



Research to Reality

2009 EDITION 3



I am delighted to introduce the third edition of the University of Tasmania's research magazine *Research to Reality*. This edition focuses on research in health as well as on social sciences, pharmacy, agriculture and hydrodynamics applied to shipping.

Tasmania offers a superb environment in which to conduct epidemiological studies on the inherited components of disease. This is because the State has a stable population with excellent genealogical records. In this issue, work conducted by the University of Tasmania's Menzies Research Institute has demonstrated the value of classification systems used for predicting the chances of developing future heart disease in children. Research in the School of Human Life Sciences has shown that chillies contain substances that can have the same beneficial effects as taking aspirin for reducing the risk of thrombosis or blood clots. Clearly there are benefits in eating hot stuff! Obesity is a growing problem facing public health. Almost 25 per cent of children in Australia are overweight, and this results from parents trusting their children to make sensible choices in what they consume. Perhaps naively, parents assume their children can make healthy

food choices, when in fact, given a choice, most kids choose the unhealthy option. Depression and stress are part of modern life for managers in business. As part of an ARC Linkage grant the School of Management is developing a DVD aimed at small to medium enterprises that do not usually have sufficient resources to provide corporate mental health support for their employees. The DVD will provide important support in addressing the problems of stress and depression. Natural plant extracts have been used in both medicine and veterinary science for hundreds of years. The School of Pharmacy is exploiting the healing properties of *Kunzea ambigua*, an endemic Tasmanian plant, to cure a form of dermatitis in horses.

The availability of public housing is an important social issue. The global financial crisis has provided a wake-up call to governments, demanding a reassessment of their public housing policies. A study in the School of Sociology and Social Work, funded by the Australian Housing and Urban Research Institute, is undertaking a critical analysis of public housing in Australia.

Many plants have a symbiotic relationship with soil fungi called mycorrhiza, which confers a

major advantage to the plant in enabling it to access important nutrients from the soil needed for growth. The intricacies of the relationship between plant and fungus are complex and understanding them is important to agricultural production. Research in the School of Plant Science is focusing on the role of plant hormones in the symbiosis between plant and mycorrhiza.

Tasmanian company Incat produces high-speed catamarans for the global market. A joint project between Incat and the University of Tasmania is aimed at improving the performance of such vessels in extreme oceanic conditions. The Australian Maritime College at UTAS has some of the best hydrodynamics testing facilities in the world, facilitating collaboration with industry and our engineers.

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

Relief from hoof grief for horses and their owners



The UTAS Business Competition Grant provided \$25,000 for the trial.



A natural plant extract from an endemic Tasmanian species is demonstrating a positive impact on a chronic skin condition affecting horses.

Greasy heel (pastern dermatitis) is a common, problematic and progressive dermatitis that affects the hind legs of horses, resulting in bleeding sores, scabbing and hair loss. A variety of factors can lead to greasy heel, including prolonged exposure to mud and damp. The condition affects all horse breeds, with draught horses the hardest hit. If left untreated for long periods, it can lead to lameness.

A topical formulation for pastern dermatitis in horses was originally developed by retired pharmacist Mr Bob Armstrong, from Longford, Tasmania. The area has a large horse population and Mr Armstrong developed the formulation in response to veterinary and horse owner requests for an effective treatment for pastern dermatitis.

Two researchers from the School of Pharmacy at UTAS, Dr Glenn Jacobson and Dr Christian Narkowicz, recognised the need for a simple, clinically-proven treatment option for greasy heel and, with their team, they conducted a scientific trial in horses to assess the effectiveness.

A key ingredient of the formulation is kunzea oil, which is obtained from the foliage of the Tasmanian native shrub *Kunzea ambigua* and is produced commercially in Tasmania.

Dr Jacobson and Dr Narkowicz ran a trial of 21 horses suffering from greasy heel and discovered that the formula containing kunzea oil proved to be a safe and effective treatment. Dr Narkowicz said more than half the cases treated with the kunzea formulation were completely cured and all cases improved after only one week of treatment.

"Reports from horse owners indicated that in some cases lesions improved dramatically within a few days," Dr Jacobson said.

"The kunzea oil ointment proved safe, fast-acting and effective in treating the horses in the study cohort and may offer a good treatment option for the general horse population."

Dr Jacobson and Dr Narkowicz were joint winners of the 2008 inaugural UTAS Business Competition and are now working towards commercialising their product for Australian and overseas markets.

*Dr Christian Narkowicz and Dr Glenn Jacobson from the School of Pharmacy have developed an ointment derived from the native *Kunzea ambigua* to combat greasy heel in horses.*



The positives of public housing

The recent global financial crisis has acted as a wake-up call for governments to reassess their public housing policies and what these policies are striving to achieve.

