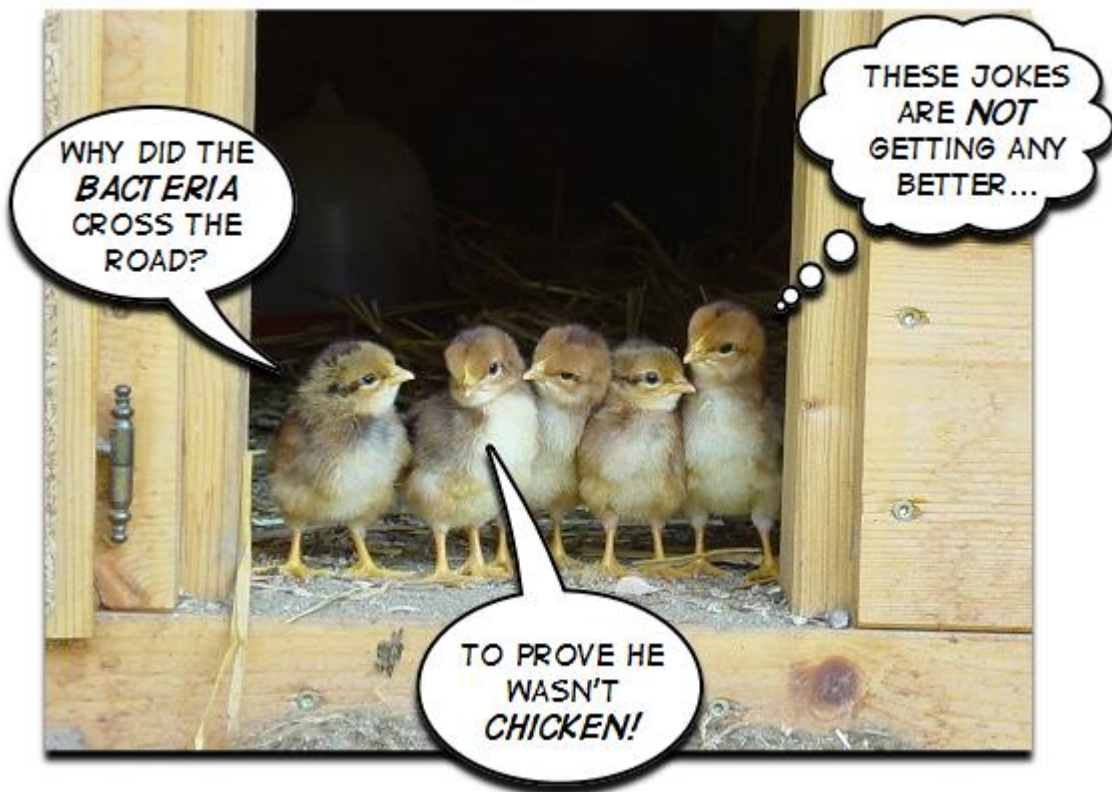


Chapter 16

Bacterial kingdoms



Day One:

Today, you and your child will:

1. Read the text
2. Review the text with your child
3. Complete the student worksheets
4. Collect the materials you will need for days two and three

National Science Education Standards covered this week:

All bacteria in the world has been grouped into two different kingdoms.

Kingdom Archaeobacteria thrive in very dangerous habitats. These organisms have been placed into three separate groups according to the habitat where they can be found. Methanogens are found in areas with high amounts of the gas, methane. Halophiles are found in areas of high salt content. Thermophiles live in areas of extreme heat.

Organisms of the Kingdom eubacteria can be found in nearly every biome of the world. These bacteria are the typical organism that humans come into contact with.

