tpo_36_passage_1

Living organisms play an essential role in soil formation. The numerous plants and animals living in the soil release minerals from the parent material from which soil is formed, supply organic matter, aid in the translocation(movement) and aeration of the soil, and help protect the soil from erosion. The types of organisms growing or living in the soil greatly influence the soil's physical and chemical characteristics. In fact, for mature soils in many parts of the world, the predominant type of natural vegetation is considered the most important direct influence on soil characteristics. For this reason, a soil scientist can tell a great deal about the attributes of the soil in any given area simply from knowing what kind of flora the soil supports. Thus prairies and tundra regions, which have characteristic vegetations, also have characteristic soils. The quantity and total weight of soil flora generally exceed that of soil fauna. By far the most numerous and smallest of the plants living in soil are bacteria. Under favorable conditions, a million or more of these tiny, single-celled plants can inhabit each cubic centimeter of soil. It is the bacteria, more than any other organisms, that enable rock or other parent material to undergo the gradual transformation to soil. Some bacteria produce organic acids that directly attack parent material, breaking it down and releasing plant nutrients. Others decompose organic litter (debris) to form humus (nutrient-rich organic matter). A third group of bacteria inhabits the root systems of plants called legumes. These include many important agricultural crops, such as alfalfa, clover, soybeans, peas, and peanuts. The bacteria that legumes host within their root nodules small swellings on the root change nitrogen gas from the atmosphere into nitrogen compounds that plants are able to metabolize, a process, known as nitrogen fixation, that makes the soil more fertile. Other microscopic plants also are important in soil development. For example, in highly acidic soils where few bacteria can survive, fungi frequently become the chief decomposers of organic matter. More complex forms of vegetation play several vital roles with respect to the soil. Trees, grass, and other large plants supply the bulk of the soil's humus. The minerals released as these plants decompose on the surface constitute an important nutrient source for succeeding generations of plants as well as for other soil organisms. In addition, trees can extend their roots deep within the soil and bring up nutrients from far below the surface. These nutrients eventually enrich the surface soil when the tree drops its leaves or when it dies and decomposes. Finally, trees perform the vital function of slowing water runoff and holding the soil in place with their root systems, thus combating erosion. The increased erosion that often accompanies agricultural use of sloping land is principally caused by the removal of its protective cover of natural vegetation. Animals also influence soil composition. The faunal counterparts of bacteria are protozoa. These single-celled organisms are the most numerous representatives of the animal kingdom, and, like bacteria, a million or more can sometimes inhabit each cubic centimeter of soil. Protozoa feed on organic matter and hasten its decomposition. Among other soil-dwelling animals, the earthworm is probably the most important. Under exceptionally favorable conditions, up to a million earthworms ?with a total body weight exceeding 450 kilograms? may inhabit an acre of soil. Earthworms ingest large quantities of soil, chemically alter it, and excrete it as organic matter called casts. The casts form a high-quality natural fertilizer. In addition, earthworms mix soil both vertically and horizontally, improving aeration and drainage. Insects such as ants and termites also can be exceedingly numerous under favorable climatic and soil conditions. In addition, mammals such as moles, field mice, gophers, and

prairie dogs sometimes are present in sufficient numbers to have significant impact on the soil. These animals primarily work the soil mechanically. As a result, the soil is aerated, broken up, fertilized, and brought to the surface, hastening soil development.

question 1

According to paragraph 1, which of the following factors is the most important in determining the characteristics of a mature soil?

A The kinds of minerals in the parent material

B The extent of erosion in the surrounding area

C The amount of air that circulates through the soil

D The kind of vegetation associated with the soil

question 2

Which of the sentences below best expresses the essential information in the highlighted sentence in the passage? Incorrect choices change the meaning in important ways or leave out essential information.

A Legumes make the soil more fertile by hosting bacteria in their root nodules.

B Nitrogen fixation makes compounds that plants and bacteria in legumes can metabolize.

C Bacteria living in the roots of legumes make the soil more fertile by producing nitrogen compounds that plants can metabolize.

D The root nodules of legumes contain bacteria, nitrogen gas from the atmosphere, and nitrogen compounds that plants can metabolize.

question 3

According to paragraph 2, which of the following statements about soil creation is true?

A Soil creation requires that there be more plants than animals in any given location.

B Soil is created from the organic debris left over when bacteria decompose.

C Soil creation occurs when a cubic centimeter of existing soil contains abundant organic material.

D Soil is created as a result of bacteria breaking down rocks and organic material.

question 4

In paragraph 2, why does the author mention the activity of fungi in acidic soils?

A To demonstrate that fungi are capable of nitrogen fixation under certain conditions

B To support the claim that microscopic plants besides bacteria contribute to soil development

C To show that fungi play a different role from bacteria in decomposing organic matter

D To account for the survival rate of microscopic plants in highly acidic soils

question 5

According to paragraph 3, how do trees benefit other plants?

A Trees make deep-lying nutrients available to plants whose roots do not extend very far into the soil.

B When trees decompose, they release nutrient minerals deep into the soil.

C Humus from trees provides nutrients for plants with roots that extend deep within the soil.

D When trees die and decompose, they make available a large space for generations of other plants to grow.

question 6

Paragraph 3 supports which of the following inferences about the effect of vegetation on soil?

