Theory of Evolution Notes 2

Chapter 14: Darwin

FIRST THING TO REMEMBER…

- This unit contains many THEORIES…
- Theories are ideas that have some scientific basis, but have not been proven or disproven.
- The ideas in this section relate to many things that are millions of years old…when there were no people to record the information…

theories	laws
* Are based on observations * Testable explanations that have not been proven * Have evidence to back the claim	* Are based on FACTS * Have been PROVEN * Have evidence and results to support the proof.

Evolution is based on adaptations of species

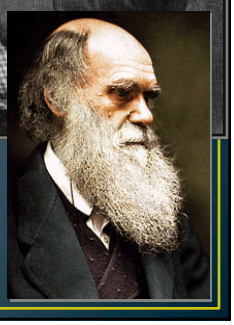
- Adaptations are changes that happen to species **over periods of time to help the species.**
- Adaptations are based on scientific evidence.
- Evolution is a change over time.

Charles Darwin

- Darwin was born in 1809 in England.
- He was from a strong Christian family.
- He loved science & decided to take several voyages around the world to study.

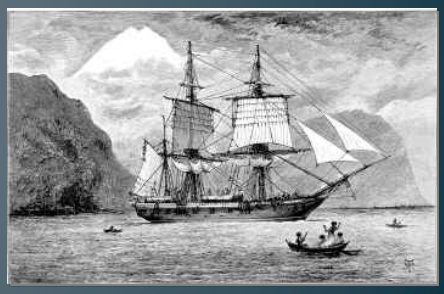
Charles Darwin

- Proposed a way how evolution works
  - *How* did creatures change over time?
  - by natural selection
- Collected a lot of evidence to support his ideas



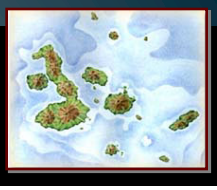
Voyage of The H.M.S. Beagle

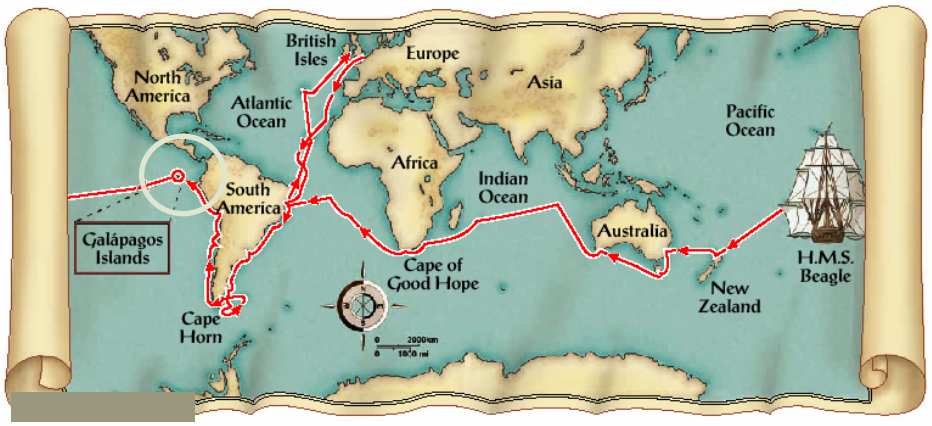
- 1831 – 1836
  - Darwin took his ship, the H.M.S Beagle around the world to study the rocks (geology), flora (plants) and fauna (animals) around the world.
- He ended up in the Galapagos Islands in the Pacific Ocean.
- He saw many strange creatures and studied them over many years.



