CeMMP

Australian Government
Australian Research Council

MONASH University

bio21 institute

MOLECULAR HORIZONS

WEHI brighter together

SEMINAR SERIES 2026

10 November, 10:00 AM AEDT Via

Dr Charles Bayly-Jones

Department of Biochemistry and Molecular Biology, Biomedicine Discovery Institute, Monash University, Australia



Charles completed his bachelor's degree (2016; BSc Science Scholar program) at Monash University with specialisations in theoretical physics and biochemistry. He continued his studies at Monash and earned a PhD (2021) training within the ARC Centre of Excellence for Advanced Molecular Imaging under the mentorship of ARC laureate fellow Professor James Whisstock (2017-2021). During his post-doctoral work under the mentorship of Professor Andrew Ellisdon (2022-2025), Charles made seminal contributions to the discovery and characterisation of cell growth machinery (Nature 2024, Cell 2026). In 2026, Charles established an independent research group at the Biomedicine Discovery Institute centred on lysosome biology and metabolism. He has previously held major competitive funding (NHMRC Ideas grant, MRIF, Bayer). He is currently an ARC DECRA fellow (2024-2026) and a member of the Monash Early Career Research Excellence Program. Charles was the 2025 Victorian Premier's Award recipient for discovery science.

Visualising the molecular basis of nutrient sensing in Eukaryotes.

Eukaryotic cells continuously integrate nutrient and metabolic cues at the lysosome to coordinate growth, metabolism and stress responses through mechanistic target of rapamycin complex 1 (mTORC1) signalling. Recent advances in cryo-electron microscopy have begun to reveal the molecular architectures that underpin nutrient sensing across amino acid and lipid signalling pathways. Structural analyses of the KICSTOR–GATOR1 regulatory axis demonstrate how large lysosomal assemblies coordinate amino acid sensors to regulate Rag GTPase signalling and control mTORC1 activation. Complementary studies of the lysosomal membrane protein LYCHOS uncover an unexpected transporter–GPCR hybrid architecture that directly couples cholesterol sensing to mTORC1 regulation. In parallel, high-resolution structures of the tuberous sclerosis complex (TSC) bound to the lysosomal recruitment factor WIPI3 reveal how phosphoinositide signalling coordinates lysosomal localization of the RHEB GTPase-activating complex to suppress mTORC1 activity under nutrient-limiting conditions. Together, these studies provide a structural framework for understanding how diverse nutrient and lipid signals are detected at the lysosomal surface to subsequently control cellular growth programs. More broadly, they establish the principles of eukaryotic nutrient sensing and illuminate how disruption of these molecular assemblies contributes to metabolic disease, cancer and developmental disorders.