Mission 3 Logbook
Mars Jars! (Phase 1)
Could an Earth Microbe Survive on Venus or Mars?
Culturing *Penicillium notatum* on Earth

Directions

We need to see how *Penicillium notatum* grows on Earth so that, after it has been exposed to the simulated environments of Venus and Mars, the *Penicillium notatum* can be checked to see if it has actually survived according to its life processes as they occur on Earth. Today you will prepare two Petri dishes with a food supply for microbes-a nutrient gelatin medium. You will add seeded soil containing *Penicillium notatum* to one Petri dish; the other will serve as a control. You will observe both dishes for a few days and record the normal growth of *Penicillium.* They will be too small to see at first, but they will multiply at room temperature and grow numerous enough to see as colonies in a few days. This process is temperature dependent.

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 distribute the gelatin evenly across the bottom of the Petri dish.

4. Obtain two soil samples using the two sterile carrying dishes. One will be pure soil and the other will be seeded soil, which contains *Penicillium notatum.* Remember which is which!

5. Be careful when adding the seeded soil containing *Penicillium notatum* to your Petri dishes. Do not inhale close to the seeded soil. Some people have an allergic reaction to this organism. If you are allergic to penicillin, let your partner handle the seeded soil while you handle the pure soil.

6. Sterilize a spatula with an alcohl swab. Sterilize the spatula before each use.

7. For the Experimental Petri dish, plate out a sample of the seeded soil onto the nutrient gelatin: using the sterilized spatula, lightly sprinkle about 1/4 teaspoon of the soil over the surface of the cooled, set gelatin.

8. For the Control Petri dish, plate out a sample of the pure soil onto the nutrient gelatin: using the sterilized spatula, lightly sprinkle about 1/4 teaspoon of the soil over the surface of the cooled, set gelatin.

9. Draw an arrow on each Petri dish. Use the arrow to orient your dishes the same way each time you look at them; this way you can identify colonies and chart their progress as they grow bigger. Store both Petri dishes. You will be observing them over the next several days. Both dishes should be left at room temperature.

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Mars Jars! (Phase 1)
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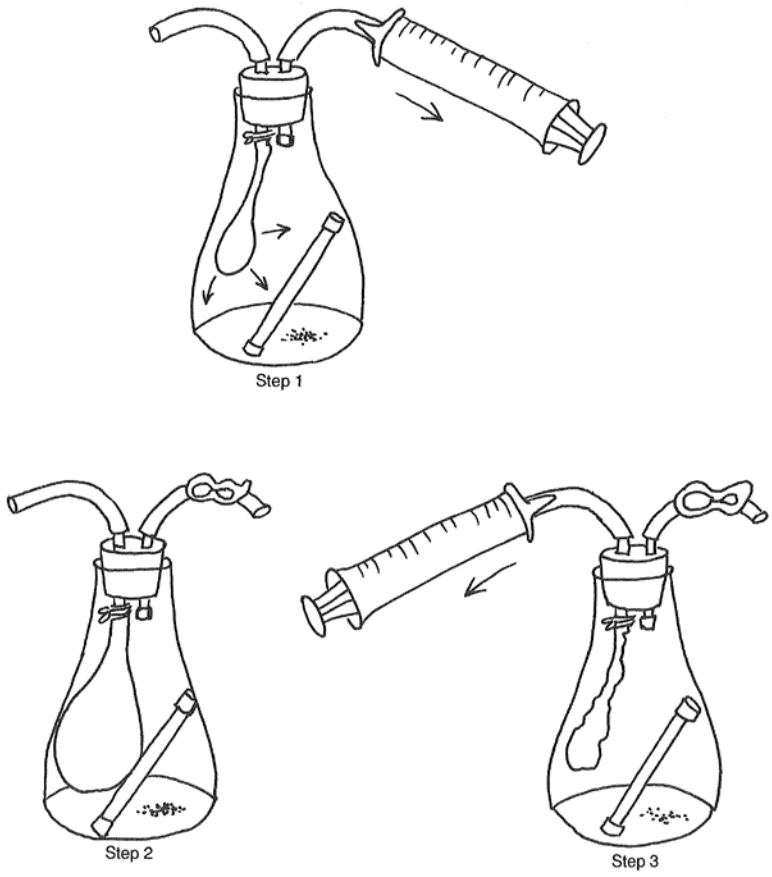
A Mars Jar – Images

Figure 3.2—Making a Mars Jar.



