

## 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, the 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 Sustainable Production Forestry.

## Environment

Diverse landscapes protected in World Heritage Areas and national parks provide the inspiration for a progressive research programme 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 institutions 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, the Centre for Clinical Research, 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 Cooperative Research Centre for Smart Internet Technology, 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.



[www.UTAS.edu.au](http://www.UTAS.edu.au)

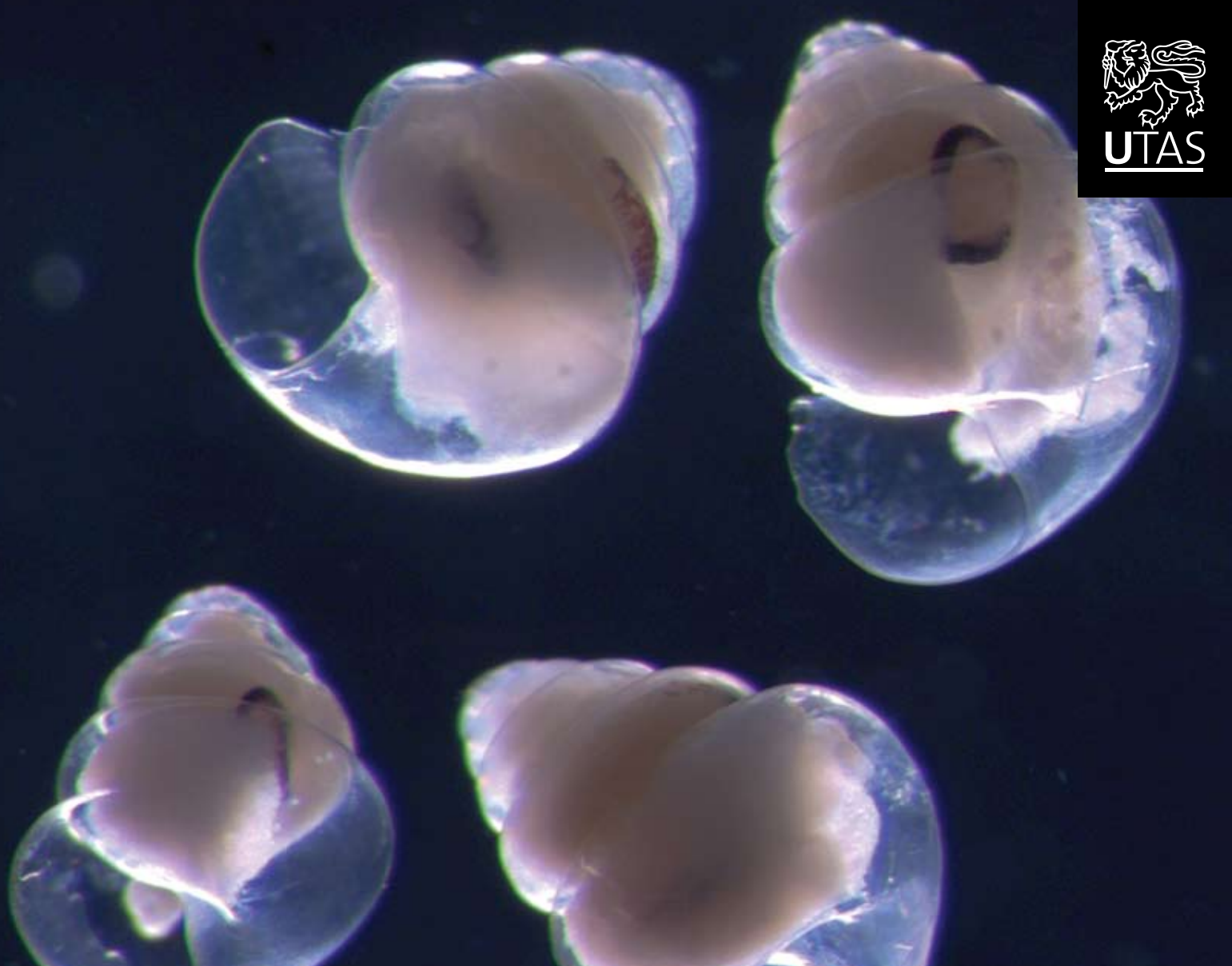
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# *Research to Reality*

