

The Department of Cell Biology and Neuroscience presents:

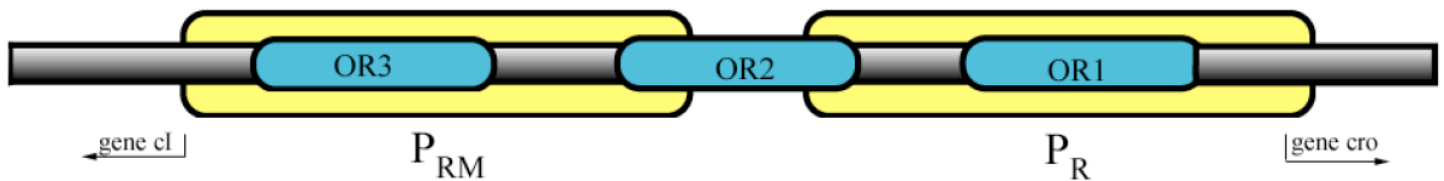
Departmental Seminar

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“Binding cooperativity in phage lambda is not sufficient to produce an effective switch.”



Friday, Feb. 15, 2008 - 3:00pm
108 Ag/Plant Bioscience

please note
new time!

Bacteriophage lambda is the best studied example of a gene regulation switch. The phage-infected cell can follow lytic pathway which leads to production of new phages and lysis of the cell. Alternatively, the infected cell can follow lysogenic pathway, in which the virus establishes stable association with the host. In the last 20 years a number of experiments elucidated gene regulation mechanisms that are behind the choice of alternative states and their maintenance.

The transcription initiation involves two distinct steps; first RNA polymerase binds the promoter to form an unstable, closed complex (this reaction is described by an equilibrium constant K_B); second the closed complex isomerizes to an active, stable open complex (the reaction is described by a forward rate constant k_f). The cooperativity between CI protein and RNA polymerase is accomplished by DNA bound CI increasing the forward rate constant k_f about 10-fold without having any significant effect on K_B .

We use a model based on Ackers chemical equilibrium description of the promoter binding by the regulatory factors, to show that the stability of the lysogen will be severely compromised if CI had the 10-fold effect on K_B and no effect on k_f . We also discuss the underlying reasons for this highly non-linear and counterintuitive effect.