EVOLUTION 6 MARCH 2013

Lesson Description

In this lesson, we:

- Discuss the difference between a hypothesis and a theory
- Summarise ideas on evolution - Erasmus Darwin, Jean Baptiste de Lamarck, Alfred Wallace and Charles Darwin
- Look at Lamarck's theory in more detail
- Explain Natural selection as an explanation for evolution

Key Concepts

Important Terminology

Hypothesis: A temporary explanation of physical phenomena, which can be tested by observation or experiment.

Theory: An explanation of a group of physical phenomena, firmly founded on observation and experiment, which continues on to be investigated.

Evolution: Evolve, to unroll, to disclose, to develop, to unravel.
The theory of evolution states that all species of living things that exist today (and many more which are now extinct) have evolved from simple life forms, which first developed more than 3 billion years ago.

Gene pool: The communal genes of all the organisms in a population at a particular time.

Gene Pool

Species: A group of organisms that share similar characteristics and can interbreed and produce fertile offspring.

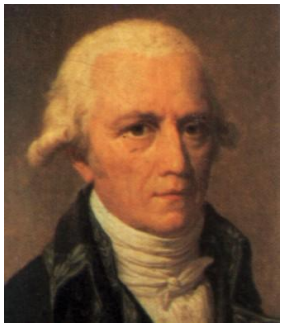
Population: A group of organisms of the same species that can interbreed in a specific habitat at a specific time

Early Theories

Erasmus Darwin (1731 – 1802)

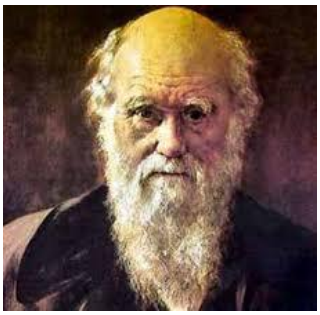
Ideas on evolution that were proposed by Erasmus Darwin in his book called *Zoonomia*: All life developed from simple forms There are similarities amongst various organisms Artificial selection and metamorphosis showed how changes may have occurred

Jean Baptiste de Lamarck (1744 – 1829)



Two ideas of Lamarck in explaining evolution: Law of use and disuse as well as inheritance of modified characteristics.

Charles Darwin (1809 – 1882)



Theory of evolution by natural Selection.

Alfred Wallace (1823 – 1913)

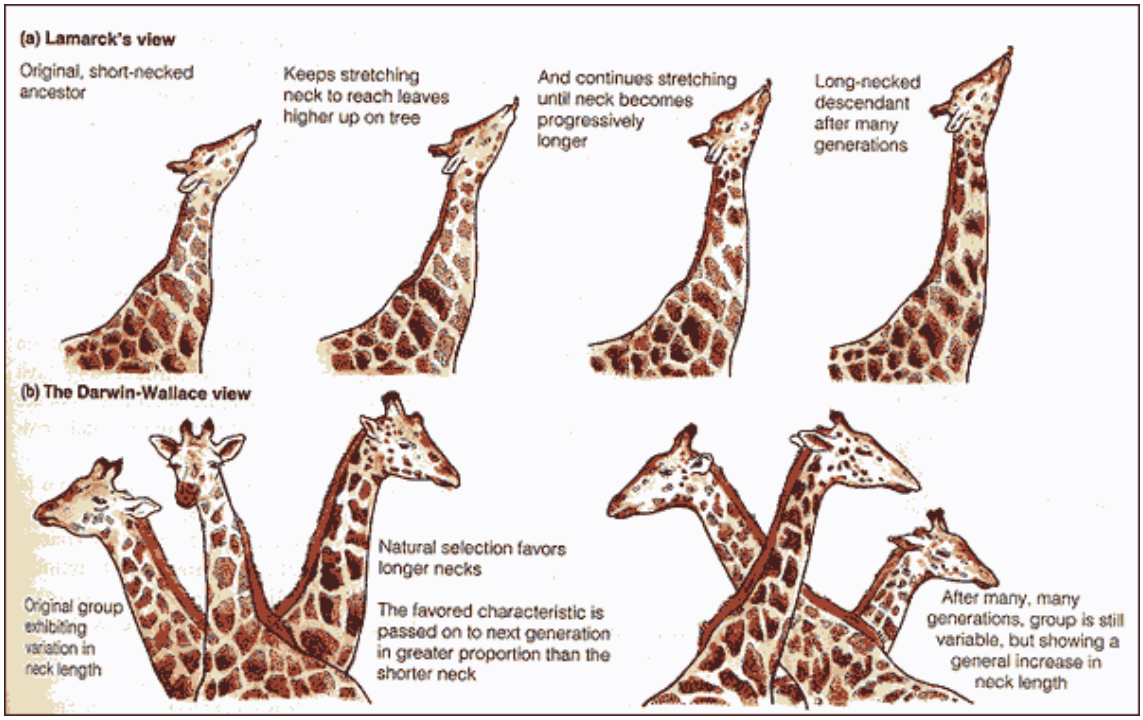
Natural selection as an explanation for evolution.

Lamarck Explained

- Species evolve from older species.
- If organisms use a structure often, it becomes bigger. If they don't use it at all, it becomes smaller and may disappear. He called this the **'law of use and disuse'**.
- The offspring of organisms inherit the characteristics their parents acquired during their lifetimes. Lamarck called this the **'inheritance of acquired characteristics'**.
- Forces within organisms drive species to evolve up a ladder of progress.


