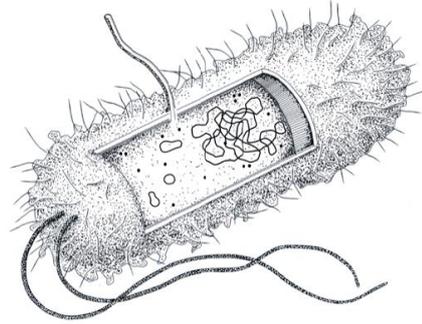


# ARTIS MICROPIA

## Invisible life

### Culture your own micro-organisms

Microbes are very tiny living creatures. They are so small in fact, that they cannot be seen with the naked eye. Fungi and bacteria are microbes, for example. Maybe you have heard of bacteria and fungi before. Maybe you have even come across some of them before. For example, on an old loaf of bread that is covered with green mould.



Scientists mostly use microscopes to examine microbes. A microscope is a device consisting of all kinds of magnifying glasses, or lenses. These lenses magnify the image and make microbes visible.

Your school might not have a microscope. In this test, you will therefore make microbes visible in another way. You are going to culture them yourself. Culturing microbes makes it possible for them to multiply. As a result, a great many microbes will grow together and form groups. These groups of microbes can be seen with the naked eye. In this way, you can indeed make 'the invisible' visible without the use of expensive devices. What, for instance, grows on the door knob, your finger or a keyboard?

## Step 1

the first day (week 1)

duration: 1 hour

You will need a few things before you can start your test. Below is a list:

- Refrigerator
- Kettle
- 1 large bowl (volume at least 1 litre)
- 1 bowl for the gelatin sheets
- 8 Petri dishes / plastic containers
- Cotton swabs
- Waterproof markers
- Teaspoons
- Tablespoon
- Kitchen paper
- Aluminium foil
- Adhesive tape
- 5 tablespoons of sugar
- 1 litre of water
- 6 packs of gelatin sheets  
(total of 36 of sheets of gelatin)
- 5 cubes of beef bouillon
- Spatula

## Getting started!

1. You are going to start by making a broth, the growth medium. The microbes will later be able to grow in this growth medium. Ask your teacher or another adult to help you with this.
2. Boil 1 litre of water. Beware! You have to be careful with boiling water.
3. Fill a bowl with cold water.
4. Separate the 36 gelatin sheets from each other. Place them together in the bowl of cold water.
5. Allow the gelatin sheets to soak for at least 5 minutes until they have softened.
6. Place 5 cubes of beef bouillon in a large empty bowl and add 5 tablespoons of sugar.
7. Pour the boiling water in the large bowl with the bouillon cubes and sugar. Beware! Ask an adult to help you.
8. Mix well.
9. Remove the gelatine sheets from the bowl with water and carefully wring them out so that there is almost no water left in them.
10. Place the gelatin sheets in the large bowl with the mixture of water, bouillon and sugar.
11. Mix everything together until the gelatin has completely dissolved.
12. Cover the bowl with aluminium foil and allow the liquid to cool for approximately 15 minutes.
13. Once the liquid has cooled, distribute it over the plastic containers (no more than 1 cm high) and loosely place the lids on them. This will prevent the liquid from being contaminated by the air.
14. Allow the mixture to cool to room temperature.

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15. Once it has cooled off, place the lid securely on the containers and place them in the refrigerator for at least 4 days.
16. While in the refrigerator, the gelatin will make the liquid turn into a solid jelly; the growth medium.

## Step 2

after the fourth day (week 1)

duration: 30 minutes.

1. Remove the containers from the refrigerator.
2. Remove the lids. Wipe the droplets of water off of the inside of the lid with a piece of kitchen paper.
3. Then put the lid back on.

*By carefully putting the lid back on the container each time, and not creating too much air flow, you will prevent microbes in the air ending up in your container. This is important as they can 'contaminate' your growth medium.*

4. Think of an object or surface you would like to test for microbes, such as: fingers, the doorknob, the keyboard, the computer mouse, the edges of your table, the teacher's desk, etc.
5. Try to make sure that you test a different object or surface in each container.
6. Use a waterproof marker to write the name of the object or surface on the bottom of the container. Also write the date.

### FOR EXAMPLE: fingerprints

7. Write 'fingerprint' on the bottom of the container.
8. Remove the lid from the container.
9. Gently place your fingertips in the growth medium and hold them there for approximately 15 seconds. It works best if you avoid washing your hands shortly before doing this.
10. Then place the lid back on the container.
11. You will use a cotton swab for other objects or surfaces.
12. Get a clean cotton swab (do not touch the ends, as this will contaminate the cotton swab) and sweep it several times over the surface or object you are going to test.
13. Remove the lid from the container and carefully drag the cotton swab several times over the growth medium. Be careful not to apply too much pressure, as that could damage the growth medium.
14. Place the lid back on the container.
15. Now place the closed container somewhere in the room where it will not be in the way. Preferably in the shade.

*Do not leave the container in the sun or under a lamp. The growth medium will melt from the heat and your experiment will be ruined.*

16. Let the containers sit for a week.

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## Step 3

after the 11th day (week 2)

duration: 30 minutes.

After about a week, you can check the containers for microbes. You should do this without removing the lids from the containers and without touching the microbes in the containers with your hands. After examining and comparing the containers with the microbes, throw the containers including everything in it in the waste bin.

### Questions for the pupils:

Question 1: **Which container is the most covered with microbes?**

Question 2: **Which surface or object goes with this container?**

Question 3: **Why do you think this object or surface has so many microbes?**

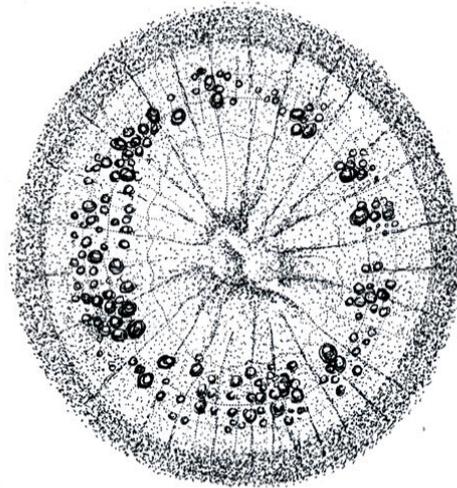
Question 4: **What does the container with fingerprints look like?**

Question 5: **Why do you always have to wash your hands after going to the toilet?**

If you took a sample from mud or dirt, or from old bread, did you see something like this?



*Streptomyces griseus*



*Penicillium chrysogenum*