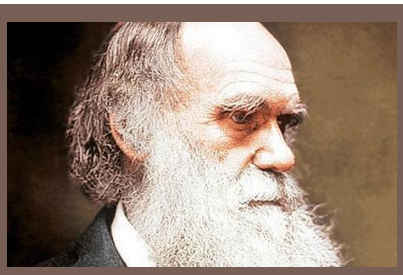


DARWIN'S THEORY OF EVOLUTION

Turner College & Career High School • 2015

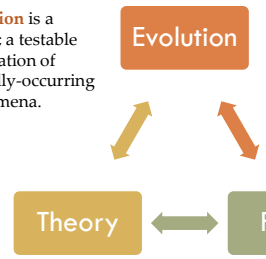
1. The History of Life

Define These…

- **Evolution**
  - change **over time**; the process by which modern organisms have descended from ancient organisms.
- **Theory**
  - a **well-supported**, **testable** explanation of phenomena that have occurred in the natural world.
- **Fossil**
  - the preserved remains of **ancient** organisms.

They are Connected…

Evolution is a **theory**; a testable explanation of naturally-occurring phenomena.



The **fossils** that Darwin found caused him to ask questions that led to his **theory** of **evolution**.

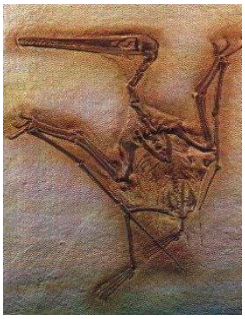
The **fossil** record provides for some the evidence to support the **theory** of **evolution**.

Flashback…

- The total variety of all the organisms in the biosphere = **biodiversity**.
- What scientific explanation can account for the diversity of life?
  - **A collection of scientific facts, observations, and hypotheses known as evolutionary theory.**

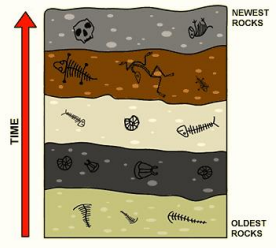
Proof of Evolution

- **Fossil Record** – Fossils are the remains of ancient organisms found in layers of rock in the Earth.

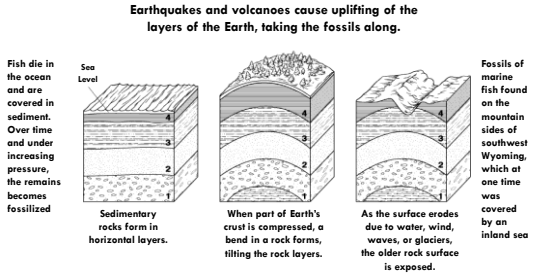


Proof of Evolution

- The layers of rock tell the history of the Earth, while the fossils found within the rock tell a history of life.
- The fossils are thought to be the same age as the rock they are found in.



Movement of Earth's Crust



Movement of Earth's Crust

Movement of Earth's Crust

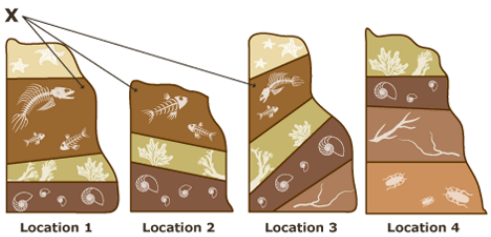


Plate Tectonics

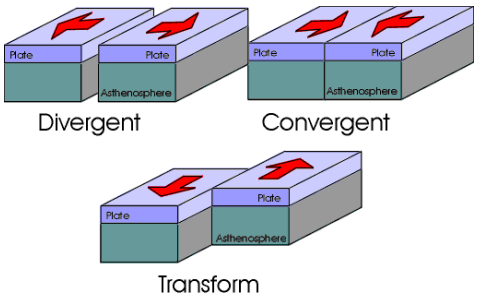
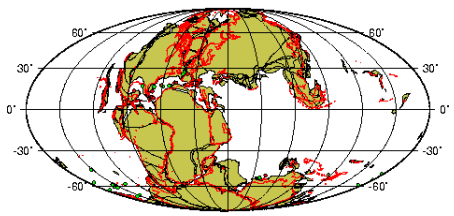
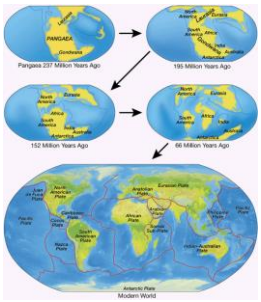