Mars Jars!(Phase 1)
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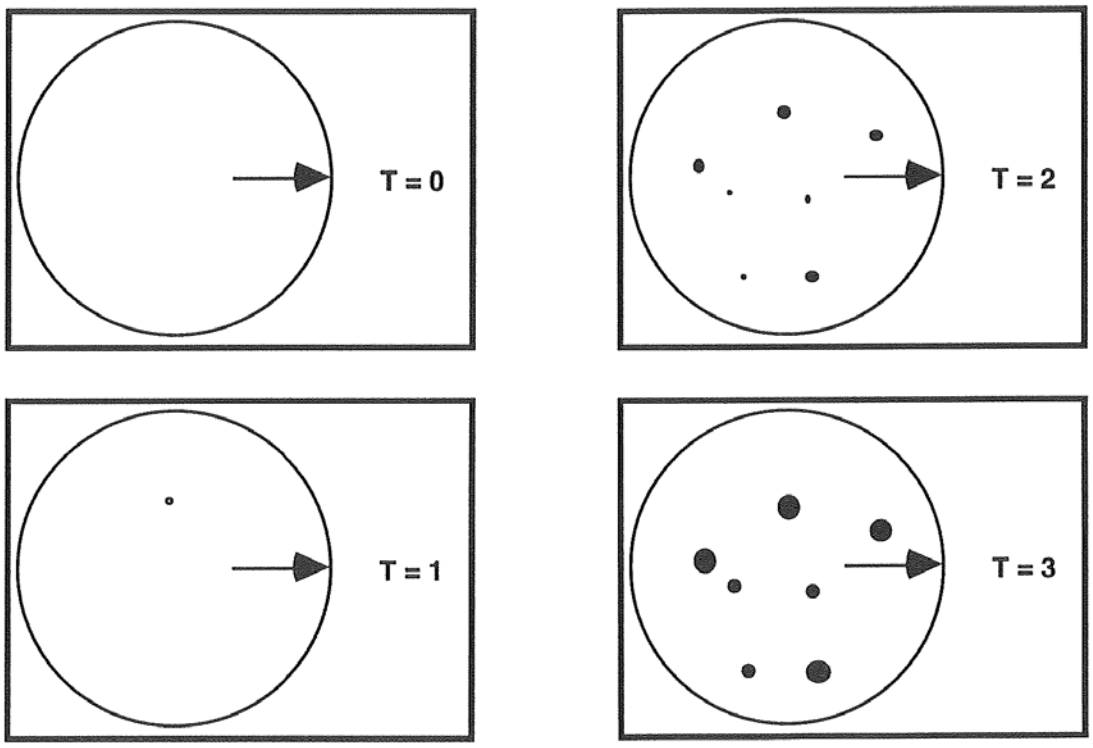
Growth of Microbial Colonies – Image

Figure 3.3.



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Making a Mars Jar – Directions

To set up a Mars Jar:

1. Obtain a sample of seeded soil using the sterile carrying dish. Put 114 teaspoon of seeded soil into a sterilized 250-ml Erlenmeyer flask.

2. Obtain a double-holed stopper that has two glass tubes in it.

3. Cut four 1-cm lengths of rubber tubing and use them to carefully cover the four ends of the glass tubes that will be exposed to the balloon: the bottom ends of the two glass tubes that extend through the stopper and the two ends of the 7-cm glass tube (the equalization tube).

4. Place the glass equalization tube into the Erlenmeyer flask. (The tube is used to keep the balloon from sealing with the inside of the flask, which would prevent its inflation.)

5. Put your balloon on the bottom end of one of the glass tubes that extends through the stopper.

6. Make a slip knot around the mouth of the balloon. Wrap three inches of string around the mouth of the balloon to prevent air from leaking. Put the stopper tightly on the Erlenmeyer flask, with the balloon hanging inside.

