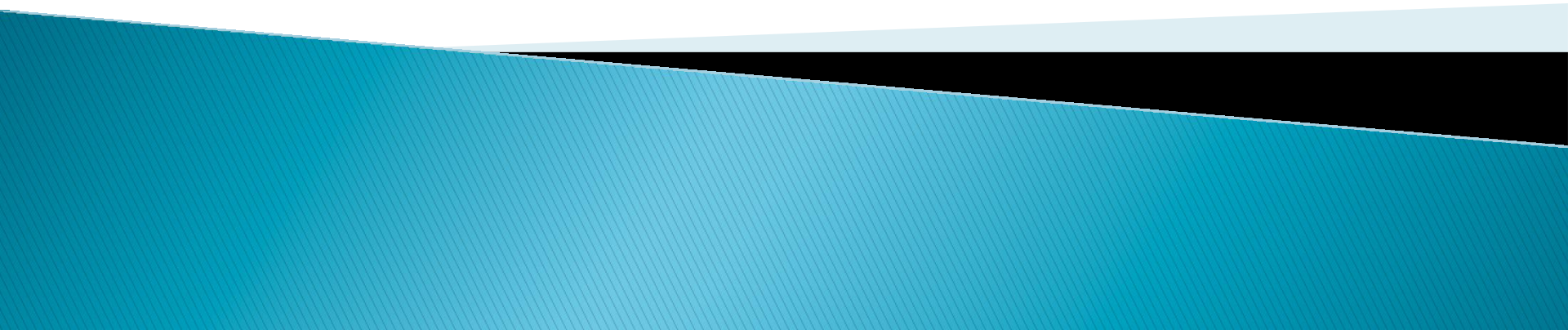


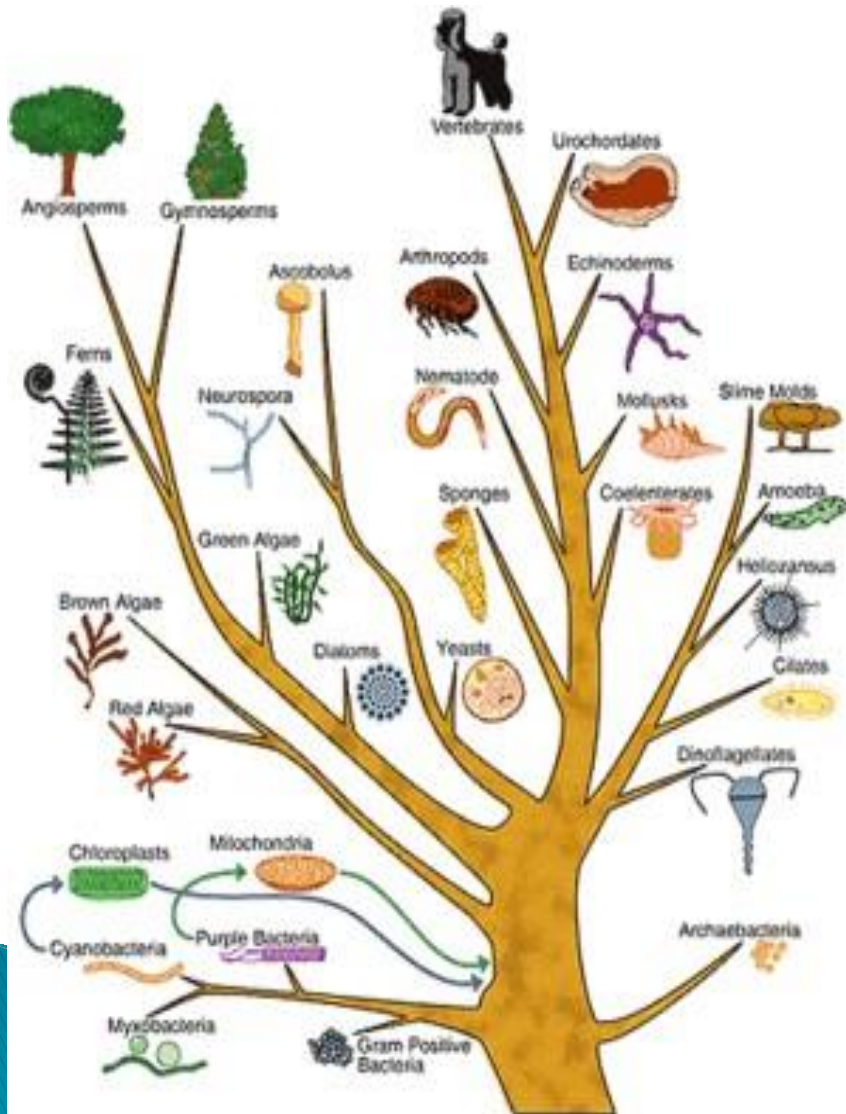
Macroevolution

Grade 11 Biology

SBI3U



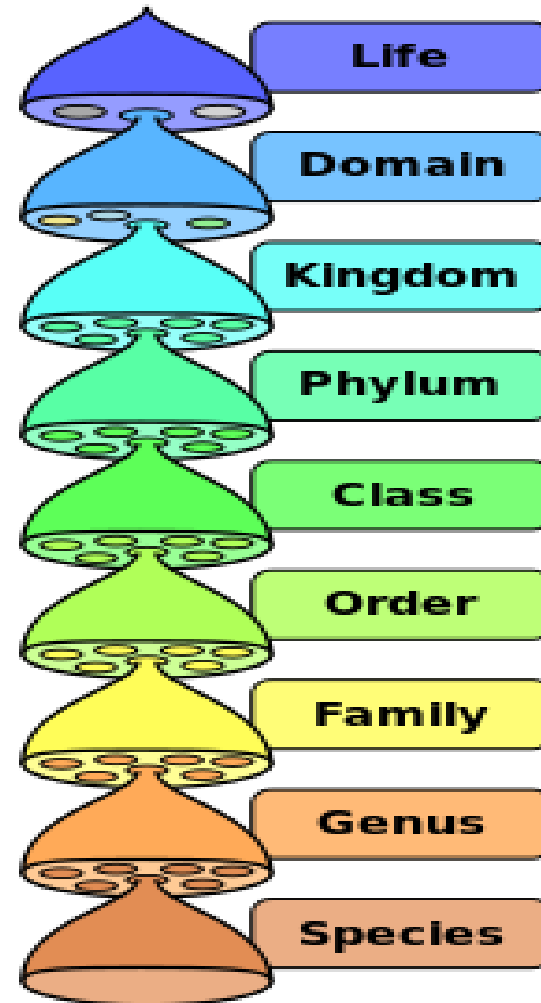
Macroevolution



- ▶ Since the first single-celled life began on Earth, life has taken amazing and unique forms
 - Ourselves included
- ▶ We can trace the large-scale processes of evolution through phylogeny

