Evolution

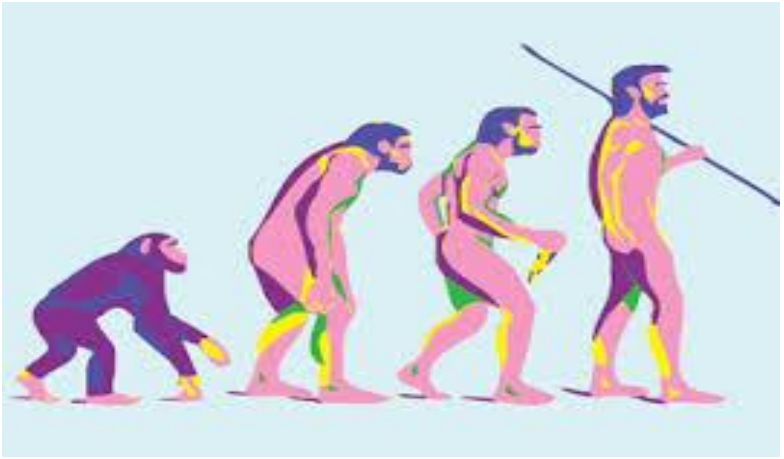
What factors influence evolution of a species?

Chapter 15.1: The puzzle of Life's Diversty

The variety of living things is called *biodiversity*.

THEORY OF EVOLUTION

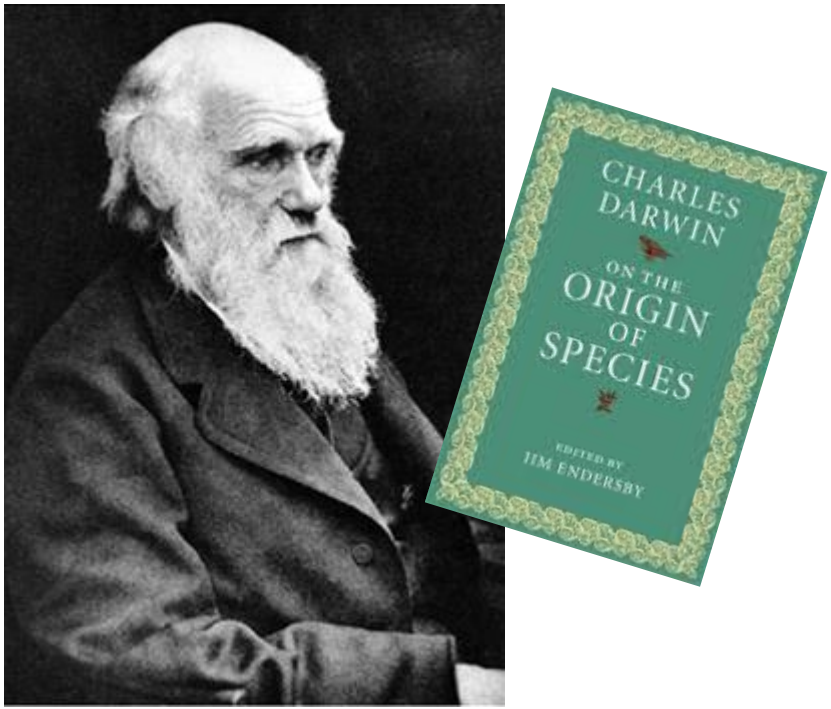
The process by which organisms *change over time* as a result of changes in heritable physical or behavioral traits.



Evolution is the process by which modern organisms have descended from ancient organisms

Theory: a well supported testable explanation of phenomenon that have occurred in the natural world.