7. Fit the two 7-cm rubber tubes over the exposed ends of the glass tubes that extend up through the stopper.

To decrease the pressure inside a Mars Jar:

Note: Always keep hold of the Erlenmeyer flask to keep it from falling over.

1. First, attach a syringe (with its plunger pushed completely into the syringe) to the rubber tube that does not have the balloon tied to it. Suck air out of the Erlenmeyer flask with the syringe. The balloon inside the flask will inflate. Keep sucking until the balloon is full and pressed against the glass equalization tube.

   To do this you must pinch the rubber tube shut with a tube clamp each time you reset the syringe for another pull. When the balloon is full, use a tube clamp again to clamp this rubber tube tightly shut.

2. Attach the syringe to the rubber tube that has the balloon tied to it. Suck air from the balloon with the syringe until the balloon starts to deflate. Completely deflate your balloon. This

should take between 25 and 35 pulls on the syringe. When the balloon is deflated, use a tube clamp again to clamp this rubber tube tightly shut.

3. Label your Mars Jar with your names and the date and place it in a freezer to simulate the temperature conditions on Mars.

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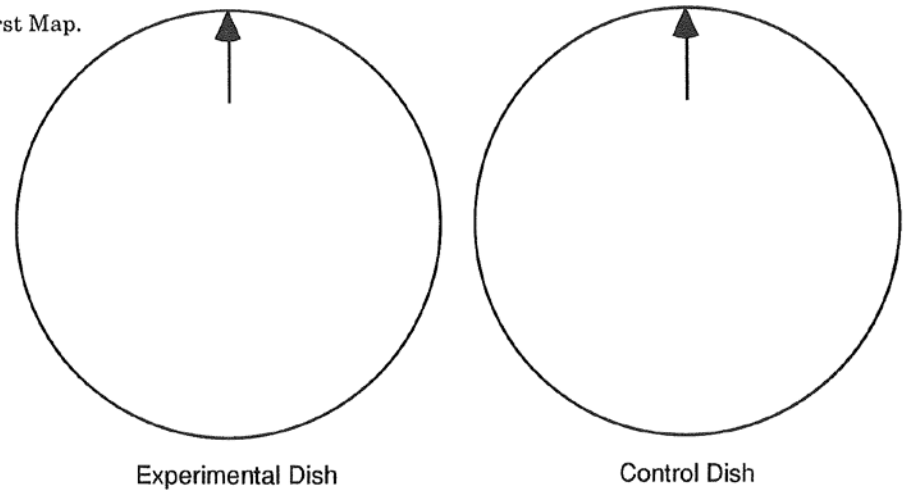
Growth of Penicillium notatum – Worksheet

Name : _____ Date: _____

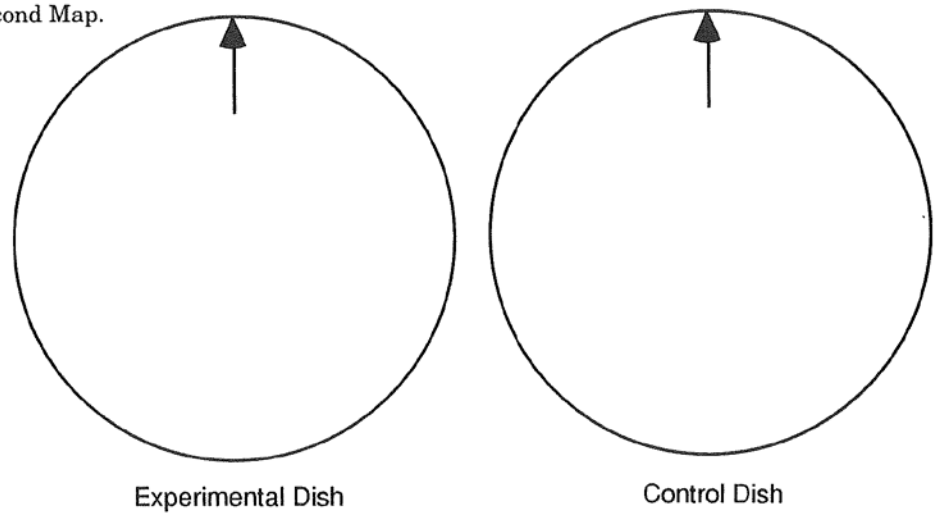
1. First map of *Penicillium notatum* growth. Date of Observations:

Figure 3.4—First Map.



