



Mission 9 Logbook

Mission to Planet *Earth*—Life in Soil!

SETI INSTITUTE Can You Recognize Life Up-Close?

Dirty Science-Directions

Today you will play the role of an extraterrestrial scientist who is investigating whether or not there is life on Planet Earth! You have sent a probe to Earth to collect two soil samples and bring them home for observation and experimentation. You will be given two samples of soil such as might be scooped up by your probe. The probe took these samples in two different locations: one was in a “desert” and the other was in a “forest.”

Your objective is to see if you can tell, by looking carefully with a microscope, whether something in the soil is now alive, is dead but was once alive, or was never alive. Sometimes you will see an object that you just can't decide about. “Don't know” is a scientifically acceptable answer. In fact, “Don't know” is a better answer than a wild guess!

Procedure

1. Obtain a Petri dish with dry Earth Sample # 1.
2. Look carefully at dry Earth Sample # 1, first using your unaided eyes, then using a hand lens, and finally using a microscope (if one is available).
3. Draw the objects that you see. Identify each kind of object as either “Alive,” “Once Alive,” “Never Alive,” or “Don't Know.” Look at more than one random part of each soil sample.
4. Follow the same procedure with dry Earth Sample # 2.
5. Put the Earth samples into two separate beakers. Label them Earth Sample 1 and Earth Sample 2.
6. Pour dechlorinated water into the beakers. Cover the “desert” soil with a few centimeters of water. Slightly moisten the “forest” soil. Because this is a life detection experiment, the drier sample requires more water (if there are dormant life-forms in the soil, water could activate them).
7. Label the watered samples with your name so that you can retrieve your own sample the next time the class meets to examine them.
8. Set these watered samples into the incubation area, under a light bulb.

9. Use an eyedropper to take a drop of the water from on top of the wet Earth Sample # 1. Look carefully at the water, first using your unaided eyes, then using a hand lens. Draw and classify any objects as you did before. Stir the soil sample a little and then look again.
9. Follow the same procedure with the wet Earth Sample # 2.



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SETI INSTITUTE Observing Dry Soil Samples- Worksheet

Name: _____ Date: _____

On this page, describe and draw the objects you see in the dry Earth Sample # 1. Do the same for objects seen in the dry Earth Sample # 2. For each object seen, write “A” if the object is alive, “OA” if it is dead but was once alive, “NA” if it was never alive, or “DK” if you don't know. Show the relative sizes of the things that you see.

Observations of Earth Sample # 1 (dry soil):

Observations of Earth Sample # 2 (dry soil):



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SETI INSTITUTE Observing Wet Soil Samples - Worksheet

Name: _____ Date: _____

On this page, describe and draw the objects you see in the wet Earth Sample # 1. Do the same for objects seen in the wet Earth Sample # 2. For each object seen, write “A” if the object is alive, “OA” if it is dead but was once alive, “NA” if it was never alive, or “DK” if you don't know. Show the relative sizes of the things that you see.

Observations of Earth Sample # 1 (wet soil):

Observations of Earth Sample # 2 (wet soil):



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SETI INSTITUTE Soil Sample Analysis - Worksheet

Name: _____ Date: _____

Answer the following questions, based upon your observations of the two soil samples.

1. How can you tell if something you are looking at is alive?

2. How can you tell if something you are looking at is dead, but was once living?

3. How can you tell if something you are looking at was never alive?

4. What did adding water to the soil do? Did this make it easier for you to tell if life was present in some cases? Why?

5. How would your answers be different if you had only a single closeup photograph of soil to study, as may be the case with a spaceship? Would it help if the photograph was in color rather than black and white?

6. Based upon your observations of the two soil samples, is there life on Earth? Why?

7. If you had only seen Earth Sample # 1, and had only looked at it when it was dry, would you have known that there was life on Earth? Why or why not?
8. As an extraterrestrial scientist, what can you conclude about life on Planet Earth?
9. Which of the two soil samples you saw do you think is most like soil on Mars? (Neither? Both?) Why? Which is most like Venus? (Neither? Both?) Why?
10. From your recent experiences, speculate about Earth scientists' ability to detect life on Mars and Venus.