Open career paths and develop critical thinking skills

Contact the relevant laboratories for Honours project opportunities
What is an Honours program?
An Honours program is intended to provide students with a ‘research apprenticeship’ with students being integrated into existing research teams where practicable. The program is designed to ensure a thorough grounding in major methodologies common to most biomedical and medical science disciplines and will expose students to a research environment at the leading edge of new knowledge development and innovation. It is the first step towards a career in research, and a unique opportunity for students to explore their research potential.

You’ll work independently on a research project of interests to you, under the supervision of an academic in the Faculty.

You’ll gain advanced scientific knowledge, learn to plan, organise and find solutions, work independently and communicate your ideas and results to your peers, the scientific community and the general public.

What am I supposed to do with this manual?
The goal of this manual is to provide you with a guide to the research profiles of potential supervisors in the School of Life Sciences at UTS. Please look through this manual and contact supervisors who’s research you are interested in. Contact the supervisor(s) directly and arrange a time to meet to discuss your interest in undertaking an honours under their supervision.

What am I supposed to do after I have decided on a project?
1. Finalise agreement for supervision – it is important that you obtain agreement that the Academic offering the project is willing to supervise you.
2. Submit the appropriate application forms based on your degree choice, as below.
3. Download the application forms to complete and submit. (QR code link or https://bit.ly/2lMprd6).
Collaborations:
- A/Prof Kevin A. Keay, The University of Sydney
- Dr Gian Marco Leggio and Dr Giuseppe Musumeci, University of Catania, Italy
- Prof James A. Waschek, University of California at Los Angeles (UCLA)

Dr Castorina received his PhD in Neuropharmacology from the University of Catania, Italy in February 2009. In June 2009, Dr Castorina was the recipient of a post-doctoral fellowship and in 2011 was appointed as Lecturer by the same university. In 2015 Dr Castorina took on a new academic challenge and moved to Australia, where he joined the University of Sydney as a Senior Research Fellow. In 2016 he was appointed by UTS as Senior Lecturer and in 2017 he established the LCMN. His research focuses on impact of neuroinflammation in the onset and progression of neurological diseases. His recent studies have shown that a class of neuropeptides (PACAP and VIP) are able to reduce brain inflammation and afford neuroprotection in models of Multiple Sclerosis and Parkinson’s disease.

**Research Interest at the LCMN include:**
- Unravelling the biological role of PACAP and VIP in models of Multiple Sclerosis (MS) and Parkinson’s disease (PD).
- Repurposing of old drugs to reduce the inflammatory burden in models of MS and PD.

**Methods/Research Skills commonly utilised at the LCMN include:**
- Cell culture
- Animal models of Multiple Sclerosis and Parkinson’s disease
- RNA extraction, end-point PCR, Real time PCR
- Western blot, ELISA and other biochemical assays
- CRISPR-Cas9 mediated gene editing and bioinformatics
Andy received her PhD in Evolution, Ecology and Systematics from the Australian National University (ANU), where she investigated the functional significance of leaf form. Andy commenced as a full-time academic at UTS in 2007, where she has been a researcher, supervisor and educator in environmental science ever since. Andy is fascinated with plants living in harsh conditions, particularly arid regions, typified by extreme temperatures and low irregular rainfall. High temperature extremes are increasing in both intensity and frequency in the future and researchers in Andy’s lab are uncovering how plants cope with temperature stress, so that we can better understand their future survival and distribution.

**Keywords:** plants, botany, plant ecology, thermal tolerance, climate change, desert, semi-arid, arid

**Research Interest/Honours Project opportunities:**
- Plant tolerance to both extremes: hot and cold, including field work in remote NSW and/or glasshouse studies at ANU, Canberra.
- How do droughted plants cope with heat extremes, based at the Australian Arid Lands Botanic Garden, Port Augusta, South Australia.
- Potential for co-supervised plant projects at University of Wollongong (plant heat stress in urban environments) and University of Tasmania (leaf form and function).

**Methods/research skills commonly utilised in Andy's laboratory include:**
- Predominantly physiological measurements of plants, such as:
  - Leaf function and response to temperature stress using chlorophyll fluorometry;
  - Leaf gas exchange (photosynthesis, conductance, transpiration, respiration) using an Infrared Gas Analyser and/or Porometer;
  - Leaf temperature using infrared thermography and/or thermocouples and dataloggers;
  - Potted plant experiments (experimental garden in Port Augusta or UTS rooftop);
  - Leaf morphological measurements;
  - Plant identification in the field;
  - Spectroradiometry for leaf pigment analysis;
  - Protein extraction and Western Blots (in conjunction with Stella Valenzuela’s laboratory).

**Team members (present and recent past):**
- Alicia Cook, PhD student
- Kirsty Milner, PhD student
- Tiffany Carroll-Macdonald, PhD student
- Eli Bendall, PhD student, co-supervised at University of Wollongong
- Neil Berry, Honours (2017-2018)
- Dr Ellen Curtis, PhD (2012-2017)

**Collaborations:**
- Prof John Close, ANU.
- Prof Kristine French, UOW.
- Prof N. Michelle Holbrook, Harvard University.
- A/Prof Greg Jordan, University of Tasmania.
- Dr Brad Murray, UTS.
- Prof Adrienne Nicotra, ANU.
- Dr Katherina Petrou, UTS.
- Dr Sanna Sevanto, Los Alamos National Laboratory.
- Professor David Watson, Charles Sturt University.
- Staff and Friends of the Australian Arid Lands Botanic Gardens and the Port Augusta City Council, Port Augusta, South Australia.

**Website/publications:**
I am a cellular immunologist specialising in infectious diseases. My current research projects are focused on identifying new biomarkers to aid the diagnosis of lung diseases including tuberculosis and LAM and in dissecting the mechanisms by which macrophages control infection and regulate inflammation. The laboratory is also working on developing new treatments for tuberculosis and the non-tuberculosis mycobacteria, which are a major problem for individuals with cystic fibrosis.

Keywords: tuberculosis, macrophages, infection, cystic fibrosis, lung inflammation, microRNA, biomarkers

Research Interest/Honours Project opportunities:
- Developing new drugs to treat tuberculosis and related infections
- microRNA and macrophage activation
- Biomarkers of TB disease
- Developing new biomarkers of LAM (lymphangioleiomyomatosis) disease

Methods/Research Skills commonly utilised in Dr Saunders Laboratory include:
- Microbiology
- Cell culture (human macrophages, cell lines)
- Immune assays (including ELISA, Cytometric Bead Assays, flow cytometry)
- Real time PCR, sequencing,
- In vivo infection studies with mice

Team members (optional):
- Jessica Pederson, PhD student
- Giang Le, PhD student
- Maxwell Stevens, PhD
- Karina Pazaky, Honours (spring 2019)
- Xinyuan Hu, Masters student
- Dr Nilesh Bokil, adjunct researcher

Collaborations (optional):
- Professor Warwick Britton, Centenary Institute (co-supervisor TB projects)
- A/Prof Valery Combes, UTS (co-supervisor LAM Project)

Website/publications: https://www.uts.edu.au/staff/bernadette.saunders
Dr Murray is an ecologist and conservation biologist in the Environmental Sciences Discipline Group. His research seeks to understand differences in flammability among plant species, from leaf to whole plant scales, with application to wildfire mitigation and biodiversity conservation at the wildland-urban interface. Student projects in his research group can involve experimental burns of plants, field surveys of plant and animal biodiversity, and statistical analyses of ecological datasets.

