**Darwin and Evolution Notes**

**Evolution**

* The **processes** that have transformed life on earth from it’s **earliest forms** to the vast **diversity** that characterizes it today.
* A **change** in the **\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_!!!!!!!!**

**Old Theories of Evolution**

* **Jean Baptiste Lamarck** (early 1800’s) proposed: **“The inheritance of acquired characteristics”**
* He proposed that by using or not using its body parts, an individual tends to **\_\_\_\_\_\_\_\_\_**certain**\_\_\_\_\_\_\_\_\_\_\_\_**, which it **\_\_\_\_\_\_\_\_\_\_\_** on to its **\_\_\_\_\_\_\_\_\_\_\_\_\_\_.**
* **Example:** A giraffe acquired its long neck because its ancestor stretched higher and higher into the trees to reach leaves, and that the animal’s increasingly lengthened neck was passed on to its offspring.

**Charles Darwin**

* **Influenced by Charles Lyell** who published **“Principles of Geology”.**
* This publication led **Darwin** to realize that natural forces gradually change Earth’s surface and that the forces of the past are still operating in modern times.
* Darwin set sail on the **\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_** (1831-1836) to survey the south seas **(mainly South America and the Galapagos Islands)** to collect plants and animals.
* On the **\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_,** Darwin observed species that lived nowhere else in the world.
* These observations led Darwin to write a book.
* **Wrote in 1859**: **“On the Origin of Species by Means of Natural Selection”**

**Two main points:**

**1.**

**2.**

* **Individuals** with **\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_** are more likely to leave more offspring better suited for their **environment**.
* Also known as **“\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_”**
* **Example:**

**English peppered moth (*[Biston](http://tidepool.st.usm.edu/crswr/peppermoths.html)*** [***betularia***](http://tidepool.st.usm.edu/crswr/peppermoths.html)**)** **- light and dark phasesLooks like a dangerous moth and is not**

**Artificial Selection**

* The **\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_** of domesticated plants and animals by man.
* **Question:**

What’s the ancestor of the domesticated dog?

* **Answer:** **\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_**

[**Evidence of Evolution**](The_Evidence_for_the_Theory_of_Evolution.asf)

**1. \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_:** **Geographical distribution of species.**

**2. \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_: Fossils and the order in which they appear in layers of sedimentary rock (strongest evidence).**

**3. \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_:** **Classification of life forms.**

**4. \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_:** **Structures that are similar because of common ancestry (comparative anatomy)**

**5. \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_:** **Study of structures that appear during embryonic development.**

**6. \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_:** **DNA and proteins (amino acids)**

**Population Genetics**

* The **science** of **\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_** in population.
* **Population**
  + A localized group of **\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_** belonging to the **\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_**.
* **Species**
  + A group of **populations** whose **individuals** have the potential to **\_\_\_\_\_\_\_\_\_\_\_\_\_** and produce **\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_** offspring.
* **Gene Pool**
  + The total **\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ of genes** in a population at any one time.
* **Hardy-Weinberg Principle**
  + The **concept** that the **\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_** that occur during sexual reproduction, by itself, **cannot change** the overall genetic makeup of a population.

This **principle** will be maintained in nature only if all **five** of the following conditions are met:

**1. Very large population**

**2. Isolation from other populations**

**3. No net mutations**

**4. Random mating**

**5. No natural selection**

* If these conditions are met, the population is at**\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_**. This means **“No Change or “No Evolution”.**

**Five Mechanisms of Evolution**

**1. Genetic drift:**

**Change in the gene pool of a \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ population due to chance.**

* **\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_** (reduction of alleles in a population) resulting from a **disaster** that drastically **reduces population size**.
* **Examples:**

**1. Earthquakes**

**2. Volcano’s**

**3. Floods**

**4. Hurricanes or Tornado’s**

**Founder Effect**

* **Genetic drift** resulting from the **\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_** of a new location by a small number of individuals.
* Results in **\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ change** of the gene pool.
* **Example:**

**1. Islands (first Darwin finch)**

**2. Early colonization of the USA**

**2. Gene Flow:** The **\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ of alleles** from a population by the **\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_** of individuals or gametes.

* **Immigration or emigration**.
* **Five Mechanisms of Microevolution**

**3. Mutation:**

**Change in an organism’s DNA that creates a new allele.**

**4. Non-random mating:**

**The selection of mates other than by chance.**

**5. Natural selection:**

**Differential reproduction.**

**Speciation**

* The **\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_** of new species.

**Reproductive Barriers**

* Any **mechanism** that **\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_** two species from producing **fertile and/or viable hybrid offspring**.
* **Two barriers:**

**1. \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_-zygotic barriers**

**2. \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_-zygotic barriers**

**Convergent Evolution**

* **Species** from different **evolutionary branches** may come to resemble one another if they live in **very similar environments.**
* **Example:**

**1. Ostrich (Africa) and Emu (Australia).**

**2. Sidewinder (Mojave Desert) and**

**Horned Viper (Middle East Desert)**

**Coevolution**

* **Evolutionary change**, in which one species act as a **selective force** on a **second** species, inducing adaptations that in turn act as selective force on the **first** species.
* **Example:**

**1. Acacia ants and acacia trees**

**2. Humming birds and plants with flowers with long tubes**