



Centre for Cryo-electron
Microscopy of Membrane Proteins

8 NOVEMBER

SEMINAR SERIES 2022

A/Prof Michael Landsberg

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Michael Landsberg obtained his PhD in 2003 following which he embarked on a postdoc with Prof. Ben Hankamer (Institute for Molecular Biosciences) working as part of one of the first research groups in Australia to embrace electron cryo-microscopy (cryo-EM) as a tool for studying previously intractable biomolecular targets. His research since has come to focus on employing cryo-EM alongside complementary structural and biophysical methods to investigate fundamental molecular mechanisms defining the functional roles multiprotein complexes play in cellular homeostasis and disease. This work has helped illuminate mechanisms associated with bacterial pore-forming proteins, the



assembly of viruses and virus-like particles, signalling cascades that contribute to innate immune responses and enzymes that regulate essential biosynthetic pathways. He was formally appointed as a group leader in the School of Chemistry and Molecular Biosciences at UQ in 2016, where he was promoted to Associate Professor in 2019 and was granted tenure in 2020. Alongside his own group's research, he also currently leads SCMB's Research Theme in Structural Biology and Biochemistry.

Using Cryo-EM to understand the structure, function and evolution of an emerging bacterial toxin family

Pore-forming proteins are remarkably versatile molecular platforms that have evolved to fulfil essential yet diverse roles in microbes, plants and animals, and which have been successfully exploited and repurposed by humankind to drive new biomedical and biotechnological applications. Research in the Landsberg group over the past decade has focused on elucidating the structure and function of a recently emerged family of bacterial pore-forming proteins – ABC toxins – which offer the potential to be deployed as either selective or broad-spectrum biopesticides, or engineered for use as customised inter-cellular protein delivery devices. In this seminar, results will be presented from the group's ongoing research into a member of this pore-forming protein family that has an unusual molecular architecture. Specifically, how this toxin is unique, what functional advantages this imparts, and how it has come to evolve. His most recent research has been supported by the use of the JEOL Cryo-ARM platform for automated, high-throughput and high resolution cryo-EM. In the second part of the talk, he will discuss aspects of the journey to install two new and largely unproven electron microscopes in the middle of a global pandemic.