**Keywords:** biodiversity, conservation, ecology, evolution, flammability, wildfire

**Research Interest/Honours Project opportunities:**
- Projects in wildfire ecology targeting plant flammability, biodiversity conservation, indigenous fire management

**Methods/Research Skills commonly utilised in Dr Snow’s Laboratory include:**
- Experimental burns using a muffle furnace and plant BBQ
- Measurements of plant traits
- Field biodiversity surveys
- Statistical analyses in R

**Team members (optional):**
- Dan Krix, Post-doctoral Research Fellow
- Philippa Alvarez, HDR student
- Thomas Hawthorne, HDR student
- Elise Verhoeven, Honours student
- Molly Wallace, undergraduate intern student

**Collaborations (optional):**
- Dr Tim Curran, University of Auckland
- Prof. Chris Dickman, University of Sydney
- Dr Megan Murray, Assoc. Prof. Jonathan Webb, Dr Leigh Martin, UTS

**Website/publications:** [https://www.uts.edu.au/staff/brad.murray](https://www.uts.edu.au/staff/brad.murray)
Dr Oliver was initially trained in the UK. Following his work at Imperial College, UK, he completed his PhD in respiratory virology at The University of Sydney (2005). 7M AUD of funding, a few fellowships, and 150 publications later he now knows a thing or two about respiratory diseases. His group (around 20 people) carries out research spanning basic to clinical in all aspects of respiratory medicine.

**Keywords:** Asthma, COPD, CF, Lung Cancer, breathing

**Research Interest/Honours Project opportunities:**
- Understanding why people develop asthma and COPD focusing upon epigenetics
- Clinical research into biomarkers of disease

**Methods/Research Skills commonly utilised in A/Prof Oliver’s Laboratory include:**
- Cell culture
- Molecular biology (qPCR, RNAseq, ChiP ect)
- Cell signalling cascades (Western blotting, Confocal Microscopy, inhibitor experiments)
- In-vitro / ex-vivo / in-situ models of disease
- Clinical cohort studies

**Team members:**
- Dr Jeremy Chan, NHMRC post-doctoral fellow (maternal programming)
- Dr Xia Zenaki, post-doctoral fellow (Lung Cancer)
- Dr Raj Allum, post-doctoral fellow (models of asthma and COPD)
- Dr Joel Ma, post-doctoral fellow, (immunology)
- Dr Penny Dalla, post-doctoral fellow (proteomics)
- Dr David van Reyk, research associate (free radical biology)

**Collaborations (optional):**
- Dr Sanjay Chotamali (NTU – micobiome)
- Dr Ian Adcock (Imperial – epigenetics)
- Dr Rama Krishnan (Harvard – biomechanics)

**Website/publications:**
[http://respiratoryresearchgroup.org](http://respiratoryresearchgroup.org)
Join us for an exciting future in neuroscience. CNRM’s exciting research focuses on understanding and curing Alzheimer’s and Parkinson’s disease as well as studies of the neuroscience of learning and movement. We are part of UTS and we are located at the prestigious St Vincent’s hospital medical research precinct, which includes state-of-the-art facilities shared with AMR, Garvan Institute, Victor Chang Cardiac Institute and St Vincent’s hospital. We ensure an outstanding student experience and provide strong student support to ensure the basis of a fantastic future.

Keywords: Neuroscience, Alzheimer’s, dementia, Parkinson’s, neuroscience of learning and memory, neuroscience of movement, spinal cord injury, mental health disorders

Research Interest/Honours Project opportunities:
- Understanding the cellular basis of memory formation and modulation
- Mechanisms of Parkinson’s disease and approaches to cure
- Mechanisms and cures of Alzheimer’s disease and dementia
- Alzheimer’s and neuroinflammation-related deficits in decision-making
- Brain regeneration and stem cells
- Spinal cord injury
- Mental health and developmental disorders

Methods/Research Skills commonly taught to students at CNRM include:
- Animal models of Alzheimer’s and Parkinson’s
- State-of-the-art behavioural studies of learning and memory.
- Neurosurgery
- Sophisticated genetic manipulations in vivo and in vitro
- High-end Imaging and microscopy
- Detailed brain analyses
- Pharmacology, stem cells, cell culture, regeneration

Team members:
- Prof. Bryce Vissel
- Dr Laura Bradfield
- Dr Sandy Stayte
- Dr Jessica Leake
- Dr Peggy Rentsch
- St Vincent’s hospital doctors and researchers

Website/publications:
I obtained my PhD in microbiology from the University of New South Wales in 2010. My research focused on the ecology of host associated bacterial communities from the marine environment, and I now employ the same techniques to study microbial communities associated with the human body (the human microbiota). I use observational techniques to examine differences in the microbiome in health and disease to infer possible relationships between our resident bacteria and health. I also use experimental techniques and models to test the hypotheses generated from observational data. Currently I am actively working on respiratory microbiomes associated with chronic sinusitis and a model to increase microbial exposure and immune activation in mice.

Keywords: microbiology, microbiome, 16S rRNA gene sequencing, in-vitro model, mouse model

Research Interest/Honours Project opportunities:
- Development of multispecies communities in in-vitro models of the respiratory microbiome
- Assessment of the microbiome in “dirty” and laboratory mice

Methods/Research Skills commonly utilised in Dr Burke’s Laboratory include:
- Biological sample processing
- DNA extraction
- Molecular cloning
- Microscopy
- In-vitro cell culture
- PCR
- 16S rRNA gene sequencing
- Bioinformatics

Team members (optional):
- Ms Pooja Narang, PhD student
- Ms Sarah Ratcliffe, Honours student

Collaborations (optional):
- A/Prof Tri Phan, Garvan Institute of Medical Research
- Dr Mehra Haghi, UTS
- Dr Alen Faiz, UTS

Dr Gorrie received her PhD in Neuroscience from UNSW in 2008. She joined UTS in 2011 and you may know her as a teacher in one of your subjects (Histology, Neuroscience, Biobusiness) or as the Program Director for the Biomedical Science degrees. Her research interest is in neuroscience, in particular in neurotrauma (brain and spinal cord injury). She has conducted studies on human autopsy material and uses animal models to investigate damage and repair of the central nervous system. She has supervised 11 Honours students and 7 PhD students while at UTS.

**Keywords:** Spinal cord injury, stem cells, animal models, inflammation, histology

**Research Interest/Honours Project opportunities:**
- Development of compression model of spinal cord injury (SCI) in neonatal rats.
- Visualising spinal cord injury with Manganese enhanced Magnetic resonance imaging (MEMRI) and laser ablation-inductively coupled plasma-mass spectrometry (LA-ICP-MS).
- Neuroplasticity following spinal cord injury (SCI).

**Methods/Research Skills commonly utilised in Dr Gorrie's Laboratory include:**
- Animal (rat) models of SCI*, surgery, behavioural assessments
- Histology and Immunohistochemistry
- Imaging techniques
- Laser ablation-inductively coupled plasma-mass spectrometry (LA-ICP-MS).
- Cell culture, Real time PCR, ELISA, WB

**Team members (optional):**
- Miss Neus Gomila Pelegri, PhD student

**Collaborations (optional):**
- Dr Elizabeth Clarke (USYD)
- Dr David Bishop (MAPS)
- Prof. Bryce Vissel (CNRM)

**Website/publications:** [https://www.uts.edu.au/staff/catherine.gorrie](https://www.uts.edu.au/staff/catherine.gorrie)

*Animal ethics training is essential and all students must also undergo competency assessments. All experimental procedures will be conducted with appropriate UTS ethics approval.*
Dr Donovan has recently joined the Centre for Inflammation, Centenary Institute/UTS, directed by Professor Phil Hansbro. She has worked in Prof. Phil Hansbro’s team as an NHRMC Early Career Postdoctoral Researcher from 2016. Prior to joining his group, she completed postdoctoral training at Monash University and completed her PhD in Respiratory Pharmacology from The University of Melbourne. Dr Donovan’s research is focused on novel targets and therapies for respiratory diseases. Her primary focus is on murine models of chronic obstructive pulmonary disease (COPD), asthma-COPD overlap, and idiopathic pulmonary fibrosis, utilising genetically modified mice and small molecule inhibitors to elucidate disease mechanisms.

Keywords: respiratory pharmacology, COPD, asthma-COPD overlap, airway remodelling.

Research Interest/Honours Project opportunities:
- To assess the role of Flightless-1 in experimental chronic obstructive pulmonary disease.

