The University of Queensland's extensive range of research Infrastructure and facilities, coupled with expert advice and leadership provided within these facilities, are here to support and enable researchers in reaching research excellence. This exceptional blend ensures UQ can deliver 100 per cent of its research at world standard or above, with outcomes that directly impact global society.

Click on the examples below for how it all works together.

INDEX OF CONTENTS

UNLOCKING THE OCTOPUS BRAIN

How smart can a supercharged snail be?

Once claimed to have 'alien intelligence', octopuses are now thought to be as smart as dogs. But there is still so much humans do not understand about this soft-bodied creature. With their unique ability to see polarisation light, solve complex tasks, master colour blind camouflage and express emotions, octopuses have captured our imagination.

Now UQ researcher **Dr Wen-Sung Chung** at **Queensland Brain Institute (QBI)** has modified brain imaging procedures using the state-of-the-art imaging facility at Centre for Advanced Imaging (CAI).

He has adopted MRI techniques originally developed for small mammal research.

Dr Chung's work leads a new way to investigate the complex cephalopod brain in detail and proposes new approaches to investigate octopuses' evolutionary history and functional properties. This provides a firm base upon which to place the currently fashionable but contentious cephalopod's cognitive capabilities .

The research represents a significant breakthrough in octopus brain and behaviour research - most of which dates back more than 50 years.

Dr Chung's work provides the first modern neuroscience foundation to cut through claims based on some old dataset and give octopuses a chance to explain themselves, avoiding emotive and anthropogenic claims of 'alien intelligence'.

He has led the first MRI-based mesoscale brain-wide connectome of the cephalopod brain, combined with supportive results using both classical and modern histological techniques. This new knowledge forms a bridge to the past work where classical histology was used and starts unlocking the most complex of the invertebrate brain and the underlying neural circuits.

As the vast majority of neuroscience focuses on a few standard lab-based animal models, Dr Chung's current study works to re-discover one of the classical neuroscience model animals – the octopus.

Another potential benefit is to contribute a new animal model which contains different sensory and neural networks into the bio-inspired application such as soft robotics and computer vision system.

UQ Infrastructure	Capabilities
Queensland Brain Institute	Advanced microscopy, neural tracing
Centre for Advanced Imaging	16.4T MR imaging in non-model animals, developing image analyses
National Imaging Facility-Queensland Node	Brain imaging
Moreton Bay Research Station	Animal sampling, field work supports, behavioural experiments

Further information
Ana Vuckovic
Business Development Officer
T 3443 1751

REDUCING SKIN CANCER RISK

A new treatment that could help prevent organ transplant recipients from developing harmful skin cancers

Cancer is the leading cause of death for kidney transplant recipients in Australia, not transplant failure or rejection.

However, Associate Professor James Wells and his team at The University of Queensland's Diamantina Institute have identified a potential solution to prevention of skin cancers for patients receiving immune-suppressing drugs, and are working with UniQuest, UQ's technology transfer company, to find a potential partner to take this promising drug candidate through preclinical development and into clinical trials and ultimately to market.

"This new potential therapy works by enabling the patient's immune system to fight the skin cancer locally, without impacting the most commonly prescribed drug, tacrolimus – an immune suppressant, and its role in preventing rejection of transplanted organs," says A/Prof James Wells.

Working with A/Prof Wells, the team at UniQuest's Queensland Emory Drug Discovery Initiative (QEDDI) discovered a molecule that, specifically activates cancer clearing mechanisms at the site of the skin cancer, allowing the patient's immune system to quickly eliminate the skin cancer without the need for invasive surgery.

A/Prof Wells said that using this molecule would help the patient's immune system clear up the cells damaged from UV rays and prevent skin cancers from growing or developing.

UniQuest Executive Director of Intellectual Property Commercialisation Dr Mark Ashton said QEDDI was uniquely placed to drive the drug discovery and development activities supporting A/Prof Wells' successful NHMRC Development Grant application.

"QEDDI compliments and adds significant value to the rich knowledge base of disease pathways and target biology held by UQ's research teams, enabling the translation of biology in to drug candidates that could progress to new medicines. Our fully integrated small molecule drug discovery facility is based at UQ's Institute for Molecular Bioscience, so researchers can easily collaborate with QEDDI's industry-experienced team to progress their potential new therapies towards the clinic," Dr Ashton said.

