

TOPIC: HISTORY OF EVOLUTIONARY THOUGHT

Geological Thinking

◆ In the late 1700s, geology was _____ ideas of an unchanging Earth.

James Hutton (1726-1797)

◆ Uniformitarianism: geological processes today are the same as in the _____; Change is _____.

Take-away: Earth is _____ and changes slowly.



Hutton had the idea.

Georges Cuvier (1769-1832)

◆ Fossil records show _____ organisms.

Take-away: Life is _____ today than in the past.

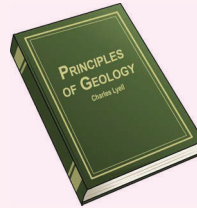


Cuvier came with the fossils.

Charles Lyell (1797-1875)

◆ Popularized modern geological thinking in book "Principles of Geology".

Take-away: Book _____ brought on his voyage.



Lyell laid it all out.

PRACTICE

Whose book "Principles of Geology" most directly influenced the thinking of Charles Darwin?

- a) Georges Cuvier. b) Charles Lyell. c) Alfred Russel Wallace. d) James Hutton.

PRACTICE

Which scientist was one of the first proponents of uniformitarianism and suggested the Earth was much older than a few thousand years?

- a) Georges Cuvier. b) Charles Lyell. c) Alfred Russel Wallace. d) James Hutton.

PRACTICE

Which scientist specialized in fossils and has been called "The Father of Paleontology"?

- a) Georges Cuvier. b) Charles Lyell. c) Alfred Russel Wallace. d) James Hutton.

TOPIC: HISTORY OF EVOLUTIONARY THOUGHT

Lamarck and Inheritance of Acquired Traits

◆ By the 1800s, there was evidence for evolution, but scientists could not explain _____ it happened.

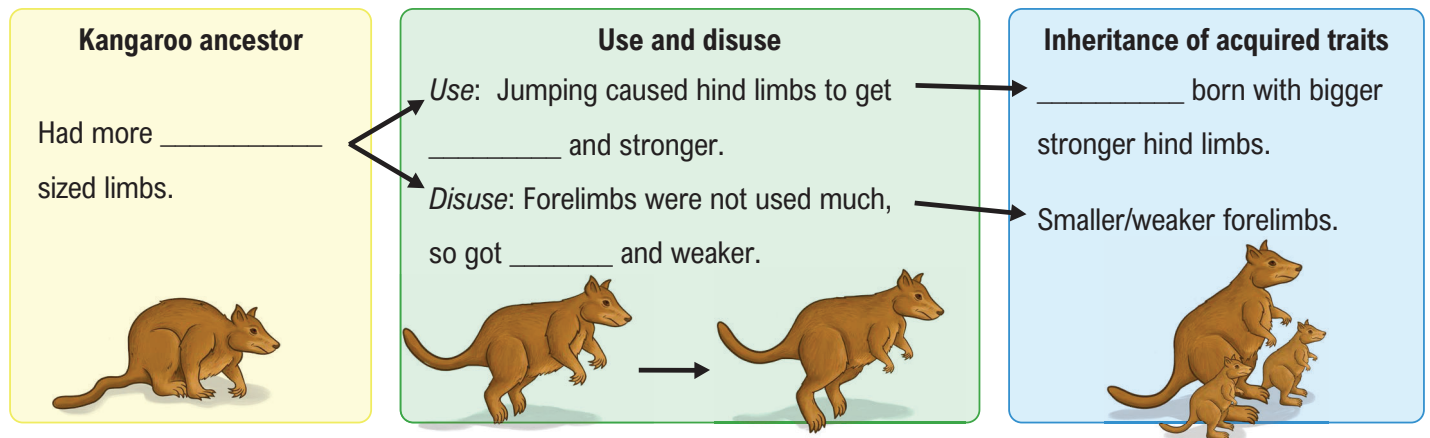
- *Recall:* Genetics and inheritance were not understood until early _____.

◆ **Jean-Baptiste de Lamarck** (1744-1829) proposed a mechanism based on _____ principles (he was _____):

1. **Use and _____:** due to use, traits can become more or less developed in an organism's lifetime.
2. **Inheritance of acquired traits:** traits that develop through use or disuse can be _____.

Example of Lamarckian thought:

Why do Kangaroos have such big hind limbs and small fore limbs?



◆ **Takeaway:** Lamarck was wrong: changes that occur during an organism's lifetime are _____ inherited.

EXAMPLE

The fiddler crab shown below has one large claw and one small claw. How might Lamarck explain this observation?



Crab ancestor _____ _____	Use and disuse _____ _____	Inheritance of acquired traits _____ _____
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Why is this incorrect? _____

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PRACTICE

Lamarck developed his ideas almost 100 years before Mendel's principles of genetics would be widely understood.

With our current understanding of genetics, which of Lamarck's ideas do we most clearly understand to be INCORRECT?

- a) In an individual, traits that are not used regularly will become less enhanced.
- b) In an individual, traits that are used regularly will become more enhanced.
- c) Characters acquired in an organism's lifetime can be inherited by offspring.
- d) Populations will become more adapted to their environments over time.

PRACTICE

Certain dog breeds regularly have "docked" tails, where a dog's tail is cut to a short length while still a puppy. A breeder of rottweilers tells you that docking has become so common in this breed that they think puppies will start being born with short tails. Evaluate their thinking.

