

Decomposers- Microbial Garden

5th Grade

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References:

- <http://www.exploratorium.org/kamchatka/activity.html>

Benchmarks & Objective:

LS #3 & 4: Trace the organization of simple food chains and food webs (e.g., producers, herbivores, carnivores, omnivores and decomposers. Summarize that organisms can survive only in ecosystems in which their needs can be met (e.g., food, water, shelter, air, carrying capacity, waste disposal).

Materials:

- 1 egg
- 1/4 page of shredded newspaper
- pond mud (at least 3 cups)
- water
- stir stick (longer than 12 inches)
- tennis ball case with lid
- crayons and paper
- 40 watt lightbulb in a clip light
- digital camera

Target Concepts:

- Microbes require energy, but not all require oxygen. A microbes ability to colonize depend on its energy and oxygen supply. Decomposers play a vital role in food web as recyclers.
- Organisms may only occupy a certain area that depends on limiting factors

Initial Introduction:

Students will be asked to describe what makes something alive. We will talk about energy, respiration, and nutrients. How do plants get energy compared to people? What about mold? What is a decomposer? A microbe? If food webs have already been brought up ask where decomposers belong.

Procedure:

Students will be given the supply list and told that they are going to create a bacterial garden. They will be asked to identify what the microbes will feed on? They will also be asked where the microbes live now? What will give the microbes additional energy? How and what do they breathe? How do they think the microbes will change as time goes on? Ideally they will design the setup (look at the Exploratorium website for their setup to assure it is close. Students will need to examine the colony over time (as the oxygen is used up and the egg and paper are consumed). They should make measurements and drawings in the changes over time (1 time every week). A picture should be taken after set-up and every week when measurements are made. They should come up with two hypotheses on how their garden(s) will change and grow over time.

Target Observations:

- Microbes require food and many act as decomposers in the food chain.
- Colonization depends on time and available nutrient and energy sources.
- Organisms can exist in a broad array of environments, include extreme environments without oxygen.

Final Target Concept:

- After time passes, and the initial oxygen supply is depleted, photosynthesizing microbes will colonize on the top of the column while anoxic microbes respire on the bottom of the column
- Students could be asked why the microbes colonizing at the top are green and why the microbes at the bottom are red? (What can they think of that is alive that is green--- plants that photosynthesize). They could also be asked what color might microbes be on a planet without oxygen or on our early earth?
- The microbes will change in relation to their food and oxygen supply. They die as their food source runs out. (limiting factors)

Summary & Discussion:

Students really enjoy setting this one up. It works well to have them create their own garden with ingredients they have- sandwiches, milk, cheese, apples. Students need an introduction on microbes and decomposers. (We spoke about earthworms first).

Extensions (Optional):

- Students could build an additional bacterial garden using two different muds, or modifying the procedure to add more or less newspaper, not using a heat & light source, etc. Students could also read some of the Exploratorium website on microbes living in extreme environments (great pictures).