

Microorganism Memory in Response to Calcium Perturbations

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Microorganisms have complex mechanisms that allow them to survive drastic changes in their environment, that is, to maintain homeostasis. To understand these mechanisms, we can systematically subject them to a variety of controlled conditions and observe their reaction. A specific example is the observation of the response of yeast to large variations in environmental calcium concentrations; this problem is important as a model of for the behavior of human cardiac cells. The variations in internal calcium concentration of the yeast, induced by external changes can be monitored by luminometric techniques where we observe the light emitted by calcium sensing molecules. Extension of these methods to more complex stimuli such as sequential changes in concentration is likely to lead to deeper understanding of homeostatic mechanisms. In particular, the response to similar repeated stimuli might not be identical but rather indicate the presence of memory mechanisms where previous experiences modify the latest responses.

In this project students will investigate qualitatively and quantitatively response of yeast to external calcium concentration variations systematically controlling one of variable such as time between stimuli, relative sizes of stimuli or its qualitative form, replacing calcium by other relevant substances.