Methods/Research Skills commonly utilised include:
- Mouse models of experimental COPD
- Tissue collection
- RNA extraction
- Real time PCR
- Western Blot
- Immunofluorescence

Team members (optional):
- Professor Phil Hansbro (Director, Chair of Inflammation, Centenary Institute/UTS)
- Dr Richard Kim (Post-doctoral Research Fellow, Lecturer)

Website/publications:  [https://www.uts.edu.au/staff/chantal.donovan](https://www.uts.edu.au/staff/chantal.donovan)
Dr Chris Rodrigues is a Molecular Microbiologist interested in bacterial molecular biology and genetics. He completed his PhD at the University of Technology Sydney (2007-2011) and his postdoc at the Harvard Medical School (2011-2017).

The Rodrigues lab is interested in the molecular processes that underlie the process of how bacteria develop into spores - one of the toughest cell types on Earth. Spores are dormant, highly-resistant cells that allow bacteria to persist in the environment. Spores are inert to antibiotics and resist common sterilisation methods that kill actively growing bacteria. Many spore-forming bacteria cause life-threatening disease in humans and animals, and contaminate food sources.

Website/publications: https://www.rodrigueslab.com

Keywords: bacterial development, spores, bacteria, molecular genetics, cell biology

Research Interest/Honours Project opportunities:
- Specialized secretion during spore development
- Morphogenesis of the spore envelope
- Physiology of spore development

Methods/Research Skills commonly utilised in the Rodrigues Laboratory include:
- Wide-field and super-resolution microscopy
- High-throughput genetic screens (Transposon-sequencing)
- Forward and reverse genetics
- Molecular biology (PCR, site-directed mutagenesis, molecular cloning)

Team members:
- Mr Ahmed Mohamed, PhD student
- Miss Johana Luhur, Honours student
- Miss Hayley Sherry, Undergraduate student

Collaborations:
- Dr. Cecile Morlot, Institute of Structural Biology - IBS (France)
- A/Prof Patrick Eichenberger, New York University (USA)
- Prof. David Rudner, Harvard Medical School (USA)
- A/Prof. Erdem Karatekin, Yale University (USA)
- Prof. Ulf Skoglund, Okinawa Institute of Science and Technology (Japan)
Collaborations:
- Dr Mohammad Hamidian, ithree institute
- A/Prof Scott Rice, Nanyang Technological University, Singapore
- A/Prof Georgios Sotiriou, Karolinska Institutet, Sweden

Dr Gunawan received her PhD in Biotechnology from UNSW Sydney in 2006. Dr Gunawan had her postdoctoral training in the School of Chemical Engineering, UNSW Sydney, then joined UTS in 2015 as a Chancellor's Research Fellow. Her research focuses on the unravelling of the molecular basis of pathogen resistance to antimicrobial nanoparticles and how to solve this resistance issue. With the rapid rise of antibiotic resistance, less conventional antimicrobials, such as silver nanoparticle, have been used as alternative technologies to fight infections. Dr Gunawan’s recent work demonstrated that WHO-listed priority pathogens are capable to adapt to nanoparticle toxicity. The bacteria genetically increased their capabilities to reduce the efficacy of the nanoparticle. In-depth understanding on the molecular mechanisms of the adaptation responses is key to the efforts to overcome this resistance capability.

Research Interest in Dr Gunawan’s Laboratory include:
- Understanding bacterial resistance in the form of biofilm growth
- Identifying genes that are responsible for the resistance characteristics
- Understanding the role of cell-to-cell communication in biofilm resistance

Methods/Research Skills commonly utilised in Dr Gunawan’s Laboratory include:
- Cell culture
- Genomic analysis
- RNAseq
- Quantitative PCR
- Bioinformatics
- Microscopy
David Booth is Professor of Marine Ecology at UTS, and past-President of the Australian Coral Reef Society. He has published over 140 papers in reef-fish ecology, climate change and other anthropogenic impacts on fishes and fisheries, in the Caribbean, Hawaii, Great Barrier Reef, and studies how tropical fish travel down the East Australian Current past Sydney. He researches fishes in estuaries around Sydney, the ecology and behaviour of threatened fishes such as seadragons, black cod and white sharks and the ecology of the deep sea. He is also a strong advocate of sustainable fisheries and marine parks.

Professor Booth is a core member of SEA SERPENT, a research collaboration between the oil and gas industry and independent scientists in the southeast Asian region. He has a strong record of applying his research to influence government policy, and is active in public communication (numerous media and public lecture appearances annually). He has researched fish recruitment, population dynamics and impacts of pollution in environments including Canadian freshwater lakes, worldwide coral reefs and Australian seagrass systems. He is a prominent researcher on the effects of climate change on marine biota, and recently lead author on a climate change report on temperate fishes. He is a core member of the Ocean Science Council of Australia (http://oceansciencecouncil.org/).

**Keywords:** marine fishes, climate change, biodiversity, marine ecology

**Research Interest/Honours Project opportunities:**
- Role of artificial reefs in enhancing marine fish biodiversity
- Status of key iconic species (seadragons, shaks) in SE Australia
- Ecology of tropicalisation of SE Australia
- Impact of pollutants eg cigarette bits on marine biota

**Methods/Research Skills commonly utilised in Prof Booth’s Laboratory include:**
- Field skills/logistics: e.g., snorkelling
- Aquarium fish experiment husbandry
- Analytical Skills: lipid analyses, otolith ultrastructure and microchemistry

**Website/publications:** [https://www.uts.edu.au/staff/david.booth](https://www.uts.edu.au/staff/david.booth)
Dr Chapman received his PhD in respiratory physiology from the University of Sydney in 2011. He completed his post-doctoral training at the University of Vermont, USA before joining the University of Technology Sydney in 2016. David is an internationally recognised expert in lung function and its effect on clinical outcomes in patients with lung disease. He has been at the forefront of research defining subgroups of obese patients with asthma and has greatly contributed to current understanding of the role of small airways disease in respiratory disease. Dr Chapman has twice been awarded the highest respiratory physiology prize in the country from the Thoracic Society of Australia and New Zealand, and was awarded the 2018 American Thoracic Society Award “for overall accomplishments and future promise”.

Keywords: lung disease, clinical physiology, small airways disease

Research Interests:
- Asthma
- Chronic Obstructive Pulmonary Disease
- Idiopathic Pulmonary Fibrosis
- Obesity

Methods/Research Skills commonly utilised in Dr Chapman’s Laboratory include:
- Spirometry
- Body Plethysmography
- Forced Oscillation Technique
- Multiple Breath Nitrogen Washout

Team members (optional):
- Mr Edward Jeagal, PhD student
- Miss Riva Shirol, Honours student

Collaborations (optional):
- Prof Greg King (Royal North Shore Hospital)
- A/Prof Cindy Thamrin (Woolcock Institute)
- A/Prof Claude Farah (Concord Hospital)

Website/publications: www.uts.edu.au/staff/david.chapman
Dr van Reyk received his PhD in free radical biology and immunobiology from the University of Sydney in 1998. He joined UTS from Heart Research Institute where he held a National Heart Foundation grant, and where he still holds an affiliation (https://www.hri.org.au/). His research focuses on the role of free radicals and reactive oxygen species in inflammation. He currently works in A/Prof Brian Oliver’s Respiratory Research Group (http://respiratoryresearchgroup.org/) at the Woolcock Institute of Medical Research (https://woolcock.org.au/) focusing on chronic inflammatory diseases of the lungs and environmental pollutants.

