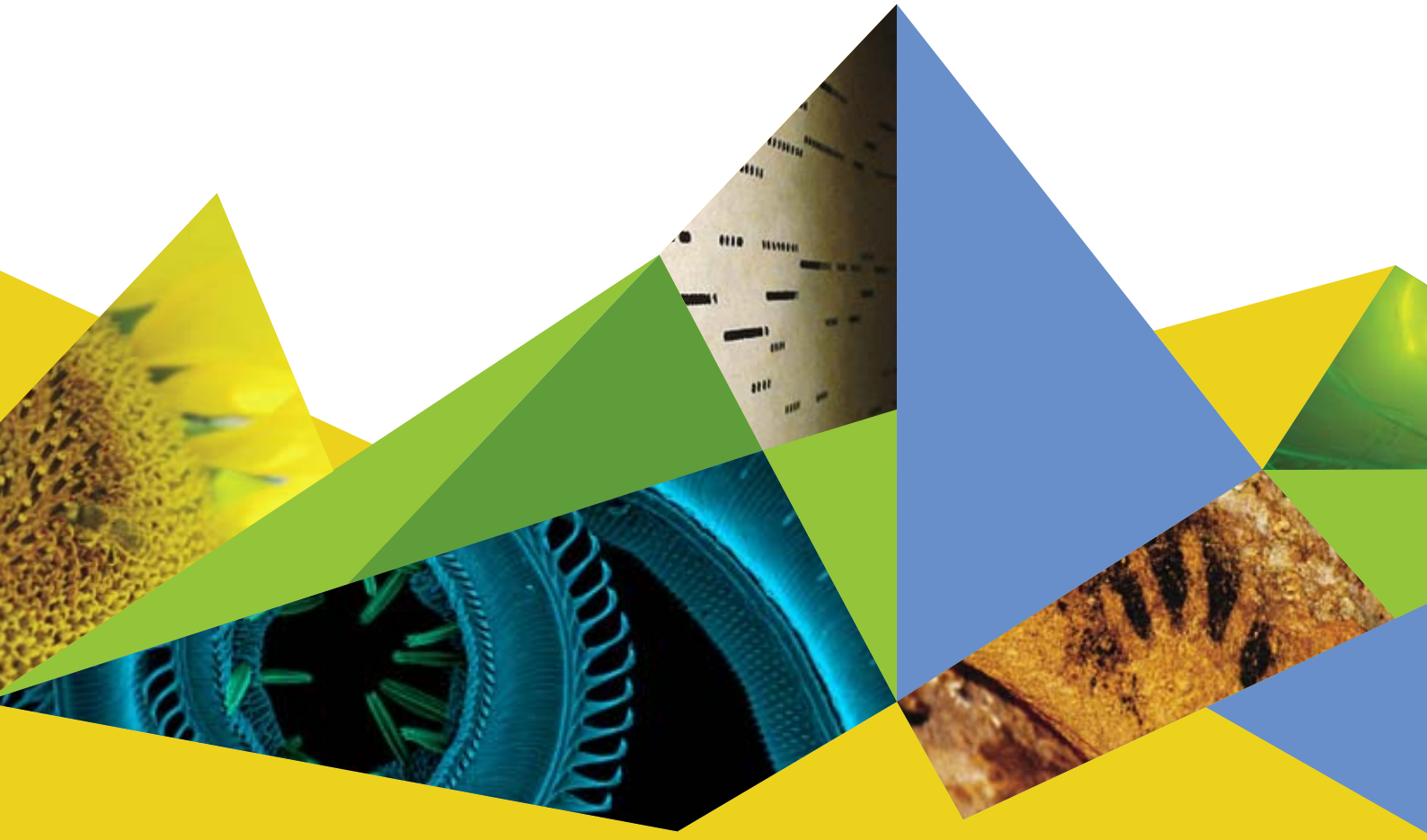
DISCOVERY AT UQ 2012



SUPPORTING UQ

Your gift to the University can help fund facilities, programs, research and scholarships. You can designate your gift to a particular school or program or leave your gift unrestricted so it can be used for emerging needs, such as construction of new facilities, scholarships, innovative new programs, research or technology. If you are interested in making a gift to the University, please visit **www.alumni.uq.edu.au/giving** or contact UQ's Advancement Office at email: advancement.office@uq.edu.au or telephone: +61 7 3346 3900.

SCAN ME

RESEARCH WEEK WEBSITE

To view featured online video and website content, use your smartphone or tablet device to scan the QR codes printed throughout Discovery at UQ.

UQ RESEARCHERS

experts / collaborators / supervisors

Industry and business, the academic community, prospective and current research students and the community can access UQ expertise at

www.uq.edu.au/uqresearchers

CRICOS Provider Number 00025B
ISSN 2201-0521(print)
ISSN 2201-053x (online)

CONTENTS

In the past 12 months, the strength of people power has come to the fore at UQ, as researchers made the most of landmark infrastructure investments, and people worldwide benefited from the translation of UQ research.

The activities and contributions came from researchers across the University, as exemplified by the differing backgrounds of our two newest Australian Research Council (ARC) Australian Laureate Fellows, marine scientist Professor Ove Hoegh-Guldberg and economist Professor John Quiggin. Both have made their own disciplinary transitions (Ove began in physiology and John's first degree was in maths), and both have extensive collaborative networks that are focused on massive problems such as climate change, ocean health and global financial shocks.

While their new fellowships rank among Australia's best research awards, other UQ staff have also earned outstanding accolades. One of the many is Professor Mark Kendall, who is reinvesting his 2012 Rolex Laureate prize to ensure that people in developing zones experience the health benefits of the nanopatch vaccine technology that he is driving. The interdisciplinary nanopatch team won a 2011 Eureka Prize, and the technology's start-up received a global venture capital award.

If nanopatch fulfils its promise it will revolutionise the prevention and cure of many diseases, much as a cervical cancer vaccine hatched by UQ researchers is improving healthcare for women. This is an example of the impact of UQ research; however impact is not generally easy to measure. That is why UQ and 11 other Australian universities are cooperating to develop a robust methodology for assessing the economic, social, cultural and environmental contributions of high-quality discovery. The prototype will inform an Australian Government feasibility study into the measurement of research impact.

CREATING A BETTER WORLD

FROM THE VICE-CHANCELLOR, DEPUTY VICE-CHANCELLOR (RESEARCH) AND SENIOR DEPUTY VICE-CHANCELLOR

There is a relationship between the quality of research and its positive reverberations in the wider community. Citation is an accepted measure of research calibre, and studies have shown correlation between share price movements and citation of the published research that underlies patents held by the companies in question.

All excellent research – whether fundamental or applied – has potential for positive impact, and work supported by government, private companies and non-government organisations almost invariably aims for tangible community outcomes.

So UQ's links with external groups – broadly termed "industry engagement" – are channels for community benefits, and we are proud of our established leadership in areas such as ARC Linkage Projects funding.

Industry partnerships help us to train and employ people who are pivotal to an innovation workforce and therefore to sustainable economies. For instance, the University recently appointed a second joint professor with the world's biggest mining company, Vale, and an agreement with resources giant Rio Tinto enables us to employ two post-doctoral fellows who will be encouraged to educate and mentor engineers and scientists of the future.

Philanthropic partnerships are also essential to UQ's ability to conduct discovery with worldwide implications. This year marks the advent of a new phase in our relationship with The Atlantic Philanthropies, which has given $5 million to a $15 million head and neck cancer centre that is also funded by the Queensland Government and the Princess Alexandra Hospital.

Appropriately, it will be located next to the soon-to-open Translational Research Institute (TRI), which was made possible by Atlantic and the Queensland and Australian governments. TRI staff and research students (sourced from UQ, the Queensland University of Technology, Princess Alexandra Hospital, and the Mater Medical Research Institute) have great potential to improve human health, and the scope of outcomes from the Australian Infectious Diseases Research Centre is also vast. A UQ joint venture with the Queensland Institute of Medical Research that was officially launched in 2012, the centre responds to the World Health Organisation's call to ramp up the fight against disease outbreaks and the development of new vaccines and therapies.

The collaborative essence of the TRI and the Australian Infectious Diseases Research Centre reflects the expanding appetite for international and interdisciplinary teams. This is the era of borderless discovery, when differences in nationality and expertise bring the strength of diversity to global challenges.

Both the Queensland and Australian governments have encouraged local and international partnerships, and by funding world-class infrastructure they have helped UQ attract brilliant overseas collaborators.

For the past 15 years, these governments have had an unequalled ally in the quest for excellent research: The Atlantic Philanthropies. Now, in line with the "giving while living" example of its Founding Chairman, Mr Chuck Feeney, Atlantic is winding down. In one sense, the end of an era of Feeney-inspired construction is drawing to a close, but this is also the dawn of a new age for the researchers in the new infrastructure.

This will be the age of high-impact outcomes, and the challenge for UQ and our governments will be to hold and attract the best people, who will use their equipment, skills and collaborations to enhance humanity.

Professor Max Lu, Senior Deputy Vice-Chancellor, Professor Deborah Terry, Vice-Chancellor, and Professor Alan Lawson, Deputy Vice-Chancellor (Research), The University of Queensland

ART MEETS RESEARCH

PARTICIPATING UQ RESEARCHERS:
Darren Brown, Dr Bronwen Cribb, Michael Crichton, Professor Mark Kendall, Dr Michael Landsberg

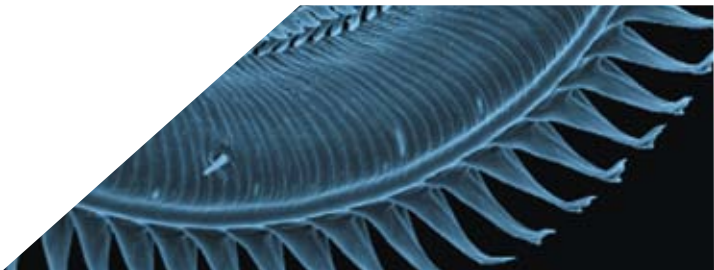
WEB: www.ammrf.org.au/innerspace/index.html

Five UQ researchers collaborated with scientists across Australia to show how their work not only has scientific value, but is also of merit artistically.

The *Incredible Inner Space* exhibition features 28 microscopic images taken by scientists from leading national research organisations.

Pictured here is a moth proboscis visualised using scanning electron microscopy by the Institute for Molecular Bioscience's Darren Brown.

The green structures, known as sensilla, are the moth's taste buds. The proboscis unrolls from beneath the labial palps when the moth wants to feed.



ARTS INNOVATION

Humanities research at UQ develops a deeper understanding of culture, society and the economy, both past and present

IMAGE COURTESY TODD HRYCKOWIAN

THE PROPS OF MADNESS

Although we immediately think of straightjackets and asylums, understanding the "history of madness" may be much more prosaic.

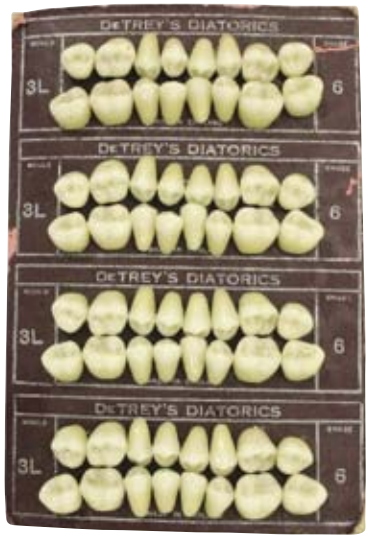


IMAGE COURTESY MUSEUM VICTORIA

Artificial Teeth - Porcelain Cuspid and Molar, DeTrey's Diatorics, c1925

Set of porcelain teeth for dentures, comprising cuspids and molars. Made by DeTrey's Diatorics for the Amalgamated Dental Co. Limited, London, England, c1925. Used in the mental health hospital Lakeside Hospital, Ballarat, Victoria, Australia

Source – Museum Victoria, Photographers – Cherie McKeich and Sarah Parker

"Having visited a number of decommissioned psychiatric and disability institutions in Australia with heritage conservation staff and architects, I became fascinated by the material culture objects left behind in these abandoned facilities, and the evidence of gender segregation etched into the buildings of these institutional landscapes," says Dr Dolly MacKinnon, Director of Engagement and Internationalisation for the School of History, Philosophy, Religion and Classics.

As a notable historian of Australian psychiatry, Dr MacKinnon is well placed to work on her latest project *Reading the Objects: developing online personal stories from Australia's 'Museums of Madness', 1890-1980*, with collaborators Professor Elizabeth Malcolm from the University of Melbourne and Dr Nurin Veis, Senior Curator of Human Biology and Medicine, from Museum Victoria.

Their work builds on research conducted for a separate Australian Research Council project *A History of Psychiatric Institutions and Community Care in Australia c1811-c2000* (**see www.ahpi.esrc.unimelb.edu.au/researchteam.html**).

"My research involves using diverse forms of evidence – archival records, material culture and the landscape – in innovative ways to understand how people shape and in turn are shaped by their environment," Dr MacKinnon continues.

"The overwhelming abundance of objects, many mundane and some medical, offer a complex picture of life in an institutional setting."

For example, the 19th and 20th century medical belief in the benefits of indoor and outdoor recreation for patients explains the survival of 78rpm records and sports trophies in the collection.

The plethora of dental equipment and porcelain teeth reflects the periodic drives to tackle the dental hygiene of the women, men and children in these institutions. Most objects were used by patients and staff, while some were used only by staff on patients.

"Researching the material culture of institutional life provides a very different history of the experiences of both patients and staff," says Dr MacKinnon.

"For example, sports grounds have been seen, erroneously, to reflect exclusively staff based activities, yet the survival of trophies for the 'Mental Hospital Patient Cricket' and 'Football Associations', naming the winning teams in 1957 and 1964-65 demonstrates that patients were actively involved in sports at Ararat and Sunbury.

"Equally, the pianola roll 'Jealousy Tango' (1945), is the sole survivor from a very large collection of rolls used at Mayday Hills Mental Hospital, Beechworth, for patient recreation. Both patients and staff pumped the pedals of the pianolas activating the music and lustily singing along in the segregated wards."

Once Dr MacKinnon and her colleagues research the 1,645 objects in Museum Victoria's Psychiatric Services collection, their images and a brief explanation of each will be made available through Museum Victoria's online database. All objects are from psychiatric and disability institutions in Victoria between c1880 and 1980.

IMAGES COURTESY MUSEUM VICTORIA

Straightjacket - Mayday Hills Hospital, Cream Canvas, c1900

Heavy cream canvas straightjacket worn by female patients as a restraining device at a mental health hospital - Mayday Hills Hospital, Beechworth, Victoria, Australia, c1900

Source – Museum Victoria, Photographer - Jon Augier

Dress - Reinforced Cotton Quilted, Blue, c1900

Heavy cotton quilted strong dress worn by female patients in a mental health hospital in Victoria, Australia, c1900. The reinforced fabric made destruction of the garment difficult.

Source – Museum Victoria, Photographer - Jon Augier

IMAGE COURTESY TODD HRYCKOWIAN

UNDERSTANDING THE HISTORY OF MADNESS

UQ RESEARCHER:
Dr Dolly MacKinnon (School of History, Philosophy, Religion and Classics)

FUNDING SOURCE:
Australian Research Council Discovery and Linkage Projects grants

PARTNER ORGANISATIONS:
Museum Victoria, University of Melbourne

EMAIL: a.mackinnon@uq.edu.au

WEB: www.uq.edu.au/hprc

Right: Jandamarra's Rock is a site in Windjana Gorge in the Kimberley, where Aboriginal resistance leader Jandamarra hid from the police: Jandamarra's story is the subject of a play, a documentary and several books

CULTURAL TRAVELS

Putting Australia's film, literature, and theatre on the map: the Cultural Atlas of Australia…

CULTURAL ATLAS OF AUSTRALIA
UQ RESEARCHERS: Dr Jane Stadler, Dr Peta Mitchell, Dr Stephen Carleton (School of English, Media Studies and Art History)
FUNDING SOURCE: Australian Research Council Discovery Projects
EMAIL: j.stadler@uq.edu.au
WEB: www.australian-cultural-atlas.info/CAA/

Left: the site where Baz Luhrmann's Australia *was filmed near the Cockburn Ranges, Western Australia*

Doctors Jane Stadler, Peta Mitchell, and Stephen Carleton, colleagues from the School of English, Media Studies, and Art History, have teamed up to secure funding from the Australian Research Council to build a digital map that will visually represent the locations of narrative settings in Australian film, literature, and theatre. Their project *A Cultural Atlas of Australia: Mediated Spaces and Landscapes in Theatre, Film and Literature* investigates regionality, cultural identity, and a sense of place.

The researchers plan to use the map to explore the patterns that emerge from geographically visualising these films, novels, and plays, and will publish their findings in a research-led book.

However, narrative is an important source of historical, geographic, and cultural knowledge so the map also has many practical applications outside of the university environment. It will enable students, scholars, screen industry professionals, and travellers with an interest in Australian geography and culture to locate the settings of Australian narratives in order to plot literary tours, visit film sites, and map and identify patterns of representation in the country's cultural landscape.

"If somebody wants to tour Australia and wants to read some books or watch some films set in the places they'll be visiting to get a feel for what it will be like, they will be able to look it up on our map," Dr Mitchell explains.

The researchers hope that the map will challenge assumptions about how Australian space is characterised in cultural works.

The work analyses Australian films, novels, and plays to extract the "geodata", the locations mentioned in each work – which is then georeferenced, logged into a database, and represented on the map.

One of the challenges the researchers face is dealing with texts set in fictionalised places, such as "the Never Never", that are based on combinations of real places and regions, rather than specific locations. Mapping Indigenous representations of landscape is also complex, for they often implicitly challenge a Western cartographic understanding of space and place.

By bringing together film, literature, and theatre, the cultural atlas – which will be complemented by a book and series of articles – promises to provide the most comprehensive geographical picture of Australia's narrative landscape to date.

