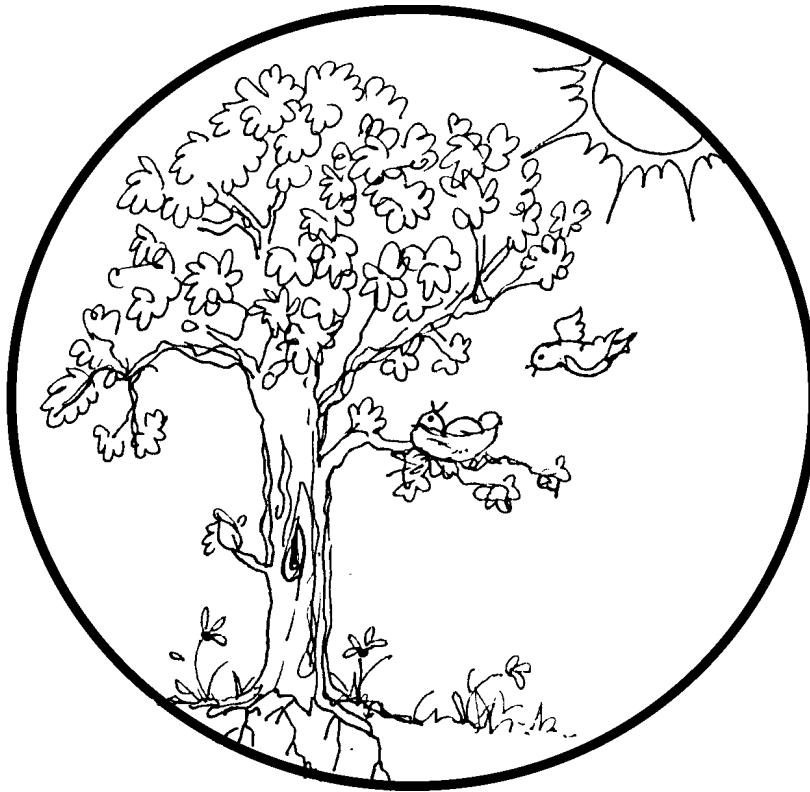




Life Cycle
Diversity in a Balance



FOURTH GRADE
ORGANISMS



2 WEEKS
LESSON PLANS AND
ACTIVITIES

LIFE CYCLE OVERVIEW OF FOURTH GRADE

ORGANISMS

WEEK 1.

PRE: *Exploring the components of a cell.*

LAB: *Comparing cells, tissues, and organs.*

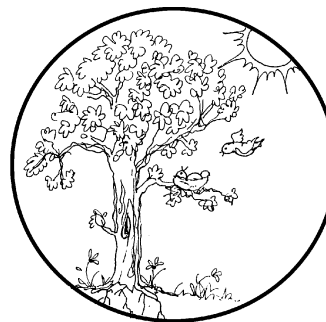
POST: *Classifying different organisms.*

WEEK 2.

PRE: *Understanding the reasons for invertebrate classification.*

LAB: *Comparing and contrasting invertebrates.*

POST: *Comparing characteristics of the 5 kingdoms.*



HUMAN BIOLOGY

WEEK 3.

PRE: *Describing how the human body works.*

LAB: *Discovering if boys are more flexible than girls.*

POST: *Exploring four types of tissues.*

WEEK 4.

PRE: *Exploring how the circulatory system works.*

LAB: *Comparing the pulse rate of males and females.*

POST: *Exploring the components of blood.*

PLANT LIFE

WEEK 5.

PRE: *Defining the characteristics of plants.*

LAB: *Comparing monocots and dicots.*

POST: *Identifying monocots and dicots in the field.*

WEEK 6.

PRE: *Explaining how light is transformed into food.*

LAB: *Discovering that starch is important to plants.*

POST: *Analyzing components of drugs.*

NATURAL ENVIRONMENT

WEEK 7.

PRE: *Investigating soil.*

LAB: *Exploring a soil profile.*

POST: *Investigating the ecosystem of the school yard.*

WEEK 8.

PRE: *Identifying plants in a saline environment.*

LAB: *Creating a San Francisco Bay mud fauna food web*

POST: *Examining a fresh water aquarium ecosystem.*

LIFE CYCLE - ORGANISMS (4A)

PRE LAB

Students use a worksheet to compare plant and animal cells.