**Keywords:** free radicals, inflammation, immunology, reactive oxygen species

**Research Interest/Honours Project opportunities:**
- The role of leucocyte-derived oxidising species in the modification of, and the damage to, lung tissue in chronic obstructive pulmonary disease
- The impact of soil-derived particles upon the cells of the respiratory system
- Cell and tissue changes in cardiovascular disease and how they contribute to either atherosclerosis and heart failure

**Methods/Research Skills commonly utilised:**
- Cell culture principally using cells derived from humans and other mammals
- ELISA
- Flow cytometry
- Immunohistochemistry
- UV/visible spectrophotometry
- Analysis of protein modifications

**Collaborations:**
- Associate Professor Brian Oliver, UTS and Woolcock
- Dr Scott Levick, Kolling Institute of Medical Research
- Dr Benjamin Rayner, Heart Research Institute

**Website:** https://www.uts.edu.au/staff/david.vanreyk
Professor Deborah Marsh

Discipline Leader, Medical Science
Lab Head, Translational Oncology Group
School of Life Sciences
Faculty of Science
Deborah.Marsh@uts.edu.au

Professor Marsh is a cancer researcher trained in cell and molecular biology, genetics and epigenetics. Her PhD was awarded by the University of Sydney and she undertook postdoctoral studies at the Dana Farber Cancer Institute, Harvard Medical School, Boston, USA (1996-99). She joined UTS in August 2018 from the Kolling Institute, Royal North Shore Hospital and University of Sydney, and holds the honorary title of Professor of Molecular Oncology with the Faculty of Medicine and Health, University of Sydney. She has a broad research interest in malignancies that affect women, with a predominant focus on ovarian cancer. This includes research into familial cancer syndromes as well as sporadic tumours. She is also experienced in bio-banking. Her recent work is focussed on understanding the role of chromatin modifiers, both as drivers of malignancy and in overcoming drug resistance. Her group is also focussed on targeting DNA repair pathways and has a specific interest in the ‘guardian of the genome’ tumour suppressor p53. Furthermore, she collaborates with external researchers at the Kolling Institute, Royal North Shore Hospital, where honours students have also been placed.

Keywords: cancer, women’s cancers, DNA repair, tumour suppressors, molecular and cell biology

Research Interest/Honours Project opportunities:
- Sensitising ovarian cancer cells to therapeutic intervention
- Elucidating interactions between genetic and epigenetic changes in malignancy

Methods/Research Skills commonly utilised in Prof Marsh’s Laboratory include:
- Cell culture: including live cell imaging, transfection, cell survival assays, 3D bio-printing (new)
- Molecular techniques: cloning, gene editing (new)
- Protein extraction and analysis, e.g. immunoblotting, ELISA
- Real time PCR

Team members:
- Ms Kristie Dickson, Senior Research Assistant
- Mr Yue (Daniel) Ma, Honours student
- Ms Tao Xie, Honours student
- Mr Pritam Bordhan, Honours student

Collaborations (honours placement possibilities):
- Professor Robert Baxter, Kolling Institute, Royal North Shore Hospital (breast cancer and DNA repair)
- Dr Martyn Bullock, Kolling Institute, Royal North Shore Hospital (thyroid cancer, telomerase)

Academic Profile: https://www.uts.edu.au/staff/deborah.marsh
McDougald leads the Pathogen Evolution group located at The ithree Institute (Infection, Immunology and Innovation), UTS. The Pathogen Evolution group’s major research interests are the mechanisms of survival and persistence of pathogens in the environment, and what impact these mechanisms have on virulence and pathogenicity in the host. The team investigates the drivers and consequences of bacterial adaptation to stresses, including interactions with higher organisms. Broadly, the team studies the interactions of prokaryotes and eukaryotes using a number of model systems to investigate the impact of predation by protozoa on microbial communities and how evolution of grazing defences drives the evolution of pathogenicity in the environment.

Protozoa can release undigested pathogenic bacteria in expelled food vacuoles (EFVs) that have, until now, been an unrecognised vector for transmission of bacterial pathogens. The release of EFVs is driven by the bacterial pathogen. This project investigates the mechanisms of release of *Vibrio cholerae* and *Legionella pneumophila* in EFVs by identification of genes expressed by cells inside of EFVs.

**Keywords:** pathogenicity, predation by protozoa, evolution of virulence, *Vibrio cholerae, Legionella*

**Research Interest/Honours Project opportunities:**
- An unrecognised vector for transmission of pathogenic bacteria: Protozoa and expelled food vacuoles

**Methods/Research Skills commonly utilised in Dr Snow’s Laboratory include:**
- Molecular biology (cloning, mutagenesis, qPCR etc)
- Tissue culture assays
- Protozoan grazing assays
- Virulence factor bioassays

**Team members:**
- Dr Gustavo Espinoza-Vergara, post-doctoral fellow
- Dr Parisa Noorian, Post-doctoral fellow
- Mozammel Hoque, PhD student

**Collaborations:**
- Professor Fitnat Yildiz, University of California at Santa Cruz, USA
- Professor Andrew Camilli, Department of Molecular Biology and Microbiology, Howard Hughes Medical Institute, Tufts University, School of Medicine, Boston, USA
- Professor Staffan Kjelleberg, Singapore Centre for Environmental Life Sciences Engineering, Nanyang Technological University, Singapore

**Website/publications:** https://www.uts.edu.au/staff/diane.mcdougald
Exposure to air pollution is an emerging world-wide problem, with growing evidence that it is a major cause of morbidity worldwide. Plant-based systems are gaining recognition as a possible adjunct to standard mechanical air pollutant management systems for the management of urban air pollution.

The UTS Plants and Environmental Quality Research Group has 20 years’ experience in studying the role that botanical systems play in ameliorating many forms of air pollution. We produce world leading research targeting the potential of phytosystem technology to contribute to urban sustainably. We are an industry-focussed group, and collaborate actively with private industry and government to develop, trial and credential biological air pollution mitigation systems ranging from portable devices to large infrastructure projects. Projects within both the Science and Engineering Faculties, or cross-disciplinary research between Faculties, including the Faculty of Design, Architecture and Building, will be welcomed.

**Keywords:** biofiltration, phytotechnology, air pollution, green buildings, sustainability

**Research Interest/Honours Project opportunities:**
- Horticultural biotechnology for mitigating air pollutants
- Functional active green wall technology development
- Botanical systems for improving urban amenity: noise attenuation, aesthetics, water use, temperature
- Geospatial analysis of the determinants of urban air quality
- Urban aerobiology, with an emphasis on pathogenic fungi
- Urban agriculture, urban forestry, urban greening

**Methods/Research Skills commonly utilised in our Laboratory include:**
- Air pollutant generation and instrumental quantification
- GIS
- Flow dynamics
- Statistical data analysis
- Microbial identification and quantification (culture-based and molecular)

**Team members:**
- Dr Fraser R Torpy, Director (Science)
- Dr Peter J Irga, Chancellor’s post-doctoral fellow (FEIT)
- Dr Nic Surawski (Lecturer, FEIT)
- Thomas Pettit, PhD student (Science)
- Ashley Douglas, PhD student (Science)
- Naomi Paull, PhD student (Science)
- Robert Fleck, PhD student (Science)
- Peter Abdo, PhD student (FEIT)

**Collaborations:**
- Junglefy P/L
- Delos Living LLC (New York)
- Lend Lease
- Transport for NSW
- Transurban
- Fulton Hogan
- Randwick City Council
- Campbelltown City Council
- North Sydney Council
- The City of Sydney Council
- Horticulture Innovation Australia
- Bravolinear Tech Ltd (Hong Kong)
- Rural Development Administration (Republic of Korea)
- ORNATEC (People’s Republic of China)

**Website/publications:**
[https://pegresearch.wordpress.com](https://pegresearch.wordpress.com)
Dr Hui Chen received her Medical Degree from Nanjing University, China (2002) and PhD in neuroscience from the University of Melbourne (2006). Dr Chen joined UTS from University of New South Wales where she was a Research Associate. Her research focuses on impact of maternal environmental oxidant exposure (obesity, cigarette smoke exposure, e-cigarette vapour, air pollution) on the development of chronic diseases in the offspring. Her recent work demonstrated that maternal smoking increase the risk of fatty liver disease in the offspring, which can be ameliorated by mitochondrial specific antioxidant supplement during pregnancy.

**Keywords**: learning, memory, type 2 diabetes, fatty liver, maternal programming, mouse model, inflammation, oxidative stress

**Research Interest/Honours Project opportunities**:
- Gene regulation of cognitive change due to maternal environmental oxidant exposure.
- Risk of diabetes due to in utero or postnatal environmental change.