This is currently the only drug of its type that could prevent the incidence of skin cancers for transplant patients.

UQ Infrastructure	Capabilities
The University of Queensland Diamantina Institute	Immunological expertise; Establishing novel cancer models; assessing immune function in cancer; testing the impact of immunotherapeutics; T cell activation studies
Queensland Emory Drug Discovery Initiative (QEDDI)	Market analysis; Drug Discovery and development, medicinal chemistry, biology and pharmacology; Therapeutics, project management, commercialisation
Translational Research Institute	Flow cytometry and Histology Facilities; Biological Research Facility; Clinical Research Facility; Tissue culture
Princess Alexandra Hospital	Clinical knowledge, samples, and expertise
UQ Biological Resources	Animal management; embryo transfer and rederivation

Further information

Ana Vuckovic
Business Development Officer
T 3443 1751

UQ FACILITIES HELPED DEVELOP HOME COVID-19 TEST

The University of Queensland's Central Research Platforms and numerous facilities across the campus regularly work with Industry to solve some of world's most pressing problems.

Several of University of Queensland research facilities have been critical to the development of a 20-minute, smartphone-linked, home COVID-19 diagnostic test now available in the US.

The Ellume COVID-19 Home Test, developed by **UQ alumnus Dr Sean Parsons'** biotechnology start-up Ellume, employed UQ's Australian Biomolecular Interaction Facility (ABIF) and Protein Expression Facility (PEF) to develop the technology.

UQ's **Associate Professor Bryan Fry** said that he and his ABIF colleagues were proud to have helped develop the community-transmission-curbing tech.

"Ellume needed to precisely measure chemical reactions to validate that their kit was indeed able to efficiently and reproducibly detect the virus," Dr Fry said.

"And at UQ, we have the only machine capable of conducting these particular experiments – known as kinetic binding experiments – in the southern hemisphere.

"The Octet HTX can screen thousands of samples a day for applications like vaccine development, drug design, medical diagnostics, and detection of toxins in agricultural products.

"UQ's ABIF can help replace laborious, error prone, and expensive assay techniques, such as ELISA (enzyme-linked immunosorbent assay) – routinely used to measure antibody titres after vaccination.

"The high throughput and fully automated workflow replace expensive laboratory technicians – our robot is able to work 24 hours a day, non-stop while generating much more accurate data.

Professor Linda Hwee-Lin Lua, Director of UQ's PEF, said they are perfectly placed to rapidly assist Ellume.

"By delivering highly pure and functional SARS-CoV-2 recombinant proteins at the outset of the pandemic, PEF was able to accelerate Ellume's development and verification of their range of COVID-19 diagnostic tests." Professor Lua said.

UQ Infrastructure	Capabilities
Australian Bimolecular Interaction Facility	Octet HTX for screening and measuring of measuring interactions between proteins. Useable for a wide range of applications ranging from antibody-virus interactions through interactions between proteins and receptors. Integrated with a Hamilton Vantage robot, allowing for full automation of workflows and thus capable of high-throughput screenings of up to 96 reactions every 10 minutes.
Protein Expression Facility	Baculovirus - insect cell technology for protein production; 24-well plate format parallel expression optimisation; Multi steps purification strategy including tangential flow filtration, affinity - and size exclusion chromatography; Protein analytics and characterisation including PMF, IM, SEC-MALS; Protein thermal and conformational stability analysis using nano differential scanning fluorometry.

Further information
Ana Vuckovic
Business Development Officer
T 3443 1751

"RUNNING" INTO THE FUTURE WITH PRINTABLE BATTERIES

Printable electronics is an exciting field of research with varied and extensive applications – and now thanks to the development of a new breed of printed batteries, its applications are making their way into our daily lives.

Imagine being able to wrap a special bandage around an injured limb, have it send real-time updates to your doctor or having a smartphone that's so thin you can roll it up and put it in your pocket, while also charging it on the go via your solar-power-generating clothes.

