ORIGINS

EDITION 1 2010

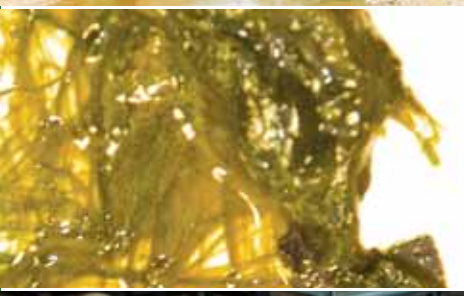
FROGS' SECRET DISPOSAL SYSTEM

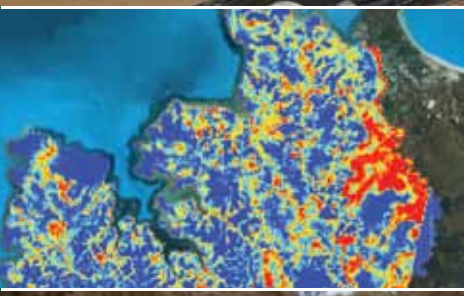
POWER OF ONE IN AFGHANISTAN

DESERT ROSE BLOOMS

ORIGINS

FEATURES





REGULARS

ORIGINS

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CHARLES DARWIN UNIVERSITY

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ROBYN McDOUGALL

Robyn is CDU's Public Relations and Media Manager, and has just celebrated her third year editing *Origins*. She was formerly a journalism academic and newspaper journalist and editor. In this edition she talks with the Chair of the Academic Board, Professor Sandra Dunn.

JASON McINTOSH

As CDU's Regional Media Officer based in Alice Springs, Jason has spent the past four years writing about education delivery in "the bush". He enjoys spreading the word about the creative and innovative programs from regional and remote Australia. In this edition Jason follows the journey from community to college for a young man from South Autralia's far north and explores the NT's Daly River system.

LEANNE COLEMAN

This is the first edition of *Origins* for long-time Territorian Leanne Coleman. Leanne has a background in science communication and has worked in various media and communication roles, travelling extensively throughout remote NT. This edition Leanne draws on her specialist writing skills to explore some critically important scientific research.

RICHMOND HODGSON

Richie Hodgson is a regular contributor to *Origins*, bringing a wealth of local knowledge and insight to each issue. In this edition he probes the university's innovative Yolngu Studies program and some ground-breaking research involving the humble tree frog.

NEED, RESOURCES AND OPPORTUNITY COME TOGETHER

> "Whether they are from the remote community of Hermannsburg, the regional town of Tennant Creek, or the busy capital of Darwin, NT residents expect CDU to be central to the intellectual, professional, cultural and environmental wellbeing of the Territory."

Driving between Charles Darwin University's campuses provides an opportunity for reflection – three days of it, as it happens. I recently returned from my second annual driving tour through the length of the Northern Territory, visiting our campuses and centres, meeting with community and business leaders, and calling into remote communities.

It was clear throughout the 1500km drive from Alice Springs to Darwin that the people of the Northern Territory regard CDU as much more than its tertiary education provider. We might be one of the smaller universities in the country, but few institutions carry the weight of responsibility to the wider community as does CDU.

Whether they are from the remote community of Hermannsburg, the regional town of Tennant Creek, or the busy capital of Darwin, NT residents expect CDU to be central to the intellectual, professional, cultural and environmental wellbeing of the Territory.

As the university matures, it becomes better placed to meet these responsibilities and expectations. Two initiatives that will come into full force in 2011 illustrate both the depth of CDU's contributions to developing the NT as well as our collaborative approach in establishing new projects.

The first involves our work with Flinders University to offer a full medical program in the Territory for the first time. By any measure, this initiative is one of the most important developments in helping to address critical health concerns. Recruiting local students into the program will cultivate an ongoing supply of doctors for the NT. We are also putting in place pathways into the medical program that will assist Indigenous people to become doctors.

The second project I want to mention briefly is the creation of the Australian Centre for Indigenous Knowledge and Education (ACIKE), in partnership with the Batchelor Institute of Indigenous Tertiary Education. ACIKE will be based on Casuarina campus and will significantly augment Indigenous education in the Northern Territory and improve the quality of higher education available to Indigenous people.

Both initiatives are a direct response to deep needs in the Territory. In this edition of *Origins* you will discover some of the other ways in which this university is supporting and engaging with our communities. I hope you enjoy it.

Professor Barney Glover
Vice-Chancellor

SNAPSHOT

NEW FACILITIES FOR ALICE SPRINGS

A new accommodation block and teaching facilities are almost completed on Alice Springs campus.

The facilities will be used to house and teach visiting interstate and remote students while the new classrooms will be used to teach aged care, disability and youth services to students across Central Australia. The classrooms will also be used for flexible lesson delivery during evenings and weekends.

CDU Campus Administrator David Reilly said: "The demand for vocational education, particularly in community services incorporating disability care, aged care and children's services, was a major motivation for us to develop these facilities and they will be put to good use."

The Federal Government provided total funding of $4.5 million, which included extra classrooms at the Katherine campus.

TOP END PROBES OIL AND GAS HUB

Darwin could be one step closer to becoming a research and training hub for the oil and gas industry in Australia and south-east Asia following high-level talks at CDU.

Representatives of industry, government, business and research facilities met on Casuarina campus to discuss the CDU initiative. The next step will involve a full analysis of industry needs.

Vice-Chancellor Professor Barney Glover said he was especially encouraged by the positive response to the proposal, which could involve a purpose-built facility on Casuarina campus to provide training for the industry's workforce and to meet its research needs.

Representatives at the meeting included the Minerals Council of Australia, OPITO, Challenger TAFE, NT Government, Conocophillips, Wood Group, Inpex, Woodside Energy, Curtin University, ENI Australia, CO2 CRC, NT Training Group, CSIRO, Western Australia Energy Research Alliance, SkillsDMC, Star Energy Group of Companies, Larrakia Development Corporation, Darwin Chamber of Commerce and NT Industry Capability Network.

WORK STARTS ON MEDICAL BUILDING

Construction is under way on a building to house the Northern Territory Medical Program in preparation for the first intake of students in 2011.

The Australian Government provided $27.8 million in infrastructure funding to support the establishment of a full medical program in the NT.

The program will be run by Flinders University with extensive support from CDU. Buildings that will house the medical program are being established at CDU's Casuarina campus and at Royal Darwin Hospital.

CDU Vice-Chancellor Professor Barney Glover said: "Through this collaborative approach, we aim to recruit local students, particularly Indigenous students, into medical education pathways. The long-term result will be local doctors with local knowledge to tackle local problems."

CDU is introducing new medical science courses, including the Bachelor of Clinical Sciences and the Bachelor of Medical Laboratory Sciences, as important elements of the development of the NT Medical Program.

CHANCELLOR ELECTED

Former Northern Territory Supreme Court Judge the Honourable Sally Thomas AM has been elected Chancellor of Charles Darwin University.

Chancellor Thomas, the University's second Chancellor since its inception in 2003, replaces chartered accountant, company director and entrepreneur Richard Ryan AO, who retired at the end of 2009 after six years in the top governance post.

She was Deputy Chancellor since 2003 and continues a 24-year association with CDU and its predecessors.

RIGHT
Chancellor of CDU the Honourable Sally Thomas AM.

NEW SSPR DIRECTOR

LEFT
The new Director of SSPR, Professor Daniela Stehlik.

One of Australia's leading social scientists has joined CDU as Director of the School for Social and Policy Research (SSPR).

Professor Daniela Stehlik has taken over the position from inaugural Director Associate Professor Tess Lea. Professor Stehlik was formerly the Director of the Research Centre for Stronger Communities at Curtin University of Technology.

Soon to head a new research institute at CDU to be known as The Northern Institute, Professor Stehlik said she was looking forward to SSPR becoming a core component of this new Institute.