Charles Darwin



An English naturalist and geologist, born 1809

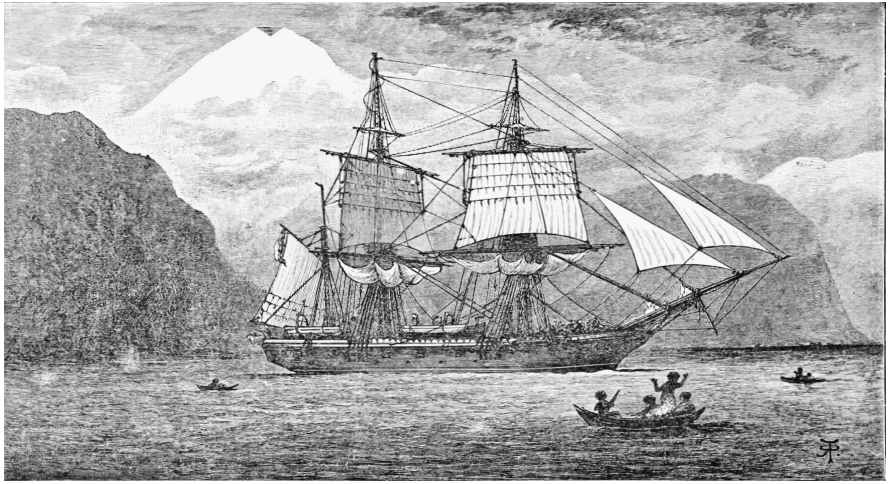
In 1859, Charles Darwin published his book On the *Origin of Species*.

This book was the first to provide compelling evidence for the theory of evolution by *natural selection*.

Voyage of the H.M.S Beagle

In 1831, Darwin traveled the world aboard the HMS Beagle.

Along the way Darwin collected plant and animal specimen for research.

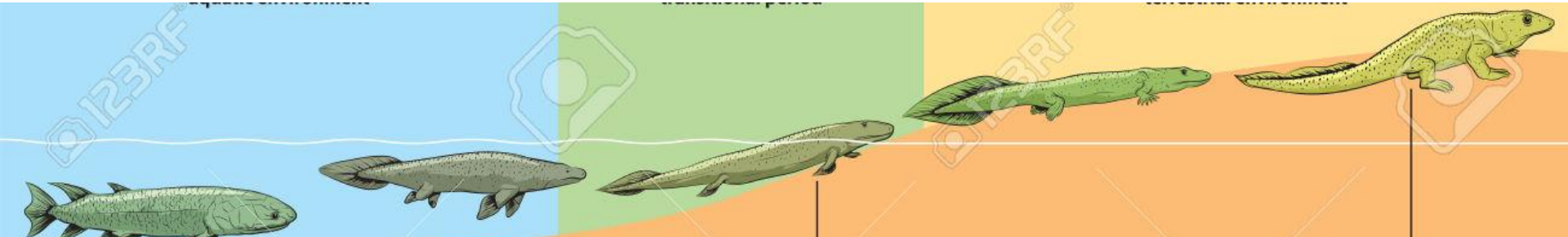


Darwin's observations

Darwin recorded thousands of observations in his field journals along with the specimen he collected.

This research led him to propose a *hypothesis* about the way life changes over time

His hypothesis has become the *theory of evolution.*



Patterns of Diversity

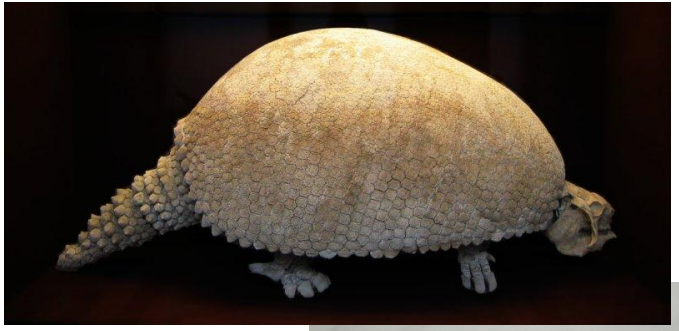
Darwin was puzzled by how many different species there were across the Earth and *how well suited* each species was to its environment.

He was also puzzled by where different species lived and did not live.

