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Quenched Spatial Disorder in Cyclic Three-Species Predator-Prey Models QIAN HE, UWE C. TAUBER, Department of Physics, Virginia Tech, Blacksburg, Virginia 24061-0435, USA — We employ individual-based Monte Carlo simulations to study the effects of quenched spatial disorder in the reaction rates on the co-evolutionary dynamics of cyclic three- species predator-prey models with conserved total particle density. To this end, we numerically explore the oscillatory dynamics of two different variants: (1) the model with symmetric interaction rates near the center of the configuration space, and (2) a strongly asymmetric model version located in one of the three "corners" of configuration space. We find that spatial rate variability has only minor effect on the dynamics of generic, not strongly asymmetric systems (variant 1). In stark contrast, spatial disorder can greatly enhance the fitness of both minor species in "corner" systems (2). Furthermore, through both mean-field analysis and numerical simulation, we conclude that the evolutionary dynamics of two-species Lotka-Volterra predator- prey models is well approximated by such strongly asymmetric cyclic three-species predator-prey systems. Refs.: Qian He, Mauro Mobilia, and Uwe C. Tauber, Phys. Rev. E 82, 051909 (2010); Qian He and Uwe C.Tauber, in preparation (2011).

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