Homework 4: Adaptation. Name\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

The connection between selection and adaptation. Turn in questions 3b, 6a and 7b for homework

1. Zebras and stripes.

What is the new hypothesis regarding the function of stripes in zebras? Do you feel the old hypothesis should be rejected because the evidence overwhelmingly supports the new hypothesis?

A bit of history.

2 a. List the problems with the “adaptationist programme” as detailed by Gould and Lewontin.

b. Critique the work on blue birds. What are some of the problems with the conclusions drawn from that work or how bad can a study of adaptation be? In this day and age, it is easy to forget that studies as the one on blue birds were accepted by peer reviewed journals.

Part of the problem is that there is a widespread misconception that natural selection most often produces adaptation. This is a bad misconception, as history would indicate that most often the result of the natural selection process, despite the variation present, is extinction. Scientists propose that 66 to over 95% of all the species the once existed do not anymore.

Also almost always natural selection is constrained by various factors. The result is extinction or at best, “imperfect” adaptation. So how imperfect is an adaptation before it is no longer an adaptation.

Limits to natural selection.

3. Wikipedia and website Evo101.

a. What are the definitions given on the EVO 101 site and Wikipedia for adaptation?

b. What are the limits to natural selection?

c. Give reasons why “bad genes” persist?

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4. A more in depth look at why adaptations are not perfect and difficult to study.

Read the limits to adaptation chapter from Stearns and Hoekstra

Define and give reasons that the following can constrain selection and so affect the “perfection” of adaptations.

a. Gene flow

b. Time lags

c. Trade off

d. Constraints (ignore discussion of asexual and sexual mammals)

5. Give examples of how each factor in 4 can limit the perfection of adaptations.

6. How to study adaptation.

a. How can you recognize an adaptation?

b. Describe traits that are not adaptions

7. An important application of the modern study of adaptation. Please make sure to examine the entire study, including Conover’s suggestions and ideas on preserving variation.

a. What were the results of Conover’s selection experiments?

b. Was size the only trait that responded in Conover’s experiments to selection? Again we monitor natural selection of traits, selection in reality works on the entire phenotype.