Seminar/Talk

The perks of being squishy: Archaea as a skillful mechanoresponsive machine

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Cells sense and respond to their physical surroundings using organized molecular machinery that is tightly regulated in space and time. The Bisson Lab is interested in the biophysical and spatio-temporal control of unusual cell shape transitions, how these traits evolved and the signals responsible for such shapeshift events. We combine state-of-the-art microscopy ranging from single-cell and single-molecule tracking, microfabrication, genetics, and biochemistry to study the molecular mechanisms of cell shape formation across over 100 different archaeal species. Here, I will discuss our recent finding around one of the main hypotheses: that instead of reading out mainly their chemical and metabolic environment, archaeal cells evolved to sense physical cues in order to build different cell shapes and mediate social behavior within the same and across different species. Their accurate mechanosensing brings significant implications for cell cycle regulation, cytoskeleton dynamics, and the emergence of a set of complex molecular factors present in eukaryotes, including animal tissue. We observed that cells respond to shear stress (shape-shifting transitions between polygons and rods) and confinement (transitioning from single- to tissue-like multicellular lifestyle). We speculate on possible evolutionary factors that enable archaeal cells to conserve such "squishy" properties and their connection to the microbiome's social interactions.

Thursday, September 14, 2023 02:00pm - 03:00pm
Sunstone Building - Big Seminar Room B

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