Mold Madness!

Globally, billions of dollars are lost every year because of food spoilage. While new advances in nano-particles of silver may help prevent some of these losses by stopping the growth of bacteria, there are other microorganisms, like molds, that also cause your food to go bad. In this activity, you'll be using bread to grow your own samples of mold and bacteria and to explore the kinds of conditions that increase the chance of spoiling!

This activity is linked to the Antibacterial Silver demonstration that you may have seen at the *Small Wonders* cart at a science museum.

Time: 15 minutes of preparation, several days for results. Parents, please supervise children. Mold can trigger respiratory problems in some children; careful hygienic practices are essential. Recommended age: 8 – 13 years old

Goals

- Observe the microorganisms responsible for food spoilage
- Identify conditions that encourage bread mold and bacterial growth

Materials

- Bakery bread[i]
- Sealable plastic sandwich bags
- Labels to identify the bags
- Water

Pre-activity

Have you ever observed mold grow on your bread, cheese, or fruit? What does it look like? Does it always have the same color and shape? Where do you keep the food that spoils the most often? When your food spoils, there are two different kinds of microorganisms that are responsible: mold and bacteria. These microorganisms grow in clusters called *colonies*, and when you intentionally grow them, it's called *culturing.* Many different types of scientists, but especially microbiologists, use culturing techniques to study bacteria, mold, and cells!

Question: Under what conditions does bread spoil? Does it depend on temperature, light, moisture, or some other condition?

Activity

- In this activity, you're going to be growing organisms that can make us sick or contaminate our food; it's very important to always wash your hands before and after handling the experiments and to never directly touch the mold. So, go wash your hands!
- If the bread isn't already cut, have someone help you to slice it into equal size pieces. Try to keep the pieces the same width.
- In the table below, some ideas have already been listed for where to place your different slices of bread. Are there any other locations or conditions you would like to test? If so, write them into the boxes provided.

Conditions	Is there anything growing?						
	Day 1?	Day 2?	Day 3?	Day 4?	Day 5?	Day 6?	Day 7?
Dry & Room Temperature							
Dark & Damp							
Light & Damp							
Dark & Dry							
Light & Dry							
Damp & Cool							

- Now it's time to prepare your experiment. Take a sandwich bag for each row in your table above (at least 6). Label the bag with the date you started the experiment and the kind of place where you are going to put it.
- If the table tells you to have a "damp" condition, carefully sprinkle about 1 teaspoon of water across the slice of bread, then place it the correctly labeled bag. If the bread is suppose to be dry then it doesn't need any treatment before it goes in the bag.

- Once all of your different slices of bread are ready, seal the bags shut. In this step, it's important *not* to squeeze out all of air. Try to seal the bags so that air is trapped inside like a pillow.
- Do not open the bags back up! The mold and bacteria that you're trying to grow inside can make you sick!
- After setting up all of your bread baggies, leave them overnight. Come back and make your observations in the chart above
- Keep on observing your bread cultures for a week. Which samples grew mold? What did that mold look like?
- If you like, this is a great online site for trying to identify the molds that you grew: http://www.doctorfungus.com . **Just remember: don't open the plastic bag!**

Connection to Nano-silver

Nano-silver particles are used in many different products to prevent food spoilage and bacteria growth; however, as this experiment demonstrates, there are many other microorganisms that can cause food spoilage that Nano-silver does not prevent.

Extensions

After you've determined the best places in your house to grow mold, you can conduct other experiments to see the microorganisms in your house or school. To collect a sample, gently rub a Q-tip in the location you're studying (doorknobs, keyboards, or bathrooms work well). Then, gently drag that Q-tip in a zig-zag pattern across the top of a dampened piece of bread. Put the bread slices into their individual bags, label the bags with where the sample was collected from, and wait like you did in the above activity. Don't open the bags when you are finished! What's the dirtiest place you can find?

Vocabulary

Mold: A type of fungus that, like all fungi, resembles a plant but cannot make its own food.

Colony: A visible growth of microorganisms, like bacteria or mold.

Culturing: A set of techniques designed to intentionally grow microorganisms.

References

Doctor Fungus. (2009). *Introduction to Fungi*. Retrieved May 10, 2009 from http://www.doctorfungus.com/thefungi/index.htm
Food and Agriculture Organization of the United Nations. (2008). *New Stories.* Retrieved May 10, 2009, from http://www.fao.org/newsroom/en/news/2008/index.html
Mad Sci Network. (2009). *Bread Mold.* Retrieved May 10, 2009, from http://www.madsci.org/FAQs/micro/molds.html

[i] Packaged bread contains more preservatives and so can impede mold and bacteria growth. Also, avoid sourdough bread as its acidity can affect the results.