OBJECTIVES:

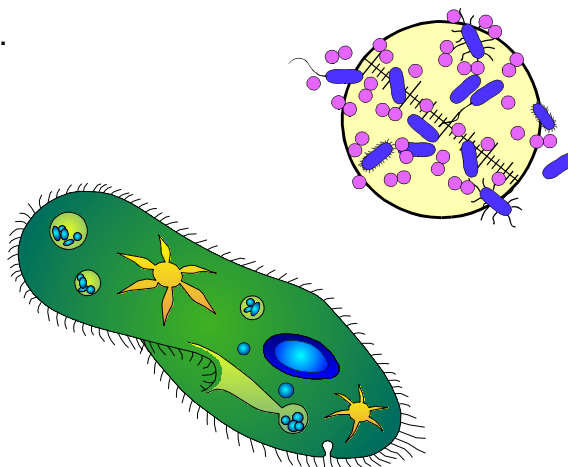
1. Exploring the components of a cell.
2. Investigating animal cells.

VOCABULARY:

cell
cytoplasm
nucleus
organelle

MATERIALS:

worksheet
crayons
Internet



BACKGROUND:

Cells are the fundamental units of all organisms. Some organisms made up of only one cell, but many more organisms are made of billions of cells. A cell is a packaged power plant that maintains all necessary functions in order to stay alive. All cells have certain components that enable them to carry out vital life processes. There are several different types of specialized cells, but emphasize to students the basic structure of the cell.

A cell has several components that perform different functions. The vital parts of a cell are called "organelles." Among the most important are the nucleus, vacuoles, and mitochondria, all of which are enclosed within the cell membrane and immersed in cytoplasm.

Each organelle performs a specific task that helps keep the cell alive. In both an animal and plant cell, the nucleus, vacuoles, mitochondrion, cell membranes, and cytoplasm can be found.

The **nucleus** is the control center of cell activity and contains the genetic material that is important for cell division. The structures that resemble air bubbles are called **vacuoles**. Some vacuoles store food for future use while other store wastes until they are removed. Since the cell is a living entity, it needs energy. The energy that a cell uses is produced in the **mitochondrion** which releases sugar and starches that is used as fuel by the cell. Most of the parts of the cell are surrounded by a **cell membrane**. The function of the membrane is to allow only certain fluids and chemicals into and out of the cell. Cells

contain a thick substance called **cytoplasm** which is capable of maintaining the life processes. The name of the protoplasm within the nucleus is called nucleoplasm.

A plant cell also contains chloroplasts and a cell wall. Chloroplasts are the photosynthesis center of a plant cell. It converts light into energy. It contains chlorophyll which gives it the green color we associate with plants. The cell wall gives plant cell a rigid support and protects the cell.

PROCEDURE:

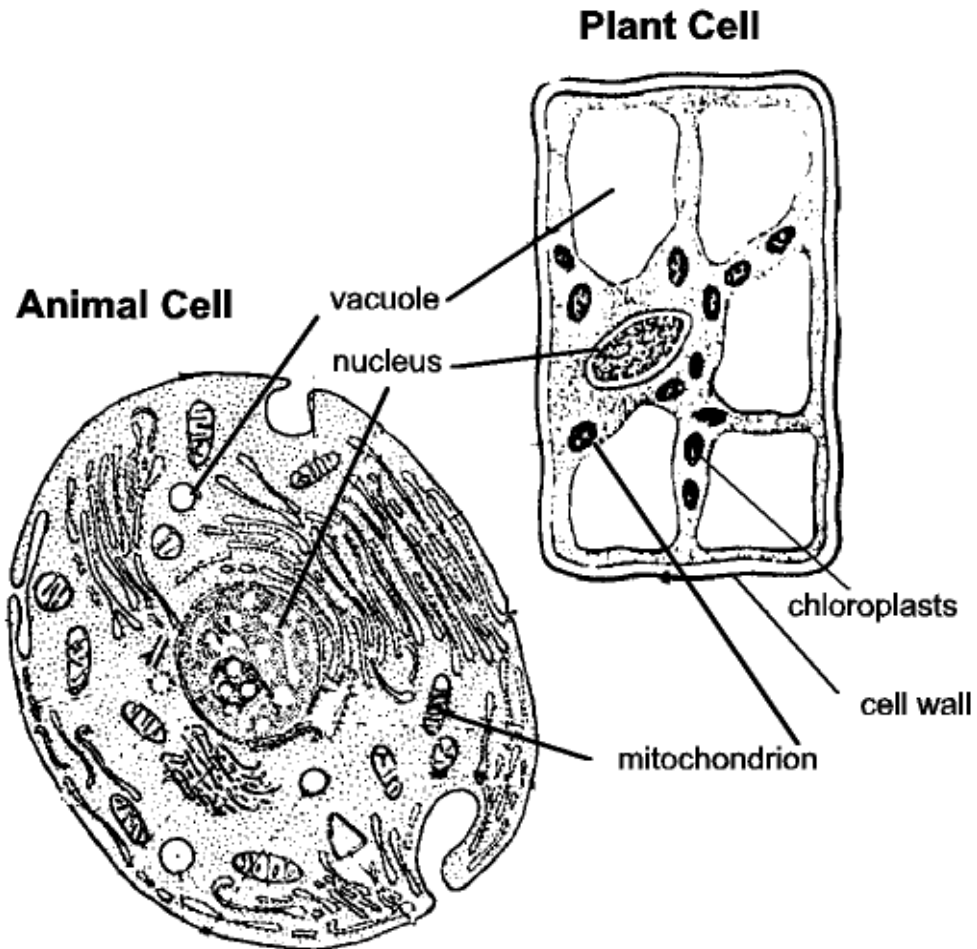
1. There are various differences between animal and plant. The worksheet shows the different types of cells and has the students comparing and contrasting the various parts. The major difference between the cells is that plant cells have a cell wall, chloroplasts, and larger food vacuoles.

