Environomics Future Science Platform • Science Showcase

Canberra, Monday July 29th, 2019

University House – Australian National University

Welcome!

ENVIRONOMICS
Future Science Platform

Environmental genomics is a fast evolving, intellectually challenging and fascinating research area. But, more importantly, it has huge untapped potential to deliver new tools and knowhow for the benefit of the environment and humanity. The Environomics Future Science Platform is an effort to grasp this opportunity and, as our tagline says, we are …

"*Reinventing how ecosystem health, change and threats are measured, and finding new resources in nature."*

It's pleasing to look back and see how far we've come in the past two years - major science achievements (as will be revealed today!), training workshops in new science methods, cross-disciplinary symposia, a fresh-faced cohort of postdocs, overseas presentations and visits to leading labs. We've also been reviewed and presented to the CSIRO Board and passed with flying colours.

Today's event is designed to showcase our diverse science portfolio to our partners and colleagues and to identify how these new and developing platforms can have impact. There is great technical depth and thought behind all of the science, but today our focus is on take-home messages – how technical achievements and real-world problems are being addressed through the development of new genomic technology and knowhow.

I know we can all look forward to an energetic and thought-provoking meeting. I'm excited!

Cheers,

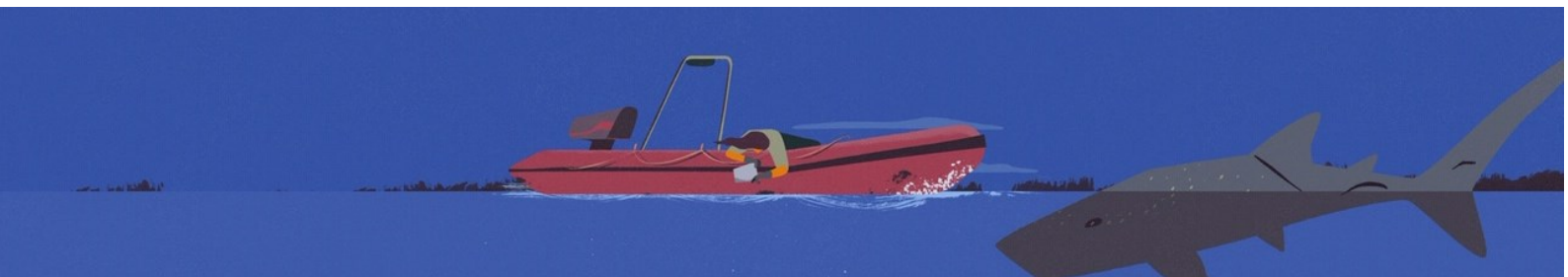
Olly

What to expect

There are two components to Monday's meeting:

- **MONDAY AFTERNOON**: Science showcase. Each Environomics FSP projects will make a 5-minute lightning presentation. To keep it snappy we will have a ~7-minute group Q & A session after every three presentations.

- **MONDAY EVENING**: After post-showcase drinks we will be impressed by a plenary presentation from Professor Matt Trau from the University of Queensland's Australian Institute of Biotechnology and Nanoscience. Matt's expertise is in nanotechnology for the diagnosis and characterisation of cancer. This may seem an odd match for an environmental genomics audience, but biomedicine is the engine for much innovation in molecular science. As Matt will show, locating and characterising cancer cells in a human body is in many ways the same needle-in-a-haystack problem as finding rare molecules in the large, messy and complicated substrates environmental geneticists work with. The opportunities for cross-disciplinary cross-pollination are vast.



ENVIRONOMICS FSP SHOWCASE, CANBERRA, MONDAY 29 JULY 2019

Programme

12pm – 5pm ***Location: Great Hall, ANU University House***

TIME	TOPIC	SPEAKER
12-1 PM	**Arrival Lunch**	**Please join us for lunch prior to the commencement of the meeting**
1 PM	Welcome address	Dr Linda Broadhurst, Dr Andrew Young, Dr Oliver Berry
1.15 PM	Lightning 1 *Novel methods for monitoring of plant-pollinator interactions*	Dr Liz Milla
1.20 PM	Lightning 2 *Rapid epigenetic age estimation for animals*	Dr Benjamin Mayne
1.25 PM	Lightning 3 *A paper platform for nucleic acid detection in the field*	Dr Andy Bachler
1.30 PM	Q & A	
1.40 PM	Lightning 4 *Maximising tropical fish biodiversity detection with eDNA metabarcoding*	Dr Cindy Bessey
1.45 PM	Lightning 5 *Unravelling diets and food webs: a place for eDNA analysis*	Dr Gavin Rees
1.50 PM	Lightning 6 *eDNA in the Atlas of Living Australia*	Michael Hope
1.55 PM	Q & A	
2.05 PM	Lightning 7 *Strategy for Culture of Uncultivated Subsurface Microorganisms*	Dr Xiao Deng
2.10 PM	Lightning 8 *Improving Seagrass Survival using Microorganisms*	Dr Flavia Tarquinio
2.15 PM	Lightning 9 *Understanding microbial diversity and function to better support environmental management*	Dr Kristen Karsh & Dr Eric Raes
2.20 PM	Q & A	
2.30 PM	**Afternoon Tea**	
3:00 PM	Lightning 10 *eDNA for temperate fish biodiversity knowledge*	Dr Sharon Appleyard
3.05 PM	Lightning 11 *Can metabarcoding provide estimates of species' relative abundance?*	Dr Elise Furlan

