

# Evolution Standards 3 & 4 Study Guide

## Standard 3: Classify evidence supporting biological evolution

The three types of evidence for biological evolution discussed in class: structures (homologous, analogous, vestigial), fossils, and DNA (two tests).

For each of the following, explain and provide an example by drawing a diagram/picture or explaining an example:

| Structure  | Explanation (Picture or Words)  | Example  |
|------------|---|--|
| Homologous | Structure that is similar between two species due to common ancestor              | <del>arm</del> arm bones in humans, elephants, & whale |
| Analogous  | Structure that is similar between two species & <u>not due</u> to common ancestor | wings in bird & insect                                 |
| Vestigial  | Structure from ancestor that is no longer used but present                        | Human Appendix, Whale Femur (leg) bone                 |

Similar structures due to evolutionary origin (forearm bones in humans, birds, elephants, & porpoises) are called homologous. Structure that have a similar purpose but different ancestors due to evolutionary origin are called analogous structures

Fossils provide a record of the past. Fossils that show the middle & form between ancestors and descendants are called transitional fossils. Fossils can be reconstructed and analyzed to provide information about

past life and explain show how species can change over time.

**Match the following examples with the correct types of evidence:**

Examples:

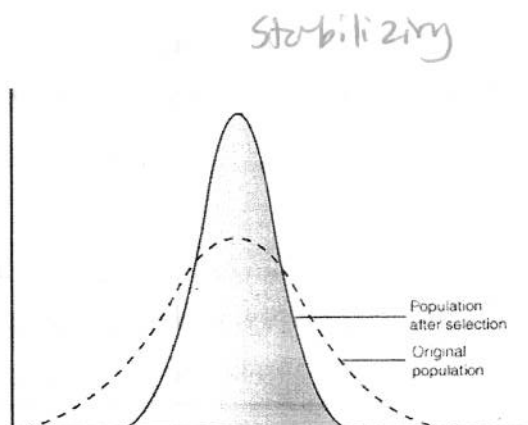
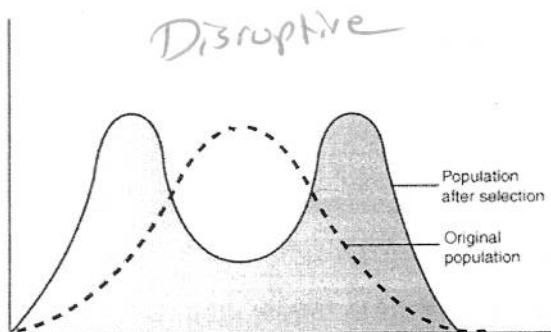
- A. Comparing amino acid sequence between two species: DNA / Amino Acid
- B. Using radiometric dating to determine age of samples: Fossils
- C. Comparing structures between two different organisms to determine relatedness: Structural
- D. A whale and turtle have 5 amino acid differences in the protein cytochrome c. DNA / Amino Acid

Modern horses descended from a species that had a foot with four hoofs; modern horses have a single hoof. When the ancestor of modern horses lived the environment was wet and marshy and having four hoofs was best fit for the environment. As the environment changed to a solid ground, having less hoofs was best fit for the environment. **Using the terms transitional form and intermediate, explain how this represents evidence for biological evolution.**

Modern horse ancestor species had hoofs with multiple parts (4 hoofs). Today's horse species have a single hoof. The numerous fossils that show intermediate form from the ancestor to today's horse represent the transitional form of

**Standard 4: Identify patterns of selection acting upon a species:** ancestor to modern species.

Identify the following two types selection demonstrated in the graphs below and explain how the population has changed:



Draw a graph showing directional selection and explain how the population changes:



Due to selection, populations are always changing. In polygenic traits, a bell curve shows the distribution or range of phenotypes for the trait. If one extreme of the trait is best fit for the environment this represents directional selection; if both extremes of the trait are best fit for the environment this represents disruptive selection; if the middle or average form of the trait is best fit for the environment this represents stabilizing selection. Sexual Selection occurs when an individual selects a mate based on specific trait characteristics. For example, male peacocks have brightly colored feathers to attract mates.

### **Types of Isolation:**

A process of isolation or separating of a population due to a physical barrier geographic isolation. A process of isolation or inability of a population to no longer reproduce is called reproductive isolation. This can occur by a physical inability, change of mating ritual, or a change in mating timing. A(n) behavioral isolation occurs when there is a change in how organisms act or carry out functions in order to survive that separates or isolates the population.

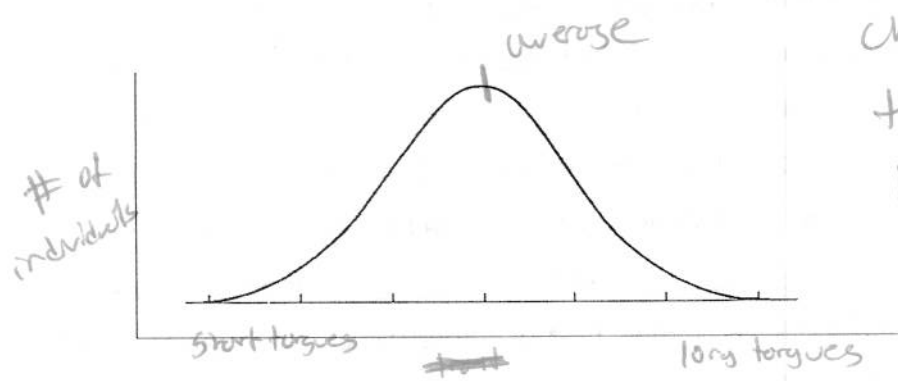
This is an example of what type of biological evolution evidence? \_\_\_\_\_

A form of evidence for biological evolution in which bone structures are present in an organism but no longer used: vestigial

Biological evolutionary process in which new species arise: speciation

What is the following type of graph? Bell Curve

- Label the axes
- Identify where the average form of the trait is located?
- Indicate what would happen in the following situation:
  - The graph shows tongue length in chameleons and long tongue length allows chameleons to catch insects more often.
- How does this represent natural selection?



↓

population will change so that there are more long tongues. Represents directional selection

If given hypothetical species population which has variation in the number of fur spots on its' body, describe how natural selection could change the population over time if increased spots was better fit for the environment.

- If more spots are better fit those individuals who have increased spots will survive and reproduce and pass on their increased spots trait. Because of variation this process will continue.

The chemical pesticide DDT has been used to remove insects from crops for many years. While initially very successful in killing harmful insects, DDT has been found to be less and less successful. Explain, using your understanding of natural selection, why this occurrence has been observed and the insect species have become more resistant to the DDT pesticide.

Insects that were resistant to DDT (variation in population) survive & reproduce; those not resistant die. Over time population is made up of insects that are completely resistant to DDT.