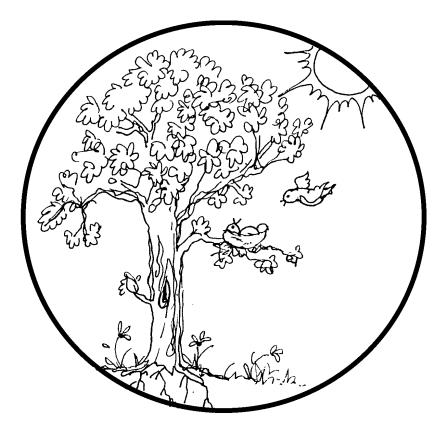






SIXTH GRADE ORGANISMS



2 WEEKS LESSON PLANS AND ACTIVITIES

LIFE CYCLE OVERVIEW OF SIXTH GRADE

ORGANISMS

WEEK 1.

PRE: Defining classification.
LAB: Exploring characteristics of the lower kingdoms.
POST: Comparing classification and taxonomy.
WEEK 2.
PRE: Exploring how food gets rotten.
LAB: Discovering why food rots.
POST: Defining the parameters of the kingdom system.



HUMAN BIOLOGY

WEEK 3.

PRE: Exploring the endocrine system.
LAB: Analyzing the different stages of human growth.
POST: Comparing mitosis and meiosis.
WEEK 4.
PRE: Distinguishing bacteria, protozoa, and viruses.
LAB: Distinguishing bacteria and viruses.

POST: Comparing genetic disorders with diseases.

PLANT LIFE

WEEK 5.

PRE: Distinguishing land from aquatic plants.
LAB: Comparing growth factors of plants.
POST: Exploring uses of auxins.
WEEK 6.
PRE: Exploring the history of genetics.
LAB: Testing heredity models.

POST: *Developing a mutation theory*.

NATURAL ENVIRONMENT

WEEK 7.

PRE: Exploring ecosystem requirements.
LAB: Comparing the pH of different soils.
POST: Interpreting the results of soil pH.
WEEK 8.
PRE: Adapting to the local environment.

LAB: Researching factors on adaptation. POST: Comparing different theories on evolution.

PRE LAB

OBJECTIVES:

- 1. Defining classification.
- 2. Classifying buttons.

VOCABULARY:

classification taxonomy

MATERIALS:

buttons metric ruler kit worksheet

BACKGROUND:

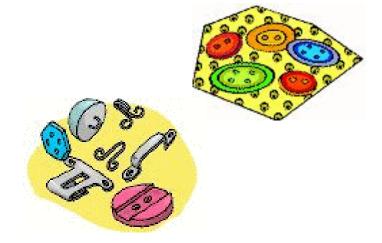
Organizing (classifying) data is one of the most important skills of a scientist. However, you organize "data" on your own every day whether you are a scientist or not. You probably sort your clothes into drawers, separate your homework by subject and keep your desk clean by separating paper from pencils and pens. There are many different ways to organize data. Some ways work better than others depending on the items to be organized. Words in a dictionary are organized alphabetically, and this makes it very easy to find a word. But what would happen if the local supermarket was organized alphabetically? Chaos, for not only the shopper but the store merchant.

PROCEDURE:

1. This exercise could be assigned as a homework assignment or you might want to have the children bring to school some buttons that no one is using. This classification exercise has the students carefully choosing characteristics that might help them group the buttons together faster. Biologists and paleontologists call these characteristics "keys," which help group organisms into major groups fairly quickly.

2. In the post lab, students will compare classification with taxonomy (the science of classification). This exercise is intended to have students develop logical, realistic, and useful characteristics as they separate their groups.

Students use buttons to classify.

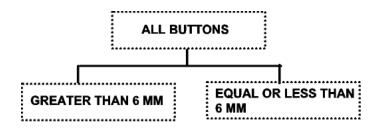


1. You are going to make a "sorting machine" on paper to organize (classify) your buttons. You may have seen a similar "machine" at a bank or a fair which separates coins poured into the top. This machine organizes coins by size.

2. You are going to draw a picture of your machine on the back of this worksheet. It will be a classification tree for buttons.

3. First you must make a list of the key characteristics for the buttons. Size might be one. List some other characteristics, but be specific. For example, buttons that are greater than 6 mm but less than or equal than 6 mm. Make sure you are realistic with your buttons. If you don't have any bottoms that are less than 6 mm, you should not separate them. You need more than just size.

