Mathematical Approaches to Studying the Patterns of Organisms

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In this talk, I will present two mathematical schemes that help reveal novel patterns in the dynamics and variations of pattern formation in multicellular organisms. In the first project, in collaboration with the Carthew Lab (NU), I will present how the use of complex analysis helps the alignment of images of developed adult organs, facilitating the high precision study of the shape of variation across populations. In the second project, in collaboration with the Munro Lab (UofC) and the Lemaire Lab (Montpellier), I will present novel mechanical properties of 3D multicellular aggregates that provide a route to inferring the forces relevant to morphogenesis based on light-sheet live-imaging of Ascidian embryos. Both projects work towards and are indeed guided by a view that evolving systems challenge us with a fundamentally different class of pattern formation to those often studied by physical scientists.

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