



**GREENBELT  
CONSERVANCY**

## Growing Bacteria Introduction

Bacteria are small organisms, or living things, that can be found in all natural environments. They are made of a single cell. Most bacteria can be seen only with a microscope. Bacteria take in food and send out waste through their cell walls. Most bacteria reproduce by dividing down the middle to form two separate cells. These each divide again to form a total of four cells, then eight, then sixteen and so on.

Single bacteria are so small they cannot be seen with the naked eye, but when we feed them with nutrients and give them perfect conditions they reproduce in large numbers and form into colonies. Because there are so many bacteria in these colonies we do not need a microscope to see them anymore. Different species of bacteria can produce very different colonies and by studying the characteristics of the bacterial colonies we can determine what bacteria is growing.

When we grow bacteria into colonies to study them, it is called a bacterial culture. If you have ever gone to the doctor when you were feeling sick and they swabbed your throat with a cotton swab, you have probably had a bacterial culture grown from your own body. By doing this the doctor was able to see if there were any bad bacteria in your throat. If there was bacteria, the doctor could also find out what kind of bacteria it was and what kind of medicine was needed to make it go away. All from growing the bacteria into a colony.

In order to grow your own colony you will need to buy or make an agar plate. Agar is a jelly like substance that comes from seaweed that helps to hold and feed the bacteria which helps them to multiply. Sometimes different nutrients, like beef broth or even sheep's blood, are added to the agar in order to encourage specific bacteria to grow.

Most agar plates are made in a Petri dish. A Petri dish is a special container that is perfect for growing bacteria and is named after its inventor, German bacteriologist Julius Richard Petri.

To grow your own bacterial culture you can purchase pre-poured nutrient agar plates on-line through science supply stores or on Amazon, or you can make your own at home.

### To make your own agar plate you will need:

Materials:

- 1 cup of water.
- Pot to boil water.
- 1 tbs of agar. (Agar can be purchase on-line or in specialty supermarkets).
- 2 tsp sugar.
- 1 beef bouillon cube or 1 tsp of beef bouillon granules.
- Clear, heat-resistant, disposable container with cover. Petri dish is best but if you don't have one you can use a small take out soup container.
- Several cotton swabs.
- Tape.
- Dark, warm spot to grow culture.
- Thermometer.
- Zipper bag for disposal.

Procedure: \*\*\*\* Parental supervision required!!

Step one: Boil the water on the stove and add the agar, bouillon and sugar. Stir until completely dissolved.

Step two: Allow the mixture to cool down enough to allow it to be poured into the containers. Don't cool too much or the mixture will solidify.

Step three: Pour the mixture into the containers and cover.

Step four: Place containers into the refrigerator and allow to solidify. Keep agar plates refrigerated until ready to use.



### To grow your own culture:

Step one: Decide what you want to test for bacteria. You can test anything you think bacteria may be living on. Your hands, stinky feet, kitchen counter, phone, doorknob, etc.

Step two: Label your agar plate on the bottom with whatever you are testing. You can draw lines to divide the plate into sections and test a few different things on one plate.



Step three: Take a cotton swab and rub it on whatever you are testing. Then rub it gently on the agar plate. Don't push too hard or you will mash the agar!

\*\*Repeat with a new, clean cotton swab for each surface you are testing.

Step four: Cover your agar plate so that no other bacteria can get in and tape the cover shut.

Step five: Find a warm, dark place to store your agar plate to allow the bacteria to grow. 75 degrees to 95 degrees is best, but don't let it get too hot or too cold! Use a thermometer to monitor the temperature. Under 75 degrees is okay, but it will take longer for the bacteria to grow. BUT.... If the temperature goes over 100 degrees or below freezing it could kill the bacteria and your experiment won't work.

Step six: Wait! It could take anywhere from 3-4 days to a week or for bacterial colonies to form. Keep checking, but don't open the containers!

Step seven: Once bacteria starts to grow, you can try to figure out what types of bacteria are growing looking at the characteristics of each colony. The shape, size, color, texture of the colonies that result is called the *colony morphology*. By using the chart below we can start to ID the bacteria.

Although we may not be able to determine the exact bacteria without a microscope or a microbiologist, we may be able to figure out the general type of bacteria by doing a little research online.

You may even have other things growing on your agar plate like a mold, fungus or yeast! But don't worry.... viruses, like Covid-19, are not living organisms so they will NOT grow on your agar plate.

Try testing something before cleaning (like your hands) then after cleaning. See if cleaning helps reduce the amount of bacteria that grows on the agar!