

Research to Reality

2009 EDITION 2



I am pleased to present the second edition of *Research to Reality*, which showcases examples of research from the faculties of Science, Engineering and Technology; Law; Arts and Business at the University of Tasmania.

Primary industry is crucial to the economy of Tasmania. The Tasmanian Institute of Agricultural Research (TIAR), a joint venture with the State Government, has a strong focus on transferring knowledge to industry. The development of a scab-free potato cultivar exemplifies this approach. The Tasmanian Aquaculture and Fisheries Institute (TAFI) is also a joint venture with the State Government. Like TIAR it focuses on serving industry. Its research on striped trumpeter aquaculture is an excellent example of providing new opportunities to industry.

Research by the School of Chemistry, which includes the Australian Centre for Research in Separation Science, has a wide spectrum of applications from climate change to terrorism and nanotechnology. Like many others I am afflicted by a totally irrational fear of spiders and while I can deal with the odd huntsman that dares to invade my house, for some people these phobias can impact significantly on their lives. The School of Psychology is providing support through an online treatment program.

As a complete contrast, research in the Faculty of Arts is providing an insight into Australian culture and ideas in the 20th century, while a project in the Faculty of Business is focusing on the current financial crisis in the 21st century. Trial by jury has its origins in medieval Europe, but in today's more analytical world we seek to understand how jurors respond to the process in which they are participating. A project in the Faculty of Law provides some surprising insights into juror opinion.

A handwritten signature in black ink that reads "Jo Laybourn-Parry". The signature is fluid and cursive.

Johanna Laybourn-Parry

Pro Vice-Chancellor for Research

THE SUPREME COURT OF TASMANIA

Jurors believe criminal sentencing is too lenient, research being undertaken at UTAS is showing. However, Professor Kate Warner from the School of Law and Tasmanian Law Reform Institute says the same jurors usually agree with the judges' sentence in cases they have tried.

Professor Warner is leading the investigation into the opinions of jurors about sentencing as part of a two-year study of the opinion of jurors in trials returning guilty verdicts in the Supreme Court of Tasmania.

Researchers ask the jurors what they consider an appropriate sentence in their case, as well as a range of general questions about crime and sentencing. After sentencing, the jurors are asked for their views on the judge's ruling.

Results so far show 90 per cent of jurors found the sentence relating to the case in which they were a juror, appropriate. More than half the jurors suggested a sentence less severe than that of the judge.

Professor Warner said that when responding to the general questions about sentencing levels, most respondents stated sentences were too lenient, particularly for sex and violent offences, even after being informed of the sentence.

"There is a division between jurors' views about the particular case and their views about sentencing in general, which suggests that pre-existing perceptions about issues such as lenient sentencing may be difficult to change," Professor Warner said.

The study will finish in September 2009.

This study is being funded by the Criminology Research Council.

Professor Kate Warner

Jurors & judges





The global economic crisis is providing real-life analytical material that financial researchers hope will help guide measures for future economic security.

US bond markets' behaviour and impact are being investigated in a new national research collaboration, driven by UTAS, with the results expected to have a significant impact for Australian policy makers.

The bond market is the market for trading outstanding government debt. In this case, researchers are looking at the market for debt issued by the United States Treasury, which is a market far larger than any of the stock markets.

Chief investigator Professor Mardi Dungey, from the UTAS School of Economics and Finance, said the bond market acts as a safe haven for many investors and, as a result, has been at the heart of the global financial crisis.

"Put simply, at the height of the crisis everyone wanted to buy US Treasury bonds, and sell everything else," she said.

Professor Dungey is building a picture of the behaviour of US Treasury markets, working in collaboration with the Centre for Financial Analysis and Policy at the University of Cambridge.

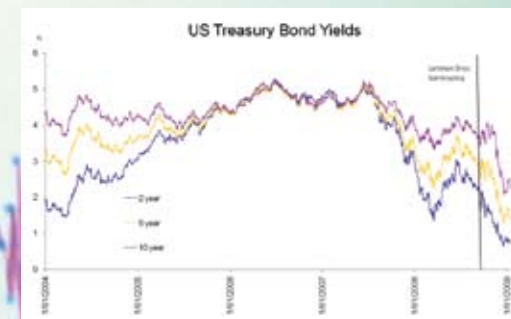
A new direction in this research considers the time between trades, or duration, which has been found to affect market behaviour.

