**Biology 180 Practice Exam 1 Name: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_**

**Spring 2015**

**Question 1 2 points**

While doing fieldwork on a species of lizard, you find that, on average, individuals have thicker osteoderms (bony plates in their scales to protect them from predators) in places where there are more predators that eat lizards.

Explain how the process of Lamarckian evolution would cause this pattern.

Sample answer:

When confronted with predators, individual lizards acquire thicker osteoderms and pass this acquired trait onto their offspring. As a result, thicker osteoderms become more common in areas where there are more predators.

Rubric:

2pts (full credit): Clearly articulate the concepts that (1) individuals acquire the trait, and (2) pass the

acquired trait to their offsprintg.

1pt (partial credit): One of the two concepts listed in the full credit answer is articulated clearly, but not both.

0pts (no credit): The answer is confusing, wrong, or misleading.

**Question 2 2 points**

Some lizards have extremely high levels of biliverdin in their blood (they have bright green blood; how cool is that?!). How would a biologist explain how a population of lizards with high biliverdin levels evolved from an ancestral population with low biliverdin levels?

Sample answer:

The level of biliverdin in blood is a heritable trait that varied in the ancestral lizard population. Due to a change in the environment, lizards with high biliverdin levels had higher reproductive success (fitness) than individuals with low biliverdin levels. As a result, average biliverdin levels in this lizard species increased over time.

Rubric:

2pts (full credit): Answer must clearly articulate that (1) biliverdin levels are a trait with heritable variation, (2) high reproductive success is associated with high biliverdin levels, and (3) the outcome is that the population changes over time, because more offspring are being produced by parents with high biliverdin levels in their blood.

1pt (partial credit): Only 2 of the 3 points above are clear and correct.

0pts (no credit): None or only 1 of the 3 points listed for full credit are clear and correct.

**Question 3 2 points**

Design an experiment to test the hypothesis that the green blood in this species allows the lizards to blend in with plants, and thus avoid predation by birds. At your disposal you have two solutions: (1) a solution that, when injected into the lizards, turns their blood red, and (2) a solution that is identical in every way to the first, except that when injected, the lizard blood remains green. You will place lizards into exclosures in the field and monitor the how many get eaten by birds.

State what your test groups will be, the independent (explanatory) variable, and the dependent (response) variable.

Sample answer:

The test groups are (1) lizards with the “red blood” injection, (2) lizards with the “green blood” injection, and (3) untreated lizards.

The independent variable is the color of blood, and the dependent variable is the rate of predation.

Rubric:

The test groups are worth 1 point. To get this point, the answer must describe (1) a group of lizards injected with the solution that turns their blood red, and (2) a group of lizards injected with the solution that does not turn their blood red. The “untreated lizard” group is **not** necessary for the point, but think about why it would make the experimental design more robust!

The independent and dependent variables are worth 1 point. To get this point, the answer must clearly state that blood color is the independent variable and predation is the dependent variable.

**Question 4 2 points**

Describe the process of natural selection in one sentence.

Sample answer:

Natural selection occurs when heritable variation leads to differential reproductive success.

Rubric:

2pts (full credit): The answer must clearly articulate that (1) heritable variation leads to (2) differential reproductive success.

1pt (partial credit): Only one of the two key points above are clear and correct.

0pts (no credit): Neither key point is clearly articulated.