2. Instruct students to color the worksheet in the appropriate colors. Remember the plant cell should contain green.

3. The website, <http://www.cellsalive.com> can help your students learn more about the different components of a plant and animal cell.

LIFE CYCLE - ORGANISMS (4A) PRE

COMPARE PLANT AND ANIMAL CELLS. HOW ARE THEY DIFFERENT? WRITE A PARAGRAPH ON HOW THEY ARE SIMILAR AND DIFFERENT.



LIFE CYCLE - ORGANISMS (4A)

LAB

Students look at prepared slides under a microscope.

OBJECTIVES:

1. Comparing cells, tissues and organs.
2. Exploring skin cells.

VOCABULARY:

cell
cytoplasm
nucleus
organelle
organ
tissue

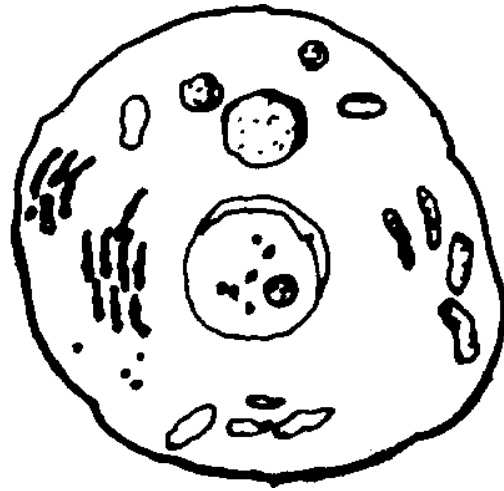


Figure of an animal cell.

MATERIALS:

Swift GH microscope
Prepared slides (LER)

BACKGROUND:

Cells are the basic unit of living systems, but obviously there's a lot more to an organism than just cells. Cells are the building blocks that are used to create larger groups of cells which perform more specific tasks.

The second level of organization is the tissue. A tissue is a group of similar cells that work together to perform a specific job. Remember that there are specialized cells in multicellular organisms, for example, nerve, muscle, and blood cells. Tissues function to perform many tasks that are too complicated for a single cell to perform. Tissues are used for support, movement, secretion, protection, growth, and reproduction. Specialized cells form specialized tissues such as blood tissue.

A group of tissues working together to perform a specific function is called an organ. Organs are the third level of organization. Examples of organs include the skin, heart, eye, stomach, and lungs. The complexity of organs is a characteristic that is used to separate groups of organisms.

The skin is a large organ with many different cells. As part of this lab, students are to look at their skin cells at different locations on their bodies and then compare the same areas on their partners. The skin is the largest organ of the body and is very complex. It wraps the adult body in about 20 square feet of tissue and weighs some seven pounds. The skin has 3 layers, however, students will only be dealing with the epidermis, or the outer layer. The outer skin is composed of dead cells that are always being worn off. We

shed our skins continuously, not all at once but little by little, which goes on mostly unnoticed.

