

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

QUESTION FOUR
ARCHEAN AND PROTEROZOIC DAISYWORLDS

BACKGROUND:

James Lovelock's Daisyworld models of fluctuating populations of various bacterial types, and temperature and water regulation through the Archean and Proterozoic are, of course, theoretical models. And they are very simplified. But as the definition of a model we are using indicates . . .

"A mathematical, mental, or structural representation of a real world phenomena that can be easily manipulated and changed to allow clearer understanding of processes that are otherwise too large, too small, or too complex to understand."

. . . simple models are often necessary to understand the essential processes and principles operating in a system. We discussed several of Lovelock's models in attempts to understand Archean and Proterozoic ecosystems.

QUESTION FOUR:

Given with the test slip, blank versions of the following diagrams (the chemical formulas will be present but no other titles or labeling) . . .

- ☺ **Water Retention in the Archean According to the Gaia Hypothesis**
- ☺ **Temperature Regulation in the Archean According to the Gaia Hypothesis**
- ☺ **Model of the Transition from the Archean to the Proterozoic**

. . . develop a thorough description and analysis of the events they model. You should assume your reader is scientifically literate, but has never encountered Daisyworld models before. (NOTE that although you may label the drawings provided, your written answers must also be self-sufficient and internally consistent.)