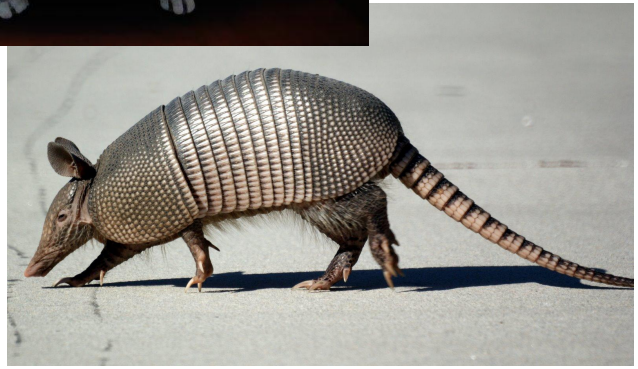
Darwin also studied fossils

Fossils are the remains of ancient organisms.

Some fossils resemble living organisms.



Fossil of Glyptodon

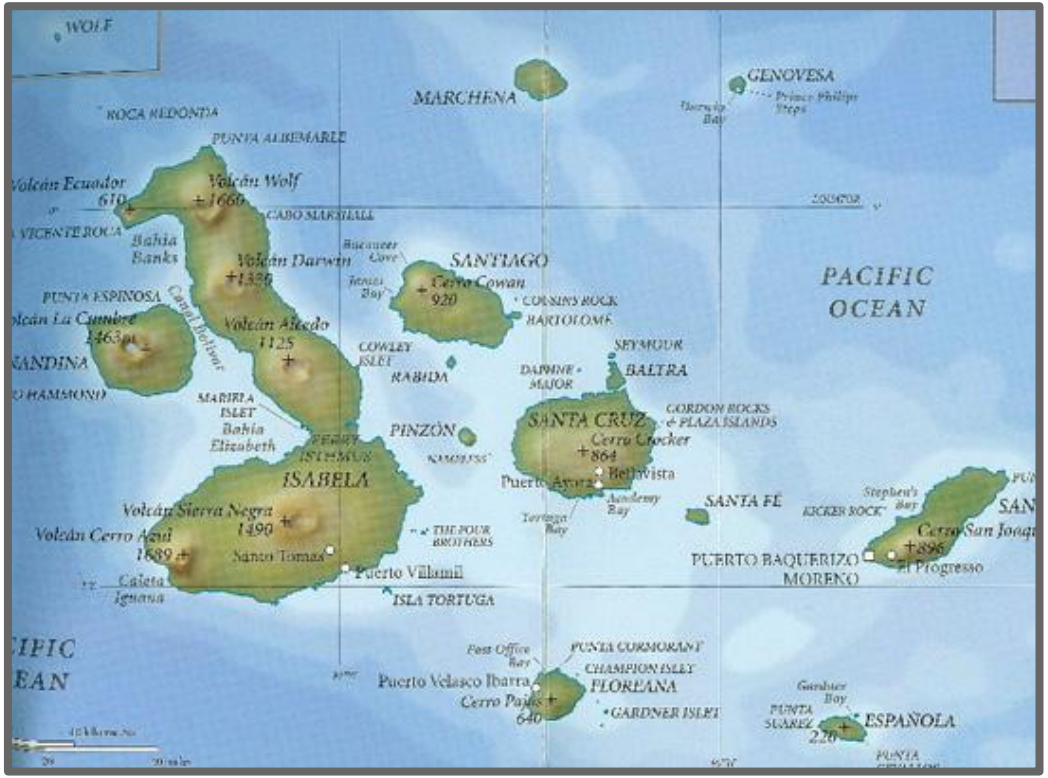


Present-day Armadillo

Other fossils looked like nothing he had ever seen