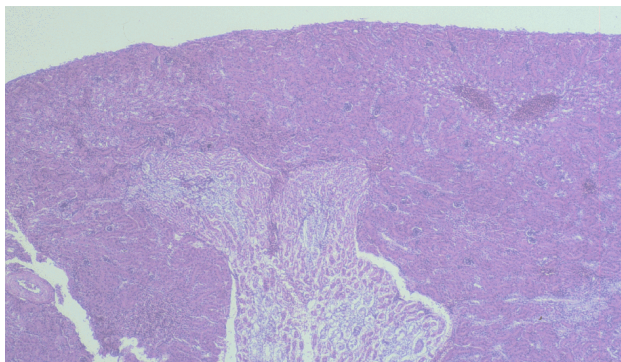
PROCEDURE:

1. Have students look at the prepared slides of the different groups. See if they can predict whether something is a whole organism, appendage, cell, tissue or organ. An appendage is an auxiliary part of the main body. Appendages can contain part of an organ, depending on the type of organism. Students will also see examples of the whole organisms and synthetic substances. List the answers

ANSWERS:

POLLENS AND SPORES -

Tulip pollen - cell
Leaf spore- cell
Pine tree pollen-cell
Orange pollen - cell
Pollen of lily - cell
Sunflower pollen - cell
Bottle brush spore - cell
Fern spore - cell



Photomicrograph of bird kidney, showing the different types of tissues making up this organ.

TINY CREATURE

Common red sponge - tissue
Angora rabbit hair - tissue
Ant- whole
Mouse fur - tissue
Plant louse - whole
Fruit fly - whole
Shrimp egg - cell
Silk worm larva (moth) - whole

TEXTILE FIBERS

Panya - tissue
Nylon - synthetic
Wool - tissue
Handmade paper - tissue
Hemp fiber - tissue
Silk stuff - tissue
Cotton fiber -tissue
Bemberg - synthetic

INSECTS

- Dragon Fly Wing - appendages
- Work Bee Wing - appendages
- Bee antenna - appendages
- Bee abdomen - appendages
- Leg of butterfly - appendages
- Wing of butterfly - appendages
- Wing of locust - appendages
- leg of honey bee - appendages

PLANTS

- Stem of corn - tissue
- Leaf of nerium - tissue
- Onion rind - tissue
- Silver berry scaly hair - tissue
- Pine wood - tissue
- Camellia leaf section - tissue
- Bamboo shoot - tissue
- Sponge gourd - tissue

ANIMALS

- Cat hair - tissue
- Canary feather - tissue
- Dog hair - tissue
- Sheep hair - tissue
- Goldfish scale - tissue
- Hare hair - tissue
- camel hair - tissue
- feather fowl point - tissue

2. Students will discover that the shapes of the cells change from one part of the body to the other. Remember that the skin is our body's largest organ. Have the students place the Swift GH microscope directly on the skin so students can record what they see. The key point is just to observe that there are differences. Have them compare the palm of their hand, fingertips, back of hand and leg. Just have them draw in the appropriate area on the lab sheet what they see. If they compare with their neighbors, they will notice that the skin cells from different parts of the same body do change, but that the shape is similar from different people.

LIFE CYCLE - ORGANISMS (4A)

PROBLEM: Do cells vary on different parts of the body?

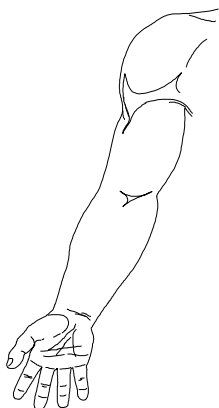
PREDICTION: _____

MATERIALS: MICROSCOPE, PREPARED SLIDES

PROCEDURE: Draw a picture of a cell, tissue, appendage, whole organism, or synthetic material.

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Look at the following parts of your skin (the largest organ) by using the microscope. Draw what you see. Pay attention to the shape and size of the cells in these areas.



PALM	FINGERTIPS
BACK OF HAND	LEG (ANY PART)

CONCLUSIONS: Are the cells from different parts of your body the same?

Would other organisms have different skin cells over their bodies? Explain your answer. _____

LIFE CYCLE - ORGANISMS (4A)

POST LAB

Students use a worksheet to compare cell, tissues, and organs.