SNAPSHOT

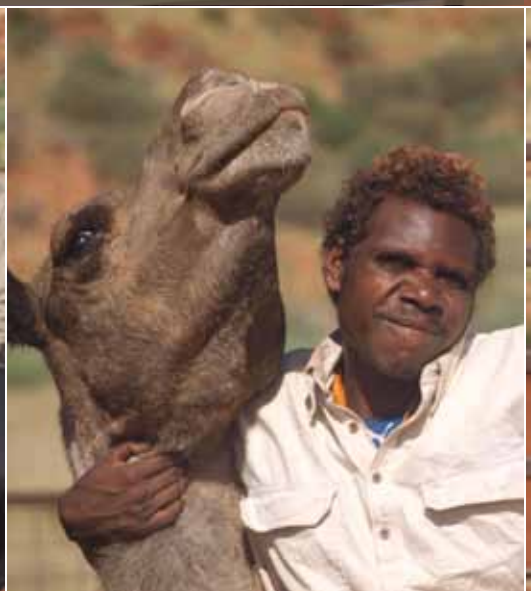
COMMUNITIES GET A HANDLE ON CAMELS

Two remote Central Australian communities are in a better position to work with camels after an intense week of training. Fifteen people from Walkabout Bore homelands and Tjitjikala community, south of Alice Springs, have completed the CDU camel handling training, developed in conjunction with Rural Skills Australia. **JASON MCINTOSH** captures the training in progress.

BELOW LEFT
(From left) Moses Mulda and Gavin Campbell working with camels at Walkabout Bore.

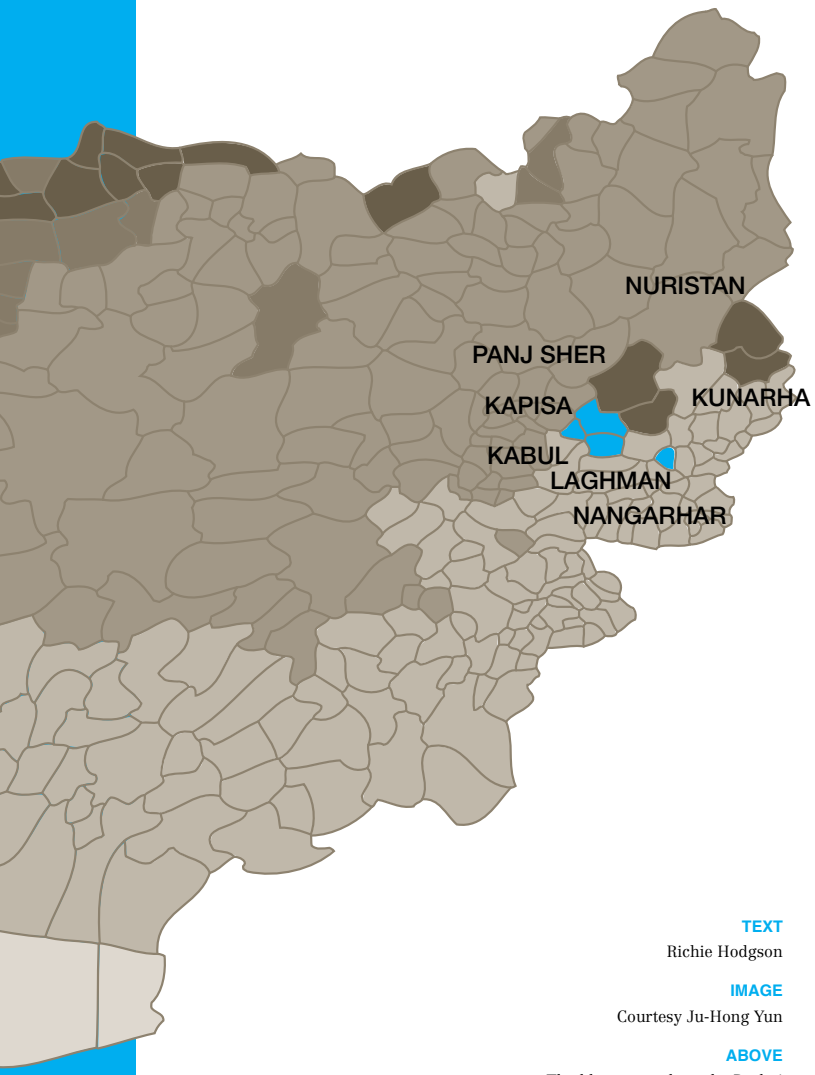
BELOW CENTRE
Tristan Mulda shows his confidence handling camels.

BELOW RIGHT
Gavin Campbell prepares to use his new skills to muster camels.



Education is a perennial victim in Afghanistan's long and brutal conflicts, resulting in thousands of Afghanis facing a lifetime of illiteracy and poverty. Now literacy specialist **JU-HONG YUN** is changing the lives of marginalised people in a remote part of the country and is receiving accolades from the United Nations for his work.

THE POWER OF ONE: CHANGING LIVES IN



TEXT
Richie Hodgson

IMAGE
Courtesy Ju-Hong Yun

ABOVE
The blue areas show the Pashai language speakers in Afghanistan.

Three decades of war and internal conflict have left an indelible mark on the fabric of Afghan society. Nowhere is this more evident than in Afghanistan's education system.

Under Taliban rule, the country of 27 million had only 900,000 students at school and all were boys. Now there are six million students enrolled in schools throughout the country, although another 5.3 million are still being denied access for cultural or security reasons.

When the Taliban regime ended in 2001, the country's diverse ethnic groups were allowed once again to speak and use their own languages, but because they had spent so long without formal education, many thousands of adults were illiterate. The problem was compounded by a lack of trained teachers and cultural taboos surrounding adults studying with children.

The scarcity of teachers is easily understood. Poor wages and better opportunities with NGOs and foreign contractors make teaching an unattractive proposition for Afghani college graduates. As a result, 75 per cent of Afghanistan's teachers have only a high school diploma qualification.

Against this background, a Charles Darwin University graduate has developed a literacy program that is making inroads into both the illiteracy and poverty of the Pashai speaking people in eastern Afghanistan. Ju-Hong Yun, who holds a Master of Applied Linguistics from CDU, has been working in Afghanistan since 1999 and has developed an award-winning Pashai language project.

Mr Yun responded to requests for literacy help from communities that were without adult education or education for women and young girls. His subsequent Pashai project has been awarded the United Nations Educational, Scientific and Cultural Organisation (UNESCO) Confucius Prize for Literacy 2009.

The Pashai language is spoken by about 500,000 people, mostly living in eastern

AFGHANISTAN

Afghanistan. While it has been spoken for about 2000 years, it has been in written form only since 2003.

Mr Yun told *Origins* that the Pashai language development project empowered vulnerable and marginalised community members through Pashto and Pashai literacy work.

"The project trains local community members (both male and female) who have limited formal education to be teachers for literacy classes that are held within their communities," he said.

"This is an appropriate methodology for the conservative rural communities in which the project is based. In this way, the project is well placed to improve educational opportunities and therefore social and economic participation for poor community members, especially women, girls and members of the Pashai ethnic group."

The Pashai mother tongue development program began in 2003 to establish a written language.

"An initial two-day seminar was held in July 2003 and focused on developing a Pashai alphabet," Mr Yun said.

"Most village elders in the area participated, along with literacy teachers and delegates from local schools, which led to the publishing of a Pashai alphabet book."

In 2009, the Committee of the District School Principals asked the project team to train all district school teachers to equip them with the skills and attitudes that the project teachers had developed.

"People have seen the result and benefit of the Pashai literacy program. Beyond the personal benefit, people in Pashai areas now recognise how important it is to have their own language in the written form," Mr Yun said.

"The project helps the tribal people maintain their ethnic identity by recording their history and cultures, in writing, in their own language.

"The literacy skills enable community members to participate in development activities to improve their living conditions and it is especially effective to empower women and to enlighten parents for girls' education in the area."

An added advantage is that the Pashai people have been integrating socially with the majority population.

"Before the project, there was a hostile attitude to outsiders, especially to foreigners. And for women and girls, there were zero opportunities of education and work," he said.

"Many men carried guns when they were outside their homes. But now the area is the safest in the eastern zone of Afghanistan and most of the girls go to school and women can also be educated and get jobs."

The literacy project, however, does not work in isolation, but includes community development programs to help redress the extreme poverty of the population.

One such program involves distributing around 2400 cows and milking goats to counter malnutrition in vulnerable families in the region.

The Pashai project, with its literacy, livelihood and health components, continues to reach about 1000 Pashai ethnic minority men and women each year.

ABOVE
CDU graduate and literacy specialist Ju-Hong Yun consults with a village elder in Afghanistan.

> "People in Pashai areas now recognise how important it is to have their own language in the written form."

