**Evolution Notes Guide: - General Biology B**

You are responsible not only for the material in this guide but the diagrams and pictures on the notes. The notes can be found on Mr. Walkers website: [www.walkersclass.com](http://www.walkersclass.com).

# **Charles Darwin (Chapt 10)**

## 1831 Darwin set sail on the H.M.S. Beagle as the ships Naturalist.

## He studied the environments in the Galapagos Islands and found a lot of animal diversity.

## He found that the animals on the main land were similar but not identical to those on the islands.

## He studied his collection from the trip for the rest of his life.

## He wrote a book called Natural Selection: the Origin of \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_.

## Biogeography: The study of the distribution of organisms around the world.

# **Objective 1: Describe evidences of evolution including genetic information, fossil records, similar DNA sequences, anatomical structures, and order of appearance of structures in embryological development.**

## **Evolution is the changing of a \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ genotype (genetics) over time.**

## **Terms to Know:**

### Homologous structures

### Analogous structures

### Vestigial structures

### Polyploids

### Embryological structures

### Fossil records

### DNA evidence

# **Fossil Records**

## -\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ indicate how a species lived and what they looked like.

# **Homologous Structures**

## -Structures that have a \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ evolutionary origin

# **Analogous Structures**

## -Body parts of organisms that do \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ have a common evolutionary origin but are similar in function.

# **Vestigial Organ/Structures**

## -A body structure in a present-day organism that is no longer \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_.

# **-Other Evidences**

## -There are 3.1 Billion letters in our gene pool. Most of it is no longer used but is in the genome. It is

## \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ DNA.

## -Embryology: How animals are formed from an egg to an infant. All animal species develop from an egg through a fetus with the same development processes.

# **Objective 2: Explain what natural selection is and how it occurs**

# Natural Selection: The choosing of favorable traits in a population which allow the

# to better survive or reproduce. More successful individuals are “naturally selected” to live longer and to produce more offspring that share those adaptations for their environment.

#### -Natural selection acts on phenotypes, or physical traits, rather than on genetic material itself. New alleles are not made by natural selection —they occur by genetic mutations. Natural selection can act only on traits that already exist.

## Variation: The heritable \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ that exist in every population are the basis for natural selection. The differences among individuals result from differences in the genetic material of the organisms, whether inherited from a parent or resulting from a genetic mutation.

**Variation in Populations**

## Genetic variation comes from two main sources: mutation and recombination.

### Mutation: A mutation is a \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ change in the DNA of a gene. This change can form a new allele. Mutations in reproductive cells can be passed on to offspring. This increases the genetic variation in the gene pool. Because there are many genes in each individual and many individuals in a population, new mutations form frequently in gene pools.

### Recombination: New allele combinations form in offspring through a process called recombination. Most recombination occurs during meiosis—the type of cell division needed for sexual reproduction. When gametes are made, each parent’s alleles are arranged in new ways. This shuffling of alleles results in many different genetic combinations.

## -Speciation: The development of \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ species from existing species

### **Example of Natural Selection:**

# After the change in climate, jaguars that had larger teeth and jaws had a higher fitness than other jaguars in the population. Jaguars that ate less didn’t necessarily all die or stop producing altogether; they just reproduced a little less. Today, large teeth and jaws are considered typical traits of jaguars.

# **Types of Natural Selection** -Stabilizing Selection:

### This selection favors the \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ individual in a population

## -Directional Selection:

### This selection favors \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ extreme form of a trait. An example would be antibiotic resistance in which bacteria are increasingly unable to be killed by antibiotics.

## -Disruptive Selection:

### This selection favors \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ extreme forms of a trait.

# **Vocabulary to Know:**

## Fitness: A measure of the ability to survive and produce more \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ relative to other members of the population in a given environment.

## -Gene Pool: All the genes in the population

## -Allelic Frequency: The percentage of the gene pool with any specific allele (trait).

## -Genetic Equilibrium: The frequency of the alleles in the population remaining the same over generations. If the frequencies remain the same, no evolution can take place.

## **Objective 3: Explain how behavior, morphology and physiology changes can result in evolution.**

## -Morphology: The \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ and structure of animals and plants.

## -Sexual Selection: The choosing of a mate due to specific physical traits.

## -Vestigial structure: A body structure in a present-day organism that is no longer needed.

## -Reproductive isolation: When two populations cannot reproduce and create viable offspring. It can be behavior, geographic, or genetic. Reproductive isolation occurs when formerly interbreeding organisms can no longer mate and produce fertile offspring.

## -Polyploidy: An individual or species with multiple of the normal set of chromosomes. This is the fastest form of speciation because it results in immediate reproductive isolation.

# **Objective 4: Explain how morphology changes can result in evolution**

# Courtship \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ of birds and courtship songs of frogs are examples of behavioral sexual signals used to attract mates. Changes in these signals can prevent mating between populations.

## -Sexual Selection: The choosing of a mate due to specific physical or behavioral traits.

## -Behavioral isolation: Isolation caused by differences in courtship or mating behaviors. Over 2000 species of fireflies are isolated in this way. Male and female fireflies produce patterns of flashes that attract mates of their own species. For example, *Photuris* frontalis emits one flash every second, *P. hebes* emits one flash every 2 seconds, and *P. fairchildi* produces a double flash every 5.5 seconds.

## -Divergent Evolution: The pattern of evolution in which species that once were similar to an ancestral species diverge or become increasingly distinct. Example: Darwin's finches, Honeycreepers in Hawaii.

# **Objective 5: Explain how competition for limited resources can result in evolution**

## -Competition: When species must compete for a \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ resource. If there is less food/resources, competition increases.

## -Divergent Evolution: The pattern of evolution in which species that once were similar to an ancestral species diverge or become increasingly distinct. Example: Darwin’s finches, Honeycreepers in Hawaii.

## -Adaptive radiation: Occurs when an ancestral species evolves into an array of species to fit a number of diverse habitats.

## Convergent Evolution: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ related organisms evolve similar traits due to environmental pressures. Example: The tail fins of whales and sharks. They each evolved to be similar due to similar environmental conditions.

# **Objective 6: Explain why species go extinct due to changes in the environment**

## -Natural disasters occur including: flooding, hurricanes, tornados, earthquakes, meteor strikes, and climate change.

## -When the environment changes species will be required to \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ or die. These adaptations to new environmental influences can drive a species to evolve into a new species.