Salah Mohammad Memorial COLLOQUIUM SERIES

MATH SIUC

Title

Direct and Indirect Effects of Species Interactions in Disease Systems

ABSTRACT: Indirect effects, both density- and trait-mediated, have been known to act in tandem with direct effects in the interactions of numerous species. They have been shown to affect populations embedded in competitive and mutualistic networks alike. At the same time, in disease systems, pathogens can harm their hosts in a variety of ways. For this reason, we define virulence as an umbrella term that encompasses disease induced mortality, fecundity reduction and increased predation due to the disease. Moreover, competitors can alter the course of an epidemic through disease dilution or amplification. All these interactions greatly complicate the task of determining key factors and interactions in disease spread.

In this talk, we will introduce mathematical models based on coupled ordinary and partial differential equations to investigate the invasibility and prevalence of an obligately killing fungal parasite in a zooplankton host as they are embedded in a complex ecological network of predators, competitors and resources. Among our main findings is the demonstration that indirect effects cause qualitative and quantitative changes almost indistinguishable from direct effects and the theoretical verification of the fact that the effects of direct and indirect mechanisms cannot be disentangled. Our results underpin the conclusions of past studies calling for comprehensive models that incorporate both direct and indirect effects to better describe field data. We also demonstrate trade-offs among the various manifestations of virulence and how these together with life-history traits shape the disease dynamics.

This is joint work with C. Caceres, T. Stewart, J. Kavouras, and B.Mueller-Brennan.

Time: 3:00PM
Date: November 16, 2017
Place: Neckers 156

Reception immediately following in Neckers 356.

Dr. Zoi Rapti

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