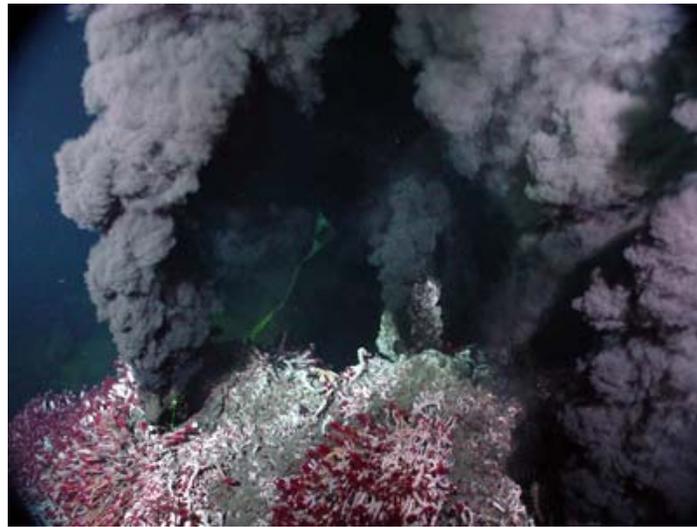


Life Finds a Way



Deep, deep under the ocean, there is a place unlike anywhere else on Earth. In a place so deep that it's impossible for sunlight to reach it, great rocky tubes shoot up from the sea floor. These tubes, or chimneys, belch out what looks like black smoke, all day and all night. The "smoke" is in fact a mixture of minerals from deep within the earth, which shoot out of the chimneys at extremely hot temperatures. For many years after these things (which scientists now call "hydrothermal vents") were discovered, scientists were sure that nothing could live anywhere near them.

They had lots of reasons to think this. For one, there was absolutely no sunlight. In one way or another, sunlight is the source of almost all life on the surface of earth. Plants use it to make food in a process called photosynthesis, some animals eat those plants, and other animals eat the plant-eaters. Without sunlight, the whole system falls apart, so how could there be any life somewhere that is so deep in the ocean that no light makes it down?

Secondly, the minerals in the smoke, mostly sulfur, were thought for a long time to be poisonous to most living things on Earth. With so much sulfur coming out of the ground at such high temperatures, for many years scientists were pretty confident that nothing could live around these vents.

After studying them for a long time, however, scientists made a shocking discovery. There was life around the vents. Tiny bacteria used the sulfur from the vents to make food – a process called "chemosynthesis." Other animals, like worms and shrimp, then ate this bacteria. A whole ecosystem exists there.

Finding this life made scientists reconsider the power of evolution. They had thought for almost a hundred years that while life was adaptable to a certain extent, there were some things it simply couldn't do without: sunlight and oxygen being two. However, as the animals around the hydrothermal vents proved, life was much more adaptable than they had believed. Now, scientists think that life, just like it does around the vents, could exist right now on Europa, one of Jupiter's moons. Europa has long been known to have vast oceans, but scientists thought that being so far from the sun and having an atmosphere so thin that it can't hold in much air, life would not be possible there. Now, it seems like those factors might not matter as much as previously thought. Some scientists also think that Mars may have once had life on its surface.

As the undersea vents example shows, life is extremely adaptable. All different kinds of places on Earth have animals and plants that have adapted over many years to thrive in the particular places where they live. Some animals that live in places where it is very snowy, like high in the mountains or in the arctic, end up white so that they fit in better. Animals and plants that live in the desert, like cacti and camels, have evolved so that they need only the very little water that they get living there. Now think of fish. They are able to swim and breathe perfectly in the water. But a fish would not do very well living in the middle of the desert. Similarly, if you took a big black bear from the forest and dropped it down in the middle of the ocean, it would not last long at all.

