Early Evolution

How did everything come to evolve on the Earth?
Early Evolution

• 4.6 Billion Years Ago

• Radioactive decay shows that Earth formed
Early Evolution

4.5 Billion Years Ago

• During the early formation Earth heated up due to radioactive decay of isotopes within the Earth’s interior
Oldest Zircon Crystals - 4.4 billion years old
Western Australia
Early Evolution

4.4 Billion Years Ago

- During early Earth’s melting, materials separated into zones according to their densities
  - Fe and Ni settled into the core
  - Silicates formed the earliest crust
  - Gaseous compounds made up the atmosphere
Early Evolution

4.2 Billion Years Ago

- Solid crust formed and plate tectonics started
- Gases trapped inside the Earth seeped out in a process called outgassing and created a completely different second atmosphere
Oldest Rocks - 4.28 billion years old
Hudson Bay in Northern Quebec
Early Evolution

3.9 Billion Years Ago

• After the crust had cooled enough, water vapor in the atmosphere began to precipitate and form water on Earth
Early Evolution

3.8 Billion Years Ago

• Weathering, erosion, and deposition began and the first sedimentary rock was formed
The Potential for Life
Early Evolution

3.5 Billion Years Ago

• Life forms that used CO$_2$ and released free oxygen began to evolve

• This allowed for oxygen to start collecting in our atmosphere
Early Evolution

3.5 - 2.8 Billion Years Ago

- Oxygen in the atmosphere reacted with iron in the soil to produce rust
- Resembled the surface color of current day Mars
Early Evolution

2.8 Billion Years Ago

• Most of the iron compounds that could have reacted with the oxygen had done so, thus oxygen in the atmosphere increased
Early Evolution

2.8 - Present Billion Years Ago

- Life slowly evolved from single-celled bacteria to multicellular to hard parts on life forms

Single-Celled  Multi-Celled  Shelled
Cambrian Explosion / Burgess Shale