The Galapagos Islands

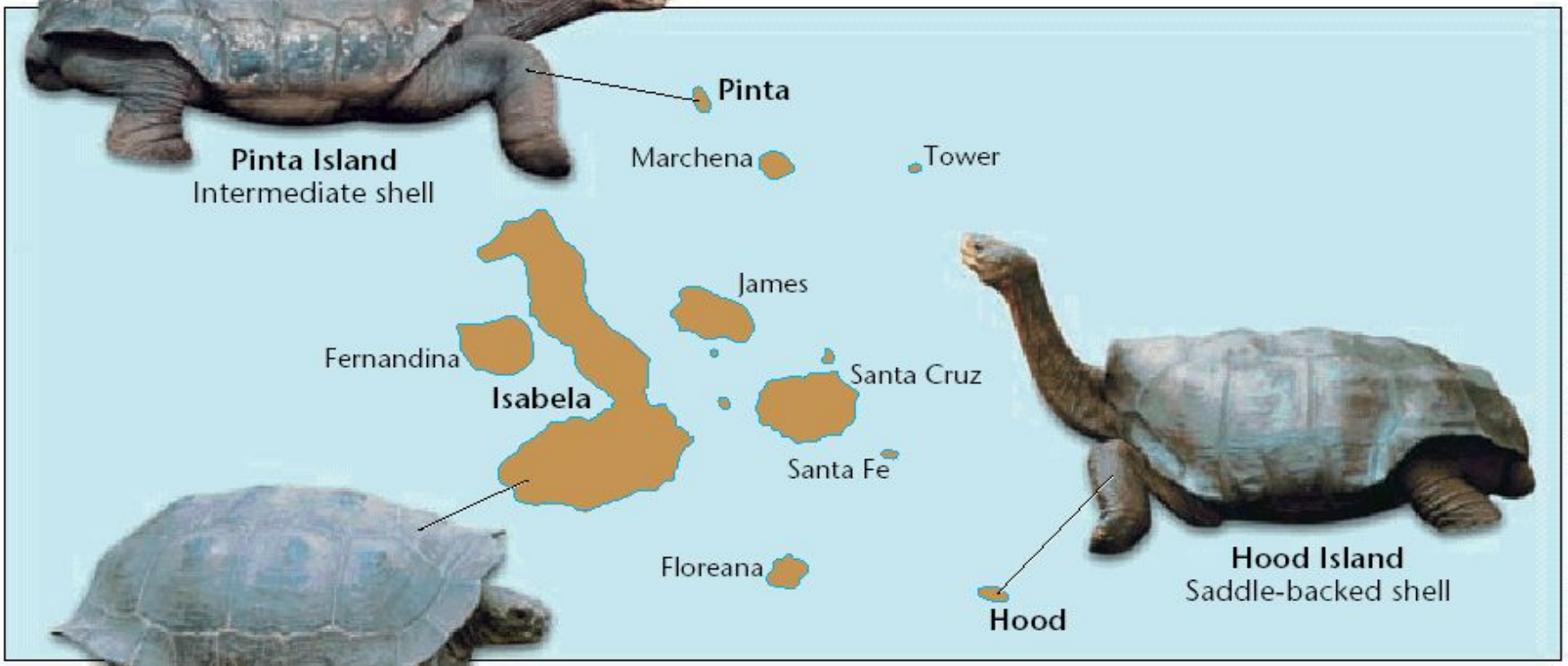
A series of islands off the coast of Ecuador proved to be the greatest source of evidence Darwin needed to support his hypothesis.



These islands although close together had very different climates.

