**The Process of Evolution, Mass-Extinction Events, and the Lack of SETI Success**
**Jeffrey D. Nyman**

## Figures

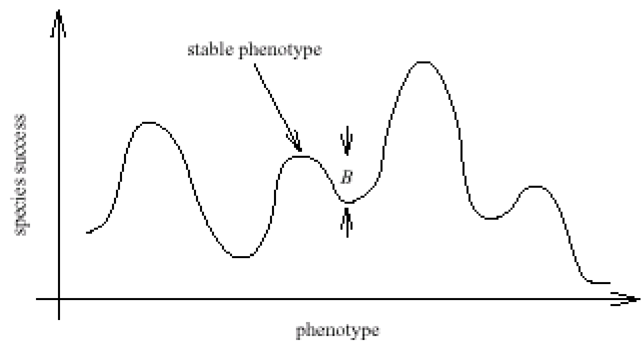


**Figure 1**
A schematic representation of a portion of a rugged fitness landscape. Maxima in the fitness function correspond to stable phenotypes. *B* represents the smallest fitness barrier that has to be traversed by a species at the indicated point in order for it to mutate to a new stable form.

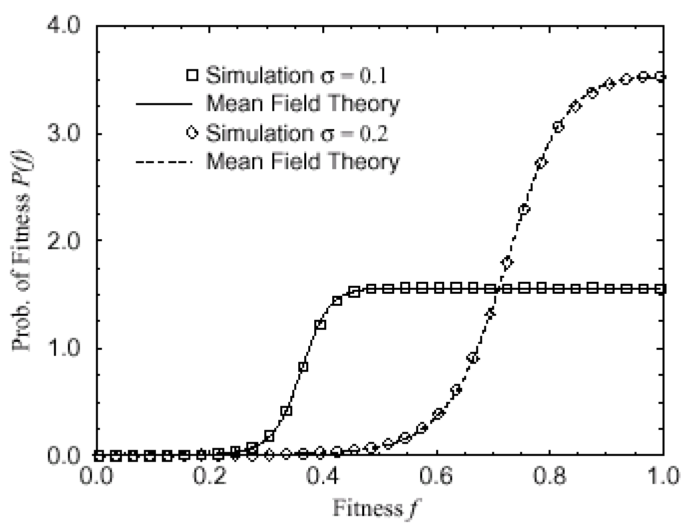


**Figure 2**
A histogram of the mean fitness distribution over the whole ecosystem for two different strengths of Gaussian noise. The symbols are the results from the numerical simulations, and the solid lines are the mean-field solution.

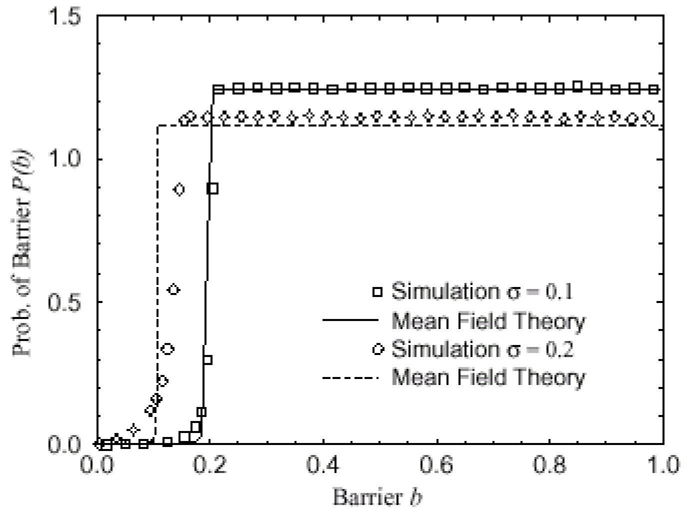


**Figure 3**

A histogram of the mean distribution of barriers for two different strengths of Gaussian noise. The symbols are the results from the numerical simulations, and the solid lines are the mean-field solution.

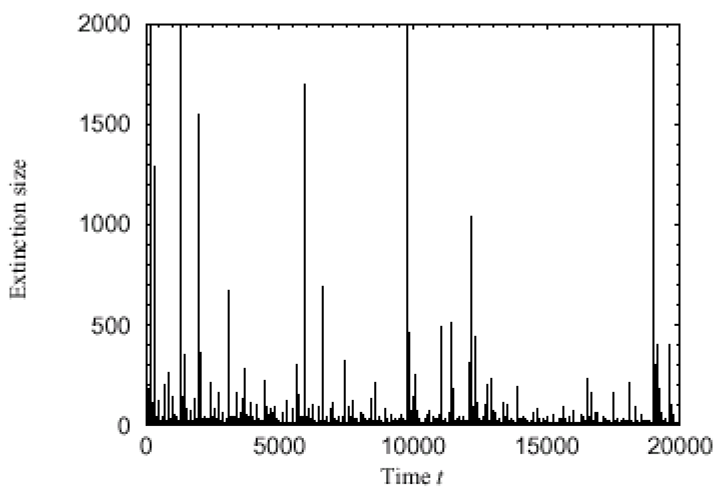


**Figure 4**

A section of the extinction data from a simulation of our model with N=10000 and K=4. Notice the punctuated behavior of the model, with long periods of inactivity separated by brief bursts of heavy extinction.

