



*New ideas for teaching science*

**WARNING** — This set contains chemicals that may be harmful if misused. Read cautions on individual containers carefully. Not to be used by children except under adult supervision.

# Air Quality Lab

## INVESTIGATION

#20-3563

### OBJECTIVES

- *Identify* potential sources of air pollution
- *Observe* and *identify* microorganisms present in the air
- *Collect* and *observe* airborne particulate matter
- *Describe* the effects of air pollution on plant and animal life

For complete  
technical support  
call 1-800-526-6689

Neo/SCI™  
PO Box 22729  
Rochester, NY 14692-2729  
www.neosci.com  
E-mail: support@neosci.com

## Science Concepts

- Microbiology
- Environment
- Bacteria Forms
- Microscopy
- Ecology

## Kit Materials List

*This kit has been designed for 8 lab groups*

- 1 Petri plates, sleeve of 20
- 1 Nutrient agar, bottle, 200 ml
- 1 Starch agar, bottle, 200 ml
- 1 Methylene blue, bottle, 30 ml
- 1 Microscope slides, box of 72
- 1 Mounting medium, bottle, 30 ml
- 1 Cover slips, box, 1 oz.
- 1 Toothpicks, box
- 4 Petroleum jelly, packet
- 1 Microscope grid transparency

### Material Needed but Not Supplied

- Clear tape
- Wax pencils
- Stereomicroscope(s)
- Compound microscope(s)
- Bunsen burner

### Safety Materials

- Heat-resistant gloves, goggles, aprons

## Time Requirements

**Pre-lab preparation:** 30-60 minutes

**Activity 1:** 15 minutes

**Activity 2:** 15 minutes

**Activity 3:** 30 minutes

**Activity 4:** 60 minutes

**Activity 5:** 15 minutes

**Activity 6:** 30 minutes

## Safety & Disposal

Be sure to direct your students to follow proper lab safety and aseptic technique protocols.

Students should always wear protective gloves, goggles, and a lab apron when working with microorganisms.

Students should avoid touching their face, mouth, and clothing with their hands.

Once students have gathered their agar plates that potentially contain bacteria or fungi, they should seal them with clear tape and not open them again without your direct supervision. All results can be easily viewed through the clear agar plate cover.

Be sure that the heat protective gloves are worn when pouring hot agar.

At the end of the investigation, collect all agar plates and any other potentially contaminated items in a dedicated waste container. Prior to disposal, sterilize all contaminated materials by immersing them in a 5% bleach solution for about 1 hour.

The work area should also be decontaminated by wiping it with either a bleach solution or 95% ethanol.

For safety reasons, it is recommended that you perform the smearing and fixing of bacteria onto microscope slides in Activity 4 (see Teacher Demonstration).

## Pre-Lab Preparation

This kit has been designed for 8 lab groups of up to 5 students each.

### Preparing Agar Plates

Starch agar is predominantly used to grow fungi, and nutrient agar is predominantly used to grow bacteria. Each lab group will use one plate of each to study their environment for both bacteria and fungi. It may be possible that some bacteria grow on the starch agar and some fungi grow on the nutrient agar. If this is the case, students should still make counts of all colonies on each plate.

**Note:** *You have been sent 20 Petri plates. You will need 9 Petri plates with nutrient agar and 9 with starch agar for Activity 2. Use the remaining two plates as extras just in case some of the lab groups make a mistake and need to start over.*

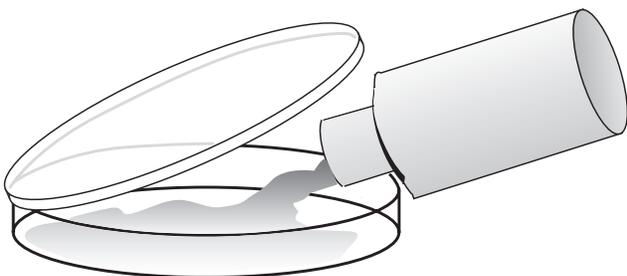
1. You may wish to pour the plates the day before the lab or you may want the students to pour their own. If students pour their own plates, demonstrate the proper pouring and aseptic techniques for them.

