Pelet lab: Quantitative Signaling Group

Department of Fundamental Microbiology

Project for SUR students in 2022

Project description:

A key question in developmental biology is how cell fate is determined. To investigate the molecular mechanisms involved in such a process, the mating pathway of Saccharomyces cerevisiae serves as a simplified eukaryotic model to study this complex question.

In budding yeast, mating partners communicate their presence through the secretion of pheromones. The signal is then transduced via a Mitogen-Activated Protein Kinase (MAPK) cascade leading to the activation of a complex expression program necessary to allow efficient mating. Interestingly, the hundreds of genes, which are under the control of one major transcription factor Ste12, are induced in a specific temporal sequence. This specific order is believed to be important for achieving proper cell fate determination. So far, the precise molecular mechanism responsible for the regulation of these sequential inductions remains to be elucidated. Among the hypotheses, preliminary data suggest a role for the transcriptional regulator Kar4 in addition to Ste12.

The project will aim at investigating how Kar4 is involved in the expression of certain mating genes. To do so, we will study the contribution of different Kar4 mutants on the expression of mating genes. In parallel, kar4Δ strains, carrying synthetic promoters, will be used to test the influence of Kar4 on gene expression. Also, we will determine how the Kar4 protein associates to the promoters to activate targeted genes.