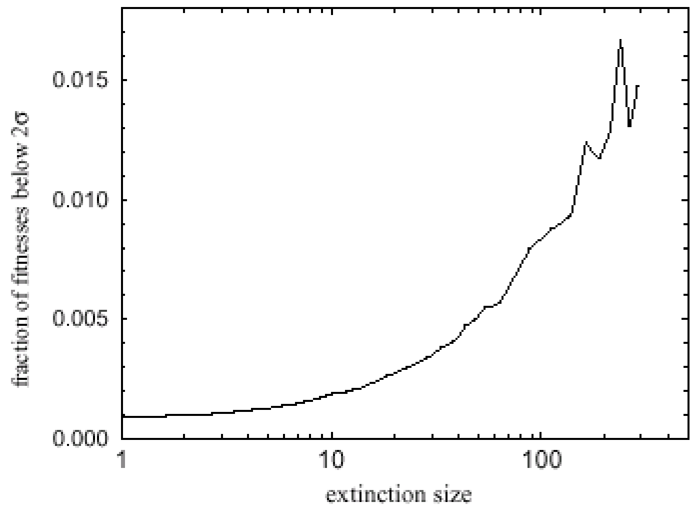


**Figure 5**
The fraction of the species having fitnesses below a certain threshold (twice the standard deviation of the noise in this case) immediately before extinctions of a certain size. Notice that the number of species having low fitness is higher immediately before a larger extinction, indicating that the large extinctions are the result of the coincidence of lower fitness with larger environmental stresses.

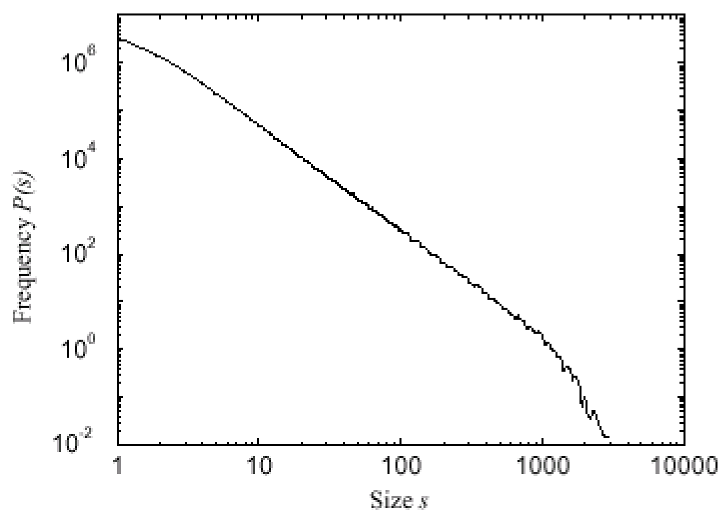


**Figure 6**
Log-log plot of the distribution of extinction sizes in the model. The straight-line form of the graph indicates that the distribution is a power-law, and the gradient of the line gives a value 2.183±0.007 for the exponent of the power-law.

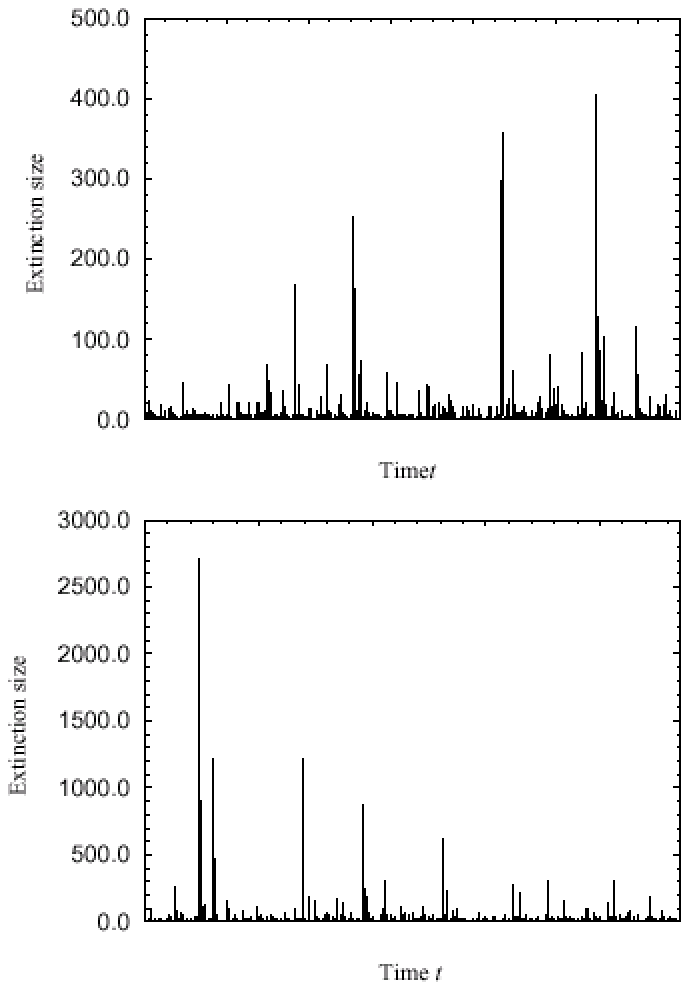


**Figure 7**
(a) An example of the “precursor” effect described in Section III.
(b) An example of the “aftershocks” described in Section III.