OBJECTIVES:

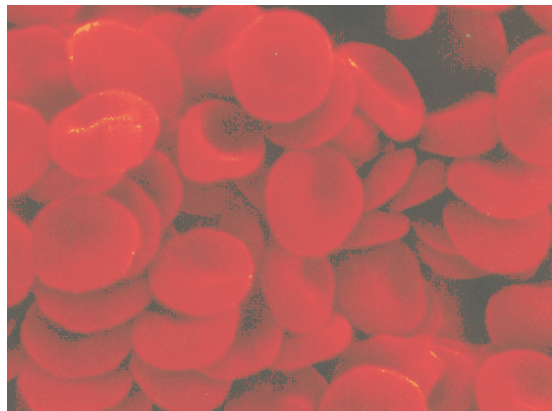
1. Comparing cells, tissues, and organs.
2. Classifying different organisms.

VOCABULARY:

cell
organ
tissue

MATERIALS:

worksheet



SEM of human blood cells.

BACKGROUND:

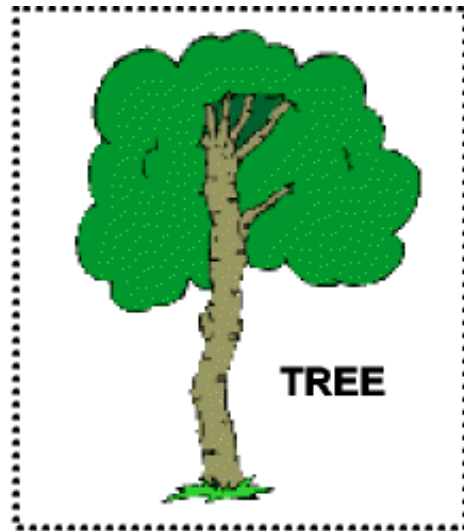
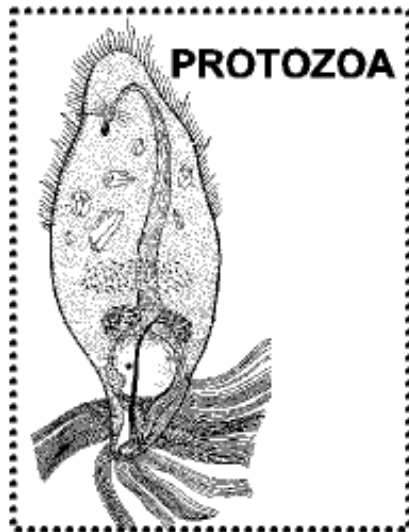
Higher plants and animals require more complex structures in order to maintain their bodily processes. Some structures found in plants are organs but these are difficult to compare with those of an animal. Such things as limbs on a tree and plant stems are organs but in the classical sense we only consider organs to be structures like the heart or brain. Just as tissues and cells grouped together to form a higher system, organs do the same. A group of organs working together to perform a task is called an organ system. An example of an organ system is the circulatory system which includes the heart, blood, blood vessels, and lymph vessels in the animal kingdom. In higher animals, there is an organ system for almost every life process that takes place.

An organism is considered the ultimate level of organization. At this level all other levels are working together to make the organism a complete living thing. Thus the definition of an organ system is: A system that is constituted to carry on the life processes by means of organs that are functionally independent but mutually dependent.

PROCEDURE:

1. Use the worksheet to review organs, tissues, and cells of a protozoa, a mushroom, a flower and a dog. Some protozoa have no organs and tissues. It just has one cell. The different organelles act as the center of activity. Protozoa are so small that they do not need organs to circulate food, fluid, or wastes. A mushroom is a multicellular fungus whose external features represent its reproductive organs. A dog has internal organs composed of different types of tissues, just like humans.

LIFE CYCLE - ORGANISMS (4A) POST



Write a sentence on whether you think the organism has cells, tissues, and/or organs.

1. _____

2. _____

3. _____

4. _____

LIFE CYCLE - ORGANISMS (4B)

PRE LAB

Students discuss why it may be important to classify organisms.

OBJECTIVES:

1. Understanding the reasons for classification.
2. Comparing and contrasting invertebrates.

VOCABULARY:

characteristics
classification



MATERIALS:

books on sea life
Internet

BACKGROUND:

In order to talk about organisms, scientists and naturalists had to develop a system to group organisms with like characteristics. Classification is a means by which objects with similar characteristics can be grouped together. A system of classification should be constructed in assisting people to discuss and understand the objects or animals that are being classified.