LANGUAGE FOR LEARNING IN INDIGENOUS SCHOOLING
UQ RESEARCHER: Dr Ilana Mushin (School of Languages and Comparative Cultural Studies)
FUNDING SOURCE: Australian Research Council Linkage Projects grant, Queensland Department of Education, Training and Employment
PARTNER ORGANISATIONS: Griffith University, Queensland Department of Education, Training and Employment
EMAIL: i.mushin@uq.edu.au

LANGUAGE FOR LEARNING

Varieties of English spoken by students in many Indigenous communities do not always sound like "Standard Australian English" they hear from their teachers: this can lead to misunderstanding on both sides.

Poor schooling outcomes are a key factor driving Indigenous Australian disadvantage in life, and the way students and teachers speak to each other may be part of the problem.

At least, that's what Dr Ilana Mushin from the School of Languages and Comparative Cultural Studies and her research partner, Associate Professor Rod Gardner, from Griffith University, believe.

"We were inspired to conduct our research *Clearing the path towards literacy and numeracy: language for learning in Indigenous schooling* by our observations that although most Indigenous children in Australia do not speak a traditional language, they do speak a variety of English that is sufficiently different so as to create learning difficulties.

"This is particularly noticeable when they start school and can cause many communication issues: often teachers will not understand what a child has said and so may not react in the way the child expects.

"Coupled with the already well-documented challenges faced by Indigenous students, this can lead to real educational disadvantage."

What Dr Mushin hopes to achieve from her research is an empirical basis to the observation that when Indigenous children start school, they have to learn English through the medium of a second dialect, which impacts successful transmission of knowledge.

"At present, we are looking at how children try to get teachers' attention for feedback or clarification, and whether or not their strategies are successful," says Dr Mushin.

"We have noticed that Indigenous children often have to work hard to get a response, suggesting that perhaps teachers need some professional development – often the teachers are from a non-Indigenous background and are not aware of the issues.

"We will continue to work with the Queensland Department of Education, Training and Employment to run workshops and produce training guides and posters. We believe our findings can be applied to other culturally diverse school environments."

Dr Mushin and Associate Professor Gardner also hope to provide a socio-historical account of the linguistic variation and development within some Queensland Indigenous communities to show how such community vernacular languages are robust linguistic systems, and not simply "Broken English" or "Slang".

"Our studies show that there is no one community vernacular, but rather a range of related varieties that connect and inter-relate with other communities. This may also affect how Indigenous children understand and interpret questions being asked of them at school."

HISTORICAL DIRECTIONS

In his classic 1989 book *Wonderful Life,* Stephen Jay Gould persuasively sets out the view that if it were possible to "replay the tape" of evolution, the outcomes would be very different.

In particular, prospects for the emergence of something like human consciousness would be very remote: indeed, intelligent life was probably a cosmic accident.

According to Professor Peter Harrison, Director of the Centre for the History of European Discourses, this "replaying the tape" can be applied to virtually any historical scenario, and raises fundamental questions about whether history is directional and, if so, what its sources of directionality might be.

"The question of whether events have a particular order is a venerable one," he says.

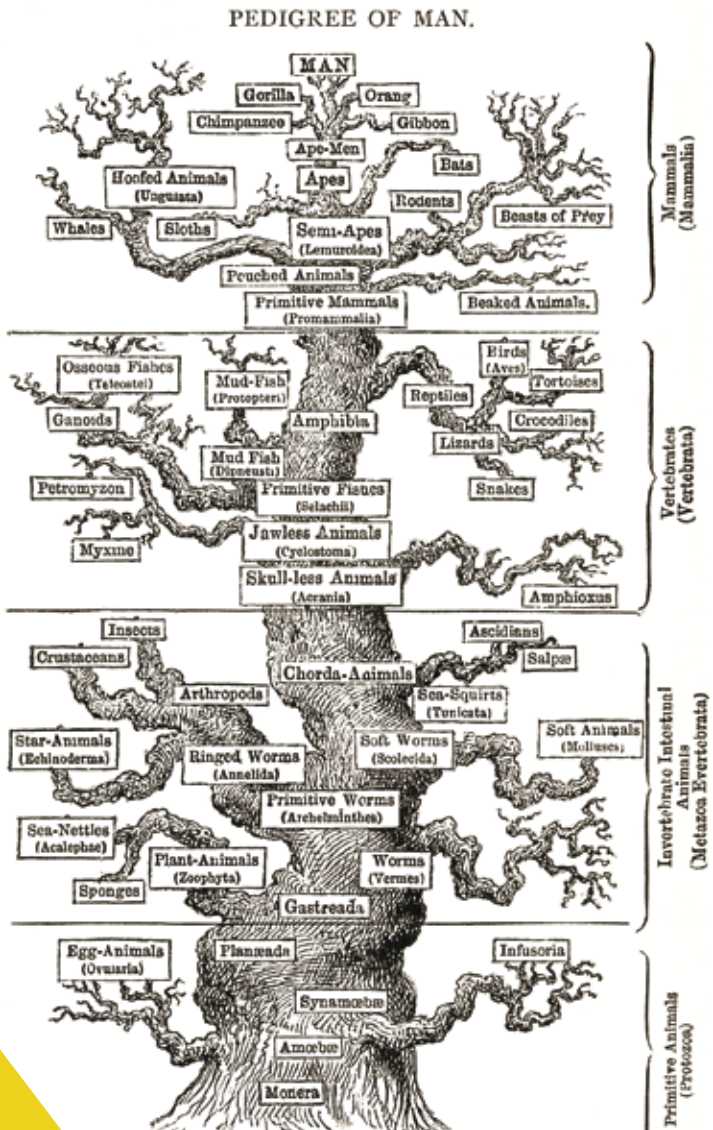
"Ancient Greek thinkers, Christian theologians, Marxist theorists, and Neo-conservatives, have in various ways asserted the directionality of history, suggesting that patterns underlie apparently chance events, and shape the direction history takes. Nineteenth century thinkers also considered evolution to be inherently progressive.

"Although a less popular idea today, evolutionary history appears to exhibit at least some recurring patterns. Similarly, fine-tuning arguments in cosmology, although they remain contentious, have also suggested a degree of inevitable directionality in cosmic history."

The Science, Progress and History project was inspired by these general questions about the "shape" and directionality of history, and whether the contingent or accidental features of history necessarily rule out the possibility of an underlying order.

Collaborating with colleagues from several international universities, Professor Harrison hopes to explore these questions at the interface of history and the natural sciences, with a focus on laws, patterns and narrative structures in human history, evolutionary history, and cosmology. A truly multi-dimensional project, it will begin a conversation among historians, philosophers of science, and scientists (history, geology, evolutionary biology and cosmology) about these issues and how they inform the natural sciences past and present.

Perhaps the answer to Haeckel's progressive scheme of evolution with "man" at the pinnacle will be verified… or not.



Pictured left:
Pedigree of Man *(1874), Ernst Haeckel*

SCIENCE, PROGRESS AND HISTORY

UQ RESEARCHER: Professor Peter Harrison (Centre for the History of European Discourses)

FUNDING SOURCE: Templeton World Charity Foundation (TWCF)

PARTNER ORGANISATIONS: Duke University, Florida State University, London School of Economics, University of British Columbia, University of Cambridge, University of Oxford

EMAIL: p.harrison@uq.edu.au

WEB: www.ched.uq.edu.au/science-progress-history

HEALTHY PEOPLE

Eradicating disease and helping build a healthier community are key motivators for UQ's scientific research

SOUND ASLEEP?

Loud snoring may threaten more than just the marriage-bed, but current Sleep Apnoea diagnostic techniques are neither very comfortable nor accessible.

OSA, or Obstructive Sleep Apnoea, is a condition affecting 25 percent of middle-aged men and nine percent of women that causes an increased risk of stroke, cardiovascular disease and type II diabetes, as well as significantly higher accident rates. Its main symptoms are snoring at night and excessive sleepiness during the day.

Patients with the condition can have breathing disruptions – full and partial collapse of the airway – as many as 100 times an hour while asleep, and so do not enjoy a proper night's rest.

Yet many people are not even aware of the disease.

"Diagnosing OSA is difficult," says Associate Professor Udantha Abeyratne from the School of Information Technology and Electrical Engineering, "and so is the assessment of sleepiness. My aim is to develop technologies to make these processes easy – both inside and outside the lab."

The aim seems to be on target, as Dr Abeyratne and his team are currently working on simplified but accurate technology to monitor and quantify sleepiness in real-time, actual work environments such as mines and industrial vehicles.

Perhaps the team's most fundamental discovery, however, is that snoring sounds yield highly specific markers of OSA – although not all snorers have the condition.

"The medical community was aware that almost all OSA patients snored, but did not believe it was a specific marker of the disease," says Dr Abeyratne. "By recording snore sounds and analysing them with specialised technology our research team has developed, we can detect OSA without even touching a patient."

Based on these outcomes, UQ spin-off company SnoreSounds, of which Associate Professor Abeyratne is founding scientist, is currently developing a cost-effective sleep-monitoring device that can be used at home.

"We are also working on developing wearable brainwave devices that will continuously and quantitatively measure a person's sleepiness so that we can predict dangerous levels of sleepiness requiring corrective action. We think this will save the community many millions of dollars by helping prevent industrial accidents such as the Exxon Valdez oil spill and Chernobyl nuclear disaster that have often been attributed to OSA."

And after that?

"We would like to customise diagnostic technologies targeting specific groups such as pregnant women and the elderly, as well as enhance treatment options for OSA sufferers generally," he continues.

"We would also like to develop personalised technologies to make OSA treatments more effective, and easier to prescribe and use."

SLEEP APNOEA

UQ RESEARCHER: Associate Professor Udantha Abeyratne (School of Information Technology and Electrical Engineering)

FUNDING SOURCE: Australian Research Council Discovery Projects and Linkage Projects grants, Bill and Melinda Gates Foundation grant, Princess Alexandra Hospital Foundation grant, UQ Early Career Researcher grant, Visiting fellowships: Japanese Society for the Promotion of Science and Technology Invitation Fellowship for Senior Scientists, Heiwa-Nakajima Fellowship

PARTNER ORGANISATIONS: Princess Alexandra Hospital, University of Tokushima

EMAIL: udantha@itee.uq.edu.au

WEB: www.itee.uq.edu.au/~udantha

Above left: Dr Vinayak Swarnkar, co-developer of the brainwave technology, demonstrating conventional laboratory instrumentation

LEFT RIGHT OUT

Strokes emanating from the right-hand side of the brain can sometimes lead to a surprising outcome: patients completely ignore the left side of their world!

This curious condition known as "unilateral spatial neglect" can result in people, for example, ignoring food on the left side of their plate, or only shaving (or applying make-up to) the right-hand side of their face. The core deficit in these people seems to be their failure to pay attention to sensory information coming from their affected side.

"Unfortunately, people who suffer from this condition after a stroke tend to have the worst outcomes in terms of regaining lost function in affected parts of their bodies," says Professor Jason Mattingley, who is Foundation Chair in Cognitive Neuroscience at the Queensland Brain Institute and School of Psychology, and recipient of an ARC Australian Laureate Fellowship.

"We know that brain plasticity (changing the way the brain wires itself through neuronal activity) plays a critical role in recovering from stroke.

"The fact that neglect patients with attention problems tend to have poorer recovery of motor function than similar patients without neglect suggests that attention may be important for guiding plasticity following a stroke."

To test this theory, Professor Mattingley and his team are exploring the effect of attention on brain plasticity and how it can be used in neurorehabilitation.

First, they conduct magnetic resonance imaging (MRI) scans on volunteers to produce three-dimensional pictures of their brains.

"We then use these images to guide a transcranial magnetic stimulation (TMS) coil into position on the volunteers' scalps and specifically target a part of the motor cortex that controls the thumb muscle in the left hand," says Professor Mattingley.

"We already know that the more often neurons activate at the same time, the more likely they are to communicate efficiently in the future: this is one of the ways in which the brain learns.

"We're exploiting that general principle in this research."

Dr Marc Kamke, Research Fellow at the Queensland Brain Institute, explains, "By adjusting the type of brain stimulation delivered we can artificially induce short-term changes that resemble naturally occurring plasticity."

What they have found so far is that the effects of stimulation upon a brain's plasticity are dependent on attention.

"When we ask people to undertake a visual task that is irrelevant to the brain stimulation, but that demands a great deal of their attention, we observe reduced plasticity," continues Dr Kamke.

"When the task does not require much attention, however, the brain's plastic response is apparent."

These results show that attention does indeed play an important role in guiding brain plasticity, and this knowledge may ultimately help the research team develop more effective strategies for physical therapy after stroke.

BRAINWAVES

UQ RESEARCHERS: Professor Jason Mattingley, Dr Marc Kamke (Queensland Brain Institute)

FUNDING SOURCE: Australian Research Council, National Health and Medical Research Council

EMAIL: j.mattingley@uq.edu.au

WEB: www.qbi.uq.edu.au/group-leader-mattingley

SAVING MOTHERS AND BABIES

"End poverty by 2015" was the challenge set by the United Nations in 1990 and agreed to by all the world's countries and leading development institutions.

Focusing on Millennium Development Goals Four (Reduce child mortality) and Five (Improve maternal health), UQ's research is helping to meet the needs of the world's poorest.

Says Dr Eliana Jimenez Soto from the Australian Centre for International and Tropical Health, "We have been conducting research in India, Indonesia, Nepal, the Philippines and Papua New Guinea to determine which socio-economic groups (based on geography, wealth and ethnicity) suffer the highest child mortality rates, and which receive the lowest level of intervention.

"We have found that very little data is currently available, and we hope that our research will form the basis for a more equitable allocation of health resources by government officials in future."

The team uses sophisticated planning and analysis tools, and works closely with the local governments.

"Apart from analysing under-five mortality rates across each study country to estimate equity markers, we are also identifying the health system limitations that are creating the problems in the first place.

"We anticipate that our evidence-based results will help governments decide where to invest resources so that they can benefit the greatest number of mothers and babies," Dr Jimenez Soto continues.

To date, the team has noticed high levels of inequity across the different countries. Decisions are rarely made according to evidence, and – despite improvements made generally – some disadvantaged groups are actually becoming worse off.

"Improving the information systems and identifying key constraints and bottlenecks in the health systems are vital for meeting the UN's Millennium Development Goals Four and Five," Dr Jimenez Soto says.

"Our research should identify the best ways to increase coverage of the 'best-buy range of interventions' required to reduce inequity, and our work with a wide range of stakeholders ensures that everyone is part of the solution."

SAVING MOTHERS AND BABIES

UQ RESEARCHERS: Dr Eliana Jimenez Soto, Zoe Dettrick, Sonja Firth, Andrew Hodge, Kim Nguyen (Australian Centre for International and Tropical Health)

FUNDING SOURCE: AusAID, Bill and Melinda Gates Foundation

PARTNER ORGANISATIONS: Burnet Institute, Centre for International Child Health, Gadjah Mada University, Menzies School of Health Research, New ERA, Nossal Institute for Global Health, Public Health Foundation of India, UPecon Foundation

EMAIL: e.jimenez@sph.uq.edu.au

WEB: www.uq.edu.au/investmentcase

TOXIC TESTING

Australia is now the world's second largest producer of iron ore, which means that more people than ever before may be exposed to iron ore dusts – but it's not just miners at risk.

"With personal protective equipment, we can safeguard the health of miners, but what of the general population who inadvertently breathe in these iron ore particles?" asks Jack Ng, a toxicologist and Professorial Research Fellow at the National Research Centre for Environmental Toxicology (Entox).

"Depending on weather conditions, the dusts can travel hundreds of kilometres away, yet our current air quality regulations do not discriminate between non-specific dusts and metal ore dusts, nor how toxic they are."

What is known is that particles less than 10 micrometres in diameter (PM10) can permeate lungs deeply and are a major component of airborne iron-rich dust. Toxicity depends on the composition of the compounds and minerals released from different mine-sites.

As public concern within mining communities mounts, Professor Ng and his team are investigating cost-effective ways of assessing air quality *in-vitro* (in test-tubes), specifically to measure the toxicological effects of iron-rich particulate matter.

"We are producing 'synthetic lungs' within the laboratory to discern how insoluble PM10 affects the lung surface, cell membrane and immune system so that we can predict lung damage, scarring and inflammatory outcomes," he says.

"We believe it is vital to assess relative toxicities between inhalable iron-rich dusts so that the mining industry has a sustainable future with minimal impact on public health."

If their methods prove successful, health authorities will routinely apply such high-throughput air quality testing of crustal dust to all types of metal ore mines (where around 22 percent of all atmospheric dust originates) so that disease outcomes may be predicted and the integrity of Australian air quality ensured.

So far, the team has discovered that although immediate damage to the lungs from iron-rich PM10 is no greater than pure iron oxide, there are long-term adverse health effects of which to be cautious. Further cross-testing with toxicological databases built onto dust-concentration maps needs to be conducted before definitive answers can be given, however.

BIOMONITORING SOLUTIONS TO IMPROVE AIR QUALITY

UQ RESEARCHERS: Professor Jack Ng, Shiva Prakash (National Research Centre for Environmental Toxicology)

FUNDING SOURCE: CRC for Contamination Assessment and Remediation of the Environment (CRC-CARE)

PARTNER ORGANISATIONS: ChemCentre of Western Australia (CCWA), CRC for Contamination Assessment and Remediation of the Environment (CRC-CARE)

EMAIL: j.ng@uq.edu.au

WEB: www.entox.uq.edu.au/jack-ng-155133

Main picture: Cinders; inset: Bonnie and Abbie, some of the dogs who participated in the research

CANINE CANCER SAVER

"Dogs are part of the family: we want to be able to help our pets and save them from unnecessary euthanasia. And our findings may help save human cancer sufferers."

With such positive motivation, it has been easy for scientists April Choi, Dr Michelle Hill and Dr Caroline O'Leary to stay focused on their research, *Developing rapid diagnostic or predictive blood markers for dog haemangiosarcoma (cancer)*.

"Haemangiosarcoma is an aggressive tumour originating from the vascular endothelium (blood vessel lining cells)," says Dr O'Leary.