Plate Tectonics

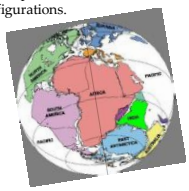


150 My Reconstruction

Theory of Pangaea

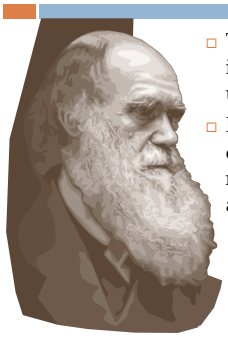


Pangaea was a believed to be the supercontinent that existed during the late Paleozoic and early Mesozoic eras, forming about 300 million years ago and beginning to rift around 200 million years ago, before the component continents were separated into their current configurations.



2. Charles Darwin

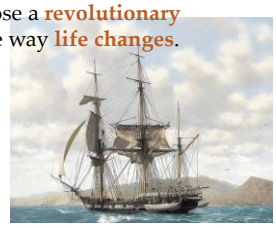
Charles Darwin



- The person who was most influential to our understanding of evolution.
- In 1831, at age 22, he joined the crew of the **HMS Beagle** as a naturalist for a 5 year voyage around the world.

Darwin and the HMS Beagle

- During his travels, Darwin wrote thousands of pages in his journals, drew pictures of the things he saw, and collected a vast amount of **evidence** that led him to propose a **revolutionary hypothesis** about the way **life changes**.



Darwin's Observations

- Why do Argentina and Australia have different animals even though they have similar grassland ecosystems?
- Why are there no rabbits in Australia and no kangaroos in England?
- Why have so many species disappeared?
- How are these extinct species related to living species?

Galápagos Islands

- While on his voyage around the world aboard the HMS Beagle, Darwin spent about one month observing life on the Galápagos Islands.
- There, he encountered some unique animals, such as **finches** and **tortoises**.

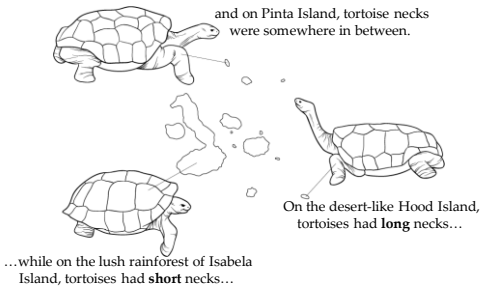
Galápagos Islands

Galápagos Islands

- The Galápagos Islands are close together but have very different climates.
- Some were hot and dry, with little vegetation.
- Others had more rainfall and were rich in vegetation.
- Each island had its own unique assortment of plant and animal species.

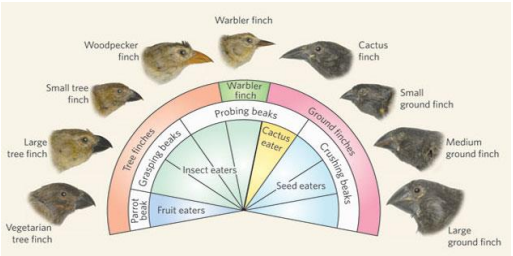
Galápagos Tortoises

Galápagos Tortoises



Galápagos Finches

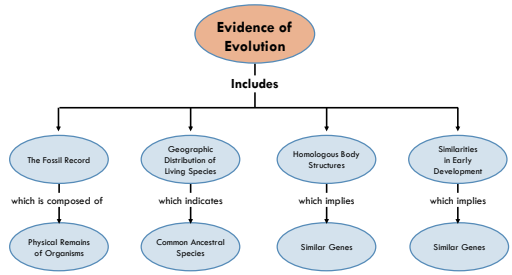
Galápagos Finches



Darwin's Findings

- After his voyage, Darwin spent a great deal of time thinking about his findings.
- He began to wonder if animals living on different islands had once been members of the same species that had developed different characteristics after becoming isolated from one another in different habitats.