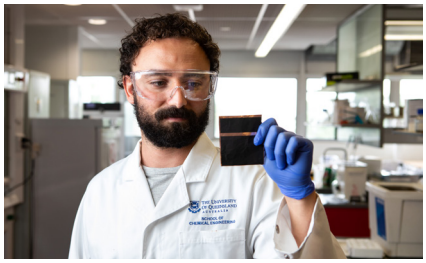
While the application of flexible electronics is limited only by our imaginations, these devices must be powered by batteries, which in most cases are heavy, cannot be bent and need to be connected by wires. In addition, most batteries contain toxic chemicals and cannot be easily recycled, which poses an environmental problem.

These challenges are being tackled by researchers at UQ, who are supporting Printed Energy specialising in printed batteries and photovoltaics, to develop paper-thin, flexible, rechargeable batteries in partnership with the University of New South Wales (UNSW). The collaboration has been made possible by an Australian Government Cooperative Research Centres Project (CRC-P) grant, and led by Professor Chris Greig, Professor Vicki Chen and Professor Lianzhou Wang.

One impressive example of the progress of this technology, is the trial of "smart" marathon bibs, used in December 2019 for capturing runners' times. These paper-thin batteries were printed via a screen-printing technology, not unlike a paper printing one, integrated with radio-frequency identification (RFID) sensor. The printed battery can provide power for the RFID sensor for recording and sending the data from the race runner.

"These batteries are made of zinc and manganese oxide, which are both cheap and easily recycled, making them far more sustainable than current alternatives," says Dr Miaoqiang Lyu, an Advance Queensland Research Fellow .

Dr Lyu says flexible printed batteries are much safer than alternatives such as lithium-ion batteries. "This makes them more suitable for use in medical devices, wearable healthcare electronics and therapeutics," he says.



PhD researcher Benoit Clement, holding printed flexible electrodes for printed batteries

UQ Infrastructure	Capabilities
Australian National Fabrication Facility–Queensland	Metal oxide thin-film deposition using the magnetron sputtering system.
Centre for Microscopy and Microanalysis	Fundamental studies: printed battery ink materials, electrodes and additives, including chemical valence states, morphologies of materials and phases of electrode materials at different electrochemical stages – SEM, XRD and XPS
School of Chemical Engineering	Battery assembly and testing
Australian Institute for Bioengineering and Nanotechnology	Surface area analysis for the porous electrode materials using BET
UQ Glassblowing Services	Home-designed glassware and testing kits for electrochemical experiment

Further information
Ana Vuckovic
Business Development Officer
T 3443 1751

COUNTERACTING CORONAVIRUS

Understanding a novel virus is the first step in developing effective diagnosis, prophylactic vaccines and therapeutics.

Thanks to its fully fledged, highly advanced range of capabilities to enhance research into infectious pathogens and the prevention and treatment of disease – along with leading research technologies, specialised equipment, and fit-for-purpose laboratories – UQ is well placed in the current fight against coronavirus.

UQ Protein Expression Facility Director **Professor Linda Lua** believes UQ's expertise in immunology, structural biology, vaccine engineering and bioprocessing, and materials fabrication and characterisation has assisted many of the University's COVID-19-related research activities.

"In drug discovery, rapid diagnostics and vaccine development, it's critical to have a comprehensive understanding of the virus-host interaction and the structure and function of key viral proteins," she says.

"UQ has several centres with a range of expertise and diverse equipment on offer to accelerate drug discovery and the development of rapid diagnostic tools and vaccines

For example, the **Australian National Fabrication Facility** - Queensland node offers state-of-the-art fabrication, characterisation and 3D printing services.

This can help create diagnostic devices for early rapid disease identification and also develops and tests personal protective equipment (PPE) to protect against virus transmission.

UQ Infrastructure	Capabilities
Australian Genome Research Facility	Sanger sequencing for validation purposes
Australian National Fabrication Facility–Queensland	Diagnostic devices, PPE manufacture and quality-control, design and fabrication of microfluidic devices, rapid development of medical treatments
Centre for Advanced Imaging	Processing of small molecules via NMR molecular structure determination tools, preclinical molecular imaging, vaccine component monitoring, vaccine safety testing, clinical tracing, long-term patient monitoring
Centre for Microscopy and Microanalysis	Macromolecular and protein structure characterisation via TEM; cryo-EM and use of X-ray protein crystallography for protein structure determination; mass photometry for measurement of macromolecules complexes and their molecular mass.
Protein Expression Facility	Recombinant protein production, high-grade plasmid DNA, serology-specific reagents, protein engineering, bioprocess development, antibody technology
Research Computing Centre	GPU high-performance computer cluster Weiner for processing data from the electron microscopes to produce a 3D model of the "spike" protein
TetraQ	Rodent toxicology and pharmacokinetic services, bioanalytical services