"Understanding this behaviour will enable more informed design of markets to handle crises such as the current global financial crisis," Professor Dungey said.

The study also involves researchers at the University of Melbourne and the University of Sydney, and is supported by the Australian Research Council.

UTAS on the money with global financial crisis

Professor Mardi Dungey



Fighting the fear

Specific phobias affect eight per cent of the adult population and are a risk factor for other problems such as depression and anxiety disorders. But only one in 10 of those affected seeks help for their phobia. UTAS researchers have developed an online treatment program, Feardrop, to make therapy more accessible and flexible.

Chief investigator Professor Ken Kirkby, from the School of Medicine, said the project worked by exposing participants to images of spiders. Over time the anxiety caused by the image should decrease. This is called graded exposure and is a common psychological technique. It is the first time it has been available online.

“Twenty-four hours a day we can provide a service to the population in their own home,” he said.

Feardrop has two purposes: treatment and research. When participants take part they provide information to researchers on which programs are more effective, allowing them to improve the system.

“We want to make sure research is not divorced from everyday treatment,” Professor Kirkby said.

So far, more than 800 people from around the world have signed up. The project currently centres on Australia’s most common phobia – spiders – but by the end of 2009 researchers hope to incorporate programs addressing frog, rodent, snake, bird, dog, cat and some insect phobias.

Feardrop can be found at www.feardrop.com

This study is being funded by Beyond Blue and the Rotary Club.





*Separation
science
to improve detection of
terrorism
bombs*

*ACROSS Director
Professor Paul Haddad*

From drug testing of elite athletes to helping identify explosives used by terrorists – separation science is delivering significant new discoveries for the benefit of all Australians, as well as international research.

Separation science involves the separation of complex mixtures into their components, followed by the measurement of the amount of each component present.

An example is the measurement of a banned drug in an athlete's urine: the separation step makes it easier to detect the banned drug by removing it from the many other components of urine.

The Australian Centre for Research on Separation Science (ACROSS), within the UTAS School of Chemistry, is developing new technology at the heart of the separation science system.



*Professor Paul Haddad
and Dr Greg Dicoski*



The unique technology is expected to have major implications for existing studies under way at the Hobart campus including biotechnology for the identification of disease markers, pre- and post-blast identification of improvised explosives used by terrorists and improved pharmaceutical drug discoveries.

ACROSS Director Professor Paul Haddad said funding from a recent Australian Research Council Discovery Grant will focus on the design and evaluation of a new stationary science system to build on platform technology already patented and commercialised by UTAS and a major US manufacturer.

Professor Haddad said the new technology involves the synthesis of a block of porous polymer, called a porous

monolith, inside a glass tube column, which is then coated with nanoparticles having a diameter 1/1000th of a human hair, to achieve a surface required for separation.

"We will explore the synthesis of this monolith, its characterisation in terms of pore size and surface area, and performance in achieving difficult separations," he said.

Advances in separation science at ACROSS have inspired new developments in biological sciences (genomics, proteomics and medicine), pharmaceutical sciences (drug discovery and characterisation), environmental sciences (ultra-trace residue analysis) and forensic sciences (illicit drugs, DNA fingerprinting and analysis of explosive residues).

ACROSS was established in 2001 as a strategic agreement between key researchers at UTAS and RMIT University.

In 2007, ACROSS secured more than \$5 million in external funding and a new entity, the Pfizer Analytical Centre, specialising in pharmaceutical drug development, was launched.

*Major supporters of ACROSS include:
the University of Tasmania, the Australian
Research Council, the Tasmanian
Government and Pfizer.*

Walking about **Australian culture**

Researchers have turned to popular magazine *Walkabout* for an insight into Australian culture and ideals in the 20th century.