TECHNOLOGY SPREADS YOLŊU VOICE

People from remote communities who hold Australian Aboriginal knowledge have had little voice in academic teaching in Australian universities. Now the Teaching from Country program, led by **MICHAEL CHRISTIE**, is changing that.

"Hello everyone, my name is Yingiya Guyula. I come from the Liya-dhalinymirr clan of the Gupawupa people..." With these words Yolŋu Lecturer Yingiya Guyula welcomes online students to the first lecture in the Teaching from Country program at Charles Darwin University.

BELOW
Yingiya Guyula, Michael Christie and John Greatorex discuss further engagement opportunities for the Teaching from Country program.

WHO ARE THE YOLŊU?

The Yolŋu are the traditional owners of eastern East Arnhem Land in the Northern Territory of Australia. They number about 6000 people, divided into two moieties: Dhuwa and Yirritja. They speak many different but related languages including Djambarrpuyŋu, Gupapuyŋu, Rirratjiŋu, Gumatj, Warramiri, and Wangurri. The major Yolŋu communities are Milingimbi, Ramingining, Gapuwiyak, Galiwin'ku, and Yirrkala, and many Yolŋu continue to live on their traditional lands in remote homeland centres.

KEY YOLŋU KINSHIP TERMS

bäpa	father
ŋändi	mother (and waku's waku's daughter)
ŋapipi	mother's brother
märi	mother's mother and her brother
waku	woman's son or daughter, man's sister's son or daughter, (and mother's mother's mother and her brother)
gutharra	waku's waku
wäwa	older brother (and father's father's father's father)
yapa	older sister (and father's father's father's father's sister)
yukuyuku	younger sibling.

Teaching from Country brings together Aboriginal knowledge authorities who live in remote Yolŋu homeland centres in the Northern Territory's north-east Arnhem Land, and tertiary level students of Yolŋu languages and culture, mostly in urban spaces on the land of the Larrakia people, the traditional owners of the Darwin area. Through the program, digital technologies have addressed the problems of teaching an Indigenous language and culture on foreign land.

Professor of Education in CDU's School of Education and Australian Learning and Teaching Council (ALTC) National Teaching Fellow, Michael Christie said that although Aboriginal knowledge opportunities in tertiary settings had been few and far between there was increasing recognition of the potential of Indigenous knowledge to enhance general understanding of the environment, ecological systems, linguistic and biological diversity, culture, history, art, health and much more.

"This collaborative program brings together Yolŋu (East Arnhem Land Aboriginal) knowledge authorities with developing expertise in digital technology and multimedia, some of whom have experience as higher education teachers or co-researchers," he said.

Tracing the evolution of Yolŋu studies at CDU reveals a long history of collaborative engagements with the Yolŋu people, beginning with the development of the Yolŋu program in 1994. In 2005, the Yolŋu team was awarded the country's premier university teaching award in recognition of the Yolŋu Studies program, the only program in the world where Aboriginal people teach their own languages and culture at undergraduate and postgraduate levels under the supervision of their own community elders.

In July 2008, Professor Christie was awarded a $360,000 ALTC fellowship to continue his work integrating Aboriginal culture and practices into tertiary teaching. The fellowship meant his team could develop an internationally significant collaboration to work through a complex range of questions relating to Indigenous knowledge in the academy.

"We came together as different small groups, in different spaces, virtually and in real time and space to keep working through some of the key questions which arose, taking care to bring together all perspectives – students' and academics', international experts' and local teachers', Yolŋu and other Indigenous and non-Indigenous participants', the technical the social, and the pedagogical," Professor Christie said.

"The fundamental question the team addressed together was how can digital technologies be mobilised so that Indigenous knowledge systems are actively and effectively incorporated into higher education teaching programs while remaining faithful to the ancestral practices and protocols which govern them?"

As the reach of broadband in remote Australia continues to grow, the team is better able to investigate ways in which knowledge owners and authorities from extremely remote locations can become actively involved in e-teaching.

In 2008, the time was ripe for the expertise that Aboriginal elders and interpreters have developed in teaching, consulting and the use of information technologies, to be brought into the university's teaching programs. The exercise was designed to invigorate the university's engagement with Aboriginal knowledge authorities, and as a public expression of the value of Aboriginal knowledge in academic contexts, and its protection in the digital and academic worlds.

Professor Christie said that one of the most valuable aspects to emerge from the study was a new understanding of the relation between Aboriginal and Western knowledge practices and the ways in which digital technologies, such as cameras and videos, reopened questions concerning time, space, identity, teaching, learning, and knowledge.

And the impact of the program is felt beyond Australia's borders. In second semester 2009, Yingiya Guyula began teaching Yolŋu languages and culture to a class of Japanese students at the Tokyo University of Foreign Studies and, earlier this year, taught a session for the postgraduate informatics class at the University of Pittsburgh, USA.

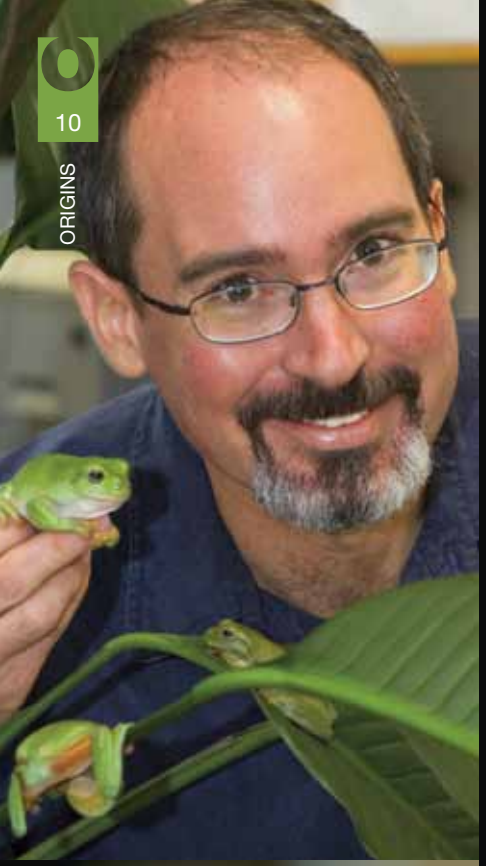
The evolution of Yolŋu language and culture studies has taken a serpentine route from its origins in mission times to its present, more sophisticated incarnation. Inevitably, anthropologists have a keen interest in the Yolŋu. Philologists are fascinated by their complex, interleaved dialects; musicologists by their dances and song.

"The Yolŋu elders in Arnhem Land have always expressed goodwill and willingness to share their knowledge with anybody who is prepared to take it seriously and in good faith, and treat them respectfully," Professor Christie said.

Evaluation of the Teaching from Country program continues to be negotiated collaboratively and is ongoing.
Visit www.cdu.edu/tfc to view the current results.

TEXT
Richie Hodgson

IMAGE
Julianne Osborne



Ground-breaking research by **CHRIS TRACY** has unlocked biological secrets of the green tree frog and shed some light on how these little creatures survive a life of leaping around in thorny forests and consuming spiny insects.

TEXT
Richie Hodgson

IMAGES
Julianne Osborne

TOP LEFT
Dr Chris Tracy in his living laboratory on Casuarina campus.

LEFT
The disposal system of green tree frogs is a secret no more.

Lead researcher and Post Doctoral Fellow in Zoology at Charles Darwin University, Dr Chris Tracy has discovered that green tree frogs can absorb foreign objects from their body cavities into their bladders and then excrete them by urinating. The findings have revealed the previously baffling and secret disposal system of these amphibians.

In 2003, Dr Tracy and his colleagues began a three-year, $220,000 ARC-funded study to investigate the biological secrets of Northern Territory frogs. Of particular interest was how they regulate their body temperature.

The team surgically implanted temperature-sensitive radio transmitters in the abdominal cavities of tree frogs of three species living around the city of Darwin.

After several months, the researchers set out to

RESEARCHERS FLUSH OUT FROGS' SECRET DISPOSAL SYSTEM

recapture their frogs to log the data and replace the transmitter batteries.

"We started off doing pretty well by collecting some nice temperature data from them," Dr Tracy said.

But then, things turned a little odd. "We started finding transmitters that were out on the ground, which we thought to be really weird," he said.

"We've seen that before in telemetry studies where frogs and other small animals had been eaten, and that's pretty common. A lot of things eat frogs.