A major study into Australian housing policy, under the leadership of UTAS Associate Professor Keith Jacobs, will consider the future viability of public housing.

Assoc. Prof. Jacobs says this issue is timely because any increase in the number of people out of work will boost the demand for public housing, yet it may require a new approach.

“Increasing the supply of public housing would enable housing authorities to allocate a far greater proportion of homes to those who are employed,” he said.

“Providing public houses to a wider social mix of people is the best way to counteract the negative associations that have undermined the image of public housing residents.”

Assoc. Prof. Jacobs believes that the current economic global crisis can be traced back to governments promoting home ownership over renting and failing to invest in public housing.

“Successive governments in Australia and around the world have introduced generous subsidies to encourage people to purchase homes for both owner-occupiers and investors,” he said.

“Large numbers of people with poor credit histories in the US were encouraged to take out loans to purchase a home because there were not enough public houses to meet demand.

“These government subsidies have the effect of increasing house prices, but have little effect on increasing the supply of housing.”

There are 176,000 people on public housing waiting lists and an estimated 105,000 homeless in Australia.

“Up until the 1980s, public housing was available to a greater mix of tenants, but due to the increasing demand, housing authorities have had to prioritise those people with the highest needs,” Assoc. Prof. Jacobs said.

“In our large cities many public servants like teachers, nurses and ambulance drivers now have to spend hours travelling to work because they can only afford to purchase homes in the outer suburbs.

“At one time, public housing would have been available to them, which would have given them more opportunity to live near work.”

This study is being funded by the Australian Housing and Urban Research Institute with \$82,500 and will be complete by April 2010.

Chillies vs aspirin

The potent chilli could pack a punch in the future prevention and treatment of diabetes and cardiovascular disease – the leading causes of chronic illness and death in developed countries.

UTAS School of Human Life Sciences research fellow Dr Kiran Ahuja is investigating the biological activity of the two active ingredients of chillies – capsaicin and dihydrocapsaicin – and whether chillies could replace aspirin in preventing blood clots.

Dr Ahuja's research has focused on the antioxidant properties of these two chemicals, with results showing there is a beneficial relationship between the chemicals and the formation of fatty deposits on the inner wall of arteries – a precursor to many cardiovascular-related health issues.

Most recently Dr Ahuja and her co-researchers have found that capsaicin and dihydrocapsaicin inhibit platelet aggregation, which can lead to thrombosis or blood clots.

“Aspirin is commonly used to inhibit platelet aggregation; however, it has a nasty side effect, which causes stomach bleeding in patients,” Dr Ahuja said.

This year, Dr Ahuja's research will assess the comparative effects of aspirin and chilli on platelet aggregation.

The study will investigate what amount of chilli gives the same effect as a standard dose of aspirin on platelet aggregation and will be followed up with a dietary intervention study with human volunteers.

Dr Ahuja says it is possible that one day chillies could replace aspirin, or be combined with aspirin, as a medication for the prevention and treatment of cardiovascular disease.

This work on blood coagulation follows on from Dr Ahuja's earlier investigations for her PhD thesis that showed a potential role of chilli in diabetes prevention. Her study published in the *American Journal of Clinical Nutrition* found that eating a meal containing chillies lowers post-meal blood glucose and insulin concentrations. High levels of glucose and insulin are associated with an increased risk for the development of diabetes.

The chilli versus aspirin project is being funded by the University of Tasmania's Institutional Research Grants Scheme, which supports early career researchers, with \$16,400.



Menzies Research Institute
helping to make a
healthier world

The National Health and Medical Research Council provided a \$2.3 million grant for Stage 1 and a \$349,700 grant for Stage 2 of the CDAH study.

Longitudinal population studies at the UTAS Menzies Research Institute are providing crucial insights into international population health management strategies.

Established as an epidemiology research centre at the University of Tasmania in 1988, the Menzies Research Institute has made important advances into the cause and prevention of a number of chronic diseases such as heart disease, dementia, multiple sclerosis, cystic fibrosis and cancer.

The UTAS Medical Sciences Building (Stage One) is due for completion in late November and will house the Menzies Research Institute and the Tasmanian School of Medicine.



Longitudinal population studies at the UTAS Menzies Research Institute are providing crucial insights in international childhood health management strategies. The Menzies team – Front: Alison Venn (L) and Kristy Sanderson. Middle row (Seated) L to R: Ellen Glazebrook, Kylie Smith and Sue Pearson. Rear (Standing): Bev Curry, Siddarth Trivedi, Petr Otahal, Russell Thomson, Kim Jose and Shuying Wei.



The first stage of the CDAH study included ultrasound measures of the early markers of heart disease such as the thickness of arteries.

A key factor in the Institute's success is Tasmania's unique population. Excellent genealogical records, a stable population and high rates of participation in research make Tasmania ideal for the study of the inherited components of disease.

