




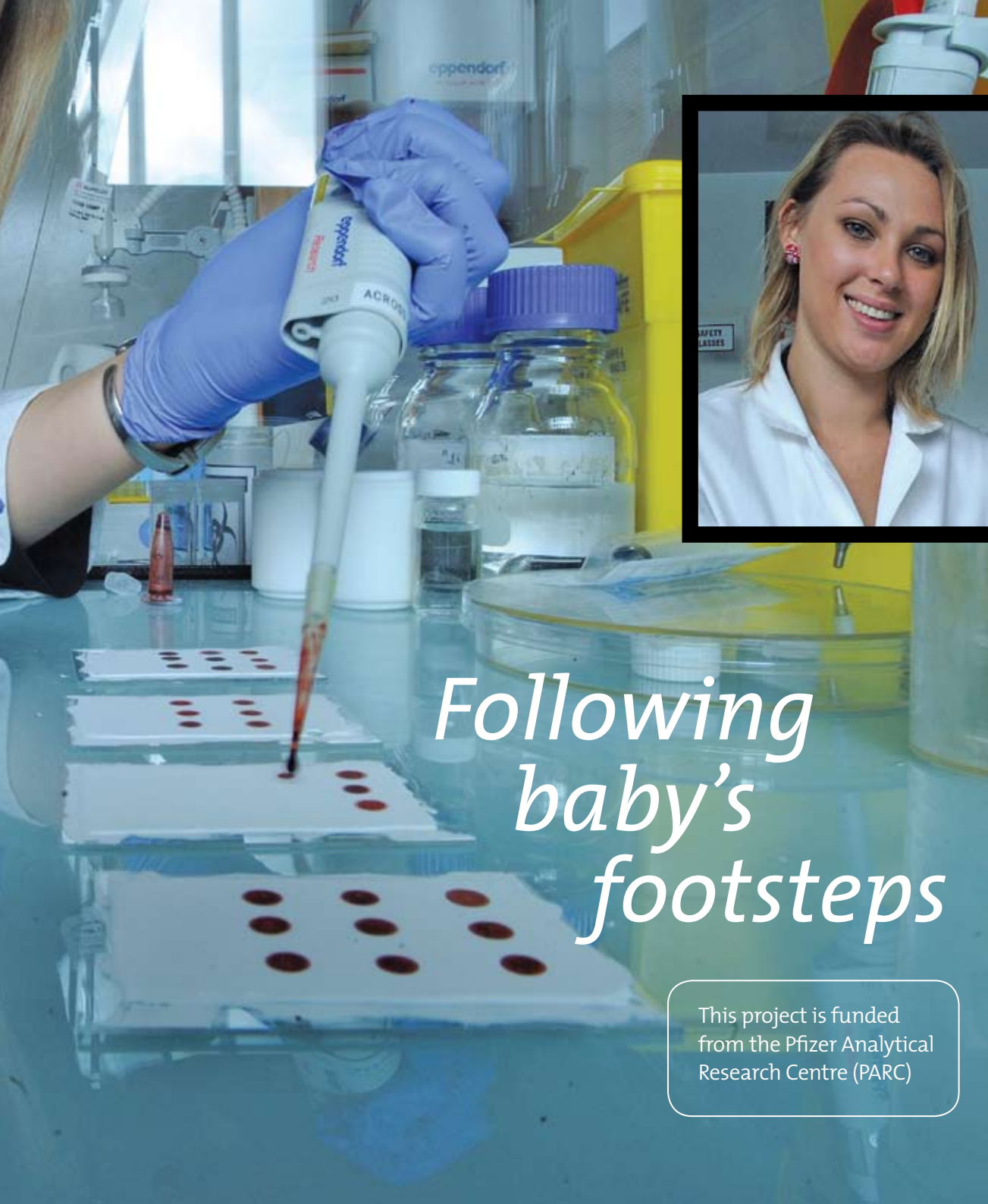
Research to Reality

2010 EDITION 5



This edition of *Research to Reality* illustrates the wide diversity of research at the University of Tasmania, a characteristic feature of a broadly based and comprehensive university. It is particularly pleasing to note the enthusiastic approach of UTAS staff towards the inclusion of their research in *Research to Reality*. The stimulating manner in which research is described here reflects their commitment to high-quality research and the presence of a strong research culture at UTAS across the broad spectrum of activities.