Darwin noticed that animals and plants varied *noticeably* across the islands

TORTOISES

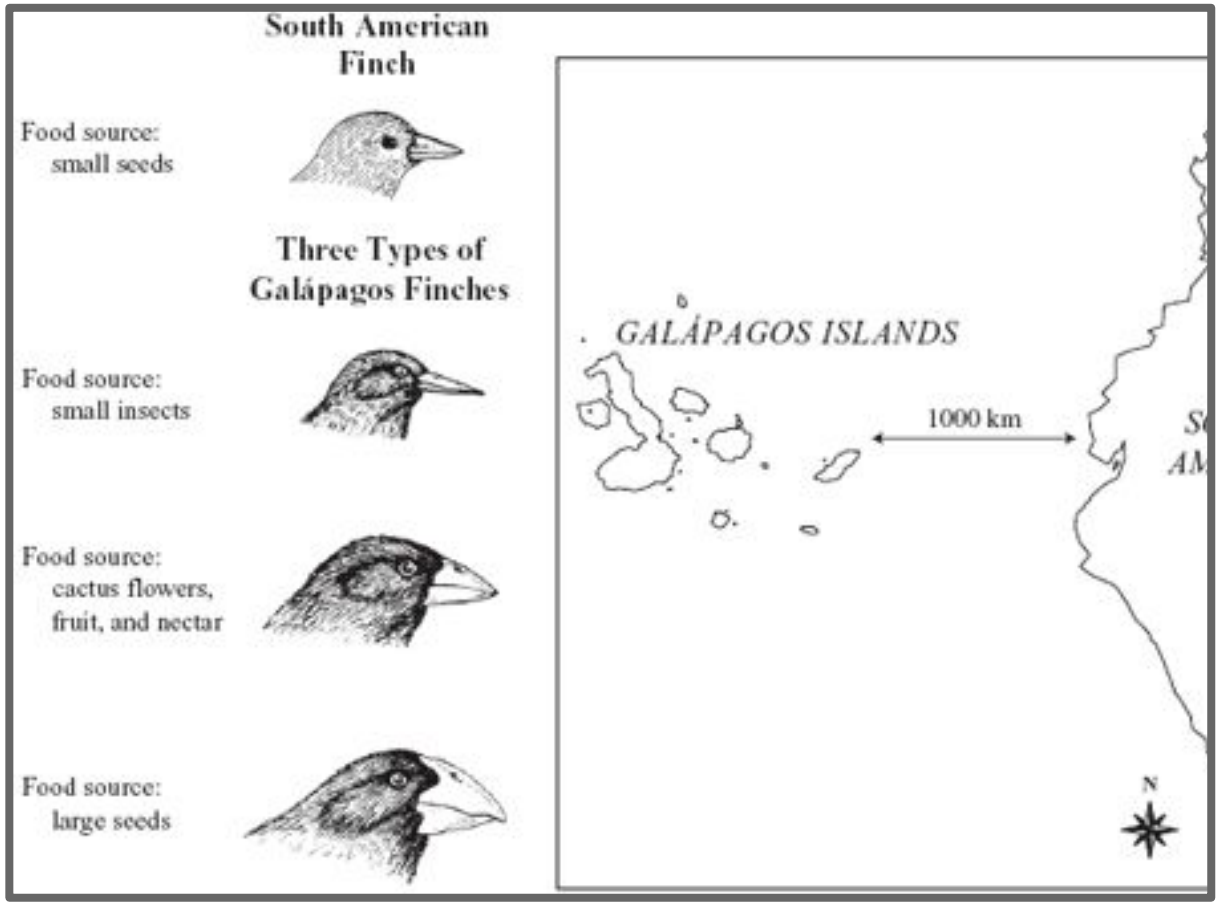


Pinta Island
Intermediate shell

Isabela Island
Dome-shaped shell

Hood Island
Saddle-backed shell

Finches



Darwin wondered if these species had once been members of the same species.

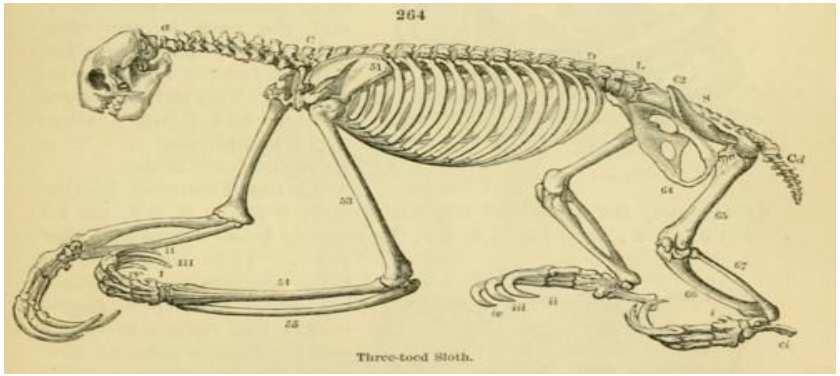
Had they evolved from an original ancestor?

