

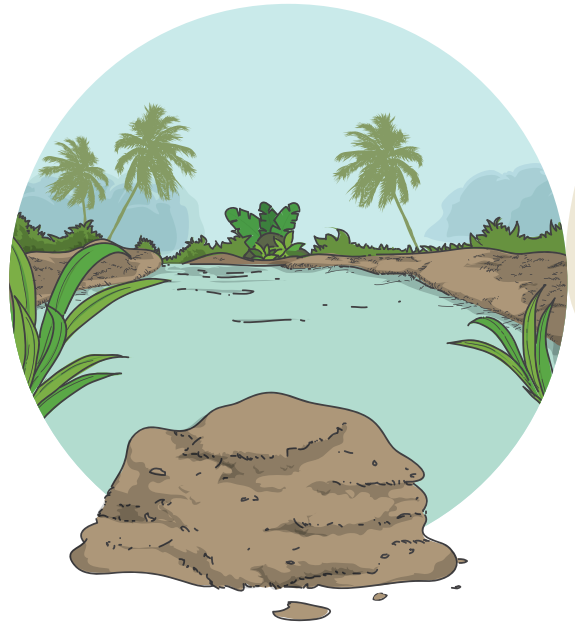
MICROBES IN MUD



How to make a Winogradsky column

A Winogradsky column is a way to study the microbes that we find in mud from rivers and streams that we can't normally see.

By putting the mud in a clear container and feeding the microbes that live in the mud, we can watch how they change over time.



The Winogradsky column was invented by Sergi Winogradsky who was a Russian scientist born in 1856. He made many discoveries about how microbes in the natural environment get nutrients.

For one Winogradsky column you will need

1



2



3



4



5



6



7



8



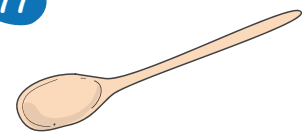
9



10



11



1. A 500 ml plastic bottle with no ridges
2. Some plastic wrap
3. Scissors
4. Marker pen
5. Mud from a local pond, stream or river
6. Water from the same pond, stream or river
7. A source of carbon - 1/2 cup of shredded newspaper
8. A source of sulphur - a raw egg yolk
9. Elastic band
10. Mixing bowl
11. Mixing spoon

what to do



1

If the mud is dry like sand, add some pond water until it is as thick as a milkshake.



- In the mixing bowl, mix 2 cups of mud, $\frac{1}{2}$ a cup of shredded newspaper and an egg yolk.

2



- Cut the top off the plastic bottle where the top begins to curve and measure the height.



4

- Fill the bottle up to the mark with the mud mixture (tip: use the top that was cut away as a funnel).

3



- Mark the side of the bottle $\frac{1}{4}$ of the distance from the top with the marker pen.



5

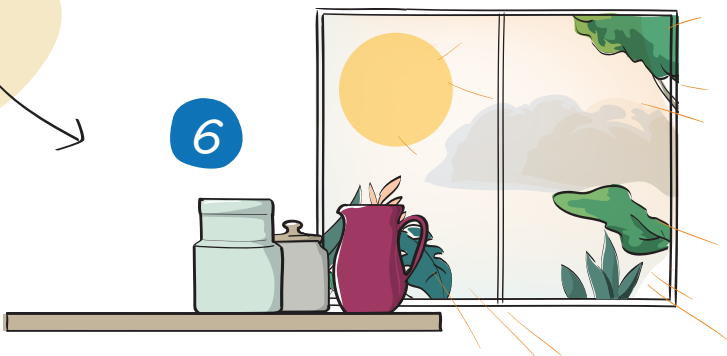
- Seal with plastic wrap and an elastic band (but not too tight - gas needs to escape).

7



- Cut the top off the plastic bottle where the top begins to curve and measure the height.

6



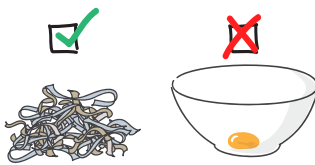
- Place on a window ledge that doesn't have too much direct sunlight, or in front of a desk lamp. Find a place where if the Winogradsky column smells a little bit, nobody will be upset.

