Astr450 Assignment 13: invent an alien
due Thu Apr 23, 2009

Word limit: 250

1. List three physical conditions of the subsurface liquid ocean on Jupiter’s moon Europa.

2. For each condition, list a location on the Earth that is similar.

3. Speculate, in an intelligent way, how life on Europa might have adapted to this physical condition.

An example response:

1. The liquid subsurface of Europa would be a dark place: light from the Sun would not filter down through tens of km of overlaying frozen water. The only source of light would be at volcanic vents, which emit mostly infrared light.

2. This lightless condition is matched at the bottom of Earth’s oceans, such as the Mariana trench in the Pacific ocean. This condition is also matched in deep underground caves.

3. Life may develop eyes sensitive to light in the infrared portion of the spectrum. Life may develop eyes with a mechanism similar to a Geiger counter, that multiplies each bit of light many times to produce an enhanced signal. Life may not develop eyes, but instead develop very sensitive ears, like a bat. Life would not be able to photosynthesize, thus would have to rely upon chemosynthesis, i.e., rely upon capturing a naturally-produced chemical and getting energy directly from it. Photosynthesis is a photon-regulated process, not an energy-related one; if life on Europa did rely upon photosynthesis from low-energy infrared light, then this life would have to be able to store several photons until enough energy was built up to break a chemical bond.

Requirements for a good assignment

- All work must be completely original. The assignment will be graded strictly, as expected for a 400-level course. The assignment is graded out of 30 points.
- Have your name, SID, and a word count at the top of the paper. Use question-and-answer format when writing your assignment, do NOT hand in a run-on paragraph (50% penalty).
- Be typed, double-spaced, and within the word limit. Assignments longer than the word limit will receive zero credit.
- Reference all sources of information you use.
- Use quotations only to illustrate your point, not to make it. If you are unclear about this requirement, then speak with the instructor.
- Show completeness of information, conciseness of expression, have a logical development of ideas, and evidence of thought regarding the content.
- Be professional of presentation, e.g., no ragged ends, creases, or ink blobs on the paper.
- In all ways, the author should show pride in his/her work.