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 Two
Chaos and Complexity Theories

The patterns of life, indeed of almost all nature, are fractal, so ultimate explanations of the record of life must explain this phenomena. And fractal geometry is intimately connected with chaos and complexity theories. In this question we are not interested in applying chaos and complexity theory to the evolutionary record but in explicating the core principles of these theories.

Write a discourse explaining to a curious, intelligent layperson the essence of Chaos and Complexity theories. Be sure to include all the terms and concepts listed in the table below, and a discussion of the "Properties of Chaotic, Open (Dissipative) Systems."

- ❒ Attractors (all types)
- ❒ Bifurcation
- ❒ Bifurcation diagram
- ❒ Butterfly effect
- ❒ Computational View
- ❒ Deterministic (system)
- ❒ Emergent (property)
- ❒ Negative feedback
- ❒ Nonlinear
- ❒ Period doubling
- ❒ Positive feedback
- ❒ Self-referencing
- ❒ Sensitive dependence
- ❒ $X_{next} = rX (1-X)$