"It is a common neoplasm (abnormal mass of tissue) in dogs, mostly occurring in middle-aged to older, and large breed dogs.

"Unfortunately, diagnosis is often made too late to save the dog for more than a few months, due to a lack of specific clinical signs before the tumour bleeds or spreads internally. At the moment, we cannot discriminate between this malignant cancer and other more benign splenic and hepatic masses.

See: 'High-throughput lectin magnetic bead array-coupled tandem mass spectrometry for glycoprotein biomarker discovery'. Choi et al. Electrophoresis 2011 *doi: 10.1002/elps. 201100341*

"What it means is that owners generally opt to euthanase their pets – thinking they are going to die soon anyway – when it is likely that some of the dogs have benign conditions that could be easily treated."

The team's aim is to discover novel or blood biomarkers (molecules that indicate disease) for canine haemangiosarcoma and then develop a simple blood test that can be used in the veterinary surgery. If these diagnostic tests suggest a benign rather than malignant mass, many pets may be saved from early euthanasia.

Enthusiasm for the project has been overwhelming with many colleagues freely helping with sample testing. Particular thanks go to veterinary pathologist Dr Helle Bielefeldt-Ohmann; UQ Small Animal Clinic staff (particularly John Mallyon, Donna Spowart, Geoff Nicholson, Beth Price, Carly Bloom, Sean Surman, Lance Wilson, Bruce Smith, Nicola Lloyd, Emily Cook, Tania Banks and Joshua King); veterinary specialists Rod Straw, Jason Beck, Nicola Volstad and Fiona Campbell; and countless dogs and their owners.

To date, the team has performed the first screen to identify potential biomarkers for a second, validation screen.

"After validation, we will have a small panel of candidate biomarkers that we can then take into clinical studies," says Dr Hill.

"We are currently seeking industry partner(s) to produce test kits for trial in veterinary clinics."

One advantage of studying animal instead of human cancer is the speed of disease development. Because of their shorter lifespans, what may take years to notice in a human may only take weeks in a dog, and so our understanding of cancer biology can be much faster.

"Dogs and humans have similar genomes, and so are likely to have similar cancer pathogenesis, progression, drug response, therapy, and diagnostic and prognostic markers," says Ms Choi.

Many dog cancers directly correlate with human cancers – in this case, canine haemangiosarcoma correlates with human angiosarcoma, a rare but lethal form of cancer that sometimes occurs in women following breast cancer treatment – and so the team's research may be able to help with early diagnosis of this condition.

"After all, dogs have been exposed to the same environmental surroundings, nutrition and everyday risk factors as their human companions," adds Dr Hill.

As well as trying to help diagnose canine haemangiosarcoma, the team is aiming to develop a genetic test that will identify pets with increased risk of this disease so that they can be regularly screened. Results from both these tests will help the researchers understand the disease's pathology and find new therapeutic targets. This too may have positive implications for human cancer sufferers.

CANINE CANCER

UQ RESEARCHERS: April Choi, Dr Michelle Hill (UQ Diamantina Institute), Dr Caroline O'Leary (School of Veterinary Science)

FUNDING SOURCE: Australian Animal Cancer Foundation, UQ Centre for Companion Animal Health, UQ Collaboration and Industry Engagement Fund

PARTNER ORGANISATIONS: Brisbane Veterinary Specialist Centre, Queensland Veterinary Specialists, Veterinary Specialist Services, Griffith University

EMAIL: m.hill2@uq.edu.au

WEB: www.di.uq.edu.au or www.uq.edu.au/vetschool/index.html

GOING VIRAL, NOT

Feed a cold and starve a fever: this old adage may indeed be true if the "food" is a low-cost vaccine that "starves" the body of exposure to new viruses before they become pandemic.

Surviving a cold may be pretty easy these days, but with more than 15 million deaths worldwide each year, beating influenza and other infectious diseases is still a major challenge.

According to Professor Anton Middelberg from the Australian Institute for Bioengineering and Nanotechnology, the answer to preventing large-scale spread of infectious disease is to immunise people with vaccines that are quick and inexpensive to produce.

"Vaccines need to be affordable, otherwise they will not be used," he says, "and they need to be quickly mass-produced once we identify a mutated or new virus – and certainly before it causes widespread disease.

Current influenza vaccines are made using egg-based technologies first developed in the 1930s. This technology has a lot of inertia: it takes a long time to make a new vaccine when a virus is detected.

"If we are surprised by a sudden change, as with swine flu in 2009, people die while they wait for the vaccine composition to 'catch up' with the new virus," continues Professor Middelberg.

"This issue of speed is also critical for other new and emerging viruses that may invade from overseas, or even locally. We simply can't make vaccine fast enough."

Using modern molecular and bioprocessing tools, Professor Middelberg and his team are developing vaccines that can be changed and manufactured for the entire Australian population within days of a new virus appearing.

"The new vaccines we are developing are also much cheaper to mass-produce than traditional technologies, so are relevant where cost is an issue – for example, in the developing world," says Professor Middelberg.

How is this possible?

"We use biotechnology to create the safe parts of a virus, and then we use nanotechnology to assemble these building blocks into a virus-like particle (VLP) in a reactor. VLPs resemble viruses but, as they only use the safe part of the virus, they are not infectious," he says.

"However, being a safe mimic of the dangerous virus, they raise an excellent immune response.

"Biotechnology allows us to make VLPs rapidly using bacteria, and the VLPs can be manipulated within reactors (not cells) to change composition and target the new disease-causing agent. This enables an incredibly fast response to new threats."

Such radical re-engineering of the system we use to make and deliver new vaccines will have a huge impact on how we can prevent disease, particularly in developing countries, and will bolster another old saying, "prevention is better than cure".

NEW VACCINE TECHNOLOGY

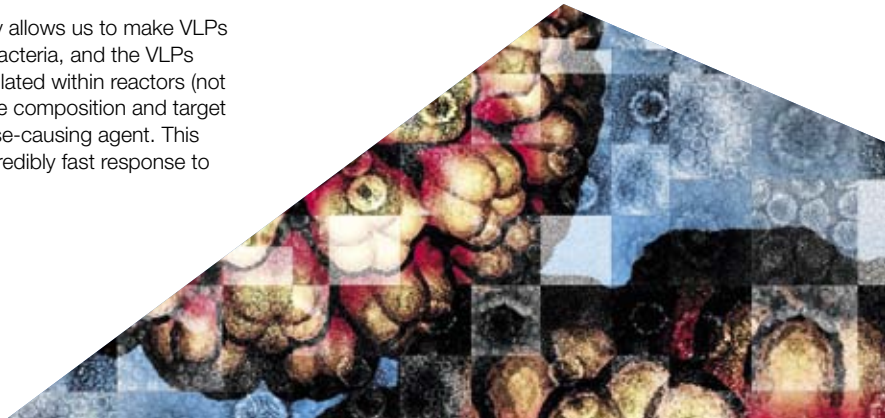
UQ RESEARCHERS: Professor Anton Middelberg, Dr Yap Pang Chuan, Dr Natalie Connors, Dr Linda Lua, Dr Nani Wibowo (Australian Institute for Bioengineering and Nanotechnology)

FUNDING SOURCE: Australian Research Council grants, Gates Grand Challenge Exploration Award, Queensland Smart Futures Fund (Premier's Fellowship, and National and International Research Alliances Program (Australia))

PARTNER ORGANISATIONS: Karlsruhe Institute of Technology, Pasteur Institute of Ho Chi Minh City, Tianjin University

EMAIL: a.middelberg@uq.edu.au

WEB: www.aibn.uq.edu.au



NO PAIN, ALL GAIN

Sometimes a change of scenery can be just what the doctor ordered – literally.

If it wasn't for some idle doodling during an overseas conference, that legendary "aha!" moment precipitating all great scientific discoveries may never have happened for Nanopatch developer Professor Mark Kendall from the Australian Institute for Bioengineering and Nanotechnology.

"Being away from my normal routine I found my mind was free to wander and wrestle with a problem I had been struggling with for several years.

"I started drawing a map of the body from scratch to work out where immune 'sweet spots' were, and this formed the idea of applying vaccine in a patch on the surface of the skin, rather than injecting into one spot of muscle. The skin has lots of immune cells, whereas muscle has very few, so it seemed logical."

The "nanopatch" was the result, a one-centimetre square "patch" with more than 10,000 tiny ("nano") projections to deliver vaccine painlessly and more efficiently than traditional methods.

But what led to this moment?

"I have always been fascinated by how things work and how they can be improved," he says.

"As a child I used to wonder why escalators kept moving or how aeroplanes left the ground. This inspired me to study Mechanical Engineering at UQ, after which I completed a PhD in Hypervelocity Aerodynamics, a field that includes rockets and scramjet technology: I really enjoy aerospace engineering.

"I was then invited to study rocket science of a different sort at the University of Oxford – co-developing the Powderject technology. We were testing the use of hand-held mini-rockets to 'fire' vaccines into the skin of people."

Although partially successful, it wasn't until Professor Kendall hit upon the idea of the nanopatch that the skin could be more fully exploited for improved vaccines. Of course, this "simple" concept had entailed many years of preliminary research and mathematical modelling by a skilled team of scientists – and then required patenting of the idea, securing funding, and establishing commercial enterprise Vaxxas to help develop the product.

The team is now more than half way through the typical 15-year product development process and is looking towards the next step of proving it in the clinic.

And has all the effort been worth it?

"Definitely!" says Professor Kendall. "Realising the nanopatch can potentially bring huge benefits – particularly for developing countries – because of reduced costs in three key areas.

"Firstly, as the patch will deliver vaccine more effectively, we may only need one-hundredth of the dose previously required (this has been shown in mouse studies) – meaning less vaccine to be manufactured.

"Second, we may no longer require refrigerated storage. Unlike traditional methods, the nanopatch is dry-coated and can survive for up to a year at room temperature.

"And finally, we may not need medical staff to administer the vaccine: the technology is so simple – and pain-free – that almost anyone can apply it. No more screams, cross-contamination or needle-stick injuries: just what the doctor ordered!"

NANOPATCH

UQ RESEARCHERS: Professor Mark Kendall and his team (Australian Institute for Bioengineering and Nanotechnology)

FUNDING SOURCES:
Research Group: Australian Innovation Challenge, Australian Research Council, Bill and Melinda Gates Foundation, Eureka Prize for Research, National Health and Medical Research Council, Queensland Smart Futures Fund, Rolex Award, UQ, Vaccine Industries Development Award;
Vaxxas: One Ventures, Brandon Capital Partners, Healthcare Ventures, Medical Research Commercialisation Fund

PARTNER ORGANISATIONS:
Harvard University, Oregon Research Institute, PATH (Seattle), University of Melbourne, University of New South Wales, University of Oxford, University of South Australia

EMAIL: m.kendall@uq.edu.au

WEB: www.aibn.uq.edu.au/mark-kendall

BIOLOGICS
UQ RESEARCHERS: Professor Peter Gray (Australian Institute for Bioengineering and Nanotechnology)
FUNDING SOURCE: Australian and Queensland governments
PARTNER ORGANISATIONS: DSM Biologics (The Netherlands), Biopharmaceuticals Australia Pty Ltd
EMAIL: aibn.director@uq.edu.au
WEB: www.aibn.uq.edu.au

PROTEIN POWER

Protein may be our body's building block, but scientists have discovered its other secret power: fighting disease.

Welcome to the wonderful world of biologics!

"Science is just amazing," says Professor Peter Gray, Director of the Australian Institute for Bioengineering and Nanotechnology (AIBN).

"We can now produce molecules based on proteins from the body, grow large amounts of it in the laboratory, and then use it therapeutically to target tumours, infections and other illnesses.

"Using DNA technology with all natural products, this 'smart medicine' is in the class of therapy known as biologics and is an alternative to the chemical synthesis of drugs."

Such "top-end" science is the latest development in biotechnology and has excellent prospects for healthcare.

"Biologics may be used for a variety of medical conditions for which there are no other treatments," Professor Gray says, "and, for example, offers the only known potential treatment for Hendra virus infection. Biologics can also provide another treatment option for those suffering from cancer and auto-immune disorders."

The State and Australian governments certainly support the development of biologics, investing heavily in the creation of a new scale-up facility at the Princess Alexandra Hospital, Woolloongabba.

Currently under construction at the Translational Research Institute, the $65 million facility will be run by staff from DSM Biologics who will manufacture clinical and commercial grade biologics for global markets.

The AIBN will provide support with its expertise in developing mammalian cell lines (which produce biologics) and has signed a memorandum of understanding with both DSM Biologics and the State Government.

"This is great news for Queensland," says Professor Gray.

"Research can now be taken from the lab, through manufacturing, to the market – and make a difference to people's health."

And all through the power of protein.

SOCIAL IMPACT

The focus on social science research is people: how they live, work and interact in their family, community and different societies

KEEP HOPE ALIVE

When American activist Jesse Jackson uttered these immortal words, little did he realise how relevant they would be more than two decades later in the management of emergency services "down under".

But relevant they most certainly are. As a key primary producing nation facing an unprecedented spate of natural disasters of late, Australia is in a prime position to overhaul its emergency procedures.

And a number of UQ researchers are playing their part.

Dr Jonathan Corcoran from the School of Geography, Planning and Environmental Management is focusing his research on fire safety programs.

"Fire, both deliberate and accidental, is an unfortunate reality of life," he says. "I want to make people more aware of fire hazards and threats, and so reduce its impact on the community's economy, psyche and mortality.

"My team and I are working with the Queensland Fire and Rescue Service to record fire incidence from a range of perspectives: the type of fire (household, car, backyard, hoax), socio-economic status of those affected, urban characteristics, and meteorological and calendar events.

"Using advanced geographical and statistical methods, we hope to discern any patterns, and be able to determine, for example, whether or not smoke detectors are effective (yes), where public information campaigns should best be targeted (outlying lower socio-economic areas), and when hoax calls are most likely to occur (between 9pm and 1am on Fridays and Saturdays). We can then make recommendations to the authorities concerned."

Fire and other disasters are all too common in the underground coal-mining industry, which is where Professor David Cliff from the Minerals Industry Safety and Health Centre is focusing his attention.

"It seems that we train our mining engineers in many things, but not for dealing with the emotional stress of being decision-makers in mining disasters," he says.

"We have also noticed that while we have sophisticated data collection systems in place, they are not designed to provide key information quickly in emergencies."

Professor Cliff and his team aim to redress both these shortcomings.

"We are liaising with several mining rescue services to ensure that disaster preparedness is a top priority in mining operations.

"We are also developing tools for improving data systems so that information is more easily available in control rooms, and are highlighting the fact that making decisions under stress needs proper training."

All useful outcomes to "keep hope alive" for those dealing with and affected by potentially disastrous emergency situations.

MEASURING EFFECTIVENESS OF FIRE SAFETY PROGRAMS

UQ RESEARCHER: Dr Jonathan Corcoran (School of Geography, Planning and Environmental Management)

FUNDING SOURCE: Australian Research Council Linkage Projects grant

PARTNER ORGANISATIONS: Queensland Fire and Rescue Service, RMIT University

EMAIL: jj.corcoran@uq.edu.au

IMPROVING MINING INDUSTRY RESPONSE TO EMERGENCIES

UQ RESEARCHERS: Professor David Cliff, Ruth Fuller, Tania Xiao (Minerals Industry Safety and Health Centre)

FUNDING SOURCE: Australian Coal Association Research Program

PARTNER ORGANISATIONS: NSW Mines Rescue Service, Queensland Mines Rescue Service, Simtars (Safety in Mines Testing and Research Station)

EMAIL: d.cliff@mishc.uq.edu.au

WEB: www.mishc.uq.edu.au

LATCH-ON LIVES ON

"Everyone is a learner and has ideas worth communicating."

This philosophy underpins Latch-On, a literacy program for young adults with intellectual disabilities that has been taught in Australia and Canada and, since 2012, in Ireland.

Parents of young people with intellectual disabilities know that their sons and daughters are still developing cognitively and could benefit from ongoing education. Researchers at UQ could verify this through the Down Syndrome Research Project begun in 1976, but there were no post-school programs offered to people with intellectual disabilities that took this reality seriously.

Enter Anne Jobling and Karen Moni from UQ's School of Education.

"Our work has broken down some of the barriers that used to exist around the notion that young people with intellectual disabilities could not continue to learn new skills," says Associate Professor Karen Moni.

"Our research has shown that literacy levels can keep improving with specific life-long learning strategies, enabling learners to engage more fully and independently in their communities. We continue to be inspired by the enthusiasm, determination and successes of students who have attended our program."

As well as the standard two-year program, students can enrol in a Vocational and Education Training Certificate II in Literacy and Technology, which enhances computer literacy skills while improving self-confidence and employment prospects.

Thanks to UniQuest, the benefits of Latch-On are being delivered to the world with Down Syndrome Ireland (DSI) in the Republic of Ireland the latest to embrace the program.

Says DSI CEO Pat Clarke, "We expect many great achievements from this world-class program of education and sincerely hope it will enhance many people's learning skills.

"The United Nations has made 2003-2012 the decade for literacy – a basic human right – and we believe Irish people with Down Syndrome have been ignored for far too long when it comes to our educational system."

Latch-On continues to attract interest from around the world and the UQ team is constantly generating new approaches to helping people with intellectual disabilities in their life-long learning.

LATCH-ON

UQ RESEARCHERS: Associate Professor Karen Moni, Dr Anne Jobling (School of Education)

FUNDING SOURCE: Australian National Training Authority, Research and commercial partnerships

PARTNER ORGANISATIONS: Down Syndrome Ireland; Endeavour Foundation; North Island Community College British Columbia, Canada

EMAIL: k.moni@uq.edu.au

WEB: www.uq.edu.au/education/latch-on-program

PRIVACY LAW FOR THE ONLINE WORLD
UQ RESEARCHER: Dr Mark Burdon (TC Beirne School of Law)
FUNDING SOURCE: UQ
EMAIL: m.burdon@law.uq.edu.au
WEB: www.law.uq.edu.au/academic-staff/staff.php?nm=markburdon

PRIVATE POWER

Am I my Facebook page? No, my Facebook page is a selected fragment of "me" that I choose to broadcast… but it is how I will be judged by the world at large.

