



COLLOQUIUM

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Masking, maintenance and mimicry: the interplay of cell-intrinsic and cell-extrinsic effects in evolutionary games

Friday April 21st at 2:30pm in RT 1516

Bio: Masters in Physics at the University of Oxford 2011-2015. PhD in Spatial metrics and models of the tumor microenvironment in ovarian cancer at the University of Cambridge 2016-2020. Now working as a postdoc within Jacob Scott's lab at the Cleveland Clinic, looking at applying math in fun ways to better understand and map the evolutionary dynamics of cancer through space and time. In his spare time, he plays ice hockey and does professional wrestling.

Abstract: Biological evolution is a stochastic yet inevitable process that lies at the heart of cancer, and thus underlies treatment resistance. Modelling the evolutionary processes underlying resistance is fundamental to both understanding and treating complex diseases, particularly in the interest of engineering solutions that avoid the evolution of multi-drug resistance entirely. There is a need for evolutionary theory and modelling that incorporates both biological stochasticity and the interactions between cells within tumors. Through the lens of experimental biology and a simple two species system, we frame cell-cell interactions in our mathematical approach as cell-extrinsic, growth-rate modifying, frequency-dependent interactions. In this way, we show the extent to which the presence of these ecological interactions can modify the evolutionary trajectories that would be predicted from cell-intrinsic properties alone. We show that these interactions can modify evolution in such ways as to mask, mimic, or maintain the results of cell-intrinsic fitness advantages. This work has implications for the interpretation and understanding of evolution; a result which may explain an abundance of apparently neutral evolution in cancer systems and heterogeneous populations in general. In addition, the derivation of an analytical result for stochastic, ecologically dependent evolution paves the way for treatment approaches involving genetic and ecological control.

Refreshments will be served in RT 1517 at 2:10pm