Mission 11 Logbook
Mission to Planet Earth – Life Trap!

Can You Detect Life in the Atmosphere?
Making a Life Trap! - Directions

Today you will become an extraterrestrial scientist who is investigating whether or not there is life in the atmosphere of Planet Earth! You have sent a probe to Earth. This probe will not take soil samples; instead it will be a Life Trap designed to capture any microscopic, airborne life-forms. In this experiment, you will simulate sending a life detection device to some strange location to see if it actually finds life there.

Each team will prepare two identical Life Traps, which are Petri dishes with a nutrient gelatin food supply for microbes. The experimental dish will be opened at a strange location for 20 minutes. The control dish will never be opened. You will observe both dishes for a few days to see if any life appears.

If any microbes settled into the experimental dish while it was open, and if they can use the nutrients in the dish, then they will grow. They may be too small to see at first, but if they have enough time to multiply, they will grow numerous enough so that you can see their colonies. Nonliving things that settle into the experimental dish will not grow at all. Therefore, this is a way of finding life-forms that are too small to see with the naked eye.

Procedure

1. Wash your hands and your work areas with soap and water.

2. Obtain two sterile Petri dishes and four pieces of masking tape. Tape shut your Petri dishes without opening them; this makes a “hinge” on one side of each dish and a rebreakable seal on the other. Write your names on both dishes. Write “Control” on one dish and “Experimental” on the other.

3. Take your Petri dishes to the central area of the classroom where the nutrient gelatin medium is being prepared. Remove one piece of tape from each dish. Your teacher will pour the nutrient medium into your Petri dishes. You must work quickly to close and retape them. Gently swirl the dishes to evenly distribute the gelatin.

4. Agree on a strange location to which one member, or the whole team, will take the Petri dishes after school. These strange locations may include an attic, doghouse, back yard, or wherever. They represent random samples of Earth taken by extraterrestrials!

5. The two Petri dishes should be taken to the strange location and set side by side. The experimental dish should be opened and left open for 20 minutes. Then it should be closed and retaped. The control dish must remain shut. Both dishes should be left at room temperature overnight and brought to school the next day.

6. Both Petri dishes will be examined by your team before they are set aside to incubate for a few days. But they'll be back!

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Mapping Microscopic Life – Directions

1. Examine your team's Petri dishes carefully without opening them. This is a precaution because certain molds could produce irritating or infectious spores, although most common molds are harmless.

2. Make a “map” of the surface of each dish on your worksheet. Mark a line or arrow on the dish with a grease pencil. This will allow you to orient the dishes for future observations after any life-forms have had a few days to incubate.

3. Use a hand lens to examine any growth.

   Here are some of the things you might notice as you examine the dish. Take a guess at what they are, but remember that one must usually use a microscope to be sure of the identification of such small organisms.

   Shiny low circular growths, glistening and. smooth-usually *bacteria*.

   Irregular patches or threadlike things often *funguses* or molds.

   Dark center is oldest part of colony, may be producing spores. Colony with two older centers was founded by two individuals.

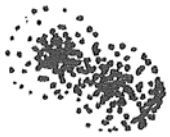
4. Use a plastic ruler to measure any microbial colonies that are growing on your dish. Draw each colony as accurately as you can on your worksheet. Put each colony in the right place on the map and Fungus including mold. draw it the correct size.

5. After your team has mapped your own Petri dishes, visit other teams. A good way is for half of your team to remain at their station to explain their findings to visitors while the other half circulates; then switch halves and duties.

Figure 11.3—Microscopic Life.

Bacteria.

Fungus including mold.



Colony produced by two spores.

6. Put your pair of Petri dishes away somewhere at room temperature for safekeeping. You will be observing them for a few minutes each day over the next few days.

7. Calculate the minimum time that the Life Trap would have to remain open to catch one microbe at your test location.

8. At the end of the entire experiment, follow your teacher's instructions to dispose of the Petri dishes.

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Life in Strange Locations – Worksheet

Name: _____ Date: _____

1. After school, pick up both dishes and take them and this data sheet to the test location. Remove the lid from the experimental dish and write the time in the blank below. Let the dish sit open, exposed to the air, for 20 minutes. (Don't put anything into the dish.) Then close and retape the dish and record the time and other data below.

Date of test:

Test location:

Time opened:

Time closed:

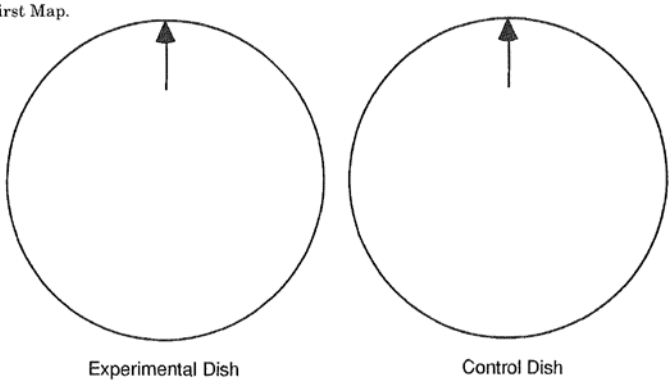
Person(s) observing:

Description of test area (particularly wind conditions, dustiness, and approximate temperature):

How “clean” does the area appear?

