

Greetings earthlings!

This week, for exercises, there are two movies that amount to just over an hour. You can watch them in the 2 hours on Thursday in exercise class, or at some other time that is convenient.

Make sure you understand what questions they are investigating.

- What sort of organisms are they looking at?
- What are the spatial challenges faced by the cells?
- Which experimental assays did they use?
- What sort of “machinery” does the cell use to grip the environment and to exert force?

Try to extract the key conclusions they are making.

Julie Theriot on actin-based motility

<https://www.ibiology.org/cell-biology/cell-motility/>

Julie is awesome and knows a huge amount about cell movement and shape. She has forgotten more than I can remember!

Part 1: Protein Polymers, Crawling Cells and Comet Tails (30 minutes), and

Part 2: Mechanics and dynamics of rapid cell motility (37 minutes).

Julie will go over some material about actin that should be familiar to you, but it’s a good thing to remind yourself about it. She explains how nanometer sized actin molecules can self-assemble into filaments that are hundreds of microns in length. These actin filaments are constantly growing and shrinking, and this dynamic behavior allows a network of actin to generate enough force for cell motility.

Then she describes how the intracellular bacterial pathogen *Listeria monocytogenes* uses actin polymerization to propel itself through the cytoplasm and to invade other cells. These *Listeria* “comet tails” have allowed Julie and others to dissect the regulation of the actin network and give us ideas about what happens at the leading edge of crawling cells.

In the second video she looks at how cells move *fast* and how they steer themselves. Really cool experiments and a nice intuitive model for the process. By labeling actin and myosin in cells, she was able to follow turnover of actin in the lamellipodium. This technique of

Unexpectedly, she finds that myosin II plays an important role in actin disassembly at the rear of the cell. In addition, she found that asymmetric localization of myosin at the back of the cell appears to govern the process of cell turning.

As you are watching and thinking about this, I’d like to ask you to consider what implications these discoveries might have for human health more generally? Is this relevant for metastasis?

As you will know, being able to extract and distil information from (reliable) sources, including recorded lectures from world experts (like Julie), is a critical part of active learning, and it is something we do in the labs all the time in addition to reading text books and review papers. By the way, Julie Theriot was one of our famous invited guests at the SV 20th Anniversary Symposium in September 2022.

Enjoy the videos!