

# Early Evolution

How did everything come to evolve on the Earth?

# Early Evolution

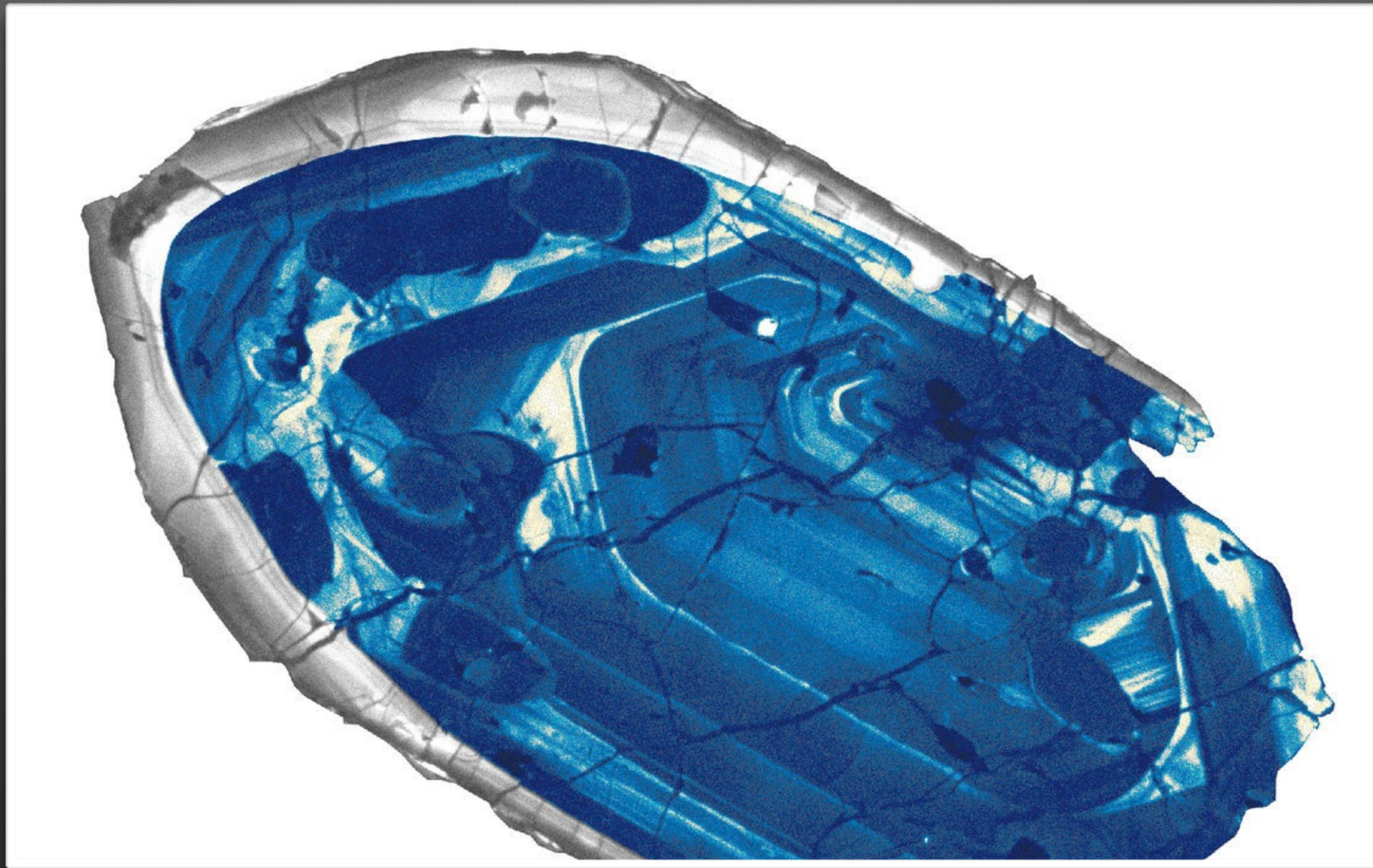
- 4.6 Billion Years Ago
  - Radioactive decay shows that Earth formed



