Name _____ Class _____ Date _____

ACTIVITY 21-2. ORGANIZATION WITHIN THE BIOSPHERE

The portion of the earth on which life exists is called the *biosphere*. It extends from the deepest part of the ocean, about 11 kilometers down, to the top of the highest mountain, about 9 kilometers up. Within the biosphere, living organisms may be divided into groups and subgroups depending on where they live and their relationships with other living organisms and with the environment.

Organisms of the same species that inhabit the same area make up a *population*. The various populations of different species found in a given area form a *community*. Within the community each species fills a certain position. It lives in a particular part of the community (its *habitat*). It obtains food in a particular way. It has certain water and nutritional requirements. It serves as food for certain other organisms. The role of a species within the community is its *niche*. Each species within the community occupies a particular niche. When two species occupy the same niche in a community, competition will arise between them.

The populations of the community interact with the nonliving part of the environment. The community of living organisms and the nonliving portion of the environment in which it exists form an *ecosystem*. For an ecosystem to function, it must have a source of energy, autotrophs to convert this energy into organic compounds, and the ability to recycle elements between the abiotic environment and the individual organisms that make up the community.

Questions

1. What is a population?

2. What is a community?

3. What is an ecosystem?

4. All the dogs that live in your town or city could be said to make up a(n) _____.

5. The plants and animals of a self-sustaining aquarium could be said to make up a(n) _____.

6. A pond and all the organisms it contains make up a(n) _____.

7. The position of a certain species within a community is its _____.

8. Competition arises between two different species in a community when they both occupy the same _____.

9. The portion of the earth on which life exists is the _____.

1.

ACTIVITY 21-5. BIOMES

Alfred Wallace, who cooperated with Darwin in writing the initial paper on natural selection, also developed the first scheme of world biogeographical regions. Each such region, or *biome*, shows the influence of climate on succession by the development of specific climax communities.

TERRESTRIAL BIOMES

tundra

The *tundra* is found surrounding the ice and snow of the Arctic regions. In winter, the ground in the tundra is completely frozen. During the short summer, only the top layer of soil thaws, with the ground beneath remaining frozen *(permafrost)*. In the summer, the tundra is wet with numerous bogs and ponds.

The vegetation of the tundra consists mainly of mosses, lichens, and grasses. There are also a few flowering plants. There are no real trees because of the low temperatures and short growing season (about 60 days). Animals of the tundra include insects; rodents, such as the Arctic hare and the lemming; Arctic foxes; caribou; and ptarmigans.

Questions

1. Where is the tundra located?

2. What are the most abundant types of vegetation in the tundra?

3. Three animals that live in the tundra are _____, _____, and _____.

taiga

The *taiga* is a region of evergreen forest found south of the tundra. The growing season in the taiga is about double that of the tundra. Pines, firs, and spruce are the dominant vegetation. Black bears, moose, squirrels, snowshoe hares, lynx, and many types of insects and birds are found in this region. Some animals from the tundra migrate south to the taiga for the winter.

Questions

1. The region of evergreen forest located south of the tundra is called the _____.
2. Characteristics trees of this evergreen forest include _____ and _____.
3. What are some of the animals found in this region?

Temperate forest South of the taiga is the *temperate forest* of the temperate region. The climate is marked by cold winters and warm summers. Deciduous trees and shrubs lose their leaves during the cold months. Compared with the tundra and taiga, the temperatures are moderate. Rainfall averages from about 80 to 160 centimeters a year. Trees of the deciduous forest include beech, hickory, oak, maple, and basswood. Animals include rabbits, mice, chipmunks, raccoons, deer, squirrels, and foxes.

Questions

1. The deciduous forest is found south of the _____.
2. What is the climate of the deciduous forest?

3. Common trees of the deciduous forest include _____, _____, and _____.
4. Common animals of the deciduous forest include _____, _____, and _____.

tropical rain forest In a *tropical rain forest*, or *jungle*, the annual rainfall is more than 225 centimeters. Biomes of this type are generally found near the Equator. Temperatures in the rain forests remain quite constant over the course of the year. There is a tremendous variety of both plant and animal life in a rain forest. The tree cover is so dense that little light reaches the ground. The trees are often covered with vines. These vines are *epiphytes*, which are plants that hang on the trees but are not parasites. Animals of the rain forest include insects, spiders, lizards, snakes, birds, and monkeys.