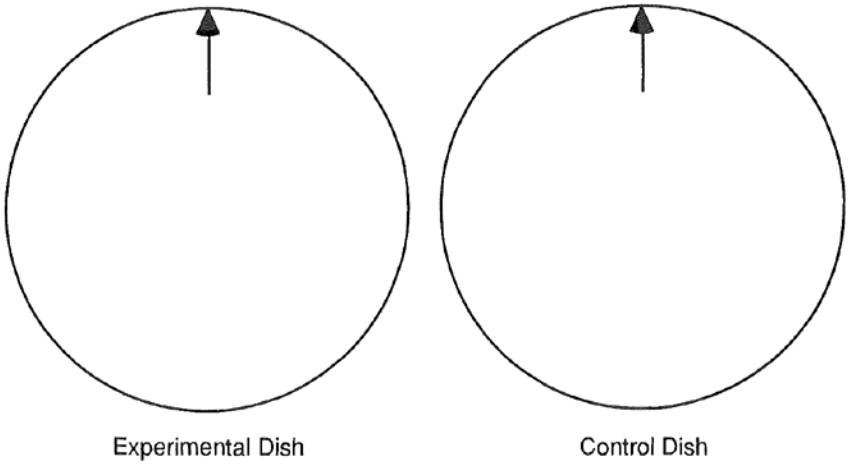
2. Initial Maps of Life Traps. Date of observations:

Figure 11.4—First Map.



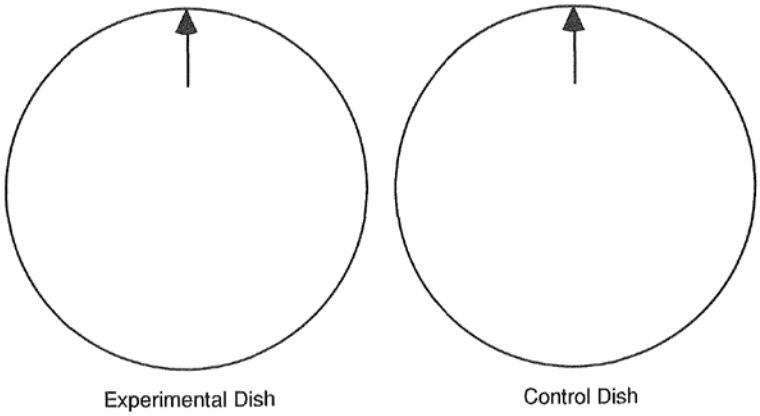
3. Second map of Life Traps. Date of observations:

Figure 11.5—Second Map.



4. Third map of Life Traps. Date of observations:

Figure 11.6—Third Map.



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Analyzing Life Traps – Worksheet

Name: _____ Date: _____

1. As a team, compare your newer maps with the earlier ones. List all of the changes you observed.

2. List the number of original colonizers that invaded your experimental dish and use the identification diagram on your instruction sheet to see what kinds they were.

   Number of colonizers in experimental dish:

   Kinds of colonizers in experimental dish:

3. On average, how many colonizers invaded the experimental dish per every minute that it was open? To find out, divide the number above by the number of minutes that the dish was open.

   Number of minutes the experimental dish was open:

   Average number of colonizers per minute

5. You can now estimate how long you would need to leave the dish open, at your test site, to be reasonably sure of catching at least one of the types of organisms shown. To do so, divide the number of minutes that the trap was open by the number of organisms. (This is the reciprocal of the numbers found in number 3, which is the same as 1 divided by the numbers shown.)

   Number of minutes needed to catch at least one organism:

6. If you had left the experimental dish open for less time than the number of minutes shown in the last blank, what do you think would have happened?

7. If you had left the experimental dish open for more time than the number of minutes shown in the last blank, would you have detected life? Why or why not?

8. Are there organisms in your control dish? yes no

   If the answer is yes, how did they get there, and when and where did it happen?

   If the answer is yes, and if the experimental dish had been opened on Mars or Venus, rather than at your test location, what would that tell you about whether or not there is life on Mars or Venus?

9. There were probably a few organisms that entered the experimental dish that did not grow there. Why not? What might have kept them from growing?

10. Suppose that the dishes were to go to Mars or Venus, and suppose- that somebody on your team says that they couldn't detect Martian or Venusian life because the organisms there can't use the nutrients in your Life Trap. How might you answer them? How might you change this experiment?