

Active Reading

Section: How Did Life Begin?

Read the passage below. Then answer the questions that follow.

Listed below are the steps of Louis Lerman's bubble model.

Step 1: Eruption of undersea volcanoes produces ammonia, methane, and other gases that become trapped in underwater bubbles.

Step 2: Protected by bubbles, gases needed to make amino acids undergo chemical reactions.

Step 3: As bubbles burst on the water's surface, simple organic molecules are released into the air.

Step 4: The simple organic molecules are carried upward by the wind and exposed to ultraviolet radiation and lightning. The additional energy they produce causes further reactions.

Step 5: Complex organic molecules fall into the oceans.

SKILL: ORGANIZING INFORMATION

Read each question, and write your answer in the space provided.

1. What gases were produced by the eruption of undersea volcanoes?

2. What were the simple organic molecules exposed to, as they were carried upward by wind?

3. After undergoing further reactions caused by exposure to ultraviolet radiation and lightning, what did organic molecules form?

In the space provided, write the letter of the phrase that best completes the statement.

- _____ 4. According to Lerman's bubble model, the key processes that formed the chemicals needed for life took place
- a. at the same rate as the primordial soup model.
 - b. more slowly than what is estimated by the primordial soup model.
 - c. within bubbles on the ocean's surface.
 - d. on land rather than on a watery surface.

Active Reading

Section: Complex Organisms Developed

Read the passage below. Then answer the questions that follow.

Early in the history of life, two different groups of prokaryotes evolved—eubacteria and archaeobacteria. Living examples include *Escherichia coli*, a species of eubacteria, and *Sulfolobus*, a group of archaeobacteria. Eubacteria are prokaryotes that contain a chemical called peptidoglycan in their cell walls and have the same type of lipids in their cell membranes that eukaryotes do. Eubacteria include many bacteria that cause disease and decay.

Archaeobacteria are prokaryotes that lack peptidoglycan in their cell walls and have unique lipids in their cell membranes. Archaeobacteria are thought to be closely related to the first bacteria to have existed on Earth. Chemical evidence indicates that the first eukaryotic cells are more likely to have evolved from archaeobacteria than from eubacteria.

SKILL: READING EFFECTIVELY

Read each question, and write your answer in the space provided.

1. How are eubacteria and archaeobacteria alike?

2. What relationship exists between *Sulfolobus* and archaeobacteria?

3. What two traits of eubacteria are identified in the third sentence of this passage?

4. What two traits of archaeobacteria are identified in the fifth sentence of this passage?

5. What unique trait of archaeobacteria is described in the sixth sentence?

Active Reading *continued*

6. What evidence supports this idea?

An analogy is a comparison. In the space provided, write the letter of the term or phrase that best completes the analogy.

- _____ 7. Archaeobacteria is to *Sulfolobus* as eubacteria is to
- a. *Escherichia coli*.
 - b. cyanobacteria.
 - c. peptidoglycan.
 - d. Both (a) and (b)

Active Reading

Section: Life Invaded the Land

Read the passage below. Then answer the questions that follow.

The first vertebrates to inhabit the land were early amphibians. Amphibians are smooth-skinned organisms that include frogs, toads, and salamanders.

Amphibians were able to adapt to land because of the development of several structural changes in their bodies. Early amphibians had moist breathing sacs called lungs, which they used to absorb oxygen from air. The limbs of amphibians are thought to be derived from the bones of fish fins. What made walking possible was the evolution of a strong support system of bones in the region just behind the head. This system of bones provided a rigid base for the limbs to work against.

SKILL: READING EFFECTIVELY

Read each question, and write your answer in the space provided.

1. What three types of amphibians are identified in the passage?

2. What made it possible for amphibians to adapt to life on land?

3. According to the passage, the limbs of an amphibian were derived from what structure?

In the space provided, write the letter of the phrase that best completes the statement.

- _____ 4. Jawless fishes and salamanders are alike in that both types of animals
- a. are amphibians.
 - b. have backbones.
 - c. have fins.
 - d. are smooth-skinned organisms.

Active Reading

Section: The Theory of Evolution by Natural Selection

Read the passage below. Then answer the questions that follow.