Questions

1. What are the characteristics of climate in a tropical rain forest?

2. What types of plants and animals are found in tropical rain forests?

grassland *Grasslands* of the temperate region occur where rainfall ranges from 25 to 75 centimeters a year. These regions have cold winters and warm summers. The relatively small amount of rain cannot support the growth of trees so the natural vegetation is limited to grasses. In North America, temperate grasslands are now used for agriculture and the raising of domestic animals. In the past, great herds of bison roamed the grasslands. Other grassland animals include prairie dogs, antelopes, owls, snakes, and badgers.

Questions

1. Why are grasses the natural vegetation of the grasslands?

/hat are the climate characteristics of grasslands?

3. What areas of the United States were grasslands?

desert *Deserts* exist where the annual rainfall amounts to about 25 centimeters or less. In deserts the temperature varies greatly in the course of 24 hours—the days are very hot, the nights cold. The plants of the desert are well adapted to the limited water available. Such plants include cactuses, creosote bushes, yucca, sagebrush, and mesquite. Animals of the desert include owls, roadrunners, lizards, kangaroo rats, spiders, and insects.

Questions

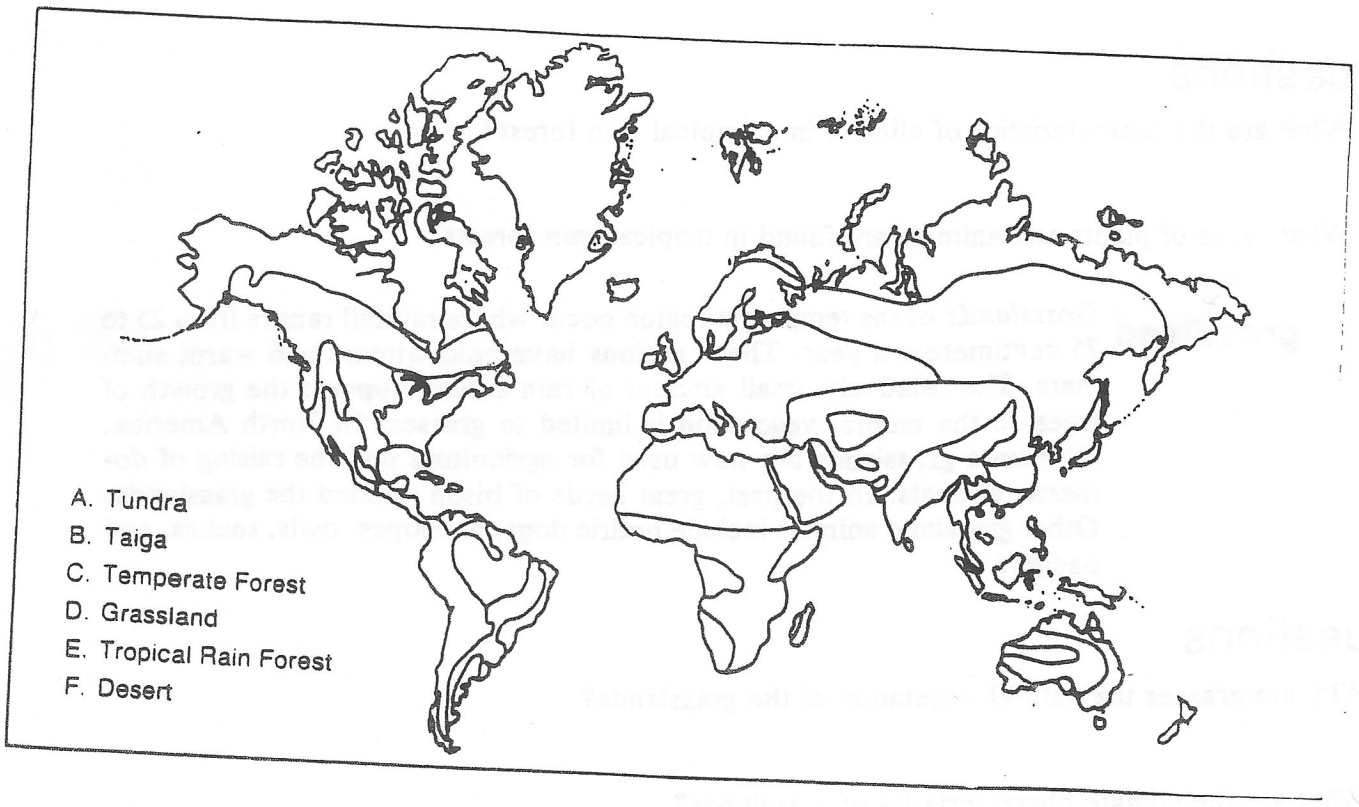
1. What are the climate characteristics of a desert?

