

Department of Molecular and Cellular Biology
Graduate Seminar MCB*6500

Friday, April 19th, 2024 @ 12:00 p.m.

presented by:

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(Advisor: Dr. Georgina Cox)

**"A Systems Level Analysis of Efflux Pump pH
Homeostasis in *Escherichia coli*"**

Efflux pumps are known to play a crucial role in the efflux of antimicrobial compounds in *Escherichia coli*. Efflux pump-encoding genes are highly conserved, with several pumps being functionally redundant. Recent studies in *E. coli* have shown that efflux pumps are increasingly associated with physiological functions and are conditionally expressed. There are several mechanisms of pH resistance in *E. coli*, and it is now known that efflux systems are important components of these pH response mechanisms. Therefore, it is important to understand fitness trade-offs or benefits that occur when these pumps are expressed and how this contributes to pH homeostasis. To better understand the molecular basis of efflux pump roles in pH homeostasis, including growth and survival, this study will utilise a highly efflux deficient strain, Efflux Knock-Out strain (EKO-35), which has been generated to be devoid of all 35 efflux pumps in *E. coli*. A strain library was constructed where each individual efflux pump-encoding gene (n=35) was integrated back into the genome, enabling functional studies. This research will utilise this strain collection to provide insight into the role of efflux pumps in fitness and survival under both acidic and alkaline conditions relevant to *E. coli* physiological growth. Gene expression studies and metabolomic analysis will further elucidate cellular responses of efflux pumps that contribute to *E. coli* survival. Overall, this research will provide a comprehensive analysis of the natural functions of efflux pumps and their contribution to *E. coli* pH homeostasis.