

[Honors Biology Bellringer:](#)

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Define the terms
natural selection and
evolution.

Standard: Students will evaluate the role of natural selection in the development of the theory of evolution.

Element: a. Trace the history of the theory. *and* d. Relate natural selection to changes in organisms.

EQ: How does natural selection affect species?

Natural Selection: organisms with traits best suited to their environment will survive and reproduce, or “survival of the fittest”

Evolution: inherited changes in *species* over time
“descent with modification”

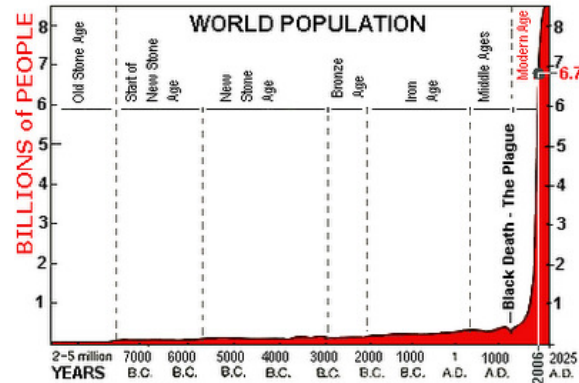
- I) History of the theory of evolution
 - A) James Hutton and Charles Lyell
 - 1) Geologists who studied fossils and the stratification (layers) in rock formations
 - 2) Hypothesized that geological processes happened very slowly and gradually over time



History of the Theory Outline

B) Thomas Malthus

- 1) Economist who studied the growth of the human population
- 2) Discovered that the human population was growing much more quickly than the food supply, so eventually there would not be enough resources to support the entire population

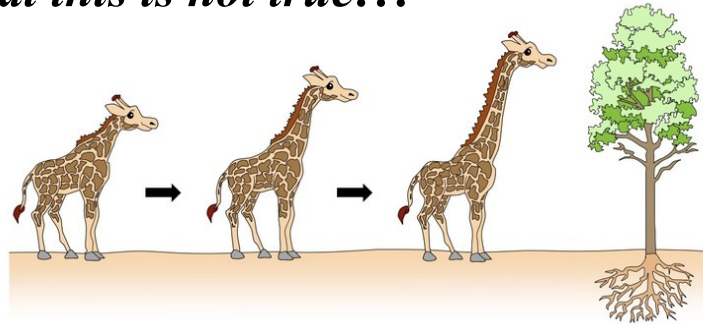


C) Jean Baptiste Lamarck

- 1) French scientist who studied the changes of organisms
- 2) Hypothesized that species were able to adapt to their environment and change over time
- 3) Incorrectly hypothesized that organisms were able to acquire these changes during their lifetime and pass new traits on to their offspring

History of the Theory Outline

Example: A giraffe with a short neck eventually stretches it out during its lifetime in order to reach leaves in trees. It passes this long neck down to its offspring, therefore producing a new generation of giraffes with longer necks. ***Remember, we now know that this is not true!!!***



D) Charles Darwin

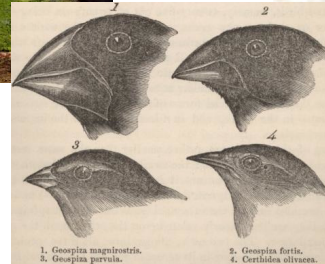
- 1) English naturalist who went on a 5 year journey around the world on the HMS Beagle
- 2) Collected many animal specimens from around the world and made detailed



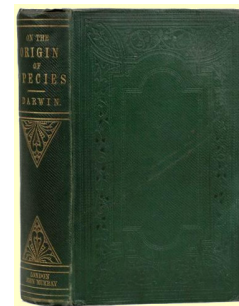
observations about similarities and differences between them

History of the Theory Outline

- 3) Studied the organisms of the Galapagos Islands in great detail and compared them to species from the mainland, which he hypothesized were the ancestors of the island species



- 4) Presented his theory of evolution in a book called *On the Origin of Species by means of Natural Selection* (or more commonly just called *Origin of Species*)



- 5) Darwin was the first person to present such a completely thought out theory of evolution that was supported by evidence he collected while on the Beagle. Other scientists had made similar hypotheses, but none had the same amount of evidence to support them.

History of the Theory Outline

II) Conditions that must exist for natural selection to occur

- 1) **Overproduction:** organisms produce more offspring than could possibly survive into adulthood



B) Variation: offspring of an organism have genetic variations that make them slightly different from each other and their parents



C) Selection: only the individuals with traits best suited to their environment will be able to survive and reproduce



D) Adaptation: over time, entire species change as beneficial genes become more common in the population and detrimental genes are greatly reduced or eliminated

Porcupine Adaptations



History of the Theory Outline

III) Evolution: A Scientific Theory

A) Meaning of the word "theory"

- 1) In casual conversation, the word theory usually means a hunch or a guess
- 2) In science, a theory is a broad explanation that is well-supported by evidence from many different experiments
- 3) A scientific theory is generally accepted to be TRUE among scientists unless substantial evidence is found to overturn it.

B) Meaning of the word "law"

- 1) A scientific law describes what happens under certain conditions; this is usually directly observable/measurable
- 2) Many scientific laws tend to be described mathematically (which is why you find them more often in chemistry and physics than in biology)
- 3) A theory does not become a law after a certain amount of time/testing/evidence!

History of the Theory Outline

C) Examples of Scientific Theories and Laws

- 1) Theory of Evolution (duh!)
- 2) Cell Theory
- 3) Atomic Theory
- 4) Theory of Relativity
- 5) Theory of Plate Tectonics
- 6) Law of Gravity (sometimes called a theory)
- 7) Newton's Laws of Motion
- 8) Mendel's Laws of Inheritance

