**Air Quality Lab**

***Testing the Air for Microorganisms***

*Materials:*

1 – Nutrient or starch agar plate

Masking tape

Wax Pencil

Hand Lens

*Procedures – Day 1*

1. Obtain one (either nutrient or starch) agar plate from the teacher. With the lids still on the plate, turn them over and place them on the table. Using a wax pencil, carefully split the bottom of your plate into four quadrants. Refer to the following illustration:
2. Your teacher will assign your lab group a number and an environment to test. Write these on the bottom of your agar plate and in Table 1. There will be control plates that your teacher will set up. Be sure to make a note of them in Table 1 as well.
3. Take your agar plate to your assigned environment with the lid still on the plate. Find a level spot where you would like to place them. Make sure that it is a spot that will not be disturbed. Remove the lid and place it underneath the plate. Place them on the level surface. Allow the plates to sit there undisturbed for approximately 24 hours.

*Procedures – Day 2*

1. After 24 hours, retrieve your plate and immediately cover them with the lid. Seal the plate with masking tape. Next, turn the plate over with the lid on the bottom.
2. Take you plate to the teacher. She will place it in the incubator for 24 hours at 37⁰C.

The plates must be upside down so that the condensation does not drip onto the surface of the bacterial colonies and alter their growth.

DO NOT OPEN THE SEALED PLATES. SOME OF THE BACTERIA ON THE PLATES MAY BE PATHOGENIC.

1. Disinfect your work area after finishing the lab. The area should be decontaminated with a bleach solution. You should also thoroughly wash your hands with soap before leaving the classroom.

*Procedures – Day 3*

1. Collect your agar plate from the incubator. Observe the growth patterns of any colonies. Count the number of colonies in each quadrant on the plate. Record the number in Table 1.
2. Add the number of colonies in each of the four quadrants on the plate for your environment. Record those results in Table 1.
3. Fill in the counts from the rest of the lab groups and from the control plates in Table 1. Once this is complete, analyze Table 1 with the class.
4. Using a hand lens, study the physical characteristics (morphology) of each type of colony on your agar plate.

*Do NOT remove the lids on the plate. If you happen to have a plate with no growth, find a lab group that has a plate with growth that you can study. In this case, just make sure to note the environment you are studying.*

As a group decide on two or three colonies that you would like to study further and make a drawing of them in Table 2. Next to each drawing, describe the morphology of the colony.

**Table 1**

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| **Group #** | **Environment** | **Type of Agar** | **# of Colonies per Quadrant** | | | | **Total # of Colonies** |
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| Control |  |  |  |  |  |  |  |

**Table 2**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Drawing of colony** | **Morphology** | **Drawing of Microorganism** | **Description** | **Type of Bacteria or Fungi identified** |
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**Air Quality Lab**

***Testing the Air for Particulates***

*Materials:*

1 – Microscope grid

1 – tooth pick

Petroleum jelly

Microscope

*Procedures – Day 1*

1. Collect a microscope grid, toothpick and petroleum jelly.
2. Your teacher will assign your lab group a number and an environment to test. Label the back side of your microscope grid and Table 3 with this information. There will be control grids that your teacher will set up. Be sure to make a note of them in Table 3 as well.
3. Use the toothpick to cover the top of your microscope grid with a thin layer of petroleum jelly. Discard the toothpick into the designated receptacle.
4. Gently place the microscope grid (jelly side up) into the palm of your hand with the other hand cupped over the slide. You may also place your slide into an appropriate sized container. This will allow you to transport your microscope grid to and from your designated environment with minimal risk of contamination.

*Make sure that you do not touch the jelly with your hands or with the container as it is being transported. Be sure to keep the microscope grid level as you transport it from place to place.*

1. Carefully take your microscope grid to your designated environment. Find a safe, level spot to place your grid where it will not be disturbed.
2. Gently set your grid on the level spot (jelly side up). Allow the gird to remain undisturbed for approximately 24 hours.

*Procedures – Day 2*

1. After 24 hours, retrieve your grid and carefully transport it to the lab in the same manner that you transported it to your environment.
2. Place the grid in the designated container to not be contaminated.

*Procedures – Day 3*

1. Using a microscope on low power, count the number of particles in 10 random squares on the grid. Just make sure that you do not count the same square twice. Record your data in Table 3.
2. Once you have counted all 10 squares, take the average to determine the average number of particulates per square. Record this aver in Table 3.
3. Create a drawing, in the circles below, of any interesting particulate matter that you see on your grid.
4. Fill in the rest of Table 3 with information from each of the lab groups testing air for particulates. Analyze the data table.

**Particulate Matter Drawings**

**Table 3**

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| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **Group #** | **Environment** | **Number of Particulates per Square** | | | | | | | | | | **Average # of Particulates per Square** |
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| Control |  |  |  |  |  |  |  |  |  |  |  |  |

**Lab Questions**

1. In Table 1, which environment contained the most number of colonies?
2. Why do you think there is so much growth in this environment as compared to the others? Give some possible explanations.
3. Was there a control in this experiment?

What was it?

What does the growth on the control plate tell us about the control?

Why are controls important when performing scientific experiments?

1. What was the purpose of using the agar and the petroleum jelly in this experiment?
2. According to Table 3, which environment had the greatest amount of particulates?

Which location had the least amount of particulates?

1. Suggest possible sources of particles that were observed in Table 3.
2. Explain how the following factors might influence an experiment jult like the one you just performed:

the day

the time of day

the weather

the season

1. Prepare a list of possible air pollutants and air pollution sources in your community.
2. What are some ways that you could reduce air pollution in your community?
3. What are some of the effects on human health from air pollutants?
4. What different aspects of your life could be affected by air pollution?