

Composting Explorations Unit

Grade 6

Grade Level:

6th Grade

Concepts Taught:

decomposition, observation, data collection, biodiversity

Activity Time(s):

Lesson 1: Decompose This!

1 class period for set-up and initial observations

3 weeks experiment time / observation

1 class period for follow-up and analysis

Lesson 2: Deciphering Decomposers

2-3 class periods

Essential Questions:

- What is decomposition?
- What conditions need to be met in order for decomposition to occur?
- What is a microorganism and what are the different types?
- How does each type of microorganism help the decomposition process?

NC CORE/Essential Standards:

ELA: Key Ideas & Details #1-3, 7; Writing standard 2,4, 6, 7, 8; Language: 1-4

Science 6.E.2.3, 6.E.2.4, 6.L.2.1, 6.L.2.2, 6.L.2.3

Visual Arts 6.V.2.2, 6.V.2.3

Objectives:

- Students will investigate the conditions needed for decomposition to occur.
- Students will explore and identify common microorganisms found in compost.
- Students will recall the roles that decomposers play in compost.

Materials:

Lesson 1: Decompose This!

fresh leaves or grass clippings, 2 plastic re-sealable bags, soil (NOT potting soil – you may want to use soil dug from your school grounds), water, eyedropper, magnifying glasses, microscope, forceps

Lesson 2: Deciphering Decomposers

Internet / online resources, decomposer worksheet



Lesson 1: Decompose This!

Grade Level:

6th Grade

Concepts Taught:

decomposition, observation, data collection, biodiversity

Activity Time(s):

1 class period for set-up and initial observations

3 weeks experiment time / observation

1 class period for follow-up and analysis

Essential Questions:

- What is decomposition?
- What conditions need to be met in order for decomposition to occur?
- What is a microorganism and what are the different types?

NC CORE/Essential Standards:

ELA Key Ideas & Details #1-3, 7; Writing standard 7; Language standard 1 - 4

Science 6.E.2.3, 6.E.2.4, 6.L.2.1, 6.L.2.2, 6.L.2.3

Materials:

fresh leaves or grass clippings
2 plastic re-sealable bags
Soil (NOT potting soil)
water
eyedropper
magnifying glasses
Microscope
forceps

Objectives:

- Students will investigate the conditions needed for decomposition to occur.
- Students will explore and identify common microorganisms found in compost

Procedure:

1. Provide students with a small sample of fresh leaves or grass clippings to be divided into 2 plastic re-sealable bags. Have students punch 2 small holes near the top of each bag and, using an eyedropper, add a few drops of water to each bag.
2. Have the students take one of the bags and label it "No Soil." Then have them add a small amount of soil (1-2 Tbsp.) to the other bag and label that bag "Soil."
3. Set bags aside for 3 weeks, adding a few drops of water to each bag every few days or as needed. Do not allow contents to dry, but they also should not be sopping wet.
4. After the third week, have students open the bags and dump contents out onto 2 separate clean, white surfaces.
5. Using forceps and magnifying glasses have students search through each pile for microorganisms.
6. Provide students with a microscope to further analyze any microorganisms found.
7. Discuss with students the following:
 - a. **Did decomposition occur more rapidly in one of the bags? How could you explain this?**
 - b. **Were more microorganisms found in one of the bags? If so, which one?**
 - c. **Where did the microorganisms come from?**
 - d. **How would the number of microorganisms change if the bags were left for another three weeks? How can the variety of microorganisms be explained?**

Extensions/Modifications:

Repeat the above experiment, adding objects such as paper or a small piece of plastic to each bag to check the rates of decomposition of these objects



Lesson 2: Deciphering Decomposers

Grade Level:

6th Grade

Concepts Taught:

decomposition, observation, data collection, biodiversity

Activity Time(s):

2-3 class periods

Essential Questions:

- What is a microorganism and what are the different types?
- How does each type of microorganism help the decomposition process?

NC CORE/Essential Standards:

Visual Arts 6.V.2.2, 6.V.2.3,
Writing Standard 2, 4, 6, 8;

Materials:

Internet / online resources
Decomposer matching sheets (included)

Objectives:

- Students will explore and identify common microorganisms found in compost.
- Students will understand the roles that decomposers and detritivores play in compost.