Sometimes what is not published on Facebook is more telling than what is actually there – both our published and withdrawn selves are increasingly on trial – and these fundamental issues have enormous implications for privacy law.

Information sharing technologies such as Facebook and Google pose significant privacy challenges for individuals and regulators. However, there is a risk that privacy law may not be keeping up-to-date with rapid technological and online developments.

Dr Mark Burdon from the TC Beirne School of Law has established a Privacy Research Group, comprising colleagues from across the University, to consider these very issues.

"We believe that a multi-disciplinary perspective is essential in understanding fundamental concepts and requirements for privacy, particularly in the online world," he says.

"We hope to provide a clearer conceptualisation of the power relationships that exist in our online worlds, and how powerful parties shape our understandings of personal information and the meaning of privacy in online settings."

One of the aims of Dr Burdon's research is to critically re-evaluate privacy law and its different applications between the "real" and "online" worlds. For example, he is currently examining how Google has used public statements in three major privacy situations to deflect, and ultimately redefine, the privacy threat faced into something much more benign.

"Power relationships are an important part of our new online lives," he says.

"We need to re-examine the consequences of a society where the distinction between what is private and what is public is becoming increasingly diminished. Privacy-threatening actions are going to be ever-present in our lives as companies and governments find new uses for our personal information, driven by constantly changing information technology.

"We need to address both the benefits and dangers now."

OUT TO DRY

We may think of climate change as a recent phenomenon, but the Australian Aboriginal community has been observing shifts in weather patterns for thousands of years.

Tapping into this wealth of knowledge is Professor Paul Memmott and his team from the Aboriginal Environments Research Centre within UQ's School of Architecture and the Institute for Social Science Research.

"Most of the focus on climate change has been on rising sea levels," he says, "but inland arid zones are also affected by dramatic events, such as cyclones, heat-waves, bushfires and floods, and we have very little data available on it.

"As weather predictability is an important issue for residents in remote areas – affecting seasonal mobility, hunting patterns, and traditional land management strategies – we are keen to document the changes people have observed. Anecdotal evidence so far suggests that the weather has changed over the past 50 years, resulting in difficulties for planning ahead."

Using the Upper Georgina River Basin as a case study, Professor Memmott's team is adopting a three-pronged approach to the task: the first is to collate data from face-to-face interviews with the local community to determine areas of concern, and detect any noticeable trends. This will set the baseline for future climate comparisons within the area.

The second aspect is to hold workshops on how to deal with potential disasters, and the third is to draft a Regional Climate Adaptation Plan to enable future generations to learn from the past.

"We have already noticed that the local community would prefer to adapt their way of life to suit the climate, rather than leave their traditional homelands," says Professor Memmott, "and so it is in everyone's best interests to be well prepared for major events."

The advantage of this research is that it can be applied to other remote arid zones around the country and will benefit the mostly local Indigenous communities living there.

It may also help national security given that global warming may attract many illicit "climate refugees" from overseas in future.

ABORIGINAL RESPONSES TO CLIMATE CHANGE

UQ RESEARCHERS: Professor Paul Memmott, Professor Brian Head, Dr James Davidson, Dr Daphne Nash, Timothy O'Rourke, Adjunct Professor Joseph Reser, Associate Professor Susanne Schmidt (through the Aboriginal Environments Research Centre)

FUNDING SOURCE: National Climate Change Adaptation Research Facility

PARTNER ORGANISATIONS: Barkly Shire Council Alpurrurulam, Dugalunji Aboriginal Corporation Camooweal, Jimberella Cooperative Society Dajarra, Marmanya Aboriginal community Urandangi

EMAIL: p.memmott@uq.edu.au

WEB: www.nccarf.edu.au/research/thematic/648

R2P: READY TO PRACTISE

As world leaders clash, innocent bystanders are often caught in the cross-fire: the Asia-Pacific Centre for the Responsibility to Protect (R2P) hopes to change all that.

"Our aim is to prevent and respond to genocides and mass atrocities," says the Centre's Co-Director, Dr Noel Morada.

"We hope to foster and develop expertise on how to advance the Responsibility to Protect (R2P) principle that will help protect ordinary people from large-scale humanitarian atrocities.

"We need to discover more about the conceptual and policy challenges such a major undertaking requires so that we can move policy into practice and make a tangible difference in the global world of politics."

The Centre is building a strong evidence base for shaping government policy and programs and is focusing on three key areas: Regional Diplomacy and Capability Building; Prevention of Genocide and Mass Atrocities; and Doctrine, Concepts and Interagency Coordination.

This requires critically examining what s actually happening within the Asia Pacific region, making policy recommendations to change unacceptable behaviours, and then promoting good international citizenship to challenge grave and systematic violations of human rights.

Says Research Director Professor Tim Dunne, "To enhance awareness of the need to prevent atrocities from being committed we want to build a knowledge network with reliable data to assist the policy agenda: the more supporters and 'champions' we have, the better we will get our message across.

"We also want to strengthen ties with the Association of Southeast Asian Nations (ASEAN) and the United Nations (UN) to identify practical pathways to implement R2P, and to conduct more research on mass sexual violence."

The team believes that prevention is better than cure and so is keen to develop frameworks that can help detect possible future mass violence. Identifying procedures for monitoring intervention policies is another key research target.

To change the behaviour of governments, the Centre must necessarily take a long-term approach. In the immediate future, however, the team will be working with regional policymakers to enhance their understanding of the obligations generated by the R2P principle. The UN Secretary-General describes this as the challenge of moving from "words to deeds" and the Centre wants to respond to this challenge in the Asia-Pacific region.

"It is the responsibility of all governments to protect their people," says Professor Dunne.

"If governments fail to live up to their responsibility, then this means regional and global institutions have to take decisive measures to assist them."

ASIA-PACIFIC CENTRE FOR THE RESPONSIBILITY TO PROTECT (APC R2P)

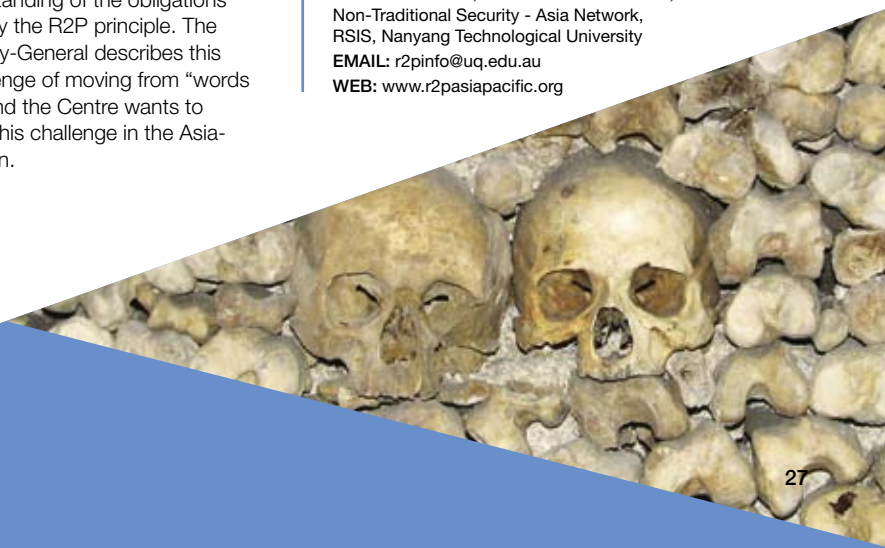
UQ RESEARCHERS: Professor Tim Dunne, Charles Hunt, Dr Noel Morada, Dr Heather Rae, Sarah Teitt, Dr Jocelyn Vaughn (School of Political Science and International Studies)

FUNDING SOURCE: Australian Agency for International Development (AusAID), UQ

PARTNER ORGANISATIONS: Academic and think-tank partners in Cambodia, Indonesia, the Philippines and Thailand; Council for Security Cooperation in the Asia Pacific; Global Centre for the Responsibility to Protect; Griffith University; International Coalition for the Responsibility to Protect; Institute for Ethics, Law and Armed Conflict; Non-Traditional Security - Asia Network, RSIS, Nanyang Technological University

EMAIL: r2pinfo@uq.edu.au

WEB: www.r2pasiapacific.org



AFRICA UNEARTHED

High plateaus next to ocean-like lakes: how would our ancestors have coped with such different environments? And how did they deal with extreme climate change?

Wanting to answer questions such as these spurred Dr Jessica Thompson from the School of Social Science to spearhead a major archaeological dig in Malawi, central Africa, that has attracted scholars and scientists from all over the world.

"Driving through northern Malawi several years ago, I was struck by how diverse the landscape was over such a short distance," says Dr Thompson. "I also knew that large-scale 'megadroughts' had swept through this area between 135 and 75 thousand years ago, around the time that biologically modern people first emerged.

"I began to wonder how this would have structured movements and challenged the innovative capacities of those early human populations: would they have used the environment to their advantage – or would they have abandoned the area altogether?"

Fortunately for Dr Thompson and her team of specialists in palaeoclimate research, geomorphology, dating of sediments and, of course, archaeology, the northern Malawi region has unearthed rich Stone Age treasures.

"During 2011, our team discovered an undisturbed layer full of stone artefacts that had been buried by over a metre of sediment," she continues. "Many could be refitted to show how they were made, and geological and dating work shows they were most likely found where they were discarded – between 42 and 22 thousand years ago.

"Most importantly, preliminary dating work at nearby sites indicates that even older sites may be present, which means we can construct a sequence of similar 'snapshots' over time."

The project team is working closely with the local community, and delivers educational programs and training through the Cultural and Museum Centre Karonga. The site has also become the destination of choice for the Archaeological Fieldwork course at UQ, where student enrolment has tripled within a year.

Looking towards the future, Dr Thompson says, "Whether we continue our fieldwork long-term depends on whether our discoveries spark new questions, but I believe there is much research potential still to be found in the archaeological deposits of northern Malawi."

MALAWI EARLIER-MIDDLE STONE AGE PROJECT

UQ RESEARCHER: Dr Jessica Thompson (School of Social Science)

FUNDING SOURCE: Australian Research Council Discovery Projects grant, Cosmos Club Foundation, Explorers Club Washington Group, National Geographic-Waitt Foundation grant, Thomas Jones, Wenner-Gren Foundation for Anthropological Research, UQ

PARTNER ORGANISATIONS: African Heritage: Research and Consultancy, Arizona State University, Australian National University, City University of New York, Cultural and Museum Centre Karonga, George Washington University, Griffith University, La Trobe University, Malawi Department of Antiquities, Seoul National University, University of Arizona, University of Illinois, University of Tübingen

EMAIL: jessica.thompson@uq.edu.au

WEB: http://commonsites.akvoapp.org/project/460/

THE SECRET OF SUCCESS

What defines business success: growth, profit, innovation, or personal satisfaction? And who cares?

Dr Martie-Louise Verreynne and Dr John Steen from the UQ Business School are keen to answer the first question. They already know the answer to the second.

"We began this research as we wanted to discover why some businesses flourish, while others struggle or fail," says Dr Verreynne, "and it seems we are not alone in our query: both industry and the government are very interested in our results.

"We are also keen to help policy-makers and other agencies provide the best advice to small business owners that will enable them to better achieve their goals."

Depending on definition, small businesses comprise up to 95 percent of all businesses in Australia – crucial for our economy – yet there is very little quantitative data available on them. The aim of this research *Growing Australian Business* is to compile internationally comparable "snapshots" of Australian business that can be used to spot indicators of success, and then use them to advise current and prospective business-owners.

The team has collected data in five different areas: Business characteristics and practices, Innovation, Competition and collaboration, Finance, and Chief Executive Officer (CEO) motivation, and is well on its way to answering that vital question.

"The definition of business success depends on the size of the company, whether it wishes to expand, and (sometimes) the motivation of the CEO," says Dr Verreynne.

"For those micro-businesses (one to four employees only) set up for lifestyle purposes, 'success' may be as simple as satisfying customers, paying back the initial investment, and having enjoyable work that allows time with the family.

"On the other hand, larger businesses wishing to grow are less focused on personal circumstances: they look more towards sustained profits through innovation, satisfying multiple stakeholders, and expanding their markets."

While providing a good service or product is important to all businesses surveyed – as well as having a good cash flow – the team found that being innovative is only seen as crucial for those wishing to expand.

So, in essence, the answer to the question of what makes a business successful depends on who is doing the asking...

GROWING AUSTRALIAN BUSINESS

UQ RESEARCHERS: Dr Martie-Louise Verreynne, Dr John Steen (UQ Business School)

FUNDING SOURCE: Department of Science, Information Technology, Innovation and the Arts; Pathfinder (UniQuest)

PARTNER ORGANISATIONS: Centre for Business Research, Cambridge University, UK; Growing New Zealand Business research group, Auckland University, NZ

EMAIL: m.verreynne@business.uq.edu.au

WEB: www.growingaustralianbusiness.com

SUSTAINABLE AUSTRALIA

Spanning many disciplines, UQ researchers help develop clean energy and discover ways to protect and conserve our environment

DEEP EARTH MINING
UQ RESEARCHER: Professor Gideon Chitombo (Sustainable Minerals Institute)
FUNDING SOURCE/RESEARCH PARTNERS:
In Australia: BHP Billiton, Dyno Nobel Asia Pacific, Newcrest Mining, Orica Australia, Rio Tinto, Xstrata Copper
In Canada: Vale Inco
In Europe: Atlas Copco, LKAB, Sandvik Mining and Construction
In South America: Anglo American, Codelco Chile
In Southern Africa: African Explosives Limited, Anglo American, De Beers, Debswana Diamond Operations
In USA: Itasca
EMAIL: g.chitombo@uq.edu.au
WEB: www.smi.uq.edu.au

DELVING DEEPER

Jules Verne's *Journey to the Centre of the Earth* may soon become reality as we deplete mineral resources close to the world's surface.

"Given that the future will be dominated by deep-seated or deeply placed and lower grade mineral resources, we must find more effective ways of accessing these resources," says ATSE Clunies Ross Award winner Professor Gideon Chitombo from the Sustainable Minerals Institute's WH Bryan Mining and Geology Research Centre (BRC).

And this is the basis of his team's research being funded by several major mining companies.

"As we gradually use up resources close to the world's surface, we face great challenges in supplying minerals for future generations," he continues.

"Our goal is to find safe and cost-effective strategies to reduce the geological and mining risks of delving far below the earth's surface, and to improve mining procedures for the benefit of all.

"We want to achieve maximum resource potential with minimum environmental impact."

His team has and continues to include research and consulting groups in Australia (including UQ), the USA, UK, Sweden, Chile and Canada. With BRC's engineers and scientists, he is forming research alliances with the Earth Systems Science Computational Centre (ESSCC) and the Computational Geomechanics group to help understand how mining excavations will respond and behave at these new mining depths outside current experience.

For operating future mines at depth, the industry is considering increased utilisation of automation and robotics to remove people from areas of potentially high safety risk.

"Our role is to work closely with the industry to support them in areas such as orebody or deposit knowledge, and rock response at depth," says Professor Chitombo.

"We are working with the industry to help develop and/or improve mass mining methods or techniques that can be effectively applied at depth while taking into account issues related to energy and water use, as well as other potential environmental impacts.

"We are studying methods including very large caving operations – or Supercaves – and ultra-deep open pits greater than 1000 metres."

As most open pit mines are currently less than 1000 metres deep, this is a major expansion.

Given the potential wealth of resources being found at depth globally, and indeed Australia, this is a great opportunity for UQ to positively contribute to the future of Deep Earth Mining.

CATLIN SEAVIEW SURVEY
UQ RESEARCHERS: Professor Ove Hoegh-Guldberg, Dr Pim Bongaerts (Global Change Institute)
FUNDING SOURCE: Catlin Insurance Group
PARTNER ORGANISATIONS: Catlin Insurance Group, Digital Dimensions, Underwater Earth
EMAIL: d.harris@uq.edu.au
WEB: www.gci.uq.edu.au/OurWork/LivingwithourChangingLandscapesandOceans/LivingwithHealthyOceans/CatlinSeaviewSurvey.aspx

SEAVIEW: SEE LIFE

Thanks to the Catlin Seaview Survey, people from all around the world will be able to "dive" into the Great Barrier Reef without actually getting wet.

However, that is not the main purpose for conducting groundbreaking research and documentation of our world heritage-listed coral reef.

"The Catlin Seaview Survey proposes to undertake the first comprehensive study of the composition and health of the Great Barrier Reef and Coral Sea across an unprecedented depth range (down to 100 metres) in order to answer questions about our rapidly warming and acidifying oceans," says Global Change Institute Director Professor Ove Hoegh-Guldberg.

"We want to set a baseline for measuring future climate change and the impacts it has on our environment."

The survey will comprise three parts, with significant benefits for both scientists and the general public.

"The first will be to document shallow-water reefs on a scale never attempted before," continues Professor Hoegh-Guldberg.

"We will be using custom-made underwater (camera) vehicles that will take rapid-fire 360° shots across the entire length of the reef (around 2,600 kilometres). These images will then become available through the Catlin Seaview Street View portal.

"Next, we will be surveying the deeper waters that make up around 93% of the reef and which are largely unexplored. This should indicate whether mesophotic (deep) reefs could possibly replace damaged shallow reefs as brood-stocks for marine life.

"Finally, we will be conducting satellite tracking of the reef's mega-fauna – such as tiger sharks, manta rays and green turtles – to discern whether or not their movements are changing pattern as the sea temperatures change."

The survey results should provide some definite answers for government and other agencies about how to sustainably manage the biodiversity of the reef, and whether we need to modify our current activities to ensure the long-term sustainability of our ocean ecosystems.

As well as monitoring the reef's stress and vulnerability to rising ocean temperatures and acidity, the survey will feature in-depth assessments of unique reef events, such as the timing of the mass annual coral spawning and whether shallow and deep communities are synchronised.

