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| **Biology 11**  **The Effect of Antimicrobial Agents on Bacterial Growth** | **Name: Date:**  **Block:** |

Chemical substances that either kill bacteria or inhibit bacterial growth are called antimicrobial agents. Antimicrobial agents are of three basic types; antiseptics or chemicals used to inhibit the growth of or kill bacteria on nonliving things; and antibiotics or chemical substances produced by living organisms which inhibit the growth of bacteria. In this investigation, you will test the effectiveness of certain antiseptics, disinfectants and antibiotics in inhibiting the growth of bacteria.

**Purpose:** To investigate how the growth of bacteria can be controlled.

**Materials:**

* Petri dish with agar
* Tape
* Disinfectants/antiseptics
* Marking pen
* Bacteria
* Circle paper
* Forceps
* Microscope
* Prepared Bacteria Slide
* Ruler

**Safety:** Handle Petri dishes with bacteria with care.

**Part 1:** Bacteria around the school

1. Obtain 1 Petri dish with agar. Keep closed until you are ready to use to prevent contamination.
2. Use a marker to divide plate into 4 equal parts. Make sure to use a marker on the agar side to mark and label it. Label each section numbers 1-4 (small in the corners).
3. Choose one surface area to test. Example: thumb, desk, water fountain etc. Try to pick an area where you think there will be lots of bacteria.
4. Using four pieces of tape, stick one piece on the surface. Now transfer the collection by sticking the tape on the Petri dish. Repeat on the **same** surface for all sections. Make sure to limit the amount the Petri dish is open during each transfer.
5. Section one will be the control. Only the bacteria sample will be placed here.
6. Take a circle paper and soak in each of the three solutions.
   1. Solution 1: Windex
   2. Solution 2: Antibacterial soap
   3. Solution 3: Vinegar
7. Now take each piece of paper and place one in each section of the Petri dish. Remember to keep the Petri dish closed as much as possible.
8. Tape the outside edges of the Petri dish and write names.
9. Place Petri dish in incubator upside down! Make sure the agar is on the top otherwise the condensation will prevent growth.
10. Complete the table below with observations from each day.

Area tested: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

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| --- | --- | --- | --- |
| Petri Dishes | Day 1 | Day 2 | Day 3 |
| Section 1: Control |  |  |  |
| Section 2:  \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ |  |  |  |
| Section 3:  \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ |  |  |  |
| Section 4:  \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ |  |  |  |

**Part 2: Viewing a prepared slide of mixed bacteria on high power.**

1. Using a microscope, focus your slide on low power and then medium power. Increase the magnification to high power and focus further using the fine focus knob.
2. Draw a biological diagram of exactly what you see. **Remember:** use pencil and label your drawings. Include a title, total magnification, drawing magnification, drawing size and actual size.
3. Identify 3 different bacterial colonies (different shapes). Make sure these are labeled on your diagram. **Note:** you may need to do more than one drawing to find all three in the same field of view. If necessary, attach another drawing in the space below.

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Total Magnification: \_\_\_\_\_\_\_\_\_\_\_\_\_

**Discussion Questions:**

1. Were any of sections on the Petri Dish completely free of bacteria?
2. Which of the 4 sections appeared to have the most bacterial growth?
3. Which of the 4 sections had the least amount of bacterial growth? Which cleaning agent worked the best?
4. Based on color and general appearance, how many different types of bacteria appear to be growing on each section of the agar plates?
5. What is a disinfectant?
6. Why do you slightly raise the cover of the agar plate rather than remove it completely?
7. In addition to food (which had been added to the agar), what other conditions are necessary for bacterial growth?
8. Do you think antibacterial soaps do a better job at removing bacteria than “regular” soap? Explain.
9. Why is it important for doctors to wash their hands and use sterile gloves before examining patients?
10. Odor is a byproduct of the metabolic process of bacteria (mainly *corynebacteria* and *micrococci*), which break down organic substances found on your skin, in your sweat or on your clothing. Why do you think bacteria flourish on the foot and underarm rather than on other parts of your body?
11. What is a pathogen?
12. How are most bacterial infections transmitted?
13. How are most bacterial infections treated?
14. What is a “superbug”?
15. How dud “superbugs” evolve?