University of Tasmania Riawunna and School of English, Journalism and European Languages researchers Dr Mitchell Rolls and Dr Anna Johnston are analysing *Walkabout* to determine the nation's perception of itself at the time, and how it has influenced Australia today.

"*Walkabout* made a significant contribution to Australia's sense of itself as a nation. It intervenes directly in debates about how Australia has interpreted itself, debates that continue to resonate powerfully," Dr Johnston said.

Walkabout, produced by the Australian National Travel Association from 1934 to 1974, was one of Australia's most popular 20th century magazines.

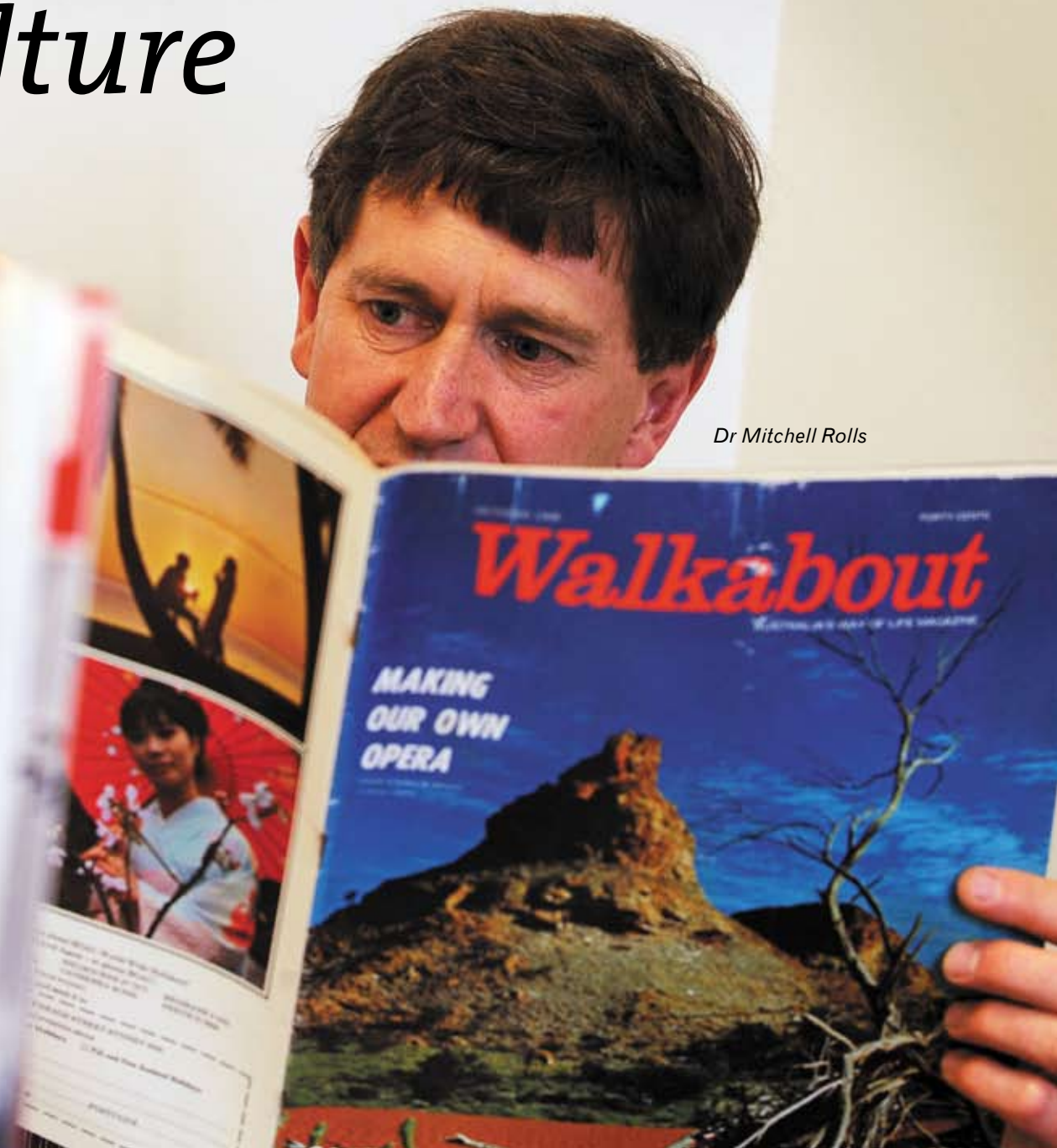
It was a travel magazine, but covered many other aspects of Australian culture at the time. It was one of the few publications at the time to recognise Aborigines, with both photographs and articles.