"There's usually some evidence that happened: scratches on the ground or a pile of predator faeces. In this case we didn't see any signs that they'd been eaten and the transmitters were pristine."

The strangest discovery occurred when the researchers opened up dozens of animals to retrieve the transmitters. In many cases, they pulled transmitters not from the body cavity, but from the urinary bladder.

"That's when we started thinking about trying to pin down exactly what was going on," Dr Tracy said.

The researchers decided in 2008 to look into the phenomenon in earnest. They kept tree frogs and cane toads in the lab and surgically implanted beads in their body cavities.

Within two to three weeks, all the beads appeared on the floor of the green tree frog cages.

According to Dr Tracy one cane toad in five excreted a bead, but he then opened up the other toads and found the beads inside their bladders. Another 30 toads were implanted with beads as a follow-up experiment to try to catch the act of enveloping the beads in progress.

> "They have a unique way of getting rid of objects that are in the body cavity."

In just two days, the bead was surrounded by a transparent tissue devoid of blood vessels, which subsequently became vascularised and muscular. "It appeared they had a unique way of getting rid of objects that are in the body cavity," he said.

"They use tissue that starts in the bladder and grows out of the bladder and surrounds these beads and transmitters and they pass them out of the body cavity by urinating. All of a sudden they're peeing them right out in front of us."

Dr Tracy said he believed that the finding also helped to explain how these little creatures survived a life of constant danger.

"Frogs hop and they're kind of clumsy in general. So if they're hopping around, they leap and happen to land on something thorny, then the thorns could pierce the body.

"Reptiles have scales whereas frogs only have thin skin. Once something pierces them it's inside the body cavity."

The transmitters are still being used for the tracking studies because they are just big enough to not be passed through. Despite how uncomfortable it sounds, Dr Tracy said the frog did not display any discomfort.

"It strikes me as being a pretty incredible mechanism for getting stuff out from the body cavity," he said.

TEXT
Jason McIntosh

IMAGES
Courtesy Lindsay Hutley

INSERT IMAGE
Sally Carrington

DALY'S POTENTIAL GOES UNDER MICROSCOPE

With 70% of Australia's freshwater resources occurring in northern Australia, southerners continue to look northward for their water security. **LINDSAY HUTLEY** is at the forefront of assessing the possible impact of exploiting the resources of the Territory's mighty Daly River system.

The rain that pummelled eastern Australia early in the year brought huge relief to much of the nation grappling with severe water shortages.

But one of the nation's last untapped fresh water resources, the Northern Territory's Daly River system, remains in the firing line as a possible solution to the water problems of the south.

The system's rivers and tributaries of floodplains and wetlands cover 300 km and finally open to the Timor Sea. And while an Australian Government taskforce recently found that the area under irrigated agriculture could be doubled from its current low base, the notion of a "northern food bowl" was dismissed.

The Daly River catchment has been earmarked for future development and the Australian Research Council (ARC) has funded a team of researchers led by Charles Darwin University's Associate Professor Lindsay Hutley to explore the impacts of damming and farming the area. The team includes researchers from Monash and Melbourne universities as well as officers from the industry partners in the NT and the Australian Government.

A $500,000 ARC grant will help to explore all possible future scenarios for the Daly River system as the next frontier of agricultural development, covering greenhouse gas dynamics and land use change.

The project started in June this year and will be of significant national benefit. It will explore the impacts of savanna clearing and conversion of cleared pasture on greenhouse gas emissions, carbon and nitrogen levels, the mass plantation of imported timber species and will attempt to assess the combinations for sustainable farming practices. It will track greenhouse emissions, soil health, water resources and dry season (environmental flows) of uncleared savannas that have been converted to pasture and timber plantations.

Savanna carbon, water nutrients and trace gas emissions will be monitored through observing changes in soil moisture, sapflow, icrometeorology (study of weather conditions within a small scale) and the chemical structure of water.

Associate Professor Lindsay Hutley, from CDU's School of Environmental and Life Sciences and School for Environmental Research, said the research data was critical to underpinning future debate on the area.

"Looking at this idea from a practical point of view, the costs of building new roads and infrastructure would be enormous as would the challenge of building dams where it's basically flat as a tack," he said.

"But emotions aside, we need solid data that gives future

government and organisations a very clear insight into the changes that would occur if we were to consider the Daly for significant future exploitation."

Dr Hutley has spent years researching how vegetation has adapted to the physical environment imposed by wet-dry tropical climates typical of northern Australia. He has also worked on carbon and water cycling in tropical and temperate Eucalypt-dominated ecosystem.

He said the latest project was part of a wide range of projects that would provide detailed analyses of the delicate ecosystem of Daly River system providing a comprehensive assessment of the impacts of current agricultural practices in the area.

This will in turn provide vital base-line data for predicting the impact of increased agricultural development.

Dr Hutley urged the need for high-quality data to underpin catchment scale hydrological and climate change models to help land managers make decisions to ensure sustainability.

"Agricultural activity may provide short to medium term economic benefits, but we need the tools to cost the longer-term impacts on the environment," he said.

ABOVE
Stray Creek which runs into the Daly near a CDU research site.

RIGHT UPPER
A plantation timber species that could dominate the catchment.

RIGHT LOWER
Measuring wet season carbon uptake and water use in the Daly catchment.

Spreading the results

The results of the research into the Daly River system will help to inform a range of governmental and environmental agencies that manage Australia's greenhouse emissions.

They include the Commonwealth Department of Climate Change, NT Government Department of Natural Resources, Environment and the Arts, and the NT Department of Business and Innovation.

This work led by Associate Professor Lindsay Hutley will also complement the CDU-based Tropical Rivers and Coastal Knowledge research program that is also examining catchment scale issues across north Australian river systems.

ABOVE
Professor Karen Gibb is leading the CDU team trying to solve the issue of acid rock drainage at mine sites.

MICROBES IN THE MIX TO SHAKE UP TOXIC COCKTAIL

Algal slime could hold the key to a multi-million-dollar problem facing Australia's mining industry. A team of Northern Territory researchers led by **KAREN GIBB** is on the case of acid rock drainage at mine sites.

Each year the Australian mining industry contributes close to $40 billion in goods and services to the nation's economy, but with the economic benefits comes costly impacts on surrounding and downstream ecosystems.

Professor Karen Gibb, of CDU's School of Environmental and Life Sciences, is heading a team of researchers that is collaborating with industry to solve one of the most difficult environmental issues facing the mining sector, acid rock drainage (ARD).

While ARD is a natural process, it is accelerated when rocks from deep underground are brought to the surface in mining operations. The waste rock reacts with water and oxygen to form sulphuric acid, which dissolves salts and metals to create a metal-rich cocktail that is harmful to water ways.

Professor Gibb said treatment systems including microbes were being used overseas to help remove toxic metals from mine sites around the world, but in most of these systems nothing was known about the microbes being used. "There are no detailed studies of the microbiology of ARD in the wet-dry tropics and our extreme climate of long dry periods and monsoonal rain means that we will almost certainly have different microbes from everywhere else in the world. To treat ARD in the Top End, we need to understand the characteristics of the microbes before we attempt to use biological treatments to help combat ARD.

"We are effectively looking at a complex community of microbes and our aim is to identify which microbes are working in concert to trap the toxic metal products of ARD," Professor Gibb said. "If we can establish which microbes are suitable, we can design a natural treatment to remove the toxic metals before they leach into aquatic systems."

To find out more CDU Research Fellow Dr Claire Streten-Joyce has spent two and a half years testing hundreds of samples of waste rock to try to distinguish the microbes that cause ARD from those that might help solve the problem.

"We are looking for microbes that can tolerate the highly toxic conditions of ARD and can assist with the removal of heavy metals," Dr Streten-Joyce said.

"Working with our mining industry partners across the Top End, we selected typical ARD sites to collect samples of microbes that would carry the essential characteristics we were looking for. Most of the useful microbes we have found were associated with strings of algae known as 'slime streamers'. Using scanning electron microscopy we discovered that the slime streamers contained a heavy metal concentration a hundred times higher than that of the ARD conditions. The fact that these algae can sequester metals at such high concentrations makes the microbes found in the streamers good candidates for ARD treatment," she said.