A Phylum is a subgroup of a kingdom that has similar tissue and organ development. A Class, Order, Family, and Genus are grouped according to characteristics determined by zoologists, biologists, or paleontologists working on that group of organisms. A species is a group of individuals that can successfully reproduce with each other.

PROCEDURE:

1. Ask students to discuss the characteristics of a dog and write down their responses on the board.

A DOG IS:	
short or long haired creature	small or large
4 legged animal	has a tail
an animal that barks	can bite

2. Next, ask the students to describe the characteristics of a poodle. They should

list all the characteristics of a dog plus the characteristics of a poodle: for example curly hair which can be white, gray, or black.

3. Ask students to create an image in their mind of a tree-like organism that has long, thin needles and cones. Ask them to tell you something about this unknown organism. The organism that they describe should resemble a pine tree. Classification helps us predict what type of object something may be.

4. Discuss with students that living objects are classified into kingdoms, phyla, orders, classes, families, genera, and species. Stress that the species classification is very important to the classification scheme of an organism, but it is artificial. Nature does not always fit our artificial classification. A “Kingdom” is a grouping of living organisms that have similar eating and reproductive strategies.

LIFE CYCLE - ORGANISMS (4B)

LAB

Students look at different invertebrates and try and determine how they are similar.

OBJECTIVES:

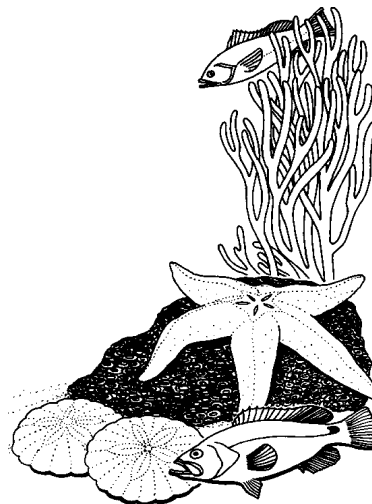
1. Classifying invertebrates.
2. Comparing invertebrates.

VOCABULARY:

Arthropoda
Cnidaria
Echinodermata
Mollusca
Porifera

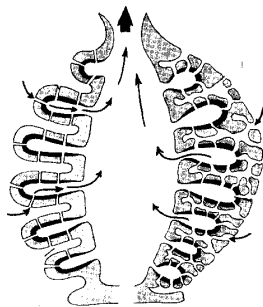
MATERIALS:

Marine Invertebrates
Swift GH



BACKGROUND:

There are five phyla represented in this lab: Porifera, Cnidaria, Arthropoda, Mollusca, and Echinodermata. The students should discover the characteristics described below. After the lab is completed discuss the following characteristics.



PORIFERA (SPONGE): This soft, porous specimen represents a very primitive invertebrate. Sponges that are used today for cleaning are synthetic. However, if you look at a synthetic sponge, you notice that it looks like a real sponge. In the early days, people used sponges for soaking up water.

Water containing nutrients, enters pores of sponges. Waste is released through larger openings called “oscula.” Look for the different size openings on the specimens.

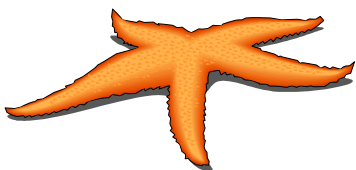
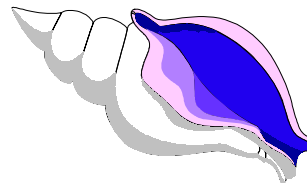
CNIDARIA (CORAL): Cnidaria are organisms with a central stomach surrounded by stinging cells on the end of finger-like projections. This phylum includes jellyfish, sea anemones, and corals. Coral heads are the skeletal remains of living corals. They are rough in texture and come in a variety of shapes, sizes, and colors. Corals are classified as soft and hard corals. The coral samples you see have tiny holes which once contained a single



organism.

Examples from this phylum have holes, rough textures, radiating walls or branches, and are mostly white when dead. Coral may form large reefs, like the Great Barrier Reef in Australia, which serve as homes and shelters for fish and other sealife.

MOLLUSCA (CLAM, MUSSEL, SCALLOP, SNAIL): Specimens from this group of invertebrates have hard shells, curved or twisted bodies, one or two shell parts, and an unsegmented body. Many animals from this phylum can be found at stores or seafood restaurants as clam chowder, seafood platters, or escargot.