The study will provide an insight into public perception of indigenous Australians mid last century.

"This project will advance both Australian and international scholarship on race, representation, nature, natural history, travel and place-making in popular middlebrow reading material," Dr Johnston said.

This study is funded by an ARC Discovery Grant.

Dr Mitchell Rolls



The perfect potato

The pursuit for the perfect potato is on target at UTAS, with researchers creating a 'scab-free' spud.

Common scab disease is one of the world's top four devastating potato diseases, reducing market value and impacting on the quality of processed potato products. Scab resistance is a key priority of potato breeding programs around the world, but the ability to achieve effective resistance and maintain essential characteristics for yield and processing has eluded producers, until now.

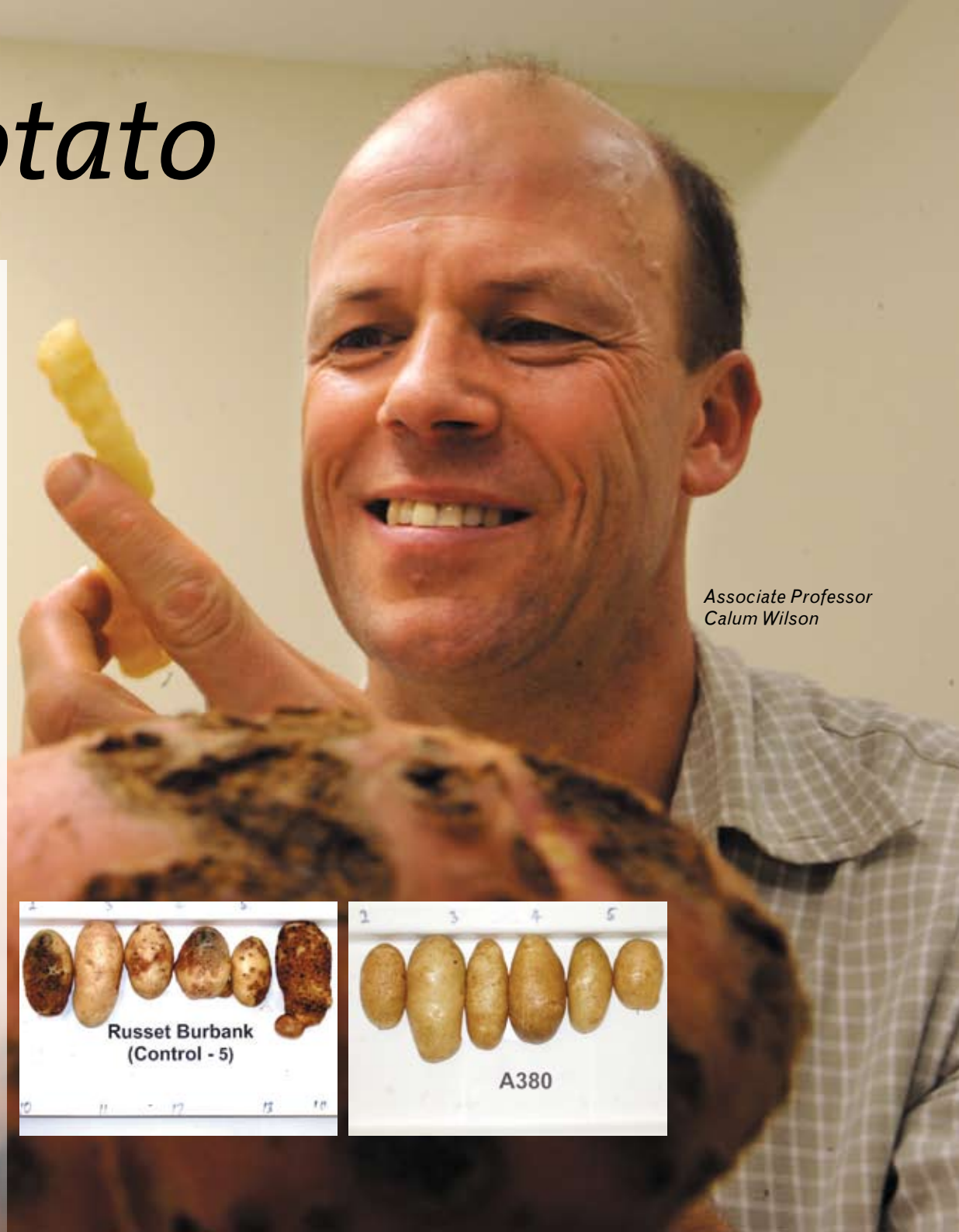
The significant breeding breakthrough for the world's number one non-grain food commodity is expected to have major implications for the industry and consumer. In 2007 alone, there were 325 million tonnes of potatoes produced worldwide.

