Abstract Submitted
for the MAR07 Meeting of
The American Physical Society

Origin of Modularity in Recombination Evolution JUN SUN, MICHAEL DEEM, Rice University — Modularity is a well-known phenomenon in biology. Modularity implies a hierarchical character, and is manifested in both phenotypic and genotypic levels. A module is defined, in general, as a component which operates relatively independently of other components of the system. The independence is in both the structural and functional levels. How does modularity originate? Evolvability is a selectable trait and modularity enhances evolvability. Thus, under conditions that select for evolvability, we expect to see the emergence of modularity. We used a spin-glass model to simulate the evolution of genomes. This model captures the interactions between amino acids or epistasis between genes. The evolutions include both sequence evolution and structure evolution. The environment changes and recombination plays an important role in evolution. We will present our result of the emergence of modularity, a symmetry breaking of the system. We will present the dependence of modularity on the amplitude and frequency of environment changing. The crucial role of recombination in the emergence of modularity will be discussed as well.

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Date submitted: 20 Nov 2006 Electronic form version 1.4