Biology/Geology 350
Invertebrate Paleontology: The History of Life on Earth
Exam Number One

Remember, this is only the essay portion of the test, and although you are to ***prepare*** answers to all questions provided, you will answer only one or perhaps two for the test. Which one or two you will not know until the time you take the test. Also, you may have a choice.

Question Three
Artificial Life and Cellular Automata

This question deals with the results of your "Experimenting with Artificial Life" (Life3000) experiments. This question differs from the other questions in that your answers at test time may be written using any references you wish, and need not be written following the rules applied to the other questions. If this question is chosen do the following:

(1) Turn in the record of the results of your experiments, following the instructions provided with the Life3000 experiment.

Write Dissertations on the Following:

(2) In terms of all the principles we discussed in non-equilibrium thermodynamics (including chaos theory, information flow, positive and negative feedback and its influence on the behavior of open systems, classifying cellular automata behaviors (Langton and Wolfram), etc.) explain the conclusions and consequences of your experiments.

Because you may use references in preparing this essay you should reference any ideas that come from the readings in support of your essay (this is encouraged for this question).

(3) Explain what, if any, implications these experiments have for understanding the fossil record and the history of life. Your deduced implications must be carefully, logically explained, and must follow naturally out of your specific experimental results. Specific issues you should address include the following. Draw on lecture material to illustrate your discussions.

- ✡ The spontaneous evolution of order out of chaos, as in the development of the primordial soup and early evolution of biochemical systems.
- ✡ Their application to the concepts of axiomatic and proximal causes in understanding evolutionary theory and the problem of the evolution of life.
- ✡ Their implications for the theory and practice of Lovelock's Gaia Hypothesis.