**Caution:** *Heat protective gloves and a face shield must be worn when handling hot liquids.*

2. Place 9 Petri plates in a row along the edge of a lab bench. Label each plate "nutrient agar".
3. Loosen the cap on the nutrient agar bottle and place it in a microwave. Heat the agar in one-minute intervals until it is completely liquefied. Remove the agar bottle from the microwave and allow it to cool until it is warm to the touch (about 55°F).

**Alternative:** *If a microwave is not available, create a hot water bath. Carefully place the agar bottle into the water bath, swirling often, until the agar is completely melted.*

4. Open the lid of each Petri plate as little as possible and pour enough agar, approximately 15 ml, into each plate to cover the bottom. Close the lid.



5. Allow the plates to remain undisturbed until the agar hardens.
6. Invert the plates and refrigerate them until the lab period.
7. Repeat steps 2-6 using the starch agar bottle. Be sure to label each plate "starch agar".

**Caution:** *Before the lab, check all plates for contamination and discard any plates that show any growth.*

### Preparing Microscope Grids

1. Obtain a microscope slide.
2. Cut out one of the prepared microscope grids.
3. Repeat this procedure in order to produce enough grids for each lab group and the control.
4. Tape each to the bottom of a microscope slide using clear tape. These microscope grids will be used to collect and count particulate matter.
5. Set these aside until needed in Activity 5.

Air Quality  
#20-3563  
1-800-526-6689

## Preparing Control Plates

You will need to prepare the control plates for Activity 2 and the control grid for Activity 5.

A covered and sealed nutrient agar plate and a covered and sealed starch agar plate will be used as a control in Activity 2. Make sure to let students know how these were prepared and why they were prepared. Make sure that they observe these plates along with their plates.

A covered and sealed Petri dish (or other container) containing a microscope grid (with a thin layer of petroleum jelly on the top) will be used as the control in Activity 5. Make sure to let students know how it was prepared and why it was prepared.

**Note:** *These controls obviously do not contain 100% pure air, but because they are sealed, they should be able to serve as a nice control for this experiment. Just make sure that these controls are prepared under a fume hood, near an air purifier, or somewhere else where the air is exceptionally clean to reduce the risk of contamination.*

## Assignment of Group Numbers and Environments

This activity has been designed for 8 lab groups of up to 5 students each. We recommend that you divide your class into lab groups before starting the activities. Assign each lab group with a group number and an environment that they will be testing for air quality. Make a chart of this information on the class chalkboard, for example, so students can refer to it.

Make sure that you and your students have permission from the proper authorities to be testing on their property or in their classrooms, etc. Make sure that you have a nice variety of samples for the students to test so they will have some interesting environments to compare and contrast. You may want to come up with this list ahead of time, or you may want your students to get involved in creating or adding to the list.

In Activities 2 and 5, you may assign the same group numbers and environments for each activity, or you may decide to rearrange them. Just make sure to create a chart with all of this information. Also, you may decide to perform these activities separately or at the same time, depending on your time schedule.

## Possible environments to test:

**Note:** *When transporting plates to and from environments, students should always keep the lids on them, and they should keep them level.*

### Classroom:

- In a corner
- Inside a window
- Outside a window
- Against a wall near the floor
- Against a wall near the ceiling
- Near the entry door
- Near a heating or cooling vent

### School:

- In the hall
- In the cafeteria
- In a tree
- Under a tree
- Near the main entry door
- On the playground

### Home:

- Above your bed
- Above the kitchen stove
- Near a wood stove
- Near the front door
- Near a pet bed
- In the bathroom

# Teacher Demonstration

**Teacher's Note:** For safety reasons, it is recommended that you perform the part of Activity 4 that involves smearing and fixing the bacteria and fungi onto microscope slides. Students can then stain and study the slides under the microscope.