Concept Map



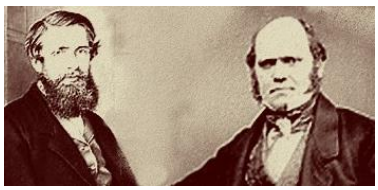
3. Darwin Presents His Case

Darwin's Findings

- After Darwin returned to England in 1836 he filled notebooks with his ideas about species diversity and the process that he would later call evolution.
- He did not rush to publish his ideas because they disagreed with the fundamental scientific beliefs of his day.
- He asked his wife to publish his ideas when he died.

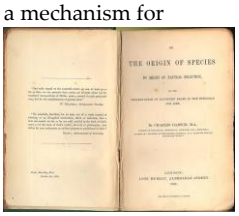
Wallace's Essay

In 1858, another naturalist, Alfred Russell Wallace wrote an essay describing his work in Malaysia that summarized the same ideas Darwin had been thinking about for 25 years.



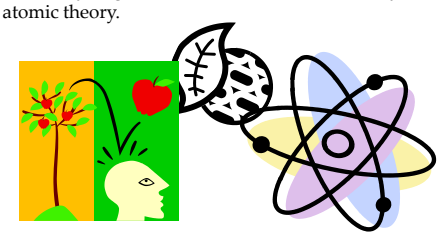
Origin of Species

- Suddenly Darwin had incentive to publish the results of his work.
- In 1859 *On the Origin of Species* presented evidence and proposed a mechanism for evolution that he called **natural selection**.



Evolution is a THEORY

- A theory is a well-supported, testable explanation of phenomena that have occurred in the natural world, like the theory of gravitational attraction, cell theory, or atomic theory.



Keys to Darwin's Theory

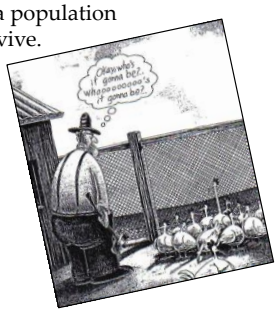
- Genetic variation is found naturally in all populations.

Keys to Darwin's Theory

- Struggle for existence means that members of each species must compete for food, space, and other resources.

Keys to Darwin's Theory

- Some organisms in a population are less likely to survive.

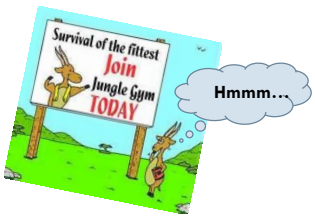


Keys to Darwin's Theory

- Survival of the fittest means organisms which are better adapted to the environment will survive and reproduce, passing on their genes.

Vocabulary

- **Fitness** is the ability of an individual to survive and reproduce in its specific environment. This leads to …

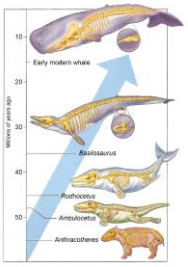


Vocabulary

Adaptation is any inherited characteristic that increases an organism's chance of survival.

Vocabulary

A **transitional fossil** is any fossilized remains of a life form that exhibits traits common to both an **ancestral** (original) group and its derived **descendant** (new) group. This is especially important where the descendant group is sharply distinguished by anatomy and mode of living from the ancestral group.



What is Darwin's Theory?

- Over time, natural selection results in changes in the inherited characteristics of a population.
- These changes increase a species' fitness in their environment.
- How does it work?
  - **Descent with modification** suggests that each species has descended with changes, from other species over time.
  - This idea suggests that all living species are related to each other; and that all species, living and extinct, share a common ancestor.