# Chapter 4 Notes

# Section 1

# Objectives

- **Distinguish** between the biotic and abiotic factors in an ecosystem.
- **Describe** how a population differs from a species.
- **Explain** how habitats are important for organisms.

# **Defining an Ecosystem**

- Ecosystems are \_\_\_\_\_\_ of organisms and their abiotic environment.
- Examples are an oak forest or a coral reef.
- Ecosystems do not have clear \_\_\_\_
- Things move from one ecosystem to another. Pollen can blow from a forest into a field, soil can wash from a mountain into a lake, and birds migrate from state to state.

# Levels of Ecological Organization

Organism – Population – Community – \_\_\_\_\_- Biosphere

# The Components of an Ecosystem

- In order to survive, ecosystems need \_\_\_\_\_ basic components: energy, mineral nutrients, water, oxygen, and living organisms.
- Plants and rocks are components of the land ecosystems, while most of the energy of an ecosystem comes from the sun.
- If one part of the ecosystem is \_\_\_\_\_\_ or \_\_\_\_\_, the entire system will be affected.

# **Biotic and Abiotic Factors**

- **Biotic factors** are environmental factors that are associated with or results from the activities of \_\_\_\_\_\_\_ which includes plants, animals, dead organisms, and the waste products of organisms.
- Abiotic factors are environmental factors that are not associated with the activities of living organisms which includes \_\_\_\_\_, \_\_\_\_, rocks, and temperature.
- Scientists can organize these living and nonliving things into various levels.

# Organisms

- Organisms are living things that can carry out life processes \_\_\_\_\_\_
- You are an organism, as is an ant, and ivy plant, and each of the many bacteria living in your intestines.
- Every organism is a member of a \_\_\_\_\_.
- Species are groups of organisms that are closely related, and can mate to produce fertile offspring.

# **Populations**

- Members of a species may not all live in the same place. Field mice in Maine will not interact with field mice in Texas. However, each organism lives as part of a \_\_\_\_\_.
- Populations are groups of organisms of the same species that live in a specific \_\_\_\_\_\_ area and interbreed.
- For example, all the field mice in a corn field make up a population of field mice.
- An important characteristic of a population is that its members usually \_\_\_\_\_\_ with one another rather than with members of other populations
- For example, bison will usually mate with another member of the same \_\_\_\_\_, just as wildflowers will usually be \_\_\_\_\_ by other flowers in the same field.

# Communities

- **Communities** are groups of \_\_\_\_\_\_ species that live in the same habitat and interact with each other.
- Every population is part of a community.
- The most obvious difference between communities is the types of \_\_\_\_\_\_ they have.
- Land communities are often dominated by a few species of \_\_\_\_\_\_. These plants then determine what other \_\_\_\_\_\_ can live in that community.

# Habitat

- Habitats are places where an organism usually \_\_\_\_\_\_.
- Every habitat has specific characteristics that the organisms that live there need to survive. If any of these factors change, the habitat changes.
- Organisms tend to be very well suited to their \_\_\_\_\_\_. If fact, animals and plants usually cannot survive for long periods of time away from their natural habitat.

# Section 2

# Objectives

- **Explain** the process of evolution by natural selection.
- **Explain** the concept of adaptation.
- **Describe** the steps by which a population of insects becomes resistant to pesticide.

# **Evolution by Natural Selection**

- English naturalist \_\_\_\_\_\_ observed that organisms in a population differ slightly from each other in form, function, and behavior.
- Some of these differences are \_\_\_\_\_\_
- Darwin proposed that the environment exerts a strong \_\_\_\_\_\_ over which individuals survive to produce offspring, and that some individuals, because of certain traits, are more likely to survive and reproduce than other individuals.
- **Natural selection** is the process by which individuals that have \_\_\_\_\_\_ variations and are better adapted to their environment \_\_\_\_\_\_ and reproduce more successfully than less well adapted individuals do.
- Darwin proposed that over many generations, natural selection causes the characteristics of populations to change.
- **Evolution** is a change in the \_\_\_\_\_\_ of a population from one generation to the next.

# **Nature Selects**

• Darwin thought that nature selects for certain traits, such as sharper claws, because organisms with these traits are more likely to survive.

- Over time, the population includes a greater and greater \_\_\_\_\_\_ of organisms with the beneficial trait.
- As the populations of a given species change, so does the species.

# **Summary of Natural Selection**

- 1. Organisms produce more offspring than can survive.
- 2. The environment is hostile and contains \_\_\_\_\_
- 3. Organisms differ in the \_\_\_\_\_\_ they have.
- 4. Some inherited traits provide organisms with an \_\_\_\_\_
- 5. Each generation contains proportionately more organisms with advantageous traits.