## What you need

- Bunsen burner
- Toothpicks or inoculating loops
- Clothespin or forceps
- Slides
- Coverslips
- Student agar plates

## What to do...

1. Each lab group will choose 2 to 3 colonies that they would like to study.
2. Carefully unseal the agar plate containing the colonies.
3. Using a toothpick or an inoculating loop (if available), transfer a bacterial colony from the agar plate to a clean microscope slide. Spread a thin film of the bacteria, about the size of a dime, along one half of the slide so that the other half of the slide can be handled during staining.
4. Repeat this procedure as many times as needed for each lab group.
5. Allow each slide to air dry for 10-15 minutes.

6. Holding the microscope slide with a clothespin or forceps, fix the dry bacterial film by passing the bottom of the slide through a Bunsen flame 3 to 5 times. This will ensure that the bacteria will not wash off during staining. Refer to the following illustration:



---

## ACTIVITY

# 1



### Observation of the Air Around Us

---

In this experiment, your students will take on the role of environmental specialists. They will investigate the air quality of various local sources by performing two different types of tests.

#### What to do...

##### Step 1

---

First, direct the lab groups to visually inspect a variety of environments for air quality. Allow your students to take a walk around the school, both inside and outside, just to observe the air around them. Tell them to make mental notes of any particulate matter, smoke, smells, etc. that they observe.

##### Step 2

---

After observing the characteristics of the air, have your students answer the following questions:

1. Are there any characteristics that distinguish the air in one environment from another?

**The point of asking this question is to demonstrate to students that, upon visual inspection, most of the air may look the same. They may state they are able to see smoke, vehicle exhaust, dust, etc. in some environments. But, for the most part, the air in different environments may look clean and pure. Student answers will vary, but most likely, they will not be able to distinguish one environment from another just by looking at them.**

2. Even though the air may look clean and pure, is this enough evidence to prove that it does not contain pollutants? Why or why not?

**A visual inspection is not enough to prove that the air lacks contaminants. Bacteria, fungal spores, and some particulate matter, for example, are microscopic, and they cannot be seen with the naked eye. You need to perform tests and use microscopes to determine the presence of these. So, even though the air may look clean and pure, there may be pollutants there that we just cannot see.**

# ACTIVITY

## 2

### Testing Air for Microorganisms

#### What you need

##### Per group

- 1 Nutrient agar plate (for growing bacteria)
- 1 Starch agar plate (for growing fungi)

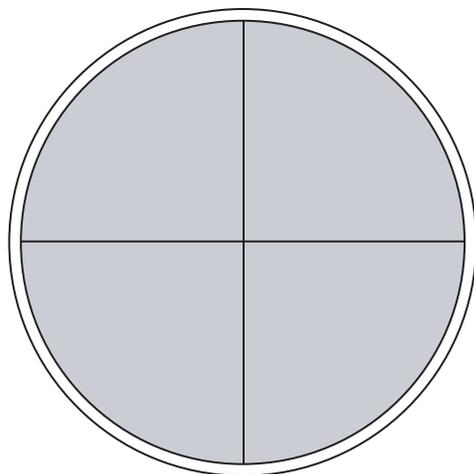
##### Shared

- Masking tape
- Wax pencil(s)

#### What to do...

##### Step 1

Give each lab group two agar plates, one nutrient and one starch. With the lids still on the agar plates, students should turn them over and place them on their desk. Using a wax pencil, they should carefully split the bottom of each plate into four quadrants. Refer to the following illustration.



##### Step 2

Assign the lab groups a group number and an environment to test. Have students write these on the bottom of their agar plates and in Table 1. Make sure that students are aware that there will be control plates set up. They should make a note of them in Table 1 as well.

**Note:** Various kinds of bacteria grow on nutrient and starch agar. Keep the plates covered until the actual time of use.

##### Step 3

Have your students take their agar plates to their assigned environment with the lids still on the plates. They should find a level spot where they would like to place them. It should be a spot that will not be disturbed. Students should remove the lids and place them underneath the plates. Have them place them together on the level surface. They should allow their plates to sit there undisturbed for approximately 24 hours.