EXPERIMENT TIME

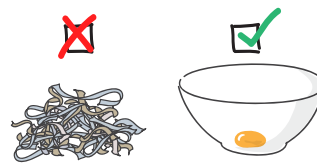
If you have enough material to make more than one Winogradsky column, let's do an experiment.

In the previous step, you added mud, sulphur (egg) and carbon (newspaper) before leaving the column in light. What would happen if we changed some of these things?

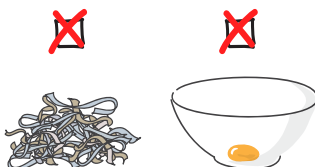
- For example, what happens if you add carbon but no sulphur?



- What happens if you add sulphur but no carbon?



- What happens if you don't add sulphur or carbon?



- And what happens if you leave a column in the dark by covering it with a cardboard box?



What happens to your Winogradsky columns each week?

Now that you have set up the Winogradsky column, we need to give the microbes time to do their work. It can take a long time, so the best way to see changes is to come back to your Winogradsky column each week to take some photos and make notes about what has changed.

It is really important not to shake the column as this will break up all of the layers where the different microbes are living.

THINGS TO LOOK OUT FOR ARE:

- Are the layers of mud changing?
Are they more compact or loose?
Are there more or less layers?
Do the layers have different colours?

~~~~~  
If you have more than one Winogradsky column, make sure you compare it to the others and note down any differences  
~~~~~

WEEK 1

DATE ___/___/___

WINOGRADSKY COLUMN NAME _____

OBSERVATIONS

SKETCH

Are there any new colours in the mud or the water?

Are the layers of mud changing? Are they more compact or loose?

Are there more or less layers?

Do the layers have different colours?

Are there any smells?

Did you take a picture?

WEEK 2

DATE ___/___/___

WINOGRADSKY COLUMN NAME _____

OBSERVATIONS

SKETCH

Are there any new colours in the mud or the water?

Are the layers of mud changing? Are they more compact or loose?

Are there more or less layers?

Do the layers have different colours?

Are there any smells?

Did you take a picture?

WEEK 3

DATE ___/___/___

WINOGRADSKY COLUMN NAME _____

OBSERVATIONS

SKETCH

Are there any new colours in the mud or the water?

Are the layers of mud changing? Are they more compact or loose?

Are there more or less layers?

Do the layers have different colours?

Are there any smells?

Did you take a picture?

WEEK 4

DATE ___/___/___

WINOGRADSKY COLUMN NAME _____

OBSERVATIONS

SKETCH

Are there any new colours in the mud or the water?

Are the layers of mud changing? Are they more compact or loose?

Are there more or less layers?

Do the layers have different colours?

Are there any smells?

Did you take a picture?

WEEK 5

DATE ___/___/___

WINOGRADSKY COLUMN NAME _____

OBSERVATIONS

SKETCH

Are there any new colours in the mud or the water?

Are the layers of mud changing? Are they more compact or loose?

Are there more or less layers?

Do the layers have different colours?

Are there any smells?

Did you take a picture?

WEEK 6

DATE ___/___/___

WINOGRADSKY COLUMN NAME _____

OBSERVATIONS

SKETCH

Are there any new colours in the mud or the water?

Are the layers of mud changing? Are they more compact or loose?

Are there more or less layers?

Do the layers have different colours?

Are there any smells?

Did you take a picture?

WEEK 7

DATE ___/___/___

WINOGRADSKY COLUMN NAME _____

OBSERVATIONS

SKETCH

Are there any new colours in the mud or the water?

Are the layers of mud changing? Are they more compact or loose?

Are there more or less layers?

Do the layers have different colours?

Are there any smells?

Did you take a picture?

WEEK 8

DATE ___/___/___

WINOGRADSKY COLUMN NAME _____

OBSERVATIONS

SKETCH

Are there any new colours in the mud or the water?

Are the layers of mud changing? Are they more compact or loose?

Are there more or less layers?

Do the layers have different colours?

Are there any smells?

Did you take a picture?
