Dr. Reichler's Bio 311D class time:_____ Print Name:_____KEY_____
Exam #2 February 29, 2008

Read each question carefully and don't hesitate to ask if a question seems unclear. If possible, answer each question in the space provided, but if needed, continue on the back. If you use a drawing as part of your answer, be sure to also include a written explanation. These questions have specific answers, although for some, more than one answer is possible. To receive full credit you must clearly and fully answer the question being asked. The points for each question are noted in parentheses totaling 103 points.

1. If there is a dramatic shift in environmental conditions over a few years, which species would be most likely to **not** go extinct, one that reproduces three times per year, or one that reproduces once every ten years? Why? (10 pts)
The more rapid reproducer would be less likely to go extinct. Evolution happens via reproduction. Without much reproducing during the environmental change, there is little chance of the once every ten year species being able to survive.

2. A very effective insecticide is sprayed on a field of crops. Initially the population of bugs goes down, but then increases again. When you test the bugs, they are resistant to the insecticide.
a) Did the environment cause this new trait? Why or why not? (4 pts)
No, the trait must already exist. The environment can cause different selection, but not the creation of new traits.

b) What kind of evolution occurred (natural selection, genetic drift, or bottleneck)? What evidence led to this conclusion? (6 pts)
Natural selection: the resistant bugs survived and passed on their DNA.
(4/6 pts) Bottleneck: there was a dramatic decrease in the population, but it was not random who survived.

3. Grasses (a subset of the monocot angiosperms) and gymnosperms both use wind pollination. What does this tell us about the environment during the different times when gymnosperms and grasses evolved? Explain. (10 pts)
The environments must have been similar to lead to this convergent evolution.

4. Would the introduction of a mutation into a population lead to more or less genetic diversity? Why? (10 pts)
More, it can introduce a new trait leading to more genetic diversity.
OR
Less, if the new trait is advantageous so that individuals with this trait are better at passing on their DNA so most individuals have the DNA with the new mutation, there would be less genetic diversity. Also, the mutation could remove a gene thereby causing less genetic diversity.

5. You are studying two populations of birds in different geographic regions. The birds are similar, and you want to determine if they are the same or different species. In captivity they produce fertile offspring. Why would need to know something about their migration patterns to make a final

determination? (10 pts)
Even if they do make fertile offspring, they might not ever reproduce outside of captivity. To be the same species they must be sharing DNA, and unless they are in the same place, they cannot share DNA.

6. You find no difference in the mitochondrial DNA of someone born in Korea compared to someone born in Portugal. What do we know about where these two peoples' ancestors lived? (10 pts)
That they were in the same place within the last ~10,000 years. They had to be together to reproduce.

7. Could exposure to **positive** reinforcement and pictures of snakes **decrease** someone's ability to pick out the picture of a snake in a background of flowers? Why or why not? (10 pts)
No. Our ability to preferentially pick out snake pictures is strongly genetic so changing the environment will not have a major affect on this ability.

8. What type of natural selection (directional, stabilizing, or disruptive) led to ferns from equisetum? Explain. (10 pts)
Disruptive: there was a separation into two species. With leaves and without leaves.
(6/10 pts) Directional: there was a change of larger branches forming leaves, but the original species also remained, so this is not directional.

9. How could you tell the difference between a plant species that had self-incompatibility and one that did not by looking at the two species' genetic diversity? (10 pts)
Plants without self-incompatibility will have less genetic diversity due to self-fertilization.

10. Why did atmospheric CO_2 levels drop more rapidly after vascular plants evolved? (10 pts)
The vascular plants were bigger, taller, and so they had more area to do more photosynthesis and use more CO_2.

Bonus: Would organisms in the same genus or the same phylum have shared a more recent ancestor? Explain. (3 pts)
Same genus. The phylogeny reflects evolutionary relationships. Phylum is a more encompassing grouping that reflects a more distant common ancestor then genus.