Stretch! Stretch!
Think about the
CHILDREN!!!
AAAH!


North America
Plymouth
Canary Islands
Asia
Africa
Galapagos Islands
South America
Callao
Bahia
Mauritius
Australia
Valparaiso
Montevideo
Falkland Islands
Cape Town
King George's Sound
Hobart


(a) Lamarck's view
Original, short-necked ancestor
Keeps stretching neck to reach leaves higher up on tree
And continues stretching until neck becomes progressively longer
Long-necked descendant after many generations
(b) The Darwin-Wallace view
Original group exhibiting variation in neck length
Natural selection favors longer necks
The favored characteristic is passed on to next generation in greater proportion than the shorter neck
After many, many generations, group is still variable, but showing a general increase in neck length

Why was Lamarck's theory rejected?

- Organisms cannot change/adapt because they want to – the environment determines any change.
- There is not sufficient evidence to prove that changes/modifications occurring in the lifetime of an organism is passed on to further generations.

What is Natural Selection?

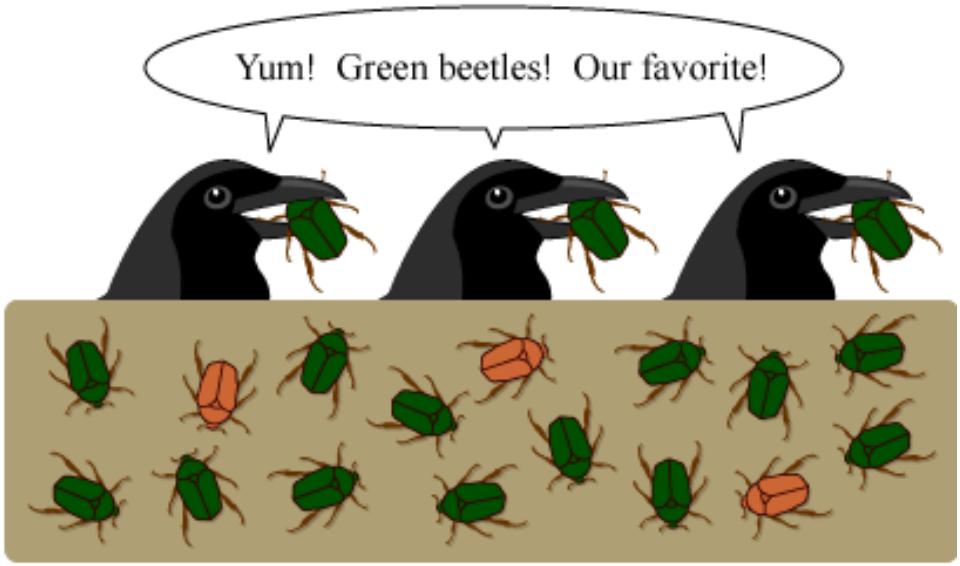
The main concepts of natural selection are:

- In a population, more offspring are produced than the environment can support, so there is a struggle for life and many organisms die.
- The organisms best suited to the environment survive, reproduce and pass on their inherited adaptations to the next generation.
- In this way, the composition of the population changes, i.e. the population evolves.
- Because the best-suited individuals survive, the population remains suited to its environment.

Keywords

Many offspring	Competition	Natural selection
Variety	Survival of the fittest	Population change over several generations

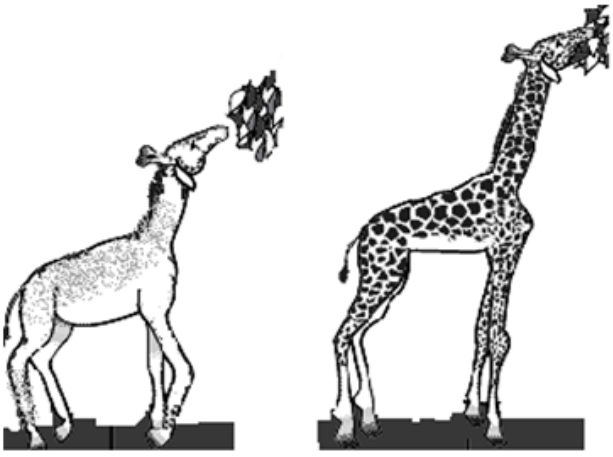
Natural Selection in a Nutshell



Questions

Question 1

Tens of thousands of years ago, the animals that evolved into giraffes were not as tall as modern giraffes. Over a long period of time, the necks of giraffes became longer. They could reach leaves high in the trees and reach down for water.



Ancestral and modern giraffes feeding

a.) Describe how the long necks of modern giraffes would have been explained by the following:
   i. Darwin
   ii. Lamarck

b.) Explain why Lamarck's theory is not accepted.

Question 2

Both Darwin and Lamarck proposed theories to explain the origin of new species.

a.) State the FOUR observations upon which Darwin based his theory. (4)

b.) Tabulate TWO differences between Lamarck's and Darwin's theories. (5)

Question 3

Study the diagram of a duck's foot below.

Webbed foot of a duck

Ancestors of ducks did not have webbed feet. Explain how the webbed feet could have evolved In terms of natural selection. (5)

Question 4

(Adapted from November 2012, P1, Question 4)

One of the observations Darwin made during his study of pigeons was about artificial selection. In 1859 Darwin and Wallace jointly proposed that new species could develop by a process of natural selection.

Using examples describe natural and artificial selection and also highlight the differences between these two processes.

Content: (17)

Synthesis: (3)

(20)