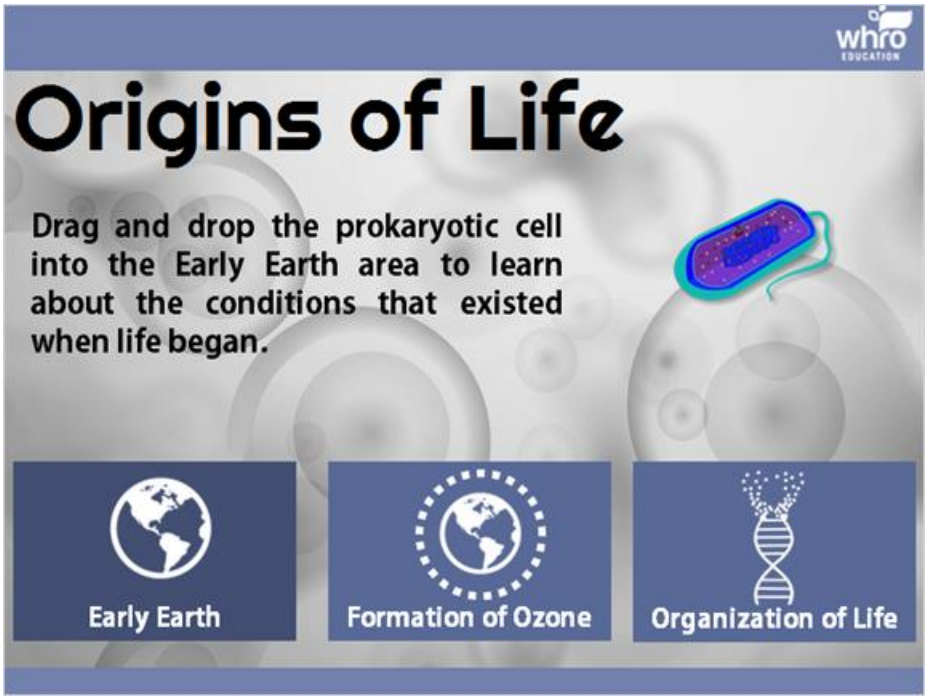
Module 3: Cell Biology - Structure and Function
Topic 2 Content: Origins of Life Notes

Introduction



Earth formed around 4.6 billion years ago and the environment was much more hostile than it is today. Drag and drop the prokaryotic cell into the Early Earth area to learn about the conditions that existed when life began.

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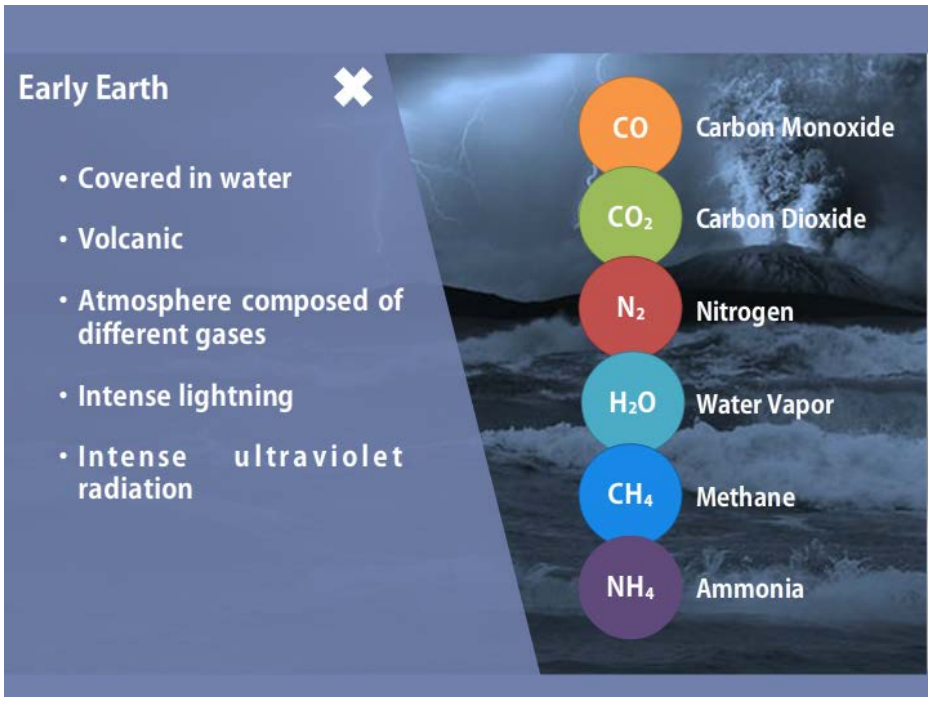
Early Earth



