

ARTIS MICROPIA

Winogradsky column

Make your own micro-zoo

Microbes are an indispensable link in the circle of life. Microbes are responsible for producing and breaking down materials that other life within the ecosystem needs. Microbes are the beginning and end of the food chains on Earth. It is possible to study how microbes do this from the comfort of your own home.

In this experiment you will study the various microbes from your local environment by building a Winogradsky column - a miniature ecosystem. This experiment is named after Sergei Winogradsky (1856 - 1953), a Russian microbiologist who researched the coexistence of soil microbes.



Part 1: building the Winogradsky column.

What do you need?

- Bucket
- Shovel
- Gloves
- Soap
- 2 large bowls for stirring
- 2 spoons for stirring
- Black marker
- Plastic bottle of 1 liter
- Scissors
- Water
- Plastic foil
- Rubber band
- Lightsource (window or lamp)

Optional:

- 1/4 page of shredded newspaper
- 1 egg yolk

Let's get to work!

1. Go to a pond, rain puddle or river bed and dig up mud. Use the shovel and bucket, and wear gloves.
2. Wash your hands thoroughly with water and soap before starting to build the column.
3. Remove all stones, twigs and other solid material from the mud.
4. Carefully cut the neck off of the plastic bottle with scissors to form an open cylinder.
5. Draw 2 lines on the plastic bottle with the black marker. Draw the first line about a quarter of the way from the bottom of the bottle, and the other about three quarters.
6. Put enough mud in mixing bowl 1 to fill three quarters of the bottle.
7. Add water to the mud in mixing bowl 1 while stirring. Stir until the mud has the consistency of a milkshake.
8. Optional: If you don't have or don't want to add egg yolks and shredded newspaper, skip to step 12.
9. Move a quarter of the mud shake from mixing bowl 1 to mixing bowl 2.
10. Add the egg yolks and shredded newspaper to mixing bowl 2 while stirring.
11. Now add the mud shake from mixing bowl 2 to the plastic bottle up to the first line. Remove air bubbles by gently lifting the bottle and tapping it on the table a few times.
12. Add the mud shake from mixing bowl 1 to the plastic bottle up to the top line. Remove air bubbles by gently lifting the bottle and tapping it on the table a few times.
13. Add water on top of the mud. Leave about 2.5 centimetres of air.
14. Cover the top of the bottle with the plastic foil and a rubber band.
15. Place the bottle in the light and let it develop for 6-8 weeks.

Look at the column every few days. Also an interesting idea: take a photo from exactly the same angle every week so that you can record any changes.

Part 2: questions.

Try to answer the following questions during this experiment.

Question 1: What changes do you see in the column after three weeks? And after eight weeks?

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Question 2: Are there also parts of the column that remain exactly the same after eight weeks?

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Question 3: In a Winogradsky column, oxygen plays an important role. Predict the concentration of oxygen in the entire column. (Think about all parts of the column: mud, water and air.) Try to find out if you are right.

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Question 4: Note which colours the layers of the Winogradsky column have over time, and look up which microorganisms could be in each layer or colour.

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