# 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



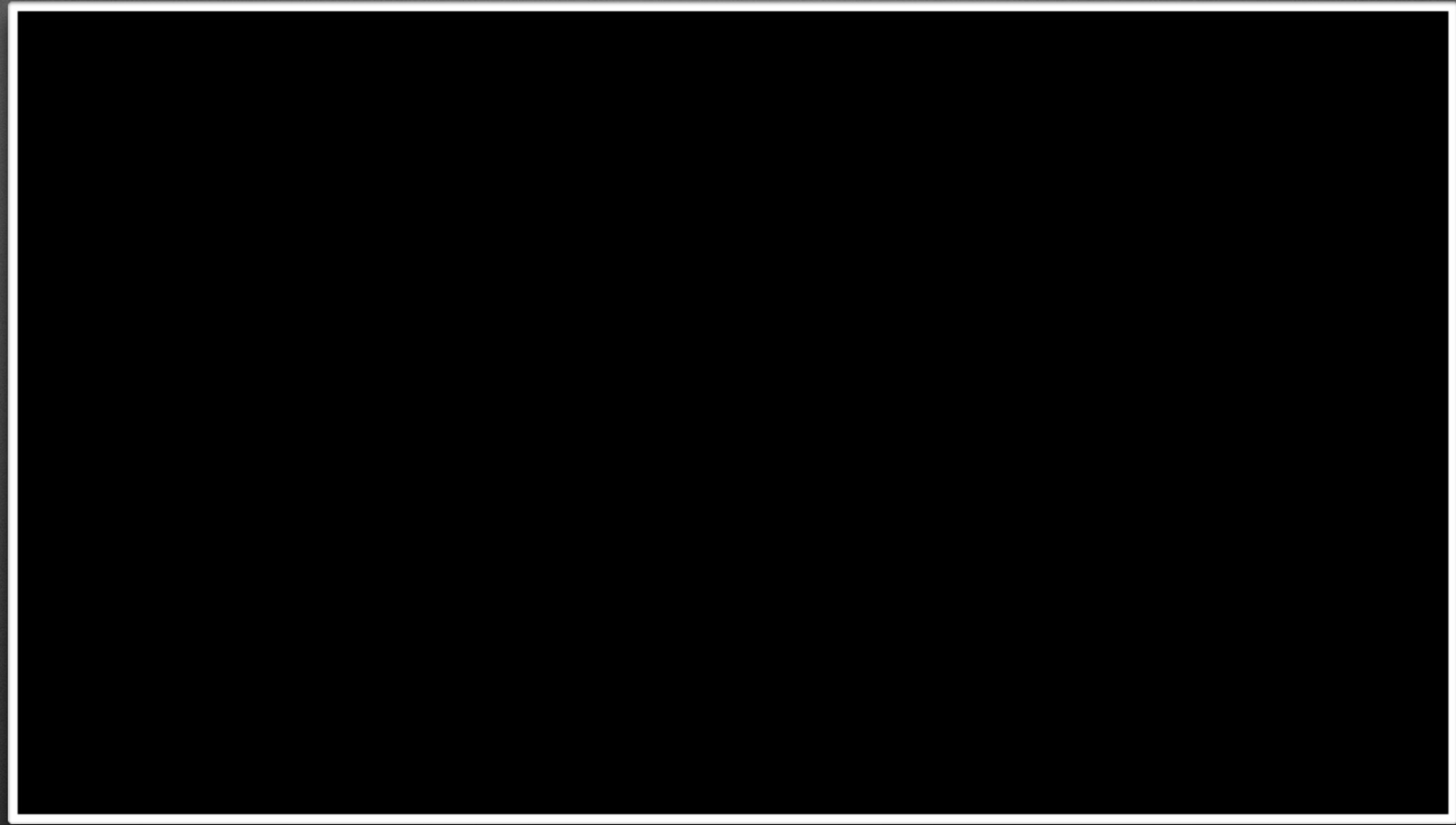


# Early Evolution

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