Note: *(Decomposers, such as mushrooms, get their nourishment from leaf litter or decaying matter. Detritivores are animals that eat decaying organic matter (leaves, bark, trees, etc.) such as earthworms or beetles.)

Procedure:

1. Provide students with template sheets that list the names of the following decomposer / detritivore microorganisms commonly found in compost: actinomycetes, bacillus, saprophytes, protozoa, rotifer, and nematode.
2. Students should choose or be assigned one of the microorganism names.
3. Without using any prior knowledge or images students should use imagination and creativity, then develop a written and artistic description for the chosen microorganism. Written descriptions should include what role they think the microorganism plays in the compost pile.
4. Then using the Internet and/or online encyclopedias, have students find factual information about the chosen microorganism and prepare a brief report. Students should include a picture or sketch of what the microorganism actually looks like.

Extensions:

Have students prepare a display or presentation based on their creative written and artistic compost microorganism description OR their brief factual report.

Have students write a skit, based on the roles that each microorganism plays in the compost pile.

As a follow-up activity: cut apart the pictures, names, and descriptions of compost microorganisms printed on the following pages. Then have students match each name and description to the correct picture.



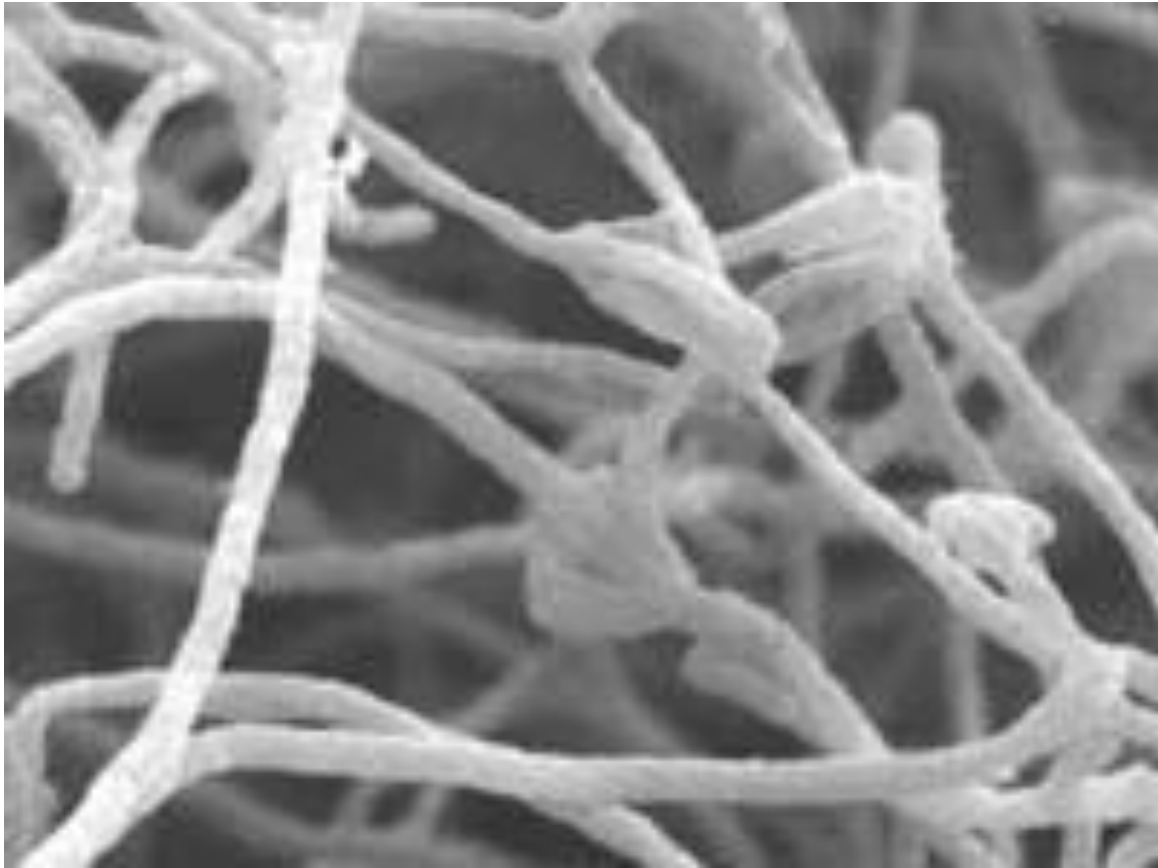
Composting in the Classroom

Name _____



Name of organism: _____

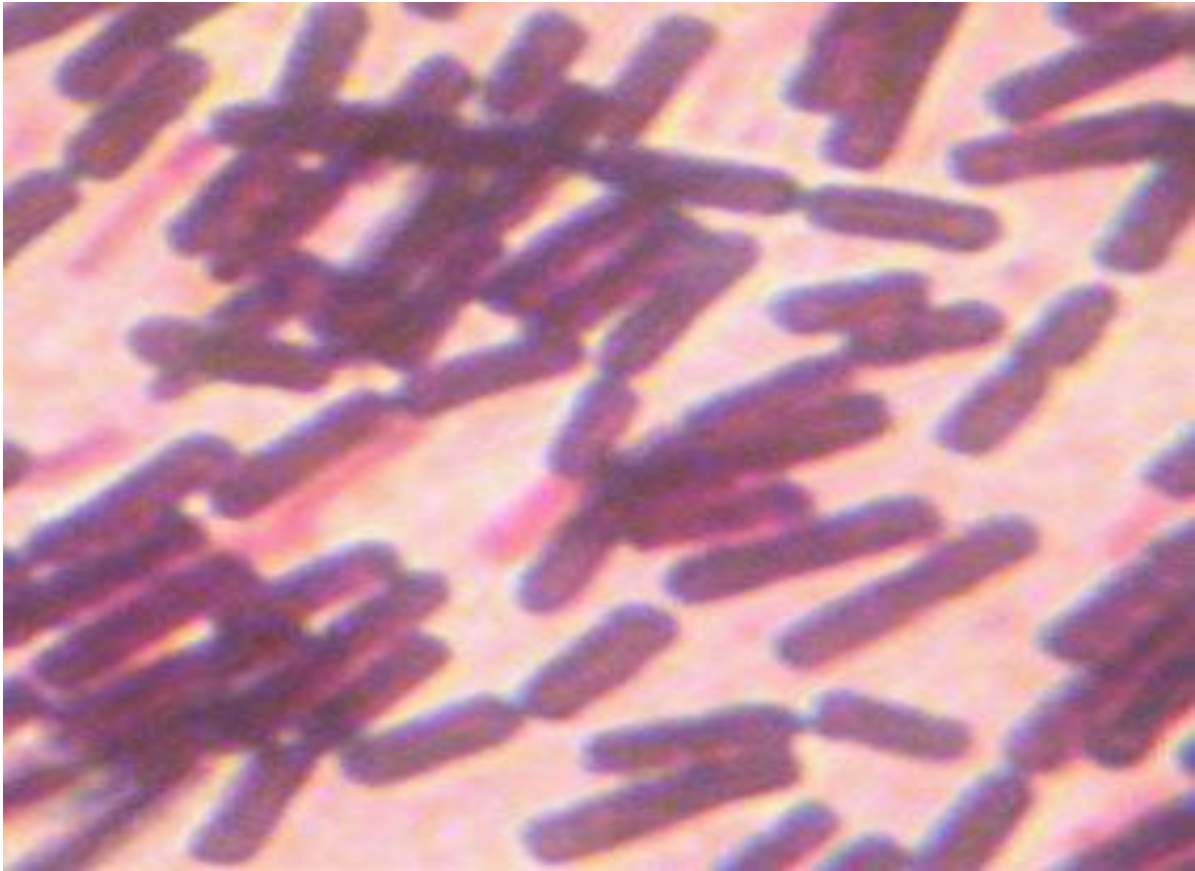
Description of organism (including its role in the compost pile):