When Earth formed, it was a vastly different planet from the planet where you live today. Covered in water, Earth's only land masses were mostly volcanic, spewing poisonous gases into the atmosphere and molten rock onto the surface. The atmosphere was composed of carbon monoxide (CO), carbon dioxide (CO_2), nitrogen (N_2), and water vapor (H_2O), with methane (CH_4) and ammonia (NH_4). Along with the intense lightning and ultraviolet radiation, this was not a place conducive to today's life on Earth. Yet, it was in these conditions that life began.

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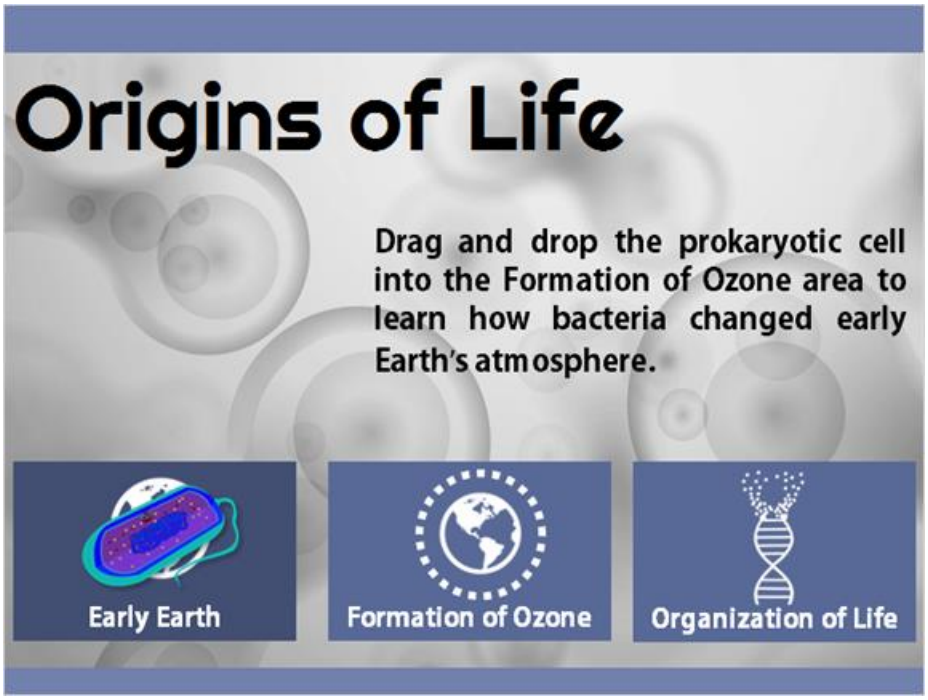
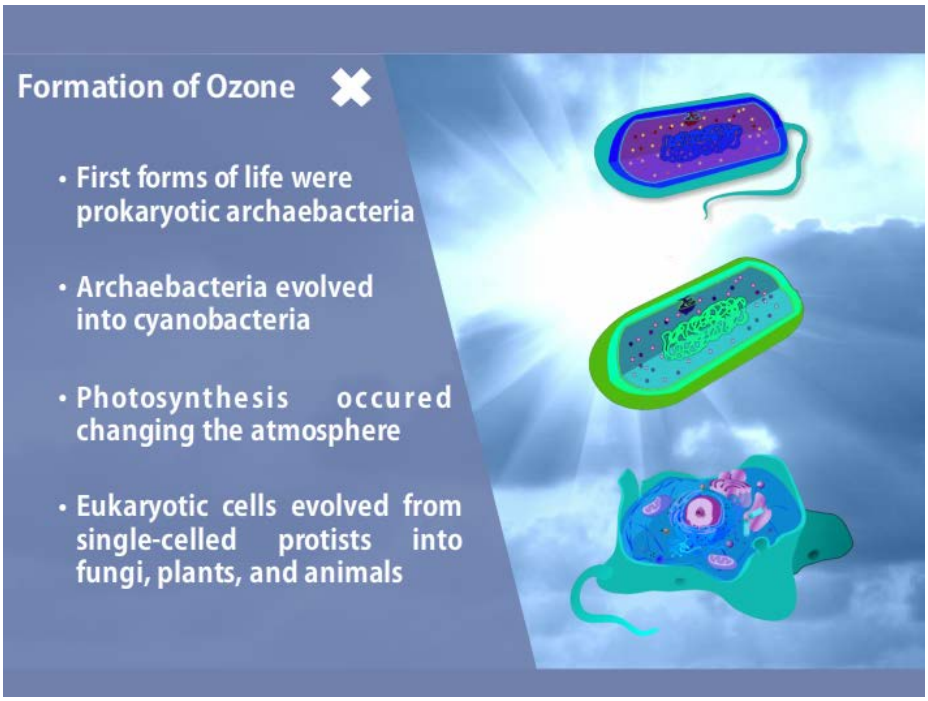


