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Evolutionary epidemiology of drug resistance in space

Abstract: One way to control the spread of drug resistance in pathogen populations is to act on the spatial coverage of treatments. I will present results from models that track the epidemiology and evolution of a pathogen allowed to diffuse in a one-dimensional environment where drug treatment varies in space. First, I will present a work on the impact of spatially heterogeneous drug treatments on the evolutionary equilibrium of the pathogen population (in collaboration with Florence Débarre and Thomas Lenormand, Débarre et al (2009)). In particular, I will discuss the existence of a drug coverage threshold below which drug resistance does not evolve in the pathogen. Second, I will present an ongoing work on the analysis of the speed of an epidemic spreading in a heterogeneous population where drug use varies periodically in space (in collaboration with Quentin Griette, Matthieu Alfaro and Gael Raoul). I will show how the presence of a multiresistant pathogen can accelerate (or slow down) the speed of the epidemic.

Débarre F., Lenormand T. & Gandon S. (2009) Evolutionary epidemiology of drug-resistance in space. *PLoS Computational Biology*. 5: e1000337.