



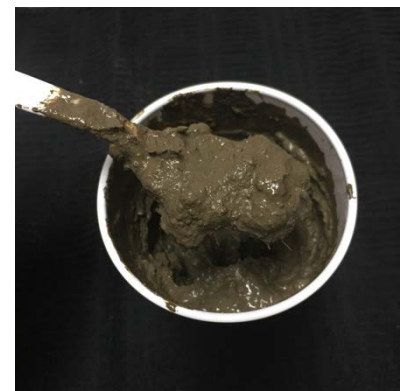
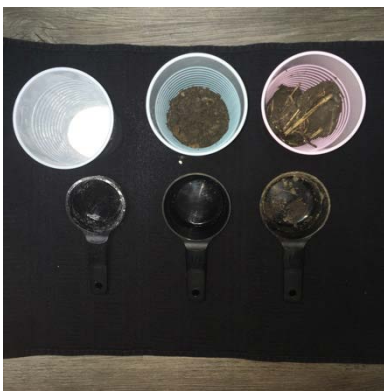
Winogradsky Columns

What you need

- ½ cup of mud (by a source of water, like a river or a pond)
- ½ cup of dry soil (nearby the source of water)
- 1-2 cups of water from source, or distilled water
- 1/8 cup of sulfur source, like Plaster of Paris or Epsom salts
- Mixing bowl
- Spoon
- Column (made by cutting the neck off a plastic soda bottle – ask an adult for help!) or a glass jar
- Carbon source, like newspaper or dried leaves ripped into tiny pieces
- Plastic wrap
- Rubber band or string

Preparation

A Winogradsky Column is a mixture of mud, soil, water, and nutrients. It is a mini-microbial community! Different microbes grow in certain layers; most are bacteria or archaea, a group of very small, single-celled microbes. Over time the columns will show different colors in the layers of the muddy mixture caused by different microbes that grow, depending on the nutrients and other resources available.



Step 1. Collect mud, water, and dry soil from sample site.

Step 2. Mix ½ cup mud, ½ cup dry soil, and 1/8 cup Plaster of Paris together in a bowl with a spoon. Remove any rocks, sticks and leaves.

Step 3. Add water to create a slurry with the consistency of cake batter. Don't use all your water for this step. Save some for later.



Step 4. Add several bits of newspaper to the bottom of the column.



Step 5. Add slurry to column until it is half full.



Step 6. After adding the slurry, gently tap column on a hard surface to release air bubbles.



Step 7. Add water to the column, about 1 to 2 inches above the mud slurry.



Step 8. Cover the column with plastic wrap and use a rubber band or string to hold it in place.



Step 9. Place the column in a sunny spot.

What to do

Observe the changes in your column once a week for 8 to 10 weeks. There should always be 1 to 2 inches of water above the mud layers; add water from source or distilled if needed. After 10 weeks you can dispose of the column by dumping it outside. Be aware that it will smell!

What is happening?

Nutrients determine what microbes grow in a column. Most of the oxygen is at the top of the column and decreases as you move down the column. Microbes that like oxygen are found near the top of the column. The bottom is where most of the carbon dioxide, methane, and sulfide are produced; these decrease as you move up the column. Microbes that like those nutrients can be found towards the bottom of the column.

Winogradsky Columns are great tools to not only learn about microorganisms but also to experiment. You can add different materials and nutrients to influence the type of bacteria that grow. Here is another suggestion for an experiment: Collect one cup of soil from a garden or a grassy area and, using tap water as a water source, follow the instructions to make a Winogradsky Column.