Further information
Ana Vuckovic
Business Development Officer
T 3443 1751

EXPANDING SPINIFEX SUCCESS

Traditionally used by Indigenous Australians for building materials, household goods and weapons, spinifex grass, a sacred symbol of resilience which embodies significant Indigenous traditional knowledge, has recently revealed exciting possibilities at the nano-scale.

Working in collaboration with the Dugalunji Aboriginal Corporation, UQ researcher Professor Darren Martin and his team at the Australian Institute for Bioengineering and Nanotechnology (AIBN) have discovered that the arid Australian grass is a unique source of flexible cellulose nanofibres (CNF) of very high yield, tensile strength and toughness.

"This makes it ideal for creating high-value medical gels; stronger recycled paper, cement, mortars and grouts; and stronger and thinner rubber products such as latex gloves and condoms," Professor Martin says.

"We see great potential in an emerging global nanocellulose market for producing high-quality biomaterial that will reduce waste and CO_2 emissions, and also boost jobs in remote Indigenous communities."

Professor Martin's team relied heavily on two UQ infrastructure units, **Australian National Fabrication Facility – Queensland** and the **Centre for Microscopy and Microanalysis**, to characterise the obtained nanocellulose and a myriad of nanocellulose-reinforced composite systems, as well as to progress basic research.

The Spinifex Pilot Facility at Long Pocket now houses specialty equipment for spinifex washing, drying, grinding, pulping and refining into several nanocellulose grades.

UQ Infrastructure	Capabilities
Australian National Fabrication Facility–Queensland	Characterising CNF and composites (Atomic Force Microscopy), measuring flow properties of latex and medical gels (rheometers), measuring viscoelastic properties of composites (Dynamic Mechanical Analyser), ascertaining trace impurities for medical gels (HPLC and LCMS)
Centre for Microscopy and Microanalysis	Preparing thin sections for electron microscopy (Ultra Cryomicrotomy), obtaining statistical morphological measurements of CNF measure strength, obtaining contrast and high-resolution structure of CNF-reinforced composites (paper, cement, rubber and gels) – SEM, CryoSEM, CryoTEM, XRD, XPS, SAXS and Raman

Further information
Ana Vuckovic
Business Development Officer
T 3443 1751

HATCHING HEALTHIER CHICKS

Adjusting to life on the farm after having been 'in ovo' (in the egg) can be quite a challenge for baby chickens.

Moving from a close-to-sterile environment to one with drastically variable conditions can expose them to a wide range of potentially fatal enteric diseases.

Dr Marta Navarro and **Dr Shahram Niknafs**, postdoctoral research fellows in UQ's Centre for Nutrition and Food Sciences, believe that establishing a beneficial and protective microflora early in life could help reduce chickens' susceptibility to such disease and boost their immunity for episodes later in life that may otherwise require antibiotics.

"We are investigating how chickens can develop a non-pathogenic microbiome, while still an embryo," Dr Navarro says.

"To this end, we have put together a state-of-the-art pilot hatchery at UQ St Lucia, funded by AgriFutures Australia, as a way of supplementing nutrients to the developing embryo.

"We are evaluating 'in ovo' interventions that could program future 'ex-ovo' microbiomes to develop a healthy gut."

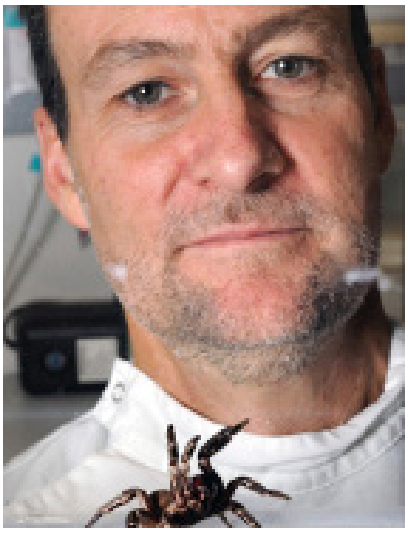
The overall aim of this research is to ensure chicken longevity and viability.