Definitions

Bacteria	single celled organisms that live in soil, water, and other organisms
Flagella	body part of a bacteria that acts like a tail which moves the bacteria through a liquid
Kingdom Archaeobacteria	"ark-ee-bak-tear-e-ah"; bacteria that live in very dangerous habitats
Methanogens	"meth-an-o-gens"; archaeobacterial named after the gas they make - methane
Halophiles	"hal-o-files"; archaeobacteria that live in very salty water
Thermophiles	"therm-o-files"; archaeobacterial that live in areas with very high temperatures
Oxygen	"ox-e-gen"; the gas humans need to breathe to stay alive
Kingdom Eubacteria	"u-bak-tear-e-ah"; common bacteria that can live in every biome of the world

Sample questions to ask your child after completing the weekly reading.

Which kingdom of organism, archaeobacteria or eubacteria, can be found anywhere in the world?

Organisms of Kingdom Eubacteria can be found in every biome of the world.

How do some bacteria move?

Some bacteria use a long, whip-like tail to move them through a liquid towards a food source.

Do all bacteria need oxygen to survive?

No. to some bacteria, oxygen is poisonous. This is especially true of methanogens and other organisms from the Kingdom Archaeobacteria.

Answers to worksheet questions:

Page 1:

bacteria

flagella

Kingdom Archaeobacteria

methanogens

halophiles

thermophiles

oxygen

Kingdom Eubacteria

Page 2:

2 - bacteria

6 - flagella

1 - Kingdom Archaeobacteria

8 - methanogens

7 - halophiles

4 - thermophiles

5 - oxygen

3 - Kingdom Eubacteria

Unit Four Review Answer Key

Fill in the blanks in the story below:

Since I am heterotrophic, I have to eat other organisms to stay alive! This is much different than plants who are autotrophic. Other organisms, called decomposers break down all kinds of biotic material into more useful forms.

Match the words in the first column to the best available answer in the second column:

- 6 - plants
- 3 - fungi
- 1 - animals
- 5 - protists
- 4 - archaeobacteria
- 2 - eubacteria

Be certain to go over your definitions for the test!

Day Two:

Today, you and your child will:

1. Review Day One using the following text
2. Run the first activity this week

The following text will give you the most important items to review for your activity today.

Growing archaeobacteria does not require expensive equipment. Most of these organisms can be found very close to home.

The growth rate of some archaeobacteria is very slow. While some species has a very fast growth rate. Patience must be practiced in order to grow these organisms.

In order to provide an environment that is suitable for some archaeobacteria, one must remove all traces of oxygen from the environment. Once this is accomplished, the archaeobacteria has an opportunity to grow and spread into this area.

Growing colorful critters

Objective:

Children will grow two kinds of bacteria in their own terrarium.

Materials:

clear tennis ball container (with the cap) or soda bottle with the top cut off

plastic wrap and a rubber band (if using a soda bottle)

mud from the edge of a shallow pond (the smellier the better)

water

$\frac{1}{4}$ newspaper page (shredded)

one raw egg

bowl

spoon

Procedure:

Remove any large objects from the mud and mix it with water in a bowl until it is can flow like a thick cream.

Put the shredded paper, the raw egg (without the shell) and about an inch of mud into the container or soda bottle and mix well.

Fill the container with mud up to an inch from the top. Cover the container and wash your hands.

Put the container in a sunny location and leave it there, undisturbed.

Every few days, briefly remove the container's top to vent off the gases. Don't forget about this step. If you do, you might find that the top can be forced off. If the mud at the top is drying out, add a little water.

It may take several weeks to get your bacteria to grow very well. When they do, you will be amazed at the colors of bacteria that you will find.

Explanation:

Many different kinds of bacteria live in mud. As these organisms continue to eat and grow, they use up their resources. One of these resources is oxygen. After several days, most of the oxygen at the bottom of the container is used up. Only the archaebacteria can live in this environment. These bacteria use the resources from the paper and the egg as food to survive.

Some bacteria are photosynthetic. So, the bacteria near the top of the container can use the light and water to make their own food in order to survive. The different environments on the top and bottom of the container allow for different colonies of bacteria to survive. You will be able to notice these different colonies by their different colors.

Day Three: Lab Activity

Today, you and your child will:

1. Review Day One using the following text
2. Run the first activity this week

The following text will give you the most important items to review for your activity today.