4. Your tree might look like this to start with.



Each time you separate a group of buttons they can be divided into two more groups based on one characteristic (such as "blue and not blue") for the third branch.

5. Continue branching until each button (or group of identical buttons) has its own box.

6. Your instructor will test your machine with one button to see if it can find its home box when dropped in the top of your machine.

CONCLUSIONS: Why is it important to organize information? Does classification help identify an object? How?

LAB

OBJECTIVES:

1. Comparing bacteria, fungi, algae, and protozoa.

2. Exploring the lower kingdoms.

VOCABULARY:

bacteria fungi microbe protozoa

MATERIALS:

pond water or aquarium water microscope microbes (enclosed sheets) mushroom (fresh) petri dishes (recommended) worksheets

BACKGROUND:

Students look at pond water

using the microscope.

This lab will help students develop a better understanding of characteristics of organisms belonging to Monera, Protista, Plantae, and Fungi. Many of the smaller representatives of these groups are called "microbes."

The Monera are single-celled organisms that do not possess a true nucleus, they are presently divided into two large Kingdoms, the Eubacteria and Archeobacteria. They are divided into these groups dependant on their nuclear structure. Their nucleus has no outer membrane and the cell is called prokaryotic. All other living organisms are eukaryotic, which have a membrane surrounding the nucleus.

Monera (sometimes referred to as bacteria or blue green algae) are microscopic. They are either autotrophic or heterotrophic. An autotroph is an organism that can build its own food from "chemicals" like carbon dioxide and water. Monera that do not make their own food are heterotrophic and must seek a supply of food. Heterotrophs depend on tissues, remains, and wastes of other living organisms for food. Bacteria come in 3 different shapes. Bacillus are rod shaped, coccus are spherical, and spirillum are spiral. Bacteria reproduce by asexual means, usually by dividing. Bacteria can be found just about everywhere, they are in air, water, inside you, outside you, in the frozen Arctic and even in hot springs.

Some bacteria are responsible for food spoilage, and others are useful in changing food to a different desirable flavor or consistency such as in making cheeses. High temperatures kill most bacteria and this knowledge led to the discovery of pasteurization or the heating of milk to kill any bacteria that would lead to spoilage. Canning food or heating food and sealing it in air tight container also prevents spoilage. Cooling bacteria slows down their decomposing action and this led to the use of refrigeration and freezing to retard spoilage.

Blue-green algae or cyanobacteria, unlike some bacteria, undergo photosynthesis. They carry on cell division and respiration. Some are harmful in that they may add to the pollution of lakes and rivers by their rapid growth, but most are benign. Cyanobacteria are one of the most primitive organisms found in the fossil record, making massive mounds 600 million years ago (stromatolites).

The Kingdom Protista are single-celled organisms that have a true nucleus (eukaryotic). Protista may be either autotrophic or heterotrophic. Movement by protists is dependent upon certain physical characteristics. Some protozoa have pseudopodia which can extend the cell membrane and push forward or surround a food particle, such as an amoeba does. A protist that possesses a single tail-like structure is called a flagellate. The flagellum will beat back and forth and propel the organism through the water, examples are trypanosome and trichosomes. Some Protozoa are covered with tiny hair-like structures called cilia which move back and forth quickly propelling the organisms through the water. A paramecium is an example of a ciliate. Some Protozoa have axopodia, or pencil-like structures, that help them to be planktonic or floaters in the water. Radiolaria are marine examples of protozoa containing this feature.

There are many debates about whether protozoa are all one-celled organisms or whether they are all one-celled organisms that are heterotrophs. Scientists who study these groups, debate on how to classify some of these organisms, like euglena and dinoflagellate. With more study these groups will be better understood.

Most protozoa are helpful in that they are important in lower levels of the food chain. They provide food for living things such as snails, clams, and sponges. Some protozoa are capable of causing diseases in humans and other animals. Some diseases caused by protozoa in humans are malaria, black fever, sleeping sickness, and some types of diarrhea.

Organisms found in the Fungi Kingdom are heterotrophic. Fungi obtain food by decomposing anything that is organic in nature. Fungi live everywhere. They grow best in warm, moist places. They are not green and do not possess chlorophyll. Fungi can grow on vegetables, bread, meat, fur, wood, leather, or anything that is in a warm and moist area.

