

Section 3: The Diversity of Living Things

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Preview 

Main 

Section 3: The Diversity of Living Things

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- Plants
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- Animals
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- Vertebrates

Bellringer

Section: The Diversity of Living Things

Do you know how a scientist would classify you?
Write down the scientific groups you think humans belong to starting with your kingdom.

Write your responses in your *EcoLog*.

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

The Kingdoms of Life

The Kingdoms of Life		
Kingdom	Characteristics	Examples
Archaeobacteria	single celled; lack cell nuclei; reproduce by dividing in half; found in harsh environments	methanogens (live in swamps and produce methane gas) and extreme thermophiles (live in hot springs)
Eubacteria	single celled; lack cell nuclei; reproduce by dividing in half; incredibly common	proteobacteria (common in soils and in animal intestines) and cyanobacteria (also called <i>blue-green algae</i>)
Fungi	absorb their food through their body surface; have cell walls; most live on land	yeasts, mushrooms, molds, mildews, and rusts
Protists	most single celled but some have many cells; most live in water	diatoms, dinoflagellates (red tide), amoeba, trypanosomes, paramecia, and <i>Euglena</i>
Plants	many cells; make their own food by photosynthesis; have cell walls	ferns, mosses, trees, herbs, and grasses
Animals	many cells; no cell walls; ingest their food; live on land and in water	corals, sponges, worms, insects, fish, reptiles, birds, and mammals

Bacteria

- **Bacteria** are extremely small, single-celled organisms that usually have a cell wall and reproduce by cell division.
- Unlike all other organisms, bacteria lack nuclei.
- There are two main kinds of bacteria, archaeobacteria and eubacteria. Most bacteria is eubacteria.
- Bacteria live in every habitat on Earth, from hot springs to the bodies of animals.

Bacteria and the Environment

- Some kinds of bacteria break down the remains and wastes of other organisms and return the nutrients to the soil.
- Others recycle nutrients, such as nitrogen and phosphorus.
- Certain bacteria can convert nitrogen 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 vitamins that humans need.

Fungi

- A **fungus** is an organism whose cells have nuclei, rigid cell walls, and no chlorophyll and that belongs to the kingdom Fungi.
- Cell walls act like mini-skeletons that allow fungi to stand up right.
- A mushroom is the reproductive structure of a fungus. The rest of the fungus is an underground network of fibers that absorb food from decaying organisms in the soil.

Fungi

- Fungi get their food by releasing chemicals that help break down organic matter, and then absorbing 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.

Fungi

- Some fungi, like some bacteria, cause disease. Athlete's foot is an example of a condition caused by fungi.
- Other fungi add flavor to food as in blue cheese. The fungus gives the cheese both its blue color and strong flavor.
- Yeasts are fungi that produce the gas that makes bread rise.

Protists

- **Protists** are diverse organisms that belong to the kingdom Protista.
- Some, like amoebas, are animallike. Others are plantlike, 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 malaria.

Protists

- From an environmental standpoint, the most important protists are algae.
- 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 initial 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 leaves to get sunlight, oxygen, and carbon dioxide from the air. While absorbing nutrients and water from the soil using their roots.
- Leaves and roots are connected by vascular tissue, which has thick cell walls and serves as a system of tubes that carries water and food.

Lower Plants

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

Gymnosperms

- **Gymnosperms** are woody vascular seed plants whose seeds are not enclosed by an ovary or fruit.
- Conifers, such as pine trees, are gymnosperms that bear cones.
- Much of our lumber and paper comes from gymnosperms.

Gymnosperms

- Gymnosperms have several adaptations that allow them to live in drier conditions than lower plants.
 - They can produce pollen, 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 water.

Angiosperms

- **Angiosperms** are flowering plants that produce seeds within fruit. 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 insects and birds. Many flowering plants depend on animals to disperse their seeds and carry their pollen.

Angiosperms

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

Animals

- Animals cannot make their own food. They must take it in from the environment.
- Animal cells also have no cell walls, making their bodies soft and flexible. Although, some animals have evolved hard exoskeletons.
- As a result, animals are much more mobile 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 backbones.
- Many live attached to hard surfaces in the ocean and filter their food out of the water, such as corals, various worms, and mollusks.
- These organisms are only mobile when they are larvae. At this early stage in their life they are part of the ocean's plankton.

Invertebrates

- Other invertebrates, including squid in the ocean and insects on land, actively move in search of food.
- More insects 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.

Invertebrates

- Many insects and plants have evolved together 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.

Invertebrates

- However, insects and humans are often enemies.
- Bloodsucking insects transmit human diseases such as malaria, sleeping sickness, and West Nile virus.
- Insects do most damage indirectly by eating our crops.

Vertebrates

- **Vertebrates** are animals that have a backbone, and includes mammals, birds, reptiles, amphibians, and fish.
- The first vertebrates were fish, but today most vertebrates live on land.
- The first land vertebrates were reptiles. 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.

Vertebrates

- Birds are warm-blooded vertebrates with feathers. 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 milk.
- Birds and mammals have the ability to maintain a high body temperature which allows them to live in cold areas, where other animals cannot live.

Graphic Organizer

Graphic

Organizer

Spider Map

Create the **Graphic Organizer** entitled "Spider Map" described in the Appendix. Label the circle "Kingdoms." Create a leg for each kingdom. Then, fill in the map with details about the organisms in each kingdom.



Quick LAB

QuickLAB



Pollen and Flower Diversity



Procedure

1. Use a **cotton swab** to collect pollen from a common **flowering plant**.
2. Tap the cotton swab on a **microscope slide** and cover the slide with a **cover slip**.
3. Examine the slide under a **microscope**, and draw the pollen grains in your **EcoLog**.
4. Repeat this exercise with a **grass plant in bloom**.

Analysis

1. Based on the structure of the flower and the pollen grains, explain which plant is pollinated by insects and which is pollinated by wind.

Math Practice

MATH PRACTICE



Insect Survival Most invertebrates produce large numbers of offspring. Most of these offspring die before reaching adulthood. Suppose an insect lays 80 eggs on a plant. If 70 percent of the eggs hatch and 80 percent of those that hatch die before reaching adulthood, how many insects will reach adulthood?