This is because a process called natural selection has been at work since not long after the earth first formed many billions of years ago. Natural selection allows animals that have traits suited to a particular environment to survive and produce offspring. Animals who are unable to adapt to changes in their environments die off. With this process constantly at work, nature produces all sorts of animals well-suited to where they are: giraffes with long necks to reach the leaves on the trees in Africa, bears that sleep through long winters where there's no food, and on and on.

The process of natural selection helps us to understand how many plants and animals became the way they are. Many times, life finds a way, no matter how harsh the environment.

Name: _____ Date: _____

1. What is one reason people used to think that nothing could live deep down in the ocean?

- A) There was no sunlight there.
- B) Some bacteria make food from sulfur.
- C) Europa has very large oceans.
- D) Life is extremely adaptable.

2. What does this passage describe?

- A) This passage describes the process of photosynthesis and all the plants that use it.
- B) This passage describes the importance of camels to other animals living in the desert.
- C) This passage describes life deep in the ocean and the process of natural selection.
- D) This passage describes the formation and discovery of hydrothermal vents.

3. Read the following sentences: "Some animals that live in places where it is very snowy, like high in the mountains or in the arctic, end up white so that they fit in better. Animals and plants that live in the desert, like cacti and camels, have evolved so that they need only the very little water that they get living there."

What can be concluded from this information?

- A) Animals are better suited to living in the desert than in places where it is very snowy.
- B) Plants evolve more quickly than animals do.
- C) Animals evolve more quickly than plants do.
- D) Animals and plants change over time based on where they live.

4. What is a result of the discovery of life deep in the ocean?

- A) Scientists realized that sulfur is poisonous to most living things on Earth.
- B) Scientists realized that life can exist in places without sunlight and oxygen.
- C) Scientists became confident that nothing could live around a hydrothermal vent.
- D) Scientists learned that sunlight is necessary for the process of photosynthesis.

5. What is the main idea of this passage?

- A) For many years scientists thought that nothing could live near a hydrothermal vent.
- B) Life is extremely adaptable and can be found even in harsh environments.
- C) Some bacteria use sulfur to make food in a process known as chemosynthesis.
- D) Scientists now think that life may exist on Europa, one of Jupiter's moons.

6. Read the following sentence: "All different kinds of places on Earth have animals and plants that have **adapted** over many years to thrive in the particular places where they live."

What does **adapted** mean in the sentence above?

- A) changed
- B) died
- C) played
- D) run away

7. Choose the answer that best completes the sentence below.

Scientists now know that life exists deep in the ocean around hydrothermal vents; _____, they thought that nothing could live there.

- A) for example
- B) therefore
- C) previously
- D) currently

8. According to the passage, why did scientists think that nothing could live around hydrothermal vents?

9. How did the bacteria and animals that scientists discovered around the hydrothermal vents get food?

10. Explain how the bacteria and animals around the hydrothermal vents showed scientists that life was much more adaptable than they had believed.

Teacher Guide & Answers

Passage Reading Level: Lexile 1060

1. **A** *There was no sunlight there.*
2. **C** *This passage describes life deep in the ocean and the process of natural selection.*
3. **D** *Animals and plants change over time based on where they live.*
4. **B** *Scientists realized that life can exist in places without sunlight and oxygen.*
5. **B** *Life is extremely adaptable and can be found even in harsh environments.*
6. **A** *changed*
7. **C** *previously*
8. **Suggested answer:** *All students should be able to identify the lack of sunlight as one reason. They may also identify the presence of sulfur, thought to be poisonous, as another reason.*
9. **Suggested answer:** *Bacteria used the sulfur from the vents to make food. Animals like worms and shrimp ate this bacteria.*
10. **Suggested answer:** *Answers may vary. At minimum, students should recognize that the bacteria and animals around the vents showed scientists that life could exist in conditions previously thought to be prohibitive to life. A more complex answer might involve a discussion of adaptation. For example, students could infer that the bacteria, which make their food from sulfur, are an example of organisms that have adapted to their environment.*