1067-92-2350 **Rosalyn C. Rael*** (rrael@umich.edu), Dept. of Ecology and Evolutionary Biology, 2004 Kraus Natural Sciences Bldg., University of Michigan, Ann Arbor, MI 48103, and **J. M. Cushing**, Department of Mathematics, 617 N. Santa Rita, University of Arizona, Tucson, AZ 85721.
Evolution and competitive coexistence in food chains.

Using an evolutionary game theory approach, we combine ecological and evolutionary dynamics in a differential equation model to study the effects of trophic structure and competition on evolutionarily stable strategies (ESS) in food chains. We build food chains with three trophic levels where the predation rate depends on a body-size based preference function. Body size represents the strategy, or evolving trait, in this model.

We show how the addition of trophic levels in a food chain changes the equilibrium strategies of existing species. When a consumer is introduced, the equilibrium strategy of the basal species evolves toward a value that increases the intrinsic growth rate; however, this effect is buffered by predator species at the third trophic level. We also show how increasing the speed of evolution gives rise to cyclical dynamics that influence the number of basal species that can coexist. These results suggest that evolution is essential to understanding long term dynamics in trophic interaction networks that form the basis for large-scale food web models of ecosystems. (Received September 22, 2010)