

RELATIONSHIPS BETWEEN ECOLOGICAL INTERACTION MODIFICATIONS AND DIFFUSE
COEVOLUTION: SIMILARITIES, DIFFERENCES, AND CAUSAL LINKS.

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Abstract

A major empirical approach in community ecology is to describe the dynamics of a community by examining small subsets of species. Unfortunately, interaction modifications, which cause pair-wise interaction coefficients to depend on the presence or absence of additional species, can make it difficult to predict the overall dynamics of species within a community from experiments with pairs of species. In a similar fashion, one of the major approaches in evolutionary ecology has been to describe the likely evolutionary dynamics of a single species by focusing on the selection imposed by a limited number of other species within the community. However, recent work on diffuse coevolution indicates that selection pressures due to one species can change in the presence of other species. The magnitude of the difficulty that interaction modifications and diffuse coevolution present for predicting ecological and evolutionary dynamics is an unresolved question. Here we outline the similarities and differences between the two topics, discuss experimental and statistical approaches to studying them, and make predictions about when ecological interaction modifications are likely to cause diffuse coevolution. Since the currencies for interaction modifications are usually fitness components such as growth, fecundity, or survival, it is likely that these will translate into corresponding differences in the relative fitness of individuals or genotypes, and thus in general these two phenomena will occur together. We argue that community ecologists and evolutionary ecologists will both benefit from experiments that test for the effects of interaction modifications, and that studies of the mechanisms driving interaction modifications and diffuse coevolution (e.g. changes in behavior, nonlinear effects on shared resources, genetic covariances) will aid our progress in understanding the ecological and evolutionary dynamics of communities.