

2013
VICTORIA PRIZE
FOR SCIENCE
& INNOVATION
AND
VICTORIA
FELLOWSHIPS





Victoria Prize for Science & Innovation

The prestigious \$50,000 tax-free Victoria Prize for Science & Innovation is awarded to outstanding Victorian researchers whose discovery or innovation, or potential discovery or innovation, has significantly advanced knowledge or has provided commercial or other benefits to the community.

The Victoria Prize for Science & Innovation honours the life-long commitment and achievements of the recipients.

Created in 1998, the annual Victoria Prize is an initiative of the Victorian Government in support and recognition of outstanding Victorian scientific research and innovation.

In 2013, two researchers – representing the fields of life sciences and physical sciences – will receive the Victoria Prize for Science & Innovation.

Victoria Fellowships

The Victoria Fellowships were established in 1998 to encourage innovation and the commercial application of research among researchers in the early stages of their careers.

In 2013, the Victorian Government doubled the number of fellowships and, for the second time, up to 12 outstanding young people will be awarded up to \$18,000 each for international study missions.

Overseas study missions offer Victoria Fellows the opportunity to broaden their experience, develop international networks and better understand where their activities fit into the local and international scene. The Victoria Fellowship also provides an opportunity to develop commercial ideas.



veski on behalf of the Victorian Government is delivering the two Victoria Prizes for Science & Innovation from 2013 to 2015. veski is also delivering 12 Victoria Fellowships per year for this period with six fellowships in each category.

MINISTER'S WELCOME

Since 1998, the Victoria Prize and Victoria Fellowships have recognised and rewarded outstanding Victorian scientists and researchers in fields ranging from bio-medicine to clean technologies to robotics and advanced materials. Their work has enhanced our quality of life and driven the development of new technologies, products and services that create more jobs and prosperity for our State.

As part of the Victorian Coalition Government's commitment to a more productive and competitive economy underpinned by innovation and skills, we doubled the number of Victoria Prizes for Science and Innovation and Victoria Fellowships on offer. The Victoria Prize for Science and Innovation now provides two individual awards of \$50,000 each. There are now 12 Victoria Fellowships available that each provide up to \$18,000 for early-career researchers and innovators to undertake international study missions.

Once more the Australian French Association for Science & Technology - Victoria (AFAS) will support two Victoria Fellows in studying in France.

Over the past 15 years, the Victoria Prize and Fellowships have given many talented Victorians the opportunity to further pursue their research, undertake specialist training and forge international connections while highlighting our State's position as the science capital of Australia. The standard of applications has remained consistently high year on year, and the award recipients are chosen only after a rigorous and competitive selection process, which is further testament to our research excellence. I ask all Victorians to join with me in thanking the winners and applicants for the contribution they are making towards a more innovative and prosperous Victoria.

The Hon. Louise Asher MP

Minister for Innovation, Services and Small Business
Minister for Tourism and Major Events
Minister for Employment and Trade



2013



“Hollenberg is sparking a new era of nanoscale magnetic imaging with research spanning quantum physics, chemistry, bio-engineering, materials science, and biology”

Victoria Prize for physical science Professor Lloyd Hollenberg

Imperfect diamonds could help answer fundamental questions in the life sciences, thanks to groundbreaking research by Victorian physicist Professor Lloyd Hollenberg. In world first experiments, Hollenberg and his team demonstrated nanodiamond quantum sensing technology in a living cell with sensitivity and resolution a million times greater than any conventional MRI system in the world.

The quantum sensor, a single atom defect in a diamond crystal called a nitrogen-vacancy centre, has the potential to revolutionise sensing and imaging at the atomic and molecular levels. The combination of the special properties of diamond and the quantum properties of the nitrogen-vacancy centre are one of nature’s remarkable coincidences and allows the device to detect the very small magnetic fields arising from individual atoms and molecules. With human life beginning and ending with atoms and molecules, a quantum sensor will provide us views of life at this fundamental level in a way never before experienced.

Internationally, there is huge interest in the potential of quantum technologies. Working at the convergence of quantum mechanics and biology, Professor Hollenberg is sparking a new era of nanoscale magnetic imaging with research spanning quantum physics, chemistry, bio-engineering, materials science and biology. As

a result, he and his team have demonstrated that sensors based on the strange rules of quantum mechanics can offer new tools to address important problems in biology.

Professor Hollenberg received the 2012 Walter Boas Medal for pioneering work in quantum sensing and quantum computing. In 2013, he was awarded an ARC Laureate Professorship and was part of the team that received the 2013 Eureka Prize for Excellence in Interdisciplinary Scientific Research. According to ABC’s Catalyst his work is “a quantum leap in theoretical physics, that’s poised to make a huge impact in cell biology”.