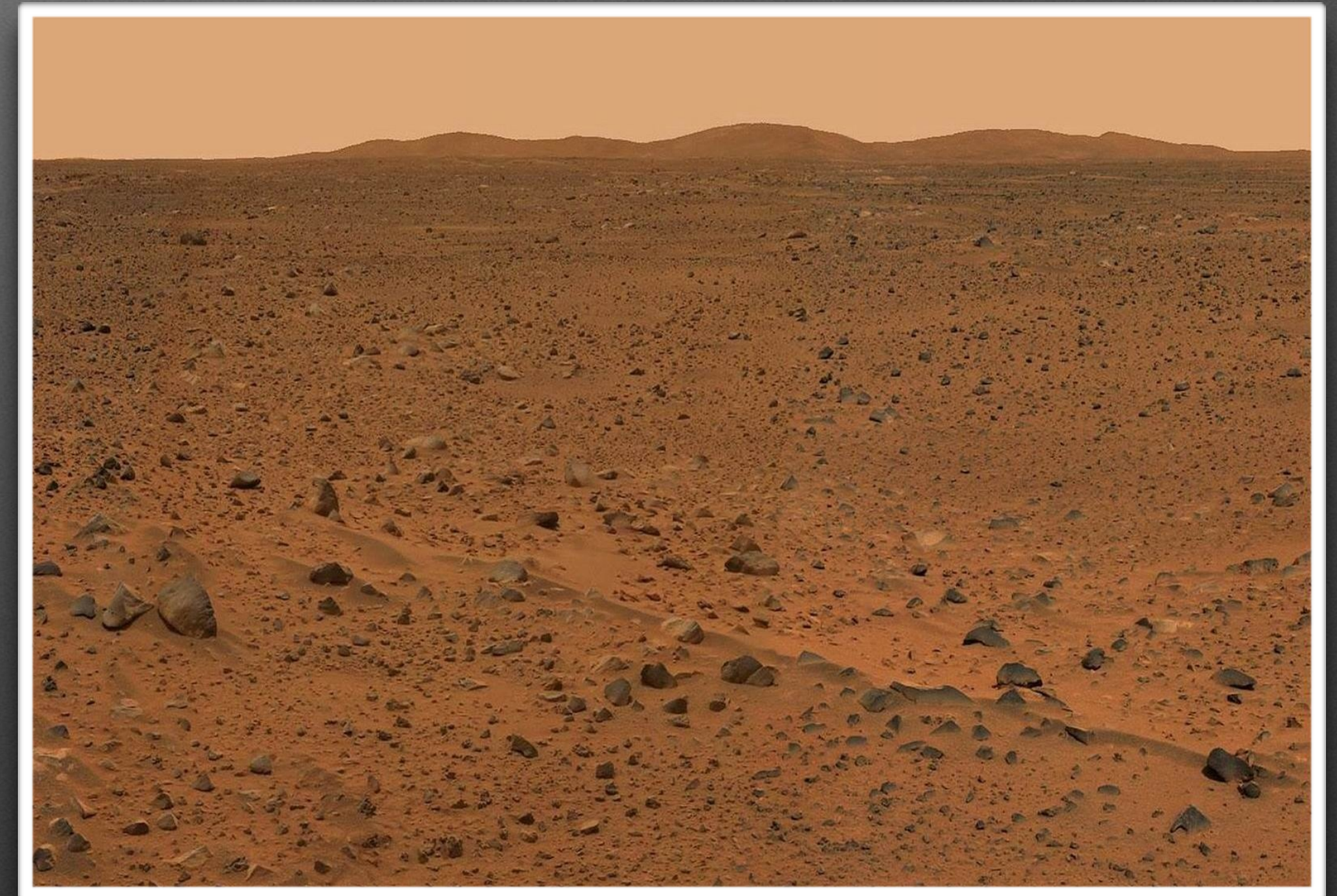
- Life forms that used  $\text{CO}_2$  and released free oxygen began to evolve
- This allowed for oxygen to start collecting in our atmosphere



