

Name _____

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Homework 10.3: Theory of Natural Selection

KEY CONCEPT Darwin proposed natural selection as a mechanism for evolution.

Darwin's ideas about evolution were influenced by many different sources. One important influence was the work of farmers and breeders. **Artificial selection**, the process by which humans change a species by breeding it for certain traits, provided Darwin with some important insights. He noticed that breeders could produce a great amount of diversity through selection of certain traits. In order for artificial selection to occur, the trait must be heritable. **Heritability** is the ability of a trait to be inherited, or passed down, from one generation to the next.

Darwin extended the ideas he gained from studying artificial selection to his theory of natural selection. **Natural selection** is a mechanism by which individuals that have inherited beneficial adaptations produce more offspring on average than do other individuals. Unlike artificial selection, where humans do the selecting of traits, in natural selection the environment is the selective agent.

Natural selection is based upon four principles:

- Overproduction: producing more offspring than are likely to survive
- Variation: the heritable differences that exist in every population
- Adaptation: a certain characteristic that allows an individual to survive better than other individuals it competes against for resources
- Descent with modification: the spread of an adaptation throughout new generations

Natural selection works on physical traits rather than genetic material itself. New traits are not made by natural selection. Natural selection can act only on traits that already exist in a population.

1. What is the main *similarity* between the processes of artificial selection and natural selection?

2. What is the main *difference* between artificial selection and natural selection?

3. Could natural selection work on a trait that is not heritable? Explain.

4. Could natural selection work on a population that has no variation? Explain.

Section Quiz 10.3: Theory of Natural Selection

Choose the letter of the best answer.

- _____ 1. The development by scientists of a new color in a rose is the result of
- natural selection.
 - artificial selection.
 - descent with modification.
 - overproduction.
- _____ 2. In natural selection, the selective agent is the
- humans.
 - mutations.
 - breeders.
 - environment.
- _____ 3. All the rabbits living in a particular area would be an example of a(n)
- population.
 - species.
 - fossil.
 - individual organism.
- _____ 4. A bird that can easily outcompete other birds for food and that can produce many eggs has a high
- life expectancy.
 - mutation rate.
 - fitness.
 - adaptability.
- _____ 5. Which of the following describes natural selection?
- It acts on genetic material directly.
 - It acts on existing physical traits.
 - It forms new traits.
 - It forms new genetic material