2008 EDITION 1



The University of Tasmania is one of Australia's oldest universities, with a long tradition of research, particularly in areas such as marine and Antarctic science, as befits an island state that is the staging post for Australia's Antarctic programme. The island of Tasmania focuses on primary industries that lead to the development of a strong research profile in agriculture, forestry, food science and aquaculture within the University. CODES, an ARC Centre of Excellence in Ore Deposits, conducts innovative research with mining companies worldwide and is recognised internationally. From a medical perspective Tasmania offers a unique population database providing exciting opportunities in the study of epidemiology, which was the original focus of the University of Tasmania's Menzies Research Institute. Today the institute embraces a wide range of research in medicine, providing many exciting and innovative outputs. In the humanities there is a strong focus on heritage and on colonisation and its aftermath, not just in Tasmania but also in a broader world context. The University is committed to its *excellence, distinctiveness, growth* and *engagement* (EDGE) agenda in both research and teaching. This publication provides just a few highlights of our wide portfolio of research across a range of disciplines.

*Johanna Laybourn-Parry*

Johanna Laybourn-Parry

Pro Vice-Chancellor for Research

*"On each night, with each observation, there is the chance to discover a whole new world".*

The global quest to discover new frontiers beyond Earth has just taken a quantum leap with the discovery of the first planetary system with similarities to our Solar System.

Astronomers in a worldwide collaboration have uncovered two planets orbiting a cooler star half the mass of our Sun, about 5,000 light years from Earth.

It resembles a scaled-down version of our Solar System with the two planets having mass ratios (as compared with their stars), orbiting separations and surface temperatures similar to Jupiter and Saturn.

University of Tasmania astronomers have played a key role in the discovery. Dr John Greenhill and Dr Stefan Dieters, from the UTAS School of Mathematics and Physics, are the Australian contributors to an international team whose findings were this year reported in the prestigious journal *Science*.

The Tasmanian observations of the new system, code-named OGLE-2006-BGL-109L, were made using the UTAS Mt Canopus one-metre telescope based near Hobart.

# Beam me up, UTAS.





# Fungus

*a blight on the pyrethrum industry*



*The pyrethrum industry contributes more than \$25 million annually to the Australian economy.*

Australia is the second largest producer of pyrethrin in the world. Produced from the pyrethrum plant, pyrethrin is a natural insecticide. But the industry has an enemy that's insidious, tiny and deadly – the Ray Blight fungus. The fungus causes severe dieback of pyrethrum crops in spring and has the potential to result in complete crop losses.

Dr Sarah Pethybridge from the Tasmanian Institute of Agricultural Research, based at UTAS, has been working with about 100 of the State's pyrethrum growers to develop

management strategies for Ray Blight fungus – the most significant foliar disease affecting pyrethrum in Tasmania. Outcomes from the pyrethrum research program have resulted in the development of successful management strategies for the fungus, which have been adopted eagerly by growers and deliver benefits of around \$3,500 per hectare.

Working with researchers from Washington State University in the United States, Dr Pethybridge and

her team are extending this research even further to determine whether the fungus has the capacity to mutate, and how far it can travel in the environment.

The success of the research program is directly linked to industry partnerships, enabling the researchers to see the results of their research implemented.

The pyrethrum industry contributes more than \$25 million annually to the Australian economy.

# Ore inspiring



*"We are now the world's leading research provider in geoscience."*

As the worldwide demand for resources continues to grow at an ever increasing rate, the need to find new ore bodies and improve recovery methods becomes increasingly important. CODES, an ARC Centre of Excellence in Ore Deposits at UTAS, is pioneering a number of research projects in geology and geometallurgy that are having profound, positive impacts on the industry and the wider community.