ECHINODERMATA (SEA COOKIE, SEASTAR, SEA URCHIN): This phylum consists of animals that have a 5-arm pattern, sometimes brittle bodies, and circular holes that allow the entrance and removal of food and waste. One example, the familiar seastar, can grow back body parts that are cut off or lost.



ARTHROPODA (BARNACLE): This phylum consists of segmented or jointed invertebrates including insects, spiders, and crustacea. A barnacle is a shrimp-like arthropod with a shell. Students will not be able to see the arthropod itself, only the shell that houses the organism when it is alive.

PROCEDURE:

1. Students will examine specimens of invertebrates in this lab activity. Invertebrates are animals that lack a backbone and comprise 95% of the Animal Kingdom. Discuss techniques on observing the specimens using the senses of touch, sound, and sight.

2. Have the students determine which samples belong together by describing characteristics such as texture, shape, growth patterns, hardness, and color. Each of the specimens is an individual species. Emphasize with students that there are many other species within these groups.

LIFE CYCLE - ORGANISMS (4B)

PROBLEM: How do we group species into larger groups?

PREDICTION: _____

MATERIALS: packets of organisms (Marine Invertebrates)

PROCEDURE: You have different organisms in your packet that represent different species. Classify the organisms into large groups (Phylum) using characteristics that might link the individual samples. Draw the specimens and label the characteristics they have in common. (Hint: there are 5 major groups).

	CHARACTERISTICS	DRAWING

CONCLUSION: What were some of the characteristics that you used to sort these samples into groups?

LIFE CYCLE - ORGANISMS (4B)

POST LAB

OBJECTIVES:

1. Learning about kingdoms.
2. Comparing characteristics of the 6 kingdoms.

VOCABULARY:

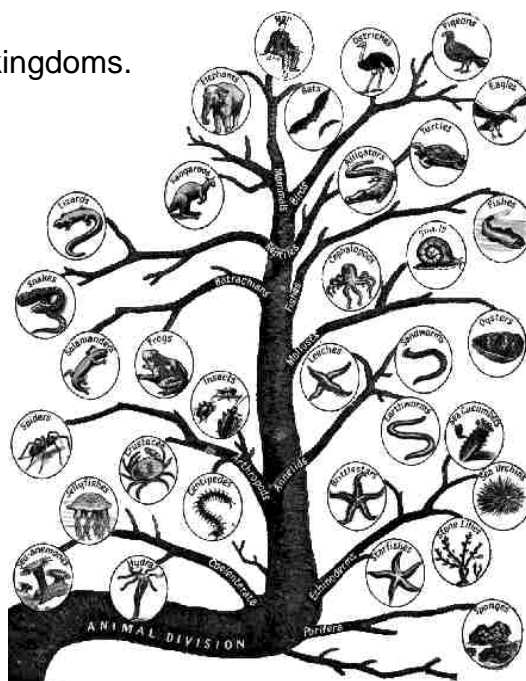
animal
fungi
kingdom
monera
plant
protozoa

MATERIALS:

worksheet
scissors

BACKGROUND:

Students discuss how we classify large groups of organisms.



The reasons for grouping organisms into certain kingdoms are not always obvious. The development of the kingdom classification dates back to Aristotle who divided organisms into animals and plants. Today, specialists working with different phyla change classifications when they derive more information. You must realize that we do not know all there is to know about organisms. The 5 kingdom classification system was first derived in the early 1960's, and there are many biologists today that use a 6 kingdom division.

The Monera group is now broken up into 2 other Kingdoms, the Archeabacteria and the Eubacteria. Examples include bacteria or blue-green algae. Monera as a group, have a very simple nucleus and do not have a nuclear membrane. The Kingdom Protista is made up of protozoa, consisting of one celled organisms, that have a well defined nuclear membrane. Protozoa will eat their food and reproduce asexually more commonly than sexually. The Fungi are characterized in that they lack chlorophyll and absorb food from the surrounding ground. Fungi possess organs and reproduce by sexual means (spores). The Plant Kingdom is characterized by its ability to produce by either sexual or asexual means. The animal kingdom is divided into invertebrates and vertebrates. To be an animal requires that an organism eat its food and reproduce mainly by sexual means. Organs are much more developed in the Animal Kingdom than the other kingdoms.