2. What types of plants and animals are found in deserts?

MAPPING THE WORLD'S BIOMES

Textbook reference Sections

Earth's vegetation and animal life have become adapted to different climates, soils, and other abiotic features of the environment in which they live. On the map below, place the letter of the biome listed to the left in the area where it belongs. Then complete the chart on the next page.



AQUATIC BIOMES

pp. 109–112

marine biomes

The oceans, which cover about 70 percent of the earth, represent a large, stable biome. Most of the photosynthesis on earth occurs in the oceans. The physical factors in the oceans that affect marine organisms include temperature, light intensity, currents, tides, waves, and concentrations of suspended and dissolved materials, including oxygen and carbon dioxide. These factors vary greatly with depth. Thus, the ocean can be divided into four distinct zones, depending on depth.

Intertidal Zone →

The *littoral zone*, which is along the shore, is covered with water at high tide and open to the air at low tide. The many organisms found in this zone must be able to withstand the hours of dryness. Animals of the littoral zone include sponges, mussels, clams, oysters, snails, crabs, worms, starfish, and sea anemones. Many species of red and brown algae are also found in this zone.

The *sublittoral zone*, is the relatively shallow water above the continental shelf, extending out from shore as far as 300 kilometers. Much of the ocean's productivity occurs in this zone. It contains nutrients from the continent washed into the ocean by rivers and streams. Wave action against the shore adds oxygen to the water. And because this zone is relatively shallow, light penetrates to the bottom. Animals of the sublittoral zone include worms, sea cucumbers, crabs, mussels, oysters, barnacles, and fish of many kinds. Algae are abundant on stable bottoms free from shifting sand.

photic zone?