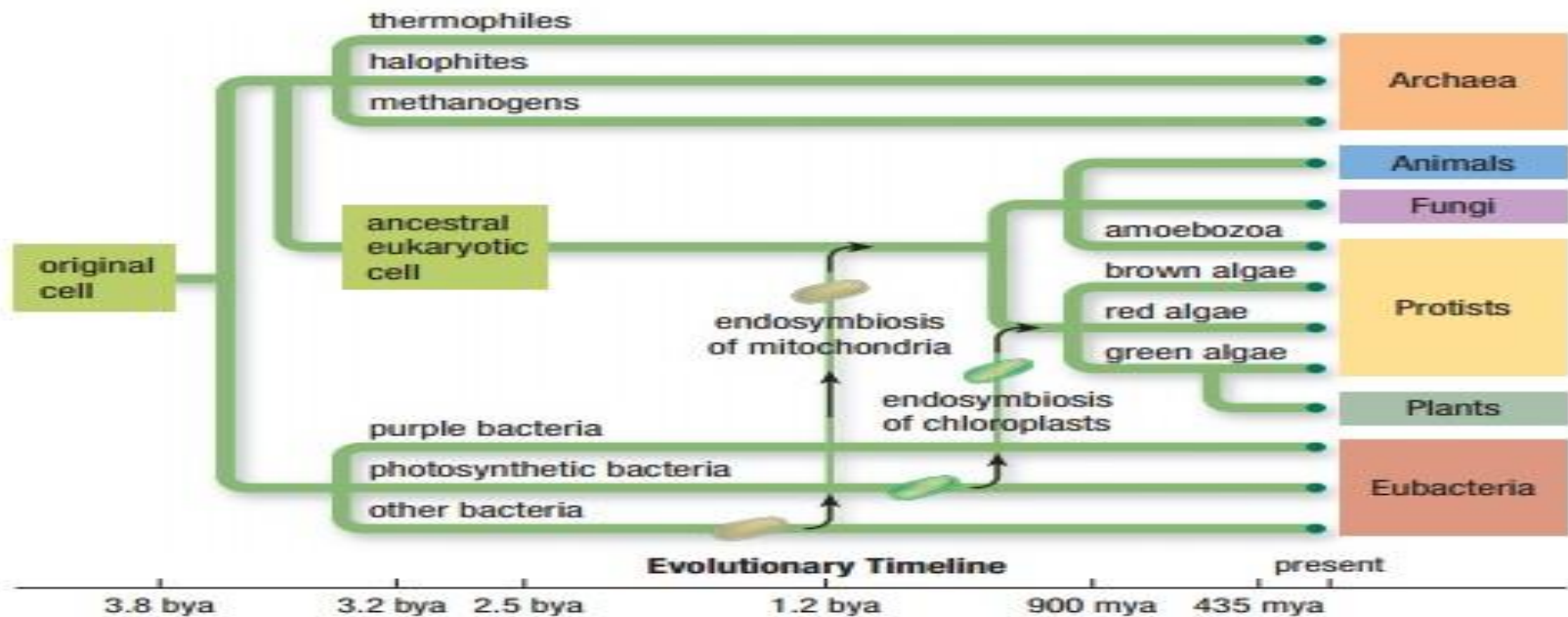
Macroevolution

- ▶ **Macroevolution:** Large-scale evolutionary changes including the formation of new species and taxa
- ▶ We can examine this to study evolutionary relationships between species



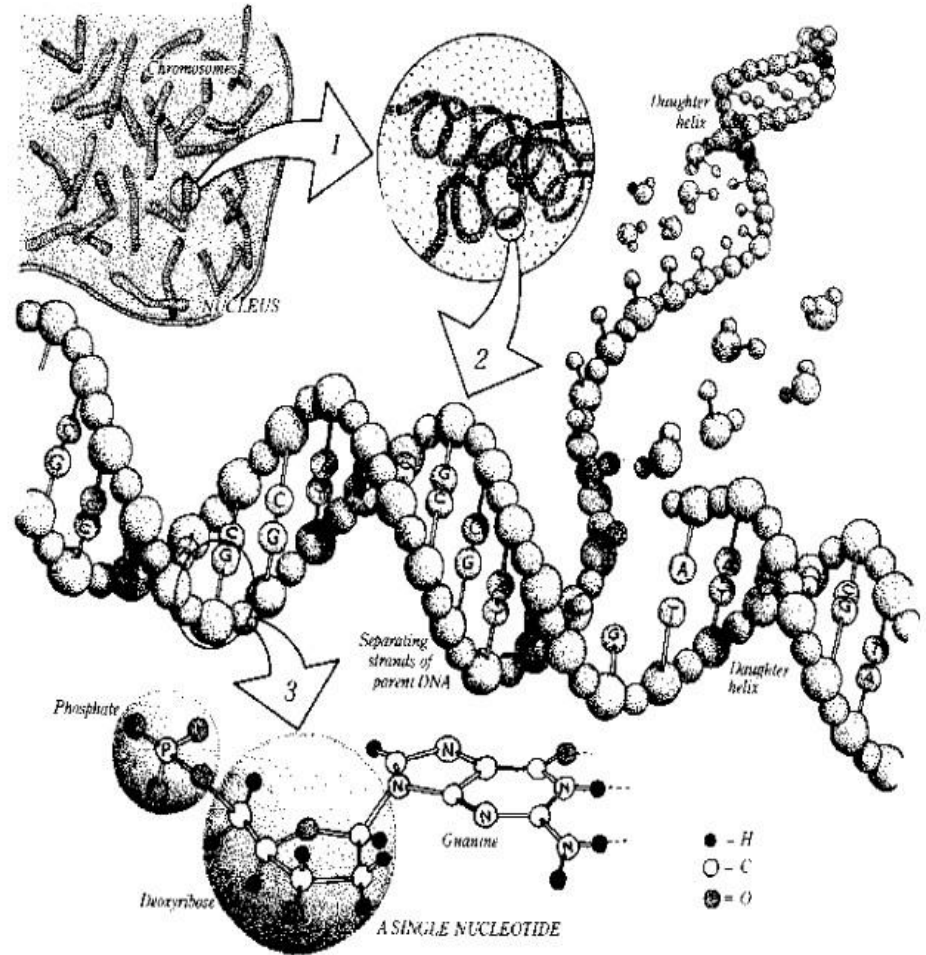
Moment 1

- ▶ Regardless of how different species are, there was a **first species we all evolved from**
 - A single-celled organism
- ▶ How did this first cell arise?
 - How did organic matter first appear?

