



**ASCUS**  
ART & SCIENCE

DIY Learning Resource

# MAKE YOUR OWN SELF CONTAINED MICROBIAL ECOSYSTEM

**The Winogradsky Column**

*Suitable for ages 10+ (5+ with adult supervision)*

*Activity time (excluding prep time): 30mins*



[WWW.ASCUS.ORG.UK](http://WWW.ASCUS.ORG.UK)



ASCUSARTANDSCIENCE



\_ASCUS



HISTORIC  
ENVIRONMENT  
SCOTLAND

ÀRAINNEACHD  
EACHDRAIDHEIL  
ALBA



THE UNIVERSITY  
of EDINBURGH

# WINOGRADSKY COLUMN

## What is it?

The Winogradsky column is a closed system that mimics what happens in a natural environment. It shows how microorganisms help recycle nutrients in the environment, and in turn, how the nutrients, temperature, oxygen levels, time, acidity and moisture all affect microbial growth.

The components we will add to our column help get a nutrient cycle started (the eggshells adds carbonate, the egg yolk adds sulfur, and the paper towels are a source of carbon to the microbes in the soil and water).



# WINOGRADSKY COLUMN

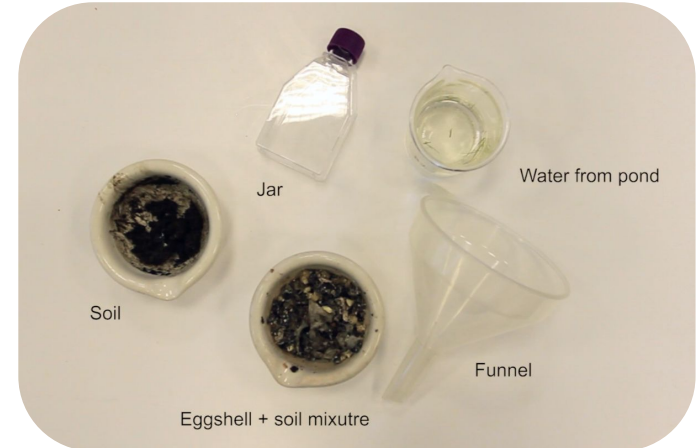
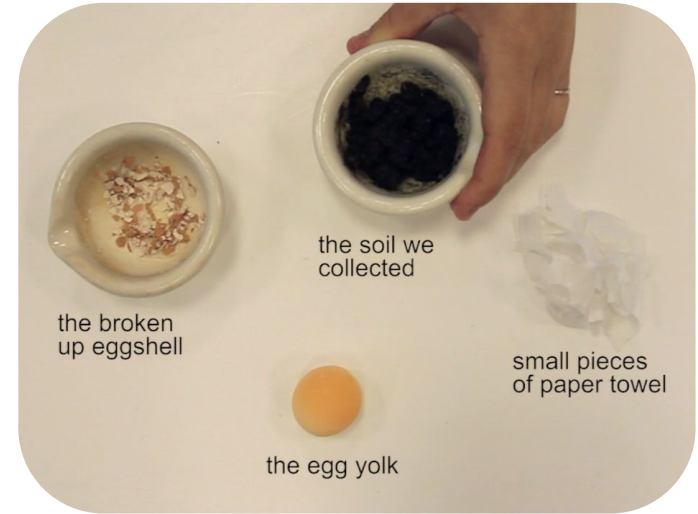
## Materials needed:

*The amount of the materials needed depends on the size of your bottle. Volumes indicated are based on a 100 ml bottle and do not have to be exact. Use larger volumes if using a larger bottle.*

1. Transparent bottle/jar (narrow and tall works best)
2. 50 ml Soil or mud (*Remove sticks and debris*)
3. 30 ml Water from your local pond/river
4. 5 ml Paper towel/cardboard/newspaper (*Shred into small pieces*)
5. 1 egg (*hard-boiled and peeled. Crush up the eggshell and yolk into small pieces. Discard the egg white*)
6. Funnel with wide opening

### **Safety advice:**

*Be mindful that environmental samples (water, soil, raw eggs) may contain hazardous or pathogenic microorganisms. Wash your hands regularly during this activity and wipe down any surfaces used with an all-purpose household cleaner after creating your Winogradsky column.*