**Methods/Research Skills commonly utilised in Dr Chen’s Laboratory include**:
- Western blotting
- Real time PCR
- ELISA
- Immunohistochemistry

**Team members (optional)**:
- Mr Gerard Li, PhD student

**Collaborations (optional)**:
- Professor Carol Pollock
- A/Professor Sonia Saad, Kolling Institute of Medical Research
- Dr Sarah Glastras, Kolling Institute of Medical Research
- Dr Rita Machaalani, The University of Sydney
- A/Professor Alison Ung, UTS
- Dr Mehra Haghi, UTS

**Website/publications**:
- [https://www.uts.edu.au/staff/hui.chen-1](https://www.uts.edu.au/staff/hui.chen-1)
Iain Duggin is an Associate Professor and holds a Future Fellowship from the Australian Research Council. He leads the Microbial Cell Shape and Structural Dynamics group located at the ithree (infection, immunology and innovation) institute, University of Technology Sydney.

**Keywords:** molecular biology, microbiology, morphogenesis, uropathogenic E. coli (UPEC), halophilic archaea, protein function.

**Research Interest/Honours Project opportunities:**
1. Function of key bacterial proteins that control infection of human epithelial cells by pathogenic E. coli.
2. Function and regulation of cytoskeletal proteins in archaeal division and morphological plasticity.
3. Expression of proteins in archaea, and archaeal vesicle formation, for developing molecular delivery systems, e.g. for drugs or vaccines.

**Methods/Research Skills:**
- Functional genomics and next-generation DNA sequencing
- Protein functional analysis in vivo and in vitro
- Microscopy, live-cell movies, fluorescence systems and protein labelling
- Flow-culture systems, microfluidics, infection model

**Team members**
- Dr Solenne Ithurbide, cytoskeletal protein function archaeal cell division
- Dr Yan Liao, archaeal cell division genes
- Tamika Blair, PhD: Proteins regulating infection of human epithelial cells by UPEC
- Dr Greg Iosifidis, conditions for UPEC morphological responses during infection, archaeal protein production.
- Dora Pittrich, PhD. Control of cytoskeletal protein function in archaeal morphological responses
- Vinaya Shinde, Masters. Interactions and function analysis of archaeal cytoskeletal protein CetZ1

**Website/publications:**
https://www.uts.edu.au/staff/iaing.duggin
https://sites.google.com/view/dugginlab/home
Dr Cleverly received his PhD in plant ecophysiology, soil science and agronomy from the University of Nevada Las Vegas (USA) in 1999. Dr Cleverly joined UTS in 2009 from the University of New Mexico where he was a Research-focused Assistant Professor. His research focuses on the impact of droughts and flooding rains on productivity by Australian vegetation and ecosystems. His recent work demonstrated that dryland ecosystems are very resilient to climate extremes, whereas Australian vegetation along the East Coast is largely protected from climate extremes.

**Keywords:** plant physiology, arid ecosystems, groundwater-dependent ecosystems, ecohydrology, biometeorology

**Research Interest/Honours Project opportunities:**
- Plant physiological responses to stress and mortality
- Ecophysiology and ecohydrology of arid-adapted plants and ecosystems
- Satellite remote sensing and ecophysiology of groundwater-dependent ecosystems

**Methods/Research Skills commonly utilised in Dr Cleverly's Laboratory include:**
- Leaf gas exchange/photosynthesis/leaf traits
- Plant water status/stem hydraulic conductivity
- Stable isotopes
- Sapflux/dendrometers (transpiration/tree growth)
- Eddy covariance/field sensors
- Phenocams/imagery analysis

**Team members:**
- Mr John Gallegos Carboneras, PhD student
- Mr Swaminathan Palanisami, PhD student
- Ms Maria Trinidad Torres Garcia, visiting PhD student (September–December 2019)

**Collaborations:**
- Emeritus Professor Derek Eamus, UTS
- Distinguished Professor Alfredo Huete, UTS
- Professor Peter Cook, Flinders Uni
- Professor David Chittleborough, Uni of the Sunshine Coast & Uni of Adelaide

**Website/publications:** [https://publons.com/researcher/593555/james-cleverly/](https://publons.com/researcher/593555/james-cleverly/)
Associate Professor Jonathan Webb is a wildlife ecologist whose research has focused on mitigating the impacts of cane toads on native animals, reintroducing critically endangered mammals to Kakadu National Park, and restoring rock outcrops for threatened reptiles. His recent research has focused on the loss of antipredator behaviour in mammals, the effects of incubation temperatures on the behaviour of reptiles, and the impact of poaching on threatened snake populations.

Keywords: animal behaviour, reptiles, mammals, wildlife ecology, ecophysiology, evolution

Research Interests/Honours Project opportunities:
- Effects of incubation temperatures on lizard cognitive abilities
- Consequences of heatwaves for ectotherms
- Restoration of rock outcrops for reptiles
- Predator prey interactions

Methods/Research Skills commonly utilised in Dr Webb’s Laboratory include:
- Field studies to estimate survival in wild populations
- Video analysis of locomotor performance and behaviour
- Measurement of thermal tolerance
- Quantifying behavioural traits in wild animals
- Analysis of mark-recapture data sets

Team members:
- Santiago Cuartas, PhD student
- Yingyod Lapwong, PhD student
- Reannan Honey, PhD student
- Naomi Indigo, Research Assistant
- Chinithi Epasinghe, Honours student

Collaborations:
- Associate Professor Martin Whiting, Macquarie University

Website/publications: [https://www.wildlifeconservationbiology.com/](https://www.wildlifeconservationbiology.com/)
Collaborations:
- Dr Damien Stark, Department of Microbiology, St. Vincent’s Hospital Sydney
- Dr Rogan Lee, ICPMR, Westmead Hospital
- Dr Stephanie Fletcher, Public Health Unit, South West Sydney Area Health Authority

John completed a PhD on leishmaniasis at the Liverpool School of Tropical Medicine, and subsequently did postdoctoral research on *Eimeria* vaccines at the Institute for Animal Health (U.K.) and *Babesia* phylogeny (Flinders University of South Australia). He joined UTS in 1991. His main research interests are focused on translational research that includes development of vaccines and diagnostics for parasitic protozoan diseases. This has included studies on veterinary vaccines, neosporosis in animals, diagnostics for human gastrointestinal infections such as dientamoebiasis, cryptosporidiosis, amebiasis, and more recently other diseases such as giardiasis, leishmaniasis and malaria. He was awarded the higher doctoral degree of DSc by Liverpool University in 2006 for his pioneering research on the biology of cyst-forming coccidia including *Neospora caninum*. He has published 200 peer-reviewed research papers and is an editor of two U.K. based, peer-reviewed journals *Parasitology* and the *Journal of Medical Microbiology*.

Research Interest in Dr Snow’s Laboratory include:
- Diagnosis and epidemiology of human gastrointestinal diseases, including *Dientamoeba fragilis*
- Molecular phylogeny of the trypanosomatidae (trypanosomes and leishmania)
- Malaria and drug resistance
- Vaccines to neosporosis in cattle

Methods/Research Skills commonly utilised in Professor Ellis’ Laboratory include:
- “omics” including genome and transcriptome sequencing
- Bioinformatics, including machine learning
- Cell culture of parasites
- PCR
Dr Rodgers received his PhD from the Faculty of Medicine at the University of Sydney. He was then a Pfizer post-doctoral fellow at the University of Bristol in England. He joined UTS from The Heart Research Institute in Sydney where he was leader of the Cell Biology Research Group. His research now focuses on neurotoxins and encompasses both understanding their mechanisms of toxicity and analyses of toxins levels in the environment to determine human exposure. In addition, his group are interested in developing treatments to protect the human brain against a range of toxic molecules.

**Keywords:** neurotoxicity, cell biology, non-protein amino acids, environmental toxins, motor neurone disease, Parkinson’s disease

**Research Interest/Honours Project opportunities:**
- Understanding how toxins produced by cyanobacteria (blue-green algae) damage neurons.
- Testing compounds that protect or reverse damage to neuronal cells.
- Monitoring rivers and lakes to determine levels of cyanobacterial neurotoxins.
- Developing better therapeutic strategies to treat Parkinson’s disease.

