Student Name: _____ Date: _____

Activity Sheet 1

BACTERIA TAKE OVER

Problem:

How does bacteria grow? Can bacteria be visible? What areas have the most and least bacteria?

Background:

Germs are EVERYWHERE!!! This is something that you most likely have heard. Quite often illnesses and diseases can be caused by the transmittance of some sort of microorganism. These different ***microorganisms*** could vary from some sort of ***virus***, ***fungi***, or ***bacteria***. Bacteria in particular are single celled microbes. The cell structure is simpler than that of other organisms as there is no ***nucleus*** or ***membrane*** bound organelles. Instead their control centre containing the genetic information is contained in a single loop of ***DNA***.These little invaders use the nutrient rich and warm human body to prosper and to replicate themselves (Alberts, Johnson, & Lewis). An example of a harmful bacteria is E Coli. When E Coli is found in food or water it can be harmful to our bodies.

Hypothesis:

#1 How does Bacteria Grow?

I believe that…

_____

Because,

_____

#2 Can bacteria be visible?

I believe that…

_____

Because,

_____

#3 What areas have the most and least bacteria?

I believe that…

_____

Because,

_____

Materials:

- petri dishes (1-2 per group)
- Nutrient agar powder (or agar powder and beef boulion cube)
- heater or incubator
- cotton swabs
- hand sanitizer
- marker for labeling
- liquid bleach
- lab safety gloves
- miscellaneous metals

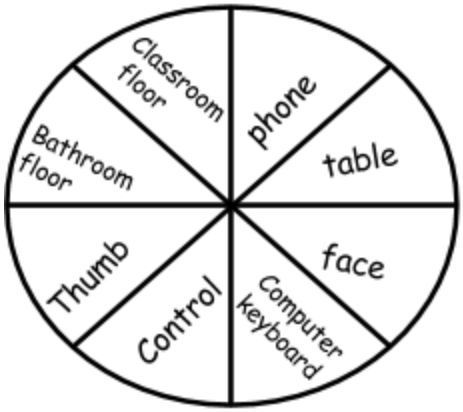
Student Name: _____ Date: _____

.

Safety:

- Wearing lab safety gloves, goggles, and an apron or lab coat
- Make sure that bacteria is dead before disposing of it by washing it down the sink. This can be done by using bleach.
- Make sure that all bacteria is contained and that hands are always washed after working with samples.

Procedure:

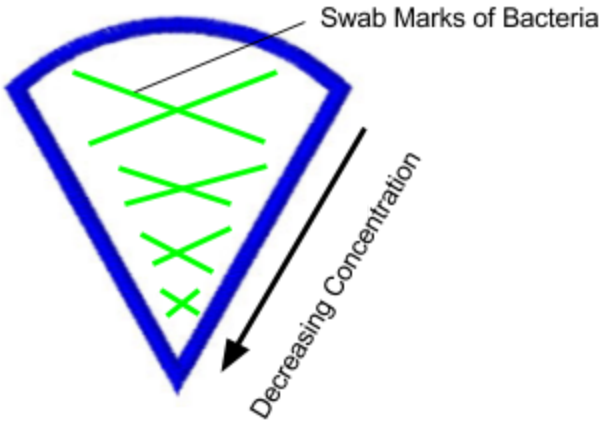


Example Petri Dish

1. Aquire 1-2 agar plates. Plate cover should not be removed until instructed to do so.
2. Take these petri dishes and turn upside down. Label each section with the area you indent to introduce bacteria for. An example of a plate is to the right. Make sure that one section of your plate is a "control" section where no bacteria will be plated (the areas to take bacteria from to the right are only suggestions. You should test the areas that you and your group members hypothesize in your third hypothesis on the first page.
3. Use a cotton swab and wipe it along a surface that your group has chosen to test thoroughly.

__Note:__ The next few steps(4-6) should be done quickly in order to ensure the least amount of contamination

4. Lift the lid off of one of your petri dishes. (Do not set down on the countertop. You will replace as soon as you are done introducing the bacteria)
5. Using the cotton swab that you swiped your surface with, swipe the appropriate section of the dish without breaking the agar. A diagram is given below of a petri dish section with how to introduce bacteria into your plate in order to gradually decrease the concentration of the bacteria on your plate.



6. Quickly replace the lid of your petri dish.

Student Name: _____ Date: _____

7. Repeat steps 4-6 in order to fill all the sections of your petri dish except for the control which should be empty to see if any bacterias were airborne and introduced through the opening and closing of the petri dish.
8. After you have finished adding all your bacteria replace the tops to the appropriate petri dishes, as an extra precaution to prevent contamination, you can place each petri dish in a zipper-lock bag. This will provide an extra layer of protection against any hazardous bacteria colonies that may develop, but will still allow you to view the contents of the petri dish.
9. Record your Day 1 observations on the ***Data Sheet*** attached.
10. Place the petri dishes in a warm, dark place as instructed by your teacher(incubation system is ideal). Leave the petri dishes in a warm, dark place where the bacteria can develop, undisturbed, for several days. The ideal temperature for growing bacteria is around 98^0 F (37 ^{0}C)... Similar to human body temperature!.
11. Leave the petri dishes in their warm dark place for 4-6 days, checking on them each day and writing down and drawing observations based of their appearance, smell, and size on the ***Data Sheet***.
12. After the 4-6 days record your final observations and compare your results with other classmates and complete the discussion and conclusion questions attached to this lab.

Student Name: _____ Date: _____

Data Sheet

Day 1: *Diagram-* *Observations-*	**Day 2:** *Diagram-* *Observations-*	**Day 3:** *Diagram-* *Observations-*
Day 4: *Diagram-* *Observations-*	**Day 5:** *Diagram-* *Observations-*	**Day 6:** *Diagram-* *Observations-*

Student Name: _____ Date: _____

Discussion Questions:

1. How extensive was the growth of the "control" section of your petri dishes? Did this surprise you? Explain.

2. What area has the most and least bacteria based off of the classroom data? Explain why you think this might be.

3. Was their bacteria growth in the "control" section of your petri dish?

4. What you you believe the ideal "microbiome" is?

5. Does all the bacteria look the same? Did the bacteria all grow in a certian pattern? If yes what are the main characteristics of it? If no what are some of the differing characteristics of it?

6. Do you believe that you have grown different varieties or species of bacteria?... *yes bacteria are living things!*

7. What do you believe the purpose of antibacterial soap and hand sanitizers are? Do you think they are important? Explain why.

Student Name: _____ Date: _____

Conclusion Questions:

1. What is the difference between sexual and asexual reproduction?

2. What is binary fission?

3. How would the temperature of the environment affect the growth of these bacteria?

4. What in the bacteria's environment gave it the ability and energy to grow?

5. What is an example of a helpful and harmful bacteria that is not mentioned in this lab?

6. What is the difference between viruses and bacteria?

7. What are some components that must be present in order for bacteria to grow?

8. What are some potential areas of error in this lab experiment?

9. If you were to do this lab over again what would you do differently?

Extensions:

- Explore some different methods of inhibiting bacterial growth. Try plating bacteria using these different methods and see if it affects your bateria growth.
- How well does toothpaste kill bacteria on your teeth? Swab bacteria onto a plate before and after brushing your teeth to see if there's a difference.
- Metals are often used in medicine. Try using petri dishes to plate bacteria and introduce different metals into their environment to see how it affects the growth and development of the bacteria.
- Complete research to try and identify the bacteria you have grown.
- Using a microscope use the link below to identify the bacteria you have grown. http://microbiologyonline.org/teachers/observing-microbes/observing-bacteria-in-a-petri-dish