



The Interplay of Antibiotic Inhibition and Inactivation Promotes Microbial Diversity



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ABSTRACT:

Many natural environments harbor microbial communities exhibiting a great diversity of antibiotic production and resistance capabilities. This raises the question of whether inhibitory antibiotic interactions stabilize or disrupt diversity. Theoretical studies and microcosm experiments have shown that inhibitory interactions can promote diversity through relationships of cyclic dominance (e.g. paper-scissor-rock games) they generate. However, such theories rely on preservation of spatial community structure and do not predict stable diversity under realistic assumptions of microbial dispersal. In this work we demonstrate that antibiotic inactivation, in which one species alleviates the antibiotic inhibition of another species, is widespread among antibiotic producing soil bacteria and that this type of higher-order interaction enables robust diversity maintenance of species with different antibiotic production and resistance capabilities even at high levels of microbial dispersal. More generally, this illustrates that competitive pairwise interactions can promote diversity when higher order effects are taken into account, which is likely of importance in many ecosystems.

Host: Van Savage, Ph.D.

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