Hollenberg is Deputy Director of the ARC Centre of Excellence for Quantum Computation and Communication Technology within the Department of Physics at the University of Melbourne.

“The quantum sensor has the potential to revolutionise sensing and imaging at the atomic and molecular levels”

VICTORIA PRIZE FOR SCIENCE & INNOVATION

Victoria Prize for life science Professor Alan Cowman

Every year, 3.3 billion people remain at risk of contracting malaria, an estimated 300 million are infected, up to one million die, and drug resistant malaria parasites continue to emerge. While a vaccine remains undiscovered, the work of Professor Alan Cowman over the past two decades has brought us much closer to that much-needed yet elusive preventive measure.

Throughout his career, Professor Cowman has greatly contributed to understanding how the parasite causes disease and how it circumvents many of the anti-malarial drugs. Not only have these been important basic research discoveries, they have made it easier to detect when a patient is infected with a resistant malaria parasite. This has been used in the development of simple

“Widely regarded as the world’s best molecular biologist focused on malaria”

tools to inform governments of malaria endemic countries about the emergence of drug resistant malaria and the most appropriate therapies for patients. His work not only comprises science performed at the highest level, but also represents an exciting translation from bench to clinic.

Cowman also pioneered the technique of genetic manipulation in the *P. falciparum* parasite and with his team successfully identified the proteins responsible for the parasite’s survival and virulence. This led to the identification of prime vaccine candidates and based on his technology and knowledge, he was able to weaken live parasites by manipulating their genes.

Professor Cowman is widely regarded as the world’s best molecular biologist focused on malaria. He is a Fellow of the Australian Academy of Science and the Royal Society and has received many awards, including the Howard Taylor Ricketts Medal for Infectious Diseases from the University of Chicago, the Commonwealth of Australia Centenary Medal and the NHMRC Research Achievement Award. The significance of Cowman’s work is further highlighted by publication in top ranked international journals.

Cowman is Head of the Infection and Immunity Division at the Walter and Eliza Hall Institute of Medical Research.



“Cowman has greatly contributed to understanding how the parasite causes disease, and how it circumvents many of the anti-malarial drug”



Dr Meenakshi Arora

Like many major cities throughout the world, Melbourne is close to running out of water. With the population expected to exceed seven million by 2050, retrofitting the centralised water facilities is not sustainable and alternative water sources are needed.

The aim of Dr Meenakshi Arora's Victoria Fellowship study mission is to develop a triple-bottom-line framework for integrating decentralised water supply systems with existing water service infrastructure, with minimal financial, environmental and social impacts.

Few studies have taken into account the challenges that need to be overcome in Victoria. It's a similar situation in California, where Dr Arora will visit three locations to facilitate joint research and knowledge sharing. She will assess water security, technology options, and system configuration, along with social, environmental and economic viability of centralised-decentralised hybrid systems.



Dr Nishar Hameed

Early detection is key to treating a range of chronic diseases, such as cancer. Unfortunately, MRI and ultrasound technologies often fail to detect the disease until it's too late.

Dr Nishar Hameed aims to use the Victoria Fellowship to develop a solution: highly sensitive medical imaging agents which diagnose and distinguish diseased tissue from normal tissue, provide information on a disease state and monitor the effect of a treatment.

He will build on his BioNanotechnology research at BioGeelong and bring together the world-class research expertise of Deakin University, Imperial College London, University of Cambridge and CNRS at the Institut Charles Gerhardt.



**Associate Professor
Bradley Ladewig**

Despite water treatment and desalination technologies becoming increasingly widespread, they are not reducing in price or becoming more efficient.

Associate Professor Bradley Ladewig's study mission as a Victoria Fellow will build a multinational, multidisciplinary research effort to develop and commercialise technology to deliver water more efficiently for Australians.

If successful, Bradley's work could spark a significant high-tech industry for Victoria, with development, manufacturing, sales and support. Core scientific and engineering collaboration and development will be the focus of Bradley's study tour.

He will also review activity in Berlin, Europe's high-tech startup epicentre, to identify how best to stimulate the translation of research discoveries into commercial startups back in Victoria.

VICTORIA FELLOWSHIPS - PHYSICAL SCIENCES



Dr Xiangping Li

The Internet is producing more data than ever and accelerating the development of storage devices with capacities never before dreamed about.

The most promising is all-optical magnetic recording but development is hindered by a lack of sophisticated light or nanophotonic-manipulation techniques and limited to a few wavelengths. Dr Xiangping Li will investigate a new approach to large capacity data storage, using nanophotonics-enabled super-resolution all-optical magnetic recording.

This Victoria Fellowship study mission aims to integrate cutting-edge knowledge in: nanophotonics at Swinburne University, part of Nanotechnology Victoria; nanofabrication at Melbourne Centre for Nanofabrication; nanoplasmonics at Imperial College London; opto-magnetic material sciences at York University; and data storage commercialisation at Anwell Ltd., to tackle the bottlenecks of all-optical magnetic recording.