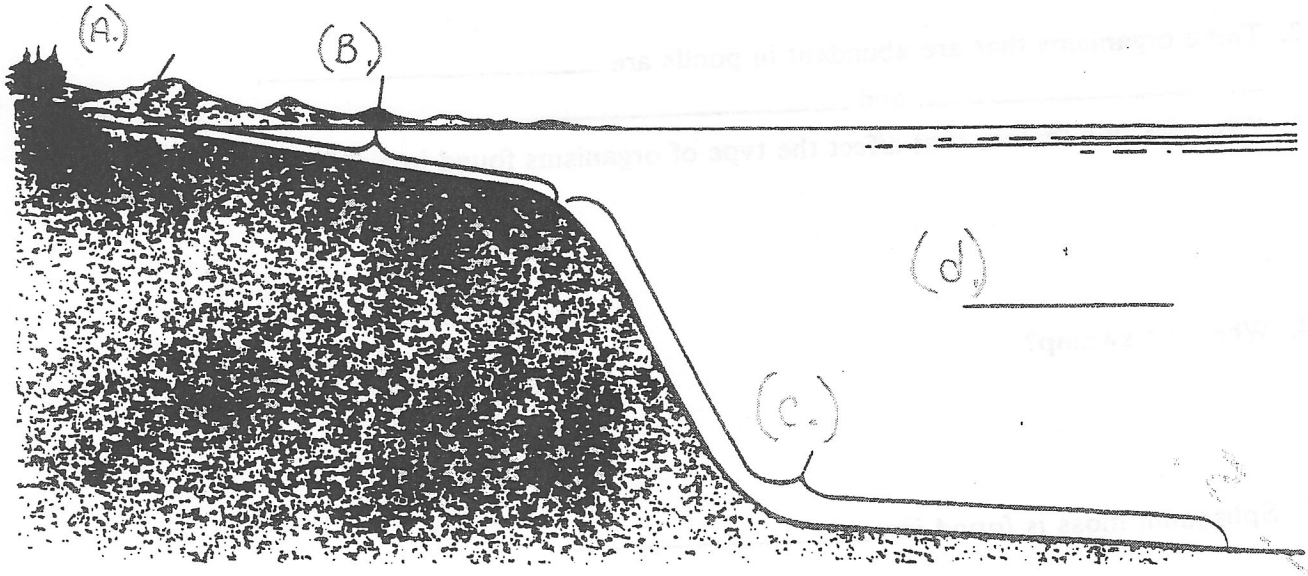
aphotic zone?

The *pelagic zone* is the zone of open ocean, which is occupied mainly by plankton. These microscopic organisms are moved about by the currents. There are two types of plankton—the autotrophic (photosynthetic) *phytoplankton* and the heterotrophic *zooplankton*. Many larger animals feed on plankton. Many types of fish, including sharks, and squids and porpoises inhabit this zone. Below the depth where photosynthesis is possible, animals, some of which are bioluminescent, form a food chain based on organic debris that sinks down from above.

The *benthic zone* is the ocean bottom, where all living organisms are heterotrophic. Many are scavengers, feeding on material drifting down from above.

Questions

1. Label each of the zones indicated on the diagram below of the marine biome. Also indicate in which zones photosynthesis occurs.



2. List four physical factors that affect marine organisms.

3. The zone along the shore which is alternately covered and uncovered by the ocean tides is the _____ zone.

4. The shallow waters over the continental shelf make up the _____ zone.

5. The waters of the open ocean make up the _____ zone.

fresh water biomes

Fresh water biomes are of two major types—moving water (streams) and standing water (lakes, ponds, swamps, and bogs).

In most fast-moving streams, the bottom consists of gravel or large rocks. In areas of the stream where water flow is less violent, algae and similar organisms grow attached to the rocks on the stream bottoms. There are also insect larvae and various types of fish. Where the water moves slowly, many types of organisms live in the mud and gravel of the bottom. These include aquatic insects and their larvae, snails, worms, and crayfish. There are also fish and turtles and aquatic plants. Many animals, including birds and raccoons, live along the banks of the stream.

Lakes and ponds are bodies of standing water. Ponds are generally smaller than lakes, and they are often shallow enough so that sunlight reaches to the bottom in all parts of the pond. Phytoplankton, attached algae, and many types of water plants are the producers in ponds. Zooplankton, rotifers, hydras, small crustaceans, insect larvae, crayfish, leeches, fish, frogs, and turtles are consumers in the complex food web. Lakes have a zone in which light does not reach the bottom. Photosynthetic activity is carried out by phytoplankton and larger algae. Zooplankton are primary consumers in a food web that includes aquatic insects, minnows, crayfish, turtles, and snails, and that terminates in large fish.

Swamps are low, wetland areas of both shrubs and large trees. Many types of plants and animals are found in the wetlands. Bogs are shallow bodies of water containing large growths of sphagnum moss. The presence of sphagnum moss and other factors create an acid condition that decreases the rate of decay.

Questions

1. List five types of fresh water biomes.

2. Three organisms that are abundant in ponds are _____, _____, and _____.

3. What are two factors that affect the type of organisms found in a stream?

4. What is a swamp?

5. Sphagnum moss is found in _____.