"The Great Barrier Reef is an important indicator of how healthy our oceans are globally," says Professor Hoegh-Guldberg, "yet we know so little about it. This is just the start for future 'real-time' evaluations of coral reef ecosystems and what the future holds for the world underwater."

SCAN ME ▶
▶ CATLIN SEAVIEW VIDEO

IMAGE COURTESY ALAN BATCHELOR, GOLD COAST CITY COUNCIL

RENEWABLE MATERIALS WASTEWATER

UQ RESEARCHERS: Professor Zhiguo Yuan, Dr Guangming Jiang, Dr Liu Le, Dr Phil Bond (Advanced Water Management Centre)

FUNDING SOURCE: Australian Research Council, Australian water industry, UniQuest

PARTNER ORGANISATIONS: Gold Coast Water, US Peroxide

EMAIL: zhiguo@awmc.uq.edu.au

WEB: www.awmc.uq.edu.au

SCAN ME ▶

▶ CLOEVIS-ENTERPRIZE PITCH VIDEO

NO MORE STINK!

"Exciting" and "sewage" are two words that don't generally mix, but that's all about to change as the Advanced Water Management Centre "sniffs the sweet smell of success".

"Bad smells are one cost of transporting sewage," says Professor Zhiguo Yuan, "but bad pipes caused by hydrogen sulfide corrosion are another more noxious side-effect that costs the Australian water industry around $100 million a year.

"Our plan is to change all that by applying to the pipes a once-a-week dose of environmentally friendly free nitrous acid (FNA) that we can source from the sewage itself.

"This will be good for both the environment and our senses."

To deal with the inevitable smells and corrosion caused by unwanted biofilms that grow on the surfaces of wastewater infrastructure, the industry currently uses expensive chemicals to treat the problem continuously. Apart from the cost of the chemicals themselves, this "solution" creates problems further downstream in the sewage treatment and reclaiming process, as it becomes yet another chemical needing to be neutralised.

"Our challenge was to find an affordable chemical that doesn't harm the environment," continues Professor Yuan.

"We have developed a technology that produces FNA directly from sewage as a renewable material. The FNA kills the organisms that create the smells and corrosion, and is then removed itself by the microbial community living within the sewage pipes.

"The pipes won't rot, nor will they smell, and should actually last the 100 years they were designed for, instead of the sometimes only 10 years they currently do."

Building on their knowledge acquired over the past decade, Professor Yuan and his team of engineers and microbiologists recently made the ground-breaking discovery that, at parts per million level, FNA is a strong biocidal agent, causing cell-death and biofilm disintegration.

"This was a very exciting breakthrough and allows us to turn our technology into a valuable business.

"Our UniQuest-managed company, Cloevis, has already developed a patent-pending chemical mix that helps prevent corrosion, and a software modelling tool, SeweX™, for managing the dosage process."

The team is now refining how FNA can be produced commercially and how it can be adapted for the control of other types of biofilms.

UQ ENERGY INITIATIVE
UQ DIRECTOR: Professor Chris Greig
EMAIL: chris.greig@uq.edu.au
WEB: www.uq.edu.au/energy

ARC CENTRE FOR EXCELLENCE IN INTEGRATIVE LEGUME RESEARCH (CILR)
UQ RESEARCHERS: Professor Peter Gresshoff, Dr Paul Scott
FUNDING SOURCE: Australian Research Council Linkage Projects grant with BioEnergy Plantation Pty Ltd and Stanwell Corporation, Boeing, Brisbane City Council, Global Change Institute, Queensland Sustainable Aviation Fuel Initiative, UQ
PARTNER ORGANISATIONS: Balkanu Cape York Development Corporation, BioEnergy Plantation Australia, Stanwell Corporation
EMAIL: p.gresshoff@uq.edu.au
WEB: www.cilr.uq.edu.au

SCHOOL OF AGRICULTURE AND FOOD SCIENCES
UQ RESEARCHERS: Professor Ian Godwin, Associate Professor Peer Schenk
FUNDING SOURCE: Alexander von Humboldt Foundation, Australian Research Council Linkage Projects grants, Pacific Seeds, Queensland State Government, UQ
PARTNER ORGANISATIONS: Meat and Livestock Australia, North Queensland and Pacific Biodiesel, Queensland Sea Scallops, Pacific Seeds
EMAIL: i.godwin@uq.edu.au or p.schenk@uq.edu.au
WEB: www.uq.edu.au/agriculture/iangodwin or www.algaebiotech.org

FUTURE FUEL

With fossil fuels fading, biofuels are set to boom as we seek a better future.

Meeting the world's ever-growing demand for energy while minimising environmental impact presents quite a challenge – but it's one that UQ researchers relish.

The UQ Energy Initiative is a University-wide initiative set up specifically to coordinate UQ's energy research activities in support of the global transition to more sustainable energy systems. Research activities cover renewable power systems, such as solar and geothermal, as well as more sustainable use of fossil fuels, but it is perhaps biofuels research that's growing the most – literally.

"We are fortunate at UQ to have many gifted scientists, engineers and economists looking at sustainable ways of fuelling our future," says Professor Chris Greig, Director of The UQ Energy Initiative.

"Incorporating plant science, microbiology, bioengineering and process engineering, we are researching the production of ethanol, biodiesel, jet fuel and hydrogen from a variety of renewable sources such as oil seeds, cellulosic plants and algae. We must be on the right track because the US Navy visited UQ and has hosted UQ at the Pentagon to talk biofuels."

The US Department of Defense aims to fuel its global fleet of ships and aircraft with 50% bio-derived fuels by 2020, and during their visit to Queensland, Navy personnel were particularly keen to investigate the new-generation "drop-in" biofuels that are physically and chemically identical to traditional fossil fuels and suit existing distribution networks and engines.

"One of UQ's strengths is in the area of bioengineering, where we develop new strains of microorganisms to convert sugars into fuel intermediates. And this dovetails well with another stand-out in the area of nano-materials that provides us with a technology platform to more efficiently convert intermediate products into advanced biofuels," Professor Greig says.

"For example, we use microbial fermentation to convert the sucrose from sugarcane into advanced biofuel that can be used in the aviation industry."

The School of Agriculture and Food Sciences is also taking the lead in one area of advanced biofuel research, development and demonstration. Of particular interest is the selection of superior Pongamia genetic material for oil production suitable for creating biodiesel and biojet fuel through partnerships with Australian industry such as Stanwell Corporation, Origin Energy and BioEnergy Plantation Australia.

Says Professor Peter Gresshoff, Director of the ARC Centre of Excellence for Integrative Legume Research (CILR). "We have formed a new collaboration with traditional land owners in far northern Queensland to develop a commercial plantation of Pongamia trees. Pongamia has significant environmental benefits as it requires little nitrogen fertiliser, is both salt and drought tolerant, and can be used to rehabilitate degraded land."

The ability to minimise inputs such as nitrogen, and grow in marginal areas could be a key to success for another sustainable bioenergy crop, sorghum.

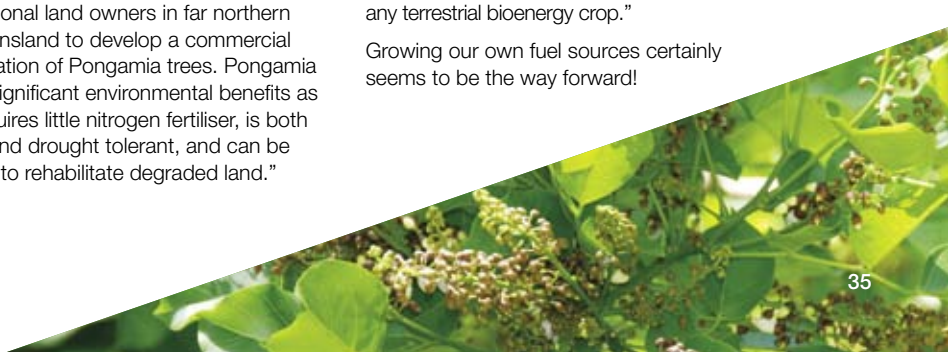
Professor Ian Godwin from the School of Agriculture and Food Sciences says, "Our work manipulating sorghum's genes to increase starch and sugar content and biomass will deliver highly adapted hybrids both for Australia and internationally: these will be ideal as a second generation biofuel."

A completely different biomass resource, algae, is being studied by several research groups, including the Institute for Molecular Bioscience's Associate Professor Ben Hankamer and Professor Lars Nielsen from the Australian Institute for Bioengineering and Nanotechnology.

Associate Professor Peer Schenk and his team from the School of Agriculture and Food Sciences are another group working on cultivating microalgae.

"We have engineered biorefineries where we not only produce biofuels, but also protein-rich animal feedstock and high-value products such as Omega-3 fatty acids. Microalgae are extremely productive as they can be cultivated all year round, do not produce any waste, and yield approximately 10 to 20 times higher than any terrestrial bioenergy crop."

Growing our own fuel sources certainly seems to be the way forward!



CENTRE FOR COAL SEAM GAS
INTERIM DIRECTOR: Professor Chris Moran
FUNDING SOURCE: Arrow Energy, QGC, Santos, UQ
EDUCATION PARTNER ORGANISATION: Heriot-Watt University
EMAIL: ccsg@uq.edu.au
WEB: www.ccsg.uq.edu.au

NOTHING AS IT SEAMS

Coal. Seam. Gas. Three words that provoke intense debate whenever they are mentioned in the same sentence.

UQ's recently established Centre for Coal Seam Gas (CSG) is the world's first research and education hub dedicated to this emerging industry. It will provide scientifically rigorous research into the environmental, economic and community impacts of coal seam gas (CSG) and train professionals wanting to work in the industry.

"As the coal seam gas industry develops, a number of research questions have arisen. The industry is looking for leading technical advice and innovation, governments require data to better inform policy and regulation, and the community is searching for answers about the industry more broadly," explains Director of the Sustainable Minerals Institute and Interim Director of the Centre for Coal Seam Gas Professor Chris Moran.

From its inception, the industry-funded Centre has engaged with its members, as well as government and the community, to ensure research meets the requirements of various stakeholders. More than 50 researchers from across the University have been involved in developing research projects.

"The Centre is in a unique position to involve people with varied interests and ideas in the development of its research projects. Further, a Development Board ensures the depth and breadth of the Centre's research portfolio to ensure it is adequately addressing the most pressing questions regarding coal seam gas," Professor Moran says.

The Centre is recruiting a Director, along with leading researchers in water, geoscience and petroleum engineering, and Associate Professor Will Rifkin was recently appointed to lead social impact research. His first project will determine how to measure and assess the impact multiple CSG projects will have on communities.

"Cumulative impacts present significant challenges for regulators, who historically have focused on project-by-project approval," the engineer-turned-sociologist explains.

"For industry, the impacts of one proposed project can become entangled with those of their competitors, but communities and the region as a whole are experiencing the sum of these impacts."

The study was one of five research projects announced by the Centre in mid-2012. Other projects will:

- investigate how small particles interfere with CSG-well productivity
- improve understanding and decision making to ensure co-existence between the agricultural and energy industries
- characterise why some coal seams are poor gas sources and identify ways to stimulate coal to ensure the free flow of gas
- develop a surface and groundwater chemistry atlas, to provide a baseline and ensure changes in water level and quality can be understood and managed.

"Water is an area of particular concern for community groups and individuals," says Professor Moran.

"There is a lack of knowledge currently available in this field, and the Centre is committed to becoming the leading global research organisation into coal seam gas."

At the conclusion of each three-to five-year project, researchers will be encouraged to publish their findings in peer-reviewed journals. The Centre will also make information available through its website.

Professor Moran concludes, "As the international appetite for energy increases, so too does the demand for information on this energy resource.

"The Centre for Coal Seam Gas is well positioned to lead global research in this area – and to positively impact this form of energy extraction for many years to come."

TECHNOLOGY & AGRICULTURE

UQ researchers create innovative technologies ranging from space vehicles to sustainable agriculture

GEM OF AN IDEA

As the world heats up, will our crops dry up? How can we predict what future crops will yield? Can we adapt? Will we have enough to eat?

With the use of advanced mathematical modelling, these are the questions that 2012 Farrer Memorial Medal recipient Professor Graeme Hammer and his team from the Queensland Alliance for Agriculture and Food Innovation are currently investigating.

"As our climate changes, we need to know how plants will cope and how we can adapt to get the maximum yield from our crops," he says.

"Farmers often take a risk about when and what to plant, and our technology should help them become as productive (and profitable) as possible."

The team is using the 'Genotype x Environment x Management' approach (GEM for short), which means seeking the combination of plant traits (genotype) and management system that performs best in specific production environments. They capture vast amounts of data available about climate, soils and cultivated plants online, and combine that with data from experiments conducted in field and controlled environments aimed at understanding the principles affecting crop productivity.

The experiments measure the impact of variation in nitrogen, temperature, light, water, crop management and genetics on plant growth and development.

"We then interpret these data and develop mathematical equations to create a virtual crop so that we can simulate consequences of different plant types and farm management systems," says Professor Hammer.

The team inputs weather patterns from the last 100 years to take account of rainfall sequence during the season, moisture levels in the soil profile, when crops go in and how they are managed, and simulates how plants respond.

"We can test what impact the type of plant (genotype) has on growth, how they can be affected by climate and rainfall patterns, and how the plants' adaptive traits interact with different soils, fertilisers and available water in generating yield (phenotyping)."

The aim is to create a "knowledge bank" that includes information about land management, soil, climate and plant behaviour, and link it to software that can predict how these are likely to interact under a variety of typical seasonal conditions: in effect, the software behaves like a plant, right down to a reliance on environmental conditions.

As the computer can discern patterns beyond human capabilities it means that farmers can be supported by identifying the most drought-tolerant plant attributes, and ways to use water most effectively. This is particularly important in Australia where the El Nĩno weather pattern can wreak havoc on farming practices.

"We can break down the biological complexity of plant growth and predict the consequences of genetic and management changes," Professor Hammer concludes.

"For long-term food security this is vital."

MOLECULAR PLANT BREEDING FOR DROUGHT ADAPTATION

UQ RESEARCHERS: Professor Graeme Hammer, Dr David Jordan, Dr Erik van Oosterom (Queensland Alliance for Agriculture and Food Innovation)

FUNDING SOURCE: Australian Research Council Discovery Projects and Linkage Projects grants; Pioneer Hi-Bred; Queensland Department of Agriculture, Fisheries and Forestry

PARTNER ORGANISATIONS: CSIRO; Pioneer Hi-Bred International; Queensland Department of Agriculture, Fisheries and Forestry; UQ

EMAIL: g.hammer@uq.edu.au

WEB: www.qaafi.uq.edu.au

SKY PILOTS

Before creating the world's first biplane, bicycle builders Wilbur and Orville Wright spent a lot of time watching birds fly.

VISUALLY GUIDED FLIGHT IN BIRDS

UQ RESEARCHERS: Professor Mandyam Srinivasan, Partha Bhagavatula, Dr Charles Claudianos, Professor Michael Ibbotson (Queensland Brain Institute)

FUNDING SOURCE: Australian Research Council Centre for Excellence in Vision Science grant, Australian Research Council Discovery Projects grant, Queensland Premier's Fellowship, Queensland Brain Institute/UQ funding

EMAIL: m.srinivasan@uq.edu.au

IMAGE COURTESY DEE MCGRATH, QBI

The brothers noticed that birds change the shape of their wings to turn and manoeuvre and, after testing the process in wind tunnels, they adapted this "wing warping" method to enable controlled flight in a man-made flying machine.

More than a century later, UQ researchers are extending the Wrights' observations, focusing on visual rather than wing mechanics, and using specially decorated passages rather than wind tunnels for testing.

"Research over the past 20 years or so has revealed that insects guide their flight by using cues based on the pattern of image motion experienced during flight," says Professor Mandyam Srinivasan from the Queensland Brain Institute.

"We wanted to find out whether birds use similar strategies of 'optic flow' to avoid obstacles, regulate flight speed, orchestrate smooth landings, and estimate distance flown.

"We believe our findings will be of great interest not only to biological science, but also for aeronautical engineering in the design of novel, biologically inspired vision systems for aircraft guidance."

To date, the team has discovered that birds do, in fact, use similar visual cues as insects to negotiate their way through complex and cluttered environments, suggesting that visually guided flight is common to all daytime-flying animals.

"Much research has been conducted on bird migration over large distances," says PhD student Partha Bhagavatula, "yet surprisingly little is known about how birds deal with the challenges of short-range flight through 'busy' environments such as forests.

"We have filmed budgerigars flying collision-free through highly patterned narrow corridors, and hope to develop bird-inspired vision algorithms for aircraft guidance from these observations.

"With a better understanding of exactly how birds use both eyes to navigate, we also hope to provide answers for creating bird-friendly buildings, windmills and aeroplanes in future."

The team's findings should also be useful for refining mechanisms in autonomous aerial vehicles for search and rescue, infrastructure inspection, traffic and weather monitoring, coastal surveillance, and planetary exploration.

TEA TREE OIL RESEARCH
UQ RESEARCHER: Dr Peter James (Queensland Alliance for Agriculture and Food Innovation)
FUNDING SOURCES: Paul and Pat Bolster, Rural Industries Research and Development Corporation (RIRDC)
PARTNER ORGANISATIONS: RIRDC
EMAIL: p.james1@uq.edu.au
WEB: www.qaafi.uq.edu.au

NATURALLY AHEAD

We all know that tea tree oil is a natural home remedy, but scientists at the Queensland Alliance for Agriculture and Food Innovation (QAAFI) are now investigating its industrial use for lice and fly-strike in sheep – with very positive results.

"Tea tree oil has long been the antiseptic of choice for Indigenous Australians, and soldiers in World War II praised its insect-repellent and anti-fungal properties," says Dr Peter James.

"Unfortunately, with the flood of cheap, synthetic antibiotics in the 1960s, the oil fell out of favour and we are only now rediscovering its benefits.

"It could be just the 'natural' solution to a problem in the sheep industry that costs more than $400 million per year in Australia alone."

QAAFI's laboratory trials showed that a one percent tea tree oil formulation reliably produces a 100 percent kill rate of lice and lice eggs, with similar results in the field.

