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Class: _____

How Earth's Air Came to Be

By Tracy Vonder Brink

2022

In this informational text, Tracy Vonder Brink explains how Earth's present atmosphere came to be.

As you read, take notes on how cyanobacteria affect the air.

- [1] If you could step into a time machine and travel back about 3 billion years, you'd have a big problem. No, it wouldn't be meat-eating dinosaurs — they didn't show up until much, much later. Your problem would be the air. You wouldn't be able to breathe. In fact, the air would be like poison to you.

When Earth formed, it didn't have the kind of air we breathe. Our atmosphere today is a mixture of gasses, including nitrogen and oxygen. Your body is made to use oxygen. But 3 billion years ago, the atmosphere was full of carbon dioxide and methane. Those are not gasses that today's people or animals can breathe.



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There also wasn't much land back then. In fact, some scientists believe there might not have been any dry land at all. It's thought that the ancient oceans had two to three times more water than they do today. The continents were down too deep to rise above the sea.

What kind of life could survive a water world without breathable air? Bacteria. They were simple life forms, but they did something really important. They completely changed Earth's air.

- [5] The kind of bacteria that lived in the ancient oceans are called cyanobacteria (sai-a-now-bak-TEE-ree-uh). They were the main life form on Earth for more than 1.5 billion years. Like all living things, they needed food to live. They used sunlight to change water and carbon dioxide into sugars. Then they released oxygen as waste. It's a lot like the way today's plants take in sunlight and carbon dioxide and release oxygen.

The planet's oceans were full of cyanobacteria, and they all released oxygen. There was so much oxygen in the water that some escaped into the air. This happened over and over for millions of years. Finally, somewhere around 2 billion years ago, there was enough oxygen in the air that it became a major part of Earth's atmosphere.

That was bad news for cyanobacteria. All that extra oxygen was deadly to them. They began to die off. Sad for them, but good for us. It took another 1.7 billion years, but life forms that could breathe the new kind of air developed. Eventually, that led to animals — like the dinosaurs — and finally, us.

Cyanobacteria didn't die off completely, though. Today's cyanobacteria are sometimes called blue-green algae.¹ (That name isn't quite right, because they're bacteria, not algae.) Too many of them in a body of water sometimes end up as the slimy stuff known as pond scum.

We can also see some ancient cyanobacteria today, in layered rocks called stromatolites. Cyanobacteria often clump together. Their stickiness traps bits of minerals, rocks, and soil into layers. The layers build up and up. Over time, the layers turn to rock. A stack of cyanobacteria layers is called a stromatolite. It can take a long time for one to form. It may take 2,000 to 3,000 years to make one 3-foot (1 m) tall stromatolite.

- [10] If you visit the shallow waters of Hamlin Pool in Western Australia, you can see stromatolites. Some of the rounded, rocky stacks sit underwater. Others have grown tall enough that their tops are above the water's surface. Some are thought to be 3.5 billion years old! Even though the bottom layers are ancient, there are still living cyanobacteria on top. The Hamlin Pool stromatolites are considered to be living fossils.²

Life as we know it today wouldn't exist without those long-ago bacteria. The next time you take a breath, thank the cyanobacteria that started it all.

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1. living things that mostly live in water and make their food from sunlight
 2. left behind traces of living things from an earlier time

Text-Dependent Questions

Directions: For the following questions, choose the best answer or respond in complete sentences.

1. What is one main idea of the text?
 - A. Cyanobacteria are the living things responsible for making Earth's air breathable.
 - B. Cyanobacteria are underwater rocks that turn oxygen into carbon dioxide.
 - C. Cyanobacteria are the reason dinosaurs are no longer on the planet.
 - D. Cyanobacteria are a life form that uses sunlight to make sugar.

2. Which best describes the author's point of view on cyanobacteria?
 - A. The author wants to live during the time cyanobacteria were alive.
 - B. The author believes that cyanobacteria are harmful to the planet.
 - C. The author hopes that more people will protect cyanobacteria.
 - D. The author thinks people should appreciate cyanobacteria.

3. Which of the following best describes how the information in paragraphs 5-7 of the text are arranged?
 - A. The author explains the series of events that changed Earth's atmosphere.
 - B. The author gives details about the dinosaurs that lived billions of years ago.
 - C. The author compares cyanobacteria to other living things from the same time.
 - D. The author asks and answers main questions about how Earth's air came to be.

4. The word "major" in paragraph 6 most closely means —
 - A. deadly.
 - B. hidden.
 - C. important.
 - D. unusual.

5. How did cyanobacteria change the air on Earth over time?