Review Activity

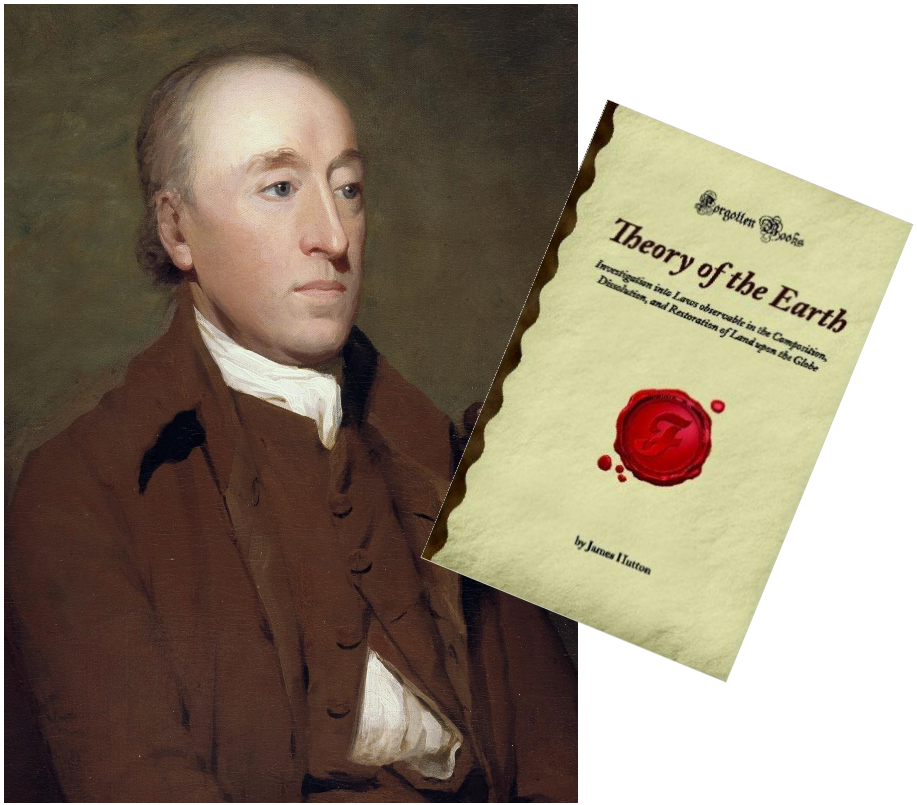
Chapter 15.2: Ideas that shaped Darwin's thinking

In Darwin's day, most Europeans believed that and all its life forms had been created only a few thousand years ago … and that nothing has changed since.

The formation of a fossil record and new geologic discoveries were beginning to challenge this belief system.



James Hutton



In 1795, Hutton published his hypothesis about the geological forces that shaped Earth.

He hypothesized that geologic forces happen very slowly *over millions of years*.

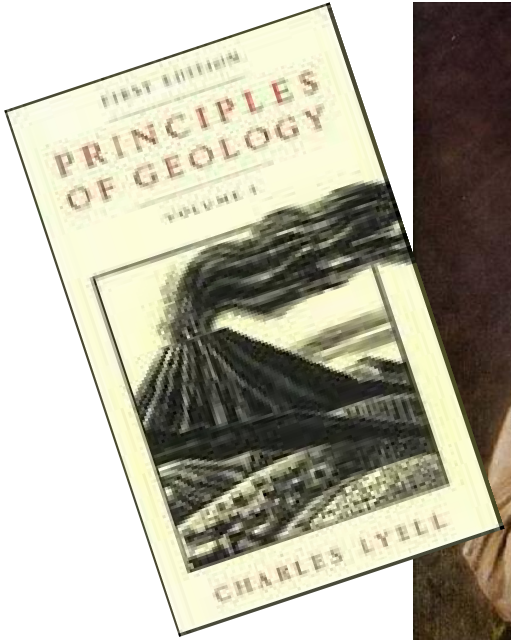
This was revolutionary compared to previous thought.