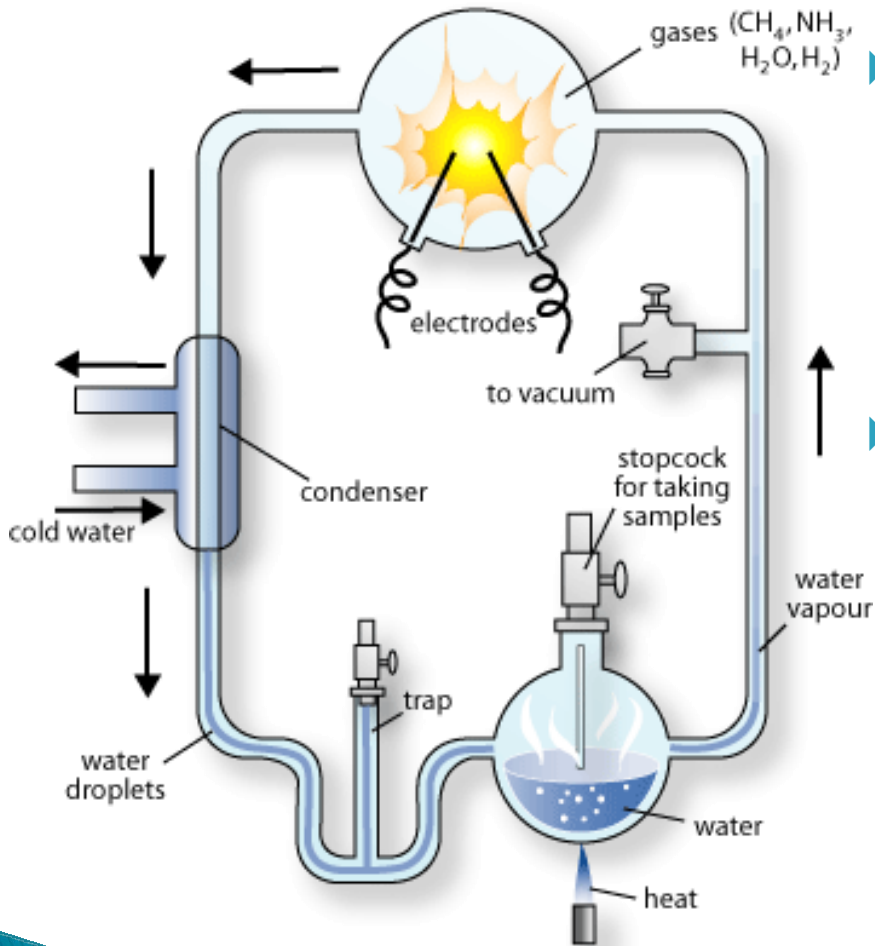


Abiogenesis

- ▶ **Abiogenesis: The formation of life from non-organic material**
- ▶ many of the building blocks of life can be formed under natural conditions
 - Amino acids, hydrocarbon chains
- ▶ Some have even been found **within comets**