A The root systems of most crops are unable to prevent erosion on sloping

ground.

B Without a cover of vegetation, fast running water is likely to disappear from the ground surface before it can erode much of the soil.

C The roots of trees and other large plants remove much water from the ground, making the soil dry and likely to be eroded by the wind.

D Areas that naturally have little vegetation, such as deserts, are more easily eroded than is agricultural land that has been cleared of its natural vegetation.

question 7

According to paragraph 4, earthworms do all of the following to help soils develop EXCEPT

A eat waste matter

B mix the soil in different directions

C change the chemistry of the soil

D create a natural fertilizer

question 8

According to paragraph 5, in which of the following ways do some mammals help soils develop?

A They prevent insects from feeding on nutrients that enrich the soil.

B They break up the soil as they move through it.

C They remove waste matter that would otherwise contaminate the soil.

D They ensure that fertilizer remains in the soil.

question 9

Look at the four squares [ ] that indicate where the following sentence could be added to the passage.

Living organisms play an essential role in soil formation. The numerous plants and animals living in the soil release minerals from the parent material from which soil is formed, supply organic matter, aid in the translocation(movement) and aeration of the soil, and help protect the soil from erosion. The types of organisms growing or living in the soil greatly influence the soil's physical and chemical characteristics. In fact, for mature soils in many parts of the world, the predominant type of natural vegetation is considered the most important direct influence on soil characteristics. For this reason, a soil scientist can tell a great deal about the attributes of the soil in any given area simply from knowing what kind of flora the soil supports. Thus prairies and tundra regions, which have characteristic vegetations, also have characteristic soils. The quantity and total weight of soil flora generally exceed that of soil fauna. By far the most numerous and smallest of the plants living in soil are bacteria. Under favorable conditions, a million or more of these tiny, single-celled plants can inhabit each cubic centimeter of soil. It is the bacteria, more than any other organisms, that enable rock or other parent material to undergo the gradual transformation to soil. Some bacteria produce organic acids that directly attack parent material, breaking it down and releasing plant nutrients. Others decompose organic litter (debris) to form humus (nutrient-rich organic matter). A third group of bacteria inhabits the root systems of plants called legumes. These include many important agricultural crops, such as alfalfa, clover, soybeans, peas, and peanuts. The bacteria that legumes host within their root nodules small swellings on the root change nitrogen gas from the atmosphere into nitrogen compounds that plants are able to metabolize, a process, known as nitrogen fixation, that makes the soil more fertile. Other microscopic plants also are important in soil development. For example, in highly acidic soils where few bacteria can survive, fungi frequently become the chief decomposers of organic matter. More complex forms of vegetation play several vital roles with respect to the soil. [] Trees, grass, and other large plants supply the bulk of the soil's humus. [] The minerals released as these plants decompose on the surface constitute an important nutrient source for succeeding generations of plants as well as for other soil organisms. [] In addition, trees can extend their roots deep within the soil and bring up nutrients from far below the surface. [] These nutrients eventually enrich the surface soil when the tree drops its leaves or when it dies and decomposes. Finally, trees perform the vital function of slowing water runoff and holding the soil in place with their root systems, thus combating erosion. The increased erosion that often accompanies agricultural use of sloping land is principally caused by the removal of its protective cover of natural vegetation. Animals also influence soil composition. The faunal counterparts of bacteria are protozoa. These single-celled organisms are the most numerous representatives of the animal kingdom, and, like bacteria, a million or more can sometimes inhabit each cubic centimeter of soil. Protozoa feed on organic matter and hasten its decomposition. Among other soil-dwelling animals, the earthworm is probably the most important. Under exceptionally favorable conditions, up to a million earthworms ?with a total body weight exceeding 450 kilograms? may inhabit an acre of soil. Earthworms ingest large quantities of soil, chemically alter it, and excrete it as organic matter called casts. The casts form a high-quality natural fertilizer. In addition, earthworms mix soil both vertically and horizontally, improving aeration and drainage. Insects such as ants and termites also can be exceedingly numerous under favorable climatic and soil conditions. In addition, mammals such as moles, field mice, gophers, and prairie dogs sometimes are present in sufficient numbers to have significant impact on the soil. These animals primarily work the soil mechanically. As a result, the soil is aerated,

broken up, fertilized, and brought to the surface, hastening soil development.

question 10

Directions: An introductory sentence for a brief summary of the passage is provided below. Complete the summary by selecting the THREE answer choices that express the most important ideas in the passage. Some sentences do not belong in the summary because they express ideas that are not presented in the passage or are minor ideas in the passage. This question is worth 2 points.

A. Small organisms such as bacteria and fungi create and enrich soils by breaking down rocks and organic matter.

B. Prairie and tundra soils can be found in areas where conditions are generally not favorable for soil development.

C. Such agricultural crops as alfalfa, clover, soybeans, peas, and peanuts provide nutrient minerals to the soil as they die and decompose.

D. Certain animals block soil development by digging holes in the ground that prevent nutrients from reaching some areas of the soil.

E. Trees and other large plants aid soil development by providing natural fertilizer as they decompose, and by protecting the soil against erosion.

F. Protozoa, earthworms, and small mammals contribute to soil development by aerating, fertilizing, and mixing the soil.