

ARTIS MICROPIA

Pilobolus

Spore cannon

Pilobolus is a genus of fungi that grows on the poo of herbivores, such as horses, for instance. Like other fungi, *Pilobolus* disperses its spores for the purpose of reproduction. It does this in a spectacular manner. It shoots out spores at tremendous velocity. A bullet is shot out of a pistol with a force of 9G. Spores shoot out of *Pilobolus* with a much greater force: 20,000G! The spores are always shot towards the closest source of light.



In the three experiments explained below, we will take a closer look at these fungi. The experiment components can be conducted separately and have gradually increasing levels of difficulty. In the first experiment, we will look at the growth of *Pilobolus* on horse dung. In the second experiment, we will look at whether *Pilobolus* also grows on other kinds of poo. In the third experiment, we will try to find out what colour light *Pilobolus* prefers.

You may not succeed in growing any *Pilobolus* on the poop on the first try. Many factors can affect this. If need be, you can try again with another horse's dung or with dung from another location.

DID YOU KNOW THAT...

...a famous American dance company is named after the *Pilobolus*?

NOTE: the *Pilobolus*' small fruiting bodies are extremely sensitive. Make sure you open and close the lids carefully, otherwise the spores may launch by accident.

Part 1 (simple)

Growing *Pilobolus*

In this experiment, we will watch *Pilobolus* grow on horse dung. Within just a few days, the fungus will grow out of the dung and shoot out its spores against the lid of the storage container.

What do you need?

- a plastic container with a transparent lid.
- kitchen paper
- water
- a safety pin
- fresh horse dung
- scoop
- latex gloves
- a binocular microscope (or a magnifying glass)



NOTE: Avoid touching the dung with your bare hands! Use a spoon or other kind of scoop and always wear latex gloves.

WHICH DUNG IS BEST?: In these experiments, it is useful if the dung is fresh, i.e. no more than a day old. Older horse dung may be too dry. Then you will have to make sure that it is properly moistened again before the fungi will start growing. Try to obtain dung from a horse that has eaten fresh grass in a pasture. If there are no horses in your area, you can also use goat or sheep dung. You could ask a farmer for permission to take some dung with you, for example.

Getting started!

1. Place a piece of kitchen paper soaked with water on the bottom of a plastic container.
2. Put on the latex gloves and use the scoop to place the fresh horse dung on the wet kitchen paper. A 2-cm layer is sufficient.
3. Place the lid on the container. Use the safety pin to poke small holes in the edge of the lid to allow air inside the container.
4. Place the container under a lamp at room temperature.
5. Wait 5 to 7 days and check how the fungus is growing and how the spores have been shot out against the lid.
6. Place the lid under the binocular microscope and examine the spores in detail.

Questions

Question 1: How can *Pilobolus* shoot out its spores?

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Question 2: The spores can land up to two metres away. Then they end up in the grass. How does the new *Pilobolus* get from the grass back into the horse dung?

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Part 2 (average)

Comparing poo

In this experiment, we will investigate whether *Pilobolus* will also grow on other kinds of poo. That way, we can see whether *Pilobolus* occurs in all poo, or only the poop of certain animals.

What do you need?

- three plastic containers with a transparent lid.
- kitchen paper
- water
- a safety pin
- fresh horse dung
- fresh dung of sheep, goats, or another grass eater
- fresh dog poo
- scoop
- latex gloves

hypothesis

Do you expect for *Pilobolus* to grow on all kinds of poo?

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Getting started!

1. Repeat steps 1 through 4 as described for experiment part 1 with the three containers.
2. Put on the latex gloves and use the scoop to place each kind of poo in a separate container. Clean off the scoop after scooping each type of poo to avoid mixing the different kinds.
3. Check after 5 to 7 days what has grown in the container and whether *Pilobolus* spores have been shot out against the lid.
4. Place the lid under the binocular microscope and examine the spores in detail.

Questions

Question 1: Are there any visible differences? If so, which ones?

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Question 2: Why do you think these differences exist?

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Part 3 (advanced)

Pilobolus with light filters

In this experiment, we will cover containers with different coloured film. That way we can see whether *Pilobolus* is sensitive to a particular colour of light when it shoots out its spores.

What do you need?

- four plastic containers with a transparent lid.
- kitchen paper
- water
- fresh horse dung
- aluminium foil
- adhesive tape
- transparent yellow, red and blue light filters/film
- scoop
- latex gloves



Getting started!

1. Repeat steps 1 through 3 as described for experiment part 1 with the four containers. Try to place the same amount of dung in each of the containers.
2. Cut a piece measuring approximately 4 x 4 cm out of each of the coloured filters and place them on three of the four lids. If necessary, stick them to the corners with a piece of adhesive tape. You will not do anything with the fourth lid. That way, each of the containers will receive a different colour of light.
3. For each container, take a piece of aluminium foil more than big enough to cover the whole lid and tape it down.
4. Make a 2x2 cm opening in the middle. You should now be able to see the colour filter in three of the containers.
5. Place the containers under a lamp at room temperature. Make sure that the light shines through the openings in the aluminium foil on the dung. Otherwise, the *Pilobolus* might not be able to properly launch its spores.
4. After 5 to 7 days, check with which colour of light the most spores were launched.
5. Place the lid under the binocular microscope and examine the spores in detail.

Questions

Question 1: What is the point of *Pilobolus* shooting its spores towards the light?

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Question 2: Towards which colour of film did *Pilobolus* shoot out the most spores? Why do you think this colour attracts more spores than other colours?

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General questions to think about

Question 1: How does *Pilobolus* 'see' where the light is?

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Question 2: Why are the *Pilobolus* spores black?

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Question 3: In the experiments, the sporangia get stuck to the lids. Why is it useful for the spores to be sticky?

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Question 4: How do the *Pilobolus* spores survive the trip through the horse's gastrointestinal tract?

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Would you like to find out more about fungi and the important role they perform on earth? Or would you like to do more experiments? Then go to micropia.nl.