Associate Professor
Timothy Rawling

Global extraction of oil, gas and coal over several decades has put extreme pressure on the Earth's sedimentary basins.

Associate Professor Tim Rawling is trying to address this situation through the development of a Sedimentary Basin Management Co-operative Research Centre. The Centre will develop sophisticated geological models and simulation tools to predict the Earth's response to meeting the challenges of present and future energy demand.

The Victoria Fellowship is critical to the development of the Centre, with visits to world-leading developers of 3-D geological models. He will establish ongoing research partnerships and return to the Centre with cutting-edge modelling technologies.

Tim's mission will also include presenting at the Sustainable Earth Sciences Conference in Paris, showcasing technologies for 'Sustainable Use of the Deep Sub-surface'.



Dr Jin Zhang

Silkworms could hold the answer to advanced materials like bulletproof vests and artificial tendons.

Dr Jin Zhang will use the Victoria Fellowship to understand how these extremely light-weight, thin cocoons protect the wild silkworms from physical attacks and extreme weather. She wants to create and develop new lightweight materials for personal protection, load bearing and energy absorbing purposes.

This study mission will focus on understanding the mechanics of the silk fibres and their biological structure to allow the biomimicry of this natural composite. It will also provide a valuable opportunity for Dr Zhang to visit and work in the world's most prestigious silk research organisations.

Jin will build on her recent discovery that some wild silkworm silks exhibit strain-hardening behaviour and large extensibility.



Dr Anil Kumar Asthana

Victorians suffering from inflammatory bowel disease will benefit from increased use of intestinal ultrasound scans.

Dr Anil Asthana will travel to Denmark and Italy as part of his Victoria Fellowship to develop skills to establish a Melbourne-based service. The new service will address the significant productivity losses and premature death caused by the disease, and make Victoria a centre for training Australian gastroenterologists.

Intestinal ultrasound is a non-invasive and low cost way of monitoring the disease's activities, with less people requiring hospitalisation.

His study mission will begin with attendance at the European Crohn's and Colitis Organisation conference. He will then train for ten weeks in Milan where he will see patients on a daily basis alongside a world-leading authority in the area.



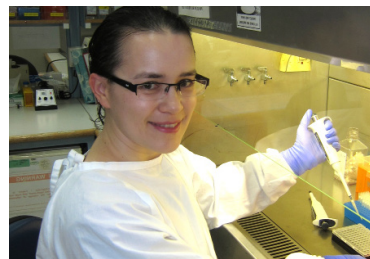
Dr Ross Clark

Falls remain Australia's most common cause of hospitalisation due to injury.

Given the greying population, and with each fall costing the health system more than \$3000, Dr Ross Clark wants to create a system to accurately identify those at risk of falling and implement falls-prevention programs.

These programs, often consisting of balance and strength training, work in a range of healthy and clinical populations however, they are expensive and require a clinician to train and supervise the participant. Inexpensive, portable and simple-to-use technologies are a feasible alternative for clinical use and are already widely available.

The Victoria Fellowship will allow Ross to travel and meet with key collaborators throughout the world and investigate portable technologies to bring back to Victoria.



Dr Natasha Holmes

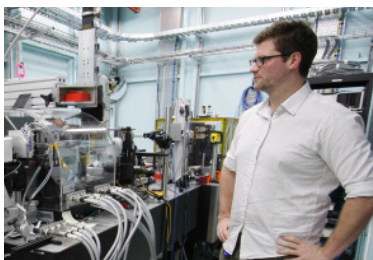
People continue to die from Golden Staph and other serious bacterial infections in spite of effective antibiotic treatments.

Dr Natasha Holmes is investigating the immune system response in patients who have developed Golden Staph, with the aim of being able to predict which individuals may benefit from a more tailored treatment.

While overseas, as part of her Victoria Fellowship, Natasha will spend time at the Erasmus Medical Centre in Rotterdam to obtain practical experience in performing multiplex bead arrays for anti-staphylococcal antibodies, as well as develop her skills in analysis of the data.

Natasha has established a unique study of patients with Golden Staph in Australia, with almost 1000 individual samples, forming an important part of her work. She will benefit from new knowledge the Victoria Fellowship will enable her to bring back to Victoria.

VICTORIA FELLOWSHIPS - LIFE SCIENCES



Dr Simon James

Victoria's key piece of science infrastructure, the Australian Synchrotron, could help tackle Alzheimer's disease.

Dr Simon James' Victoria Fellowship study mission will allow him to attend international workshops and conferences supporting his use of the Synchrotron.