- a) Because only dogs with docked tails are reproducing, puppies are likely to be born with short tails.
- b) A docked tail would be considered an acquired trait, and therefore, you would not expect it to be inherited.
- c) Docked tails will become more common if they help the dogs perform certain tasks.
- d) Short tails are unlikely to become common in puppies because a docked tail mainly affects a dog's appearance.

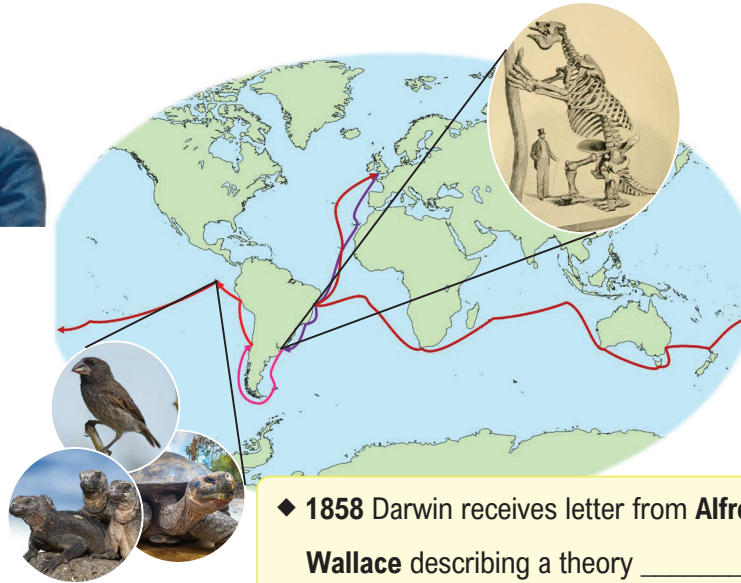
TOPIC: HISTORY OF EVOLUTIONARY THOUGHT

Darwin and Wallace

◆ In the mid 1800's, two naturalists came to the _____ conclusions about evolution.

Charles Darwin (1809-1882)

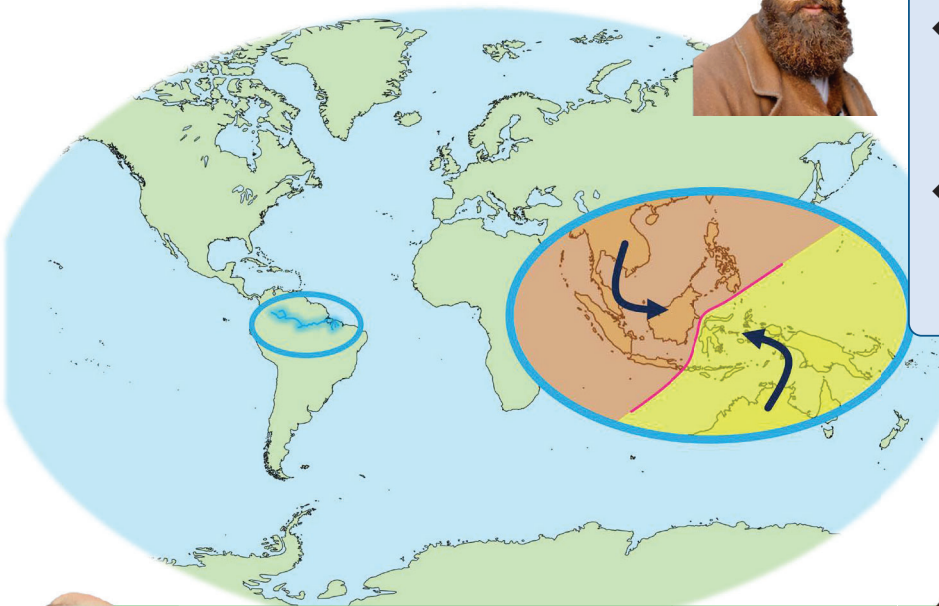
- ◆ From _____ family of physicians/intellectuals.
- ◆ Traveled around the world on HMS Beagle (1831-36).
- ◆ Observed _____, geology, & organisms.
- ◆ Unique organisms on _____ islands make big impression.
- ◆ Spends _____ years researching and developing theory.



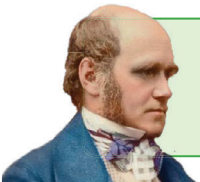
◆ **1858** Darwin receives letter from **Alfred Russel Wallace** describing a theory _____ to his.

Alfred Russel Wallace (1823-1913)

- ◆ Limited formal education.
- ◆ Inspired by _____, traveled to the _____ (1848-52) and to the Malay archipelago (1854-62).
- ◆ In Malay Archipelago observed distribution of species on different islands— _____ line.



- ◆ 1858 Darwin and Wallace's ideas are published _____.
- ◆ 1859 Darwin publishes "On the Origin of Species".



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PRACTICE

Of the following four observations, three were made by and strongly influenced Charles Darwin. Which observation was made by and influenced Alfred Russel Wallace?

- a) The distribution of species on islands in the Malay Archipelago.
- b) A large earthquake in Chile that caused measurable changes to the landscape.
- c) Fossils, including those of an extinct giant ground sloth.
- d) Differences between the finches on different islands of the Galapagos.

PRACTICE

In 1858, Darwin received a letter from Alfred Russel Wallace describing a theory nearly identical to his theory of natural selection. How did Darwin respond?

- a) He ignored the letter and quickly published his own short paper.
- b) He immediately published his book "On the Origin of Species".
- c) He quickly published his own paper jointly with Wallace's letter.
- d) He published the letter from Wallace first, and waited to publish his ideas until he had finished his book "On the Origin of Species".