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The Mathematical Laws of Morphology and Biomechanics

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Virtual Presentation: <https://purdue.webex.com/meet/aselvite>



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Evolutionary tales of biological shape: bodies and beaks

The beak of the finch has a hallowed history in evolutionary biology. I will attempt to complement this approach with a mathematical/physical perspective on the range of beak shapes seen (and not), how the beak develops from a simple bud, and how beak function and form may have co-evolved. I will then switch to the study of an early event in morphogenesis, gastrulation, the first step in the formation of the body in most animals. Recent experiments that show how simple manipulations can channel chick gastrulation to resemble the primitive streak in different organisms. I will provide a mathematical/physical framework for primitive streak formation by coupling active cell contractility, reorientation, and flow dynamics that leads to a phase diagram for the morphology of the primitive streak. Time permitting, I will close with some thoughts on other related problems in morphometry and morphogenesis in an Evo-Devo context.



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