

Micro 201:
Bernhardt Lecture 6 - Cell Motility
February 14, 2019

Overview:

In this class we will cover cell motility and the assembly of the bacterial flagellum. We will also briefly discuss chemotaxis and transmembrane signaling by chemoreceptors. Signaling and two-component systems (sensor kinases and response regulators) will be covered in more detail later in the semester. Trans-envelope protein secretion systems will be mentioned, but not covered in detail. Because these structures are often used by pathogens to secrete their arsenal of toxins and inject them into host cells, trans-envelope secretion machines will be covered in much greater depth in Micro 214.

The paper discussion will focus on two papers from Dan Kearns' lab. The first paper describes the discovery of a new motility regulator that stops flagellar rotation so that *B. subtilis* can settle down to build a biofilm. The second paper also started out with an investigation of motility, but as often happens in science, the story took an unexpected turn. It's a nice example of how to follow up a mutant phenotype to ultimately discover gene function. In this case, they ended up identifying a new component of the *B. subtilis* Min system. In both papers, pay special attention to the genetic methods used to isolate motility mutants and suppressors of motility defects.

Papers for discussion:

- 1) Kris M Blair, Linda Turner, Jared T Winkelman, Howard C Berg, Daniel B Kearns. **A molecular clutch disables flagella in the *Bacillus subtilis* biofilm. (2008)** Science 320:1636-1638
- 2) Joyce E Patrick and Daniel B Kearns. **MinJ (YvjD) is a topological determinant of cell division in *Bacillus subtilis*. (2008)** Mol Microbiol 70:1166-1179

General Reviews:

- 1) Fabienne F V Chevance, Kelly T Hughes. **Coordinating assembly of a bacterial macromolecular machine. (2008)** Nat Rev Microbiol 6:455-65
- 2) Gerald L Hazelbauer, Joseph J Falke, John S Parkinson. **Bacterial chemoreceptors: high-performance signaling in networked arrays. (2008)** Trends Biochem Sci 33: 9-19