

## Potato Microbiology

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### Introduction:

A number of microorganisms thrive on the nutrients that can be found in a potato. My research at MIT this summer has led me to discover that small differences in the environment can greatly impact the microorganisms of that environment. This finding can be applied in the high school setting with a little bit of potato microbiology.

Below you will find a protocol for using a normal potato as the nutrient source for bacteria. In the early days, only kitchen foods were available for microbiological media. In fact, one “famous” person who worked with bacteria was Dr. Robert Koch, a German physician. He is famous for several discoveries related to bacteria, including Koch’s postulates. He noted bacteria growing on a spoiled potato and realized that each colony he saw grew from one bacterium that had landed on the potato. He realized he could remove a bit of one of the colonies and transfer it to a sterile medium to start a pure culture of that species of bacterium. This is called single colony isolation.



Remember to use Sterile Technique when dealing with bacterial studies (see rules listed below).

**Rules for Working with Bacterial Cultures (Adapted from A Field Guide to Bacteria by Betsey Dexter Dyer):**

1. Never eat or drink near your cultures.
2. Keep the lids on your cultures and remove only briefly as needed.
3. Wash your hands well after working with bacterial cultures.
4. Wash with rubbing alcohol whatever work surface you are using before and after working with bacteria.
5. When you are done with your cultures, pour in a little bleach to kill all bacteria.
6. Use dilute nutrients to lessen the risk of pathogenic bacteria.
7. If you have a compromised immune system, make sure to alert your teacher and follow the precautions prescribed by your doctor. Do not culture bacteria without permission of your doctor.

## Potato Sampling Method:

1. Carefully clean one or two large potatoes. (Feel free to use different types of potatoes to see if there is any effect on the cultures. Red vs. Russet vs. Golden? Frozen vs. Fresh? Cooked vs. Raw?) Make sure to record your choice.
2. Use sterile dishes with lids or baby food jars or sterile test tubes. Boil dishes/jars and lids in water (or cook dishes/jar in pressure cooker for 15 minutes) and let them drain—while still hot—upside down on paper towels.
3. Cut slices of potato (~1/4 inch thick) and drop into your sterile jar/dish.
4. Inoculate with a few drops of pond water. Use a swab to spread the water around the surface of the potato. Cover with lid.
5. Choose incubation time and conditions (maximum of 5 days). Some variables can be sunlight, darkness, warmth, etc. Make sure to record your conditions, including temperature.
6. Examine what grew and take daily pictures of your potato plate. Approximate the size of each colony (measure the diameter). Bacteria form shiny, droplet-like colonies and fuzzy colonies are probably fungi.
7. If you have many colonies repeat experiment with a more dilute pond sample.
8. Analyze your results using your pictures. Use a sterile toothpick to pick colonies to view under a microscope.

## Lab Design

Outline the variables of your experiment. (Ex. What potato did you decide to use? Where will you be leaving your potato plate?)

## Results

Record your daily observations.

It is recommended to draw pictures or take photos to complement your results.

Day One	
Day Two	
Day Three	
Day Four	
Day Five	

## Analyze your Results

Share the results in class.

Brainstorm: What similarities/differences do you observe between each condition?

Which condition and which type of potato seemed to grow the most bacteria/fungi? Why?

Summarize your experimental results (include pictures).