# 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

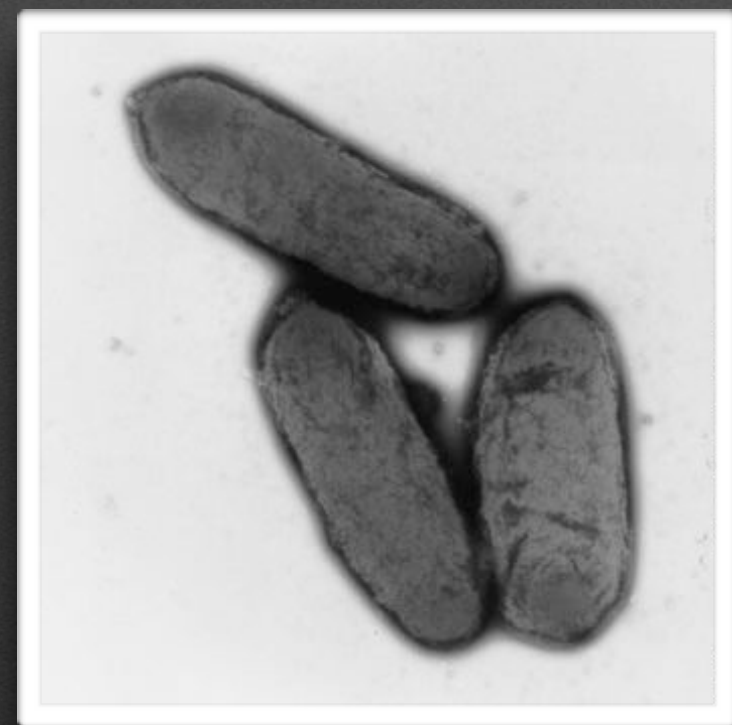
- Most of the iron compounds that could have reacted with the oxygen had done so, thus oxygen in the atmosphere increased



