Science 100

Questions for Discussion VI (be prepared to discuss on Wednesday, February 16)

Instructions: Same deal as before. Due midnight on Wednesday.

Ward and Brownlee, The Life and Death of the Planet Earth

1. (page 191) The Allan Hills Meteorite mentioned here seems to be implicated in bringing life (microbes) to Earth. Go to an appropriate website or book (by appropriate, I mean something published or updated within the last three years) and find out what the current status is on whether this meteorite is thought truly to have brought microbial life to Earth. Give one piece of evidence of how we came to this conclusion and cite your reference. (Hint: the meteorite is often known by its catalog name ALH 84001).

2. (page 191) Time to introduce you to a wonderful resource on-line for our solar system: http://www.nineplanets.org. This site, maintained by Bill Arnett for many years, is a wonderful up-to-date compendium of all sorts of different planetary research sources. Go to the site, click on the Mars link and find another reason (apart from the reasons that Ward and Brownlee give) why Mars probably does not support life now.

3. (page 193) Ward and Brownlee claim “seventeen” extrasolar (beyond our own solar system) planets discovered “so far”. Another nice web resource is for extrasolar planetary research; it is located at http://exoplanets.org/, maintained jointly by the University of California and the Carnegie Institute of Washington. The copyright on the Ward and Brownlee book is 2002; how many extrasolar planets have been found now (up to February, 2005)? Click around the various links of this site and find out the size of the smallest extrasolar planet discovered so far is. Also find out the largest number of planets in any extrasolar system so far. Note the last two points are directly related to the Drake Equation.

4. (pages 195 to 197) What property or properties define:

• the inner edge of the solar system habitable zone
• the outer edge of the solar system habitable zone
• the inner edge of the galactic habitable zone
• the outer edge of the galactic habitable zone

5. (page 207) Ward and Brownlee dismiss the notion of interstellar travel with the sentence “The difficulty of “practical” travel between the stars is getting there on the timescale of a human life span.” NASA’s Jet Propulsion Laboratory (JPL) in Pasadena, California, has several craft on “Interstellar Missions”. One of these is Voyager 1, the fastest and furthest human-made object, launched back in 1977. Go to http://voyager.jpl.nasa.gov/mission/interstellar.html and determine the number of years to the next stellar “close encounter” Voyager 1 will have. Does this confirm or refute Ward and Brownlee’s flippant point?

6. (page 200) This is not a question. “Terraforming” is the term applied to human engineering of Mars to be inhabitable by humans. Even though Ward and Brownlee point out the difficult aspects of terraforming Mars, it does not stop human writers from speculating about how to do so. Recent good examples of such books are the Red Mars/Green Mars/Blue Mars trilogy by Kim Stanley Robinson, Moving Mars by Greg Bear and Mars by Ben Bova. Please read these after you finish the course readings!