

1. What is Evolution?

= gradual changes in **populations** of organisms from their ancestors over time

- **population** = group of organisms of the same **species** in the same area
- **species** = group of similar organisms that can interbreed to produce fertile offspring

2. The Theory of Evolution

- attempts to explain how living organisms so similar in **molecular structure** are so different in **form and function**
- there are 2 main theories of evolution:

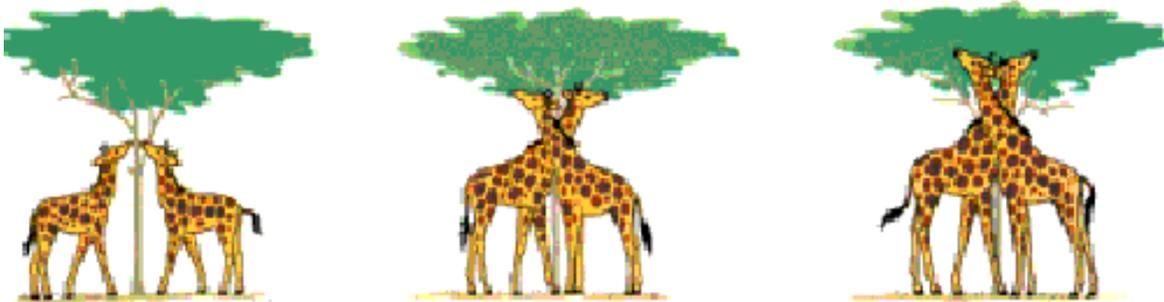
A. Lamarck's Theory Of Acquired Characteristics (1809)

➤ changes in the environment caused organisms to **need** or **not need** certain structures.

- if an organism does not need a certain part, it will **disappear**

Ie) Appendix of man

- when an organism needs a certain adaptation, that adaptation arises.
- if the change is beneficial then parents pass this change to their offspring by **heredity**.



Ie) Due to droughts in Africa, giraffes needed long necks so developed this adaptation which was passed to their offspring by heredity

➤ today, Lamarck's theory is regarded as **invalid!**

B. Darwin's Theory of Natural Selection Charles Darwin- The Theory of Natural Selection

➤ Darwin's Theory of Evolution by Natural Selection states that evolution is caused by factors:

1. Variation

- No 2 organisms are exactly alike, even among the same family. These **variations** are passed on through heredity.

2. Over Production (Over Population)

- All organisms produce more offspring than can **survive** to reproduce.

Ie) perch lay millions of eggs

3. Competition (Struggle for Existence)

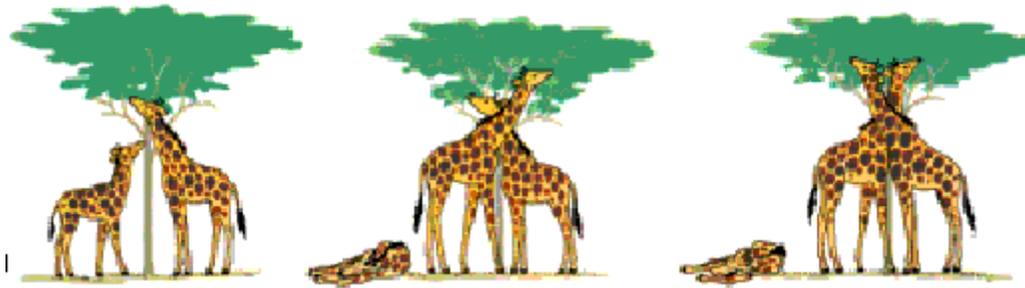
- Over population causes organisms of the same species and organisms of different species to **compete** for limited resources.

Ie) food, shelter, space, etc.