**Methods/Research Skills commonly utilised in Dr Rodgers' Laboratory include:**
- Protein extraction and analysis
- Cell culture
- Real time PCR
- Mass spectrometry and metabolomics
- Western blotting
- Microscopy and live-cell imaging

**Team members:**
- Kate Samardzic, PhD student
- Carly Italiano, PhD student
- Joel Steele, PhD student
- Jake Violi, PhD student
- Lisa Pu, Masters student

**Collaborations (UTS):**
- Dr David Bishop, Analytical Chemistry, MaPS
- Dr Simon Mitrovic, Environmental Scientist, SoLS

**Website/Publications:** [https://www.uts.edu.au/staff/kenneth.rogers](https://www.uts.edu.au/staff/kenneth.rogers)
Dr Keshav Raj Paudel

Postdoctoral researcher, School of Life Sciences
Faculty of Science
keshavraj.paudel@uts.edu.au

Dr Paudel received his PhD in pharmacology from the Mokpo National University, South Korea in 2017. Dr Paudel joined UTS from University of Texas Health Science Centre at Houston, Texas, USA where he was a Postdoctoral Research Fellow working on the field of circadian rhythm using. His current research focuses on investigative miRNAs as a diagnostic marker of lung cancer. He uses cigarette smoke to develop lung’s adenocarcinoma in mice and analysis various parameter involved in pathogenesis of lung cancer using various molecular cell biology experiments.

Keywords: lung cancer, asthma, miRNA, airway inflammation

Research Interest/Honours Project opportunities:
- miRNA as a diagnostic markers of lung cancer.
- Role of extracellular vesicles on cancer progression.
- Ambient dust particles mediated respiratory diseases.

Methods/Research Skills commonly utilised by Dr Paudel's in laboratory include:
- Protein extraction and analysis
- Cell culture (A549, Calu-3, THP-1) and cell based in vitro assay
- Real time PCR
- ELISA
- Smoke/Carcinogen induced mice model of lung cancer
- Histology (Immunohistochemistry, H&E staining, PAS staining)
- InExpose system for aerosol, fine dust induced airway disease model

Team members:
- Professor Philip Hansbro, Mentor
- Mr Vamshikrishna Malyla, PhD student

Dr McGrath received her Bachelor of Science (Hons) from University of Western Australia (1998) and PhD (2006) from the University of Sydney for a thesis entitled “Molecular pathways of androgen action in the male cardiovascular system”. Dr McGrath was a postdoctoral research fellow at the Heart Research Institute before she was awarded the UTS Chancellor’s Research Fellowship in 2011. There are two research arms that the McGrath laboratory focuses on. The first focuses on investigating the impact of diet and air pollutants (diesel, nanoparticles, e-cigarette vapour) that can increase the risk for the development of the pathologies - type 2 diabetes, atherosclerosis and Alzheimer’s disease. The second is focused, in part from using the knowledge gained from the first arm, on the discovery of targets/compounds that can target chronic inflammation and oxidative stress to reduce the risk for the development of the subsequent pathologies. 

**Keywords:** inflammation, oxidative stress, gene expression, animal models, type 2 diabetes, cardiovascular disease, Alzheimer’s disease

**Research Interest/Honours Project opportunities:**
- Investigating the molecular mechanism of honey-treated diabetic wounds: Exploring 3D bio-printed skin models.
- Investigating the effects of e-Cigarette vaping in atherosclerosis and type 2 diabetes.
- Developing novel strategies to reduce acute atherosclerosis-associated inflammation.

**Methods/Research Skills commonly utilised in Dr McGrath’s Laboratory include:**
- *In vitro* cell culture / *In vivo* animal models
- Gene expression (e.g. Real time PCR, ELISA, Western blotting)
- Histology and immunohistochemistry
- Molecular biology (e.g. luciferase assays, chromatin immunoprecipitation)

**Team members:**
- Miss Gihani Manodara, PhD Student
- Miss Claire Rennie, PhD Student
- Miss Charlotte Fleming, PhD student
- Dr Hermily Geronimo, PhD student
- Mr Michael Chhor, PhD student

**Collaborations contributing to Honours Project:**
- A/Prof Sheila Donnelly (SoLS, UTS)
- Dr Cindy Gunawan (iThree institute, UTS)
- Dr Lana McClements (SoLS, UTS)
- Dr Sarah Bajan (SoLS, UTS)
- Dr Ashish (Heart Research Institute)
- Dr Sanjay Patel (Heart Research Institute)

**Website:** [https://www.uts.edu.au/staff/kristine.mcgrath](https://www.uts.edu.au/staff/kristine.mcgrath)
Dr McClements is a clinical pharmacist with a PhD in molecular therapeutics from Queen’s University Belfast, UK. Since the beginning of her research career, she has been involved and carried out translational research studies working with cell models, patient samples, and various pre-clinical models. Her research focuses on understanding the pathogenic mechanisms of cardiovascular complications in pregnancy and heart disease in association with diabetes. Identifying new pathogenic mechanisms is then translated into the development of novel biomarkers or targets which can be explored for disease prediction, early diagnosis or treatment. Dr McClements is also investigating the therapeutic potential of mesenchymal stem cells and associated extracellular vesicles in cardiovascular diseases.

**Keywords:** vascular biology, preeclampsia, diabetes, cardiovascular disease, heart, stem cells

**Research Interest/Honours Project opportunities:**
- Novel biomarkers/mechanisms in cardiac fibrosis and heart failure
- Mechanisms of diabetic cardiomyopathy
- Novel biomarkers and targets in pre-eclampsia
- Mesenchymal stem cells as a therapy for pre-eclampsia

**Methods/Research Skills commonly utilised in Dr McClements’ Laboratory include:**
- Protein/mRNA/miRNA extraction and analysis
- Genetic manipulations/transfections
- Cell culture
- Real time PCR
- ELISA
- *In vivo/ex vivo*

**Team members:**
- Mr Michael Chorr, HDR student
- Mr Sargon Lazar, Honours student
- Mrs Claire Richards, Honours student
- Mr Hao Chen, Honours student

**Collaborations:**
- Dr Kristine McGrath (UTS)
- Dr Matthew Padula (UTS)
- Dr Benjamin Rayner (Heart Research Institute)
- Dr Guillermo Lopez-Campos (Queen’s University Belfast)

**Website/publications:** [https://www.uts.edu.au/staff/lana.mcclements](https://www.uts.edu.au/staff/lana.mcclements)
Collaborations:
- Dr Bernadette Saunders, School of Life Sciences, Faculty of Science
- Iain Duggin, Diane McDougald, The ithree Institute, Faculty of Science

Professor Harry is a Professor of Biology and Director of the ithree institute (infection, immunity and inflammation, https://www.uts.edu.au/research-and-teaching/our-research/ithree-institute) in the Faculty of Science at UTS. She has a PhD in biochemistry from the University of Sydney and was a postdoctoral fellow at Harvard. Dr Bottomley is a Research Associate in Professor Harry's group. She completed a PhD at Sheffield University and has been at UTS for 7 years. Our research focuses on how bacteria know when and where to divide to ensure faithful propagation; important during infection. Bacteria also program division inhibition to form really long cells during infection. We are investigating why and how they do this as it opens up possibilities for new ways to prevent and treat infectious disease. Professor Harry partners with industry to identify new ways to fight antibiotic resistant bacteria.

Research Interests in the Harry Lab include:
- Regulation of cell division
- Medicinal honey as an antibacterial (another honours project with Dr Nural Cokcetin)

Methods/Research Skills commonly utilised in the Harry Lab include:
- Molecular biology
- Cell imaging (microscopy)
- Tissue culture
- Antibacterial testing
A/Prof. Maurizio Labbate is an interdisciplinary researcher who enjoys working independently as well as collaboratively to solve complex problems affecting society and the environment. His research interests include:

- Bacterial evolution with a strong focus on the bacterial process of lateral gene transfer, a phenomenon that facilitates bacterial sharing of DNA and has been a major driving force in the emergence of bacterial pathogens and their resistance to antimicrobials. He predominantly focuses on a group of marine bacteria called *Vibrio* species that cause disease in humans (e.g. diarrhoeal diseases such as cholera) and aquaculture species (e.g. oysters). Specifically, he is interested in mobile DNA such as the *integron* and *genomic islands* and how they drive adaptive processes such as *biofilm* formation. See the following links for relevant articles:

- Environmental contamination with antibiotic resistance genes, water quality in coastal environments and impacts on human health.