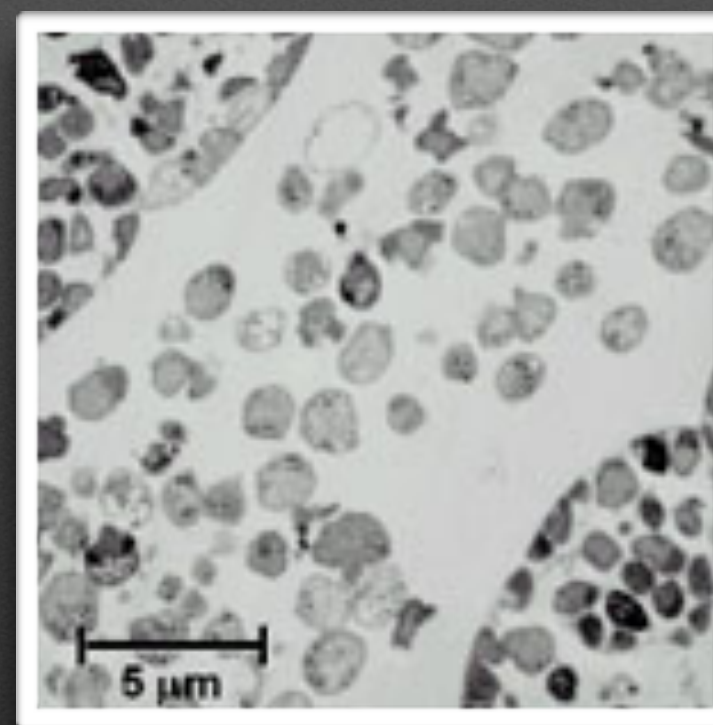
# Early Evolution

2.8 - Present Billion Years Ago

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



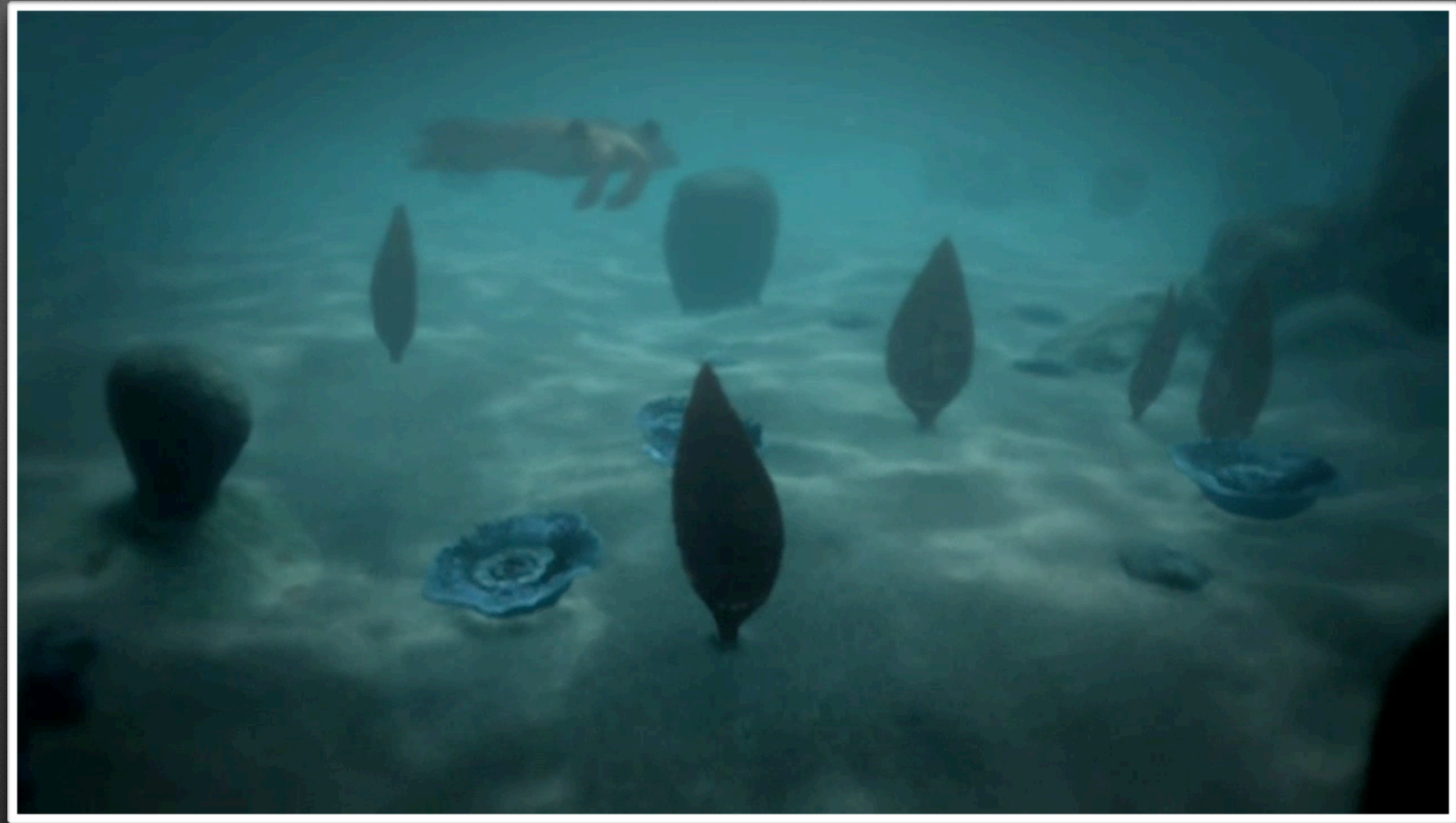
