

## **FUN WITH FUNGI IN THE CLASSROOM**

*The Good, The Bad, and The Ugly*

**Developed by: Rebecca L. Collier** (<http://bellnetweb.brc.tamus.edu/fungus.htm>)

### **Summary:**

This unit of study is to familiarize students with the beneficial as well as detrimental attributes of fungus.

### **Time:**

This unit can be extended for two weeks of study.

### **Season:**

This unit of study can be used any time of the year.

### **Background Information:**

Fungi are non-green plantlike organisms that don't move from place to place. The singular of fungi is fungus. A fungus is a plantlike living thing that does not contain chlorophyll. Some fungi, such as yeast are one-celled. Others, such as mushrooms, are many celled. Unlike plants, fungi cannot make their own food, but must take in food to get energy to live. Some fungi get food from things that are dead while others are parasites. A parasite is an organism that gets food from and harms another living thing.

Lichens are a result of a partnership between fungus and algae. Lichens are described as single organisms that are found on barren rocks and soil. Lichens can grow where nothing else could possibly survive, and where neither fungi nor algae could exist alone. Lichens can help scientists in determining air quality as well as be destructive to human structures. Lichens are able to live in cracks of old stonework working their way deeper and deeper into the stone making large chunks fall away in the process.

Fungi are classified in their own kingdom since they do not have chlorophyll and cannot make their own food. Fungi secrete enzymes, which digest food found outside the organism, and then the fungi absorb the resulting nutrients. Mushrooms, molds, yeast and mildews are all a part of the fungi kingdom. Fungi can be both beneficial and detrimental to mankind. Fungi help in the breaking down and removal of dead organic matter. Some species attack the tissues of living trees and plants resulting in many plant diseases being caused by parasitic fungi. In the 1840's in Ireland, the potato blight fungus, *Phytophthora*, destroyed the potato crop and caused serious famine. Dutch elm disease, corn smut, and wheat rust are examples of other fungal diseases that attack plants.

Some fungus can be eaten safely, while others are poisonous. Penicillin, which is produced by the sac fungus *Penicillium*, is used as an antibiotic to fight disease. Allergy medications and cortisone are products of fungi as well. Yeast, used in the making of bread and wine, bleu cheese and yogurt also contain beneficial fungi.

Infectious fungi cause ringworm and athlete's foot. The saying, "There's a fungus among us!" is accurate in all aspects being both positive and negative in the regenerative loop of the Earth's environment.

## **Fungus- The Good**

### *Phase 1*

#### **Materials:**

- food advertisements including all yeast products such as: breads, rolls, and pizza
- food advertisements including: Bleu Cheese, yogurt products and edible mushrooms
- empty medicine boxes that are derivatives from penicillin
- photos of decaying logs, mushrooms and lichens

#### **Objective:**

Students will understand the fungus can be good for people and the environment.

#### **Procedure:**

### *Phase 1*

Have students look at all of the products and try to brainstorm what they have in common. Write student ideas on the board or overhead. Discuss their answers allowing all students to share their ideas. The underlying feature will be all products contain fungi which can be good for people and the environment. Explain what a fungus is referring to the aforementioned background information at the beginning of this unit of study.

### *Phase 2-Can Yeast Eat?*

#### **Background Information:**

Yeasts are one type of sac fungi that vary in shape among species and even within a species. They can resemble a circle, an oval, a rectangle or a long cell. Unlike most fungi, yeast are single-celled organisms. Yeasts often form long chains with the spores being produced in tiny enclosed tubes, or sacs.

#### **Materials:**

- yeast
- warm water
- sweeteners such as: maple syrup, sugar, artificial sweetener, brown sugar, corn syrup and honey
- separate graduated cylinders for each type of sweetener
- a balloon
- 2 teaspoons
- 1 cup measure

**Objective:**

Students will understand that yeasts are a fungi that uses sugar or other natural sweeteners for food. Students will recognize that carbon dioxide is a bi-product of yeast as it grows.

*Procedure #1*

- Measure 1 cup of warm water into a graduated cylinder.
- Dissolve a teaspoon of one sweetener into the water.
- Add one teaspoon of yeast to the water.
- Measure and record the growth of the yeast over 15 minutes time.
- Continue the experiment until all sweeteners have been used . Determine what sweetener helped the yeast grow the most carbon dioxide bubbles.

*Procedure #2*

- Measure 1 cup of warm water into a graduate cylinder.
- Dissolve 1 teaspoon of molasses into the water.
- Add one teaspoon of yeast to the water.
- Stretch a balloon over the mouth of the graduated cylinder.
- Experiment to see if there is enough Carbon Dioxide to partially or fully inflate the balloon.

**Questions:**

- Are there other sweeteners that could be used to test the appetite of yeast?
- Did all of the sweeteners feed the yeast?
- Is yeast a single celled or many celled fungus?
- Did the yeast grow in colonies or did it grow separately?

**Extensions:**

Explain that an antibiotic is used to kill certain disease-causing bacteria. Penicillin is an antibiotic that was first obtained from that type of mold. Have students share when they had to take a penicillin product such as amoxicillin for an ear infection to get well. Allow an orange to decay and grow penicillin fungus in sealed bag in the classroom. Explain that though this fungus looks bad, it is really good when used in medicine for both people and pets.

Bring bleu cheese to class and allow students to look at the mold with a hand lens. Students can draw the mold. Bring bleu cheese dressing to class and allow students to try it as a party dip on carrots, celery or chips.

If a bread maker is available, use make a loaf of bread without yeast for students to see. The next day, make a loaf of bread using the yeast. Compare the loaves of bread using a Venn Diagram to chart the results in size, texture, color and taste.