# **Nature Selects**

- An example of evolution is a population of deer that became isolated in a cold area.
- Some of the deer had \_\_\_\_\_\_ for thicker, warmer fur. These deer were more likely to survive, and their young with thick fur were more likely to survive to reproduce.
- Adaptation is the process of becoming adapted to an environment. It is an anatomical, physiological, or \_\_\_\_\_\_ change that improves a population's ability to survive.

### **Evolution by Artificial Selection**

- Artificial selection is the selective \_\_\_\_\_\_ of organisms, by humans, for specific desirable characteristics.
- Dogs have been bred for certain characteristics.
- Fruits, grains, and vegetables are also produced by artificial selection. Humans save seeds from the largest, and sweetest fruits. By selecting for these traits, \_\_\_\_\_\_ direct the evolution of crop plants to produce larger, sweeter fruit.

#### **Evolution of Resistance**

- **Resistance** is the ability of an organism to \_\_\_\_\_\_ a chemical or disease-causing agent.
- An organism may be resistant to a chemical when it contains a \_\_\_\_\_\_ that allows it to break down a chemical into \_\_\_\_\_\_ substances.
- Humans promote the evolution of resistant populations by trying to control pests and bacteria with

#### **Pesticide Resistance**

- A pesticide sprayed on corn to kill grasshoppers, for example, may kill \_\_\_\_\_\_ of the grasshoppers, but those that survive happen to have a gene that protects them from the pesticide. These surviving insects \_\_\_\_\_\_ this resistant gene to their offspring.
- Each time the corn is sprayed, more resistant grasshoppers enter the population. Eventually the \_\_\_\_\_\_ population will be resistant, making the pesticide \_\_\_\_\_\_.

# Section 3

# **Objectives**

- Name the six kingdoms of organisms and identify two characteristics of each.
- **Explain** the importance of bacteria and fungi in the environment.
- **Describe** the importance of protists in the ocean environment.
- **Describe** how angiosperms and animals depend on each other.
- Explain why insects are such successful animals

# The Diversity of Living Things

- Most scientists classify organisms into \_\_\_\_\_\_ kingdoms based on different characteristics.
- Members of the six kingdoms get their \_\_\_\_\_ in different ways and are made up of different
- types of \_\_\_\_\_, the smallest unit of biological organization.
- The cells of animals, plants, fungi, and protists all contain a \_\_\_\_\_\_. While cells of bacteria, fungi, and plants all have cell walls.

# The Kingdoms of Life

• Archaebacteria – Eubacteria – Fungi – Protists – Plants - Animals

#### Bacteria

- **Bacteria** are extremely small, \_\_\_\_\_\_ organisms that usually have a cell wall and reproduce by cell division.
- Unlike all other organisms, bacteria lack \_\_\_\_\_\_.
- There are two main kinds of bacteria, \_\_\_\_\_ and eubacteria. Most bacteria are eubacteria.
- Bacteria live in every habitat on Earth, from hot springs to the bodies of animals.
- Some kinds of bacteria break down the remains and wastes of other organisms and return the

\_\_\_\_\_ to the soil.

- Others recycle nutrients, such as nitrogen and phosphorus.
- Certain bacteria can convert \_\_\_\_\_\_ from the air into a form that plants can use. This conversion is important because nitrogen is the main component of proteins and genetic material.

# **Bacteria and the Environment**

- Bacteria also allow many organisms, including humans, to extract certain nutrients from their food.
- The bacterium, **Escherichia coli** or **E. coli**, is found in the intestines of humans and other animals and helps digest food and release \_\_\_\_\_\_ that humans need.

# Fungi

- A **fungus** is an organism whose cells have nuclei, rigid cell walls, and no \_\_\_\_\_\_ and that belongs to the kingdom Fungi.
- Cell walls act like mini-skeletons that allow fungi to stand up right.
- A mushroom is the \_\_\_\_\_\_ structure of a fungus. The rest of the fungus is an underground network of fibers that absorb food from \_\_\_\_\_\_ in the soil.
- Fungi get their food by releasing \_\_\_\_\_\_ that help break down organic matter, and then

\_\_\_\_\_ the nutrients.

- The bodies of most fungi are huge networks of threads that grow through the soil dead wood, or other material on which the fungi is feeding.
- Like bacteria, fungi play an important role in breaking down the bodies of dead organisms.
- Some fungi, like some bacteria, cause \_\_\_\_\_. Athlete's foot is an example of a condition caused by fungi.
- Other fungi add flavor to food as in \_\_\_\_\_\_. The fungus gives the cheese both its blue color and strong flavor.
- Yeasts are fungi that produce the \_\_\_\_\_ that makes bread rise.

# Protists

- **Protists** are diverse organisms that belong to the kingdom Protista.
- Some, like \_\_\_\_\_, are animal-like. Others are \_\_\_\_\_, such as kelp, and some resemble fungi.

