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Moving slime: exploring chemotaxis with slime mould

Preparation – teacher instructions

1. Preparing agar plates

Slime moulds grow well on 2% agar gel.

Materials

- 2 g agar powder
- 100 ml distilled water
- 250 ml Erlenmeyer flask
- Microwave
- Petri dishes (the amount of agar produced by these quantities is enough for approximately five Petri dishes)

Procedure

1. Put 2 g agar powder in the Erlenmeyer flask. Add 100 ml of water, and heat it in the microwave until the agar is fully dissolved and the liquid is clear.
2. Let the flask cool down until it is still hot, but not too hot to touch with the hands (about 50–60 °C).
3. Fill the Petri dishes until the bottom is completely covered with agar. Wait for the agar to fully cool down and get hard before using the plates.
4. Seal the plates with parafilm and store them upside down. This prevents contamination of the plates with moulds or bacteria and any possible condensing water will be collected on the lid instead of on the agar.

2. Getting slime moulds

Option 1: Collect slime moulds in the woods. They grow on tree trunks or fallen leaves. The best time is when it is moist outside but not too cold. (https://www.youtube.com/watch?v=uyVVknT0gpY).

Option 2: Buy a slime mould (usually as sclerotia) from companies that also sell other microorganisms or experimental kits..

Option 3: Contact microbiology faculties at universities. Some carry out research on slime moulds and are willing to provide some sclerotia for educational purposes.

3. Growing slime moulds

It is important to work under conditions that are as sterile as possible. Contamination with other fungi will lead to the slime mould dying.

Slime moulds should always be kept in a dark place at room temperature. If the temperature is too low, they will die.

Materials

- A sclerotium of a slime mould (usually provided on filter paper)
- Agar plate
- Distilled water
- Sterile oat flakes (buy them sterile or sterilize them in an autoclave or in an oven)
- Scalpel/scissors
- Tweezers
- Pipette
- Parafilm
- Aluminium foil

Sclerotium of a slime mould (left), sclerotium on an agar plate with oats (middle), plasmodium after one day (right)

Image courtesy of the authors

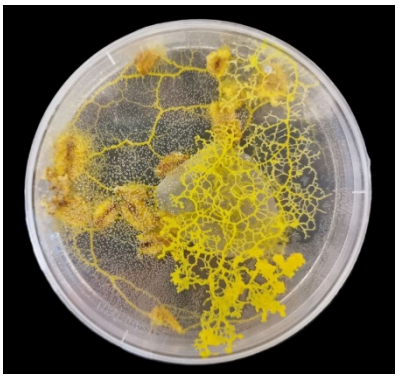
Procedure

1. Take the filter paper with the sclerotium and cut it into smaller pieces. This increases the chance of awakening a slime mould.
2. Take a piece with tweezers and dip it into water, so that the filter paper is moist, but not dripping wet.
3. Place it onto an agar plate and place some oat flakes around it (about 1 cm distance).
4. Seal the plate with parafilm and wrap it in aluminium foil. Let it sit in the dark at room temperature for about 24 h. The slime mould should now be growing and moving towards the oat flakes.

   If nothing has happened, wait another 24 h. Sometimes it takes more time for them to grow.

5. Add more oat flakes as the slime mould is growing. If the conditions are good (enough food, darkness, room temperature) the slime mould should double its size every day.
6. If it fills out the whole agar plate, cut it in half and put each half on a new agar plate.

Move the slime moulds to new plates at least every third day. Remove the old agar pieces as soon as the slime mould has left them.



Slime mould (*Physarum polycephalum*) on an agar plate

Image courtesy of the authors

4. Getting rid of the slime moulds

If the slime moulds are not needed anymore once the experiments are done, there are different ways of stopping their growth.

Option 1: Transform them into sclerotia that can be kept and reused another time.

Materials

- Empty Petri dish
- Filter paper
- Scissors
- Scalpel
- Slime mould

Procedure

1. Cut out a circle of filter paper in the size of the Petri dish.
2. Place the filter paper in the Petri dish.
3. Cut out a piece of the slime mould with the agar and place it on the filter paper.
4. Leave the Petri dish in the dark.
5. As soon as the slime mould is moved to the filter paper, remove the agar and oat flakes it had been growing on.
6. Put the Petri dish in the dark again. After some time, the slime mould will dry out and transform into a sclerotium.
7. Cut it out and keep the piece of filter paper in a dry place.

Option 2: Dispose of them with other waste.

To do so, the plates should be put into the freezer for about 24 h. After this time, the slime moulds will clearly be dead and can be thrown away safely.

Note: A good visualisation of parts 2–4 can be found in this tutorial (French language but you can use the autogenerated subtitles) from researcher Audrey Dussutour (University Paul Sabatier, Toulouse, France): https://www.youtube.com/watch?v=uyVVknT0gpY