The researchers also found bacteria and fungi that could survive in acidic conditions with low nutrients and could absorb or detoxify heavy metals to reduce the toxicity of ARD. "We are now trying to find out if these microbes can work in unison on a floating artificial membrane to form a microbial mat to treat or extract the toxins caused by ARD in contaminated waterways," Dr Streten-Joyce said.

The new microbial mats were being grown now and would be deployed in the next few months. Although it was still early days, Professor Karen Gibb said successful ARD microbial treatment would contribute to an overall industry approach to managing acid run-off and metal seepage into rivers and through groundwater.

TEXT
Leanne Coleman

IMAGES
Julianne Osborne

ABOVE
CDU Research Fellow Dr Claire Streten-Joyce samples some algal slime streamers.

AWARD ADVANCES KNOWLEDGE

Dr Claire Streten-Joyce won the 2008 CDU Vice-Chancellor's Award in the early career category, which allowed her to attend the American Geophysical Union Fall Meeting in the US.

What she learned there about the latest techniques of microbial analysis has led to big changes in approach by the molecular ecology research group at CDU.

Using a new DNA sequencing technique, Dr Streten-Joyce said the research group could now characterise thousands of microbes at each mine site to determine their role in ARD formation and their remediation potential.

The researchers have identified countless species of microbes using new DNA exhaustive sequencing techniques, and have discovered that the usual microbes found in ARD formation around the world may be different to those found in the Top End.

FUNDING

The project is funded by the Australian Research Council. It is led by Professor Karen Gibb in collaboration with Australian Institute of Marine Science Professor David Parry, University of NSW Professor Brett Neilan, CDU Research Fellow Dr Claire Streten-Joyce and CDU Research Associate Judy Manning. Industry partners include Xstrata Zinc, McArthur River Mining Pty Ltd, HNC Resources NL, Vista Gold Corp and the NT Government.

CDU research into electric engine technology began long before the current interest in environmentally responsible energy sources. The university's ground-breaking Desert Rose Solar Car project is now in its third decade.

Since its inception before the very first 1987 World Solar Challenge (WSC), the Desert Rose Electric Vehicle (EV) and its solar predecessors have received numerous awards particularly in the area of technical excellence.

In 1999, the Desert Rose achieved its best result in the WSC as it crossed the line in fourth place, only one hour behind the eventual winner of the gruelling 3020 km race from Darwin in the Northern Territory to Adelaide in South Australia.

In early 2000, the Desert Rose achieved one of the highest accolades in solar car racing. Following the "Hay 100", a feature of the Whirlpool Sunrace 2000, the International Solar Racing Federation announced that the World Solarcar speed record for the fastest average speed over this measured 100 km stretch had been broken by the Desert Rose. It had averaged 107.78 km/h on the Hay Plain, between Hay and Mildura.

But the Desert Rose's racing life was not limited to Australia. After a surprise phone call in 1995, the Rose participated in its first overseas race, the 1995 World Solar-Car Rallye at Akita, Japan. This was the first of two attempts to win, the second coming three years later in 1998. Both races generated good results, but better still, the experiences provided important lessons on reliability and strategy.

"Brushless" motor technology, originally developed for the Desert Rose, is now used in almost all solar cars worldwide.

The research was commercialised in 2002 by CDU spin-off company In Motion Technologies (IMT).

IMT was acquired by US-based, multi-billion dollar company FASCO Motors in 2006 as part of a new Asia Pacific R&D centre of excellence. To date the technology has been used by John Deere and produced for the Avanti Electra electric bicycle in conjunction with partner Avanti Bicycles.

Engineering lecturer with CDU's School of Engineering and Information Technology, Dr Greg Heins said that after analysing race data from the 2001 World Solar Challenge the Desert Rose team realised that to be competitive was going to require a considerable sum of money for a new solar array.

"The solution of a new purely electric vehicle allowed us to continue developing the technologies and strategies we have experience in, but without the huge expense of experimental grade solar cells," Dr Heins said.

The concept of the Desert Rose EV was born in late 2002, and in 2003 the Desert Rose EV began a new revolution in demonstrating world class technology. The 2005 World Solar Challenge provided the first opportunity for the team to display the abilities of the new vehicle.

"The new Desert Rose EV is a demonstration of technology transfer and showcases the innovation of CDU and its engineering students and staff," Dr Heins said.

He has also put his involvement with the Desert Rose EV to greater use with his pioneering research into the quietening of industrial equipment, air-conditioners and other devices relying on electric motors.

DESERT ROSE

BL

Born out of a vision to take solar car technology towards real world applications, research into electric motors now finds itself in applications beyond all expectations. It is part of the charge toward a more environmentally sustainable future.

TEXT
Richie Hodgson

IMAGE
Julianne Osborne

> The new Desert Rose EV is a demonstration of technology transfer and showcases the innovation of CDU.

Dr Heins was awarded a PhD by CDU in 2008 for his research into controlling the current flow into electric motors, providing similar levels of power with greater efficiency and less noise.

He chose the research topic after his involvement in the CDU co-developed Desert Rose High Performance EV.

Dr Heins identified the imperfections of common electric motors by measuring their operational noises, then applied various methods that included modifying the structure of electric signals that fed the motor, effectively cutting noise by one-third.

“Combining various approaches is a clever way to compensate for noisy motors,” he said.

The research, which offers enormous potential for equipment that uses electric motors from large building cooling systems through to robotics, is being continued by three postgraduate students and has provided project work for five undergraduate student theses and 12 European intern student placements.

RIGHT
Dr Greg Heins’ research into controlling current flow of electric motors is providing similar levels of power with greater efficiency and less noise.

OOMS

RESEARCHERS CLOSE IN ON KILLER BACTERIUM

Each year the wet season in the Top End provokes a usually dormant bacterium, releasing a deadly disease. A **MENZIES SCHOOL OF HEALTH RESEARCH** breakthrough is fast-tracking detection in patients.

TEXT
Leanne Coleman

IMAGES
Julianne Osborne
Map courtesy Menzies School of Health Research

Researchers at CDU's Menzies School of Health Research have been on the hunt for the habitat of a killer bacterium found in northern Australia.

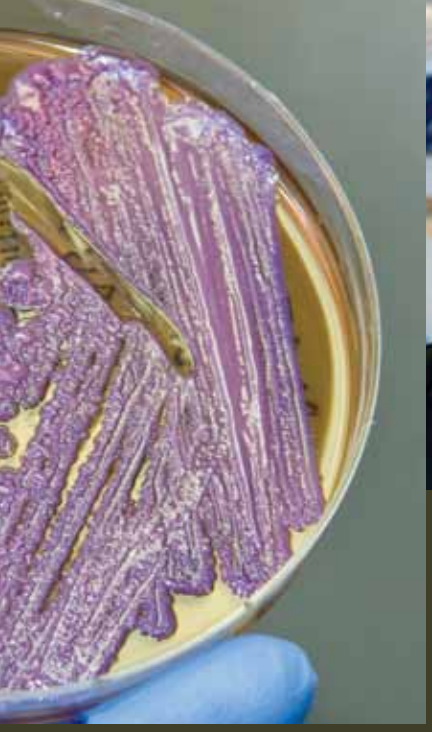
The bacterium, *Burkholderia pseudomallei*, lies dormant in soils throughout the Northern Territory, but thrives in wet conditions and becomes a potentially deadly threat during the annual wet season. People exposed to the bacterium can develop melioidosis, a tropical disease that usually infects up to 40 people each year.

Menzies' Melioidosis Project Manager Mark Mayo said people most at risk from the disease were those with an already suppressed immune system with conditions such as diabetes, heavy alcohol consumption, kidney disease, lung disease or cancer.

Towards the end of this year's wet season, 77 people in the Northern Territory had been infected with the disease and 10 people had died.

There is good news, however, and that is a Menzies School of Health Research team, known as the "Melioid Mob", is working with the latest molecular diagnostic tools to detect the disease in patients earlier and improve treatment.

"Our research has the potential to reduce the length of time it takes to diagnose melioidosis from four days to one," Mark Mayo said. "With early detection medical professionals will be able to provide faster and more targeted treatment to patients and this may lead to faster recovery and a reduction in mortality.



LEFT
Mark Mayo is the Melioidosis Project Manager at Menzies School of Health Research.

FAR LEFT
Senior Research Officer Dr Mirjam Kaestli checks the acidity of the soil to help detect the presence of bacteria species.

LEFT
The bacterium Burkholderia pseudomallei is grown in the lab to extract DNA.