The study, led by the University's Tasmanian Institute of Agricultural Research Associate Professor Calum Wilson, has successfully developed commercially important potato cultivars with extreme disease resistance by using novel technologies.

"Our approach uses cell selection techniques, screening with a toxin produced by the pathogen that causes the disease," Associate Professor Wilson said. "Rare variants of potato cultivator, Russet Burbank, with extreme disease resistance, have been recovered and found to retain essential yield and processing characteristics."

This is the first extreme resistance to this disease in a commercially valuable and industry-recognised processing cultivator.

Supported by Horticulture Australia Limited and the Potato Processing Association of Australia.

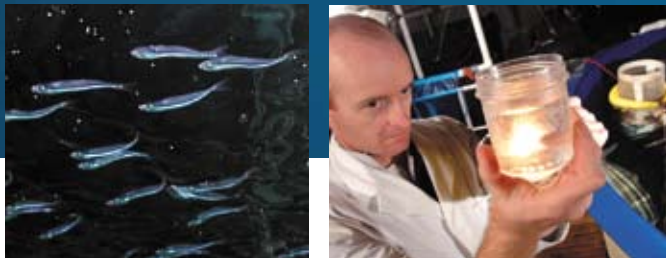


*Associate Professor
Calum Wilson*





Researchers trumpet new aquaculture industry



The program is supported by the Tasmanian Government, the salmon industry, CSIRO, Fisheries Research and Development Corporation, Aquaculture (Aquaculture CRC) and the Sustainable Aquaculture of Finfish Cooperative Research Centre (Aquafin CRC).

The striped trumpeter is a wonderful fish to eat but a hard one to breed.

A native fish, the striped trumpeter was over-fished and the population plummeted during the mid 20th century.

In the 1980s it was chosen as the best candidate for diversifying sea cage culture in Tasmania but early attempts to culture the species proved difficult.

The striped trumpeter has a high-mortality “paper fish” life stage that makes it hard to rear to adulthood.

A sophisticated research program to develop striped trumpeter aquaculture

has been under way since the early 1990s at the Tasmanian Aquaculture and Fisheries Institute.

Associate Professor Stephen Battaglione has been at the forefront of attempts to rear the fish.

He said the nine-month-long paper fish stage had been tricky when breeding the fish and the research program aimed to overcome the mortality bottleneck by understanding the nutritional needs of the larvae.

“The striped trumpeter’s rare extended larval phase sees it turn into

something like a flat sardine – a paper fish. This is a rare phase that only a couple of species of fish go through,” he said.

“We captured the brook stock and got them to spawn but the bottleneck came in trying to keep the small larvae alive and growing normally.”

Dr Battaglione and his team worked on improving the growth and survival rate of the tiny fish larvae by taking a multidisciplinary approach – cultured fish are now been grown in sea cages.

Researchers and nature close in on climate change

Professor Brian Yates with PhD student Nigel Brookes

While the world campaigns to reduce carbon emissions entering the atmosphere, UTAS is developing a unique chemistry model that could extract climate change pollutants.

