Johns Hopkins University

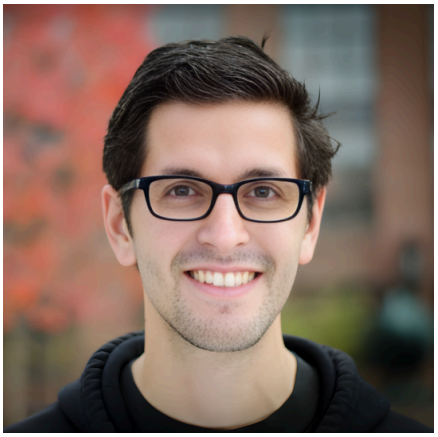
Department of Biology Seminar Series

Thursdays, 4:00pm

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

Zoom link: https://zoom.us/j/97925356454?pwd=bjNuTlY1d119BcXcvRFdleis2TVNadz09

Mudd Room 100 - May 9th, 2024



Nathan Lord

Department of Computational and Systems Biology

McGowan Institute for Regenerative Medicine
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Host: Bob Johnston

"Mechanisms of Robust Developmental Patterning"

Embryos often communicate instructions to their cells using diffusible signaling molecules called morphogens. In textbook models, morphogens diffuse from a localized source to form a concentration gradient, and target cells select fates by measuring the local morphogen concentration. However, natural patterning systems often incorporate numerous co-factors and extensive signaling feedback, suggesting that embryos require additional means of control to generate reliable patterns. This talk will present our recent results that illuminate how additional regulatory features enable robust pattern formation by the morphogen Nodal in zebrafish embryogenesis. Using a series of mutant embryos engineered to have feedback-compromised patterning systems, we demonstrate that simple ligand diffusion and capture is sufficient to explain the formation of normal Nodal signaling patterns. We further demonstrate that embryos regulate pattern features by tuning ligand capture with cell surface receptor complexes. Finally, we show that negative feedback on signaling, though dispensable under normal circumstances, is required to correct perturbations. Collectively, these results establish the Nodal patterning system as an exciting model for robust developmental patterning.