Department of Molecular and Cellular Biology

Graduate Seminar MCB*6500

Friday, Sept. 22, 2017 in SSC 2315@ 12 noon

presented by:

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(Advisors: J. Wood and S. Seah)

"The role of membrane physical properties in *Escherichia coli* osmotolerance: the relationship between the osmosensory transporter ProP and ubiquinone"

Cells lose water in response to increasing external osmotic pressure. In bacteria, this triggers the intracellular accumulation of osmolytes to forestall cellular dehydration. Osmolytes are organic compounds that can be transported into the cell via specific osmosensing transporters, such as the paradigmatic H^+ symporter ProP of *Escherichia coli*. Recent evidence indicates a novel role for the isoprenoid lipid ubiquinone 8 (Q8) in osmoprotection of *E. coli.* Experiments indicated that this role was independent of Q8's roles in respiration and oxidative stress. Q8 may confer osmoprotection by enhancing the mechanical stability of the cytoplasmic membrane. This would be consistent with work showing that other ubiquinone homologues modulate phospholipid membrane physical properties. This project will test the hypothesis that membrane Q8 accumulation is necessary for the function of other osmoregulatory systems that are integral membrane proteins, such as *E. coli* ProP. To determine if ProP is affected by Q8's role in aerobic respiration, osmosensing by ProP will be analyzed in cells with and without Q8. To determine if ProP is affected by Q8's modulation of membrane physical properties, osmosensing by ProP will be further analyzed in ProP-containing proteoliposomes with and without Q8. If there appears to be a direct effect of Q8 on ProP via the membrane, the impact of Q8 on physical properties of the bacterial membrane will be examined. For example, membrane fluidity will be monitored using diphenylhexatriene fluorescence anisotropy.