Successes include research that led to the discovery of a \$358 million ore deposit at the Rosebery Mine on Tasmania's west coast – a discovery which secured the long-term viability of the mine, and provided a significant economic boost to a sparsely populated regional area.

A similar success was achieved at the Gosowong Mine in Indonesia, where a research project, carried out in conjunction with industry partner Newcrest Mining, resulted in the discovery of a gold deposit worth \$2.7 billion.

"We are justifiably proud of our research outputs. In just two and half years since becoming a Centre of Excellence, we have produced 104 Science Citation Index publications, and we are now the world's leading research provider in geoscience," CODES Director Ross Large said.

"However, what is not so widely known is the positive impact our research is having on the industry and the community, such as at Rosebery and Gosowong."



*"A project such as this could potentially identify and assist more than 80,000 Australians with poorly controlled asthma."*

# *Asthmatics breathe easy with new research*

Breathing easy is the business of a School of Pharmacy research team that has developed and tested an innovative computer solution for asthma management.

The computer software is a database for community pharmacists to use to identify customer issues based on their medication records. Trials found that 1500 adults with asthma management issues were using an average seven puffs each day of their reliever medication. The benchmark recommended by the Asthma Foundation for reliever medication, such as Ventolin spray, is three puffs each week.

Chief Investigator Professor Gregory Peterson said, as a result of the trial, there was a significant overall shift in recipients using a preventer instead of relying on reliever medication. Nearly half of the GPs involved in the trial reported modifying or intended to adjust their patients' therapy after the level of their reliever medication use was revealed.

"This has to result in much better health outcomes for patients, and ultimately, less of a burden on the health system," he said.

"It is estimated that if implemented on a national scale, a project such as this could potentially identify and assist more than 80,000 people around Australia with poorly controlled asthma."



# Techno pets for the elderly

*In Australia, about 140,000 hospital patients a year are admitted with problems related to medication. Many of these are avoidable. Now robots are being developed to help the elderly manage their medication and can be adapted for each individual situation.*

There is no mess, feeding or vet bills – robots could soon become the new techno pet for Tasmania's elderly.

School of Computing and Information Systems researcher Dr Byeong Kang has a vision to create a robot that can not only hold a conversation or provide stockmarket updates, but, more crucially, have the ability to deliver crucial medical support to improve health and lifestyle.

Dr Kang is drawing on his research career capturing human intelligence and transferring this knowledge into an expert software system to build a functioning robot for elderly people who require daily monitoring.

Dr Kang is collaborating with the University's School of Pharmacy to create a medication

review system where the robot, with the touch of a finger, will monitor food intake, and check pulse and temperature. It will also process information such as medical history, pathology reports and prescribed medications, so that doctors and pharmacists can inform the patient if the drugs should be taken.

Dr Kang said about 140,000 hospital patients per year in Australia are admitted with problems related to the incorrect use of medication and many of these cases are preventable.

"Each robot will be adaptable to each situation. If a patient has diabetes or heart disease, the robot can download the expert system knowledge base so it can meet their requirements," Dr Kang said.

# Bulldozer beneath the sea

*It is the equivalent of taking a bulldozer to a rainforest and clearing everything to bare earth.*

An exotic and voracious sea predator, with the power to cause as much destruction to a marine reserve as a bulldozer to a rainforest, has arrived in Tasmania.

The long-spined sea urchin, a marine herbivore, is spreading down Tasmania's east coast and creating a 'barrens' habitat by overgrazing seaweed and invertebrates that sustain the abalone and rock lobster fisheries.

Professor Craig Johnson, a marine ecology researcher in the Tasmanian Aquaculture and Fisheries Institute (TAFI) based at UTAS, reports that their action is the equivalent of taking a bulldozer to a rainforest and clearing everything to bare earth. The reduction in biodiversity and productivity is potentially devastating to important commercial fisheries.

