Cologne Evolution Colloquium

CRC 1310 Predictability in Evolution

Pete Czuppon
University of Münster

Evolution of drug resistance: mode of action and density regulation

The use of an antibiotic creates a beneficial environment for the evolution of resistant bacteria. The dosage of the antibiotic drug plays an important role during this process. Previous studies have shown that the optimal dose to limit resistance evolution will either be the highest or the lowest drug concentration possible to administer; however, no analytical results exist that help decide between these two extremes. We developed a stochastic mathematical model of bacterial dynamics under antibiotic treatment to address this gap. We explore various scenarios of density regulation (bacterial density affects cell birth or death rates), and antibiotic modes of action (biostatic or biocidal). Importantly, we obtain an analytical prediction of the antibiotic concentration that maximizes the survival of resistant cells until the end of antibiotic treatment, which may help to decide which drug dosage (not) to administer.

Wednesday, November 29, 2023, 17:00
Institute for Biological Physics, Zülpicher Str. 77a
Seminar Room 0.02, Ground Floor
Hosted by Joachim Krug