

Construction of the *Escherichia coli* Cell-Cycle Mechanism

Amy Gilbert
Department of Chemistry
Eastern University
St. David's, PA 19087
agilbert@eastern.edu

Charles Johnson
Department of Biology
Texas A&M University
College Station, TX 77843
cljohnson@tamu.edu

Quingwu Yang
Department of Biochemistry
Texas A&M University
College Station, TX 77843
yqingwu@hotmail.com

Paul A. Lindahl
Department of Chemistry
Texas A&M University
College Station, TX 77843
lindahl@mail.chem.tamu.edu

ABSTRACT

Our group is attempting to model the growth and replication of simple living systems at the molecular level. Given the complexity of even the simplest living systems and the lack of required mechanistic and kinetic information, our approach is to model Mechanical Cells. These hypothetical living systems are given properties similar to (but simpler than) real prokaryotic cells. The advantage of using such constructions is that their complexity can be adjusted to available information and modeling capabilities. We are currently constructing a mechanical cell (called MC5) with properties corresponding to those of the best-studied organism, *Escherichia coli*. We have focused initially on

cell-cycle processes, as they are arguably the least understood and lie at the "heart" of cellular functions. Toward this end, we are constructing a database containing relevant information from the available literature. A cell-cycle mechanism for MC5 is being constructed based on this information. Given gaps in our knowledge, hypothetical components and reactions are used to complete the mechanism. A second database is being constructed in which reactions and components corresponding to the MC5 cell-cycle mechanism are specified. Details of this mechanism will be presented.