The production of agar plates is an important industry for a scientist who studies bacteria. These individuals are known as microbiologists.

True "agar" is developed from a plant and is used as a food source for growing bacteria. There are plenty of alternatives to create homemade food sources for the growth of bacteria.

Care must always be taken when growing bacteria, especially when there is sufficient growth on the food source. Be certain not to touch, taste or smell the food source after you begin to grow your bacteria. When you are completed, be certain to dispose the container into the trash!

Homemade microbe food: Part One

Objective:

Children will make their own agar plates and run a simple test for the presence of bacteria.

Materials:

saucepan and stove

packet of unflavored gelatin

water

sugar

beef bouillon

four foil muffin cups

muffin pan

measuring spoons

four sealable sandwich baggies

data chart (see attached)

Procedure:

In the saucepan, mix together one package of unflavored gelatin, one cup of cold water, 2 teaspoons of sugar and one teaspoon of beef bouillon.

Bring slowly to a boil, stirring constantly.

Allow the mixture to cool a little bit and pour into foil muffin cups placed inside of the muffin pan for support.

Fill each cup about halfway with the mixture.

Place the muffin pan in the refrigerator until the gelatin hardens. Remove the foil cups from the pan and place one of them in a sealable sandwich baggie. Be certain not to touch the surface of the gelatin.

Take one of the cups and run your finger all over the surface of the gelatin.

Place it into a sealable sandwich baggie.

Take another cup and lick the surface of the gelatin before placing it in a baggie.

Go wash your hands thoroughly and run your finger, once again over a different gelatin cup. Seal this one in a baggie as well.

Place all of the baggies in a warm area, but not in direct sunlight. Check on them periodically for 2-3 days.

Have the child predict which gelatin cup would grow bacteria first. They can also predict which one would have the most bacteria.

Explanation:

Commercial media for bacteria (the most common form is called agar) the glassware used to grow bacteria can be very expensive. This activity allows you to produce your own food source for growing bacteria in a moderately controlled environment. Naturally, you may have contaminated your "agar" from bacteria in the refrigerator, the baggie or your hands. Nevertheless, you should get a good collection of bacteria on each of your samples.

You should expect to find more bacteria from your tongue and your unwashed hands, than from the gelatin touched by your washed hand. The first cup was placed into the baggie as a control. This "control" is used as a gauge for the other cups. If you have a large amount of bacteria growing on your control, you should expect to see large growth in the other cups as well. You should expect to find very little, if any at all, bacteria in this control cup.

Homemade microbe food: Data chart

Gelatin cup	Contents	Prediction	Actual results
Cup #1	Nothing		
Cup #2	Dirty finger		
Cup #3	Licked surface		
Cup #4	Clean finger		

Test: Unit 4

Chapters 13-16

Match the words in the second column to the best available answer in the third column. Place the correct number on the blank line.

_____	kingdoms	1) organisms that break down biotic material into more useful forms
_____	fungi	2) common bacteria that can live in every biome
_____	cells	3) organisms made of one cell; can live in soil, water and other organisms
_____	protists	4) animals without a backbone
_____	archaebacteria	5) organisms that share traits with plants and animals and fungi
_____	invertebrates	6) a group of organisms that are autotrophic and have some form of leaf and stem and root
_____	eubacteria	7) large groups that scientists have placed all living organisms into
_____	decomposers	8) bacteria that live in very dangerous habitats
_____	autotrophic	9) smallest parts of living organisms
_____	nonvascular plants	10) being able to make your own food
_____	plant kingdom	11) plants without body parts to move water from their roots to the stem and to the leaves
_____	bacteria	12) organisms that act as decomposers and absorb their food through their bodies

Which one is right? Circle the correct answer:

1. If you are heterotrophic, you would...

- a) make your own food
- b) have someone else make your own food
- c) eat other organisms

2. Biodiversity means:

- a) all of the different kinds of animals in the world
- b) the ability to place organisms into groups
- c) all of the different kinds of organisms in the world