Now that you have learned about the conditions present during when Earth was still young, drag and drop the prokaryotic cell into the Formation of Ozone area to learn to learn how bacteria changed early Earth's atmosphere.

Formation of Ozone



The first forms of life on Earth did not survive in the fossil record. It is believed that these early forms of life were prokaryotic archaebacteria. These types of bacteria live in volcanic vents, hot springs, oceans with high salt concentrations, and in environments without oxygen. Archaebacteria evolved into cyanobacteria. Cyanobacteria are capable of photosynthesis. Over a long period of time, the cyanobacteria converted enough carbon dioxide into oxygen to form the ozone layer. The ozone layer protects Earth from harmful ultraviolet radiation. The formation of the ozone layer allowed for life to flourish, and prokaryotic cells evolved into eukaryotic cells.

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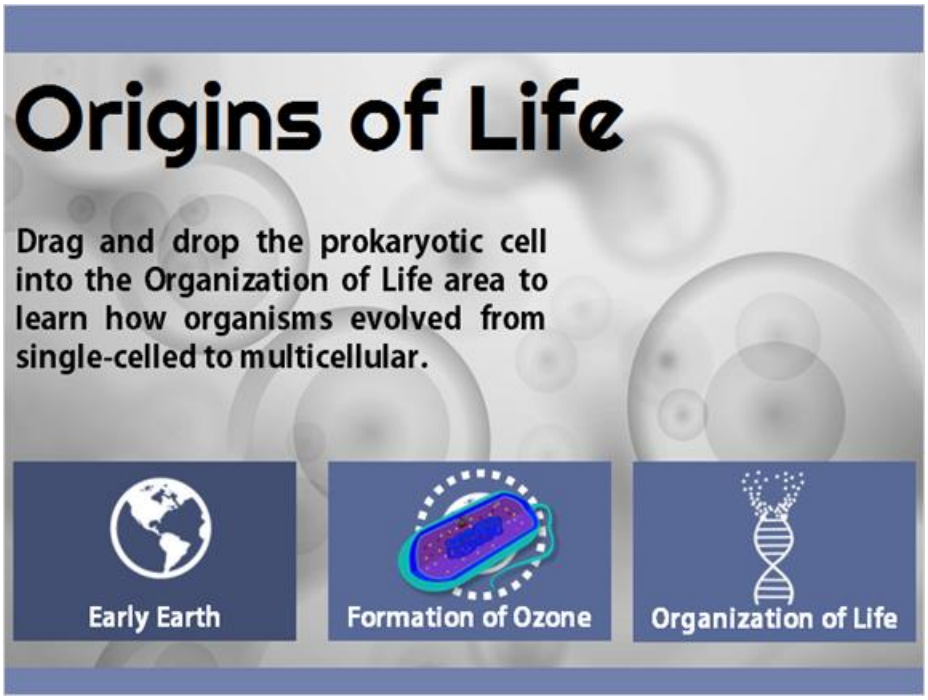

