), has served the Royal Society of New South Wales with distinction over many years. Professor Hora is a former Vice-President and Councillor of the Society and is a current member of the Fellows and Members Assessment Committee, to which he has made significant contributions over several years. In that role, he has helped ensure that the most talented and qualified individuals across many fields join the ranks of the Fellowship of the Society. In addition to his extensive service to the Society, Professor Hora is a noted theoretical physicist who has made and continues to make significant contributions to solid state physics, the optical properties of plasma, and non-linear dynamics with the application of lasers to the production of nuclear fusion energy.

Archibald Liversidge:
Imperial Science under the Southern Cross

Roy MacLeod
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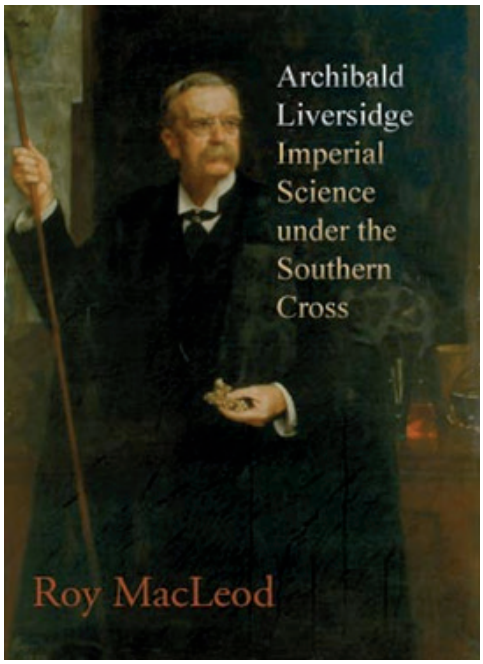

When Archibald Liversidge first arrived at the University of Sydney in 1872 as Reader in Geology and Assistant in the Laboratory, he had about ten students and two rooms in the main building. In 1874, he became Professor of Geology and Mineralogy and by 1879 he had persuaded the University Senate to 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
P.O. Box 576
Crows Nest, NSW 1585, Australia

info@royalsoc.org.au (general)
editor@royalsoc.org.au (editorial)
www.royalsoc.au
www.facebook.com/royalsoc

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