Professor Allan Canty FAA
Acting Pro Vice-Chancellor (Research)



Following baby's footsteps

This project is funded from the Pfizer Analytical Research Centre (PARC)

A novel blood analysis technique, inspired by the baby heel prick test, has the potential to replace more invasive animal testing as well as help provide society with cheaper and safer pharmaceutical drugs.

The new technology for analysing blood as part of pharmaceutical drug development is being produced in the Pfizer Analytical Research Centre (PARC), a research partnership between Pfizer and UTAS within the Australian Centre for Research on Separation Science (ACROSS) at UTAS.

The revolutionary separation science project will substitute current blood sampling techniques, which require relatively large volumes of samples. It will also reduce the challenges faced when handling and storing blood samples, eliminate biohazard issues and meet animal ethic protocols.

ACROSS student Esme Candish said there was no way around conducting testing on animals as part of scientific research.

“But with this technique we can now repeatedly sample animals without sacrifice,” she said. “We can take the same volume of blood from the same animal and achieve the same quantitative data.”

The project, in collaboration with pharmaceutical company Pfizer, derives from testing developed in the 1940s and is best known as the method used to obtain blood samples by pricking the heel of newborn babies.

This new media also eliminates storing samples on paper and will eventually replace manmade labour with robotics. “This has the potential to revolutionise pharmaceutical analysis of new drug developments,” ARC Future Fellow Dr Emily Hilder from ACROSS said. “It will mean drugs can be available on the chemist shelf faster and cheaper.”

ACROSS, within the UTAS School of Chemistry, specialises in exploring and developing new separation science technologies and techniques. Separation science involves the extraction of complex mixtures into 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.



*Tasmanian timbers test
tonal traditions*

This project is supported by funding from Island Specialty Timbers/Forestry Tasmania, UTAS School of Architecture and Design, and the CSIRO

Stradivarius relied on the European timbers spruce and maple to make his famous violins. UTAS research may soon reveal that violins crafted from Tasmanian timbers can match the Italian master's with their acoustic and tonal qualities.

Maria Perez Pulido is a luthier, or creator and repairer of stringed instruments. She is a graduate of the Antonio Stradivari International Institute in Cremona, Italy, and has been making and restoring bowed string instruments using traditional timbers since 1991. Maria is now researching the potential of Tasmanian timbers for their use in making instruments from the violin family as her postdoctoral research.

"When using traditional instrument-making techniques for the creation of bowed string instruments, Tasmanian woods seem to match some of the important tonal qualities of European woods," Ms Pulido explained.

"This research aims to recognise the potential benefits of using Tasmanian woods for violin making, by determining the acoustical and mechanical properties of species, including the hardwoods blackwood, Tasmanian myrtle and sassafras; and the softwoods Huon, King Billy and celery top pine."



Timber for violins must be light, flexible and beautiful.

"King Billy and blackwood have been used successfully for many years to make instruments, but what we are doing is putting some science behind a luthier's assumptions about the timbers," she said.

"Forestry Tasmania donated 31 slabs of wood, which I took over to the CSIRO in Melbourne. From these we cut 175 samples and they were tested by a machine that sent sound through them to determine their acoustic characteristics. The idea was to determine which areas of the slabs would be best to actually make the instrument."

Ms Pulido plans to compare the scientific results for wood quality, with the luthiers' ear for picking timber suited to violin making.

"I will make a violin with traditional European timbers and another with the best of Tasmanian timbers and then one of my supervisors, Edwin Paling, Head of Strings at the UTAS Conservatorium of Music, will organise to have both instruments played by an accomplished violinist to make a comparison of their sound quality," she said.

So far, Ms Pulido has made two violins out of Tasmanian timber, one of which can be seen on permanent display at the Makers' Gallery in Burnie.



The pointy end of public health

The first full-scale study of the rise and stalling of global vaccination is under way at UTAS.