##### Step 4

After 24 hours, students should retrieve their plates and immediately cover them with their lids. Have students seal the plates with masking tape. They should invert the plates, with the lid on the bottom, and incubate them at 37°C for 24 hours.

**Note:** If you do not have an incubator, find a warm place in the lab to place the plates. This may increase the incubation time to 2-3 days. Be sure to check the plates daily.

The plates must be inverted so that any condensation does not drop back on the surface of the bacterial colonies and inhibit their growth.

**Safety:** Do not open the sealed plates. Some of the bacteria grown on these plates may be potentially pathogenic.



*New ideas for teaching science*

### **Step 5**

---

Ask students to predict the types of microorganisms that may grow on the plates in each environment.

**Student answers will vary but bacteria, fungi, mold, etc. may be predicted. This step will get your students thinking about all of the different types of living things in our air that we cannot see with our naked eyes.**

### **Step 6**

---

Students should disinfect their work area after finishing with the lab. The work area should also be decontaminated by wiping it with either a bleach solution or 95% ethanol. They should also thoroughly wash their hands before leaving the laboratory.

---

# ACTIVITY

## 3



### Observation of Microorganisms

---

#### What you need

##### Per group

Student agar plates

##### Shared

Stereomicroscope or hand lens

#### What to do...

##### Step 1

---

Their agar plates can be observed after 24 hours for any growth. Students should observe the growth pattern of any colonies. They should count the number of colonies in each quadrant on each plate.

**Suggestion:** *Students can share the counting with their lab partners. For example, have a different lab partner count each quadrant while one partner records the data.*

Students should add the number of colonies in each of the four quadrants on each plate to get the total number of colonies for their environment. They can record their results in Table 1.

##### Step 2

---

Students should fill in the counts from the rest of the lab groups and from the control plate in Table 1. Once this is complete, they should analyze Table 1 as a class.

Based on the colony counts, which environment is most abundant with microorganisms?

**Depending on the environments chosen for a particular class, answers will vary.**

##### Step 3

---

Using a stereomicroscope or hand lens, students should study the morphology (physical characteristics such as color, shape, texture and overall appearance) of each type colony on their agar plates.

**Note:** *Students should be able to perform this step with the lid on the plate. However, if they need to remove it, they should ask you for assistance. If a lab group happens to have a plate with no growth, they should find a lab group that has a plate with growth that they can study. In this case, they should just make sure to note which environment they are studying.*

Each lab group should choose two or three colonies that they would like to study further and make a drawing of them in Table 2. Next to each drawing, they should describe the morphology of the colony.

**Table 1**

Group #	Environment	Type of Agar	# of Colonies per Quadrant				Total # of Colonies
			1	2	3	4	
1	Near a vent	Nutrient	4	3	7	5	43
		Starch	4	5	10	5	
2	Against a wall	Nutrient	2	2	6	2	22
		Starch	7	6	0	0	
3	Under a tree	Nutrient	18	15	5	5	80
		Starch	10	9	11	7	
4	Above the bed	Nutrient	1	2	1	0	6
		Starch	1	0	0	1	
5	In the hall	Nutrient	4	7	10	7	48
		Starch	5	5	5	5	
6	Cafeteria	Nutrient	3	5	6	1	28
		Starch	5	4	1	3	
7	Inside a window	Nutrient	1	0	0	1	6
		Starch	1	1	1	1	
8	Front door	Nutrient	2	1	0	2	11
		Starch	3	1	2	0	
Control	Sealed agar plate	Nutrient	0	0	0	0	0
		Starch	0	0	0	0	

# ACTIVITY

## 4

### Making and Staining Bacterial and Fungal Smears

#### What you need

##### Per group

Slides that you will prepare

##### Shared

Coverslips

Mounting medium

Methylene blue

Compound microscopes

#### What to do...

##### Step 1

From their list on in Table 2, students should choose a colony. You will smear and fix a small sample of the colony onto a microscope slide (refer to Teacher Demonstration section).

