

## ***Where are Bacteria Found?***

### ***Introduction:***

They're everywhere. Bacteria are the huddled masses of the microbial world, performing tasks that include everything from causing disease to fixing nitrogen in the soil. The estimated number of bacteria on Earth is five million trillion trillion -- that's a five with 30 zeroes after it. When people think of bacteria, they likely first consider the nasty ones that cause disease, but the bacteria inside all animals combined -- including humans -- makes up less than one percent of the total amount. By far the greatest numbers are in the subsurface, soil and oceans.

### ***Objectives:***

1. To take bacterial swabs from various places in the school
2. To inoculate a petri dish with a bacterial culture
3. To count bacterial colonies
4. To determine what kind of environmental conditions influence bacterial growth

### ***Materials:***

Petri dish, pencil, incubator, hot water bath, nutrient agar, thermometer

### ***Procedure (Part A): Petri Dish Preparation***

1. Set up a hot water bath at 95°C.
2. Loosen the caps and place nutrient agar bottle in hot water bath until agar liquefies. (Agar melts above 95°C and remains liquid until cooled to about 45°C.)
3. Remove agar bottles and allow the agar to cool to about 50-55°C.
4. Partially lift the cover of the petri dish and pour about 15-20ml of liquid to cover 2/3 of the plate surface.
5. Lower the lid of the dish and gently swirl the plate to spread the media over all the bottom surface.
6. Repeat step 5 to fill other petri dishes.
7. DO NOT MOVE the covered plates until the nutrient agar has solidified.
8. Once the plates are solidified, turn the plates upside down (prevents condensation from getting on the agar surface).
9. From this moment on, keep the plates upside down (condensation will disappear) in a dark, dust-free place in the room until ready to add bacteria. If plates will not be used for several days, refrigerate them.
10. Check plates for contamination before proceeding to Part B. Discard contaminated plates.

## **Materials:**

Petri dish with nutrient agar, sterile cotton swabs, permanent marker, index card with sample location, pencil, incubator

## **Procedure (Part B): Collecting Bacteria**

1. Choose an index card to determine your sample location
2. Turn the petri dish upside down, and using your marker, place your initials, date and sample location along the bottom perimeter of the dish, **NOT** in the middle
3. Get your sterile Q-tip, being very careful not to touch the side that will collect your sample. Go to your assigned area and quickly swab and return with your sample! (Sample locations included door handles, water faucets, desk tops, etc.)
4. Carefully open your dish just enough to **lightly** rub your Q-tip in a zigzag pattern across the agar.



5. Draw what your dish looks like in **Figure 1** and record the number of bacterial colonies, if any, present on the agar surface in table 1
6. Place your petri dish upside down in the incubator to be examined again in a few days.
7. Recheck the plates after 1 day, 2 days, and 5 days. Count and record the number of bacterial colonies on each plate. If the plate is completely covered with bacteria, record "lawn" in the data table.
8. **Ignore "fuzzy" appearing colonies that are actually fungi!**

**Example of Bacterial Colonies on Plate**



8 colonies

**Data:**

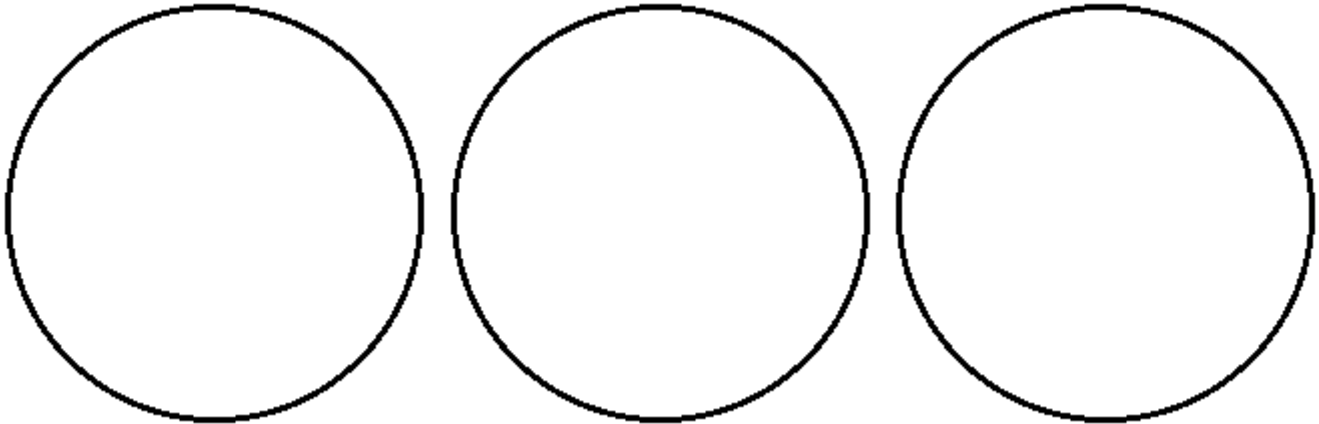
Reminder --- Fuzzy Colonies = Fungus not Bacteria

**Figure 1**

**Day 1**

**Day 2**

**Day 5**



**Table 1: Number of Colonies on petri dish**

Location:	
Day	Number of Colonies

*Circle a well defined colony from any of the diagrams above. Using the charts from the next page, describe the colony using the appropriate scientific terminology in the space below,*

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1. Round



2. Round with Scalloped Margin



3. Round with Raised Margin



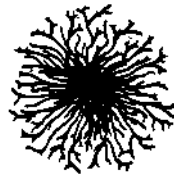
4. Wrinkled



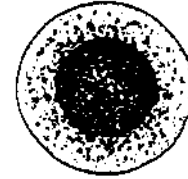
5. Concentric



6. Irregular and Spreading



7. Filamentous



8. L-Form



9. Round with Radiating Margin



10. Filiform



11. Rhizoid



12. Complex

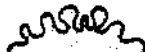
### CONFIGURATIONS



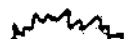
1. Smooth (Entire)



2. Wavy (Undulate)



3. Lobate



4. Irregular (Erose)



5. Ciliate



6. Branching



7. Woolly



8. Thread-Like



9. "Hair-Lock"-Like

### MARGINS



1. Flat



2. Raised



3. Convex



4. Drop-Like



5. Umbonate



6. Hilly



7. Ingrowing Into Medium



8. Crateriform

### ELEVATIONS

### ***Analysis:***

1. Compare the number of colonies on your plate on day 5 with the plates collected from other locations. Did any of the areas show a greater number of bacteria? How many clusters of bacteria appear to be growing in each petri dish?
2. Which petri dish had the most growth? The Least?
3. Why was the agar sterilized before this investigation?
4. What kind of environmental conditions seem to influence where bacteria are found?
5. How can you control the amount of bacteria that you will encounter?
6. Check the plate that the teacher has had open, exposed to the air for several days. What did you observe and why?