UQ Infrastructure	Capabilities
Australian Institute for Bioengineering and Nanotechnology	Metabolomics, NMR structural elucidation, free radical detection
Queensland Animal Science Precinct	Temperature controlled animal shed with custom-designed livestock housing; highly trained staff who provide specialised support in animal welfare and best research practices
Queensland Brain Institute	Microbiomics
UQ Biological Resources	Pilot hatchery (including incubation and brooding facilities)

Further information
Ana Vuckovic
Business Development Officer
T 3443 1751

REDUCING STROKE IMPACT

When a stroke happens, the brain becomes deprived of oxygen, triggering lactic acidosis similar to what happens to the body during strenuous exercise. This then results in acid-sensing ion channels being turned on, initiating a chain of events that leads to the death of neurons and, ultimately, irreversible brain damage.



But UQ researcher Professor Glenn King and his team at the Institute for Molecular Bioscience have found a possible solution to short-circuit this response.

"We have uncovered a peptide from the venom of funnel-web spiders that can inhibit acid-sensing ion channels and stop the wave of post-stroke destruction," he says.

"The peptide is called Hi1a and has the potential to not only save lives but transform the quality of life for stroke survivors.

"Until this discovery, no current treatment for stroke had been available outside a hospital and for many, this is too late. Administering a peptide treatment while the patient is in the ambulance will save brain tissue and so prevent death or disability for millions."

Professor King's team was fortunate to rely on a broad range of UQ infrastructure to confirm their findings.

UQ Infrastructure	Capabilities
Centre for Advanced Imaging	Used PET technology to identify how Hi1a travels to various tissues in the body
Centre for Microscopy and Microanalysis	Determined the three-dimensional structure of acid-sensing ion channels
Mass Spectrometry Facility	Performed quality control of manufactured Hi1a
Protein Expression Facility	Explored recombinant protein expression in multiple heterologous hosts
Queensland Nuclear Magnetic Resonance Network	Determined the three-dimensional structure of Hi1a
Research Computing Centre	Maintained data repositories, storage and virtual machines to develop in-depth understanding
UQ Biological Resources	Maintained frogs to allow collection of oocytes for testing the function of Hi1a

Further information

Ana Vuckovic
Business Development Officer
T 3443 1751

‘COOLING’ HEAT STRESS

Hyperthermia episodes – when animals get too hot and suffer heat stress – are considered one of the main welfare and economic problems in modern pig production.

Lactating sows are particularly vulnerable to heat stress because of the high exothermic capacity of their large bowel, in association with the high demands on them to produce milk to feed their litters.

Dr Marta Navarro, a postdoctoral research fellow in UQ’s Centre for Nutrition and Food Sciences, is all too familiar with this scenario. She expects the situation to only worsen in the future, with more heat waves of increased frequency, length and intensity predicted.

“Porcine genetic selection has prioritised reproductive efficiency and fast and lean weight gain, while ignoring heat resilience traits,” she says.

“As a result, pigs today show an increase in body heat production that jeopardises physiological adaptations towards high ambient temperatures.”

Interestingly, large variations exist between individuals and their heat tolerance, which could be partly related to specific gut microbiome profiles and/or innate metabolic pathways that enhance the capacity to cope with the metabolic effects of heat stress.

Dr Navarro is now working on a research project funded by the Australasian Pork Research Institute Limited to investigate metabolic pathways linked to heat resilience in lactating sows. She plans to capitalise on UQ’s expertise in nutritional strategies to prevent heat stress, the availability of state-of-the-art climate control facilities at the Queensland Animal Science Precinct, and the leadership in ‘omics’ analytical technologies at UQ St Lucia.