3.10 PM	Lightning 12 *eCells: Developing novel ways to estimate animal abundance*	Dr Haylea Miller
3.15 PM	Q & A	
3.25 PM	Lightning 13 *Visualising and communicating genome-led biodiversity discovery in Australia*	Dr Renee Catullo
3.30 PM	Lightning 14 *Mining the uncharacterised reads in eDNA data*	Dr Xin-Yi Chua
3.35 PM	Lightning 15 *Bioinformatics for Environomics*	Dr Annette McGrath
3.40 PM	Q & A	
3.50 PM	Lightning 16 *Estimating the thermal limits of plants with help from traits of the transcriptome*	Dr Sam Andrew
3.55 PM	Lightning 17 *Mapping pollination networks: the use of genomics in the study of plant-pollinator interactions*	Dr Francisco Encinas-Viso
4:00 PM	Lightning 18 *Mobile species identification*	Dr Luana S.F. Lins
4.05 PM	Q & A	
4:15 PM	Lightning 19 Mobilising collections through genomics	Dr Andreas Zwick
4:20 PM	Lightning 20 Genetic drift in living collections	Dr Anusuya Willis
4:25 PM	Q & A	
4:35 PM	Lightning 21 *The CSIRO Fish Collection and degraded DNA*	Dr Sharon Appleyard
4:40 PM	Lightning 22 *Museum epigenomics: can natural history collections reveal temporal changes gene expression?*	Dr Clare Holleley
4:45 PM	Q & A	
4:55 PM	**Networking drinks and nibbles in the Foyer**	
6.00 PM	Plenary by Professor Matt Trau (University of Queensland)	
6:45 PM	Find a seat for dinner	
7:00 PM	**Dinner service**	

Professor Matt Trau

BSc. (Hons) PhD
UQ-CSIRO Chair in Personalised Nanodiagnostics
Professor of Chemistry, School of Chemistry and Molecular Biosciences
Senior Group Leader, Australian Institute for Bioengineering and Nanotechnology
Director, Centre for Personalised Nanomedicine
The University of Queensland

Making Precision Medicine Personal:
Translating Genome-Wide & Point of Care Nano-Diagnostics into the Clinic (with cross applications in Environomics)

Modern medicine is currently transitioning to a new paradigm of precision and personalized care, where patients will be comprehensively screened and monitored for the detailed molecular abnormalities that characterise their specific disease. In the past decade, nanotechnology has provided new tools (e.g., next-generation sequencing) with unprecedented power to comprehensively interrogate genetic, transcriptomic and epigenetic information. The Centre for Personalised Nanomedicine at UQ is focused on translating these new technologies into a clinical setting, whilst simultaneously developing the next generation of point-of care diagnostic technologies to further empower the personalised and precision medicine approach. As part of a major National Collaborative grant funded by the National Breast Cancer Foundation ("Enabling clinical epigenetic diagnostics: The next generation of personalized breast cancer care", CG-12-07), our consortium recently published hundreds of epigenetic regions that area highly informative in cancer. These are now being validated in a real-time clinical setting, where comprehensive DNA, methyl-DNA and RNA information is collected in tandem and analysed. In this talk we will present data on the clinical translation of this approach, highlighting some of the positive impacts that such an approach can make on the "recovery trajectory" of cancer patients. Along with comprehensive DNA/RNA/methylated-DNA sequencing methodologies, several point-of-care nanotechnologies recently developed by our lab will be presented. These include novel technologies for detecting circulating free DNA/RNA/methyl-DNA, circulated tumour cells, exosomes and protein biomarkers. Several of these technologies have been developed collaboratively with US partners via a collaborative NIH grant ("Accelerated Molecular Probe Pipeline", U01AI082186-01).

In Dec 2018, Matt's laboratory published a paper in the journal Nature Communications describing a universal DNA nano-signature for cancer. This discovery and related detection technology has been dubbed the "10 minute cancer test". It has subsequently received broad media interest globally and has been selected by CNN and the journal BioScope as one of the "Top scientific advances" for 2018.

Acknowledgments

CSIRO acknowledges the Ngunnawal people as the traditional owners and custodians of the land upon which we are meeting. We also recognise the deep history and culture of Aboriginal people on this site and pay our respects to elders past, present and future.

Environomics FSP Science Advisory Group

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External Partners

Atlas of Living Australia

Applied Ecology Institute (University of Canberra)

Bioplatforms Australia

Centre for Biodiversity Analysis (ANU)

Integrated Marine Observing System

TrEnD Lab (Curtin University)

Partner CSIRO Business Units

Oceans and Atmosphere, Data61, Land and Water, National Collections and Marine Infrastructure.