

Awards for 2015

The Council of the Royal Society of New South Wales have determined to make the following awards for 2015.

1. Edgeworth David Medal:

Associate Professor Simon Ho

ARC Queen Elizabeth II Fellow, School of Biological Sciences, University of Sydney.

The Edgeworth David Medal, established in memory of Professor Sir Tannatt William Edgeworth David FRS, a past President of the Society, is awarded for distinguished contributions by a young scientist under the age of 35 years.

Associate Professor Simon Ho has made hugely important contributions and developed new methods in the field of ‘molecular clocks’ in biology – a way of estimating evolutionary rates and timescales from DNA sequences using statistical models. These estimates underpin a broad range of studies in conservation genetics, speciation and diversification, domestication of animals and plants, events in human prehistory, and the population dynamics of pathogens. His research focuses on understanding how evolutionary rates vary at the genomic level and estimating the timescale of the Tree of Life. These are fundamental goals of biological inquiry because they deal with the details of the evolutionary process.

Simon Ho’s work has set a range of standards in the field, as well as producing methods and practises that are now widely used by researchers. His research has led to important improvements in the way that researchers estimate evolutionary timescales using genetic and genomic data, with significant consequences for our understanding of the evolutionary past.

2. History and Philosophy of Science Medal:

Professor Warwick Anderson

ARC Laureate Fellow and Professor in the Department of History and the Centre for Values, Ethics and the Law in Medicine, University of Sydney. Additionally, he has an affiliation with the Unit for History and Philosophy of Science at Sydney University.

The Royal Society of NSW History and Philosophy of Science Medal was established in 2015 to recognise outstanding achievement in the History and Philosophy of Science. The medallist will have made a significant contribution to the understanding of the history and philosophy of science, with preference being given to the study of ideas, institutions and individuals of significance to the practice of the natural sciences in Australia.

Professor Anderson is a medical doctor turned historian, who has made important contributions to the history of science, medicine, and public health; the history of racial thought and postcolonial science studies. He is a Fellow of the Academy of the Social Sciences, and won the 2014 History of Science Society's Price/Webster Prize for article - “Hybridity, Race and Science: The Voyage of the Zaca, 1934-1935.”

In 2014 Professor Anderson, with immunologist Ian Mackay, wrote a brilliant and original book “Intolerant Bodies: A Short History of Autoimmunity”, published by Johns Hopkins University Press. The authors follow the puzzle of autoimmunity from theory to laboratory practice to individual patients’ case histories. The result is a compelling study of concepts in action. This sophisticated but highly readable history helps close the gap between medical science and the general public’s understanding.

3. Clarke Medal for Zoology.

Professor Christopher Dickman

University of Sydney School of Biological Sciences.

The Clarke Medal was established to acknowledge the contribution by Rev William Branwhite Clarke MA FRS FGS, Vice-President of the Royal Society of New South Wales from 1866 to 1878. The Medal is awarded annually for distinguished work in the natural sciences of geology, botany and zoology done in Australia and its Territories.

Professor Dickman's major contributions lie in terrestrial zoology and ecology. He has long been curious about the factors that promote and maintain biodiversity, especially among land mammals and other terrestrial vertebrates. For the last 35 years he has focused in particular on understanding the forces that shape the distribution and abundance of Australia's endemic mammals and identifying the factors that are causing so many species to decline. His ground breaking works on Australia's desert mammals and on the continent's introduced predators have gained him a formidable reputation as a leading national and international authority on mammalian ecology.

4. Royal Society of New South Wales Scholarships.

Adrian Dudek (Australian National University, School of Mathematics)

Yevgeny Stadnik (University of New South Wales, School of Physics)

Charles Foster (University of Sydney, School of Botany)

The Council of the Society funds the Royal Society of New South Wales Scholarship in order to acknowledge outstanding achievements by early-career individuals working, in a science-related field within New South Wales or the Australian Capital Territory, towards a research degree in a science related field.

Adrian Dudek is working in number theory under Dr Trudgian at the ANU. During his PhD he has published (or had accepted) eight papers in the peer reviewed literature. His application explained his research thus: “In particular, I’m interested in the elusive tale of the prime numbers. When I let this slip to most people, somewhat tepid memories of their primary school days are horrifically conjured. However, the prime numbers have been studied for thousands of years, or at least since 300BC, when the great Greek geometer Euclid proved that there are infinitely many of them. Since such ancient times, the primes have attracted the attention of curious mathematicians (and other characters) for one reason: it’s extraordinarily difficult to understand the behaviour of the prime numbers. For instance, if you were to write down a list of the first 100 prime numbers (a rousing exercise for a Friday night, I’m sure!), you would not be able to find an intelligible pattern. That being said, some recent spectacular advances in number theory mean that the prime numbers are becoming less elusive and more understandable ...”

Yevgeny Stadnik works with Professor Flambaum FRSN on “Manifestations of Dark Matter and Variation of Fundamental Constants in Atoms and Astrophysical Phenomena”. He writes: “My project is on the investigation of new effects produced by dark matter and proposing novel ways of detecting dark matter. We have published a number of important works in this direction, including results that already improve on existing sensitivities in the detection of certain types of dark matter by up to 15 orders of magnitude. Our results have been published in leading physics journals, including three publications in *Physical Review Letters* (which is the most highly cited physics journal), and have contributed to the initiation of a number of new laboratory searches worldwide.”

Charles Forster is a botanist working with our Edgeworth David medallist Simon Ho on a project “Using genome-scale data to untangle the evolutionary history of flowering plants”. A University of Sydney medallist, Charles has been able to estimate the timescale of evolution of a range of plants using genomic data. His analyses have been careful and comprehensive, and he is on the verge of publishing his outstanding work on this topic. This is in addition to three papers from his honours research and three published or under review. This work has also led to the development of some important research collaborations with colleagues at the Royal Botanic Gardens (Sydney) and Université Paris-Sud (France). He writes: “I have provided the most comprehensive combination of analyses of the angiosperm evolutionary timescale so far. The results I have obtained reflect the increasingly common finding that molecular dating estimates predate the oldest fossils by a non-trivial amount of time, up to 70 million years when considering mean estimates.”

5. The Royal Society of New South Wales and Australian Institute of Physics Jak Kelly Award
James Colless

University of Sydney, School of Physics

The Jak Kelly Award is awarded jointly with the Australian Institute of Physics (AIP) to the best PhD student talk, this year presented to a joint meeting with the AIP held on November 17 at Trinity Grammar School.

James Colless is a postgraduate student at the University of Sydney currently undertaking his PhD under the supervision of Professor David Reilly. His research focus is readout and control techniques for GaAs spin qubits. James hopes his research will influence the design and fabrication of reliable multiqubit gates. His talk was entitled “From Quantum Devices to Quantum Machines”. It explored the complexity of scaling quantum processors and discussed new techniques and hardware developed to meet these challenges. In particular, James had developed new methods of readout that allow the dispersive sensing of single-electrons using integrated sensors and the capability to read out multiple qubits simultaneously. A scalable control scheme is also demonstrated allowing large numbers of qubits to be manipulated with a small number of input signals.

The award consists of an engraved plaque, a \$500 prize and a year of membership of the Society. As the winner of the Jak Kelly award, James then presented his talk to Royal Society on the 1st of November at the Union, Universities and Schools Club.