## Special Bioinformatics Faculty Search Seminar

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Ecology and evolution of cancerous tumors and expanding populations

Species expand their geographic ranges following an environmental change, long range dispersal, or a new adaptation. For species like the influenza virus, range expansions are the way of life. When species spread to new territories, they not only alter the affected ecosystems, but also change the course of their own evolution. I will first show that range expansions could destroy genetic diversity even when it is favored by natural selection. The loss of diversity is caused by genetic drift (demographic fluctuations) and is similar to a phase transition in physical sciences. Then, I will describe how range expansions can help populations to escape social parasites and maintain high levels of cooperation. This escape is possible, but not guaranteed when cooperators can spread faster than cheaters can invade them. Finally, I will discuss evolutionary dynamics of growing cancer tumors and show that accumulation of damaging mutations can be an Achilles' heel of cancer.