**Safety Note:** For safety reasons, you will demonstrate and perform this technique for your students.

##### Step 2

Students should obtain the slide and flood the slide with methylene blue stain for 1-2 minutes over a sink or tub.

##### Step 3

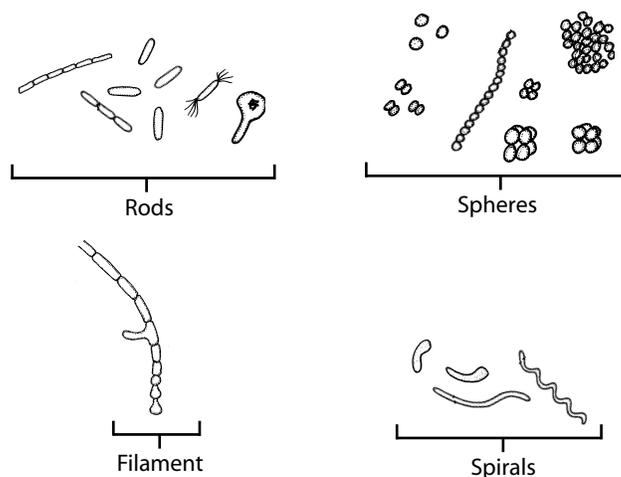
They need to rinse the slide by dipping it into water and blotting it dry with a piece of filter paper or paper towel. Students should add 1-2 drops of mounting medium to the microscope slide in the area where the coverslip should be mounted. They should place the cover slip onto the mounting medium, then apply

gentle pressure to the coverslip to evenly distribute the mounting medium between the coverslip and the slide. They can gently tap the coverslip with a soft eraser to eliminate air bubbles. Students should allow the mounting medium to dry.

**Note :** Students should avoid getting the mounting medium on the top of the coverslip.

##### Step 4

Students should examine the slide under high power and oil immersion (if available), and then make a drawing of what they see in Table 2. Here are some common shapes of bacteria that students can look for:



They should describe the shape and detail of the microorganism in Table 2. Students can refer to the included Common Bacteria Types and Common Molds and Fungi charts (or any other reference material that you recommend) to assist with the identification of the microorganism. Be sure that students note their findings in Table 2.

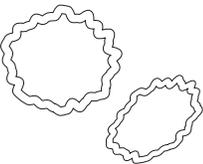
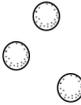
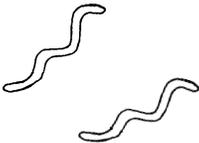
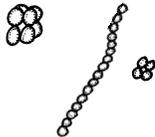
##### Step 5

Each lab group should repeat Steps 1-4 for each of the colonies that they would like to study.

**Step 6**

Students should dispose of all materials after completing their final observations. These should go in a bio-hazard bag or other receptacle that you designate. Direct your students to wash their hands before leaving the laboratory.

**Table 2**

Drawing of Colony	Morphology	Drawing of Bacteria	Description	Type of Bacteria Identified
	<p>White, dull, wavy edge, dry</p>		<p>Rod-shaped</p>	<p>Bacillus</p>
	<p>Tan, circular, smooth, translucent</p>		<p>Spiral-shaped, slightly bent</p>	<p>Spirilla</p>
	<p>Yellow, shiny, smooth edge, round, tiny colony</p>		<p>Spherical-shaped, in clusters at times</p>	<p>Cocci</p>

---

# ACTIVITY

## 5

### Testing Air for Particulates

---

#### What you need

##### Per group

- 1 Microscope grid
- 1 Toothpick

##### Shared

- Petroleum jelly
- Compound microscopes

#### What to do...

##### Step 1

Assign each lab group a number and an environment. Each group should obtain a microscope grid. They should label the back side of their microscope grid and Table 3 with this information. You will designate a control so make sure that students note this in Table 3 as well.

