Dual Credit Biology II Final Exam – Spring 2013

1. You are a bacterium called *Photobacterium phosphoreum* using your flagella to swim around a lake. *Photobacterium phosphoreum* is a bioluminescent bacterium that glows.
2. Why is this beneficial to the bacteria for bioluminescence? [2]
3. What are one advantage & disadvantage for being bioluminescent in the ecosystem? [2]
4. Would it be possible for a virus to be bioluminescent? Why or why not? [1]
5. The reaction that makes the bacteria glow is below. It involves an enzyme called Luciferase.

Luciferin + Luciferase + Oxygen + Salt ---> Light + Water

1. Would you most likely find these organisms in the ocean or freshwater river? Why? [1]
2. Based on the reaction, what other organisms need to live in the lake for bioluminescence to occur? Why? [1]
3. Other organisms heard about your bioluminescent coolness and want to join the same pond. The pond became overpopulated with organisms! You want to form a mutualistic symbiotic relationship with one of the organisms of the lake. You look and identify the following organisms: *Pediastrum boryanum*, *Alternaria alternata*, *Zostera marina*, and *Zebrasoma flavescens*.
4. Which organism would be best to establish a mutualistic symbiotic relationship with? Give three reasons why (food attainment, homeostatic environment, cells number & cell type, etc.) [3]
5. Describe why you did not pick each of the other organisms? [3]
6. There are other organisms that are bioluminescent such as Oyster Mushrooms, the Blue Ghost Firefly, Dinoflagellates, and the Hawaiian Bobtail Squid.
7. How might the bioluminescent trait been acquired by these higher organisms. Explain two ways they might have acquired that trait? [2]
8. How might it have been naturally selected in the ecosystem? Describe three ways bioluminescence could have benefited these animals. [3]
9. Dead organisms cannot glow. If the organism becomes extinct, how can scientists tell that these organisms were bioluminescent thousands of years from now? When considering different evidences of evolution, why is it the only evidence that can be used? [2]
10. Look up an article from a scientific journal concerning any topic that was described in the previous question or anything discussed this semester. Print out a portion of the paper and highlight the following:
11. Why was the study done? (problem/purpose) [1]
12. Interpret a diagram and or graph presented in the paper. [1]
13. What was the conclusion based on the results? [1]
14. What is the real world application from the results? [1]

\*\*\* Finding and printing out paper [1]