PROCEDURE:

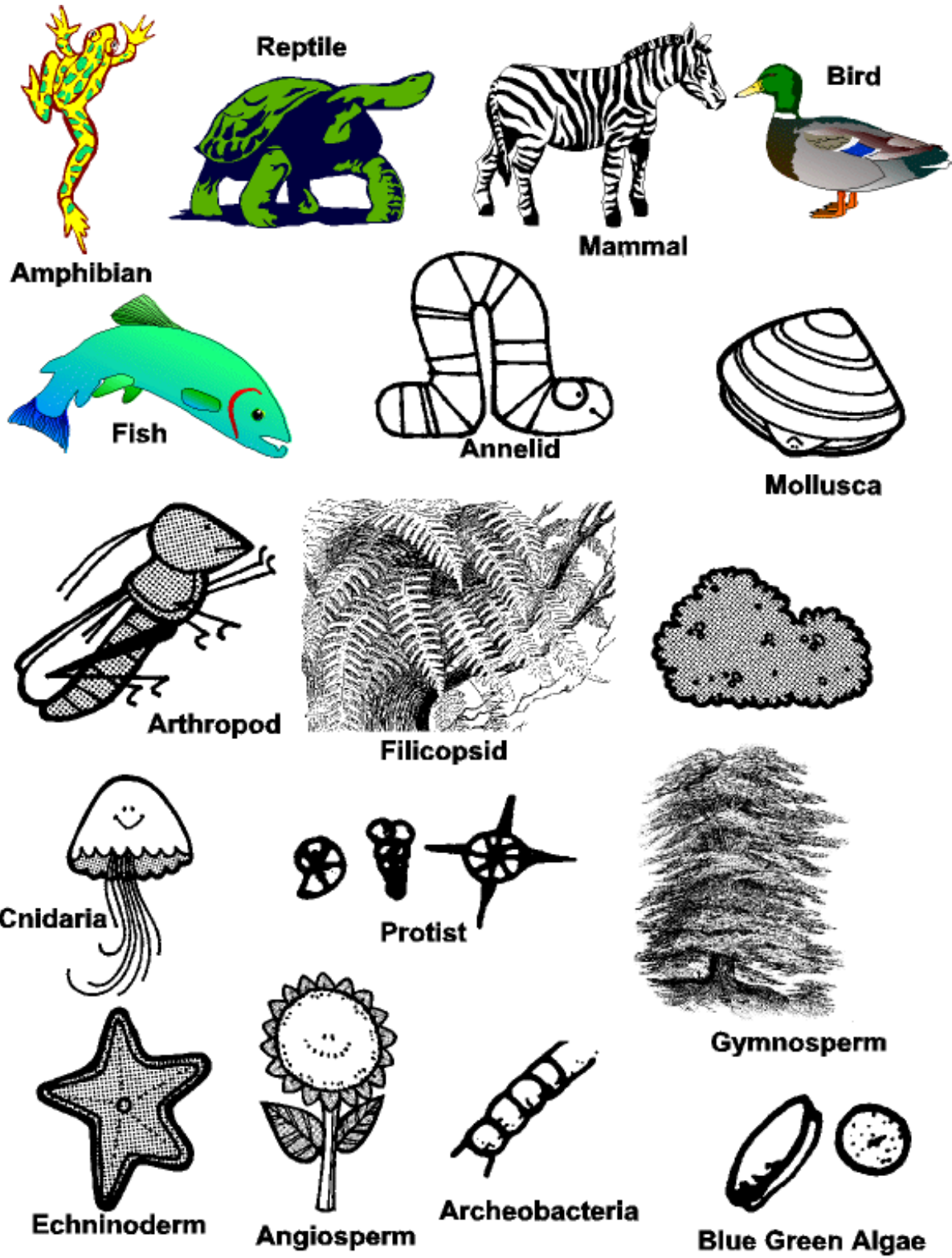
1. Discuss with students that living organisms are grouped into kingdoms, making it easy for people to discuss the various groupings. Either make a transparency or use the enclosed master as a worksheet to illustrate the common phyla within each kingdom.

2. You may want to use the following summary:

KINGDOM	REASON
plant	make their own food, mainly green
monera (including Archeobacteria and Eubacteria)	one cell, primitive nucleus
protozoa	one cell, eat food
fungi	absorb food
animal	multicellular, eat food

3. Give students the worksheet with the different organisms and have them create their own "Tree of Life." Show them the Tree of Life with the pictures on it, to help them recreate their own.

LIFE CYCLE - ORGANISMS (4B)



TREE OF LIFE