Single-Celled



Multi-Celled

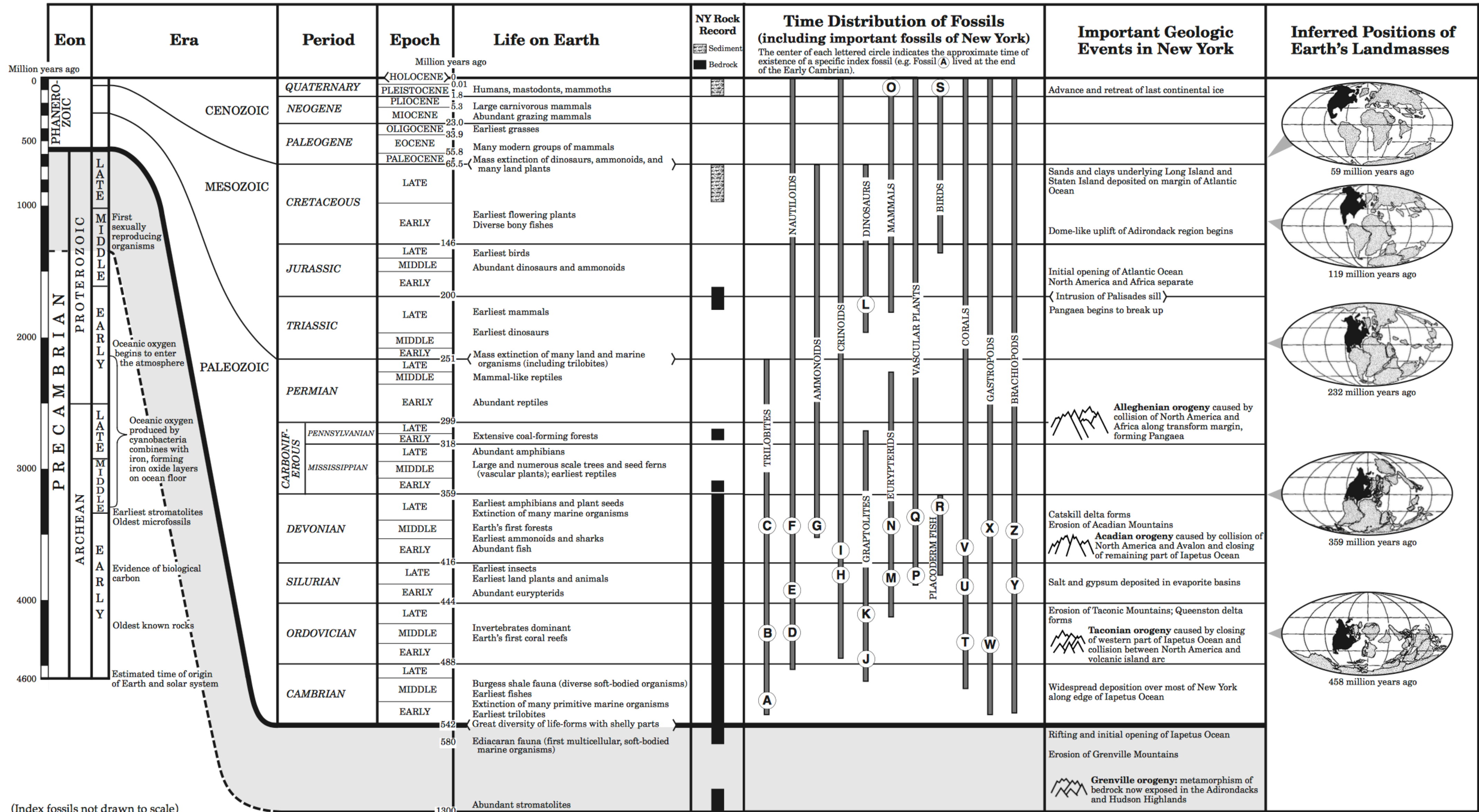


Shelled



Cambrian Explosion / Burgess Shale

# GEOLOGIC HISTORY OF NEW YORK STATE



(Index fossils not drawn to scale)

