

MAR08-2007-000197

Abstract for an Invited Paper
for the MAR08 Meeting of
the American Physical Society

Strong Fluctuations and Cycling in Biological Systems¹

TIMOTHY NEWMAN, Arizona State University

In this talk I describe a mechanism for generating cycles in a large class of “mesoscale” biological populations (meaning populations composed of thousands to tens of thousands of units). Cycles are caused by a resonant amplification of the system dynamics triggered by internal noise. I will discuss this mechanism in the context of two classes of simple systems: ecological (e.g. predator-prey, host-pathogen) and biochemical (e.g. small gene regulation networks, modules of metabolic processes). [Predator-Prey Cycles from Resonant Amplification of Demographic Stochasticity, A. J. McKane and T. J. Newman, Physical Review Letters 94, 218102 (2005); Amplified Biochemical Oscillations in Cellular Systems, A. J. McKane, J. Nagy, T. J. Newman, and M. Stefanini, Journal of Statistical Physics 128, 165:191 (2007).]

¹This work was partially supported by awards NSF DEB-0328267 and NSF/NIH DMS/NIGMS-0342388.