Fungi that obtains nutrients from non-living organic matter are called saprobes. Other fungi obtain nutrients directly from a living host, these are parasites. In either case, the fungi secretes enzymes that allow digestion to take place outside of the fungal body. Nutrients are then absorbed across the cell membranes. Together with bacteria, fungi are the decomposers of the earth. Fungi include yeast, bread mold, and mushrooms.

Fungus itself is made up of a fungal body or what is called mycelium. The mycelium is a mesh of filaments that branch out in any direction living over or within the organic matter. Each filament is a hypha. Hypha are transparent thin walled tubes.

Fungi reproduce asexually through the formation of spores, through fragmentation of the mycelium or by budding. Some reproduce sexually through the formation of male and female gametes.

The organisms from the Plantae Kingdom are different from the other groups because they photosynthesize or create their own food from light. The algae are a group of water plants. They range in size from large (kelp) to microscopic (algae). The microscopic group that you will encounter in pond water will belong to some type of algae.

PROCEDURE:

1. During lab students will look at examples from the different groups. Have pictures available of different microbes so they can compare and contrast.

2. If you are looking at pond water, use the enclosed pictures of the possible different groups that students may see. The Swift GH with a 2.5X objective will only see the largest of these. If you have a 4X or 10X objective you will be able to see more. Use the list that can be found after the pictures of where these organisms belong.

3. Marine water also is home for many protozoa and microscopic algae. If you live near a marine environment you may want to sample and compare.

4. Prepare the following materials for students to observe and record on their lab sheet.

PROTOZOA

If you have an aquarium or have pond water, the students can look at live specimens which are much more exciting. You can use the Swift GH on the aquarium by taking the base from the microscope, putting on the 10X objective and putting the microscope right on the glass of the aquarium. Focus on the slimy surface of the glass and you will be able to see protozoa eating, playing and reproducing!

FUNGI

Cut a fresh mushroom in thin slices. Students should be able to look at the entire cross section with the microscope.

MONERA

The only "bacteria" that the students may see in pond water are the cyanobacteria which include Oscillatoria. Other bacteria require at least 100X or higher magnification.

ALGAE

The Plantae Kingdom also has representatives in the micro world. Plants are

different from the other groups because they can create their own food through photosynthesis. Small algae are found in fresh and salt water. The most common in both environments are diatoms. The Swift GH with a 2.5x objective cannot distinguish individual diatoms. However, diatoms like to "clump" together. The clue is that they would have a greenish-brown tint.

5. The most important part of this lab is for students to realize that there are many types of microorganisms. These microorganisms live in many different environments. Some of these organisms may be microscopic; others can be seen with the naked eye.

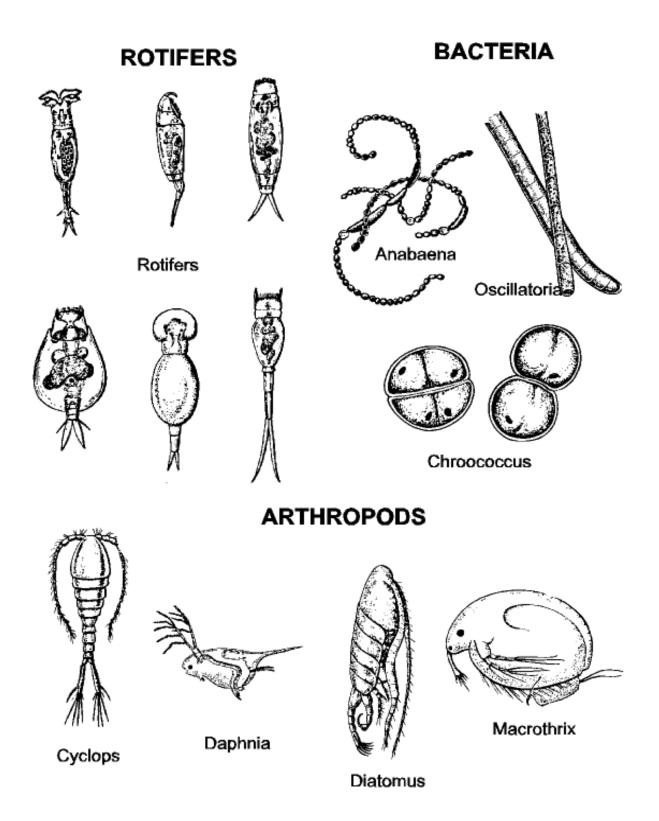
PROBLEM: How can you distinguish different microbes?