Some of the most internationally significant research is being used to help define abnormal cholesterol levels in children and adolescents and better identify those at high risk of developing cardiovascular disease in adulthood.

In recent studies Menzies researchers have compared two classification systems for identifying dangerous cholesterol levels in children – a 15-year-old classification and a recently introduced replacement classification designed to be more accurate.

They found both classifications were equally as good in predicting children at risk of developing heart disease.

But both classifications, which are used internationally for general screening of cholesterol levels in children, were actually found not to be very accurate in predicting future heart disease risk unless they were applied to those children with other cardiovascular risk factors such as obesity.

The Australian data used in the analysis was the result of an ambitious Menzies Research Institute project to follow up a 1985 health survey of 8,498 Australian school children, aged 7 to 15 years.

Called the Childhood Determinants of Adult Health (CDAH) study, it was one of the most detailed health surveys ever conducted and examined childhood predictors of adult cardiovascular disease and diabetes by collecting lifestyle and physical fitness data, along with cholesterol testing.

Menzies researchers tracked down 5,170 participants from this 1985 study to take part in a follow-up in 2002-

2006, which included operating a mobile clinic that travelled to 34 sites around Australia to take participants' physical measurements, including cholesterol levels.

The findings have been further strengthened by an international collaboration of the Menzies CDAH study with two other large cohort health studies in Finland and the United States of America – both of which also followed subjects from childhood to young adulthood.

The second stage of the CDAH project is just about to begin with funding from the National Health and Medical Research Council. With the participants now aged 31 to 40 years, the 2009-2010 survey will have an additional focus on connections between lifestyle factors and mental health.

Influencing kids' healthy food choices

This study received \$5,000 in funding and was supported by a Primary Health Care Research, Evaluation and Development grant as well as through a partnership between UTAS Department of Rural Health and Eat Well Tasmania.

Childhood overweight and obesity affects almost 25 per cent of school-aged children, yet parents largely trust their children to choose healthy food and drink, UTAS research is showing.

The UTAS Department of Rural Health has been investigating the attitudes of Tasmanian parents towards healthy food choices at children's sporting venues.

With more than 100 surveys completed, researcher Dr Nick Towle says the results indicate the majority of parents (95 per cent) believe their children are aware of healthy food and drink choices, but this belief does not appear to translate into practice. When left to choose food or drink on their own, 75 per cent of children choose an unhealthy option, compared to just 23 per cent when their parents influence the choice.

"This raises important considerations for parent efficacy, such as their confidence and ability to positively encourage healthy eating behaviours," Dr Towle said.

The questionnaires have also revealed that more than three quarters of parents surveyed always or often took food and drink from home and that the majority of food brought from home tended to be healthier than that bought at canteens.

Dr Towle says he does not know why this was the case, suggesting it may be because there was a lack of healthy food options at a particular venue or that the healthy food choices were too expensive. This, he says, would form the basis for further research.

The study also found parents view food and drink sales as important for raising money. Parents also felt their child's sporting performance was an important consideration in deciding what food and drink was consumed.

Dr Towle says he hopes the study could help plan more effective strategies to increase the consumption of healthy food and drink at sporting venues.

"It is important because the prevalence of overweight and obesity in school-aged children has increased in the past two decades to almost 25 per cent, despite a high participation rate in out-of-school-hours sport," he said.



Medical researcher Dr Nick Towle is researching children's food choices at sporting events.

Researchers take on the high seas for fast-ferry industry



Researchers at UTAS are taking on Mother Nature by establishing a platform for structural design for large, high-speed catamarans to withstand extreme sea conditions.

In recent years catamarans, designed by Incat Tasmania, have expanded their role from regular ferries to military operations with exposure to severe ocean weather.

This has increased requirements for strength of ship structures, which are exposed to the impact of extreme waves, known as slamming.

Incat-designed catamarans have a wave piercing design and due to the complex nature of the transient flow around the bow it was unknown how large slam forces could be.

UTAS School of Engineering, the Australian Maritime College and Incat Tasmania have been investigating extreme slam forces to establish a basis for structural

design using both sea trials and model tests.

The sea trials are undertaken during delivery from Incat to customers around the world, most recently including the 112m, 3000 tonne Incat-built vessels now operating between the main islands of Japan and between the UK and France.

Wave radar, motion sensors and strain gauges monitor the sea conditions, ship motions and forces, giving the opportunity to evaluate the vessel performance in heavy seas.

Data has also been obtained on Incat vessels of the United States Navy in severe sea conditions.

Project Chief Investigator Professor Michael Davis said these trials have shown these catamarans can experience extreme slam forces of 2200 tonnes without damage.

“We’re measuring slam forces about equal to the weight of the boat. Those are very large forces,” he said.

