

Analytical solutions towards a deeper biological understanding

The CSIRO Metabolomics and Proteomics team provides systems biology-based solutions towards a deeper understanding of environmental, clinical and bio-industrial challenges.

We have established world-class facilities to address complex challenges relating to health, the environment and bio-industrial processes. CSIRO Metabolomics and Proteomics, in collaboration with research partners at the Australian National University (ANU) and the University of Queensland, are developing an increasingly deeper understanding of the small molecule and protein fingerprints of biological systems, and how they reflect cellular processes when organisms are exposed to stress (i.e., pollution, climate change, pathogens).

World class capability

Our collaborative and holistic approach to systems biology research, and additional access to shared facilities with our university partners, enables truly multidisciplinary research to be applied to globally impacting problems across a range of areas, including:

- Synthetic biology
- Agriculture and food security
- Health
- Biosecurity
- Environment
- Industrial chemistry

Our facilities includes over \$10 million dollars of capital instrumentation and laboratory infrastructure, comprising state-of-the-art liquid chromatography (LC) and gas chromatography (GC) based instrumentation coupled with intermediate- (Q, QqQ) and high-resolution (Q-TOF, Orbitrap) mass spectrometry (MS).

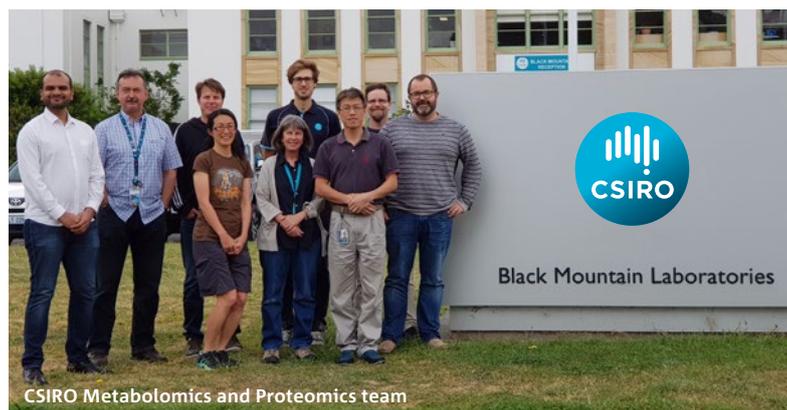
World class research

Our world class capabilities are perfectly suited to tackle problems in a hugely diverse range of environmental, industrial and clinical systems biology-based applications. We are networked globally to ensure we are leading innovation in systems biology applications.



Honeybee colony collapse

A systems biology approach is being applied to investigate colony collapse in honeybees. By looking at the metabolomes, proteomes and transcriptomes of individual bees and larvae exposed to various stressors, we can unearth further biological clues around the causes of colony collapse and broader ecosystem health, and even find early warning biomarkers that indicate that a colony is under stress.



CSIRO Metabolomics and Proteomics team



Environmental health (microbial multi-omics)

CSIRO Metabolomics and Proteomics uses multi-omics based techniques (metagenomics, proteomics and metabolomics) to gain insight into ecosystem health and anthropogenic impacts. Multi-omic approaches provide a deeper understanding of contaminants and their impact on ecosystem health in terms of metabolic function and microbial distribution, resilience and robustness that are not possible using traditional monitoring methods.

Biomarker discovery

CSIRO Metabolomics and Proteomics are using a systems biology approach that deepens our fundamental understanding of the biochemical pathways and the underlying mechanisms of biomarker formation that relate to the various stages of infection caused by protozoan pathogens in humans. We are building on previous metabolomics investigations using animal models to study human health issues.

CSIRO Metabolomics and Proteomics research partners and collaborators:

- World Health Organisation
- CSL/BioCSL
- Biotransformation Innovation Platform University of Queensland
- The Australian National University
- University of Minnesota
- RMIT University
- Swinburne University of Technology
- Australian Centre for Research on Separation Science (ACROSS)
- Department of Agriculture and Water Resources

Metabolite profiling of transgenic plants

Our facility has been gaining experience in lipidomics and polar metabolomics of higher plants using state-of-the-art equipment, as well as exploring various omics data analysis platforms to extract and present information in a biologically meaningful manner.



Transgenic potato tuber with significantly raised oil content shown upper left (Sudan red staining for oil), compared to a typical WT tuber (upper right). Liu, Q. et al. 2017

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We innovate for tomorrow and help improve today – for our customers, all Australians and the world.

**WE IMAGINE
WE COLLABORATE
WE INNOVATE**

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