www.antibiotics.riken.go.jp/.../nocardia.jpg

ACTINOMYCETES

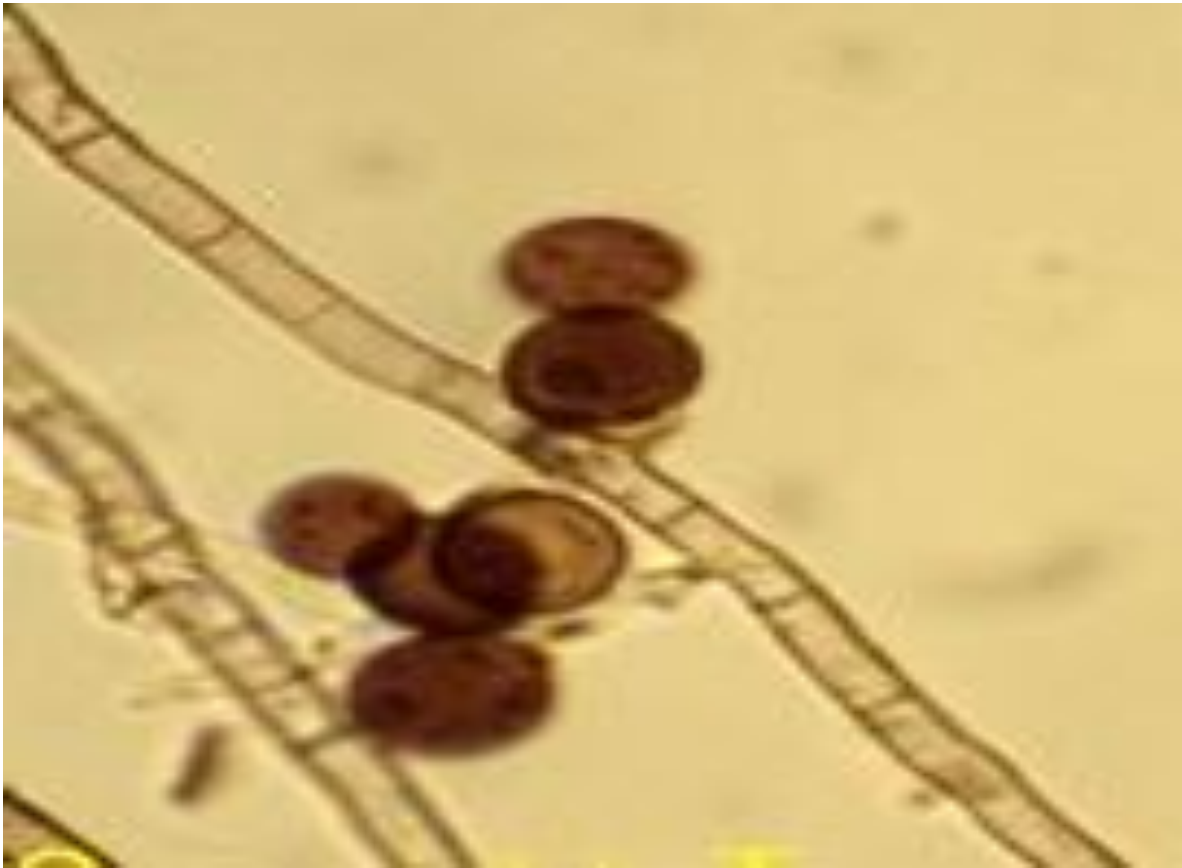
Bacteria that grow in multicellular filaments similar to fungi. They contain enzymes that break down tough woody materials in the compost pile.