##### Step 2

Each group should obtain a toothpick. They should use the toothpick to cover the top of their microscope grid with a thin layer of petroleum jelly. Students should discard the toothpick into the designated receptacle.

##### Step 3

Students should gently place the microscope grid (jelly side up) into the palm of their hand with the other hand cupped around it. Or, they may place their grid into an appropriately sized box or container. This will allow them to transport their microscope grid to their designated environment without any contamination.

**Note:** Make sure that students do not touch the jelly with their hands or with the container as it is being transported. Be sure that students keep the grid level as they transport it from place to place.

##### Step 4

Students should carefully take their microscope grid to their designated environment. They should find a safe, level spot to place their grid where it will not be disturbed.

##### Step 5

They should gently set their grid on the level spot (jelly side up). Students should allow the grid to remain undisturbed for approximately 24 hours.

## ACTIVITY

# 6

### Observation of Air Particulates

#### What to do...

#### Step 1

After 24 hours, students should retrieve their grid and carefully transport it to the lab.

#### Step 2

Using a microscope on low power, students should count the number of particles in 10 random squares on the grid. Just make sure that they do not count the same square twice. Have them record their data in Table 3.

#### Step 3

Once students have counted all 10 squares, they should take the average to determine the average number of particulates per square. Have students record this average in Table 3.

#### Step 4

Students should create a drawing, in the circles provided, of any interesting particulate matter that they see on their grid.

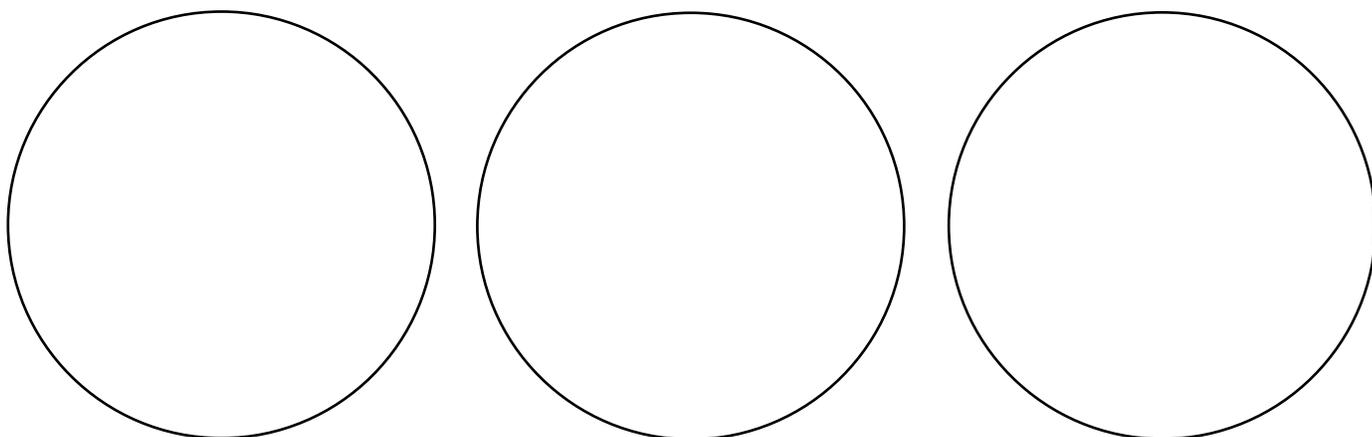
#### Step 5

As a class, students should fill in the rest of Table 3 with information from each of the lab groups. Once this is complete, they should analyze the data table as a class.