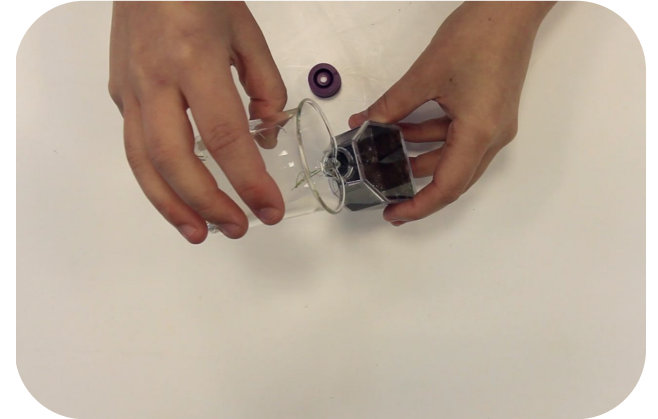


# WINOGRADSKY COLUMN

## Preparation:

*Rough mixture of ingredients (proportional to size of the bottle):*

1. Separate the soil into two halves. To one half, add roughly  $\frac{1}{4}$  of the ground eggshell,  $\frac{1}{2}$  of the egg yolk, and the paper towel/newspaper.
2. Add this eggshell-soil mixture to your bottle to make up  $\frac{1}{3}$  of the volume of the bottle.
3. Add the other half of the soil to make up another  $\frac{1}{3}$  of the volume of the bottle (total volume is now  $\frac{2}{3}$  full).
4. Finally, pour in the water from the pond to saturate the soil and occupy the remaining volume. Leave a little space at the top of the bottle for air.
5. Close/cover the jar leaving the lid a little loose.
6. Place your Winogradsky column on your windowsill and watch your ecosystem evolve!

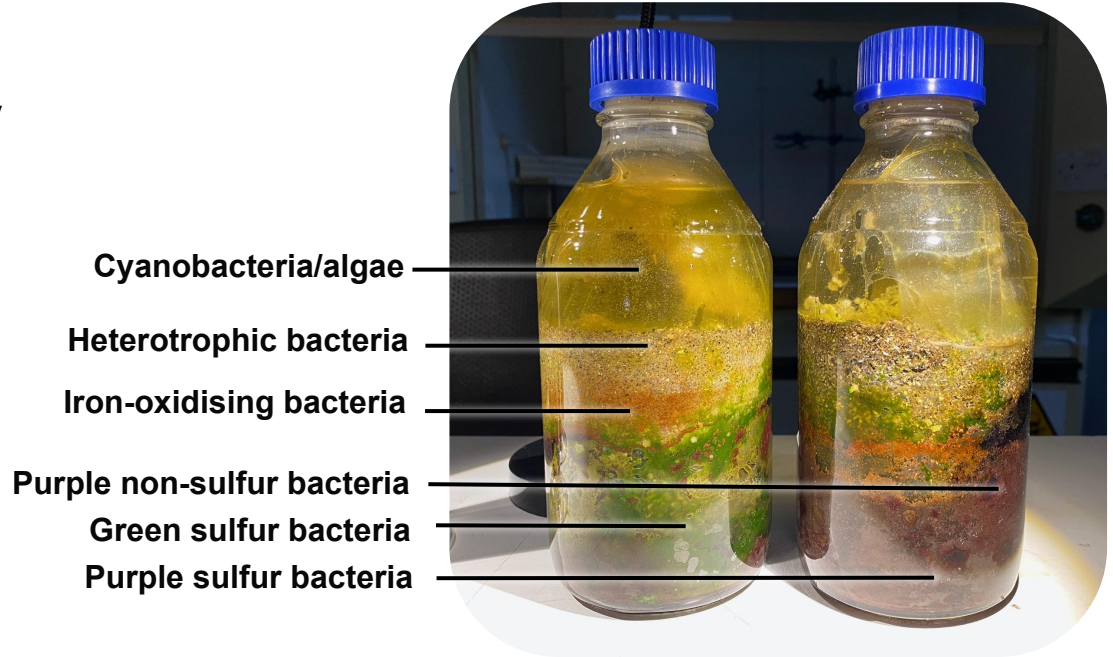


# WINOGRADSKY COLUMN

## What will you see?

The concentrations of oxygen are very low at the bottom of the column and higher at the top, while concentrations of sulfide are low and the top and high at the bottom which affect the species of microorganisms that can grow in particular places.

With time, different colours might appear in your Winogradsky column which indicates the type of microorganisms that are thriving in your column at certain places due to the nutrients and other microbial growth factors.



Share your Winogradsky columns with us on social media!