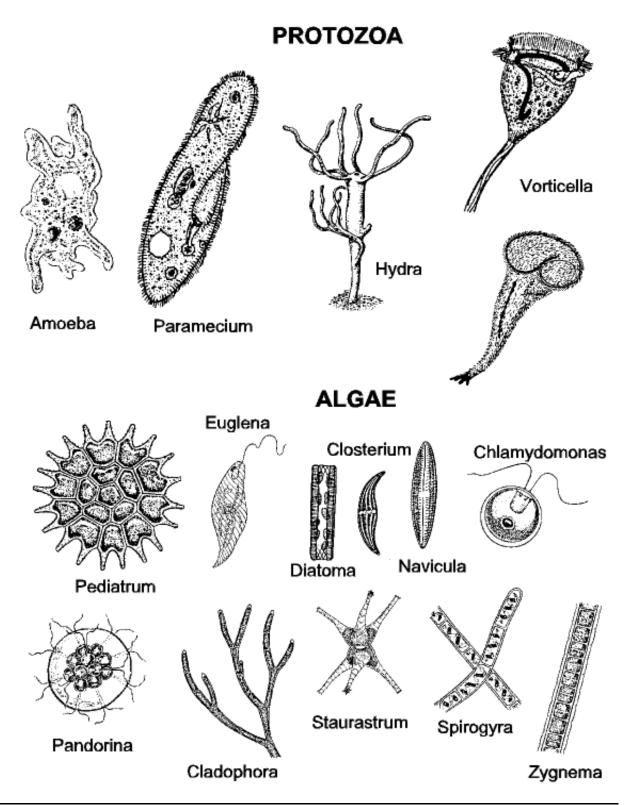
PREDICTION:_____

MATERIALS: slides, pond water, microscope, pictures of microbes found in fresh water **PROCEDURE:** Look at the slides that your instructor has prepared for you and the mushroom. Draw what you see. After you look at the prepared slides, look at live material with the microscope. Your teacher will give you instructions. Draw what you see on the back of this lab sheet.

BACTERIA	PROTOZOA
PROTOZOA	MUSHROOM

CONCLUSIONS: What differences did you observe among bacteria, protozoa, and fungi?





POST LAB

Students research a large group and give an oral report.

OBJECTIVES:

- 1. Evaluating the kingdom classification system.
- 2. Comparing classification and taxonomy.

VOCABULARY:

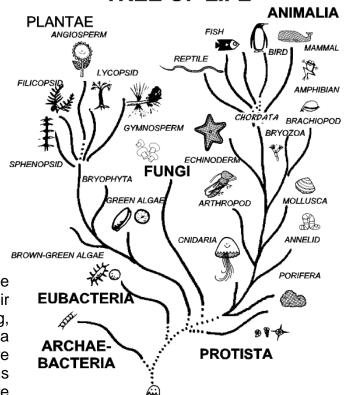
classification kingdom morphology taxonomy

MATERIALS:

reference books internet worksheet

BACKGROUND:

Classification is one of the processes used by scientists in their search for explanations. In classifying, things that are similar with respect to a given feature or set of features are grouped together. Classification systems used to place things in a group are



TREE OF LIFE

determined by humans. Thus, there may be many types of groupings. Early classifiers of plants and animals grouped them in entirely different ways from how they are classified today. Classification is a means of organizing knowledge. This process often indicates order where order does not appear to exist. Classification of living things is useful in learning to identify organisms and in acquiring insight into the relatedness of living things.

Classification is important in science because it attempts to discover order in a chaotic world. Classification itself is not a science, only logical divisions to arrange things so that they can be easily identified. Not all characteristics can be used to classify an organism, however. For example, librarians could classify books in two groups, large and small, but this would not help a person to locate a specific book.

