Beyond Toxicity: Microcystin-Mediated Metabolic Plasticity Through Carbon Fixation and Central Carbon Metabolism in *Microcystis aeruginosa*

Souvik Roy

Laboratory of Algae Biotechnology

Microcystins are best known as potent cyanobacterial toxins, but their biological role within the producing cells remains less understood. Could these compounds also help cyanobacteria adapt to changing environmental conditions? Our study explores the contribution of microcystin to the physiological and metabolic plasticity of *Microcystis aeruginosa* under temperature stress. By comparing a microcystin-producing wild type with a microcystin-deficient mutant across various temperatures, we investigated changes in growth, intracellular metabolite localisation, central carbon metabolism and gene expression. The integrated experimental approach combines physiological, proteomic, metabolomic and molecular analyses to examine how microcystin influences cellular organisation and metabolic responses to temperature variation. The findings provide new insights into the intracellular functions of microcystin and its potential contribution to the environmental adaptability of *M. aeruginosa*.