"Tea tree oil also killed blowfly maggots and eggs, preventing flies from laying new eggs on treated wool for up to six weeks," continues Dr James, "and could also prove useful as a wound healer for injuries such as docking and mulesing cuts."

This is very encouraging news, particularly for Northern Rivers tea tree growers Paul and Pat Bolster who, along with the Rural Industries Research and Development Corporation (RIRDC), funded the research.

"Tea tree oil-based products may possibly work to counteract resistance to existing pesticides, reduce occupational exposure to farm chemicals, and greatly reduce the threat of environmental contamination," says Dr James.

"Formulation is critical and further research still needs to be undertaken to get it exactly right and ensure that the product can be registered for farm use.

"The appeal of using tea tree oil as an insecticide is that it is a natural product.

"And fortunately, it is already specified under an international standard (ISO 4730) which means we can be confident in its long-term consistency – often an issue with 'natural' products."

Full details of Dr James's findings can be seen in *Controlling Fly Strike and Louse Infestations in Sheep with Tea Tree Oil* at **www.rirdc.gov.au**

Above, top: Tea tree oil-treated and below: untreated sheep at 12 weeks after dipping

NATIVE ISLAND LANDSCAPES

UQ RESEARCHERS: Dr Patrick Moss, Lydia MacKenzie, Dr Lynley Wallis (School of Geography, Planning and Environmental Management)

FUNDING SOURCE: Australian Research Council Discovery Projects grant

PARTNER ORGANISATIONS: James Cook University, Queensland University of Technology

EMAIL: patrick.moss@uq.edu.au

WEB: www.gpem.uq.edu.au/patrick-moss

ISLAND LIFE

Humans have been adapting to the environment for thousands of years – but how has the environment adapted to us?

Native Island landscapes: people and environmental change in tropical sclerophyll landscapes is a project being conducted by Dr Patrick Moss from the School of Geography, Planning and Environmental Management to study the impact of people on their surroundings in the context of changing climates and sea-levels.

"We are investigating what actually happens when people enter new environments, and how much difference they make to the ecosystem – particularly with their altered vegetation and fire regimes," says Dr Moss.

"When we learn how past societies dealt with and were affected by climate change, we should be able to better respond to future environmental changes."

The team will be identifying and measuring changes to undisturbed Australian ecosystems that have been populated only intermittently during the past 10,000 years.

"We are investigating the Wellesley archipelago in the southern Gulf of Carpentaria because of the long periods in which these islands have been unoccupied (from around 9000 to 2000 years ago and from the 1940s to 1980s)," continues Dr Moss.

"Bentinck Island is a perfect place to look at, for example, as it was abandoned for forty years last century.

"We are fortunate to have access to extensive ethnographic evidence from local Aboriginal people and so can compare the differences between when the islands were and were not populated.

Drawing on its archaeological, palaeoecological and geomorphological expertise, the team will be analysing the pollen and charcoal content of the islands' sediment cores to determine how people and the environment co-existed.

Preliminary results from the team's work were presented at the 13th International Palynological Congress/9th International Organisational of Palaeobotany Conference in Tokyo, and will form the basis for recommendations on how society generally should respond in future to changing coastal environments in the context of rapidly changing climates.

RESEARCH TRAINING

UQ research students satisfy their intellectual curiosity and contribute to the world's fund of knowledge

UQ GRADUATE SCHOOL
Email: uqadvantage@gradschool.uq.edu.au
Web: www.uq.edu.au/grad-school/

FINDING CERTAINTY

Investing money in the stock market is not something many people associate with safety and certainty in recent years, but UQ Business School PhD student Rand Low hopes his research will change that outlook.

"When you get on a plane, you feel safe and secure because the aircraft has been designed to get you to your destination regardless of whether it is sunny or stormy," Mr Low says.

"Investors should have that same feeling of safety when they invest their money, whether it is a bear market or a bull market.

"My research is about designing and testing new portfolio management strategies that can generate a better risk adjusted return, regardless of market conditions."

Mr Low, who has presented internationally at institutions in Great Britain and the United States, says stock markets have an asymmetrical dependence structure that largely nullifies strategies designed to protect investors from steep losses.

"Asymmetrical dependence can be explained by the news that we hear on television or read in the newspapers where stocks drop excessively during bad times, but don't rise in the same way during good times.

"Last year we heard about the market losing $26 billion in a single day, but we never hear of the opposite happening.

"Asymmetrical dependence reduces the effectiveness of portfolio diversification, which is what we have been told protects us from the volatility of the market, but as we know, it doesn't always do that."

Mr Low, who is a qualified Chartered Professional Engineer (CPEng) and worked for a multi-national technology firm for several years before commencing his PhD, used his professional background as a way of looking at the issues within financial markets in a unique way.

"I specialised in control systems engineering, and from that perspective, I saw my research as finding a way of reducing the effects of any excessive anomalies in a defined system.

"As engineers, we are given problems and have to find tools to solve them. I looked at this research topic in largely the same way."

"I harness tools and models from the areas of computer science, computer engineering, actuarial science and statistics, and use them to solve complex contemporary problems in financial research and portfolio management."

Mr Low says he also focused on behavioural, not just traditional, finance.

"Incorporating behavioural finance is new. I include the behaviours we hear about from friends and family who tend to hold onto shares that are losing money, but quickly sell ones that are making small gains.

"The practical outcomes of the research are the development of a financial model that can be used as a decision-making tool for portfolio managers in the asset allocation process."

Simply put, Mr Low would like us all to feel as good about investing as we do about getting on a plane to go on a holiday.

INTERNATIONAL ADVANTAGE

Research Higher Degree students are taking advantage of UQ's global connections to add an international edge to their academic CV.

The University of Queensland prides itself on the international mobility opportunities that are available for research students to enrich their training, and Dean of UQ Graduate School Professor Zlatko Skrbis says the University forms an important piece in a larger framework.

"The University of Queensland is an important element in a large global research and research training network," says Professor Skrbis.

"By giving our students the opportunity to access this network during their candidature, we are ensuring they are equipped to work effectively and successfully in a globalised research environment."

Foremost in these efforts is UQ's Australia-first Career Advantage PhD Program, a professional skills development initiative that was launched in 2011.

As part of the program, students choose from three specially designed career packages: Higher Education Practice and Leadership; Research Innovation, Translation and Commercialisation; and Global Collaborations. Those undertaking the Global Collaborations package participate in an international experience as part of the program.

Students are financially supported in their overseas study through a number of international travel awards funded by UQ Graduate School.

In addition to this, opportunities for formalised student exchange are being developed with some of the world's best universities.

A recent example is an exchange agreement signed with leading European institution Technische Universität München (TUM) in Germany. As part of the arrangement, students from UQ will take part in TUM Graduate School's doctoral candidate networking and training initiative, called Kick-Off Seminar. In return, TUM students will visit UQ where they will have access to the Career Advantage PhD Program.

As well as exchange opportunities, Joint PhD programs are also becoming a popular option.

"Joint PhDs are a great example of how a close working relationship between researchers in different countries can create an enhanced training experience for a student," Professor Skrbis says.

"A student undertaking a joint-PhD can spend time researching with, and being mentored by, researchers at two different institutions and will graduate with a degree recognised by both universities.

"With these opportunities for an international research experience alongside financial and developmental support, UQ is playing its part in creating well rounded and globally aware research graduates."

UQ GRADUATE SCHOOL
EMAIL: uqadvantage@gradschool.uq.edu.au
WEB: www.uq.edu.au/grad-school/

UQ GRADUATE SCHOOL
EMAIL: www.uqadvantage@gradschool.uq.edu.au
WEB: www.uq.edu.au/grad-school/

QUALITY OF LIFE

UQ PhD student Ryan Stafford knows overcoming prostate cancer is a huge achievement for any man, and he is determined to ensure survivors don't succumb to a complication that could devastate their quality of life.

Urinary incontinence affects up to 30 percent of males who undergo surgery for prostate cancer, but Mr Stafford says little is known about how to treat this problem.

"Bladder weakness in women is spoken about on television and in the community, but there isn't that same openness from men. Many are hesitant to talk to their own family members about it, let alone a doctor, which can lead to depression and compound the problem," Mr Stafford says.

"After a man has surgery to remove the prostate, he actually loses part of the normal continence mechanism. Some men regain continence while others don't, and it is a mystery as to why there is this difference.

"Treatment options are limited because we don't understand the function of the muscles near the prostate in regard to which ones actually control continence. The first step in my research was to develop this understanding."

Mr Stafford, who in 2009 became the first student ever to win the prestigious Delsys Prize for innovation in the field of Electromyography, has developed a new method to monitor key pelvic floor muscles that overcome the flaws of previous techniques.

"Previous experiments involved sticking needle electrodes directly into the muscles deep in the pelvis to record their electrical activity without knowing exactly where the tip of the needle was going. This method also didn't tell us how the muscles worked when a man is going about his daily life," Mr Stafford says.

"As an alternative, Professor Paul Hodges and I have developed an electrode that is not as invasive and is therefore better for the patient. It records muscle electrical activity through the wall of the urethra without having to break the skin, sort of like a microphone recording a voice.

"The electrode can record the pelvic floor muscles' activity while the patient is doing functional activities such as walking or coughing or sneezing. We can see how the muscles operate and coordinate together which may facilitate more effective treatments," Mr Stafford says.

While identifying the correct muscles to treat is one issue, actually teaching men to exercise those muscles as part of any potential treatment program is a separate challenge.

"Unlike muscles in our limbs, we can't simply see when the pelvic floor muscles are working correctly," Mr Stafford says.

"To overcome this, we are developing a new non-invasive method using ultrasound imaging which will allow the patients and the therapists to see these deep muscles while they are being used."

WEIGHING UP THE GAINS

Weight gain may often be frowned upon in modern society, but for UQ Postdoctoral Research Fellow Dr Karen Harper, its promotion was critical to her PhD studies.

Now furthering her research at UQ's Gatton campus where she also completed her PhD within the School of Agriculture and Food Sciences, Dr Harper's focus is on rumen microbes and the role they play in grazing livestock in northern Australia.

"In the tropical north there are long periods, particularly in the dry season, where pastures are very low in quality despite being abundant," Dr Harper says.

"As a result, many animals only maintain weight, and often lose weight, which puts these farmers at a real disadvantage compared with those who are raising animals in higher quality pastures.

"There is a need to strategically supplement these animals, and if we can increase their weight during times when they would normally slim down, then it would result in an economic boost."

Dr Harper says that to improve live weight of cattle on these pastures, it is important to understand the microbes in the rumen, because they digest the grazed forage. The more efficiently microbes can digest this forage the better the productivity of the cattle.

Unfortunately, these microbes are not as efficient on tropical pastures as they are on pastures further south.

"We can supplement cattle with all the nutrients they would normally need – nitrogen, energy, and the major and minor nutrients – but they still don't get the same live weight gains as they do in temperate pastures," Dr Harper says.

"However, what is really interesting is a supplement called spirulina algae, a fresh water algae that we have found creates huge improvements on tropical grass digestion when administered.

"Identifying the microbial species involved in these changes would greatly improve our understanding of the rumen, and also help develop nutritional strategies to ultimately increase the live weight of livestock that graze tropical pasture."

While Dr Harper was pleased with the progress made during her research, especially while using the latest 454 pyrosequencing methodology, she says the issue would require more work and funding in order to discover a solution.

"Research has been going on in this area for 50 years, but I am using new technology to look at old problems.

"With this research we have opened a lot of doors in terms of understanding more about the rumen microbes involved in tropical pastures.

"More research needs to be done, but it has certainly opened a door for improved productivity in the north."

UQ GRADUATE SCHOOL
EMAIL: uqadvantage@gradschool.uq.edu.au
WEB: www.uq.edu.au/grad-school/

RESEARCHING THE FUTURE

As a research-intensive university, UQ's focus begins at undergraduate level.

Whether "testing the research-career waters" or actively pursuing a particular field of interest, UQ undergraduates have numerous opportunities to discover solutions to global questions, and enjoy activities that extend their academic studies – such as conferences, summer schools, student exchanges, and vacation research programs – through the Office of Undergraduate Education (OUE).

The programs also provide an opportunity for interstate and international students to collaborate with UQ researchers. In 2011-12, 75 non-UQ students participated in this program – 36 of them from 12 overseas countries.

Says Acting OUE Director Dr Jessica Gallagher, "Our summer and winter research programs are the perfect opportunity for students to gain valuable academic and professional skills, develop links with industry and academia, and 'test-drive' research before embarking on a research career or higher degree research projects.

"They have certainly been popular, with more than 1300 students participating since their inception in 2008/9."

One such participant is Xzarina Nicholson, from the School of Political Science and International Studies.

"I was invited to be part of an Australian Research Council Discovery Project on *How images shape responses to humanitarian crises*, which seeks to gain a better understanding of how images shown in the media influence our reactions to humanitarian crises, and how they could be used to benefit humanitarian ventures," she says.

"My experience – for which I was paid – was a great way to determine whether or not a research career was really something for me. I also picked up valuable data collection and analysis skills, and saw my discipline in a new light beyond that of just a student.

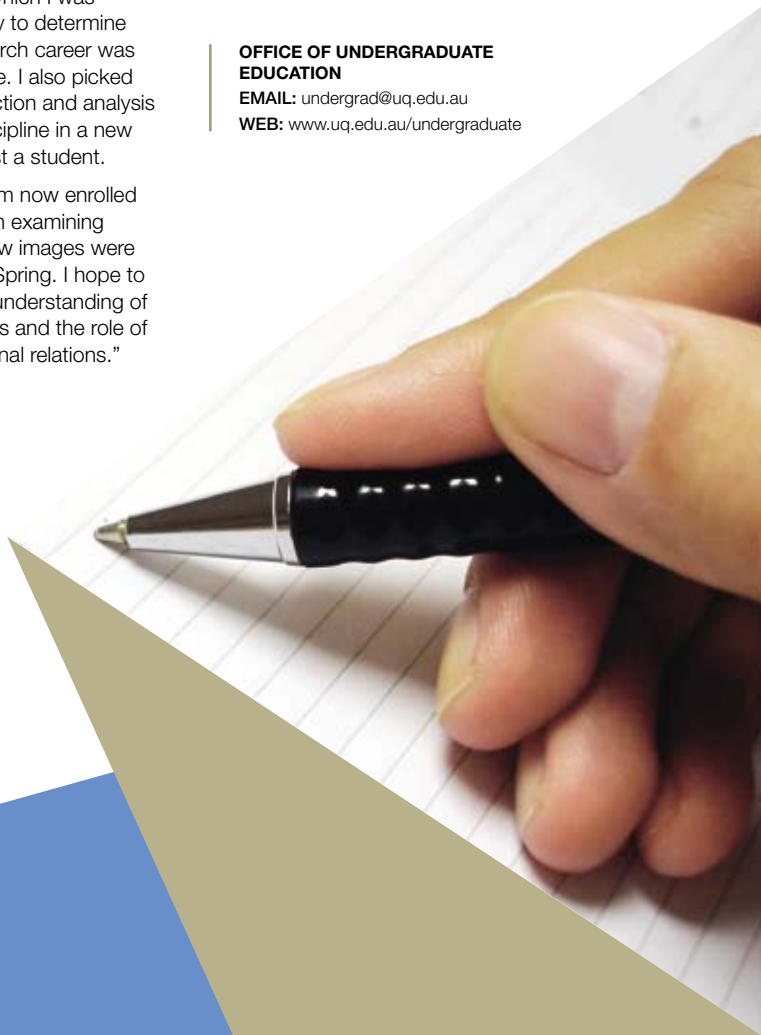
"I'm pleased to say I am now enrolled in an Honours program examining 'visual dissent' and how images were used during the Arab Spring. I hope to contribute to a better understanding of global dissent practices and the role of aesthetics in international relations."

Another plus for Ms Nicholson was the strong rapport she developed with her project supervisors who have now gone on to become her Honours supervisors.

"I strongly recommend swapping a summer vacation for summer research: I found the research project very interesting and the encouragement particularly supportive."

Dr Gallagher agrees, "By expanding our undergraduate research offerings, we hope that more students will take advantage of the exceptional research facilities and advisors we have at UQ, and explore the possibility of a future in research."

