

MAR12-2011-009123

Abstract for an Invited Paper
for the MAR12 Meeting of
the American Physical Society

Bacterial Games

ERWIN FREY, Ludwig-Maximilians-Universitaet Muenchen

Microbial laboratory communities have become model systems for studying the complex interplay between evolutionary selection forces, stochastic fluctuations, and spatial organization. Two fundamental questions that challenge our understanding of evolution and ecology are the origin of cooperation and biodiversity. Both are ubiquitous phenomena yet conspicuously difficult to explain since the fitness of an individual or the whole community depends in an intricate way on a plethora of factors, such as spatial distribution and mobility of individuals, secretion and detection of signaling molecules, toxin secretion leading to inter-strain competition and changes in environmental conditions. We discuss two possible solutions to these questions employing concepts from evolutionary game theory, nonlinear dynamics, and the theory of stochastic processes. Our work provides insights into some minimal requirements for the evolution of cooperation and biodiversity in simple microbial communities. It further makes predictions to be tested by new microbial experiments.