**Keywords:** vibrio, vibrio cholerae, antibiotic resistance, aquatic pathogens, water quality

**Research Interest/Honours Project opportunities:**
- Role of lateral gene transfer and mobile DNA in pathogenicity and biofilm formation of *Vibrio* species
- Antibiotic resistance in coastal environments and risk to recreational water users
- Coastal water quality
- Aquaculture (e.g. oyster diseases)

**Methods/Research Skills commonly utilised in Dr Snow's Laboratory include:**
- DNA cloning
- Genome sequencing
- Microbiome analyses
- Bioinformatics

**Collaborations:**
- Professor Justin Seymour – The Climate Change Cluster (water quality)
- A/Prof Diane McDougald – The ithree Institute (*Vibrio* species)

**Website:** [https://www.uts.edu.au/staff/maurizio.labbate](https://www.uts.edu.au/staff/maurizio.labbate)
Dr Nural Cokcetin is a Research Fellow at the ithree institute, specialising in the field of microbiology. Her research interest is in understanding how bacteria cause infections and disease, and finding new approaches for infection control that help to slow down the rise of antimicrobial resistance. Her expertise is in the medicinal properties of honey—a potent killer of bacteria—and its potential as a novel, cheap and accessible solution for the treatment of infections.

Dr Cokcetin received her PhD from the University of New South Wales, where she investigated the effects of eating honey on the human gut microbiota. She joined Professor Harry’s group in 2015, and together with Dr Cath Burke and collaborators from the Microbiome Research Centre, they are investigating the use of honey as a prebiotic food to remediate the gut microbiome and help combat the onset and progression of gut-related diseases.

**Research Interests in the Harry Lab include:**
- Honey as a prebiotic food for promoting gut health
- Honey as a topical treatment for chronic wounds and skin infections

**Methods/Research Skills commonly utilised in the Harry Lab include:**
- Microbiology and molecular biology
- 16S sequencing
- Metabolomics
- Bioinformatics
- Microscopy
What do honey, spider toxins and pH-responsive peptides have in common? They all have the ability to kill bacteria or cancer cells by targeting and disrupting cell membranes.

In the UTS Membrane Biophysics Laboratory we endeavour to understand the molecular details of how these and many other compounds bind to, and disrupt, cell membranes. For this, we use a number of ‘wet-lab’ biophysical techniques and ‘in silico’ biomolecular simulations.

The research in our lab enables an in-depth understanding of potentially new therapeutic compounds for the development of novel antibiotics and anti-cancer agents.

**Keywords:** membranes, phospholipid bilayers, honey, spider venom, toxins, pH-responsive peptides, membrane-disruptive peptides, antimicrobial agents, anticancer compounds.

**Research Interest:**
- Spider venom peptides and their selective capacity to target cancer cells.
- Deciphering the anti-bacterial properties of Manuka honey.
- Designing peptides that will target cancer cells by using the acidic cancer microenvironment.
- Interaction of statins (cholesterol-lowering pharmaceutical compounds) or general anaesthetics with biological membranes.
- Development of sensors for lipid enzymes (e.g. for the detection of high level of lipase during acute pancreatitis).

**Unique research techniques utilised in UTS Membrane Biophysics Laboratory include:**
- Tethered phospholipid bilayers and electrical impedance spectroscopy
- Quartz Crystal Microbalance with dissipation
- Membrane bound fluorescent probes
- Single cell microfluidics system to test for cancer cytotoxicity
- Biomolecular simulations

**Team members:**
- Dr Evelyne Deplazes, [https://www.uts.edu.au/staff/evelyne.deplazes](https://www.uts.edu.au/staff/evelyne.deplazes)
Dr Kim recently joined the Centre for Inflammation, Centenary Institute/UTS, directed by Professor Phil Hansbro. He has been part of Prof. Phil Hansbro’s team since 2006. He completed his PhD and postdoctoral training at the University of Newcastle/Hunter Medical Research Institute.

Dr Kim is a respiratory immunologist whose work focuses on identifying new treatments for infection-induced lung diseases and severe asthma using complementary experimental and clinical models and patient samples. His primary focus is on developing and interrogating murine models of respiratory infection, severe asthma, and chronic obstructive pulmonary disease using novel approaches.

**Keywords:** respiratory immunology, severe asthma, infection, COPD.

**Research Interest/Honours Project opportunities:**
- To assess the role of microRNA-155 in early life respiratory infection-induced chronic lung disease

**Methods/Research Skills commonly utilised include:**
- Mouse models of severe asthma
- Tissue collection
- Lung function analysis
- RNA extraction
- Real time PCR
- Western Blot
- Immunofluorescence

**Team members (optional):**
- Professor Phil Hansbro (Director, Chair of Inflammation, Centenary Institute/UTS)
- Dr Chantal Donovan (Postdoctoral Research Fellow, Lecturer)

**Website/publications:**
- https://www.uts.edu.au/staff/richard.kim
- https://www.uts.edu.au/staff/philip.hansbro
A/Prof Donnelly received her PhD in Microbiology from Trinity College Dublin, Ireland many years ago! Since graduating she has developed a research career centered on understanding the relationship between infectious organisms and their hosts. In 2004, Sheila moved to UTS where she has focused more specifically on the interaction parasitic worms (helminths) and their mammalian hosts. This research has two streams: understanding the mechanisms by which helminths successfully manipulate their host’s immune system; and using this knowledge to develop novel therapeutics for the treatment of autoimmune disease.

Keywords: helminths, macrophages, autoimmunity, inflammation, therapeutics

Research Interest/Honours Project opportunities:
- Understanding the mechanisms helminths utilise to modulate macrophage activity
- Exploiting parasite peptides to preserve beta cell function
- Utilising parasite peptides to prevent inflammatory disease
- Elucidating the molecular mechanisms of parasite infection

Methods/Research Skills commonly utilised in Dr Snow’s Laboratory include:
- Cell culture
- Real time PCR
- ELISA/Multiplex
- Extracellular Flux assays
- Confocal Microscopy

Team members (optional):
- Dr Akane Tanaka, post-doctoral researcher
- Alison Ricafrente, PhD Student
- Claire Rennie, PhD Student
- Susel Lolo Quinteros, PhD student
- Inah Camaya, PhD student

Collaborations contributing to Honours Projects:
- A/Prof Bronwyn O’Brien (UTS)
- A/Prof Maria Sukkar (UTS)
- Dr Nham Tran (UTS)
- Prof John Dalton (NUIG, Ireland)
- Dr Kristine McGrath (UTS)

Website/publications: https://www.uts.edu.au/staff/sheila.donnelly
Dr. Sj Shen

Postdoctoral Researcher,
Philip Hansbro group,
School of Life Sciences
Faculty of Science
UTS/Centenary Centre for Inflammation
SjSijie.Shen@uts.edu.au

Dr Shen is a postdoctoral researcher in Professor Phil Hansbro’s group at the recently established UTS/Centenary Centre for Inflammation, based at the Centenary Institute. Our research aims to examine the role of the gut and lung microbiome during lung inflammation and diseases, including severe asthma, chronic obstructive pulmonary disease, and lung cancer.

Dr Shen received his PhD in medicine / immunology from Monash University, Melbourne in 2019. His research shows that both host immunity and environmental factors such as diet can change the bacteria composition in the gut (the gut microbiome) and influence colon disease.