Taxonomy is the science of classification, and is usually restricted to biology and paleontology. Taxonomic relationships try to find those characteristics that are natural and of some significance. Modern taxonomy depends upon organisms that reproduce through

time. The basic method of taxonomy is to compare and weigh the characteristics of the structures of plants and animals by comparative anatomy or genetic coding. The most recognizable taxonomic unit is a species. The other arrangements include: Kingdom, Phylum, Class, Order, Family, Genus, and Species. Organisms change through time. Many times it can take only a change in one gene to create a different morphological creature.

PROCEDURE:

1. Nature sometimes does not fit into nice little groups. It is important for students to realize that biologists, zoologists, and paleontologists have not been successful in defining and grouping all organisms. Students by this time should have developed a sense of the different types of organisms. Have students research on a particular organism and have them give an oral report to the class.

2. Using the internet and/or library have the students research and write a story about one group of organisms. It could be any representative of the 6 Kingdoms. The worksheet may help guide the student get information.

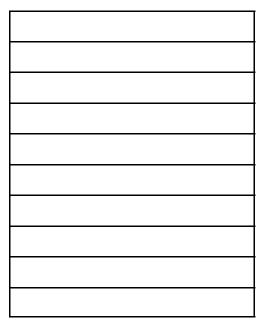
3. Discuss with students that in their oral report they should address where the organism is classified within the Kingdom system. Students should explore why the organism has been classified in that manner. They should discuss the eating habits, reproduction, habitat, life cycle, and the physical structure of the organism.

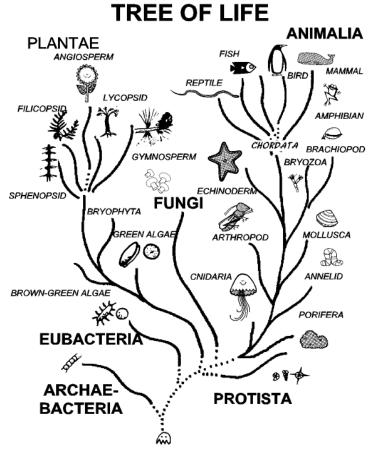
4. If you have scheduled enough time, have students give an oral report. Other students should be taking notes as their class mates give information. By the end of all the oral talks, see if students can find those characteristics that classify the organisms into the 6 kingdom system. They should conclude that eating habits and sexual habits delineate their kingdom. The physical structure helps to classify them into their subgroups, which on this kingdom chart refers to phyla. Make sure that within the class, representatives of the different phyla are included.

ORGANISM TO STUDY:

What kingdom does it belong to?

Information:





PRE LAB

OBJECTIVES:

- 1. Exploring how food gets rotten.
- 2. Discovering how mold occurs.

VOCABULARY:

mold rot spore

MATERIALS:

Lots of Rot by V. Cobb (Harper) worksheet of rot

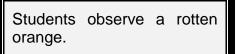
BACKGROUND:

How many times have you looked for an orange to eat and found that the last one left had grown soft, blue-green fuzz? Have you ever left a wet towel at the bottom of your clothes hamper and at the time of washing you found that it had green "freckles" all over it? Or how many times have you found bread that has gone stale and has grown black "whiskers?" The green fuzz on the orange, the green freckles on the towel and the black whiskers on the bread are all known as molds. Molds are really tiny fungi belonging to one of the 5 kingdoms. "Molds" are a term that is not really a natural grouping, but until scientists figure out exactly where they belong, we will consider them fungi. Molds are so tiny that we cannot see them unless there are many of them bunched together. To see just one mold you need a microscope. There are many kinds of molds. One of the most common molds is the one which turns oranges into green fuzzy balls. It is called penicillium. This is where the drug penicillin comes from.

Plants use sunlight to make food in their leaves. The green coloring matter acts as a kind of food factory. Molds have no food factories, so they take the food they need from their host. All molds are food robbers.

Foods will eventually rot if not kept cool or not eaten within a certain time unless frozen. The more time food stays around the more of a chance spores from a mold have of landing on it and growing. A spore is the reproductive part of the fungi.

Wherever there is food, air, and moisture, some mold spores will find their way there to settle and begin to grow. If a spore doesn't find the food, air or moisture it needs to grow it does not die. It just waits. It can remain alive for years in its case, waiting for the right conditions to burst open and grow.