- Most protists are one-celled microscopic organisms, including diatoms, which float on the ocean surface.
- Another protist, **Plasmodium**, is the one-celled organism that causes the disease \_\_\_\_\_
- From an environmental standpoint, the most important protists are \_\_\_\_\_\_.
- Algae are plantlike protists that can make their own food using the energy from the sun.
- They range in size from the giant kelp to the one-celled phytoplankton, which are the

\_\_\_\_\_ source of food in most ocean and freshwater ecosystems.

#### Plants

- Plants are many-celled organisms that make their own food using the sun's energy and have cell walls.
- Most plants live on land where they use their \_\_\_\_\_\_ to get sunlight, oxygen, and carbon

dioxide from the air. While absorbing nutrients and water from the soil using their \_\_\_\_\_.

• Leaves and roots are connected by vascular tissue, which has thick cell walls and serves as a

system of tubes that carries \_\_\_\_\_ and \_\_\_\_\_.

# **Lower Plants**

- The first land plants had no vascular tissue, and swimming \_\_\_\_\_\_. They therefore had to live in damp places and couldn't grow very large.
- Their descendents alive today are small plants such as \_\_\_\_\_\_.
- \_\_\_\_\_ and club mosses were the first vascular plants, with some of the ferns being as large as small trees.

# Gymnosperms

- **Gymnosperms** are woody vascular plants whose seeds are not enclosed by an ovary or fruit.
- Conifers, such as pine trees, are gymnosperms that bear cones.
- Much or our lumber and paper comes from gymnosperms.
- Gymnosperms have several adaptations that allow them to live in \_\_\_\_\_ conditions than lower plants.
  - They can produce \_\_\_\_\_\_, which protects and moves sperm between plants.
  - These plants also produce seeds, which protect developing plants from drying out.
  - A conifer's needle-like leaves also lose little \_\_\_\_\_.

# Angiosperms

- Angiosperms are flowering plants that produce seeds within \_\_\_\_\_\_. Most land plants are angiosperms.
- The flower is the reproductive structure of the plant. Some angiosperms, like grasses, have small flowers, that use wind to disperse their pollen.
- Other angiosperms have large flowers to attract \_\_\_\_\_\_ and birds. Many flowering plants

depend on \_\_\_\_\_\_ to disperse their seeds and carry their pollen.

- Most land animals are \_\_\_\_\_ on flowering plants.
- Most of the food we eat, such as wheat, rice, beans, oranges, and lettuce comes from flowering plants.
- Building materials and \_\_\_\_\_, such as oak and cotton, also come from flowering plants.

# Animals

- Animals cannot make their own \_\_\_\_\_. They must take it in from the environment.
- Animal cells also have no cell walls, making their bodies soft and \_\_\_\_\_\_. Although, some animals have evolved hard exoskeletons.
- As a result, animals are much more \_\_\_\_\_\_ than plants. All animals move around in their environment during at least one stage in their lives.

# Invertebrates

- **Invertebrates** are animals that do not have \_\_\_\_\_\_.
- Many live attached to hard surfaces in the ocean and \_\_\_\_\_\_ their food out of the water, such as corals, various worms, and mollusks.
- These organisms are only mobile when they are \_\_\_\_\_. At this early stage in their life they are part of the ocean's plankton.
- Other invertebrates, including squid in the ocean and insects on land, actively move in search of food.
- More \_\_\_\_\_\_ exist on Earth than any other type of animal.
- Insects are successful for many reasons: they have a waterproof skeleton, can move and reproduce quickly, most insects can fly, and their small size allows them to live on little food and to hide from enemies in small places.
- Many insects and plants have evolved \_\_\_\_\_\_ and depend on each other to survive.
- Insects carry pollen from male fruit parts to fertilize a plant's egg, which develops into fruits such as tomatoes, cucumbers, and apples.
- Insects are also valuable because they eat other insects that we consider to be pests.
- However, insects and humans are often \_\_\_\_\_.
- Bloodsucking insects transmit human \_\_\_\_\_\_ such as malaria, sleeping sickness, and West Nile virus.
- Insects do most damage indirectly by eating our \_\_\_\_\_.

# Vertebrates

- **Vertebrates** are animals that have a backbone, and include mammals, birds, reptiles, amphibians, and fish.
- The first vertebrates were \_\_\_\_\_, but today most vertebrates live on land.
- The first land vertebrates were \_\_\_\_\_. These animals were successful because they have an almost waterproof egg which allows the egg to hatch on land, away from predators in the water.
- Birds are warm-blooded vertebrates with \_\_\_\_\_\_. They keep their hard shelled eggs and young warm until they have developed insulating layers of fat and feathers.
- Mammals are warm-blooded vertebrates that have fur and feed their young \_\_\_\_\_\_.
- Birds and mammals have the ability to maintain a high \_\_\_\_\_\_ which allows them to live in cold areas, where other animals cannot live.