Professor Michael Bennett, from the School of History and Classics, is leading the project, which will examine the success and failure of the first major public health campaigns in world history.

In the 18th century, smallpox was universally feared. The disease was responsible for killing or scarring a significant proportion of the world's children. In 1798, English surgeon Edward Jenner presented evidence that exposure to the relatively benign disease of cowpox provided immunity, and proposed cowpox inoculation. The terms 'vaccine' and 'vaccination' – derived from the Latin for 'cow' (*vacca*) – began to be used generically.

It was not easy to persuade people that they should infect their children with an animal disease, but Jenner and his followers were able to demonstrate experimentally that cowpox gave immunity by exposing vaccinated children to smallpox.

Vaccination soon won converts and by 1800 cowpox vaccination was established in several centres in continental Europe and the USA and ambitious vaccination programs were soon under way in Napoleonic France, Sweden and Russia. The first vaccinations in Hobart took place in 1805.

Within a decade several million people were vaccinated and for the first time people saw the total eradication of a major disease as an achievable goal.

Professor Bennett said the advent of vaccination was a major event in world history.

"We are examining the rapidity of the spread of the new preventative, the scale of the mobilisation inside and outside the medical profession, the ambition of the immunisation programs and the global dimension of the movement," he said.

"There remain major gaps in our knowledge and understanding of the global spread of vaccination in the early 19th century, which this project will address."

"This study of the first global immunisation campaign will also give a historical dimension to contemporary concerns about pandemic disease, vaccination and bio-terrorism, and generate new insights into the factors determining the success and failure of public health initiatives."

Cambridge University Press will be publishing a book of Professor Bennett's research.

This project is supported
by a \$300,000 Australian
Research Council
Discovery Grant



Hobart gardeners stake their own patch

The changing face of Tasmania's urban tree estate is under the spotlight as a new study examines what influences private home owners to plant trees or remove them.

The study suggests Hobartians 'possess a stronger sense of their right to do as they will' with their own patch and less of a 'feeling of moral obligation to blend in'.

The UTAS School of Geography and Environmental Studies recently examined the front garden characteristics of homes in Hobart – prompted by a study in Montreal, Canada which found neighbouring gardens were more similar than those up or down the street and more alike than those across the road.

"Grant Daniels, Aidan Davison and I decided to test the prevalence of these relationships in Hobart by using a random sample of groups of five front gardens from 32 suburbs," said Professor James Kirkpatrick.

The study found front gardens in Hobart were diverse, and

lacked the 'non-random effect of proximity on the characteristics of front yards' found in Canada.

Professor Kirkpatrick said he was surprised by the findings.

"I expected some sort of influence but then found out that the answer was that there is basically no contagion between neighbours and front gardens in the same street or suburb."

"The diversity could be due to the different sizes and age of gardens, along with the enormous variation between individuals of different age, background, education and wealth in their preferences for different types of gardens. For example, the tertiary-educated tend to prefer the untidier and more arboreal form of garden. Their equally well-off older neighbour might like highly manicured flower beds and lawns."

It could also be a result of the lower degree of external control on privately owned land in Australia compared to some other countries.

"In some states in the US there

are strong regulations about what a garden can contain and what it should look like. For example, residents living in sub-divisions are bound by covenants preventing them from having an outside clothesline or from hanging their laundry to dry outside."

Urban planners in Hobart may also need to pay attention to the findings.

"For example, strategies that aim to influence the activities of people in their gardens by educating them cannot assume that changes will permeate through a neighbourhood once a few people are convinced," Professor Kirkpatrick said.

None of the authors of the paper thinks that this is necessarily a bad thing, 'as diversity in gardens reflects diversity in people and may be preferred by native wildlife.'

The study is part of a three-year Australian Research Council Discovery Grant that is in the process of finding out the causes of the planting and demise of trees in Australian cities.