## **Fungus-The Bad**

*Dermatophytosis-(Ringworm)*

### **Materials:**

- colored construction paper
- glue
- scissors
- glitter
- yarn
- ribbon
- colored chalk
- white butcher paper for a vertical poster

### **Background Information:**

Dermatophytosis is a fungal skin disease commonly called ringworm. The fungus lives on the skin surface in dead skin cells. As the fungus grows, it often spreads outward in a circular pattern; hence, the name ringworm.

Fungi can be found in soil, animals, and people. A pet may acquire a fungal infection from any of these sources and may pass the infection along to other animals or people. Fungal infections first appear as one or more small areas of hair loss that may be reddened or inflamed. As infection progresses, crusts form on the area of hair loss, the patches increase in number and size, and large portions of skin may become involved.

### **Treatment:**

Clipping: Local or total body clipping may be necessary in long haired animals.

This will facilitate topical medical application.

*Medications:* Treatments include topical creams, lotions, oral medications and dip solutions. The treatment may be lengthy depending on the severity of the disease. It sometimes requires 6-12 weeks of therapy to totally rid a pet of this unwanted organism. Handle your pet as little as possible for six to eight weeks. Exposure of other animal to your pet should also be avoided if possible. Wash your hands after handling your pet.

### **Prevention:**

There is now a vaccine available that will help in the prevention of feline Dermatophytosis. In human cases, one should go to a physician and a topical anti-fungal agent will be prescribed to kill the fungus.

### **Objective:**

Many students in 5<sup>th</sup> grade have experienced ringworm from their pets or know a friend who has

had ringworm. Students need to learn what ringworm is along with prevention and control procedures.

### **Vocabulary**

- ringworm-a disease caused by fungi characterized by ring-shaped discolored patches on the skin
- germination-to cause to sprout, develop, or begin to grow
- keratin-fibrous proteins that form on the skin's epidermal tissue
- reservoir-a place where something is kept in store- a large amount of something
- environment – everything around you
- spores-the reproductive unit of fungi consisting of one or more cells

### **Procedure:**

Using the attached life cycle of the ringworm, have students create their own visual representation of the life cycle. Students can use construction paper to create a visual poster of the life cycle. The poster can be a collage of art products sequencing the life cycle of ringworm.

### **Questions:**

- What is ringworm?
- How does an animal or person get ringworm?
- Can ringworm stop growing on its own?
- How can ringworm be prevented?

### **Extensions:**

A guest speaker would be appropriate and could include a school nurse or a veterinarian to reinforce prevention and control measures dealing with ringworm. Another important and necessary topic of discussion should be about the fungus Athlete's Foot Prevention measures would best be taught during the spring before students start swimming and having to rinse off in public shower areas emphasizing the wearing of sandals in public shower areas. Emphasis on proper hygiene relating to foot care would be as well.

## **Fungus-The Ugly**

### *Molds and Spores*

#### **Background Information:**

Molds are another kind of fungus that grow on bread or fruit. Mold is made up of threadlike structures with some of the threads growing down into the bread for sustenance. Mold has spores growing on the ends of the threads. Spores are single cells that are the reproductive unit of fungi and is analogous to the seed of green plants. The fuzzy substance growing on stale bread is called sporangium fungus. Molds can also grow on dead organisms, food made by plants or people, leather, cloth, or paper.

**Objective:**

Most students have seen bread mold; however, they don't know how it forms its reproductive spores. This activity is a combination of spore recognition and growth of spores on bread.

***Spore Observation:*****Materials:**

- a mushroom
- unlined white paper
- a paper cup
- a microscope
- slides
- coverslips
- an eyedropper

**Procedure:**

- Take the mushroom and carefully examine it. The section you see is what grows above ground. Under the ground, there are rootlike extensions that feed the mushroom called mycelia.
- Take a piece of paper. Draw and label the mushroom. The gills of the mushroom look like bicycle spokes and contain the structures that produce spores. The top is called the cap; there is also a ring, stalk and cup at the base. Mycelium are the rootlike structures.
- Hold the mushroom with the cap down facing down. Take the stalk between your thumb and forefinger, twist gently, and carefully remove the cap without disturbing the gills.
- Take a sheet of white paper and place the cap on it with the gills touching the paper.
- Place the cup upside down over the cap and put it in a safe place for overnight.
- The next day, carefully take the cup off of the mushroom and remove the mushroom cap. Under the cap should be indicators on the paper where the spores fell from the gills. They will be spore "prints."
- Make a wet mount of the spores and observe them under a microscope.
- On the paper where the mushroom was drawn, draw the spores as well.

***Observing Bread Mold*****Materials:**

- molded bread with no preservatives
- a microscope
- a hand lens
- clean slide and a slide cover
- a paper towel
- a toothpick
- an eyedropper

**Procedure:**

- Observe the bread mold with a hand lens and describe its texture, color and any structures.
- Take a toothpick and scrape a tiny bit of the mold from the bread.
- Take a microscope slide, and using an eyedropper place a drop of water on the slide.
- Place the mold sample on the water drop placing the cover slide at the edge of the water drop.
- Using the microscope, have students draw and describe what they see.

**Questions:**

- Why should the bread have no preservatives?
- Where does the mold come from?
- How does the mold get food as it grows on the bread?
- What color were the spores that were observed?
- What function do the spores serve?

**Extension:**

There are many forms of fungus that are detrimental to agriculture. Corn smut, wheat rust, and potato blight are just a few that can cause economic devastation. A county extension educator could be a guest speaker bringing samples of the above fungal pathogens to show students in class. Internet research would be an invaluable tool in the study of fungal pathogens as well.

---