Micro201
Rudner Class 3: Chromosome Organization and Segregation
March 12th 2019

Overview:

For Tuesday's class we will discuss how bacterial chromosomes are organized and segregated. The background readings include a brief (3 pages) commentary (Holmes and Cozzarelli, 2000) on the role of supercoiling in DNA compaction and chromosome dynamics. This is among the best commentaries on the topic ever written. I encourage you to read it. It makes supercoiling accessible and interesting. The second (Wang et al 2013) is a more recent review that focuses more broadly on chromosome organization and segregation in bacteria. I think this one is also a pretty good read.

The primary reading [Hiraga et al, (1989)] takes you through an elegant and creative screen to identify mutants involved in chromosome segregation. The screen is conceptually straightforward. The devil is in the details. Read this one for the details. Don't worry about the particular mutant (*mukA1*) that they describe. The other complementation groups turned out to be much more interesting. I'll tell you more about them at the end of class.

The second paper (Mercier et al 2008) is focused on how the terminus region of the *E. coli* chromosome is organized. The idea of large ("macro") domains had been around for years but the data were all indirect. I wasn't even sure if they were real. This paper provides the molecular basis for at least one of these domains (the Ter Macro Domain). We will only discuss the first 3 figures and the screen used to identify the *matP* gene.

Finally, I've included a provocative review (Jun & Wright, 2010) arguing that entropy is the principal driving force for chromosome segregation in bacteria. Food for thought.

David

Required Reading:

1) Hiraga et al (1989)
2) Mercier et al (2008) (thru the Results section entitled: "Long-Range DNA Interactions between Righ and Left Ter MDs are Affected by MatP Inactivation"

Background Reading:

1) Holmes and Cozzarelli (2000)
2) Wang et al (2013)
3) Jun and Wright (2010)