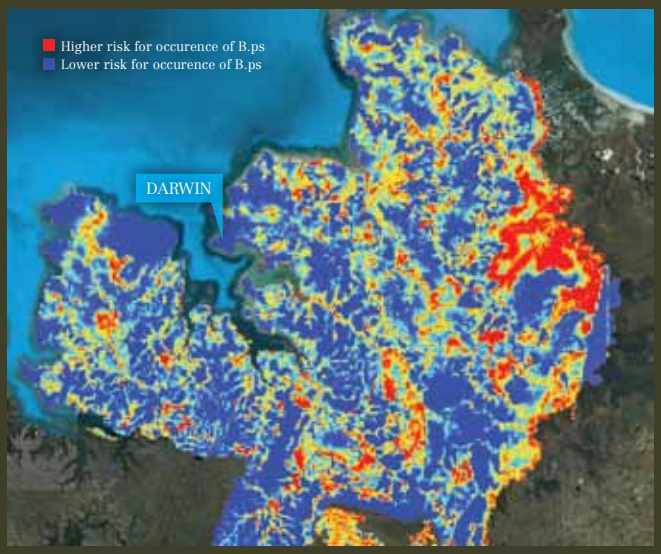
FUNDING

The project is funded by the National Health and Medical Research Council and the Department of the Prime Minister and Cabinet. It is lead by Menzies School of Health Researchers Dr Bart Currie, Mark Mayo and Dr Mirjam Kaestli. Industry partners include the Northern Territory Centre for Disease Control and Prevention, Charles Darwin University and the Northern Territory Government.

"Along with research into the clinical aspects of melioidosis in patients, we also looked into the habitat of the bacterium in northern Australia."

With little known about the habitat of the bacterium in the Northern Territory, the team developed a technique to extract DNA from more than 800 soil samples throughout the Top End to identify the bacterium in soil. These results were used to create a map to help predict the location of potential "hot spots" where people may be at an increased risk of catching the disease.

"If we can improve our understanding of the habitat of the bacterium, we can predict hot spot areas in our region that have increased levels of bacterium. This new information can help improve treatment of people coming into hospital from these hot spot areas and testing for melioidosis can be done as soon as possible," he said.



LEFT
This map, developed by the Menzies' researchers, helps to predict the occurrence of the potentially fatal disease.

TAKE CARE

Currently no vaccine against melioidosis exists.

Preventative measures are the key to avoiding infection.

Top End residents are urged to limit their exposure to soil.

They should wear waterproof shoes or boots when walking in wet soil and protective gloves when handling soil, particularly in the wet season.

CARL TAKES A CHANCE

Carl Wakupi Roberts is about to take the greatest trip of his short life and **GEOFF DEANS** is making it possible.

Sitting outside on the cool grass, the group of women is silent. Apart from an occasional glance at wandering children, they focus intensely on the words of someone they trust.

With them is Geoff Deans, a teacher who arrived at their remote community nearly four years ago and who continues to take an active interest in the future of their young people.

Today's meeting with the women is about the future of one of their own. Today, Geoff is getting the final "OK" to send a young man on a challenge that no others from this community have attempted.

Now based at the Alice Springs campus of Charles Darwin University, Geoff has travelled to the Anangu Pitjantjatjara Yankunytjatjara, or APY lands, of far north South Australia to follow through on a promise.

ABOVE
Geoff Deans and Carl Roberts charge through the muddy track as they head from SA's far north to Katherine Rural campus.

TEXT
Jason McIntosh

IMAGE
Jason McIntosh

> "I despise paternalism and I'm not here to save souls."

If all goes well, 16-year-old Carl Wakupi Roberts will take a huge step in his education by leaving the familiarity of his community for a three-month rural training course at CDU's Katherine Rural campus.

With some final words of comfort and encouragement, Carl's family nod their permission. Trusted for his long service to the community's youth, Geoff will return to Alice Springs and organise Carl's forward trip to Katherine.

Geoff got to know Carl when he was the boy's high school teacher and later his youth mentor in the 200-strong community of Fregon, 500 km south of Alice Springs, where he taught horse riding and pastoral skills to local youth.

He said Carl's talents and tenacity became apparent when the youngster took part in short courses in horse riding, which were held in the community and outside Alice Springs.

"It was at the last training session at Hamilton Downs near Alice Springs that I realised he had the motivation and coping skills to thrive in a completely different setting," Geoff said.

But he stressed his visit to "the Lands" was not about saving anybody.

"I despise paternalism and I'm not here to save souls. Today is simply opening the door for Carl, who has the guts and determination to walk through it," he said.

"This kid could have been from inner Sydney or the outskirts of Adelaide, but what matters to me is I do my job well and follow through with my word."

Geoff acknowledged the huge talents of Carl's peers, but said the young man had the key attributes to make a success of the intense three-month program at Katherine.

"Carl owns his success and by that I mean he always challenged himself in the activities we gave him and he takes ownership of his life," Geoff said.

"This trip to Katherine is the next logical step for him and he has the drive to make it," he said.

The next morning, Geoff drives up to the house, but there is no sign of Carl. It's crunch time for the young man who may be long gone by now.

"He might bail on us but at the end of the day it is his and his family's choice. They understand the opportunity and consequences," Geoff said.

"It's up to him to make the decision."

As proud family and pets mill around, Carl appears from the house ready and packed.

Looking a little nervous, he soon warms up to the adventure in front of him.

"He is tackling a course that was developed around the demands of the pastoral industry and not the clients so, if all goes well, he can walk with real pride," Geoff said.

"It will be a challenging course but setting people up for success means giving it to them straight, the good, the bad and the ugly and both Carl and his family made the call to do it."

As Carl puts on his sunglasses and relaxes in the front seat, it seems he is ready to make the best of it.

Geoff explains the local saying *Ngapartji Ngapartji*, which translates to "I put in and expect equal effort in return".

"I've assisted Carl to the next step. Now it's up to him to make a success of it," he said.

RIGHT AT HOME IN FRONTIER LAND

As a Canada-born former nurse, **SANDRA DUNN** hankered for fresh horizons and new experiences. Now as a professor in the Graduate School for Health Practice and Chair of CDU's Academic Board, her wishes have come true.

How do you describe your transition from hospital wards to teaching theatres?

It was gradual. From the time I started working in the clinical area, I spent a lot of time teaching informally at the bedside as part of the nursing role. You're always teaching families and clients. By the time I moved into intensive care and became a more senior nurse I was teaching new graduates and junior nurses. That gradually evolved into doing some teaching at community colleges first in Canada, then in America. It was a busy time in my life, working with the community college, working full-time as nurse manager in a coronary care unit, and going to university. At that point we had four children.

We wanted to move to new places and gain new experiences. After I received my Masters we moved to Australia. At that time there were way less than 50 nurses in Australia who had their PhDs. I must have been considered a pretty good prospect because they brought my family and me over to work at the university. My first Australian teaching position was at QUT, where I got my PhD. During this time we had our fifth child. Maybe it was a hard transition, but I was too busy to notice!

What motivated this change?

I really wanted to be more involved in teaching. I've always loved to teach newly qualified nurses what the profession is about, and how to use their knowledge and skills to provide the kind of care people need in hospital or acute care.

Or even more, working with nurses who had been out there for years, helping them develop their professional specialty, getting them to think about how much there is to know and help them develop a framework for continuous learning. Now particularly, working with the nurse practitioners, helping to change the way health care is delivered in Australia. It is just an amazing privilege to do be able to do those things.

If your career had not taken this course, what would you most like to have been?

I guess wanting to be a ballerina and ride bareback horses are really a long way back (laughs). I earned my living for a while as a pool manager and lifeguard and was a competitive swimmer for years. That's how I worked my way through university. I have always been interested in health care in various ways.

Who or what inspires you?

Many people have inspired me over the years in different ways. My mother was a bush pilot in the wilds of northern Canada with my father. They went prospecting on their honeymoon and we did a lot of flying around Canada when I was a kid. I am the eldest of five. She was one of the very few women to referee water polo – a tough sport – and did white water canoeing and cross-country skiing. She was one of those women who does not have the word "no" in their vocabulary. She was certainly an inspiration, but it was one of those things that I didn't even really realise. It gave me the mind-set that anything was possible; subtle, it was always there. Forgiveness is easier to obtain than permission: just go for it and have it done. One of the reasons I chose nursing was because I wanted to be a remote area nurse and work in the remote parts of Canada, which is almost the same as here except that it is 40 below, not 40 above!