Voyage of the HMS Beagle

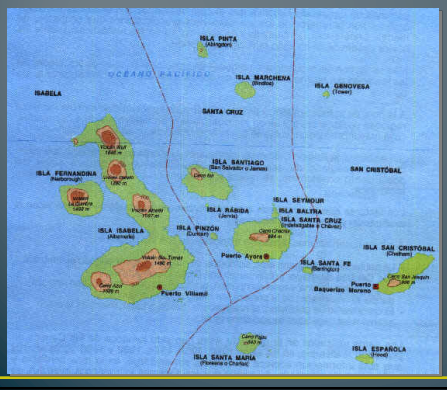
- Stopped in Galapagos Islands
  - 500 miles off coast of Ecuador



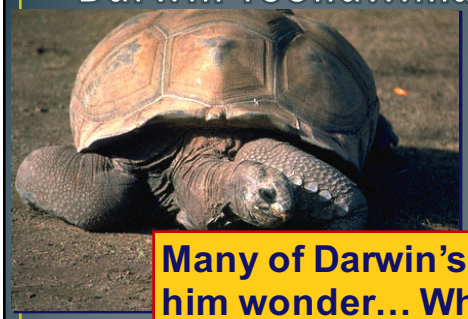


Galapagos

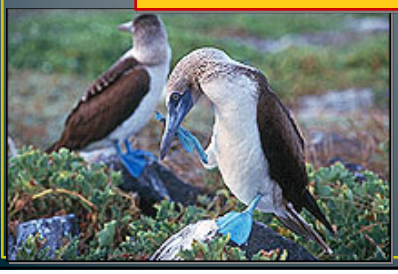
Most of animals on the Galápagos live nowhere else in world, but they look like species living on South American mainland.



Darwin found…many unique species



Many of Darwin's observations made him wonder… Why?



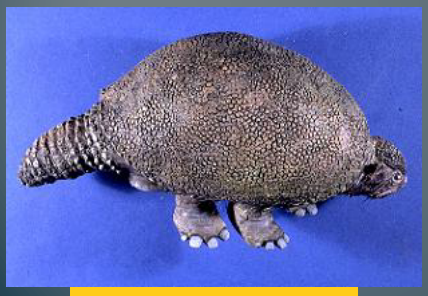
Finches from Galapagos Archipelago

Darwin found…clues in the fossils

Darwin found:

Evidence that creatures have changed over time

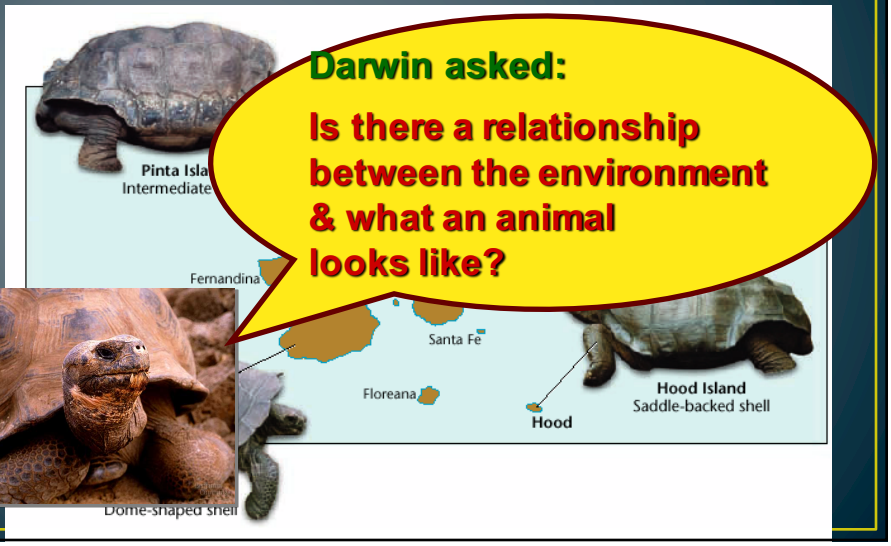
present day Armadillos



ancient Armadillo

Darwin found:

- Different shells on tortoises on different islands



Darwin's Finches

- There were 14 different species of finches (birds) on the Galapagos Islands, that are unique to that area.
- Darwin theorized that the finches on the islands adapted to their surroundings in order to get food more easily. This was driven by competition.
- Competition can lead to evolution.

What Happened to the Darwin Finches?

- As the birds with smaller beaks died off, the birds with larger beaks continued to eat the food and mate / have offspring.
- The "large beak" genes were passed on to these offspring, and eventually all the finches had large beaks, because the "small beak" gene was wiped out of the population.
- The finches have evolved over many generations to better survive in the environment.