4. Natural Selection (Survival of the Fittest)

- Those organisms with **variations** that allow them to out compete will survive to reproduce while all others die off without leaving offspring

= nature '**selects**' the organisms best **adapted** to survive



Ie) Over time and numerous generations African droughts trigger evolution and may lead to a new species resulting from an accumulation of inherited variations

Organisms **ALREADY ADAPTED TO** an environment to survive

= **Speciation**

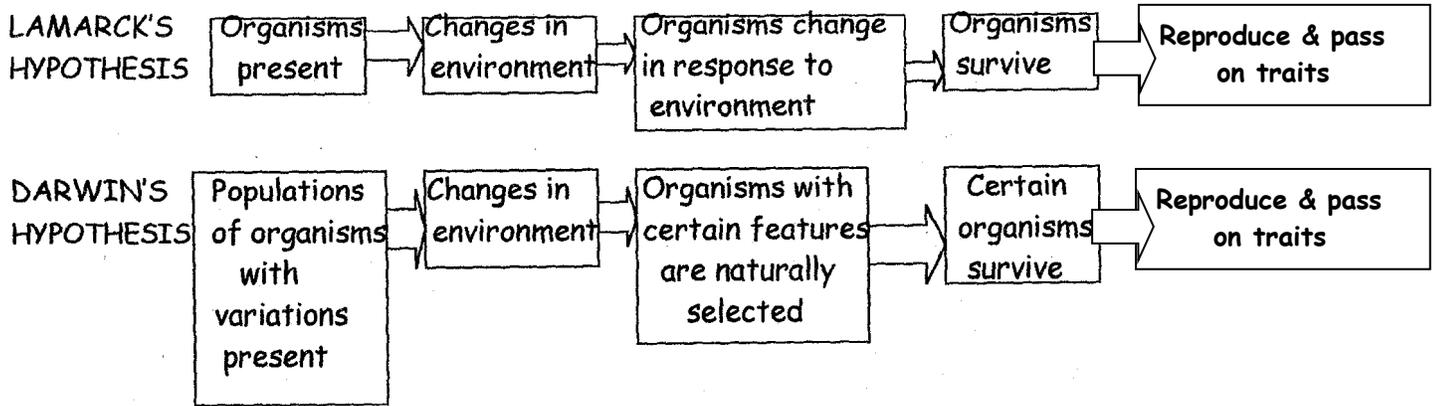
(genetically separate from the original species)

Why Do Organisms Evolve?

- one population of organisms cannot survive in the same environment as another population that has the same needs

= cannot occupy the same **niche**

LAMARCK VS DARWIN



Similarities:

- 1) Evolution (changes) does occur
- 2) Environments do change
- 3) Traits are passed on via reproduction
- 4) Speciation = result of evolution

Differences:

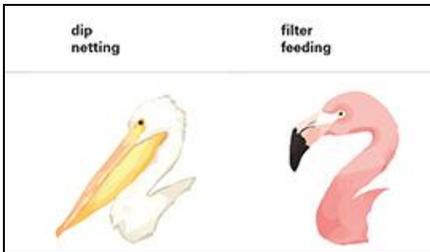
| Lamarck | Darwin |
|--|---|
| 1) All organisms within a population are the SAME | 1) Organisms within a population DIFFER from each other (variations) |
| 2) When the environment changes, organisms change in RESPONSE TO the environment so all organisms survive | 2) When the environment changes organisms WITH the best variations (adaptations) survive |
| 3) Change (speciation) occurs over ONE GENERATION | 3) Change (speciation) occurs over MANY GENERATIONS |

3. Sources of Variations **How Does Evolution Really Work (PBS)**

- Adaptations are inherit traits (**variations**) that improve the chances of survival
= variations are the raw materials for natural selection
- adaptations may be:

Structural

(bird's bill, camouflage, etc),



Physiological

(making venom, secreting slime, etc)



Behavioral

(mimicry, stalking prey, hunting in packs)



Where do the adaptations come from?

a) Mutations

- all genetic variation in a population originates as a **heritable mutation** & is passed on & preserved from one generation to the next
- whether a mutation is good, neutral, or harmful depends on how it affects **survival & reproductive success** of a species
- these changes do not enter the evolution process rapidly because they tend to be **recessive traits**
- if environmental changes occur, this trait may be selected for
= the mutation becomes an **adaptation** (ie. Peppered moths)

b) Recombination

- during meiosis when gametes are made **crossing over** occurs causing chromosomes to exchange pieces resulting in different **genetic combinations** of traits
(ie. brown hair & blue eyes)

Complete the Natural Selection Simulation
[Natural Selection Simulation](#)