

# Yeasts, Molds and Mushrooms

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## Teacher's Guide

### Objectives

To demonstrate to students the beneficial aspect of fungi and to clarify the image about these group organisms, "molds are not always bad". Fungi can be friends and foes at the same time

### Segment I

- Discuss with students what they know about fungi and whether they have seen fungi and where.
- It is important to introduce the students to some vocabulary related to study of fungi (Mycology).

**simple organisms**—The smallest and simplest of all living things, some of which can be seen only by microscope. Bacteria, protists, fungi and viruses are examples of simple organisms.

**fungus (plural: fungi)**—A simple organism with cell walls and no chlorophyll, belonging to the Kingdom Fungi. Fungal cells have at least one nucleus and can fuse together to form strands or grow as single cells. Fungi digest and absorb food from their environment. Some examples of fungi are molds, yeasts and mushrooms.

**chlorophyll**—The green pigment found in plants that permits them to make their own food through photosynthesis.

**cell wall**—The protective, rigid, outer layer of the cells of plants, fungi and bacteria.

**heterotrophs**—Organisms that get their food by consuming other living or once-living things.

**hyphae**—The long strands that make up the body of a fungus. Hyphae secrete enzymes that digest food so that it can be absorbed by the fungus.

**mycologists**—The scientists who study fungi.

**spores**—The reproductive cells of fungi. Each spore has the capacity to develop into a new fungus.

**molds**—Fungi that have the simplest reproductive spores in the Kingdom Fungi. Some molds grow on people's food, making it unappetizing. Others are added to food.

**antibiotic**—A drug that interferes with the growth of bacteria. Penicillin, made by mold, was the first antibiotic.

**penicillin**—An antibiotic made by the mold species *Penicillium notatum*.

**sac fungi**—Fungi that make their spores in sacks. This group of fungi includes single-celled bread yeast and multi-celled truffles. Other types of sac fungi can harm plants and animals.

**club fungi**—Fungi that produce spores on little structures that look like clubs. These are housed in the fruiting body of the fungus, commonly known as a mushroom. Some mushrooms are edible, and some are highly poisonous.

**mushroom**—The fruiting body of a fungus, containing a cap with spore producing gills resting on top of a stalk. The purpose of the mushroom is to manufacture and release spores.

**mycelium**—The mass of tangled, interwoven hyphae that forms the main body of a fungus.

**organic matter**—Anything that is or once was alive.

**decomposers**—Organisms that are responsible for breaking down organic matter, decomposing it into a simpler form and recycling nutrients into the soil.

### Segment II

- Show students charts with different type of fungi pointing out to the overall morphologies of different fungi, namely unicellular (yeast), mycelial/mold (*Penicillium*), Club fungi (mushroom).
- Explain in brief how these fungi multiply and propagate

### Segment III

#### Making bread

##### Materials and methods

One cup Flour

One cup of warm water

½ tea spoon salt

1 teaspoon yeast

Already prepared raised doe

**Procedure:**

First mix flour, water, salt and yeast until mixture is homogeneous and bread dough becomes firm. Incubate at 37°C for 3-4 hrs. Show students a prepared raised dough and compare it to the one you've just prepared.

**Results discussion with students**

Can you see the differences between the tubes that had sugar solution and the tubes that had water only?  
Which balloon is bigger?  
Why did it become inflated?  
What does inflated balloon contain in it?  
What did the CO<sub>2</sub> do to the bread dough?

**Segment IV**

- Show students some illustrations for penicillium and discuss with them how molds can spread all over places surrounding us.
- Discuss with students the importance of yeast in making food and drugs such as penicillium in addition to other drugs such as cephalosporin (antibiotic) and cyclosporine (immunosuppressant).
- If microscopes are available. You can prepare wet mounts as follows

**Materials and methods**

Microscope slide  
Cover slips  
Forceps  
Water dropper

**Procedure:**

Using the forceps collect parts of the mold (mycelia) from either the moldy bread or orange and put on microscope slide. Then add a small drop of water to the mycelia and cover with the cover slip. Use the medium power 40X lens to observe the hyphae and spores.

**Segment V**

- Give each student one head mushroom and let them examine the small gills

**Discussion with students**

Where can we find mushrooms in nature?  
How do they feed?  
Explain to the students that not all mushrooms are edible and that some are dangerous and poisonous.

**At the end of the class you can review the material by ask the following questions**

1. Are fungi classified as plants, animals or neither? Explain your answer.
2. What characteristics do fungi share with plants?
3. What characteristics do fungi share with animals?
4. What are the three main types of fungi?
5. What are hyphae?
6. What is the mold *Penicillium notatum* known for?
7. Why are club fungi given that name?
8. What are the fruiting bodies of club fungi commonly known as?
9. Describe the anatomy of a club fungus.
10. Why is it important not to eat mushrooms found in the wild?
11. How do fungi get their nourishment? How is that different from animals?
12. What do the eating habits of fungi have to do with their role as Earth's decomposers?
13. What do yeast release when they undergo fermentation?
14. How can you tell the yeast in the bread dough produced CO<sub>2</sub>?

**Follow-up Activities**

- Encourage students to design an experiment for growing bread mold. Students can identify variables to be controlled (temperature, sunlight, dampness, fresh vs. old bread, covered vs. uncovered...) in their experiments. What conditions are the best for growing bread mold?