Darwin realized that Malthus's hypotheses about human populations apply to all species. Every organism has the potential to produce many offspring during its lifetime. In most cases, however, only a limited number of those offspring survive to reproduce. Adding Malthus's view to what he saw on his voyage and to his own experiences in breeding domestic animals, Darwin made a key association: *Individuals that have physical or behavioral traits that better suit their environment are more likely to survive and will reproduce more successfully than those that do not have such traits.* Darwin suggested that by surviving long enough to reproduce, individuals have the opportunity to pass on their favorable characteristics to offspring. In time, these favorable characteristics will increase in a population, and the nature of the population will gradually change. Darwin called this process by which populations change in response to their environment **natural selection.**

SKILL: READING EFFECTIVELY

Read each question, and write your answer in the space provided.

1. Based on the first three sentences of this passage, what can the reader infer was Malthus's idea about the human population?

2. What real-life experiences of his own did Darwin reflect upon when considering Malthus's ideas about human populations?

3. According to Darwin, what causes the nature of a population to change?

Active Reading *continued*

Read this second passage below. Then answer the questions that follow.

Scientists now know that genes are responsible for inherited traits. Therefore, certain forms of a trait become more common in a population because more individuals in the population carry the alleles for those forms. In other words, natural selection causes the frequency of certain alleles in a population to increase or decrease over time. Mutations and the recombination of alleles that occurs during sexual reproduction provide endless sources of new variations for natural selection to act upon.

SKILL: READING EFFECTIVELY

Read each question, and write your answer in the space provided.

4. What controls inherited traits?

5. What causes a particular trait to become more common in a population?

6. What two events cause new variations of traits in a population?

Active Reading

Section: Evidence of Evolution

Read the passage below. Then answer the questions that follow.

The fossil record, and thus the record of the evolution of life, is not complete. Many species have lived in environments where fossils do not form. Most fossils form when organisms and traces of organisms are rapidly buried in fine sediments deposited by water, wind, or volcanic eruptions. The environments that are most likely to cause fossil formation are wet lowlands, slow-moving streams, lakes, shallow seas, and areas near volcanoes that spew out volcanic ash. The chances that organisms living in upland forests, mountains, grasslands, or deserts will die in just the right place to be buried in sediments and fossilized are very low. Even if an organism lives in an environment where fossils can form, the chances are slim that its dead body will be buried in sediment before it decays. For example, the organism may be eaten and scattered by scavengers.

READING EFFECTIVELY

Read each question, and write your answer in the space provided.

1. Why is the fossil record incomplete?

2. Where do fossils form?

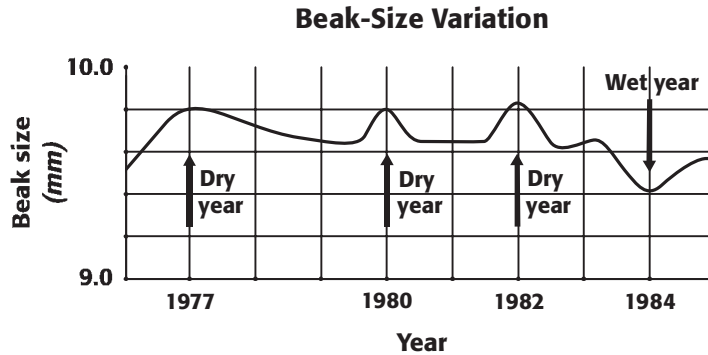
3. In areas where fossils form, why don't all organisms that die become fossilized?

Skills Worksheet

Active Reading

Section: Examples of Evolution

The figure below shows beak-size variations in finches. Using the information contained in the figure, answer each question in the space provided.



SKILL: INTERPRETING GRAPHICS

1. The title of a graph indicates the type of information it contains. What is the title of the graph shown? Based on this title, what type of information can an observer expect to find?

2. Read the label on the horizontal axis of the graph. What information is plotted along this axis?

3. What intervals are used on the horizontal axis?

4. Read the label on the vertical axis of the graph. What information is plotted along this axis?

Active Reading *continued*

5. What units are used on the vertical axis?

6. Based on the data shown, what effect does a dry year have on beak size?

7. Based on the data shown, what effect does a wet year have on beak size?

In the space provided, write the letter of the dates that best answers the question.

_____ 8. During which two years was the average finch beak size nearly the same?

- a. 1976 and 1982
- b. 1977 and 1979
- c. 1979 and 1981
- d. 1980 and 1983