

2019-2020

EEB Seminar Series

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From Individual Amoebae to Fruiting Bodies: Connecting Single-Cell Signaling to Multicellular Behaviors

Abstract: Coordinating biological behaviors across groups of cells is critical for a wide range of biological processes ranging from development to wound healing. How these basic group phenomena are regulated, potentially by modulating factors like the frequency of synchronized signaling or the speed of group migration at the level of single cells is still an open question. Identifying what single cells tune in their own signaling programs to produce these phenotypic changes in group-wide behaviors would yield parameters we can control when reprogramming these systems for our benefit. To address this challenge, we are pursuing two complimentary efforts in the classic model system for collective signaling, Dictyostelium discoideum. First, we are interrogating signaling behaviors in mutant strains to link specific signaling network components to single-cell dynamics that are known to lead to changes in group-wide behaviors. Second, we are linking single-cell signaling to population-wide behaviors through quantifying different natural strain behaviors and direct experimental optogenetic control over signaling. Through directly controlling signaling, we can causally link our observations of single-cell signaling dynamics to the population-wide behaviors they control. Together, these efforts will allow us to identify how population-wide multicellular behaviors are naturally regulated at the level of single-cell signaling.

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