If the Tasmanian abalone and rock lobster fisheries industries were cut by 15 per cent, this would see a \$25 million drop in value, before processing.

Evidence suggests that this sea urchin species established in the Kent Group in Bass Strait in the 60s and then in the north east of Tasmania in the 70s, but its rapid spread is the direct result of changes to the east Australian current driven by climate change.

Professor Johnson said it was imperative to carefully evaluate the effectiveness of potential management strategies before introducing any methods to try and either minimise the risk of further barrens habitat, or to rehabilitate existing barrens.



# Tiny snails

*Marine scientists have found the first field evidence that climate change is causing ecological change by altering the balance of ocean chemistry.*

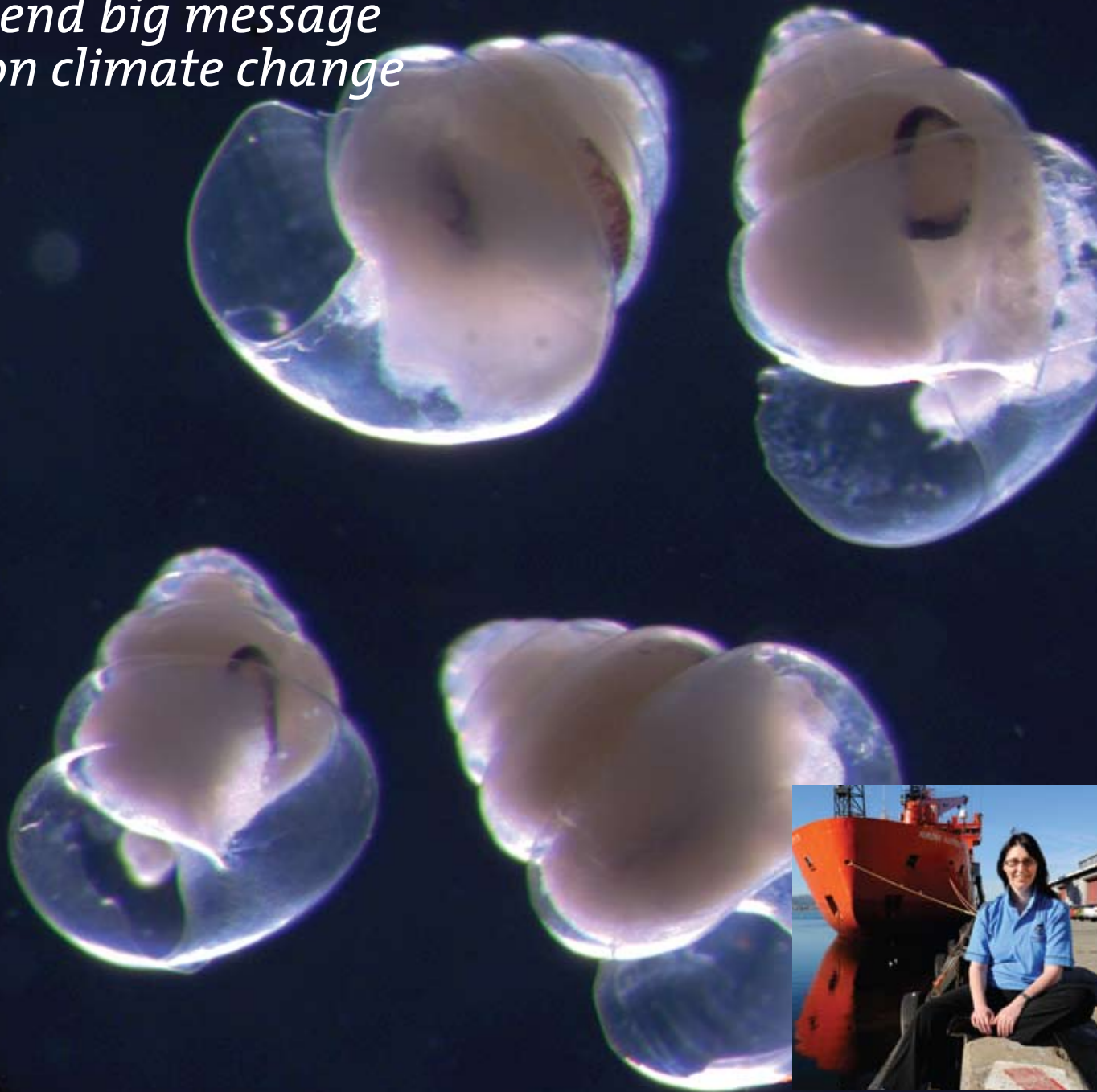
The ocean is a major sink for carbon dioxide emissions, where it forms a weak carbonic acid. As more and more carbon dioxide enters the atmosphere and, in turn, the ocean, the concentration of this weak acid is increasing.

