**Unit 2: Evolution – Why Evolution?**  Date: \_\_\_\_\_\_\_\_\_\_\_\_\_

**Objectives:**

By the end of the lesson you should be able to:

* Explain why DNA is so important to the theory of evolution
* State the men of evolution and what they contributed to the developing theory
* Explain Darwin’s theory (*Decent with Modification* through *Natural Selection)* and his 2 problems
* Use these examples to explain evolution: Peppered Moth, Giraffe necks, Finch beaks

**DNA and Evolution**

* Before we can truly understand evolution we need to understand DNA
* DNA = **d**eoxyribo**n**ucleic **a**cid

Characteristics of DNA

1. Double helix
2. Sugar-phosphate backbone
3. 4 nitrogenous bases (ACTG)
4. Complimentary base pairing (A – T; C – G)

* DNA is \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_to each organism
* If DNA changes, the \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
* ***Evolution*** is the change of \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ over time
* **THEREFORE** the \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ over time if the organisms are changing!

**What is Evolution?**

- the \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

- all living and non-living things change over time

* We have lots of evidence that the earth is changing and has changed over time

**- Biological evolution is defined as any change in the heritable traits within a population across generations**

**Why Evolution?**

* As the earth changes life must \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
* Most life dies
* But some \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ – this is evolution!!

**Evolution as a Theory**

* *"EvoLutTiOn is JuST A TheORy?!?!1111!”*
* It has been scientifically tested for many years, has an immense \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ to support it, and is overwhelmingly supported within the scientific community. Evolution is the fundamental principle of biology – nothing else in biology makes sense without it.

**A Theory Emerges**

* \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_is credited with formulating our modern theory
* He couldn’t have done so without all the scientists before him
* Let's look at who was working before Darwin

**Erasmus Darwin**

* Believed that organisms evolved over time, including man, but didn’t know how
* Did not widely spread his ideas but profoundly influenced his grandson Charles

**Jean Baptiste Lamarck**

* Proposed the *Theory of Inheritance of Acquired Characteristics* and the mechanism of “\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_”
* First person to propose a mechanism for evolution, although “wrong”, he really challenged peoples long held ideas.

**Use-Disuse Theory**

* If an organism \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_and so do its ancestors, over time that structure develops better. Ex: Giraffes

**Charles Darwin**

* As a young naturalist he sailed on a 5 year voyage around the globe on HMS Beagle
* During this trip, especially to the \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_, he put all the evolution puzzle pieces together

Darwin’s Ideas

* Darwin was puzzled by the diversity of life on the Galapagos.
* He knew these islands were young volcanic islands.
* He observed \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_, all clearly related, but different from the one variety found on the mainland

**Darwin’s 13 varieties of finches:**

* note the \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

Alfred Russell Wallace

* Sailed to South America and formulated the same theory as Darwin
* Except his boat sank on the return trip with all his evidence ☹
* Presented his theory, with Darwin, only to have the theory credited to Darwin because Darwin had all the evidence!

**Darwin’s Main Ideas**

* Darwin contributed two main ideas:

 1. Evolution theory, which he called “\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_”

 2. The **\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_** of evolution: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

* Today we refer to Darwin’s theory as “**Gradualism**”

Darwin’s Publication

* Although his voyage ended in 1836, he did not publish his theory until 1859
* He published “\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_”
* Although he was publicly ridiculed, the scientific community quickly became convinced

**Darwin’s Theory:
*Descent with Modification***

* In nature, \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_than can possibly survive
* From this overabundance, there is a “\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_” among the offspring
* In every population, there are \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_in all traits
* Those offspring with variations that make them better \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ are more likely to survive (Survival of the fittest)
* Those offspring who survive will \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ and this trait will be passed on to future generations (Natural Selection)

**Two Problems with the Theory**

1. Darwin \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_variations could appear in a population.

- The answer was in Gregor Mendel’s work on pea genetics

 2. He could not show a single \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ today, i.e. evolution in progress.

- He missed a good example right under his nose: the \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ of the Manchester Forest.

Can you …

… explain why DNA is so important to the theory of evolution?

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… use these examples to explain evolution: Peppered Moth, Giraffe necks, Finch beaks?