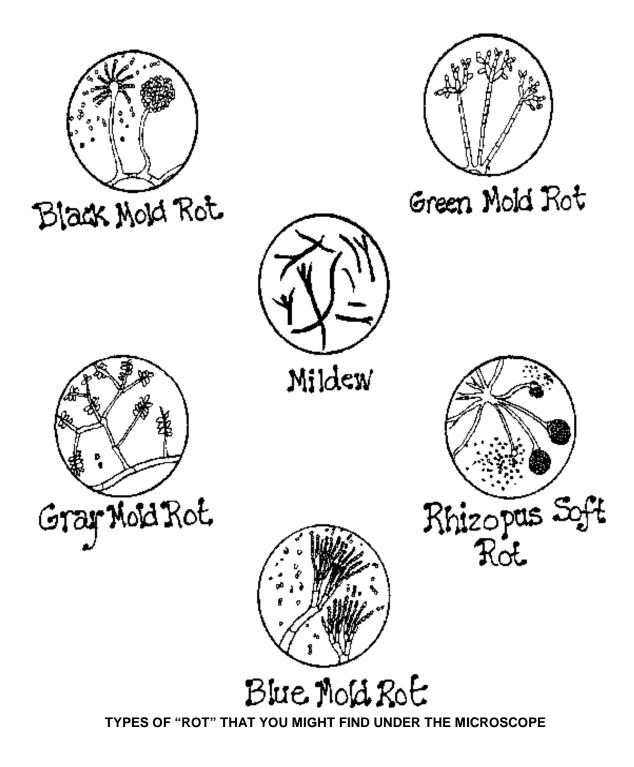
PROCEDURE:

1. Review with students the different kingdoms and their characteristics. You may want to review some of the lower grade material if your students have not developed a feeling for the diversity of life. In this unit, students will look at organisms that they see, but rarely think about as being living.

2. In a large zip lock bag, place a fresh orange and a "molded" orange and then seal the bag. In another bag, place another molded orange and seal the bag. Place a fresh orange besides the bag with only the molded orange. Place both sets in separate dark, warm areas in the room. Have students predict which will grow mold first. You may want to put other materials next to the bags and observe what happens. For example can plastic become infected or can different types of bread get moldy faster than others?

3. Use the worksheet for students to identify the types of rot they discovered. *Lots of Rot* can also help students identify what they have found.

WHAT KIND OF ROT DO YOU HAVE?



LAB

OBJECTIVES:

- 1. Discovering why food rots.
- 2. Exploring different forms of organisms that are not seen everyday.

VOCABULARY:

fungi mold rot

MATERIALS:

Swift GH 4 samples of bread

BACKGROUND:

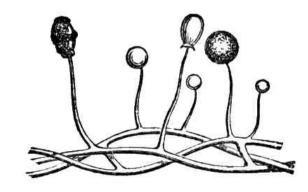
There is a world of tiny living things called microbes, which live all around us. They are almost everywhere and on almost everything you can think of. They're in the air, the water, the soil, your food, your clothes, on your hands, even on your desk and pencil! Microbes are small, too small for us to see with our eyes. People who study microbes use microscopes to see them.

Certain microbes cause disease, but they make up a very small part of the whole microbe population. Most are harmless, in fact, about one in every thirty thousand are likely to cause disease. Two of our most common drugs, penicillin and streptomycin are from the activity of certain microbes. The word microbe comes from two Greek words *Mikros* meaning small and *Bios* meaning life.

This lab will focus on molds, which belong to the Fungi Kingdom. Molds can grow in both hot and cold places but they grow best in warm places. The colder it is the slower they grow. This is why foods get moldy more in the summer than in the winter. Molds also like damp places such as a damp towel left at the bottom of the clothes hamper. Molds also grow well on damp wood or soggy paper. Ask students why we put food into a refrigerator. To keep the food from spoiling we must put it where molds don't like to grow, in the coldness of a refrigerator. To keep foods fresh for a longer period of time we put them in the freezer, where molds do not like to live.

PROCEDURE:

1. PRIOR TO LAB: Place a piece of bread into the bottom of a shallow dish. Moisten the bread with a little water using a dropper. Don't soak it! Allow it to stand open to the air for 45 minutes. Cover it and leave in a warm, dark place. About 1 week prior to lab, start a few molds, then 2 days after start another group, and then a third group 3 days before the lab begins. You should have bread that is 1 week old, and 5 and 3 days old for



Students compare fungi growth

over several days.

students to observe. Include a fresh piece of that same brand of bread. Also include any other food item that might be molding.