www-micro.msb.le.ac.uk/video/graphics/Bcereus.jpg

BACILLUS

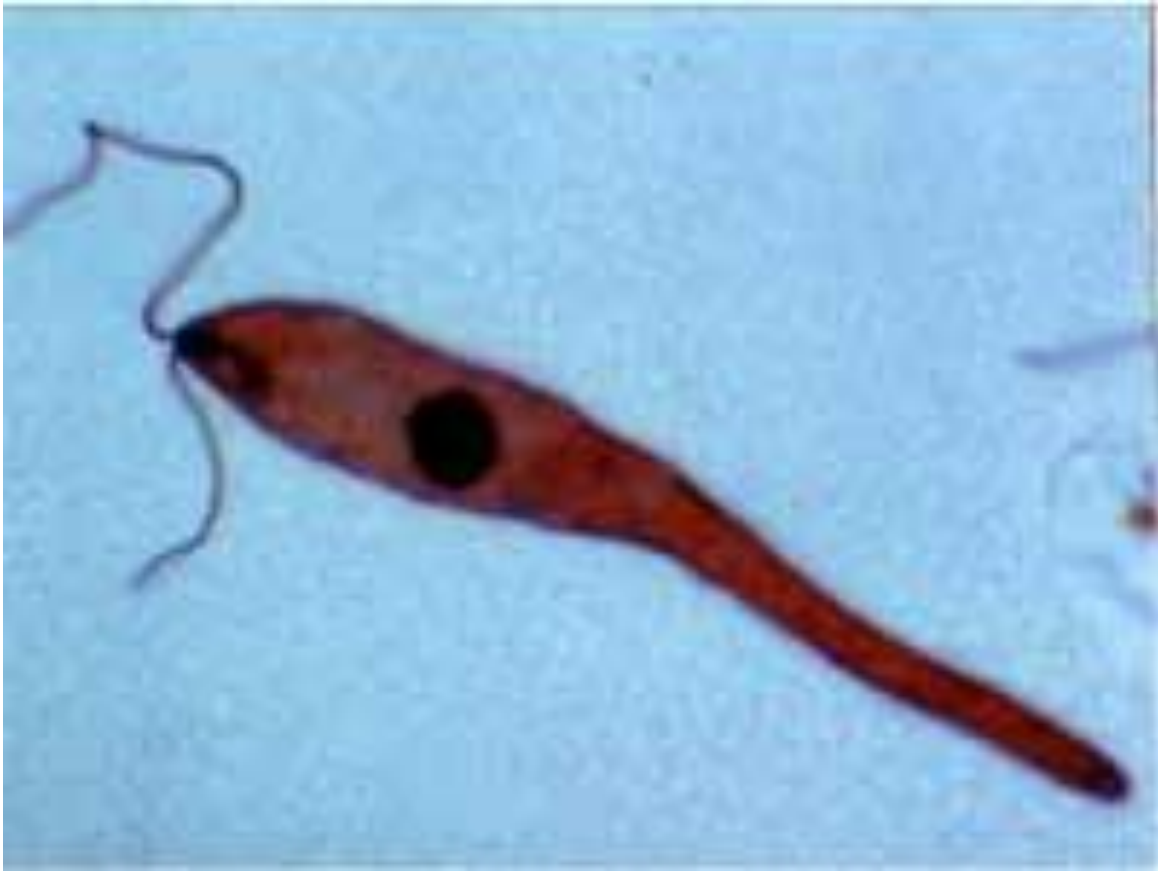
Rod-shaped bacteria that use enzymes to break down organic matter. They reproduce in high numbers as the compost pile's temperature begins to rise.



<http://www.niaes.affrc.go.jp/inventry/microorg/eng/z59e-Arth-st.html>

SAPROPHYTES

Fungi that grow and spread quickly throughout the outer layers of the compost pile. They digest organic material that bacteria cannot break down.