UQ Infrastructure	Capabilities
Australian Institute for Bioengineering and Nanotechnology	Metabolomics, NMR structural elucidation, free radical detection
Queensland Animal Science Precinct	Custom-designed climate control rooms with highly accurate control of temperature and relative humidity to mimic a climatic event; highly trained staff who provide specialised support in animal welfare and best research practices
Queensland Brain Institute	Microbiomics
School of Chemistry and Molecular Biosciences	Proteomics

Further information

Ana Vuckovic
Business Development Officer
T 3443 1751

TARGETING BRAIN TUMOURS

Treating brain cancer is very complex and challenging. Treatment must target cancer tissue without damaging surrounding non-cancer tissue. Another challenge is to determine if the new drug is delivered to the tumour.

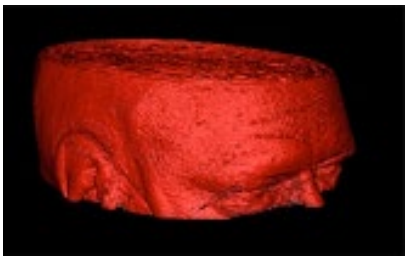
UQ researcher Dr Gary Cowin at the Centre for Advanced Imaging knows all too well how difficult these challenges can be.

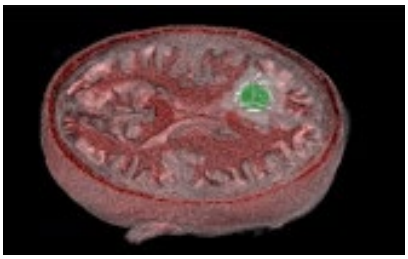
"The blood-brain barrier is designed to keep foreign chemical drugs out of the brain," he says.

"A perfect drug for killing cancer cells may be useless as a treatment if it cannot get into the tumour, which is where our use of UQ infrastructure comes into play.

"For example, at the **National Imaging Facility – Queensland node**, MR-PET testing allows measurement of the blood-brain barrier integrity and PET-labelled drug delivery at the same time.

"Dynamic MRI shows bright regions due to increased uptake of Gadolinium in the tumour and surrounding regions, and the green shows the PET uptake of a new drug targeting the tumour. This makes assessing the effectiveness of new drugs much easier."





UQ Infrastructure	Capabilities
Australian National Fabrication Facility–Queensland	Synthesis of novel probes for diagnostics and treatment
Centre for Advanced Imaging	Imaging, metabolomics, NMR structural elucidation, free radical detection
Herston Imaging Research Facility	Human imaging, PET radiotracer development
National Imaging Facility – Queensland node	Imaging, probe development, radioactive PET tracers
Research Computing Centre	Data management, analysis, visualisation and data sharing
TetraQ	Preclinical GLP-accredited animal trials and first in human clinical studies
UQ Biological Resources	Animal management, models and manipulation

Further information

Ana Vuckovic
Business Development Officer
T 3443 1751

‘TICKING’ ALL THE BOXES

Cattle ticks and the diseases they carry are estimated to cost the cattle industry $175 million in Australia and US$22–30 billion worldwide.*

While Australia has led the world in tick vaccine research since the development of CSIRO’s TickGARD vaccine in the 1990s, there is still a way to go.

But Professorial Research Fellow at UQ’s Centre for Animal Science **Professor Ala Tabor**, who has been studying the problem since 2005, believes an answer is near.

“Although the TickGARD vaccine was successful, it was not suitable for northern beef industries because boosts had to be administered three or four times a year and cattle there are only mustered once a year,” she says.

“So, in 2005, tick vaccine research recommenced in a third Beef Cooperative Research Centre, developing a modern ‘reverse vaccinology’ approach that led to the identification of 400 possible vaccine candidates. These were screened in wet lab assays and in an in vitro tick feeding model, identifying around 20 lead candidates.

“We have now completed individual testing of these candidates, which show positive initial success – with four final lead candidates being tested in final trials.”

The research is now at the commercial end of the program and full patents were lodged in February 2018 through Meat & Livestock Australia and the Queensland Department of Agriculture and Fisheries. If successful, the vaccine will return $98 million in revenue to the state.