Australia's changing urban tree estate: a socio-ecological study of patterns, causes and consequences is funded by a three-year \$130,000 Australian Research Council Discovery Grant

Visit the following websites for more information:
www.surveymonkey.com/s/urbantrees
www.surveymonkey.com/s/yourtreestory

New tool to tackle greenhouse gas emissions

This project is supported by funding from the Australian Department of Agriculture, Fisheries and Forestry (DAFF) and Dairy Australia

The concepts of climate change, greenhouse gas emissions and carbon pollution are pretty tricky to get your head around, let alone work out how much gas your herd of milking cows is adding to the debate.

In Tasmania, one big step forward is the development of a key tool to help dairy farmers work out just what level of greenhouse gases they are producing on their enterprise.

The Dairy Greenhouse Gas Abatement Strategies (DGAS) calculator has been developed by Karen Christie, Richard Rawnsley and Rob Kildare at the Tasmanian Institute of Agricultural Research (TIAR), using funding from the Department of Agriculture, Fisheries and Forestry and Dairy Australia.

The DGAS software program enables farmers to estimate their on-farm emissions of greenhouse gases and assists their business in balancing profit and environmental impacts.

Karen Christie says DGAS is a spreadsheet program that requires the farmer, or farm adviser, to enter in basic information relating to the farm enterprise.

"Inputs include things like electricity and diesel use, proportion of the farm that is dryland or irrigated, fertiliser usage, purchased feed inputs, details of the animals being run on the farm and annual milk production. The calculator gives farmers a chance to have a look at their methane, nitrous oxide and carbon dioxide emissions and works everything down to

an emissions figure per tonne of milk solids," Ms Christie explained. "Although agriculture looks to be directly excluded from the federal government's Carbon Pollution Reduction Scheme, it will be indirectly affected by the scheme with increased prices for inputs such as fertilisers, diesel and electricity. So farmers need to be thinking about how they can improve farm efficiency. DGAS lets them look at how various management strategies will reduce emissions from their farms and hopefully improve their bottom line at the same time," Ms Christie said.

"One area could be better fertiliser management. There are new nitrogen fertilisers that are designed to break down more slowly than traditional fertilisers such as urea, so that they don't produce as much nitrous oxide, which is one of the major contributing gases linked to climate change."

"Some animal-based measures include feeding fats and oils to reduce methane production or feeding condensed tannins to reduce nitrous oxide emissions. Researchers in Victoria have shown that condensed tannins are very useful for reducing the nitrous oxide emissions associated with urine production, but these tannins have been bred out of pasture species. New breeding programs are under way to try to get them back into pasture species such as lucerne."

DGAS is available as a free download from the Dairying for Tomorrow website and has already been taken up by the Murray Goulburn milk processing co-operative in south-east Victoria to assess the greenhouse gas emissions of some of their milk suppliers.



Online media and politics in an age of environmental conflict

In today's political climate, the way environmental issues are reported in the media can affect important democratic debate.

Dr Libby Lester, Associate Professor in Journalism, Media and Communications at UTAS, Dr Brett Hutchins from the School of Communications and Media Studies at Monash University and Professor Simon Cottle from the Cardiff School of Journalism, Media and Cultural Studies in Wales, are working together to investigate environmental conflict, news media and politics in a time of rapid socio-cultural and technological change.

The first project of its type in Australia, this research aims to enhance understanding of the media and political contexts in which environmental conflict occurs. The project will look at how the internet affects media communications strategies and outcomes of environmental politics, from the perspective of campaigners, the news media and formal political representatives.

An alleged incident in Tasmania points to the complexity of mediated political communication today.

In October 2008 in Tasmania's Upper Florentine Valley, two environmentalists

allegedly blockaded a logging road with a car. The incident was filmed by a third, hidden protestor and uploaded to the environmentalists' MySpace page.

News media organisations used the footage's online presence as justification for covering the story. This resulted in the Tasmanian State Government addressing its environmental practices and policies in the media. Dr Lester said this incident highlighted several key concerns, which the project will examine.

"We will look at the media platforms and technologies used by environmental groups and activists, the evolving role of news media in political communication of environmental issues and the formal political practices, decisions and responses affecting environmental futures," she said.

Dr Lester said print and electronic media have played a central role in environmental politics and that the internet and World Wide Web are crucial additions to the 'media ecology' mix.

"These new platforms have the ability to enable innovative activist strategies and produce unpredictable political responses," Dr Lester said.