What this means for life in the oceans is unclear, but Dr Donna Roberts at the Antarctic Climate & Ecosystems Cooperative Research Centre (ACE CRC), with funding from the Department of Climate Change, has been comparing the shell weights of today's microscopic marine snails from the Southern Ocean with samples from ancient marine sediments, to see whether there have been changes to shell weights.

Dr Roberts and her team have discovered that the shells of microscopic sea critters are thinner than they used to be, providing the world's first field evidence that climate change may well be affecting marine species that form hard shells and their ability to function.

The potential ripple-up effects pose significant implications for the oceanic food chain, and with cold sea absorbing more carbon dioxide than warmer waters, the ACE CRC's studies in the Southern Ocean are a worrying signal for what we can expect to see elsewhere in the future.

*send big message  
on climate change*



*"We're hoping to improve quality of life. Hopefully people might remember better, move their limbs better."*

# Brain injury: when a neuron dies

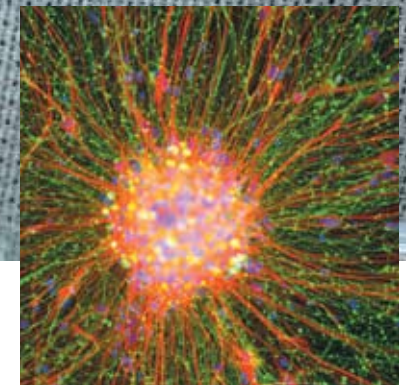
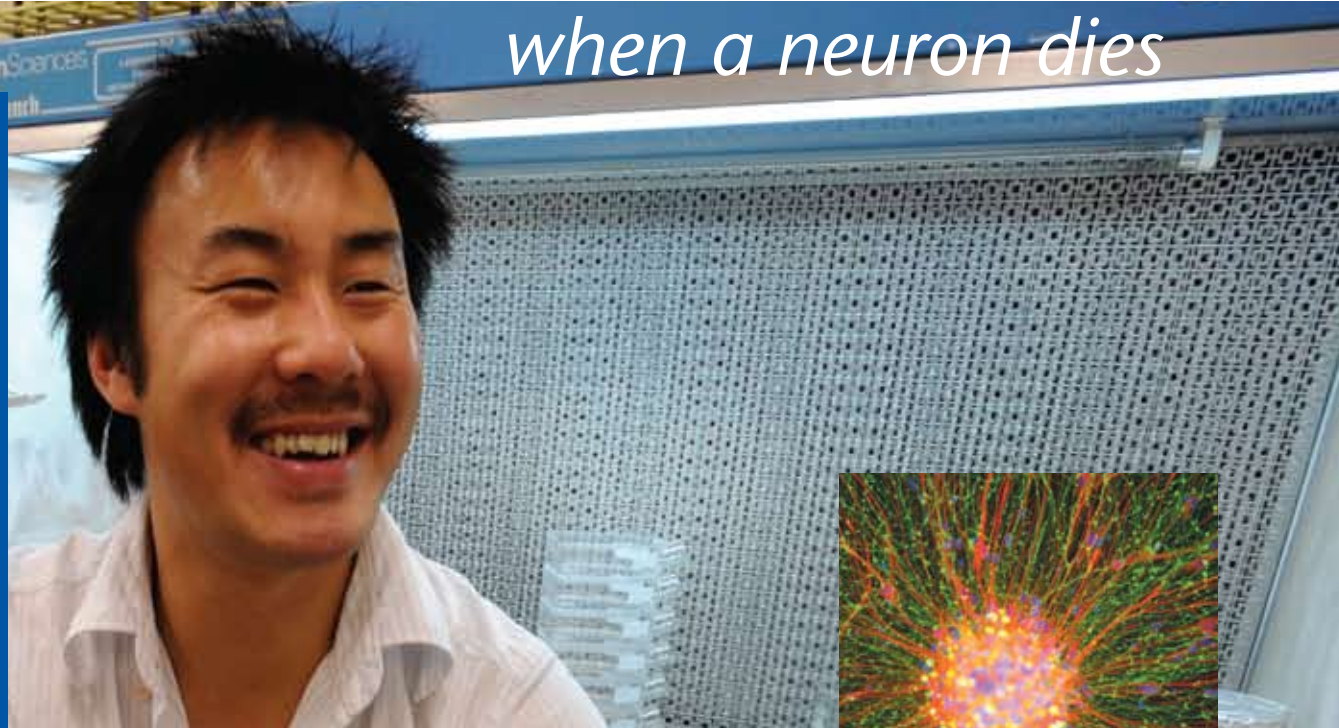
Experimental cell testing could produce a method for doctors to restore a degree of movement and memory for sufferers of brain injury and disease.