2. Set your molds out for students to observe. Make sure you label how old the molds are. Students should observe different stages of mold growth. Thin, transparent threads growing all over the slice of bread are a mold garden. The cluster will look like a tangled spider web. If you single out one of the threads and observe it with a microscope you will see many branches of threads. At the ends of some of these branches are little round balls. These balls are hollow round cases and each one is filled with tiny seeds called spores. The spores are the mold's seeds. In a 2-3 day old mold you will begin to see the spores on the garden. The spores are the black substances sitting on top of the threads. Each black ball or spore contains more than 20,000 smaller spores of their own. The threads and their cases have no color but the spores within the cases are all colored. So mold plants have no color, their spores make them appear to have different colors. The 3-4 day old mold should have produced hundreds of millions of new spores. Later they may fall on moist food left out somewhere, sprout threads of their own, and give rise to new spores.

3. ADDITIONAL EXPERIMENTS WITH MOLDS

Have children save a piece of something from lunch and set these foods out on a clean sheet of paper. Let them stand for 45 minutes in the open and then cover each of the foods with a dish. In a period of a day or two observe what happens. Molds grow best in foods that have a large amount of sugar or acid such as fruit, fruit juices, jellies, and oranges.

Select a certain food and put it in different areas to grow. Again allow it to stand in the open uncovered for 45 minutes and then cover. Areas selected should include light, dark, moist, dry, cold or hot conditions. Observe and see what happens. What do you think?

A piece of Roquefort or Blue cheese has green spots all over. These spots are mold spores called penicillium molds. Touch a toothpick to the green blue cheese mold and transfer it to a piece of bread and an orange slice. Don't forget to moisten the bread a little. Cover both soon after transferring mold. Which grew mold and why?

PROBLEM: How does food rot?

PREDICTION: _____

PROCEDURE:

MATERIALS: MICROSCOPES, 1 week, 5 day, and 3 day old bread Look at the different molds. Draw what you see using a microscope.

FRESH	3 DAY
5 DAY	1 WEEK

CONCLUSIONS: What are the differences among the 4 pieces of bread? Where did the mold come from?

POST LAB

OBJECTIVES:

1. Classifying characteristics of different organisms.

2. Writing a creative story for children using organisms as a theme.

VOCABULARY:

kingdom phylum

MATERIALS:

worksheet examples of children's books

BACKGROUND:

Creative writers are usually knowledgeable about their subjects, even if the story is fictional. Describing characters realistically adds to the reality of the book. Writers must convince a reader that the characters are real, even in fantasy. Dr. Seuss, a well known writer of *Cat in the Hat, Green Eggs and Ham, Lorax,* and hundreds of other books was able to make fictional animal characters relay a story with a societal meeting. For instance, in the Lorax, Dr. Seuss creates a fictional land and talks about its destruction by harvesting all of its natural resources. The message is environmental, without Dr. Seuss even mentioning the environmental problems on our Earth caused by humans.

PROCEDURE:

1. Many authors must have a knowledge of their subject before they can write an interesting story. This exercise is for students to look at some science children's books and see if they can create a book of their own. Notice that most books have a writer and an illustrator. You may want students to team up to create a book.

2. Also you might want to set up teams of students to produce one book. Students get the wrong idea when they see a book by one author. They sometimes don't realize that writers must research even the "easiest" book. The craft of writing is similar to science in that you must logical think of how the plot will progress.

3. You may want to use the worksheet to try and get students to visualize a story. The worksheet can help guide students to think of how to develop a plot.

4. Then use the character worksheet to help students who cannot draw, to pick a



Students write a creative story

on organisms.

picture and write a story around that picture. For example the turtle with a soccer ball as a shell could be a story about how the turtle helped his team win a soccer match. But then he realized that this was cheating and had to confess and make the game go to the real winners. Just something silly, but enough to get the students to think about creating a story.



LIFE CYCLE - ORGANISMS (6B) POST

DEVELOPING A PLOT FOR CHILDREN'S STORY

SUBJECT	 	
AUTHOR_		

CHARACTERS

PLOT OF STORY

THE STORY WILL OPEN AS:

THE MAIN CHARACTER WILL ACCOMPLISH WHAT?

WHAT WILL THE ENDING BE LIKE?

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LIFE CYCLE - ORGANISMS (6B) POST