Table 3

Group #	Environment	Number of Particulates per Square										Average # of Particulates per Square
		30	26	34	23	30	19	44	38	33	36	
1	Near a vent	30	26	34	23	30	19	44	38	33	36	31.3
2	Against a wall	10	9	11	13	20	6	6	10	12	7	10.4
3	Under a tree	44	50	46	55	30	44	47	51	54	59	48
4	Above the bed	4	7	10	14	2	15	6	11	8	3	8
5	In the hall	20	25	27	31	29	20	18	25	22	23	24
6	Cafeteria	34	31	26	22	25	17	38	32	40	31	29.6
7	Inside a window	2	5	6	8	11	13	4	6	7	8	7
8	Front door	20	15	26	11	15	11	15	20	15	16	16.4
Control	Sealed agar plate	0	0	0	0	0	0	0	0	0	0	0

## Particulate Matter Drawings



### Questions

1. In Table 1, which environment contained the most number of colonies?

Depending on the environments chosen for a particular class, student answers will vary.

2. Why do you think there is so much growth in this environment as compared to the others? Give some possible explanations.

Abundant growth may be due to a high-traffic environment that many people and animals come in contact with, ideal weather conditions for bacterial or fungal growth, etc.

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?

A sealed agar plate was the control in this experiment. There should have been no (or, minimal) growth in the sealed agar plate because there should have been no exposure to contaminants in that environment. A control is important because it establishes a constant environment with no variables.

4. What was the purpose of using the agar and the petroleum jelly in this experiment?

The agar is a nutrient media that microorganisms are able to feed on and grow on. The use of agar allowed us to see what types of microorganisms grow in each environment. The petroleum jelly was used because it is a sticky substance that is ideal for trapping and collecting particulate matter from the air.

5. According to Table 3, which environment had the greatest amount of particulates? Which location had the least amount of particulates?

The environment with the greatest amount of particulates may be one that collects a lot of dust, is in a high traffic area, etc. and the environment with the least amount of particulates may be one that is more secluded, clean, treated with an air purification system, etc.

6. Suggest possible sources of particles that were observed in Activity 3.

**Trees, plants, automobile exhaust, factories, heating and cooling systems, vents, clothing, smokers, etc.**

7. Explain how the following factors might influence an experiment just like the one you just performed: the day, the time of day, the weather, the season.

**The time of day and the day of the week could have influenced the results because of high or low traffic patterns through the environments. The weather has an enormous influence on outside environments. For example, rain may wash away many particulates, and wind may blow many particulates into the environment. Even the seasons can influence particulates in the air. For example, during the wintertime in the northeastern US, the snow may carry many particles, and a humid environment in the summertime may also carry many particles, bacteria or fungi.**

8. Prepare a list of possible air pollutants and air pollution sources in your community.

**Air pollutants may include carbon monoxide, ozone, nitrogen oxides, and sulfur oxides, bacteria, etc. Local sources of air pollution may include factories, industrial facilities, automobiles, planes, households, smokers, etc.**

9. What are some ways that you could reduce air pollution in your community?

**Car-share, car-pool, use electric or hybrid vehicles, stop smoking, reduce the use of hazardous chemicals, use of air filtration systems, etc.**

10. What are some of the effects on human health from air pollutants?

**Eye irritation, respiratory problems, headaches, cancer, etc.**

11. What different aspects of your life could be affected by air pollution?

**Recreational facilities and beaches could be shut down because of contamination and public health safety concerns. Also, drinking water could become contaminated, which could force households to boil their drinking water. Produce and seafood may also be affected by contaminated water. Produce is irrigated with water and fish and shellfish live in water. Contamination of water supplies such as these could cause a food advisory.**

### Optional

Students may want to design their own experiment to determine other types of organisms that exist in the air around them.

### Assessment

Completion of data tables and analysis questions are general tools of assessment. In addition, designing new laboratories, Internet searches/projects, creative book reports, and oral presentations on findings are a few other ways of gauging understanding of the subject material at hand.

### Cross Curricular Integration

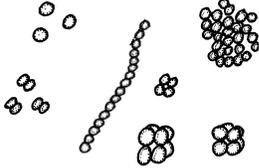
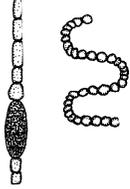
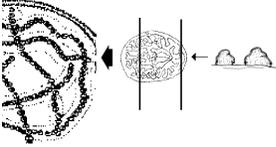
#### History and Government:

Students can study the history of air pollution legislation through the decades in order to get a better understanding of the current air quality conditions.

