Johns Hopkins University

Department of Biology Seminar Series

Thursdays, 4:00pm

For more information go to: *https://bio.jhu.edu/events*

Zoom link: *https://zoom.us/j/97925356454?pwd=bjNuTlY1dU9BcXcvRFdleis2TVNadz09*

Mudd Room 100 - October 6th, 2022

Alexandre Bisson

Assistant Professor of Biology

Brandeis University

Host: Jocelyne DiRuggiero

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

Cells sense and respond to their physical surroundings using organized molecular machinery that is tightly regulated in space and time. Furthermore, cells have co-evolved their biomechanical and biochemical traits in order to convert physical signals from the environment into biological information. As a result, we contemplate a diversity of cellular structures with different material properties and functions. Using genetics, biophysics and cell biology tools, the Bisson Lab aims to understand how unusual polygonal-shaped archaeal cells are assembled. Different from the vast majority of microbes, archaeal cells are devoid of a rigid envelope, allowing them to shape-shift into different cell types in response to physical and chemical stimuli. Here, I will discuss our recent discovery of how specific mechanical perturbations trigger the development of tissue-like structures similar to known primitive multicellular eukaryotes. Using tools such RNA-Seq, CRISPRi and super-resolution microscopy, we characterized new important factors specific to multicellular lifestyle such as cytoskeletal polymers, mechano-channels and cell-cell junctions. Altogether, we believe this novel and unexpected discovery introduces a new way of understanding the potential of prokaryotes to self-organize into complex cellular structures. We would also like to speculate possible molecular mechanisms that enabled archaeal cells to conserve such "squishy" properties, which reflects in many challenges for the cell biologists domesticating this domain of life.