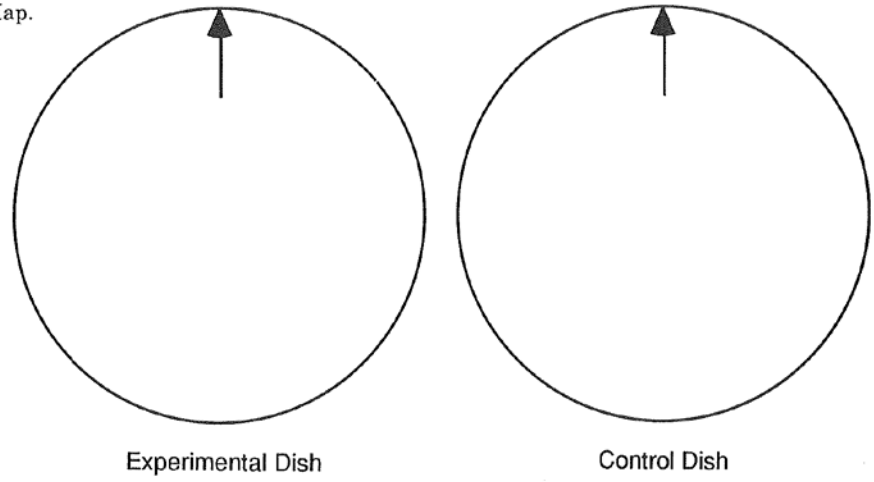
2. Second map of *Penicillium notatum* growth. Date of Observations:

Figure 3.5—Second Map.



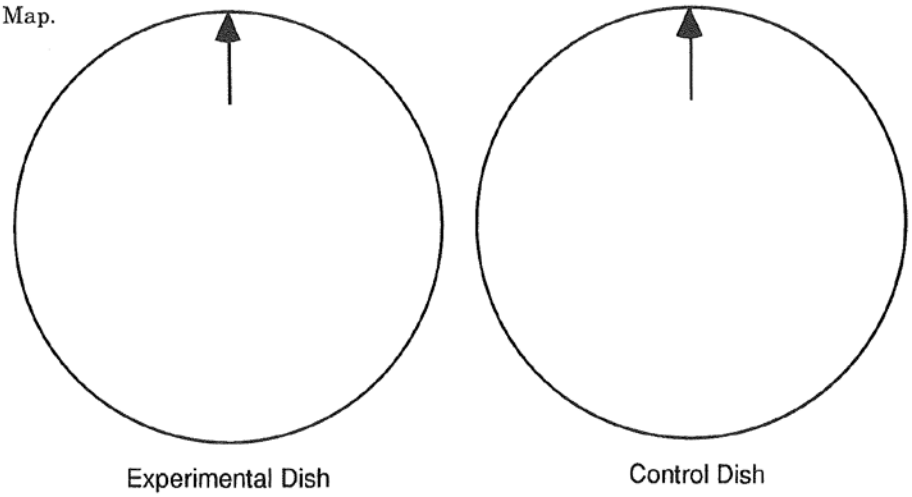
3. Third map of *Penicillium notatum* growth. Date of observations:

Figure 3.6—Third Map.



4. Fourth map of *Penicillium Notatum* growth. Date of observations.

Figure 3.7—Fourth Map.



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Harsh Environments – Worksheet

Name: _____ Date: _____

1. What is an exobiologist?

2. How would an exobiologist determine if an Earth life-form could survive on Mars or Venus?

3. Why did you need to culture *Penicillium notatum* under Earth conditions?

4. Why did you use a control dish that was plated with pure soil?

5. What do you think will happen to the *Penicillium notatum* that was put into your Mars Jar?