

Good Bacteria

CONTENT STANDARD: Life Science

CONTENT TOPIC: Good Bacteria

CONCEPT: Bacteria are essential to life.

CONTENT OBJECTIVE: To identify and learn about good bacteria

INSTRUCTIONAL OBJECTIVES: The learner will:

- define good bacteria.
- list and observe the characteristics of bacteria.
- research the distribution of microorganisms.

OUTLINE OF CONTENT:

- I. Define bacteria
- II. Characteristics of bacteria
- III. Useful bacteria
- IV. Research making yogurt and bread

GOAL: To enable students to demonstrate the process of science by posing questions and investigating phenomena through language, methods and instruments of science

THEME: Observing and Explaining- The senses are used to develop an awareness of an event or object and the properties thereof.

STANDARD(S): The learner will understand that:

The human senses and technological instruments are used to gather information from the environment.

BENCHMARK Information is gathered by using human senses and various instruments such as magnifying lenses, microscopes, telescopes, thermometers, scales, and balances.

CLASSROOM CONNECTORS

TIME REQUIRED: 30 minutes

MATERIALS: jars/cups, milk, yogurt, water, sugar, yeast and balloons

SET:

Some bacteria are helpful and some are harmful. We are going to talk about some helpful bacteria. Have you ever seen dead dinosaurs in your neighborhood? Why not? Earth used to be covered with them. They should be everywhere.

There are no dead dinosaur bodies around in part because bacteria are decomposers that feed on dead plants or animals. The tissues of dead organisms are broken down into nitrogen- and carbon-containing molecules.

A decomposing animal can be pretty gross! But the next time you see a dead bird or squirrel, take a good look at it, but ***do NOT touch it!*** Then look at it again about a month later. There will be nothing left but bones. And that's what happened to the dinosaurs.

INSTRUCTION:

Kinder and 1st grade:

- Bacteria are tiny living things we can only see with a microscope
- We use good bacteria to make foods like cheese, yogurt, vinegar and chocolate.
- Good bacteria help's our bodies stay healthy by helping us digest food.
- Good bacteria make's soil useful for growing plants.

2nd-5th grades:

Bacteria eat some dead organism's molecules for food, but the rest of the molecules get mixed into the soil for plants to use for their growth. Different types of animals will eat the plants in order to build cells for themselves until they die. Then the cycle repeats itself as bacteria decompose the animals. That is why bacteria are so important to life on Earth. Without them, plants and animals could not obtain the nutrients they need to survive.

Most bacteria are harmless and offer beneficial functions to living things and humanity. Some bacteria, such as *E. coli*, live in the intestines of animals and people, helping them digest food as well as producing vitamins. Other animals (including cows, goats, deer, and giraffes) depend even more than humans on bacteria to digest their food. Billions of them live in the animal's rumens (a special type of stomach) where they break down grass and hay into nutrients the animal can absorb into its bloodstream.

Plants also need bacteria to help them get nutrients into their roots. Plants need nitrogen to build protein, but atmospheric nitrogen (which is 78% of the air) cannot be used because of its chemical properties. In the soil, and even inside the plant's roots themselves, bacteria help turn atmospheric nitrogen into protein.

Bacteria are also used in many commercial and industrial applications. Bacteria are used all the time in the food industry. Yogurt wouldn't be tangy without the help of a bacterium called *Lactobacillus acidophillus*. Yogurt is made from milk. The lactobacilli devour the milk, rich in a

type of sugar called lactose, and in the process release acid that makes the yogurt sour. The acid in the yogurt can also help preserve it because the acidity makes yogurt inhospitable to other bacteria.

The benefits of bacteria are endless. One type of bacteria eats oil and is used to help clean up oil spills. Sewage treatment plants use bacteria to purify water. And still other bacteria are sources of life-saving medicines, such as antibiotics.

ACTIVE PARTICIPATION:

(Divide the class into five groups.)

Experiment 1: Yogurt Making (NOT FOR EATING!!):

- 1) Show the students the yogurt consistency
- 2) Fill each jar or cup $\frac{3}{4}$ full with warm milk (need to prepare milk)
- 3) Add about 1 Tablespoon of yogurt to each jar and stir mixture
- 4) Cover jar with plastic wrap
- 5) Place covered jars into warm water bath and cover bath
- 6) Talk about what just happened when you added the yogurt to the milk. (The good bacteria in the yogurt will “eat” the sugar (lactose) in the milk and make more yogurt. The yogurt will change the milk into more yogurt.

Experiment 2: Making bread (or beer and wine). Note: This experiment doesn't use the bacteria microbe, instead we are using yeast which is a *fungi* microbe but, does the same thing as good bacteria. The yeast will eat the sugar in the water and make CO₂ gas as a waste product.

- 1) Show the students the sugar and yeast
- 2) Fill each jar $\frac{3}{4}$ full with warm water
- 3) Add about 1 Teaspoon of sugar to each jar and stir mixture
- 4) Once sugar is dissolved add a small amount of yeast
- 5) Cover jar with balloon
- 6) Place covered jars on tabletop
- 7) Talk about what just happened when you added the yeast to the sugar/water. This process is what makes bread “rise” and makes the little holes inside the bread.

CLOSURE:

Microbes like bacteria and yeast help keep all living things alive. Most bacteria in the world is either harmless or is good for living things.

- 1) Explain how good bacteria help's people?
- 2) Can you name some foods that use bacteria?
- 3) Draw pictures of what you think good bacteria looks like?