Drag and drop the prokaryotic cell into the Organization of Life area to learn how organisms evolved from single-celled to multicellular.

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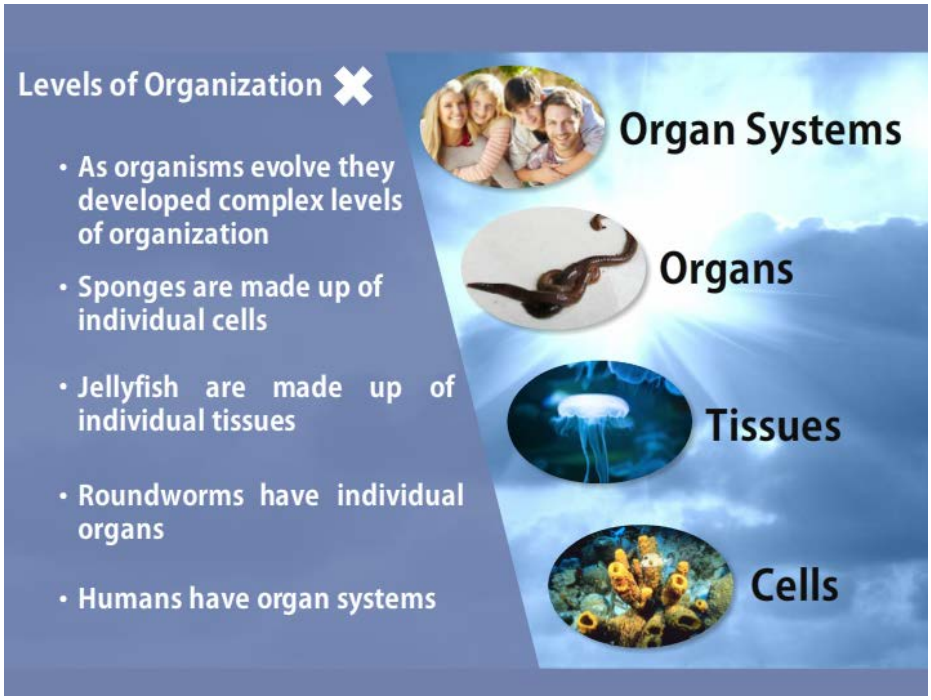
Levels of Organization



Just how did single-celled organisms become multicellular? Scientists believe that multicellular organisms evolved when many single-celled organisms of the same species started to work together and benefited from the relationship. As multicellular organisms continued to evolve, they developed tissues, organs, and then organ systems. Today, there are multicellular organisms at all levels of organization, from the simplest, cell level of organization to the most complex, organ-system level of organization. Here are some examples of hierarchical levels of organization:

- In sponges, different cells complete different functions and each cell works alone. Some cells digest food, while others allow water to pass through the sponge.
- Jellyfish are a bit more complex when compared to sponges. Jellyfish contain groups of cells that form tissues. In jellyfish, some tissues digest food while other tissues sense the environment.
- Roundworms are slightly more complex than jellyfish. In roundworms, cells form tissues and the tissues work together to perform a function as an organ. Roundworms have a simple brain that controls how the organism responds to the environment.
- Humans are extremely complex when compared to roundworms. Humans contain organ systems that work together to complete a certain job. In a human's digestive system, each organ, from the mouth to the small intestine, plays a vital role in breaking down food and absorbing nutrients.