Dr Roger Chung from the University's Menzies Research Institute is progressing research to understand how and why neurons die following brain injury or neurodegenerative disease. It will also identify some of the earliest biochemical and cellular processes associated with ageing or disease of the brain, such as Alzheimer's and Parkinson's diseases.

Neurons (nerve cells) are surrounded and protected by star-shaped astrocytes. When a neuron dies, the nerve messages are linked to a surviving cell. It can, however, take the wrong path and debilitate accurate movement or function. Lab efforts will investigate the interaction of these two major cell types in the brain, astrocytes and neurons, and how their relationship changes as a result of injury, ageing or neurodegenerative disease.

The study will also review the protein metallothionein (MT), which is released from an astrocyte when injury occurs and works to repair the damaged cell.

Researchers will provide the first unambiguous explanation for why MT proteins have consistently been found to elevate and become protective when injury and stress occurs in the brain. They will also prove that these proteins have important functional roles outside the cell.





# *Suspended sentences: weighing up the evidence*

*"A goal term or community service is less of a deterrent than a suspended sentence."*

Offenders given suspended sentences are less likely to reoffend than those who receive jail or other penalties.

This is one of the key findings from a study by researcher and Faculty of Law PhD candidate Lorana Bartels, who explored the use of suspended sentences in Tasmania.

An analysis of all sentencing decisions in the Tasmanian Supreme Court in the 2002-04 financial years compared reconviction rates for those who received a suspended sentence, against imprisonment and non-custodial orders.

"Many people think that offenders are not likely to be deterred by a suspended sentence and this finding is particularly surprising when looking at offenders on non-custodial orders. For example, probation or community service, 52 per cent of people – or 55 out of 106 people – were later reconvicted for another offence," Ms Bartels said.

From the reconviction analysis data, the research looked at 81 partly suspended sentences and 229 wholly suspended sentences to examine how many of these offenders breached their suspended sentence.

It was found that 40 per cent of those on a partly suspended sentence and 41 per cent on a wholly suspended sentence committed one or more imprisonable offences during the suspension period. Of these, offenders serving a wholly suspended sentence committed less serious crimes compared with those on partly suspended sentences.