

Micro201

Rudner Class 8: Bacterial Development (or Differentiation)

April 4th 2019

In our final class together, we will discuss examples of bacterial differentiation (or “bacterial development”). How one cell type differentiates into a different cell type is a fundamental and unsolved question in developmental biology. (There will be many answers to this question.)

I will give you an overview of examples of bacterial differentiation. And then we will focus on one of the best-characterized examples: Spore-formation in *Bacillus subtilis*. We will discuss the **Ben-Yehuda and Losick 2002** paper that addresses how the sporulating cell switches its division site from the middle to the pole.

We will then discuss the current thinking on how the pre-divisional cell generates two new cell types: the mother cell and forespore (or pre-spore). How do you go from 1 cell-type to 2 cell-types? Finally, if there is time, we will discuss developmental commitment. At what stage, is the sporulating cell committed to its developmental fate? How could you test this? And what type of mechanisms can you imagine would prevent the differentiating cell from changing its mind?

The background reading is a review on “morphological coupling”. I hope that this review will connect our discussion in last class on checkpoints to our discussion this coming Tuesday on bacterial differentiation.

The second paper, which are unlikely to get to, is about a diffusible factor involved in heterocyst development in *Anabaena*. This is a very cool organism that does some very interesting differentiation.

I have included a recent review on heterocyst formation that will get you up to speed.

I have also included a very recent paper on FtsZ dynamics that *might* speak to the models proposed in the Ben-Yehuda and Losick paper.

enjoy!

David

Required Reading:

Ben-Yehuda and Losick 2002

Yoon & Golden 1998

Background Reading:

Rudner & Losick 2001

Herrero 2016

Bisson-Filho et al 2017 (food for thought)