OFFICE OF UNDERGRADUATE EDUCATION
EMAIL: undergrad@uq.edu.au
WEB: www.uq.edu.au/undergraduate



FELLOWSHIPS AND AWARDS

UQ researchers are recognised for their achievements at international, national and institutional levels

FELLOWSHIPS, AWARDS AND MEMBERSHIPS

FELLOWSHIPS

Australian Research Council Australian Laureate Fellows

Professor Bernard Degnan
(School of Biological Sciences)

Professor Alex Haslam
(School of Psychology)

Professor Jenny Martin
(Institute for Molecular Bioscience)

Professor Jason Mattingley
(Queensland Brain Institute/School of Psychology)

Professor Lorraine Mazerolle
(Institute for Social Science Research)

Professor Peter Mumby
(School of Biological Sciences)

Australian Research Council Federation Fellows

Professor Paul Burn
(School of Chemistry and Molecular Biosciences)

Professor David Fairlie
(Institute for Molecular Bioscience)

Professor Peter Koopman
(Institute for Molecular Bioscience)

Professor Gerard Milburn
(School of Mathematics and Physics)

Professor Hugh Possingham
(Centre for Biodiversity and Conservation Science)

Professor John Quiggin
(School of Economics/School of Political Science and International Studies)

Professor Graeme Turner
(Centre for Critical and Cultural Studies)

Professor Guifre Vidal
(School of Mathematics and Physics)

Professor Andrew White
(School of Mathematics and Physics)

National Health and Medical Research Council Australia Fellows

Professor Matthew Cooper
(Institute for Molecular Bioscience)

Professor Wayne Hall
(UQ Centre for Clinical Research)

Professor Wendy Hoy
(School of Medicine)

Professor John Mattick
(Institute for Molecular Bioscience)

Professor Robert Parton
(Institute for Molecular Bioscience)

Queensland Government Smart Futures/State Premier's Fellows

Professor Ian Frazer
(UQ Diamantina Institute/Translational Research Institute)

Professor Ove Hoegh-Guldberg
(Global Change Institute)

Professor Anton Middelberg
(Australian Institute for Bioengineering and Nanotechnology)

Professor Mandyam Srinivasan
(Queensland Brain Institute)

Queensland Government Senior Clinical Research Fellows

Professor David Paterson
(UQ Centre for Clinical Research)

Professor Peter Sly
(Queensland Children's Medical Research Institute)

AWARDS AND HONOURS

Postdoctoral Researcher Award, Queensland Health and Medical Research Awards

Dr Kelly Smith
(Institute for Molecular Bioscience)

Fresh Scientist of 2011, Science in Public

Dr Vijaya Singh

2011 Australia Mining Award, Excellence in Environmental Management

Dr Laurence Rossato
(Centre for Mined Land Rehabilitation/ School of Agriculture and Food Sciences)

2011 Women in Technology Awards

Biotech Outstanding Achievement Award

Professor Jenny Martin
(Institute for Molecular Bioscience)

Infotech Outstanding Achievement Award

Professor Jane Hunter
(School of Information Technology and Electrical Engineering)

Infotech Research Award

Professor Janet Wiles
(School of Information Technology and Electrical Engineering)

WiT Rising Star Award
Dr Olivia Wright
(School of Human Movement Studies)

WiT PhD Career Start
Ms Kelly Brooks
(UQ Diamantina Institute)

2011 Awards of Excellence in Chemical Engineering, Australasian Conference on Chemical Engineering

Chemeca Medal
Professor Max Lu
(Senior Deputy Vice-Chancellor)

Caltex Teaching Award
Professor Ian Cameron
(School of Chemical Engineering)

Freehills Award
Professor John Zhu
(School of Chemical Engineering)

Graeme Jameson Award
Ms Li Wang
(School of Chemical Engineering)

Scopus Young Researcher of the Year
Associate Professor Lianzhou Wang
(School of Chemical Engineering)

Australian Museum Eureka Prizes

2011 Research by an Interdisciplinary Team
Professor Mark Kendall and the Nanopatch Vaccination Team
(Australian Institute for Bioengineering and Nanotechnology)

2011 Outstanding Mentor of Young Researchers
Professor Jian-xin Zhao
(Centre for Microscopy and Microanalysis)

2011 Advancement of Climate Change Knowledge
Mr John Cook
(Global Change Institute)

Sydney PEN Keneally Award
Associate Professor Katharine Gelber
(School of Political Science and International Studies)

The Australian Innovation Challenge Award
Professor Mark Kendall
(Australian Institute for Bioengineering and Nanotechnology)

Research Australia Griffith University Discovery Award
Dr Oliver Baumann
(Queensland Brain Institute)

2011 International Science and Technology Cooperation Award, Chinese Academy of Sciences
Professor Max Lu
(Senior Deputy Vice-Chancellor)

2011 Edgeworth David Medal, Royal Society of New South Wales
Dr Trent Woodruff
(School of Biomedical Sciences)

Churchill Fellowship
Dr Andreas Schloenhardt
(TC Beirne School of Law)

Distinguished Fellow Award, Economic Society of Australia
Professor John Quiggin
(School of Economics/School of Political Science and International Studies)

2011 National Health and Medical Research Council Excellence Awards, Career Development Fellowships Achievement Award - Clinical Level 1
Associate Professor Kiarash Khosrotehrani
(UQ Centre for Clinical Research)

L'Oreal Australia for Women in Science Fellowship
Dr Eve McDonald-Madden
(School of Biological Sciences)

Queensland Health Minister's Best Innovation Award, Queensland Health Healthcare Improvement Awards
Dr Nigel Armfield
(UQ Centre for Online Health)

Australian Sports Medicine Federation Fellows Awards

Asics Best Paper Physical Activity and Health Promotion
Professor Wendy Brown
(School of Human Movement Studies)

Ken Macguire Award for Best New Investigator - Clinical Sports Medicine
Ms Kassia Weston
(School of Human Movement Studies)

John Sutton Award for Best New Investigator - Exercise and Sports Science
Dr Tina Skinner
(School of Human Movement Studies)

Wendy Ey - Women in Sport Award
Professor Wendy Brown
(School of Human Movement Studies)

2011 Queensland Young Tall Poppy Science Award and 2011 Queensland Young Tall Poppy of the Year
Dr Tamara Davis
(School of Mathematics and Physics)

2011 Queensland Young Tall Poppy Science Award
Associate Professor Matthew Davis
(School of Mathematics and Physics)
Dr Siobhan Schabrun
(School of Health and Rehabilitation Sciences)

von Karman Award for International Cooperation in Aeronautics, International Council of Aeronautical Sciences
Professor Michael Smart
(School of Mechanical and Mining Engineering)

Wilson TS Wang Visiting Professorship - Chinese University of Hong Kong
Professor Ping Chen
(School of Languages and Comparative Cultural Studies, Confucius Institute at UQ)

2011 Emerald/European Foundation for Management Development Outstanding Doctoral Research Award in the field of hospitality and tourism
Dr Richard Robinson
(School of Tourism)

Royal Australian Chemical Institute Leighton Memorial Medal
Professor Mary Garson
(School of Chemistry and Molecular Biosciences)

Distinguished Researcher Award, Australian and New Zealand Marketing Academy
Professor Janet McColl-Kennedy
(School of Business)

2011 Institute of Electrical and Electronic Engineers International Conference on Data Mining Research Contributions Award
Professor Geoff McLachlan
(School of Mathematics and Physics)

Combinatorial Mathematics Society of Australasia Medal
Associate Professor Elizabeth Billington
(School of Mathematics and Physics)

MEMBERSHIPS (NEW IN 2011/2012)

Fellows, Academy of the Social Sciences in Australia
Professor Robert Lingard
(School of Education)
Professor Stephen Bell
(School of Political Science and International Studies)
Professor Mark Western
(Institute for Social Science Research)
Professor Andrew McLennan
(School of Economics)

Council Member, Australian Academy of Science
Professor Ian Frazer
(UQ Diamantina Institute/Translational Research Institute)

Fellow, Australian Academy of Science
Professor Paul Burn
(School of Chemistry and Molecular Biosciences)

Fellows, Australian Academy of Technological Sciences and Engineering
Professor Ian Cameron
(School of Chemical Engineering)
Professor Maree Smith
(Centre for Integrated Preclinical Drug Development)
Professor Jurg Keller
(Advanced Water Management Centre)

Fellow, American Academy of Microbiology
Professor Philip Hugenholtz
(School of Chemical and Molecular Biosciences)

Fellow Member, Optical Society of America
Professor Halina Rubinsztein-Dunlop
(School of Mathematics and Physics)

Chair of the Executive Board, World Health Organisation Health Metrics Network
Professor Alan Lopez
(School of Population Health)

Member, Prime Minister's Science, Engineering and Innovation Council
Professor Graeme Turner
(Centre for Critical and Cultural Studies)

Members, Australian Research Council College
Professor Janeen Baxter
(Institute for Social Science Research)
Professor Brian Head
(Institute for Social Science Research)

Fellow, Australian and New Zealand Marketing Academy
Professor Janet McColl-Kennedy
(School of Business)

List current for period 1 June 2011 to 31 May 2012.

2012 UQ FOUNDATION

RESEARCH EXCELLENCE AWARDS

DR BROCK BASTIAN

School of Psychology
$72,000
What we gain from pain: exploring the benefits of physical pain

Despite its evolutionary functions and its commonality in human experience, pain has long been seen as something to manage or eradicate. What Dr Brock Bastian wishes to explore is the potential benefits of physical pain, and specifically whether the experience of pain may promote social connectedness with others.

"We will be focusing on instances of pain that have been understudied: those where pain is controlled and moderate," he says. "We will aim to show that overcoming this type of pain may be energising and rejuvenating for individuals – even meaningful – and may also motivate interpersonal connection and strengthen group life."

DR OLIVER BAUMANN

Queensland Brain Institute
$70,000
The role of the human cerebellum in emotion regulation

"The cerebellum is well-known for its role in motor coordination," says Dr Oliver Baumann, "but what we have discovered is that it is also responsible for a wide variety of perceptual and cognitive functions, including regulating emotional responses.

Dr Baumann plans to investigate cerebellar contributions to emotion regulation by using a combination of non-invasive brain-stimulation and neuroimaging techniques. His research will not only provide new insights into this brain structure, but may also enable a better understanding of and potential treatment for a range of disorders that have been linked to cerebellar dysfunction, including schizophrenia, autism and depression.

DR TAMARA DAVIS

School of Mathematics and Physics
$85,000
What is the nature of dark energy?

"Modern cosmology has discovered that the universe is dominated not by the matter we see, but by two competing dark components – dark matter and dark energy – that no-one can yet explain," says Dr Tamara Davis. "Many theories have been developed, but observations can not yet verify which, if any, are correct."

Dr Davis hopes to change this situation by taking existing theories and making observational predictions of different phenomena that will allow us to distinguish between those theories, and so explain the acceleration of the universe.

Now in its 14th year, the UQ Foundation Research Excellence Awards are designed to nurture early career researchers. 2012 saw $703,000 bestowed on nine researchers from a range of faculties, centres, schools and institutes across the University.

DR DANIEL FRANKS

Social Responsibility in Mining
$81,000
Shift: the dynamics of change-making for sustainable development in the global resources sector

Extracting resources presents promise and pitfalls for society, the environment and economy, and with the focus on sustainability, the debate will continue. "Corporate policy and capability have improved in the mining sphere," says Dr Daniel Franks, "but doubt persists about how genuine such change is – particularly with the current scale, technology and location of mining that has potentially undermined any gains made."

Dr Franks plans to critically reflect on the efficacy, drivers, instruments and dynamics of change in the resources sector by drawing on insights from change-makers both inside and outside the industry.

DR RICHARD FULLER

School of Biological Sciences
$85,000
Optimal protection for the world's ecosystems

How much of the world should be set aside for conservation, and which specific ecosystems – rainforests, coral reefs, desert or tundra? This is the question Dr Richard Fuller wants to answer.

"I want to develop theory and establish practical rules for determining how much of each of the world's biomes should be protected to enable the long-term survival of wild plant and animal species," Dr Fuller says, "and also to improve the planet's resilience to environmental challenges such as climate change."

DR KERRY-ANN O'GRADY

Queensland Children's Medical Research Institute
$77,000
Respiratory illnesses in urban Aboriginal and Torres Strait Islander children

"Respiratory illnesses in urban Indigenous children are major causes of ill-health, hospitalisation and death," says Dr Kerry-Ann O'Grady, "yet the focus to date has been entirely on children from remote areas. Over a three-year period we plan to follow up those children presenting at an urban Aboriginal Medical Service so that we can improve care and reduce the burden of disease."

Dr O'Grady's research will comprehensively examine the causes, risk factors, socio-economic impacts and health outcomes of all children studied.

DR RYAN TAFT

Institute for Molecular Bioscience
$85,000
Unlocking rare paediatric deterioration brain disorders with high throughput genome sequencing

At present, Australia does not have a coordinated national plan for rare diseases, despite the fact that they affect more than 1.5 million people nationwide. Dr Ryan Taft's research will begin to address this deficit by using the latest high-throughput genome sequencing technologies to reveal the genetic cause underpinning three kinds of rare paediatric brain disorders called leukodystrophies.

"I hope that my research will broaden our understanding of the origin of these rare childhood illnesses, help establish reliable and rapid genetic screening, and eventually lead to the development of tailored therapies," he says.

DR DA-WEI WANG

Australian Institute for Bioengineering and Nanotechnology
$78,000
Polymer nanocomposite solid electrolytes for high-energy lithium batteries

"Through the design of polymer nanocomposite solid electrolytes, I plan to develop highly reliable, high-energy lithium batteries that can be used to power electric or hybrid vehicles," says Dr Da-Wei Wang.

Dr Wang will be researching how to create nanocomposite membranes made up of functionalised nanocarbons and polymers, and will also study the ionic conductivity and mechanical strength of the new solid electrolytes.

DR GRAEME WERE

School of English, Media Studies and Art History
$70,000
Cultural restitution in the digital world: objects, images and knowledge in Melanesia

Focusing on Melanesia's social and political economy and employing ethnographic methodologies and survey techniques, Dr Graeme Were's research will document and analyse how people access, use and apply digital images in the course of their lives.

"My aim is to better understand how ethnographic collections in the form of digital images play a significant role in identity building, community development and civil society strengthening in the Asia-Pacific region," he says. "I believe my study to be a world-first and hope to inform the political and social values at stake in terms of cultural restitution policies in the 21st century ethnographic museum."

UQ AWARDS

FOR EXCELLENCE IN RHD SUPERVISION

The University of Queensland prides itself on its culture of research excellence developed through the efforts of world-class academics and the provision of first-class facilities.

Approximately 4000 students are enrolled in research higher degrees at UQ, and their success is underpinned by advisors who guide them through their candidature. Since 2000, UQ has acknowledged and rewarded outstanding advisors through the Awards for Excellence in RHD Supervision.

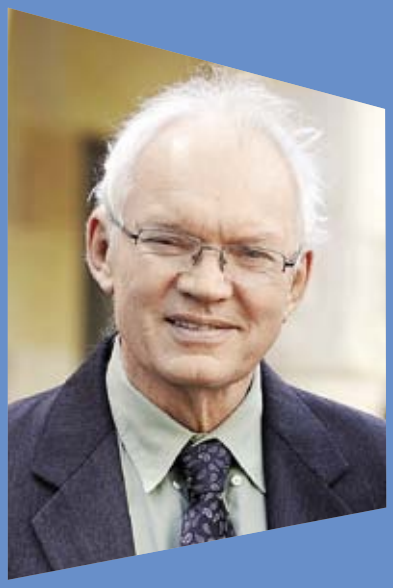
PROFESSOR STEPHEN ADKINS

School of Agriculture and Food Sciences

A previous recipient of this award in 2001, Professor Adkins's passion for developing outstanding research students remains undiminished. The majority of his students come from non-English speaking backgrounds, and his supervision is tailored to meet their individual needs.

Taking into account each student's previous training, experience and cultural differences, he removes barriers that may otherwise hinder their pathway to success. Highlighting the value of this approach, many of them adopt the same training model after they return home to start their own careers.

Professor Adkins promotes extensive collaboration with international and industry partners, and fosters an empathic and team-minded approach among his RHD students, including a mentoring program.



PROFESSOR RICHARD MORGAN

School of Mechanical and Mining Engineering

Director of the Centre for Hypersonics Professor Morgan has engaged with leading researchers, including those at NASA and the European Space Agency, for more than 30 years.

Described as a humble leader who refers to his students as research colleagues, Professor Morgan encourages development through international exchange, while engendering a strong spirit of cooperation. His challenge is to provide a balance between mentoring while still encouraging independent thought, and his students are in high demand by employers both in Australia and internationally.

Professor Morgan notes that the biggest reward in his career is to see many of his students working successfully in what is a highly competitive field. As Principal Advisor, he has guided an impressive 23 RHD students to graduation.

PROFESSOR JENNY ZIVIANI

School of Health and Rehabilitation Sciences

The Professor of the Children's Allied Health Research that partners UQ with Queensland Health, Jenny Ziviani is a leader and pioneer in the field of occupational therapy.

One of the first occupational therapists to earn a PhD in Australia, Professor Ziviani has been a key driver in increasing research capacity in the profession through research higher degree training and the establishment of the Occupational Therapy Research Foundation.

A believer in the importance of helping students develop a belief in their self-competence as independent researchers and leaders, Professor Ziviani appreciates the need to understand students' individual motivations for undertaking a research higher degree. She works with students to ensure they have realistic goals, build a national and international research network, and are exposed to incremental learning experiences tailored to their needs.

UQ SUPPORTERS

Thank you to all organisations and individuals who provide support for research at UQ. Special thanks to those listed here who contributed more than $100,000 in 2011.