UQ Infrastructure	Capabilities
Pinjarra Hills Research Facility	Vaccine trials, sample collection, host-biomarker identification, cattle agistment
Protein Expression Facility	Vaccine production
Queensland Animal Science Precinct	Vaccine trials, 24 individual moated pens for cattle tick infestations and collections

* *Meat & Livestock Australia, 2005, and* Ticks and tick-borne diseases *journal, 2016.*

Further information
Ana Vuckovic
Business Development Officer
T 3443 1751

TUMOUR TISSUE TECHNOLOGY

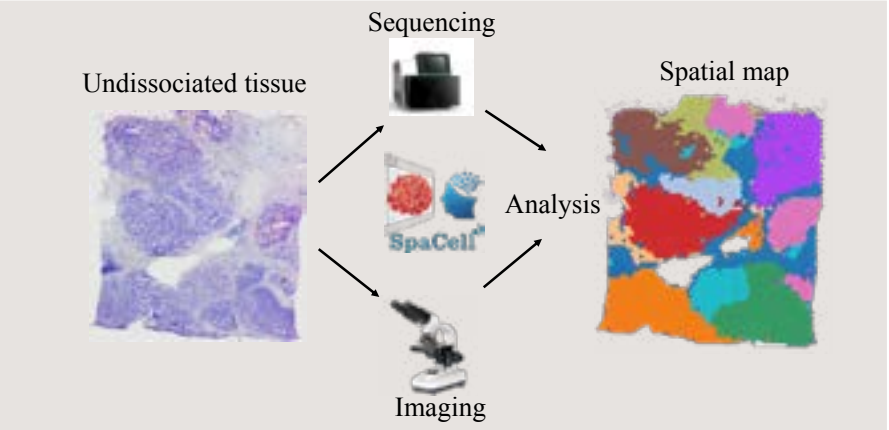
Spatial transcriptomics is a revolutionary new technology that allows researchers to sequence tissue without dissociation, and so understand its complexities more easily.

Currently being pioneered by Institute of Molecular Bioscience's Nguyen Group to study skin cancer and paediatric brain cancer, the technology generates important knowledge of intratumoural heterogeneity.

Combining high-resolution sequencing and tissue imaging data, it creates novel spatial cellular maps that elucidate tumour changes in response to therapy, and also generates unprecedented new understanding of microenvironments, cell types, and cell-to-cell interactions.

By integrating tissue image and spatial genomics information, early detection of disease onset or disease development (before phenotypes can be seen by the human eye) is possible.

"The spatial transcriptomics data we generate allows us to identify cell types, their spatial organisation, cell-cell interactions, and the native tumour microenvironments at tissue scale and at single-cell resolution," says Group Leader **Dr Quan Nguyen**.



Building a spatial map of breast cancer tissue

"Using these approaches, we will be able to identify rare cells within a tumour that ultimately drive relapse, and will further elucidate the molecular and cellular basis of relapse. This will lead to better survival outcomes for patients."

"We also have the potential to improve the sensitivity and accuracy of molecular pathological diagnosis, which is extremely important in cancer pathology – especially for biopsies in brain tumour and early melanoma cancer. Traditional histopathological analysis of a stained microscopic slide is highly variable, time-consuming and semi-quantitative, but from this work, we expect to develop computer assisted tools to hasten the process."

With more people affected by skin cancer than any other cancer, and paediatric brain cancer being the leading cause of disease-related mortality in children, the impact of the Nguyen Group's research is sure to be extremely high.

UQ Infrastructure	Capabilities
Genome Innovation Hub	Collaborations in the development of experimental protocols (RNAScope and Spatial Transcriptomics sequencing and imaging) and bioinformatics analysis (machine learning)
IMB Sequencing Facility	Customised sequencing protocols for spatial transcriptomics libraries
Research Computing Centre	GPU high-performance computer cluster Weiner supports the advanced machine learning analysis to combine big data generated from imaging and sequencing experiments
School of Biomedical Sciences	Imaging and Histology facilities

Further information

Ana Vuckovic
Business Development Officer
T 3443 1751

UNIQUELY AUSTRALIAN FOODS

Australia has a range of unique, native food products that present a major opportunity for growers and suppliers to sell in both the domestic and export premium markets.

And researchers at UQ's ARC Training Centre for Uniquely Australian Foods are determined to help them make the most of this opportunity.

"Thanks to the highly advanced range of capabilities available at the University, we can advise agricultural entrepreneurs about the nutritional value of Australian native foods as well as their sensory profiles, physical properties, and antimicrobial and antioxidant characteristics," says Centre Director **Associate Professor Yasmina Sultanbawa**.