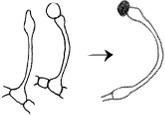
#### Math

Introduce your students to population curves, logarithm, exponential growth, etc. by tying it in with the growth patterns of the microorganisms.

## Common Bacteria Types

Name	Illustration	Where to look	What to look for
<i>Cocci</i>		Various surfaces, soils and in polluted water	Cocci are spheres 0.5 to 2.2 μm in diameter. After dividing, they usually adhere to each other and form clusters. Type of clusters include: Diplococcus (e.g. pairs), Tetracoccus (e.g. groups of four), Streptococcus (e.g. chains), Sarcina (e.g. cubes of eight), and Staphylococcus (e.g. irregular clusters).
Cyanobacteria- <i>Anabaena</i>		On submerged aquatic plants, other submerged surfaces or shoreline muds	Anabaena are macroscopic. Their blue-green color is evenly distributed throughout the cell. Their hair-like filaments are composed of beadlike or barrel-shaped cells (8 to 10 μm in diameter).
Cyanobacteria- <i>Nostoc</i>		Stagnant waters, ponds, lakes, ditches or on rocks or other submerged objects in stream riffles	Nostoc colonies are up to 2 cm in diameter and are usually globular with a firm mucilage matrix.
Rods- <i>Bacillus thuringiensis</i>		Ornamental shrubs, trees and vegetables that are infested with caterpillars	Rods are 0.5 to 0.9 μm wide by 1.2 to 3.0 μm long. They exist as rods and produce a protein crystal.
<i>Spirilla</i>		Various surfaces, soils, and in polluted water	Spirilla appear as short rods, 0.5 μm to 0.8 μm wide by 5 to 60 μm long. They appear slightly bent or as rigid spirals.

### Common Molds and Fungi

Name	Illustration	Where to look	What to look for
<i>Aspergillus</i>		<p>Moldy breads; also appear on peanuts, especially after spring showers</p>	<p>Aspergillus are macroscopic. They have fuzzy appearance with dark spore cases. Fruiting bodies are either black (<i>Aspergillus niger</i>) or yellow-green (<i>Aspergillus flavus</i>). They resemble a fan with spherical-shaped spores (2 to 5 mm in diameter) located in chains that radiate from a central point. The hyphae are either transparent (<i>Aspergillus flavus</i>) or yellowish (<i>Aspergillus niger</i>) and have a cross wall. The mycelia are either white or yellow with small black spore cases.</p>
<i>Mucor</i>		<p>Moldy breads and fruits, such as oranges, coconuts, as well as other foods</p>	<p>The macroscopic mycelia are beige or white with black fruiting bodies. The microscopic fruiting bodies resemble a lollipop on a branched stick. Hyphae, which are also microscopic, are transparent and have no cross walls.</p>
<i>Penicillium</i>		<p>Moldy breads or fruits</p>	<p>Mycelia are macroscopic and green to bluish gray. The hyphae are microscopic, transparent and have cross walls. The fruiting bodies are also green to bluish gray. They resemble a brush or broomstick with spherical spores (2 to 5 mm) situated in chains on each hyphal branch.</p>
<i>Pilobolus</i>		<p>Barns or pastures housing horses or cows</p>	<p>Macroscopic. The fruiting bodies are transparent, bulblike structures with a black cap that sits on top of a long slender stalk. The hyphae have no cross walls.</p>
<i>Rhizopus</i>		<p>Moldy breads, bananas, potatoes and other plant materials</p>	<p>Mycelia are macroscopic. They are gray to white, fuzzy-looking, and have black spore cases. The microscopic fruiting bodies are black and resemble a lollipop on a long stick. Microscopic hyphae have no cross walls.</p>
<i>Rhytisma</i>		<p>Maple trees</p>	<p>Appear as black spots on maple trees</p>

# Microscope Grids

