Abstract Submitted
for the MAR05 Meeting of
The American Physical Society

Glassy Dynamics in the Immune System Prevents Auto-Immune Disorders JUN SUN, DAVID EARL, MICHAEL DEEM, Rice University — A model of protein evolution is introduced. Hierarchical structures of the protein sequences or modularities play an important role in the dynamics. Computer simulations of the dynamics show that different evolving mechanisms(DNA swapping + point mutation v.s. point mutation) lead to different stable(metastable) states. From the immunological point of view, point mutation corresponding to the metastable state has the advantage of preventing auto-immune disorders. The energy of the equilibrium states is determined only by the dynamics and independent of the initial states. Differences in initial states leads to different times of reaching equilibrium, and the binding energy is linear to the difference. Analytical arguments will be given as well to explain these features.

Jun Sun
Rice University

Date submitted: 01 Dec 2004 Electronic form version 1.4