Native Australian plant foods often have high nutritional levels and unique sensory properties, yet very few of them have been studied in depth.

At the Queensland Alliance for Agriculture and Food Innovation (QAAFI), where the ARC Training Centre for Uniquely Australian Foods is based, studies have been conducted over many years to analyse the nutritional properties, safety qualities and targeted metabolomics of foods such as the green plum, Kakadu plum, Burdekin plum, native honey, seaweed, and a multitude of herbs, spices and legumes.

A trained panel and state-of-the-art sensory facilities are used to provide sensory descriptions and consumer preferences, and recommendations are then made to develop unique products.

The Kakadu plum's use in extending the shelf life of prawns is just one such innovative example.

UQ Infrastructure	Capabilities
Australian Institute for Bioengineering and Nanotechnology	Particle size distribution, physical and chemical properties of nanoemulsions
Centre for Advanced Imaging	MRI for fruit structure, metabolomics by NMR for chemical composition, NMR structural elucidation for chemical compounds, and antioxidant activity by EPR for food preservation properties
Centre for Microscopy and Microanalysis	Characterisation of plant material and antimicrobial properties
Protein Expression Facility	Protein functionality and properties
School of Agriculture and Food Science	Synbiotics and animal science for studying specialised animal feed
School of Chemical Engineering	Rheology and tribology studies to understand mechanical properties of foods and their functionality

Further information
Ana Vuckovic
Business Development Officer
T 3443 1751

REVEALING OUR RECENT PAST

To understand how the environment is changing and to predict how it may change in future, first we need to identify and quantify what has happened in nature recently – both on land and at sea.

Fortunately, UQ's combination of world-class geochemical facilities, electron imaging facilities, marine research stations and specialised boating infrastructure allows us to do just that.

"Separating the effects of anthropogenic and natural change is necessary to predict future change and to target appropriate strategies for amelioration, management and adaptation," says **Professor Gregory Webb**, Dorothy Hill Chair in Palaeontology in the School of Earth and Environmental Sciences.

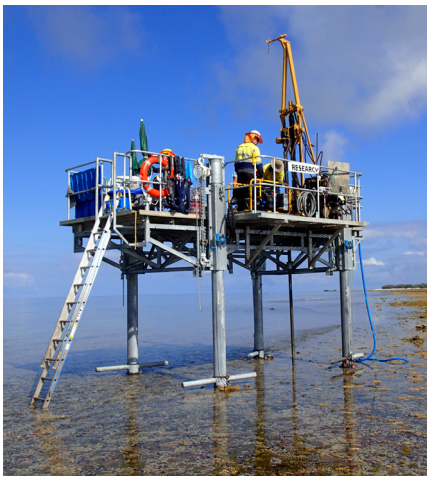
"We have been able to date some of the most important palaeoenvironmental archives – such as coral skeletons, cave stalagmites and stromatolites – from as young as decades old to those dating back hundreds of thousands of years.

"These materials grow sequentially and record a temporal record of their local environment through their trace element geochemistry."

Recent studies have used 20th century corals to provide detailed records of changing water quality in the Great Barrier Reef as well as temporal records of land clearing and burning in the adjacent catchment. These records have allowed identification of the sources and causes of water pollution as well as the evaluation of previous catchment legislation.

Older corals (2,000–8,000 years old) have yielded information about water temperatures in the Reef as well as the initiation of El Niño climate forcing.

And stromatolites (layered rocks made by microbes) in South Australian lakes



have recorded anthropogenic changes in water levels as well as changing climate.

"All reveal what was 'normal' in the past and what may not be in the future," says Professor Webb.

UQ Infrastructure	Capabilities
Central Boating and Diving Facility	Drilling platform of the RV *D Hill*
Centre for Microscopy and Microanalysis	Scanning electron microscopy, elemental analysis and mapping
Centre for Geoanalytical Mass Spectrometry	Precise U-series dating in low-blank laboratory, ultra-low level trace element analysis by solution and laser ablation ICP-MS, stable isotope analysis, specialised staff in geochemical analysis for environmental studies
Marine stations	Sample collection and research on Great Barrier Reef

Further information

Ana Vuckovic
Business Development Officer
T 3443 1751