3. Ferns are a kind of:

- a) flowering vascular plants
- b) non-flowering vascular plants
- c) non-flowering non-vascular plants

4. Decomposers are usually found in which kingdom?

- a) fungi
- b) plant
- c) protist

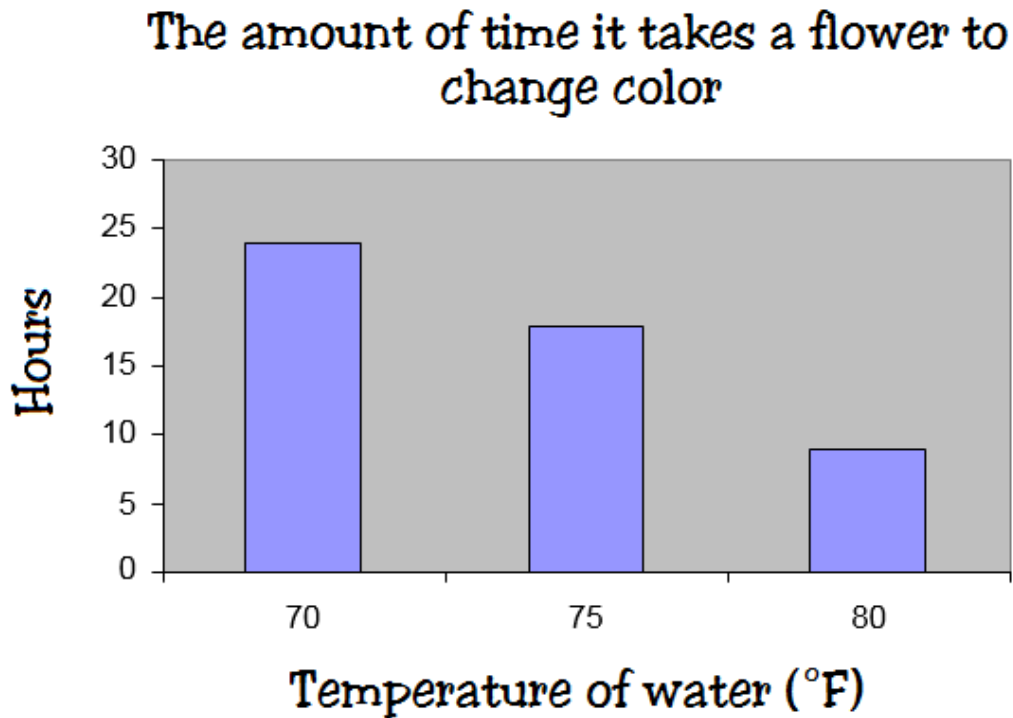
5. Protists can be...

- a) only autotrophic
- b) only heterotrophic
- c) both autotrophic and heterotrophic

6. Which sentence is true?

- a) all bacteria are dangerous to humans
- b) some bacteria are helpful to humans
- c) bacteria cannot be found in many biomes

Lane placed a white flower into three glasses of colored water. The water in each of these glasses had a different temperature. He recorded how long it took the colored water to reach the white flower and start turning it different colors. Here are his results:



Which temperature of water took the longest time to change the color of the flower? _____

Do you think that the temperature of the water has an effect on the amount of time it takes for the flower to change colors? Why or why not?

Test: Unit 4

Answer Key

Matching

7 kingdoms

12 fungi

9 cells

5 protists

8 archaeobacteria

4 invertebrates

2 eubacteria

1 decomposers

10 autotrophic

11 nonvascular plants

6 plant kingdom

3 bacteria

Multiple choice

1. c

2. c

3. b

4. a

5. c

6. b

Graph analysis

Which temperature of water took the longest time to change the color of the flower?

70 °F

Do you think that the temperature of the water has an effect on the amount of time it takes for the flower to change colors? Why or why not?

Yes, the temperature has an effect on the water.

The warmer the water in this experiment, the faster the color change.