Keywords: allergy, asthma, cancer, COPD, gut, lung, inflammation, microbiome, mucosal immunity

Research Interest/Honours Project opportunities:
- Interplay between the gut-lung microbiome and immune cells in lung inflammation
- Modulating the gut microbiome to influence the progression of lung diseases

Methods/Research Skills commonly utilised in Dr Shen’s Laboratory include:
- Mouse model, animal handling and techniques
- Gut and lung function and permeability assays
- Protein extraction and analysis
- Real time PCR
- Flow cytometry
- ELISA
- Histology
- Microbiome analysis

Team members (optional):
- Prof. Phil Hansbro

Collaborations (optional):
- Prof. Emad el Omar, UNSW

Website/publications:
Dr. Sj Shen
https://www.linkedin.com/in/shensj/;
https://www.uts.edu.au/staff/sjsijie.shen

Prof. Phil Hansbro
https://www.uts.edu.au/staff/philip.hansbro
Dr Bill Söderström works interdisciplinary in the intersection between bacteriology, biophysics and nanotechnology, with a background in Engineering physics and high-resolution bioimaging. He completed his PhD in Biophysics at Stockholm University (2011-2014) and his postdoc at the Okinawa Institute of Science and Technology, OIST, Japan (2014-2019). He is currently a staff scientist in the Structural Cellular Biology unit at OIST but will relocate to UTS and the ithree institute in December 2019.

Bill is primarily interested in bacterial cell division and morphology. Advanced imaging technologies are used to determine the organization and dynamics of specific components within the cell division machinery in great detail. This knowledge may lay the foundation for developing new antibiotics targeting specific cell division directly.

Website/publications: https://www.linkedin.com/in/bill-söderström-007/

Keywords: Super-resolution microscopy, microfluidics and bacterial morphology

Research Interest/Honours Project opportunities:
- High-resolution imaging of cell division in bacteria
- Microfluidic engineering to follow bacterial shape changes in real time
- Novel approaches for labelling cell division proteins using nanobodies

Methods/Research Skills commonly utilised in the Söderström Laboratory will include:
- Super-resolution and time-lapse microscopy
- Microfluidics development and engineering
- Basic biochemistry
- General bacteriology

Team members:
- You’ll be the first!

Collaborations:
- Prof. Jie Xiao, Johns Hopkins University (USA)
- Prof. Tanneke den Blauwen, University of Amsterdam (The Netherlands)
- A/Prof. Daniel Daley, Stockholm University (Sweden)
- Dr. Cecile Morlot, Institute of Structural Biology - IBS (France)
- Profs. Ulf Skoglund and Amy Shen, Okinawa Institute of Science and Technology (Japan)
Dr Sztynda received his PhD in Pathology (histopathology and transmission electron microscopy of equivocal cases of malignancy) from the University of the Melbourne. Her research is often collaborative where she contributes her forensic knowledge, microanatomy and anatomical pathology skills. Her own research focuses on forensic application of facial image analysis.

**Keywords:** inflammation, forensic image analysis, histotechnology, human volunteer research

**Research Interest/Honours Project opportunities:**

- Focal osteoarthritis of the knee affect the surrounding joint ligaments (Kolling Research Institute, with Prof Little)
- Defining the mechanisms which regulate osteoclast fission and fusion *in vitro* (Garvin Research Institute, Dr McDonald)
- Investigating the *in vivo* bone phenotype of the Prx1/Dkk1 knockout mouse (Garvin Research Institute, Dr McDonald)
- Examining the cellular mechanisms behind rebound bone loss following denosumab withdrawal (Garvin Research Institute, Dr McDonald)
- Impact of alcohol on criminal activity - Facies of foetal alcohol spectrum disorder in archival ‘mug shots’ (Australian Centre of Public History, Dr Alana Piper)
- Assessing emotion and behaviour using facial images and physiology (Forensic Predictive Imaging Unit, A/Prof Lal)

**Methods/Research Skills commonly utilised in Dr Sztynda’s Laboratory include:**

- Light and transmission electron microscopy, histology and histopathology (bone pathology, inflammation)
- Histotechnology, special stains and immunohistochemistry
- Digital facial image analyses, biometric data base creation & anthropometry
- Human ethics, volunteer recruitment, film stimulation of spontaneous emotions, physiological monitoring

**Current Students:**

- Ms Lina Sidavong, PhD student (with A/Prof Sara Lal)
- Mr Denis Boulais, PhD student (with A/Pros Sara Lal and Chris Zaslawski)
- Ms Tamara Fraser, MSc student (with Prof Anthony Gill)
- Ms Sandali Alahakone, MSc student (with Dr Maike Ueland)

**Collaborations:**

- Professor Anthony Gill, Kolling Research Institute, Royal North Shore Hospital
- Professor Christopher Little, Director, Raymond Purves Bone and Joint Research Laboratories Kolling Research Institute, Royal North Shore Hospital
- A/Prof Sara Lal, Neuroscience Unit, School of Life Sciences, UTS
- Dr Michelle McDonald Group Leader Bone Microenvironment Group, Garvin Research Institute, St. Vincent’s Hospital
- Dr Alana Piper, Chancellor’s Postdoctoral Research Fellow, Australian Centre for Public History, Faculty of Social Sciences, UTS
- Dr Maike Ueland, Centre of Forensic Science, School of Mathematics and Physical Sciences, UTS

**Website/publications:** [https://www.uts.edu.au/staff/tamara.sztynda](https://www.uts.edu.au/staff/tamara.sztynda)
Dr Vyoma Patel received her PhD in Medicine from Vascular Biology Research Centre, Westmead Hospital, University of Sydney, NSW in 2019. Vyoma joined UTS from Westmead Institute of Medical Research (WIMR), Westmead Hospital, University of Sydney where she was a Senior Research Associate. Her research focuses on the epigenetic changes in pathogenesis of severe asthma and chronic obstructive pulmonary disease (COPD). Vyoma recently joined Professor Phil Hansbro’s group in the recently established UTS/Centenary Centre for Inflammation.

**Keywords:** asthma, COPD, epigenetics, DNA methylation, acetylation

**Research Interest/Honours Project opportunities:**
- Epigenetic mechanisms of pathogenesis of chronic obstructive pulmonary disease (COPD)
- Therapeutically manipulate epigenetic changes in the pathogenesis of chronic obstructive pulmonary disease (COPD)

**Methods/Research Skills commonly utilised in Dr Vyoma’s Laboratory include:**
- Data analysis/bioinformatics (Sequencing assays: CHIP-seq, single/multi cell-RNAseq, ATAC-seq)
- Tandem Mass Tag proteomics (TMT)
- Flow cytometry
- Cell culture
- Real time PCR
- ELISA

**Team members:**
- Prof Philip Hansbro, Supervisor
- Dr Sobia Idrees, Bioinformatics Post-doctoral fellow

**Collaborations:**
- A/Prof Gary Myers, Institute of Infection, Immunity and Innovation (ithree), UTS
- Dr Alen Faiz, School of Life Sciences, UTS
- A/Prof Brian Oliver, Woolcock Institute of Medical Research

**Website:**
https://www.uts.edu.au/staff/vyoma.patel
https://www.uts.edu.au/staff/philip.hansbro
A/Prof Willa Huston
Associate Professor, School of Life Sciences
Faculty of Science
Wilhelmina.Huston@uts.edu.au

Associate Professor Huston received her PhD in 2004 from the University of Queensland, in the fields of microbiology and biochemistry. Her research is focussed on understanding bacterial pathogenic mechanisms that can be used to improve diagnosis and treatment strategies. Her research team is especially focussed on Chlamydia, and how the infection can lead to infertility and other immunopathological damage in some women. She is also interested in sexually transmitted infections, and intracellular pathogenic processes more broadly.

Keywords: Chlamydia, intracellular pathogen, sexually transmitted infection, immunopathology

Research Interest/Honours Project opportunities:
- Immunopathological factors in chlamydial disease leading to infertility.
- Pathogenic mechanism of chlamydial disease.
- Improved treatment of chlamydia.
- Novel diagnostic methods, and improved strategies to diagnose pelvic inflammatory disease

Methods/Research Skills commonly utilised in Dr Snow’s Laboratory include:
- Protein extraction and analysis
- Cell culture
- Bacterial cultures
- Real time PCR
- ELISA
- Bioinformatics
- Microbiota
- Immunological analysis

Collaborations (optional):
- Dr Cath Burke, School of Life Sciences, UTS
- A/Prof Garry Myers, iThree Institute, UTS

Website/publications: https://www.uts.edu.au/staff/wilhelmina.huston