

Interactions in genes and ecosystems

Understanding biological systems means elucidating how system components interact, be they molecules in a cell or species in an ecosystem. In this talk I describe two efforts to better understand biological interactions. First, I will show how large-scale mutagenesis data can reveal key intramolecular and intermolecular interactions that determine proper gene function. Systematically mutating codons across an essential gene enables us to distinguish effects that occur at the protein level versus those that occur within the mRNA. In the second half, I describe how three-way interactions created by antibiotic production and degradation can stabilize microbial communities, even in well-mixed environments. We show that these 3-way interactions enable coexistence that is robust to substantial differences in inherent species growth rates and to invasion by “cheating” species that cease producing or degrading antibiotics.