

Lesson Outline for Teaching

Lesson 2: Ancient Earth

A. Earth's Earliest History

1. Before Earth or even the solar system existed, a cloud of gas, ice, and dust, called a(n) nebula, floated in space.
 - a. First, gravity pulled the particles together into a flattened disk shape that began to rotate. Then, the material in the center of the disk became dense, and the Sun formed.
 - b. Finally, the pieces of material remaining in the disk attracted each other, and the planets formed.
2. As Earth formed, colliding particles warmed the planet.
3. Gravity pulled the molten rock that made up Earth into the shape of a(n) sphere.

B. The Hadean Eon

1. Earth was heated by collisions with asteroids and energy given off during radioactive decay.
2. The first 640 million years of Earth's history are called the Hadean eon.
3. When Earth became hot enough to melt metal, denser metal began to flow and some metals flowed toward Earth's center, forming its core. As radioactive materials became less common and fewer asteroids struck Earth, Earth began to cool.
4. Volcanic gases formed Earth's earliest atmosphere.
 - a. The Hadean atmosphere would have been poisonous for modern organisms.
 - b. This atmosphere contained water vapor, but no oxygen.
5. Earth had its first solid surface during the Archean eon.
 - a. Extensive eruptions from cracks in the ocean floor formed the first oceanic crust.
 - b. Convection currents moved the crust from place to place.
6. During the Archean eon, the first continental crust formed.
 - a. These small, early continents are called protocontinents.
 - b. Sometimes convection currents caused the continents to move together, forming larger continents.
7. As Earth cooled, water vapor in the atmosphere condensed, forming rain.
 - a. The resulting rain was acidic, and it dissolved mineral salts from rocks.
 - b. These dissolved minerals made the ocean salty.

Lesson Outline continued

8. The earliest evidence of life is found in rocks that formed in the warm Archean oceans.
 - a. The earliest fossils are difficult to see because many of the organisms were microscopic.
 - b. Ancient cyanobacteria trapped sediments from the ocean and formed mounds called stromatolites.

C. The Proterozoic Eon

1. The time from 2.5 to 0.542 billion years ago is known as the Proterozoic eon.
 - a. During this time, the oxygen content in the atmosphere increased because unicellular organisms in the ocean produced oxygen, and energy from the Sun split water molecules.
 - b. This increase in oxygen was called the Great Oxygenation Event because the new oxygen-rich atmosphere was harmful to organisms that had evolved in an oxygen-poor environment.
2. In addition to Pangaea, scientists hypothesize that another supercontinent, Rodinia, existed.
3. During this eon, life was restricted to the water.
 - a. Throughout most of the eon, all life-forms were unicellular.
 - b. Toward the end of the eon, the first multicellular life-forms developed.

Discussion Question

What kinds of life-forms lived during the Proterozoic era? Why are there few fossils of these organisms?

Unicellular organisms were the dominant life-forms during the Proterozoic eon. These organisms lived in water. Near the end of the Proterozoic eon, the first multicellular organisms evolved in the oceans. Because these life-forms had no hard parts, their fossils are not abundant, although soft mud preserved the delicate remains of some of these organisms.