- fossils
- trilobites
- fish
- insects
- amphibians
- reptiles
- dinosaurs
- birds
- mammals
- oceans and ocean life
- continents
- supercontinents (Pangaea, Laurasia, Gondwanaland)
- mountains
- oxygen and carbon dioxide

Resources

The BBC's Science and Nature website contains an appealing summary of prehistoric life that students and teachers can explore together: <http://www.bbc.co.uk/sn/prehistoric_life/>

THE SECOND GREAT LESSON: LIFE COMES TO EARTH

When the earth first formed, along with other planets and stars in our solar system, it was a hot glowing ball of gases. Over millions of years, the ball of gases slowly cooled, and different layers of the earth formed. As gas cools, it can turn to liquid. Long ago, earth was covered in liquid, red-hot rock called molten rock. Meteorites were crashing into the earth. Volcanoes were spewing gases and red-hot lava. The earth's sky had so many gases in it that the sky may not have looked blue, as it does today, but reddish, like the color of a sunset.

In those days, the earth was still too hot for any plants or animals. But over even more millions of years, as the earth's surface slowly cooled, a solid crust began to form over the liquid material. As the crust continued to cool, it wrinkled and cracked. Water below the earth's crust escaped through the cracks. Water vapor formed above the earth and the first clouds

appeared. When the clouds first began to drop rain, the earth was still so hot that the raindrops quickly evaporated. But eventually the earth cooled enough that the rain stayed on the surface of the earth. At one time, long ago, the earth was covered by a giant ocean.

The water that remained on the surface of the earth mixed with rock particles from the earth's surface. Some scientists think that these particles made this first ocean a greenish color, like the color of green olives.

In those early days, this giant ocean covered much of the earth's land. The land that was not covered by ocean was all rock. Some scientists think that the rocky land may have been a reddish color, like bricks or rust. The earth's land at that time would have looked strange to people now because there were no trees, grasses, or flowers growing on it. Imagine the world with no plants!

Another reason the earth's land at that time would have looked strange is that there were no animals living on it. No frogs, dogs, spiders, snakes, elephants, or people. And because there were no people, there were no buildings or cars or any other inventions of people. Imagine the world with no people or animals of any kind! In fact, in the early days of the earth, there was no life on the land at all. Earth's land in those days was a very rocky, very red, very strange place indeed.

But deep in the earth's giant ocean, something different and marvelous was happening. Somehow — and even today's cleverest scientists don't know exactly how — one tiny bit of matter came to life. This tiny bit of living matter was many, many, times smaller than a speck of dust or a grain of sand. This tiny bit of living matter was so tiny that it was invisible. In fact, to see this tiny bit of living matter, someone would need to look through a powerful microscope —but of course, there were no microscopes or people to look through them in these early days of the earth!

The tiny bit of living matter in the ocean was the earth's very first life. It was a very small and simple kind of life, because it had no legs or eyes or mouth. It had no leaves or stem or trunk. It was more like a little blob. But it was alive. Nowadays, there are millions and millions of these tiny life forms on earth, and they are called **bacteria**. The earth's first bacteria was special because it miraculously found a way to live and multiply in the ocean, even though that first ocean was filled with many minerals and gases that would poison the life forms of today.

Demonstration 1: Bacteria

Show a picture of bacteria. Emphasize that real bacteria are millions of times smaller than the picture.

For millions of years, there was only this one simple kind of life on earth — bacteria. After a very long time, one particular group of blue-green bacteria called **blue-green algae** began to live in the shallow parts of the ocean, where the light from the sun warmed the water quickly. In these warm, shallow waters, the blue-green algae found a way to make a simple type of food for itself. The blue-green algae made this simple kind of food by taking in three things that surrounded it. Those three things were: energy from sunlight, water from the ocean, and **carbon dioxide**, a kind of gas that was plentiful in the air. Nowadays, this process of making nourishment from sunlight, water, and carbon dioxide is called **photosynthesis**, and plants do it all the time.

As the blue-green algae produced food, it also began to create a new gas. Some of this new gas went right back into the ocean, but some of this new gas also went into the sky as it evaporated from the oceans. This gas became the start of what is now called the earth's **atmosphere**, the blanket of air surrounding the surface of the earth. This new gas was very special and important because it was the gas that all of earth's future animals would need to breathe. This gas is called **oxygen**.

Demonstration 2: Breathing oxygen

Show students how to place their hands on their own bellies and chests to feel breath (oxygen) coming into their bodies.

At this time, all of earth's life was in the ocean. After bacteria developed, many other kinds of sea plants and sea creatures gradually appeared, such as seaweeds, sponges, sea lilies, jellyfish, worms, and more. These plants and animals were the only life in the ocean for a very long time.

Demonstration 3: Early ocean life

Show students pictures, models, or specimens (if possible) of two kinds of ocean life, such as sponge, seaweed, worm, or jellyfish.

Then, one day, a new and fascinating creature appeared in the ocean. This creature was unlike any life that had come before. It had a head, a body, a tail, legs, and a hard shell on its back. It did not have bones. Instead, it had a hard outer shell, like a suit of armor. This type of shell is called an **exoskeleton**, meaning that the hardest part of the creature's body was on the outside instead of the inside.

This new and fascinating creature grew plentiful and soon there were thousands of different types. Some had eyes and swam around. Some had no eyes and simply crawled around on the ocean floor. Some were only as big as the head of a pin. Some were as big as a kitchen sink. If the creature was in danger, it rolled up into a little ball.

This new and fascinating creature was an animal called a **trilobite**, and it was different from anything else on earth. Because of that, the trilobite has become famous! So famous, that the time when they existed is nowadays called the **Age of Trilobites**.