Abbott Laboratories
Agrichem
Alchemia
Alstom
Abbott Animal Health
Ambre Energy
Amgen
AMIRA International
Anglo American
Anonymous (four donors)
Aramco Overseas Company
Arborescent 2
Archdiocese of Brisbane Catholic Education
Arthritis Foundation of Australia
Association for International Cancer Research
Asthma Foundation of Queensland
Australia Zoo
Australian Agency for International Development
Australian Antarctic Division
Australian Bureau of Statistics
Australian Cancer Research Foundation
Australian Centre for International Agricultural Research
Australian Centre for Plant Functional Genomics
Australian Coal Research Limited
Australian Dental Research Foundation
Australian Egg Corporation Limited
Australian Federal Police
Australian Genetics Testing
Australian Housing and Urban Research Institute
Australian Institute of Nuclear Science and Engineering
Australian Liver Foundation
Australian National Low Emissions Coal Research and Development
Australian Paralympic Committee
Australian Power Institute
Australian Red Cross Blood Service
Australian Research Council
Australian Solar Institute
Australian Sports Commission
Australian Stem Cell Centre
Australian Water Recycling Centre of Excellence
Baker IDI Heart and Diabetes Institute
Baosteel Group Corporation
Bayer BioScience
Berghof Foundation for Conflict Studies
beyondblue
BHP Billiton
Bill and Melinda Gates Foundation
Bioenergy Plantations Australia
Biomatters
Blue Care
Boeing Defence Australia
Andrew and Jennifer Brice
Brisbane City Council
BUPA Health Foundation
Burnet Institute
Burnett Mary Regional Group for Natural Resource Management
Joseph and Veronika Butta
Canadian Institutes of Health Research
Cancer Australia
Cancer Council Queensland
Cancer Council Victoria
Carbon Synergy
CAST CRC
Catlin Group
CBio
Cement Australia
Centennial Coal
Children's Health Foundation Queensland
Clive and Vera Ramaciotti Foundation
Colonial Foundation Limited
Commonwealth Scientific and Industrial Research Organisation
Cotton Research and Development Corporation
Cotton Seed Distributors
CRC Beef
CRC for Advanced Composite Structures
CRC for Contamination Assessment and Remediation of the Environment
CRC for Greenhouse Gas Technologies
CRC for Optimising Resource Extraction
CRC for Polymers
CRC for Rail Innovation
CRCMining
CSR Sugar
Dairy Australia
Dairy Innovation Australia
Danisco
Robert W Day
Dental Board of Queensland
Department of Agriculture, Fisheries and Forestry (QLD)
Department of Climate Change and Energy Efficiency (Federal)
Department of Communities, Child Safety and Disability Services (QLD)
Department of Defence (Federal)
Department of Education, Training and Employment (QLD)
Department of Environment and Heritage Protection (QLD)
Department of Families, Housing, Community Services and Indigenous Affairs (Federal)
Department of Health and Ageing (Federal)
Department of Industry, Innovation, Science, Research and Tertiary Education (Federal)
Department of Mining and Safety (QLD)
Department of the Prime Minister and Cabinet (Federal)
Department of the Premier and Cabinet (QLD)
Department of Resources, Energy and Tourism (Federal)
Department of Science, Information Technology, Innovation and the Arts (QLD)
Department of Sustainability and Environment (VIC)
Department of Sustainability, Environment, Water, Population and Communities (Federal)
Department of Transport and Main Roads (QLD)
Department of Veterans' Affairs (Federal)
DMTC
Dow Chemicals (Australia)
Earthwatch Institute
Eli Lilly Australia
Environmental Biotechnology CRC
Envirovolve
Epiderm
Epilepsy Research Foundation
FEI
Fellowships Fund Inc
Fight Cancer Foundation
Financial Markets Foundation for Children
Foundation for High Blood Pressure Research
G James Australia
Gallipoli Research Foundation
Gladstone Ports Corporation
Gold Coast City Council
Gold Coast Water
Cyril and Shirley Golding
Grains Research and Development Corporation

Great Barrier Reef Marine Park Authority
Great Barrier Reef Foundation
Health Workforce Australia
Healthy Waterways
HEARing CRC
Horticulture Australia Limited
Incitec Pivot
Intel
Inter Derm
International Association of Oil and Gas Producers
International Human Frontier Science Program Organization
International Maize and Wheat Improvement Center
Ipswich Hospital Foundation
James S McDonnell Foundation
JEM Research Foundation Trust
Jimboomba Turf Group
John D and Catherine T MacArthur Foundation
Johnson & Johnson
Juvenile Diabetes Foundation International
KBR
Leukaemia Foundation of Queensland
Lions Medical Research Foundation
Liverpool Hospital
Ludwig Institute for Cancer Research
Magnetica
Mater Health Services
Mater Medical Research Institute
Mayne Bequest Fund
Meat and Livestock Australia
Medtronic
Melbourne Water Corporation
Metabolix
Metso Minerals (Australia) Limited
Minerals Council of Australia
Ministry of Foreign Affairs of Denmark
MMR
Monsanto
Motor Accident Insurance Commission
Motor Accidents Authority of NSW
Motor Neurone Disease Research Institute of Australia
MS Australia - Queensland
Multiple Sclerosis Research Australia
Mungovan, Breckenridge Physiotherapy and Associates
Murdoch Childrens Research Institute
National Breast Cancer Foundation
National Climate Change Adaptation Research Facility
National Drug Law Enforcement Research Fund
National Health and Medical Research Council
National Heart Foundation of Australia
National Institutes of Health
National Oceanic and Atmospheric Administration
National Resource Management
Nature Conservancy
Neste Oil Corporation
Newcrest
Newmont
Nihon Superior
North Queensland and Pacific Biodiesel
NuNerve
Occupational Therapists Board of Queensland
Office of Economic and Statistical Research (QLD)
Office of Environment and Heritage (NSW)
Office of Health and Medical Research (QLD)
Oncology Children's Foundation
Origin
Ottawa Hospital Research Institute
Outotec
PA Research Foundation
Pacific Seeds
Papua New Guinea Institute of Medical Research
Parker CRC for Integrated Hydrometallurgy Solutions
Pew Charitable Trusts
Pfizer Australia
Pioneer Hi-Bred
Polymers CRC
Pork CRC
Powerlink Queensland
Prince Charles Hospital Foundation Trust
Prostate Cancer Foundation of Australia
QER
QGC
Queensland Academy of Sport
Queensland Alumina Limited
Queensland Cyber Infrastructure Foundation
Queensland Emergency Medicine Research Foundation
Queensland Health
Queensland Institute of Medical Research
Quality Medication Care
Queensland Police Service
Queensland Skin and Cancer Foundation
RBS Morgans
Reef and Rainforest Research Centre
Rio Tinto
RoCan Trust
Roche Organ Transplantation Research Foundation
Royal Adelaide Hospital
Royal Australasian College of Physicians
Royal Brisbane and Women's Hospital Foundation
Royal Ministry of Foreign Affairs Norway
Rural Industries Research and Development Corporation
Sandvik
Sanofi-Aventis Australia
Santos
Science and Industry Endowment Fund
Sea World Research and Rescue Foundation
SEMATECH
Seqwater
Shandong Fangyuan Nonferrous Metals Group
Shire
Sibelco
Siemens
Rosamond M Siemon
Sinclair Knight Merz
Sir Robert Menzies Memorial Foundation
South Australian Water Corporation
South East Water
St Andrews War Memorial Hospital
Trevor St Baker
St Vincent's Institute
Sucrogen
Sugar Research and Development Corporation
Swedish International Development Cooperation Agency
Swisse
Sydney Water Corporation
Tarong Energy Corporation
Technological Resources Pty Ltd
Templeton World Charity Foundation
The Atlantic Philanthropies
The Bryan Foundation
The Estate of Walter Alexander Easterling
The Estate of Dulcie R Gardner
The Estate of Irene P Hunt
The Estate of Dr Clem Jones AO
The Garvan Institute of Medical Research
The Helpful Foundation
The Historical Society, Boston
The Social Research Centre
The Wiseman Trust
Therapeutic Innovation Australia
Thiess Services
Toowong Private Hospital
Total
UBS Optimus Foundation
Unimin Australia
University of Queensland Endowment Fund
US Air Force
Vale
Venomics Pty
Veolia Environnement
Victor Chang Cardiac Research Institute
Water Corporation
Water Quality Research Australia
WateReuse Research Foundation
Wellcome Trust
Wesley Research Institute
Western Corridor Recycled Water
Graeme Wood and Annette Olle
World Health Organization
Wound Management Innovation CRC
X Radiology Australia
Xstrata

For more information or to advise of an error or omission, please contact +61 7 3365 7594 or email research@uq.edu.au.

LIBRARY RESEARCH SUPPORT

UQ Library plays a key role in supporting discovery at UQ through its extensive research collections – many in electronic format, including:

- substantial back-runs of journals, archival material and electronic books
- online exhibitions
- rare books, manuscripts, theses, pictorial collections and architectural drawings.

The Library also assists researchers through all stages of their research lifecycle, providing advice and support on:

- measuring and benchmarking research publication performance for grant applications
- research data management
- research publications reporting and evaluation.

Home to UQ eSpace – central to the Higher Education Research Data Collection reporting, Excellence in Research for Australia (ERA) reporting and access, submission and final deposit for MPhil and PhD theses, and the source of publications data that feeds into UQ reSEARCHers and Q-Index – the Library also helps improve the discovery and reuse of UQ research data through its involvement in the Australian National Data Services *Seeding the Commons* project.

UQ LIBRARY
WEB: www.library.uq.edu.au/research-support

INDEX

THE UNIVERSITY OF QUEENSLAND
AUSTRALIA

RESEARCH
AT THE UNIVERSITY OF QUEENSLAND

The University of Queensland is one of Australia's premier research institutions, receiving $338.7 million in research grants in 2011.

A WORLD-CLASS RESEARCH INSTITUTION

UQ is ranked in the top 100 universities worldwide in three key global university rankings: the *Times Higher Education*, *QS World University Ranking*, and the Shanghai Jiao Tong *Academic Ranking of World Universities*.

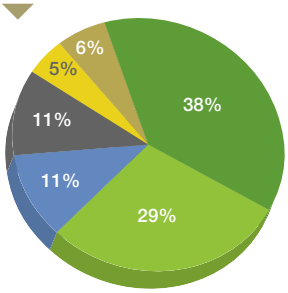
RESEARCH QUALITY

The Australian Government's ERA 2010 National Report confirms UQ's status as one of Australia's top two universities, measured on a combination of research quality and breadth:

- Research at UQ is above world standard in more broad fields of research than any other Australian university
- UQ was the highest ranked university nationally in 13 fields of research
- UQ was confirmed as one of Australia's most comprehensive universities, active in 24 out of a possible 25 broad fields of research.

SOURCES OF UQ RESEARCH SUPPORT 2011

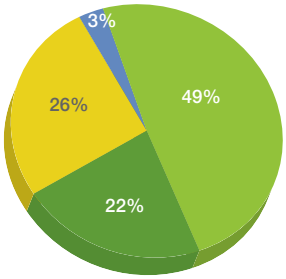
	$ million
Commonwealth Government Research Funding	183.7
Commonwealth Government Research Block Grants	139.0
State/Local Government	54.0
Australian Industry and Other Contract/Grants	51.6
All Australian Donations, Bequests, Trusts, Foundations	22.5
All International Funding	26.8



RESEARCH FUNDING 2011

$338.7 million total sponsored grants and contracts including:

	$ million
Australian competitive grants	166.5
Other public sector research funding	74.8
Industry and other funding for research	87.4
Cooperative Research Centre funding	10.0



UQ FELLOWSHIP HONOURS 2011

Australian Research Council (ARC) Federation Fellows	9
Australian Research Council (ARC) Laureate Fellows	6
National Health and Medical Research Centre (NHMRC) Australia Fellows	6
Fellows of the Academy of Social Sciences in Australia	37
Fellows of the Australian Academy of Science	19
Fellows of the Australian Academy of Technological Sciences and Engineering	19
Fellows of the Australian Academy of the Humanities	18

EDUCATION IMPACT AND TRAINING 2011

Research Higher Degree students enrolled			3949
PhDs awarded	Domestic	356	496
	International	140	
MPhils awarded	Domestic	39	57
	International	18	

RESEARCH IMPACT

UQ research has far-reaching social, economic and environmental impacts. Examples include:

- Gardasil – cervical cancer vaccine, approved for use in 121 countries
- Triple P – a preventively-oriented parenting and family support strategy, available in 18 languages in 23 countries
- Marxan – conservation planning software used to support the design of marine and terrestrial reserves, used in more than 100 countries
- GroundProbe – technology developed at UQ led to the foundation of GroundProbe whose systems monitor slope stability in mines in 19 countries.

UQ ranks first among Australian universities for licence income, value of equity holdings and invention disclosures, new Australian patents, and active start-up companies. UQ's main commercialisation company, UniQuest Pty Ltd, benchmarks in the top 10 percent globally for university-based technology transfer.

Annual sales from UniQuest-licensed innovations	more than $3 billion
Number of licences/options/assignments managed by UQ's commercialisation companies	68
Value of equity holdings	$41.5 million

COMMONWEALTH RESEARCH BLOCK GRANTS 2011

	$ million
Joint Research Engagement	29.2
Research Infrastructure Block Grant	23.7
Sustainable Research Excellence	10.8
Commercialisation Training Scheme	0.6
Research Training Scheme	55.3
Australian Postgraduate Awards (296 new places)	17.6
International Postgraduate Research Scholarships (30 new places)	1.8

RESEARCH FUNDING HIGHLIGHTS

- $27.95 million from the Australian Research Council to support 21 Future Fellowships from 2011 and 34 Discovery Early Career Researcher Awards from 2012: UQ was second nationally in the number of successful proposals in these rounds
- $6.6 million from the Baosteel Group to establish the Baosteel-Australia Joint Research and Development Centre, headquartered at UQ and involving three interstate universities
- $12.4 million from the Australian Government's National Environmental Research Program to support the Research Hub in Environmental Decisions
- $10 million from the Dow Chemical Company to establish the Dow Centre for Sustainable Engineering Innovation: for cutting-edge research expertise in energy, water and sustainability
- $8.2 million for three Australian Research Council Australian Laureate Fellowships to Professor Jason Mattingley, Psychology and Queensland Brain Institute; Professor Alex Haslam, Psychology; and Professor Bernie Degnan, Biological Sciences
- $7.5 million for a National Health and Medical Research Council Program Grant: for research into musculoskeletal pain, injury and health
- $5 million from the Wellcome Trust Seeding Drug Discovery program: for research and development into a new treatment for "superbugs"
- $3.8 million from the Australian Centre for International Agricultural Research: for research to further the sustainable development of crops in the Pacific Islands.

FACULTIES, INSTITUTES AND CENTRES

In partnership with government, industry and donors, UQ has developed eight globally recognised research institutes to complement the teaching and research activity in its six Faculties:

Faculties

- Arts
- Business, Economics and Law (BEL)
- Engineering, Architecture and Information Technology (EAIT)
- Health Sciences
- Science
- Social and Behavioural Sciences (SBS)

Institutes

- Australian Institute for Bioengineering and Nanotechnology (AIBN)
- Global Change Institute (GCI)
- Institute for Molecular Bioscience (IMB)
- Institute for Social Science Research (ISSR)
- Queensland Alliance for Agriculture and Food Innovation (QAAFI)
- Queensland Brain Institute (QBI)
- Sustainable Minerals Institute (SMI)
- UQ Diamantina Institute (UQDI)

The University also has more than 100 research centres and major University-wide research initiatives that support the critical mass that enable UQ to tackle significant global challenges.

UQ REVENUE 2011

Total Operating Revenue	$1.64 billion
Total Research Support	$477.6 million

UQ RESEARCH AND INNOVATION
EMAIL: director.management@research.uq.edu.au
PHONE: +61 7 3365 3560
WEB: www.uq.edu.au/research

Please note all funding represented in AUD$.
Data current as at June 30, 2012.

CRICOS Provider Number 00025B

THANKS

The Deputy Vice-Chancellor (Research) would like to thank all Executive Deans, Institute Directors, researchers and professional staff for their contributions in producing *Discovery at UQ 2012*.

Editorial Committee

Professor Alan Lawson
Deputy Vice-Chancellor (Research)
Carla Boeckman
Director, International Foundations and Development
Ian Harris
Director, Research Partnerships
Michelle Paez-Kirkland
Director, UQ Graduate School
Janine Richards
Director, Research Analysis and Operations
Nicole Thompson
Director, Research Strategy and Management

Publication Coordinators

Suzanne Parker
Office of Marketing and Communications
Kirsty Fraser
Office of the Deputy Vice-Chancellor (Research)
Prue McMillan
Office of Marketing and Communications
Lynn Nielsen
Office of the Deputy Vice-Chancellor (Research)

Designer

Jenelle Phillips
Office of Marketing and Communications

Contributors

Associate Professor Udantha Abeyratne
School of Information Technology and Electrical Engineering
Bronwyn Adams
Institute for Molecular Bioscience
Dr Brock Bastian
School of Psychology
Dr Oliver Baumann
Queensland Brain Institute
Anna Bednarek
Sustainable Minerals Institute
Dr Mark Burdon
TC Beirne School of Law
Katie Cameron
Research Management Office
Professor Gideon Chitombo
Sustainable Minerals Institute
Professor David Cliff
Minerals Industry Safety and Health Centre
Dr Jonathan Corcoran
School of Geography, Planning and Environmental Management
Dr Tamara Davis
School of Mathematics and Physics
Professor Tim Dunne
Asia-Pacific Centre for the Responsibility to Protect
Sam Ferguson
UQ Graduate School
Dr Daniel Franks
Centre for Social Responsibility in Mining
Dr Richard Fuller
School of Biological Sciences
Dr Jessica Gallagher
Office of Undergraduate Education
Professor Ian Godwin
School of Agriculture and Food Sciences
Professor Peter Gray
Australian Institute for Bioengineering and Nanotechnology
Professor Chris Greig
UQ Energy Initiative
Professor Peter Gresshoff
Centre for Excellence in Integrative Legume Research
Kathy Grube
School of Agriculture and Food Sciences
Professor Graeme Hammer
Queensland Alliance for Agriculture and Food Innovation
Professor Peter Harrison
Centre for the History of European Discourses
Professor Ove Hoegh-Guldberg
Global Change Institute
Dr Michelle Hill
UQ Diamantina Institute
Dr Peter James
Queensland Alliance for Agriculture and Food Innovation
Dr Eliana Jimenez Soto
Australian Centre for International and Tropical Health
Trent Kathage
Research Management Office
Professor Mark Kendall
Australian Institute for Bioengineering and Nanotechnology
Dr Dolly MacKinnon
School of History, Philosophy, Religion and Classics
Professor Jason Mattingley
Queensland Brain Institute
Caroline McKinnon
School of English, Media Studies and Art History
Professor Paul Memmott
Aboriginal Environments Research Centre
Professor Anton Middelberg
Australian Institute for Bioengineering and Nanotechnology
Associate Professor Karen Moni
School of Education
Professor Chris Moran
Sustainable Minerals Institute
Dr Patrick Moss
School of Geography, Planning and Environmental Management
Dr Ilana Mushin
School of Languages and Comparative Cultural Studies
Professor Jack Ng
National Research Centre for Environmental Toxicology
Mark Schroder
UQ Graduate School
Professor Mandyam Srinivasan
Queensland Brain Institute
Dr Jane Stadler
School of English, Media Studies and Art History
Dr Ryan Taft
Institute for Molecular Bioscience
Dr Jessica Thompson
School of Social Science
Dr Martie-Louise Verreynne
UQ Business School
Dr Da-Wei Wang
Australian Institute for Bioengineering and Nanotechnology
Dr Graeme Were
School of English, Media Studies and Art History
Professor Zhiguo Yuan
Advanced Water Management Centre
Tanya Ziebell
UQ Library

Photographs

Contributors
David Sproule
stock.xchng (pp 5, 7, 9, 11-13, 17, 20-21, 25, 27, 31-34, 36-40, 44-45, 48-49)
UQ Photo Library

64115 F 4K AUG12