

Grow your own microbial community!

Did you know that there's life hidden right under your feet?

Microscopic organisms (microbes) live in water and soil, and though we can't see them they perform a vital role in breaking down organic matter into simpler chemicals that organisms can use as food. Basically, microbes are the recyclers of the natural world! They are tough, hard to kill, live life in extreme and weird ways and they built the world as we know it today!

You can undercover this micro-world for yourself though through a simple science experiment – building a Winogradski column and growing your own micro-ecosystem!

Equipment –

- Mud and water
- Plastic bottle or jar
- Plastic tub or bucket
- Spoon
- Cling film
- Elastic band
- Newspaper
- Egg

Experiment –

(see the video for a walkthrough):

Get some mud! Collect from wet mud (and if possible some water) from the edge of a stream or pond using your spoon and tub/bucket. **Make sure to be careful when doing this.** If you can't access one of these muddy areas then you can take any kind of soil and mix it with water to form mud and this will work too. You will need enough mud to almost fill a bottle or jar.

Make your column filling! In your tub stir your mud until it's as thick as a milkshake and add more water if needed. Remove any sticks or stones. Into your mud add some shredded newspaper and one egg yolk. Stir it until it's all mixed in. Pour your muddy mix into a bottle or jar until it's about $\frac{3}{4}$ full. If you are using a plastic bottle, cut off the top bit with the neck to make a wide opening. Pour a little of your pond/stream/tap water on top.

Get growing! Cover your bottle/jar with clingfilm to keep out air. Place in a light area, but not in direct sunlight (we don't want to dry out the mud mix!). Now sit back and let those little microbes adapt to their new home! Be patient, it will take a while, days or weeks, to see them because though they grow fast they are very small.

Remember to keep checking your column and make a note if you see any colour changes.

Recording observations is a very important part of science – it is how you can test your ideas and determine what is going on in your experiment.

When you make an observation write it down in a notebook or on a computer, if you are able, you could take a picture or make a sketch to help you remember later what you saw!

What might you see?

After recording your observations in a science experiment, you need to think about what they mean, in other words you need to interpret your results!

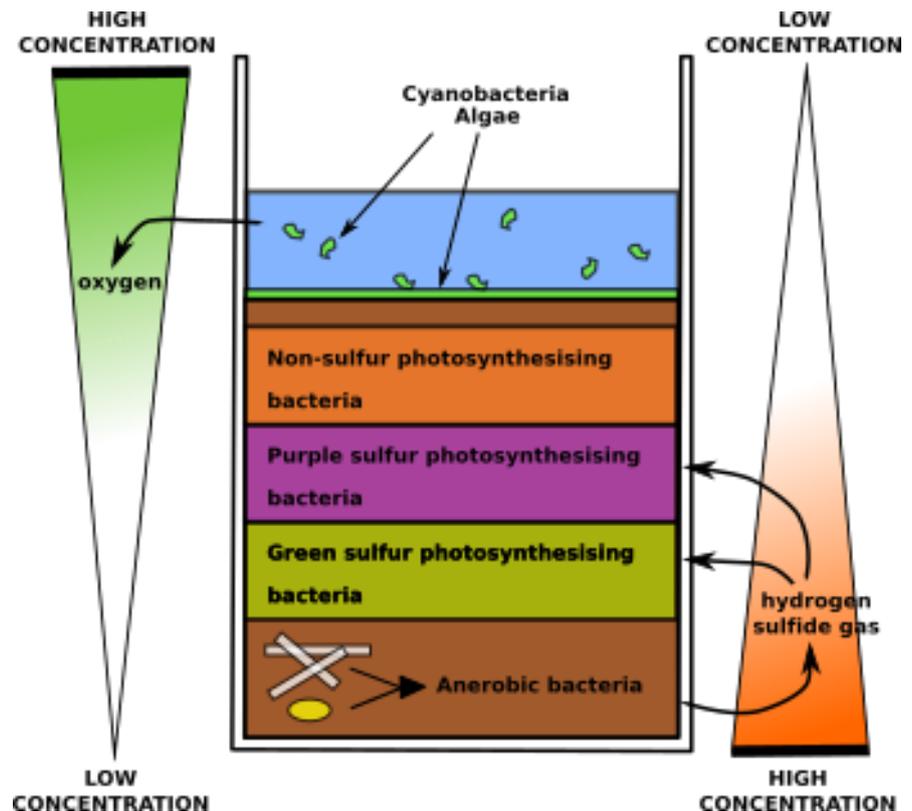
Depending on your mud and water, as well as the food and light you give the column you will see different things. Below is an example of what you may see – you may see all or just some of these features.

Hopefully you will see some layers of different colours. The layers will be

made of different microbes. At the top and in the water there may be green microbes. These microbes use sunlight to grow and give out oxygen.

At the bottom other microbes will break down the egg and newspaper to grow and will give off hydrogen sulfide gas – it smells like rotten eggs!

In between you will find a few different types of colourful microbe. They use hydrogen sulfide and sunlight to grow, but different groups of microbes find too much hydrogen sulfide and too much oxygen toxic. Therefore, you can find them hanging out at different depths in the column where the concentrations (shaded triangles) of each gas are just right.



Next steps:

Congratulations – you are now a successful **geomicrobiologist!** But what now? As a scientist you might ask what controls the type of microbes that grow in your Winogradski column. To answer that question you will need to do more careful experiments. In each experiment change just **one variable at a time** so that you can test which variables cause the most change in your column.

Variable - any factor that can be controlled, changed or measured in an experiment.

Some variables you could change are:

- Removing sulfur source (egg) and/or carbon source (newspaper)
- Changing the source: instead of newspaper use some grass cuttings or leaves.
- Changing the light: put one column in a cupboard/dark place and leave an identical column in the light.

Remember to compare your new results to your first experiment and then you can figure out what controls the bacteria that grow!

We would love to see your experiments – tag us on social media:



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We are particularly grateful to Neo Energy as their support has allowed us to produce these resources in association with Dr Matthew Warke, University of St. Andrews, and funding from the Carnegie Trust for the Universities of Scotland.