Upon his return he will continue investigating how a small protein called amyloid- β interacts with metals, building on research that links age-related changes in our metabolism of metals with the onset of Alzheimer's disease.

The X-ray Absorption Spectroscopy at the Australian Synchrotron allows researchers to watch specific chemical reactions occurring inside cells or tissues.

This new technique can be used to 'map' a particular reaction to sub-regions of a cell or tissue and can provide insight into how drugs interact with disease-causing molecules in real biological systems.



Dr Arthur Nasis

Heart disease is the leading cause of death in Australia affecting at least 300,000 people annually.

A common cause is cardiomyopathy, a condition where the heart muscle becomes inflamed and eventually scarred by a process called fibrosis.

For his Victoria Fellowship, Dr Arthur Nasis will inspect a cutting-edge cardiac MRI technique called equilibrium-contrast imaging, a world-first non-invasive method to detect and quantify heart fibrosis. This could mean earlier and more accurate diagnosis and targeted treatment.

His research will be undertaken at the Heart Hospital at University College London. Arthur will develop specific cardiac MRI imaging techniques to share widely through lectures and training for other Australian cardiologists, enhancing Victoria's already-strong reputation in cardiac imaging research.



Dr Jennifer Pilgrim

With an increasing number of prescription-drug-related deaths worldwide, accurately determining their safety is paramount.

Despite much research and testing, many pharmacological treatments still fail, causing undesirable side effects or death, and diagnosing fatal drug intoxication as a cause of death remains challenging.

Dr Jennifer Pilgrim will use her Victoria Fellowship to take advantage of the similarities between Australia and Sweden's nation-wide coronial case databases. Her aim is to establish the world's first international, evidence-based resource for toxic concentrations of drugs in humans.

The combination of data from Sweden and Australia will vastly improve the interpretation of drug analysis results, and the estimation of the prevalence of drug toxicity deaths, thereby aiding in prevention and improved public health.

2013

Previous winners of the Victoria Prize for Science & Innovation

Year	Recipient	Research Area
2012	Professor Ana Deletic (Physical) Professor Terence (Terry) Speed (Life)	Storm water management Bioinformatics
2011	Professor Andreas Strasser	Cancer cell research and apoptosis
2010	Associate Professor Voytek Gutowski	Manufacturing technology
2009	Professor Murray Esler AM	Cardiovascular neuroscience
2008	Dr Peter Colman	A new class of anti-influenza viral drugs
2007	Professor Colin Masters	Alzheimer's disease pathways
2006	Professor David Solomon AM	Polymer chemistry
2005	Professor Eric Reynolds AO	Remineralisation of dental caries
2004	Professor Keith Nugent	Quantitative phase imaging
2003	Dr David Vaux	Programmed cell death - Apoptosis
2002	Professor David Boger	Fluid mechanics
2001	Dr Roger Francey & Dr Paul Steele	Greenhouse gas monitoring
2000	Professor Donald Metcalf AC	Haematology
1999	Professor Graeme Clark AC	Hearing solutions: Cochlear implants
1998	Mr Andrew Martin	Digital microwave radio systems

For further information on the awards and to view a full list of past Victoria Prize and Victoria Fellowship recipients visit veski.org.au/fellowships

VICTORIA PRIZE & VICTORIA FELLOWSHIPS

Additional opportunities

Premier's Award for Health and Medical Research 2014

The Premier's Award for Health and Medical Research recognises achievement by Victoria's early career health and medical researchers. The award is open to PhD students or recently completed postgraduates whose research has or is being undertaken in a Victorian research institution in a field of health or medical research.

Australian French Association for Science & Technology (AFAS) Associate Award

In addition to applying for a Victoria Fellowship, applicants can also apply for an Australian French Association for Science & Technology - Victoria (AFAS) Associate Award valued at up to \$5,000.

AFAS Associate Awards support study missions in France in conjunction with the Victoria Fellowship and aim to facilitate science and technology innovations to mutually benefit Victoria and France.

AFAS further assist Victoria Fellows by providing research and company contacts in France, including access to the 3,000 member organisations in UBIFrance, a French company for international business development. AFAS also offers subsidised French lessons in Melbourne prior to the study mission, and complimentary membership to AFAS for two years.

veski innovation fellowships

The veski innovation fellowships bring Australian expatriates and leading researchers, with outstanding skills in science and innovative technology, typically in the top five percent of their respective fields, to Victoria.

Since 2004, veski has awarded 18 fellowships to scientists and researchers working across a range of basic, applied and clinical research fields from modern health issues such as cancer, dengue and obesity to innovative studies into nanotechnology and organic semiconductors.

Applications are sought from globally competitive individuals in the fields of biotechnology, biomedical, advanced manufacturing, environmental technologies, or the enabling sciences and technologies.

veski.org.au/fellowships



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business.vic.gov.au/vicfellows