Abiogenesis

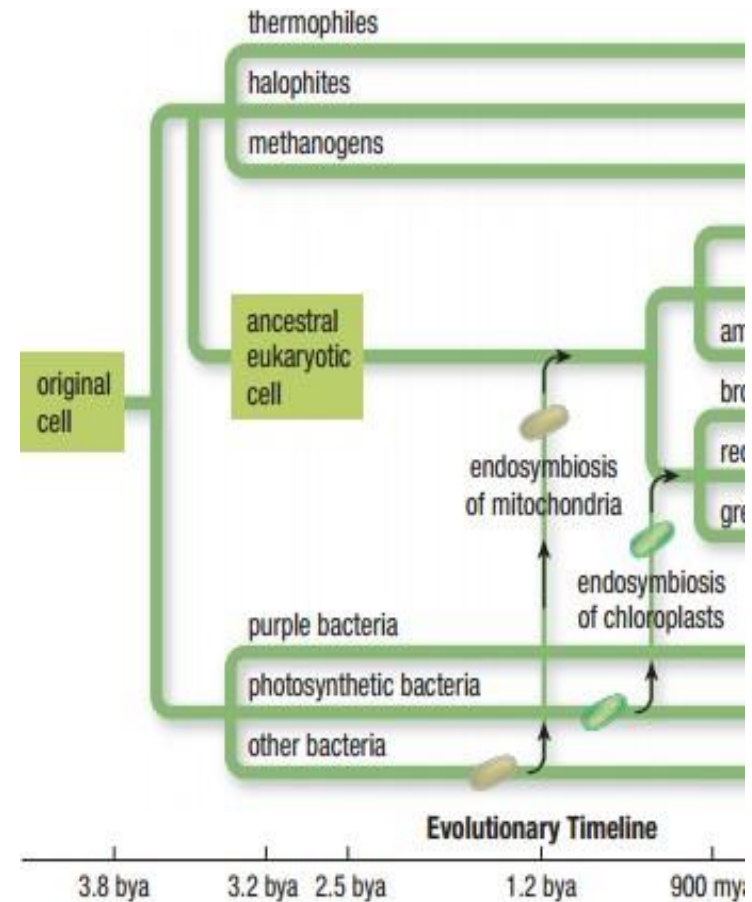


► We know that the elements of life can form naturally

► Scientists have not yet fully recreated the exact environmental conditions that existed billions of years ago

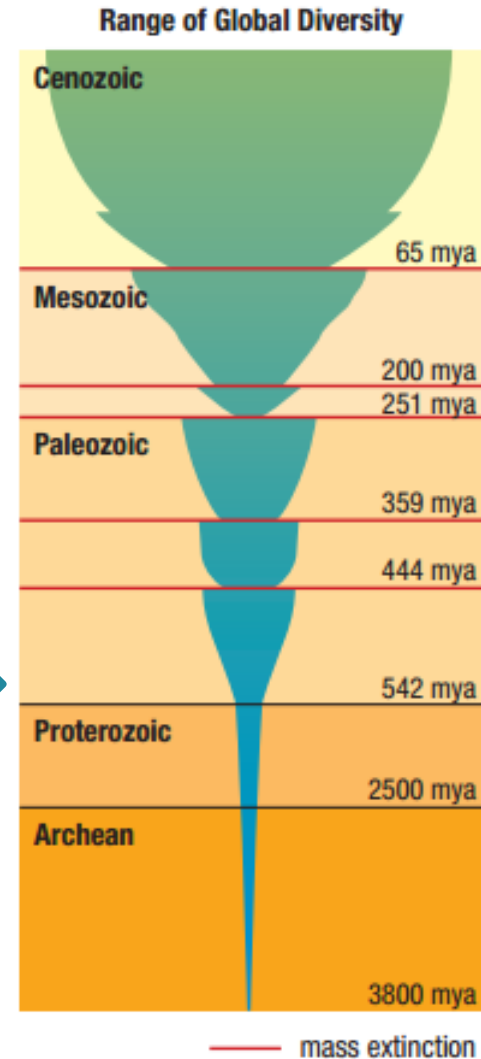
Abiogenesis Theories

- ▶ It is believed that life has existed on Earth for 3.5 billion years
 - 2 billion years later, eukaryotic cells evolved
 - Several more hundred million years later, multicellular organisms appeared



Cambrian Explosion

- ▶ **Cambrian Explosion:** a period of time in which **the evolution of most major animal phyla occurred over 40 million years**
- ▶ One of the most significant periods of evolution in Earth's history



Rise of the Terrible Lizards



- ▶ 250 million years ago, dinosaurs first appeared
- ▶ By 200 million years ago, they truly ruled the earth
- ▶ At their height, dinosaurs were an amazingly diverse group

End of the Dinosaurs

- ▶ For all their success, dinosaurs were wiped out 65 million years ago
 - At least 300 species went extinct when a 200 km wide asteroid collided with Earth
- ▶ Although the loss of life was devastating, this was not the only (or the largest) mass extinction in Earth's history



Figure 3 The extinction of most species of dinosaurs 65 million years ago is thought to have been caused by a large meteorite impact.

Mass Extinction

- ▶ There have been many mass extinctions in history, the largest of which occurred **251 million years ago in the Permian Era**
- ▶ Most life was wiped out in this extinction
 - **90% of all marine life**
- ▶ This event eventually gave rise to dinosaurs



Consequences of Extinction

- ▶ How different would the Earth be today if these extinctions had not occurred?
- ▶ Gene pools have shrunk, shifted, and been altered
- ▶ These extinctions have led to genetic drift on a massive scale



Extinctions Today

- ▶ We are in the midst of **another mass extinction today**
- ▶ Species are disappearing today at an enormous rate
- ▶ **Humans, and the impact we have on Earth, are the cause**



The Tree of Life

- ▶ From that first organism all life developed
- ▶ We've seen how evolutionary biologists attempt to trace how this life has developed
- ▶ This includes us!

Have humans also evolved, or are we the exception?