The research could also lead to methods of recycling the damaging waste, turning it into environmentally friendly chemicals.

Head of Chemistry and lead investigator Professor Brian Yates said the research was part of a broader project to develop a model for the breaking of the strong bonds that form the components of molecules, and to understand how these compounds react with metal complexes.

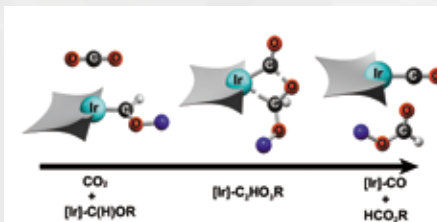
Professor Yates said these principles, developed over six years, aim to create a platform where atmospheric pollutants, such as carbon dioxide and nitrogen dioxide, can be removed

from the air. "We are using nature's guidance to work with these metals," he said.

"This experiment is about carbon dioxide in the atmosphere reacting with compounds in such a way that it takes the pollutant, breaks it apart, and turns it into something less toxic – possibly better for the environment."

Experiments already conducted for this model have successfully separated two-atom components. The results have been published

in the prestigious science publication *Journal of American Chemical Society*.



This project is supported by the Australian Research Council.

Antarctic and Marine Studies

The University is recognised internationally for its commitment to teaching and research in Antarctic, Southern Ocean and temperate marine sciences. This profile has been achieved through its educational courses (undergraduate, masters and PhD level) and research activities under the Centre for Marine Science, Antarctic Climate and Ecosystems Cooperative Research Centre, the Institute of Antarctic and Southern Ocean Studies and the International Antarctic Institute.

Sustainable Primary Production

Primary producing industries in Australia are being supported by high-quality and novel developments in research and teaching at the University. UTAS has formed partnerships with state and federal governments through the Tasmanian Institute of Agricultural Research, the Tasmanian Aquaculture and Fisheries Institute, the Centre of Excellence in Ore Deposits, and the Cooperative Research Centres for Australian Seafood and Forestry.

Environment

Diverse landscapes protected in World Heritage Areas and national parks provide the inspiration for a progressive research program in environmental issues and solutions at the University. Innovation in nature-based learning and discovery is supported by the Centre for Environment, the School of Geography and Environmental Studies, the Cooperative Research Centre for Sustainable Tourism, and the Tasmanian Institute of Agricultural Research.

Community, Place and Change

The University's work in this field advances understanding of the complex and dynamic character of different communities – communities of place and of interest – through many disciplines as well as centres and institutes including the Tasmanian Law Reform Institute, the Rural Clinical School, the Cooperative Research Centre for Sustainable Tourism, the Tasmanian Institute of Law Enforcement Studies, and the Housing and Community Research Unit.

Population and Health

The health and wellbeing of the nation is being addressed through a Tasmanian collaboration. State and federal governments, health professionals and the general public support university courses and internationally competitive research at institutes and centres throughout Tasmania including the Menzies Research Institute, Medication Outcomes Research and Education, the Australian Centre for Research on Separation Science and the Rural Clinical School.

Frontier Technologies

Frontier technologies at the University provide a platform for research and teaching to promote understandings and innovations in fundamental science. They are enhanced by activities at the Institute of Antarctic and Southern Ocean Studies, the Australian Centre for Research on Separation Science and the Central Science Laboratory, and through developments in areas such as biotechnology, health informatics and forensic science.



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For more information contact: Office of Research Services
Manager, Laura Denholm
Ph: 03 6226 2761
Email: Laura.Denholm@utas.edu.au

UTAS Media Office
Email: Media.Office@utas.edu.au
Ph: 03 6226 2124
Mobile: 0417 517 291 (+61 outside Australia)

Credits

Photography: Chris Crerar, stock.xchng, Ann Overweter, Bruce Miller, Ross Goldsmid, Eadaoin Tyrrell
Production: Michelle Grima
Writers: Sarah Nicol, Cherie Cooper and Michelle Grima
Design & printing: Clemenger Tasmania