<http://soils.tfrec.wsu.edu/mg/flagella.jpg>

PROTOZOA

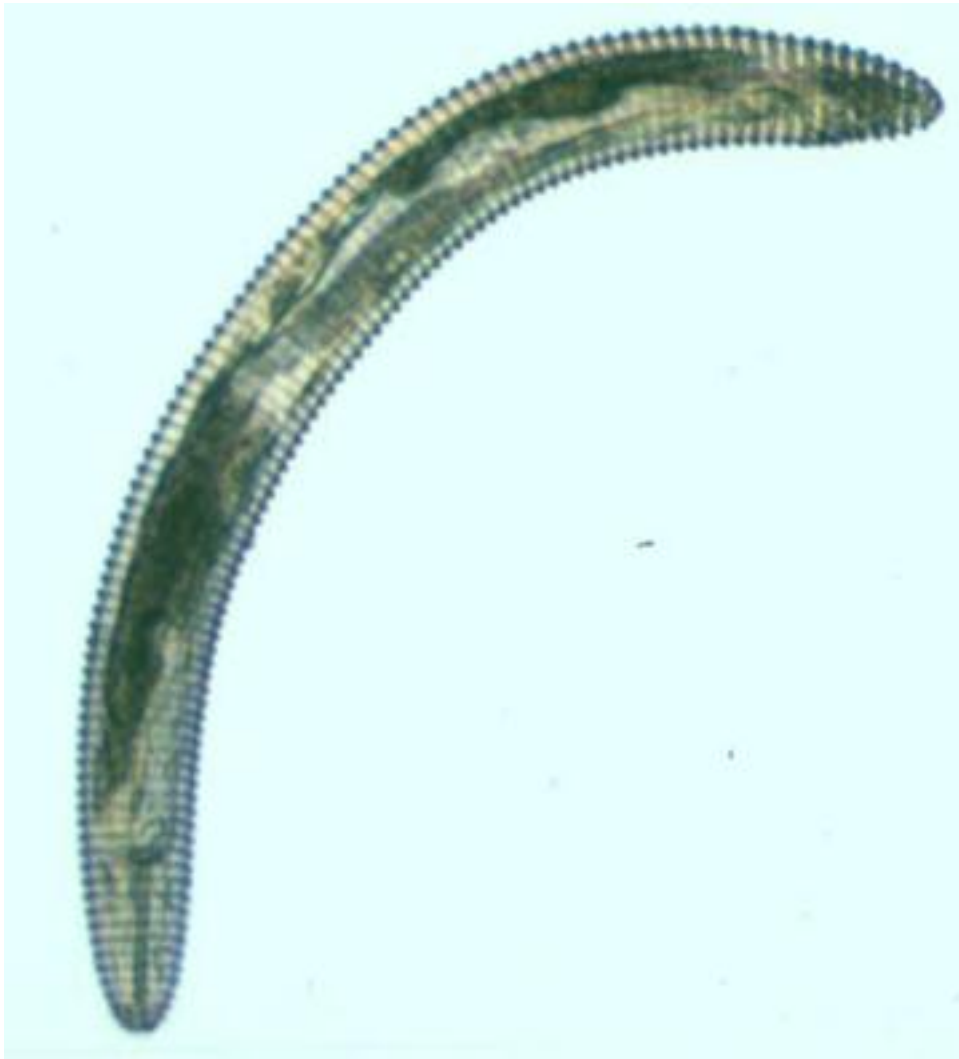
Microscopic unicellular organisms that feed on organic matter and bacteria and fungi in the compost pile.



<http://www.ycy63.dial.pipex.com/freshwater/rotifer.html>

ROTIFER

Microscopic multicellular organism found in water droplets throughout the compost pile. These organisms feed on organic matter and bacteria and fungi in the compost.



<http://plantpath.caes.uga.edu/extension/nematodes/ring.html>

NEMATODE

Microscopic, cylinder-shaped worm that feeds on decaying matter, bacteria, fungi, and protozoa in the compost pile.

Composting in the Classroom

Deciphering Decomposers Grading Rubric

CATEGORY	4	3	2	1
Written Description - Imaginative & Creative	The physical description is adequate and the role of the microorganism is addressed.	The physical description is adequate but the role of the microorganism is not addressed.	The physical description is not adequate but the role of the microorganism is addressed.	The physical description is not adequate and the role of the organism is not addressed.
Illustration - Imaginative & Creative	The illustration matches the physical description given in the written portion and features many creative elements of design.	The illustration matches the physical description given in the written portion and features some creative elements of design.	The illustration matches the physical description given in the written portion but does not attempt to be creative in design.	The illustration does not match the physical description given in the written portion.
Written - Factual	Information clearly relates to the assigned microorganism. The report includes several supporting details and/or examples.	Information clearly relates to the assigned microorganism. The report includes 1-2 supporting details and/or examples.	Information clearly relates to the assigned microorganism. No details and/or examples are given.	Information has little or nothing to do with the assigned microorganism.
Illustration - Factual	The illustration is accurate and adds to the understanding of the topic.	The illustration is accurate but does not add to the understanding of the topic.	The illustration is inaccurate.	No illustration is included.
Overall Achievement	All products completed and products indicate understanding of the topic.	Some products completed and products indicate understanding of the topic.	Some products completed, but products do not indicate understanding of the topic.	No products completed.