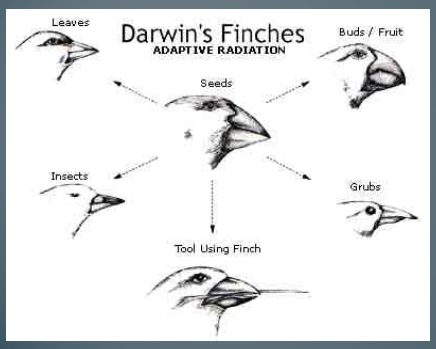
The Finches Evolved

- On some of Darwin's first voyages to the Galapagos, he recorded that some of the finches had large beaks & some small.
- On future voyages, he discovered that many of the finches with smaller beaks were gone (died off) because they were unable to eat the large food found on the islands.

Darwin Came Up With Two Main Points

1. Descent with Modification
2. Natural Selection

Darwin and Descent with Modification



- Darwin Found
  - The differences between species of finches were associated with the different food they ate.
  - All finches came from one ancestor but eventually over time nature selected for different species with different beaks.

Darwin and Natural Selection

- Darwin published a book called "The Origin of the Species by Means of Natural Selection" in 1859.
- This book talked about how species change over long periods of time.

"Survival of the Fittest"

- Natural Selection is also known as "survival of the fittest".
  - This means that the strongest of the species, the ones with the best natural defenses, or the ones with the most advantageous variations, will survive.

Natural Selection

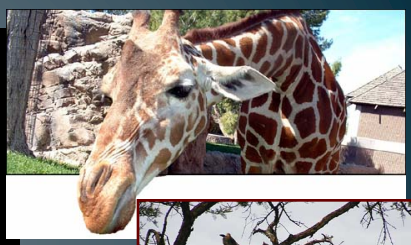
1. All species overproduce!
2. Members of the same species have differences/variations.
3. Some of these variations will provide the organisms with the advantage.
4. Those with the advantage will survive and reproduce!

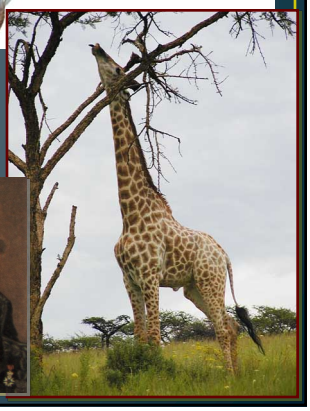
Natural Selection and Differential Survival

- Only a limited amount of organisms in each population can survive. So the traits that are left in that population can either help the population to survive & thrive & therefore evolve, or harm it & cause it to become extinct.
- For Example
  - Giraffes

Earlier ideas on Evolution

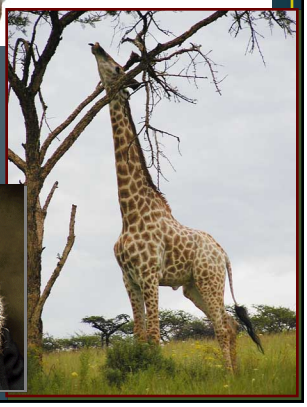
- LaMarck
  - Evolution By Acquired Traits
    - creatures developed traits during their lifetime
    - give those traits to their offspring
  - Example
    - In reaching higher leaves giraffes stretch their necks & give the acquired longer neck to offspring
  - NOT accepted as valid

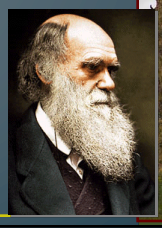




Darwin's view of Evolution

- Darwin
  - giraffes that *already* have long necks survive better
  - leave more offspring who inherit their long necks
    - variation
    - selection & survival
    - reproduction & inheritance of more fit traits





Darwin's finches

- Darwin's conclusions
  - variations in beaks
    - differences in beaks in the original flock
    - adaptations to foods available on islands
  - natural selection for most fit
    - over many generations, the finches were selected for specific beaks & behaviors
  - offspring inherit successful traits
    - accumulation of winning traits: both beaks & behaviors
  - separate into different species