

THE EFFECTS OF EVOLUTION ON FOOD WEB DIVERSITY AND ABUNDANCE

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Abstract

Food webs, or ecological networks representing consumer-resource relationships, are widely used tools for studying the interplay between ecosystem stability, resilience, and diversity. Combined with population dynamic models, food webs have been used to understand how ecological interactions play a role in shaping ecosystem structure. However, the strengths and nature of the interactions can change over longer time scales as ecosystems evolve and undergo natural changes in composition with species adapting, going extinct, and new species emerging. In this talk I will present an evolutionary game theory model that combines deterministic ecological dynamics with a stochastic speciation process and discuss patterns in abundance, extinction, trait distribution, and structural changes that emerge as food webs evolve. Many of the simulated food webs in this study persist over hundreds of speciation events, exhibiting varying degrees of diversity and connectance over time. This work demonstrates how a few relatively simple evolutionary and ecological assumptions can be integrated to model ecological change and produce complex ecosystem structures that can be used to study vulnerability and stability of natural systems.