This project is funded by a \$182,000 Australian Research Council Discovery Grant

This project was supported
by a two-year \$90,000 Australia
Council Visual Arts Fellowship

Drawing with light

Awe-inspiring vistas of the expansive desert night sky have been captured as part of a UTAS research project.

Photographer Dr David Stephenson, Associate Professor and Head of Photography at the UTAS School of Art, for many years has focused his artwork on the idea of the sublime. The sublime, in artistic and philosophical terms, refers to an overwhelming feeling of awe when confronting something spectacular.

Originally from Washington DC, Dr Stephenson first became interested in the sublime as a postgraduate student. His art explores the idea, how it resonates with his own existence and how to communicate this experience to viewers of his work.

“When I first encountered the idea of the sublime, it was really the putting of a word to something I intuitively understood,” he said.

In Dr Stephenson’s case, the sublime is represented in the vast skies of the Western Australian desert, where he produced a series of night sky photographs, having spent a full week photographing all night.

“The experience of the sublime is an imaginative repositioning of oneself in relation to the greater scale of things – on a cosmic scale, the night sky,” Dr Stephenson said.

Dwarfed by the massive expanse of sky studded with countless stars, Dr Stephenson would take an entire night to capture a single image of the heavens. He said the resulting images are as much drawings

as they are photographs, owing to the process he created himself to produce them: using multiple layered exposures, rotating the camera at intervals and creating fine marks on a black background to build up complex patterns.

“It’s the impulse of looking up and being surrounded by this very awesome situation that makes us reconsider our own place in the universe.”

He said the experience of creating the works and finding form to express his interpretation of the sublime was something he hoped was available to the viewer of the photographs.

The night sky photographs have been exhibited nationally and Dr Stephenson is planning to publish a book of the photographs.

Patently unclear...

Patents designed to give protection over intellectual property may not always promote innovation, according to a new UTAS review. Australia's patent system is currently under investigation by the UTAS Centre for Law and Genetics to assess if it inspires or stifles innovation in new areas of technology.

Led by Professor Dianne Nicol, the project will analyse the role of patents and licensing activity in developing new technologies, with the aim of formulating policy recommendations for the Australian Government and developing model strategies for industry.

Professor Nicol said the current patent system was originally designed to promote innovation by encouraging inventors to take their creations into the marketplace, but there is ongoing uncertainty over whether it actually achieves this purpose.

She said while the patent system worked well in the past for steam engines and the like, by providing patent holders with 20 years of protection from competition, it may not work so well in more complex new industries, like biotechnology and information technology. In these industries, many components have to be put together to make a single product.

"One of the arguments against patenting is that if you have one small component covered by a patent, which is critical to the development of a new product, the patent holder could, if she or he chose to, block the whole product development," Professor Nicol said. The project she is involved in includes an analysis of whether patent holders actually use their patents as blocks, or whether it is better strategically for them to use their patents more like bargaining chips.

"As part of our project, we'll be measuring and evaluating collaborative rather than exclusive patenting and licensing strategies."

The project will focus on Australia's biotechnology industry to establish a model for wider application. There are about 600 research-active biotech organisations in Australia. The research will collect patent, product and other data for each of these organisations from a number of publicly available databases.

Interviews and surveys will also be conducted to collect information on the perceived benefits and impediments of patenting, and the economists on the research team will then develop a model of the role of intellectual property in innovation.

"It is widely acknowledged that there is a real struggle to get new technologies out into the marketplace," Professor Nicol said. "At the moment there's uncertainty about the role of patents – whether they stifle rather than encourage innovation. We're interested in seeing how they can be used to support collaboration to facilitate product development."



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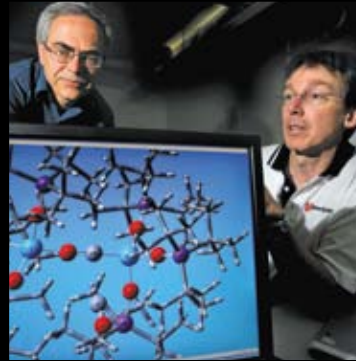
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