“We have also carried out model tests in the 100-metre tank at the Australian Maritime College in seas up to 5 metres wave height without submerging the bow, demonstrating the inherent sea-worthiness of the Incat design.

“These tests have demonstrated extreme slams corresponding to 2200 tonnes on a full-size vessel.”

This phase of the research is supported by an Australian Research Council Linkage project with \$300,000.

AMC's Giles Thomas is a naval architecture lecturer with the National Centre for Maritime Engineering and Hydrodynamics and is working with Incat-designed catamarans to show how the wave piercing design copes with large slam forces.

Ancient secret life of plants and fungi to be revealed

An ancient relationship between fungi and plants could be harnessed to increase yields and improve the sustainability of Australian agriculture.

UTAS School of Plant Science research fellow Dr Eloise Foo is investigating how a simple microscopic soil fungus may be harnessed to help boost crops yields, impart drought resistance, reduce disease outbreaks and prevent soil erosion.

Her study is focused on the plant hormones involved in the establishment of the beneficial relationship between plant roots and soil fungi called 'mycorrhizal symbiosis'.

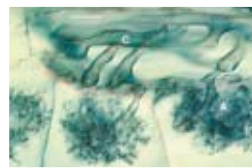
This intimate relationship, thought to have developed when plants first moved onto land 400 million years ago, has been recorded in 80 per cent of all land plants species where soil fungus grows into the roots of the plant and exchanges soil nutrients for sugars.

Dr Foo says there is evidence that mycorrhizal symbiosis provided previously unavailable essential elements such as phosphorous to the plant. This is particularly significant for Australia's phosphorous-poor soils.

"The fungi also produce a substance called glomalin, which helps to bind soil particles together and improve the soil's water holding capacity," she said.

Originally from Queensland, Dr Foo says she moved to Tasmania because the UTAS School of Plant Science was the best institution in Australia to study the role of plant hormones in plant development.

"The enormous collection of pea hormone mutants and the excellent laboratory facilities at UTAS is a unique resource that will allow me to study what effect different plant hormones have on controlling the establishment of mycorrhizal symbiosis," Dr Foo said.



The tree-like arbuscules formed by fungi can be seen growing in plant root cortex cells under a microscope. The coiling arbuscule is the point where the plant and fungi exchange nutrients.



This study is funded by a \$268,000 Australian Research Council grant.

UTAS research fellow Dr Eloise Foo pictured with pea plants in the UTAS School of Plant Science glasshouses.

Managing mental health



UTAS School of Management's Business in Mind project coordinator Dr Angela Martin says a self-help DVD being developed at UTAS is aimed at lowering the rate of depression among business managers in Australia.



Excessive work demands, stress, depression and anxiety – this is the reality for a high number of managers in business today.

A self-help DVD being developed at UTAS is aimed at lowering the rate of depression among business managers in Australia.

With recent studies finding that more than one-third of business managers in Australia have mental health levels the same or worse than psychiatric outpatients, producers of the Business in Mind DVD hope it will provide business managers with a tool to equip them to better deal with the symptoms that lead to depression.

UTAS School of Management's Business in Mind project coordinator Dr Angela Martin says the DVD is aimed at managers because they often experience high levels of psychological stress due to excessive work demands.

A depressed manager can put their employees more at risk of becoming depressed too.

"A manager's mental health can be 'contagious' and affect the mental health of their employees," she said. "There is strong evidence that employees who experience stress resulting from unfair treatment or abusive communication from managers are at increased risk themselves of developing depression."

The DVD is aimed at managers of small and medium-sized businesses as they often do not have the finances to provide corporate mental health support services for their employees.

"While managers in corporate and government settings typically have access to employer-sponsored psychological services, those in smaller businesses often struggle to find time and money for such services," Dr Martin said.

"The development of the Business in Mind DVD program shows managers ways of approaching some of the stresses and challenges involved in running a business."

The DVD will feature interviews with business managers talking about their experiences of stress, depression or anxiety at a workplace or how they helped staff members deal with these issues in the business.

The DVD will be distributed to Tasmanian business managers early next year, potentially followed by a national release.

Business in Mind is funded by the Australian Research Council Linkage project with \$245,000 and is a joint project between the University of Tasmania, Griffith University, Beyond Blue, WorkCover Tasmania and the Tasmanian Chamber of Commerce and Industry.

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 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 Tasmanian Institute of Law Enforcement Studies, and the Housing and Community Research Unit.

Population and Health

Population studies in Tasmania have benefits for the health of the nation. 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
Director, Dr Mark Potter
Ph: 03 6226 2761
Email: Mark.Potter@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, aliasX Photography, Mark Brundrett
Production: UTAS Communications and Media
Writers: Kathy Grube, Cherie Cooper, Sarah Nicol and Michelle Grima
Design & printing: Clemenger Tasmania