Where do you do your best thinking?

Probably between 2am and 4am when I'm asleep. I'll go to sleep and have a problem on my mind and, if I can get to sleep and let my brain work on it without interference, it seems to work pretty well. I have the answers when I wake up: "Oh, I know how we can manage that." Otherwise you know how they say to schedule your work time when you are at your best? Well, my best is the 15 minutes from 10am to 10.15am. That is when I'm just firing (laughs).

What is your idea of a "good read"?

I'm a voracious reader. I read ANYTHING. I'll read the back of cereal boxes. I usually have several books on the go at once. Right now I'm reading "Kingdom of Fear, The Bronze Horseman" and "The Idea of Perfection". I enjoyed the Harry Potter series and Robin Hobb is a favourite. Although I have resisted the Twilight series… (laughs).

Why CDU, why Darwin?

I've been in Darwin for three years now. It's a fabulous place. This is the frontier. You can do anything. The trick to surviving is not to do everything but to try to have a bit of focus because there are just so many opportunities. It's such a different kind of place. I've travelled around the world looking for different experiences and working in different places, meeting different people and working under different systems, but this is unique in my experience.

The opportunity to make a difference is fantastic. The people you meet here are people who have a real dedication to implementing change and to making things better especially in healthcare and education. I think more than anywhere else if all you are looking to do is just get by, then Darwin is not the place to be.

What was the biggest surprise coming to the NT?

Moving into the Territory opened whole new areas that I knew nothing about. There have been very few times in my life when I have been made so aware of how little I know and how much I have to learn! I'm talking clinically in nursing, in the university, and my family and social life. I said I was looking for new experiences, being in different places…

We recently went out to Galuwink'u and just the chance to visit the places and people was something. I love to go out to the communities and really try to see things from an entirely different perspective. I don't know quite how to express how much difference that makes. Until you do that you don't really appreciate how hard it can be to learn and communicate across such dissimilar ways of understanding.

What is your main research interest currently?

I'm working with the health workforce and implementation of nurse practitioner roles to improve health care access and delivery. Our nurse practitioner prescribing education program has been picked up by the National Prescribing Service. I am also working with a team on improving cross-cultural health communication between Aboriginal clients and the prevailing Western bio-medical health care system.

If there were one thing you could change about your life, what would it be?

I would be far fitter. I would have learnt more about when to be pig-headed, perhaps be a bit smarter. With all the bad stuff that happens in life there are always the parts that you learn from, things that will never be the same and give you something to take forward. I don't think there is anything about my life that I would give away.

What do you consider to be your greatest achievement?

I don't think I have had it yet. You will have to come back and talk to me in three years. There are people who I really respect who tell me that I have made a difference to their lives, that I've helped them make a difference in the lives of others. You can't ask for more than that.

TEXT
Robyn McDougall

IMAGE
Julianne Osborne

"More than anywhere else, if all you are looking to do is just get by then Darwin is not the place to be."

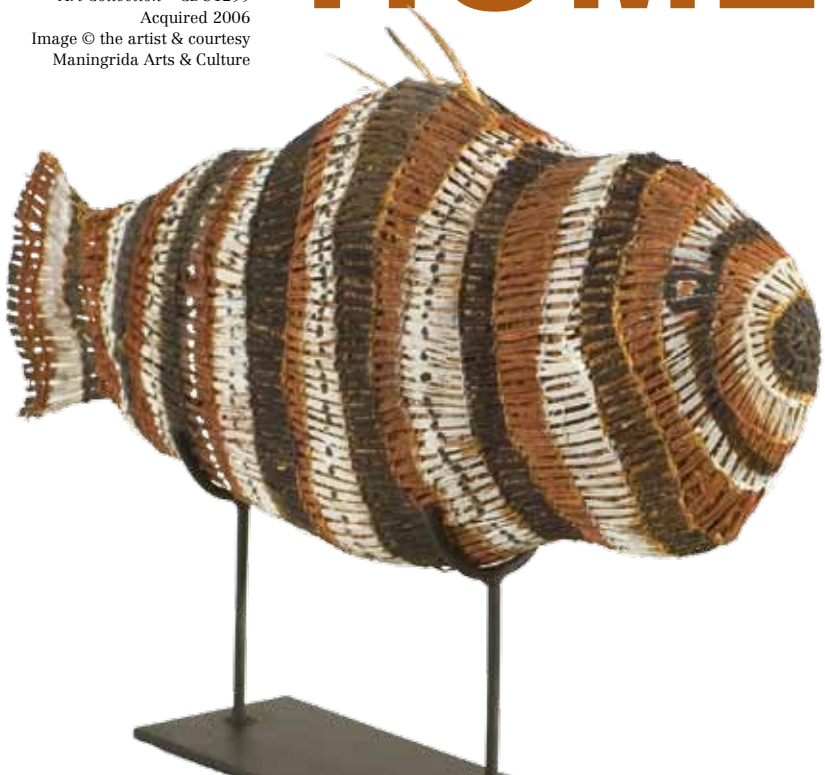
Franck Gohier
What Country Doesn't Have... (Intellectual Wankers)? 1999
Screenprint (poster print) edn of 28
Charles Darwin University Art Collection – NTU1094
Gifted by the artist; image © the artist

Jacinta Numina-Waugh
Women's Ceremony 2004
Etching, WP edn 25
12 x 13.5cm [image]
CDU Art Collection – CDU1144
Gifted by Northern Editions Printmaking Studio, 2004
Image © the artist

G.W Bot
Poem 2005
Linocut
33 x 33cm [image]
Charles Darwin University Art Collection – CDU1443
Gifted by Franck Gohier 2006
Image © the artist

ART COLLECTION GAINS PURPOSE-BUILT HOME

Maryanne Cameron
Fish 2006
Woven sculpture
H25 x W26 x D5 cm
Charles Darwin University Art Collection – CDU1299
Acquired 2006
Image © the artist & courtesy Maningrida Arts & Culture



One of the most important art collections in the Northern Territory now has a permanent home on CDU's Casuarina campus.

The Charles Darwin University Art Collection, comprising almost 2000 works, is displayed and stored in a purpose-built Art Gallery in the university's recently opened Chancellery. It is the first time the Collection has had a dedicated exhibition space.

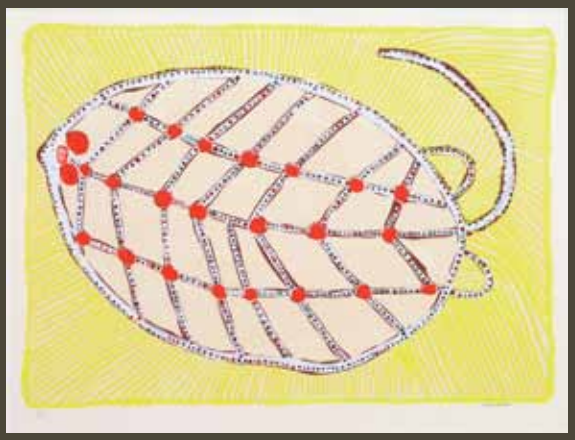
Developed over 30 years, the Collection features paintings, drawings and works of mixed media by Indigenous and non-Indigenous Australian artists, sculpture and ceramics, bark paintings, a collection of Indigenous material culture items, and paintings, prints and textiles by artists from South-east Asia.

It also comprises more than 1000 limited edition prints of national and international significance, including those produced at Northern Editions' printmaking studio.

The Art Collection, examples of which feature in these pages, focuses on the acquisition of work by established and emerging Australian Indigenous, non-Indigenous and South-east Asian artists inspired by or with a connection to the NT and adjoining regions.

The CDU Art Gallery is open to the public from 10am to 2pm, Monday, Wednesday and Friday, or by appointment through 8946 6621 or 8946 7299. It is located on the ground floor at the eastern end of the Chancellery, Orange 12.1.02 on Casuarina campus. Entry is free.