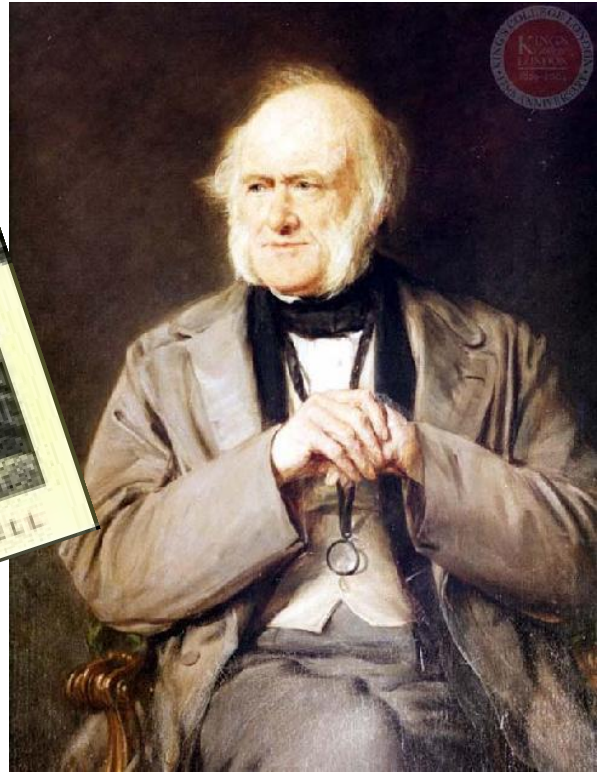
Charles Lyell

In 1833, Lyell published his work the *Principles of Geology.*

He proposed that processes which shaped Earth in the past continue to shape Earth in the present.

This also supported the idea that the Earth was changing over long periods of time.

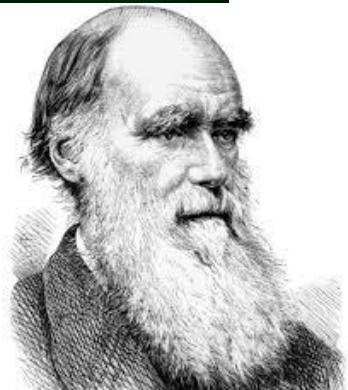




These understandings of geology influenced Darwin in his studies of life.

Could life also change slowly over great periods of time?

Could life forms have changed as the Earth also changed?



Jean-Baptiste Lamarck

in 1809 (the year Darwin was born) Lamarck had published his hypothesis of species changing over time.

He believed that because species have an innate tendency toward perfection, therefore *the use or disuse* of body parts would change the species over time.

This proved to be incorrect, but did influence Darwin's thinking.

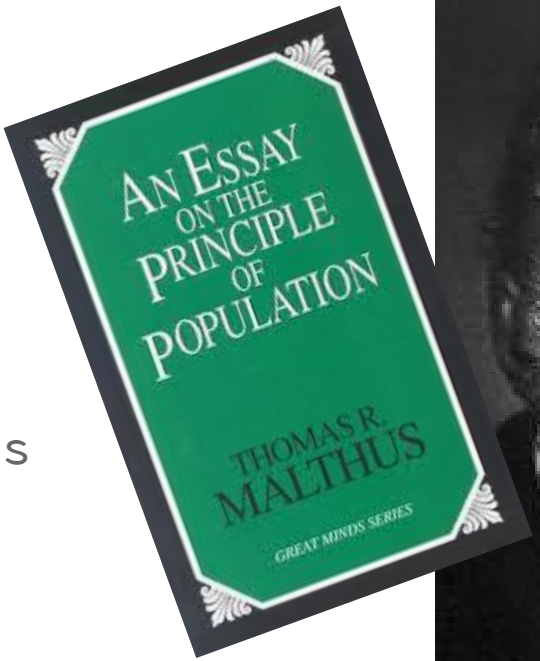
Thomas Malthus

In 1798, Malthus published his book on human population.

He noted that babies were being born faster than people were dying.

Environmental factors such as war, disease, and famine controlled human populations

Darwin believed this could apply to other living organisms as well...



If *all the offspring* of almost any species survived for several generations, they would eventually overrun the world!

Oh dear!

Obviously this hasn’t happened.

What factors determine which offspring survive and reproduce and which ones do not?