Susan Marawarr
Stingray 2001
Screenprint
47.5 x 66cm [image]
Charles Darwin University Art Collection – NTU922
Gifted by Northern Editions Printmaking Workshop, 2002
Image © the artist & courtesy Maningrida Arts & Culture



Thelma Dixon
One from Borroloola 2007
Screenprint
38 x 57cm
Charles Darwin University Art Collection – CDU1478
Image © the artist & courtesy Waralunkgu Arts

Angelina George
Rainbow Serpent Dreaming 2004
Acrylic on Belgian linen
121 x 96cm
Charles Darwin University Art Collection – CDU1272
Acquired 2005
Image © the artist and courtesy Karen Brown Gallery, Darwin

Jean Baptise Apuatimi
Numwariyaka 2006
Natural ochres on canvas
80 x 30cm
Charles Darwin University Art Collection – CDU1293
Acquired 2006
Image © the artist & courtesy Tiwi Design Aboriginal Corporation

CDU PUBLISHING

Greg Shaw
Paperback 223 pp
ISBN 9780980665031

Information Communication Technology at University: Skills for Success (3rd edn)

This text aims to provide higher education students with a solid foundation in the area of Information Communication Technology (ICT). Greg Shaw takes a problem-based learning approach with scaffolding to assist the reader to understand and learn by doing. The reader will learn how to successfully complete the tasks required to research and produce written and oral presentations at university and professionally.

ICT is changing rapidly and students and universities use different variations of computers and software. The book will be useful for both beginning computer users and users who have some skills and knowledge and who wish to extend these.

Greg Shaw Deputy Director of the Batchelor Institute of Indigenous Tertiary Education.

Jack Frawley, Maggie Nolan, Nereda White (eds)
Paperback 250 x 175
ISBN 9781921576072

Indigenous Issues in Australian Universities: Research, Teaching, Support

This collection of essays by both Indigenous and non-Indigenous scholars offers a range of perspectives on issues confronting Indigenous students, staff and Indigenous studies in a range of Australian higher education courses. The collection offers both theoretical explorations of issues relevant to Indigenous students, staff and studies as well as practical examples, personal reflections and case studies of programs and services which suggest the potential for ongoing and future research and practice.

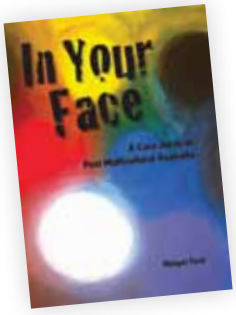
The editors are from the Australian Catholic University. Jack Frawley is Senior Research Fellow in the Centre for Creative and Authentic Leadership, Maggie Nolan is a Senior Lecturer in Australian Studies, and Nereda White is Director of the Centre for Indigenous Education and Research.

Jude Conway (ed)
Paperback pp 250x175
ISBN 9781921576096

Step by Step: Women of East Timor, Stories of Resistance and Survival

This is a compilation of the stories of 13 East Timorese women outspoken enough to talk about their lives and what it was like living in a Portuguese colony; how they were affected by the Indonesian invasion; what day-to-day life was like under the occupation or in the diaspora; how they contributed to the resistance; and how they have adapted to independence won by the East Timorese people in 1999.

These are the stories of Céu Lopes Federer, Dulce Vitor, Maria Dias, Laura Soares Abrantes, Domingas 'Micato' Fernandes Alves, Cesarina Rocha, Carolina do Rosário, Mica Barreto, Lucia Lobato, Isabel 'Beba' Sequeira, Ina Varella Bradridge, Luisa Ferreira Exposto and Filomena Reis.



Margot Ford
Paperback 250 x 175
ISBN 9781921576058

In Your Face: A Case Study in Post Multicultural Australia

Darwin is one of the most racially and ethnically diverse cities in Australia. The nation has now gone beyond multiculturalism, but how has the slow dismantling of the multicultural policy during the Howard years and its replacement with a policy of "social inclusion" by the Labor Government affected the people?

Drawing on interviews with children, youth and adults from diverse backgrounds in Darwin, this book sets out to answer this question. It focuses on issues of race and ethnicity using the idea of racialised practice to examine the social dynamics of inclusion and exclusion.

Margot Ford said: "There is an additional personal dimension, because my daughter was born in Australia, of Indonesian/Scottish descent. It was her struggle to find a way to belong as an Australian in Australia, and my own helplessness in the face of those struggles that prompted this study."

Margot Ford lived many years in the Northern Territory, working in education. She studied at the University of Queensland and is currently a lecturer in education at the University of Newcastle, NSW.

GIS Applications for Sustainable Development and Good Governance in Eastern Indonesia and Timor Leste

Geographic information systems (GIS) and remote sensing are often represented as complex, expensive and cutting edge technology, the province of a techno-elite in developed countries. GIS is now used, however, to visualise and analyse a wide range of data types in developing countries.

This book represents an important and unique set of papers describing the application of such "high technology" as appropriate technology within a remote/regional and developing country context. The high diversity of GIS applications in eastern Indonesia and Timor Leste is evident in the scope of papers included in this bilingual (English/Indonesian) publication, ranging from land use to health services.

Rohan Fisher and Dr Bronwyn Myers are both from Charles Darwin University, Max Sanam is from James Cook University, and Dr Vincent Tarus is from Mississippi State University, USA.

Rohan Fisher, Bronwyn Myers, Max Sanam and Vincent Tarus (eds)

Paperback 260 pp

ISBN 9781921576065

Social Capital and Social Justice: Critical Australian Perspectives

The debate on social capital in the social policy and social science arenas continues and with it there is a growing gulf between the manner and effect by which these discourses are being played out.

This collection of essays brings together emerging and established scholars who have enlivened and enriched the debates about social capital in Australia. Based on a workshop conducted under the auspices of the Academy of Social Sciences in Australia, it illustrates the continuing relevance of social capital in analysing Australian society and strengthening social policy and programs to promote social justice in contemporary Australia.

Geoff Woolcock is Associate Professor and Research Fellow with the Urban Research Program at Griffith University and Lenore Manderson is Professor of Medical Anthropology in the Faculty of Medicine, Nursing and Health Sciences at Monash University and is a Fellow of the Academy of Social Sciences in Australia.

Geoffery Woolcock & Lenore Manderson (eds)

Paperback 220pp

ISBN-13: 9781921576089

Independent Nation: The Evolution of Australian Foreign Policy 1901-1946: Australia, the British Empire and the Origins of Australian-Indonesian Relations

During the period before World War II, from 1901–1941, two distinct ideologies had formed over Australian strategic policies. They were pro-Imperial and self-reliance. This book traces the evolution of a new independence of thought displayed by the Australian Government towards foreign policy, and in particular towards its relations with Indonesia, after World War II.

This book is based on the author's MA Hons thesis at Macquarie University, Sydney. Adam Hughes Henry is based at the Research School of Social Sciences (Department of History) at the Australian National University, Canberra.

Adam Hughes Henry

Paperback

ISBN 9780980665000

Prepare for Impact! When People and Environment Collide in the Tropics

South-east Asia and tropical Australia are undergoing major changes, which are likely to intensify in the next decade. The changes include booming economies, climate change, land cover transformations, human disease outbreaks, and more.

In May, 2006, an international symposium was held in Darwin in the Northern Territory of Australia, to discuss the drivers and impacts of climate change.

The challenges are immense. This publication features papers by leading researchers and policy makers that reflect on the challenges of climate change and our responses.

Contributors: **Dr Natasha Stacey, Dr Guy Boggs, Professor Bruce Campbell** and **Professor Will Steffen.**

Natasha Stacey, Guy Boggs, Bruce Campbell, Will Steffen (eds)

Paperback 153pp

ISBN 9780980665017

LIMITED EDITION

Rob Brown has collaborated with Northern Editions printmaker Jacqueline F. Gribbin to produce a series of etchings exploring the life and works of Charles Darwin, on the 150th anniversary of the publication of his seminal work *On the Origin of Species*.

With his characteristic wit, Brown has depicted both ends of Darwin's evolutionary scale in these inventive and lively monochrome prints. Reminiscent of 17th Century copper plate etchings they pay homage to one of Brown's idols Rembrandt, with their deep black chiaroscuro, irregular scratching marks and experimental quality.

These prints cleverly marry an old world sensibility with a sharp, humorous contemporary edge.

Rob Brown
Charles Darwin 1863
2009

Etching, Drypoint, Aquatint

IMAGE SIZE
58 x 40 cm

COLLABORATOR AND PRINTER
Jacqueline F. Gribbin

IMAGE
Joanna Osborn


CHARLES
DARWIN
UNIVERSITY